ISO 9001 ISO 14001



Kakogawa, Japan



Instruction Manual

Multi-purpose Controller SC-F71

(Parameters/Functions)

Copyright © 2021 by TLV CO., LTD. All rights reserved

Contents

Pictorial table of contents. 5 Safety Considerations. 6 Notice 8 Notice Regarding the Export Trade Control Order (Japan) 8 Disposal. 8 Symbols. 9 Document Configuration 11 1. Mode Switching 12 2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 18 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [G] 24 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 40 3.7 Parameters to Be Initialized 79
Safety Considerations 6 Notice 8 Notice Regarding the Export Trade Control Order (Japan) 8 Disposal 8 Symbols 9 Document Configuration 11 1 Mode Switching 12 2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 18 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [F] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.6 Memory Area Transfer Mode [E] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Paramet
Notice 8 Notice Regarding the Export Trade Control Order (Japan) 8 Disposal 9 Document Configuration 11 1. Mode Switching 12 2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 18 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [F] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [G] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [C] 40 3.7 Parameter Select Mode [B] 40 3.8 Setup Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [F] 42 3.8 Setup Setting Mode [G]
Notice Regarding the Export Trade Control Order (Japan) 8 Disposal 9 Document Configuration 11 1. Mode Switching 12 2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 18 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [F] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.7 Parameter Select Mode [E] 41 3.7 Parameter Setting Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Pa
Disposal
Symbols 9 Document Configuration 11 1. Mode Switching 12 2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 18 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [F] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [D] 40 3.4 Operation Transfer Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [F] 42 3.8 Setup Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters to Be Initialized
Document Configuration 11 1. Mode Switching 12 2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 14 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [G] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [C] 40 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 41 3.7 Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Automatically Converted 93 5. Input Function 105 5.2 Switching Functions Using Digital Inputs (DI) <
1. Mode Switching 12 2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 18 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [G] 24 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [G] 42 3.8 Setup Setting Mode [G] 42 3.8 Setup Setting Mode [G] 42 3.9 Engineering Mode [H] 54 4. Parameters to Be Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Automatically Converted 93 5.1 Input Function 105 <t< td=""></t<>
1. Mode Switching 12 2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 14 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [G] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [C] 40 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [G] 41 3.7 Parameters to Be Ini
2. Selecting Parameters 14 2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 18 2.3 Operation Transfer Mode [C] 20 2.5 Memory Area Transfer Mode [E] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [G] 24 2.8 Engineering Mode [G] 24 2.8 Engineering Mode [H] 27 3.1 How to Read the Table 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter 37 3.2 Monitor & SV Setting Mode [C] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [G] 49 3.9 Engineering Mode [G] 49 3.9 Engineering Mode [G] 49 3.9 Engineering Mode [G] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Automatically Converted 93 5.1 Input Function 105 5.2 Switching Functions Using Digital Inputs (
2.1 Monitor & SV Setting Mode [A] 14 2.2 Parameter Select Mode [B] 18 2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [F] 21 2.6 Parameter Setting Mode [G] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 42 3.8 Setup Setting Mode [G] 42 3.8 Setup Setting Mode [G] 42 3.9 Engineering Mode [H] 54 4. Parameters to Be Initialized 79 4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 </td
2.2 Parameter Select Mode [B]
2.3 Operation Transfer Mode [C] 19 2.4 Setting Lock Mode [D] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [G] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [G] 42 3.8 Setup Setting Mode [G] 42 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Automatically Converted 93 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Inp
2.4 Setting Lock Mode [L] 20 2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [G] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [G] 42 3.8 Setup Setting Mode [G] 42 3.9 Engineering Mode [G] 42 3.8 Setup Setting Mode [G] 42 3.9 Engineering Mode [H] 54 4. Parameters to Be Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input Flicker </td
2.5 Memory Area Transfer Mode [E] 21 2.6 Parameter Setting Mode [G] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters to Be Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input Flicker 127 5.5 Inverting the Input Flicker 127 5.6 Extracting Squar
2.6 Parameter Setting Mode [G] 22 2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [G] 105 5.1 Input Function 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input Flicker 127 5.6 Extracting Squ
2.7 Setup Setting Mode [G] 24 2.8 Engineering Mode [H] 27 3. Parameter 37 3.1 How to Read the Table 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input Flicker 127 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134
2.6 Engineering Mode [n] 27 3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [G] 49 3.9 Engineering Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input Flicker 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8
3. Parameter 37 3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input Flicker 127 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 143 6.1 Chapting Curtuat Assignment Footter Output Function 143
3.1 How to Read the Table 37 3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 6.0 Utput Function 143 6.1 Chapsing Output Assignment Footetal Output Entrop 143
3.2 Monitor & SV Setting Mode [A] 38 3.3 Parameter Select Mode [B] 40 3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input Flicker 127 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
3.3 Parameter Select Mode [B]
3.4 Operation Transfer Mode [C] 40 3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
3.5 Setting Lock Mode [D] 41 3.6 Memory Area Transfer Mode [E] 41 3.7 Parameter Setting Mode [F] 42 3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 6.8 Using Dual Input Function 141 6.1 Changing Output Assignment [Control Output Betraperiosion Output 143
3.7 Parameter Setting Mode [F]
3.8 Setup Setting Mode [G] 49 3.9 Engineering Mode [H] 54 4. Parameters that are Initialized/Modified when Settings are Changed 79 54 4.1 Parameters to Be Initialized/Modified when Settings are Changed 79 79 4.2 Parameters to Be Initialized. 79 4.2 Parameters to Be Automatically Converted. 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input Flicker 127 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
3.9 Engineering Mode [H]
4. Parameters that are Initialized/Modified when Settings are Changed 79 4.1 Parameters to Be Initialized
4.1 Parameters to Be Initialized 79 4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 6.0 Utput Function 143
4.2 Parameters to Be Automatically Converted 93 5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
5. Input Function 105 5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
5.1 Changing Measured Input Settings 105 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
5.1 Changing Measured input Settings 103 5.2 Switching Functions Using Digital Inputs (DI) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
5.2 Switching Functions Using Digital inputs (D) 114 5.3 Correcting Input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
5.3 Connecting input 124 5.4 Preventing the Input Flicker 127 5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
5.5 Inverting the Input 128 5.6 Extracting Square Root of Input 131 5.7 Changing Error Handling at Input Error 134 5.8 Using Dual Input Function 141 6. Output Function 143
5.6 Extracting Square Root of Input
5.7 Changing Error Handling at Input Error
5.8 Using Dual Input Function
6. Output Function
6.1 Changing Output Assignment [Control Output Botronomicsion Output
Logic Calculation (Event) Output Instrument Status Output 143
6.2 Changing Output Type of OUT3
6.3 Using Retransmission Output

6.5 Changing Energizing/De-energizing Output 160 6.6 Limiting Output 161 6.7 Suppressing Sudden Change in Output (Output Change Rate Limiter) 165 6.8 Suppressing Sudden Change in Output (Balanceless Bumpless) 168 6.9 Changing the Output Action While in Control Stop Mode 172 6.10 Monitoring Manpulated Output Value 175 7. Event Function 176 7.1 Using Event Function 176 7.2 Checking Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Controlling with Heating/Cooling Control 229 8.8 Using with Monucl Control 229 8.9 Using With Manual Control 264 8.12 Executing Differential temperature control 264 8.12 Executing Control with PV select 271 8.14 Ex		6.4 Changing Proportional Cycle Time	158
6.6 Limiting Output 161 6.7 Suppressing Sudden Change in Output (Output Change Rate Limiter) 165 6.8 Suppressing Sudden Change in Output (Balanceless Bumpless) 168 6.9 Changing the Output Action While in Control Stop Mode 172 6.10 Monitoring Manipulated Output Value 175 7. Event Function 176 7.1 Using Event Function 176 7.2 Checking Event ON State 1192 7.3 Keeping the Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Manually 213 8.5 Setting PID Values Manually 213 8.6 Controlling with Heating/Cooling Control 229 8.7 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing Coop control 264 8.12 Executing Control with PV select 271 <td></td> <td>6.5 Changing Energizing/De-energizing Output</td> <td>160</td>		6.5 Changing Energizing/De-energizing Output	160
6.7 Suppressing Sudden Change in Output (Output Change Rate Limiter) 165 6.8 Suppressing Sudden Change in Output (Balanceless Bumpless) 166 6.9 Changing the Output Action While in Control Stop Mode		6.6 Limiting Output	161
6.8 Suppressing Sudden Change in Output (Balanceless Bumpless) 168 6.9 Changing the Output Action While in Control Stop Mode 172 6.10 Monitoring Manipulated Output Value 175 7. Event Function 176 7.1 Using Event Function 176 7.2 Checking Event ON State 192 7.3 Keeping the Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 217 8.4 Setting PID Values Manually 218 8.6 Controlling with ON/OFF Action 224 8.7 Controlling with Manual Control 227 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing Cascade Control 260 8.12 Executing Cascade Control 260 8.14 Executing Cascade Control 280 8.15 Co		6.7 Suppressing Sudden Change in Output (Output Change Rate Limiter)	165
6.9 Changing the Output Action While in Control Stop Mode 172 6.10 Monitoring Manipulated Output Value 175 7. Event Function 176 7.1 Using Event Function 176 7.2 Checking Event ON State 192 7.3 Keeping the Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Function) 193 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 207 8.4 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Manually 218 8.6 Controlling with ON/OFF Action 224 8.7 Controlling with Manual Control 229 8.8 Using with Mc-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing Control with PV select 271 8.14 Executing Control with PV select 271 8.14 Executing Offset Inherent to Proportioning Control (Manual Reset) 303 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Re		6.8 Suppressing Sudden Change in Output (Balanceless Bumpless)	168
6.10 Monitoring Manipulated Output Value 175 7. Event Function 176 7.1 Using Event Function 176 7.2 Checking Event ON State 192 7.3 Keeping the Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 201 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Automatically (Cooling Control 229 8.8 Using with MC·COS/MC·VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing		6.9 Changing the Output Action While in Control Stop Mode	172
7. Event Function 176 7.1 Using Event Function 176 7.2 Checking Event ON State 192 7.3 Keeping the Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Automatically (Coling Control 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Haaula Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 264 8.13 Executing Control with PV select 271 8.14 Executing Control with PV select 271 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inheremt to Proportioning Control (Manual Reset		6.10 Monitoring Manipulated Output Value	175
7.1 Using Event Function 176 7.2 Checking Event ON State 192 7.3 Keeping the Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Manually 218 8.6 Controlling with ON/OFF Action 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Haaual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Control with PV select 271 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Trans	7	Event Function	176
7.2 Checking Event ON State. 192 7.3 Keeping the Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 213 8.5 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Manually 218 8.6 Controlling with NO/OFF Action 229 8.8 Using with MMC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input. 266 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 264 8.13 Executing Control with PV select 271 8.14 Executing Costoade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control atter the Operation Transfer (SV Tracking) 304 8.19 Chang		7 1 Using Event Function	176
7.3 Keeping the Event State (Interlock Function) 193 7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Starup tuning) 213 8.5 Setting PID Values Manually 218 8.6 Controlling with ON/OFF Action 224 8.7 Controlling with Manual Control 225 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 264 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens in the Monitor & SV sett		7.1 Using Event 1 unclon	102
7.4 Releasing the Event State (Interlock Release) 194 7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Manually 214 8.6 Controlling with Heating/Cooling Control 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input. 260 8.11 Executing Calcop control 264 8.12 Executing Differential temperature control. 264 8.12 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9.1 Grouping Necessary Screens 331 9.2.2		7.2 Checking Event ON State (Interlock Function)	102
7.5 Preventing Control with Input Errors (Input Circuit Error Alarm) 196 8. Control Function 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Manually 218 8.6 Controlling with Heating/Cooling Control 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing Differential temperature control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 310 8.19 Changing the Screens in the Monitor & SV setting mode 331		7.0 Releasing the Event State (Interlock Palease)	10/
8. Control Function 199 8. Control Function 199 8. 1 Running/Stopping Control (RUN/STOP Transfer) 199 8. 2 Changing Control Action 201 8. 3 Setting PID Values Automatically (Autotuning) 207 8. 4 Setting PID Values Automatically (Startup tuning) 213 8. 5 Setting PID Values Manually 214 8. 6 Controlling with ON/OFF Action 224 8. 7 Controlling with Heating/Cooling Control 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320		7.5 Preventing Control with Input Errors (Input Circuit Error Alarm)	106
8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Manually 214 8.6 Controlling with ON/OFF Action 224 8.7 Controlling with Heating/Cooling Control 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input. 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control. 267 8.13 Executing Control with PV select. 271 8.14 Executing Control with PV select. 271 8.15 Controlling with Level PID. 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping N	0	Control Eupotion	100
8.1 Running/Stopping Control (RUN/STOP Transfer) 199 8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Manually 218 8.6 Controlling with ON/OFF Action 224 8.7 Controlling with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing Control with PV select 267 8.12 Executing Control with PV select 271 8.14 Executing Control with PV select 271 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.1 Grouping Necessary Screens in the Monitor & SV setting mode 331 9.2.1 Hiding the Display Position of STOP during the Control Stop 337 9.2.1 Hiding the Display Contents of the	о.	CONTROL FUNCTION	199
8.2 Changing Control Action 201 8.3 Setting PID Values Automatically (Autotuning) 207 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Manually 218 8.6 Controlling with ON/OFF Action 224 8.7 Controlling with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related F functions 320 9.1 Grouping Necessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 333 9.2.3 Hiding the Size value (SV) 335 9.4 Changing the Display Of the Se		8.1 Running/Stopping Control (RUN/STOP Transfer)	199
8.3 Setting PID Values Automatically (Autotuning) 217 8.4 Setting PID Values Automatically (Startup tuning) 213 8.5 Setting PID Values Manually 218 8.6 Controlling with ON/OFF Action 224 8.7 Controlling with Meating/Cooling Control 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens in Operation transfer mode 333 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331		8.2 Changing Control Action	201
8.4 Setting PID Values Automatically (Startup tuning). 213 8.5 Setting PID Values Manually. 218 8.6 Controlling with ON/OFF Action. 224 8.7 Controlling with MC-COS/MC-VCOS. 236 8.9 Controlling with Manual Control. 257 8.10 Using Remote Setting Input. 260 8.11 Executing 2-loop control. 264 8.12 Executing Differential temperature control. 267 8.13 Executing Control with PV select. 271 8.14 Executing Cascade Control. 280 8.15 Controlling with Level PID. 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset). 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking). 304 8.18 Suppressing Overshoot. 310 8.19 Changing the Action at Power ON (Hot/Cold Start). 316 9. Display-related Functions. 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2.2 Hiding Unnecessary Screens (Parameter Select Function) 333 9.2.2 Hiding the screen using the Blind function. 334 9.3.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control		8.3 Setting PID Values Automatically (Autotuning)	207
8.5 Setting PID Values Manually 218 8.6 Controlling with ON/OFF Action 224 8.7 Controlling with MC-COS/MC-VCOS 236 8.9 Controlling with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input. 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens in the Monitor & SV setting mode 331 9.2.2 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Botom Value 341		8.4 Setting PID Values Automatically (Startup tuning)	213
8.6 Controlling with ON/OFF Action. 224 8.7 Controlling with Heating/Cooling Control 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2.1 Hiding Unnecessary Screens (Parameter Select Function) 320 9.2.2 Hiding the screen using the Blind function 333 9.2.3 Hiding the Sereen using the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Lighting Condition		8.5 Setting PID Values Manually	218
8.7 Controlling with Heating/Cooling Control 229 8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens in the Monitor & SV setting mode 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 333 9.2.2 Hiding the Screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Ligh		8.6 Controlling with ON/OFF Action	224
8.8 Using with MC-COS/MC-VCOS 236 8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens in Operation transfer mode 333 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding the Screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering <t< td=""><td></td><td>8.7 Controlling with Heating/Cooling Control</td><td>229</td></t<>		8.7 Controlling with Heating/Cooling Control	229
8.9 Controlling with Manual Control 257 8.10 Using Remote Setting Input 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens in the Monitor & SV setting mode 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 333 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the Screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Flickeri		8.8 Using with MC-COS/MC-VCOS	236
8.10 Using Remote Setting Input. 260 8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select. 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID. 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking). 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens in Operation transfer mode 333 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the ALM Lamp Lighting Condition 338 9.5 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Dis		8.9 Controlling with Manual Control	257
8.11 Executing 2-loop control 264 8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the Screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information		8.10 Using Remote Setting Input	260
8.12 Executing Differential temperature control 267 8.13 Executing Control with PV select 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the Screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information 344 10. Setting and Key Operation 347 10.1 Limiting the Setting Range of Set Value (SV)<		8.11 Executing 2-loop control	264
8.13 Executing Control with PV select. 271 8.14 Executing Cascade Control 280 8.15 Controlling with Level PID. 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the Screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information 344 10. Setting		8.12 Executing Differential temperature control	267
8.14 Executing Cascade Control 280 8.15 Controlling with Level PID 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the Screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information 344 10. Setting and Key Operation 347 10.1 Limiting the Setting		8.13 Executing Control with PV select	2/1
8.15 Controlling with Level PID. 293 8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the Screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information 344 10. Setting and Key Operation 347 10.1 Limiting the Setting Range of Set Value (SV) 347 10		8.14 Executing Cascade Control	280
8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset) 303 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) 304 8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information 344 10. Setting and Key Operation 347 10.1 Limiting the Setting Range of Set Value (SV) 347 10.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		8.15 Controlling with Level PID	293
8.17 Continuing Stable Control after the Operation Transfer (SV Tracking)		8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset)	303
8.18 Suppressing Overshoot 310 8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information 344 10. Setting and Key Operation 347 10.1 Limiting the Setting Range of Set Value (SV) 347 10.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		8.17 Continuing Stable Control after the Operation Transfer (SV Tracking)	304
8.19 Changing the Action at Power ON (Hot/Cold Start) 316 9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information 344 10. Setting and Key Operation 347 10.1 Limiting the Setting Range of Set Value (SV) 347 10.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		8.18 Suppressing Overshoot	310
9. Display-related Functions 320 9.1 Grouping Necessary Screens (Parameter Select Function) 320 9.2 Hiding Unnecessary Screens 331 9.2.1 Hide the monitor screen in the Monitor & SV setting mode 331 9.2.2 Hiding screens in Operation transfer mode 333 9.2.3 Hiding the screen using the Blind function 334 9.3 Hiding the Display of the Set Value (SV) 335 9.4 Changing the Display Position of STOP during the Control Stop 337 9.5 Changing the ALM Lamp Lighting Condition 338 9.6 Changing the Display Contents of the MV Display 340 9.7 Checking Input Peak Value/Bottom Value 341 9.8 Suppressing the Display Flickering 343 9.9 Checking the Instrument Information 344 10. Setting and Key Operation 347 10.1 Limiting the Setting Range of Set Value (SV) 347 10.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		8.19 Changing the Action at Power ON (Hot/Cold Start)	316
9.1 Grouping Necessary Screens (Parameter Select Function)3209.2 Hiding Unnecessary Screens3319.2.1 Hide the monitor screen in the Monitor & SV setting mode3319.2.2 Hiding screens in Operation transfer mode3339.2.3 Hiding the screen using the Blind function3349.3 Hiding the Display of the Set Value (SV)3359.4 Changing the Display Position of STOP during the Control Stop3379.5 Changing the ALM Lamp Lighting Condition3389.6 Changing the Display Contents of the MV Display3409.7 Checking Input Peak Value/Bottom Value3419.8 Suppressing the Display Flickering3439.9 Checking the Instrument Information34410. Setting and Key Operation34710.1 Limiting the Setting Range of Set Value (SV)34710.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350	9.	Display-related Functions	320
9.2 Hiding Unnecessary Screens3319.2.1 Hide the monitor screen in the Monitor & SV setting mode3319.2.2 Hiding screens in Operation transfer mode3339.2.3 Hiding the screen using the Blind function3349.3 Hiding the Display of the Set Value (SV)3359.4 Changing the Display Position of STOP during the Control Stop3379.5 Changing the ALM Lamp Lighting Condition3389.6 Changing the Display Contents of the MV Display3409.7 Checking Input Peak Value/Bottom Value3419.8 Suppressing the Display Flickering3439.9 Checking the Instrument Information34410. Setting and Key Operation34710.1 Limiting the Setting Range of Set Value (SV)34710.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		9.1 Grouping Necessary Screens (Parameter Select Function)	320
9.2.1 Hide the monitor screen in the Monitor & SV setting mode3319.2.2 Hiding screens in Operation transfer mode3339.2.3 Hiding the screen using the Blind function3349.3 Hiding the Display of the Set Value (SV)3359.4 Changing the Display Position of STOP during the Control Stop3379.5 Changing the ALM Lamp Lighting Condition3389.6 Changing the Display Contents of the MV Display3409.7 Checking Input Peak Value/Bottom Value3419.8 Suppressing the Display Flickering3439.9 Checking the Instrument Information34410. Setting and Key Operation34710.1 Limiting the Setting Range of Set Value (SV)34710.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		9.2 Hiding Unnecessary Screens	331
9.2.2 Hiding screens in Operation transfer mode3339.2.3 Hiding the screen using the Blind function3349.3 Hiding the Display of the Set Value (SV)3359.4 Changing the Display Position of STOP during the Control Stop3379.5 Changing the ALM Lamp Lighting Condition3389.6 Changing the Display Contents of the MV Display3409.7 Checking Input Peak Value/Bottom Value3419.8 Suppressing the Display Flickering3439.9 Checking the Instrument Information34410. Setting and Key Operation34710.1 Limiting the Setting Range of Set Value (SV)34710.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		9.2.1 Hide the monitor screen in the Monitor & SV setting mode	331
9.2.3 Hiding the screen using the Blind function3349.3 Hiding the Display of the Set Value (SV)3359.4 Changing the Display Position of STOP during the Control Stop3379.5 Changing the ALM Lamp Lighting Condition3389.6 Changing the Display Contents of the MV Display3409.7 Checking Input Peak Value/Bottom Value3419.8 Suppressing the Display Flickering3439.9 Checking the Instrument Information34410. Setting and Key Operation34710.1 Limiting the Setting Range of Set Value (SV)34710.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		9.2.2 Hiding screens in Operation transfer mode	333
 9.3 Hiding the Display of the Set Value (SV)		9.2.3 Hiding the screen using the Blind function	334
9.4 Changing the Display Position of STOP during the Control Stop		9.3 Hiding the Display of the Set Value (SV)	335
9.5 Changing the ALM Lamp Lighting Condition3389.6 Changing the Display Contents of the MV Display3409.7 Checking Input Peak Value/Bottom Value3419.8 Suppressing the Display Flickering3439.9 Checking the Instrument Information34410. Setting and Key Operation34710.1 Limiting the Setting Range of Set Value (SV)34710.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		9.4 Changing the Display Position of STOP during the Control Stop	337
 9.6 Changing the Display Contents of the MV Display		9.5 Changing the ALM Lamp Lighting Condition	338
 9.7 Checking Input Peak Value/Bottom Value		9.6 Changing the Display Contents of the MV Display	340
 9.8 Suppressing the Display Flickering		9.7 Checking Input Peak Value/Bottom Value	341
 9.9 Checking the Instrument Information		9.8 Suppressing the Display Flickering	343
10. Setting and Key Operation		9.9 Checking the Instrument Information	344
10.1 Limiting the Setting Range of Set Value (SV)	10). Setting and Key Operation	347
10.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) 350		10.1 Limiting the Setting Range of Set Value (SV)	347
		10.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter)	350

10.3 Storing the Control Related Set Values (Memory Area Function	on) 360
10.4 Copying the Data in Memory Area to Set Other Areas	364
10.5 Running a Simple Ramp/Soak Control	366
10.6 Using a Simple Sequence Operation	373
10.7 Registering a Set Value (SV) Without Pressing the SET Key.	380
10.8 Accessing Some Functions Directly (FUNC Key)	381
10.9 Restricting Key Operation (Set Data Lock)	384
10.10 Initializing the Set Data	386
Product Warranty	388
Service	389

Introduction

Thank you for purchasing the TLV multi-purpose controller.

This product has been thoroughly inspected before being shipped from the factory. When the product is delivered, before doing anything else, check the specifications and external appearance to make sure nothing is out of the ordinary. Also be sure to read this manual carefully before use and follow the instructions to be sure of using the product properly.

Δ

If detailed instructions for special order specifications or options not contained in this manual are required, please contact TLV for full details.

This instruction manual is intended for use with the model(s) listed on the front cover. It is necessary not only for installation but for subsequent maintenance, disassembly/ reassembly and troubleshooting. Please keep it in a safe place for future reference.

- Microsoft Windows is a trademark of Microsoft Corporation (in the United States and other countries).
- MODBUS is a registered trademark of Schneider Electric SA.
- All product names mentioned are trademarks or registered trademarks of the respective companies [owners].

Pictorial table of contents

Sections describing hardware shown below.



Safety Considerations

- Read this section carefully before use and be sure to follow the instructions.
- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- The precautions listed in this manual are designed to ensure safety and prevent equipment damage and personal injury. For situations that may occur as a result of erroneous handling, three different types of cautionary items are used to indicate the degree of urgency and the scale of potential damage and danger: DANGER, WARNING and CAUTION.
- The three types of cautionary items above are very important for safety: be sure to
 observe all of them as they relate to installation, use, maintenance, and repair.
 Furthermore, TLV accepts no responsibility for any accidents or damage occurring
 as a result of failure to observe these precautions.

Symbols

dicates a DANGER, WARNING or CAUTION item.
Indicates an urgent situation which poses a threat of death or serious injury
Indicates that there is a potential threat of death or serious injury such as electrical shock, fire (burns), etc.
Indicates that there is a possibility of injury or equipment/product damage
• To prevent injury to persons, damage to the instrument and the equipment, a suitable external protection device shall be required.
• All wiring must be completed before power is turned on to prevent electric shock, fire or damage to the instrument and the equipment.
 This instrument must be used in accordance with the
specifications to prevent fire or damage to the instrument and the equipment.
 This instrument is not intended for use in locations subject to flammable or explosive gases.
 Do not touch high-voltage connections such as power supply
terminals, etc. to avoid electric shock.
• TLV is not responsible if this instrument is repaired, modified or
disassembled by non-factory-approved personnel. Malfunction
may occur and warranty is void under these conditions.

Continued on the next page

I	
	• This product is intended for use with industrial machines, test and measuring equipment. (It is not designed for use with medical
	equipment and nuclear energy plant.)
	• This is a Class A instrument. In a domestic environment, this
	instrument may cause radio interference, in which case the user
	may be required to take additional measures.
	This instrument is protected from electric shock by reinforced
	insulation. Provide reinforced insulation between the wire for
	the input signal and the wires for instrument power supply,
	source of power and loads.
	 Be sure to provide an appropriate surge control circuit
	respectively for the following:
	 If input/output or signal lines within the building are longer than 30 metors
	- If input/output or signal lines leave the building, regardless of the
	length.
	 This instrument is designed for installation in an enclosed
	instrumentation panel. All high-voltage connections such as
	power supply terminals must be enclosed in the instrumentation
	panel to avoid electric shock to operating personnel.
	 All precautions described in this manual should be taken to
	avoid damage to the instrument or equipment.
	• If the equipment is used in a manner not specified by the
	manufacturer, the protection provided by the equipment may be impaired.
	• All wiring must be in accordance with local codes and regulations.
	• To prevent instrument damage as a result of failure, protect the
	power line and the input/output lines from high currents with a
	suitable overcurrent protection device with adequate breaking
	capacity such as a fuse, circuit breaker, etc.
	A malfunction in this product may occasionally make control
	operations impossible or prevent alarm outputs, resulting in a
	possible hazard. Take appropriate measures in the end use to
	prevent hazards in the event of malfunction.
	 Prevent metal fragments or lead wire scraps from falling inside
	instrument case to avoid electric shock, fire or malfunction.
	• Tighten each terminal screw to the specified torque found in the
	manual to avoid electric shock, fire or malfunction.
	For proper operation of this instrument, provide adequate
	ventilation for heat dissipation.
	• Do not connect wires to unused terminals as this will interfere with
	proper operation of the instrument.
	• Turn off the power supply before cleaning the instrument.
	• Do not use a volatile solvent such as paint thinner to clean the
	instrument. Deformation or discoloration may occur. Use a soft,
	dry cloth to remove stains from the instrument.
	• To avoid damage to the instrument display, do not rub with an
	abrasive material or push the front panel with a hard object.

Notice

• This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.

8

- The figures, diagrams and numeric values used in this manual are only for explanation purpose.
- TLV is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- TLV is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. TLV makes no warranty, expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
- No portion of this document may be reprinted, modified, copied, transmitted, digitized, stored, processed or retrieved through any mechanical, electronic, optical or other means without prior written approval from TLV.
- Various symbols are used on the equipment, and they have the following meaning.
 - \sim : Alternating current
 - ---- : Direct current
 - : Reinforced insulation

: Safety precaution

This symbol is used where the instruction manual needs to be consulted for the safety of both the operator and the equipment. Carefully read the cautions in this manual before using the instrument.

Notice Regarding the Export Trade Control Order (Japan)

The intended application and end user should be checked to make sure this product will not be used in weapons of mass destruction, military applications or military equipment etc.

Take precautions not to allow this product to be illegally exported, even in the case of reselling or distribution.

Disposal

When disposing of each part used for this instrument, always follows the procedure for disposing of industrial wastes stipulated by the respective local municipality.

Symbols

Pictorial Symbols (safety symbols)

NOTE	This icon indicates important information on installation, handling and operating procedures.
	This icon indicates supplemental information on installation, handling and operating procedures.
A	This icon indicates where additional information may be located.

9

Character Symbols

11-segment character

0	1	2	3	4	5	6	7	8	9	Minus	Period
0		2	Ξ	4	5	6	7	8	9	-	•
A	B (b)	С	с	D (d)	E	F	G	н	I	J	К
R	Ь	Γ	С	d	Ε	F	Б	Н		J	K
L	М	Ν	n	O (o)	Р	Q	R	S	Т	t	U
L	М	N	п	o	Ρ	Q	R	5	Г	F	Ц
u	V	W	Х	Y	Z	Degree	/	Prime	★ (Asterisk)	→	
u	<i>\</i>	W	X	Ч	2	0	1	1	×	÷	

7-segment character

0	1	2	3	4	5	6	7	8	9	Minus	Period
0		2	Ξ	Ч	5	6	ף	8	9	-	•
A	B (b)	С	с	D (d)	E	F	G	Н	I	J	К
R	Ь	Ľ	С	Ь	Ε	F	6	Н		J	Ч
L	М	N (n)	O (o)	Р	Q	R	S	Т	t	U	u
L	Ā	п	٥	Ρ	9	г	5	Г	F	U	U
V	W	Х	Y	Z	Degree	/	Prime	★ (Asterisk)			
Н	ū	<u> </u>	Ч	=	0	لم	1	U			

Abbreviation symbols

Abbreviation symbols	Name	Abbreviation symbols	Name
PV	Measured value	TC (input)	Thermocouple (input)
SV	Set value	DTD (input)	Resistance temperature
MV	Manipulated output value	RTD (Input)	detector (input)
AT	Autotuning	V (input)	Voltage (input)
ST	Startup tuning	l (input)	Current (input)
OUT (1 to 3)	Output (1 to 3)	HBA (1, 2)	Heater break alarm (1, 2)
DI (1 to 6)	Digital input (1 to 6)	CT (1, 2)	Current transformer (1, 2)
DO (1 to 4)	Digital output (1 to 4)	LBA	Control loop break alarm
FBR	Feedback resistance	LBD	LBA deadband
		V/I	Voltage (V)/Current (I)

These abbreviations are used in this manual:

Screens used in this manual

The SC-F71 has two inputs. Following input type is available by setting parameters: Dual PV (PV + PV) type or PV + Remove setting type. The input type is set to PV + Remote setting type when shipped from the factory.

For a dual input model, the same parameter may exist in both Input 1 and Input 2. "*l.*" or "*2.*" is added to the top of the parameters for identification. "*l.*" is not added to the top of the parameters list for the single input type.

Display example of the dual input type:



Display example of a single input type:



This manual uses the dual inputs for explanation. For other types such as a single input type, ignore the first character "*l*." at the top of the parameter.

The parameters used only for the dual input type are displayed in the colored background (_____).

Notation in this manual:



Input 1_Set value (SV)

Parameter shown only on the dual input type



 In 2. Selecting Parameters, two types of frames are used to distinguish different parameter conditions as follows.



Parameters to be always displayed

Parameter to be displayed when display condition is satisfied

Document Configuration

There are seven manuals pertaining to this product. Please be sure to read all manuals specific to your application requirements.

Contact TLV for the following manuals.

Manual	Document Number	Remarks
Multi-purpose Controller SC- F71 Quick Start Guide	172-65706M	This manual is enclosed with instrument. This manual explains the basic key operation, mode menu, and data setting.
Multi-purpose Controller SC- F71 Installation Manual	172-65707M	This manual is enclosed with instrument. This manual explains the mounting and wiring.
Multi-purpose Controller SC- F71 Parameter List	172-65708M	This manual is enclosed with instrument. This list is a compilation of the parameter data of each mode.
Multi-purpose Controller SC-F71 Instruction Manual [Hardware]	172-65709M	This manual describes installation, wiring, troubleshooting and product specification.
Multi-purpose Controller SC-F71 Instruction Manual [Parameters/Functions]	172-65710M	The manual you are reading now. Parameters: This manual describes how to switch the operation modes and parameters, the range of parameters, and initialization/automatic conversion associated with the change of settings. Functions: This manual describes how to set up and each function.
Multi-purpose Controller SC- F71 Instruction Manual [Host Communication]	172-65711M	This manual explains original communication protocol and Modbus relating to communication parameters setting.
Multi-purpose Controller SC- F71 Instruction Manual [PLC Communication]	172-65712M	This manual describes how to set up the instrument for communication with a programmable controller (PLC).

Read this manual carefully before operating the instrument. Please place the manual in a convenient location for easy reference.

1. Mode Switching

This chapter describes various modes and how to switch between them.

Mode switching

The instrument has eight different modes for operation and setting. Modes can be switched through the key operation of () and (MODE keys.



172-65710M-04 (SC-F71 Parameters/Functions) 23 Dec 2021

Model, Input type, Unit and Input range

Immediately after the instrument is turned on, the input type, the unit symbol and the input range will be displayed.

Example: Thermocouple input (type K) and -200 to 1372 °C



* Displayed for 2 seconds (Single input type)

2. Selecting Parameters

This chapter describes various parameter types and how to switch between them.

2.1 Monitor & SV Setting Mode [A]

When the Monitor and SV setting mode is entered, there are 4 (four) display contents depending on the control. Each display also differs between the Auto mode and the Manual mode.

- 1-loop control (including Remote setting input/Input circuit error alarm)
- 2-loop control/Cascade control
- Control with PV select
- Differential temperature control

1-loop control (including Remote setting input/Input circuit error alarm)





Control with PV select





;.....

2.2 Parameter Select Mode [B]

Displays the screens registered in Parameter select setting.



- The display can be switched in the reverse order when the R.SET key is pressed.
 - While the Blind function is activated, only Parameter select setting screen, Set data lock mode, and PV/SV monitor* screens are displayed. The instrument starts from the Parameter select mode after being turned on.
 - * The PV/SV monitor includes SV setting mode and Manual manipulated output value setting.

2.3 Operation Transfer Mode [C]



* This parameter is displayed when any of the following is selected in Select function for input 2: "Remote setting input", "Cascade control", "Control with PV select", or "2-loop control/Differential temperature control".

- The display can be switched in the reverse order when the R.SET key is pressed.
- Use the \frown or \frown key to switch modes (no SET key operation required), and a status indicator lights up or blinks if there is a status indicator corresponding to the mode.

2.4 Setting Lock Mode [D]



The display can be switched in the reverse order when the R.SET key is pressed.

2.5 Memory Area Transfer Mode [E]



2.6 Parameter Setting Mode [F]





* This parameter is displayed when any of the following are selected in Select function for input 2: "Remote setting input", "Cascade control", "Control with PV select", or "2-loop control/Differential temperature control".

2.7 Setup Setting Mode [G]







The display can be switched in the reverse order when the R.SET key is pressed.



NOTE To set up parameters in Engineering mode, control must be stopped (STOP). Parameters can be checked while in RUN mode.

SET

Return to Fn10 screen

The display can be switched in the reverse order when the R.SET key is pressed.

SET

SET



The display can be switched in the reverse order when the R.SET key is pressed.









The display can be switched in the reverse order when the R.SET key is pressed.



The display can be switched in the reverse order when the R.SET key is pressed.






The display can be switched in the reverse order when the R.SET key is pressed.

3. Parameter

This chapter describes displays, names and data ranges of each parameter. **3.1 How to Read the Table**

.1 H	ow to Re	ead the Table			
(1)	(2)	(3)	(4)	(5)	(6)
\downarrow	\downarrow	\downarrow	\downarrow	\downarrow	\downarrow
No.	Symbol	Name	Data range	Factory set value	User set value
					1

- No.: This is a screen number used to register screens displayed in Parameter select mode. The screen number can be registered in the Parameter select setting screen. Parameters without numbers cannot be registered in the Parameter select setting screen.
 If there are two items with the same number, one of them will be displayed according to the display requirements.
- (2) Symbol: 11-segment parameter symbols shown on the PV display.
- (3) Name: Name of parameter
- (4) Data range: Data range of parameter
- (5) Factory set value: Factory set value of parameters
- (6) User set value: Stores parameter values set by the user. This may be useful when the data is initialized.

In the data range and the factory set value some unfamiliar expressions are used. These are used for Control with PV select and can be rephrased as follows: PV select input span as Input span

PV select input range high as Input range high

PV select input range low as Input range low

The setting range is as follows.

- PV select input range high: Input range high of Input 1 and Input 2, whichever is larger
- PV select input range low: Input range low of Input 1 and Input 2, whichever is smaller
- PV select input span: PV select input range low up to PV select input range high

[Example] When there is a relation as follows between the Input range of Input 1 and Input 2.



3.2 Monitor & SV Setting Mode [A]

No.	Symbol	Name	Data range	Factory set value	User set value
1		Input 1_Measured value (PV)/ Input 1_Set value (SV) ¹⁾	PV display unit: Input 1_Input range low - (Input 1_5% of input span) to Input 1_Input range high + (Input 1_5% of input span) [Varies with the setting of the Decimal point position.]		
			SV display unit ²⁾ : • Input 1_Set value (SV) (Auto mode: at RUN)		
			 STOP display [5^r o^p, d5^r P, 25^r P] Remote setting input value (at Remote mode) Input 1 Manual manipulated output value 		
1		P\/ select Measured	(at Manual mode)		
		value (PV)/ Input 1_Set value (SV) ³⁾	When controlling with Input 1: Input 1_Input range low - (Input 1_5% of input span) to Input 1_Input range high + (Input 1_5% of input span) When controlling with Input 2: Input 2_Input range low - (Input 2_5% of input span) to Input 2_Input range high + (Input 2_5% of input span) [Varies with the setting of the Decimal point position.] SV display unit ² :		
			 Input 1_Set value (SV) (Auto mode: at RUN) STOP display [STOP, dSTP, KSTP] Input 1_Manual manipulated output value (at Manual mode) 		
2	_	Input 2_Measured value (PV)/ Input 2_Set value (SV) 4)	 PV display unit: Input 2_Input range low - (Input 2_5% of input span) to Input 2_Input range high + (Input 2_5% of input span) [Varies with the setting of the Decimal point position.] SV display unit ¹⁾²: Input 2_Set value (SV) (Auto mode: at RUN) STOP display [5f oP, d5f P, d5f P] Input 2_Manual manipulated output value (at Manual mode) 		_
3	_	Measured value (PV) of differential temperature input/ Set value (SV) of differential temperature input ⁵⁾	PV display unit: -19999 to +99999 [Varies with the setting of the Decimal point position.] SV display unit: -(Input 1_Input span) to +(Input 1_Input span) [Varies with the setting of the Decimal point position.]		
4	_	Input 1_Measured value (PV)/ Input 2_ Measured value (PV) ⁶⁾	PV display unit: Input 1_Input range low - (Input 1_5% of input span) to Input 1_Input range high + (Input 1_5% of input span) [Varies with the setting of the Decimal point position.] SV display unit: Input 2_Input range low - (Input 2_5% of input span) to Input 2_Input range high + (Input 2_5% of input span) [Varies with the setting of the Decimal point position.]		
24	I. 5V	Input 1_Set value (SV) 7)	Input 1_Setting limiter low to Input 1_ Setting limiter high [Varies with the setting of the Decimal point position.]	0	
25	2. SV	Input 2_Set value (SV) 7)	Input 2_Setting limiter low to Input 2_ Setting limiter high [Varies with the setting of the Decimal point position 1	0	
26	dS⊮	Set value (SV) of differential temperature	-(Input 1_Input span) to +(Input 1_Input span)	0	<u> </u>

		input $5) 7)$ \bigstar	[Varies with the setting of the Decimal point position.]		
5	SVR	Remote setting input	Input 1_Setting limiter low to Input 1_ Setting		
-		value monitor ⁹	limiter high		
			[Varies with the setting of the Decimal point		
			position.]		
6	L MV	Input 1_Manipulated	-5.0 to +105.0%		
		output value monitor			
_		[neat-side]	5.0 to 1405.00/		
1	I. MVc	Input 1_Manipulated	-5.0 to +105.0%	—	
0		Input 2 Manipulated	-5.0 to +105.0%		
0	2. MV	output value monitor ¹¹⁾	-5.0 10 +105.0 %		_
9	EVENE	Comprehensive event	When an event occurs, the character of the		
-		state	occurring event is displayed on the Set value		
			(SV) display unit. If two or more events occur		
			at the same time, the relevant characters are		
			displayed alternately every 0.5 seconds.		
			EUF I: Event 1		
			EUF2: Event 2		
			EBF 3: Event 3		
			EBI 4: Event 4		
			In IUP: Input 1_Input error high		
			I n Idn: Input 1_Input error low		
			i neure: input 2_input error high		
10	000	Momony area apoly	1 nc.dn. Input 2_Input error low		
10	HPi	time monitor	59 minutes 59 seconds	_	—
			0 hours 00 minutes to 99 hours 59 minutes		
			0 minutes 00 seconds to 199 minutes 59		
			seconds		
			[Data range of Memory area soak time monitor		
			can be selected on the Soak time unit.]		
11	1 5-65	Input 1_Soft start	0 hours 00 minutes to 99 hours 59 minutes		
	1	remaining time ¹²⁾	0 minutes 00 seconds to 199 minutes to 59		
			seconds		
			[Time unit depends on the Soft start time unit		
			setting.]		
12	2. Soff	Input 2_Soft start	0 hours00 minutes to 99 hours 59 minutes	—	
		remaining time 11/12/	0 minutes 00 seconds to 199 minutes to 59		
			Seconds		
			conting 1		
10		Interlock release ¹³⁾	Setting.j		
13	I ILR	Intender Telease	and Interlock state	סרר	

★ Data included in Memory area
 ¹⁾ Not displayed when "Control with PV select" is selected in "Select function for input 2."
 ²⁾ Refer to the following table for the display range and the setting range of each data.

		j j
Display data	Data type	Data range
Input 1_Set value (SV)	Monitor/Setting	Input 1_Setting limiter low to Input 1_Setting limiter high
Input 2_Set value (SV)	Monitor/Setting	Input 2_Setting limiter low to Input 2_Setting limiter high
Remote setting input value	Monitor	Input 1_Setting limiter low to Input 1_Setting limiter high
Input 1_Manual manipulated output value	Setting	 In case of PID control: Input 1_Output limiter low [heat-side] to Input 1_Output limiter high [heat-side] In case of Heating/Cooling PID control: -Input 1_Output limiter low [cool-side] to +Input 1_Output limiter high [heat-side] In case of pressure or temperature control with MC-(V)COS(R): Input 1_Output limiter low [heat-side] to whichever the smaller value of either "calculated value from Input 1_Pressure (temperature) limiter" or "Input 1_Output limiter high [heat_side]
Input 2_Manual manipulated output value	Setting	Input 2_Output limiter low to Input 2_Output limiter high

³⁾ Displayed when "Control with PV select" is selected in "Select function for input 2."

⁴⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for input 2."
 ⁵⁾ Displayed when "2-loop control/Differential temperature control" is selected in "Select function for input 2" AND "Differential

⁶ Displayed when "2-loop control/Differential temperature control," "Cascade control," "Control with PV select" or "Input circuit error alarm" is selected in "Select function for input 2."
 ⁷ Displayed in Manual mode.

⁸⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for input 2."

9) Displayed when "Remote setting input" is selected in "Select function for input 2."

¹⁰Displayed when Input 1 is Heating/Cooling PID control.

¹¹⁾Displayed when " 2-loop control/Differential temperature control" is selected in "Select function for Input 2" AND "2-loop" is selected in "Remote/Local transfer (two-loop/differential temperature control transfer)". ¹² Displayed when "Soft start" is selected in "Soft start/setting change rate limiter selection" in Function block No. 70: Memory area

function (R-ER).

¹³ Displayed when Interlock function is available.

3.3 Parameter Select Mode [B]

Up to 16 screens registered on the Parameter select setting screen (Set data lock mode) by the user can be displayed.

Ν	۱o.	Syı	mbol	Name	Data range	Factory set value	User set value
	15		R/S	RUN/STOP transfer	r ปก: RUN (Control start) 5Г₀Р: STOP (Control stop)	SCoP	
,	16	I.	ALN	Input 1_Autotuning (AT) ¹⁾	 □FF: PID control □n: Start Autotuning When the Autotuning (AT) is finished, the control will automatically return to "□FF." 	oFF	
	17	2.	ALN	Input 2_Autotuning (AT) ²⁾	 □FF: PID control □n: Start Autotuning When the Autotuning (AT) is finished, the control will automatically return to "□FF." 	oFF	
-	18	Ι.	SFU	Input 1_Startup tuning (ST) ¹⁾	۵۶۶: ST unused ۵٫۵ : Execute once * ۵٫۵ : Execute always * When the ST is finished, the control will automatically return to "۵۶۶."	₀FF	
	19	2.	SFU	Input 2_Startup tuning (ST) ²⁾	۵۶۶: ST unused ۵٫۵ : Execute once * ۵٫۵ : Execute always * When the ST is finished, the control will automatically return to "۵۶۶."	₀FF	
2	20	I.	R∕M	Input 1_Auto/Manual transfer	Rura: Auto mode ¬Rn: Manual mode	ō₽∩	
4	21	2.	R∕M	Input 2_Auto/Manual transfer 3)	R⊔Γם: Auto mode ⊡Rn: Manual mode	ōR∩	
2	22		R/L	Remote/Local transfer ⁴⁾	When "Remote setting input" is selected at Select function for Input 2 ⁻⁵⁾ LoC: Local mode <i>rEn</i> : Remote mode	LoC	
					When "Cascade control" is selected at Select function for input 2 60 SmGL: Single control ER5: Cascade control	SnGL	
					When "Control with PV select" is selected at Select function for input 2 ⁷⁾ I nP I: Input 1 I nP2: Input 2	I nP I	
					When "2-loop control/Differential temperature control" is selected at Select function for input 2 ⁸⁾ 2LaoP: 2-loop control dl FF: Differential temperature control	2LooP	
2	23		L/E	Control area Local/ External transfer 9)	LoE: Local mode EYF: External mode	LoC	

3.4 Operation Transfer Mode [C]

² Displayed when "Pressure control Operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".
 ³ Displayed when "2-loop control/Differential temperature control" is selected in "Select function for Input 2" AND "Pressure control operation [MC-(V)COS(R)]" is not selected in "Input 2_Control action".
 ³ Displayed when one of "Remote setting input", "Cascade control", "Control with PV select", or "2-loop control/Differential temperature control" or "Heating/Cooling PID control" is selected in both temperature control" or "Heating/Cooling PID control" is selected in the case of "2-loop control", "PID control" or "Heating/Cooling PID control" is selected in the case of "2-loop control".

both Input 1_Control action and Input 2_Control action. ⁴⁾ Displayed when "Remote setting input" is selected in "Select function for Input 2."

⁴⁷ Displayed when "Remote setting input is selected in "Select function for input 2."
 ⁵⁰ Displayed when "Cascade control" is selected in "Select function for Input 2."
 ⁶⁰ Displayed when "Control with PV select" is selected in "Select function for Input 2." When "Switching by level" is selected at "Selection of PV select trigger," the parameter becomes display only.
 ⁷⁰ Displayed when "Control with PV select" is selected in "Select function for Input 2." When "Switching by level" is selected at "Select function of PV select trigger," the parameter becomes display only.

"Selection of PV select trigger," the parameter becomes display only. ⁸ Displayed when "2-loop/differential temperature control" is selected in "Select function for Input 2" AND "PID control" or "Heating/Cooling PID control" is selected both in Input 1 and Input 2.

⁹⁾ Displayed when "Memory area transfer (without area set signal)" is selected in DI function selection.

3.5 Setting Lock Mode [D]

No.	Symbol	Name	Data range	Factory set value	User set value
	LoEK	Set data unlock/lock transfer	oFF: Unlock state	oFF	
		Set lock level	Set Lock/Unlock at each digit.	00000	
			SV display unit		
			0: Unlock 1: Lock		
			SV setting mode* +		
			* Set value (SV) and		
			Interlock release		
			Operation transfer mode		
			Parameter setting mode		
			Engineering mode		
	ARE !!!	Area lock	0: Memory area is adjustable when the	0	
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		setting data is locked.		
			1: Memory area is not adjustable when		
			(Memory area transfer mode is not		
			displayed)		
—		Select Blind function	□FF: Blind function: OFF	oFF	
		Deven star aslast direct	an: Blind function: ON		
	PSL. d	registration	Direct registration: OFF	oFF	
		Parameter select setting 1	1 to 351 (Screen No.)	0	
	PSLUI		0: No registration		
—	רח ורפ	Parameter select setting 2	1 to 351 (Screen No.)	0	
_	0000	Parameter select setting 3	1 to 351 (Screen No.)	0	
	PSLUJ		0: No registration	Ŭ	
—	рсі пч	Parameter select setting 4	1 to 351 (Screen No.)	0	
	, 201	Deremeter coloct patting 5	0: No registration	0	
	PSLOS	Farameter select setting 5	0: No registration	0	
_	חבי חב	Parameter select setting 6	1 to 3513 (Screen No.)	0	
	PSLUB	-	0: No registration		
—	PSLOA	Parameter select setting 7	1 to 351 (Screen No.)	0	
_		Parameter select setting 8	1 to 351 (Screen No.)	0	
	PSLUB		0: No registration	Ŭ	
—	פקן חפ	Parameter select setting 9	1 to 351 (Screen No.)	0	
-		Parameter select setting 10	U: NO REGISTRATION	0	
	PSL ID	i arameter seleti setting 10	0: No registration	0	
—	<i>ב</i> כן וי	Parameter select setting 11	1 to 351 (Screen No.)	0	
		Demonstration of the second second	0: No registration		
	PSL 12	Parameter select setting 12	0: No registration	U	
_	חרו וח	Parameter select setting 13	1 to 351 (Screen No.)	0	
	rsi id	U	0: No registration		
—	PSI IY	Parameter select setting 14	1 to 351 (Screen No.)	0	
_		Parameter select setting 15	1 to 351 (Screen No.)	0	
	PSL IS	. a.umotor coloci cotting 10	0: No registration	Ĭ	
—	פכן וב	Parameter select setting 16	1 to 351 (Screen No.)	0	
	י שב וט		0: No registration		

3.6 Memory Area Transfer Mode [E]

No.	Symbol	Name	Data range	Factory set value	User set value
14	AREA	Memory area transfer 1)	1 to 16	1	

¹⁾ Displayed in the Monitor & SV setting mode. Displayed only (not settable) when "Memory area transfer (without area set signal)" is selected in "DI function selection" AND "External mode" is selected in "Control area Local/External transfer." Not displayed when "Memory area is not adjustable when the setting data is locked" is selected in Area lock.

3.7 Parameter Setting Mode [F]

3.7.1 Parameter group No. 00: Setting (58)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Pn00	Parameter group No. 00 This is the first parameter symbol of Parameter group No. 00.			
24	I. 5V	Input 1_Set value (SV)	Input 1_Setting limiter low to Input 1_ Setting limiter high [Varies with the setting of the Decimal point position.]	0	
25	2. SV	Input 2_Set value (SV) 1)	Input 2_Setting limiter low to Input 2_ Setting limiter high [Varies with the setting of the Decimal point position.]	0	
26	dSŀ∕	Set value (SV) of differential temperature input ²⁾	-(Input 1_Input span) to +(Input 1_Input span) [Varies with the setting of the Decimal point position.]	0	

A Data included in Memory area
 Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2."
 Displayed when "2-loop control/Differential temperature control" is selected in "Select function for Input 2" AND "Differential
 temperature control" is selected in "two-loop control/Differential temperature control."

3.7.2 Parameter group No. 40: Event (EB)

No.	Symbol	Name	Data range	Factory set value	User set value
—	P-10	Parameter group No. 40 ¹⁾	This is the first parameter symbol of Parameter group No. 40.	—	—
27	EVI	Event 1 set value (EV1) ²⁾ Event 1 set value (EV1) [high] ^{2) 3)}	Deviation: • When assigned to Input_1 or Differential temperature input -(Input 1_Input span) to +(Input 1_ Input span) • When assigned to Input 2 -(Input 2_Input span) to +(Input 2_ Input span) • When Control with PV select is selected at Select function for input 2. -(PV select input span) to +(PV select input span) [Varies with the setting of the Decimal point position.] Input value or Set value: • When assigned to Input 1 Input 1_Input range low to Input 1_ Input range high • When assigned to Differential temperature input -(Input 1_Input span) to +(Input 1_ Input span) • When assigned to Differential temperature input -(Input 1_Input span) to +(Input 1_ Input span) • When Control with PV select is selected at Select function for input 2. PV select input range low to PV select input range high [Varies with the setting of the Decimal point position.] Manipulated output value: -5.0 to +105.0%	High action, high/low action: max. Low action, process action: min.	

28	5 EV II	Event 1 set value (EV1')	Deviation:	High/low
	L / I	[low] ^{2) 3)}	 When assigned to Input_1 or 	action: min.
			Differential temperature input	
			-(Input 1_Input span) to +(Input 1_	Broose
			Input span)	PIOCESS
			When assigned to Input 2	action.
			-(Input 2_Input span) to +(Input 2_	IIIdA.
			Input span)	
			 When Control with PV select is selected at Select function for input 2 	
			(P) select input span) to $\pm(P)$ select	
			input span)	
			Input value or Set value:	
			When assigned to Input 1	
			Input 1_Input range low to Input 1_	
			Input range high	
			 When assigned to Input 2 	
			Input 2_Input range low to Input 2_	
			Input range high	
			 When assigned to Differential 	
			(Input 1, Input appn) to (Input 1	
			-(input 1_input span) to +(input 1_	
			 When Control with PV select is 	
			selected at Select function for input 2	
			PV select input range low to PV select	
			input range high	
			[Varies with the setting of the Decimal	
		*	point position.]	
29	רגים	Event 2 set value (EV2) 4)	Same as Event 1 set value (EV1)/Event 1 s	set value
	2,2	Event 2 set value (EV2)	(EV1) [high]	
		$[high]^{4/5} \bigstar$		
30	י איז א	Event 2 set value (EV2)	Same as Event 1 set value (EV1) [low]	
2		Event 3 set value (EV/3) 6	Same as Event 1 set value (EV/1)/Event 1	set value
3	5% J	Event 3 set value (EV3)	(FV1) [high]	set value
		[high] $^{6)7}$		
32	יר ער	Event 3 set value (EV3')	Same as Event 1 set value (EV1') [low]	
	"ביא	[low] ^{6) 7)}		
33	s Е//Ч	Event 4 set value (EV4) ⁸⁾	Same as Event 1 set value (EV1)/Event 1 s	set value
	<i>L, 1</i>	Event 4 set value (EV4)	(EV1) [high]	
		[high] ⁸⁾⁹⁾ ★		
34	FVU	Event 4 set value (EV4')	Same as Event 1 set value (EV1') [low]	
	la included in Mem	ory area ent function is available		
²⁾ Dis	played when Event	1 is available.		
3) Dis	played when type s	elected in Event 1 has high/low	individual setting.	
4) Dis	played when Event	2 is available.	individual sotting	
	played when Event	a is available	numuudi selling.	
7) Dis	played when type s	elected in Event 3 has high/low	individual setting.	
⁸⁾ Dis	played when Event	4 is available.	-	
⁹⁾ Disi	played when type so	elected in Event 4 has high/low i	individual setting.	

⁹⁾ Displayed when type selected in Event 4 has high/low individual setting.

3.7.	3 Para	meter	group	No.	51:	Input	1_	Control	(].	Conf)
------	--------	-------	-------	-----	-----	-------	----	---------	------	------	---

No.	Symbol	Name	Data range	Factory set	User set
—	PnS I	Parameter group No. 51	This is the first parameter symbol of Parameter group No. 51		
35	I. P	Input 1_Proportional band [heat-side]	TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of Input 1_Input span (When Control with PV select: 0.0 to 1000.0% of PV select input span) 0 (0.0, 0.00): ON/OFF action NOTE: 0 (0.0, 0.00) cannot be set when temperature control operation [MC- (V)COS(R)] is selected for Input 1_ Control action.	TC/RTD inputs: 30 V/I inputs: 3.0	
36	1. 1	Input 1_Integral time [heat-side] ^{1) 2)}	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240	
37	l. d	Input 1_Derivative time [heat-side] ^{1) 2)}	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/ Derivative time decimal point position.]	60	
38	I. oHH	Input 1_ON/OFF action differential gap (upper) ^{3) 5)}	TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0% of Input 1_Input span (When Control with PV select: 0.0 to 100.0% of PV select input span)	TC/RTD inputs: 1 V/I inputs: 0.1	
39	I. oHL	Input 1_ON/OFF action differential gap (lower) ^{1) 3)}	TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0% of Input 1_Input span (When Control with PV select: 0.0 to 100.0% of PV select input span)	TC/RTD inputs: 1 V/I inputs: 0.1	
40	I. RPC	Input 1_Control response parameter ¹⁾	0: Slow 1: Medium 2: Fast [When P or PD action is selected, this setting will be unavailable]	PID control: 0 Heating/C ooling PID control: 2	
41	I. PAET	Input 1_Proactive intensity ^{1) 2) 4)} ★	0 to 4 0: No function	2	
42	I. MR	Input 1_Manual reset ^{1) 5)}	-100.0 to +100.0%	0.0	
43	I. FF	Input 1_FF amount ^{1) 2) 4) 6)} ★	-100.0 to +100.0%	0.0	
44	I. oLH	Input 1_Output limiter high [heat-side]	Input 1_Output limiter low [heat-side] to 105.0%	105.0	
45	I. oLL	Input 1_Output limiter low [heat-side]	-5.0% to Input 1_Output limiter high [heat-side]	-5.0	
46	І. МЕ́дЬ	Input 1_Dead zone ^{/)}	0 to 10% of Input 1_Input span [Decimal point position depends on the setting for Input 1_Valve coefficient F.]	See Table 1	

★ Data included in Memory area
 ¹⁾ Not displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

45

- ²⁾ Displayed when the "Input 1_Proportional band [heat-side]" in the same memory area is other than 0 (0.0).
 ³⁾ Displayed when the "Input 1_Proportional band [heat-side]" in any memory area is 0 (0.0). (Common setting in memory area)
 ⁴⁾ Displayed when the "Input 1_Proportional band [heat-side]" in the same memory area is other than 0 (0.0).
 ⁵⁾ Displayed when the "Input 1_Integral time [heat-side]" in the same memory area is other than 0 (0.0, 0.00).
 ⁶⁾ Displayed when Bottom suppression function is available.
 ⁷⁾ Displayed when Bottom constraints [MC_(V)COS(R)]" is selected in "Input 1_Control action".

⁷⁾ Displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

Control				Valve coe	fficient F (pre	ssure unit)			
action*	0	1	2	3	4	10	11	12	13
3	0.03	0.03	0.4	3	0.003	—	—	—	—
4	0.04	0.04	0.4	4	0.004	—			—
5	0.10	0.10	1.5	10	0.010	—	—	—	—
6	0.10	0.10	1.5	10	0.010	—		—	—
7	—	—	—	—	—	7	10	0.3	0.14

Table 1: Factory set value of the Dead zone

* Set value for the control operation set in Function block No. 51: Input 1_Control action (ί. ΓωηΓ) For Input 2, the set value is for Function block No. 52: Input 2_Control action (*2*. ΓωηΓ)

3.7.4 Parameter group No. 52: Input 2_Control (2. Conf)

No.	Sy	mbol	Name	Data range	Factory set value	User set value
—	Pn	52	Parameter group No. 52 ¹⁾	This is the first parameter symbol of Parameter group No. 52	_	_
47	2.	Ρ	Input 2_Proportional band	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of Input 2_Input span 0 (0.0, 0.00): ON/OFF action NOTE: 0 (0.0, 0.00) cannot be set when temperature control operation [MC- (V)COS(R)] is selected for Input 2_ Control action.	TC/RTD inputs: 30 V/I inputs: 3.0	
48	2.	1	Input 2_Integral time ^{1) 2) 3)}	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/ Derivative time decimal point position.]	240	
49	2.	Ь	Input 2_Derivative time ¹⁾	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/ Derivative time decimal point position.]	60	
50	2.	оНН	Input 2_ON/OFF action differential gap (upper) ^{1) 2)}	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0% of Input 2_Input span	TC/RTD inputs: 1 V/I inputs: 0.1	
51	2.	oHL	Input 2_ON/OFF action differential gap (lower) ^{1) 2) 4)}	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0% of Input 2_Input span	TC/RTD inputs: 1 V/I inputs: 0.1	
52	2.	RPF	Input 2_Control response parameter ^{1) 2)}	0: Slow 1: Medium 2: Fast [When P or PD action is selected, this setting will be unavailable]	0	
53	2. I	PREF	Input 2_Proactive intensity ^{1) 2) 3) 5)}	0 to 4 0: No function	2	
54	2.	MR	Input 2_Manual reset 1) 2) 6)	-100.0 to +100.0%	0.0	
55	2.	FF	Input 2_FF amount ^{1) 2) 3) 5)}	-100.0 to +100.0%	0.0	
56	2.	oLH	Input 2_Output limiter high ¹⁾	Input 2_Output limiter low to 105.0%	105.0	
57	2.	oLL	Input 2_Output limiter low	-5.0% to Input 2_Output limiter high	-5.0	

58	2. МС АЬ	Input 2_Deadband ^{1) 8)}	*	0 to 10% of input_2 span [Decimal point position depends on the setting for Input 2_Valve coefficient F.]	See Table 1 in 3.7.3	
----	----------	-----------------------------------	---	---	----------------------------	--

Setting for input 2_valve coefficient F.] In 3.7.3
 ★ Data included in Memory area
 Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2."
 Not displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action".
 Displayed when "Input 2_Proportional band [heat-side]" in the same memory area is other than 0 (0.0).
 Displayed when "Input 2_Integral time [heat-side]" in the same memory area is other than 0 (0.0, 0.00).
 Displayed when "Input 2_Integral time [heat-side]" in the same memory area is other than 0 (0.0, 0.00).

⁶⁾ Displayed when "Input 2_Integral time [heat-side]" in the same memory area is 0 (0.0, 0.00).

⁶ Displayed when "http://2_integration procession function is available.
 ⁸ Displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action".

3.7.5 Parameter group No. 56: Input 1_Cooling control (1. Cool)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Pn56	Parameter group No. 56 ¹⁾	This is the first parameter symbol of Parameter group No. 56		
59	Ι. Ρε	Input 1_Proportional band [cool-side] ^{1) 2)}	TC/RTD inputs: 1 (0.1, 0.01) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 1 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.1 to 1000.0% of Input 1_Input span (When Control with PV select: 0.1 to 1000.0 % of PV select input span)	TC/RTD inputs: 30 V/I inputs: 3.0	
60	I. I.C.	Input 1_Integral time [cool- side] ^{1) 2)}	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/ Derivative time decimal point position.]	240	
61	l. dc	Input 1_Derivative time [cool-side] ^{1) 2)}	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/ Derivative time decimal point position.]	60	
62	I. db	Input 1_Overlap/Deadband ¹⁾	TC/RTD inputs: -(Input 1_Input span) to +(Input 1_ Input span) (When Control with PV select: -(PV select input span) to +(PV select input span) (Unit: °C [°F])) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: -100.0 to +100.0% of Input 1_Input span (When Control with PV select: -100.0 to +100.0% of PV select input span) Minus (-) setting results in Overlap. However, the overlapping range is within the proportional range.	TC/RTD inputs: 0 V/I inputs: 0.0	
63	I. oLHc	Input 1_Output limiter high [cool-side] 1)	Input 1_Output limiter low [cool-side] to 105.0%	105.0	
64	I. oLLc	Input 1_Output limiter low [cool-side] 1)	-5.0% to Input 1_Output limiter high [cool-side]	-5.0	

A Data included in Memory area
 Displayed when the "Input 1_Control action" is Heating/Cooling PID control.
 Displayed when the "Input 1_Proportional band [heat-side]" in the same memory area is other than 0 (0.0)

No.	Symbol	Name	Data range	Factory set value	User set value
	Pano	Parameter group No. 70	This is the first parameter symbol of	_	
65	r RGA	Select Trigger type for Memory area transfer	0 to 63 0: No assignment	0	
			+1: Event 1		
			+2: Event 2		
			+4. Event 3 +8: Event 4		
			+16: Digital input 1 (DI1) Close edge		
			+32: Digital input 1 (DI1) Open edge		
		+	To select two or more functions, sum		
66	pcr	Area soak time	0 hours 00 minutes 00 seconds to 9 hours	0:00	
	"_"		59 minutes 59 seconds	(0 minutes	
			0 hours 00 minutes to 99 hours 59 minutes 0 minutes 00 seconds to 199 minutes 59	00	
			seconds	seconds)	
			[Data range of Area soak time can be		
67		Link area number	0 to 16	0	
01		*	0: No link		
68	I. SFLU	Input 1_Soft start time	0 hours 00 minutes to 99 hours 59 minutes 0 minutes 00 seconds to 199 minutes 59	0:00 (0 minutes	
		(up)	seconds	00	
			[Data range of Soft start time can be	seconds)	
69		■ Input 1 Soft start time	0 hours 00 minutes to 99 hours 59 minutes	0:00	
03	ו. שרו מ	$(\text{down})^{(1)}$	0 minutes 00 seconds to 199 minutes 59	(0 minutes	
			seconds	00 000000da)	
			selected on the Soft start unit.]	seconds)	
70	ISKRII	Input 1_Setting change	0 to Input 1_Input span	0	
		rate limiter (up) ²⁾	(When Control with PV select: 0 to PV		
			0: No function		
			[Varies with the setting of the Decimal		
71		Input 1 Setting change	0 to Input 1 Input span	0	
11	ו. בי יים	rate limiter (down) ²⁾	(When Control with PV select: 0 to PV	-	
		+	select input span) 0: No function		
		~	[Varies with the setting of the Decimal		
		lenset 4. Asite (Manual	point position.]	0	
72	1. H/M. H	transfer selection (Area) 3)	1: Auto mode (bumpless)	0	
		· · · · · · · · · · · · · · · · · · ·	2: Auto mode (bump)		
		*	3: Manual mode (bumpless)		
73	I ML/ A	Input 1_Manipulated	PID control, Position proportioning PID	Heating/C	
	1. 117.11	output value (Area) 3)	control: -5.0 to +105.0%	ooling PID	
			+105.0%	Other	
			[When settings either 2: Auto mode	control: -	
		*	(bump) or 4: Manual mode (bump) is selected in Input 1 Auto/Manual transfer	5.0	
			selection (Area)]		
74	2.SFFU	Input 2_Soft start time	0 hours 00 minutes to 99 hours 59 minutes	0:00	
			seconds	00 minutes	
			[Time unit depends on the Soft start time	seconds)	
75	7666	Input 2 Soft start time	unit setting.]	0.00	
15	d.561 d	decrease ⁴⁾	0 minutes 00 seconds to 199 minutes 59	(0 minutes	
			seconds	00	
			unit setting.]	seconds)	
76	2. SVRII	Input 2_Setting change	0 to Input 2_Input span	0	
	J	rate limiter (up) 5)	0: No function		
		^	point position.]		

3.7.6 Parameter group No. 70: Memory area (R-ER)

77	2. SVRd	Input 2_Setting change rate limiter (down) ⁵⁾	0 to Input 2_Input span 0: No function [Varies with the setting of the Decimal point position.]	0	
78	2. A/M. A	Input 2_Auto/Manual transfer selection (Area) 6)	0: No transfer 1: Auto mode (bumpless) 2: Auto mode (bump) 3: Manual mode (bumpless) 4: Manual mode (bump)	0	
79	2. MV.A	Input 2_Manipulated output value (Area) ⁶⁾ ★	-5.0 to +105.0% [When settings either 2: Auto mode (bump) or 4: Manual mode (bump) is selected in Input 2_Auto/Manual transfer selection (Area)]	-5.0	
80	R/L.A	Remote/Local transfer selection (Area) ⁷) ★	 When "Remote setting input" is selected at Select function for Input 2⁽⁸⁾ 0: No transfer 1: Local mode 2: Remote mode When "Cascade control" is selected at Select function for input 2⁽⁹⁾ 0: No transfer 1: Single control 2: Cascade control When "Control with PV select" is selected at Select function for input 2⁽¹⁰⁾ 0: No transfer 1: Input 1 2: Input 2 When "2-loop control/Differential temperature control" is selected at Select function for input 2⁽¹¹⁾ 0: No transfer 1: 2-loop control 2: Differential temperature control 	0	

★ Data included in Memory area ¹⁾ Displayed when "Soft start" is selected in "Soft start/setting change rate limiter selection" in Function block No. 70: Memory area function (R-ER).

²⁾ Displayed when "Setting change rate limiter" is selected in "Soft start/setting change rate limiter selection" in Function block No. 70: Memory area function ($\overline{R}_{r}ER$).

³⁾ Not displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

 ADD splayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2", AND "Soft start" is selected in "Soft start/setting change rate limiter selection" in Function block No. 70: Memory area function (RrER).

⁵⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2" AND "Setting change rate limiter" is selected in "Soft start/setting change rate limiter selection" in Function block No. 70: Memory area function (R-ER).

6) Displayed when "2-loop control/Differential temperature control" is selected in "Select function for Input 2" AND "Pressure control operation [MC-(V)COS(R)]" is not selected in "Input 2_Control action". ⁷⁾ Displayed when one of "Remote setting input", "Cascade control", "Control with PV select", or "2-loop control/Differential

temperature control" is selected AND in the case of "2-loop control", "PID control" or "Heating/Cooling PID control" is selected in both Input 1_ Control action and Input 2_Control action. ⁸⁾ Displayed when "Remote setting input" is selected in "Select function for Input 2".

⁹ Displayed when "Cascade control" is selected in "Select function for Input 2".
 ¹⁰ Displayed when "Control with PV select" is selected in "Select function for Input 2".
 ¹¹ Displayed when "2-loop control/Differential temperature control" is selected, AND in the case of "2-loop control", "PID control" or "Heating/Cooling PID control" is selected in both Input 1_Control action and Input 2_Control action.

3.8 Setup Setting Mode [G]

3.8.1 Setting group No. 10: Display (d5P)

No.	Symbol	Name	Data range	Factory set value	User set value
—	5n 10	Setting group No. 10	This is the first parameter symbol of Setting group No. 10		_
81	РИСУ	Display update cycle	1: 50 ms* 5: 250 ms 9: 450 ms 2: 100 ms 6: 300 ms 10: 500 ms 3: 150 ms 7: 350 ms 4: 200 ms 8: 400 ms * When "Cascade control" or "2-loop control/ Differential temperature control" is selected, Display update cycle is 100 ms even when "1" is selected.	1	

3.8.2 Setting group No. 21: Input 1 (1.1 nP)

No.	Symbol	Name	Data range	Factory set value	User set value
—	5n2 I	Setting group No. 21	This is the first parameter symbol of Setting group No. 21	_	
82	I. Pb	Input 1_PV bias	-(Input 1_Input span) to +(Input 1_Input span) (When Control with PV select: -(PV select input span) to +(PV select input span)) [Varies with the setting of the Decimal point position.]	0	
83	I. dF	Input 1_PV digital filter	0.0 to 100.0 seconds 0.0: Filter OFF	0.0	
84	I. PR	Input 1_PV ratio	0.500 to 1.500	1.000	
85	I. PLC	Input 1_PV low input cut-off ¹⁾	0.00 to 25.00% of Input 1_Input span (When Control with PV select: 0.00 to 25.00% of PV select input span)	0.00	

¹⁾ Displayed when Input 1 is Voltage/Current and Square root extraction is available.

3.8.3 Setting group No. 22: Input 2 (2. 1 nP)

No.	Symbol	Name	Data range	Factory set value	User set value
—	5n22	Setting group No. 22 ¹⁾	This is the first parameter symbol of Setting group No. 22	_	_
86	2. РЪ	Input 2_PV bias ¹⁾ (RS bias) ²⁾	Input 2_PV bias -(Input 2_Input span) to +(Input 2_ Input span) RS bias -(Input 1_Input span) to +(Input 1_ Input span) [Varies with the setting of the Decimal point position.]	0	
87	2. dF	Input 2_PV digital filter ¹⁾ (RS digital filter) ³⁾	0.0 to 100.0 seconds 0.0: Filter OFF	0.0	
88	2. PR	Input 2_PV ratio ¹⁾ (RS ratio) ⁴⁾	Input 2_PV ratio: 0.500 to 1.500 RS ratio: 0.001 to 9.999	1.000	
89	2. PLC	Input 2_PV low input cut-off ⁵⁾	0.00 to 25.00% of Input 2_Input span (When Control with PV select: 0.00 to 25.00% of PV select input span)	0.00	

¹⁾ Not displayed when "No function" is selected in "Select function for Input 2."

²⁾ Displayed as "RS bias" when "Remote setting input" is selected in Select function for Input 2.

³⁾ Displayed as "RS digital filter" when "Remote setting input" is selected in Select function for Input 2.
 ⁴⁾ Displayed as "RS ratio" when "Remote setting input" is selected in Select function for Input 2.

⁵⁾ Displayed when Input 2 is Voltage/Current and when Square root extraction is available. Not displayed when "No function" or "Remote setting input" is slected in "Select function for Input 2."

3.8.4 Setting group No. 30: Output (aur)

No.	Symbol	Name	Data range	Factory set value	User set value
—	5-30	Setting group No. 30	This is the first parameter symbol of Setting group No. 30	_	
90	ГЭ	OUT3 proportional cycle time ¹⁾	0.1 to 100.0 seconds	2.0	
91	мг э	OUT3 minimum ON/OFF time of proportional cycle ¹⁾	0 to 1000 ms	0	

¹⁾ Displayed when OUT3 is supplied and "Universal output type selection" is "Voltage pulse output."

3.8.5 Setting group No. 51: Input 1 Control (12007)

No.	Symbol	Name	Data range	Factory set	User set
-	- ,	Cotting group No. 51	This is the first personator symbol of	value	value
_	SnS I	Setting group No. 51	Setting group No. 51		
92	I. M.MV	Input 1_Manual manipulated output value	PID control, Position proportioning PID control: Input 1_Output limiter low [heat-side] to Input 1_Output limiter high [heat-side] Heating/Cooling PID control ¹): -(Input 1_Output limiter high [cool- side]) to +(Input 1_Output limiter high [heat-side]) MC-(V)COS(R) pressure/temperature control: Input 1_Output limiter low [heat-side] to whichever the smaller value of either "calculated value from Input 1_Pressure (temperature) limiter" or "Input 1_Output limiter high [heat-side]. When STOP is set, Input 1_Output limiter low [heat-side] to Input 1_Output limiter high [heat-side]	PID control, Position proportioni ng PID control: - 5.0 Heating/C ooling PID control: 0.0	
93	I.LEV I	Input 1_Level PID setting 1 ^{2) 3)}	Input 1_Input range low to Input 1_Input range high (When Control with PV select: PV select input range low to PV select input range high) [Varies with the setting of the Decimal point position.]	Input 1_ Input range high (Control with PV select: PV select input range high)	
94	1.LEV2	Input 1_Level PID setting 2 ^{2) 3)}	Same as Input 1_Level PID setting 1	Same as Input 1_	
95	I.LEV 3	Input 1_Level PID setting 3 ^{2) 3)}	Same as Input 1_Level PID setting 1	Level PID setting 1	
96	I.LEV4	Input 1_Level PID setting 4 ^{2) 3)}	Same as Input 1_Level PID setting 1		
97	I.LEVS	Input 1_Level PID setting 5 ^{2) 3)}	Same as Input 1_Level PID setting 1]	
98	I.LEV6	Input 1_Level PID setting 6 ^{2) 3)}	Same as Input 1_Level PID setting 1		
99	I.LEV7	Input 1_Level PID setting	Same as Input 1_Level PID setting 1		

¹⁾ In case of Heating/Cooling PID control, the data range has exceptional conditions, such as shown below.

(1) Input 1_Output limiter high [cool-side] is less than or equal to 0.0 %

• Input 1_Output limiter low [heat-side] is less than or equal to 0.0 %: 0.0 % to +(Input 1_Output limiter high [heat-side]) Input 1_Output limiter low [heat-side] is greater than 0.0 %: Input 1_Output limiter low [heat-side] to Input 1_Output limiter high [heat-side]

Input 1_Output limiter high [heat-side] is less than or equal to 0.0 %
Input 1_Output limiter low [cool-side] is less than or equal to 0.0 %: -(Input 1_Output limiter high [cool-side]) to 0.0%

 Input 1_Output limiter low [cool-side] is greater than 0.0 %: -(Input 1_Output limiter high [cool-side]) to -(Input 1_Output limiter low [cool-side])

(3) Fixed at 0.0% in the following cases: Input 1_Output limiter high [cool-side] less than or equal to 0.0 %, AND Input 1_Output limiter high [heat-side] less than or equal to 0.0 % ²⁾ Displayed when Input 1 is with Level-PID AND any code other than "Cascade control" is selected in Select function for Input 2, AND

a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected for "Input 1_Control action". ³⁾ Input 1_Level PID settings 1 to 7 always maintain the following relation.

(Input 1_Level PID setting 1) less than or equal to (Input 1_Level PID setting 2) less than or equal to (Input 1_Level PID setting 3) less than or equal to (Input 1_Level PID setting 4) less than or equal to (Input 1_Level PID setting 5) less than or equal to (Input 1_ Level PID setting 6) less than or equal to (Input 1_Level PID setting 7)

No.	Symbol	Name	Data range	Factory set value	User set value
—	5-52	Setting group No. 52	This is the first parameter symbol of Setting group No. 52		
100	2. M.MV	Input 2_Manual manipulated output value 1)	Input 2_Output limiter low to Input 2_ Output limiter high Pressure/temperature control operation [MC-(V)COS(R)]: Input 2_Output limiter low to whichever the smaller value of either "calculated value from Input 2_Pressure (temperature) limiter" or "Input 2_Output limiter high [heat-side]. When STOP is set, Input 2_Output limiter low [heat-side] to Input 2_Output limiter high [heat-side]	-5.0	
101	2.LEV I	Input 2_Level PID setting 1 ^{2) 3)}	Input 2_Input range low to Input 2_Input range high [Varies with the setting of the Decimal point position.]	Input 2_ Input range high	
102	2.LEV 2	Input 2_Level PID setting 2 ²⁾³⁾	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1	
103	2.LEV 3	Input 2_Level PID setting 3 ⁽²⁾⁽³⁾	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1	
104	2.LEV4	Input 2_Level PID setting 4 ^{2) 3)}	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1	
105	2.LEV 5	Input 2_Level PID setting 5 ^{2) 3)}	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1	
106	2.LEV6	Input 2_Level PID setting 6 ^{2) 3)}	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1	
107	2.LEV7	Input 2_Level PID setting 7 ⁽²⁾⁽³⁾	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1	

3.8.6 Setting group No. 52: Input 2_Control (2.Lonf)

¹ Displayed when "2-loop control/Differential temperature control" is selected in "Select function for Input 2." ²⁾ Displayed when Input 2 is with Level-PID AND "2-loop control/Differential temperature control" is selected in Select function for Input

2, AND a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected for "Input 2_Control action".
 ³⁾ Input 2_Level PID settings 1 to 7 always maintain the following relation. (Input 2_Level PID setting 1) less than or equal to (Input 2_Level PID setting 2) less than or equal to (Input 2_Level PID setting 3) less than or equal to (Input 2_Level PID setting 5) less than or equal to (Input 2_Level PID setting 5) less than or equal to (Input 2_Level PID setting 7)

3.8.7 Setting group No. 53: Input 1_Tuning (IF UnE)

	No.	Symbol	Name	Data range	Factory set value	User set value
Ī		SnS3	Setting group No. 53 ¹⁾	This is the first parameter symbol of Setting group No. 53	—	_
	108	І. АГЪ	Input 1_AT bias ¹⁾	-(Input 1_Input span) to +(Input 1_Input span) (When Control with PV select: -(PV select input span) to +(PV select input span)) [Varies with the setting of the Decimal point position.]	0	
	109	І. АГГМ	Input 1_AT remaining time monitor ¹⁾	0 hours 00 minutes to 48 hours 00 minutes	—	_
	110	I. FUNE	Input 1_AT/ST status monitor ¹⁾	0: AT/ST complete 1: AT running now 2: ST running now -1: Aborted. Setting changed -2: Aborted. Abnormal input -3: Aborted. Timeout -4: Aborted. Abnormal calculated values		

¹⁾ Not displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

No.	Symbol	Name	Data range	Factory set value	User set value
	SnS4	Setting group No. 54	This is the first parameter symbol of Setting group No. 54	_	_
111	2. AF6	Input 2_AT bias ¹⁾	-(Input 2_Input span) to +(Input 2_Input span) [Varies with the setting of the Decimal point position.]	0	
112	2. Allw	Input 2_AT remaining time monitor ¹⁾	0 hours 00 minutes to 48 hours 00 minutes	_	
113	2. FUNE	Input 2_AT/ST status monitor ¹⁾	 O: AT/ST complete 1: AT running now 2: ST running now -1: Aborted. Setting changed. -2: Aborted. Abnormal input. -3: Aborted. Timeout. -4: Aborted. Abnormal calculated values. 	_	_

3.8.8 Setting group No. 54: Input 2_Tuning (2.7UnE)

¹⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2" AND a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action".

²⁾ Displayed when "2-loop control/Differential temperature control" is selected in "Select function for Input 2" AND "Pressure control operation [MC-(V)COS(R)]" is not selected in "Input 2_Control action".

3.8.9 Setting group No. 57: Proactive (PREF)

No.	Symbol	Name	Data range	Factory set value	User set value
—	5-57	Setting group No. 57 ¹⁾	This is the first parameter symbol of Setting group No. 57	_	_
114	FFSF	FF amount learning ²⁾	0 to 3 0: No learning +1: Learn Input 1 +2: Learn Input 2 To select two or more functions, sum each value.	0	
115	I.E × d J	Input 1_Determination point of external disturbance ³⁾	 -(Input 1_Input span) to +(Input 1_Input span) (When Control with PV select: -(PV select input span) to +(PV select input span)) [Varies with the setting of the Decimal point position.] 	-1	
116	2.E × d J	Input 2_Determination point of external disturbance 4)	-(Input 2_Input span) to +(Input 2_Input span) [Varies with the setting of the Decimal point position.]	-1	

¹⁾ Displayed when a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action" or "Input 2_Control action".

²⁾ Displayed when "Bottom suppression function" is available AND a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action", OR "2-loop control/Differential temperature control" is selected AND a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action".

³⁾ Not displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

⁴⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2" AND a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action".

3.8.10 Setting group No. 58: 2-input function (2PH)

No.	Symbol	Name	Data range	Factory set value	User set value
—	5-58	Setting group No. 58 ^{1) 2) 3)}	This is the first parameter symbol of Setting group No. 58	_	
117	MAS. P	Cascade_Proportional band (master-side) ^{1) 3)}	TC/RTD inputs: 1 (0.1, 0.01) to Input 1_Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.1 to 1000.0% of Input 1_Input span	TC/RTD inputs: 30 V/I inputs: 3.0	
118	MRS. I	Cascade_Integral time (master-side) ¹⁾³⁾	1 to 3600 seconds, 0.1 to 3600.0 seconds or 0.01 to 360.00 seconds [Varies with the setting of the Integral/ Derivative time decimal point position.]	240	

119	MBS J	Cascade_Derivative time	0 to 3600 seconds, 0.0 to 3600.0	60	
		(master-side) ¹⁾³⁾	seconds or 0.00 to 360.00 seconds		
			0 (0.0, 0.00): PI action		
			[Varies with the setting of the Integral/		
			Derivative time decimal point position.]		
120	קוע פ	Cascade_Proportional	TC/RTD inputs:	TC/RTD	
	JC7.7	band (slave-side) ^{1) 3)}	1 (0.1, 0.01) to Input 2_Input span	inputs: 30	
			(Unit: °C [°F])	V/I inputs:	
			[Varies with the setting of the Decimal	3.0	
			point position.]		
			Voltage (V)/Current (I) inputs:		
			0.1 to 1000.0 % of Input 2_Input span		
121	$\Box V I$	Cascade_Integral time	1 to 3600 seconds, 0.1 to 3600.0	240	
	JC7.7	(slave-side) ¹⁾³⁾	seconds or 0.01 to 360.00 seconds		
			[Varies with the setting of the Integral/		
			Derivative time decimal point position.]		
122	ה עוב	Cascade_Derivative time	0 to 3600 seconds, 0.0 to 3600.0	60	
	JC7. U	(slave-side) ¹⁾³⁾	seconds or 0.00 to 360.00 seconds		
			0 (0.0, 0.00): PI action		
			[Varies with the setting of the Integral/		
			Derivative time decimal point position.]		
123	r HE	Cascade_Digital filter ^{1) 3)}	0.0 to 100.0 seconds	10.0	
	C. Ur		0.0: Filter OFF		
124	r srh	Cascade_Scale high ^{1) 3)}	Cascade_Scale low to Input 2_Setting	Input 2_	
			limiter high	Setting	
			[Varies with the setting of the Decimal	limiter high	
			point position.]		
125	ר קרו	Cascade_Scale low ^{1) 3)}	Input 2_Setting limiter low to Cascade_	Input 2_	
			Scale high	Setting	
			[Varies with the setting of the Decimal	limiter low	
			point position.]		
126	2PV IV	PV select transfer level ^{2) 3)}	Input 1_Input range low to Input 1_Input	Input 1_	
	,,,,		range high	Input	
			[Varies with the setting of the Decimal	range high	
			point position.]		
127	2PV CM	PV select transfer time ²⁾³⁾	0.0 to 100.0 seconds	0.0	
L				1	

¹ Displayed when "Cascade control" is selected in "Select function for Input 2." ² Displayed when "Control with PV select" is selected in "Select function for Input 2." ³ Not displayed when "Pressure control operation [MC-(V)COS(R)]" or "Temperature control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action" and "Input 2_Control action".

3.8.11 Setting group No. 59: Input 1_MC-COS(R)/MC-VCOS(R) pressure control (INCEN)

No.	Symbol	Name	Data range	Factory set value	User set value
—	5-59	Setting group No. 59	This is the first parameter symbol of Setting group No. 59	—	_
128	I. oSP	Input 1_Overshoot prevention feature ¹⁾	0: No 1: Yes	0	

¹⁾ Displayed when "3-7: Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

3.8.12 Setting group No. 60: Input 2_MC-COS(R)/MC-VCOS(R) pressure control (272Cn)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Sn60	Setting group No. 59	This is the first parameter symbol of Setting group No. 60	—	—
129	2. oSP	Input 2_Overshoot prevention feature ¹⁾	0: No 1: Yes	0	

¹⁾ Displayed when "2-loop control/Differential temperature control" is selected in "Select function for Input 2" AND "3 – 7 (Pressure control operation [MC-(V)COS(R)])" is selected in "Input 2_Control action".

.8.1:	3 Setting g	group No. 91: Syste	em (555)		
No.	Symbol	Name	Data range	Factory set value	User set value
—	Sng I	Setting group No. 91	This is the first parameter symbol of Setting group No. 91	—	
130	I.PHL d	Input 1_Peak hold monitor	Input 1_Input range low - (Input 1_5% of input span) to Input 1_Input range high + (Input 1_5% of input span) [Varies with the setting of the Decimal point position.]		—
131	I.BHL d	Input 1_Bottom hold monitor	Input 1_Input range low - (Input 1_5% of input span) to Input 1_Input range high + (Input 1_5% of input span) [Varies with the setting of the Decimal point position.]		—
132	I.HL dR	Input 1_Hold reset	HoLd: Hold ~E5EF: Reset Returns to Hold state automatically after reset.	HoLd	—
133	2.PHL d	Input 2_Peak hold monitor ¹⁾	Input 2_Input range low - (Input 2_5% of input span) to Input 2_Input range high + (Input 2_5% of input span) [Varies with the setting of the Decimal point position.]		_
134	2.6HL d	Input 2_Bottom hold monitor ¹⁾	Input 2_Input range low - (Input 2_5% of input span) to Input 2_Input range high + (Input 2_5% of input span) [Varies with the setting of the Decimal point position.]	—	_
135	2.HL dR	Input 2_Hold reset 1)	HoLd: Hold ~ESEF: Reset Returns to Hold state automatically after reset.	Hold	_

3.

¹⁾ Displayed when "Cascade control", "Control with PV select", "2-loop control/Differential temperature control" or "Input circuit error alarm" is selected in "Select function for Input 2".

3.9 Engineering Mode [H]

WARNING	Parameters in the Engineering mode should be set according to
	the application before setting any parameter related to operation.
	Once the parameters in the Engineering mode are set correctly,
	no further changes need to be made to parameters for the same
	application under normal conditions. If they are changed
	unnecessarily, it may result in malfunction or failure of the
	instrument. TLV will not bear any responsibility for malfunction or
	failure as a result of improper changes in the Engineering mode.

IDENTIFY and SET UP: NOTE Parameters in Engineering mode are settable only when the controller is in STOP mode. However, only checking can be made even in the RUN state.

3.9.1 Function block No. 10: Display (d5P)

	No.	Symbol	Name	Data range	Factory set value	User set value
ſ		Fn 10	Function block No. 10	This is the first parameter symbol of Function block No. 10		_
Ī	136	SPEH	STOP display selection	0: Stop on PV display 1: Stop on SV display	1	
				2: Stop on MV display.		

137 RLC ALM tamp lighting condition 0 to 255 15 0 0.0 CPF +1: Event 1 +2: Event 2 +4: Event 3 +4: Event 4 +4: Event 3 +8: Event 4 +6: Input 2_Input error low +64: Input 2_Input error low +64: Input 2_Input error low +64: Input 2_Input error low to select two or more functions, sum each value. 0 138 d 5 a P PV flashing display at input error 0: Flashing display 0 139 I_d5.5 V Show/Hide Input 1_SV 1 1 140 2_d5.5 V Show/Hide Input 2_SV ⁻¹ 0: Hide Input 2_SV 1 141 I_d5.MV Show/Hide Input 2_SV ⁻¹ 0: Hide Input 2_SV 1 141 I_d5.MV Show/Hide Input 2_MV ⁻² 0: Hide Input 2_SV 1 142 2_d5.MV Show/Hide Input 2_MV ⁻² 0: Hide Input 2_Manipulated output value (MV) 1 143 d5.MaN Select hide items in Monitor mode 0: Brow all +1: Remote setting input value monitor +2: Manipulated output value (MV) monitor +4: Current transformer (CT) monitor +4: RUNSTOP transfer +16: Memoty area soak time To select two or more functions, sum each value. 0 144 d5.Mad Select hide items in Operation transfer mode Value. 0 to 63 0:						1
138 d 5 a P PV flashing display at input error high input error is is input error is input error is is is input error is is is input error is is is input error is is is input error is is is is input error is is is input error is is is is is is input error is	137	RI C	ALM lamp lighting	0 to 255	15	
141 Ld5.MV Show/Hide Input 2_MV 3 0 143 d5.MaN Select hide items in Montor mode 0: Flashing display tail 1: Show soft start time 0 143 d5.MaN Select hide items in Operation transfer mode 0: Flashing display tail 0: Flashing display 0 144 d5.MaN Select hide items in Operation transfer mode 0: Flashing display tail 0: Flashing display 0 144 d5.MaN Select hide items in Operation transfer mode 0: Flashing display tail 0: Flashing display 0 144 d5.MaN Select hide items in Operation transfer mode 0: Flashing display tail 0: Flashing display 1 144 d5.MaN Select hide items in Operation transfer mode 0: O flashing display 0 0 144 d5.MaA Select hide items in Operation transfer mode 0: 0 flashing input value monitor 0 0 144 d5.Mad Select hide items in Operation transfer mode 0: 0 flashing flashing flashing flashing flashing flashing input value monitor 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 145 d5.Mad Select hide items in Operation transfer mode 0 t			condition	0: OFF		
143 d5.MaN Select hide items in Monitor mode 0 0 144 d5.MaN Select hide items in Monitor mode 0 0 144 d5.MaN Select hide items in Monitor mode 0 0 144 d5.MaN Select hide items in Monitor mode 0 0 144 d5.MaN Select hide items in Operation transfer mode 0 0 145 d5.Mad Select hide items in Operation transfer mode 0 0 145 d5.Mad Select hide items in Operation transfer mode 0 0 145 d5.Mad Select hide items in Operation transfer mode 0 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 0 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 0 0 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 0 0 0 0 0 145 d5.Mad Select hide items in Operation transfer mode 0 0 0 0 0 0				+1: Event 1		
138 d5aP PV flashing display at input error 0 138 d5aP PV flashing display at input error 0 0 138 d5aP PV flashing display at input error 0 0 0 139 Ld5.5V ShowHide Input 2_SV 0 1 0 1 140 2.d5.5V ShowHide Input 2_SV 0 1 1 1 140 2.d5.5V ShowHide Input 2_SV 0 1 1 1 1 141 I.d5.MV Show/Hide Input 2_MV 0 1 1 1 1 142 2.d5.MV Show/Hide Input 2_MV 0 1 <td></td> <td></td> <td></td> <td>+2: Event 2</td> <td></td> <td></td>				+2: Event 2		
138 d5aP PV flashing display at input error 0 138 d5aP PV flashing display at input error 0. Flashing display 0 139 Id55V Show/Hide Input 1_SV 0. Flashing display 0 139 Id55V Show/Hide Input 1_SV 1 1. 140 2.d55V Show/Hide Input 2_SV ⁺ 1 1 141 I.d55MV Show/Hide Input 2_SV ⁺ 1 1 142 2.d55MV Show/Hide Input 2_MV ⁻⁰ 1 1 144 I.d55MV Show/Hide Input 2_MV ⁻⁰ 1 1 143 d5,MaV Select hide Input 2_MV ⁻⁰ 1 1 144 J5,MaN Select hide Items in Monitor mode 0 to 31 0 143 d5,MaN Select hide items in Monitor mode 0 to 31 0 144 d5,Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5,Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5,Mad Select hide items in Operation transfer mode 0 to 63 0 0<				+4: Event 3		
138 dSaP PV flashing display at input 1_Input error nigh +32: Input 2_Input error now more functions, sum each value. 138 dSaP PV flashing display at input error 0 139 I.d5.5// Show/Hide Input 1_SV 0 140 2.d5.5// Show/Hide Input 2_SV 1 141 I.d5.M/ Show/Hide Input 2_SV 1 144 J.d5.M/ Show/Hide Input 2_MV 0 143 J.d5.M/ Show/Hide Input 2_MV 1 144 J.d5.M/ Show/Hide Input 2_MV 1 143 J.d5.M/ Show/Hide Input 2_MV 0 144 J.d5.M/ Show/Hide Input 2_MV 0 143 J.d5.M/ Show/Hide Input 2_MV 0 144 J.d5.M/ Show/Hide Input 2_MV 0 143 J.M.N Select hide items in Monitor mode 0 0 144 J.M.A Select hide items in Operation transfer mode 0 0 144 J.M.A Select hide items in Operation transfer mode 0 0 144 J.M.A Select hide items in Operation transfer mode 0 0				+8: Event 4		
138 dS_aP PV flashing display at input error low To select two or more functions, sum each value. 0 138 dS_aP PV flashing display at input error low To select two or more functions, sum each value. 0 139 I.d5.5V Show/Hide Input 1_SV 1 140 2.d5.5V Show/Hide Input 2_SV * 1 144 I.d5.MV Show/Hide Input 2_MV * 1 141 I.d5.MV Show/Hide Input 2_MV * 1 141 I.d5.MV Show/Hide Input 2_MV * 1 144 J.d5.MV Show/Hide Input 2_MV * 0 143 d5.MaN Select hide items in Monitor mode 0 1 143 d5.MaN Select hide items in Operation transfer mode 0 to 31 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d				+16: Input 1 Input error high		
138 d 5 a P PV flashing display at input 2. Input error low To select two or more functions, sum each value. 0 138 d 5 a P PV flashing display at input error 1: Reashing display 0 139 I.d 5.5V Show/Hide Input 1_SV 0: Hide Input 2_SV 1 140 2.d 5.5V Show/Hide Input 2_SV ⁻¹ 0: Hide Input 2_SV 1 141 I.d 5.MV Show/Hide Input 2_SV ⁻¹ 0: Hide Input 2_SV 1 141 I.d 5.MV Show/Hide Input 2_SV ⁻¹ 0: Hide Input 2_SV 1 142 2.d 5.MV Show/Hide Input 2_MV ⁻² 0: Hide Input 2_NV 1 143 d 5.Ma/N Select hide Input 2_MV ⁻³ 0: Hide Input 2_Manipulated output value (MV) 1 143 d 5.Ma/N Select hide items in Monitor mode 0: Show all +1: Remote setting input value monitor +2: Manipulated output value (MV) monitor 0 144 d 5.Ma/d Select hide items in Operation transfer mode 0: Show all +1: Remote setting input value (MV) monitor +4: Current transformer (CT) monitor +4: Current transformer (CT) monitor +4: Current transformer (CT) monitor +4: Startup tuning (ST) +4: Startup tuning (S				+32: Input 1 Input error low		
138 d5aP PV flashing display at input error 10 138 d5aP PV flashing display at input error 0 139 1.d55V Show/Hide Input 1_SV 1 140 2.d5.5V Show/Hide Input 2_SV 1 141 1.d5.MV Show/Hide Input 2_MV ²) 0 142 2.d5.MV Show/Hide Input 2_MV ³) 0 143 d5.MaN Select hide items in Monitor mode 0 143 d5.MaN Select hide items in Monitor mode 0 0 144 d5.MaN Select hide items in Monitor mode 0 0 0 144 d5.Mad Select hide items in Monitor mode 0 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 0 0 144 d5.Mad <td></td> <td></td> <td></td> <td>+64: Input 2 Input error high</td> <td></td> <td></td>				+64: Input 2 Input error high		
To select two or more functions, sum each value. 138 d5aP PV flashing display at input error Flashing display 0 139 Ld55V Show/Hide Input 1_SV 1 1 140 2.d55V Show/Hide Input 2_SV 1 1 141 Ld5.MV Show/Hide Input 1_MV ² 0 Hide Input 2_SV 1 141 Ld5.MV Show/Hide Input 1_MV ² 0 Hide Input 2_SV 1 142 2.d5.MV Show/Hide Input 2_MV ³ 0 Hide 1 142 2.d5.MV Show/Hide Input 2_MV ³ 0 Hide 1 143 d5.MaN Select hide Input 2_MV ³ 0 Hide 1 143 d5.MaN Select hide items in Monitor mode 0 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 31 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 31 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 31 0 0 0 144 </td <td></td> <td></td> <td></td> <td>+128: Input 2 Input error low</td> <td></td> <td></td>				+128: Input 2 Input error low		
The second seco				To select two or more functions sum		
138 dSaP PV flashing display at input error 0. Flashing display 0 139 I.dS.5V Show/Hide Input 1_SV 1 140 2.d5.5V Show/Hide Input 2_SV 1 141 I.d5.MV Show/Hide Input 2_SV 1 141 I.d5.MV Show/Hide Input 2_SV 1 141 I.d5.MV Show/Hide Input 2_SV 1 142 Show/Hide Input 1_MV 0. Hide Input 2_SV 1 143 J.d5.MV Show/Hide Input 2_MV 0. Hide 1. Show Input 2_Manipulated output value (MV) 1 143 J.MON Select hide items in Monitor mode 0. Hide 1. Show Memory area soak time 3. Show soft start time 0 144 J.MoN Select hide items in Monitor mode 0 to 31 0 144 J.Mod Select hide items in Operation transfer mode 0 to 63 0 144 J.Mod Select hide items in Operation transfer mode 0 to 63 0 144 J.Mod Select hide items in Operation transfer mode 0 to 63 0 144 J.Mod Select hide items in Operation transfer mode 0 to 630 0				each value		
136 d50P In Vertical graph of the input of the i	120	10 0	PV flashing display at	0: Elashing display	0	
139 I.d 5.5V Show/Hide Input 1_SV 1 140 2.d 5.5V Show/Hide Input 2_SV 1 141 I.d 5.MV Show/Hide Input 2_SV 1 141 I.d 5.MV Show/Hide Input 1_MV ²) 0: Hide Input 2_SV 1 141 I.d 5.MV Show/Hide Input 1_MV ²) 0: Hide Input 2_SV 1 142 2.d 5.MV Show/Hide Input 2_MV ³) 0: Hide Input 2_MV ³) 1: Show Input 1_Manipulated output value (MV) 143 d 5.MeV Show/Hide Input 2_MV ³) 0: Hide Input 2_Manipulated output value (MV) 1 144 d 5.MeV Select hide items in Monitor mode 0 to 31 0 0 144 d 5.MeV Select hide items in Operation transfer mode 0 to 63 0 0 144 d 5.Med Select hide items in Operation transfer mode 0 to 63 0 0 144 d 5.Med Select hide items in Operation transfer mode 0 to 63 0 0 144 d 5.Med Select hide items in Operation transfer mode 0 to 63 0 0 144 d 5.Med Select hide items in Operation transfer mode <t< td=""><td>130</td><td>dSor</td><td>input error</td><td>1: Non-flashing display</td><td>0</td><td></td></t<>	130	dSor	input error	1: Non-flashing display	0	
139 1.35.9 Show/hide input 1_30 0. Hide input 1_30 1 140 2.d5.5.7 Show/Hide Input 2_SV 0. Hide input 2_SV 1 141 1.d5.M7 Show/Hide Input 1_MV 0. Hide input 2_SV 1 141 1.d5.M7 Show/Hide Input 1_MV 0. Hide 1 142 2.d5.M7 Show/Hide Input 2_MV 0. Hide 1 143 d5.MaN Select hide items in Monitor mode 0. Go 31 0 143 d5.MaN Select hide items in Monitor mode 0 to 31 0 144 d5.MaN Select hide items in Operation transfer mode 0 to 63 0 144 d5.MaN Select hide items in Operation transfer mode 0 to 63 0 144 d5.MaN Select hide items in Operation transfer mode 0 to 63 0 144 d5.MaN Select hide items in Operation transfer mode 0 to 63 0 144 d5.MaA Select hide items in Operation transfer mode 0 to 63 0 144 d5.MaA Select hide items in Operation transfer mode 0 to 63 0 144 d5.MaA <	400	1.15.5.1	Show/Hido Input 1 SV		1	
140 2.d5.5V Show/Hide Input 2_SV 1 141 I.d5.MV Show/Hide Input 1_MV 2 0: Hide Input 2_SV 1 141 I.d5.MV Show/Hide Input 1_MV 2 0: Hide Input 1_Manipulated output value (MV) 1 142 2.d5.MV Show/Hide Input 2_MV 3 0: Hide 1 1 143 d5.MaN Select hide Input 2_MV 3 0: Hide Input 2_Manipulated output value (MV) 1 143 d5.MaN Select hide items in Monitor mode 0 to 31 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 144	139	1.d5.5%	Show/filde input 1_3V	1: Show Input 1. SV	1	
140 2.35.57 Show/Hide Input 2_SV 1 141 1.35/m Show/Hide Input 1_MV 0: Hide 1 141 1.35/m Show/Hide Input 1_MV 0: Hide 1 142 2.35/m Show/Hide Input 2_MV 0: Hide 1 142 2.35/m Show/Hide Input 2_MV 0: Hide 1 143 3.50 show/Hide Input 2_MV 0: Hide 1 1 143 3.5/m Select hide items in Monitor mode 0 to 31 0 0 144 3.5/m Select hide items in Operation transfer mode 0 to 31 0 0 144 3.5/m Select hide items in Operation transfer mode 0 to 63 0 144 3.5/m Select hide items in Operation transfer mode 0 to 63 0 144 3.5/m Select hide items in Operation transfer mode 0 to 63 0 144 3.5/m Select hide items in Operation transfer mode 0 to 63 0 144 3.5/m Select hide items in Operation transfer mode 0 to 63 0 144 3.5/m Select hide items in Operation transfer mode<			Chaun/Llida Instat 0, CV(1)	1. Show input 1_SV	4	
141 I.d 5.MV Show/Hide Input 1_MV ²) 0: Hide 1: Show Input 1_Manipulated output value (MV) 2: Show Memory area soak time 3: Show soft start time 1 142 2.d 5.MV Show/Hide Input 2_MV ³) 0: Hide 1: Show Input 2_Manipulated output value (MV) 2: Show Memory area soak time 3: Show soft start time 1 143 d 5.M_N Select hide items in Monitor mode 0 to 31 0 144 d 5.M_O Select hide items in Operation transfer mode 0 to 63 0 144 d 5.M_O Select hide items in Operation transfer mode 0 to 63 0 144 d 5.M_O Select hide items in Operation transfer mode 0 to 63 0 144 d 5.M_O Select hide items in Operation transfer mode 0 to 63 0 144 d 5.M_O Select hide items in Operation transfer mode 0 to 63 0 144 d 5.M_O Select hide items in Operation transfer mode 0 to 63 0 145 Kemote setting transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) 0 144 d 5.M_O Select hide items in Operation transfer the control area Local/External transfer +16: Remote/Local transfer +16: Remote/Local transfer To select two or more	140	2.25.51	Show/Hide input 2_5V	0: Hide input 2_SV	1	
141 I.d 5.MV Show/Hide Input 1_MV 0: Hide 1 142 Z.d 5.MV Show/Hide Input 2_MV 0: Hide 1 142 Z.d 5.MV Show/Hide Input 2_MV 0: Hide 1 143 d 5.Mon Select hide items in Monitor mode 0: Hide 1 143 d 5.Mon Select hide items in Monitor mode 0: Show all 0 144 d 5.Mond Select hide items in Operation transfer mode 0: to 31 0 144 d 5.Mond Select hide items in Operation transfer mode 0: to 63 0 144 d 5.Mond Select hide items in Operation transfer mode 0: Show all 0 144 d 5.Mond Select hide items in Operation transfer mode 0: Show all 0 144 d 5.Mond Select hide items in Operation transfer mode 0: Show all 0 144 d 5.Mond Select hide items in Operation transfer mode 0: Show all 0 144 d 5.Mond Select hide items in Operation transfer mode 0: Show all 0 144 d 5.Mond Select hide items in Operation transfer mode 0: Show all 0				1: Show input 2_5V		
142 2.d5.MV Show/Hide Input 2_MV 0 1 142 2.d5.MV Show/Hide Input 2_MV 0 0 1 143 d5.M_N Select hide items in Monitor mode 0 to 31 0 0 143 d5.M_N Select hide items in Monitor mode 0 to 31 0 0 144 d5.M_A Select hide items in Operation transfer mode 0 to 31 0 0 144 d5.M_A Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.M_A Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.M_A Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.M_A Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.M_A Select hide items in Operation transfer mode 0 to 63 0 0 144 d5.M_A Select hide items in Operation transfer mode 0 to 63 0 0 145 x0.totuning (AT) +4: Starup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer	141	1.d5.MV	Show/Hide Input 1_MV ²	0: Hide	1	
142 2.5 MV Show/Hide Input 2_MV ³) 0: Hide 3: Show soft start time 1 142 2.4 5 MV Show/Hide Input 2_MV ³) 0: Hide 1: Show Input 2_Manipulated output value (MV) 1 143 d 5 MaN Select hide items in Monitor mode 0 to 31 0 143 d 5 MaN Select hide items in Monitor mode 0 to 31 0 144 d 5 Mad Select hide items in Operation transfer mode 0 to 63 0 144 d 5 Mad Select hide items in Operation transfer mode 0 to 63 0 144 d 5 Mad Select hide items in Operation transfer mode 0 to 63 0 144 d 5 Mad Select hide items in Operation transfer mode 0 to 63 0 145 Manuel Transfer +16: Memory area soak time To select two or more functions, sum each 0 144 d 5 Mad Select hide items in Operation transfer mode 0 to 63 0 0 0: Show all +1: RUN/STOP transfer +2: Autouning (ST) +8: Auto/Manual transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				1: Show Input 1_Manipulated output value		
142 2.d5,MV Show/Hide Input 2_MV ³) 0: Hide 0: Hide 1: Show Input 2_Manipulated output value (MV) 2: Show Memory area soak time 3: Show soft start time 1 143 d5,MaN Select hide items in Monitor mode 0 to 31 0: Show all +1: Remote setting input value monitor +2: Manipulated output value (MV) monitor +4: Current transformer (CT) monitor +4: Current transformer (CT) monitor +6: Comprehensive event state +16: Memory area soak time To select two or more functions, sum each value. 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 to 63 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 to 63 0 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 145 Select hide items in Operation transfer mode 0 to 63 0 0 145 Select hide items in Operation transfer mode 0 to 63 0 0 145 Select hide items in Operation transfer mode 0 to 63 0 0 146 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 146 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0 147 transfer 16: Remote/Local transfer 0 0 0				(MV)		
142 2.d5.MV Show/Hide Input 2_MV ³) 0: Hide 0: Hide 1: Show Input 2_Manipulated output value (MV) 2: Show Memory area soak time 3: Show soft start time 0 to 31 0: Show all +1: Remote setting input value monitor +2: Manipulated output value (MV) monitor +4: Current transformer (CT) monitor +4: Current transformer (CT) monitor +2: Manipulated output value (MV) monitor 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0: Show all +1: RUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				2: Show Memory area soak time		
142 $\overline{2.45.M\nu}$ Show/Hide Input 2_MV ³) 0: Hide 1: Show Input 2_Manipulated output value (MV) 2: Show Memory area soak time 3: Show soft start time 1 143 $d5.M \Box N$ Select hide items in Monitor mode 0 to 31 0 143 $d5.M \Box N$ Select hide items in Monitor mode 0 to 31 0 144 $d5.M \Box A$ Select hide items in Operation transfer mode 0 to 63 0 144 $d5.M \Box A$ Select hide items in Operation transfer mode 0 to 63 0 144 $d5.M \Box A$ Select hide items in Operation transfer mode 0 to 63 0 144 $d5.M \Box A$ Select hide items in Operation transfer mode 0 to 63 0 144 $d5.M \Box A$ Select hide items in Operation transfer mode 0 to 63 0 144 $d5.M \Box A$ Select hide items in Operation transfer mode 0 to 63 0 144 $d5.M \Box A$ Select hide items in Operation transfer mode 0 to 63 0 144 $d5.M \Box A$ Select hide items in Operation transfer mode 0 to 63 0 145 Katrup tuning (ST) +3: RUN/STOP transfer +2: AutofManual transfer +3: Control area Loc				3: Show soft start time		
1: Show Input 2_Manipulated output value (MV) 1: Show Input 2_Manipulated output value (MV) 143 d5.MaN Select hide items in Monitor mode 0 to 31 0 143 d5.MaN Select hide items in Monitor mode 0 to 31 0 144 d5.MaN Select hide items in Monitor mode 0 to 31 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 145 Manual transfer +1: RUN/STOP transfer +2: Autoruning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer +16: Remote/Local transfer +16: Remote/Local transfer +16: Remote/Local transfer +16: Remote/Local transfer +16: Remote/Local transfer +16: Remote/Local transfer +32: Control area Local/External transfer +32: Control area Local/External transfer +32: Control area Local/External transfer	142	245MV	Show/Hide Input 2_MV 3)	0: Hide	1	
143 d5.MoN Select hide items in Monitor mode 0 to 31 0 143 d5.MoN Select hide items in Monitor mode 0 to 31 0 143 d5.MoN Select hide items in Monitor mode 0 to 31 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 145 Remote/Local transfer +16 Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-		C.C.D.M		1: Show Input 2_Manipulated output value		
143 J5.M_N Select hide items in Monitor mode 0 to 31 0 143 J5.M_N Select hide items in Monitor mode 0 to 31 0 144 J5.M_N Select hide items in Monitor mode 0 to 31 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 144 J5.M_A Select hide items in Operation transfer mode 0 to 63 0 <td></td> <td></td> <td></td> <td>(MV)</td> <td></td> <td></td>				(MV)		
143 d 5.MoN Select hide items in Monitor mode 0 to 31 0 143 d 5.MoN Select hide items in Monitor mode 0 to 31 0 143 d 5.MoN Select hide items in Monitor mode 0 to 31 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d 5.Mod Select hide items in Operation transfer mode 0 to 63 0 145 Katrup transfer -2 control/cop transfer -2 control/coal transfer <td></td> <td></td> <td></td> <td>2: Show Memory area soak time</td> <td></td> <td></td>				2: Show Memory area soak time		
143 JS.MoN Select hide items in Monitor mode 0 to 31 0 143 JS.MoN Monitor mode 0 to 31 0 143 JS.MoN Select hide items in Monitor mode 0 to 31 0 144 JS.Mod Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mod Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mod Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mod Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mod Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mod Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mod Select hide items in Operation transfer mode 0 to 63 0 145 RUN/STOP transfer 1 1 1 145 Control argue control/Differential temperature control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				3: Show soft start time		
113 D.J.I.D.N Monitor mode 0: Show all +1: Remote setting input value monitor +2: Manipulated output value (MV) monitor +4: Current transformer (CT) monitor +8: Comprehensive event state +16: Memory area soak time To select two or more functions, sum each value. 0 0 0 0 0 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 to 63 </td <td>143</td> <td>JEM_N</td> <td>Select hide items in</td> <td>0 to 31</td> <td>0</td> <td></td>	143	JEM_N	Select hide items in	0 to 31	0	
144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 0: Show all +1: RUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer +16: Remote/Local transfer +16: Remote/Local transfer +1: RUN/STOP transfer +16: Remote/Local transfer +16: Remote/Local transfer +16: Remote/Local transfer +2: Control area Local/External transfer +32: Control area Local/External transfer +32: Control area Local/External trans		03.1011	Monitor mode	0: Show all		
144 d5.Mad Select hide items in Operation transfer mode 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 145 Katup/STOP transfer +2: Autot/Manual transfer +2: Autot/Manual transfer +16: Remote/Local transfer +16: Remote/Local transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer +32: Control area Local/External transfer				+1: Remote setting input value monitor		
144 d5.Mod Select hide items in Operation transfer mode 0 0 144 d5.Mod Select hide items in Operation transfer mode 0 0 144 d5.Mod Select hide items in Operation transfer mode 0 0 144 d5.Mod Select hide items in Operation transfer mode 0 0 144 d5.Mod Select hide items in Operation transfer mode 0 0 0 0 0 0 0 144 d5.Mod Select hide items in Operation transfer mode 0 0 0 0.5 Now all +1: RUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				+2. Manipulated output value (MV)		
144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 145 Katoutoning (AT) +4: Statup tuning (ST) +8: Auto/Manual transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				monitor		
144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 145 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 145 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 145 d5.Mod Select hide items in Operatin transfer mode				± 4 : Current transformer (CT) monitor		
144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 184 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 184 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 184 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 184 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 184 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 184 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 184 d5.Mad Select hide items in Operation transfer mode 0 to 63 0 184 d5.Mad Select hide items in Control/Select transfer 1: RUN/STOP transfer 1: RUN/STOP transfer 185 Auto/Manual transfer -1: Remote/Local transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer 184 -3: Select two or more functions, sum each -3: Select two or more functions, sum each -3: Select two or more fun				14. Comprehensive event state		
144 JS.Mad Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mad Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mad Select hide items in Operation transfer mode 0 to 63 0 144 JS.Mad Select hide items in Operation transfer mode 0 to 63 0 144 Select hide items in Operation transfer mode 0 to 63 0 145 Walker 1: RUN/STOP transfer 1: RUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each	1			16: Memory area cook time		
144 JSMad Select hide items in Operation transfer mode 0 to 63 0 144 JSMad Select hide items in Operation transfer mode 0 to 63 0 144 JSMad Select hide items in Operation transfer mode 0 to 63 0 144 JSMad Select hide items in Operation transfer mode 0 to 63 0 144 JSMad Select hide items in Operation transfer mode 0 to 63 0 144 JSMad Select hide items in Operation transfer mode 0 to 63 0 144 JSMad Select hide items in Operation transfer mode 0 to 63 0 145 Katup/Nanual transfer +1: RUN/STOP transfer +3: Auto/Manual transfer 146 Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer 147 To select two or more functions, sum each 0 1				To poloot two or more functions, sum cach		
144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 d5.Mod Select hide items in Operation transfer mode 0 to 63 0 144 Startup tuning (AT) +1: RUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each	1			volue		
144 d 5.Mod Operation transfer mode 0 to 03 0 0: Show all +1: RUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each			Coloct hide items in		0	
U: Snow all +1: RUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each	144	d'S.Mod	Select nide items in		U	
+1: KUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each	1		Operation transfer mode			
+2: Autotuning (A1) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each	1			+1: KUN/STOP transfer		
+4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				+2: Autotuning (AT)		
+8: Auto/Manual transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				+4: Startup tuning (ST)		
+16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				+8: Auto/Manual transfer		
(Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				+16: Remote/Local transfer		
transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each	1			(Cascade mode transfer, PV select		
temperature control) +32: Control area Local/External transfer To select two or more functions, sum each				transfer, 2-loop control/Differential		
+32: Control area Local/External transfer To select two or more functions, sum each	1			temperature control)		
To select two or more functions, sum each	1			+32: Control area Local/External transfer		
	1			To select two or more functions, sum each		
value.				value.		

¹ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2." ²⁾ When "cascade control" is selected in "Select function for Input 2", it also applies to the setting in Input 2. ³⁾ Displayed when "2-loop control/Differential temperature control" is selected in "Select function for Input 2."

3.9.2 Function block No. 11: Key operation (KEY)

No.	Symbol	Name	Data range	Factory	User
				set value	set value
—	Eo ! !	Function block No. 11	This is the first parameter symbol of	_	
			Function block No. 11		
145	SEF.KY	Data registration	 0: SET key method Used to register the Set value (SV) using the SET key. 1: Direct registration Used to register the Set value (SV) without pressing the SET key. 	0	

146	FN.KY	FUNC key assignment	 Unused RUN/STOP transfer Autotuning (AT) (Common to Input 1 and 2) Input 1_Autotuning (AT) Input 2_Autotuning (AT) Input 2_Autotuning (AT) Auto/Manual transfer (Common to Input 1 and 2) Input 1_Auto/Manual transfer (Common to Input 1 and 2) Input 1_Auto/Manual transfer Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) Control area Local/External transfer Interlock release Hold reset (Common to Input 1 and 2) Input 1_Hold reset Input 2_Hold reset Set data unlock/lock transfer Farameter setting mode display switching 	1	
147	FN.ГУР	FUNC key operation selection	 0: Press once The function set at "FUNC key assignment" is activated upon a press of the FUNC key. 1: Press and hold The function set at "FUNC key assignment" is activated by holding the FUNC key pressed. 	0	

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn2 I	Function block No. 21	This is the first parameter symbol of Function block No. 21	—	_
148	I. I NP	Input 1_Input type	0: TC input K 1: TC input J 2: TC input R 3: TC input S 4: TC input B 5: TC input E 6: TC input H 7: TC input T 8: TC input V5Re/W26Re 9: TC input V5Re/W26Re 9: TC input VLII 10: TC input U 11: TC input U 11: TC input L 12: TC input PR40-20 13: RTD input PH100 14: RTD input JPt100 15: Current input 0 to 20 mA DC 16: Current input 4 to 20 mA DC 17: Voltage input 0 to 10 V DC 18: Voltage input 0 to 5 V DC 19: Voltage input 1 to 5 V DC 20: Voltage input -10 to +10 V DC 21: Voltage input 0 to 10 mV DC 22: Voltage input 0 to 10 mV DC 23: Voltage input 0 to 10 mV DC 24: Voltage input 1_Control action: 15 to 24	Product identificatio n code specified at the time of order.	
149	I.UNI F	input 1_Display unit "	0: °C 1: °F	identificatio n code specified at the time of order.	

150	IPGdP	Input 1_Decimal point	0: No decimal place	Product	
		position	1: One decimal place	identificatio	
			2: Two decimal places	n code	
			3: Three decimal places	specified at	
			4: Four decimal places	the time of	
			TC input:	order.	
			W5Re/W26Re, PR40-20: 0 (fixed)	For V/I	
			Thermocouples other than those	inputs: 1	
			shown above: 0 to 1		
			RTD input: 0 to 2		
			Voltage (V)/Current (I) input:		
			In case of Input data type 0: 0 to 4		
			In case of Input data type 1: 0 to 3		
			(When Control with PV select:		
			Decimal point position setting of Input 1		
			and Input 2 is compared and the smaller		
			will be used.)		
151	ІРГ. ЯН	Input 1_Input range high	(Input 1_Input range low + 1 digit)	Product	
			to Input 1_Maximum value of input range	identificatio	
			[Varies with the setting of the Decimal	n code	
			point position.]	specified at	
			When 3 to 7 (pressure control operation	the time of	
			[MC-(V)COS(R)]) is set to Input 1_Control	order.	
1			action, the set value for the parameter	⊢or V/I	
			should be entered with the same pressure	inputs:	
			unit selected for Input 1_Valve coefficient	100.0	
			F.		
152	IPCSI	Input 1_Input range low	Input 1_Minimum value of input range	Product	
			to (Input 1_Input range high - 1 digit)	identificatio	
			[Varies with the setting of the Decimal	n code	
			point position.]	specified at	
			When 3 to 7 (pressure control operation	the time of	
			[MC-(V)COS(R)]) is set to Input 1_Control	order.	
			action, the set value for the parameter	For V/I	
			should be entered with the same pressure	inputs: 0.0	
			unit selected for Input 1_Valve coefficient		
1.50		han at A. Is well a man	F.	Lanual A	
153	I. Poľ	Input 1_Input error	Input 1_Input error determination point	Input 1_	
		determination point (nign)	(IOW) to Input 1_Input range high + (Input	Input range	
			1_5% of input span)	nign +	
1			I varies with the setting of the Decimal	(input 1_	
				span)	
154	1 0	Input 1 Input error	Input 1 Input range low - (Input 1, 5% of	Input 1	
154	I. PUN	determination point (low)	input span) * to Input 1 Input error	Input range	
			determination point (high)	low - (Input	
1			[Varies with the setting of the Decimal	1.5% of	
			point position.1	input span)	
			* When Input type of Input 1 is RTD, low limit		
1			value is about 2 Ohms. (Pt100: -245.5 °C		
			[-409.8 °F], JPt100: -237.6 °C [-395.7 °F])		
155	ורר.ור	Input 1_Temperature	0: No temperature compensation calculation	1	
		compensation calculation ²⁾	1: With temperature compensation		
		-	calculation		
156	1 605	Input 1_Burnout direction ³⁾	0: Upscale	0	
			1: Downscale	-	
157	I. SQR	Input 1_Square root	0: Unused	0	
450			1: Used	0	
158	I. INV		1. Unuseu	U	

 [1: Used
 [1: Used

 ¹⁾ Displayed when Thermocouple (TC)/RTD is selected in "Input 1_Input type".

 ²⁾ Displayed when Thermocouple (TC) is selected in "Input 1_Input type".

 ³⁾ Displayed when Thermocouple (TC) input" and "Low voltage input (0 to 100 mV DC, 0 to 10 mV DC) is selected in "Input 1_Input type", AND a setting other than "Pressure control operation [MC-(V)COS(R)])" is selected in "Input 1_Control action".

 ⁴⁾ Displayed when "Voltage (V)/Current (I)" is selected in Input 1 AND "PID control" or "Heating/Cooling PID control" is selected in "Input 1_Control action".

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn22	Function block No. 22 ¹⁾	This is the first parameter symbol of Eurotion block No. 22	—	—
159	2. I NP	Input 2_Input type ¹⁾	0: TC input K 1: TC input J 2: TC input R 3: TC input S 4: TC input B 5: TC input E 6: TC input N 7: TC input PLI 10: TC input PLII 10: TC input PR40-20 13: RTD input Pt100 14: RTD input Pt100 15: Current input 0 to 20 mA DC 16: Current input 4 to 20 mA DC 17: Voltage input 0 to 10 V DC 18: Voltage input 0 to 10 V DC 19: Voltage input 0 to 1 V DC 19: Voltage input 0 to 1 V DC 20: Voltage input 0 to 1 V DC 21: Voltage input 0 to 1 0 W DC 22: Voltage input 0 to 10 MV DC 23: Voltage input 0 to 10 MV DC 24: Voltage input 0 to 10 MV DC 24: When Remote setting input is selected and MC-(V)COS(R) pressure control is selected for Input 1_Control action: 15 to 24 • When Measured input 2 is selected and MC-(V)COS(R) pressure control is selected for Input 2_Control action: 15 to 24	Same as Input 1_ Input type When Remote setting input is specified at the time of order, but the input type is not specified: 17	
160	2.UNI Г	Input 2_Display unit ^{1) 2) 3)}	0: °C 1: °F	Same as Input 1_ Display unit	
161	2.PG.J.P	Input 2_Decimal point position ^{1) 3)}	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places 4: Four decimal places TC input: W5Re/W26Re, PR40-20: 0 (fixed) Thermocouples other than those shown above: 0 to 1 RTD input: 0 to 2 Voltage (V)/Current (I) input: 0 to 4	Same as Input 1_ Decimal point position	
162	2.PGSH	Input 2_Input range high ¹⁾ Input 2_Input range low ¹⁾	TC/RTD inputs and Voltage (V)/Current (I) Inputs (For other than Remote setting input): (Input 2_Input range low + 1 digit) to Input 2_Maximum value of input range Voltage (V)/Current (I) Inputs (For Remote setting input): (Input 2_Input range low + 1 digit) to Input 1_Maximum value of input range [Varies with the setting of the Decimal point position.] When 3 to 7 (pressure control operation [MC-(V)COS(R)]) is set to Input 2_Control action, the set value for the parameter should be entered with the same pressure unit selected for Input 1_Valve coefficient F. TC/RTD inputs and Voltage (V)/Current (I) Input 2_Input range high - 1 digit) Voltage (V)/Current (I) Inputs (For Remote setting input): Input 1_Minimum value of input range to (Input 1_Minimum value of input range to	Same as Input 1_ Input range high Same as Input 1_ Input range Iow	

3.9.4 Function block No. 22: Input 2 (2. 1 nP)

164	2.	Poľ	Input 2_Input error determination point (high)	Input 2_Input error determination point (low) to Input 2_Input range high + (Input	Input 2_ Input range	
			·/	2_5% or input span)	nign +	
				[Varies with the setting of the Decimal	(Input 2_	
				point position.]	5% of input	
					span)	
165	ק	PHN	Input 2_Input error	Input 2_Input range low - (Input 2_5% of	Input 2_	
	۰.		determination point (low) 4)	input span)* to Input 2_Input error	Input range	
				determination point (high)	low - (Input	
				[Varies with the setting of the Decimal	2_5% of	
				point position.]	input span)	
				* When Input type of Input 2 is RTD, low		
				limit value is about 2 Ohms.		
				(Pt100: -245.5 °C (-409.8 °F),		
				JPt100: -237.6 °C (-395.7 °F))		
166	Эr	r ir	Input 2 Temperature	0: No temperature compensation calculation	1	
100	ς,	ւսւ	compensation calculation	1: With temperature compensation		
			1) 5)	calculation		
167	כ	L_C	Input 2 Burnout direction	0: Upscale	0	
101	С.		1) 6) 8) 9)	1: Downscale	-	
168	כ	cno	Input 2 Square root	0: Unused	0	
100	С.	אטכ	extraction ^{1) 7) 10)}	1: Used	5	
169	כ	1 11/	Input 2 Inverting input 4) 7)	0: Unused	0	
	Ε.	IINV	10) = 5 1 4 4	1: Used		
¹⁾ Not d	isplav	ed when "N	No function" is selected in "Selected in "Se	ct function for Input 2"	•	•

2)

Displayed when Input 2 is either Thermocouple (TC) or RTD. 3)

Not settable when "Remote setting input" or "Control with PV select" is selected. 4) Not displayed when "No function" or "Remote setting input" is selected in "Select function in Input 2".

5)

6)

Displayed when Input 2 is Thermocouple (TC) input. Displayed when Input 2_Input type is "Thermocouple (TC) input" and "Low voltage input (0 to 100 mV DC, 0 to 10 mV DC). Displayed when "PID control (0 to 1) is selected in "Input 2_Control action" AND "Voltage (V)/Current (I) input" is selected for Input 7) 2.

8) Displayed when "2-loop control" is selected in "Select function for Input 2" AND a setting other than "0, 1 and 8 (Pressure control operation [MC-(V)COS(R)])" is selected in "Input 2_Control action".

9) Displayed when "Remote control" is selected in "Select function for Input 2" AND a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

¹⁰⁾ Displayed when PID control or Heating/Cooling PID control is selected in "Input 2_Control action".

3.9.5 Function block No. 23: Digital input (d)

No.	Symbol	Name	Data range	Factory set value	User set value
	Fn23	Function block No. 23	This is the first parameter symbol of Function block No. 23		—
170	di SL i	DI1 function selection	 0: No function 1: RUN/STOP transfer 2: Auto/Manual transfer (Common to Input 1 and 2) 3: Input 1_Auto/Manual transfer 4: Input 2_Auto/Manual transfer¹⁾ 5: Remote/Local transfer²⁾ (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) 6: Interlock release 7: Hold reset (Common to Input 1 and 2) 8: Input 1_Hold reset¹⁾ 10: Autotuning (AT) (Common to Input 1 and 2) 11: Input 1_Autotuning (AT) 12: Input 2_Autotuning (AT)¹⁾ 13: Set data unlock/lock transfer 14: Direct/Reverse action transfer 15: Memory area transfer (2 points, without area set signal) 	0	

			 16: Memory area transfer (8 points, without area set signal) 17: Memory area transfer (8 points, with area set signal) 18: Memory area transfer (16 points, without area set signal) 19: Memory area transfer³⁾ (16 points, with area set signal) 20: Area jump 		
171	di SL2	DI2 function selection	0 to 14 Same as DI1 function selection (0 to 14)	0	
172	di SLB	DI3 function selection	0 to 14 Same as DI1 function selection (0 to 14)	0	
173	di SL4	DI4 function selection	0 to 14 Same as DI1 function selection (0 to 14)	0	
174	di SLS	DI5 function selection ³⁾	0 to 14 Same as DI1 function selection (0 to 14)	0	
175	di SL6	DI6 function selection ³⁾	0 to 14 Same as DI1 function selection (0 to 14)	0	
176	di i NV	DI logic invert	0 to 31 0: No logic invert +1: RUN/STOP transfer +2: Auto/Manual transfer +4: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +8:Set data unlock/lock transfer +16: Direct/Reverse action transfer To select two or more functions, sum each value.	0	
177	ЫГІМ	Area switching time (without area set signal)	1 to 5 seconds	2	

¹⁾ Only when two inputs are available.
 ²⁾ The function selected at "Select function for Input 2" can be switched.
 ³⁾ Displayed when six or more Digital inputs (DI) are available (when the communication option is not selected.)

3.9.6 Function block No. 30: Output (₀⊔Ր)

No.	Symbol	Name	Data range	Factory	User
	-			set value	set value
_	6-30	Function block No. 30	This is the first parameter symbol of		
	טבויי		Function block No. 30	<u> </u>	
178	-51 1	OUT1 function selection	0: No assignment	1	
	050,		1: Input 1_Control output [heat-side] or		
			[open-side]		
			[close-side]		
			3. Input 2. Control output		
			4: Retransmission output		
			5: Logic calculation output (Event, Input		
			error)		
			6: RUN state output		
			7: Input 1_Manual mode state output		
			8: Input 2_Manual mode state output		
			9: Remote mode state output (Casaada control state output, Output of		
			differential temperature control state		
			Input 2 state output of Control with PV		
			select)		
			10: Input 1_Autotuning (AT) state output		
			11: Input 2_Autotuning (AT) state output		
			12: Output while Set value of Input 1 is		
			changing		
			13: Output while Set value of Input 2 is		
			changing		
			monitoring result		
			15: FAIL output		
170	רו ד	OUT2 function selection	Same as OUT1 function selection	4	
113	0360				
180	oSL 3	OUT3 function selection	Same as OUT1 function selection	4	
181		OUT1 logic calculation	0 to 255	0	
		selection	0: OFF		
			+1: Event 1		
1			+2: Event 2		1

			+4: Event 3		
			+8: Event 4		
			+16: Input 1_Input error high		
			+32: Input 1_Input error low		
			+64: Input 2_Input error high		
			+128: Input 2_Input error low		
			To select two or more functions, sum each		
			value.		
182		OUT2 logic calculation	Same as OUT1 logic calculation selection	0	
_		selection	-		
183		OUT3 logic calculation	Same as OUT1 logic calculation selection	0	
		selection		-	
184		Energized/De-energized	0 to 127	0	
104	EAL	selection	0: All outputs are energized	Ũ	
		Scicotion	+1: OUT1 de-energized		
			12: OUT2 do operaized		
			+2. OUT2 de-energized		
			+4. 0013 de-energized		
			+8: DOI de-energized		
			+16: DO2 de-energized		
			+32: DO3 de-energized		
			+64: DO4 de-energized		
			To select two or more functions, sum		
			each value.		
185	115	Interlock selection	0 to 255	0	
			0: Unused		
			+1: Event 1		
			+2: Event 2		
			+4 Event 3		
			+8: Event 4		
			± 16 : Input 1 Input error high		
			+10. Input 1_Input error low		
			+32. Input 1_input error high		
			+64. Input 2_input error high		
			+128: Input 2_Input error low		
			To select two or more functions, sum each		
			value.		
186	55	Output action at control	0 to 7	0	
		stop	0: OFF		
			+1: Logic calculation output: Action		
			continues		
			+2: Retransmission output: Action		
			continues		
			+4: Instrument status output: Action		
			continues		
			To select two or more functions sum each		
			value		
407	14145	Event ention during MAN		0	
187	MMS		U: Yes	U	
		mode	1: No		
188		OUT1 Type selection	0: Continuous current output (4 to 20 mA)	0	
	00, 1		1: Continuous current output (0 to 20 mA)		
180	רחו	OUT2 Type selection	0: Continuous current output $(1 \text{ to } 20 \text{ m}^{\text{A}})$	0	
103	מטו כ'		1. Continuous current output (4 to 20 mA)	, v	
			1. Continuous current output (0 to 20 mA)		
190	UNI n	Universal output type	U: voitage pulse output	1	
	<u> </u>	selection (OUT3)	1: Current output (4 to 20 mA)		
		1	2: Current output (0 to 20 mA)		

3.9.7 Function block No. 31: Retransmission output 1 (Ra !)

No.	Symbol	Name	Data range	Factory set value	User set value
	Fn∃l	Function block No. 31	This is the first parameter symbol of Function block No. 31		_
191	Ao I	Retransmission output 1 type	 0: No retransmission output 1: Input 1_Measured value (PV) 2: Input 1_Local SV 3: Input 1_SV monitor value 4: Input 1_Deviation 5: Input 1_Manipulated output value [heatside] 6: Input 1_Manipulated output value [coolside] 7: Input 2_Measured value (PV) 8: Input 2_Local SV 9: Input 2_SV monitor value 10: Input 2_Deviation 	0	

	11: Input 2 Manipulated output value	
	12: Pometo antiga input value	
	12. Remote setting input value	
	13: Current transformer 1 (CT1) input	
	value	
	14: Current transformer 2 (CT2) input value	
	15: Measured value (PV) of differential	
	temperature input	

I	192	חור ו	Retransmission output 1	No retransmission output. Input 1	No	
	152	ו בחת	scale high	Measured value (PV) Input 1 Local SV	retransmiss	
			ocalo mgn	Input 1 SV monitor value and Remote	ion output	
				setting input value:	Input 1	
				Input 1 Input range low to Input 1 Input	Moasurod	
				ronge high	volue (D)/)	
				(M/han Constral with D) (cale at	value (FV),	
				(When Control with PV select.		
				PV select input range low to PV select	Local SV,	
				Input range nign)	input 1_SV	
				[Varies with the setting of the Decimal	monitor	
				point position.]	value, and	
				Input 1_Deviation:	Remote	
				-(Input 1_Input span) to +(Input 1_Input	setting	
				span)	input value:	
				[Varies with the setting of the Decimal	Input 1_	
				point position.]	Input range	
				Input 2_Measured value (PV), Input 2_	high	
ļ				Local SV, and Input 2_SV monitor value:	(Control	
				Input 2_Input range low to Input 2_Input	with PV	
				range high	select: PV	
ļ				[Varies with the setting of the Decimal	select input	
				point position.]	range high)	
ļ				Input 2_Deviation:	Input	
				-(Input 2_Input span) to +(Input 2_Input	1_Deviatio	
				span)	n: +(Input	
				Varies with the setting of the Decimal	1_Input	
				point position.]	span)	
				Manipulated output value: -5.0 to +105.0%	Input 2	
				Current transformer (CT) input value:	Measured	
				0.0 to 100.0%	value (PV).	
				Measured value (PV) of differential	Input 2	
				temperature input:	Local SV.	
				-(Input 1 Input span) to +(Input 1 Input	and Input 2	
				span)	SV	
				Varies with the setting of the Decimal	monitor	
				point position.1	value:	
				F F	Input 2	
					Input range	
					high	
					Input 2	
					Deviation:	
					+(Input	
					2 Input	
					span)	
					Manipulate	
					d output	
					value and	
					Current	
ļ					transformer	
ļ					(CT) input	
ļ					value.	
ļ					100.0	
ļ					Measured	
ļ						
					of	
					differentiel	
ļ					tomporatur	
ļ					temperatur	
		1		1	e input: 100	1

-	T				
193	I 8! 5 ! !	Retransmission output 1	No retransmission output, Input 1_	No	
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	scale low	Measured value (PV), Input 1_Local SV,	retransmiss	
			Input 1 SV monitor value, and Remote	ion output.	
			setting input value	Input 1	
			Input 1 Input range low to Input 1 Input	Moonurod	
			input i_input lange low to input i_input		
			range nign	value (PV),	
			(When Control with PV select:	Input 1_	
			PV select input range low to PV select	Local SV,	
			input range high)	Input 1	
			Waries with the setting of the Decimal	SV monitor	
			point position 1	value and	
			point position.	Domoto	
			input I_Deviation.	Remote	
			-(Input 1_Input span) to +(Input 1_Input	setting	
			span)	input value:	
			[Varies with the setting of the Decimal	Input 1_	
			point position.	Input range	
			Input 2 Measured value (PV) Input 2 Local	low	
			SV and Input 2 SV monitor value:	(Control	
			logue 2 logue ronge low to logue 2 logue		
			Input 2_Input lange low to input 2_Input		
			range nign	select: PV	
			[varies with the setting of the Decimal	select input	
			point position.]	range low)	
			Input 2_Deviation:	Input	
			-(Input 2_Input span) to +(Input 2_Input	1 Deviatio	
			span)	n:	
			Varies with the setting of the Decimal	-(Input	
			point position 1	1 Input	
			Moninulated autout values E 0 to 10E 00/	n_mput	
				span)	
			Current transformer (CT) input value:	Input	
			0.0 to 100.0%	2_Measure	
			Measured value (PV) of differential	d value	
			temperature input:	(PV), Input	
			-(Input 1 Input span) to +(Input 1 Input	2	
			span)	Local SV	
			Naries with the setting of the Decimal	and	
			[valles with the setting of the Decimal	anu Innut 2 CV/	
			point position.]	input 2_5v	
				monitor	
				value:	
				Input 2_	
				Input range	
				low	
				Input 2	
				Deviation:	
				_(Input ?	
				Meninulata	
				ivianipulate	
				a output	
				value, and	
				Current	
				transformer	
				(CT) input	
				value: 0.0	
				Measured	
				value (FV)	
				OI IIII	
				differential	
				temperatur	
				e input:	
				-100	

3.9.8 Function block No. 32: Retransmission output 2 (Ra2)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn32	Function block No. 32	This is the first parameter symbol of Function block No. 32	—	—
194	Ro2	Retransmission output 2 type	Same as Retransmission output 1 type	1	
195	RHS2	Retransmission output 2 scale high	Same as Retransmission output 1 scale high	n	
196	AL S2	Retransmission output 2 scale low	Same as Retransmission output 1 scale low		

3.9.9 Function block No. 33: Retransmission output 3 (Ro 3)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn33	Function block No. 33 ¹⁾	This is the first parameter symbol of Function block No. 33	—	—
197	Ro3	Retransmission output 3 type ¹⁾	Same as Retransmission output 1 type	3	
198	RHS3	Retransmission output 3 scale high ¹⁾	Same as Retransmission output 1 scale high	ר	
199	ALS3	Retransmission output 3 scale low ¹⁾	Same as Retransmission output 1 scale low		

¹⁾ Displayed when "Current output" is selected in "Universal output (OUT3)_type selection".

3.9.10 Function block No. 34: Digital output (da)

No.	Symbol	Name	Data range	Factory	User
		Function block No. 24		set value	set value
	Fnd4	Function DIOCK NO. 34	Function block No. 34		
200	doSL I	DO1 function selection	 0: No assignment 1: Logic calculation output (Event, Input error) 2: RUN state output 3: Input 1_Manual mode state output 4: Input 2_Manual mode state output 5: Remote mode state output (Cascade control state output, Output of differential temperature control state, Input 2 state output of Control with PV select) 6: Input 1_Autotuning (AT) state output 7: Input 2_Autotuning (AT) state output 8: Output while Set value of Input 1 is changing 9: Output of the communication monitoring result 11: FAIL output 12: Input 2_Control error state output * 13: and 13 are displayed only when pressure is 	0	
201	do51.2	DO2 function selection	Same as DO1 function selection	0	
202	do <u>see</u> do51 7	DO3 function selection	Same as DO1 function selection	0	
203	doSLY	DO4 function selection	Same as DO1 function selection	0	
204	dal G I	DO1 logic calculation selection	0 to 255 0: OFF +1: Event 1 +2: Event 2 +4: Event 3 +8: Event 4 +16: Input 1_Input error high +32: Input 1_Input error low +64: Input 2_Input error high +128: Input 2_Input error low To select two or more functions, sum each value.	0	
205	dol G2	DO2 logic calculation selection	Same as DO1 logic calculation selection	0	
206	doLG3	DO3 logic calculation selection	Same as DO1 logic calculation selection	0	
207	dolG4	DO4 logic calculation selection	Same as DO1 logic calculation selection	0	

No.	Symbol	Name	Data range	Factory set value	User set value
	Fnyl	Function block No. 41	This is the first parameter symbol of	_	
200		Event 1 assignment 1)	1: Input 1	1	
208	EVHI		2: Input 2	1	
			3: Differential temperature input		
209	<u> </u>	Event 1 type	0: None	0	
			1: Deviation high (Using SV monitor value) ¹⁾		
			2: Deviation low (Using SV monitor value) ¹⁾		
			3: Deviation high/low (Using SV monitor		
			4: Band (Using SV/ monitor value) ¹⁾		
			5: Deviation high/low (Using SV monitor		
			value) [High/Low individual setting] 1)		
			6: Band (Using SV monitor value)		
			[High/Low individual setting] ¹⁾		
			7: SV high (Using SV monitor value)		
			0. SV IOW (USING SV MONILOF VAIUE)		
			10: Process low ^b		
			11: Deviation high (Using local SV) ¹⁾		
			12: Deviation low (Using local SV) ¹⁾		
			13: Deviation high/low (Using local SV) ¹⁾		
			14: Band (Using local SV) ¹		
			[High/Low individual setting] ¹⁾		
			16: Band (Using local SV) [High/Low		
			individual setting] ¹⁾		
			17: SV high (Using local SV)		
			18: SV low (Using local SV)		
			19: MV high [heat-side] ^{2) ()}		
			20: MV low [neat-side] $\frac{2}{3}$		
			22: MV low [cool-side] ²⁾		
			23: Process high/low [High/Low individual		
			setting] ²⁾		
			24: Process band [High/Low individual		
			¹⁾ Event held and re held action is available		
			²⁾ Event hold action is available		
210		Event 1 hold action	0: Hold action OFF	0	
			1: Hold action ON		
			2: Re-hold action ON		
			Setting hold or re-hold action on the		
			re-hold actions will just be ignored		
211	בטי	Event 1 differential gap	Deviation, Process and SV:	Deviation.	
	671	5	 If event assignment is set to either 	Process	
			Input 1 or Differential temperature.	and SV:	
			0 to Input 1_Input span	TC/RTD	
			(when Control with PV select: 0 to PV select input span)	V/Lipputs: 2	
			If event assignment is set to Input 2	0.2% of	
			0 to Input 2_Input span	Input span	
			[Varies with the setting of the Decimal	MV: 0.2	
			point position.]		
040	EVE :	Event 1 timer	MV: 0.0 to 110.0%	0.0	
212	EVII			0.0	

3.9.11 Function block No. 41: Event 1 (EH !)

¹⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2."

3.9.12 Function block No. 42: Event 2 (E82)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn42	Function block No. 42	This is the first parameter symbol of Function block No. 42	—	—
213	EV A 2	Event 2 assignment 1)	Same as Event 1 assignment		
214	652	Event 2 type	Same as Event 1 type		
215	EHo2	Event 2 hold action	Same as Event 1 hold action		

217 EVIC Event 2 timer Same as Event 1 timer	216	EH3	Event 2 differential gap	Same as Event 1 differential gap	
	217	EVL5	Event 2 timer	Same as Event 1 timer	

¹⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2."

3.9.13 Function block No. 43: Event 3 (EU3)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn43	Function block No. 43	This is the first parameter symbol of Function block No. 43	_	_
218	EV A 3	Event 3 assignment 1)	Same as Event 1 assignment		
219	653	Event 3 type	Same as Event 1 type		
210	EHo3	Event 3 hold action	Same as Event 1 hold action		
221	EH3	Event 3 differential gap	Same as Event 1 differential gap		
222	ЕГГЭ	Event 3 timer	Same as Event 1 timer		

¹⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2."

3.9.14 Function block No. 44: Event 4 (EB4)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn44	Function block No. 44	This is the first parameter symbol of Function block No. 44	—	—
223	ЕКАЧ	Event 4 assignment 1)	Same as Event 1 assignment		
224	654	Event 4 type	Same as Event 1 type		
225	ЕНоЧ	Event 4 hold action	Same as Event 1 hold action		
226	ЕНЧ	Event 4 differential gap	Same as Event 1 differential gap		
227	ЕЙГЧ	Event 4 timer	Same as Event 1 timer		

¹⁾Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2."

3.9.15 Function block No. 50: Control (Lanf)

No.	Symbol	Name	Data range	Factory set value	User set value
—	FnSO	Function block No. 50	This is the first parameter symbol of Function block No. 50	_	—
228	Pd	Hot/Cold start	 O: Hot start 1 Hot start 2 Cold start STOP start Follow the selected action when power is restored 	4	
229	rUnSL	RUN/STOP selection when power is restored	0: STOP 1: RUN 2: Operation immediately before power cut	0	
230	MANSL	MAN/AUTO selection when power is restored	0: MAN 1: AUTO 2: Operation immediately before power cut	0	
231	REMSL	LOC/REM selection when power is restored ¹⁾	0: LOCAL 1: REMOTE 2: Operation immediately before power cut	0	
232	E×SL	LOC/EXT selection when power is restored ²⁾	0: LOC 1: EXT 2: Operation immediately before power cut	0	
233	MVSL	Output value selection when power is restored	0: 0% 1: Output limiter low 2: Status immediately before power cut	0	
234	MVFS	Manual manipulated output value selection	0: The last manipulated output value (Balanceless-bumpless function) 1: Manual manipulated output value	0	

235	Γ <i>R</i> K	SV tracking	0 to 3	1	
			0: No SV tracking function		
			+1: SV tracking at transferring		
			Remote/Local *		
			* Including Cascade mode transfer,		
			2-loop control/Differential temperature		
			control transfer		
			+2: SV tracking at transferring Auto/Manual		
			To select two or more functions, sum each		
			value.		
236	סבב י	Integral/Derivative time	0: No decimal place	0	
	1 0 0 1	decimal point position ^{3) 4)}	1: One decimal place		
			2: Two decimal places		
237	ברב	ST start condition 3) 4)	0: Activate the Startup tuning (ST) function	0	
	ב יב		when the power is turned on; when		
			transferred from STOP to RUN: or when		
			the Set value (SV) is changed.		
			1: Activate the Startup tuning (ST) function		
			when the power is turned on: or when		
			transferred from STOP to RUN		
			2. Activate the Startup tuning (ST) function		
			2, the value of $C(x)$ is the part of $C(y)$ is the part of $C(y)$		

¹⁾ Displayed when "Remote setting input", "Cascade control", "Control with PV select" or "2-loop control" are selected in "Select function for Input 2" AND in the case of "2-loop control", both "Input 1_Control action" and "Input 2_Control action" are set to "PID control" (0 or 1) or "Heat/cool PID control" (2).

²⁾ Displayed when "DI function selection" is set to "Area switching (without area set signal)".

³⁾ Not displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

⁴⁾ Displayed when "2-loop control" is selected in "Select function for Input 2" AND "Pressure control operation [MC-(V)COS(R)]" is not selected in "Input 2_Control action".

No.	Symbol	Name	Data range	Factory set value	User set value
—	FnSl	Function block No. 51	This is the first parameter symbol of Function block No. 51		_
238	I. o5	Input 1_Control action	 0: PID control with Autotuning (direct action) 1: PID control with Autotuning (reverse action) 2: Heating/Cooling PID control with Autotuning [Cooling linear type] 3: Pressure control operation [MC-COS(R)-3] 4: Pressure control operation [MC-COS(R)-16, 15 to 50 mm] 5: Pressure control operation [MC-COS(R)-16, 65 to 150 mm] 6: Pressure control operation [MC-COS(R)-21] 7: Pressure control operation [MC-COS(R)-21] 8: Temperature control operation [MC-COS(R)] 8: Temperature control operation [MC-COS(R)] 9: Temperature control operation [MC-COS(R)] For cascade control, only 0 or 1 are selectable. In the case of Control with PV select, only "0 to 2" are selectable. 	Product identificatio n code specified at the time of order.	
239	I. aRU	Input 1_Output change rate limiter (up) [heat- side] ¹⁾	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0	
240	I. aRd	Input 1_ Output change rate limiter (down) [heat- side] ¹⁾	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0	

3.9.16 Function block No. 51: Input 1_Control (1. Conf)

241	I.R ₀ V E	Input 1_Action (high) input error	 0: Control continues (with the latest output) 1: Manipulated output value at input error (Manual mode) The operation mode is switched to the Manual mode and the Input 1_ Manipulated output value at input error is output. 2: Manipulated output value at input error (Auto mode) The operation mode remains in the Auto mode and the Input 1_Manipulated output value at input error of is output. When the error is recovered, the operation mode is switched to the PID control. 	2	
242	I.RUNE	Input 1_Action (low) input error	 0: Control continues (with the latest output) 1: Manipulated output value at input error (Manual mode) The operation mode is switched to the Manual mode and the Input 1_ Manipulated output value at input error is output. 2: Manipulated output value at input error (Auto mode) The operation mode remains in the Auto mode and the Input 1_Manipulated output value at input error of is output. When the error is recovered, the operation mode is switched to the PID control. 	2	
243	I. PSM	Input 1_Manipulated output value at input error	Heating/Cooling PID control: -105.0 to +105.0% Other control: -5.0 to +105.0%	Heating/Co oling PID control: 0.0 Other control: -5.0	
244	I. RMV	Input 1_ Manipulated output value at STOP [heat-side]	-5.0 to +105.0%	-5.0	
245	I. PdR	Input 1_Start determination point	 0 to Input 1_Input span (When Control with PV select: 0 to PV select input span) 0: Operation starts from any start state selected by Hot/Cold start [Varies with the setting of the Decimal point position.] 	0	
246	ILPI d	Input 1_Level PID action selection ²⁾	 Switching by Memory area number Switching by Set value (SV) (Level PID action) Switching by Measured value (PV) (Level PID action) 	0	
247	I. LHS	Input 1_Level PID differential gap ²⁾	0 to Input 1_Input span (When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point	TC/RTD inputs: 2 V/I inputs: 0.2	

¹⁾ Not displayed when "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action". ²⁾ Displayed when "Cascade control" is selected in "Select function for Input 2" AND a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

position.]

3.9.17	Function	block No.	52: Input 2	_Control	(2. Con	Γ)
--------	----------	-----------	-------------	----------	---------	----

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn52	Function block No. 52 ¹⁾	This is the first parameter symbol of Function block No. 52	_	_
248	2. oS	Input 2_Control action ¹⁾	0: PID control with Autotuning (direct action) 1: PID control with Autotuning (reverse action)	1	
			 3: Pressure control operation [MC-COS(R)-3] 4: Pressure control operation [MC-COS(R)- 16, 15 to 50 mm] 		
			 5: Pressure control operation [MC-COS(R)- 16, 65 to 150 mm] 6: Pressure control operation [MC-COS(R)- 		
			 21] 7: Pressure control operation [MC-VCOS(R)] 8: Temperature control operation [MC-COC(R)] 		
			9: Temperature control operation [MC- VCOS(R)] 2: n/a		
			In the case of Cascade control, only "0" or "1" is selectable.		
249	2. aRU	Input 2_Output change rate limiter (up) 3)	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0	
250	2. oRd	Input 2_Output change rate limiter (down) ³⁾	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0	
251	2.RoVE	Input 2_Action (high) input error ²⁾	0: Control continues (with the latest output) 1: Manipulated output value at input error (Manual mode)	2	
			The operation mode is switched to the Manual mode and the Input 2_ Manipulated output value at input error is		
			output. 2: Manipulated output value at input error (Auto mode)		
			The operation mode remains in the Auto mode and the Input 2_Manipulated output value at input error of is output.		
			When the error is recovered, the operation mode is switched to the PID control.		
252	2.AUNE	Input 2_Action (low) input error ²⁾	0: Control continues (with the latest output)1: Manipulated output value at input error (Manual mode)	2	
			The operation mode is switched to the Manual mode and the Input 2_ Manipulated output value at input error is		
			output. 2: Manipulated output value at input error (Auto mode)		
			The operation mode remains in the Auto mode and the Input 2_Manipulated output value at input error of is output.		
			When the error is recovered, the operation mode is switched to the PID control.		
253	2. PSM	Input 2_Manipulated output value at input error ²⁾	-5.0 to +105.0%	-5.0	
254	2. RMV	Input 2_Manipulated output value at STOP ²⁾	-5.0 to +105.0%	-5.0	
255	2. PdA	Input 2_Start determination point ¹⁾	0 to Input 2_Input span 0: Operation starts from any start state selected by Hot/Cold start [Varies with the setting of the Decimal point	0	
256	י יח ור	Input 2 Level PID action	position.] 0: Switching by Memory area number	0	
200	C.L.P.I.d	selection ³⁾	1: Switching by Set value (SV) (Level PID action) 2: Switching by Measured value (PV)		
L			(Level PID action)		

257	2. LHS	Input 2_Level PID differential gap 3)	0 to Input 2_Input span [Varies with the setting of the Decimal point position.]	TC/RTD inputs: 2 V/I inputs: 0.2	
-----	--------	--	--	---	--

1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1

3.9.18 Function block No. 53: Input 1_Valve coefficient (1. McVc)

No.	Symbol	nbol Name	Data range	Factory set value	User set value
_	Fn53	Function block No. 53 ¹⁾	This is the first parameter symbol of Function block No. 53	—	
258	I. A	$R _{A^{(1)}}$ Input 1_Valve coefficient	-1999 to 9999	0	
259	І. Ь	Input 1_Valve coefficient	-1999 to 9999	0	
260	I. C	L Input 1_Valve coefficient	-1999 to 9999	0	
261	l. d	Input 1_Valve coefficient	-1999 to 9999	0	
262	I. E	E Input 1_Valve coefficient	-1999 to 9999	0	
263	I. F	F Input 1_Valve coefficient	When Input 1_Control action is set to 3 to 7 or 8: 0: kg/cm ² G 1: barg 2: psig 3: kPaG 4: MPaG When Input 1_Control action is 7 or 9: 10:mmHg/Torr 11:mbar 12:inHg 13:psi 14:kPa NOTE: The pressure unit to be entered for the pressure value is defined by the valve coefficient F. Parameters to be entered in pressure units, such as measurement input range, target set value, and alarm set value, must be entered in the same pressure units defined by the valve coefficient F. If the pressure unit and the parameter do not match, the product will not operate properly. To use a pressure unit other than the valve coefficient F (indicated on the valve coefficient F (indicated on the valve coefficient plate) is used, refer to the "Converting valve coefficient" section in "8.8 Using with MC- COS/MC-VCOS" in the instruction manual (parameters/functions) to convert the valve coefficient F along with valve coefficients A. C. and E.	Product identificatio n code specified at the time of order	
264	I. GSL	DSL Input 1_Valve coefficient F pressure standard ²⁾	0: Atmospheric pressure standard 1: Absolute pressure standard	Product identification code specified at the time of order	
265	I. VSL	USL Input 1_Control valve selection ²⁾	0: MC-VCOS(R) 1: PC-VCOS(R)	0	
266	I. PrL	PrL Input 1_Pressure (Temp) limiter 1)	When Input 1_Control action is set to 3 to 7: Input 1_Input range low to Input 1_Input range high When Input 1_Control action is set to 8: Valve coefficient Coefficient F = 0 (kg/cm ² G): 0.00 to 99.99 Coefficient F = 1 (barg): 0.00 to 99.99 Coefficient F = 2 (psig): 0.0 to 999.9 Coefficient F = 3 (kPaG): 0 to 9999	When a setting other than "7" is selected in Input 1_ Control action: 0 When "7" is	
	Coefficient F = 4 (MPaG): 0.000 to 9.999 When Input 1_Control action is 9: 0.0 to whichever the smaller value of either Input 1_range high or 140.0 °C (280.0 °F) Select the temperature unit according to the following conditions: When Input type is set to Temperature input: Input 1_Display unit When Input type is set to V/I input: Input 1_Temperature limiter unit Pressure (temperature) limiter function is OFF when 0 (0.0, 0.00, 0.000) is set [Varies with the setting of the Decimal point position, when a setting is other than 8 for Input 1_Control action.]	selected in Input 1_ Control action: Input 1_Input range high			
--	---	--	--		
--	---	--	--		

267	,	0 N	Input 1_Temperature	Displayed when "Current/Voltage input" is	Follows the	
	<i>i</i> .	PruN	limiter unit 3)	set to Input type in Temperature control	unit	
				operation [MC-VCOS]	specified at	
				0: °C	the time of	
				1: °F	order	
268			Input 1 Regression	-50.0 to +50.0%	0.0	
	1.	ob	equation bias ¹⁾			
269			Input 1 Response speed	0: Yes	0	
	1.	EMF	self-learning selection 4)	1: No	-	
270			Input 1 Response speed	0 to 9999 seconds	6	
	1.	E 1	learning parameter ^{4) 5)}		-	
271			Input 1 Response speed	0 to 9999 seconds	6	
211	1	F5	learning parameter ^{4) 5)}		Ŭ	
			t2 0 down			
272			Input 1 Response speed	0 to 9999 seconds	6	
212	1	F-1	lographic percenter 4) 5)	0 10 9999 Seconds	0	
	•.					
070			lossel up	0 to 0000 accordo	6	
213	1	ĻЧ	Input 1_Response speed	0 10 9999 Seconds	о	
	1.	<i>C i</i>	learning parameter 1, 3,			
			t4 set down			
274	1	11	Input 1_Response speed	0 to 9999 seconds	2	
	1.		learning parameter 4) 5)			
			L1 0 up			
275	,	רו	Input 1_Response speed	0 to 9999 seconds	2	
	1.	LC	learning parameter ^{4) 5)}			
			L2 0 down			
276	,	17	Input 1_Response speed	0 to 9999 seconds	2	
	i.	ĹĴ	learning parameter 4) 5)			
			L3 set up			
277			Input 1_Response speed	0 to 9999 seconds	2	
	<i>i</i> .	Ľ٩	learning parameter 4) 5)			
			L4 set down			
278		- ·	Input 1_Response speed	0 to 9999 seconds	2	
	1.	51	learning parameter ^{4) 5)}			
			S1 0 up			
279			Input 1 Response speed	0 to 9999 seconds	2	
	1.	52	learning parameter ^{4) 5)}			
			S2 0 down			
280			Input 1 Response speed	0 to 9999 seconds	2	
	1.	53	learning parameter ^{4) 5)}			
			S3 set up			
281		_	Input 1 Response speed	0 to 9999 seconds	2	
_0.	1.	54	learning parameter ^{4) 5)}		_	
			S4 set down			
282			Input 1 No. of corrective	0 to 99 times (99: unlimited times)	99	
202		Pc !	actions ⁴⁾		55	
202		/	Input 1 Corrective action	0: Yes	1	
203		Рсг	repeat 4)	1. No		
204	··		Input 1 Corrective estimate	0: Voc	0	
204	1	P_{-}	for romp control 4)	0. 105	U	
	1.			1. INU		

285			Input 1_Lower range of	0.0 to 105.0%	20.0	
	1.	οίδ	corrective action amount 4)			
286			Input 1_Upper range of	0.0 to 105.0%	20.0	
	Ι.	oHb	corrective action amount 4)			
) Displa	Displayed when 3 to 9 is selected in "Input 1 Control action".					

²⁾ Displayed when "7 (Pressure control operation [MC-VCOS(R)])" is selected.

³⁾ Displayed when "9 (Temperature control operation [MC-VCOS(R)])" is selected, AND "Current" or "Voltage input" is selected in Input 1_type.

⁴⁾ Displayed when "3-7 (Pressure control operation [MC-(V)COS(R)])" is selected in "Input 1_Control action".

⁵⁾ Displayed when "1" is selected in "Input 1_Response speed self-learning selection".

3.9.19 Function block No. 54: Input 2_Valve factor (2. McVc)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn54	Function block No. 54 ¹⁾	This is the first parameter symbol of Function block No. 54	—	
287	2. R	Input 2_Valve coefficient A 1)	-1999 to 9999	0	
288	2. Ь	Input 2_Valve coefficient b 1)	-1999 to 9999	0	
289	2. [Input 2_Valve coefficient C 1)	-1999 to 9999	0	
290	2. d	Input 2_Valve coefficient d 1)	-1999 to 9999	0	
291	2. E	Input 2_Valve coefficient E 1)	-1999 to 9999	0	
292	2. F	Input 2_Valve coefficient F 1)	When Input 2_Control action is set to 3 to 6 or 8: 0: kg/cm ² G 1: barg 2: psig 3: kPaG 4: MPaG When Input 2_Control action is 7 or 9: 10: mmHg/Torr 11: mbar 12: inHg 13: psi 14: kPa NOTE: The pressure unit to be entered for the pressure value is defined by the valve coefficient F. Parameters to be entered in pressure units, such as measurement input range, target set value, and alarm set value, must be entered in the same pressure units defined by the valve coefficient F. If the pressure unit and the parameter do not match, the product will not operate properly To use a pressure unit other than the valve coefficient F (indicated on the valve coefficient F (indicated on the valve coefficient F (indicated on the valve coefficient plate), refer to the "Converting valve coefficient" section in "8.8 Using with MC-COS/MC- VCOS" in the instruction manual (parameters/functions) to convert the valve coefficient F along with valve coefficients A, C, and E.	Same as Input 1_ Valve coefficient F (pressure unit)	
293	2. GSL	Input 2_Pressure standard for valve coefficient F ²⁾	0: Atmospheric pressure standard 1: Absolute pressure standard	Same as pressure standard for Input 1_ Valve coefficient F	
294	2. VSL	Input 2_Control valve selection ²⁾	0: MC-VCOS(R) 1: PC-VCOS(R)	0	
295	2. PrL	Input 2_Pressure (Temp) limiter ¹⁾	When Input 2_Control action is set to 3 to 7: Input 2_Input range low to Input 2_Input range high When Input 2_Control action is set to 8:	When a setting other than "7" is selected in Input 2_	

				Valve coefficient Coefficient $F = 0$ (kg/cm ² G): 0.00 to	Control action: 0	
				99.99 Coefficient F = 1 (barg): 0.00 to 99.99 Coefficient F = 2 (psin): 0.0 to 999.9	When "7" is selected in	
				Coefficient $F = 3$ (kPaG): 0 to 9999	Input 2_	
				Coefficient $F = 4$ (MPaG): 0.000 to 9.999	Control	
				0.0 to Whichever the smaller value of	2 Input	
				either Input 2_range high or 140.0 °C	range high	
				(280.0 °F)		
				the following conditions:		
				When Input type is set to Temperature		
				input: Input 2_Display unit		
				2_Temperature limiter unit		
				Pressure (temperature) limiter function is		
				[Varies with the setting of the Decimal		
				point position, when a setting is other than		
2000	-		Input 2 Tomporaturo	8 for Input 1_Control action.]	Samo as	
296	C '.	PruN	limiter unit ³⁾	selected in Temperature control operation	Input 1_	
				[MC-VCOS]	Pressure	
				0: °C 1: °F	(Temp) limiter unit	
297	2.	ob	Input 2_Regression equation bias ¹⁾	-50.0 to +50.0%	0.0	
298	2.	EMF	Input 2_Response speed	0: Yes 1: No	0	
299	כ	L !	Input 2_Response speed	0 to 9999 seconds	6	
	L.	L 1	learning parameter ^{4) 5)} t1 0 up			
300	-		Input 2_Response speed	0 to 9999 seconds	6	
	С.	66	t2 0 down			
301	-		Input 2_Response speed	0 to 9999 seconds	6	
	с.	63	learning parameter 4) 5)			
302	_		Input 2_Response speed	0 to 9999 seconds	6	
	2.	64	learning parameter ^{4) 5)}			
303			Input 2_Response speed	0 to 9999 seconds	2	
	2.	LI	learning parameter ^{4) 5)}			
304			Input 2_Response speed	0 to 9999 seconds	2	
001	2.	L2	learning parameter ^{4) 5)}			
305			L2 0 down Input 2 Response speed	0 to 9999 seconds	2	
303	2.	LΞ	learning parameter 4) 5)		_	
206			L3 set up	0 to 9999 seconds	2	
300	2.	LЧ	learning parameter ^{4) 5)}		-	
007			L4 set down	0 to 9999 seconds	2	
307	2.	51	learning parameter 4) 5)		۷	
	<u> </u>	- ·	S1 0 up	0 to 0000 accords	2	
308	2	52	learning parameter 4) 5)	O IO AAAA SECOUDS	2	
			S2 0 down	0.45.0000.00000		
309	ק	57	Input 2_Response speed	U TO 9999 SECONDS	2	
	<u> </u>	دد	S3 set up			
310	2.	54	Input 2_Response speed learning parameter ^{4) 5)}	U to 9999 seconds	2	
211			S4 set down	0 to 99 times (99: unlimited times)	99	
511	2.	Pc I	actions ⁴⁾			
312	ح	و_2	Input 2_Corrective action	0: Yes 1: No	1	
313	L.	, , ,	Input 2_Corrective actions	0: Yes	0	
0.0	2.	Pc3	for ramp control 4)	1: No		
314	ح	_! L	Input 2_Lower range of corrective action amount ⁴⁾	0.0 to 105.0%	20.0	
1	L.	JLU				

315	2.	оНЬ	Input 2_Upper range of corrective action amount ⁴⁾	0.0 to 105.0%	20.0	

¹⁾ Displayed when "2-loop control" is selected in "Select function for Input 2" AND "3-9: Pressure control operation [MC-VCOS(R)]" or "8-9: Temperature control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action".

²⁾ Displayed when "2-loop control" is selected in "Select function for Input 2" AND "7: Pressure control operation [MC-VCOS(R)]" is selected in "Input 2_Control action".

³⁾ Displayed when "2-loop control" is selected in "Select function for Input 2" AND "9: Temperature control operation [MC-VCOS(R)]" is selected in "Input 2_Control action", AND "Current" or "Voltage output" is selected in "Input 2_type".

⁴⁾ Displayed when "2-loop control" is selected in "Select function for Input 2" AND "3-7: Pressure control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action".

⁵⁾ Displayed when "1" is selected in "Input 2_Response speed self-learning selection".

3.9.20 Function block No. 56: Input 1_Cooling control (I. Cool.)

No.	Symbol	Name	Data range	Factory set value	User set value
—	FnS6	Function block No. 56 ¹⁾	This is the first parameter symbol of Function block No. 56	—	—
316	I.o.R.U.c	Input 1_Output change rate limiter (up) [cool-side] ¹⁾	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0	
317	l.oRdc	Input 1_Output change rate limiter (down) [cool- side] ¹⁾	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0	
318	I.RMV c	Input 1_Manipulated output value at STOP [cool-side] ¹⁾	-5.0 to +105.0%	-5.0	
319	US	Undershoot suppression factor ¹⁾	0.000 to 1.000	1.000	
320	дРА	Overlap/Deadband reference point ¹⁾	0.0 to 1.0	0.0	

¹⁾ Displayed when "2: Heating/Cooling PID control" is selected in "Input 1_Control action".

3.9.21 Function block No. 57: Proactive (PREF)

	No	Symbol	Name	Data range	Factory	User
INO.	Symbol	Name	Data range	set value	set value	
	_	6-67	Function block No. 57 ¹⁾	This is the first parameter symbol of	_	
		1 1 1 1		Function block No. 57		
	321	ГСМСС	Bottom suppression	0: No function	0	
	-	יבויים	function ¹⁾	1: FF amount is added by level		
				2: FF amount is forcibly added		

¹⁾ Displayed when a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action", OR "2-loop control" is selected in "Select function for Input 2" AND a setting other than "Pressure control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action".

3.9.22 Function block No. 58: 2-input function (2PH)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn58	Function block No. 58	This is the first parameter symbol of Function block No. 58	—	—
322	297	Select function for input 2	 0: No function 1: Remote setting input 2: 2-loop control/Differential temperature control 3: Control with PV select 4: Cascade control (Slave single ↔ Cascade) 5: Cascade control (Master single ↔ Cascade) 6: Input circuit error alarm Selectable range is limited depending on Input 1_ Control action. PID control: 0 to 6 When pressure control operation [MC-(V)COS(R)] is selected: 0 to 2, 6 Heating/Cooling control: 0 to 3, 6 	1	
323	MRS.AC	Cascade_AT mode (master-side) ¹⁾	0: Easy adjustment (AT: one cycle) 1: Load factor adjustment (AT: 2 cycles)	TC/RTD inputs: 0 V/I inputs: 1	
324	SLV.AC	Cascade_AT mode (slave-side) ¹⁾	0: Easy adjustment (AT: one cycle) 1: Load factor adjustment (AT: 2 cycles)	TC/RTD inputs: 0	

				V/I inputs: 1	
325	2PV CC	Selection of PV select	0: Switching by level	0	
		trigger ²⁾	1: Switching by signal (Key, DI and		
			Communication)		
326	1	Input circuit error alarm	0 to Input 1_Input span	TC/RTD	
	, , , , ,	set value 3)	0: No function	inputs: 10	
			[Varies with the setting of the Decimal	V/I inputs:	
			point position.]	5% of Input	
				1_Input span	

¹ Displayed when "Cascade control" is selected in "Select function for Input 2." ²⁾ Displayed when "Control with PV select" is selected in "Select function for Input 2." ³⁾ Displayed when "Input circuit error alarm" is selected in "Select function for Input 2."

3.9.23 Function block No. 60: Communication (52)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn60	Function block No. 60 ¹⁾	This is the first parameter symbol of Function block No. 60		_
327	C MPS	Communication protocol ¹⁾	 Original communication Modbus (Order of data transfer: upper word to lower word) Modbus (Order of data transfer: lower word to upper word) PLC communication (MITSUBISHI MELSEC series special protocol QnA- compatible 3C frame [format 4]) 	0	
328	Rdd	Device address ¹⁾	Original communication: 0 to 99 Modbus: 1 to 99 PLC communication: 0 to 30	Original communica tion: 0 Modbus: 1 PLC communica tion: 0	
329	6PS	Communication speed ¹⁾	0: 2400 bps 3: 19200 bps 1: 4800 bps 4: 38400 bps 2: 9600 bps 5: 57600 bps	3	
330	ЫΓ	Data bit configuration ¹⁾	0 to 11 Refer to Data bit configuration table	0	
331	I NF	Interval time 1)	0 to 250 ms	10	
332	EMRM	Communication response monitor ¹⁾	Communication response monitor 0: Normal response 1: Overrun error 2: Parity error 4: Framing error 8: Receive buffer overflow If two or more errors occur, the error values are summed up. Errors are displayed in the hexadecimal format (0 to F). 0 (fixed) Reception status monitor* Each time signal is sent or received, 0 and 1 are displayed in tums. Engineering mode		

¹⁾ Displayed when Communication function is supplied.

Data bit configuration table

Set value	Data bit	Parity bit	Stop bit
0	8	Without	1
1	8	Without	2
2	8	Even	1
3	8	Even	2
4	8	Odd	1
5	8	Odd	2

Set value	Data bit	Parity bit	Stop bit
6	7	Without	1
7	7	Without	2
8	7	Even	1
9	7	Even	2
10	7	Odd	1
11	7	Odd	2

: Not settable for Modbus

3.9.2	4 Functio	n block No. 62: PLC	C communication (<i>GRP</i>)		
No.	Symbol	Name	Data range	Factory set value	User set value
_	Fn62	Function block No. 62 ¹⁾	This is the first parameter symbol of Function block No. 62	_	—
333	MP.REG	Register type ¹⁾	Mitsubishi PLC (MELSEC) 0: D register (data register) 1: R register (file register) 2: W register (link register) 3: ZR register (Method of specifying consecutive numbers when 32767 of R register is exceeded.)	0	
334	MP.SRH	Register start number (High-order 4-bit) ¹⁾	0 to 15	0	
335	MP.SRL	Register start number (Low-order 16-bit) ¹⁾	0 to 65535	1000	
336	MP.Mod	Monitor item register bias 1)	12 to 65535	12	
337	MP.SГЬ	Setting item register bias 1)	0 to 65535	0	
338	МР.LГМ	Instrument link recognition time ¹⁾	0 to 255 seconds	5	
339	МР.Г Ма	PLC response waiting time ¹⁾	0 to 3000 ms	255	
340	МР.5ГМ	PLC communication start time ¹⁾	1 to 255 seconds	5	
341	MP.SL b	Slave register bias 1)	0 to 65535	80	
342	MP.MAd	Number of recognizable devices ¹⁾	0 to 30	8	

¹⁾ Displayed when both Communication function and PLC communication protocol are supplied.

3.9.25 Function block No. 70: Memory area (RrER)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fn7O	Function block No. 70	This is the first parameter symbol of Function block No. 70		_
343	SKRS	Soft start/setting change rate limiter selection	0: Soft start 1: Setting change rate limiter	0	
344	SKLZ	Soft start time selection 1)	0: m.s 1: h.m	0	
345	5855	Soft start point selection ¹⁾	0: Measured value (PV) start 1: Zero point start	0	
346	SVRF	Setting change rate limiter unit time ²⁾	1 to 3600 seconds	60	
347	SrdP	Soak time unit	 0: 0 hours 00 minutes to 99 hours 59 minutes 1: 0 minutes 00 seconds to 199 minutes 59 seconds 2: 0 hours 0 minutes 0 seconds to 9 hours 59 minutes 59 seconds 	1	

¹⁾ Displayed when "0: Soft start" is selected in "Soft start/Setting change rate limiter selection".
 ²⁾ Displayed when "1: Setting change rate limiter" is selected in "Soft start/Setting change rate limiter selection".

3.9.26 Function block No. 71: Input 1_Setting limiter (1. 58L)

No	Symbol	Name	Data range	Factory	User
110.	Cymbol	Tame	Bata lange	set value	set value
	C O I	Function block No. 71	This is the first parameter symbol of		
	Fn'i i		Function block No. 71		
.348	1 514	Input 1_Setting limiter	Input 1_Setting limiter low to Input 1_Input	Input 1_	
		high	range high	Input range	
			(When Control with PV select	high	
			Input 1_Setting limiter low to PV select	(Control	
			input range high)	with PV	
			[Varies with the setting of the Decimal	select: PV	
			point position.]	select input	
				range high)	
349	1 511	Input 1_Setting limiter low	Input 1_Input range low to Input 1_Setting	Input 1_	
		_	limiter high	Input range	

		(When Control with PV select	low
		PV select input range low to Input	(Control
		1_Setting limiter high)	with PV
	[]	Varies with the setting of the Decimal	select: PV
	p	point position.]	select input
1			range low)

3.9.27 Function block No. 72: Input 2_Setting limiter (2. 58L)

No.	Symbol	bol Name Data range		Factory set value	User set value
—	Fn72	Function block No. 72 ¹⁾	This is the first parameter symbol of Function block No. 72	—	—
350	2. SLH	Input 2_Setting limiter high ¹⁾	Input 2_Setting limiter low to Input 2_Input range high [Varies with the setting of the Decimal point position.]	Input 2_ Input range high	
351	2. SLL	Input 2_Setting limiter low	Input 2_Input range low to Input 2_Setting limiter high [Varies with the setting of the Decimal point position.]	Input 2_ Input range low	

¹⁾ Displayed when "2-loop control/Differential temperature control" or "Cascade control" is selected in "Select function for Input 2."

3.9.28 Function block No. 91: System (555)

No.	Symbol	Name	Data range	Factory set value	User set value
—	Fng I	Function block No. 91	This is the first parameter symbol of Function block No. 91	_	_
	dЕF	Initialization	1225: Start initialization Other values: Set values are maintained After the initialization, this instrument is restarted. This setting will automatically go back to zero.	0	_
—	ЫΓ	Integrated operating time	0 to 65535 hours	—	—
—	LJJ	Peak hold monitor of ambient temperature	-120 to +120 °C	—	—
—	RoM	ROM version	The installed ROM version is displayed	—	—
—	5C-F7	Product identification code monitor	Product identification code is displayed. Use the UP or DOWN key to scroll the display horizontally (left or right).	_	_
	The serial number of the instrument is displayed.	Instrument number monitor	Instrument number is displayed.		_

4. Parameters that are Initialized/Modified when Settings are Changed

This chapter describes the parameters that are initialized/modified when settings are changed.

4.1 Parameters to Be Initialized

Changing any of the following parameters will require initialization* of the related settings.

* Settings are reset to the factory preset values. Some parameters may not be set to a factory preset value (such as change of input type).

NOTE Make sure all settings are recorded before changing the set values. **NOTE** Check all set values after having changed the settings.

- Select function for Input 2
- Input 1_Input type
- Input 1_Display unit
- Input 1_Decimal point position
- Input 2_Input type
- Input 2_Display unit
- Input 1_Control action
- Input 2_Control action
- OUT3 function selection
- Universal output type selection
- Retransmission output 1 type
- Retransmission output 2 type
- Retransmission output 3 type
- Event 1 type
- Event 1 assignment
- Event 2 type
- Event 2 assignment
- Event 3 type
- Event 3 assignment
- Event 4 type
- Event 4 assignment
- Integral/Derivative time decimal point position
- Input 1_Valve coefficient (F)
- Input 2_Valve coefficient (F)
- Communication protocol
- Register type
- Soak time unit
- Initialization

Engineering Mode Engineering Mode Engineering Mode Engineering Mode **Engineering Mode** Engineering Mode Engineering Mode **Engineering Mode** Engineering Mode Engineering Mode Engineering Mode **Engineering Mode Engineering Mode** Engineering Mode **Engineering Mode** Engineering Mode Engineering Mode Engineering Mode **Engineering Mode** Engineering Mode Engineering Mode Engineering Mode Engineering Mode Engineering Mode Engineering Mode **Engineering Mode** Engineering Mode Engineering Mode

Function block No. 58 Function block No. 21 Function block No. 21 Function block No. 21 Function block No. 22 Function block No. 22 Function block No. 51 Function block No. 52 Function block No. 30 Function block No. 30 Function block No. 31 Function block No. 32 Function block No. 33 Function block No. 41 Function block No. 41 Function block No. 42 Function block No. 42 Function block No. 43 Function block No. 43 Function block No. 44 Function block No. 44 Function block No. 50 Function block No. 53 Function block No. 54 Function block No. 60 Function block No. 62 Function block No. 70 Function block No. 91

79

4.1.1 When Select function for input 2 (*∂PV*) is changed [Engineering Mode: Function block No. 58]

The following parameters will be initialized.

Some parameters may have prerequisites for initialization. (See below for conditions.)

1	Mode	Items	Symbol	Initial value	Condition
Operation T	ransfer Mode	Remote/Local transfer	R/L	LoC	—
		When "Remote setting input" is			
		selected in Select function for Input 2			
		Remote/Local transfer	R/L	Shūl	
		When "Cascade control" is selected			
		In Select function for Input 2			
		Remote/Local transfer	R/L	I nP I	
		When "Control with PV select" is			
		selected in Select function for input			
		Z Romoto/Local transfor		71 8	
		When "2-loop control/Differential	R/L	c'LooP	
		temperature control" is selected in			
		Select function for Input 2			
Monitor & S	V Setting Mode	Input 1 Set value (SV)		0	1
Paramotor	Parameter			0	1
Setting	group No. 00	Input 1_Set value (SV)	1. SV	0	1
Mode	Parameter	Event 1 set value (EV1)	EV I		4
	group No. 40	Event 1 set value (EV1) [high]	LV 1		
		Event 2 set value (EV2)	EV2	High action, high/low	4
		Event 2 set value (EV2) [high]	.,.	action: max.	
		Event 3 set value (EV3)	FV7		4
		Event 3 set value (EV3) [high]	<i>L, J</i>	Low action, process	
		Event 4 set value (EV4)	FĽЧ	action: min.	4
		Event 4 set value (EV4) [high]	2, ,		
		Event 1 set value (EV1') [low]	EVI		4
		Event 2 set value (EV2') [low]	FVZ	High/low action: min	4
		Event 3 set value (EV3') [low]	ירעד	Process action: max.	4
		Event 4 set value (EV4') [low]			4
	Parameter	Input 1 Proportional band [beat-		TC/RTD inputs: 30	1
	group No. 51	sidel	i. P	V/I inputs: 3.0	•
		Input 1_Integral time [heat-side]	1 1	240	1
		Input 1_Derivative time [heat-side]	, <u>,</u> Н Ц	60	1
		Input 1 Control response		PID control: 0	1
		parameter	1. 1. 1	Heating/Cooling PID	
				control: 2	
		Input 1_Proactive intensity	IPREF	2	1
		Input 1_Manual reset	I. MR	0.0	1
		Input 1_FF amount	I. FF	0.0	1
		Input 1 ON/OFF action differential	1	TC/RTD inputs: 1	1
		gap (upper)	1. 01111	V/I inputs: 0.1	
		Input 1_ON/OFF action differential	l nHl		1
		gap (lower)			
	Parameter	Input 1_Proportional band [cool-	I. Pc	TC/RTD inputs: 30	1
	group No. 56	side]		V/I inputs: 3.0	
		Input 1_Integral time [cool-side]	1. I c	240	1
		Input 1_Derivative time [cool-side]	I. dc	60	1
		Input 1_Overlap/Deadband	l, dh	TC/RTD inputs: 0	1
				V/I inputs: 0.0	
	Parameter	Input 1_Setting change rate limiter	I.SV RU	0	1
	group No. 70	(up)		Ŭ	<u> </u>
		Input 1_Setting change rate limiter (down)	I.SVRd	0	1

80

Setup Setting	Setting group No. 21	Input 2_PV bias	I. P6	0	1
Mode	Setting group	Input 2_PV bias (RS bias)	2. Pb	0	2
	No. 22	Input 2_PV digital filter (RS digital filter)	2. dF	0.0	2
		Input 2_PV ratio (RS ratio)	2. PR	1.000	2
	Setting group	Input 1_Level PID setting 1	I.LEV I	Input 1_Input range high	1
	No. 51	Input 1_Level PID setting 2	1.LEV 2	(Control with PV select:	1
		Input 1_Level PID setting 3	ILEV3	high)	1
		Input 1_Level PID setting 4	ILEV4		1
		Input 1_Level PID setting 5	ILEVS		1
		Input 1_Level PID setting 6	1.LEV6		1
		Input 1_Level PID setting 7	ILEVN		1
	Setting group	Input 1_AT bias	І. ЯГЬ	0	1
	No. 53	Input 1 Determination point of		0	1
	No. 57	external disturbance	1. E×dJ	-1	1
Engineering Mode	Function block No. 21	Input 1_Decimal point position	I. PGdP	0	1
		Input 2_Input type	2. INP	Same as Input 1_Input type When Remote setting input is specified at the time of order: 17	3
		Input 2_Display unit	2. UNI F	Same as Input 1_Display unit Only when the input type is Control with PV select, Input circuit error alarm, and Remote setting input (V/l inputs). Not initialized in other cases.	5
	Function block No. 22	Input 2_Decimal point position	2. PGdP	Same as Input 1_ Decimal point position Only when the input type is Control with PV select, Input circuit error alarm, and Remote setting input (V/l inputs). Zero (0) for other cases.	5
		Input 2_Input range high	2. PGSH	•TC/RTD inputs Input 2_Maximum value of input range •V/I inputs Remote setting input: Input 1_Maximum value of input range Others: 100	6
		Input 2_Input range low	2. PGSL	•TC/RTD inputs Input 2_Minimum value of input range •V/I inputs Remote setting input: Input 1_Minimum value of input range Others: 0	6
	No. 31	Retransmission output 1 scale high	RH5 I	Input 1_Measured value (PV), Input 1_Local SV, Input 1_SV monitor value, and Remote setting input value: Input 1_Input range high (Control with PV select: PV select input range high) Input 1_Deviation: +(Input 1_Input span) Measured value (PV) of differential temperature input: 100	1 and 7

		UZ
		-
ALS I	Input 1_Measured value (PV), Input 1_Local SV, Input 1_SV monitor value, and Remote setting input value: Input 1_Input range low (Control with PV select: PV select input range low) Input 1_Deviation: -(Input 1_Input span) Measured value (PV) of differential temperature input: -100	1 and 7
RHS2	Same as Retransmission output 1 scale high	1 and 7
	O and a set D at a set of a start	

			Input 1_Input range low (Control with PV select: PV select input range low) Input 1_Deviation: -(Input 1_Input span) Measured value (PV) of differential temperature input: -100	
Function block No. 32	Retransmission output 2 scale high	RH52	Same as Retransmission output 1 scale high	1 and 7
	Retransmission output 2 scale low	RLS2	Same as Retransmission output 1 scale low	1 and 7
Function block No. 33	Retransmission output 3 scale high	RHS3	Same as Retransmission output 1 scale high	1 and 7
	Retransmission output 3 scale low	RL53	Same as Retransmission output 1 scale low	1 and 7
Function block	Event 1 assignment	EVRI	1	_
NO. 41	Event 1 differential gap	EHI	TC/RTD inputs: 2 V/I inputs: 0.2% of input span MV: 0.2	4
Function block	Event 2 assignment	EV R2	1	
NO. 42	Event 2 differential gap	EH5	TC/RTD inputs: 2 V/I inputs: 0.2% of input span MV: 0.2	4
Function block	Event 3 assignment	EV R 3	1	_
No. 43	Event 3 differential gap	EH3	TC/RTD inputs: 2 V/I inputs: 0.2% of input span MV: 0.2	4
Function block	Event 4 assignment	Е₽ЯЧ	1	
NO. 44	Event 4 differential gap	ЕНЧ	TC/RTD inputs: 2 V/I inputs: 0.2% of input span MV: 0.2	4
Function block No. 51	Input 1_Start determination point	I. PdR	0	1
Function block No. 51	Input 1_Level PID differential gap	I. LHS	TC/RTD inputs: 2 V/I inputs: 0.2	1
Function block No. 58	Input circuit error alarm set value	I CR	TC/RTD inputs: 10 V/I inputs: 5 % of Input 1 _Input span	3
Function block No. 71	Input 1_Setting limiter high	I. SLH	Input 1_Input range high (Control with PV select: PV select input range high)	1
	Input 1_Setting limiter low	I. SLL	Input 1_Input range low (Control with PV select: PV select input range low)	1

Retransmission output 1 scale low

Conditions:

Function

block No. 31

1. "Select function for Input 2" is switched between "Control with PV select" and another setting*.

* No function, Remote setting input, 2-loop control/Differential temperature control, Cascade control, or Input circuit error alarm.

"Select function for Input?" is switched between "Remote setting input" and another setting".
 * No function, Control with PV select, 2-loop control/Differential temperature control, Cascade control, or Input circuit error alarm.

 3. "Select function for Input 2" is switched between "Input circuit error alarm" and another setting".
 * No function, Remote setting input, Control with PV select, 2-loop control/Differential temperature control, or Cascade control.
 4. Event type is a setting other than Manipulated output value AND "Select function for Input 2" is switched between "Control with PV select" and another setting*.

 * No function, Remote setting input, 2-loop control/Differential temperature control, Cascade control, or Input circuit error alarm.
 5. "Select function for input t 2" is switched from any of "Remote setting input," "Control with PV select" or "Input circuit error alarm" to Select function for input t2 is switched from any of "Remote setting input," "Control with PV select for "input circuit error a another setting."
 * No function, 2-loop control/Differential temperature control, and Cascade control.
 "Select function for Input 2" is switched from either "Remote setting input" or "Input circuit error alarm" to another setting *.
 * No function, Control with PV select, 2-loop control/Differential temperature control, or Cascade control.
 Retransmission output is "No retransmission output," "Input 1_Measured value (PV)", "Input 1_Set value (SV)", "Input 1_Deviation," "Input 1_Remote setting input value," OR Measured value (PV) of differential temperature input.

4.1.2 When Input 1_Input type (1. 1 NP) and Input 1_Display unit (1. UNIF) are changed [Engineering Mode: Function block No. 21]

The following parameters will be initialized. Some parameters may have prerequisites for initialization. (See below for conditions.)

Mo	ode	Items	Symbol	Initial value	Condition
Monitor & SV	Setting Mode	Input 1_Set value (SV)		Input 1_Set value (SV)	
	-	Set value (SV) of differential		Set value (SV) of	
		temperature input		differential temperature	
				input	
Parameter	Parameter	Input 1_Set value (SV)	I. 5V		
Setting Mode	group No. 00	Set value (SV) of differential	dSV		
5	0 1	temperature input		_	
	Parameter	Event 1 set value (EV1)	EVI		3
	aroup No. 40	Event 1 set value (EV1) [high]			
	0 1	Event 2 set value (EV2)	EV2	High action, high/low	3
		Event 2 set value (EV2) [high]		action: max.	
		Event 3 set value (EV3)	FV7		3
		Event 3 set value (EV3) [high]		Low action, process	
		Event 4 set value (EV4)	ЕИЧ	action: min.	3
		Event 4 set value (EV4) [high]			
		Event 1 set value (EV1') [low]	EV I		3
		Event 2 set value (EV2') [low]	יקעב	High/low action: min.	3
		Event 3 set value (EV3') [low]	ירע		3
		Event 4 set value (EV4') [low]	 EV:41	Process action: max.	3
Darameter	Parameter	Input 1 Proportional band [heat-side]		TC/RTD inpute: 30	
Setting	aroun No. 51	input 1_1 toportional band [neat side]	1. 1	V/I inputs: 3.0	
Mode	group No. 51	Input 1 Integral time [heat-side]	1 1	240	
Widde		Input 1_Integral time [heat-side]	י .ו ע ו	60	
		Input 1 Control reasonable percenter	1. O	BID control: 0	
		Input 1_Control response parameter	ו. ארו	Hosting/Cooling PID	
				neating/Cooling FID	
		Innut 1. Dropotivo intensity	1 0055		
		Input 1_Proactive Intensity		2	
			1. MR	0.0	
		Input 1_FF amount	i. FF		
		app (upper)	i. ohh	IC/RID Inputs: I	
		gap (upper)		V/I inputs. 0. I	
		Input 1_ON/OFF action differential	i. oHL		
	Deverseter	gap (lower)			
	Parameter	Input 1_Proportional band [cool-side]	1. Pc	1C/RTD Inputs: 30	
	group 110. 56	Length de la terme litter e l'are el state l			
		Input 1_Integral time [cool-side]	1. I C	240	
		Input 1_Derivative time [cool-side]	1. dc	60	
		Input 1_Overlap/Deadband	i. db	TC/RTD Inputs: 0	
	D (V/I Inputs: 0.0	
	Parameter	Input 1_Setting change rate limiter (up)	1. SKRU	0	
	group No. 70	Input 1_Setting change rate limiter	I. SKRA	0	
	0	(down)			
Setup	Setting	Input 1_PV bias	I. PG	0	
Setting	group No. 21	Input 1_PV digital filter	I. dF	0.0	
Mode		Input 1_PV ratio	I. PR	1.000	
		Input 1_PV low input cut-off ¹⁾	I. PLC	0.00	—
	Setting	Input 2_PV bias (RS bias)	2. РЬ	0	1
	group No. 22	Input 2_PV digital filter (RS digital filter)	2. dF	0.0	1
		Input 2_PV ratio (RS ratio)	2. PR	1.000	1
	Setting	Input 1_Level PID setting 1	I. LEV I	Input 1_Input range	
	group No. 51	Input 1_Level PID setting 2	I. LEV2	high	
		Input 1_Level PID setting 3	I. LEV 3	Control with PV select:	_
		Input 1_Level PID setting 4	1. LEV4	PV select input range	_
		Input 1 Level PID setting 5	I. LEVS	high	
		Input 1 Level PID setting 6	I, LEVR		
		Input 1 Level PID setting 7	LIFVN		<u> </u>
	Setting	Input 1 AT bias	AFA	0	
	aroup No. 53			0	—
	Setting	Input 1 Determination point of external	l Exal	_1	
	group No. 57	disturbance			_

83

Setup	Setting	Cascade_Proportional band (master-	MRS. P	TC/RTD inputs: 30	
Setting	group No. 58	side)		V/I inputs: 3.0	
Mode		Cascade_Integral time (master-side)	MRS. I	240	
		Cascade_Derivative time (master-side)	MRS. d	60	_
		Cascade_Proportional band (slave-	SLV. P	TC/RTD inputs: 30	
		side)	5 1.11.1	V/I inputs: 3.0	
		Cascade_Integral time (slave-side)	SLV. I	240	
		Cascade_Derivative time (slave-side)	SLV. d	60	
		Cascade_Digital filter	L. dF	10.0	
		Cascade_Scale high	L. 3LM	high	_
		Cascade_Scale low	C. SCL	Input 2_Setting limiter low	
		PV select transfer level	2PV. LV	Input 1_Input range high	
	Setting	Input 1_Peak hold monitor	I. PHLd		
	group No. 91	Input 1_Bottom hold monitor	I. BHLd		
Engineering	Function	Input 1_Decimal point position 1)	I. PGdP	0	
Mode	block No. 21	Input 1_Input range high	I. PGSH	•TC/RTD inputs: Input 1_Maximum value of input range •V/I inputs: 100	
		Input 1_Input range low	I. PGSL	•TC/RTD inputs: Input 1_Minimum value of input range •V/I inputs: 0	_
		Input 1_Input error determination point (high)	I. Poľ	Input 1_Input range high + (Input 1_5% of input span)	_
		Input 1_Input error determination point (low)	I. PUN	Input 1_Input range low - (Input 1_5% of input span)	_
	Function block No. 22	Input 2_Display unit ²	e. Uni i	Same as Input 1_ Display unit Only when the input type is Control with PV select, Input circuit error alarm, and Remote setting input (V/I inputs). Not initialized in other cases.	2
		Input 2_Decimal point position ¹⁾	2. PGdP	Same as Input 1_ Decimal point position Only when the input type is Control with PV select, Input circuit error alarm, and Remote setting input (V/I inputs). Zero (0) for other cases.	2
		Input 2_Input range high	2. PGSH	•TC/RTD inputs Input 2_Maximum value of input range •V/I inputs Remote setting input: Input 1_ Maximum value of input range Others: 100	1
		Input 2_Input range low	2. PGSL	TC/RTD inputs Input 2_Minimum value of input range V/I inputs Remote setting input: Input 1_Minimum value of input range Others: 0	1

Engineering Mode	Function block No. 31	Retransmission output 1 scale high	RHS I	Input 1_Measured value (PV), Input 1_Local SV, Input 1_SV monitor value, and Remote setting input value: Input 1_Input range high (Control with PV select: PV select input range high) Input 1_Deviation: +(Input 1_Input span) Measured value (PV) of differential temperature input: 100	4
		Retransmission output 1 scale low	ALS I	Input 1_Measured value (PV), Input 1_Local SV, Input 1_SV monitor value, and Remote setting input value: Input 1_Input range low (Control with PV select: PV select input range low) Input 1_Deviation: -(Input 1_Input span) Measured value (PV) of differential temperature input: -100	4
	Function block No. 32	Retransmission output 2 scale high	8452	Same as Retransmission output 1 scale high	4
	Function			output 1 scale low	4
	Function block No. 33	Retransmission output 3 scale high	8853	Same as Retransmission output 1 scale high	4
		Retransmission output 3 scale low	AL 5 3	Same as Retransmission output 1 scale low	4
	Function block No. 41	Event 1 differential gap	EHI	TC/RTD inputs: 2 V/I inputs: 0.2% of input	3
	Function block No. 42	Event 2 differential gap	EH5	span MV: 0.2	3
	Function block No. 43	Event 3 differential gap	ЕНЭ		3
	Function block No. 44	Event 4 differential gap	ЕНЧ		3
	Function	Input 1_Start determination point	I. PJR	0	
	block No. 51	Input 1_Level PID differential gap	I. L H S	TC/RTD inputs: 2 V/I inputs: 0.2	_
	Function	Cascade_AT mode (master-side)	MRSRF	TC/RTD inputs: 0	_
	block No. 58	Cascade_AT mode (slave-side)	SLVAF	V/I inputs: 1	_
		Input circuit error alarm set value	ICR	TC/RTD inputs: 10 V/I inputs: 5% of Input 1_Input span	—
	Function block No. 71	Input 1_Setting limiter high	I. SLH	Input 1_Input range high (Control with PV select: PV select input range high)	—
		Input 1_Setting limiter low	I. SLL	Input 1_Input range low (Control with PV select: PV select input range low)	—

¹⁾ When Input 1_Input type is changed.

²⁾When Input 1_Display unit is changed.

Condition

1. When "Remote setting input" is selected in "Select function for Input 2" AND either Voltage input or Current input are selected in "Input 2_Input type".

 When "Remote setting input" is selected in "Select function for Input 2" AND either Voltage input or Current input are selected in "Input 2_Input type", OR "Control with PV select is selected in "Select function for Input 2".
 The condition is either of the following.

 "Manipulated output value" is not selected in "Event type" AND "Control with PV select" is selected in "Select function for Input 2".

 Event type is a setting other than Manipulated output value AND Event assignment is either "Input 1" or "Differential temperature input."

Retransmission output is "No retransmission output," "Input 1_Measured value (PV)," "Input 1_Set value (SV)," "Input 1_Deviation," "Input 1_Remote setting input value," OR Measured value (PV) of differential temperature input.

4.1.3 When Input 1_Decimal point position (L PGdP) is changed [Engineering

Mode: Function block No. 21]

The following parameters will be initialized.

When Select function for input 2 is "Remote setting input" AND Input 2_Input type is Voltage/Current input, OR Select function for input 2 is "Control with PV select."

Mode	Items	Symbol	Initial value
Engineering Function Mode block No. 22	Input 2_Decimal point position	2.P.G.d.P	Same as Input 1_Decimal point position Only when the input type is Control with PV select, Input circuit error alarm, and Remote setting input (V/I inputs). Zero (0) for other cases.

4.1.4 When Input 2_Input type (2. 1 NP) and Input 2_Display unit (2. UNIF) are changed [Engineering Mode: Function block No. 22]

The following parameters will be initialized. Some parameters may have prerequisites for initialization. (See below for conditions.)

Mo	ode	Items	Sy	mbol	Initial value	Condition
Monitor & SV	Setting Mode	Input 2_Set value (SV)			0	—
Parameter Setting Mode	Parameter group No. 00	Input 2_Set value (SV)	2.	s۲	0	_
	Parameter group No. 40	Event 1 set value (EV1) Event 1 set value (EV1) [high]		EV I	High action, high/low action: max.	3
		Event 2 set value (EV2) Event 2 set value (EV2) [high]		E¥3	Low action, process	3
		Event 3 set value (EV3) Event 3 set value (EV3) [high]		Е⊬Э	action: min.	3
		Event 4 set value (EV4) Event 4 set value (EV4) [high]		Е⊬ч		3
		Event 1 set value (EV1') [low]	E	1 1		3
		Event 2 set value (EV2') [low]	E	121	High/low action: min.	3
		Event 3 set value (EV3') [low]	E	'E '	Process action: max.	3
		Event 4 set value (EV4') [low]	E	1/4/		3
	Parameter group No. 52	Input 2_Proportional band	2.	Ρ	TC/RTD inputs: 30 V/I inputs: 3.0	
		Input 2_Integral time	2.	1	240	_
		Input 2_Derivative time	2.	Ь	60	_
		Input 2_Control response parameter	2.	RPſ	0	—
		Input 2_Proactive intensity	2,F	PAEL	2	_
		Input 2_Manual reset	2.	MR	0.0	
		Input 2_FF amount	2.	FF	0.0	
		Input 2_ON/OFF action differential gap (upper)	2.	оНН	TC/RTD inputs: 1 V/I inputs: 0.1	_
		Input 2_ON/OFF action differential gap (lower)	2.	οHL		_
	Parameter	Input 2_Setting change rate limiter (up)	2.5	iv RU	0	
	group No. 70	Input 2_Setting change rate limiter (down)	2.5	ir R9	0	

Setup Setting	Setting group	Input 2_PV bias (RS bias)	2. РЬ	0	_
Mode	No. 22	Input 2_PV digital filter (RS digital filter)		0.0	
		Input 2_PV ratio (RS ratio)	2 PR	1.000	_
		Input 2_PV low input cut-off ¹⁾		0.00	_
	Setting group	Input 2 Level PID setting 1		Input 2 Input range high	_
	No. 52	Input 2 Level PID setting 2			
		Input 2 Level PID setting 3			
		Input 2 Level PID setting 4			_
		Input 2_Level PID setting 5	2.667		
		Input 2_Level PID setting 6	<u>2.LEVS</u>		
		Input 2_Level PID setting 7	2.666		_
	Sotting group	Input 2_Level FID Setting 7	2.2.2.11	0	_
	No. 54	Input 2_AT bias	<i>с.</i> Ні Б	0	—
	Setting group No. 57	Input 2_Determination point of external disturbance	2.E × dJ	-1	_
	Setting group No. 58	Cascade_Proportional band (master- side)	MRS.P	TC/RTD inputs: 30 V/I inputs: 3.0	_
		Cascade_Integral time (master-side)	MRS.I	240	_
		Cascade_Derivative time (master-side)	MRS.d	60	_
		Cascade_Proportional band (slave- side)	SLV.P	TC/RTD inputs: 30 V/I inputs: 3.0	
		Cascade_Integral time (slave-side)	SLV.	240	_
		Cascade_Derivative time (slave-side)	SLV.d	60	_
		Cascade_Digital filter	E.dF	10.0	_
		Cascade_Scale high	C.SCH	Input 2_Setting limiter high	—
		Cascade_Scale low	E.SEL	Input 2_Setting limiter low	_
	Setting group	Input 2_Peak hold monitor	2.PHL d		_
	NO. 91	Input 2_Bottom hold monitor	2.6HL d		_
Engineering Mode	Function block No. 21	Input 1_Decimal point position ¹⁾	I.PGdP	0	1
	Function block No. 22	Input 2_Decimal point position ¹⁾	2.PG d P	Same as Input 1_ Decimal point position Only when the input type is Control with PV select, Input circuit error alarm, and Remote setting input (V/I inputs). Zero (0) for other cases.	2
		Input 2_Input range high	2.РБ5Н	• TC/RTD inputs Input 2_Maximum value of input range • V/I inputs Remote setting input: Input 1_Maximum value of input range Others: 100	
		Input 2_Input range low	2.PGSL	• TC/RTD inputs Input 2_Minimum value of input range • V/I inputs Remote setting input: Input 1_Minimum value of input range Others: 0	—
		Input 2_Input error determination point (high)	2. PoV	Input 2_Input range high + (Input 2_5 % of input span)	
		Input 2_Input error determination point (low)	2. PUN	Input 2_Input range low – (Input 2_5 % of input span)	_

	Function block No. 31	Retransmission output 1 scale high	RHS I	Input 2_Measured value (PV), Input 2_Local SV, and Input 2_SV monitor value: Input 2_Input range high Input 2_Deviation: +(Input 2_Input span)	4
		Retransmission output 1 scale low	ALS I	Input 2_Measured value (PV), Input 2_Local SV, and Input 2_SV monitor value: Input 2_Input range low Input 2_Deviation: -(Input 2_Input span)	4
	Function block No. 32	Retransmission output 2 scale high	RH52	Same as Retransmission output 1 scale high	4
		Retransmission output 2 scale low	RL S2	Same as Retransmission output 1 scale low	4
	Function block No. 33	Retransmission output 3 scale high	RH53	Same as Retransmission output 1 scale high	4
		Retransmission output 3 scale low	RL S 3	Same as Retransmission output 1 scale low	4
Engineering Mode	Function block No. 41	Event 1 differential gap	EHI	TC/RTD inputs: 2 V/I inputs: 0.2	3
	Function block No. 42	Event 2 differential gap	EH5		3
	Function block No. 43	Event 3 differential gap	ЕНЭ		3
	Function block No. 44	Event 4 differential gap	ЕНЧ		3
	Function	Input 2_Start determination point	2. PdR	3% of Input 2_Input span	
	DIOCK NO. 52	Input 2_Level PID differential gap	2. LHS	TC/RTD inputs: 2 V/I inputs: 0.2	
	Function	Cascade_AT mode (master-side)	MRS.RC	TC/RTD inputs: 0	
	DIOCK INO. 58	Cascade_AT mode (slave-side)	SLV.AF	v/i inputs: 1	_
	Function	Input 2_Setting limiter high	2. SL H	Input 2_Input range high	_
	DIOCK INO. 72	Input 2_Setting limiter low	2 511	Input 2_Input range low	

¹⁾ When Input 2_Input type is changed.

Conditions:

1. "Select function for Input 2" is "Control with PV select."

Select function for input 2 is Control with PV select.
 A setting other than Control with PV select is selected for "Select function for Input 2"
 Event type is a setting other than Manipulated output value AND "Select function for Input 2" is a setting other than "Control with PV select," AND Event assignment is "Input 2."
 Retransmission output is "Input 1_Measured value (PV)," "Input 1_Set value (SV)," or "Input 1_Deviation."

4.1.5 When Input 1_Control action (1 a5) is changed [Engineering Mode: Function block No. 51]

The following parameters will be initialized. Some parameters may have prerequisites for initialization. (See below for the conditions.)

Mode		Items	Sy	rmbol	Initial value	Condition
	Parameter group No. 51	Input 1_Proportional band [heat-side]	I.	Ρ	TC/RTD inputs: 30 V/I inputs: 3.0	_
		Input 1_Integral time [heat-side]	Ι.	1	240	_
		Input 1_Derivative time [heat-side]	Ι.	Ь	60	_
Parameter Setting Mode		Input 1_Control response parameter	Ι.	RPF	PID control or Position proportioning PID control: 0 Heating/Cooling PID control: 2	_
0		Input 1_Proactive intensity	I.F	PACT	2	—
		Input 1_Manual reset	1.	MR	0.0	_
		Input 1_FF amount	1.	FF	0.0	_
		Input 1_ON/OFF action differential gap (upper)	Ι.	οHH	TC/RTD inputs: 1 V/I inputs: 0.1	_
		Input 1_ON/OFF action differential gap (lower)	Ι.	οHL		_

88

		Input 1_Dead zone	І. МЕ АЬ	See Table 1 in 3.7.3	5
	Parameter group No. 56	Input 1_Proportional band [cool-side]	1. Pc	TC/RTD inputs: 30 V/I inputs: 3.0	
		Input 1_Integral time [cool-side]	1. I c	240	
		Input 1_Derivative time [cool-side]	l. dc	60	_
		Input 1_Overlap/Deadband	l. db	TC/RTD inputs: 0 V/I inputs: 0.0	_
	Parameter group No. 70	Input 1_Manipulated output value (For Area transfer)	I. MV.R	Heating/Cooling PID control: 0.0 Other control: -5.0	4
Sotup Sotting	Setting group No. 30	OUT3 proportional cycle time	ΓЭ	Voltage pulse output: See NOTE below	3
Mode	Setting group No. 51	Input 1_Manual manipulated output value	I. M.MV	Heating/Cooling PID control: 0.0 Other control: -5.0	4
	Function block No. 51	Input 1_Manipulated output value at input error	I. PSM	PID control: –5.0 Heating/Cooling PID control: 0.0	4
Engineering	Function block No. 53	Input 1_Valve coefficient F	1. F	MC-COS(R) control: 3 MC-VCOS(R) control: 10	5
Mode		Input 1_ Pressure (Temperature) limiter	I. PrL	0	5
	Function block No. 56	Undershoot suppression factor	US	Water cooling: 0.100 Air cooling: 0.250 Cooling linear: 1.000	

Conditions:

1. OUT1 is configured to control output: (Switching between Dir/Rev action in Input 1 is excluded from the initialization).

2. OUT2 is configured to control output: (Switching between Dir/Rev action in Input 1 is excluded from the initialization). 3. OUT3 is configured to control output: (Switching between Dir/Rev action in Input 1 is excluded from the initialization).

OUT3 is configured to control output: (Switching between Dir/Rev action in Input 1 is excluded from
 Input 1_Control action is other than switching between Dir/Rev action and Cooling action.

"Pressure/Temperature control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

.....

4.1.6 When Input 2_Control action (2. a5) is changed [Engineering Mode: Function block No. 52]

Мс	de	Items	Symbol	Initial value
Parameter Setting Mode	Parameter group No. 52	Input 2_Proportional band	2. P	TC/RTD inputs: 30 V/I inputs: 3.0
C C	° ,	Input 2_Integral time	2. I	240
		Input 2_Derivative time	2. d	60
		Input 2_Control response parameter	2. RPC	0
		Input 2_Proactive intensity	2.PRCT	2
		Input 2_Manual reset	2. MR	0.0
		Input 2_FF amount	2. FF	0.0
		Input 2_ON/OFF action differential gap (upper)	2. оНН	TC/RTD inputs: 1 V/I inputs: 0.1
		Input 2_ON/OFF action differential gap (lower)	2. oHL	
		Input 2_Dead band	2.МС d Ь	See Table 1 in 3.7.3
Engineering mode	Function block No. 54	Input 2_Valve coefficient F	2. F	MC-COS(R) control: 3 MC-VCOS(R) control: 10
		Input 2_Pressure (Temperature) limiter	2. Prl	0

The following parameters will be initialized.

4.1.7 When OUT3 function selection (□5L∃) and Universal output type selection (UNI □) are changed [Engineering Mode: Function block No. 30]

	51			
Мо	de	Items	Symbol	Initial value
Setup Setting	Setting	OUT3 proportional cycle time	ГЭ	2.0
Mode	group No. 30			

The following parameters will be initialized.

4.1.8 When Retransmission output 1 type (*R*□ *I*) is changed [Engineering Mode: Function block No. 31]

The following parameters will be initialized.

Mo	de	Items	Symbol	Initial value
Engineering Mode	Function block No. 31	Retransmission output 1 scale high	RHS I	 Input 1_Measured value (PV), Input 1_Local SV, Input 1_SV monitor value, and Remote setting input value: Input 1_Input range high (Control with PV select: PV select input 1_Deviation: +(Input 1_Input span) Input 2_Measured value (PV), Input 2_Local SV, and Input 2_SV monitor value: Input 2_Input range high Input 2_Deviation: +(Input 2_Input span) Manipulated output value, and Current transformer (CT) input value: 100.0 Measured value (PV) of differential temperature input: 100
		Retransmission output 1 scale low	ALS I	 Input 1_Measured value (PV), Input 1_Local SV, Input 1_SV monitor value, and Remote setting input value: Input 1_Input range low (Control with PV select: PV select input 1_Deviation: -(Input 1_Input span) Input 2_Measured value (PV), Input 2_Local SV, and Input 2_SV monitor value: Input 2_Input range low Input 2_Deviation: -(Input 2_Input span) Manipulated output value, and Current transformer (CT) input value: 0.0 Measured value (PV) of differential temperature input: -100

4.1.9 When Retransmission output 2 type (*R*_□*2*) is changed [Engineering Mode: Function block No. 32]

The following parameters will be initialized.

Мо	de	Items	Symbol	Initial value
Engineering Mode	Function block No. 32	Retransmission output 2 scale high	RHS2	Same as Retransmission output 1 scale high
		Retransmission output 2 scale low	ALS2	Same as Retransmission output 1 scale low

90

4.1.10 When Retransmission output 3 type (*R*_□∃) is changed [Engineering Mode: Function block No. 33]

The following parameters will be initialized.

Mode		Items	Symbol	Initial value
Engineering Mode	Function block No. 33	Retransmission output 3 scale high	RHS3	Same as Retransmission output 1 scale high
		Retransmission output 3 scale low	AL S 3	Same as Retransmission output 1 scale low

4.1.11 When Event 1 type (E5 /) and Event 1 assignment (EVR /) are changed [Engineering Mode: Function block No. 41]

The following parameters will be initialized.

Mode		Items	Symbol	Initial value
Parameter Setting Mode	Parameter group No. 40	Event 1 set value (EV1) Event 1 set value (EV1) [high]	EV I	High action, high/low action: max. Low action, process action: min.
		Event 1 set value (EV1') [low]	EV I	High/low action: min. Process action: max.
Engineering	Function	Event 1 hold action	EHo I	0
Mode block No. 41	Event 1 differential gap	EHI	Deviation, Process and SV: TC/RTD inputs: 2 V/I inputs: 0.2 MV: 0.2	
		Event 1 timer	ΕνΓΙ	0.0

4.1.12 When Event 2 type (ES2) and Event 2 assignment (EVR2) are changed [Engineering Mode: Function block No. 42]

The following parameters will be initialized.

Mode		Items	Symbol	Initial value	
Parameter	Parameter	Event 2 set value (EV2)	FVZ	High action, high/low action: max.	
Setting Mode	group No. 40	Event 2 set value (EV2) [high]	2,2	Low action, process action: min.	
		Event 2 set value (EV2') [low]	יקאַק	High/low action: min.	
			.,.	Process action: max.	
Engineering	Function	Event 2 hold action	EHo2	0	
Mode block No. 42	DIOCK NO. 42	Event 2 differential gap	EH5	Deviation, Process and SV: TC/RTD inputs: 2 V/I inputs: 0.2 MV: 0.2	
		Event 2 timer	Ейгэ	0.0	

4.1.13 When Event 3 type (ES3) and Event 3 assignment (EVR3) are changed [Engineering Mode: Function block No. 43]

	The following parameters will be initialized.					
Mode		ode	Items	Symbol	Initial value	
	Parameter Setting Mode	Parameter group No. 40	Event 3 set value (EV3) Event 3 set value (EV3) [high]	ЕVЭ	High action, high/low action: max. Low action, process action: min.	
			Event 3 set value (EV3') [low]	ЕК Э	High/low action: min. Process action: max.	
	Engineering Fu Mode blc	Function	Event 3 hold action	EHo3	0	
			Event 3 differential gap	ЕНЭ	Deviation, Process and SV: TC/RTD inputs: 2 V/I inputs: 0.2 MV: 0.2	
			Event 3 timer	ЕГГЭ	0.0	

The following parameters will be initialized.

4.1.14 When Event 4 type (E54) and Event 4 assignment (EVR4) are changed [Engineering Mode: Function block No. 44]

The following parameters will be initialized.

Mode		Items	Symbol	Initial value
Parameter Setting Mode	Parameter group No. 40	Event 4 set value (EV4) Event 4 set value (EV4) [high]	ЕКА	High action, high/low action: max. Low action, process action: min.
		Event 4 set value (EV4') [low]	Е⊬Ч′	High/low action: min. Process action: max.
Engineering	Function	Event 4 hold action	ЕНоЧ	0
Mode b	block No. 44	Event 4 differential gap	ЕНЧ	Deviation, Process and SV: TC/RTD inputs: 2 V/I inputs: 0.2 MV: 0.2
		Event 4 timer	ЕКГЧ	0.0

4.1.15 When Integral/Derivative time decimal point position (*I ddP*) is changed [Engineering Mode: Function block No. 50]

The	following	parameters	will	be	initialized.
	1011011119	paramotoro		~ ~	in malana o on

Mo	ode	Items	Symbol	Initial value
Parameter	Parameter	Input 1_Integral time [heat-side]	1. 1	240
Setting Mode	group No. 51	Input 1_Derivative time [heat-side]	1. d	60
	Parameter	Input 2_Integral time	2. I	240
	group No. 52	Input 2_Derivative time	2. d	60
	Parameter	Input 1_Integral time [cool-side]	1. I c	240
	group No. 56	Input 1_Derivative time [cool-side]	l. dc	60
Setup	Setting group	Cascade _Integral time (master-side)	MRS. I	240
Setting Mode	No. 58	Cascade _Derivative time (master- side)	MRS.d	60
		Cascade _Integral time (slave-side)	SLV.	240
		Cascade _Derivative time (slave- side)	SLV.d	60

4.1.16 When Input 1_Valve coefficient (F) is changed [Engineering Mode: Function block No. 53]

Mode	Items	Symbol	Initial value
Parameter Setting Mode group No. 51	Input 1_Dead zone	I. МЕ <i>д</i> Ь	See Table 1 in 3.7.3

4.1.17 When Input 2_Valve coefficient (F) is changed [Engineering Mode: Function block No. 54]

M	lode	Items	Symbol	Initial value
Parameter Setting Mode	Parameter group No. 52	Input 2_Dead zone	2. МС dБ	See Table 1 in 3.7.3

4.1.18 When Communication protocol (EMP5) is changed [Engineering Mode: Function block No. 60]

Mode		Items	Symbol	Initial value
Engineering Mode	Function block No. 60	Device address	Rdd	Original communication: 0 Modbus: 1 PLC communication: 0
		Data bit configuration	ЫГ	0
	Function block No. 62	Register type	MP. REG	0

The following parameters will be initialized.

4.1.19 When Register type (MP. REG) is changed [Engineering Mode: Function block No. 62]

The following parameters will be initialized.						
Mode		Items	Symbol	Initial value		
Engineering Mode	Function block No. 62	Register start number (High-order 4-bit)	MP.SRH	0		
		Register start number (Low-order 16-bit)	MP.S.R.L	1000		

The following parameters will be initialized.

4.1.20 When Soak time unit (5/ dP) is changed [Engineering Mode: Function block No. 70]

The following parameters will be initialized.

Mode		Items	Symbol	Initial value
Parameter Setting Mode	Parameter group No. 70	Area soak time	RSF	0:00 (0 minutes 00 seconds)

4.1.21 When Initialization (*dEF*) is changed [Engineering Mode: Function block No. 91]

If Initialization is done by setting "1225" at [Engineering Mode: Function block No. 91], all the settings will be set to the factory set values.

IDENTIFY and Settings are recorded before Initializing.

4.2 Parameters to Be Automatically Converted

If the data of the following parameter is changed, related set values are also automatically converted.

NOTE Make sure all settings are recorded before changing the set values. **NOTE** Check all set values after having changed the settings.

Refer to the "Example of automatic conversion" in 4.2 Parameters to be Automatically Converted for automatic conversion.

 Input data type 	Engineering Mode	Function block No. 21
 Input 1_Decimal point position 	Engineering Mode	Function block No. 21
 Input 1_Input range high/low 	Engineering Mode	Function block No. 21
 Input 1_Setting limiter high/low 	Engineering Mode	Function block No. 71
• Input 1_Output limiter high/low [heat-side]	Parameter Setting Mode	Function block No. 51
• Input 1_Output limiter high/low [cool-side]	Parameter Setting Mode	Function block No. 56
 Input 2_Decimal point position 	Engineering Mode	Function block No. 22
 Input 2_Input range high/low 	Engineering Mode	Function block No. 22
 Input 2_Setting limiter high/low 	Engineering Mode	Function block No. 72
 Input 2_Output limiter high/low 	Parameter Setting Mode	Function block No. 52
 Memory area transfer 	Monitor & SV Setting Mode	
	Memory Area Transfer Mode	
 Input 1_Level PID setting 1 	Setup Setting Mode	Setting group No. 51
 Input 1_Level PID setting 2 	Setup Setting Mode	Setting group No. 51
 Input 1_Level PID setting 3 	Setup Setting Mode	Setting group No. 51
 Input 1_Level PID setting 4 	Setup Setting Mode	Setting group No. 51
 Input 1_Level PID setting 5 	Setup Setting Mode	Setting group No. 51
 Input 1_Level PID setting 6 	Setup Setting Mode	Setting group No. 51
 Input 1_Level PID setting 7 	Setup Setting Mode	Setting group No. 51

- Input 2_Level PID setting 1
- Input 2_Level PID setting 2
- Input 2_Level PID setting 3
- Input 2_Level PID setting 4
- Input 2_Level PID setting 5
- Input 2_Level PID setting 6
- Input 2_Level PID setting 7
- Input 1_Pressure (Temperature) Limiter
- Input 2_Pressure (Temperature) Limiter

Setup Setting Mode Engineering Mode Setting group No. 52 Function block No. 53 Function block No. 54

Example of automatic conversion

• If the position of a decimal point is changed, the decimal point is shifted according to the setting.

Example 1:

When the Input 1_Input range high is set to 400.0 °C, changing the decimal point position to 0 from 1 will change the Input 1_Input range high to 400 °C.

Input 1_ Input range high



The value will be rounded off to a positive integer. (400.5 °C is rounded off to 401 °C)

Example 2:

When Input 1_input range is -200.0 to +850.0 °C (Input type: RTD Pt100), changing the decimal point position to 2 from 1 will change the input range to -100.0 to +100.0 °C.

Input 1_ Input range high



In case of RTD Pt100, as the maximum measuring range with decimal place of 2 is -100.0 to +100.0 °C, this value will not be exceeded.

Input 1_ Input range low

I.PGSL	I.PGSL
-200.0	- 100.00

• When the input range is changed, the setting limiter will be also changed according to the setting.

Example:

Input 1_Input range is 0 to 1372 °C, Input 1_Setting limiter high is 800 °C. Changing the Input 1_Input range high to 400 °C will change the Setting limiter high to 400 °C accordingly.



172-65710M-04 (SC-F71 Parameters/Functions) 23 Dec 2021

4.2.1 When Input 1_Decimal point position (1. PGdP), Input 1_Input range high (1. PG5H) and Input 1_Input range low (1. PG5L) are changed [Engineering Mode: Function block No. 21]

Mode		Items	Symbol	Condition
Monitor & SV Setting Mode		Input 1_Set value (SV)		—
		Set value (SV) of differential temperature input		—
	Parameter group No. 00	Input 1_Set value (SV)	I. 51/	—
		Set value (SV) of differential temperature input	dS⊬	_
	Parameter group No. 40	Event 1 set value (EV1) Event 1 set value (EV1) [high]	EV I	3
		Event 1 set value (EV1') [low]	EV 1	3
		Event 2 set value (EV2) Event 2 set value (EV2) [high]	E¥2	3
		Event 2 set value (EV2') [low]	EV 2'	3
		Event 3 set value (EV3) Event 3 set value (EV3) [high]	EV3	3
Doromotor		Event 3 set value (EV3') [low]	EV 3'	3
Setting Mode		Event 4 set value (EV4) Event 4 set value (EV4) [high]	ЕГЧ	3
		Event 4 set value (EV4') [low]	Е⊬Ч	3
	Parameter group No. 51	Input 1_Proportional band [heat-side]	I. P	2
		Input 1_ON/OFF action differential gap (upper)	I. oHH	2
		Input 1_ON/OFF action differential gap (lower)	I. oHL	2
		Input 1_Dead zone	I. МЕ́дь	5
	Parameter group No. 56	Input 1_Proportional band [cool-side]	1. Pc	2
		Input 1_Overlap/Deadband	1. db	2
	Parameter group No. 70	Input 1_Setting change rate limiter (up)	I. SKRU	
		Input 1_Setting change rate limiter (down)	I. SVRJ	—
	Setting group No. 21	Input 1_PV bias	I. РЬ	—
	Setting group No. 22	Input 2_PV bias (RS bias) *	2. Pb	1
	Setting group No. 51	Input 1_Level PID setting 1	I. LEV I	
		Input 1_Level PID setting 2	1. LEV2	
		Input 1_Level PID setting 3	1. LEV3	—
		Input 1_Level PID setting 4	I. LEV4	_
Cotup Cotting		Input 1_Level PID setting 5	I. LEVS	
Mode		Input 1_Level PID setting 6	1. LEV6	
Wede		Input 1_Level PID setting 7	I. LEVN	_
	Setting group No. 53	Input 1_AT bias	І. ЯГЬ	
	Setting group No. 57	Input 1_Determination point of external disturbance	I. Ехад	
	Setting group No. 58	Cascade_Proportional band (master-side)	MRS. P	2
		PV select transfer level	2PV.LV	
	Setting group No. 91	Input 1_Peak hold monitor	I. PHLd	—
		Input 1_Bottom hold monitor	I. HHLd	—
Engineering	Function block No. 21	Input 1_Input range high 1)	I. PGSH	—
Mode		Input 1_Input range high 1)	I. PGSL	—

Engineering	Function block No. 21	Input 1_Input error determination point (high)	I. Poľ	_
Mode		Input 1_Input error determination point (low)	I. PUN	_
	Function block No. 22	Input 2_Input range high 1)	2. PGSH	1
		Input 2_Input range high 1)	2. PGSL	1
	Function block No. 31	Retransmission output 1 scale high	RHS I	4
		Retransmission output 1 scale low	ALS I	4
	Function block No. 32	Retransmission output 2 scale high	RHS2	4
		Retransmission output 2 scale low	RLS2	4
	Function block No. 33	Retransmission output 3 scale high	RHS3	4
		Retransmission output 3 scale low	RLS3	4
	Function block No. 41	Event 1 differential gap	EH I	3
	Function block No. 42	Event 2 differential gap	EH2	3
	Function block No. 43	Event 3 differential gap	EH3	3
	Function block No. 44	Event 4 differential gap	ЕНЧ	3
	Function block No. 51	Input 1_Start determination point	I. PdR	_
		Input 1_Level PID differential gap	I. LHS	_
	Function block No. 53	Input 1_AT bias	І. АГЬ	_
	Function block No. 58	Input circuit error alarm set value	I CR	_
	Function block No. 71	Input 1_Setting limiter high	I. SLH	_
		Input 1_Setting limiter low	I. SLL	_

¹⁾ Only when the Input 1_Decimal point position has been changed. (Not applicable to high and low limit of Input 1)

Conditions:

1. "Select function for input 2" is Remote setting input AND Input 2_Input type is either voltage output or current output.

2. When Input 1_Input type is Thermocouple/RTD input.

3. The condition is either of the following when:
 • Event type is a setting other than Manipulated output value AND "Select function for Input 2" is a setting other than "Control with PV

select".
Event type is a setting other than Manipulated output value AND Event assignment is either "Input 1" or "Differential temperature input."

Retransmission output is "No retransmission output," "Input 1_Measured value (PV)," "Input 1_Set value (SV)," "Input 1_Deviation," "Input 1_Remote setting input value," OR Measured value (PV) of differential temperature input.

Pressure control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".
 "Pressure control operation [MC-(V)COS(R)]" or "Temperature control operation [MC-(V)COS(R)]" is selected in "Input 1_Control action".

4.2.2 When Input 1_Setting limiter high/low (1. 5LH, 1. 5LL) is changed [Engineering Mode: Function block No. 71]

The following parameters will be automatically converted.

Mode		Items	Syr	nbol
Monitor & SV Setting Mode		Input 1_Set value (SV)	-	_
Parameter Setting Mode	Parameter group No. 00	Input 1_Set value (SV)	Ι.	51

4.2.3 When Input 1_Output limiter high/low [heat-side] (1. aLH, 1. aLL) is changed [Parameter Setting Mode: Parameter group No. 51]

The following parameters will be automatically converted.

Mode		Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Manual manipulated output value	I. M.MV

4.2.4 When Input 1_Output limiter high/low [cool-side] (1. oLHc, 1. oLLc) is changed [Parameter Setting Mode: Parameter group No. 56]

The following parameters will be automatically converted.

If the control action is set to "Heating/Cooling PID control," the data of the following parameter will be automatically converted.

Mo	de	Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Manual manipulated output value	I. M.MV

4.2.5 When Input 2_Decimal point position (2. PLdP) is changed [Engineering Mode: Function block No. 22]

	Mode	Items	Symbol	Condition
Monitor & SV Setting Mode		Input 2_Set value (SV)	—	—
	Parameter group No. 00	Input 2_Set value (SV)	2. SV	_
	Parameter group No. 40	Event 1 set value (EV1) Event 1 set value (EV1) [high]	EV I	3
		Event 1 set value (EV1') [low]	EV 1	3
		Event 2 set value (EV2) Event 2 set value (EV2) [high]	EV2	3
		Event 2 set value (EV2') [low]	EV 21	3
Parameter Setting Mode		Event 3 set value (EV3) Event 3 set value (EV3) [high]	ЕVЭ	3
		Event 3 set value (EV3') [low]	EVB	3
		Event 4 set value (EV4) Event 4 set value (EV4) [high]	ЕVЧ	3
		Event 4 set value (EV4') [low]	EVЧ	3
	Parameter group No. 52	Input 2_Proportional band	2. P	2
		Input 2_ON/OFF action differential gap (upper)	2. oHH	2
		Input 2_ON/OFF action differential gap (lower)	2. oHL	2
	Parameter group No. 70	Input 2_Setting change rate limiter (up)	2. SKRU	
		Input 2_Setting change rate limiter (down)	2. SKR4	
	Setting group No. 22	Input 2_PV bias (RS bias)	2. Pb	1
	Setting group No. 52	Input 2_Level PID setting 1	2. LEV I	
		Input 2_Level PID setting 2	2. LEV2	—
		Input 2_Level PID setting 3	2. LEV 3	—
		Input 2_Level PID setting 4	2. LEV4	
		Input 2_Level PID setting 5	2. LEVS	—
		Input 2_Level PID setting 6	2. LEV6	—
Setup Setting		Input 2_Level PID setting 7	2. LEV7	
Wode	Setting group No. 54	Input 2_AT bias	2. RFb	—
	Setting group No. 57	Input 2_Determination point of external disturbance	2. E×dJ	—
	Setting group No. 58	Cascade_Proportional band (master-side)	SLV. P	2
		Cascade_Scale high	C. SCH	
		Cascade_Scale low	C. SEL	—
	Setting group No. 91	Input 2_Peak hold monitor	2. PHLd	—
		Input 2_Bottom hold monitor	2. GHLd	

	Function block No. 22	Input 2_Input range high	2. PGSH	1
		Input 2_Input range low	2. PGSL	1
		Input 2_Input error determination point (high)	2. Poľ	_
Engineering		Input 2_Input error determination point (low)	2. PUN	_
Mode	Function block No. 31	Retransmission output 1 scale high	RHS I	4
		Retransmission output 1 scale low	RLSI	4
	Function block No. 32 Retransmission output 2 scale high		RHS2	4
		Retransmission output 2 scale low	RLS2	4
	Function block No. 33	Retransmission output 3 scale high	RHS3	4
		Retransmission output 3 scale low	RLS3	4
	Function block No. 41	Event 1 differential gap	EH I	3
	Function block No. 42	Event 2 differential gap	EH3	3
Engineering	Function block No. 43	Event 3 differential gap	EH3	3
Mode	Function block No. 44	Event 4 differential gap	ЕНЧ	3
	Function block No. 52	Input 2_Start determination point	2. PJR	
		Input 2_Level PID differential gap	2. LHS	_
	Function block No. 72	Input 2_Setting limiter high	2. SLH	
		Input 2_Setting limiter low	2. SLL	

Conditions:

1. "Select function for input 2" is Remote setting input.

2. Input 1_Input type is Thermocouple/RTD input.

3. Event type is a setting other than Manipulated output value AND "Select function for Input 2" is a setting other than "Control with PV select," AND Event assignment is "Input 2."

4. Retransmission output is "Input 2_Measured value (PV)", "Input 2_Set value (SV)", or "Input 2_Deviation."

4.2.6 When Input 2_Setting limiter high/low (2. PG5H, 2. PG5L) is changed [Engineering Mode: Function block No. 22]

The following parameters will be automatically converted. Some parameters may have prerequisite for automatic conversion. (See below for conditions.)

Mode		Items	Symbol	Conditio n
Monitor & SV Setting Mode		Input 2_Set value (SV)	_	—
	Peremeter group No. 00	Input 1_Set value (SV)	1. SV	1
	Parameter group No. 00	Input 2_Set value (SV)	2. SV	—
		Event 1 set value (EV1) Event 1 set value (EV1) [high]	EV I	5
		Event 1 set value (EV1') [low]	EV 1	5
	Parameter group No. 40	Event 2 set value (EV2) Event 2 set value (EV2) [high]	EV 2	5
		Event 2 set value (EV2') [low]	EV 2'	5
Parameter Setting Mode		Event 3 set value (EV3) Event 3 set value (EV3) [high]	EVB	5
		Event 3 set value (EV3') [low]	EV3	5
		Event 4 set value (EV4) Event 4 set value (EV4) [high]	ЕКА	5
		Event 4 set value (EV4') [low]	ЕКЧ	5
		Input 1_Proportional band [heat-side]	I. P	3
	Parameter group No. 51	Input 1_ON/OFF action differential gap (upper)	I. oHH	3
		Input 1_ON/OFF action differential gap (lower)	I. oHL	3

		Input 2_Proportional band	2. P	2
	Decemptor group No. 52	Input 2_ON/OFF action differential gap (upper)	2. oHH	2
	Parameter group No. 52	Input 2_ON/OFF action differential gap (lower)	2. oHL	2
		Input 2_Dead zone	2. MEdb	7
	Deremeter group No. 56	Input 1_Proportional band [cool-side]	I. Pc	3
	Parameter group No. 56	Input 1_Overlap/Deadband	l. db	3
		Input 1_Setting change rate limiter (up)	I. SKRU	1
	Devery star may bla 70	Input 1_Setting change rate limiter (down)	1. SKRd	1
	Parameter group No. 70	Input 2_Setting change rate limiter (up)	2. SKRU	_
		Input 2_Setting change rate limiter (down)	2. SKRJ	_
	Setting group No. 22	Input 2_PV bias (RS bias)	2. Pb	4
		Input 1_Level PID setting 1	1. LEV 1	1
		Input 1_Level PID setting 2	1. LEV2	1
		Input 1_Level PID setting 3	1. LEV3	1
	Setting group No. 51	Input 1_Level PID setting 4	1. LEV4	1
		Input 1_Level PID setting 5	1. LEVS	1
Cotup Cotting		Input 1_Level PID setting 6	1. LEV6	1
Setup Setting		Input 1_Level PID setting 7	I. LEV7	1
wode		Input 2_Level PID setting 1	2. LEV 1	_
		Input 2_Level PID setting 2	2. LEV 2	_
	Setting group No. 52	Input 2_Level PID setting 3	2. LEV 3	
		Input 2_Level PID setting 4	2. LEV4	
		Input 2_Level PID setting 5	2. LEVS	
		Input 2_Level PID setting 6	2. LEV6	
		Input 2_Level PID setting 7	2. LEV7	
	Setting group No. 53	Input 1_AT bias	1. RF6	1
	Setting group No. 54	Input 2_AT bias	2. RF6	_
		Input 1_Determination point of external disturbance	I. E×dJ	1
o	Setting group No. 57	Input 2_Determination point of external disturbance	2. E×dJ	_
Setup Setting		Cascade_Proportional band (slave-side)	SLV. P	2
Mode	Setting group No. 58	Cascade_Scale high	E. SEH	
	001	Cascade_Scale low	E. SEL	_
	Setting group No. 91	Input 2_Peak hold monitor	2. PHLd	_
		Input 2_Bottom hold monitor	2. 6HLd	
	Employed by the state of the	Input 2_Input error determination point (high)	2. Poľ	
	Function block No. 22	Input 2_Input error determination point (low)	2. PUN	
		Retransmission output 1 scale high	RHS I	6
	Function block No. 31	Retransmission output 1 scale low	RLSI	6
	Employ black No. 00	Retransmission output 2 scale high	RHS2	6
	Function DIOCK No. 32	Retransmission output 2 scale low	RLS2	6
	Europhic his shade No. 22	Retransmission output 3 scale high	RH53	6
	Function block No. 33	Retransmission output 3 scale low	RL53	6
	Function block No. 41	Event 1 differential gap	EH I	5
	Function block No. 42	Event 2 differential gap	EH2	5
Engineering	Function block No. 43	Event 3 differential gap	EH3	5
IVIODE	Function block No. 44	Event 4 differential gap	ЕНЧ	5
	Freedow black black	Input 1_Start determination point	I. PJR	1
	Function block No. 51	Input 1_Level PID differential gap	I. LPI d	1
	Function block Mr. 50	Input 2_Start determination point	2. PJR	_
	FUNCTION DIOCK NO. 52	Input 2_Level PID differential gap	2. LHS	_
	Function block No. 54	Input 2_ Pressure (Temp) limiter	2. PrL	8
	Function block Mr. 74	Input 1_Setting limiter high	I. SLH	1
	Function block No. /1	Input 1_Setting limiter low	I. SLL	1
	Function block May 70	Input 2_Setting limiter high	2. SLH	_
	FUNCTION DIOCK INO. 72	Input 2 Setting limiter low	2. SLL	_

Conditions:

Select function for input 2" is "Control with PV select."
 Input type is Thermocouple/RTD input.

 Input type is Thermocouple/RTD input.
 "Select function for input 2" is "Control with PV select" AND Input 2_Input type is Thermocouple/RTD input.
 A setting other than Remote setting input is selected for "Select function for Input 2"
 When Event type is a setting other than Manipulated output value AND "Select function for Input 2" is a setting other than "Control with PV select," AND Event assignment is "Input 2."
 The condition is either of the following.

 Retransmission output is "Input 2_Measured value (PV)," "Input 2_Set value (SV)," or "Input 2_Deviation."
 When "Control with PV select" is set to "Select function for Input 2", the Retransmission output will be as follows. "No retransmission output," "Input 1_Measured value (PV)," "Input 1_Set value (SV)," "Input 1_Deviation," "Input 1_Remote setting input value," OR Measured value (PV) of differential temperature input.

 "Pressure control operation [MC-(V)COS(R)]" or "Temperature control operation [MC-(V)COS(R)]" is selected in "Input 2_Control action". action".

4.2.7 When Input 2_Setting limiter high/low (2. 5LH, 2. 5LL) is changed [Engineering Mode: Function block No. 72]

 Mode
 Items
 Symbol

 Monitor & SV Setting Mode
 Input 2_Set value (SV)

 Parameter Setting Mode
 Parameter group No. 00
 Input 2_Set value (SV)

 Setup Setting Mode
 Setting group No. 58
 Cascade_Scale high
 C. 5L'

 Cascade_Scale low
 C. 5LL

The following parameters will be automatically converted.

4.2.8 When Input 2_Output limiter high/low (2. aLH, 2. aLL) is changed [Parameter Setting Mode: Parameter group No. 52]

The following parameters will be automatically converted.

Mode		Items	Symbol
Setup Setting Mode	Setting group No. 52	Input 2_Manual manipulated output value	2. M.MV

4.2.9 When Memory area transfer (*RRER*) is changed [Memory Area Transfer Mode]

The following parameters will be automatically converted.

Mc	de	Items	S	ymbol
Setup Setting Mode	Setting group No. 51	Input 1_Manual manipulated output value	Ι.	M. MV
	Setting group No. 52	Input 2_Manual manipulated output value	2.	M. MV

4.1.10 When Input 1_Level PID setting 1 (1. LEV 1) is changed [Setup Setting Mode: Setting group No. 51]

The following parameters will be automatically converted.

N	lode	Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Level PID setting 2	1.LEV 2
		Input 1_Level PID setting 3	I.LEV 3
		Input 1_Level PID setting 4	I.LEV4
		Input 1_Level PID setting 5	I.LEVS
		Input 1_Level PID setting 6	I.LEV6
		Input 1_Level PID setting 7	ILEV7

4.2.11 When Input 1_Level PID setting 2 (1. LEV2) is changed [Setup Setting Mode: Setting group No. 51]

The following parameters will be automatically converted.

Mode		Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Level PID setting 1	ILEV I
		Input 1_Level PID setting 3	I.LEV 3
		Input 1_Level PID setting 4	I.L E V H
		Input 1_Level PID setting 5	I.L E V S
		Input 1_Level PID setting 6	I.LEV6
		Input 1_Level PID setting 7	I.LEV7

4.2.12 When Input 1_Level PID setting 3 (1. LEV3) is changed [Setup Setting Mode: Setting group No. 51]

M	ode	Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Level PID setting 1	I. LEV I
		Input 1_Level PID setting 2	1. LEV2
		Input 1_Level PID setting 4	1. LEV4
		Input 1_Level PID setting 5	I. LEVS
		Input 1_Level PID setting 6	1. LEV6
		Input 1_Level PID setting 7	I. LEV7

4.2.13 When Input 1_Level PID setting 4 (!. LEVY) is changed [Setup Setting Mode: Setting group No. 51]

Ν	lode	Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Level PID setting 1	I.LEV I
		Input 1_Level PID setting 2	1.LEV 2
		Input 1_Level PID setting 3	1.LEV 3
		Input 1_Level PID setting 5	I.LEVS
		Input 1_Level PID setting 6	1.LEV6
		Input 1_Level PID setting 7	I.LEV7

The following parameters will be automatically converted.

4.2.14 When Input 1_Level PID setting 5 (1. LEV5) is changed [Setup Setting Mode: Setting group No. 51]

The following parameters will be automatically converted.

	Mode	Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Level PID setting 1	I.LEV I
		Input 1_Level PID setting 2	ILEV2
		Input 1_Level PID setting 3	I.LEV 3
		Input 1_Level PID setting 4	ILEVЧ
		Input 1_Level PID setting 6	I.LEV6
		Input 1_Level PID setting 7	I.LEV7

4.2.15 When Input 1_Level PID setting 6 (1. LEVE) is changed [Setup Setting Mode: Setting group No. 51]

The following parameters will be automatically converted.

	Mode	Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Level PID setting 1	1. LEV 1
		Input 1_Level PID setting 2	1. LEV2
		Input 1_Level PID setting 3	1. LEV 3
		Input 1_Level PID setting 4	I. LEVЧ
		Input 1_Level PID setting 5	I. LEVS
		Input 1_Level PID setting 7	1. LEV7

4.2.16 When Input 1_Level PID setting 7 (1. LEV7) is changed [Setup Setting Mode: Setting group No. 51]

The following parameters will be automatically converted.

Ma	ode	Items	Symbol
Setup Setting Mode	Setting group No. 51	Input 1_Level PID setting 1	1. LEV 1
		Input 1_Level PID setting 2	I. LEV2
		Input 1_Level PID setting 3	1. LEV 3
		Input 1_Level PID setting 4	1. LEV4
		Input 1_Level PID setting 5	I. LEVS
		Input 1_Level PID setting 6	1. LEV6

4.2.17 When Input 2_Level PID setting 1 (2. LEV I) is changed [Setup Setting Mode: Setting group No. 52]

N	lode	Items	Symbol
Setup Setting Mode	Setting group No. 52	Input 2_Level PID setting 2	2. LEV2
		Input 2_Level PID setting 3	2. LEV 3
		Input 2_Level PID setting 4	2. LEV4
		Input 2_Level PID setting 5	2. LEVS
		Input 2_Level PID setting 6	2. LEV6
		Input 2_Level PID setting 7	2. LEV7

4.2.18 When Input 2_Level PID setting 2 (2. LEV2) is changed [Setup Setting Mode: Setting group No. 52]

Mode		Items	Symbol
Setup Setting Mode	Setting group No. 52	Input 2_Level PID setting 1	2. LEV I
		Input 2_Level PID setting 3	2. LEV 3
		Input 2_Level PID setting 4	2. LEV4
		Input 2_Level PID setting 5	2. LEVS
		Input 2_Level PID setting 6	2. LEV6
		Input 2_Level PID setting 7	2. LEV7

The following parameters will be automatically converted.

4.2.19 When Input 2_Level PID setting 3 (2. LEV3) is changed [Setup Setting Mode: Setting group No. 52]

The following parameters will be automatically converted.

Mode		Items	Symbol
Setup Setting Mode	Setting group No. 52	Input 2_Level PID setting 1	2. LEV 1
		Input 2_Level PID setting 2	2. LEV2
		Input 2_Level PID setting 4	2. LEV4
		Input 2_Level PID setting 5	2. LEVS
		Input 2_Level PID setting 6	2. LEV6
		Input 2_Level PID setting 7	2. LEV7

4.2.20 When Input 2_Level PID setting 4 (2. LEV4) is changed [Setup Setting Mode: Setting group No. 52]

Mode		Items	Symbol
Setup Setting Mode	Setting group No. 52	Input 2_Level PID setting 1	2. LEV 1
		Input 2_Level PID setting 2	2. LEV2
		Input 2_Level PID setting 3	2. LEV 3
		Input 2_Level PID setting 5	2. LEVS
		Input 2_Level PID setting 6	2. LEV6
		Input 2_Level PID setting 7	2. LEV7

4.2.21 When Input 2_Level PID setting 5 (2. LEV5) is changed [Setup Setting Mode: Setting group No. 52]

Mc	ode	Items	Symbol
Setup Setting Mode	Setting group No. 52	Input 2_Level PID setting 1	2. LEV 1
		Input 2_Level PID setting 2	2. LEV2
		Input 2_Level PID setting 3	2. LEV 3
		Input 2_Level PID setting 4	2. LEV4
		Input 2_Level PID setting 6	2. LEV6
		Input 2_Level PID setting 7	2. LEV7

The following parameters will be automatically converted.

4.2.22 When Input 2_Level PID setting 6 (2. LEVE) is changed [Setup Setting Mode: Setting group No. 52]

The following parameters will be automatically converted.

	Mode	Items	Symbol
Setup Setting Mode	Setting group No. 52	Input 2_Level PID setting 1	2. LEV 1
		Input 2_Level PID setting 2	2. LEV2
		Input 2_Level PID setting 3	2. LEV3
		Input 2_Level PID setting 4	2. LEV4
		Input 2_Level PID setting 5	2. LEVS
		Input 2_Level PID setting 7	2. LEV7

4.2.23 When Input 2_Level PID setting 7 (2. LEV7) is changed [Setup Setting Mode: Setting group No. 52]

The following parameters will be automatically converted.

Mo	ode	Items	Symbol
Setup Setting Mode	Setting group No. 52	Input 2_Level PID setting 1	2.LEV I
		Input 2_Level PID setting 2	2.LEV2
		Input 2_Level PID setting 3	2.LEV 3
		Input 2_Level PID setting 4	2.LEV4
		Input 2_Level PID setting 5	2.LEVS
		Input 2_Level PID setting 6	2.LEV6

4.2.24 When Input 1_Pressure (Temperature) limiter (1. PrL) is changed [Engineering mode: Function block No. 53]

The following parameters will be automatically converted.

Mo	ode	Items	Symbol	
Setup Setting Mode	Setting group No. 51	Input 1_Manual manipulated output value	I. M.M.V	

4.2.25 When Input 2_Pressure (Temperature) limiter (2. PrL) is changed [Engineering mode: Function block No. 54]

Mo	ode	Items	Symbol	
Setup Setting Mode	Setting group No. 52	Input 2_ Manual manipulated output value	2. M.M.V	

5. Input Function

This chapter describes input related functions, setting contents and setting procedure based on the key words related to inputs.

5.1 Changing Measured Input Settings

Measured input can be changed at following parameters. Set the input according to the sensor and the application.

- Input type
- Temperature unit
- Decimal point position
- Input range high/Input range low

Description of function

Input type

Input type can be easily configured to thermocouple (TC), RTD, current (I) or voltage (V) only by changing the settings.

- TC input type: K, J, R, S, B, E, N, T, W5Re/W26Re, PL II, U, L, PR40-20
- RTD input type: Pt100, JPt100
- Current input type: 0 to 20 mA DC, 4 to 20 mA DC
- Voltage input type: 0 to 10 V DC, 0 to 5 V DC, 1 to 5 V DC, 0 to 1 V DC, -10 to +10 V DC, -5 to +5 V DC, 0 to 100 mV DC, 0 to 10 mV DC

Temperature unit

In case of thermocouple (TC) or RTD input, the measurement unit can be selected from °C and °F.

Decimal point position

The decimal point position depends on the input type.

- TC input: K, J, R, S, B, E, N, T, PL II, U, L: No decimal place or one decimal place Thermocouples other than those shown above: No decimal place (fixed)
- RTD input: No decimal place, one decimal place or two decimal places
- Voltage/Current input: No decimal place, one decimal place, two decimal places, three decimal places or four decimal places

Input range high/low

In the case of temperature input (TC and RTD), input ranges can be changed. In the case of voltage (V) and current (I) inputs, the display range is programmable within - 19999 and +99999.

(The input range specified when ordered can be changed by setting the input range high and low.)

Example of input change 1: Changing thermocouple K "-200.0 to +1372.0 °C" to "0.0 to 400.0 °C"

106

Example of input change 2:

When the input range is -200.0 to +850.0 °C (Input type: RTD Pt100), changing the decimal point position to 2 from 1 will change the input range to -100.00 to +100.00 °C. The maximum range with an RTD Pt100 input with two decimal places is -100.00 to +100.00 °C. Accordingly setting beyond this range is not possible.



Example of input change 3:

In the case of Voltage input (1 to 5 V DC), the input range has been reduced from "0.0 to 100.0" to "0.0 to 50.0."



NOTE When 3 to 7 (pressure control operation [MC-(V)COS(R)]) is set to Input 2_Control action, the set value for the parameter should be entered with the same pressure unit selected for Input 2_Valve coefficient F.

107

Parameter setting

- Refer to the Input range table for the input range of each input type.
- Refer to Input range code table for the input range code.

Input 1	_Input type	[Engineering	Mode: I	Function	block No.	. 21 ((Fn2 I))]
---------	-------------	--------------	---------	----------	-----------	--------	---------	----

Parameter symbol		Data range			Factory set value	
		0:	TC input K	13: RTD input Pt100	Product identification	
<i>i</i> .	i	in F	1:	TC input J	14: RTD input JPt100	code specified at the
			2:	TC input R	15: Current input 0 to 20 mA DC	time of order.
			3:	TC input S	16: Current input 4 to 20 mA DC	
			4:	TC input B	17: Voltage input 0 to 10 V DC	
			5:	TC input E	18: Voltage input 0 to 5 V DC	
			6:	TC input N	19: Voltage input 1 to 5 V DC	
			7:	TC input T	20: Voltage input 0 to 1 V DC	
			8:	TC input W5Re/W26Re	21: Voltage input -10 to +10 V DC	
			9:	TC input PL II	22: Voltage input -5 to +5 V DC	
			10:	TC input U	23: Voltage input 0 to 100 mV DC	
			11:	TC input L	24: Voltage input 0 to 10 mV DC	
			12:	TC input PR40-20		

NOTE When the input type is changed from current or high voltage input* to TC, RTD or low voltage input*, remove the wirings of the measured input before attempting the input change. Changing the input type with the signal applied to the instrument may lead to a failure of the instrument.

* High voltage input: 0 to 10 V DC, 0 to 5 V DC, 1 to 5 V DC, 0 to 1 V DC, -10 to +10 V DC, -5 to +5 V DC

Low voltage input: 0 to 100 mV DC, 0 to 10 mV DC

Refer to 4. Parameters that are Initialized/Modified when Setting is Changed for the parameters that are initialized or changed when the Input 1_input type is changed.

Input 2_Input type [Engineering Mode: Function block No. 22 (Fn22)]

Parameter symbol		Data range			
	0: TC input K	12: TC input PR40-20	Same as Input 1_		
	1: TC input J	13: RTD input Pt100	Input type		
	2: TC input R	14: RTD input JPt100			
	3: TC input S	15: Current input 0 to 20 mA DC			
	4: TC input B	16: Current input 4 to 20 mA DC			
	5: TC input E	17: Voltage input 0 to 10 V DC			
	6: TC input N	18: Voltage input 0 to 5 V DC			
	7: TC input T	19: Voltage input 1 to 5 V DC			
	8: TC input	20: Voltage input 0 to 1 V DC			
	W5Re/W26Re	21: Voltage input –10 to +10 V DC			
	9: TC input PL II	22: Voltage input –5 to +5 V DC			
	10: TC input U	23: Voltage input 0 to 100 mV DC			
	11: TC input L	24: Voltage input 0 to 10 mV DC			
INOTE Wher	n the input type is cha	nged from current or high voltage	ge input* to TC,		
RTD	or low voltage input *, remove the wirings of the measured input				
befor	re attempting the input change. Changing the input type with the				
signa	al applied to the instrument may lead to a failure of the instrument				

* High voltage input: 0 to 10 V DC, 0 to 5 V DC, 1 to 5 V DC, 0 to 1 V DC, -10 to +10 V DC, -5 to +5 V DC

Low voltage input: 0 to 100 mV DC, 0 to 10 mV DC
- Input 2_Input type is not displayed when "No function" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).
- Refer to 4. Parameters that are Initialized/Modified when Setting is Changed for the parameters that are initialized or changed when the Input 2_input type is changed.

Input 1_Display unit [Engineering Mode: Function block No. 21 (Fn2 /)]

		· · · · ·
Parameter symbol	Data range	Factory set value
	0: °C	Product identification code
	1: °F	specified at the time of order.

To display "Input 1_Display unit", choose "Thermocouple" or "RTD" in Function block No. 21: Input 1_Input type (Engineering mode).

Refer to 4. Parameters that are Initialized/Modified when Setting is Changed for the parameters that are initialized or changed when the Input 1_display unit is changed.

Input 2_ Display unit [Engineering Mode: Function block No. 22 (Fn22)]

Parameter symbol	Data range	Factory set value
2.UNI C	0: °C 1: °F	Same as Input 1_Display unit

- To display "Input 2_Display unit", choose "Thermocouple" or "RTD" in Function block No. 22: Input 2_Input type (Engineering mode).
- Input 2_Input type is not displayed when "No function" is selected in Function block No. 58: Select function for Input 2 (Engineering mode). The setting cannot be changed when Remote setting input and Control with PV select are set.
- Refer to 4. Parameters that are Initialized/Modified when Setting is Changed for the parameters that are initialized or changed when the Input 2_display unit is changed.

Input 1_Decimal point position [Engineering Mode: Function block No. 21 (Fn2 /)]

Parameter symbol	Data range	Factory set value
	0: No decimal place	Product identification code
i.rudr	1: One decimal place	specified at the time of order.
	2: Two decimal places	For unspecified V/I inputs: 1
	3: Three decimal places	
	4: Four decimal places	
	TC input:	
	W5Re/W26Re, PR40-20: 0 (fixed)	
	Thermocouples other than those shown above: 0 to 1	
	RTD input: 0 to 2	
	Voltage (V)/Current (I) input: 0 to 4	
	(When Control with PV select: Decimal point position	
	setting of Input 1 and Input 2 is compared and the smaller	
	will be used.)	

Refer to 4. Parameters that are Initialized/Modified when Setting is Changed for the parameters that are initialized or automatically converted when the Input 1_decimal point position is changed.

Input 2_Decimal point position [Engineering Mode: Function block No. 22 (Fn22)]

Parameter symbol	Data range	Factory set value
חו זחר	0: No decimal place	Same as Input 1_Decimal
C.PùdP	1: One decimal place	point position
	2: Two decimal places	
	3: Three decimal places	

4: Four decimal places TC input: W5Re/W26Re, PR40-20: 0 (fixed Thermocourles other than those	d)
RTD input: 0 to 2 Voltage (V)/Current (I) input: 0 to	4

- Input 2_Input type is not displayed when "No function" is selected in Function block No. 58: Select function for Input 2 (Engineering mode). The setting cannot be changed when Remote setting input and Control with PV select are set.
- When Control with PV select is set in Function block No. 58: Select function for Input 2 (Engineering mode), a smaller value (of Decimal point position setting for Input 1 and Input 2) will be used.
- Refer to 4. Parameters that are Initialized/Modified when Setting is Changed for the parameters that are initialized or automatically converted when the Input 2_decimal point position is changed.

Input 1_Input range high [Engineering Mode: Function block No. 21 (Fn2 /)]

Parameter symbol	Data range	Factory set value
1.PG5H	(Input 1_Input range low + 1 digit) to Input 1_Maximum value of input range [Varies with the setting of the Decimal point position.] Refer to the Input range table for the input range of each input type.	Product identification code specified at the time of order. For unspecified V/I inputs: 100.0

- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 1_Input range high is changed.
- **NOTE** When 3 to 7 (pressure control operation [MC-(V)COS(R)]) is set to Input 1_Control action, the set value for the parameter should be entered with the same pressure unit selected for Input 1_Valve coefficient F.

Input 2_Input range high [Engineering Mode: Function block No. 22 (Fn22)]

Parameter symbol	Data range	Factory set value
2.PG\$H	 TC/RTD inputs and Voltage (V)/Current (I) inputs (For other than Remote setting input): (Input 2_Input range low + 1 digit) to Input 2_Maximum value of input range [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs (For Remote setting input): (Input 2_Input range low + 1 digit) to Input 1_ Maximum value of input range [Varies with the setting of the Decimal point position.] 	Same as Input 1_Input range high
	Refer to the input range table for the input range of each input type.	

- Not displayed when No function is selected in Function block No. 58: Select function for Input 2 (Engineering mode). Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 2_Input range high is changed.
- **NOTE** When 3 to 7 (pressure control operation [MC-(V)COS(R)]) is set to Input 2_Control action, the set value for the parameter should be entered with the same pressure unit selected for Input 2_Valve coefficient F.

Input 1_Input range low [Engineering Mode: Function block No. 21 (Fn2 /)]

Parameter symbol	Data range	Factory set value
I.PGSL	Input 1_Minimum value of input range to (Input 1_ Input range high – 1 digit) [Varies with the setting of the Decimal point position.] Refer to the Input range table for the input range of each input type.	Product identification code specified at the time of order. For unspecified V/I inputs: 0.0

- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 1_Input range low is changed.
- **NOTE** When 3 to 7 (pressure control operation [MC-(V)COS(R)]) is set to Input 1_Control action, the set value for the parameter should be entered with the same pressure unit selected for Input 1_Valve coefficient F.

Input 2_Input range low [Engineering Mode: Function block No. 22 (Fn22)]

Parameter symbol	Data range	Factory set value
2.PGŚL	 TC/RTD inputs and Voltage (V)/Current (I) inputs (For other than Remote setting input): Input 2_Minimum value of input range to (Input 2_Input range high – 1 digit) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs (For Remote setting input): Input 1_Minimum value of input range to (Input 2_Input range high – 1 digit) [Varies with the setting of the Decimal point position.] Refer to the Input range table for the input range of each input type. 	Same as Input 1_Input range low

- Not displayed when No function is selected in in Function block No. 58: Select function for Input 2 (Engineering mode). Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 2_Input range low is changed.
- **NOTE** When 3 to 7 (pressure control operation [MC-(V)COS(R)]) is set to Input 2_Control action, the set value for the parameter should be entered with the same pressure unit selected for Input 2_Valve coefficient F.

Input range table

The input resolution may vary with the selected input range, unit, and decimal point position.

Т	<u>C</u>	input	

Input type	Decimal point position	°C	°F
К	No decimal place	-200 to +400 °C	-328 to +752 °F
		-200 to +1372 °C	-328 to +2502 °F
	One decimal place	-200.0 to +400.0 °C	-328.0 to +752.0 °F
		-200.0 to +1372.0 °C	-328.0 to +2502.0 °F
J	No decimal place	-200 to +400 °C	-328 to +752 °F
		-200 to +1200 °C	-328 to +2192 °F
	One decimal place	-200.0 to +400.0 °C	-328.0 to +752.0 °F
		-200.0 to +1200.0 °C	-328.0 to +2192.0 °F
Т	No decimal place	-200 to +400 °C	-328 to +752 °F
	One decimal place	-200.0 to +400.0 °C	-328.0 to +752.0 °F
S	No decimal place	-50 to +1768 °C	-58 to +3214 °F
	One decimal place	-50.0 to +1768.0 °C	-58.0 to +3214.0 °F
R	No decimal place	-50 to +1768 °C	-58 to +3214 °F

	One decimal place	-50.0 to	+1768.0 °C	-58.0 to +3214.0 °F
E	No decimal place	-200 to	+1000 °C	-328 to +1832 °F
	One decimal place	-200.0 to	+1000.0 °C	-328.0 to +1832.0 °F
В	No decimal place	0 to	1800 °C	0 to +3272 °F
	One decimal place	0.0 to	1800.0 °C	0.0 to +3272.0 °F
Ν	No decimal place	0 to	1300 °C	0 to +2372 °F
	One decimal place	0.0 to	1300.0 °C	0.0 to +2372.0 °F
W5Re/W26Re	No decimal place	0 to	2300 °C	0 to +4200 °F
PL II	No decimal place	0 to	1390 °C	0 to +2534 °F
	One decimal place	0.0 to	1390.0 °C	0.0 to +2534.0 °F
U	No decimal place	-200 to	+600 °C	-328 to +1112 °F
	One decimal place	-200.0 to	+600.0 °C	-328.0 to +1112.0 °F
L	No decimal place	0 to	900 °C	0 to 1652 °F
	One decimal place	0.0 to	900.0 °C	0.0 to 1652.0 °F
PR40-20	No decimal place	0 to	1800 °C	0 to 3200 °F

* The least significant digit (LSD) may flicker when the display resolution is set to 0.1 °C (0.1 °F).

K, J, T, S, R, E, B, N, PL II, U, and L are settable to one decimal place. Other thermocouple inputs are fixed with no decimal place.

RTD input

Input type	Decimal point position	O°	°F
Pt100	No decimal place	-200 to +850 °C	-328 to +1562 °F
		-100 to +100 °C	-148 to +212 °F
		0 to 50	32 to 122 °F
	One decimal place	-200.0 to +850.0 °C	-328.0 to +1562.0 °F
		-100.0 to +100.0 °C	-148.0 to +212.0 °F
		0.0 to 50.0	32.0 to 122.0 °F
	Two decimal place	-100.00 to +100.00 °C	-148.00 to +212.00 °F
		0.00 to +50.00 °C	32.00 to +122.00 °F
JPt100	No decimal place	-200 to +649 °C	-328 to +1184 °F
		-200 to +100 °C	-148 to +212 °F
		0 to 50	32 to 122 °F
	One decimal place	-200.0 to +649.0 °C	-328.0 to +1184.0 °F
		-100.0 to +100.0 °C	-148.0 to +212.0 °F
		0.0 to 50.0	32.0 to 122.0 °F
	Two decimal place	-100.00 to +100.00 °C	-148.00 to +212.00 °F
		0.00 to 50.00 °C	-32.00 to +122.00 °F

Current/voltage input

Input type	Decimal point position	°C		
	No decimal place	-19999 to +99999		
	One decimal place	-1999.9 to +9999.9		
Pt100	Two decimal place	-199.99 to +999.99		
	Three decimal place	-19.999 to +99.999		
	Four decimal place	-1.9999 to +9.9999		

Input range code table

The Input range code table is a list of input range codes so that a user can specify the input range at the time of ordering. Even if the input range has been specified when ordered, the input range can be changed later within the measured range.

Thermocouple (TC) input

Input type	Code	Range	No. of digits**	Input type	Code	Range	No. of digits**
	K01	0 to 200 °C	4		T01	-199.9 to +400.0 °C	4

К	K02	0 to 400 °C	4	Т	T02	-199.9 to +100.0 °C	4
	K03	0 to 600 °C	4		T03	-100.0 to +200.0 °C	4
	K04	0 to 800 °C	4		T19	-200.0 to +400.0 °C	5
	K06	0 to 1200 °C	4	R	R01	0 to 1600 °C	4
	K07	0 to 1372 °C	4		R07	-50 to +1768 °C	4
	K08	-199.9 to +300.0 °C	4	S	S06	-50 to +1768 °C	4
	K09	0.0 to 400.0 °C	4	В	B03	0 to 1800 °C	4
	K10	0.0 to 800.0 °C	4	E	E01	0 to 800 °C	4
	K14	0 to 300 °C	4	Ν	N02	0 to 1300 °C	4
	K41	-200 to +1372 °C	4	W5Re/	W/00	0 to 2200 °C	4
	K42	-200.0 to +1372.0 °C	5	W26Re	VV03	0 to 2300 °C	4
	KA1	0 to 800 °F	4	PL II	A01	0 to 1300 °C	4
	KA2	0 to 1600 °F	4	U	U01	-199.9 to +600.0 °C	4
	KA3	0 to 2502 °F	4	L	L04	0.0 to 900.0 °C	4
J	J01	0 to 200 °C	4	PR40-20	F02	0 to 1800 °C	5
	J02	0 to 400 °C	4		FA2	0 to 3200 °F	5
	J03	0 to 600 °C	4				
	J04	0 to 800 °C	4				
	J08	0.0 to 400.0 °C	4				
	J29	-200.0 to +1200.0 °C	5				
	JA1	0 to 800 °F	4				
	JA3	0 to 2192 °F	4				
	JA6	0 to 400 °F	4				

RTD input

Input type	Code	Range	No. of digits**	Input type	Code	Range	No. of digits**
PT100	D01	-199.9 to +649.0 °C	4	Pt100	D21	-200.0 to +200.0 °C	5
	D04	-100.0 to +100.0 °C	4		D27	0.00 to +50.00 °C	4
	D05	-100.0 to +200.0 °C	4		D34	-100.00 to +100.00 °C	5
	D06	0.0 to 50.0 °C	4		D35	-200.0 to +850.0 °C	5
	D07	0.0 to 100.0 °C	4		DA1	-199.9 to +999.9 °F	4
	D08	0.0 to 200.0 °C	4		DA9	0.0 to 500.0 °F	4
	D09	0.0 to 300.0 °C	4	JPt100	P08	0.0 to 200.0 °C	4
	D10	0.0 to 500.0 °C	4		P29	-100.00 to +100.00 °C	5
	D12	-199.9 to +600.0 °C	4		P30	-200.0 to +640.0 °C	5

Voltage/Current input

Input type	Code	Range	No. of digits**	Input type	Code	Range	No. of digits
0 to 10 mV DC	101		5	1 to +5 V DC	601		5
0 to 100 mV DC	201	Programmable	5	0 to 20 mA DC	701	Programmable	5
0 to 1 V DC	301	range	5	4 to 20 mA DC	801	range	5
0 to 5 V DC	401	-199999 to +99999	5	-10 to +10V DC	904	-19999 to +99999	5
0 to 10 V DC	501]	5	-5 to +5 V DC	905]	5

Setting procedure



· Select lock on the Set data unlock/lock transfer.

5.2 Switching Functions Using Digital Inputs (DI)

With the use of Digital input (DI), switching between the following functions is available.

- RUN/STOP transfer
- Auto/Manual transfer
- Select function for Input 2 transfer * (Remote/Local transfer, Cascade mode transfer, PV select transfer or 2-loop control/Differential temperature control)
 - * The function selected at Select function for Input 2 is switchable.
- Interlock release
- Peak/Bottom holds release
- Selection of Autotuning (AT)
- Set data Unlock/Lock
- Direct/Reverse action
- Memory area

Number of Digital input (DI)

Maximum 6 points (4 points when the optional communication (RS-422A) is selected)

Functional setting of Digital input (DI)

			Jigital Input (L	<i>J</i> 1).		
Setting	DI1	DI2	DI3	DI4	DI5	DI6
0	No function	No function				
1	RUN/STOP	RUN/STOP	RUN/STOP	RUN/STOP	RUN/STOP	RUN/STOP
2	AUTO/MAN (1/2)	AUTO/MAN (1/2)				
3	AUTO/MAN (1)	AUTO/MAN (1)				
4	AUTO/MAN (2)	AUTO/MAN (2)				
5	REM/LOC	REM/LOC	REM/LOC	REM/LOC	REM/LOC	REM/LOC
6	Interlock release	Interlock release				
7	Hold reset (1/2)	Hold reset (1/2)				
8	Hold reset (1)	Hold reset (1)				
9	Hold reset (2)	Hold reset (2)				
10	AT ON/OFF (1/2)	AT ON/OFF (1/2)				
11	AT ON/OFF (1)	AT ON/OFF (1)				
12	AT ON/OFF (2)	AT ON/OFF (2)				
13	Unlock/Lock	Unlock/Lock	Unlock/Lock	Unlock/Lock	Unlock/Lock	Unlock/Lock
14	Direct/Reverse action	Direct/Reverse action				
15	2 areas					
16	8 areas without SET					
17	8 areas with SET	\langle	\langle	\langle		
18	16 areas without SET					
19	16 areas with SET	\searrow	\searrow	\searrow	$\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{$	
20	Area jump					

Set the desired function at each Digital input (DI)

: The Setting range of DI2 to DI6 is from 0 to 14. Values 15 or larger cannot be set.

When any of 16, 17, 18, and 19 is set for DI1, DI2 to DI5 (which are crossed out with) are used for switching the Memory area and not settable.

Explanation of functional setting

RUN/STOP:	RUN/STOP transfer
AUTO/MAN (1/2):	Auto/Manual transfer (Common to Input 1/Input 2)
AUTO/MAN (1):	Auto/Manual transfer (Input 1 only)
AUTO/MAN (2):	Auto/Manual transfer (Input 2 only) ¹⁾

REM/LOC:	Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop
	control/ Differential temperature control)
Interlock release:	Release of Interlock
Hold reset (1/2):	Release of Peak or Bottom hold value (Common to Input 1/ Input 2)
Hold reset (1):	Release of Peak or Bottom hold value (Input 1 only)
Hold reset (2):	Release of Peak or Bottom hold value (Input 2 only)
AT ON/OFF (1/2):	Autotuning (AT) ON/OFF (Common to Input 1/Input 2)
AT ON/OFF (1):	Autotuning (AT) ON/OFF (Input 1 only)
AT ON/OFF (2):	Autotuning (AT) ON/OFF (Input 2 only)
Unlock/Lock:	Set data unlock/lock
Direct/Reverse action:	Switching between direct and reverse actions (Common to Input 1/Input 2) ²⁾
2 areas:	Memory area transfer 2 points (without area set signal)
8 areas without SET:	Memory area transfer 8 points (without area set signal) ³⁾
	DI2 and DI3 are not settable in this setting.
8 areas with SET:	Memory area transfer 8 points (with area set signal) $^{4)}$
	DI2, DI3 and DI4 are not settable in this setting.
16 area without SET:	Memory area transfer 16 points (without area set signal) ⁴⁾
	DI2, DI3 and DI4 are not settable in this setting.
16 area with SET:	Memory area transfer 16 points (with area set signal) ⁵⁾ DI2, DI3, DI4 and DI5 are not settable in this setting.
Area jump:	Move to the linked area No. (If area is not specified, the jump destination is the current area No. $+$ 1)

¹⁾ Only when two inputs are available.

¹⁾ Only when two inputs are available.
 ²⁾ Only when control action setting for Input 1 or Input 2 is any of 0, 1, 8, and 9.
 ³⁾ Only when setting of control action of Input 1 or Input 2 is any of 0 and 1.
 ⁴⁾ Only when six or more Digital inputs (DI) are available.

Open/Close action of Digital Input (DI)

• RUN/STOP transfer, Auto/Manual transfer, Remote/Local transfer, Set data unlock/lock transfer and Direct/Reverse action transfer

Functions are selected as follows using the open/close action of the contact.

F	unction	Contact close	Contact open
RUN/S	TOP transfer	RUN	STOP
Auto/Ma	nual transfer	Auto mode	Manual mode
Remote/Local	Remote/Local transfer	Remote mode	Local mode
transfer 1)	PV select transfer ²⁾	Input 2	Input 1
	2-loop control/ Differential temperature control		2-loop control
	Cascade mode transfer (Slave single)	Cascade control	Slave single control
	Cascade mode transfer (Master single)	Cascade control	Master single control
Set data unlock/lock	transfer	Lock	Unlock
Direct/Reverse action	h transfer	Direct action	Reverse action

¹⁾ Only one of the functions is available
 ²⁾ When "1: Switch by signal" is selected in Function block No. 58: Selection of PV select trigger (Engineering mode).

- Switching between Direct/Reverse action is available, only while the instrument is at STOP. Switching is not available during RUN. Setting the contact at RUN beforehand will perform switching when the instrument enters the STOP mode. If "Input 1_Control action" or "Input 2_Control action" is set to "0: PID control with Autotuning (direct action)" or "1: PID control with Autotuning (reverse action)," PID action is switched between reverse and direction actions.
- The above open/close action can be reversed (reversing the functions of open and close). Can be set in Function block No. 23: DI logic invert (Engineering mode).

Timing chart of functions

					Up to 200 ms
Contact closed \rightarrow					
Contact open -> -		*		*	
RUN/STOP	STOP	RUN	STOP	RUN	STOP
Auto/Manual	Manual	Auto	Manual	Auto	Manual
Remote/Local	Local	Remote	Local	Remote	Local
PV select transfer	Input 1	Input 2	Input 1	Input 2	Input 1
2-loop/Differential temperature	2-loop control	Differential temp. control	2-loop control	Differential temp. control	2-loop control
Cascade	Slave/Master single	Cascade	Slave/Master single	Cascade	Slave/Master single
Unlock/lock	Unlock	Lock	Unlock	Lock	Unlock
Direct/Reverse action	Reverse action	Direct action	Reverse action	Direct action	Reverse action

NOTE After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.

• Interlock release, Peak/Bottom hold release

Through the detection of close edge (rising edge), Interlock state and Peak (or Bottom) hold values are released.

Timing chart for releasing interlock, peak and bottom hold

Close edge	Up to 200 ms	
Contact closed ->		
Contact open →	<u>_</u>	
Interlock	Interlock state	Interlock release
Peak/Bottom hold	Peak/Bottom hold state	Peak/Bottom hold release

NOTE After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.

116



• Autotuning (AT) ON/OFF

Through the detection of the close edge, Autotuning (AT) ON/OFF is switched. If Input 1 and Input 2 are common, priority is given to the AT start. (Refer to the table below.)

Status before AT on/off switching		Status after AT on/off switching		
	Input 1	Input 2	Input 1	Input 2
	in PID control	in PID control	in PID control	in PID control
	during AT	in PID control	during AT	in PID control
	in PID control	during AT	in PID control	during AT
	during AT	during AT	during AT	during AT

ON/OFF timing chart of Autotuning (AT)



NOTE After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.

• Memory area transfer

Selection of Memory area No. can be obtained through such contact status as shown below.

Memory area No.	DI1	DI2	DI3	DI4
1				
2	×	—	—	_
3	—	×	—	_
4	×	×	_	
5	_	_	×	
6	×	_	×	
7	_	×	×	
8	×	×	×	
9				×
10	×			×
11		×		×
12	×	×		×
13			×	×
14	×		×	×
15		×	×	×
16	×	×	×	×





NOTE After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.

• Without SET signal ····· First select the memory area using contacts, then wait for 0.5 to 5.0 seconds (set in Function block No. 23: Area switching time (without area set signal) (Engineering mode).

To change the Memory area without using the SET signal, "External mode" must be set in Control area Local/External transfer (Operation transfer mode).

• Area jump

The memory area will be switched to the area set in the "Link area number" in the Parameter setting mode after the Close edge or Open edge has been detected. If the "Link area number" is not specified, the area number (which is the current number* + 1) will be selected.

^{*} In case the "Link area number" is not specified and the current control area No. is 16, the area will not be changed.

Example: If the current control area is "Memory area No. 1" and the "Link area number" (set in area No. 1) is "No. 5," the memory area will be changed to No. 5 from No. 1 after the Area jump.



To perform an Area jump

"Digital input 1 (DI1) Close edge" or "Digital input 1 (DI1) Open edge," or both of these must be selected in Select Trigger type for Memory area transfer (Parameter setting mode).

Timing chart of Area jump



- **NOTE** After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.
- When "Event 1 to 4" are selected at the Select Trigger type for Memory area transfer in the Parameter setting mode of the memory area, the area jump will be performed in case the preset event happens.

Relation between Digital Input (DI) and Setting via front keys (or through communication)

• RUN/STOP transfer

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status
DUN	RUN	RUN
KUN	STOP	
STOP	RUN	STOP
310P	STOP	

Priority to STOP

Auto/Manual transfer

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status
Auto modo	Auto mode	Auto mode
Automode	Manual mode	
Manual mode	Auto mode	Manual mode
Ivianual mode	Manual mode	

Priority to manual mode

• Remote/Local transfer

Remote/Local transfer

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status	
Domoto modo	Remote mode	Remote mode	
Remote mode	Local mode		Driarity to Local
	Remote mode	Local mode	mode
Local mode	Local mode		mode

PV select transfer

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status
Input 2	Input 2	Input 2
input 2	Input 1	
Input 1	Input 2	Input 1
input i	Input 1	

Priority to Input 1

2-loop control/Differential temperature control transfer

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status	
Differential	Differential temperature control	Differential temperature control	
temperature control	2-loop control		
	Differential	2-loon control	Priority to 2-loop
2-loop control	temperature control		control
	2-loop control		

Cascade mode transfer (Slave/Master single control)

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status	
	Cascade control	Cascade control	
Cascade control	Slave/Master single control		Priority to
Slove/Meeter single	Cascade control		Slave/Master single
control	Slave/Master single control	control	control

• Set data unlock/lock transfer

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status	
Liplock state	Unlock state	Unlock state	
UNIOCK State	Lock state		Driarity in given to
	Unlock state	Lock state	Priority is given to
LUCK State	Lock state		IUCK SIALUS

Functions like "Interlock release", "Peak hold/Bottom hold release", "Autotuning on/off", "Memory area transfer (with SET signal)", and "Area jump" basically conform to the operation via front keys, through communication, or via digital inputs.

Parameter setting

• DI1 function selection [Engineering mode: Function block No. 23 (Fn23)]

0: No function 1: RUN/STOP transfer 2: Auto/Manual transfer (Common to Input 1 and 2) 3: Input 1_Auto/Manual transfer 4: Input 2_Auto/Manual transfer ¹⁾ 5: Remote/Local transfer, PV select transfer, ² (Cascade mode transfer, PV select transfer, ² -loop control/Differential temperature control) 6: Interlock release 7: Hold reset 8: Input 1_Hold reset	0

9: Input 2_Hold reset ¹⁾	
10: Autotuning (AT) (Common to Input 1 and 2)	
11: Input 1_Autotuning (AT)	
12: Input 2_Autotuning (AT) ¹⁾	
13: Set data unlock/lock transfer	
14: Direct/Reverse action transfer	
15: Memory area transfer (2 points, without area set signal)	
16: Memory area transfer (8 points, without area set signal)	
17: Memory area transfer (8 points, with area set signal)	
18: Memory area transfer (16 points, without area set signal)	
19: Memory area transfer (16 points, with area set signal) ³⁾	
20: Area jump	

¹⁾ Only when two inputs are available

²⁾ The function selected in Select function for Input 2 is switchable.

³⁾ Only when six or more Digital inputs (DI) are available (Only when optional communication is not selected)

● DI2 function selection [Engineering mode: Function block No. 23 (Fn23)]

Parameter symbol Data range		Factory set value
	0: No function	0
ן מי שנכ	1: RUN/STOP transfer	
	2: Auto/Manual transfer (Common to Input 1 and 2)	
	3: Input 1_Auto/Manual transfer	
	4: Input 2_Auto/Manual transfer ¹⁾	
	5: Remote/Local transfer ²⁾	
	(Cascade mode transfer, PV select transfer,	
	2-loop control/Differential temperature control)	
	6: Interlock release	
	7: Hold reset (Common to Input 1 and 2)	
	8: Input 1_Hold reset	
	9: Input 2_Hold reset ¹⁾	
	10: Autotuning (AT) (Common to Input 1 and 2)	
	11: Input 1_Autotuning (AT)	
	12: Input 2_Autotuning (AT) ¹⁾	
	13: Set data unlock/lock transfer	
	14: Direct/Reverse action transfer	

¹⁾ Only when two inputs are available

²⁾ The function selected in Select function for Input 2 is switchable.

● DI3 function selection [Engineering mode: Function block No. 23 (Fn23)]

		· / / / / / / / / / / / / / / / / / / /
Parameter symbol	Data range	Factory set value
di SLB	Same as DI2 function selection	0

● DI4 function selection [Engineering mode: Function block No. 23 (Fn23)]

		· //
Parameter symbol	Data range	Factory set value
dI 5L4	Same as DI2 function selection	0

● DI5 function selection [Engineering mode: Function block No. 23 (Fn23)]

Parameter symbol	Data range	Factory set value
di SLS	Same as DI2 function selection	0

"DI5 function selection" will not be displayed when the optional communication function is selected.

• DI6 function selection [Engineering mode: Function block No. 23 (Fn23)]

Parameter symbol	Data range	Factory set value
dI SL6	Same as DI2 function selection	0

"DI6 function selection" will not be displayed when the optional communication function is selected.

•	DI logic invert	[Engineering mode: Function block No. 23	(רחב'ב)]
	Parameter symbol	Data range	Factory set value
	di i nv	0 to 31 0: No logic invert +1: RUN/STOP transfer +2: Auto/Manual transfer +4: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +8: Set data unlock/lock transfer +16: Direct/Reverse action transfer To select two or more functions, sum each value.	0

* The function selected in "Select function for Input 2" can be switched.

L To display "DI logic invert," Digital input must be specified at the time of order.

• Area switching time (without area set signal) [Engineering mode: Function block No. 23 (Fn23)]

Parameter symbol	Data range	Factory set value
ЫГІМ	1 to 5 seconds	2

"Area switching time (without area set signal)" is available when any one of 15, 16, and 18 are set in "DI1 function selection".

• Control area Local/External transfer [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
L/E	L₀E: Local mode E≌F: External mode	LoC

To display "Control area Local/External transfer", choose "15, 16, or 18" in DI1 function selection.

When "External mode" is set in "Control area Local/External transfer," control area cannot be switched via key operations.

Setting procedure



- Next parameter is displayed.
- Press SET and <MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
- (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

5.3 Correcting Input

PV bias can be used for Input correction. The PV bias is used to compensate the individual variations of the sensors or correct the difference between the Measured value (PV) of other instruments.

Description of function

• PV bias

PV bias adds bias to the Measured value (PV).

Setting example of PV bias:

When measuring the same type of load by using different sensors, the Measured value (PV) will be displayed differently based on the features of sensors:

SC-F71 [A]: 200 °C SC-F71 [B]: 198 °C

To correct the Measure value (PV) of SC-F71 [B], add bias of +2 °C by PV bias:

Displayed value = Measured value (PV) + PV bias = $198 \circ C + 2 \circ C = 200 \circ C$



• PV ratio

PV ratio is a multiplier to be applied to the Measured value (PV). Setting example of PV ratio:

PV ratio can be used to display 200 °C by adding 2 °C when the actual Measured value (PV) is 198 °C but the displayed value remains 0 °C when the actual PV is 0 °C. (The displayed value changes from 0 °C to 2 °C by PV bias setting.)

Displayed value = Measured value (PV) × PV ratio = 198 °C × 1.010 = 199.98 °C



172-65710M-04 (SC-F71 Parameters/Functions) 23 Dec 2021

• When setting PV bias and PV ratio at the same time

[Example] When PV bias = 15 °C and Measured value (PV) = 50 °C If PV ratio = 0.700Displayed value = $50 \times 0.700 + 15 = 50$ °C

PV ratio = 1.500 Displayed value = 50 × 1.500 + 15 = 90 °C



Parameter setting

● Input 1_PV bias [Setup Setting Mode: Setting group No. 21 (5-2-/)]

Parameter symbol	Data range	Factory set value
I. Pb	 (Input 1_Input span) to +(Input 1_Input span) (When Control with PV select: 	0
	- (PV select input span) to +(PV select input span)) [Varies with the setting of the Decimal point position.]	

• Input 2_PV bias (RS bias) [Setup Setting Mode: Setting group No. 22 (5n22)]

Parame	ter symbol	Data range	Factory set value
٦	וח	Input 2_PV bias	0
L C.	го	 (Input 2_Input span) to +(Input 2_Input span) 	
		RS bias	
		 (Input 1_Input span) to +(Input 1_Input span) 	
		[Varies with the setting of the Decimal point position.]	

When Remote setting input is supplied, it is displayed as RS bias.

Input 2_Input type is not displayed when "No function" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

• Input 1_PV ratio [Setup Setting Mode: Setting group No. 21 (5n2 /)]

 -		
Parameter symbol	Data range	Factory set value
l. PR	0.500 to 1.500	1.000

● Input 2_PV ratio [Setup Setting Mode: Setting group No. 22 (5-22)]

1.2			
	Parameter symbol	Data range	Factory set value
	סס כ	Input 2_PV ratio: 0.500 to 1.500	1.000
	C.	RS ratio: 0.001 to 9.999	

When Remote setting input is supplied, it is displayed as PV ratio.

Input 2_Input type is not displayed when "No function" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

125

Setting procedure



 Press I and I ODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

5.4 Preventing the Input Flicker

To prevent the input flicker, PV digital filter with the first-order lag calculation is provided.

Description of function

PV digital filter is software designed to reduce variance of PV caused by noise. Effect of Input noise can be reduced by setting time constant of PV digital filter based on the controlled object requirement and its level of noise. Setting a value too small leads to a poor result of PV digital filter; just as an input response will be poor when setting a value too large.



Parameter setting

● Input 1_PV digital filter [Setup Setting Mode: Setting group No. 21 (5-72 /)]

Parameter symbol	Data range	Factory set value
I. dF	0.0 to 100.0 seconds 0.0: Filter OFF	0.0

Input 2_PV digital filter (RS digital filter) [Setup Setting Mode: Setting group No. 22 (5n22)]

Parameter symbol	Data range	Factory set value
2. dF	0.0 to 100.0 seconds 0.0: Filter OFF	0.0

When Remote setting input is supplied, it is displayed as RS digital filter.

Input 2_Input type is not displayed when "No function" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

Setting procedure



5.5 Inverting the Input

If the instrument is a current/voltage input type, the proportional relation between the input current (voltage) and the displayed value can be inverted.

Description of function

Reverse setting (Input range high < Input range low) of Input range high and low is not available on the instrument. However, with the Input invert function, the display relation to the input can be inverted.

Example: with/without invert function for voltage input 0 to 5 V



● Input 1_Inverting input [Engineering mode: Function block No. 21 (Fn2 /)]

Parameter symbol	Data range	Factory set value
	0: Unused	0
I. I ÎN <i>Î</i>	1: Used	

To display "Input 1_Inverting input", choose "Current" or "Voltage" in Function block No. 21: Input 1_Input type (Engineering mode).

• Input 2_Inverting input [Engineering mode: Function block No. 22 (Fn22)]

Parameter symbol	Data range	Factory set value
2. I NV	0: Unused 1: Used	0

To display "Input 2_Inverting input", choose "Current" or "Voltage" in Function block No. 22: Input 2_Input type (Engineering mode).

Not displayed when "No function" or "Remote setting input" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

Setting procedure



- · Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

5.6 Extracting Square Root of Input

Square root extraction can control flow by sending the output signal directly from a differential pressure type flow transmitter to instrument. By setting PV low input cutoff, Square root extraction will not be performed for the Measured value below the set value of PV low input cut-off.

Description of function

• Square root extraction

When using a differential pressure type flow transmitter, the Measured value (PV) is computed by Square root extraction.

Equation: Measured value (PV) = $\sqrt{(Input value^*)} \times PV$ ratio + PV bias



• PV low input cut-off

The result of square root extraction become "0" when the Measured value (PV) drops below the set value of the PV low input cut-off. Output is not produced when the result of square root extraction is zero (0).

When input signal square root extraction is used for in flow control, etc., the Square root extraction result varies widely at the Low measured value range. The Measured value less than the PV low input cut-off is ignored to compute control output in order to prevent control disturbance caused by input variation at Low measured value range.



Parameter setting

● Input 1_Square root extraction [Engineering mode: Function block No. 21 (Fn2 /)]

Parameter symbol	Data range	Factory set value
I. SQR	0: Unused 1: Used	0

To display "Input 1_Square root extraction", choose "Current" or "Voltage" in Function block No. 21: Input 1_Input type (Engineering mode), AND choose "0 to 2" in Function block No. 51: Input 1_Control action (Engineering mode).

• Input 2_Square root extraction [Engineering mode: Function block No. 22 (Fn22)]

Parameter symbol	Data range	Factory set value
	0: Unused	0
	1: Used	

To display "Input 2_Square root extraction," choose "Current" or "Voltage" in Function block No. 22: Input 2_Input type (Engineering mode), AND choose "0 to 1: PID control" in Function block No. 52: Input 2_Control action (Engineering mode).

Not displayed when "No function" or "Remote setting input" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

• Input 1_PV low input cut-off [Setup Setting Mode: Setting group No. 21 (5-2/)]

Parameter symbol	Data range	Factory set value
I. PLC	0.00 to 25.00% of Input 1_Input span (When Control with PV select: 0.00 to 25.00% of PV select input span)	0.00

To display "Input 1_PV low input cut-off", choose "Voltage/Current input" in Input type, AND choose "1: Used" in Function block No. 21: Input 1_Square root extraction (Engineering mode).

• Input 2_PV low input cut-off [Setup Setting Mode: Setting group No. 22 (5-22)]

Parameter symbol	Data range	Factory set value
2. PLC	0.00 to 25.00% of Input 2_Input span (When Control with PV select: 0.00 to 25.00% of PV select input span)	0.00

To display "Input 2_PV low input cut-off", choose "Voltage/Current input" in Input type, AND choose "1: Used" in Function block No. 22: Input 2_Square root extraction (Engineering mode).

Not displayed when "No function" or "Remote setting input" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

Setting procedure



5.7 Changing Error Handling at Input Error

The measures for input errors can be selected from Input burnout direction, Input error determination point, Manipulated output value at Input error, PV flashing display at input error, and Input error status output.

Description of function

If the measured value (PV) exceeds the Input error determination point (high or low), the action predefined at "Action (high and low) input error" will be taken. Input error status signal can be output from OUT1 to OUT3 and DO1 to DO4.

NOTE In manual mode and control stop mode, action and output will not be taken for input errors.

Input display range (Setting range of Input error determination point) Input range low Input range high Underscale Over-scale 5% of Input range 5% of aaaaa Measured [Flashing] input span (input span) input span [Flashing] value (PV) display Measured value Measured value (PV) [Flashing]¹⁾ (PV) [Flashing]¹⁾ Action area at input error Action area at input error Input error determination Input error determination point (low) point (high) Latest output Manipulated output at Input error Manipulated output at Input error Auto mode (AUTO): Manipulated Manipulated output value Choose either Choose either output (MV) (MV) obtained by PID control Latest output Latest output Input error High limit output ON2) Low limit output ON²⁾ status output Downscale direction Upscale direction Burnout direction³⁾

• Input error determination point is set within the input range

- ¹ Flashing can be suppressed by setting Function block No. 10: PV flashing display at input error (Engineering mode).
- ² Refer to "Details of OUT1 to 3 as well as DO1 to 4 logic calculation selection" in 6.1 Changing Output Assignment for Input error status output.
- ³ Setting Burnout direction is available for thermocouple input and low voltage input (0 to 10 mV DC, 0 to 100 mV DC). Actions of other input types are fixed as follows. RTD input: Upscale

High voltage/Current inputs: Downscale (Indicates value near 0)

Refer to the Input range table for the input range of each input.

Refer to 6.1 Changing Output Assignment for Input error status output.



• Input error determination point is set outside the input range

¹⁾ Flashing can be suppressed by setting "PV flashing display at input error" in Function block No. 10 (Engineering mode).

²⁾ Refer to "Details of OUT1 to 3 as well as DO1 to 4 logic calculation selection" in 6.1 Changing Output Assignment for Input error status output..

³⁾ Setting Burnout direction is available for thermocouple input and low voltage input (0 to 10 mV DC, 0 to 100 mV DC). Actions of other input types are fixed as follows.

RTD input: Upscale

High voltage/Current inputs: Downscale (Indicates value near 0)

Refer to the Input range table for the input range of each input.

Refer to 6.1 Changing Output Assignment for Input error status output.

In the case of control with dual inputs, the action at input error is conducted independently on each of Input 1 and Input 2. However, exceptional cases are shown below in which Action at input error may be slightly different.

Cascade control

Switching is possible between Cascade control and Master single control or Cascade control and Slave single control. Action at input error of each case is as follows.

	Cascade control	Master single control	Slave single control
Input error	 Input 1 is determined at 	Input 1 is determined at	Input 2 is determined at
determination	Input 1_Input error	Input 1_Input error	Input 2_Input error
	determination point.	determination point.	determination point.
	 Input 2 is determined at 		
	Input 2_Input error		
	determination point.		
	Whichever is triggered by		
	input error.		
Action at input error	Action selected for	Action selected for	Action selected for
	Input 1_Action input error.	Input 1_Action input error.	Input 1_Action input error.
Manipulated output Input 1_Manipulated output		Input 1_Manipulated output	Input 1_Manipulated output
value at input error value at input error		value at input error	value at input error

[Action at input error for cascade control]

The settings of Action at input error high and low are conflicting each other and when both Input 1 and Input 2 go to an input error state.

Input 1_Action input error	Input 2_Action input error	Control action
1: Manipulated output value at	2: Manipulated output value at	Input 1_Manipulated output value at
input error (Manual mode)	input error (Auto mode)	input error" is output in Manual mode
2: Manipulated output value at	1: Manipulated output value at	"Input 1_Manipulated output value at
input error (Auto mode)	input error (Manual mode)	input error" is output in Auto mode
0: Control continues	1: Manipulated output value at	Input 1_Manipulated output value at
	input error (Manual mode)	input error" is output in Manual mode
1: Manipulated output value at	0: Control continues	Input 1_Manipulated output value at
input error (Manual mode)		input error" is output in Manual mode
0: Control continues	2: Manipulated output value at	"Input 1_Manipulated output value at
	input error (Auto mode)	input error" is output in Auto mode
2: Manipulated output value at	0: Control continues	"Input 1_Manipulated output value at
input error (Auto mode)		input error" is output in Auto mode

• 2-loop control/Differential temperature control

	Input 1 is abnormal	Input 2 is abnormal
Input error determination	Input 1 is determined at Input 1_	Input 2 is determined at Input 2_ Input
	Input error determination point.	error determination point.
Action at input error	Action selected for Input 1_Action	Input 1 side:
	input error.	"Input 1_Manipulated output value at
		input error" is output [fixed]
		Input 2 side:
		Action selected for Input 2_Action
		input error.
Manipulated output value at	Input 1_Manipulated output value at	Input 1_Manipulated output value at
input error	input error	input error
		Input 2_Manipulated output value at
		input error

• Input circuit error alarm

	Input 1 is abnormal	Input 2 is abnormal
Input error determination	Input 1 is determined at Input 1_	Input 2 is determined at Input 2_ Input
	Input error determination point.	error determination point.
Action at input error	Action selected for Input 1_Action	Even if Input 2 is in input error, Action
	input error.	at input error will not be taken. 1)
Manipulated output value at input	Input 1_Manipulated output value at	
error	input error	

¹⁾ When (Input 2 – Input 1) exceeds the Input circuit error alarm set value, Action at input error is the action defined in Input 1_Action input error.

• Control with PV select

	Input 1 is abnormal	Input 2 is abnormal
Input error determination	Input 1 is determined at Input 1_	Input 2 is determined at Input 2_ Input
	Input error determination point.	error determination point.
Action at input error	When the Input 1 is used:	When the Input 1 is used:
	Action selected for Input 1_Action	No Action at input error
	input error.	When the Input 2 is used:
	When the Input 2 is used:	Action selected for Input 1_Action input
	No Action at input error	error.
Manipulated output value at input	Input 1_Manipulated output value at	Input 1_Manipulated output value at
error	input error	input error

136

Parameter setting

• PV flashing display at input error [Engineering mode: Function block No. 10 (Fn ID)]

Parameter symbol	Data range	Factory set value
dSoP	0: Flashing display 1: Non-flashing display	0

● Input 1_Input error determination point (high) [Engineering mode: Function block No. 21 (Fn2 /)]

Parameter symbol	Data range	Factory set value
1. Poľ	Input 1_Input error determination point (low) to Input 1_Input range high + (Input 1_5% of input span) [Varies with the setting of the Decimal point position.]	Input 1_Input range high + (Input 1_5% of input span)

Input 1_Input error determination point (low) [Engineering mode: Function block No. 21 (F∩2 /)]

Parameter sym	Data range	Factory set value
I. PÜI	Input 1_Input range low - (Input 1_5% of input span) * to Input 1_Input error determination point (high) [Varies with the setting of the Decimal point position.] * When Input type of Input 1 is RTD, low limit value is about 2 Ohms.	Input 1_Input range low - (Input 1_5% of input span)
	(F1100: -245.5 C (-409.8 F), 3F1100: -237.6 C (-395.7 F))	

● Input 2_Input error determination point (high) [Engineering mode: Function block No. 22 (Fn22)]

Param	neter symbol	Data range	Factory set value
2.	Poľ	Input 2_Input error determination point (low) to Input 2_Input range high + (Input 2_5% of input span) [Varies with the setting of the Decimal point position.]	Input 2_Input range high + (Input 2_5% of input span)

Not displayed when "No function" or "Remote setting input" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

● Input 2_Input error determination point (low) [Engineering mode: Function block No. 22 (Fn22)]

Para	meter symbol	Data range	Factory set value
ר	ПТИ	Input 2_Input range low - (Input 2_5% of input span) *	Input 2_Input range low
Ľ.	PUN	to Input 2_Input error determination point (high)	- (Input 2_5% of input span)
		Varies with the setting of the Decimal point position.	
		* When Input type of Input 2 is RTD, low limit value is about 2 Ohms.	
		(Pt100: -245.5 °C (-409.8 °F), JPt100: -237.6 °C (-395.7 °F))	

Not displayed when "No function" or "Remote setting input" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

● Input 1_Burnout direction [Engineering mode: Function block No. 21 (Fn2 /)]

Parameter symbol	Data range	Factory set value
1. boS	0: Upscale 1: Downscale	0

To display "Input 1_Burnout direction", choose "thermocouple (TC)" or "Low voltage (0 to 100 mV DC, 0 to 10 mV DC)" in Function block No. 22: "Input 2_Input type" (Engineering mode), AND choose "0, 1, 2, 8 or 9" in Function block No. 51: Input 1_Control action (Engineering mode).

• Input 2_Burnout direction [Engineering mode: Function block No. 22 (Fn22)]

Parameter symbol	Data range	Factory set value
2. boS	0: Upscale 1: Downscale	0

To display "Input 2_Burnout direction", choose "Thermocouple (TC)" or "Low voltage (0 to 100 mV DC, 0 to 10 mV DC)" in Function block No. 22: "Input 2_Input type" (Engineering mode), AND choose "0, 1, 8 or 9" in Function block No. 52: Input 2_Control action (Engineering mode).

Input 2_Input type is not displayed when "No function" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

Input 1_Action (high) input error [Engineering mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
I.A o V E	 Control continues (with the latest output) Manipulated output value at input error (Manual mode) The operation mode is switched to the Manual mode and the Input 1_Manipulated output value at input error is output. Manipulated output value at input error (Auto mode) The operation mode remains in the Auto mode and the Input 1_Manipulated output value at input error of is output. When the error is recovered, the operation mode is switched to the PID control. 	2

Input 1_Action (low) input error [Engineering mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
I.RUNE	 Control continues (with the latest output) Manipulated output value at input error (Manual mode) 	2
	 The operation mode is switched to the Manual mode and the Input 1_Manipulated output value at input error is output. 2: Manipulated output value at input error (Auto mode) The operation mode remains in the Auto mode and the Input 1_Manipulated output value at input error of is output. When the error is recovered, the operation mode is switched to the PID control. 	

• Input 2_Action (high) input error [Engineering mode: Function block No. 52 (Fn52)]

(
Parameter symbol	Data range	Factory set value
2.9 o¥ E	 0: Control continues (with the latest output) 1: Manipulated output value at input error (Manual mode) The operation mode is switched to the Manual mode and the Input 1_Manipulated output value at input error is output. 2: Manipulated output value at input error (Auto mode) The operation mode remains in the Auto mode and the Input 1_Manipulated output value at input error of is output. When the error is recovered, the operation mode is switched to the PID control. 	2

To display "Input 2_Action (high) input error", choose "2-loop control/Differential temperature input" in Function block No. 58: Select function for Input 2 (Engineering mode).

 Input 2_Action (low) input error [Engineering mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2.RUNE	 Control continues (with the latest output) Manipulated output value at input error (Manual mode) The operation mode is switched to the Manual mode and the Input 1_Manipulated output value at input error is output. Manipulated output value at input error (Auto mode) The operation mode remains in the Auto mode and the Input 1_Manipulated output value at input error of is output. When the error is recovered, the operation mode is switched to the DID control 	2

To display "Input 2_Action (low) input error", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

 Input 1_Manipulated output value at input error [Engineering mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
	Heating/Cooling PID control: -105.0 to +105.0%	Heating/Cooling PID
	Other control: -5.0 to +105.0%	control: 0.0
		Other control: -5.0

For Heating/Cooling PID control, output is produced from the heat side when the setting is positive (+) and output is produced from the cool side when the setting is negative (-).

Input 2_Manipulated output value at input error [Engineering mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2. PSM	-5.0 to +105.0%	-5.0

To display "Input 2_Manipulated output value at input error", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Setting procedure



Next parameter is displayed.

- Press (c) and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Mon
- (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
 Select lock on the Set data unlock/lock transfer.

5.8 Using Dual Input Function

This instrument has an optional dual input function which can be configured as follows.

• Remote setting input function

The instrument uses an input signal from Input 2 as a remote signal and sets it to the Input 1_Set value (SV). Remote setting input can be supplied if it is specified at the time of order.

Refer to 8.10 Using Remote Setting Input for details.

• 2-loop control function

The instrument performs two independent control using Input 1 and 2. The 2-loop control can be configured to Differential temperature control, and vice versa.

Refer to 8.11 Executing 2-Loop Control for 2-loop control.

• Differential temperature control function

With this function, temperature control of Input 1 is performed by setting a temperature difference between Input 2 and Input 1. The 2-loop control can be configured to Differential temperature control, and vice versa.

Refer to 8.12 Executing Differential Temperature Control for details.

• Control with PV select

This function uses two inputs and allows the sensors to be switched from one to another depending on the temperature of the controlled object (high or low temperatures).

Refer to 8.13 Executing Control with PV Select for Control with PV select.

Cascade control

Cascade control is available where Input 1 is used as a Master and Input 2 as a Slave. Cascade control is available in two control modes; "Slave single control or Cascade control" and "Master single control or Cascade control."

Refer to 8.14 Executing Cascade Control for Cascade control.

• Input circuit error alarm function

The instrument uses two inputs to detect an error from the difference in input between the two.

Refer to 7.7 Preventing Control with Input Errors (Input Circuit Error Alarm)..

Parameter setting

● Select function for Input 2 [Engineering mode: Function block No. 58 (Fn58)]

Parameter symbol	Data range	Factory set value
2 <i>P¥</i>	0: No function 1: Remote setting input 2: 2-loop control/Differential temperature control 3: Control with PV select 4: Cascade control (Slave single ↔ Cascade) * 5: Cascade control (Master single ↔ Cascade) * 6: Input circuit error alarm PID control: 0 to 6 When pressure control operation [MC-(V)COS(R)] is selected: 0 to 2, 6 Heating/Cooling control: 0 to 3, 6	1

Refer to 4. Parameters that are Initialized/Modified when Setting is Changed for the parameters that are initialized or changed when the Select function for Input 2 is changed.

Setting procedure



- Press () and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- · Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

6. Output Function

6.1 Changing Output Assignment [Control Output, Retransmission Output, Logic Calculation (Event) Output, Instrument Status Output]

SC-F71 has such hardware outputs of OUT1 to 3 (3 points) and DO1 to 4 (4 points) as shown below. The following output signals are assigned to each output terminal.

- Control output (Settable only between OUT1 and OUT3)
- Retransmission output (Settable only between OUT1 and OUT3)
- Logic calculation output [Event, Input error status]
- Instrument Status Output [RUN, Manual mode, Remote mode, Autotuning (AT), While Set value (SV) is changing, Communication monitoring result, FAIL]

Description of function

Output signals [Control Output, Retransmission Output, Logic Calculation Output, or Instrument Status Output] are assigned to the output terminals (OUT1 to 3, DO1 to 4).

• Position of output terminals



• Details of functions assigned to OUT1 to 3

Setting	Assigned functions
0	No assignment
1	Input 1_Control output [heat-side] or [open-side]
2	Input 1_Control output [cool-side] or [close-side]
3	Input 2_Control output
4	Retransmission output
5	Logic calculation output [Event, Input error]
6	RUN state output
7	Input 1_Manual mode state output
8	Input 2_Manual mode state output
9	Remote mode state output (Cascade control state output, Output of differential temperature control state, Input 2 state output of Control with PV select)
10	Input 1_Autotuning (AT) state output
11	Input 2_Autotuning (AT) state output
12	Output while Set value of Input 1 is changing
13	Output while Set value of Input 2 is changing
14	Output of the communication monitoring result
15	FAIL output
[Explanation of the setting]

- Input 1_Control output [heat-side] or [open-side]: Assignable to Input 1. When Heating/Cooling PID control is selected for Input 1, this output is used as heating output.
- Input 1_Control output [cool-side] or [close-side]: This output is available when Heating/Cooling PID control is selected for Input 1. If Heating/Cooling PID control is selected, this output is used as a cooling output.
- Input 2_Control output Assignable to Input 2. This output is available when 2-loop control (including Differential temperature control) or Cascade control is selected for Select function for Input 2.
- Retransmission output: Retransmission output type needs to be specified later. Retransmission output scaling is also available.

Refer to 6.3 Using Retransmission Output for Retransmission output.

• Logic calculation output [Event, Input error status]: Logic calculation needs to be specified separately. Multiple outputs can be output from a single output terminal as logical *OR* relation.

Refer to the Logic calculation selection.

- RUN state output: Output turns on while the instrument is in RUN mode.
- Input 1_Manual mode state output: Output turns on while the Input 1 is in Manual mode.
- Input 2_Manual mode state output: Output turns on while the Input 2 is in Manual mode.
- Remote mode state output (Cascade control state output, Output of differential temperature control state, Input 2 state output of Control with PV select) Output turns on while the instrument is in the remote mode, cascade control, differential temperature control, or when Input 2 of Control with PV select is used.
- Input 1_Autotuning (AT) state output: Output turns on while the Input 1 is in the Autotuning (AT).
- Input 2_Autotuning (AT) state output: Output turns on while the Input 2 is in the Autotuning (AT).
- Output while Set value of Input 1 is changing: Output turns on while the Input 1_Set value (SV) is changing due to Soft start/ Setting change rate limiter.
- Output while Set value of Input 2 is changing: Output turns on while the Input 2_Set value (SV) is changing due to Soft start/ Setting change rate limiter.
- Output of the communication monitoring result: Valid only when the communication function is supplied. Output turns on if improper communication continues for 10 seconds.
- FAIL output:
 - Output turns on when the instrument is in FAIL state. When FAIL is selected, the output terminal is fixed to de-energizing, and the previous setting of energizing and de-energizing will be unavailable.

•	Details	of functions	assigned	to	DO1	to	4
-	Dotano		assigned	ιU	001	10	

Setting	Assigned functions				
0	No assignment				
1	Logic calculation output [Event, Input error status]				
2	RUN state output				
3	Input 1_Manual mode state output				
4	Input 2_Manual mode state output				
5	Remote mode state output (Cascade control state output, Output of differential				
5	temperature control state, Input 2 state output of Control with PV select)				
6	Input 1_Autotuning (AT) state output				
7	Input 2_Autotuning (AT) state output				
8	Output while Set value of Input 1 is changing				
9	Output while Set value of Input 2 is changing				
10	Output of the communication monitoring result				
11	FAIL output				
12	Input 1_Control error				
13	Input 2 Control error				

[Explanation of the setting]

- Input 1_Control error: Turns ON when error (abnormality) occurs in Input 1_ Pressure control. This is only available when pressure control operation [MC-(V)COS(R)] is selected for Input 1_Control action.
- Input 2_Control error: Turns ON when error (abnormality) occurs in Input 2_ Pressure control. This is only available when pressure control operation [MC-(V)COS(R)] is selected for Input 2_Control action.

Refer to [Explanation of the setting] in "Details of functions assigned to OUT1 to OUT3" for other settings.

• Details of OUT1 to 3 as well as DO1 to 4 logic calculation selection Multiple functions can be selected in the logic operation. The selected functions are *OR*-output. To select multiple functions, add the numbers of the desired functions.

Setting	Assigned functions	
0	No assignment	E
1	Event 1	Т
2	Event 2	1
4	Event 3	·
8	Event 4	·
16	Input 1_Input error high	
32	Input 1_Input error low	5
64	Input 2_Input error high	
128	Input 2 Input error low	

xample

To select Event 1 output and Input 1_Input error output high, set as follows. •Event 1 = 1 •Input 1_Input error high = 16 1 + 16 = 17 So, set 17

[Explanation of the setting]

• Event:

Output turns on when the instrument is in the event state. You also need to set Event assignment, Event type, Event hold action, Event differential gap, Event timer, and Event set value.

Refer to 7.1 Using Event Function for details.

• Input error high:

Output turns on when the Measured value (PV) exceeds the Input error determination point (high).

Under the conditions of an available Input circuit error alarm, when the Measured value of Input 2 goes over the Set value of the Input circuit error alarm and the measured value of Input 1, the Input error high alarm of Input 1 will turn on.

• Input error low:

Output turns on when the Measured value (PV) exceeds the Input error determination point (low).

Under the conditions of an available Input circuit error alarm, when the Measured value of Input 2 falls below over the Set value of the Input circuit error alarm and the measured value of Input 1, the Input error low alarm of Input 1 will turn on.

Setting example

To provide Event 1 to Event 4 from DO1 as a logic OR output.

- 1. Select "1: Logic calculation output" in DO1 assignment.
- 2. Set "15" for DO1_logic calculation selection.

Enter "1" to output Event 1, "2" for Event 2, "4" for Event 3, and "8" for Event 4. Add the sum of these numbers (15), then the outputs of Event 1 to 4 are produced as a logical *OR*.

[Setup procedures]



Output function map

Select output function	─ Retransmission output 1
– OUT1 function selection	
- No assignment	 Retransmission output 1
 Input 1_Control output [heat-side] 	scale high
- or [open-side]	
- Input 1_Control output [cool-side]	- Retransmission output 1
	scale low
- Input 2_Control output	
	- OLIT1 logic calculation selection
- RUN state output	(Multiple selection is available)**
- Input 1 Manual mode state output	- No assignment
- Input 2 Manual mode state output	Event 1 Event 1 Assignment
- Remote mode state output	Event 2 - Event 1 type selection
 Input 1_AT state output 	Event 3 - Event 1 hold action
 Input 2_AT state output 	Event 4 – Event 1 differential gap
- Output while Set value of Input 1 is	- Input 1_Input error high - Event 1 timer
- changing	- Input 1_Input error low - Event 1 set value
- Culput while Set value of input 2 is	Input 2_Input error low Event 2.3 and 4
	Same as Event 1
- monitoring result	- Interlock selection
FAIL output	(Multiple selection is available)**
	⊢ Unused
 OUT2 function selection 	- Event 1
Same as OUT1 function selection	- Event 2
	- Event 3
- OUT3 function selection	Event 4
- Same as OUTT function selection	- Input 1_Input error low
– DO1 function selection	- Input 2 Input error high
- No assignment	Input 2_Input error low
Logic calculation output	
- RUN state output	DO1 logic calculation selection
- Input 1_Manual mode state output	(Multiple selection is available)
- Input 2_Manual mode state output	- No assignment
- Input 1 AT state output	- Event 2
- Input 2 AT state output	- Event 3
- Output while Set value of Input 1 is	- Event 4
- changing	Input 1_Input error high
 Output while Set value of Input 2 is 	 Input 1_Input error low
- changing	Input 2_Input error high
- Output of Communication monitoring resul	t └Input 2_Input error low
- Input 1_Control error state output	
- DO2 function selection	
- DO3 function selection	* If "Potronomication output" is calcuted at OUT2 function
Same as DOT function selection	selection retransmission output 2 is available
 DO4 function selection 	If "Retransmission output" is selected at OUT3 function
- Same as DOT function selection	selection, retransmission output 3 is available.
*	* "Interlock selection" is shared with "OUT1 (2, 3) logic
 Energized/De-energized selection (Multiple selection is available) 	calculation selection" and "DO1 (2, 3, 4) logic
⊢ All outputs are energized	calculation selection."
OUT1 de-energized	
OUT2 de-energized	
OUT3 de-energized	
DO1 de-energized	
- DO2 de-energized	
DO4 de-energized	

Parameter setting

• OUT1 function selection [Engineering Mode: Function block No. 30 (Fn 30)]

Parameter symbol	Data range	Factory set value
Parameter symbol	Data range 0: No assignment 1: Input 1_Control output [heat-side] or [open-side] 2: Input 1_Control output [cool-side] or [close-side] 3: Input 2_Control output 4: Retransmission output 5: Logic calculation output (Event, Input error) 6: RUN state output 7: Input 1_Manual mode state output 8: Input 2_Manual mode state output 9: Remote mode state output (Cascade control state output, Output of differential temperature control state, Input 2 state output of Control with PV select) 10: Input 1_Autotuning (AT) state output 11: Input 2_Autotuning (AT) state output 12: Output while Set value of Input 1 is changing 13: Output while Set value of Input 2 is changing 14: Output of the communication monitoring result	1
	15: FAIL output	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the OUT1 function selection is changed.

● OUT2 function selection [Engineering Mode: Function block No. 30 (Fn∃D)]

ſ	Parameter symbol	Data range	Factory set value
	oSL2	Same as OUT1 function selection	4

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the OUT2 function selection is changed.

• OUT3 function selection [Engineering Mode: Function block No. 30 (Fn30)]

ſ	Parameter symbol	Data range	Factory set value
	o5L3	Same as OUT1 function selection	4

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the OUT3 function selection is changed.

• DO1 function selection [Engineering Mode: Function block No. 34 (Fn34)]

Parameter symbol	Data range	Factory set value
Parameter symbol	Data range 0: No assignment 1: Logic calculation output (Event, Input error) 2: RUN state output 3: Input 1_Manual mode state output 4: Input 2_Manual mode state output 5: Remote mode state output (Cascade control state output, Output of differential temperature control state, Input 2 state output of Control with PV select) 6: Input 1_Autotuning (AT) state output 7: Input 2_Autotuning (AT) state output 8: Output while Set value of Input 1 is changing 9: Output while Set value of Input 2 is changing 10: Output of the communication monitoring result 11: FAIL output	Factory set value 0
	12: Output Input 1_Control error state ¹ 13: Output Input 2 Control error state ¹	

¹⁾ Available only when "Pressure control operation [MC-(V)COS(R)] is selected in "Control action".

• DO2 function selection [Engineering Mode: Function block No. 34 (Fn34)]

1	Parameter symbol	Data range	Factory set value
	doSL2	Same as DO1 function selection	0

● DO3 function selection [Engineering Mode: Function block No. 34 (Fn∃4)]

Parameter symbol	Data range	Factory set value
doSL3	Same as DO1 function selection	0

• DO4 function selection [Engineering Mode: Function block No. 34 (Fn34)]

Parameter symbol	Data range	Factory set value
doSLY	Same as DO1 function selection	0

• OUT1 logic calculation selection [Engineering Mode: Function block No. 30 (Fn3D)]

Parameter symbol	Data range	Factory set value
	Data range 0 to 255 0: OFF +1: Event 1 +2: Event 2 +4: Event 3 +8: Event 4 +16: Input 1_Input error high +22: Input 1_Input error high	Factory set value 0
	+64: Input 2_Input error high +128: Input 2_Input error low To select two or more functions, sum each value.	

● OUT2 logic calculation selection [Engineering Mode: Function block No. 30 (Fn∃□)]

Parameter symbol	Data range	Factory set value
ol G2	Same as OUT1 logic calculation selection	0

• OUT3 logic calculation selection [Engineering Mode: Function block No. 30 (Fn 30)]

Parameter symbol	Data range	Factory set value
oL G 3	Same as OUT1 logic calculation selection	0

• DO1 logic calculation selection [Engineering Mode: Function block No. 34 (Fn34)]

Parameter symbol	Data range	Factory set value
dolū I	Same as OUT1 logic calculation selection	0

● DO2 logic calculation selection [Engineering Mode: Function block No. 34 (Fn 34)]

Parameter symbol	Data range	Factory set value
dolū2	Same as OUT1 logic calculation selection	0

● DO3 logic calculation selection [Engineering Mode: Function block No. 34 (Fn∃4)]

Parameter symbol	Data range	Factory set value
dolū3	Same as OUT1 logic calculation selection	0

● DO4 logic calculation selection [Engineering Mode: Function block No. 34 (Fn∃4)]

Parameter symbol	Data range	Factory set value
dolG4	Same as OUT1 logic calculation selection	0

Setting procedure



- Next parameter is displayed.
- Press (a) and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

6.2 Changing Output Type of OUT3

OUT3 is produced as a universal output. Output type can be changed even after the purchase.

Description of function

Output 3 may be selected from the following three types. The output can be modified without changing the hardware.

- Voltage pulse output (0/14 V DC)
- Current output (4 to 20 mA DC)
- Current output (0 to 20 mA DC)

Parameter setting

 Universal output type selection (OUT3) [Engineering Mode: Function block No. 30 (Fn∃Ω)]

Parameter symbol	Data range	Factory set value
UNI o	0: Voltage pulse output 1: Current output (4 to 20 mA DC) 2: Current output (0 to 20 mA DC)	1

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Universal output type selection (OUT3) is changed.

Setting procedure



- Press () and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

6.3 Using Retransmission Output

Retransmission output can be provided from OUT1 to 3. To use the Retransmission output, the output type must be current.

Description of function

To use the Retransmission output, select Retransmission output at OUT1 to 3 function selection. If Retransmission output is selected at the OUT1 function selection, the output is provided as Retransmission output 1. If Retransmission output is selected at the OUT2 function selection, the output is provided as Retransmission output 2. If Retransmission output is selected at the OUT3 function, the output is provided as Retransmission output 3.

Refer to 6.1 Changing Output Assignment [Control Output, Retransmission Output, Logic Calculation (Event) Output, Instrument Status Output] for OUT1 to 3 function selection..

Setting	Assigned functions	
0	No retransmission output	
1	Input 1_Measured value (PV)	
	Input 1_Measured value (PV) is output.	
2	Input 1_Local SV	
	Input 1_Set value (SV) is output. The local SV is the SV set. If the set value is changed,	
	irrespective of the Soft start/Setting change rate limiter whether or not it is set, the new set	
	value will be used as soon as the value is changed.	
3	Input 1_SV monitor value	
	Input 1_Set value (SV) is output. The SV monitor value is the monitored value of the set	
	value (SV). If a Soft start/Setting change rate limiter is set, the set value starts changing	
1	Input 1 Deviation	
4	[Input 1_Deviation] [Input 1_Measured value (PV) – Input 1_Set value (SV)] is output	
5	Input 1 Manipulated output value [heat-side]	
Ũ	Input 1 Manipulated output value [heat-side] is output.	
6	Input 1 Manipulated output value [cool-side]	
	Input 1_Manipulated output value [cool-side] is output.	
7	Input 2_Measured value (PV)	
	Input 2_Measured value (PV) is output.	
8	Input 2_Local SV	
	Input 2_Set value (SV) is output. The local SV is the SV set. If the set value is changed,	
	Interspective of the Soft start/Setting change rate limiter whether or not it is set, the new set value will be used as soon as the value is changed	
9	Input 2 SV monitor value	
J J	Input 2_Set value (SV) is output. The SV monitor value is the monitored value of the set	
	value (SV). If a Soft start/Setting change rate limiter is set, the set value starts changing	
	according to the setting when the setting is changed.	
10	Input 2_Deviation	
	[Input 2_Measured value (PV) – Input 2_Set value (SV)] is output.	
11	Input 2_Manipulated output value	
	Input 2_Manipulated output value is output.	
12	Remote setting input value ¹⁾	
	Remote setting input value is output.	
13	Measured value (PV) of differential temperature input	
	Measured value (PV) of Differential temperature input [Input 1_Measured value (PV) -	
	Input 2_ivieasured value (PV)] is output.	

• Details of Retransmission output type

¹⁾ Available when "Remote setting input" is selected in Select function for Input 2.

The output will be 0% when the Retransmission output type not provided on the instrument is set.

• Scaling the Retransmission output

Set high and low limits for the Retransmission output. The scale range depends on the type of the selected Retransmission output.

No retransmission output, Input 1_Measured value (PV), Input 1_Local SV, Input 1_ SV monitor value and Remote setting input value: Input 1_Input range low to Input 1_ Input range high

(When Control with PV select: PV select input range low to PV select input range high) [Varies with the setting of the Decimal point position.]

Input 1_Deviation: -(Input 1_Input span) to +(Input 1_Input span)

[Varies with the setting of the Decimal point position.]

Input 2_Measured value (PV), Input 2_Local SV and Input 2_SV monitor value: Input 2_ Input range low to Input 2_Input range high

[Varies with the setting of the Decimal point position.]

Input 2_Deviation: -(Input 2_Input span) to +(Input 2_Input span)

[Varies with the setting of the Decimal point position.]

Manipulated output value: -5.0 to +105.0%

Measured value (PV) of differential temperature input: -(Input 1_Input span) to +(Input 1_Input span)

[Varies with the setting of the Decimal point position.]

Parameter setting

• Retransmission output 1 type [Engineering Mode: Function block No. 31 (Fn3 /)]

Parameter symbol	Data range	Factory set value
	0: No retransmission output	0
ño i	1: Input 1_Measured value (PV)	
	2: Input 1_Local SV	
	3: Input 1_SV monitor value	
	4: Input 1_Deviation	
	5: Input 1_Manipulated output value [heat-side]	
	6: Input 1_Manipulated output value [cool-side]	
	7: Input 2_Measured value (PV)	
	8: Input 2_Local SV	
	9: Input 2_SV monitor value	
	10: Input 2_Deviation	
	11: Input 2_Manipulated output value	
	12: Remote setting input value	
	13: Measured value (PV) of differential temperature input	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Retransmission output 1 type is changed.

154

Retransmission output 1 scale high [Engineering Mode: Function block No. 31 (Fn 3 /)]

Parameter symbol	Data range	Factory set value
Parameter symbol	Data range No retransmission output, Input 1_Measured value (PV), Input 1_Local SV, Input 1_SV monitor value and Remote setting input value: Input 1_Input range low to Input 1_Input range high (When Control with PV select: V select input range low to PV select input range high) [Varies with the setting of the Decimal point position.] Input 1_Input span) to +(Input 1_Input span) [Varies with the setting of the Decimal point position.] Input 2_Measured value (PV), Input 2_Local SV, and Input 2_SV monitor value:	Factory set value No retransmission output, Input 1_ Measured value (PV), Input 1_Local SV, Input 1_SV monitor value, and Remote setting input value: Input 1_Input range high (Control with PV select: PV select input range high) Input 1_Deviation: +(Input 1_Input span) Input 2_Measured value
	Input 2_Input range low to Input 2_Input range high [Varies with the setting of the Decimal point position.] Input 2_Deviation: -(Input 2_Input span) to +(Input 2_Input span) [Varies with the setting of the Decimal point position.] Manipulated output value: -5.0 to +105.0% Measured value (PV) of differential temperature input: -(Input 1_Input span) to +(Input 1_Input span) [Varies with the setting of the Decimal point position.]	(PV), Input 2_Local SV, and Input 2_SV monitor value: Input 2_Input range high Input 2_Deviation: +(Input 2_Input span) Manipulated output value: 100.0 Measured value (PV) of differential temperature input: 100

Retransmission output 1 scale low [Engineering Mode: Function block No. 31 (Fn3 !)]

Parameter symbol	Data range	Factory set value
RLS I	Same as Retransmission output 1 scale high	No retransmission output, Input 1_Measured value
		(PV), Input 1_Local SV,
		and Remote setting input
		value:
		Input 1_Input range low
		(Control with PV select: PV
		select input range low)
		Input 1_Deviation:
		Input 2 Measured value
		(PV), Input 2_Local SV, and
		Input 2_SV monitor value:
		Input 2_Input range low
		Input 2_Deviation:
		-(Input 2_Input span)
		Measured value (PV) of
		differential temperature
		input: -100

• Retransmission output 2 type [Engineering Mode: Function block No. 32 (Fn 32)]

Par	ameter symbol	Data range	Factory set value
	RoZ	Same as Retransmission output 1	1
Æ	Defente "1	Decemptors that are initialized/Madified when S	atting in Changed"

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Retransmission output 2 type is changed.

156

Retransmission output 2 scale high [Engineering Mode: Function block No. 32 (Fn32)]

Parameter symbol	Data range	Factory set value
RHS2	Same as Retransmission output 1 scale high	Same as Retransmission output 1 scale high

Retransmission output 2 scale low [Engineering Mode: Function block No. 32 (Fn∃2)]

Parameter symbol	Data range	Factory set value
RL S2	Same as Retransmission output 1 scale low	Same as Retransmission output 1 scale low

• Retransmission output 3 type [Engineering Mode: Function block No. 33 (Fn33)]

Parameter symbol	Parameter symbol Data range	
Ro3	Same as Retransmission output 1	3

L To display "Retransmission output 3 type", choose "Current output" in Function block No. 30: Universal output type selection" (Engineering mode).

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Retransmission output 3 type is changed.

• Retransmission output 3 scale high [Engineering Mode: Function block No. 33 (Fn33)]

Parameter symbol	Data range	Factory set value
RHS3	Same as Retransmission output 1 scale high	Same as Retransmission output 1 scale high

To display "Retransmission output 3 scale high", choose "Current output" in Function block No. 30: Universal output type selection" (Engineering mode).

• Retransmission output 3 scale low [Engineering Mode: Function block No. 33 (Fn33)]

Param	eter symbol	Data range	Factory set value
R	1153	Same as Retransmission output 1 scale low	Same as Retransmission output 1 scale low

To display "Retransmission output 3 scale low", choose "Current output" in Function block No. 30: Universal output type selection" (Engineering mode).

Setting procedure



- · Next parameter is displayed.
- Press I and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

6.4 Changing Proportional Cycle Time

When time proportioning output (relay output, voltage pulse output or transistor output) is specified at the time of ordering, Proportional cycle time and Minimum ON/OFF time of proportional cycle can be changed.

Description of function

Proportional cycle time



be achieved by shortening Proportional cycle time, however, the life of operating unit (Relay etc.) can be shortened based on the feature of the specific controlled object

• Minimum ON/OFF time of proportioning cycle

Minimum ON/OFF time of proportioning cycle can be used to compensate relay life by acquiring the minimum OF/OFF time.

Minimum ON time of proportioning cycle: Manipulated output does not turn ON when the duration of the computed ON output is shorter than the Minimum ON time of proportioning cycle being set. Manipulated output remains ON the same amount of time as the computed ON output when the computed ON output is longer than the Minimum ON time of proportioning cycle being set. (Minimum ON time of proportioning cycle is available when the computed ON output exceeds 0%.)

Minimum OFF time of proportioning cycle: Manipulated output remains OFF the same amount of time as the Minimum OFF time set when the computed OFF output is shorter than the Minimum OFF time being set. Manipulated output remains OFF the same amount of time as the computed OFF output when the computed OFF output is longer than the Minimum OFF time being set. (Minimum OFF time of proportioning cycle is available when the computed OFF output is below 100%.)



* When a long minimum ON/OFF time is required for the relay, set a time longer than that time.

Minimum ON/OFF time of proportioning cycle is not operative if the Proportioning cycle is set shorter than the Minimum ON/OFF time of proportioning cycle (Proportioning cycle < Minimum ON/OFF proportioning time).

Parameter setting

• OUT3 proportional cycle time [Setup Setting Mode: Setting group No. 30 (5n30)]

Parameter symbol	Data range	Factory set value
ΓЭ	0.1 to 100.0 seconds	2.0

L To display "OUT3 proportional cycle time", choose "Voltage pulse output" in Function block No. 30: Universal output type selection" (Engineering mode).

OUT3 minimum ON/OFF time of proportional cycle [Setup Setting Mode: Setting group No. 30 (5∩∃□)]

Parameter symbol	Data range	Factory set value
БJМ	0 to 1000 ms	0

To display "OUT3 minimum ON/OFF time of proportional cycle", choose "Voltage pulse output" in Function block No. 30: Universal output type selection (Engineering mode).



Measured value (PV)/Set value (SV) Monitor.)



6.5 Changing Energizing/De-energizing Output

Each output (OUT 1 to 3, DO1 to 4) can be individually set to energize or deenergize.

Setting energize/de-energize at Control output, Retransmission output, or Output terminal to which FAIL is assigned is ignored. (FAIL is fixed as de-energize.)

Description of function

• Outputs selectable to energize or de-energize

Logic calculation output: Event, Input error status Instrument Status Output: RUN, Manual mode, Remote mode, Autotuning (AT), While Set value (SV) is changing, Communication monitoring result

• Explanation of energizing and de-energizing outputs

Output type		Output state		
		Status when the function assigned	Status when the function assigned	
		to the output is ON	to the output is OFF	
Voltage pulse	Energize	ON	OFF	
output	De-energize	OFF	ON	
Current output	Energize	Outputs the maximum output current (100%)	Outputs the minimum output current (0%)	
	De-energize	Outputs the minimum output current (0%)	Outputs the maximum output current (100%)	

Example: Relay contact output

Status when the function assigned to the output is ONStatus when the function assigned to the output is OFF			Status when the function assigned to the output is ON	Status when the function assigned to the output is OFF	
Energize	Contact close	Contact open	De-	Contact open	Contact close
			energize		

Output state at STOP

Irrespective of setting Energize/De-energize, the output state at STOP is as follows. If "Output action at control stop" in Function block No. 30 (Engineering mode) is set to continue the action, setting of Energize/De-energize remains available.

Output type	Output state
Voltage pulse output	OFF
Current output	Outputs the minimum output current (0%)

Parameter setting

• Energized/De-energized selection [Engineering Mode: Function block No. 30 (Fn3D)]

Parameter symbol	Data range	Factory set value
	0 to 127	0
	0: All outputs are energized	
	+1: OUT1 de-energized	
	+2: OUT2 de-energized	
	+4: OUT3 de-energized	
	+8: DO1 de-energized	
	+16: DO2 de-energized	
	+32: DO3 de-energized	
	+64: DO4 de-energized	



· Select lock on the Set data unlock/lock transfer.

6.6 Limiting Output

Use output limiter to limit the output.

Description of function

This is the function which restricts the high and low limits of Manipulated output values (MV).



Output limiter is also available in ON/OFF control.

Parameter setting

 Input 1_Output limiter high [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I. oLH	Input 1_Output limiter low [heat-side] to 105.0%	105.0

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 1_Output limiter high [heat-side] is changed.

Input 1_Output limiter low [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I. oll	-5.0% to Input 1_Output limiter high [heat-side]	-5.0

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 1_Output limiter low [heat-side] is changed.

Input 2_Output limiter high [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. oLH	Input 2_Output limiter low to 105.0%	105.0

- To display "Input 2_Output limiter high", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 2_Output limiter high is changed.
- Input 2_Output limiter low [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. oll	-5.0% to Input 2_Output limiter high	-5.0

- To display "Input 2_Output limiter low", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 2_Output limiter low is changed.

• Input 1_Output limiter high [cool-side] [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

Parameter symbol	Data range	Factory set value
I.o.L.H.c	Input 1_Output limiter low [cool-side] to 105.0%	105.0

- To display "Input 1_Output limiter high [cool-side]", choose "Heating/Cooling PID control" in Function block No. 51: Input 1_Control action (Engineering mode).
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 1_Output limiter high [cool-side] is changed.
- Input 1_Output limiter low [cool-side] [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

Parameter symbol	Data range	Factory set value
l.oLLc	-5.0% to Input 1_Output limiter high [cool-side]	-5.0

- To display "Input 1_Output limiter low [cool-side]", choose "Heating/Cooling PID control" in Function block No. 51: Input 1_Control action (Engineering mode).
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 1_Output limiter low [cool-side] is changed.



Measured value (PV)/Set value (SV) Monitor.)

6.7 Suppressing Sudden Change in Output (Output Change Rate Limiter)

165

Output change rate limiter may be used to suppress sudden change in output at power on or at the time of set value change.

Description of function

The Output change rate limiter limits the variation of Manipulated output (MV) per second. This function is suitable for an application in which a sudden MV change is not acceptable.

Example: The Output change rate limiter is available.

- The MV reaches 100% when the power is turned on to the controller and such a sudden output change is not acceptable in the application.
- A sudden output change occurs at the SV change and it is not acceptable in the application.



The output changes at specific rates set by Output change rate limiter (up) even under the situations where a sudden output change would occur without Output change rate limiter function. There is also independent Output change rate limiter (down).

- When the output change rate is set smaller, it will cause slow control response and affect Derivative action.
- When the Output change rate limiter is used, appropriate PID constants may not be obtained by Autotuning
- The Output change rate limiter is particularly available when a sudden MV change may create uncontrollable situation cause a large current flow. Also, it is available especially when current output or voltage output is used as control output.
- Output change rate limiter may be also available in Manual mode (including communication). Output change rate limiter also functions when output changes suddenly due to manipulated manual output at input error.
- When the instrument recovers from power failure in Hot start 1, the Output change rate limiter starts from the value before the power failure.
- The Output change rate limiter will be unavailable when control is stopped (at STOP), when control action is an ON/OFF control or MC-(V)COS(R) Pressure control operation.

166

Parameter setting

 Input 1_Output change rate limiter (up) [heat-side] [Engineering Mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
I. aRU	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0

Input 1_Output change rate limiter (down) [heat-side] [Engineering Mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
I. aRd	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0

Input 2_Output change rate limiter (up) [Engineering Mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2. oRU	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0

To display "Input 2_Output change rate limiter (up)", choose "2-loop control/ Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Input 2_Output change rate limiter (down) [Engineering Mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2. oRd	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0

 To display "Input 2_Output change rate limiter (down)", choose "2-loop control/ Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Input 1_Output change rate limiter (up) [cool-side] [Engineering Mode: Function block No. 56 (Fn56)]

Parameter symbol	Data range	Factory set value
I.oRUc	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0

To display "Input 1_Output change rate limiter (up) [cool-side]", choose "Heating/Cooling PID control" in Function block No. 51: Input 1_Control action (Engineering mode).

• Input 1_Output change rate limiter (down) [cool-side] [Engineering Mode: Function block No. 56 (Fn56)]

Parameter symbol	Data range	Factory set value
I.o.R.d.c	0.0 to 1000.0%/seconds of manipulated output 0.0: OFF	0.0

To display "Input 1_Output change rate limiter (down) [cool-side]", choose "Heating/Cooling PID control" in Function block No. 51: Input 1_Control action (Engineering mode)

Setting procedure



• Next parameter is displayed.

• Press 🖅 and **(MODE** keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

6.8 Suppressing Sudden Change in Output (Balanceless Bumpless)

Balanceless bumpless may be used to suppress sudden output change when the control is transferred from Auto mode to Manual mode (or Manual mode to Auto mode).

168

Description of function

Manipulated output value, when transferred from Auto mode to Manual mode, depends on the setting of "Manual manipulated output value selection." Selection of "Use the most recent manipulated output value" (balanceless bumpless function) or "Use the Manual manipulated output value*" (bump action) can be selected in "Manual manipulated output value selection."

- * The Manual manipulated output value is the last manipulated output value in Manual mode before the mode is transferred from Auto mode to Manual mode. Note that the Manual manipulated output value can be preset in advance in the Setup setting mode before the mode is transferred to Manual mode.
- When the mode is transferred from Manual mode to Auto mode, the balanceless bumpless function is always activated.
- Balanceless bumpless function

This function is used to prevent overload caused by the Manipulated output value (MV) suddenly changing when Auto mode is transferred to Manual mode and vice versa.

Manipulated output value (MV)



- (a) Transfer from Auto mode to Manual mode. However, when the mode is transferred to Manual mode, the Manipulated output value used in Auto mode will be used as the manual output value in Manual mode.
- (b) The manipulated output value is changed (Manual mode function)
- (c) Transfer from Manual mode to Auto mode. When the mode is transferred to Auto mode, the controller starts PID control based on the MV used in Manual mode.
- Bumpless action associated with Auto/Manual transfer at the time of memory area selection

This instrument allows Auto/Manual transfer at the time of Memory area selection. Selection of balanceless bumpless action and bump action can be made at the time of Auto/Manual transfer.

[Parameters to set up]

Auto/Manual transfer selection (Area)

This setting is used to select whether the mode should be transferred to Auto mode or Manual mode at the time of Memory area selection. This setting is also used to select balanceless bumpless action or bump action at the time of Auto/Manual transfer.

169

• Manipulated output value (Area)

This setting is used to set a manipulated output value when Bump action is selected at the time of Auto/Manual selection (area). This setting is used in Auto mode and Manual mode in common.

L There are several ways to select a memory area.

Refer to 10.3 Storing the Control Related Settings (Memory Area Function) or the Quick Start Guide (172-65706M) for the selection by key operation. Refer to 5.2 Switching Functions Using Digital Inputs (DI) for the selection by Digital input (DI).

Refer to 10.5 Executing Simple Program Operation or 10.6 Executing Simple Sequence Operation for the selection by Memory area soak time.

- Bumpless/Bump action by "Auto/Manual transfer selection (Area)" has a priority over the Bumpless/Bump action by "Manual manipulated output value selection."
- Unavailable when "Pressure control operation [MC-(V)COS(R)]" is selected in Control action.

Parameter setting

 Manual manipulated output value selection [Engineering Mode: Function block No. 50 (Fn50)]

Parameter symbol	Data range	Factory set value
Μ۲ГЅ	0: The last manipulated output value (Balanceless bumpless function)1: Manual manipulated output value	0

Input 1_Manual manipulated output value [Setup Setting Mode: Setting group No. 51 (5n5 /)]

Parar	meter symbol	Data range	Factory set value
1	MMIZ	PID control, Position proportioning PID control:	PID control, Pressure or
ĺ.	F1.F1 <i>F</i>	Input 1_Output limiter low [heat-side] to Input 1_ Output	Temperature control by MC-
		limiter high [heat-side]	(V)COS(R): -5.0
		Heating/Cooling PID control:	Heating/Cooling PID
		-(Input 1_Output limiter high [cool-side]) to +(Input 1_	control: 0.0
		Output limiter high [heat-side])	
		Pressure/Temperature control operation [MC-(V)COS(R)]:	
		Input 1_Output limiter low [heat-side] to whichever the smaller	
		value of either "calculated value from Input 1_Pressure	
		(temperature) limiter" or "Input 1_Output limiter high [heat-side]	

Heating/Cooling PID control has exceptional conditions as follows for the data range when: (1) Input 1_Output limiter high [cool-side] is less than or equal to 0.0%

• Input 1_Output limiter low [heat-side] is less than or equal to 0.0%: 0.0 % to +(Input 1_Output limiter high [heat-side])

Input 1_Output limiter low [heat-side] is less than or equal to 0.0%: Input 1_Output limiter low [heat-side] to Input 1_Output limiter high [heat-side]

(2) Input 1_Output limiter high [heat-side] is less than or equal to 0.0%

• Input 1_Output limiter low [cool-side] is less than or equal to 0.0%: -(Input 1_Output limiter high [cool-side]) to 0.0%

Input 1_Output limiter low [cool-side] is greater than 0.0%: -(Input 1_Output limiter high [cool-side]) to -(Input 1_Output limiter low [cool-side])
 Iow [cool-side])

(3) Fixed at 0.0% in the following cases:

Input 1_Output limiter high [cool-side] less than or equal to 0.0%, AND Input 1_Output limiter high [heat-side] less than or equal to 0.0%

Input 2_Manual manipulated output value [Setup Setting Mode: Setting group No. 52 (5n52)]

Paran	neter symbol	Data range	Factory set value
כ	MML	PID control:	-5.0
L.	.	Input 2_Output limiter low to Input 2_Output limiter high	
		Pressure/Temperature control operation [MC-(V)COS(R)]:	
		Input 2_Output limiter low [heat-side] to whichever the smaller	
		value of either "calculated value from Input 2_Pressure	
		(temperature) limiter" or "Input 2_Output limiter high [heat-	
		side]. When STOP is set, Input 2_Output limiter low [heat-	
		side] to Input 2_Output limiter high [heat-side]	

To display "Input 2_Manual manipulated output value", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Input 1_Auto/Manual transfer selection (Area) [Parameter Setting Mode: Parameter group No. 70 (P∩∩□)]

Γ	Parameter symbol	Data range	Factory set value
ſ	ПО И МО	0: No transfer	0
	1.17/11.11	1: Auto mode (bumpless)	
		2: Auto mode (bump)	
		3: Manual mode (bumpless)	
		4: Manual mode (bump)	

Input 1_Manipulated output value (Area) [Parameter Setting Mode: Parameter group No. 70 (P∩ ∩□)]

Parameter symbol	Data range	Factory set value
	Heating/Cooling PID control: -105.0 to +105.0%	Heating/Cooling PID
i. 117.A	Other:-5.0 to +105.0%	control:0.0
	[When settings either 2: Auto mode (bump) or 4: Manual	Other: -5.0%
	mode (bump) is selected in Input 1_Auto/Manual transfer	
	selection (Area)]	

Input 2_Auto/Manual transfer selection (Area) [Parameter Setting Mode: Parameter group No. 70 (P∩∩□)]

Parameter symbol	Data range	Factory set value
חמעחר	0: No transfer	0
C.A / II.A	1: Auto mode (bumpless)	
	2: Auto mode (bump)	
	3: Manual mode (bumpless)	
	4: Manual mode (bump)	

To display "Input 2_Auto/Manual transfer selection (Area)", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Input 2_Manipulated output value (Area) [Parameter Setting Mode: Parameter group No. 70 (P_□ ∩□)]

Parameter symbol	Data range	Factory set value
2. MV.A	-5.0 to +105.0% [When settings either 2: Auto mode (bump) or 4: Manual mode (bump) is selected in Input 2_Auto/Manual transfer selection (Area)]	-5.0

To display "Input 2_Manipulated output value (Area)", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Setting procedure



- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.



6.9 Changing the Output Action While in Control Stop Mode

This instrument can continue supplying Retransmission output and Event outputs, or output Manipulated output value, even while Control is stopped.

Description of function

 Retransmission output, Logic calculation output, and Instrument status output while in Control stop mode

The following three types can be continued to output even while in control stop mode. Multi types can be selected.

- Retransmission output
- Logic calculation output
- Other: -5.0% [Event, Input error status]
- Instrument Status Output [Manual mode, Remote mode, While Set value (SV) is changing, Communication monitoring result]

Continued output types while in "Control stop" cannot be selected by the output. For example, this combination is not available:

Event 1: Continue to output even while in Control stop. Event 2: Output to be stopped.

Selection can be made in the unit of Retransmission output, Logic operation output, Instrument status output.

• Manipulated output value at STOP

Manipulated output value at STOP is a function to produce the preset manipulated output value at Control STOP. In the case of Heating/Cooling PID control, Manipulated output value can be set on both sides of heating and cooling. Likewise, in case of a dual output type, manipulated output value can be set on both sides of Control output 1 and 2.

Parameter setting

• Output action at control stop [Engineering Mode: Function block No. 30 (Fn3D)]

		· /-
Parameter symbol	Data range	Factory set value
55	0 to 7 0: OFF +1: Logic calculation output: Action continues +2: Retransmission output: Action continues +4: Instrument status output: Action continues To select two or more functions, sum each value.	0

Input 1_Manipulated output value at STOP [heat-side] [Engineering Mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
I. RMV	-5.0 to +105.0%	-5.0

Input 2_Manipulated output value at STOP [Engineering Mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2. RMV	-5.0 to +105.0%	-5.0

To display "Input 2_Manipulated output value at STOP", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Input 1_Manipulated output value at STOP [cool-side] [Engineering Mode: Function block No. 56 (Fn56)]

Parameter symbol	Data range	Factory set value
I.RMV c	-5.0 to +105.0%	-5.0

To display "Input 1_Manipulated output value at STOP [cool-side]", choose "Heating/Cooling PID control" in Function block No. 51: Input 1_Control action (Engineering mode).

Setting procedure





6.10 Monitoring Manipulated Output Value

Manipulated output value can be monitored on this instrument.

Display contents

 Input 1_Manipulated output value monitor [heat-side] [Monitor & SV Setting Mode]

Parameter symbol	Data range	Factory set value
I. MV	-5.0 to +105.0%	

Input 1_Manipulated output value monitor [cool-side] [Monitor & SV Setting Mode]

Parameter symbol	Data range	Factory set value
I. MVc	-5.0 to +105.0%	

To display "Input 1_Manipulated output value monitor", choose "Heating/Cooling PID control" in Function block No. 51: Input 1_Control action (Engineering mode).

Input 2_Manipulated output value monitor [Monitor & SV Setting Mode]

Parameter symbol	Data range	Factory set value
2. MV	-5.0 to +105.0%	

To display "Input 2_Manipulated output value monitor", choose "2-loop control/ Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Display operation



* The **MONI** key may be used instead.

** The **R.SET** key may be used to return.

7. Event Function

7.1 Using Event Function

Set the parameter	Set the parameter related to Event output.
related to event output	OUT1 to 3 function selection
	DO1 to 4 function selection
	 OUT1 to 3 logic calculation selection
	DO1 to 4 logic calculation selection
	 Energized/De-energized selection
	Interlock selection
	 Output action at control stop
	Refer to 6.1 Changing Output Assignment for OUT1 to 3 function selection, DO1 to 4 function selection, OUT1 to 3 logic calculation selection and DO1 to 4 logic calculation selection.
	Refer to 6.5 Changing Energizing/De-energizing Output for Energized/De-energized selection.
	Refer to 7.5 Keeping the Event State (Interlock Function) and 7.6 Releasing the Event State (Interlock Release) for Interlock function.
	Refer to 6.9 Changing the Output Action While in Control Stop Mode for Output action at control atom
¥	
Set the Event parameter	Set the following parameters:
	• Event assignment
	Event type Event hold action
	Event differential gap
	• Event timer
	Refer to 7.1.1 Changing input for event for event assignment.
	Refer to 7.1.2 Changing event type for event type.
	Refer to 7.1.3 Adding hold action to the event action) for event hold action.
	Refer to 7.1.4 Setting a differential gap in event action for event differential gap.
	Refer to 7.1.5 Preventing event from turning on due to a transient abnormal input for Event timer.
	Set the Event set value.
Set the Event set value	Refer to 7.1.7 Changing the event set value for event set value.

7.1.1 Changing input for event

On this instrument input signal can be individually set for each event.

- Input 1
- Input 2
- Differential temperature input

Description of function

There are four actions available for event; Deviation action, Input value action, Set value action, and Manipulated output value action. Each event uses its own value.

Deviation action

For Input 1: Deviation = Input 1_Measured value (PV) – Input 1_Set value (SV) For Input 2: Deviation = Input 2_Measured value (PV) – Input 2_Set value (SV) For Differential temperature input: Deviation = Measured value (PV) of differential temperature input – Set value (SV) of differential temperature input

• Input value action

For Input 1: Input value = Input 1_Measured value (PV) For Input 2: Input value = Input 2_Measured value (PV) For Differential temperature input: Input value = Measured value (PV) of differential temperature input

• Set value action

For Input 1: Set value = Input 1_Set value (SV) For Input 2: Set value = Input 2_Set value (SV) For Differential temperature input: Set value = Set value (SV) of differential temperature input

• Manipulated output value action

For Input 1: Manipulated output value = Input 1_ Manipulated output value (MV) For Input 2: Manipulated output value = Input 2_ Manipulated output value (MV) For Differential temperature input: Manipulated output value = Input 1_Manipulated output value (MV)

Parameter setting

• Event 1 assignment [Engineering Mode: Function block No. 41 (Fn4 /)]

Parameter symbol	Data range	Factory set value
EVRI	1: Input 1 2: Input 2 3: Differential temperature input	1

To display "Event 1 assignment", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Event 1 assignment is changed.

● Event 2 assignment [Engineering Mode: Function block No. 42 (Fn42)]

Parameter symbol	Data range	Factory set value
E¥82	1: Input 1 2: Input 2 3: Differential temperature input	1

- To display "Event 2 assignment", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Event 2 assignment is changed.

● Event 3 assignment [Engineering Mode: Function block No. 43 (Fn43)]

		· /-
Parameter symbol	Data range	Factory set value
EVAB	1: Input 1 2: Input 2 3: Differential temperature input	1

To display "Event 3 assignment", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Event 3 assignment is changed.

• Event 4 assignment [Engineering Mode: Function block No. 44 (Fn44)]

Parameter symbol	Data range	Factory set value
ЕГАЧ	1: Input 1 2: Input 2 3: Differential temperature input	1

- To display "Event 4 assignment", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Event 4 assignment is changed.

Setting procedure



• Press () and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.

- (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
 Select lock on the Set data unlock/lock transfer.
7.1.2 Changing event type

There are 24 types of event in total.

 Event type 	
Set value	Event type
0	None
1	Deviation high (Using SV monitor value) ¹⁾
2	Deviation low (Using SV monitor value) ¹⁾
3	Deviation high/low (Using SV monitor value) ¹⁾
4	Band (Using SV monitor value) ¹⁾
5	Deviation high/low (Using SV monitor value) [High/Low individual setting] ¹⁾
6	Band (Using SV monitor value) [High/Low individual setting] ¹⁾
7	SV high (Using SV monitor value)
8	SV low (Using SV monitor value)
9	Process high ²⁾
10	Process low ²⁾
11	Deviation high (Using local SV) ¹⁾
12	Deviation low (Using local SV) ¹⁾
13	Deviation high/low (Using local SV) ¹⁾
14	Band (Using local SV) ¹⁾
15	Deviation high/low (Using local SV) [High/Low individual setting] ¹⁾
16	Band (Using local SV) [High/Low individual setting] ¹⁾
17	SV high (Using local SV)
18	SV low (Using local SV)
19	MV high [heat-side] ²⁾
20	MV low [heat-side] 2)
21	MV high [cool-side] ²⁾
22	MV low [cool-side] 2)
23	Process high/low [High/Low individual setting] 2)
24	Process band [High/Low individual setting] 2)

Event type is set to 0 when shipped from the factory.

¹⁾ Event hold and re-hold action is available.

²⁾ Event hold action is available.

Description of function

• Deviation action

When the deviation (PV - SV) reaches the Event set value, event ON occurs.

SV monitor value type and local SV value type are available for Deviation action.

SV monitor value type	The Event set value is set for the SV monitor value.
	Soft start/Setting change rate limiter adjust the Event set value to
	follow the same change rate of SV monitor value.
	SV monitor value:
	SV monitor value is displayed in the Measured value (PV)/Set
	value (SV) monitor screen (Monitor & SV setting mode). When
	Soft start/Setting change rate limiter are set, the Set value (SV)
	in the changing process is displayed.
Local SV type	The Event set value is set for the Set value (SV) [Local SV].
	Local SV:
	Local SV is displayed in the Measured value (PV)/Set value
	(SV) screen (Monitor & SV setting mode).



Refer to 10.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter) for the Setting change rate limiter.

Some examples of Deviation high are described in the following:

Deviation high: When the deviation (PV – SV) is more than the Event set value, the event ON occurs.







Event turns ON or OFF in accordance with the differential gap setting. Refer to 7.1.4 Setting a differential gap in event action for Event differential gap.

Diagrams of the Deviation action type are shown in the following:

ON: Event action turned on

OFF: Event action turned off

(\blacktriangle : Set value (SV) \triangle : Event set value \ddagger : Event differential gap)

Deviation high

When the deviation (PV – SV) is more than the Event set value, the event ON occurs. (Event set value is greater than 0) (Event set value is less than 0)



Deviation high

When the deviation (PV - SV) is less than the Event set value, the event ON occurs. (Event set value is greater than 0) (Event set value is less than 0)



Deviation high/low

Two types of Deviation high/low action are available.

Without high/low individual setting:

When the absolute deviation | PV - SV | is more/less than the Event set values, the event ON occurs.

With high/low individual setting:

- High action: When the deviation (PV SV) is more than the Event set value [high], the event ON occurs.
- Low action: When the deviation (PV SV) is less than the Event set value [low], the event ON occurs.

(Without High/Low individual setting)





Band

Two types of Band action are available.

Without high/low individual setting:

When the absolute deviation | PV - SV | is within the Event set values, the event ON occurs.

With high/low individual setting:

High action: When the deviation (PV - SV) is less than the Event set value [high], the event ON occurs.

Low action: When the deviation (PV – SV) is more than the Event set value [low], the event ON occurs.





182



Set value action

When the Set value (SV) reaches the Event set value, event ON occurs. SV monitor value type and local SV value type are available for Set value action.

SV monitor value type	Event turns on when SV monitor value reaches Event set value. Setting change rate limiter turns on the event when the Set value (SV) in the changing process reaches Event set value. SV monitor value: SV monitor value is displayed in the Measured value (PV)/Set value (SV) monitor screen (Monitor display mode). When Setting change rate limiter is set, the Set value (SV) in the changing process is displayed.
Local SV type	Event turns on when Set value (SV) [Local SV] reaches Event set value. Local SV: Local SV is displayed in the Measured value (PV)/Set value (SV) screen (SV setting mode).

Some examples of SV high are described in the following:

SV high: When the Set value (SV) is more than the Event set value, the event ON occurs.



Event turns ON or OFF in accordance with the differential gap setting. Refer to 7.1.4 Setting a differential gap in event action for Event differential gap.

Diagrams of the Set value action type are shown in the following:

ON: Event action turned on

OFF: Event action turned off

(\blacktriangle : Set value (SV) \triangle : Event set value \ddagger : Event differential gap)

SV high

When the Set value (SV) is more than the Event set value, the event ON occurs.

OFF ↓_M ON Low ∨ High SV

SV low

When the Set value (SV) is less than the Event set value, the event ON occurs.

ON ∱☆ OFF Low △ High SV

• Input value action

When the Measured value (PV) reaches the Event set value, event ON occurs. ON: Event action turned on OFF: Event action turned off (\blacktriangle : Set value (SV) \triangle : Event set value \ddagger : Event differential gap)

Process high

When the Measured value (PV) is more than the Event set value, the event ON occurs.

OFF ↓ ON Low △ High > PV

Process low

When the Measured value (PV) is less than the Event set value, the event ON occurs.

ON ☆ OFF Low △ High >PV

Process high/low

Process high/low action can be modified to high and low individual setting.

High action: When the Measured value (PV) is more than the Event set value [high], the event ON occurs.

Low action: When the Measured value (PV) is less than the Event set value [low], the event ON occurs.

(With High/Low individual setting)

ON ☆ OFF ☆ ON Low △ High >PV

Process band

Process band action can be modified to high and low individual setting.

High action: When the Measured value (PV) is less than the Event set value [high], the event ON occurs.

Low action: When the Measured value (PV) is more than the Event set value [low], the event ON occurs.

(With High/Low individual setting)

OFF		ON		OFF	<u>ر ام</u>
Low	Δ		Δ	High	~ P V

• Manipulated output value action

When a Manipulated output value (MV) reaches the Event set value, the event ON occurs.

ON: Event action turned on

OFF: Event action turned off

(\blacktriangle : Set value (SV) \triangle : Event set value \ddagger : Event differential gap)

MV high

When the Manipulated output value (MV) is more than the Event set value, the event ON occurs.

OFF ↓ ON Low ∨ High MV

MV low

When the Manipulated output value (MV) is less than the Event set value, the event ON occurs.



Parameter setting

• Event 1 type [Engineering Mode: Function block No. 41 (Fague)]

Parameter symbol	Data range	Factory set value
	0: None	0
	1: Deviation high (Using SV monitor value) ¹⁾	
	2: Deviation low (Using SV monitor value) ¹⁾	
	3: Deviation high/low (Using SV monitor value) 1)	
	4: Band (Using SV monitor value) ¹⁾	
	5: Deviation high/low (Using SV monitor value)	
	[High/Low individual setting] ¹⁾	
	6: Band (Using SV monitor value) [High/Low individual setting] ¹⁾	
	7: SV high (Using SV monitor value)	
	8: SV low (Using SV monitor value)	
	9: Process high ²⁾	
	10: Process low ²⁾	
	11: Deviation high (Using local SV) ¹⁾	
	12: Deviation low (Using local SV) ¹⁾	
	13: Deviation high/low (Using local SV) ¹⁾	
	14: Band (Using local SV) ¹⁾	
	15: Deviation high/low (Using local SV) [High/Low individual setting] ¹⁾	
	16: Band (Using local SV) [High/Low individual setting] ¹⁾	
	17: SV high (Using local SV)	
	18: SV low (Using local SV)	
	19: MV high [heat-side] ²⁾	
	20: MV low [heat-side] 2)	
	21: MV high [cool-side] ²⁾	
	22: MV low [cool-side] ²⁾	
	23: Process high/low [High/Low individual setting] ²⁾	
	24: Process band [High/Low individual setting] ²⁾	
	¹⁾ Event hold action and re-hold action is available.	
	²⁾ Event hold action is available.	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Event 1 type is changed.

• Event 2 type [Engineering Mode: Function block No. 42 (Fn42)]

Parameter symbol	Data range	Factory set value
652	Same as Event 1 type	1

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Event 2 type is changed.



• Event 3 type [Engineering Mode: Function block No. 43 (Fn43)]

Parameter symbol	Data range	Factory set value
653	Same as Event 1 type	1

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Event 3 type is changed.

• Event 4 type [Engineering Mode: Function block No. 44 (Fn44)]

Parameter symbol	Data range	Factory set value
654	Same as Event 1 type	1

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Event 4 type is changed.

7.1.3 Adding hold action to the event action

This instrument can be added hold action or re-hold action to the Event action.

- Some event actions may not be available with hold and re-hold actions. Setting hold or re-hold action on the event that is not available with hold and re-hold actions will just be ignored.
- Refer to 7.1.2 Setting of Event types for those events that are available with hold or re-hold action.

Description of function

• Hold action

When hold action is ON, the event action is suppressed at start-up or STOP to RUN until the measured value has entered the non-event range.

Hold action will be cancelled when Measured value (PV) is in the Event status OFF area

- · When the power is turned on
- When transferred from STOP (control STOP) to RUN (control RUN)

[Example] Difference between with and without hold action for deviation low



Re-hold action

When Re-hold action is ON, the event action is also suppressed at the Set value (SV) change until the Measured value (PV) has entered the non-event range.

Action condition	Hold action	Re-hold action
When the power is turned on	Works	Works
When transferred from STOP (control STOP) to RUN (control RUN)	Works	Works
When the Set value (SV) is changed	Does not work	Works

[Example] When Event 1 type is the deviation low:

When re-hold action is OFF and event output type is deviation, the event output is produced due to the Set value (SV) change. The re-hold action suppresses the alarm output until the measured value has entered the non-event range again.



NOTE When high alarm with hold action/re-hold action is used for Event function, alarm does not turn on while hold action is in operation. Take measures to prevent overheating which may occur if the control device fails.

The re-hold action will be unavailable for any of the following.

- Setting of Soft start or Setting change rate limiter is other than "0 (no function)"
- Remote mode
- Cascade control
- Differential temperature control

Parameter setting

• Event 1 hold action [Engineering Mode: Function block No. 41 (Fatil)]

Parameter symbol	Data range	Factory set value
EHol	0: Hold action OFF 1: Hold action ON 2: Re-hold action ON Setting hold or re-hold action on the event that is not available with hold and re-hold actions will just be ignored.	0

• Event 2 hold action [Engineering Mode: Function block No. 42 (Fn42)]

Parameter symbol	Data range	Factory set value
6Ho2	 0: Hold action OFF 1: Hold action ON 2: Re-hold action ON Setting hold or re-hold action on the event that is not available with hold and re-hold actions will just be ignored. 	0

• Event 3 hold action [Engineering Mode: Function block No. 43 (Fn43)]

Parameter symbol	Data range	Factory set value
EHo3	 0: Hold action OFF 1: Hold action ON 2: Re-hold action ON Setting hold or re-hold action on the event that is not available with hold and re-hold actions will just be ignored. 	0

• Event 4 hold action [Engineering Mode: Function block No. 44 (Fn44)]

Parameter symbol	Data range	Factory set value
ЕНоЧ	 O: Hold action OFF Hold action ON Re-hold action ON Setting hold or re-hold action on the event that is not available with hold and re-hold actions will just be ignored. 	0

7.1.4 Setting a differential gap in event action

Description of function

When the measured value (PV) is around the Event set value, event output relay connections sometimes switch frequently between ON and OFF due to an unstable input signal. This prevents chattering of event output due to the measured value fluctuation around the Event set value.



Parameter setting

• Event 1 differential gap [Engineering Mode: Function block No. 41 (Fn4 /)]

Parameter symbol	Data range	Factory set value
	Deviation, Process and SV:	Deviation, Process and SV:
EA i	 If event assignment is set to either Input 1 or Differential 	TC/RTD inputs: 2
	temperature.	V/I inputs: 0.2% of input
	0 to Input 1_Input span	span
	(When Control with PV select: 0 to PV select input span)	MV: 0.2
	 If event assignment is set to Input 2 	
	0 to Input 2_Input span	
	[Varies with the setting of the Decimal point position.]	
	MV: 0.0 to 110.0%	

• Event 2 differential gap [Engineering Mode: Function block No. 42 (Fn42)]

Parameter symbol	Data range	Factory set value
	Same as Event 1 differential gap	Deviation, Process and SV:
ן נחכ		TC/RTD inputs: 2
		V/I inputs: 0.2% of input
		span
		MV: 0.2

190

• Event 3 differential gap [Engineering Mode: Function block No. 43 (Fn43)]

Parameter sy	mbol	Data range	Factory set value
EH	ΕI	Same as Event 1 differential gap	Deviation, Process and SV: TC/RTD inputs: 2 V/I inputs: 0.2% of input span MV: 0.2

• Event 4 differential gap [Engineering Mode: Function block No. 44 (Fn44)]

Parameter symbol	Data range	Factory set value
ЕНЧ	Same as Event 1 differential gap	Deviation, Process and SV: TC/RTD inputs: 2 V/I inputs: 0.2% of input span MV: 0.2

7.1.5 Preventing event from turning on due to a transient abnormal input

Event timer can be used to prevent event from turning on for the event state shorter than the set time.

Description of function

When an event state becomes ON, the output is suppressed until the Event timer set time elapses. If the event output is still ON after time is up, the output will resume. If an event state is cancelled while the event timer is activated, no event output is turned on.

Example: When the setting of Event 1 timer is 50.0 seconds Measured value (PV)



The Event timer is also activated for the following reasons:

- When set to the event state simultaneously with power turned on
- When set to the event state simultaneously with control changed to RUN (control start) from STOP (control stop).

In the event hold state, no event output is turned on even after the Event timer preset time has elapsed.

The Event timer is reset for the following reasons when:

- Power failure occurs while the Event timer is being activated
- Control is changed to STOP (control stop) from RUN (control start) while the Event timer is being activated

191

• Event state is cancelled while the event timer is activated

Parameter setting

• Event 1 timer [Engineering Mode: Function block No. 41 (Fat /)]

Parameter symbol	Data range	Factory set value
ΕΚΓΙ	0.0 to 600.0 seconds	0.0

● Event 2 timer [Engineering Mode: Function block No. 42 (Fn42)]

Parameter symbol	Data range	Factory set value
E%L5	0.0 to 600.0 seconds	0.0

• Event 3 timer [Engineering Mode: Function block No. 43 (Fn43)]

Parameter symbol	Data range	Factory set value
ЕГГЭ	0.0 to 600.0 seconds	0.0

• Event 4 timer [Engineering Mode: Function block No. 44 (Fn44)]

Parameter symbol	Data range	Factory set value
ЕКГЧ	0.0 to 600.0 seconds	0.0

7.1.6 Changing event output assignment

Event output assignment can be changed through OUT1 to 3 function selection, DO1 to 4 function selection, OUT1 to 3 logic calculation selection, and DO1 to 4 logic calculation selection.

Refer to 6.1 Changing Output Assignment [Control Output, Retransmission Output, Logic Calculation (Event) Output, Instrument Status Output] for Event output assignment.

7.1.7 Changing the event set value

The Event set value can be set in Parameter group No. 40 in the Parameter setting mode. Since the Set value for Event 1 to 4 are included in the Memory area, up to 16 data can be stored per parameter.

Refer to the the SC-F71 Quick Start Guide (172-65706M) or Instruction Manual [Hardware] (172-65709M) for how to set Event set values.

Refer to10.3 Storing the control related set values (Memory Area function) for Memory area transfer.

7.2 Checking Event ON State

The event ON state can be checked with the ALM lamp or on the Comprehensive event state screen in the Monitor & SV setting mode.

Display contents

• ALM lamp

The event ON state can be verified with the ALM lamp. However, the instrument has only one ALM lamp which is turned on using the OR relation of the related functions. Combination of the states can be freely available. The setting can be done in Function block: ALM lamp lighting condition (Engineering mode).

[Events that illuminate the lamp]

- Event 1
- Event 2
- Event 3
- Event 4
- Input 1_Input error high
- Input 1_Input error low
- Input 2_Input error high
- Input 2_Input error low



ALM lamp

● ALM lamp lighting condition [Engineering Mode: Function block No. 10 (Fn □)]

Parameter symbol	Data range	Factory set value
	0 to 255	15
I ALL	0: OFF	
	+1: Event 1	
	+2: Event 2	
	+4: Event 3	
	+8: Event 4	
	+16: Input 1_Input error high	
	+32: Input 1_Input error low	
	+64: Input 2_Input error high	
	+128: Input 2_Input error low	
	To select two or more functions, sum each value.	

• Comprehensive event state [Monitor & SV Setting Mode]

Parameter symbol	Data range	Factory set value
EVENF	When an event occurs, the character of the occurring event is displayed on the Set value (SV) display unit. If two or more events occur at the same time, the relevant characters are displayed alternately every 0.5 seconds	_
	EUF I: Event 1 EUF I: Event 2 EUF I: Event 3 EUF I: Event 4 I n LUP: Input 1_Input error high I n LUP: Input 2_Input error high I n 2LUP: Input 2_Input error high	

Display operation



** The **R.SET** key may be used to return.

7.3 Keeping the Event State (Interlock Function)

Description of function

The Event interlock function holds the event state (including the input error) even if the Measured value (PV) is out of the event zone after it enters the event zone once. Interlock can be set for the Event and Input error.



[Without Event hold action]

Refer to 7.4 Releasing the Event State (Interlock Release) for the interlock release.

Parameter setting

● Interlock selection [Engineering Mode: Function block No. 30 (Fn∃D)]

Parameter symbol	Data range	Factory set value
	0 to 255	0
	0: Unused	
	+1: Event 1	
	+2: Event 2	
	+4: Event 3	
	+8: Event 4	
	+16: Input 1_Input error high	
	+32: Input 1_Input error low	
	+64: Input 2_Input error high	
	+128: Input 2_Input error low	
	To select two or more functions, sum each value.	

Setting procedure



- (The **MONI** key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

7.4 Releasing the Event State (Interlock Release)

Description of function

The Event interlock function holds the event state (including the input error) even if the Measured value (PV) is out of the event zone after it enters the event zone once. The Interlock may be released by Digital input (DI) and Communication (optional) as well as key operation.

The following picture shows how to release the interlock. Event type: Deviation high Measured value (PV) Event set value D Set value (SV) Without interlock function Event state OFF ON (ALM lamp lights) Event state OFF ON Not turned OFF as the With interlock function interlock continues. Event state OFF ON (ALM lamp lights) Event state OFF ON Interlock release screen OFF ON (ILr) state Interlock release operation Release is invalid Release is valid Since the PV is in the Invalid when PV is in the alarm ON region. alrm OFF region, Interlock is released and becomes OFF.

195

- The Interlock release has an influence to all events and input error that are in the interlock state and releases such events at one time whose interlock release conditions are met.
- Refer to 5.2 Switching Functions Using Digital Inputs (DI) for Interlock release through Digital input (DI).
- Refer to the SC-F71 Instruction Manual [Host Communication] (172-65711M) for Interlock release through Communication.

Parameter setting

• Interlock release[Monitor & SV Setting Mode]

Parameter symbol	Data range	Factory set value
ILR	aFF: Interlock release	oFF

To display "Interlock release", choose a setting other than "*GFF*" in Function block No. 30: Inter lock selection (Engineering mode).

Setting procedure

After the Interlock is set, the Interlock release screen shows "an" automatically.



7.5 Preventing Control with Input Errors (Input Circuit Error Alarm)

Description of function

Input circuit error alarm uses two inputs (dual input circuits) and detects errors in the input circuit from the difference between two inputs.

When the difference between Input 1_Measured input (PV1) and Input 2_Measured input (PV2 - PV1) exceeds Input circuit error alarm set value, it is considered to be an input circuit error and "Input error state" starts.



Determination of input circuit errors

- (PV1 + Input circuit error alarm set value) < PV2 ... Input circuit error (high)
- (PV1 Input circuit error alarm set value) > PV2 ... Input circuit error (low)



Ш	Different input type can be specified for Input 1 and Input 2. Note that action may be different on each input.
	To also determine errors on external circuits, measure the same location on two external circuits and connect them as Input 1 and Input 2 respectively.
	To output "Input 1_Input error high/low," output assignment must be set in advance. Refer to 6.1 Changing Output Assignment [Control Output, Retransmission Output, Logic Calculation (Event) Output, Instrument Status Output] for output assignment.
	Irrespective of Input circuit error alarm setting, "Input 1_Input error high/low" conducts normal Input error alarm action. Refer to 5.7 Changing Error Handling at Input Error When set to the event state simultaneously with power turned on operation at Input error action.
	Before using the Input circuit error alarm, check for errors in measured values between Input 1 and Input 2 which should be removed in advance using PV bias.
	The Input circuit error alarm function uses two inputs, but control using Input 2 is not available. However, lighting the ALM lamp and providing state output from Digital output (DO) are possible.

Parameter setting

• Select function for Input 2 [Engineering Mode: Function block No. 58 (Fn58)]

Parameter symbol	Data range	Factory set value
עחר	0: No function	1
	1: Remote setting input	
	2: 2-loop control/Differential temperature control	
	3: Control with PV select	
	4: Cascade control (Slave single \leftrightarrow Cascade) *	
	5: Cascade control (Master single \leftrightarrow Cascade) *	
	6: Input circuit error alarm	
	PID control: 0 to 6	
	When pressure control operation [MC-(V)COS(R)] is selected:	
	0 to 2, 6	
	Heating/Cooling control: 0 to 3, 6	

Refer to "4. Parameters that are Initialized/Modified when setting is Changed" for the parameters that are initialized when the Select function for Input 2 is changed.

Input circuit error alarm set value [Engineering Mode: Function block No. 58 (Fn58)]

Parameter symbol	Data range	Factory set value
ICA	0 to Input 1_Input span 0: No function [Varies with the setting of the Decimal point position.]	TC/RTD inputs: 10 V/I inputs: 5% of Input 1_ Input span

To display "Input circuit error alarm set value", choose "Input circuit error alarm" in Function block No. 58: Select function for Input 2 (Engineering mode).

Setting procedure



- Press () and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- · Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

8. Control Function

This chapter describes control related functions, setting contents and setting procedure based on the key words related to controls.

8.1 Running/Stopping Control (RUN/STOP Transfer)

Choose whether to start (RUN) or stop (STOP) control. The RUN/STOP transfer can be made by Digital input (DI) or Communication (optional) other than the key operation. The factory set value is STOP. As soon as the controller is powered on, control is stopped.

199

STOP display		Displays the STOP symbol "与 ெP" on the SV, PV or MV
		displays.
		(Factory set value: SV displays)
		"Input 1_Manipulated output value at STOP [heat-side]" is
		Guipui.
	PID control	(Factory set value: -5.0%)
		"Input 2_Manipulated output value at STOP" * is output.
Control output		(Factory set value: -5.0%)
		* In the case of 2-loop control/Differential temperature control
	Heating/Cooling PID control	Heat-side: "Input 1_Manipulated output value at STOP
		[heat-side]" is output.
		(Factory set value: -5.0%)
Logic calculation output		According to the patting contents of Output patient of STOD
Retransmission output		According to the setting contents of Output action at STOP
Instrument status output		(Factory set value: OFF)
Autotuning or S	startup tuning	AT cancelled (PID constants are not updated)

• State of this instrument when set to STOP mode

- Refer to 9.4 Changing the Display Position of STOP during the Control Stop for STOP display selection.
- Refer to 6.9 Changing the Output Action While in Control Stop Mode for Action selection at STOP mode.

• State of this instrument when set to RUN mode

Operation when transferred to RUN from STOP is in accordance with the Hot/Cold start selection setting.

- Refer to 8.19 Changing the Action at Power ON (Hot/Cold Start) for Hot/Cold start.
- Refer to the SC-F71 Instruction Manual [Host communication] (172-65711M) for RUN/STOP switching by communication (optional).

200

Setting procedure



• Changing the mode with the direct key

Assigning the "RUN/STOP transfer" function to the FUNC key facilitates the RUN/STOP switching.

RUN/STOP transfer function is assigned to the FUNC key at the time of shipment for immediate use.

Each time FUNC key is pressed, RUN and STOP are toggled.

Refer to 10.8 Accessing some functions directly (FUNC key) for FUNC key assignment.

Changing the mode from RUN to STOP

STOP



RUN state

STOP display (Display for 1 second)

Selection of key action is possible from "Press once" and "Press and hold" to enable the switching. Refer to 10.8 Accessing some functions directly (FUNC key) for details.

• Switching the mode with Digital Input (DI)

To switch the RUN/STOP using the Digital Input (DI), use "DI function selection" in Function block No. 23 (Engineering mode).

Refer to 5.2 Switching Functions Using Digital Inputs (DI) for the Digital input (DI) assignment.



NOTE After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.

The above switching action can be inverted (The functions at contact close and contact open can be swapped). This setting can be configured at "DI logic invert." Refer to 5.2 Switching Functions Using Digital Inputs (DI) for details.

• RUN/STOP transfer state

The table below shows the actual RUN/STOP modes and displays under different combinations of settings by Key operation, Communication, and Digital input (DI).

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status	STOP display
	RUN	RUN	
RUN	STOP		dSCP
STOD	RUN	STOP	KSEP
310P	STOP		SC-P *

* The instrument without RUN/STOP switching by DI will have the same display.

STOP character display



Monitor & SV setting mode PV/SV monitor



RUN/STOP tranfer by DI:RUN

Monitor & SV setting mode PV/SV monitor

201



STOP with the DI RUN/STOP tranfer by key:RUN

L The display position of STOP can be changed. Refer to 9.4 Changing the Display Position of STOP during the Control Stop for details.

8.2 Changing Control Action

Refer to the following 6 types of control action:

- Heating/Cooling PID control (Cooling linear
- PID control (direct action)PID control (reverse action)
- type)
- ON/OFF action
- MC-COS(R)/MC-VCOS(R) Pressure control
- MC-COS(R)/MC-VCOS(R) Temperature control

When the control mode is set to Cascade control which uses two measured inputs, the selectable control action is limited to "PID control (direct action)," "PID control (reverse action)," or "ON/OFF action."

PID control (direct action)

PID control (reverse action)

The Manipulated output value (MV) increases as the Measured value (PV) increases. This action is used generally for cooling control.

The Manipulated output value (MV) decreases

This action is used generally for heating control.

as the Measured value (PV) increases.



ON/OFF action

ON/OFF control is possible when the Proportional band [heat-side] is set to 0. In ON/OFF control with Reverse action, when the Measured value (PV) is smaller than the Set value (SV), the Manipulated output (MV) is 100% or ON. When the PV is higher than the SV, the MV is 0% or OFF. Differential gap setting prevents control output from repeating ON and OFF too frequently.





Heating/Cooling PID control

In Heating/Cooling control, only one controller enables heating and cooling control.



Refer to 8.7 Controlling with Heating/Cooling Action for Heating/Cooling PID control.

MC-COS(R)/MC-VCOS(R) Pressure control

Pressure control performed in combination with the TLV control valve for steam, MC-COS/MC-VCOS series.

By controlling the steam pressure with TLV proprietary algorithms that utilizes the characteristics of the COS (VCOS) series, accuracy and responsiveness that exceeds conventional control valves can be achieved.

Refer to 8.8 Using with MC-COS/MC-VCOS for information on MC-COS(R)/ MC-VCOS(R) pressure control operation.

MC-COS(R)/MC-VCOS(R) Temperature control

Temperature control performed in combination with the TLV control valve for steam, MC-COS/MC-VCOS series.

The control algorithm is PID control (reverse action), however by using this device with a COS (or VCOS) series steam pressure reducing valve, the steam supply pressure can be controlled. In addition, it has characteristics that are not easily affected by external disturbances such as pressure fluctuations at the primary side of heat source steam.

Refer to 8.8 Using with MC-COS/MC-VCOS for information on MC-COS(R)/ MC-VCOS(R) pressure control operation.

PID control

PID control is a control method of achieving stabilized control result by setting P (Proportional band), I (Integral time) and D (Derivative time) constants, and is widely used. However, with this PID control, if P, I and D values are set to focus on "better response to control set value change," "response to external disturbance" deteriorates. In contrast, if PID values are set to focus on "better response to external disturbance," "response to control set value change" deteriorates. In PID control a form of "Response to setting" can be selected from among **Fast**, **Medium** and **Slow** with PID constants remaining unchanged so as to be in good "Response to disturbances." In addition, the controller is provided with the function which restricts the amount of undershooting caused by the cooling nonlinear characteristic possessed by plastic molding machines when the Set value (SV) is lowered in Heating/Cooling PID control.

Ordinary PID control







Response to disturbance change



Parameter setting

● Input 1_Control action [Engineering Mode: Function block No. 51 (Fn5 /)]

Parameter symbol Data range		Factory set value
1. 65	 0: PID control with Autotuning (direct action) 1: PID control with Autotuning (reverse action) 2: Heating/Cooling PID control with Autotuning [Cooling linear type] 3: Pressure control operation [MC-COS(R)-3] 4: Pressure control operation [MC-COS(R)-16, 15 to 50 mm] 5: Pressure control operation [MC-COS(R)-16, 65 to 150 mm] 6: Pressure control operation [MC-COS(R)-21] 7: Pressure control operation [MC-VCOS(R)] 8: Temperature control operation [MC-COS(R)-16] 9: Temperature control operation [MC-VCOS(R)] For cascade control, only 0 or 1 are selectable. For PV select, only 0, 1 or 2 are selectable. 	Product identification code specified at the time of order.

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Input 1_Control action is changed.

● Input 2_Control action [Engineering Mode: Function block No. 52 (Fn52)]

Parameter symbol		Data range	Factory set value
ר	Г	0: PID control with Autotuning (direct action)	1
Γ.	00	1: PID control with Autotuning (reverse action)	
		3: Pressure control operation [MC-COS(R)-3]	
		4: Pressure control operation [MC-COS(R)-16, 15 to 50 mm]	
		5: Pressure control operation [MC-COS(R)-16, 65 to 150 mm]	
		6: Pressure control operation [MC-COS(R)-21]	
		7: Pressure control operation [MC-VCOS(R)]	
		8: Temperature control operation [MC-COS(R)-16]	
		9: Temperature control operation [MC-VCOS(R)]	
		2: n/a	
		For cascade control, only 0 or 1 are selectable.	

To display "Input 2_Control action", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Input 2_Control action is changed.

205

Input 1_Control response parameter [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
	0: Slow	PID control: 0
i. RPi	1: Medium	Heating/Cooling PID
	2: Fast	control: 2
	[When P or PD action is selected, this setting will be	
	unavailable]	

To display "Input 1_Control response parameter", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Input 2_Control response parameter [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. RPT	0: Slow 1: Medium 2: Fast [When P or PD action is selected, this setting will be unavailable]	0

To display "Input 2_Control response parameter", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

Setting procedure



- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

8.3 Setting PID Values Automatically (Autotuning)

Autotuning (AT) automatically measures, computes and sets the optimum PID values. Autotuning (AT) can be used for PID control (Direct action/Reverse action) and Heating/Cooling PID control.

207

Refer to 8.14 Executing Cascade Control for Autotuning (AT) during the Cascade control.

Description of function

- Parameters computed by Input 1_Autotuning (AT)
- Input 1_Proportional band [heat-side]
- Input 1_Integral time [heat-side]
- Input 1_Derivative time [heat-side]
- Input 1_Proportional band [cool-side] (Only for Heating/Cooling PID control)
- Input 1_Integral time [cool-side] (Only for Heating/Cooling PID control)
- Input 1_Derivative time [cool-side] (Only for Heating/Cooling PID control)

Parameters computed by Input 2_Autotuning (AT)

- Input 2_Proportional band
- Input 2_Integral time
- Input 2_Derivative time

• AT bias

The AT bias is used to prevent overshoot during Autotuning in the application which does not allow overshoot even during Autotuning. The Autotuning method uses ON/OFF control at the set value to compute the PID values. However, if overshoot is a concern during Autotuning, the desired AT bias should be set to lower the set point during Autotuning so that overshoot is prevented.

[Example] When AT bias is set to the minus (–) side.



• AT remaining time monitor

Displays the remaining time until Autotuning (AT) is completed. (Display range: 0 hours 00 minutes to 48 hours 00 minutes)

The SV display shows "TCAL" from the start of Autotuning (AT) till the display of the remaining time. Once the remaining time is displayed, the time is reduced every minute.

[Example]



The "AT remaining time monitor" is a predictive value and may not be accurate.

• AT/ST status monitor

Displays the execution status of Autotuning (AT).

- Displays "1" during Autotuning (AT).
- Displays "0" when Autotuning (AT) is completed.
- When Autotuning (AT) is aborted, the display shows -1 up to -4 depending on the reason of the abort.
 - -1: Aborted. Setting changed.
 - When the set value (SV) is changed.
 - When the AT bias is changed.
 - When the PV bias, PV ratio, or PV digital filter is changed.
 - · When the Output limiter high or low is changed.
 - When Autotuning (AT) is changed to PID control.
 - When the instrument is switched to STOP by RUN/STOP transfer.
 - When the instrument is switched to Manual mode using Auto/Manual transfer.

• When the instrument is switched to Remote mode using Remote/Local transfer.

- · When the instrument is switched to Cascade/Single.
- When the memory area is changed.
- -2: Aborted. Abnormal input.

 When the Measured value (PV) has entered the Input error range. [Input error range: Input error determination point high ≥ Measured value (PV), Input error determination point low ≤ Measured value (PV)]
 When the Feedback resistance (FBR) input is broken

-3: Aborted. Timeout.

Output state has not been changed (ON to OFF, OFF to ON) for more than two hours.

-4: Aborted. Abnormal calculated values.

Error in the calculation of the values in Cascade control and Control with PV select.

• Caution for using Autotuning (AT)

 When a temperature change (UP and/or Down) is 1 °C or less per minute during Autotuning (AT), Autotuning (AT) may not be finished normally. In that case, adjust the PID values manually. Manual setting of PID values may also be necessary if the set value is around the ambient temperature or is close to the maximum temperature achieved by the load.

172-65710M-04 (SC-F71 Parameters/Functions) 23 Dec 2021

• When the Output change rate limiter is used, you may not be able to obtain appropriate PID constants by Autotuning (AT).

209

Refer to 8.5 Setting PID Values Manually for the manual setting of PID values.

• Requirements for Autotuning (AT) start

Start Autotuning (AT) when all following conditions are satisfied: To start Autotuning (AT), go to Operation transfer mode.

Operation state	RUN/STOP transfer	RUN	
	Auto/Manual transfer	Auto mode	
	Remote/Local transfer	Local mode	
	Autotuning (AT) setting	PID control (State before starting AT)	
Parameter	Input 1_PID control and	Input 1_Output limiter high [heat-side] > 0%	
setting	Temperature control	Input 1_Output limiter low [heat-side] <	
	operation [MC-(V)COS]	100%	
	Input 2_PID control and	Input 2_Output limiter high > 0%	
	Temperature control	Input 2_Output limiter low < 100%	
	operation [MC-(V)COS]	eration [MC-(V)COS]	
	Heating/Cooling PID	Input 1_Output limiter high [heat-side] > 0%	
	control	Input 1_Output limiter low [heat-side] <	
		100%	
		Input 1_Output limiter high [cool-side] > 0%	
		Input 1_Output limiter low [cool-side] <	
		100%	
Input value	The Measured value (PV) is not inside the Input error range.		
state	[Input error range: Input error determination point (high) \geq Measured		
	value (PV), Input error determination point (low) \leq Measured value		
	(PV)]		

• Requirements for Autotuning (AT) cancellation

Autotuning (AT) is immediately aborted and PID control starts when an error is detected in "AT/ST status monitor." The PID values will be the same as before Autotuning (AT) was activated.

Refer to "AT/ST status monitor" on the previous page for details.

Autotuning (AT) may be aborted in the following cases except for the conditions in "AT/ST status monitor."

- When the instrument is in FAIL state.
- When the power supply is disconnected.

Parameter setting

• Input 1_Autotunning (AT) [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
1. AFU	aFF: PID control an: Start Autotuning When Autotuning (AT) is finished, the control will automatically return to "aFF."	GFF

To display "Input 1_Autotuning (AT)", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode).

Input 2_Autotunning (AT) [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value

2.	ALA	aFF: PID control are: Start Autotuning	oFF
		When Autotuning (AT) is finished, the control will automatically return to " $_{o}FF$."	

To display "Input 2_Autotunning (AT)", choose "2-loop control/Differential temperature control" in Function block No.58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 1_AT bias [Setup Setting Mode: Setting group No. 53 (5n53)]

Parameter symbol	Data range	Factory set value
I. AF 6	-(Input 1_Input span) to +(Input 1_Input span) (When Control with PV select: -(PV select input span) to +(PV select input span)) [Varies with the setting of the Decimal point position.]	0

To display "Input 1_AT bias", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 2_AT bias [Setup Setting Mode: Setting group No. 54 (5-54)]

Parameter symbol	Data range	Factory set value
2. RF 6	-(Input 2_Input span) to +(Input 2_Input span) [Varies with the setting of the Decimal point position.]	0

To display "Input 2_AT bias", choose "2-loop control/Differential temperature control" in Function block No.58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode)

Input 1_AT remaining time monitor [Setup Setting Mode: Setting group No. 53 (5n53)]

Parameter symbol	Data range	Factory set value
I.ALLW	0 hours 00 minutes to 48 hours 00 minutes	

To display "Input 1_AT remaining time monitor", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 2_AT remaining time monitor [Setup Setting Mode: Setting group No. 54 (5n54)]

Parameter symbol	Data range	Factory set value
2.8FFM	0 hours 00 minutes to 48 hours 00 minutes	

To display "Input 2_AT remaining time monitor", choose "2-loop control/ Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 1_AT/ST status monitor [Setup Setting Mode: Setting group No. 53 (5n53)]

Parameter symbol	Data range	Factory set value
IFHNE	0: AT/ST complete	
	2: ST running now	
	-1: Aborted. Setting changed.	
	-2: Aborted. Abnormal input.	
	-3. Aborted. Timeout. -4: Aborted. Abnormal calculated values.	

To display "Input 1_AT/ST status monitor", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode).

• Input 2_AT/ST status monitor [Setup Setting Mode: Setting group No. 54 (5-54)]

Parameter symbol	Data range	Factory set value
PLINE	0: AT/ST complete	_
	2: ST running now	
	-1: Aborted. Setting changed.	
	-2: Aborted. Abnormal input.	
	-3: Aborted. Timeout.	
	-4: Aborted. Abnormal calculated values.	

To display "Input 2_AT/ST status monitor", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

Setting procedure

• Start Autotuning (AT)

Before start AT, refer to ●Requirements for Autotuning (AT) start. Make sure that all required conditions to start AT are satisfied.



Aborting Autotuning (AT)



The AT lamp blinks during Autotuning (AT).

- When Autotuning (AT) is finished, the control will automatically return to "_FF: PID control" and the AT lamp turns off.
- Autotuning (AT) can be started by Digital input (DI). Refer to "5.2 Switching Functions Using Digital Inputs (DI)" for assigning Digital input (DI).
- Autotuning (AT) can be started by a key operation of the direct key (FUNC key). Refer to 10.8 Accessing some functions directly (FUNC key) for details.

• Setting AT bias. Check the AT remaining time and AT/ST status.



(The MONI key may be pressed to return to the Measured

value (PV)/Set value (SV) Monitor.)

8.4 Setting PID Values Automatically (Startup tuning)

Startup tuning (ST) is a function which automatically computes and sets the PID values (Proportional band: heat-side only) from the response characteristics of the controlled system at power ON, transfer from STOP to RUN, and Set value (SV) change.

Description of function

- As simple autotuning, the PID values can be found in a short time without disturbing controllability for controlled systems with slow response at power ON.
- For controlled systems which require different PID values for each temperature setting, the PID values can be found for each Set value (SV) change.



• The setting items related to Startup tuning (ST) are shown below. Set them according to the application used.

Setting item		Details	Setting mode
Start condition	0 (Factory set value)	When the power is turned on, operation is changed from STOP to RUN, or the Set value (SV) is changed.	Engineering mode
	1	When the power is turned on or operation is changed from STOP to RUN.	
	2	When the Set value (SV) is changed.	
Execution method	<i>⊔FF</i> (Factory set value)	ST unused	Operation transfer
	on l	Execute once	mode
	on2	Execute always	

- When Startup tuning (ST) function is activated in Heating/Cooling PID control, only heat-side PID values are calculated and changed. Startup tuning (ST) is not available when the temperature is downward. (PID values for cooling cannot be calculated)
- If Startup tuning (ST) is started when the ST start condition is at power on or switching from STOP to RUN, the control will start with Hot start 2 even if the setting is Hot start 1. Refer to 8.19 Changing the Action at Power ON (Hot/Cold Start) for Hot/Cold start setting.

• AT/ST status monitor

Displays the execution status of Startup tuning (ST).

- Displays "2" during Startup tuning (ST).
- Displays "0" when Startup tuning (ST) is completed.
- When Startup tuning (ST) is aborted, the display shows -1 up to -4 depending on the reason of the abort.

-1: Aborted. Setting changed.

- When Startup tuning (ST) is disabled (*aFF*: ST unused).
- When the PV bias, PV ratio, or PV digital filter is changed.
- When the Output limiter high [heat-side] or low [heat-side] is changed.
- When the instrument is switched to STOP by RUN/STOP transfer.
- When the instrument is switched to Manual mode using Auto/Manual transfer.
- When the instrument is switched to Remote mode using Remote/Local transfer.
- When the setting of the Level PID action selection is "2: Switching by the Measured value (PV)."
- -2: Aborted. Abnormal input.

When the Measured value (PV) has entered the Input error range. [Input error range: Input error determination point high \geq Measured value (PV), Input error determination point low \leq Measured value (PV)]

-3: Aborted. Timeout.

When Startup tuning (ST) will not end approximately 100 minutes after it has been started.

- -4: Aborted. Abnormal calculated values.
 - When the input was switched by Control with PV select.
 - Startup tuning (ST) internal error, etc.

• Caution for using Startup tuning (ST)

- For Startup tuning (ST) at power ON or transfer from STOP to RUN, always set the heater power to ON simultaneously with the start of tuning or before the start of tuning.
- Start Startup tuning (ST) in the state in which the temperature differential of the Measured value (PV) and Set value (SV) at the start of Startup tuning (ST) is twice the Proportional band, or greater.
- If in Heating/Cooling PID control, activate Startup tuning (ST) function under the condition of "Set value (SV) > Measured value (PV)." Only the PID values on the heat-side are automatically calculated but no PID values on the cool-side are changed. The PID values on the cooling side can be obtained by Autotuning (AT).
- When the manipulated output value may be limited by the Output limiter setting, the optimum PID values may not be calculated by Startup tuning (ST).
- When setting the Output change rate limiter, the optimum PID values may not be computed by Startup tuning (ST).
- When setting the Soft start/Setting change rate limiter, the optimum PID values are not obtained even when Startup tuning (ST) is executed at Set value (SV) change.
- When Startup tuning (ST) is started at power on, priority is given to Startup tuning (ST) and the Proactive function will not start.

• Requirements for Startup tuning (ST) start

Begin Startup tuning (ST) when all following conditions are satisfied:

	RUN/STOP transfer	RUN	
Operation	Auto/Manual transfer Auto mode		
state	Remote/Local transfer	Local mode	
	Autotuning (AT) setting	PID control	
	Startup tuning (ST) is set to ON (Execu-	te once, Execute always)	
Parameter	Output limiter high \geq 0.1%, Output limite	er low ≤ 99.9%	
setting	[Heating/Cooling PID control type: Outp	out limiter high (heat-side) $\geq 0.1\%$]	
Setting	The Level PID action selection is done by other than "Switching by the		
	Measured value (PV)."		
	The Measured value (PV) is not underscale or over-scale.		
	Input error determination point (high) \geq Input value \geq Input error determination		
Input value	point (low)		
state	At Startup tuning (ST) at Set value (SV)	change, the Measured value (PV)	
	shall be stabilized.		
	Set value (SV) > Measured value (PV) [Heating/Cooling PID control]		
	At startup, output is changed and saturated at the Output limiter high or the		
state	Output limiter low [Heating/Cooling PID control type: Output limiter high (heat-		
side)].			

• Requirements for Startup tuning (ST) cancellation

Startup tuning (ST) will be immediately aborted if any in the cancel condition in the AT/ST status monitor is met. The PID values will be the same as before Startup tuning (ST) was activated.

Refer to "AT/ST status monitor" for details.

Startup tuning (ST) may be aborted in the following cases except for the conditions in "AT/ST status monitor."

- Autotuning (AT) has been started.
- When the instrument is in FAIL state.
- When the power supply is disconnected.

Parameter setting

• Input 1_Startup tuning (ST) [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
1. SÉU	oFF: ST unused on I: Execute once * on?: Execute always	oFF
	* When ST is finished, the control will automatically return to "_FF."	

To display "Input 1_Startup tuning (ST) ", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode).

• Input 2_Startup tuning (ST) [Operation Transfer Mode]

Parameter symbol Data range		Factory set value
2. SFU	oFF: ST unused on I: Execute once * ond: Execute always * When ST is finished, the control will automatically return to "oFF."	oFF

To display "Input 2_Startup tuning (ST) ", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).
	Input 1_	_AT/ST s	tatus monitor	[Setup	Setting M	Mode: Se	etting group	No. 53	(5n5 3)]
--	----------	----------	---------------	--------	-----------	----------	--------------	--------	-------------------------

Parameter symbol	Data range	Factory set value
I.F UNE	0: AT/ST complete 1: AT running now 2: ST running now -1: Aborted. Setting changed. -2: Aborted. Abnormal input. -3: Aborted. Timeout. -4: Aborted. Abnormal calculated values.	

To display "Input 1_AT/ST status monitor", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode).

• Input 2_AT/ST status monitor [Setup Setting Mode: Setting group No. 54 (5-54)]

Parameter symbol	Data range	Factory set value
שרוואכ	0: AT/ST complete	—
	1: AT running now	
	2: ST running now	
	-1: Aborted. Setting changed.	
	-2: Aborted. Abnormal input.	
	-3: Aborted. Timeout.	
	-4: Aborted. Abnormal calculated values.	

To display "Input 2_AT/ST status monitor", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• ST start condition [Engineering Mode: Function block No. 50 (Fn50)]

Parameter symbol	Data range	Factory set value
565	 O: Activate Startup tuning (ST) function when the power is turned on; when transferred from STOP to RUN; or when the Set value (SV) is changed. 1: Activate Startup tuning (ST) function when the power is turned on; or when transferred from STOP to RUN. 2: Activate Startup tuning (ST) function when the Set value (SV) is changed. 	0

To display "Startup tuning conditions (ST)", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode), OR choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode) AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

Setting procedure



• Start Startup tuning (ST)

Before starting ST, refer to Requirements for Startup tuning (ST) start. Make sure that all required conditions to start ST are satisfied.

Startup tuning can be started in the following manner (started in the manner that satisfies the starting condition).

- Power off the controller once and power on again.
- Stop the control once (STOP) and start the control again (RUN).
- Change the Set value (SV).

L The AT lamp lights during Startup tuning (ST).

After completion of Startup tuning (ST), the AT lamp goes off. When Startup tuning setting is "an I: Execute once", the setting will go back to "aFF: ST unused."

8.5 Setting PID Values Manually

To perform PID control, PID parameters shown below need to be set up. These PID parameters can be automatically set using Autotuning (AT) or Startup tuning (ST). Manual adjustment is also available.

- Proportional band (P)
- Integral time (I)
- Derivative time (D)
- Refer to 8.3 Setting PID Values Automatically (Autotuning) for Autotuning (AT) function. Also refer to 8.4 Setting PID Values Automatically (Startup tuning) for Startup tuning (ST) function.

Description of function

Critical parameters of PID control such as Proportional action (Proportional band: P), Integral action (Integral time: I), and Derivative action (Derivative time: D) are explained below. Note that this explanation is based on the reverse action (heating control). With the direct action (cooling control), the output increases as the measured value increases.

Proportional action

In the ON/OFF control action, the manipulated output is turned on and off repeatedly, resulting in oscillatory control.

To eliminate this oscillation, control is performed by producing Manipulated output value (MV) proportional to the deviation between the Set value (SV) and the Measured value (PV). Technically a zone called "Proportional band" is established around the Set value (SV) and when the Measured value (PV) enters the proportional band, the Manipulated output value (MV) is gradually reduced.

The Measured value (PV) stabilizes within the Proportional band at the equilibrium point, but in many cases the stabilized temperature does not match the Set value (SV).



This deviation between the Set value (SV) and the stabilized temperature is called "Offset."

With a narrower proportional band the control result becomes closer to that of the ON/OFF control (oscillatory).

With a wider proportional band the output is gradually reduced to stabilize quicker, however, often with a larger offset.

Refer to 8.6 Controlling with ON/OFF Action for ON/OFF action.

Integral action

Proportional action provides more stable control than ON/OFF control, but causes offset. This offset can be automatically corrected by Integral action.

As long as deviation exists between the Set value (SV) and the Measured value (PV), the Manipulated output value (MV) is added according to the size of the deviation until no deviation exists.

The strength of the Integral action is expressed in the Integral time. The Integral time is the time till the Manipulated output value (MV) by the Integral action gets equal to that by the Proportional action.

The shorter the Integral time, the stronger the integral effect is, and the longer the weaker.



[b]: Integral time of Integral action [b]

• Derivative action

The Derivative action allows the Manipulated output value (MV) proportional to the changing rate (speed) of the Measured value (PV) to be produced to prevent a fluctuation of the Measured value (PV) before it happens.

The strength of the Derivative action is expressed in the Derivative time. The Derivative time is the time until the Manipulated output value (MV) by the Proportional action gets equal to the Manipulated output value (MV) by the Derivative action when the Measured value (PV) changes at a constant rate.

The longer the Derivative time is, the stronger the Derivative effect is, and the shorter the weaker.

The Derivative effect, if set too strong, produces large Manipulated output (MV) against a small change of the Measured value (PV), thus causing hunting and resulting in unstable control.



• Outline of effect of PID

The following figure shows control behaviors under various control actions; ON/OFF control, proportional control (P), Proportional + Integral action (PI action), and Proportional + Integral + Derivative actions (PID control).



• Adjusting PID parameters (Applications controlled with PID control)

In some applications PID values calculated and obtained through Autotuning (AT) and Startup tuning (ST) may not be appropriate. In such a case the PID values need to be adjusted manually. Attempt this adjustment referring to the following.

The sample here shows a general tendency. Control results depend on the controlled object and combinations of control constants.

[Adjustment of Proportional band (P)]

Setting the proportional band as small as possible enables the Set value (SV) to be reached faster without overshoot.

However, if the proportional band is set too narrow, it will cause hunting and the manipulated output (MV) will oscillate.



[Adjustment of Integral time (I) and Derivative time (D)]



Parameter setting

 Input 1_Proportional band [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
	TC/RTD inputs:	TC/RTD inputs: 30
i. P	0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F])	V/I inputs: 3.0
	(When Control with PV select: 0 to PV select input span)	
	[Varies with the setting of the Decimal point position.]	
	Voltage (V)/Current (I) inputs:	
	0.0 to 1000.0% of Input 1_Input span	
	(When Control with PV select: 0.0 to 1000.0% of PV select	
	input span)	
	0 (0.0, 0.00): ON/OFF action	
	NOTE: 0 (0.0, 0.00) cannot be set when a setting	
	"Temperature control operation [MC-(V)COS(R)] is	
	selected in Input 1_control action.	

To display "Input 1_Proportional band [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No. 51: Input 1 Control action (Engineering mode).

Input 2_Proportional band [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbo	Data range	Factory set value
2. P	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs:	TC/RTD inputs: 30 V/I inputs: 3.0
	0.0 to 1000.0% of Input 2_Input span 0 (0.0, 0.00): ON/OFF action NOTE: 0 (0.0, 0.00) cannot be set when a setting "Temperature control operation [MC-(V)COS(R)] is selected in Input 2_control action.	

To display "Input 2_Proportional band", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No.58: Select function for Input 2", AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action



(Engineering mode).

• Input 1_Proportional band [cool-side] [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

Parameter symbol		Data range	Factory set value
-	0_	TC/RTD inputs:	TC/RTD inputs: 30
1.		1 (0.1, 0.01) to Input 1_Input span (Unit: °C [°F])	V/I inputs: 3.0
		(When Control with PV select: 1 to PV select input span)	
		[Varies with the setting of the Decimal point position.]	
		Voltage (V)/Current (I) inputs:	
		0.1 to 1000.0% of Input 1_Input span	
		(When Control with PV select: 0.1 to 1000.0% of PV select	
		input span)	

To display "Input 1_Proportional band [cool-side]", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_ Proportional band [heat-side] in the same memory area.

Input 1_Integral time [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 !)]

Parameter symbol	Data range	Factory set value
	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00	240
i. i	seconds	
	0 (0.0, 0.00): PD action	
	[Varies with the setting of the Integral/Derivative time decimal	
	point position.]	

To display "Input 1_Integral time [heat-side]", select other than MC-(V)COS(R) pressure control for "Input 1_Control action" in Engineering mode: Function block No. 51. Additionally, a value other than 0 must also be entered in the Input 1_Proportional band in the same memory area.

Input 2_Integral time [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
21	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240

To display "Input 2_Integral time", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band in the same memory area.

• Input 1_Integral time [cool-side] [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 240	Parameter symbol	Data range	Factory set value
 i i i i i i i i i i i i i i i i i i i	1. I c	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240

L To display "Input 1_Integral time [cool-side]", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_ Proportional band in the same memory area.

Input 1_Derivative time [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
l. d	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action	60
	[Varies with the setting of the Integral/Derivative time decimal point position.]	

To display "Input 1_Derivative time [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band in the same memory area.

• Input 2_Derivative time [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. d	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/Derivative time decimal point position.]	60

To display "Input 2_Derivative time", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band in the same memory area.

• Input 1_Derivative time [cool-side] [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

Parameter symbol	Data range	Factory set value
I. dc	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action	60
	[Varies with the setting of the Integral/Derivative time decimal point position.]	

To display "Input 1_Derivative time [cool-side]", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_ Proportional band in the same memory area.

Setting procedure



Press (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

8.6 Controlling with ON/OFF Action

In ON/OFF control, the Manipulated output value (MV) is turned on or off depending on the Measured value (PV) whether it is above or below the Set value (SV).

Description of function

When the Measured value (PV) is above the Set value (SV), the Manipulated output value (MV) is turned OFF, and when the Measured value (PV) is below the Set value

(SV), the Manipulated output value (MV) is turned ON. To use the ON/OFF control, set the Proportional band [heat-side] to "0."

225

In the ON/OFF control the output is turned on and off around the Set value (SV) and the output may be turned on and off too frequently for a small change of temperature. This is called "chattering" and may reduce the life of the output relay. To prevent this, ON/OFF differential gap should be properly set.



L This explanation applies to "Reverse action" (heating control).

The value of the ON/OFF action differential gap is a deviation from the Set value (SV). This gap can be set individually above and below the Set value (SV). For example, in case of a Reverse action (heating control), assuming that the Set value (SV) is 100 °C with a ON/OFF action differential gap (upper) of 5 °C, the Manipulated output value (MV) turns off at 105 °C.

In case of ON/OFF action, the Output changing rate limiter will be unavailable.

• Cooling control with ON/OFF action

The process of Input 1 can be controlled with the ON/OFF action for the Cooling side (direct action) by setting zero to the Input 1_Proportional band [heat-side] after "0: PID control (direct action)" is set in Function block No. 51: Input 1_Control action (Engineering mode).

The process of Input 2 can be controlled with the ON/OFF action for the Cooling side (direct action) by setting zero to the Input 2_Proportional band after "0: PID control (direct action)" is set in Function block No. 52: Input 2_Control action (Engineering mode).

The action is the same as above, but the ON/OFF position of the Manipulated output value (MV) becomes opposite. The ON/OFF action differential gap can be set similarly.

• Heating/Cooling control with ON/OFF action

Go to "Input 1_Control action" in Function block No.51 (Engineering mode). Select any one from "2: Heating/Cooling PID control [water cooling]", "3: Heating/ Cooling PID control [air cooling]", or "4: Heating/Cooling PID control [Cooling linear type]" and set "0" at the Input 1_Proportional band [heat-side].

Then, the controller starts Heating/Cooling control with ON/OFF action.



Parameter setting

Input 1_Proportional band [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I. P	 TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 1000.0% of Input 1_Input span (When Control with PV select: 0.0 to 1000.0% of PV select input span) 0 (0.0, 0.00): ON/OFF action NOTE: 0 (0.0, 0.00) cannot be set when a setting	TC/RTD inputs: 30 V/I inputs: 3.0

To display "Input 1_Proportional band [heat-side]", chose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No. 51: Input 1_Control action (Engineering mode).

- 227
- Input 2_Proportional band [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. P	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 1000.0% of Input 2_Input span 0 (0.0, 0.00): ON/OFF action NOTE: 0 (0.0, 0.00) cannot be set when a setting "Temperature control operation [MC-(V)COS(R)] is selected in Input 2_control action.	TC/RTD inputs: 30 V/l inputs: 3.0

To display "Input 2_Proportional band", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

 Input 1_ON/OFF action differential gap (upper) [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parar	neter symbol	Data range	Factory set value
1	1111	TC/RTD inputs:	TC/RTD inputs: 1
İ.	опп	0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F])	V/I inputs: 0.1
		(When Control with PV select: 0 to PV select input span)	
		[Varies with the setting of the Decimal point position.]	
		Voltage (V)/Current (I) inputs:	
		0.0 to 100.0% of Input 1_Input span	
		(When Control with PV select: 0.0 to 100.0 % of PV select	
		input span)	

- To display "Input 1_ON/OFF action differential gap (upper)", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band [heat-side] in the same memory area.
- Input 1_ON/OFF action differential gap (lower) [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parar	neter symbol	Data range	Factory set value
1	111	TC/RTD inputs:	TC/RTD inputs: 1
i.	οπί	0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F])	V/I inputs: 0.1
		(When Control with PV select: 0 to PV select input span)	
		[Varies with the setting of the Decimal point position.]	
		Voltage (V)/Current (I) inputs:	
		0.0 to 100.0% of Input 1_Input span	
		(When Control with PV select: 0.0 to 100.0% of PV select	
		input span)	

To display "Input 1_ON/OFF action differential gap (lower)", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No. 51: Input 1_Control action (Engineering mode). Additionally, a value 0 must also be entered in the Input 1_Proportional band [heat-side] in the same memory area.

Input 2_ON/OFF action differential gap (upper) [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. oHH	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0% of Input 2_Input span (When Control with PV select: 0.0 to 100.0% of PV select	TC/RTD inputs: 1 V/l inputs: 0.1
	input span)	

228

To display "Input 2_ON/OFF action differential gap (upper) ", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band in the same memory area.

• Input 2_ON/OFF action differential gap (lower) [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. oĤL	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0% of Input 2_Input span (When Control with PV select: 0.0 to 100.0% of PV select input span)	TC/RTD inputs: 1 V/I inputs: 0.1

To display "Input 2_ON/OFF action differential gap (lower) ", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value 0 must also be entered in the Input 2_Proportional band in the same memory area.

Setting procedure



8.7 Controlling with Heating/Cooling Control

With Heating/Cooling PID control method, heat-side and cool-side can be controlled by a controller. For example, this is effective when cooling control is required in extruder cylinder temperature control.

Description of function

• Cool control type

The control on the heat-side is the same as the standard PID control. The control on the cool-side can be selected from a few types according to the controlled object.

• Overlap/Deadband

Heating/Cooling PID control has a proportional band individually on each side of the heating and the cooling. With the Set value (SV) as a reference point, setting the Overlap/Deadband below the Set value (SV) [setting on the negative side] generates an overlap of the heating and the cooling proportional bands. Setting this parameter above the Set value (SV) [setting on the positive side] generates a deadband.



[Overlap/Deadband reference point]

Each Set value (SV) for the Heating/Cooling PID control becomes the Overlap/Deadband reference point.

- When setting 0.0, Overlap/Deadband reference point is at 0% of the output at Proportional band [heat-side].
- When setting 0.5, Overlap/Deadband reference point is at the midpoint of the Overlap/Deadband.
- When setting 1.0, Overlap/Deadband reference point is at 0% of the output at Proportional band [cool-side].



Example: Difference in Overlap/Deadband reference point

[Overlap/Deadband reference point: 0.0]



dbPA: Overlap/Deadband reference point

230



 Undershoot suppression factor The Undershoot suppression function suppresses the undershoot that occurs when the Set value (SV) is lowered due to the special cooling characteristic (cooling nonlinear characteristic) of plastic molding machines. The undershoot suppression effect increases as a smaller value is set for the Undershoot suppression factor.

L To change Deadband when the Overlap/Deadband reference point is 0.5, the

Proportional band on heat-side and cool-side shift equidistantly to the midpoint

Portion of

Proportional band

when Deadband is 0

of the Overlap/Deadband.



dbPA: Overlap/Deadband reference point

Set value (MV) Set value (MV) Portion of [dbPA] [dbPA] Proportional band when Deadband is 0 Deadband Overlap

172-65710M-04 (SC-F71 Parameters/Functions) 23 Dec 2021

NOTE If the Undershoot suppression factor is set too small, the undershoot function acts excessively and prevents the Measured value (PV) from reaching the Set value (SV). As a result, the PV stabilizes at an offset or approaches the set value very slowly, preventing normal control. In this event, change the setting for the Undershoot suppression factor to a slightly higher value.

Parameter setting

• Input 1_Proportional band [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
	TC/RTD inputs:	TC/RTD inputs: 30
i. P	0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F])	V/I inputs: 3.0
	(When Control with PV select: 0 to PV select input span)	
	[Varies with the setting of the Decimal point position.]	
	Voltage (V)/Current (I) inputs:	
	0.0 to 1000.0% of Input 1_Input span	
	(When Control with PV select: 0.0 to 1000.0% of PV select	
	input span)	
	0 (0.0, 0.00): ON/OFF action	
	NOTE: 0 (0.0, 0.00) cannot be set when a setting	
	"Temperature control operation [MC-(V)COS(R)] is	
	selected in Input 1_control action.	

To display "Input 1_Proportional band [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 1_Proportional band [cool-side] [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

Param	eter symbol	Data range	Factory set value
1	П	TC/RTD inputs:	TC/RTD inputs: 30
ĺ.		1 (0.1, 0.01) to Input 1_Input span (Unit: °C [°F])	V/I inputs: 3.0
		(When Control with PV select: 1 to PV select input span)	
		[Varies with the setting of the Decimal point position.]	
		Voltage (V)/Current (I) inputs:	
		0.1 to 1000.0% of Input 1_Input span	
		(When Control with PV select: 0.1 to 1000.0% of PV select	
		input span)	

To display "Input 1_Proportional band [cool-side]", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_ Proportional band [heat-side] in the same memory area.

Input 1_Integral time [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
1. 1	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240

To display "Input 1_Integral time [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band in the same memory area. Input 1_Integral time [cool-side] [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

Parameter symbol	Data range	Factory set value
I. I.C.	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240

L To display "Input 1_Integral time [cool-side]", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_ Proportional band in the same memory area.

Input 1_Derivative time [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
l. d	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/Derivative time decimal	60
	point position.	

To display "Input 1_Derivative time [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band [heat-side] in the same memory area.

• Input 1_Derivative time [cool-side] [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

Parameter symbol	Data range	Factory set value
l. dc	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/Derivative time decimal point position.]	60

L To display "Input 1_Derivative time [cool-side]", choose "Heating/Cooling PID control" in Function block No. 51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_ Proportional band [heat-side] in the same memory area.

 Input 1_Overlap/Deadband [Parameter Setting Mode: Parameter group No. 56 (Pn56)]

/1		
Parameter symbol	Data range	Factory set value
I. db	 TC/RTD inputs: -(Input 1_Input span)to +(Input 1_Input span) (When Control with PV select: -(PV select input span) to +(PV select input span)) (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: -100.0 to +100.0% of Input 1_Input span (When Control with PV select: -100.0 to +100.0% of PV select input span) Minus (-) setting results in Overlap. However, the overlapping range is within the proportional range. 	TC/RTD inputs: 0 V/I inputs: 0.0

To display "Input 1_Overlap/Deadband", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 1_Control action [Engineering Mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value		
	0: PID control with Autotuning (direct action)	Product identification code		
i. 0')	1: PID control with Autotuning (reverse action)	specified at the time of		
	2: Heating/Cooling PID control with Autotuning [Cooling linear	order.		
	type]			
	3: Pressure control operation [MC-COS(R)-3]			
4: Pressure control operation [MC-COS(R)-16, 15 to 50 mm]				
5: Pressure control operation [MC-COS(R)-16, 65 to 150 mm]				
	6: Pressure control operation [MC-COS(R)-21]			
7: Pressure control operation [MC-VCOS(R)]				
8: Temperature control operation [MC-COS(R)-16]				
9: Temperature control operation [MC-VCOS(R)]				
	For cascade control, only 0 or 1 are selectable.			
	For PV select, only 0, 1 or 2 are selectable.			

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Input 1_Control action is changed.

• Undershoot suppression factor [Engineering Mode: Function block No. 56 (Fn56)]

Parameter symbol	Data range	Factory set value
US	0.000 to 1.000	1.000

To display "Undershoot suppression factor", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode).

• Overlap/Deadband reference point [Engineering Mode: Function block No. 56 (Fn56)]

I	Parameter symbol	Data range	Factory set value
	d668	0.0 to 1.0	0.0

To display "Overlap/Deadband reference point", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode).

Setting procedure

•

Selecting Heating/Cooling PID control



Press the @Dkey until Parameter setting mode is displayed. Keep pressing without releasing your finger from the key to enter the Setting lock mode.

- Press (and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.



The Parameters in Heating/Cooling PID control can be calculated also in Autotuning (AT) (Overlap/Deadband is excluded).

Refer to 8.3 Setting PID Values Automatically (Autotuning) for Autotuning (AT).

8.8 Using with MC-COS/MC-VCOS

The SC-F71 is the only controller that controls TLV steam control valves MC-COS/MC-COSR and MC-VCOS/MC-VCOSR series.

MC-COS(R)/MC-VCOS(R) series combines an automatic pressure reducing valve with a control valve. The sensing and feedback control with the controller together with the control mechanism of the valve itself achieves a hybrid control.

Valve coefficient

The valve coefficient is a value individually determined for TLV steam control valves MC-COS(R) series and MC-VCOS(R) series.

These products use the valve coefficient to control the combined control valve with the optimum control output value and to control the steam pressure for the secondary side of the control valve.

Therefore, when MC-COS(R) series and MC-VCOS(R) series are used in combination with the equipment, it is necessary to set the valve coefficient of the control valve to be used with the equipment.

* This function is only available when pressure control operation is selected. Control output value will be calculated with PID control algorithm when temperature control operation is selected.

NOTE: The pressure unit to be entered for the pressure value is defined by the valve

coefficient F. Parameters to be entered in pressure units, such as measurement input range, target set value, and alarm set value, must be entered in the pressure units defined by the valve coefficient F. If the pressure unit and the parameter do not match, the product will not operate properly.

NOTE: To use a pressure unit other than the valve coefficient F (indicated on the valve coefficient plate), refer to the "Converting valve coefficient" section to convert the valve coefficient and change the valve coefficient F along with valve coefficients A, C, and E.

• Converting valve coefficient

Valve coefficient value for MC-COS(R) and MC-VCOS(R) are indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.

The value of the valve coefficient F indicates the unit of pressure used for control. Values of other valve coefficients A to E vary depending on the unit system. When control is performed with a pressure unit different from the value of F indicated in the product, or the pressure unit used for control is changed, it is necessary to convert the valve coefficient according to the pressure unit to be used.

Valve coefficients A, C and E need to be changed. The value obtained by multiplying the current valve coefficient described in the valve coefficient plate by the correction coefficient shown in Table 8-1-1, 8-1-2, 8-2-1, or 8-2-2 become the valve coefficient in the new pressure unit system. It is not necessary to change the values of valve coefficients b and d.

Refer to "Input 1_Valve coefficient F" and "Input 2_Valve coefficient F" for pressure unit indicated by the value of Valve coefficient F.

Current unit syste	New unit system m	kg/cm²G (F=0)	barg (F=1)	psig (F=2)	kPaG (F=3)	MPaG (F=4)
kg/cm ² G	(F=0)		1.01970	0.70307	1.01970	1.01970
barg	(F=1)	0.98067		0.68948	1.00000	1.00000
psig	(F=2)	1.42230	1.45040	—	1.45040	1.45040
kPaG	(F=3)	0.98067	1.00000	0.68948	—	1.00000
MPaG	(F=4)	0.98067	1.00000	0.68948	1.00000	_

Table 8-1-1 Correction factor of valve coefficient A and C

Current	New unit system	mmHg (F=10)	mbar (F=11)	inHg (F=12)	psi (F=13)	kPa (F=14)
mmHa	(F=10)		0 75006	2 54000	0 51715	0 75006
mbar	(F=11)	1.33320		3.38600	0.68948	1.00000
inHg	(F=12)	0.39370	0.29530		0.20360	0.29530
psi	(F=13)	1.93370	1.45040	4.91200		1.45040
kPa	(F=14)	1.33320	1.00000	3.38600	0.68948	

Table 8-2-1 Correction factor of valve coefficient E

New unit					
system	kg/cm ² G	barg	psig	kPaG	MPaG
Current	(F=0)	(F=1)	(F=2)	(F=3)	(F=4)
unit system					
kg/cm ² G (F=0)		0.98067	1.42230	0.98067	0.98067

barg	(F=1)	1.01970		1.45040	1.00000	1.00000
psig	(F=2)	0.70307	0.68948		0.68948	0.68948
kPaG	(F=3)	1.01970	1.00000	1.45040		1.00000
MPaG	(F=4)	1.01970	1.00000	1.45040	1.00000	

	New unit					
	system	mmHg	mbar	inHg	psi	kPa
Current		(F=10)	(F=11)	(F=12)	(F=13)	(F=14)
unit syste	em 📃					
mmHg	(F=10)		1.33320	0.39370	1.93370	1.33320
mbar	(F=11)	0.75006		0.29530	1.45040	1.00000
inHg	(F=12)	2.54000	3.38600		4.91200	3.3600
psi	(F=13)	0.51715	0.68948	0.20360		0.68948
kPa	(F=14)	0.75006	1.00000	0.29530	1.45040	

Table 8-2-2 Correction factor of valve coefficient E

[Conversion example]

When using the MC-COS-16, whose valve coefficient is currently displayed in kg/cm²G, in a new unit system such as psig:

Current valve coefficient

A: 552 b: 340 C: 369 d: 1425 E: 594 F: 0

The valve coefficient A and C are converted by referring to Table 1-1. The conversion factor from the current unit system (kg/cm²G) to the new unit system (psig) is 0.70307. Therefore, new valve coefficients are;

A = 552 × 0.70307 = 388.09464 ≈ 388 *

C = 369 × 0.70307 = 259.43283 ≈ 259 *

* Rounded to the nearest whole number.

The valve coefficient E is converted by referring to Table 2-1. The conversion factor from the current unit system (kg/cm²G] to the new unit system (psig) is 1.42230. Therefore, new valve coefficients are;

 $E = 594 \times 1.42230 = 844.8462 \approx 845$ **

** Rounded to the nearest whole number.

As a result of the above conversion, the values of new valve coefficients A to F are as follows.

A: 388 b: 340 C: 259 d: 1425 E: 845 F: 2

8.8.1 Controlling by using with MC-COS/MC-VCOS (pressure control)

Steam pressure supplied to the secondary side of the control valve can be controlled with the pressure control valve for steam MC-COS(R)/MC-VCOS(R) series. By controlling the steam pressure with TLV proprietary algorithms for pressure reducing valve for steam, COS (VCOS) series, accuracy and responsiveness exceeding normal control valves can be achieved.

Parameter setting

● Input 1_Control action [Engineering Mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
I. o.S	0: PID control with Autotuning (direct action)1: PID control with Autotuning (reverse action)	Product identification code specified at the

2: Heating/Cooling PID control with	Autotuning [Cooling linear type] time of order.
4: Pressure control operation [MC-C	COS(R)-16, 15 to 50 mm]
5: Pressure control operation [MC-0	COS(R)-16, 65 to 150 mm]
6: Pressure control operation [MC-0	COS(R)-21]
7: Pressure control operation [MC-\ 9: Temperature control operation [M	
9: Temperature control operation [M	IC-VCOS(R)]
For cascade control, only 0 or 1 are	selectable.
For PV select, only 0, 1 or 2 are sel	ectable.

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Input 1_Control action is changed.

• Input 1_Valve coefficient A to E [Engineering Mode: Function block No. 53 (Fn53)]

Paramete	er symbol	Data range	Factory set value
Ι.	R	-1999 to 9999	0
Ι.	Ь	-1999 to 9999	0
Ι.	Ε	-1999 to 9999	0
Ι.	d	-1999 to 9999	0
Ι.	Ε	-1999 to 9999	0

- Valve coefficient value (A to F) is indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.
- To display "Input 1_Valve coefficient A to E", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No. 51: Input 1_Control action (Engineering mode).

● Input 1_Valve coefficient F [Engineering Mode: Function block No. 53 (Fn53)]

•		· /=
Parameter symbol	Data range	Factory set value
Parameter symbol	Data range When Input 1_Control action is set to 3 to 6 or 8: 0: kg/cm²G 1: barg 2: psig 3: kPaG 4: MPaG When Input 1_Control action is set to 7 or 9: 10: mmHg/Torr 11: mbar 12: inHg 13: psi 14: kPa NOTE: To use a pressure unit other than the valve coefficient F indicated on the valve coefficient plate, refer to the "Converting valve coefficient" section in "8.8 Using with MC-COS/MC-VCOS" in the instruction manual (narameters/functions) to convert the valve coefficient and	Factory set value Product identification code specified at the time of order.
	"Converting valve coefficient" section in "8.8 Using with MC- COS/MC-VCOS" in the instruction manual (parameters/functions) to convert the valve coefficient and change the valve coefficient F along with valve coefficients A,	
	change the valve coefficient F along with valve coefficients A, C, and E.	

- ✓ Valve coefficient value (A to F) is indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.
- To display "Input 1_Valve coefficient F", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-

(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Input 1_Pressure standard for Valve coefficient F [Engineering Mode: Function block No. 53 (F∩5∃)]

Parameter symbol	Data range	Factory set value
I. GSL	0: Atmospheric (gauge) pressure standard1: Absolute pressure standard	Product identification code specified at the time of order.

To display "Input 1_Pressure standard for Valve coefficient F", choose "7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode).

• Input 1_Control valve selection [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
1. VSL	0: MC-VCOS(R) 1: PC-VCOS(R)	0

To display "Input 1_Control valve selection", choose "7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

NOTE PC-VCOS(R) is an old model control valve for MC-VCOS(R). Choose "1" when PC-VCOS(R) is used with equipment.

Input 1_Pressure (temp) limiter [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
	When Input 1_Control action is set to 3 to 7:	Input 1_Control type is a
I I. Pri	Input 1_Input range low to Input 2_Input range high	setting other than 7: 0
	When Input 1_Control action is set to 8:	Input 1_Control type is set
	Valve coefficient	to 7: Input 1_Input range
	Coefficient $F = 0$ (kg/cm ² G): 0.00 to 99.99	high
	Coefficient $F = 1$ (barg) 0.00 to 99.99	
	Coefficient $F = 2$ (psig) 0.0 to 999.9	
	Coefficient F = 3 (kPaG): 0 to 9999	
	Coefficient $F = 4$ (MPaG) 0.000 to 9.999	
	When Input 1_Control type is set to 9:	
	The smaller value of 0.0 to Input 1_Input range high or	
	140.0 °C (280.0 °F)	
	Select the temperature unit according to the following	
	conditions:	
	When Input type is set to Temperature input: Input 1_	
	Display unit	
	When Input type is set to V/I input: Input 1_I emperature	
	limiter unit	
	when 0 (0.0, 0.00, 0.000) and input 1_Pressure (Temp)	
	Limiter function OFF	
	I varies with the setting of the Decimal point position except	
	when input 1_Control action is set to "8".]	

To display "Input 1_Pressure (Temp) limiter", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 1_Return bias [Engineering Mode: Function block No. 53 (Fn53)]

Γ	Parameter symbol	Data range	Factory set value
	l. ob	-50.0 to 50.0%	0.0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 1_Regression equation bias", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 1_ Response speed self-learning selection [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
I. EMF	0: Yes 1: No	0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 1_Response speed self-learning selection", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode).

Input 1_ No. of corrective actions [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
I. Pc I	0 to 99 times (99: unlimited times)	99

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

- To display "Input 1_No. of corrective actions", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).
- Input 1_ Corrective action repeat [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
I. Pc2	0: Yes 1: No	1

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 1_Corrective action repeat", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Input 1_ Corrective actions for ramp control [Engineering Mode: Function block No. 53 (F□5∃)]

Parameter symbol	Data range	Factory set value
I. Pc3	0: Yes 1: No	0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 1_Corrective actions for ramp control", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Input 1_ Lower range of corrective action amount [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
I. olb	0.0 to 105.0%	20.0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 1_Lower range of corrective action amount", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Input 1_ Upper range of corrective action amount [Engineering Mode: Function block No. 53 (Fn5∃)]

Parameter symbol	Data range	Factory set value
I. oHb	0.0 to 105.0%	20.0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 1_Upper range of corrective action amount", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 1_Dead zone [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I.MCdb	0 to 10% of input_1 span [Position of decimal point depends of Input 1_Valve coefficient F]	See Table 8-3

To display "Input 1_Dead zone", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Control			,	Valve co	efficient	F (press	sure unit)		
action*	0	1	2	3	4	10	11	12	13	14
3	0.03	0.03	0.4	3	0.003	—	—	—	—	—
4	0.04	0.04	0.4	4	0.004	—	_	—	_	—
5	0.10	0.10	1.5	10	0.010	—	_	—	_	—
6	0.10	0.10	1.5	10	0.010	_	_	_	_	_
7	_	_	_	_	_	7	10	03	0.14	1

Table 8-3 Factory set value of Dead zone

* Set value for the control operation set in Function block No. 51: Input 1_Control action (I. EanF)

• Input 2_Control action [Engineering Mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2. 65	0: PID control with Autotuning (direct action) 1: PID control with Autotuning (reverse action) 3: Pressure control operation [MC-COS(R)-3] 4: Pressure control operation [MC-COS(R)-16, 15 to 50 mm] 5: Pressure control operation [MC-COS(R)-16, 65 to 150 mm] 6: Pressure control operation [MC-COS(R)-21] 7: Pressure control operation [MC-VCOS(R)] 8: Temperature control operation [MC-VCOS(R)-16] 9: Temperature control operation [MC-VCOS(R)] 2: n/a For cascade control, only 0 or 1 are selectable.	1

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Input 2_Control action is changed.

• Input 2_Valve coefficient A to E [Engineering Mode: Function block No. 54 (Fn54)]

Paramete	er symbol	Data range	Factory set value
2.	R	-1999 to 9999	0
2.	Ь	-1999 to 9999	0
2.	Ε	-1999 to 9999	0
2.	d	-1999 to 9999	0
2.	Ē	-1999 to 9999	0

■ Valve coefficient value (A to F) is indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.

To display "Input 2_Valve coefficient A to E", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Valve coefficient F [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. F	When Input 2_Control type is set to 3 to 6 or 8: 0: kg/cm ² G 1: barg 2: psig	Same as Input 1_Valve coefficient F (pressure unit)

	3: kPaG	
	4: MPaG	
	When Input 2_Control type is set to 7 or 9:	
	10: mmHg/Torr	
	11: mbar	
	12: inHg	
· · · · · · · · · · · · · · · · · · ·	13: psi	
· · · · · · · · · · · · · · · · · · ·	14: kPa	
	NOTE: To use a pressure unit other than the valve coefficient	
	F indicated on the valve coefficient plate, refer to the	
	"Converting valve coefficient" section in "8.8 Using with MC-	
	COS/MC-VCOS" in the instruction manual	
	(parameters/functions) to convert the valve coefficient and	
	change the valve coefficient F along with valve coefficients A,	
	Cand F	

Valve coefficient value (A to F) is indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.

To display "Input 2_Valve coefficient F", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Pressure standard for Valve coefficient F [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
יחח ר	0: Atmospheric (gauge) pressure standard	Same as pressure standard
C. UJL	1: Absolute pressure standard	for Input 1_Valve coefficient F

To display "Input 2_Pressure standard for Valve coefficient F", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

Input 2_Control valve selection [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. ¥SL	0: MC-VCOS(R) 1: PC-VCOS(R)	0

- To display "Input 2_Control valve selection", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).
- **NOTE** PC-VCOS(R) is an old model control valve for MC-VCOS(R). Choose "1" when PC-VCOS(R) is used with equipment.
- Input 2_Pressure (temp) limiter [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. Prl	When Input 2_Control type is set to 3 to 7: Input 2_Input range low to Input 2_Input range high	
	When Input 2_Control type is set to 8: Valve coefficient Coefficient F = 0 (kg/cm ² G): 0.00 to 99.99	When Input 2_Control type is set to 7: Input 2_Input

Coefficient F = 1 (barg) 0.00 to 99.99 Coefficient F = 2 (psig) 0.0 to 999.9 Coefficient F = 3 (kPaG): 0 to 9999 Coefficient F = 4 (MPaG) 0.000 to 9.999	range high
When Input 1_Control type is set to 9: The smaller value of 0.0 to Input 2_Input range high or 140.0 °C (280.0 °F)	
Select the temperature unit according to the following conditions: When Input type is set to Temperature input: Input 2_ Display unit When Input type is set to V/I input: Input 2_Temperature limiter unit	
When 0 (0.0, 0.00, 0.000) and Input 2_Pressure (Temp) Limiter function OFF [Varies with the setting of the Decimal point position when Input 2_Control action is a setting other than "8".]	

To display "Input 2_Pressure (Temperature) limiter", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

Input 2_Regression equation bias [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. ob	-50.0 to 50.0%	0.0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

- To display "Input 2_Regression equation bias", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).
- Input 2_Response speed self-learning selection [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
	0: Yes	0
	1: No	

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 2_Response speed self-learning selection", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_No. of corrective actions [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. Pc 1	0 to 99 times (99: unlimited times)	99

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 2_No. of corrective actions", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Corrective action repeat [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. Pc2	0: Yes 1: No	1

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 2_Corrective action repeat", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

 Input 2_Corrective actions for ramp control [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. Pc 3	0: Yes 1: No	0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 2_Corrective actions for ramp control", choose "2-loop control/ Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Lower range of corrective action amount [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. olb	0.0 to 105.0%	20.0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 2_Lower range of corrective action amount", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Upper range of corrective action amount [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. oHb	0.0 to 105.0%	20.0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 2_Upper range of corrective action amount", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

● Input 2_Dead zone [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2.M[db	0 to 10% of Input 2_Span [Decimal point position depends on the settings for Input 2_ Valve coefficient F]	See Table 8-3

L To display "Input 2_Dead zone", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

172-65710M-04 (SC-F71 Parameters/Functions) 23 Dec 2021

Setting procedure



Next parameter is displayed.

• Press @ and \$MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.

(The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

Select RUN on the RUN/STOP transfer.
 Select lock on the Set data unlock/lock transfer.

8.8.2 Controlling by combining with MC-COS/MC-VCOS (temperature control)

Temperature control can be performed by combining the controller with MC-COS/MC-COSR or MC-VCOS/MC-VCOSR series steam control valves. The control algorithm is PID control (reverse action), however by using MC-COS/MC-COSR or MC-VCOS/MC-VCOSR series, which include steam pressure reducing valves, the supply pressure of steam as a heat source can be controlled, enabling temperature control.

In addition, the valves are not easily affected by external disturbances such as pressure fluctuations of the heat source steam on the primary side of the valve.

Parameter setting

• Input 1_Control action [Engineering Mode: Function block No. 51 (Fn5 /)]

•	_		· /•
Parame	eter symbol	Data range	Factory set value
1	r	0: PID control with Autotuning (direct action)	Product identification
i.	כס	1: PID control with Autotuning (reverse action)	code specified at the
		2: Heating/Cooling PID control with Autotuning [Cooling linear type]	time of order.
		3: Pressure control operation [MC-COS(R)-3]	
		4: Pressure control operation [MC-COS(R)-16, 15 to 50 mm]	
		5: Pressure control operation [MC-COS(R)-16, 65 to 150 mm]	
		6: Pressure control operation [MC-COS(R)-21]	
		7: Pressure control operation [MC-VCOS(R)]	
		8: Temperature control operation [MC-COS(R)-16]	
		9: Temperature control operation [MC-VCOS(R)]	
		For cascade control, only 0 or 1 are selectable.	
		For PV select, only 0, 1 or 2 are selectable.	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized when the Input 1_Control action is changed.

Input 1_Valve coefficient A to E [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
I. R	-1999 to 9999	0
І. Ь	-1999 to 9999	0
Ι. [-1999 to 9999	0
l. d	-1999 to 9999	0
I. E	-1999 to 9999	0

- Valve coefficient value (A to F) is indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.
- To display "Input 1_Valve coefficient A to E", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Parameter symbol	Data range	Factory set value
	Data range When Input 1_Control action is set to 3 to 6 or 8: 0: kg/cm ² G 1: barg 2: psig 3: kPaG 4: MPaG When Input 1_Control action is set to 7 or 9: 10: mmHg/Torr 11: mbar 12: inHg 13: psi 14: kPa NOTE: The pressure unit to be entered for the pressure value is defined by the valve coefficient F. To use a pressure unit other than the valve coefficient F (indicated on the valve coefficient plate), refer to the "Converting valve coefficient" section to convert the valve coefficient and change the valve coefficient F along with valve coefficients A C and E	Product identification code specified at the time of order.

• Input 1_Valve coefficient F [Engineering Mode: Function block No. 53 (Fn53)]

✓ Valve coefficient value (A to F) is indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.

To display "Input 1_Valve coefficient F", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Input 1_Pressure (temp) limiter [Engineering Mode: Function block No. 53 (Fn53)]

(/4		
Parameter symbol	Data range	Factory set value
	When Input 1_Control action is set to 3 to 7:	Input 1_Control type
I. FFL	Input 1_Input range low to Input 2_Input range high	is a setting other than
	When Input 1. Control action is act to 9. Value coefficient	7: 0
	Coefficient $E = 0 (ka/cm^2G)$: 0.00 to 99.99	
	Coefficient $F = 1$ (kg/clif G): 0.00 to 99.99	Input 1_Control type
	Coefficient $F = 2$ (psig) 0.0 to 999.9	is set to 7: Input
	Coefficient $F = 3$ (kPaG): 0 to 9999	1_Input range high
	Coefficient $F = 4$ (MPaG) 0.000 to 9.999	
	When Input 1_Control action is set to 9: The smaller value of 0.0 to Input 1_Input range high or 140.0 °C (280.0 °F)	
	Select the temperature unit according to the following conditions: When Input type is set to Temperature input: Input 1_ Display unit When Input type is set to V/I input: Input 1_Temperature limiter unit	
	When 0 (0.0, 0.00, 0.000) and Input 1_Pressure (Temp) Limiter function OFF	
	[Varies with the setting of the Decimal point position when Input 2_Control action is a setting other than "8".]	

To display "Input 1_Pressure (Temperature) limiter", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 1_Temperature limiter unit [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
IPeuN	0: °C	Product identification code
		specified at the time of order.

To display "Input 1_Temperature limiter unit", choose "9: Temperature control

operation [MC-(V)COS(R)]" in Function block No.51: Input 1_Control action (Engineering mode), AND choose "Current" or "Voltage input" in Function block No. 21: Input 1_Input type (Engineering mode).

• Input 1_Return bias [Engineering Mode: Function block No. 53 (Fn53)]

Parameter symbol	Data range	Factory set value
l. ob	-50.0 to 50.0%	0.0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

To display "Input 1_Regression equation bias", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 2_Control action [Engineering Mode: Function block No. 52 (Fn52)]

	-			· /-
ſ	Parame	eter symbol	Data range	Factory set value
ſ	-	r	0: PID control with Autotuning (direct action)	1
	С.	כס	1: PID control with Autotuning (reverse action)	
			3: Pressure control operation [MC-COS(R)-3]	
			4: Pressure control operation [MC-COS(R)-16, 15 to 50 mm]	
			5: Pressure control operation [MC-COS(R)-16, 65 to 150 mm]	
			6: Pressure control operation [MC-COS(R)-21]	
			7: Pressure control operation [MC-VCOS(R)]	
			8: Temperature control operation [MC-COS(R)-16]	
			9: Temperature control operation [MC-VCOS(R)]	
			2: n/a	
			For cascade control, only 0 or 1 are selectable.	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized or changed when the Select function for input 2 is changed.

• Input 2_Valve coefficient A to E [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbo	Data range	Factory set value
2. R	-1999 to 9999	0
2. Ь	-1999 to 9999	0
2. [-1999 to 9999	0
2. d	-1999 to 9999	0
2. E	-1999 to 9999	0

Valve coefficient value (A to F) is indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.

To display "Input 2_Valve coefficient A to E", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

172-65710M-04 (SC-F71 Parameters/Functions) 23 Dec 2021
Input 2	Valvo cooff	liciont E [En	ainoorina	Modo	Eunction	block No	51 (C.	- ב ט וו
input Z_	valve coell	псіені г [Еп	igineering	woue.	Function	DIOCK NO.	34 (– r	<u>ו</u> רכו

- Valve coefficient value (A to F) is indicated in the valve coefficient plate (attached) on the MC-(V)COS(R), which is also indicated on the valve coefficient tag when the equipment is new.
- To display "Input 2_Valve coefficient F", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Pressure (temp) limiter [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
כ פ_י	When Input 2_Control action is set to 3 to 7:	Input 2_Control action is a
	Input 1_Input range low to Input 2_Input range high	setting other than 7: 0
	When Input 2_Control action is set to 8: Valve coefficient Coefficient $F = 0$ (kg/cm ² G): 0.00 to 99.99 Coefficient $F = 1$ (barg) 0.00 to 99.99 Coefficient $F = 2$ (psig) 0.0 to 999.9 Coefficient $F = 3$ (kPaG): 0 to 9999 Coefficient $F = 4$ (MPaG) 0.000 to 9.999 When Input 2_Control action is set to 9: The smaller value of 0.0 to Input 1_Input range high or 140.0 °C (280.0 °F)	Input 2_Control action is set to 7: Input 2_Input range high
	Select the temperature unit according to the following conditions: When Input type is set to Temperature input: Input 2 Display unit When Input type is set to V/I input: Input 2_Temperature limiter unit When 0 (0.0, 0.00, 0.000) and Input 2_Pressure (Temp) Limiter function OFF [Varies with the setting of the Decimal point position when Input 2_Control action is a setting other than "8".]	

To display "Input 2_Pressure (Temperature) limiter", choose "2-loop control/

Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Temperature limiter unit [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2.PruN	0: °C 1: °F	Same as Input 1_ Temperature limiter unit

To display "Input 2_Temperature limiter unit", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "9: Temperature control operation [MC-VCOS(R)] in Function block No. 52: Input 2_Control action (Engineering mode), AND choose "Current" or "Voltage input" in Function block No. 22: Input 2_Input type (Engineering mode).

• Input 2_Return bias [Engineering Mode: Function block No. 54 (Fn54)]

Parameter symbol	Data range	Factory set value
2. ob	-50.0 to 50.0%	0.0

NOTE Do not change the factory set value.

TLV engineers may change the value to adjust the controllability after checking the users' applications and conditions. Unnecessary changes to values may affect controllability. Please contact TLV for details.

- To display "Input 2_Regression equation bias", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" or "8 and 9 (Temperature control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).
- Input 1_ Proportional band [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
	TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span	TC/RTD inputs: 30
i. P	(Unit: °C [°F])	V/I inputs: 3.0
	(When Control with PV select: 0 to PV select input span)	
	[Varies with the setting of the Decimal point position.]	
	Voltage (V)/Current (I) Input: 0.0 to 1000.0% of Input 1_Input	
	span	
	(When Control with PV select: 0.0 to 1000.0% of PV select	
	input span)	
	0 (0.0, 0.00): ON/OFF action	
	NOTE: 0 (0.0, 0.00) cannot be set when a setting	
	"Temperature control operation [MC-(V)COS(R)] is	
	selected in Input 1_control action.	

To display "Input 1_Proportional band [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode). Input 1_Integral time [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
1. 1	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240

To display "Input 1_Integral time [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band in the same memory area.

• Input 1_Derivative time [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value		
l. d	1 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/Derivative time decimal point position.]	60		

To display "Input 1_Derivative time [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band in the same memory area.

Input 1_Control response parameter [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
	0: Slow	PID control: 0
i. RPi	1: Medium	Heating/Cooling PID
	2: Fast	control: 2
	[When P or PD action is selected, this setting will be	
	unavailable]	

To display "Input 1_Control response parameter", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Input 2_ Proportional band [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. P	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) (2When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) Input: 0.0 to 1000.0 % of Input 1_Input span (2When Control with PV select:: 0.0 to 1000.0 % of PV select input span) 0 (0.0, 0.00): ON/OFF action NOTE: 0 (0.0, 0.00) cannot be set when a setting "Temperature control operation [MC-(V)COS(R)] is selected in Input 2_control action.	TC/RTD inputs: 30 V/I inputs: 3.0

To display "Input 2_Proportional band", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Integral time [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. I	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240

To display "Input 2_Integral time", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band in the same memory area.

• Input 2_Derivative time [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. d	1 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/Derivative time decimal point position.]	60

To display "Input 2_Derivative time", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band in the same memory area.

 Input 2_Control response parameter [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. RPT	0: Slow 1: Medium 2: Fast [When P or PD action is selected, this setting will be unavailable]	0

To display "Input 2_Control response parameter", choose "2-loop control/ Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-VCOS(R)])" in Function block No. 52: Input 2_Control action (Engineering mode).

Setting procedure



• Selecting control action and setting valve coefficient

Next parameter is displayed.

• Press (m) and (MIODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.

(The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

• Select RUN on the RUN/STOP transfer. • Select lock on the Set data unlock/lock transfer.

• Setting PID constant

PID control is employed as the control algorithm of temperature control of the MC-COS(R)/MC-VCOS(R) series, therefore, the PID constant must be set for operation.

257

8.9 Controlling with Manual Control

Selection by front key operation

To conduct the Manual control, you need to select the Manual mode using the Auto/Manual transfer.

The Auto/Manual transfer can be made by a key operation, Digital input (DI) or communication (optional).

- Refer to the SC-F71 Instruction Manual [Host communication] (172-65711M) for the Auto Manual transfer through communication.
- Refer to 6.8 Suppressing Sudden Change in Output (Balanceless Bumpless) for the Manipulated output value (balanceless bumpless) associated with the Auto/Manual transfer.

Setting procedure



During manual mode, the Manual (MAN) mode lamp is lit. Refer to P. 8-59 for the Display position of the lamp.

Changing the mode with the direct key

Assigning the "Auto/Manual transfer" function to the FUNC key facilitates the Auto/Manual switching.

Each time FUNC key is pressed, Auto mode and Manual mode are toggled.

Refer to 10.8 Accessing some functions directly (FUNC key) for the "FUNC key assignment".

Transfer Auto mode to Manual mode (Input 1_Auto/Manual transfer)



Transfer Manual mode to Autol mode (Input 1_Auto/Manual transfer)



Selection of key action is possible from "Press once" and "Press and hold" to enable the switching. Refer to 10.8 Accessing some functions directly (FUNC key) for details.

• Switching the mode with Digital Input (DI)

To switch the Auto/Manual using the Digital Input (DI), use "DI function selection" in Function block No. 23 (Engineering mode).

Refer to 5.2 Switching Functions Using Digital Inputs (DI) for assigning functions to the Digital input (DI).

Transfer timing of Auto/Manual



NOTE After the contact is transferred, it takes "Up to 200 ms" until the action of this instrument is actually selected.

The above switching action can be inverted (The functions at contact close and contact open can be swapped). This setting can be done at "DI logic invert." For details, refer to 5.2 Switching Functions Using Digital Inputs (DI).

• Auto/Manual transfer state

The table below shows the actual Auto/Manual modes and displays under different combinations of settings by Key operation, Communication, and Digital input (DI).

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status
Auto modo	Auto mode	Auto mode
Auto mode	Manual mode	
Manual mode	Auto mode	Manual mode
	Manual mode	

• Setting Manipulated output value in Manual mode

In the Manual mode, the Manipulated output value (MV) can be manually set. Make sure the Manual mode lamp is on (the instrument is in the manual mode) before starting the operation.



• Press and hold the $|\Delta|$ key or $|\nabla|$ key makes numeric value change faster.

For Heating/Cooling PID control:

When the Manual manipulated output is positive (+), the Heating side manual manipulated output value is output. When the Manual manipulated output is negative (-), the Cooling side manual manipulated output value is output. When the Overlap is set on the instrument, the internally calculated value is output in the overlap range.



Manual manipulated output value (+): The Heating side manual manipulated output value is output

When the Manipulated output value is selected, priority is given to the display of the Heating side manual manipulated output value. When the Manual manipulated output value enters the negative range, the output is transferred to the Cooling side manual manipulated



Manual manipulated output value (-): The Cooling side manual manipulated output value is output



Manual manipulated output value (-):

The Cooling side manual manipulated output value output value.

Parameter setting

• Input 1_Auto/Manual transfer [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
I. R/M	ମଧ୍ୟ ^ଳ ନ: Auto mode ନନନ: Manual mode	ñAn

• Input 2_Auto/Manual transfer [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
2. R/M	Rura: Auto mode āRa: Manual mode	ā£n

To display "Input 2_Auto/Manual transfer", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

8.10 Using Remote Setting Input

The Remote setting input uses the external signal (Input 2) as the Input 1_set value (SV). To use the Remote setting input, the mode must be switched to the Remote mode with the Remote/Local transfer. The Remote/Local transfer can be made by a key operation, Digital input (DI) or Communication (optional).

To use "Remote setting input", choose "Remote setting input" in Function block No. 58: Select function for Input 2 (Engineering mode).

The signal type of the Remote setting input can be set in Function block No. 22: Input 2_Input type (Engineering mode).

Refer to the Instruction SC-F71 [Host communication] (172-65711M) for Remote/Local transfer through communication.

Description of function

[Description of Remote setting input]



Mode transfer



Transfer Remote mode to Local mode



During the Remote mode, the Remote (REM) mode lamp lights on.

[Position of the Remote mode lamp]



The FUNC key may be configured to switch between Remote and Local. Refer to 10.8 Accessing some functions directly (FUNC key) for details.

• Switching the mode with Digital Input (DI)

To switch the Remote/Local using the Digital Input (DI), use "DI function selection" in Function block No. 23 (Engineering mode).

Refer to 5.2 Switching Functions Using Digital Inputs (DI) for the Digital input (DI) assignment.

Transfer timing of Remote/Local

				U	p to 200 ms
Contact closed \rightarrow					
Contact open 🔸		★		↓	
Remote/Local	Local	Remote	Local	Remote	Local

NOTE After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.

The above switching action can be inverted (The functions at contact close and contact open can be swapped). This setting can be done at "DI logic invert." Refer to 5.2 Switching Functions Using Digital Inputs (DI) for details.

• Remote/Local transfer state

The table below shows the actual Remote/Local modes and displays under different combinations of settings by Key operation, Communication, and Digital input (DI).

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status
Pomoto modo	Remote mode	Remote mode
Remote mode	Local mode	
L ocal mode	Remote mode	Local mode
Local mode	Local mode	

Parameter setting

• Remote/Local transfer

[Operation Transfer Mode]

T arameter eymoer	r actory set value
When "Remote setting input" is selected at Select function fo input 2 LoC: Local mode rEn: Remote mode	LaE

L To display "Remote/Local transfer", choose "Remote setting input" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Input 2_Input type [Engineering Mode: Function block No. 22 (Fn22)]

Parameter symbol	0	Data range	Factory set value
2. I ŃP	0: TC input K 1: TC input J 2: TC input R 3: TC input S 4: TC input B 5: TC input E 6: TC input E 6: TC input T 8: TC input W5Re/W26Re 9: TC input PL II 10: TC input U 11: TC input L 12: TC input PR40-20	 13: RTD input Pt100 14: RTD input JPt100 15: Current input 0 to 20 mA DC 16: Current input 4 to 20 mA DC 17: Voltage input 0 to 10 V DC 18: Voltage input 0 to 5 V DC 19: Voltage input 1 to 5 V DC 20: Voltage input 0 to 1 V DC 21: Voltage input -10 to +10 V DC 22: Voltage input -5 to +5 V DC 23: Voltage input 0 to 100 mV DC 24: Voltage input 0 to 10 mV DC 	Same as Input 1_Input type

Input 2_Input type is not displayed when "No function" is selected in Function block No. 58: Select function for Input 2 (Engineering mode).

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized or changed when the Input 2_input type is changed.

• Select function for input 2 [Engineering mode: Function block No. 58 (Fn58)]

Parameter symbol	Data range	Factory set value
294	 0: No function 1: Remote setting input 2: 2-loop control/Differential temperature control 3: Control with PV select 4: Cascade control (Slave single ↔ Cascade) * 5: Cascade control (Master single ↔ Cascade) * 6: Input circuit error alarm PID control: 0 to 6 Pressure/temperature control operation [MC-(V)COS(R)]: 0 to 2, 6 Heating/Cooling control: 0 to 3, 6 	1

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized or changed when the Select function for input 2 is changed.

Setting procedure



8.11 Executing 2-loop control

When two inputs are supplied, independent dual loop control can be performed on Input 1 and Input 2.

Description of function

The 2-loop control enables two single loop control on a single instrument. Input 1 and Input 2 are independent from each other and setting must be done separately on each channel.



The 2-loop control and the Differential temperature control are switchable. For the detail of the Differential temperature control, refer to 8.12 Executing Differential temperature control.

Mode transfer

• Selection by front key operation

Transfer Differential temperature control to 2-loop control



• Switching the mode with Digital Input (DI)

To switch the Remote/Local (2-loop control/ Differential temperature control) using the Digital Input (DI), use "DI function selection" in Function block No. 23 (Engineering mode).

Refer to 5.2 Switching Functions Using Digital Inputs (DI) for the Digital input (DI) assignment.

Transfer timing of Remote/Local(2-loop control/ Differential temperature control)



NOTE After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.

The functions at contact close and contact open can be swapped). This setting can be done at "DI logic invert." Refer to 5.2 Switching Functions Using Digital Inputs (DI) for details.

• Remote/Local transfer (2-loop control/ Differential temperature control) state

The table below shows the actual 2-loop control/ Differential temperature control status and displays under different combinations of settings by Key operation, Communication, and Digital input (DI).

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status
Differential temperature	Differential temperature control	Differential temperature control
control	2-loop control	
2-loop control	Differential temperature control	2-loop control
-	2-loop control	

Parameter setting

• Remote/Local transfer (2-loop control/Differential temperature control) [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
R/L	When "2-loop control/Differential temperature control" is selected at Select function for input 2 <i>2L aaP</i> : 2-loop control <i>dl FF</i> : Differential temperature control	2LooP

To display "Remote/Local transfer" (2-loop control/Differential temperature control), choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Select function for input 2 [Engineering mode: Function block No. 58 (Fn58)]

		· /-
Parameter symbol	Data range	Factory set value
עחר	0: No function	1
	1: Remote setting input	
	2: 2-loop control/Differential temperature control	
	3: Control with PV select	
	4: Cascade control (Slave single \leftrightarrow Cascade) *	
	5: Cascade control (Master single \leftrightarrow Cascade) *	
	6: Input circuit error alarm	
	PID control: 0 to 6	
Pressure/temperature control operation [MC-(V)COS(R)]: 0 to		
	2,6	
	Heating/Cooling control: 0 to 3, 6	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized or changed when the Select function for input 2 is changed.

8.12 Executing Differential temperature control

Input 1 is controlled by setting a temperature difference between Input 1 and Input 2.

Description of function

Differential temperature control is conducted, while Input 1 is used as Control temperature and Input 2 is used as Reference temperature.

Temperature difference is set on Input 1 against Input 2, and the Input 1 is controlled so that the set temperature difference could be obtained. As the input 2 can also be controlled, the differential temperature control is possible while keeping the reference temperature constant.

In case of Differential temperature control, the Input 1_Set value (SV) is not used for control. The Input 1_Monitor Set value (SV)* of is used in actual control.

* Input 1_Monitor Set value (SV) = Controlled temperature = Input 2_Measured value (PV) [Reference temperature] + Set value of Differential temperature input

[Example] Control is done with the Reference temperature (PV of Input 2) at 100 °C, and the Input 1 is controlled by the Differential temperature.

268



The sensor type used on Input 1 and Input 2 can be different respectively.

[Setting items]

• Remote/Local transfer (2-loop control/Differential temperature control) [Operation transfer mode]

Transfer to Differential temperature control

- Input 2_Set value (SV) [Parameter setting mode: Parameter group No. 00]: Setting Reference temperature (2. 5¹/₂)
- Set value of Differential temperature input [Parameter setting mode: Parameter group No. 00]: Setting Differential temperature (d5/)
- Select 2-loop control/Differential temperature control in function block No. 58: Select function for input 2 (Engineering mode)
- Other items required for controlling Input 1 and Input 2 (e.g. setting PID values)
- The 2-loop control and the Differential temperature control are switchable. For the detail of the 2-loop control, refer to 8.11 Executing 2-loop control.

Mode transfer

• Selection by front key operation

Transfer 2-loop control to Differential temperature control



During the Differential temperature control, the Remote (REM) mode lamp lights on. [Position of the Remote mode lamp]

269



- The FUNC key may be configured to switch between 2-loop control and Differential temperature control. Refer to 10.8 Accessing some functions directly (FUNC key) for details.
- Refer to 8.11 Executing 2-loop control for Mode transfer by other than the front key.

Parameter setting

• Remote/Local transfer (2-loop control/Differential temperature control) [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
RiL	When "2-loop control/Differential temperature control" is selected at Select function for input 2 <i>2LooP</i> : 2-loop control <i>dl FF</i> : Differential temperature control	2LooP

To display "Remote/Local transfer" (2-loop control/Differential temperature control), choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Input 2_Set value (SV) [Parameter Setting Mode: Parameter group No. 00 (PnDD)]

Parameter symbol	Data range	Factory set value
2. SV	Input 2_Setting limiter low to Input 2_Setting limiter high [Varies with the setting of the Decimal point position.]	0

To display "Input 2_Set value (SV)", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Set value (SV) of differential temperature input [Parameter Setting Mode: Parameter group No. 00 (PnDD)]

Parameter symbol	Data range	Factory set value
d5ľ	-(Input 1_Input span) to +(Input 1_Input span) [Varies with the setting of the Decimal point position.]	0

To display "Set value (SV) of differential temperature input", choose "2loop/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode) and switch to "Differential temperature control" in "Remote/Local transfer".

• Select function for input 2 [Engineering mode: Function block No. 58 (Fn58)]

Parameter symbol	Data range	Factory set value
2 PV	 0: No function 1: Remote setting input 2: 2-loop control/Differential temperature control 3: Control with PV select 4: Cascade control (Slave single ↔ Cascade) * 5: Cascade control (Master single ↔ Cascade) * 6: Input circuit error alarm PID control: 0 to 6 Pressure/temperature control operation [MC-(V)COS(R)]: 0 to 2, 6 Heating/Cooling control: 0 to 3, 6. 	1

ß	Refer to "4. Parameters that are Initialized/Modified when Setting is Changed"
	for the parameters that are initialized or changed when the Select function for
	input 2 is changed.

Setting procedure



- Next parameter is displayed.
- Press (and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

8.13 Executing Control with PV select

The Control with PV select is a function to control by switching between two inputs for high and low temperature ranges when two different sensors are used in the single controlled object.

Description of function

In the Control with PV select, two inputs are used by switching between them: Input 1 (for low temperature range as PV1) and Input 2 (for high temperature range as PV2). Parameters on the Input 1 are used for control computation. Output is also provided on the Input 1 side as Manipulated output 1 (MV1).



There are two ways to switch between Input 1 (PV1) and Input 2 (PV2): Switch using the set value and switch by using signal (key operation, digital input, and communication).



[Description of Control with PV select]

• Switching by Set value

The set value (PV select transfer level) is set and used as a trigger for switching between Input 1 (PV1) and Input 2 (PV2). When this set value is exceeded, the present input is transferred to the other.

When the PV select transfer time is set, the transfer action takes place in the set period correcting the input.



273



• When PV1 > PV2







• Switchover by signal (key operation, digital input, and communication)

The switchover between Input 1 (PV1) and Input 2 (PV2) is done by using key operation, digital input or communication.

When the PV select transfer time is set, the transfer action takes place in the set period correcting the input.

- In the case of switchover by the signal (key operation, digital input, or communication), there are no restrictions on the switchover direction of the inputs whether the temperature is on the rise or on the decline.
- Refer to the SC-F71 Instruction Manual [Host communication] (172-65711M) for the input switchover through communication.

• Switching the input with Digital Input (DI)





During the switchover by the set value (PV select transfer level), Remote/Local transfer (PV switchover) is not possible, but the transfer status can be checked on the Remote/Local transfer (PV switchover) screen to see if the control is done by Input 1 or Input 2.

Controlling with Input 1





The Remote (REM) mode lamp lights on when the "Input 2 is used" as the Measured value (PV) of the PV select and "when Input 1 is switched to Input 2." When "Input 1 is used" and "when Input 2 is switched to Input 1", the Remote (REM) mode lamp goes off.

[Position of the Remote mode lamp]



The FUNC key may be configured to switch between Input 1 and Input 2. Refer to 10.8 Accessing some functions directly (FUNC key) for details.

Input range and input span of the PV select

The "PV select input span", the "PV select input range high" and the "PV select iput range low" mean "Input span", "Input range high" and "Input range low" at the time of Control with PV select respectively.

The setting range is as follows.

- PV select input range high: Input range high of Input 1 and Input 2, whichever is larger
- PV select input range low: Input range low of Input 1 and Input 2, whichever is smaller
- PV select input span: PV select input range low up to PV select input range high

[Example] When there is a relation as follows between the Input range of Input 1 and



In the above example, the effective range of the PV select transfer level is 0 to 100 °C. This means that the action when the PV select transfer level is set somewhere between -200 °C and 0 °C is equal to the action of the 0 °C setting.

- When the input is transferred after the start of Startup tuning (ST), ST will be aborted. In the case of Autotuning (AT), if the input is transferred after the output has been transferred, AT will be aborted.
- When either one of Input 1 (PV1) or Input 2 (PV2) is disconnected, the PV select transfer time will be unavailable.

Parameter setting

• Remote/Local transfer (Control with PV select) [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value		
R/L	When "Control with PV select" is set to Select function for Input 2 I nP I: Input 1 I nP2: Input 2	l nP l		

To display "Remote/Local transfer" (Control with PV select), choose "Control with PV select" in Function block No. 58: Select function for Input 2 (Engineering mode).

When "Switching by level" is set to "Selection of PV select trigger", the parameter becomes display only.

• PV select transfer level [Setup Setting Mode: Setting group No. 58 (5-58)]

Parameter symbol Data range		Factory set value		
2PV.LV	Input 1_Input range low to Input 1_Input range high [Varies with the setting of the Decimal point position.]	Input 1_Input range high		

278

To display "PV select transfer level", choose "Control with PV select" in Function block No. 58: Select function for Input 2 (Engineering mode).

• PV select transfer time [Setup Setting Mode: Setting group No. 58 (5-58)]

Parameter symbol	Data range	Factory set value
2PV.CM	0.0 to 100.0 seconds	0.0

To display "PV select transfer time", choose "Control with PV select" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Select function for input 2 [Engineering mode: Function block No. 58 (Fn58)]

Parameter symbol	Data range	Factory set value
	Data range 0: No function 1: Remote setting input 2: 2-loop control/Differential temperature control 3: Control with PV select 4: Cascade control (Slave single \leftrightarrow Cascade) * 5: Cascade control (Master single \leftrightarrow Cascade) * 6: Input circuit error alarm PID control: 0 to 6 Pressure/temperature control operation [MC-(V)COS(R)]: 0 to 2, 6	1
	Heating/Cooling control. 0 to 3, 8	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized or changed when the Select function for input 2 is changed.

• Selection of PV select trigger [Engineering mode: Function block No. 58 (Fn58)]

Parameter symbol	Data range	Factory set value	
	0: Switching by level	0	
	1: Switching by signal (Key, DI and Communication)		

To display "Selection of PV select trigger", choose "Control with PV select" in Function block No. 58: Select function for Input 2 (Engineering mode).

Setting procedure



- (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

8.14 Executing Cascade Control

During the Cascade control, the measured value of the controlled object is monitored by the Master, and depending on the deviation between the target value (set value) and the actual value, the set value of the Slave is adjusted. The controlled object is controlled by the Slave to bring the measured value of the controlled object to the target value.

On the SC-F71, Input 1 can be assigned to the Master and Input 2 to the Slave respectively to conduct Cascade control on a single instrument. The use of Autotuning (AT) exclusively designed for the Cascade control allows the PID values of both the Master and the Slave to be calculated.

Description of function

The Cascade control has two types; One is to switch between "Cascade control" and "Master single control" and the other is to switch between "Cascade control" and "Slave single control."

The internal processing of the control is described below.

[Description of Cascade control]



[Description of Master single control]



To switch between "Cascade control" and "Master single control", choose "Cascade control (Master single ↔ Cascade)" in Function block No. 58: Select function for Input 2 (Engineering mode).

[Description of Slave single control]



To switch between "Cascade control" and "Slave single control", choose "Cascade control (Slave single ↔ Cascade)" in Function block No. 58: Select function for Input 2 (Engineering mode). • Autotuning (AT) at Cascade control

During the Cascade control, four types of PID values can be calculated with the use of Autotuning (AT) exclusively developed for the Cascade control.

• Types of PID values

.)pee et : 12 temeree	
Types of PID values	Calculated values
Maatar aida DID valuas of	Cascade_Proportional band (master-side),
Casada control	Cascade_Integral time (master-side),
	Cascade_Derivative time (master-side)
Slove side DID velues of Caseeda	Cascade_Proportional band (slave-side),
Slave slue FID values of Cascade	Cascade_Integral time (slave-side),
Control	Cascade_Derivative time (slave-side)
PID values in Master single control	Input 1_Proportional band, Input 1_Integral time,
(PID values of Input 1)	Input 1_Derivative time
PID values in Slave single control	Input 2_Proportional band, Input 2_Integral time,
(PID values of Input 2)	Input 2_Derivative time

Cascade_AT mode

There are two types of Autotuning (AT) for the Cascade control; Easy adjustment and Load factor adjustment.

Easy adjustment: Autotuning (AT) is executed once. Control reference level* is not calculated.

Load factor adjustment: Autotuning (AT) is executed twice. Control reference level* is calculated.

* Control reference level is the data used for PID value calculation for Cascade control. In the case of TC input/RTD input, there is no need of calculating the Control reference level and Autotuning (AT) in the Easy adjustment can be used. In the case of Voltage/Current inputs, the Control reference level must be calculated and Autotuning (AT) in the Load factor adjustment must be used.

· PID values calculated by AT in different control modes

	Cascade AT mode		Types of PID values				Control reference level	
Control	Master-side	Slave-side	Master- side PID values of Cascade control	Slave- side PID values of Cascade control	PID values in Master single control	PID values in Slave single control	Master- side	Slave- side
	Easy adjustment (AT once)	Easy adjustment (AT once)	~	~	~	~	_	
Cascade	Easy adjustment (AT once)	Load factor adjustment (AT twice)	~	~	~	~	_	✓
control	Load factor adjustment (AT twice)	Easy adjustment (AT once)	~	~	~	~	~	_
	Load factor adjustment (AT twice)	Load factor adjustment (AT twice)	~	~	~	~	~	~
Master	Easy adjustment (AT once)	Note	~		~		_	
control	Load factor adjustment (AT twice)	Note	~		~		~	
Slave	Note	Easy adjustment (AT once)		~		~	_	
control	Note	Load factor adjustment (AT twice)		~		~	_	\checkmark

Note: Setting is ignored.

✓: Calculated —: No

When executing Autotuning (AT) of the Cascade control, always use "Input 1_Autotuning (AT)" in the Operation transfer mode.

284

When executing Autotuning (AT) for the Cascade control, make sure that the set values (SV) of the Master and the Slave are properly set.

Switching between Cascade and Single

• Selection by front key operation

Single control (Master single or Slave single) \rightarrow Cascade control



 \square Cascade control \rightarrow Single control (Master single or Slave single)



L During the Cascade control mode, the Remote (REM) mode lamp lights on.

[Position of the Remote mode lamp]



L The FUNC key may be configured to switch between Cascade control and Single control. Refer to 10.8 Accessing some functions directly (FUNC key) for details.

• Switching the mode with Digital Input (DI)

To switch the Remote/Local (Cascade control) using the Digital Input (DI), use "DI function selection" in Function block No. 23 (Engineering mode).

Refer to 5.2 Switching Functions Using Digital Inputs (DI) for the Digital input (DI) assignment.

Transfer timing of Remote/Local (Cascade control/Single control)

				0	p to 200 ms
Contact closed \rightarrow					
Contact open 🔿					
Remote/Local	Local	Remote	Local	Remote	Local

NOTE After the contact is transferred, it takes "up to 200 ms" until the action of this instrument is actually selected.

The above switching action can be inverted (The functions at contact close and contact open can be swapped). This setting can be done at "DI logic invert." Refer to 5.2 Switching Functions Using Digital Inputs (DI) for details.

• Remote/Local transfer (Cascade control) state

The table below shows the actual Cascade control/Single control status and displays under different combinations of settings by Key operation, Communication, and Digital input (DI).

Setting via front keys or through communication	Setting via Digital Input (DI)	Instrument status
	Cascade control	Cascade control
Cascade control	Single control (Master/Slave)	Single control
Single control	Cascade control	(Master/Slave)
(Master/Slave)	Single control (Master/Slave)	(Waster/Slave)

Parameter setting

• Remote/Local transfer (Cascade control) [Operation Transfer Mode]

Source Cascade control is selected at Select function for input 2 Source : Single control (Master single or Slave single)	Snul

To display "Remote/Local transfer" (Cascade control), choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Input 1_Proportional band [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I. P	TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 1000.0% of Input 1_Input span (When Control with PV select: 0.0 to 1000.0% of PV select input span) 0 (0.0, 0.00): ON/OFF action NOTE: 0 (0.0, 0.00) cannot be set when a setting "Temperature control operation [MC-(V)COS(R)] is selected in Input 1_control action.	TC/RTD inputs: 30 V/I inputs: 3.0

To display "Input 1_Proportional band [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode). Input 1_Integral time [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I. I	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240

To display "Input 1_Integral time [heat-side] ", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band [heat-side] in the same memory area.

Input 1_Derivative time [heat-side] [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
l. d	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/Derivative time decimal	60
	point position.]	

To display "Input 1_Derivative time [heat-side]", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band [heat-side] in the same memory area.

Input 2_Proportional band [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
C. P	Data range TC/RTD inputs: 0 (0.0, 0.00) to Input 2_Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 1000.0% of Input 2_Input span 0 (0.0, 0.00): ON/OFF action NOTE: 0 (0.0, 0.00) cannot be set when a setting "Temperature control operation [MC-(V)COS(R)] is	TC/RTD inputs: 30 V/I inputs: 3.0
	selected in Input 2_control action.	

To display "Input 2_Proportional band", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Input 2_Integral time [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. I	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/Derivative time decimal point position.]	240

To display "Input 2_Integral time", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band in the same memory area.

• Input 2_Derivative time [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

		• • • •
Parameter symbol	Data range	Factory set value
2. d	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/Derivative time decimal point position.]	60

To display "Input 2_Derivative time", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band in the same memory area.

Cascade_Proportional band (master-side) [Setup Setting Mode: Setting group No. 58 (5n58)]

Parameter symbol	Data range	Factory set value
маса	TC/RTD inputs:	TC/RTD inputs: 30
ק.כחוו	1 (0.1, 0.01) to Input 1_Input span (Unit: °C [°F])	V/I inputs: 3.0
	[Varies with the setting of the Decimal point position.]	
	Voltage (V)/Current (I) inputs:	
	0.1 to 1000.0% of Input 1_Input span	

To display "Cascade_Proportional band (master-side)", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Cascade_Integral time (master-side) [Setup Setting Mode: Setting group No. 58 (5n58)]

Parameter symbol	Data range	Factory set value
MAS.I	1 to 3600 seconds, 0.1 to 3600.0 seconds or 0.01 to 360.00 seconds [Varies with the setting of the Integral/Derivative time decimal point position.]	240

L To display "Cascade_Integral time (master-side)", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Cascade_Derivative time (master-side) [Setup Setting Mode: Setting group No. 58 (5n58)]

Parameter symbol	Data range	Factory set value
мосј	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00	60
	seconds	
	0 (0.0, 0.00): PI action	
	[Varies with the setting of the Integral/Derivative time decimal	
	point position.]	

L To display "Cascade_Derivative time (master-side)", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).
Cascade_Proportional band (slave-side) [Setup Setting Mode: Setting group No. 58 (5n58)]

Parameter symbol Data range		Factory set value
	TC/RTD inputs:	TC/RTD inputs: 30
	1 (0.1, 0.01) to Input 2_Input span (Unit: °C [°F])	V/I inputs: 3.0
	[Varies with the setting of the Decimal point position.]	
	Voltage (V)/Current (I) inputs:	
	0.1 to 1000.0% of Input 2_Input span	

To display "Cascade_Proportional band (slave-side)", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Cascade_Integral time (slave-side) [Setup Setting Mode: Setting group No. 58 (5n58)]

Parameter symbol	Data range	Factory set value
517.1	1 to 3600 seconds, 0.1 to 3600.0 seconds or 0.01 to 360.00 seconds [Varies with the setting of the Integral/Derivative time decimal point position.]	240

To display "Cascade_Integral time (slave-side)", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Cascade_Derivative time (slave-side) [Setup Setting Mode: Setting group No. 58 (5n58)]

Parameter symbol	Data range	Factory set value
	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00	60
) JLV.0	seconds	
	0 (0.0, 0.00): PI action	
	[Varies with the setting of the Integral/Derivative time decimal	
	point position.]	

To display "Cascade_Derivative time (slave-side)", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Cascade_Digital filter [Setup Setting Mode: Setting group No. 58 (5-58)]

Parameter symbol	Data range	Factory set value
E.dF	0.0 to 100.0 seconds 0.0: Filter OFF	10.0

To display "Cascade_Digital filter", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Cascade_Scale high [Setup Setting Mode: Setting group No. 58 (5-58)]

Parameter symbol	Data range	Factory set value
E.SEH	Cascade_Scale low to Input 2_Setting limiter high [Varies with the setting of the Decimal point position.]	Input 2_Setting limiter high

To display "Cascade_Scale high", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Cascade_Scale low [Setup Setting Mode: Setting group No. 58 (5-58)]

Parameter symbol	Data range	Factory set value
E.SEL	Input 2_Setting limiter low to Cascade_Scale high [Varies with the setting of the Decimal point position.]	Input 2_Setting limiter low

To display "Cascade_Scale low", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

289

•	Select function for input 2 [Engineering mode: Function block No. 58 ((Fn58)]
---	--	-----------------

Parameter symbol	Data range	Factory set value
סיים ע 0: No function		1
	1: Remote setting input	
	2: 2-loop control/Differential temperature control	
	3: Control with PV select	
	4: Cascade control (Slave single \leftrightarrow Cascade) *	
	5: Cascade control (Master single \leftrightarrow Cascade) *	
	6: Input circuit error alarm	
	PID control: 0 to 6	
	Pressure/temperature control operation [MC-(V)COS(R)]: 0 to	
	2, 6	
	Heating/Cooling control: 0 to 3, 6	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are initialized or changed when the Select function for input 2 is changed.

• Cascade _AT mode (master-side) [Engineering mode: Function block No. 58 (Fn58)]

Parameter symbol	Data range	Factory set value
MAS.AL	0: Easy adjustment (AT: one cycle)1: Load factor adjustment (AT: 2 cycles)	TC/RTD inputs: 0 V/I inputs: 1

To display "Cascade_AT mode (master-side)", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Cascade _AT mode (slave-side) [Engineering mode: Function block No. 58 (Fn58)]

Parameter symbol Data range		Factory set value
SLV.AF	0: Easy adjustment (AT: one cycle)	TC/RTD inputs: 0
	1: Load factor adjustment (AT: 2 cycles)	V/I inputs: 1

To display "Cascade_AT mode (slave-side)", choose "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

290

Setting procedure

Calculating the PID values for Cascade control (Slave single ↔ Cascade) using AT



- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.



- Next parameter is displayed.
- Press Dand MODE keys simultaneously to return to the Measured value (PV)/Set value • (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

• Checking PID values



(The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

8.15 Controlling with Level PID

Level PID function is used to set the following parameters for control to each divided level of the input range (up to 8 levels): PID values, Control response parameters and Output limiter high/low.

Description of function

- Set the values such as PID values of each level to the Memory area 1 to 8 (PID memory group 1 to 8).
- The input range can be divided based on the setting for the parameters of Level PID setting 1 to Level PID setting 7.
- The value selected in the Level PID action selection [SV or PV] is checked and determined in which level of the PID it is, and the control is done using the PID values from the Memory area appropriate to the level.



• Different levels can be set at Input 1 and Input 2.

• Memory area to be used for level

The memory area used at each level will be selected after comparison between the Level PID setting and the value [Set value (SV) or Measured value (PV)] selected in the Level PID action selection.

	PID memory	Description	Memory
Level	group	Description	area
	PID memory	Level PID setting 7 < Set value (SV) or	Memory
Levelo	group 8	Measured value (PV) ≤ Input range high	area 8
	PID memory	Level PID setting 6 < Set value (SV) or	Memory
Level /	group 7	Measured value (PV) \leq Level PID setting 7	area 7
	PID memory	Level PID setting 5 < Set value (SV) or	Memory
Level 0	group 6	Measured value (PV) \leq Level PID setting 6	area 6
	PID memory	Level PID setting 4 < Set value (SV) or	Memory
group	group 5	Measured value (PV) \leq Level PID setting 5	area 5
	PID memory	Level PID setting 3 < Set value (SV) or	Memory
Level 4	group 4	Measured value (PV) \leq Level PID setting 4	area 4
	PID memory	Level PID setting 2 < Set value (SV) or	Memory
Level 3	group 3	Measured value (PV) \leq Level PID setting 3	area 3
	PID memory	Level PID setting 1 < Set value (SV) or	Memory
Level 2	group 2	Measured value (PV) \leq Level PID setting 2	area 2
	PID memory	Input range low \leq Set value (SV) or	Memory
Level I	group 1	Measured value (PV) \leq Level PID setting 1	area 1

• When two or more levels have the same setting, the values with a smaller level number will be available and used.

[Example 1] Values in Level PID setting 4 through 6 are the same.

Input range / high	N
ັ 1372 ℃	Level 8 (PID memory group 8)
As the PID values	Level 7 (PID memory group 7)
in the Level PID setting 4 through	Level 4 (PID memory group 4)
6 are the same, the smallest level	500 °C: Level PID setting 3
"4" is used	300 °C: Level PID setting 2
Input range	Level 2 (PID memory group 2)
low -200 °C	Level 1 (PID memory group 1)

294

• If the Level PID setting is set ignoring the order of the level Nos., the Level PID values in the set range will be the same and the smallest level number is used. (See Example 2)

[Example 2] Level PID setting 3 in Example 1 has been changed to -100 °C.

Input range 🗸 high	•	
1372 ℃	Level 8 (PID memory group 8)	1350 °C: Level PID setting 7
	Level 7 (PID memory group 7)	1200 °C: Level PID setting 4 to 6
	Level 4 (PID memory group 4)	Level PID setting 3 has been set to -50 °C, smaller than Level PID setting 1. Therefore, the values in Level seetting 1 through 3 are all -100 °C and the Level number will be 1.
Input range Iow -200 °C	Level 1 (PID memory group 1)	-100 °C: Level PID setting 1 to 3

Parameters of Memory area at Level PID

When using Level PID, parameters of Memory area are separated to be used for the Level PID function and the regular Memory area function.

295



Parameters of Memory area (at Level PID)



In Memory areas 1 through 8, the parameters in [Group 1] and [Group 2] are used as parameters for Level PID. Setting in Memory areas 9 through 16 will be ignored.

Memory area number for the control area can be changed by the front key, communication, Digital input (DI), Simple ramp/soak function or Simple sequence function; however, the parameters for Level PID function of the changed Memory area are unavailable.

The value selected in the Level PID action selection [SV or PV] is checked and determined in which level of the PID it is, and the control is done using the PID values from the Memory area appropriate to the level.

To use regular Memory area function

Input 1_Level PID action selection in Function block No. 51 (Engineering mode) and Input 2_Level PID action selection in Function block No. 52 (Engineering mode) can be used as a regular Memory area function in the case of "Switching by Memory area number" (Factory set value).

Memory area display at Level PID

PID values used for control are changed by the Level PID, but the control area is not influenced. This means that the Memory area No. on the PV/SV monitor screen in the Monitor & SV setting mode remains unchanged.

To check the Memory area No. actually used by the Level PID, locate the parameter used in the Level PID in the Parameter setting mode. Then, the actual Memory No. will be displayed. (See the example below)

[Example] In this example, Area 3 is displayed on the instrument (as a control area). Parameter "P" is displayed to show the Memory area No. actually used by the Level PID.



Parameters for Memory area function

In Memory areas 1 through 16, parameters in [Group 0] can be used for the regular Memory area function. The parameters for the changed Memory area will be available by switching the Memory areas of the control area by the front key, communication, Digital input (DI), Simple ramp/soak function or Simple sequence function.

Refer to Parameters in each group for the parameters in Group 0.

 Example of action of the Memory area when setting simple ramp/soak program at Level PID

[When "1: Switching by Set value (SV) (Level PID action)" is selected in Level PID action selection]



• Level PID differential gap

When setting "Switch by Measured value (PV)" to Level PID action: The Memory areas storing the parameters for Level PID function may switch frequently by the fluctuation of the input when the Measured value (PV) is close to the Level PID set value.

Setting Level PID differential gap prevents memory areas from switching too frequently.



When setting "Switch by Set value (SV)" to Level PID action: The setting of Level PID differential gap is available; however, it is recommended to set "0.0" to Level PID differential gap. 298

When the setting of the Level PID differential gap is set larger than the half of the range between two continuous Level set values, the Level PID differential gap is forcedly limited to the half of the range between the two relevant Level set values.

299

[Example] When Level PID differential gap is "40 °C"

Input range high 400 °C	.	The Level PID differential gap is limited to the half of the between	
	Level 3 (PID memory group 3)	150 °C:	Span of level setting: 150 °C Level PID differential gap: 40 °C
Input	Level 2 (PID memory group 2)	Level PID setting 2 100 °C: Level PID setting 2	Span of level setting: 50 °C Level PID differential gap: 25 °C ←
range low 0 °C	Level 1 (PID memory group 1)	>	Span of level setting: 100 °C Level PID differential gap: 40 °C

• Autotuning (AT) at Level PID

Autotuning (AT) can be started even while Level PID function is used whether or not the Level PID action selection is "Switching by SV" or "Switching by PV". Autotuning (AT) will be executed at the Set value (SV) when it is initiated.

The calculated PID values are stored in the memory area which has the Set value (SV) at the time of Autotuning (AT) start.

[Example]



• Level PID at Differential temperature control

When the Level PID action selection is "Switching by Set value (SV)": Level PID is done at the Input 1_Monitor Set value (SV)*.

* Input 1_Monitor Set value (SV) = Input 2_Measured value (PV) + Set value of Differential temperature input

When the Level PID action selection is "Switching by Measured value (PV)": Level PID is done at the Measured value (PV) Input 1.

The Level PID will not work at the Set value (SV) or Measured value (PV) of the Differential temperature input.

Parameter setting

• Input 1_Level PID setting 1 to Input 1_Level PID setting 7 [Setup Setting Mode: Setting group No. 51 (5-5 /)]

Parameter symbol	Data range	Factory set value
IIEVI	Input 1_Input range low to Input 1_Input range high (When Control with PV select: PV select input range low to	Input 1_Input range high (Control with PV select: PV
I.L E V 2	PV select input range high) [Varies with the setting of the Decimal point position.]	select input range high)
I.L E V 3	Input 1_Level PID settings 1 to 7 always maintain the following relation.	
I.L E V 4	(Input 1_Level PID setting 1) \leq (Input 1_Level PID setting 2) \leq (Input 1_Level PID setting 3) \leq (Input 1_Level PID setting 4) \leq	
I.LEVS	(Input 1_Level PID setting 5) \leq (Input 1_Level PID setting 6) \leq (Input 1_Level PID setting 7)	
1.LEV6		
I.LEV7		

- To display "Input 1_Level PID setting 1 to Input 1_Level PID setting 7", choose "1 (Switching by Set value (SV))" or "2 (Switching by Measured value (MV))" in Function block No. 51: Input 1_Level PID action selection (Engineering mode), AND choose a setting other than "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-VCOS(R)])" in Function block No. 52: Input 2_Control action (Engineering mode).
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when Input 1_Level PID setting is changed.
- Input 2_Level PID setting 1 to Input 2_Level PID setting 7 [Setup Setting Mode: Setting group No. 52 (5-52)]

Parameter symbol	Data range	Factory set value
2.LEV 1	Input 2_Input range low to Input 2_Input range high [Varies with the setting of the Decimal point position.]	Input 2_Input range high
2.1.2.12	Input 2_Level PID settings 1 to 7 always maintain the	
2.LEV3	(Input 2_Level PID setting 1) \leq (Input 2_Level PID setting 2) \leq (Input 2_Level PID setting 3) \leq (Input 2_Level PID setting 4) \leq	
2.LEV4	(Input 2_Level PID setting 5) \leq (Input 2_Level PID setting 6) \leq (Input 2_Level PID setting 7)	
2.LEVS		
2.LEV6		
2.LEV7		

To display "Input 2_Level PID setting 1 to Input 1_Level PID setting 7", choose "Switching by Set value (SV)" or "Switching by Measured value (PV)" in Function block No. 58: Input 2_Level PID action selection (Engineering mode) AND choose "2-loop control/Differential temperature control", or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when Input 2_Level PID setting is changed.

301

Input 1_Level PID action selection [Engineering mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
I.L.P.I.d	0: Switching by Memory area number 1: Switching by Set value (SV) (Level PID action) 2: Switching by Measured value (PV) (Level PID action)	0

To display "Input 1_Level PID action selection", choose a setting other than "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

• Input 2_Level PID action selection [Engineering mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2.L P1 d	0: Switching by Memory area number 1: Switching by Set value (SV) (Level PID action) 2: Switching by Measured value (PV) (Level PID action)	0

To display "Input 2_Level PID action selection", choose settings other than "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

Input 1_Level PID differential gap [Engineering mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
	0 to Input 1_Input span	TC/RTD inputs: 2
I. LMD	(When Control with PV select: 0 to PV select input span)	V/I inputs: 0.2
	[Varies with the setting of the Decimal point position.]	

To display "Input 1_Level PID differential gap", choose settings other than "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

 Input 2_Level PID differential gap [Engineering mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2. LHS	0 to Input 2_Input span [Varies with the setting of the Decimal point position.]	TC/RTD inputs: 2 V/I inputs: 0.2

To display "Input 2_Level PID differential gap", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

Setting procedure



Next parameter is displayed.

- Press (a) and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

8.16 Eliminating Offset Inherent to Proportioning Control (Manual Reset)

In order to eliminate the offset occurring in Proportional (P) control, the Manipulated output value is manually corrected.

Description of function

This is the function used to manually correct the offset when in Proportional (P) control or PD control. If the Manual reset value varies, the Manipulated output value also changes.

Offset means the deviation of the actual when the Manipulated output value becomes stabilized (stable state).

- When the Manual reset is set to the plus (+) side The Manipulated output value under the stable condition increases by the Manual reset value.
- When the Manual reset is set to the minus (-) side The Manipulated output value * under the stable condition decreases by the Manual reset value.



Manual reset is available when the Integral time is 0 (0.0, 0.00).

Parameter setting

• Input 1_Manual reset [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I. MR	-100.0 to +100.0%	0.0

To display "Input 1_Manual reset", choose "Heating/Cooling PID control" in Function block No.51: Input 1_Control action (Engineering mode). Additionally, a value 0 must also be entered in the Input 1_Integral time [heat-side] in the same memory area.

• Input 2_Manual reset [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

 -		
Parameter symbol	Data range	Factory set value
2. MR	-100.0 to +100.0%	0.0

To display "Input 2_Manual reset", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, value 0 must also be entered in the Input 1_Integral time in the same memory area.

Setting procedure



8.17 Continuing Stable Control after the Operation Transfer (SV Tracking)

This function is used to follow (keep tracking of) the other set value in another mode (control) that was used before the change of the set value. This is useful to suppress a sudden change of the set value when the operation mode is changed.

Description of function

The SV tracking can be selected at the time of switching between Remote/Local and Auto/Manual. The functions can be selected independently or together.

• SV tracking at the time of Remote/Local transfer

The SV tracking at the time of Remote/Local transfer may be effective in such switching actions.

- Switching between Remote and Local mode
- Switching between 2-loop control and Differential temperature control
- Switching between Cascade control and Slave single control

Switching between Remote and Local mode

When the operation mode is switched from Remote to Local mode, the Local set value follows the Remote set value just before the switching (tracking).

[Change of set values when switched from Remote to Local mode]

Operation mode:	Remote mode —	> Local mode
SV tracking used	Remote set value	Remote set value just before switching
SV tracking unused	Remote set value	Local set value



305

The SV tracking does not function at the time of switching from Local mode to Remote mode.

Switching between 2-loop control and Differential temperature control

When the Differential temperature control is switched to 2-loop control, the Input 1_ Set value (SV) follows the Input 1_set value monitor [PV just before the switching + Set value of Differential temperature control].

In case of Differential temperature control, the Input 1_Set value (SV) is not used for control. The Input 1_Monitor Set value (SV)* of is used in actual control.

- * Input 1_Monitor Set value (SV) = Controlled temperature
 - = Input 2_Measured value (PV) [Reference temperature] + Set value of Differential temperature input

[Change of set values when switched from Differential temperature control to 2-loop control]

Control: Differential temperature control> 2-loop control		
Set value used (Input 1)	Input 1_Set value monitor	Input 1_Set value (SV)
SV tracking used	Input 1_Set value (SV) = Input 1_Set value (SV) Input 1_Set value monitor = Input 2_PV + Set value of Differential temperature input	Input 1_Set value (SV) = Input 2_PV just before the switching + Set value of Differential temperature input Input 1_Set value monitor = Input 2_PV + Set value of Differential temperature input
SV tracking unused	Input 1_Set value (SV) = Input 1_Set value (SV) Input 1_Set value monitor = Input 2_PV + Set value of Differential temperature input	Input 1_Set value (SV) = Input 1_Set value (SV) Input 1_Set value monitor = Input 1_Set value (SV)

L The SV tracking does not function at the time of switching from 2-loop control to Differential temperature control.

Switching between Cascade control and Slave single control

- When the Cascade control is switched to the Slave single control, the set value of Input 2 (slave-side) follows the Input 2_Measured value (PV) just before the switching
- When the Slave single control is switched to the Cascade control, the set value of Input 1 (master-side) follows the Input 1_Measured value (PV) just before the switching

Control:	Cascade control	Slave single control
SV tracking used	Input 1_Set value (master-side) = Input 1_Set value (master-side) Input 2_Set value (slave-side) = Set value according to the Manipulated output of Input 1 (master-side)	Input 1_Set value (master-side) = Input_1 Set value (master- side) Input 2_Set value (slave-side) = Measured value of Input 2 (slave-side) just before the switching
SV tracking unused	Input 1_Set value (master-side) = Input 1_Set value (master-side) Input 2_Set value (slave-side) = Set value according to the Manipulated output of Input 1 (master-side)	Input 1_Set value (master-side) = Input 1_Set value (master- side) Input 2_Set value (slave-side) = Input 2_Set value (slave-side)

[Change of set values when switched from Cascade control to Slave single control]



[Change of set values when switched from Slave single control to Cascade control]

Control:	Slave single control	→ Cascade control
	Input 1_Set value (master-side)	Input 1_Set value (master-side)
	= Input 1_Set value (master-side)	= Measured value of Input 1 (master-side)
SV tracking	Input 2_Set value (slave-side)	just before the switching
used	= Input 2_Set value (slave-side)	Input 2_Set value (slave-side)
		= Set value according to the Manipulated
		output of Input 1 (master-side)
	Input 1_Set value (master-side)	Input 1_ Set value (master-side)
SV/ tracking	= Input 1_Set value (master-side)	= Input 1_Set value (master-side)
	Input 2_Set value (slave-side)	Input 2_Set value (slave-side)
unuseu	= Input 2_Set value (slave-side)	= Set value according to the Manipulated
		output of Input 1 (master-side)

307



• SV tracking at the time of Auto/Manual transfer

Remote/Local

transferred point

When the Manual mode is switched to the Auto mode, the Set value (SV) follows the Measured value (PV) just before the switching.

Change of set values when	n switched from Ma	anual mode to Auto r	node]
---------------------------	--------------------	----------------------	-------

Operation	mode: Manual mode —	Auto mode
	Set value (SV) = Set value (SV)	Set value (SV)
SV/ tracking	Measured value (PV)	= Measured value (PV) just before the
	= Measured value (PV)	switching
useu		Measured value (PV)
		= Measured value (PV)
SV/ tracking	Set value (SV) = Set value (SV)	Set value (SV) = Set value (SV)
	Measured value (PV)	Measured value (PV)
unuseu	= Measured value (PV)	= Measured value (PV)



The SV tracking does not function at the time of switching from Auto mode to Manual mode.

Remote/Local

transferred point

SV tracking does not function at the time of Auto/Manual switching at the Differential temperature control.

Parameter setting

• Input 1_Auto/Manual transfer [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
	Rura: Auto mode	ā R n
1. Π /11	nRn: Manual mode	

308

• Input 2_Auto/Manual transfer [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
2. R/M	គមក្នេះ Auto mode ភគក: Manual mode	ñθn

To display "Input 2_Auto/Manual transfer", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• Remote/Local transfer [Operation Transfer Mode]

Parameter symbol	Data range	Factory set value
	When "Remote setting input" is selected at Select function for	LoC
RIL	input 2	
	LoE: Local mode	
	-Eā: Remote mode	
	When "Cascade control" is selected at Select function for input	SnGL
	2	
	5nGL: Single control (Master single or Slave single)	
	ER5: Cascade control	
	When "2-loop control/Differential temperature control" is	2LooP
	selected at Select function for input 2	
	2LooP: 2-loop control	
	d FF: Differential temperature control	

To display "Remote/Local transfer", choose "Remote setting input", "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

• SV tracking [Engineering Mode: Function block No. 50 (Fn50)]

Parameter symbol	Data range	Factory set value
	0 to 3	1
	0: No SV tracking function	
	+1: SV tracking at transferring Remote/Local, Cascade	
	mode, or 2-loop control/Differential temperature control	
	+2: SV tracking at transferring Auto/Manual	
	To select two or more functions, sum each value.	

Setting procedure

SV tracking setting





- Refer to 8.9 Controlling with Manual Control for operating Auto/Manual switching.
- Refer to 8.10 Using Remote Setting Input for operating Remote/Local switching.

8.18 Suppressing Overshoot

Overshoot can be suppressed at PID control at the time of startup (power on, control stop to start), Set value (SV) change, and external disturbances.

Overshoot during the transition from Ramp to Soak can be prevented, when the Setting change rate limiter is used.

Description of function

Overshoot suppressing function may include Control response parameter, Proactive intensity, Determination point of external disturbance and Bottom suppression function.

• Control response parameter

A response speed level at changing Set value (SV) at PID control can be selected from three levels (Slow, Medium and Fast) in the Control response parameter. Select "Fast" to quicken the response of the controlled object to the change in segment level and Set value (SV). When the response speed level is "Fast", overshoot will occur. To avoid overshoot, select "Slow."





• Proactive intensity, Determination point of external disturbance

Overshoot can be suppressed at startup (power on, control stop to start), Set value (SV) change, and external disturbances. Overshoot during the transition from Ramp to Soak can be prevented. The intensity ranges from 0 to 4 (5 scales).

Temperature Temperature Proactive Proactive intensity: 0 intensity: 0 Set value (SV) D Set value (SV) [Measured value (PV Set value (SV) ▷ Proactive Proactive intensity: 4 intensity: 4 Measured value (PV) ➤ Time ➤ Time Δ Power ON Set value (SV) change point

Startup (power on, control stop to start), Set value (SV) change

When external disturbance occurs

Overshoot can be suppressed when external disturbance occurs.

External disturbances are determined by the fluctuation between the stable state and Measured value (PV) of the external disturbance determination point or more which is then used as a trigger.



During Ramp control (Change of SV by Setting change rate limiter)

Overshoot can be suppressed when the temperature is in transition from the Ramp state to the Soak state.



• Bottom suppression function

When the input fluctuation by external disturbance is detected, the amount of FF (Feedforward) is added to the output value to suppress the Bottom.



[Setting items]

- FF amount: This can also be obtained automatically by Amount of FF which is added to detect external disturbance and Learning function
- FF amount learning: FF amount can be calculated from external disturbance when detection of external disturbance is executed after selection of "Learn." When setting is completed, the value will automatically return to "0: No learning."
- Bottom suppression function: Used to activate/deactivate the Bottom suppression function as well as a trigger function. There are two types of triggers; when the Determination point of external disturbance (FF amount is added by the level) is exceeded and Forced addition off FF amount. Trigger signal can be input through communication in the case of Forced addition of FF amount.

Parameter setting

 Input 1_Control response parameter [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol Data range	Factory set value
I. RPF 0: Slow 1: Medium 2: Fast [When P or PD action is selected, this setting will be unavailable]	PID control: 0 Heating/Cooling PID control: 2

To display "Input 1_Control response parameter", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_Control action (Engineering mode).

Input 2_Control response parameter [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
2. RPC	0: Slow 1: Medium 2: Fast [When P or PD action is selected, this setting will be unavailable]	0

To display "Input 2_Control response parameter", choose "2-loop control/ Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Input 1_Proactive intensity [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I.PRE C	0 to 4 0: No function	2

To display "Input 1_Proactive intensity", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 1_Proportional band [heat-side] and the Input 1_ Integral time in the same memory area.

• Input 2_Proactive intensity [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Parameter symbol	Data range	Factory set value
	0 to 4	2
	0: No function	

To display "Input 2_Proactive intensity", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band and the Input 2_Integral time in the same memory area.

• Input 1_FF amount [Parameter Setting Mode: Parameter group No. 51 (Pn5 /)]

Parameter symbol	Data range	Factory set value
I. FF	-100.0 to +100.0%	0.0

To display "Input 1_FF amount", choose "1 or 2" in Function block No. 57: Bottom suppression function (Engineering mode), AND select other than MC-(V)COS(R) pressure control for "Input 1_Control action" in Engineering mode: Function block No. 51. Additionally, a value other than 0 must also be entered in Input 1_Proportional band [heat-side] and Input 1_Integral time [heat-side] in the same memory area.

• Input 2_FF amount [Parameter Setting Mode: Parameter group No. 52 (Pn52)]

Paramete	er symbol	Data range	Factory set value
2.	FF	-100.0 to +100.0%	0.0

To display "Input 2_FF amount", choose "1 (FF amount is added by level)" or "2 (FF amount is forcibly added)" in Function block No. 57: Bottom suppression function (Engineering mode), AND choose "2-loop control/Differential temperature control" or "Cascade control", AND choose a setting other than "3 to 7 (Pressure control operation [MC-VCOS(R)])" in Function block No. 52: Input 2_Control action (Engineering mode). Additionally, a value other than 0 must also be entered in the Input 2_Proportional band [heat-side] and the Input 2_Integral time in the same memory area.

• FF amount learning [Setup Setting Mode: Setting group No. 57 (5-57)]

Parameter symbol	Data range	Factory set value
FFSF	0 to 3 0: No learning +1: Learn Input 1 +2: Learn Input 2 To select two or more functions, sum each value.	0

- To display "FF amount learning," choose 1 or 2 in Function block No. 57: Bottom suppression function (Engineering mode) AND a choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No. 51: Input 1_Control action (Engineering mode, OR choose "2-loop control/ Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (in Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No. 58: Select function for Input 2 (in Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No. 52: Input 2_Control action (Engineering mode).
- Input 1_Determination point of external disturbance [Setup Setting Mode: Setting group No. 57 (5n57)]

Parameter symbol	Data range	Factory set value
1.E × d J	-(Input 1_Input span) to +(Input 1_Input span) (When Control with PV select: -(PV select input span) to +(PV select input span)) [Varies with the setting of the Decimal point position.]	-1

- To display "Input 1_Determination point of external disturbance", choose "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.51: Input 1_ Control action (Engineering mode).
- Input 2_Determination point of external disturbance [Setup Setting Mode: Setting group No. 57 (5n57)]

Parameter symbol	Data range	Factory set value
2.E × d J	-(Input 2_Input span) to +(Input 2_Input span) [Varies with the setting of the Decimal point position.]	-1

To display "Input 2_Determination point of external disturbance", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_Control action (Engineering mode).

• Bottom suppression function [Engineering Mode: Function block No. 57 (Fn57)]

Parameter symbol	Data range	Factory set value
ЪГМЅР	 0: No function 1: FF amount is added by level 2: FF amount is forcibly added 	0

To display the "Bottom suppression function", choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No. 51: Input 1_Control action (Engineering mode), OR "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode), AND choose a setting other than "3 to 7 (Pressure control operation [MC-(V)COS(R)])" in Function block No.52: Input 2_ Control action (Engineering mode).

Setting procedure





- Next parameter is displayed.
- Press 🖅 and **(MODE** keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- · Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

8.19 Changing the Action at Power ON (Hot/Cold Start)

When restarting following a power failure (power OFF from ON), the start action can be selected by the following parameters:

- Hot/Cold start
- Start determination point
- RUN/STOP selection when power is restored
- MAN/AUTO selection when power is restored
- LOC/REM selection when power is restored
- LOC/EXT selection when power is restored
- Output value selection when power is restored

In addition, the start action can also be selected from the aforementioned settings when switching from STOP to RUN, in cases other than power failures.

Description of function

• Hot/Cold start

Recovery action from power failure can be selected from the following.

For PID control or Heating/Cooling PID control

Action when power failure recovers	Operation mode when power failure recovers	Output value when power failure recovers	
Hot start 1	Same as that before power failure	Near the output value before power failure occurs	
Hot start 2	Same as that before power failure	Auto mode	Computed control output value ²⁾
		Manual mode	Output limiter low
Cold start	Manual control mode	Output limiter low	
STOP start	Started in the Reset mode regardless of the Operation mode before power failure ¹⁾	Manipulated output value (MV) at STOP	
Action to follow when power is restored	Adheres to the setting for RUN/STOP selection when power is restored, MAN/AUTO selection when power is restored, LOC/REM selection when power is restored, LOC/EXT selection when power is restored	Adheres to the setting for output value selection when power is restored	

Factory set value: Action to follow when power is restored

¹⁾ If changed to RUN from STOP by RUN/STOP transfer after start, set to the operation mode before power failure occurs.

²⁾ The result of control computation varies with the control response parameter.

If Startup tuning (ST) function is executed or an automatic temperature rise is made just when the power is turned on or selection is made from STOP to RUN as one of the startup conditions, control starts at Hot start 2 even if set to Hot start 1 (factory set value).

• Start determination point

Determination point of Hot start 1 is set. Determination point of start is a deviation setting from the Set value (SV).

• The start state is determined according to the Measured value (PV) level [deviation from set value] at power recovery.

316

- When a Measured value (PV) is between the determination points on the + (plus) and (minus) sides, always started from Hot start 1 when recovered.
- When a Measured value (PV) is out of the determination points or the Start determination point is set at "0", operation starts from any start state selected by Hot/Cold start.
- The start determination point is set to "0" when shipped, therefore the procedure below is not performed, and operation is started in the start condition selected in "Hot/cold start".



During Cascade control: Determined for Master side (Input 1) only. In the case of Master single control and Slave single control, according to the setting of each input.

Action upon power failure for 2-loop control is as follows:

- Hot start 1, Hot start 2, Cold start and Action to follow when power is restored Control is started in a mode according to the start determination point.
- STOP start
 Starts in Hot start 1

Starts in Hot start 1 when Input 1 or Input 2 stays within the start determination point. Starts in STOP start when both of Input 1 and Input 2 are outside the start determination point.

Parameter setting

• Hot/Cold start [Engineering Mode: Function block No. 50 (Fn50)]

Parameter symbol	Data range	Factory set value
	0: Hot start 1	0
- FO	1: Hot start 2	
	2: Cold start	
	3: STOP start	
	4: Action to follow when power is restored ¹⁾	

¹⁾ Adheres to the setting for RUN/STOP selection when power is restored, MAN/AUTO selection when power is restored and when switching to RUN, LOC/REM selection when power is restored and when switching to RUN, LOC/EXT selection when power is restored and when switching to RUN, Output value selection when power is restored.

Input 1_Start determination point [Engineering Mode: Function block No. 51 (Fn5 /)]

Parameter symbol	Data range	Factory set value
I. PJA	 0 to Input 1_Input span (When Control with PV select: 0 to PV select input span) 0: Operation starts from any start state selected by Hot/Cold start [Varies with the setting of the Decimal point position.] 	0

 Input 2_Start determination point [Engineering Mode: Function block No. 52 (Fn52)]

Parameter symbol	Data range	Factory set value
2. PdR	 0 to Input 2_Input span 0: Operation starts from any start state selected by Hot/Cold start [Varies with the setting of the Decimal point position.] 	0

To display "Input 2_Start determination point", choose "2-loop control/
 Differential temperature control" or "Cascade control" in Function block No. 58:
 Select function for Input 2 (Engineering mode).

• RUN/STOP selection when power is restored [Engineering Mode: Function block No. 50 (Fn5D)]

Parameter symbol	Data range	Factory set value
rUnSL	0: STOP 1: RUN 2: Operation immediately before power cut	0

• MAN/AUTO selection when power is restored [Engineering Mode: Function block No. 50 (Fn50)]

Parameter symbol	Data range	Factory set value
MRNSL	0: MAN 1: AUTO	0
	2: Operation immediately before power cut	

LOC/REM selection when power is restored [Engineering Mode: Function block No. 50 (Fn50)]

Parameter symbol	Data range	Factory set value
REMSL	 0: LOCAL ¹⁾ 1: REMOTE ¹⁾ 2: Operation immediately before power cut 	0

¹⁾ Depending on the selected item for "Select function for Input 2", this will be LOCAL/REMOTE, Single control/Cascade control, Input 1/ Input 2 or 2-loop control/Differential temperature control.

Refer to "Remote/Local transfer" in 3.4 Operation Transfer Mode [C] for details.

LOC/EXT selection when power is restored [Engineering Mode: Function block No. 50 (Fn5D)]

Parameter symbol	Data range	Factory set value
E×SL	0: LOC 1: EXT 2: Operation immediately before power cut	0

Output value selection when power is restored [Engineering Mode: Function block No. 50 (Fn50)]

Parameter symbol	Data range	Factory set value
MVSL	0: 0% 1: Output limiter low 2: Operation immediately before power cut	0

318

Setting procedure



- (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

9. Display-related Functions

9.1 Grouping Necessary Screens (Parameter Select Function)

This instrument has a function that allows a user to specify desired screens to be displayed. This function is called "Parameter select function." Up to 16 screens can be grouped together.

320

Description of function

The Parameter select function allows grouping necessary screens into a single mode for display. Screens registered in the Setting lock mode are displayed in the Parameter select mode.

The screens displayed in this mode can be operated in the same manner as they are in the original mode.

The Setting lock mode screen and the Function block No. 91 (Engineering mode) cannot be registered with the Parameter select function.

[How does Parameter select function work?]



[Example] When "Event 1 set value (EV1)" screen in the Parameter setting mode is registered in the Parameter select setting screen, this screen can be viewed in both the Parameter select mode and the Parameter setting mode.

Set data lock

This function can be independently activated in each operation mode. For example, when the parameters in the Parameter setting mode are locked, the same parameters in the Parameter select mode are settable.

There are two ways to register screens.

- Screen number entry: Enter the screen No. on the Parameter select setting screen.
- Direct registration: Display the desired screen and register it through key operations.
- Screen number entry

Enter the predefined screen number on the Parameter select setting screen in the Setting lock mode. The registered screens in the Parameter select mode will be displayed.

Refer to 9.1 List of screen numbers for details.

[To register screens]



[Registering screens and display (1)]

There are 16 Parameter select setting screens and these are freely settable. Unregistered screens, if any, will be skipped and screens are displayed in series in the Parameter select mode.

Setting lock mode: Parameter select setting screen (for registration)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Α	В	С					D	Е						F	
	: Regi	stered	scree	ens		: Unregistered screens (Set value = 0)									

Parameter select mode: Displayed screens

А

В

С

D E F : Only registered screens are grouped for display.

[Entering screen No.]

In this example we will register "Event 1 set value (EV1)" in the Parameter setting mode.



• Direct registration

Activate the direct registration on the Parameter select direct registration screen in the Setting lock mode. Display the screen to register and press the \frown and \bigtriangledown keys simultaneously.

The screen will be registered on the Parameter select setting screen.

Control must be stopped before attempting the direct registration.

When the direct registration is activated on the Parameter select direct registration screen, all modes except for the Setting lock mode will be locked.



323



This example is of direct registration for "[Registered screen and display (1)]".

- When directly registered
 - Setting lock mode: Parameter select setting screen (for registration)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
А	В	С					D	Е						F	G
	: Re	gistere	ed scre	eens		:	Unreg	istere	d scree	ens (Se	et valu	e = 0)			\uparrow
															Directly registered scree

Parameter select mode: Displayed screens

A B C D E F G

Only registered screens are grouped for display.

When attempting a direct registration, in case there is a registered screen in the Parameter select setting screen, the new screen will be added to after the registered screen. Even if there are unregistered screens, the new screen will be added to after the screen with the largest screen number of the Parameter select setting screen.
• Registering further screens

Setting lock mode: Parameter select setting screen (for registration)



When the Parameter select setting 16 screens are registered, the latest direct registration is added to the position of No.16, and the data before that will be moved ahead to toward the direction of the smaller numbers. Consequently, the screen registered at the Parameter select setting 1 will be moved out and removed from the registration.

[Example of Direct registration]

This is an example to make a direct registration of "Input 1_PV bias" in the Setting group 21 in the Setup setting mode under the state of the "[Registered screen and display (1)]".



Parameter setting

• Parameter select direct registration [Setting Lock Mode]

Parameter symbol	Data range	Factory set value	
PSL.d	 FF: Direct registration: OFF an: Direct registration: ON 	oFF	
To allow "Parameter select direct registration", Control must be stopped (STOP).			

Set "an: Direct registration ON" to ON. All except Setting lock mode will be forced to data locked. After the registration process is over, return the setting to aFF.

This setting returns to $_{o}FF$ when the power is turned off.

• Parameter select setting 1 to 16 [Setting Lock Mode]

Parameter symbol	Data range	Factory set value
	0: No registration 1 to 351 (Screen No.) Refer to Table 9.1 List of screen numbers for details.	0
PSL 16		

Table 9-1 List of screen numbers

No.	Name	Mode
	Input 1_Measured value (PV)	Monitor & SV
1	monitor ¹⁾	settina mode
	Input 1 Set value (SV) monitor 2)	g
	Input 2 Measured value (PV)	
2	monitor	
2	$\frac{11011101}{10011101}$	
	Input 2_Set value (SV) monitor 9 9	
	Measured value (PV) of	
	differential temperature input	
3	monitor	
	Set value (SV) of differential	
	temperature input (SV) monitor ²⁾	
	Input 1 Measured value (PV)	
4	Input 2 Measured value (PV)	
	Remote setting input value	
5	monitor	
	Input 1 Manipulated output	
6	Input I_Manipulated output	
	value monitor [neat-side]	
7	Input 1_Manipulated output	
Ľ	value monitor [cool-side]	
0	Input 2_Manipulated output	
0	value monitor	
9	Comprehensive event state	
10	Memory area soak time monitor	
11	Input 1 Soft start remaining time	
12	Input 2. Soft start remaining time	
12	Input 2_30it start remaining time	
13	Interiock release	
14	Memory area transfer	
15	RUN/STOP transfer	Operation
16	Input 1_Autotuning (AT)	transfer mode
17	Input 2_Autotuning (AT)	
18	Input 1 Startup tuning (ST)	
19	Input 2 Startup tuning (ST)	
20	Input 1 Auto/Manual transfer	
20	Input 2 Auto/Manual transfer	
21		
	Remote/Local transfer	
	Cascade mode transfer	
22	PV select transfer	
	2-loop control/Differential	
	temperature control transfer	
00	Control area Local/External	
23	transfer	
24	Input 1 Set value (SV)	Parameter
25	Input 2 Set value (SV/)	setting mode
20		Parameter
26	Set value (SV) of differential	
20	temperature input (SV)	91000 NO.00
 	Event 1 pet volue (E)(4)	(FAUU)
27	Event 1 Set Value (EV1)	Parameter
	Event 1 set value (EV1) [high]	setting mode:
28	Event 1 set value (EV1') [low]	Parameter
20	Event 2 set value (EV2)	group No.40
29	Event 2 set value (EV2) [high]	(Pn40)
30	Event 2 set value (EV2') [low]	
- 50	Event 3 set value $(EV2)$ [IOW]	
31	Event 2 pet value $(E \vee 3)$	
	Event 3 set value (EV3) [nigh]	
32	Event 3 set value (EV3) [low]	
33	Event 4 set value (EV4)	
	Event 4 set value (EV4) [high]	
34	Event 4 set value (EV4') [low]	

¹⁾ Measured value (PV) of the PV select under the Control with PV select.

²⁾ Input 1_Manual manipulated output value when Input 1 is in Manual mode.

- ³⁾ Input 1_Manual manipulated output value when the control is Cascade control in the Manual mode.
- ⁴⁾ Input 2_Manual manipulated output value when the control is 2-loop control and when Input 2 is in Manual mode.

No	Name	Mode
05	Input 1 Proportional band [heat-	Parameter
35	side]	setting mode
36	Input 1_Integral time [heat-side]	Parameter
37	Input 1_Derivative time [heat-side]	group No.51
38	Input 1_ON/OFF action	(ר בהץ)
	Incut 1 ON/OFE action	
39	differential dap (lower)	
	Input 1 Control response	
40	parameter	
41	Input 1_Proactive intensity	
42	Input 1_Manual reset	
43	Input 1_FF amount	
44	Input 1_Output limiter high	
-	[neat-side]	
45	sidel	
46	Input 1 Dead zone	
47	Input 2 Proportional band	Parameter
48	Input 2_Integral time	setting mode
49	Input 2_Derivative time	Parameter
50	Input 2_ON/OFF action	group No.52
50	differential gap (upper)	(Pn52)
51	Input 2_ON/OFF action	
	differential gap (lower)	
52	Input 2_Control response	
53	Input 2 Proactive intensity	
54	Input 2 Manual reset	
55	Input 2 FF amount	
56	Input 2_Output limiter high	
57	Input 2_Output limiter low	
58	Input 2_Dead zone	
59	Input 1_Proportional band [cool-	Parameter
~~~		
60	Side]	setting mode
60 61	side Input 1_Integral time [cool-side]	setting mode Parameter group No 56
60 61 62	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlan/Deadband	setting mode Parameter group No.56 (Pn56)
60 61 62	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool-	setting mode Parameter group No.56 (Pn56)
60 61 62 63	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side]	setting mode Parameter group No.56 (Pn56)
60 61 62 63	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool-	setting mode Parameter group No.56 (Pn55)
60 61 62 63 64	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side]	setting mode Parameter group No.56 (Pn56)
60 61 62 63 64 65	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory	setting mode Parameter group No.56 (Pn55) Parameter
60 61 62 63 64 65	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter
60 61 62 63 64 65 66 66	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No 70
60 61 62 63 64 65 66 67 68	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn70)
60 61 62 63 64 65 66 67 68 69	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down)	Setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn7D)
60 61 62 63 64 65 66 67 68 69 70	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate	setting mode Parameter group No.56 ( $P_{n}55$ ) Parameter setting mode Parameter group No.70 ( $P_{n}70$ )
60         61           62         63           64         65           66         67           68         69           70         70	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up)	setting mode Parameter group No.56 ( $P_n55$ ) Parameter setting mode Parameter group No.70 ( $P_n70$ )
60         61           62         63           64         65           66         67           68         69           70         71	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate	setting mode Parameter group No.56 ( $P_n55$ ) Parameter setting mode Parameter group No.70 ( $P_n70$ )
60         61           62         63           64         65           66         67           68         69           70         71	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down)	setting mode Parameter group No.56 $(P_n 5 b)$ Parameter setting mode Parameter group No.70 $(P_n 7 D)$
60         61           62         63           64         65           66         67           68         69           70         71           72         72	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Setting change rate limiter (down)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn70)
60         61           62         63           64         65           66         67           68         69           70         71           72         72	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Auto/Manual transfer selection (Area transfer)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn70)
60         61           62         63           64         65           66         67           68         69           70         71           72         73	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Setting change rate limiter (down) Input 1_Auto/Manual transfer selection (Area transfer) Input 1_Manipulated output value (Area transfer)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn70)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Auto/Manual transfer selection (Area transfer) Input 1_Manipulated output value (Area transfer) Input 2_Soft start time (up)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn70)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Auto/Manual transfer selection (Area transfer) Input 1_Manipulated output value (Area transfer) Input 2_Soft start time (up) Input 2_Soft start time (up)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn70)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75	side] Input 1_Integral time [cool-side] Input 1_Orivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Auto/Manual transfer selection (Area transfer) Input 1_Manipulated output value (Area transfer) Input 2_Soft start time (up) Input 2_Soft start time (down) Input 2_Setting change rate	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn7D)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75           76	side] Input 1_Integral time [cool-side] Input 1_Overlap/Deadband Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Auto/Manual transfer selection (Area transfer) Input 2_Soft start time (up) Input 2_Soft start time (down) Input 2_Soft start time (down) Input 2_Soft start time (down)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn7D)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75           76         77	side] Input 1_Integral time [cool-side] Input 1_Overlap/Deadband Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Auto/Manual transfer selection (Area transfer) Input 2_Soft start time (up) Input 2_Soft start time (down) Input 2_Setting change rate limiter (up)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn7D)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75           76         77	side] Input 1_Integral time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Manipulated output value (Area transfer) Input 2_Soft start time (down) Input 2_Soft start time (down) Input 2_Soft start time (up) Input 2_Setting change rate limiter (up)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn7D)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75           76         77           78         78	side] Input 1_Integral time [cool-side] Input 1_Orevative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Manipulated output value (Area transfer) Input 2_Soft start time (up) Input 2_Setting change rate limiter (up) Input 2_Auto/Manual transfer selection (Area transfer)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn7D)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75           76         77           78         78	side] Input 1_Integral time [cool-side] Input 1_Overlap/Deadband Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Setting change rate limiter (down) Input 1_Nanipulated output value (Area transfer) Input 2_Soft start time (up) Input 2_Soft start time (down) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (down) Input 2_Nating change rate limiter (up) Input 2_Nating change rate limiter (up) Input 2_Nating change rate limiter (down) Input 2_Nating change rate limiter (down)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn7D)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75           76         77           78         79	side] Input 1_Integral time [cool-side] Input 1_Derivative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Setting change rate limiter (down) Input 1_Manipulated output value (Area transfer) Input 2_Soft start time (down) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (down) Input 2_Setting change rate limiter (down) Input 2_Auto/Manual transfer selection (Area transfer) Input 2_Manipulated output value (Area transfer)	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn70)
60         61           62         63           64         65           66         67           68         69           70         71           72         73           74         75           76         77           78         79	side] Input 1_Integral time [cool-side] Input 1_Orevative time [cool-side] Input 1_Overlap/Deadband Input 1_Output limiter high [cool- side] Input 1_Output limiter low [cool- side] Select Trigger type for Memory area transfer Area soak time Link area number Input 1_Soft start time (up) Input 1_Soft start time (up) Input 1_Soft start time (down) Input 1_Setting change rate limiter (up) Input 1_Setting change rate limiter (down) Input 1_Setting change rate limiter (down) Input 1_Setting change rate limiter (down) Input 1_Manipulated output value (Area transfer) Input 2_Soft start time (up) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (up) Input 2_Setting change rate limiter (down) Input 2_Setting change rate limiter (down) Input 2_Auto/Manual transfer selection (Area transfer) Input 2_Manipulated output value (Area transfer) Remote/Local transfer selection	setting mode Parameter group No.56 (Pn55) Parameter setting mode Parameter group No.70 (Pn70)

No	Name	Mode
81	Display update cycle	Setup setting mode: Setting group No.10 (5n III)
82	Input 1_PV bias	Setup setting
83	Input 1_PV digital filter	mode: Setting
84	Input 1_PV ratio	group No.21
85	Input 1_PV low input cut-off	(5nď l)
86	Input 2_PV bias (RS bias)	Setup setting
87	Input 2_PV digital filter	mode: Setting
00	(RS digital liter)	(5022)
80	Input 2_PV low input cut-off	(2,122)
90	OUT3 proportional cycle time	Setup setting
		mode: Setting
91	OUT3 minimum ON/OFF time of	
	Input 1 Manual manipulated	Sotup sotting
92		mode: Setting
93	Input 1 Level PID setting 1	aroup No.51
94	Input 1 Level PID setting 2	(5n5 l)
95	Input 1 Level PID setting 3	( )
96	Input 1 Level PID setting 4	
97	Input 1_Level PID setting 5	
98	Input 1_Level PID setting 6	
99	Input 1_Level PID setting 7	
100	Input 2_Manual manipulated	Setup setting
100	output value	mode: Setting
101	Input 2_Level PID setting 1	group No.52
102	Input 2_Level PID setting 2	(5652)
103	Input 2_Level PID setting 3	
104	Input 2_Level PID setting 4	
105	Input 2_Level PID setting 5	
100	Input 2_Level PID setting 6	
107	Input 1 AT bias	Setup setting
100	Input 1 AT remaining time	mode: Setting
109	monitor	group No.53
110	Input 1_AT/ST status monitor	(5n53)
111	Input 2_AT bias	Setup setting
112	Input 2_AT remaining time	mode: Setting
110	monitor	
113	E amount loorning	(I Line)
114	Input 1 Determination point of	mode Setting
115	external disturbance	aroup No.57
	Input 2 Determination point of	(5n57)
116	external disturbance	. ,
117	Cascade_Proportional band (master-side)	Setup setting
440	Cascade_Integral time (master-	group No.58
118	side)	(Sn58)
119	Cascade_Derivative time	
100	Cascade Proportional band	
120	(slave-side)	
121	Cascade_Integral time (slave-	
122	Cascade_Derivative time (slave-	
100	Side)	
123	Cascade Scale high	
124	Cascade Scale low	
120	PV select transfer level	
127	PV select transfer time	
<u> </u>		Setup setting
128	Input 1_Oversnoot prevention	mode: Setting
	Icaluic	group No.59

		(5759)
		Setup setting
	Input 2 Overshoot prevention	mode: Setting
129		aroup No 60
	leature	(5-57)
130	Input 1 Peak hold monitor	Setup setting
121	Input 1 Bottom hold monitor	mode: Setting
122	Input 1 Hold react	aroun No 91
132	Input 2 Deak hald manitar	(5-9 !)
133	Input 2_Peak hold monitor	(ו בווב)
134	Input 2_Bottom hold monitor	
135	Input 2_Hold reset	
136	STOP display selection	Engineering
137	ALM lamp lighting condition	mode:
138	PV flashing display at input error	Function block
139	Show/Hide Input 1_SV	No.10 (Fn III)
140	Show/Hide Input 2_SV	
141	Show/Hide Input 1_MV	
142	Show/Hide Input 2_MV	
4.40	Select hidden items in Monitor	
143	mode	
	Select hidden items in Operation	
144	transfer mode	
145	Data registration	Engineering
140		mode:
146	FUNC key assignment	Function block
147	FUNC key operation selection	No.11 (Fn 11)
148	Input 1 Input type	Engineering
1/10	Input 1 Display unit	mode:
150	Input 1 Decimal point position	Function block
150	Input 1 Input range bigh	
151	Input 1_Input range high	110.21 (112.1)
152	Input 1_Input range low	
153	Input 1_Input error determination	
	point (nign)	
154	Input 1_Input error determination	
	point (low)	
155	Input 1_I emperature	
	compensation calculation	
156	Input 1_Burnout direction	
157	Input 1_Square root extraction	
158	Input 1_Inverting input	
159	Input 2_Input type	Engineering
160	Input 2_Display unit	mode:
161	Input 2_Decimal point position	Function block
162	Input 2_Input range high	No.22 (Fn22)
163	Input 2_Input range low	
164	Input 2_Input error determination	
104	point (high)	
105	Input 2_Input error determination	
105	point (low)	
100	Input 2_Temperature	
100	compensation calculation	
167	Input 2_Burnout direction	
168	Input 2 Square root extraction	
169	Input 2 Inverting input	
170	DI1 function selection	Engineering
171	DI2 function selection	mode:
172	DI3 function selection	Function block
172	DI4 function selection	No.23 (Fo27)
174	DI5 function selection	
175	DIG function selection	
170	Dio function selection	
1/0		
177	Area switching time (without	
470		En ala seri
1/8		⊨ngineering
179	OUT2 function selection	mode:
180	OUT3 function selection	Function block
181	OUT1 logic calculation selection	NO.30 (⊦∩∃0)
182	OUT2 logic calculation selection	
183	OUT3 logic calculation selection	
184	Energized/De-energized selection	
185	Interlock selection	
186	Output action at control stop	
	Event extien during MAN mode	

188	OUT1 type selection	
190	Universal output type selection	
191	(OUT3) Retransmission output 1 type	Engineering
102	Retransmission output 1 scale	mode:
192	high	Function block
193	low	
194	Retransmission output 2 type	Engineering
195	Retransmission output 2 scale	mode: Function bloc
196	Retransmission output 2 scale	No.32 (Fn32)
197	Retransmission output 3 type	Engineering
198	Retransmission output 3 scale high	mode: Function block
199	Retransmission output 3 scale low	No.33 (Fn33)
200	DO1 function selection	Engineering
201	DO2 function selection	mode:
202	DO3 function selection	
203	DO4 function selection	1NO.34 (FUIT)
204 205	DO LIOUIC Calculation selection	1
205	DO2 logic calculation selection	1
207	DO4 logic calculation selection	1
208	Event 1 assignment	Engineering
209	Event 1 type	mode:
210	Event 1 hold action	Function block
211	Event 1 differential gap	No.41 (Fn4 I)
212	Event 1 timer	
213	Event 2 assignment	Engineering
214	Event 2 type	mode:
215	Event 2 hold action	
216	Event 2 differential gap	1NU.42 (FAME)
217	Event 2 timer	Engineering
∠10 210	Event 3 type	mode.
220	Event 3 hold action	Function block
221	Event 3 differential gap	No.43 (Fn43)
222	Event 3 timer	1 . ,
<u>22</u> 3	Event 4 assignment	Engineering
224	Event 4 type	mode:
225	Event 4 hold action	Function block
226	Event 4 differential gap	NO.44 (৮৯४४)
227	Event 4 timer	Engineering
228		⊏ngineering
229	nower is restored	Function block
0.0.7	MAN/AUTO selection when	No.50 (Fn50)
230	power is restored	, ,
231	LOC/REM selection when power is restored	
232	LOC/EXT selection when power	]
	Is restored Output value selection when	{
233	power is restored	
234	Manual manipulated output value selection	
235	SV tracking	]
236	Integral/Derivative time decimal point position	
237	ST start condition	1
238	Input 1_Control action	Engineering
239	Input 1_Output change rate	mode:
209	limiter (up) [heat-side]	Function block
240	Input 1_Output change rate	No.51 (Fn5 /)
0.4.4	Ilmiter (down) [heat-side]	{
241	Input 1_Action (high) input error	4
242	Input 1_Action (IOW) Input error	{
243	value at input error	

244	Input 1_ Manipulated output	
277	value at STOP [heat-side]	
245	Input 1_Start determination point	
246	Input 1_Level PID action selection	
247	Input 1_Level PID differential gap	
248	Input 2_Control action	Engineering
249	Input 2_Output change rate	mode:
	limiter (up) [heat-side]	Function block
250	Input 2_Output change rate	N0.52 (Fn52)
054	limiter (down) [heat-side]	
251	Input 2_Action (high) input error	
252	Input 2_Action (IOW) Input error	
253	input 2_Manipulated output	
	Input 2 Manipulated output	
254	value at STOP	
255	Input 2 Start determination point	
256	Input 2 Level PID action selection	
257	Input 2 Level PID differential gap	
258	Input 1 Valve coefficient A	Engineering
259	Input 1 Valve coefficient b	mode:
260	Input 1_Valve coefficient C	Function block
261	Input 1_Valve coefficient d	No.53 (Fn53)
262	Input 1_Valve coefficient E	
263	Input 1_Valve coefficient F	
264	Input 1_Pressure standard for	
204	valve coefficient F	
265	Input 1_Control valve selection	
266	Input 1_Pressure (Temperature)	
200	limiter	
267	Input 1_Temperature limiter unit	
268	Input 1_Regression equation bias	
269	Input 1_Response speed self-	
	learning selection	
270	Input 1_Response speed	
	Input 1 Besperse speed	
271	Input 1_Response speed	
	Input 1 Response speed	
272	learning parameter t3 set up	
070	Input 1 Response speed	
273	learning parameter t4 set down	
074	Input 1_Response speed	
2/4	learning parameter L1 Oup	
275	Input 1_Response speed	
210	learning parameter L2 0down	
276	Input 1_Response speed	
	learning parameter L3 set up	
277	Input 1_Response speed	
┣───	learning parameter L4 set down	
278	Input I_rtesponse speed	
	Input 1 Response speed	
279	learning parameter S2 0down	
<u> </u>	Input 1 Response speed	
280	learning parameter S3 set up	
004	Input 1_Response speed	
281	learning parameter S4 set down	
282	Input 1_No. of corrective actions	
283	Input 1_Corrective action repeat	
284	Input 1_Corrective actions for	
204	ramp control	
285	Input 1_Lower range of	
	corrective action amount	
286	Input 1_Upper range of	
007	corrective action amount	Engineering
287	Input 2_valve coefficient A	Engineering
200	Input 2_Valve coefficient D	Function block
209	Input 2_valve coefficient d	No.54 (Fa54)
290	Input 2 Valve coefficient E	
202	Input 2 Valve coefficient F	
293	Input 2 Pressure standard for	

204	valve coefficient F	
294	Input 2_Control valve selection Input 2 Pressure (Temperature)	
295	limiter	
296	Input 2_Temperature limiter unit	
297	Input 2_Regression equation bias	
298	learning selection	
200	Input 2_Response speed	
299	learning parameter t1 Oup	
300	Input 2_Response speed	
	Input 2 Response speed	
301	learning parameter t3 set up	
302	Input 2_Response speed	
	learning parameter t4 set down	
303	learning parameter L1 Oup	
204	Input 2_Response speed	
304	learning parameter L2 0down	
305	Input 2_Response speed	
	Input 2 Response speed	
306	learning parameter L4 set down	
307	Input 2_Response speed	
507	learning parameter S1 Oup	
308	Input 2_Response speed	
000	Input 2 Response speed	
309	learning parameter S3 set up	
310	Input 2_Response speed learning	
211	parameter S4 set down	
312	Input 2 Corrective action repeat	
212	Input 2_Corrective actions for	
313	ramp control	
314	Input 2_Lower range of	
	Input 2 Upper range of	
315	corrective action amount	
316	Input 1_Output change rate	Engineering
	limiter (up) [cool-side]	mode:
317	limiter (down) [cool-side]	No.56 (Fn55)
210	Input 1_Manipulated output	
310	value at STOP [cool-side]	
319	Undershoot suppression factor	
320	point	
		Engineering
321	Bottom suppression function	mode:
		Function block
322	Select function for input 2	Fngineering
323	Cascade_AT mode (master-side)	mode:
324	Cascade_AT mode (slave-side)	Function block
325	Selection of PV select trigger	No.58 (Fn58)
326	Input circuit error alarm set value	Engineering
327	protocol	mode:
328	Device address	Function block
329	Communication speed	No.60 (Fn60)
330	Data bit configuration	
331	Interval time	
333	Register type	Engineering
324	Register start number (High-	mode:
554	order 4-bit)	Function block
335	Register start number (Low-	1NO.62 (Endd)
336	Monitor item register bias	
337	Setting item register bias	
338	Instrument link recognition time	

339	PLC response waiting time	
340	PLC communication start time	
341	Slave register bias	
342	Number of recognizable devices	
343	Soft start/Setting change rate limiter selection	Engineering mode:
344	Soft start time selection	Function block
345	Soft start start time selection	No.70 (F∩70)
346	Setting change rate limiter unit time	
347	Soak time unit	
348	Input 1_Setting limiter high	Engineering
349	Input 1_Setting limiter low	mode: Function block No.71 (Fn7 I)
350	Input 2_Setting limiter high	Engineering
351	Input 2_Setting limiter low	mode: Function block No.72 (Fnn2)

## 9.2 Hiding Unnecessary Screens

On this instrument, a specified range of screens can be hidden. Below are screens that can be hidden.

- Monitor screen in the Monitor & SV setting mode
- Screens in the Operation transfer mode
- Screens restricted by the Blind function

# 9.2.1 Hide the monitor screen in the Monitor & SV setting mode

Show/Hide selection of the monitor screens in the Monitor & SV setting mode is available in Function block No. 10: Select hidden items in Monitor mode (Engineering mode).

[Applicable screens]

- Remote setting input value monitor
- Manipulated output value (MV) monitor * Input 1_Manipulated output value monitor [heat-side], Input 1_Manipulated output value monitor [cool-side], Input 2_Manipulated output value monitor
- Comprehensive event state
- Memory area soak time
- Soft start remaining time**
   Input 1_Soft start remaining time, Input 2_Soft start remaining time, * Setting is done at "Manipulated output value (MV) monitor"
   ** Setting is done at "Soft start remaining time"

[Operating navigation in the Monitor & SV setting mode]

331



#### **Parameter setting**

 Select hidden items in Monitor mode [Engineering Mode: Function block No. 10 (Fn ID)]

Parameter symbol	Data range	Factory set value
	0 to 31	0
0').i'ioii	0: Show all	
	+1: Remote setting input value monitor	
	+2: Manipulated output value (MV) monitor	
	+4: Current transformer (CT) monitor	
	+8: Comprehensive event state	
	+16: Memory area soak time	
	To select two or more functions, sum each value.	

## Setting procedure



Select RUN on the RUN/STOP transfer.

# · Select lock on the Set data unlock/lock transfer.

#### 9.2.2 Hiding screens in Operation transfer mode

Show/Hide selection of the screens in the Operation transfer mode is available in Function block No. 10: Select hidden items in Operation transfer mode (Engineering mode).

[Applicable screens]

- RUN/STOP transfer
- Autotuning (AT)*: Input 1_Autotuning (AT), Input 2_Autotuning (AT) •
- Startup tuning (ST)*: Input 1 Startup tuning (ST), Input 2 Startup tuning (ST)
- Auto/Manual transfer: Input 1 Auto/Manual transfer, Input 2 Auto/Manual transfer
- Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/ Differential temperature control)
- Control area Local/External transfer
- * Setting is done at "Autotuning (AT)" and "Startup tuning (ST)."

## Parameter setting

 Select hidden items in Operation transfer mode [Engineering Mode: Function block No. 10 (Fn ID)]

Parameter symbol	Data range	Factory set value
d S.Mod	0 to 63 0: Show all +1: RUN/STOP transfer +2: Autotuning (AT) +4: Startup tuning (ST) +8: Auto/Manual transfer +16: Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control) +32: Control area Local/External transfer To select two or more functions, sum each value.	0

## Setting procedure



Select lock on the Set data unlock/lock transfer.

## _____

## 9.2.3 Hiding the screen using the Blind function

The Blind function is used to hide all screens except Parameter select mode, Setting lock mode, and Measured value (PV)/Set value (SV) monitor. The Blind function can be set in the Setting lock mode.

When the Blind function is activated, the instrument displays the Parameter select mode after displaying the model and the input type/range at the time of power-up. When all of the necessary screens are placed together in the Parameter select mode, there will be no need of switching screens to other modes.

# [Operation flow when the Blind function is activated]





## **Parameter setting**

## • Select Blind function [Setting Lock Mode]

Parameter symbol	Data range	Factory set value
	PF: Blind function: OFF	oFF
0LI NO	an: Blind function: ON	

## Setting procedure



- Next parameter is displayed.
- Press Description of the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

# 9.3 Hiding the Display of the Set Value (SV)

On the normal PV/SV monitor screen, the Set value (SV) is displayed on the set value (SV) display unit. This display can be turned OFF.

# **Description of function**

Display of Set value (SV)



<u>Set value (SV) display</u> The Set value (SV) is displayed here. The display can be turned OFF.

# **Parameter setting**

# ● Show/Hide Input 1_SV [Engineering Mode: Function block No. 10 (Fn □)]

Parameter symbol	Data range	Factory set value
1.45.51/	0: Hide Input 1_SV 1: Show Input 1_SV	1

# ● Show/Hide Input 2_SV [Engineering Mode: Function block No. 10 (Fn □)]

Parameter symbol	Data range	Factory set value
2.d5.5V	0: Hide Input 2_SV 1: Show Input 2_SV	1

To display "Show/Hide Input 2_SV", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

# Setting procedure



- to the Measured value (PV)/Set value (SV) Monitor.
- (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

# 9.4 Changing the Display Position of STOP during the Control Stop

The display position of "5/ _P" showing the control stop state can be changed.

# **Description of function**

The position of the STOP display can be specified; Measured value (PV) display, Set value (SV) display, or Manipulated output value (MV) display.



Measured value (PV) display

Set value (SV) display

Manipulated output value (MV) display

# Parameter setting

# ● STOP display selection [Engineering Mode: Function block No. 10 (Fn □)]

Parameter symbol	Data range	Factory set value
SPEH	0: Stop on PV display 1: Stop on SV display 2: Stop on MV display	1

# Setting procedure



# 9.5 Changing the ALM Lamp Lighting Condition

The light condition of the ALM lamp on the front panel can be changed.

# **Description of function**

ALM lamps can be configured to light on the occurrence of the following events. These are freely combinable. If multiple events occur, OR-logic is used for display.

- Event 1
- Event 2
- Event 3
- Event 4
- Input 1_Input error high
- Input 1_Input error
   low
- Input 2_Input error high
- Input 2_Input error low

Factory set ranges



ALM lamp

Parameter setting

## • ALM lamp lighting condition [Engineering Mode: Function block No. 10 (For D)]

		• -
Parameter symbol	Data range	Factory set value
	0 to 255	15
<u> </u>	0: OFF	
	+1: Event 1	
	+2: Event 2	
	+4: Event 3	
	+8: Event 4	
	+16: Input 1_Input error high	
	+32: Input 1_Input error low	
	+64: Input 2_Input error high	
	+128: Input 2_Input error low	
	To select two or more functions, sum each value.	

#### Setting procedure

To enter the Engineering mode





Select RUN on the RUN/STOP transfer.
Select lock on the Set data unlock/lock transfer.

339

# 9.6 Changing the Display Contents of the MV Display

While the SC-F71 is monitoring the Measured value (PV) and the Set value (SV), the MV display can be configured to change the display contents.

# **Description of function**

The MV display can display the following data.

- Manipulated output value (MV)
- Memory area soak time
- Soft start remaining time
- Hide



Manipulated output value (MV)

Display of Show Memory area soak time

When the Soak time unit is set to "2", the time is displayed as follows depending on the time to be displayed.

Time	Time unit	Lamp		Example
2 hour or more	Hours: Minutes	H:M	H:M	2:□6 (2 hours 6 minutes)
1 hour 00 minutes 00 seconds to 1 hour 59 minutes 59 seconds	Hours: Minutes: seconds	H:M:S	H:M:S	I끄림:닉与 (1 hour 8 minutes 45 seconds)
0 minutes 00 seconds to 59 minutes 59 seconds	Minutes: seconds	M:S	M:S	コロロタ (37 minutes 9 seconds)

# **Parameter setting**

# ● Show/Hide Input 1_MV [Engineering Mode: Function block No. 10 (Fn □)]

Parameter symbol	Data range	Factory set value
1.d 5.MV	0: Hide 1: Show Input 1_Manipulated output value (MV) 2: Show Memory area soak time *	1
* The time unit depende on the	3: Show Soft start time display *	

ends on the setting of Soak time unit in Function block No. 70 (Engineering mode).

# ● Show/Hide Input 2_MV [Engineering Mode: Function block No. 10 (Fn □)]

Parameter symbol	meter symbol Data range	
		1
C.0 3.117	1: Show Input 2_Manipulated output value (MV)	
	2: Show Memory area soak time *	
	3: Show Soft start time display *	

* The time unit depends on the setting of Soak time unit in Function block No. 70 (Engineering mode).

L To display "Show/Hide Input 2 MV", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

340

## Setting procedure



- (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

# 9.7 Checking Input Peak Value/Bottom Value

This instrument incorporates as standard the Peak/Bottom hold function which allows storing the peak (max) and the bottom (min) Measured values (PV).

# **Description of function**

The peak hold/bottom hold function is used to store (hold) the peak (max) and the bottom (min) Measured values (PV). Each of these values is updated when the measured temperature becomes more (or less) than the value now being held.

The stored peak (max) and bottom (min) values can be reset on the Hold reset screen.



342

Peak/Bottom hold action description

## **Parameter setting**

## • Input 1_Peak hold monitor [Setup Setting Mode: Setting group No. 91 (5-9 /)]

Parameter symbol	Data range	Factory set value
I.PHL d	Input 1_Input range low - (Input 1_5% of input span) to Input 1_Input range high + (Input 1_5% of input span) [Varies with the setting of the Decimal point position.]	_

## • Input 2_Peak hold monitor [Setup Setting Mode: Setting group No. 91 (5-9 /)]

Parameter symbol Data range		Factory set value
2.PHL d	Input 2_Input range low - (Input 2_5% of input span) to Input 2_Input range high + (Input 2_5% of input span) [Varies with the setting of the Decimal point position.]	_

To display "Input 2_Peak hold monitor", choose "Cascade control", "Control with PV select", "2-loop control/Differential temperature control" or "Input circuit error alarm" in Function block No. 58: Select function for Input 2 (Engineering mode).

## • Input 1_Bottom hold monitor [Setup Setting Mode: Setting group No. 91 (5-9 /)]

Parameter symbol	Data range	Factory set value
I.6HL d	Input 1_Input range low - (Input 1_5% of input span) to Input 1_Input range high + (Input 1_5% of input span) [Varies with the setting of the Decimal point position.]	

## • Input 2_Bottom hold monitor [Setup Setting Mode: Setting group No. 91 (5-9/)]

Parameter symbol	Data range	Factory set value
2.6HL d	Input 2_Input range low - (Input 2_5% of input span) to Input 2_Input range high + (Input 2_5% of input span) [Varies with the setting of the Decimal point position.]	_

To display "Input 2_Bottom hold monitor", choose "Cascade control", "Control with PV select", "2-loop control/Differential temperature control" or "Input circuit error alarm" in Function block No. 58: Select function for Input 2 (Engineering mode).

● Input 1_Hold reset [Setup Setting Mode: Setting group No. 91 (5∩3 /)]			
Parameter symbol	Data range	Factory set value	
	HoLd: Hold cF5FF: Reset	Hold	
	Returns to Hold state automatically after reset.		
Note that the b	oth of the peak and the bottom hold values a	re reset at a time by	
the hold reset	operation.		
• Input 2_Hold res	set [Setup Setting Mode: Setting group No.	<b>91 (</b> 5n8 / <b>)]</b>	
Parameter symbol	Data range	Factory set value	
2.HL dR	HaLd: Hold rESEF: Reset Returns to Hold state automatically after reset.	HoLd	
<ul> <li>To display "Inp 2-loop control/ Function block</li> <li>Note that the b the hold reset</li> </ul>	ut 2_Hold reset", choose Cascade control, Co Differential temperature control, or Input circu No. 58: Select function for input 2 (Engineeri oth of the peak and the bottom hold values an operation.	ontrol with PV select, it error alarm in ng mode). re reset at a time by	
Sotting procedure			
Monitor & SV setting mode PV/SV monitor (4 sec.	Setup setting mode Setting group No.10 [Display] Setting group No.91 [System] Subscription Setting Seting Setting Setting Setting	Input 1_ Peak hold monitor	
	In case of two inputs Hold reset In case of two inputs Hold reset Hold reset Hold reset Hold reset	Bottom hold monitor	
Display Peak ho Display Peak ho Setting en • Next para • Press to the Me	ut 2_ Id monitor       Input 2_ Bottom hold monitor       Input 2_ Hold rest Bottom hold monitor         054.0       Input 2_ Bottom hold monitor       Set Input 2_ Hold rest Bottom hold monitor         Input 2_ Id monitor       Display Input 2_ Bottom hold monitor       Set Input 2_ Hold rest Hold rest Hol	Set C C C C C C C C C C C C C C C C C C C	
(The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.) 9.8 Suppressing the Display Flickering			

The display flickering due to input changes in PV/SV monitor screen can be reduced by extending the display update cycle.

# • Applicable screens

The PV/SV monitor screen which comes at the beginning in the Monitor & SV setting mode. When the instrument has two inputs, PV/SV on the Input 2 is also covered.

The Manipulated output value (MV) displayed on the Manipulated output value (MV) display is also covered.

# **Parameter setting**

## ● Display update cycle [Setup Setting Mode: Setting group No. 10 (5¬ □)]

Parameter symbol		Data range	Factory set value
חערט	1: 50 ms	6: 300 ms	1
Prij	2: 100 ms	7: 350 ms	
	3: 150 ms	8: 400 ms	
	4: 200 ms	9: 450 ms	
	5: 250 ms	10: 500 ms	
	* Selecting 1 fo	r Cascade control or 2-loop control/	
	temperature of	lifferential control will result in a display	
	update cycle	of 100 ms	

#### Setting procedure



(The **MONI** key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

# 9.9 Checking the Instrument Information

If an error occurs and when you contact us, you are requested to provide us with the product identification code and specification. You can check the ROM version, product identification code and serial number of the instrument on the instrument display. The Integrated operating time and the maximum ambient temperature (Peak hold monitor of the ambient temperature).

## How to check



# • Product identification code monitor

Displays the product identification code of the instrument. As the product identification code is too long to be displayed on a single screen, it can be scrolled left and right with  $\bigwedge$  and  $\bigvee$  keys.

Example: Product identification code is SC-F713801-8844*4NH1NN/2 303 SC-F71 comes with three display units; PV, SV and MV are displayed.



#### • Instrument number monitor

displays.

Displays the serial number of the instrument.

Refer to "Character Symbols" for reading the displayed characters.

digit left.

Alternatively, you can check the product identification code, serial number and suffix code on the label on the side of the instrument if you are unable to check the information on the display.

#### Integrated operating time

As soon as the instrument is turned on, "1" is added. Thereafter, "1" is accumulated for each hour.

## • Peak hold monitor of the ambient temperature

Temperature around the rear terminal is measured and the maximum value is stored.

L The Integrated operating time and the maximum ambient temperature (Peak hold monitor of the ambient temperature) cannot be reset.

scrolled one more.

#### **Operating procedure**



- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

# **10. Setting and Key Operation**

# 10.1 Limiting the Setting Range of Set Value (SV)

To limit the setting range of the Set value (SV), Setting limiter is used.

## **Description of function**

Setting limiter is a function to limit the setting range of the Set value (SV) within the input range.

Example: The input range is from -200.0 to +1372.0 °C, the Setting limiter high is 400.0 °C, and the Setting limiter low is 0.0 °C.



When the input range is changed, the setting limiter may be also changed according to the changed setting.

## [Example 1]

Input 1_Input range is 0 to 1372 °C, Input 1_Setting limiter high is 800 °C. Changing the Input 1_Input range high to 400 °C will change the Setting limiter high to 400 °C accordingly.



[Example 2]

When the Input 1_Input range is 0 to 400 °C and the Input 1_Setting limiter high is 400 °C, changing the Input 1_Input range high to 800 °C will not affect the setting limiter value. In this case the Input 1_Setting limiter high remains 400 °C. When a wider setting range of the Set value (SV) is required according to the extended input range, change the setting limiter value accordingly.



## **Parameter setting**

## ● Input 1_Setting limiter high [Engineering Mode: Function block No. 71 (Fn ? /)]

Parameter symbol	Data range	Factory set value
I. SLH	Input 1_Setting limiter low to Input 1_Input range high (When Control with PV select: Input 1_Setting limiter low to PV select input range high) [Varies with the setting of the Decimal point position.]	Input 1_Input range high (Control with PV select: PV select input range high)

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 1_Setting limiter high is changed.

# ● Input 2_Setting limiter high [Engineering Mode: Function block No. 72 (Fn ??)]

Parameter symbol	Data range	Factory set value
2. SLH	Input 2_Setting limiter low to Input 2_Input range high [Varies with the setting of the Decimal point position.]	Input 2_Input range high

To display "Input 2_Setting limiter high", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 2_Setting limiter high is changed.

## ● Input 1_Setting limiter low [Engineering Mode: Function block No. 71 (Fn ? /)]

	Parameter symbol	Data range	Factory set value
	I. SLL	Input 1_Input range low to Input 1_Setting limiter high (When Control with PV select: PV select input range low to Input 1_Setting limiter high)	Input 1_Input range low (Control with PV select: PV select input range low)
L		[Varies with the setting of the Decimal point position.]	

Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 1_Setting limiter low is changed.

## ● Input 2_Setting limiter low [Engineering Mode: Function block No. 72 (Fn?)]

Parameter symbol	Data range	Factory set value
2. SLL	Input 2_Input range low to Input 2_Setting limiter high [Varies with the setting of the Decimal point position.]	Input 2_Input range low

- To display "Input 2_Setting limiter low", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Input 2_Setting limiter low is changed.

#### Setting procedure



- Next parameter is displayed.
- Press () and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
   (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

# 10.2 Eliminating a Sudden Set Value Change (Setting Change Rate Limiter)

350

This function allows the Set value (SV) to change gradually, not rapidly or not at a time, when the Set value (SV) is changed.

# 10.2.1 Limiting the set value (SV) change rate (Setting change rate limiter)

## **Description of function**

This function is to allow the Set value (SV) to be automatically changed at specific rates when a new Set value (SV).

Setting the Setting change rate limiter unit time parameter and the Setting change rate limiter (up and down) will enable setting the changing rate (setting change rate limiter/unit time) of the Setting change rate limiter (up or down).

[Application examples of Setting change rate limiter]



- When the Setting change rate limiter is used, the Set value (SV) will also ramp up or ramp down by the function at power-on and operation mode change from STOP to RUN.
- When the Set value (SV) is changed by the Memory area transfer function, the Setting change rate limiter functions from the Set value (SV) before the change (transfer) toward the set value after the change (transfer).
- If the Autotuning (AT) function is activated while the Set value (SV) is ramping up or ramping down by the Setting change rate limiter, AT will starts after the Set value (SV) finishes ramp-up or ramp-down by the limiter, and the controller is in PID control mode until AT starts.
- When the value of Setting change rate limiter is changed during normal operation, the ramp-up or ramp-down rate will be changed unless the SV already has finished ramp-up or ramp-down by the function.
- When Setting change rate limiter is a setting other than "OFF: No function (disabled)" and when the Event type is set to a SV monitor value, the Event rehold function by the Set value (SV) change is unavailable. However, the Event rehold function by the Set value (SV) change is available for events using a local SV
- During the Remote mode, the Input 1_Setting change rate limiter will function to Remote setting input value.
- Input 2_Setting change rate limiter will be unavailable during Cascade control.

## **Parameter setting**

• Soft start/Setting change limiter selection [Engineering mode: Function block No. 70 (For TB)]

· /-		
Parameter symbol	Data range	Factory set value
SVRS	0: Soft start 1: Setting change rate limiter	0

# • Setting change limiter unit time [Engineering mode: Function block No. 70 (Fn7D)]

Parameter symbol	Data range	Factory set value
SVRF	1 to 3600 seconds	60

## Input 1_Setting change rate limiter (up) [Parameter Setting Mode: Parameter group No. 70 (P¬¬□)]

Parameter symbol	Data range	Factory set value
1.5 V R U	0 to Input 1_Input span (When Control with PV select: 0 to PV select input span) 0: No function [Varies with the setting of the Decimal point position.]	0

# Input 2_Setting change rate limiter (up) [Parameter Setting Mode: Parameter groupNo. 70 (P_∩ ¬□)]

Parameter symbol	Data range	Factory set value
2.5¥ R U	0 to Input 2_Input span 0: No function [Varies with the setting of the Decimal point position.]	0

To display "Input 2_Setting change rate limiter (up)", choose "2-loop control/ Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

# • Input 1_Setting change rate limiter (down) [Parameter Setting Mode: Parameter group No. 70 (Pn nB)]

Parameter symbol	Data range	Factory set value
1.5 <i>V</i> R J	0 to Input 1_Input span (When Control with PV select: 0 to PV select input span) 0: No function [Varies with the setting of the Decimal point position.]	0

# Input 2_Setting change rate limiter (down) [Parameter Setting Mode: Parameter group No. 70 (P∩∩□)]

Parameter symbol	Data range	Factory set value
2.5 V R J	0 to Input 2_Input span 0: No function [Varies with the setting of the Decimal point position.]	0

To display "Input 2_Setting change rate limiter (down)", choose "2-loop control/ Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

## Setting procedure



- Press () and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
   (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.



(The **MONI** key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

# 10.2.2 Setting the time to change the set value (SV) (Soft start)

# **Description of function**

Soft start is a function that allows to set the time until the set value (SV) reaches the changed value when the set value (SV) is changed.

Changing the set value (SV) upon setting the Soft start time means that the set value (SV) will gradually change from the start point until the set value (SV) over the time set by the user. The start point can be selected from either the measured value (PV) at the time the set value (SV) was changed, or from the zero point.

- If selecting Zero point start for Soft start start time, the set value (SV) at the time when the set value (SV) was changed will become 0.
- When the set value (SV) is changed by the Memory area transfer function, the Setting change rate limiter operates from the pre-change set value (SV) until the post-change set value (SV) is reached.
- If the Setting change rate limiter or the set value (SV) are changed during soft start, the Soft start time is recalculated and operation continues. Refer to "Action when the set value is changed during soft start" for details.
- When Setting change rate limiter is set to a value other than "0" and when the Event type is set to an SV monitor value, the Event re-hold function by the set value (SV) change is invalid. However, the event using a local SV will have the Event re-hold function by the set value (SV) change valid.
- Soft start will be invalid for the remote setting input value while remote mode is

353

354

selected.

Input 2 soft start will be invalid when cascade control is selected.

# • Action when the set value is changed during Soft start

When the set value (SV) is changed during the soft start

1) When the set value (SV) is changed in an increasing direction



Soft start time (increase)

2) When the set value (SV) is changed in an increasing  $\rightarrow$  decreasing direction



• When the Soft start time is changed during Soft start



• When changing the Soft start time or set value (SV) during Soft start, if the time passed exceeds the Soft start time setting, Soft start will be in a complete state.

1) When the set value (SV) is changed



2) When the Soft start time is changed



• Set value (SV) value when Autotuning (AT) is executed by applying Autotuning (AT) bias during Soft start

Autotuning (AT) starts after the Soft start is finished.



355

356

## Selecting the Soft start start time

Set value (SV) value at the power on or start of the Soft start function by STOP $\rightarrow$  RUN can be set.



Parameter setting

## Soft start/Setting change rate limiter [Engineering mode: Function block No. 70 (F∩∩□)]

Parameter symbol	Data range	Factory set value
	0: Soft start	0
באיכ	1: Setting change rate limiter	

#### • Soft start time select [Engineering mode: Function block No. 70 (Form)]

Parameter symbol	Data range	Factory set value
	0: m.s	0
כ ויז כ	1: h.m	

#### Soft start start time select [Engineering mode: Function block No. 70 (Fn∩□)]

Parameter symbol	Data range	Factory set value
C // C C	0: Measured value start	0
בב אב	1: Zero point start	

## Input 1_Soft start time increase [Parameter setting mode: Parameter group No. 70 (PnnD)]

Parameter symbol	Data range	Factory set value
I.SFFU	0 hours 00 minutes to 99 hours 59 minutes 0 minutes 00 seconds to 199 minutes 59 seconds [The time unit depends on the setting of Soft start time unit.]	0:00 (0 minutes 00 seconds)

 Input 2_Soft start time increase [Parameter setting mode: Parameter group No. 70 (PnnB)]

Parameter sym	nbol	Data range	Factory set value
	0	) hours 00 minutes to 99 hours 59 minutes	0:00
[.][]		0 minutes 00 seconds to 199 minutes 59 seconds	(0 minutes 00 seconds)
	[	The time unit depends on the setting of Soft start time unit.]	

To display "Input 2_Soft start time increase", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

## Input 1_Soft start time decrease [Parameter setting mode: Parameter group No. 70 (P∩∩□)]

Parameter symbol	Data range	Factory set value
	0 hours 00 minutes to 99 hours 59 minutes	0:00
l i.shi d	0 minutes 00 seconds to 199 minutes 59 seconds	(0 minutes 00 seconds)
	[The time unit depends on the setting of Soft start time unit.]	· · · · · · · · · · · · · · · · · · ·

# Input 2_Soft start time decrease [Parameter setting mode: Parameter group No. 70 (P∩∩□)]

Parameter symbol	Data range	Factory set value
2.SFFd	0 hours 00 minutes to 99 hours 59 minutes 0 minutes 00 seconds to 199 minutes 59 seconds [The time unit depends on the setting of Soft start time unit.]	0:00 (0 minutes 00 seconds)

To display "Input 2_Soft start time decrease", choose "2-loop control/Differential temperature control" or "Cascade control" in Function block No. 58: Select function for Input 2 (Engineering mode).

## **Setting Procedure**



- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

 Setting soft start time increase/decrease Monitor & SV Parameter setting mode setting mode PV/SV monitor Parameter group No.00 [Setting] Input 1_Soft start time (increase) Parameter group No.70 [Memory area function] PanO (SET) (SET) Ē (SET)  $\checkmark$ (2 sec) (4 times) 58 0.0 R-ER 000.00 Set "Soft start time (increase)" Input 2_Soft start time (decrease) Input 2_Soft start time (increase) Input 1_Soft start time (decrease) In case of SFI SE SFFd 7 (SET) כ (**SET**) Ι. two inputs ſ ſ (3 times) 000 70 LILILI.LI Set "Soft start time Set "Soft start time Set "Soft start time (decrease)" (decrease)" (increase)' (SET) In case of one input Setting end

- Next parameter is displayed.
- Press I and I ODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
   (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
# 10.3 Storing the Control Related Set Values (Memory Area Function)

This function allows PID related parameters such as a Set value (SV) to be stored as an area and up to 16 areas.

#### **Description of function**

The Memory area function is to store up to 16 areas of parameters such as a Set value (SV). Parameters that can be stored in an area are those inside the Parameter setting mode*. One of the Areas is used for control, and the currently selected area is Control area. Storing set values according to work processes in a location called "area" allows a necessary set of set values for the work process to be retrieved only by changing the area number. Parameters inside the Parameter setting mode are categorized into six groups by the setting contents.

These parameters are categorized into three groups during the "Level PID" function. * ON/OFF action differential gap (upper) and (lower) are excluded.

 Memory area parameters of Parameter group No. 00 (PnDD) [Set value (SV)] Input 1_Set value (SV)

Input 2_Set value (SV)

Set value (SV) of differential temperature input

Memory area parameters of Parameter group No. 40 (PnHD) [Event]
Event 1 set value (EV1) or Event 1 set value (EV1) [high]
Event 1 set value (EV1') [low]
Event 2 set value (EV2) or Event 2set value (EV2) [high]
Event 2 set value (EV2') [low]
Event 3 set value (EV3) or Event 3set value (EV3) [high]
Event 3 set value (EV3') [low]
Event 4 set value (EV4) or Event 4set value (EV4) [high]
Event 4 set value (EV4') [low]

 Memory area parameters of Parameter group No. 51 (Pn5 i) [Input 1_Control] Input 1_Proportional band [heat-side] Input 1_Integral time [heat-side]
 Input 1_Derivative time [heat-side]
 Input 1_Control response parameter
 Input 1_Proactive intensity
 Memory area parameters of Parameter group No. 51 (Pn5 i) [Input 1_Control]
 Input 1_Manual reset
 Input 1_FF amount
 Input 1_Output limiter high [heat-side]
 Input 1_Output limiter low [heat-side]
 Input 1_Proactive intensity
 Memory area parameters of Parameter group No. 52 (Pn52) [Input 2_Control]

 Memory area parameters of Parameter group No. 52 (Pn52) [Input 2_Control] Input 2_Proportional band
 Input 2_Integral time
 Input 2_Derivative time
 Input 2_Control response parameter
 Input 2_Proactive intensity
 Input 2_Dead zone

• Memory area parameters of Parameter group No. 56 (*P*₀56) [Input_1 Cooling control] Input 1_Proportional band [cool-side]

Input 1_Integral time [cool-side]

Input 1_Derivative time [cool-side]

Input 1_Overlap/Deadband

Input 1_Output limiter high [cool-side]

Input 1_Output limiter low [cool-side]

Memory area parameters of Parameter group No. 70 (PnnD) [Memory area] Select Trigger type for Memory area Input 1_Manipulated output value (Area) transfer Area soak time Input 2_Soft start time (increase) Input 2_Soft start time (decrease) Link area number Input 1 Soft start time (increase) Input 2 Setting change rate limiter (up) Input 2_Setting change rate limiter Input 1_Soft start time (decrease) (down) Input 1 Setting change rate limiter (up) Input 2 Auto/Manual transfer selection (Area) Input 1_Setting change rate limiter Input 2 Manipulated output value (Area) (down) Input 1 Auto/Manual transfer selection Remote/Local transfer selection (Area) (Area)

361

[Groups used during the Level PID]

- Group 0: Parameter group No. 00, No. 40 and No. 70
- Group 1: Parameter group No. 51, No. 56
- Group 2: Parameter group No. 52

Refer to 8.15. Controlling with Level PID for Level PID function.



The following four parameters are used in common in all Memory areas, and therefore are not included in the Memory area.

Parameter group No. 51:Input 1_ON/OFF action differential gap (upper)<br/>Input 1_ON/OFF action differential gap (lower)Parameter group No. 52:Input 2_ON/OFF action differential gap (upper)<br/>Input 2_ON/OFF action differential gap (lower)



# • Switching the Control area by Digital Input (DI)

To switch the control area by Digital input (DI), the instrument must have an option (Digital input). The memory area transfer must be set at DI1 function selection.

To change the Control area by Digital input (DI), two methods are offered; Transfer using the SET signal input and transfer without the SET signal.

- With a SET signal: After the Memory area has been selected by the DI, close the contact of the SET signal so that the Control area is transferred.
- Without a SET signal input: After the Memory area has been selected by the DI, the Area will be automatically changed after the time period (0.5 to 5.0 seconds) set in Function block No. 23: Area switching time (without area set signal) (Engineering mode).

Refer to 5.2 Switching Functions Using Digital Inputs (DI) for details.

# • Switching the Control area by Area soak time

Changing the Memory area by the Memory area soak time will need setting the Memory area No. to which the Memory area is switched.

Refer to 10.5 Running a Simple Ramp/Soak Operation or 10.6 Using a Simple Sequence Operation for details.

# Changing the data in the Memory area

• Change the Event 1 set value in the Control area (Memory area 1) from 10.0 to



- Next parameter is displayed.
- Press I and MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

# Memory area display

During the PV/SV monitor display, the Set value (SV) displayed on the SV display is the Set value (SV) in the Memory area No. now displayed on the Memory area display.

During the Monitor & SV setting mode display, the time displayed on the Memory area soak time is the time of the Memory area No. now displayed on the Memory area display.

[Example]



#### **Parameter setting**

#### • Memory area transfer [Memory Area Transfer Mode]

I	Parameter symbol	Data range	Factory set value
	AREA	1 to 16	1

- This parameter will not be displayed when "Memory area is not adjustable when the setting data is locked" is selected in "Setting lock mode".
- Refer to "4. Parameters that are Initialized/Modified when Setting is Changed" for the parameters that are automatically converted when the Memory area is changed.

#### 10.4 Copying the Data in Memory Area to Set Other Areas

Up to 16 Memory areas can be set, but it consumes time if Memory areas are set one after another. On this instrument, the data in the Memory area can be copied.

#### Screens for Area copy mode



[To exit from Area copy mode]



# [Example Area copy]



# 10.5 Running a Simple Ramp/Soak Control

On this instrument multiple Memory areas can be linked to run a simple ramp/soak control.

# **Description of function**

Simple Ramp/Soak control is possible by setting a Set value (SV), Setting change rate limiter (up/down), Area soak time, and Link area number in each memory area.

A term, hereinafter described as a ramp is a general term for the setting change rate limiter and the soft start time.

- Set value (SV): Sets the fixed set point control (control by fixed set value) desired value of each memory area.
- Setting change rate limiter: Sets the slope of the Set value (SV) which is raised or lowered at each unit time.
- Area soak time: Sets the fixed set point control time of each memory area.
- Link area number: Sets the memory area numbers for linking the corresponding memory areas.
- Besides the above, the Setting change rate limiter unit time and Area soak time unit are set in the Engineering mode.

Example: Ramp/Soak control by linking Memory area 1 to 3



 Refer to the "Memory area soak time monitor" in the Monitor & SV setting mode for checking the elapsed time in each area.
 Memory area soak time can be displayed on the MV display. Refer to 9.6 Changing the Display Contents of the MV Display.

# **Operation flowchart**



#### Settings before operation

When implementing Ramp/Soak control, it may be necessary to set the following items in advance.

- Function block No. 70 (F∩∩□): Setting change rate limiter unit time (Engineering mode)
- Function block No. 70 (Fn7D): Soak time unit (Engineering mode)



- · Next parameter is displayed.
- Press () and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
   (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

Setting example

This section uses the following sample of Ramp/Soak control to describe the setting procedures.

[Example: Ramp/Soak control by linking Memory area 1 to 3]



	Alea I	Alea Z	Alea S
Input 1_Set value (SV)	150.0 °C	200.0 °C	50.0 °C
Input 1_Setting change rate limiter (up)	4.0 °C/min. (60 sec.)	2.0 °C/ min. (60 sec.)	OFF
Input 1_Setting change rate limiter (down)	OFF	OFF	9.0 °C/min. (60 sec.)
Area soak time	30 minutes	40 minutes	0 minutes *
Link area number	2	3	OFF

* In this example, the Area soak time for memory area 3 is set. However, as the Area soak time for the memory area linked last will be unavailable, the state of SV3 is maintained.

Step 1: Study the Ramp/Soak control content.

The Ramp/Soak control contents are studied and Ramp/Soak status is graphed and the set values of each memory area are summarized in a table as shown above.

Step 2: Set the Setting change rate limiter unit time and Soak time unit.

Refer to Settings before operation in 10.5 Running a Simple Ramp/Soak Control and set the Setting change rate limiter unit time and Area soak time (In this example, the factory set values are used for both). Since control stops (STOP) at this time, go directly to the next step.

· Setting change rate limiter unit time: 60 seconds [factory set value]

 Soak time unit: 1 (0 minutes 00 seconds to 199 minutes 59 seconds) [factory set value]

370



The Memory area number flashes when a Memory area other than that in the Control area is displayed.



(* Area other than Control area is displayed)



Press In AMODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
 (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)

# **Parameter setting**

#### • Area soak time [Parameter Setting Mode: Parameter group No. 70 (Pond)]

Parameter symbol	Data range	Factory set value
	0 hours 00 minutes 00 seconds to 9 hours 59 minutes 59	0:00
וכח	seconds	(0 minutes 00 seconds)
	0 hours 00 minutes to 99 hours 59 minutes	
	0 minutes 00 seconds to 199 minutes 59 seconds	
	Data range of Area soak time can be selected on the Soak	
	time unit.	

## ● Link area number [Parameter Setting Mode: Parameter group No. 70 (Pn ∩D)]

Parameter symbol	Data range	Factory set value
	0 to 16	0
ヒいいロ	0: No link	

# • Soak time unit [Engineering Mode: Function block No. 70 (Fand)]

Parameter symbol	Data range	Factory set value
SFdP	<ul> <li>0: 0 hours 00 minutes to 99 hours 59 minutes</li> <li>1: 0 minutes 00 seconds to 199 minutes 59 seconds</li> <li>2: 0 hours 00 minutes 00 seconds to 9 hours 59 minutes 59 seconds</li> </ul>	1

# **10.6 Using a Simple Sequence Operation**

On this instrument, multiple Memory areas can be linked to run a simple sequence operation in each Memory area.

# **Description of function**

Simple sequence operation is possible by setting a Set value (SV), Setting change rate limiter (up/down), Select Trigger type for Memory area transfer, Area soak time, Link area number, Auto/Manual transfer selection (Area), Manipulated output value (Area), and Remote/Local transfer selection (Area) in each memory area.

- Set value (SV): Sets the fixed set point control (control by fixed set value) desired value of each memory area.
- Setting change rate limiter: Sets the slope of the Set value (SV) which is raised or lowered at each unit time.
- Soft start time: Sets the time to gradually increase or decrease to reach the target set value.
- Select Trigger type for Memory area transfer: Select a trigger type to switch the Memory area. Memory area will be switched by generated events or contact status of Digital input (DI). To use the generated events as a switching method, setting up the event function is required. To use the Digital input (DI) as a switching method, "Area jump" must be preset in the DI function selection.

Refer to 7.2 Using Event Function for the Event function. Refer to 5.2 Switching Functions Using Digital Inputs (DI) for the DI function selection.

- Area soak time: Sets the fixed set point control time of each memory area.
- Link area number: Sets the memory area numbers for linking the corresponding memory areas.
- Auto/Manual transfer selection (Area): Select the operation mode (Auto mode or Manual mode) at the time of switching the memory area. Selection between "Bump" or "Bumpless" is available both in Auto and Manual modes.

- When the SV tracking function is selected at the time of switching from Manual to Auto mode, the Set value (SV) of the Memory area will be ignored.
- Refer to 6.8 Suppressing Sudden Change in Output (Balanceless Bumpless) for Bumpless action at the time of switching between Auto/Manual, .
- Refer to 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) for the SV tracking function.
- Manipulated output value (Area): When either "Auto mode (bump)" or "Manual mode (bump)" is selected in the Auto/Manual transfer selection (Area), the Manipulated output value just after the switching is complete needs to be set here.
- Remote/Local transfer selection (Area): Select the Operation mode at the time of Memory area switching. The operation mode depends on the action selected in Select function for input 2.
  - Remote setting input: Remote mode/Local mode switching
  - Cascade control: Cascade control/Single control switching
  - Control with PV select: Input 1/Input 2 switching
  - 2-loop control/Differential temperature control: 2-loop control/Differential temperature control switching
  - When the SV tracking function is selected at the time of the operation mode transfer, the operation mode follows the action set in the SV tracking.
  - Refer to 8.17 Continuing Stable Control after the Operation Transfer (SV Tracking) for the SV tracking function.

Besides the above, the Setting change rate limiter unit time and Area soak time unit are set in the Engineering mode

Example: Operating a simple sequence using Memory areas 1 through 4 Measured value (PV)





# • Description of operation

- 1. Memory area 1: Operation mode: Auto mode Control target: Set value (SV) of Memory area 1 Area soak time: 0:00 (No function) Link area number: 4 Memory area switching trigger: Open edge (falling edge) of Digital input (DI1) 2. Memory area 4: Operation mode: Switched from Auto mode to Manual mode Control output: Bumps to the value specified by the Manipulated output value (Area) Area soak time: 0:00 (No function) Link area number: 2 Memory area switching trigger: Close edge (rising edge) of Digital input (DI1) 3. Memory area 2: Operation mode: Switched from Manual mode to Auto mode Control target: Set value (SV) of Memory area 2 Area soak time: 10 minutes Link area number: 3 Memory area switching trigger: 0 (No assignment) Area is switched after the completion of the Area soak. 4. Memory area 3: Operation mode: Auto mode continues Control target: After changing the Set value (SV) by the Setting change rate limiter, control is done using the Set value (SV) in Memory area 3. Area soak time: In this example, the Area soak time for memory area 3 is set. However, as the Area soak time for the memory area linked last will be unavailable, the state of SV3 reached continues. Link area number: 0 (No function) Memory area switching trigger: 0 (No assignment)
- When both of Area soak time and Select trigger type for memory area transfer are available, the switching takes place based on the *OR*-logic.

# **Parameter setting**

• Select Trigger type for Memory area transfer [Parameter Setting Mode: Parameter group No. 70 (Pand)]

Parameter symbol	Data range	Factory set value
	0 to 63	0
1 707	0: No assignment	
	+1: Event 1	
	+2: Event 2	
	+4: Event 3	
	+8: Event 4	
	+16: Digital input 1 (DI1) Close edge	
	+32: Digital input 1 (DI1) Open edge	
	To select two or more functions, sum each value.	

To use the generated events as a switching method, setting up the event function is required. To use the Digital input (DI) as a switching method, "Area jump" must be preset in the DI function selection. Refer to 7.2 Using Event Function for the Event function. Refer to 5.2 Switching Functions Using Digital Inputs (DI) for the DI function selection.

# • Area soak time [Parameter Setting Mode: Parameter group No. 70 (Pn 70)]

Parameter symbol	Data range	Factory set value
осг	0 hours 00 minutes 00 seconds to 9 hours 59 minutes 59	0:00
ובח	seconds	(0 minutes 00 seconds)
	0 hours 00 minutes to 99 hours 59 minutes	
	0 minutes 00 seconds to 199 minutes 59 seconds	
	Data range of Area soak time can be selected on the Soak	
	time unit.	

#### • Link area number [Parameter Setting Mode: Parameter group No. 70 (Pn 70)]

Parameter symbol	Data range	Factory set value
	0 to 16	0
	0: No link	

# • Input 1_Auto/Manual transfer selection (Area) [Parameter Setting Mode: Parameter group No. 70 (Pn na)]

Parameter symbol	Data range	Factory set value
	0: No transfer	0
1.8777.8	1: Auto mode (bumpless)	
	2: Auto mode (bump)	
	3: Manual mode (bumpless)	
	4: Manual mode (bump)	

#### Input 1_Manipulated output value (Area) [Parameter Setting Mode: Parameter group No. 70 (PnnD)]

Parameter symbol	Data range	Factory set value
I.MV.R	PID control, Position proportioning PID control: -5.0 to +105.0% Heating/Cooling PID control: -105.0 to +105.0% [When settings either 2: Auto mode (bump) or 4: Manual mode (bump) is selected in Input 1_Auto/Manual transfer	PID control, Position proportioning PID control: - 5.0 Heating/Cooling PID control: 0.0
	selection (Area)]	

# • Input 2_Auto/Manual transfer selection (Area) [Parameter Setting Mode: Parameter group No. 70 (Pana)]

Parameter symbol	Data range	Factory set value
лп / МП	0: No transfer	0
C.N / II.N	1: Auto mode (bumpless)	
	2: Auto mode (bump)	
	3: Manual mode (bumpless)	
	4: Manual mode (bump)	

To display "Input 2_Auto/Manual transfer selection (Area)", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

# Input 2_Manipulated output value (Area) [Parameter Setting Mode: Parameter group No. 70 (Pn 7□)]

Parameter symbol	Data range	Factory set value
2.MV.A	-5.0 to +105.0% [When settings either 2: Auto mode (bump) or 4: Manual mode (bump) is selected in Input 2_Auto/Manual transfer selection (Area)]	-5.0

To display "Input 2_Manipulated output value (Area)", choose "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

 Remote/Local transfer selection (Area) [Parameter Setting Mode: Parameter group No. 70 (Pn 70)]

Parameter symbol	Data range	Factory set value
R/L.A	<ul> <li>When "Remote setting input" is selected in Select function for Input 2⁻¹⁾</li> <li>O: No transfer</li> </ul>	0
	1: Local mode	
	2: Remote mode	
	When "Cascade control" is selected in Select function for	
	Input 2 ²⁾	
	0: No transfer	
	1: Single control	
	2: Cascade control	
	<ul> <li>When "Control with PV select" is selected in Select</li> </ul>	
	function for Input 2 ³⁾	
	0: No transfer	
	1: Input 1	
	2: Input 2	
	When "2-loop control/Differential temperature control" is	
	selected in Select function for Input 2 ⁴	
	0: No transfer	
	1: 2-loop control	
	2: Differential temperature control	

¹⁾ Displayed when "Remote setting input" is selected in "Select function for Input 2."

²⁾ Displayed when "Cascade control" is selected in "Select function for Input 2."

³⁾ Displayed when "Control with PV select" is selected in "Select function for Input 2."

⁴⁾ Displayed when "2-loop control/Differential temperature control" is selected in "Select function for Input 2", AND when in "2-loop control", "Input 1_Control action" and "Input 2_Control action" is set to "PID control" or "PID Heating/Cooling control".

To display "Remote/Local transfer selection (Area)", choose "Remote setting input", "Cascade control", "Control with PV select", or "2-loop control/Differential temperature control" in Function block No. 58: Select function for Input 2 (Engineering mode).

# • Soak time unit [Engineering Mode: Function block No. 70 (Foral)]

Parameter symbol	Data range	Factory set value
רר וח	0: 0 hours 00 minutes to 99 hours 59 minutes	1
ים וכ	1: 0 minutes 00 seconds to 199 minutes 59 seconds	
	2: 0 hours 00 minutes 00 seconds to 9 hours 59 minutes 59	
	seconds	

#### Setting procedure

#### Set the Setting change rate limiter unit time parameter and Soak time unit



- Press ☞ and 《MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.



# 10.7 Registering a Set Value (SV) Without Pressing the SET Key

Basically the tey must be pressed to register the data after changing the value of parameters.

There is another way of registering the Set value (SV) which takes in the changed data 2 seconds after the change.

#### **Description of function**

[Example: Changing the Set value (SV) to 100.0]

To register the value by pressing the SET key (SET key method)

Monitor & SV setting mode PV/SV monitor SV setting mode 28.0 (ଟେ) €€ (Three Registпп חחחו ה הההה Π times) ration Flashing [\] Flashing Flashing

• To register the value without pressing the SET key (Direct method)

Monitor & SV setting mode PV/SV monitor



- To set the Set value (SV) in the PV/SV monitor, press the 🔼 or 💟 key.
- Keep pressing the  $\frown$  or  $\bigcirc$  key to accelerate the speed of increase/decrease.
- In the above explanation, the value is changed by using the or key, but
   **(MODE** key may be used to shift the blinking digit to change the value digit by digit.
- To use a registration method without pressing the 🗩 key, go to "Data registration" in Function Block No. 11 (Engineering mode).
- Registration without pressing the 🐑 key is only applicable to the Set value (SV). Other parameters are not available in this method. Available mode is Monitor & SV setting mode only.

#### Parameter setting

Data registration [Engineering Mode: Function block No. 11 (For H)]

Parameter symbol	Data range	Factory set value
	0: SET key method	0
201.13	Used to register the Set value (SV) using the SET key.	
	1: Direct registration	
	Used to register the Set value (SV) without pressing the	
	SET key.	

# Setting procedure



# 10.8 Accessing Some Functions Directly (FUNC Key)

SC-F71 has a FUNC key which allows a specified function to be assigned to it.

# **Description of function**

Functions assignable to the FUNC key

- RUN/STOP transfer: A
- Autotuning (AT) (Common to Input 1 and 2): B
- Input 1_Autotuning (AT): B
- Input 2_Autotuning (AT): B
- Auto/Manual transfer (Common to Input 1 and 2): A
- Input 1_Auto/Manual transfer: A
- Input 2_Auto/Manual transfer: A
- Remote/Local transfer (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control): A
- Control area Local/External transfer: A
- Interlock release: C

- Hold reset (Common to Input 1 and 2): C
- Input 1_Hold reset: C
- Input 2_Hold reset: C
- Set data unlock/lock transfer: A
- Area jump: D
- Parameter setting mode display switching: E

Explanation of key action

- A: Mode is changed for every press of the key.
- B: Function is turned on and off for every press of the key.
- C: Function is released or reset by pressing the key.
- D: Pressing the key switches the memory area to the preset area set in the Link area number in the Parameter setting mode. When the Link area number is not specified, a memory area with the number of the current control area number +1 will be used.
- E: Pressing the key switches to Parameter setting mode  $\rightarrow$  Setup setting mode  $\rightarrow$ _Engineering mode  $\rightarrow$  Parameter setting mode.
- Refer to 5.2 Switching Functions Using Digital Inputs (DI) for the action of each function.
- Selection of key action is possible from "Press once" and "Press and hold" to enable the switching.
- L The function assigned to the FUNC key is accessible even when the Set data lock is used.

# • Displays when switched by the FUNC key

[Example] RUN/STOP switching is assigned to the FUNC key



# Parameter setting

# • FUNC key assignment [Engineering Mode: Function block No. 11 (For H)]

Parameter symbol	Data range	Factory set value
Parameter symbol	Data range         0: Unused         1: RUN/STOP transfer         2: Autotuning (AT) (Common to Input 1 and 2)         3: Input 1_Autotuning (AT)         4: Input 2_Autotuning (AT)         5: Auto/Manual transfer (Common to Input 1 and 2)         6: Input 1_Auto/Manual transfer         7: Input 2_Auto/Manual transfer         8: Remote/Local transfer         (Cascade mode transfer, PV select transfer, 2-loop control/Differential temperature control)         9: Control area Local/External transfer         10: Interlock release         11: Hold reset (Common to Input 1 and 2)         12: Input 1_Hold reset         13: Input 2_Hold reset	Factory set value 1
	14: Set data unlock/lock transfer 15: Area jump 16: Parameter setting mode display switching	

# • FUNC key operation selection [Engineering Mode: Function block No. 11 (For H)]

Parameter symbol	Data range	Factory set value
ЕМГЧР	0: Press once The function set at "FUNC key assignment" is activated	0
	<ul> <li>upon a press of the FUNC key.</li> <li>1: Press and hold</li> <li>The function set at "FUNC key assignment" is activated</li> </ul>	

#### Setting procedure



- Press () and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The MON key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

# 10.9 Restricting Key Operation (Set Data Lock)

The Set data lock function limits access of unauthorized personnel to the parameters and prevents parameter change by mistake.

#### **Description of function**

The Set data lock function restricts changing values depending on the mode. The Area lock restricts switching the Memory areas.

# • Set lock level

Select the mode to lock.



#### Area lock

Select enable/disable Memory area switching.

Setting lock mode Area lock Set value 0: Memory area is adjustable when the setting data is locked.



1: Memory area is not adjustable when the setting data is locked.

(Memory area transfer mode is not displayed)

# • Set data unlock/lock transfer

The parameter set with Set lock level and Area lock can be locked/unlocked.

Setting lock mode Set data unlock/

Set value DFF: Unlock state (Settings can be changed) DICK state (Settings cannot be changed) The Set lock indicator lights on in the lock state.



Set lock display



# • When the set value was likely to be changed during the Set data lock state

A character will be shown on the Set value (SV) display unit to show the lock mode when any of  $\checkmark$  mode,  $\frown$  or  $\checkmark$  key is pressed.

The "LEK" is displayed only while the relevant key is pressed. Releasing the finger from the key will return the display to the original.

Example 1: "Event 1 set value" screen when the Parameter setting mode is locked.



Set lock state

385

Example 2: "PV/SV monitor" screen when the SV setting mode is locked (Direct method is selected in Function block No. 11 (Engineering mode))



Switching the Set data lock is available anytime irrespective or RUN or STOP state.

- Parameter switching is available during the Set data lock state for checking the data. When the SV setting mode is locked, the Set value (SV) setting screen in the SV setting mode will not be displayed.
- Even during the Set data lock state, setting through the communication (optional function) and selection of functions by the FUNC key is possible. It should be noted that when the parameters in the Engineering mode are changed, the instrument must be stopped (or stay in the STOP mode).

# **Parameter setting**

# • Set data unlock/lock transfer [Setting Lock Mode]

Parameter symbol	Data range	Factory set value
	□FF: Unlock state	oFF
	an: Lock state	

# • Set lock level [Setting Lock Mode]



# • Area lock [Setting Lock Mode]

Parameter symbol	Data range	Factory set value
ARE.LK	<ol> <li>0: Memory area is adjustable when the setting data is locked.</li> <li>1: Memory area is not adjustable when the setting data is locked. (Memory area transfer mode is not displayed)</li> </ol>	0

# Setting procedure



# 10.10 Initializing the Set Data

The set values can be initialized when all the set values need to be reset.

# **Description of function**

When the pass code is entered in Function block No. 91: Initialize screen (Engineering mode), all the set values are initialized and reset to the factory set values.

This action initializes and erases all the set values set so far. Record your setting separately if necessary. 3. Parameter List has a field for user set values which can be used for recording.

# **Parameter setting**

# ● Initialization [Engineering Mode: Function block No. 91 (Fng /)]

Parameter symbol	Data range	Factory set value
dEF	1225: Start initialization Other values: Set values are maintained After the initialization, this instrument is restarted. This setting will automatically go back to zero.	0

#### Setting procedure



- Press (D) and (MODE keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
   (The MONI key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor.)
- Select RUN on the RUN/STOP transfer.
- · Select lock on the Set data unlock/lock transfer.

# **Product Warranty**

- Warranty Period
   One year following product delivery.
- 2. Warranty Coverage

TLV CO., LTD. warrants this product to the original purchaser to be free from defective materials and workmanship. Under this warranty, the product will be repaired or replaced at our option, without charge for parts or labor.

- 3. This product warranty will not apply to cosmetic defects, nor to any product whose exterior has been damaged or defaced; nor does it apply in the following cases:
  - 1) Malfunctions due to improper installation, use, handling, etc., by other than TLV CO., LTD. authorized service representatives.
  - 2) Malfunctions due to dirt, scale, rust, etc.
  - Malfunctions due to improper disassembly and reassembly, or inadequate inspection and maintenance by other than TLV CO., LTD. authorized service representatives.
  - 4) Malfunctions due to disasters or forces of nature.
  - 5) Accidents or malfunctions due to any other cause (such as water hammer) beyond the control of TLV CO., LTD.
- 4. Under no circumstances will TLV CO., LTD. be liable for consequential economic loss damage or consequential damage to property.

389

# Service

For Service or Technical Assistance: Contact your TLV representative or your TLV office.

In Europe:	
<b>TLV: EURO ENGINEERING GmbH</b> Daimler-Benz-Straße 16-18, 74915 Waibstadt, Germany	Tel: [49]-(0)7263-9150-0 Fax: [49]-(0)7263-9150-50
<b>TLV. EURO ENGINEERING UK LTD.</b> Star Lodge, Montpellier Drive, Cheltenham, Gloucestershire, GL50 1TY, U.K.	Tel: [44]-(0)1242-227223 Fax: [44]-(0)1242-223077
TLV. EURO ENGINEERING FRANCE SARL Parc d'Ariane 2, bât. C, 290 rue Ferdinand Perrier, 69800 Saint Priest, France	Tel: [33]-(0)4-72482222 Fax: [33]-(0)4-72482220
In North America:	
TLX: CORPORATION 13901 South Lakes Drive, Charlotte, NC 28273-6790, U.S.A.	Tel: [1]-704-597-9070 Fax: [1]-704-583-1610
In Mexico and Latin America: TLX ENGINEERING S. A. DE C. V.	
Av. Jesús del Monte 39-B-1001, Col. Hda. de las Palmas, Huixquilucan, Edo. de México, 52763, <b>Mexico</b>	Tel: [52]-55-5359-7949 Fax: [52]-55-5359-7585
In Oceania: <b>TLV. PTY LIMITED</b> Unit 8, 137-145 Rooks Road, Nunawading, Victoria 3131, Australia	Tel: [61]-(0)3-9873 5610 Fax: [61]-(0)3-9873 5010
In East Asia:	
<b>TLV. PTE LTD</b> 36 Kaki Bukit Place, #02-01/02, <b>Singapore</b> 416214	Tel: [65]-6747 4600 Fax: [65]-6742 0345
TLV. SHANGHAI CO., LTD. Room 5406, No. 103 Cao Bao Road, Shanghai, China 200233	Tel: [86]-(0)21-6482-8622 Fax: [86]-(0)21-6482-8623
<b>TLV. ENGINEERING SDN. BHD.</b> No.16, Jalan MJ14, Taman Industri Meranti Jaya, 47120 Puchong, Selangor, <b>Malaysia</b>	Tel: [60]-3-8052-2928 Fax: [60]-3-8051-0899
TLV. PRIVATE LIMITED	
252/94 (K-L) 17th Floor, Muang Thai-Phatra Complex Tower B, Rachadaphisek Road, Huaykwang, Bangkok 10310, <b>Thailand</b>	Tel: [66]-662-693-3799 Fax: [66]-662-693-3979
<b>TLV. INC.</b> #302-1 Bundang Technopark B, 723 Pangyo-ro, Bundang, Seongnam, Gyeonggi, 13511, <b>Korea</b>	Tel: [82]-(0)31-726-2105 Fax: [82]-(0)31-726-2195
In the Middle East:	
<b>TLV. ENGINEERING FZCO</b> Building 6WA, Office No. 629, PO Box 371684, Dubai Airport Free Zone, Dubai, <b>UAE</b>	Tel: [971]-(0)4-399-3641 Fax: [971]-(0)4-399-3645
In Other Countries:	
TLY INTERNATIONAL, INC. 881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511, Japan	Tel: [81]-(0)79-427-1818 Fax: [81]-(0)79-425-1167
Manufacturer:	
TLV. دم, נדם. 1881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511, <b>Japan</b>	Tel: [81]-(0)79-422-1122 Fax: [81]-(0)79-422-0112