Temperature Controller

SC-F71 Quick Start Guide

Thank you for purchasing this product. This manual describes installation and wiring of SC-F71 controllers. In order to achieve maximum performance and ensure proper operation of the instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.

For detailed handling procedures and key operations, refer to the **SC-F71 Instruction Manual**.

WARNING

- 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 other than factory-approved personnel. Malfunction may occur and warranty is void under these conditions.

CAUTION

- 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 meters
  -If input/output or signal lines leave the building, regardless 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.
- Use a soft, dry cloth to remove stains from the instrument. Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration may occur.
- 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.
- 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.
  ⏦: Alternating 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)

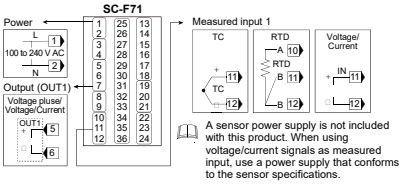
The intended application and end user should be checked to make sure this product will not be used in weapons of mass destruction, military applications or military equipment etc.
Take precautions not to allow this product to be illegally exported, even in the case of reselling or distribution.

1. MONITORING AND WIRING PROCEDURES

WARNING

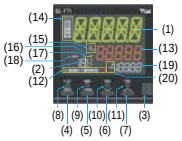
To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.

For product mounting and wiring, refer to the SC-F71 Installation Manual (172-65707M). Only the minimum explanation necessary to operate the product (power supply, measured input, control output (voltage/current output)) is mentioned here. For other functions and full details of the functions above, refer to the instruction manual before wiring.



A sensor power supply is not included with this product. When using voltage/current signals as measured input, use a power supply that conforms to the sensor specifications.

2. PARTS DESCRIPTION



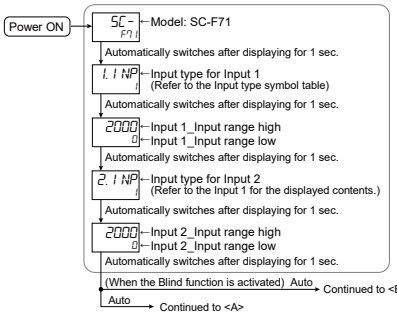
(1)	Measured value (PV) display [Yellow-green]	Displays Measured value (PV) or various parameter symbols.
(2)	Memory area display [White]	Displays the memory area No. (1 to 16)
(3)	Loader communication connector	Setting and monitoring on a computer (PC) is possible if the controller is connected with a cable to a PC via RKC USB communication converter COM-KG or COM-K2 (sold separately)*. The communication software PROTEM-T** must be installed on the PC. *For the COM-KG and COM-K2, consult TLV **Download links can be found at: https://www.tlv.com
(4)	SET key	Used for calling up parameters and set value registration.
(5)	Shift key	Shifts digits when settings are changed. Used to switch the modes.
(6)	Down key	Decreases numerals.
(7)	Up key	Increases numerals.
(8)	R.SET key	The parameters can be scrolled backwards.
(9)	MONI key	Used to switch screens. When the MONI key is pressed while any screen other than Monitor & SV setting mode is displayed, the screen returns the PV/SV Monitor.
(10)	AREA key	When the AREA key is pressed, the screen is switched to the Memory area transfer screen.
(11)	FUNC key	The selected function can be assigned to this key [1] for a direct access to it.
(12)	OUT1 to 3 lamp [White]	Lights when Outputs 1 to 3 (OUT1 to 3) [2] are turned on.
	DO1 to 4 lamp [White]	Lights when Digital outputs 1 to 4 (DO1 to 4) [2] are turned on.
	ALM lamp [Red]	Lights when any of the following occurs. • Event 1 to 4 • Input error [3] of input 1 or 2
(13)	Set value (SV) display [Orange]	Displays Set value (SV) or various parameter set values.
(14)	MV display lamp [White]	PV1 Lights when the Input 1_Measured value (PV) is displayed on the PV display unit. PV2 Lights when the Input 2_Measured value (PV) is displayed on the PV display unit.
	Manual (MAN1) mode lamp [White]	Lights when Input 1 is in Manual (MAN) mode. When lit, the SV display unit shows an Input 1_Manual manipulated output value.
	Manual (MAN2) mode lamp [White]	Lights when Input 1 is in Manual (MAN) mode. When lit, the SV display unit shows an Input 1_Manual manipulated output value.
	AT1 lamp [White]	Flashes when Autotuning (AT) is activated on Input 1. (After AT is completed: AT lamp will go out) Lights when Startup tuning (ST) is activated on Input 1. (After ST is completed: AT lamp will go out)
	AT2 lamp [White]	Flashes when Autotuning (AT) is activated on Input 2. (After AT is completed: AT lamp will go out) Lights when Startup tuning (ST) is activated on Input 2. (After ST is completed: AT lamp will go out)
	Remote (REM) mode lamp [White]	Lights in Remote (REM) mode. When lit, the SV display unit shows a remote setting input value.
(15)	SV display lamp [White]	Lights when the SV display unit shows a Set value (SV).
	PV2 display lamp [White]	PV2 Lights when the Input 2_Measured value (PV) is displayed on the SV display unit.
(16)	Set lock display [White]	Lights when the settings are locked.
(17)	Displays the ramp status [White]	SV ramp status is displayed; (rise, soak, fall)
(18)	AREA display lamp [White]	Lights when Memory area is displayed.
(19)	Manipulated output value (MV) display [White]	Displays either manipulated output value (MV) or memory area soak time input values [1].
(20)	MV display lamp [White]	Lights when Manipulated output value (MV) is displayed on the MV display.
	H:M:S display lamp [White]	Lights when time (hour:minute:second) is displayed on the MV display.
	CT 1/2 display lamp	Not used (Unlit)

[1] Functions are configured in the Engineering mode. Refer to the SC-F71 Instruction Manual [Parameter/Function] (172-65710M) for details.
[2] Outputs, such as control output, retransmission output, event output, are assigned to Outputs 1 to 3 (OUT1 to 3) and Digital outputs 1 to 4 (DO1 to 4). (Control output can be assigned to OUT1 to 3 only.)
Outputs are assigned in Engineering mode. Refer to the SC-F71 Instruction Manual [Parameter/Function] (172-65710M) for details.
[3] Disabled when shipped from factory. Light conditions are configured in the Engineering mode. Refer to the SC-F71 Instruction Manual [Parameter/Function] (172-65710M) for details.

3. SWITCHING BETWEEN MODES

When turning on the power, "Measured value (PV) display" and "Set value (SV) display" are automatically displayed as follows, and the product will switch to A: Monitor & SV setting mode.

"Measured value (PV) display" is shown at the top of the display, and "Set value (SV) display" is shown at the bottom of the display in the explanation below.



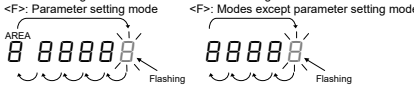
Input type symbol

Symbol	U	J	T	S	r	E	b	n	P
Input type	TC								
	K	J	T	S	R	E	B	N	PL ii

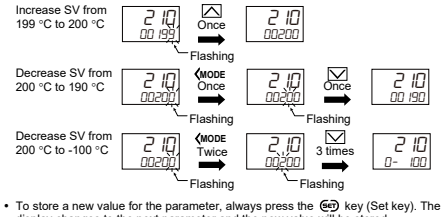
Symbol	C	U	L	Pr	Pt	JP	V	I
Input type	TC			RTD			Voltage	Current
	W5Re/W26Re	U	L	PR40-20	Pt100	JPt100		

4. CHANGING/REGISTERING SET VALUES/PARAMETERS

- The set value (SV) and parameters to be changed are displayed in the set value (SV) display (Orange). The flashing digit indicates which digit can be set. Press <MODE key (shift key) to go to a different digit. Every time the shift key is pressed, the flashing digit moves as follows



- Press the ⏶ key (Up key) or ⏷ key (Down key) to change the set value (SV), parameter or selected item. The following is also available when changing the set value.



- To store a new value for the parameter, always press the (SET) key (Set key). The display changes to the next parameter and the new value will be stored. Changes cannot be stored by only pressing the ⏶ (up) and ⏷ (down) keys. In the <C>: Operation transfer mode, however, the mode can be changed by the operations of these keys.
  🕮 When setting the set value (SV), due to the data registration method (<H>: Engineering mode), the modified set value will be adopted 2 seconds after the change even without pressing the (SET) key.
- In case no operation is performed within 60 seconds after the change of the setting, the mode will return to <A>: Monitor and SV setting mode. The modified data will not be registered in this case.

5. REGISTERING VALVE COEFFICIENT

When using the product with the TLV MC-COS series steam control valves, a unique valve factor decided for the control valve must be registered in the controller.
The valve coefficient refers to 6 numbers from A to F, which can be found on the MC-COS/MC-COSR/MC-VCOS/MC-VCOSR valve coefficient plate or for new products the valve coefficient tag). Register the valve coefficients in the controller following the instructions below.

IMPORTANT

- 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 unit selected for 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 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, C, and E.

Register the valve coefficient

- Switch to <H>: Engineering mode. ((SET) + **<MODE** (2 sec))

- Press the ⏶ or ⏷ key to display Fn53.

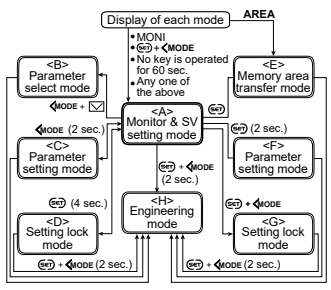
- Press the (SET) key once to display the valve coefficient A.

🕮 A 5-digit number will appear on the set value (SV) display and the digit on the right will flash. If there is no flashing digit, the device is in **RUN mode** and the valve coefficient cannot be changed. Press the FUNC key to change to **STOP mode**.

- Press the ⏶⏷ keys or **<MODE** (shift key) and change this to the value A on the valve coefficient plate or tag.

WARNING

Parameters in the Engineering mode should be set according to the application before setting any parameters 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.



Legend

(SET):	SET key	(key)(single display):	Press key once
<MODE:	Shift key	(key)(*n* times):	Press key *n* times
AREA:	Area key	(key)(for *n* seconds):	Press key for at least *n* seconds
MONI:	MONI key	(key) + (key):	Press keys simultaneously
⏷:	Down key	(key) + (*n* seconds):	Press keys simultaneously for at least *n* seconds

- Press the SET key once to complete the registration of A, then the valve coefficient b will be displayed.

- Follow the instructions to register valve coefficient values b, C, d, E, and F in the same way.

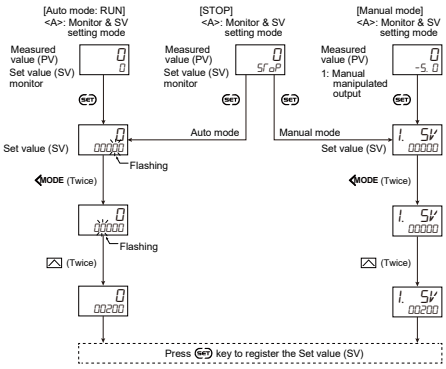
  Fn53 will display other values except A to F, however the initial values can be used as is. Change these as necessary after observing the control results. Refer to the manual SC-F71 Instruction Manual [Parameters/Functions] (172-65710) for other detailed setting examples.

- Press the MONI key or SET + **<MODE** key to return to <A>: Monitor and SV setting mode.

6. SETTING THE SET VALUES (SV)

Set value (SV) is the control target value. Register the Set value (SV)

Set the Set value (SV) to 200

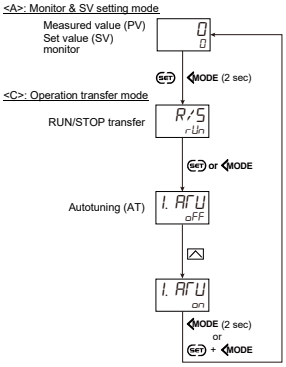


To return to the top of the list, press the **<MONI** key or the SET key until the first parameter is displayed.

7. SET AUTOTUNING (AT)

The Auto tuning (AT) function automatically measures, computes and sets the optimum PID values.
This function is unnecessary if setting the PID values manually or for pressure control by MC-COS or MC-COSR.

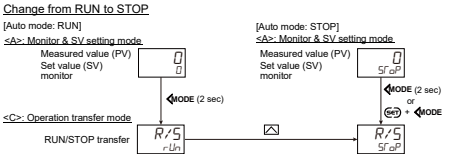
Set Autotuning (AT)



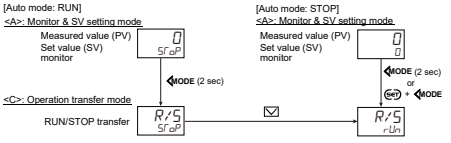
8. RUN/STOP TRANSFER

The control is switched between RUN and STOP. When stopped (in STOP), control output cannot be performed in manual mode. The instrument must be stopped before attempting the setting in the Engineering mode.

Change from RUN to STOP



Start the control (RUN)

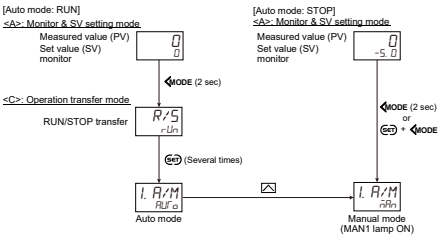


When switching between RUN/STOP、press the ∧ or ∨ key, and when the mode has switched, either RUN→STOP / STOP→RUN will be displayed.

9. AUTO/MANUAL TRANSFER

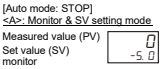
The control mode is switched between AUTO and MANUAL.

Switching to Manual mode



Perform the same steps when switching from manual mode to auto mode when  is displayed, press the ∨ key to switch to auto mode  .

Manipulated output value setting in manual mode

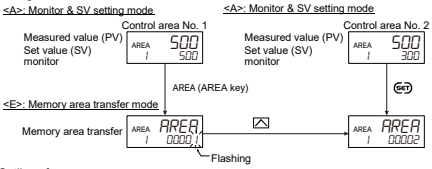


- Press the ∧ key to increase the Manipulated output value (MV).
- Press the ∨ key to decrease the Manipulated output value (MV).
- If the ∧ or ∨ key is kept pressing, the changing rate of the Manipulated output value (MV) will be accelerated.
- The output value adjusted with the ∧ and ∨ keys will be available immediately.

10. MEMORY AREA TRANSFER

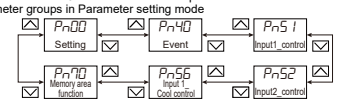
The memory area to be used for control (control area) can be switched to the desired area.

Change control area from No. 1 to No. 2



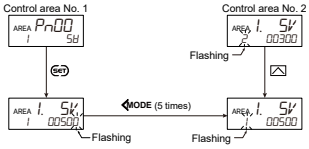
Outline of memory area

The memory area function is to store up to 16 areas (patterns) of parameters such as a Set value (SV). This parameter can be found in the <F>: Parameter setting mode. Any one area out of 16 areas can be called up for the control.
F: Parameter groups in Parameter setting mode



- One memory area consists of six parameter groups.
- To change a memory area number to another, when a certain parameter is displayed, press the **<MODE** key to shift the flashing digit to the left until the flashing digit reaches the AREA digit.

[Example: Memory area transfer of set value (SV)]



Service

For Service or Technical Assistance: Contact your TLV representative or your regional TLV office.

In Europe:	Germany	Tel: [49]-(0)7263-9150-0
	U.K.	Tel: [44]-(0)1242-227223
	France	Tel: [33]–(0)4-72482222
In North America:		Tel: [1]-704-597-9070
In Mexico and Latin America:		Tel: [52]-55-5359-7949
In Oceania:		Tel: [61]-(0)3-9873 5610
In East Asia:	Singapore	Tel: [65]-6747 4600
	China	Tel: [86]-(0)21-6482-8622
	Malaysia	Tel: [60]-3-8065-2928
	Thailand	Tel: [66]-2-693-3799
	Korean	Tel: [82]-(0)31-726-2105
In the Middle East:		Email: sales-me@tlv.co.jp
In Other Countries:		Tel: [81]-(0)79-427-1818
Manufacturer:		Tel: [81]-(0)79-422-1122

TLV EXPRESS LIMITED WARRANTY

Subject to the limitations set forth below, TLV CO., LTD., a Japanese corporation ("**TLV**"), warrants that products which are sold by it, TLV International Inc. ("**TII**") or one of its group companies excluding TLV Corporation (a corporation of the United States of America), (hereinafter the "**Products**") are designed and manufactured by TLV, conform to the specifications published by TLV for the corresponding part numbers (the "**Specifications**") and are free from defective workmanship and materials. The party from whom the Products were purchased shall be known hereinafter as the "**Seller**". With regard to products or components manufactured by unrelated third parties (the "**Components**"), TLV provides no warranty other than the warranty from the third party manufacturer(s), if any.

Exceptions to Warranty

This warranty does not cover defects or failures caused by:

1. improper shipping, installation, use, handling, etc., by persons other than TLV, TII or TLV group company personnel, or service representatives authorized by TLV; or
2. dirt, scale or rust, etc.; or
3. improper disassembly and reassembly, or inadequate inspection and maintenance by persons other than TLV or TLV group company personnel, or service representatives authorized by TLV; or
4. disasters or forces of nature or Acts of God; or
5. abuse, abnormal use, accidents or any other cause beyond the control of TLV, TII or TLV group companies; or
6. improper storage, maintenance or repair; or
7. operation of the Products not in accordance with instructions issued with the Products or with accepted industry practices; or
8. use for a purpose or in a manner for which the Products were not intended; or
9. use of the Products in a manner inconsistent with the Specifications; or
10. use of the Products with Hazardous Fluids (fluids other than steam, air, water, nitrogen, carbon dioxide and inert gases (helium, neon, argon, krypton, xenon and radon)); or
11. failure to follow the instructions contained in the TLV Instruction Manual for the Product.

Duration of Warranty

This warranty is effective for a period of one (1) year after delivery of Products to the first end user. Notwithstanding the foregoing, asserting a claim under this warranty must be brought within three (3) years after the date of delivery to the initial buyer if not sold initially to the first end user.

ANY IMPLIED WARRANTIES NOT NEGATED HEREBY WHICH MAY ARISE BY OPERATION OF LAW, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY EXPRESS WARRANTIES NOT NEGATED HEREBY, ARE GIVEN SOLELY TO THE INITIAL BUYER AND ARE LIMITED IN DURATION TO ONE (1) YEAR FROM THE DATE OF SHIPMENT BY THE SELLER.

Exclusive Remedy

THE EXCLUSIVE REMEDY UNDER THIS WARRANTY, UNDER ANY EXPRESS WARRANTY OR UNDER ANY IMPLIED WARRANTIES NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), IS **REPLACEMENT**; PROVIDED: (a) THE CLAIMED DEFECT IS REPORTED TO THE SELLER IN WRITING WITHIN THE WARRANTY PERIOD, INCLUDING A DETAILED WRITTEN DESCRIPTION OF THE CLAIMED DEFECT AND HOW AND WHEN THE CLAIMED DEFECTIVE PRODUCT WAS USED; AND (b) THE CLAIMED DEFECTIVE PRODUCT AND A COPY OF THE PURCHASE INVOICE IS RETURNED TO THE SELLER, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY THE SELLER. ALL LABOR COSTS, SHIPPING COSTS, AND TRANSPORTATION COSTS ASSOCIATED WITH THE RETURN OR REPLACEMENT OF THE CLAIMED DEFECTIVE PRODUCT ARE SOLELY THE RESPONSIBILITY OF BUYER OR THE FIRST END USER. THE SELLER RESERVES THE RIGHT TO INSPECT ON THE FIRST END USER'S SITE ANY PRODUCTS CLAIMED TO BE DEFECTIVE BEFORE ISSUING A RETURN MATERIAL AUTHORIZATION. SHOULD SUCH INSPECTION REVEAL, IN THE SELLER'S REASONABLE DISCRETION, THAT THE CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY THE SELLER FOR THE TIME AND EXPENSES RELATED TO SUCH ON-SITE INSPECTION.

Exclusion of Consequential and Incidental Damages

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Exclusion of Other Warranties

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