



# MULTI-CONTROLLER

## MODEL SP-F70

### Features

**Programmable multi-purpose controller for a wide range of operations. Ideal for equipment automation and systems creation in many fields.**

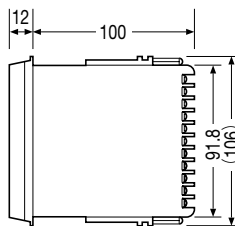
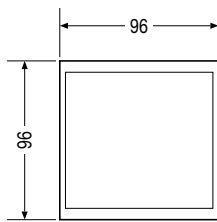
Allows pressure or temperature control when combined with automatic control valve [MC-COS (R)].  
 Allows PID action with auto-tuning when combined with pneumatic control valve.  
 Allows dual position (ON-OFF) control when combined with ON-OFF valve.

1. High measurement accuracy of 0.1% F.S.
2. Large memory allows programming of fifteen 14-segment patterns.
3. Uses auto-tuning calculation method for excellent stability and responsiveness. Overshoot prevention function.
4. Up to 4 contacts for alarm output and 3 contacts for transmission output.
5. Measurement input area can accommodate large quantities of data.
6. Voltage: 100V - 240V AC.
7. Conforms with CE marking.

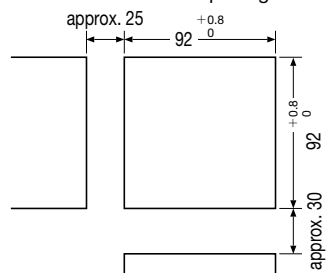


### Dimensions

(mm)



• Panel Cutout and Spacing



### Wiring Terminals

No.	Function	No.	Function	No.	Function	No.	Function
1	Ground terminal	33	R(A)	22	MAN/AUT	12	8
2	100-240V AC	34	R(B)	23	RUN	13	4
3	Power terminals	35	T(A) T/R(A) SD	24	RESET	14	2
4	AL1	36	T(B) T/R(B) RD	25	HOLD	15	1
5	Alarm 1/Alarm 2 output terminals	37	SG SG SG	26	ADVANCE	16	COM(-)
6	AL2	38	AO1	27	COM(-)	17	
7	OUT1/AL3	39	4-20mA	28	TE 1	18	Input terminals
8	Control output 1 or alarm output 3 terminals	40	OUT2/AL4	29	TE 2	19	① Thermocouple input
9	NC	41	NO	30	TE 3	20	② RTD input
10	OUT1/AO3	42	OUT2/AO2	31	TE 4	21	③ Voltage input (LOW)
11	4-20mA	43	4-20mA	32	COM(-)		④ Voltage input (HIGH) or Current input
							⑤ Sensor power

## Specifications

		Thermocouple	RTD	DC Voltage (LOW)	DC Voltage (HIGH)	DC Current
Measurement Input	Measurement Input Types & Ranges *1	● K ● J ● E ● T ● U ● L	● Pt100 ● JPt100	● 0 - 10mV ● 0 - 100mV ● 0 - 1V	● 0 - 5V ● 1 - 5V ● 0 - 10V	● 0 - 20mA ● 4 - 20mA
	Effects of Signal Resistance	approx. 0.2 $\mu$ V/ $\Omega$	—	—	—	—
	Input Line Resistance	—	maximum 10 $\Omega$	—	—	—
	Input Voltage	—	—	within $\pm$ 4V	within $\pm$ 12V	—
	Input Impedance	1M $\Omega$ minimum	—	approx. 1M $\Omega$	approx. 1M $\Omega$	approx. 250 $\Omega$
	Display during Input Disconnection	Upscale	Upscale	—	—	—
	Display during Input Short-Circuit	—	Downscale	—	—	—
Measurement Accuracy		$\pm$ (0.1% F.S. + 1 digit)				
Cold Junction Compensation Error		approx. $\pm$ 1.0 $^{\circ}$ C within range of 0 $^{\circ}$ C - 50 $^{\circ}$ C				
Sampling Period		0.25 second				
Displays	Set Values Display	4 digit 7 segment LED (orange)				
	Symbol Display	3 digit 7 segment LED (orange)				
	Operation Display	18 LED's indicate operating mode*				
Settings	Setting Range (SV)	Same as measurement input ranges				
	Setting Resolution	0.1 $^{\circ}$ C [ $^{\circ}$ F]	0.1 $^{\circ}$ C [ $^{\circ}$ F]	Depends on measurement input scaling		
	Setting Programs	15 Patterns, 14 segments each				
Control	Control Action Types	<ul style="list-style-type: none"> <li>● PID action with auto-tuning</li> <li>● Heating/cooling PID action</li> <li>● Pressure control [MC-COS(R) / MC-VCOS(R)]</li> <li>● Temperature control [MC-COS(R) / MC-VCOS(R)]</li> </ul>				
Control Output	Heating (OUT 1) *2	Current Output	Output: 4 - 20mA; Load resistance: 600 $\Omega$ maximum; Output accuracy: $\pm$ 0.1% of span * Selecting relay output for the heating control output sets it to transmission output 3 (AO3).			
		Relay Output	Contact: 1c contact 250V AC, 3A (resistance load) * Selecting current output for the heating control output sets it to alarm output 3 (AL3).			
	Cooling (OUT 2) *3	Current Output	Output: 4 - 20mA; Load resistance: 600 $\Omega$ maximum; Output accuracy: $\pm$ 0.1% of span * Selecting relay output for the cooling control output sets it to transmission output 2 (AO2).			
		Relay Output	Contact: 1a contact 250V AC, 3A (resistance load) * Selecting current output for the cooling control output sets it to alarm output 4 (AL4).			
Alarm Output	Number of Alarm Contacts	<ul style="list-style-type: none"> <li>● PID action with auto-tuning: When heating control output is set to current output: 4 contacts When heating control output is set to relay output: 3 contacts</li> <li>● Heating/cooling PID action: When both heating and cooling control output are set to current output: 4 contacts When both heating and cooling control output are set to relay output: 2 contacts When heating control output is set to current output and cooling control output is set to relay output: 3 contacts</li> <li>● Pressure control: 4 contacts</li> <li>● Temperature control: 4 contacts</li> </ul>				
	Alarm Types	No alarm, measurement upper limit, measurement lower limit, deviation upper limit, deviation lower limit, deviation upper & lower limits, within deviation range, measurement upper limit with standby, measurement lower limit with standby, deviation upper limit with standby, deviation lower limit with standby, deviation upper/lower limits with standby, input error, FAIL status, end of pattern, control error (for pressure control only)				
	Output *4	Relay contact output 1a contact 250V AC, 1A (resistance load)				
	Alarm Displays	Red surface emitting LEDs (AL1/AL2/AL3/AL4)				
Transmission Output	Number of Output Contacts	<ul style="list-style-type: none"> <li>● PID action with auto-tuning: When heating control output is set to current output: 2 contacts When heating control output is set to relay output: 3 contacts</li> <li>● Heating/cooling PID action: When both heating and cooling control output are set to current output: 1 contact When both heating and cooling control output are set to relay output: 3 contacts When heating control output is set to current output and cooling control output is set to relay output: 2 contacts</li> <li>● Pressure control: 2 contacts</li> <li>● Temperature control: 2 contacts</li> </ul>				
	Output Types	Measured values, set values, deviation values, heating control output values, cooling control output values (for heating/cooling PID action only)				
	Output Signals	4 - 20mA DC				
	Load Resistance	600 $\Omega$ maximum				
	Output Accuracy	0.1% of span				
Contact Input	No of Input Contacts	9				
	Input Method	No voltage contact, Line resistance OPEN: minimum 500k $\Omega$ , CLOSED maximum 10 $\Omega$				
	OPEN Voltage of Contacts	5V DC				
	Contact Function	Pattern 1 - 15 selection (4 contacts), MAN/AUT selection, RUN, RESET, HOLD, ADVANCE				
Contact Output	No of Output Contacts	4				
	Output Method	Transistor open collector output, load max. DC 24V, 50mA				
	Contact Function	Time event output TE1-TE4				

\* 1 Values changeable with jumper switches and PARAMETERS.

\* 2 Either current output or relay contact output can be specified for heating control output (but set to current output for pressure control or temperature control).

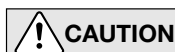
\* 3 Either current output or relay contact output can be specified for cooling control output; cooling control output only set for heating/cooling PID action.

\* 4 Specifications shown are for Alarms 1 and 2. Alarm 3 is for heating control output; Alarm 4 is used when relay output has been set for cooling control output.

## Specifications

Contact Output	No of Output Contacts	4
	Output Method	Transistor open collector output, load maximum 24V DC, 50mA
	Contact Function	Time event output TE1-TE4
Communi- cations	Communications Method	RS-422A: 4-wire type; RS-485: 2-wire type; RS-232C
	Communications Code	JIS (ASCII) 7-bit code
Self-Diagnostic Function	Check Items	ROM/RAM check, input value check, CPU power monitoring, watchdog timer
	Error Displays	FAIL lamp lights up (except during input error)
	Error Output	When FAIL lamp lights up: all output OFF During input error: action selectable
Ambient Conditions	Ambient Temperature	0 °C - 50 °C
	Ambient Humidity	20 - 85% RH
	Line Voltage Fluctuations	Rated voltage $\pm$ 10%
	Power Frequency Fluctuations	Rated value $\pm$ 5%
General Specifications	Insulation Resistance	Between measurement terminal and ground: 500V DC/20M $\Omega$ minimum Between power terminal and ground: 500V DC/20M $\Omega$ minimum
	Maximum Allowed Voltage	Between measurement terminal and ground: 1000V AC for 1 minute Between power terminal and ground: 1500V AC for 1 minute
	Line Voltage	100 - 240V AC, 50/60Hz
	Power Consumption	16VA at 240V · 12VA at 100V
	Effect of Power Outage	No effect for power outage of 50 msec or less
	Memory Backup	Setting data backed up by lithium battery. Service life approximately 10 years *1
	Weight	Approximately 600g maximum
	Accessories	1 set of fittings (2)

\* 1 Will depend on product storage time, storage environment, operating conditions, etc.



**CAUTION** To avoid abnormal operation, accidents or serious injury, DO NOT use this product outside of the specification range. Local regulations may restrict the use of this product to below the conditions quoted.

## Measurement Input Types & Ranges

	Input Type	Input Range [°C]	Code	Input Range [°F]	Code
Thermocouple (TC)	Type K (EX-: CA) [JIS/IEC]	0.0 - 400.0 0.0 - 800.0	0 1	0.0 - 800.0	200
	Type J (EX-: IC) [JIS/IEC]	0.0 - 400.0 0.0 - 800.0	10 11	0.0 - 700.0	210
	Type E (EX-: CRC) [JIS/IEC]	0.0 - 700.0	20	0.0 - 999.9	220
	Type T (EX-: CC) [JIS/IEC]	0.0 - 400.0	30	0.0 - 700.0	230
	Type U [DIN]	0.0 - 600.0	40	0.0 - 999.0	240
	Type L [DIN]	0.0 - 400.0	50	0.0 - 700.0	250
	RTD	JPt 100 [JIS]	0.0 - 300.0 0.0 - 500.0	400 401	0.0 - 600.0 0.0 - 900.0
Pt 100 [JIS/IEC]		0.0 - 300.0	410	○ 0.0 - 600.0	510
		0.0 - 600.0	411	0.0 - 999.9	511
		0 - 10mV 0 - 100mV	Arbitrary scaling possible	600 601	
0 - 1V		602			
Voltage (HIGH)	0 - 5V 1 - 5V	Arbitrary scaling possible	610 611		
	0 - 10V		612		
	Current	0 - 20mA ● 4 - 20mA	Arbitrary scaling possible	700 701	

●: Factory default for pressure control

○: Factory default for all control types other than pressure control

**Specifications Checksheet**

		Code			Remarks
Model	SP-F70	<input type="text"/>	* <input type="text" value="D"/>	<input type="text"/>	For boxes in the "code" section at left, enter the appropriate code from among the specification items below each box.
Basic Specifications	Control Operation Type	● PID action with auto-tuning	0		Selected to match the valve that will be used with the controller.
		● Heating / cooling PID action	1		
		● Pressure control operation [MC-COS (R) -3]	2		
		● Pressure control operation [MC-COS (R) -16, 15 - 50mm]	3		
		● Pressure control operation [MC-COS (R) -16, 65 - 150mm]	4		
		● Pressure control operation [MC-COS-21]	5		
		● Pressure control operation [MC-VCOS (R) ]	6		
		● Temperature control operation [MC-COS (R) -16]	7		
Additional Specifications	Remote External Input	● Contact input and time event output		D	
	Communications Function	● None ● RS-232C ● RS-422A (4-wire type) ● RS-485 (2-wire type)		N 1 4 5	Select to match the computer to be connected.
Initial Settings*	Measurement Input Types & Ranges	<input type="checkbox"/> RTD <input type="checkbox"/> Thermocouple (TC) <input type="checkbox"/> Voltage (low) input <input type="checkbox"/> Voltage (high) input <input type="checkbox"/> Current input	Range code	<input type="text"/>	-Select the type and range code from "Table of Measurement Input Types and Ranges." -Values can be changed after the controller has been shipped by changing jumper switches and PARAMETERS.
	Pressure Sensor Range	<input type="checkbox"/> 0 - 2000 kPaG <input type="checkbox"/> 0.00 - 20.40 kg/cm <sup>2</sup> G <input type="checkbox"/> 0 - 1000 kPaG <input type="checkbox"/> 0.00 - 10.20 kg/cm <sup>2</sup> G <input type="checkbox"/> 0 - 500 kPaG <input type="checkbox"/> 0.00 - 5.10 kg/cm <sup>2</sup> G <input type="checkbox"/> 0 - 400 kPa abs <input type="checkbox"/> 0 - 3000 Torr (mmHg) <input type="checkbox"/> 0.00 - 20.00 barg <input type="checkbox"/> 0.0 - 290.1 psig <input type="checkbox"/> 0.00 - 10.00 barg <input type="checkbox"/> 0.0 - 145.0 psig <input type="checkbox"/> 0.00 - 5.00 barg <input type="checkbox"/> 0.0 - 72.5 psig <input type="checkbox"/> 0 - 4000 mbar abs <input type="checkbox"/> 0.00 - 58.02 psi abs <input type="checkbox"/> Other : range(    -    ) unit (    )			Specify the range of the pressure sensor to be connected (when pressure control has been selected).

\* Initial settings can be changed after the controller has been shipped from the factory. When not specified in advance, items are set to their default values before shipment.

Manufacturer **TLV<sup>®</sup> CO., LTD.** ISO 9001/ISO 14001  
 Kakogawa, Japan  
 is approved by LRQA Ltd. to ISO 9001/14001