Model UT350L



IM 05D01D21-01E

Installation



4th Edition: Apr. 1, 2005

Yokogawa Electric Corporation

Yokogawa Electric Corporation 2-9-32, Naka-cho Musashino-shi, Tokyo 180-8750 Japan Phone: +81-422-52-7179 Facsimile: +81-422-52-6793

This manual describes installation, wiring, and other tasks required to make the controller ready for operation.

#### Contents

- 1. Safety Precautions
- 2. Model and Suffix Codes
- 3. How to Install
- 4. How to Connect Wires
- 5. Hardware Specifications
- 6. Terminal Wiring Diagrams

#### Introduction

Thank you for purchasing the UT350L limit controller.

The controller is shipped from the factory with 3 hardcopy user's manuals (A2 size). The 3 user's manuals in hardcopy format describe the operating procedures required for basic use. It is recommended that you refer to these user's manuals to understand [1] installation, [2] initial settings, [3] operating procedures, and [4] limit control function of the controller.

#### ■ How to Use the Manuals

Purpose	Manual Title	Description	Media
Setup	Installation	Describes the tasks (installation, wiring, and others) required to make the controller ready for operations.	A2-size paper front
Basic operation	Initial Settings	Describes examples of setting PV input types, limit control type selection, and alarm types.  Making settings described herein allows you to carry out basic control.	A2-size paper front
Operating procedures, troubleshooting, and maintenance	Operations	Describes key operation sequences. For operation control through external contact inputs, see Installation User's Manual.	A2-size paper back
Brief operation, setpoint recording, and description of limit control function	Parameters and Functions	Contains the parameter map used as a guideline for setting parameters and lists of parameters for recording user settings. Describes the limit control functions.	A2-size paper back and front

# 1. Safety Precautions

The following symbol is indicated on the controller to ensure safe use.



**CAUTION** 

This symbol on the controller indicates that the operator must refer to an explanation in the user's manual in order to avoid the risk of injury or death of personnel or damage to the instrument. The manual describes how the operator should exercise special care to avoid electric shock or other dangers that may result in injury or loss of life.

The following symbols are used in the hardcopy user's manuals.



Indicates that operating the hardware or software in a particular manner may damage it or result in a system failure.



Draws attention to information that is essential for understanding the operation and/or features of the controller.

# 2. Model and Suffix Codes

Before using the controller, check that the model and suffix codes match your order.

Model	Suffix Code		Description
UT350L			Limit controller
Туре	-0		Standard type
Optional functions	3	0	None With communication

# Check that the following items are provided:

- Limit controller (of ordered model): · Brackets (mounting hardware): .
- Unit label: .
- User's Manuals: . .3 (A2 size) • User's Manual (Model UT350L Communication Functions): .
- Supplied only for UT350L model with communication functions

# 3. How to Install



To install the controller, select a location where

- (1) no one may accidentally touch the terminals,
- (2) mechanical vibrations are minimal, (3) corrosive gas is minimal,
- (4) temperature can be maintained at about 23°C and the fluctuation is minimal, (5) no direct radiant heat is present.
- (6) no magnetic disturbances are caused,
- (7) no wind blows against the terminal board (reference junction compensation element),
- (8) no water is splashed.
- (9) no flammable materials are around,

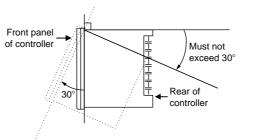
Never place the controller directly on flammable items or equipment. If the controller has to be installed close to flammable items or equipment, be sure to provide shielding panels all around the controller, at least 150mm away from every side; the panels should be made of either 1.43mm-thick metal-plated steel plates or 1.6mm-thick uncoated steel plates



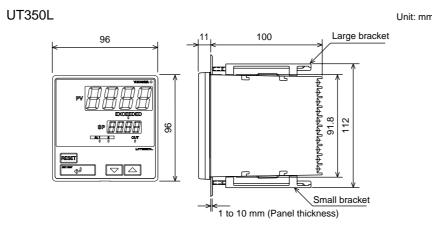
Never touch the opening at the bottom of the case. It is to be used in the factory at shipping

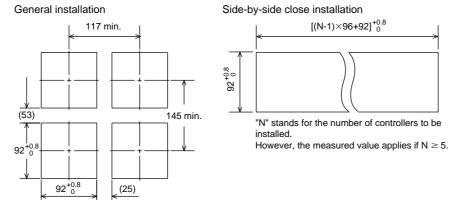
### Installation Position

Install the controller at an angle within 30° from horizontal with the front panel facing upward. Do not install it facing of controller downward. The position of right and left sides should be hori-



### ■ External Dimensions and Panel Cutout Dimensions



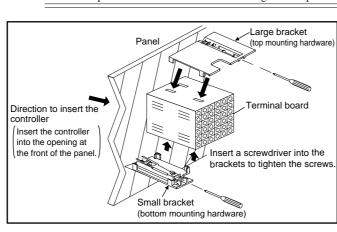


### ■ How to Install

CAUTION



Turn off the power to the controller before installing it on the panel because there is a possibility of electric shock.



After opening the mounting hole on the panel, follow the procedures below to install the controller:

1. Insert the controller into the opening from the front of the panel so that the terminal board on the rear is at the far side.

2. Set the brackets in place on the top and bottom of the controller as shown in the figure on the left, then tighten the screws of the brackets. Take care not to overtighten them.

# 4. How to Connect Wires



! CAUTION

1) Before carrying out wiring, turn off the power to the controller and check that the cables to be connected are not alive with a tester or the like because there is a possibility of electric shock.

2) For safety, be sure to install a circuit breaker switch (of 5A and 100V AC or 220V AC, and that conforms to IEC60947) near the controller so as to be operated easily, and clearly indicate that the device is used to deenergize the controller.

3) Wiring must be carried out by personnel who have basic electrical knowledge and practical experience.

′150mm

150mm

♠ NOTE

1) Provide power from a single-phase instrument power supply. If there is a lot of noise in the power line, insert an insulating transformer into the primary side of the line and use a line filter (recommended part: ZAC2205-00U from TDK) on the secondary side.

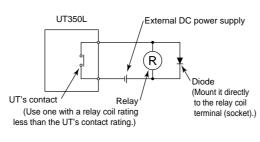
As a countermeasures against noise, do not place the primary and secondary power cables close to each other. ensating lead wires for wiring. For RTD input, use shielded wire that have low conductor resistance and cause no significant differences in resistance between the three wires.

The cables to be used for wiring, terminal specifications, and recommended parts are as shown below. 3) Control output relays may be replaced. However, because they have a life of 100,000 times that of the resistance load, use auxiliary relays to turn on/off a load.

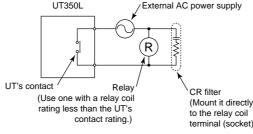
4) The use of inductance (L) loads such as auxiliary relays, motors and solenoid valves causes malfunction or relay failure; always insert a CR filter for use with alternating current or a diode for use with direct current, as a spark-removal surge suppression circuit, into the line in parallel with the load.

5) When there is the possibility of being struck by external lightning surge, use the arrester to protect the instru-

# ■ For DC Relay Wiring



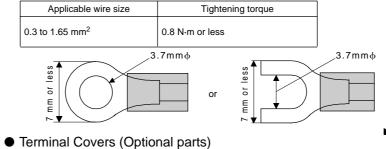
# ■ For AC Relay Wiring UT350L

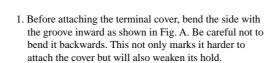


### Cable Specifications and Recommended Cables

Purpose	Name and Manufacturer
Power supply, grounding, relay contact outputs	600 V PVC insulated wires, JIS C 3307, 0.9 to 2.0 mm <sup>2</sup>
Thermocouple	Shielded compensating lead wires, JIS C 1610, □X-□-□□-□ (See Yokogawa Electric's GS 6B1U1-E.)
RTD	Shielded wires (three conductors), UL2482 (Hitachi Cable)
Other signals	Shielded wires

#### Recommended Terminal Lugs





T9115YD

Target Model Part Number

2. Fit the holes on the top and bottom (UT350L) of the terminal cover the projections on the brackets (Fig. B) and lock in place. The figure right shows the attachment of a terminal cover to UT350L.

# 5. Hardware Specifications

# PV Input Signals

For UT350L

- Number of inputs: 1 (terminals ①-②-③)
- · Input type: Universal input system. The input type can be selected with the software.
- Sampling period: 250 ms · Burnout detection: Functions at TC, RTD, standard signal
- (0.4 to 2 V or 1 to 5 V) Upscale, downscale, and off can be specified. For standard signal, burnout is determined to have occurred
- if it is 0.1 V or less • Input bias current: 0.05 μA (for TC or RTD b-terminal)
- · Measurement current (RTD): About 0.13 mA • Input resistance: 1 M $\Omega$  or more for thermocouple or mV input
- About 1 M $\Omega$  for DC voltage input - Allowable signal source resistance: 250  $\Omega$  or less for thermocouple or mV input Effects of signal source resistance:  $0.1 \mu V/\Omega$  or less
- $2 \text{ k}\Omega$  or less for DC voltage input Effects of signal source resistance: About  $0.01\%/100~\Omega$ · Allowable wiring resistance: for RTD input
- Maximum 150  $\Omega$ /wire: Conductor resistance between three wires should be equal However, 10 Ω/wire for a maximum range of -150.0 to
- Wire resistance effect:  $\pm 0.1^{\circ} C / 10 \Omega$ - Allowable input voltage:  $\pm 10\,\mathrm{V}$  DC for thermocouple, mV, or RTD input
- ±20 V DC for DC voltage input Noise rejection ratio: 40 dB (50/60 Hz) or more in normal mode
- 120 dB (50/60 Hz) or more in common mode • Reference junction compensation error:  $\pm 1.0^{\circ}$ C (15 to 35°C)  $\pm 1.5^{\circ}$ C (0 to 15°C, 35 to 50°C)
- Applicable standards: JIS, IEC, DIN (ITS-90) for thermocouples and RTD

# Purpose: Alarm output, FAIL output

A® NOTE

**Contact Outputs** 

and 60950.

Number of outputs: 2 Relay contact rating: 240 V AC/1 A or 30 V DC/1 A (COM

(8)

9

exceed 100  $\mu A$  when "off."

- terminal is common); 1a, FAIL output; 1b
- Devices connected to the UT350L must comply with IEC61010 and 60950.

#### Communication Function

controller of other manufactures

• Maximum communication distance: 1,200m

synchronization, non-procedural

Safety and EMC Standards

EN61010-1, C22.2 No.61010-1)

Display Specifications

height of 9.3 mm

Fold the cover in the direction

- Fit the cover hold

over the protrusion on the mounting bracket.

Figure A

Figure B

Either PV, or target setpoint is output

- Output accuracy:  $\pm 0.3\%$  of span under standard operating

Relay contact output (Standard type: terminals ①-②-③)

Input type: Non-voltage contact or transistor open collector input

resistance of 1  $k\Omega$  or less is determined as "on" and contact

For transistor open collector input, input voltage of 2 V or

less is determined as "on" and leakage current must not

• Devices connected to the UT350L must comply with IEC61010

· On/off determination: For non-voltage contact input, contact

Input contact rating: 12 V DC, 10 mA or more

resistance of 20 k $\Omega$  or more as "off."

Minimum status detection hold time: About 1 second

conditions (23 ±2°C, 55 ±10% RH, power frequency of

Three terminals (NC, NO, and common)

250V AC or 30V DC, 3A (resistance load)

Retransmission Output

Number of outputs: 1 (terminals 66-67)

• Output signal: 4-20 mA DC

50/60 Hz)

Number of outputs

Output signal

Contact rating

Resolution

Contact Inputs

Number of input: 1

• Load resistance: 600  $\Omega$  or less

**Limit Control Output** 

 $\triangle$ 

Status indicating lamps: LEDs

CAUTION

• Baud rate: 600, 1200, 2400, 4800, or 9600 bps

• Applicable standards: Complies with EIA RS-485

Number of controllers that can be connected: Up to 31

Communication method: Two-wire half-duplex, start-stop

4-digit, 7-segment red LED display, character height of 20 mm

• Setpoint display: 4-digit, 7-segment red LED display, character

Installation category: CAT. II Pollution degree: 2 (IEC/

Rated measurement input voltage: 10V DC max.(across

Note: It is a value on the safety standard which is assumed

by IEC/EN61010-1 in Measurement category I, and is not

This equipment has Measurement category I, there-

fore do not use the equipment for measurements

within Measurement categories II, III and IV.

the value which guarantees an apparatus performance.

Measurement category : I (CAT. I : IEC/EN61010-1)

Safety: Complies with IEC/EN61010-1 (CE), approved by

C22.2 No.61010-1, approved by UL508. Certified for FM-3810 and FM-3545.

terminals), 300V AC max.(across ground)

CAT. I For measurements performed on circuits not directly connected to MAINS.

CAT. II For measurements performed

on circuits directly connected equipments, etc.

| CAT. | For measurements performed | Distribution board,

in the building installation. circuit breaker, etc.

IV CAT.IV For measurements performed at the source of the low-voltage systems, etc.

· EMC standards: Complies with EN61326, EN61000-3-2,

The instrument continues to operate at a measuring

accuracy of within ±20% of the range during tests

Construction, Installation, and Wiring

Construction: Only the front panel is dust-proof and drip-proof

 $96 \text{ (W)} \times 96 \text{ (H)} \times 100 \text{ (depth from panel face) mm}$ 

· Installation: Panel-mounting type. With top and bottom

· Wiring: M3.5 screw terminals (for signal wiring and power

For side-by-side close installation the controller loses its

EN61000-3-3 and EN55011 (CE).

dust-proof and drip-proof protection

Material: ABS resin and polycarbonate

mounting hardware (1 each)

Installation position: Up to 30° upward facing

(not designed for facing downward)

 $92^{+0.8}$  (W)  $\times 92^{+0.8}$  (H) mm

ground wiring as well)

Class A Group 1.

(protection class IP55)

· Case color: Black

· Dimensions:

Weight: About 1 kg or less

· Panel cutout dimensions

Rated transient overvoltage: 1500V (Note)

■ Communication Interface

· Personal computer link: Used for communication with a

communication module of the FA-M3, or a programmable

- personal computer, or UT link module of the FA-M3 controller (from Yokogawa Electric Corporation). · Ladder communication: Used for communication with a ladder
  - Data backup: Non-volatile memory (can be written to up to

  - · Withstanding voltage Between primary terminals\* and secondary terminals\*\*:
  - Between primary terminals\* and grounding terminal:

  - Between grounding terminal and secondary terminals\*\*
  - At least 500 V AC for 1 minute \* Primary terminals indicate power terminals and relay
  - \*\* Secondary terminals indicate analog I/O signal and
  - Insulation resistance: 20  $M\Omega$  or more at 500 V DC between

- Not isolated from the internal circuit.
- 4-20 mA analog output terminals (for retransmission): Isolated
- output terminals and from other input/output terminals and internal circuit.
- terminals and from communication terminals. Isolated from other input/output terminals and internal circuit.
- Relay contact alarm output terminals: Not isolated between relay contact alarm outputs. Isolated from other input/
- · RS-485 communication terminals: Not isolated from contact input terminals. Isolated from other input/output terminals
- and internal circuit. Power terminals: Isolated from other input/output terminals and
- · Grounding terminals: Isolated from other input/output terminals and internal circuit.

 Normal operating condition Ambient temperature: 0 to 50°C (40°C or less for side-by-side

Temperature change rate: 10°C/h or less Ambient humidity: 20 to 90% RH (no condensation allowed)

Continuous vibration at 14 to 150 Hz: 4.9 m/s<sup>2</sup> or less Short-period vibration: 14.7 m/s<sup>2</sup>, 15 seconds or less

installation height: Height above sea level of 2000 m or less Warm-up time: 30 minutes or more after power on Installation category based on IEC61010-1: II (See Note) Pollution degree based on IEC61010-1 : 2 (See Note)

•The "Installation category" implies the regulation for impulse withstand voltage. It is also called the

- equipment •"Pollution level" describes the degree to which a solid, liquid or gas which deteriorates dielectric
- strength is adhering. "2" applies to a normal indoor atmosphere.
- Temperature: -25 to 70°C
- Humidity: 5 to 95% RH (no condensation allowed) • Effects of changes in operating conditions
- of F.S./°C, whichever is larger
- Effects from power supply fluctuation (within rated voltage
- equal to or less than whichever is larger - On analog output, ±0.05% of F.S./ 10 V or less

# 6. Terminal Wiring Diagrams

Alarm-2 output | AL2 | 5 ←

COM 7

100 to 240 V AC (±10%)

50/60 Hz shared

30 V DC, 1 A (resistance load)

CAUTION

Before carrying out wiring, turn off the power to

the controller and check that cables to be connecte

are not alive with a tester or the like becaus

Common

Power supply

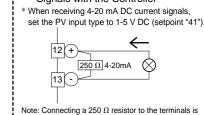
Power supply

Relay contact rating: 240 V AC, 1 A

#### Do not use unassigned terminals as relay terminals. Limit control output Relay contact output RS-485 communication \* Wiring can only be carried out TC input RTD input for controllers with communication functions NO + 2 11(A)<del>-</del> Maximum baud rate: 9600 bps 12 + 12 b --24 SDA(-) -----13 -13(B)\* 25 RDB(+) <del><</del> 30 V DC, 3 A (resistance load mV/V input 27 sg ----13 -11) 21) (12) (23) (13) Alarm-1 output 24 (14)

(18)

(19)



Note: Connecting a 250  $\Omega$  resistor to the terminals is Model: X010-250-2 (resistor with M3.5 crimp-on terminal lugs)

before shipment

Load resistance: 600  $\Omega$  or less

External contact input

17 - 4-21

Power supply: Rated voltage of 100 to 240 V AC (±10%), 50/60 Hz

• Power consumption: Max. 20 VA (8.0 W max.)

**Power Supply Specifications** 

• Internal fuse rating: 250V AC, 1.6A time-lug fuse

At least 1500 V AC for 1 minute

At least 1500 V AC for 1 minute

At least 1500 V AC for 1 minute Between secondary terminals\*\*

output terminals contact input terminals

power terminals and grounding terminal

- Grounding: Class D grounding (grounding resistance of 100  $\Omega$ 

Signal Isolations • PV input terminals: Isolated from other input/output terminals.

from other input/output terminals and internal circuit. · Relay contact control output terminals: Isolated between contact

· Contact input terminals: Not isolated between contact input

output terminals and internal circuit.

internal circuit.

# **Environmental Conditions**

close installation) The operating ambient temperature range is between 0°C.

Magnetic field: 400 A/m or less Continuous vibration at 5 to 14 Hz: Full amplitude of 1.2 mm or

Shock: 147 m/s<sup>2</sup> or less, 11 ms

"Overvoltage category." "II" applies to electrical

· Transportation and storage conditions:

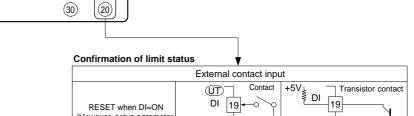
Temperature change rate: 20°C/h or less

- Effects from changes in ambient temperature - On voltage or thermocouple input,  $\pm 1~\mu V/^{\circ} C$  or  $\pm 0.01\%$ 

- On analog output, ±0.05% of F.S./°C or less

- On analog input,  $\pm 1~\mu\text{V}/10~\text{V}$  or  $\pm 0.01\%$  of F.S./10 V,

(15) 25 Retransmission output | \* PV retransmission is configured at factory (16) 16 + 17 27 4-20 mA DC



ever, setup parar DIS=DI) COM Common

IM 05D01D21-01E (1)

- On RTD input,  $\pm 0.05^{\circ}\text{C}\:/^{\circ}\text{C}$  (ambient temperature) or less

PV input See Initial Settings User's Manual ■ Receiving 4-20 mA DC Current -----Signals with the Controller

User's Manual Model UT350L

Limit Controller User's Manual SERIES

IM 05D01D21-02E

Initial Settings



4th Edition: Apr. 1, 2005

Yokogawa Electric Corporation

This manual describes examples of setting PV input types, limit control types, and alarm types. Carrying out settings described herein allows you to perform basic control.

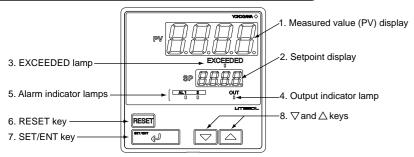
Refer to examples of various settings to understand how to set parameters required. Refer to "1. Basic Key Operation Sequence and Parameter Map" in Parameters and Functions User's Manual for an easy to understand explanation

more than 3 seconds. This brings you to the display (operating display) that appears at power-on.

### Contents

- 1. Names and Functions of Front Panel Parts
- 2. Setting PV Input Type
- 3. Changing Limit Control Type 4. Changing Alarm Type

# 1. Names and Functions of Front Panel Parts



	Name of Part	Function
1.	Measured value (PV) display	Displays PV. Displays a parameter symbol when you set a parameter. Displays an error code (in red) if an error occurs.
2.	Setpoint display	Displays the setpoint (SP) during operation. Displays the set value of parameters on the parameter setting display.
3.	EXCEEDED lamp	Light (green) to indicate the exceeded status of PV. Lights while PV exceeds SP.
4.	Output indicator lamp	Light (green) to indicate the output status. Lights while the relay output is OFF.
5.	Alarm indicator lamps	If any of alarms 1 and 2 occurs, the respective alarm indicator lamp (AL1 and AL2) is lit (in orange)
6.	RESET key RESET	Used to confirm and reset the limit output and related parameters.
7.	SET/ENT key	Used to switch or register a parameter. Pressing the key for more than 3 seconds allows you to switch between the operating display and the menu for operating parameter setting display alternately.
8.	∇and △ △ keys ▽	Used to change numerical values. On setting displays for various parameters, you can change target setpoints and parameters. Pressing the $\nabla$ key decreases a numerical value, while pressing the $\triangle$ key causes it to increase. You can hold down a key to gradually increase the speed of change.

# IMPORTANT

The controller automatically returns to the display at the time of power-on (i.e., operating display) if no key is operated for at least one minute.

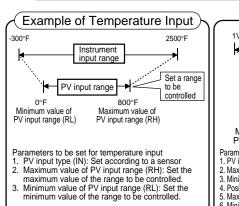
# ■ Setting of Main Parameters at the Factory before Shipment

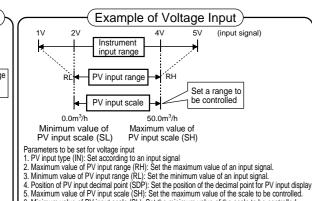
Item	Factory-set defaults
PV input type	Thermocouple type K (-300 to 2500°F) (1)
Limit control type	Hight limit (HI)
Time unit for duration time	Hour and minute (0)
Alarm output	Alarm-1: PV high limit (1), Alarm-2: PV low limit (2)
Retransmission output	PV retransmission (1)

# 2. Setting PV Input Type



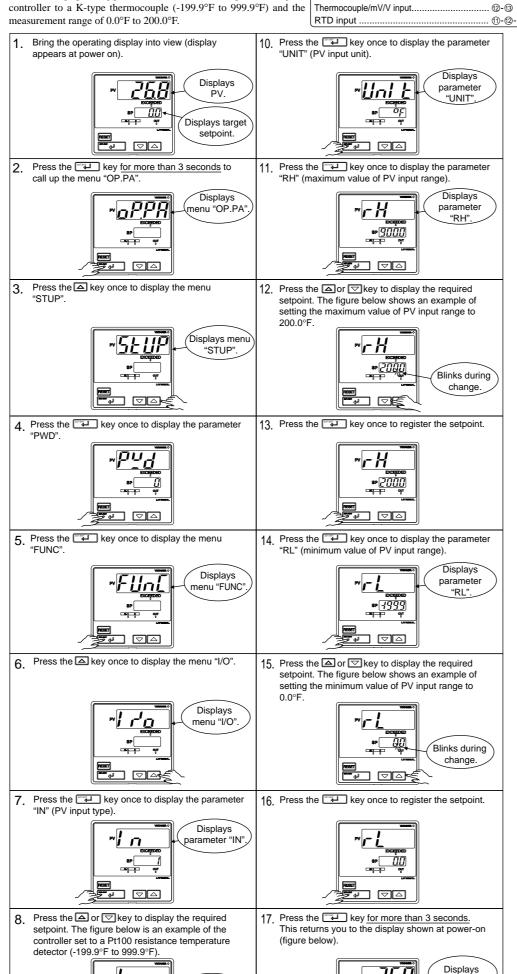
The controller is configured to the initial value of each parameter at the factory before shipment First check the initial values shown in "2. Lists of Parameters," in Parameters and Functions User's Manual and change parameter values as necessary.

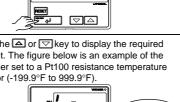


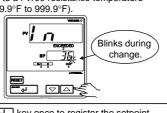


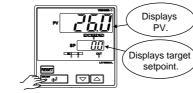
. Minimum value of PV input scale (SL): Set the minimum value of the scale to be controlled.

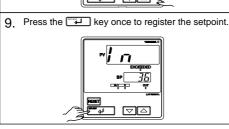
The following operating procedure describes an example of setting the PV input terminal











\* If the type of input is voltage, also configure the PV Input Decimal Point Position (SDP) Maximum Value of PV Input Scale (SH) and Minimum Value of PV Input Scale (SL) that are displayed after parameter RL.



The controller may automatically initialize the registered operating parameter setpoints if any change is made to the data item PV Input Type (IN), Maximum Value of PV Input Range (RH), Minimum Value of PV Input Range (RL), PV Input Decimal Point Position (SDP), Maximum Value of PV Input Scale (SH) or Minimum Value of PV Input Scale (SL). After a change has been made to any of these data items, be sure to verify the registered operating parameter setpoints to ensure that they are correct. If any data item has been changed to its default, set it to a required value.

### ■ Instrument Input Range Codes

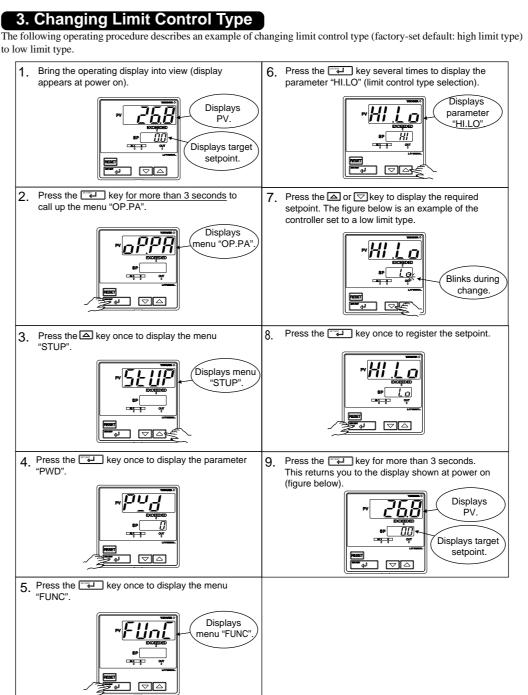
Select the unit from the UNIT parameter

Input	Туре	Instrument Input Range Code	Instrument Input Range	Measurement Accuracy			
		, i	-200 to 1370°C				
		1	-300 to 2500°F				
			-199.9 to 999.9°C	1			
	K	2					
			0 to 2300°F	±0.10/ of instrument rooms ±1 digit for temperatures			
		3	-199.9 to 500.0°C	±0.1% of instrument range ±1 digit for temperatures			
			-199.9 to 999.9°F	equal to or higher than 0°C			
	J	4	-199.9 to 999.9°C	±0.2% of instrument range ±1 digit for temperatures below 0°C			
			-300 to 2300°F	Delow 0°C			
		5	-199.9 to 400.0°C				
	Т		-300 to 750°F				
		6	0.0 to 400.0°C				
			-199.9 to 750.0°F				
				±0.15% of instrument range ±1 digit for temperatures			
	В	7	0 to 1800°C	equal to or higher than 400°C			
	ا	,	32 to 3300°F	±5% of instrument range ±1 digit for temperatures			
				below 400°C			
	s	8	0 to 1700°C				
	Ľ	0	32 to 3100°F	+0.159/ of instrument range +1 digit			
	R	9	0 to 1700°C	±0.15% of instrument range ±1 digit			
Thermocouple	I	9	32 to 3100°F				
mermocouple			000 1- 100000	±0.1% of instrument range ±1 digit			
	N	10	-200 to 1300°C	±0.25% of instrument range ±1 digit for temperatures			
			-300 to 2400°F	below 0°C			
	_		-199.9 to 999.9°C				
	E	11	-300 to 1800°F				
			-199.9 to 900.0°C	±0.1% of instrument range ±1 digit for temperatures			
	L(DIN)	12	-300 to 1300°F	equal to or higher than 0°C			
			-199.9 to 400.0°C	±0.2% of instrument range ±1 digit for temperatures			
	U(DIN)	13	-300 to 750°F	below 0°C			
			0.0 to 400.0°C				
		14	-199.9 to 750.0°F				
			0 to 2300°C	<del> </del>			
	W	15		±0.2% of instrument range ±1 digit			
			32 to 4200°F				
	Platinel 2	16	0 to 1390°C	±0.1% of instrument range ±1 digit			
			32 to 2500°F	ů ů			
			0 to 1900°C	±0.5% of instrument range ±1 digit for temperatures			
	PR20-40	17	32 to 3400°F	equal to or higher than 800°C			
				No guarantee of accuracy for temperatures below 800°C			
	W97Re3-	18	0 to 2000°C	±0.2% of instrument range ±1 digit			
	W75Re25	10	32 to 3600°F				
		30	-199.9 to 500.0°C	±0.1% of instrument range ±1 digit (Note1) (Note2)			
	ID+100	30	-199.9 to 999.9°F	[ 10.170 of instrument range in digit (Note1) (Note2)			
	JPt100	31	-150.0 to 150.0°C	+0.20/ of instrument range ±4 digit (Note4)			
		31	-199.9 to 300.0°F	±0.2% of instrument range ±1 digit (Note1)			
DTD		25	-199.9 to 850.0°C				
RTD		35	-300 to 1180°F				
	Butoo	00	-199.9 to 500.0°C	$\pm 0.1\%$ of instrument range $\pm 1$ digit (Note1) (Note2)			
	Pt100	36	-199.9 to 999.9°F				
			-150.0 to 150.0°C				
		37	-199.9 to 300.0°F	±0.2% of instrument range ±1 digit (Note1)			
Standard	0.4 to 2 V	40	0.400 to 2.000 V				
signal	1 to 5 V	41	1.000 to 5.000 V	1			
ngriai	0 to 2 V	50	0.000 to 2.000 V	±0.1% of instrument range ±1 digit			
				The read-out range can be scaled between -1999 and			
DC voltage	0 to 10 V	51	0.00 to 10.00 V	9999.			
DC voltage	-10 to 20 mV 0 to 100 mV	55 56	-10.00 to 20.00 mV 0.0 to 100.0 mV				

- Note1: The accuracy is  $\pm 0.3$ °C of instrument range  $\pm 1$  digit for a temperature range from 0°C to 100°C
- Note2: The accuracy is  $\pm 0.5^{\circ}$ C of instrument range  $\pm 1$  digit for a temperature range from -100°C to 200°C.

  \* To receive a 4-20 mA DC signal, select a standard signal of 1 to 5 V DC and connect it to a 250 $\Omega$  resistor. This resistor is optional. Model: X010-250-2 (resistor with M3.5 crimp-on terminal lugs)

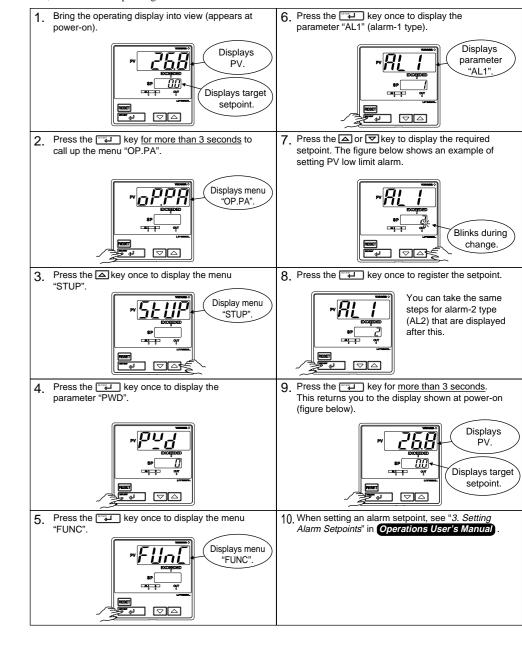
The following operating procedure describes an example of changing limit control type (factory-set default: high limit type)



# 4. Changing Alarm Type

The following operating procedure describes an example of chang- Alarm output terminals ing alarm-1 (factory-set default:PV high limit alarm) to PV low limit | Alarm-1 (terminal numbers ⑥-⑦)......PV input high limit alarm Alarm-2 (terminal numbers ⑤-⑦)......PV input low limit alarm

When you have changed alarm type, the alarm setpoint will be initialized; set the alarm setpoint again.

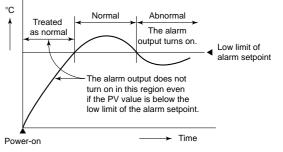


# ■ List of Alarm Types

The table below shows the alarm types and alarm actions. In the table, codes 1 to 10 are not provided with stand-by actions, while codes 11 to 20 are provided with stand-by actions.

		Alarm ty	pe code			Alarm ty	pe cod
Alarm type	Alarm action "Open/close" shows status of relay contact, and "lit" and "unlit" shows status of lamp	Contact closes if alarm occurs	Contact opens if alarm occurs	Alarm type	Alarm action "Open/close" shows status of relay contact, and "lit" and "unlit" shows status of lamp	Contact closes if alarm occurs	Conta open if alar occu
No alarm		0	FF		Hysteresis	/	
PV high limit	Open (unlit) Closed (lit)	1		De-energized on deviation low limit alarm	Open (lit)  Deviation Setpoint  Target SP  Closed (unlit)  PV  Target SP		6 16
PV low limit	Closed (lit) Alarm setpoint PV	2		Deviation high and low limits	Hysteresis Hysteresis  Closed Open (lit)  Deviation setpoint PV  Target SP	7	
Deviation high limit	Open (unlit)  Open (unlit)  Open (unlit)  Closed (lit)  PV  Deviation setpoint  Target SP	3		Deviation within high and low limits	Hysteresis Closed Hysteresis  Open (unlit) Open (unlit)  Deviation setpoint PV  Target SP	8	
Deviation low limit	Hysteresis  Closed (lit)  Open (unlit)  Deviation setpoint  A  PV  Target SP	4		De-energized on PV high limit	Closed (unlit) PV Alarm setpoint		9
De-energized on deviation high limit alarm	Closed Open (lit) Open (lit) PV Deviation setpoint Target SP		5 15	De-energized on PV low limit	Hysteresis  Open (lit)  Alarm setpoint  Closed (unlit)		10 20
Fault diagnosis output (Note 1)	Fault diagnosis output	21		FAIL output (Note 2)	The controller stops when in a FAIL state. The control output is set to "OFF", alarm output is set to "OFF" and retransmission output is set to 0%.	22	

# Stand-by Action



Note 1: The fault diagnosis output turns on in case of input burnout, A/D converter failure, or reference junction compensation (RJC) failure. In case of RJC failure, the controller continues control under the condition of "RJC=OFF".

Note 2: The FAIL output is on during normal operation and turn off in case of ROM failure, RAM failure, power

IM 05D01D21-02E (1)

User's **Manual**  Model UT350L

**Limit Controller User's Manual** 



IM 05D01D21-02E

Operations



4th Edition: Apr. 1, 2005

This manual describes key entries for operating the controller. For operations using external contact inputs. See "6. Terminal Wiring Diagrams" in Installation User's Manual . If you cannot remember how to carry out an operation during setting, press the very for more 3 seconds. This brings you to the display (operating display) that appears at power-on.

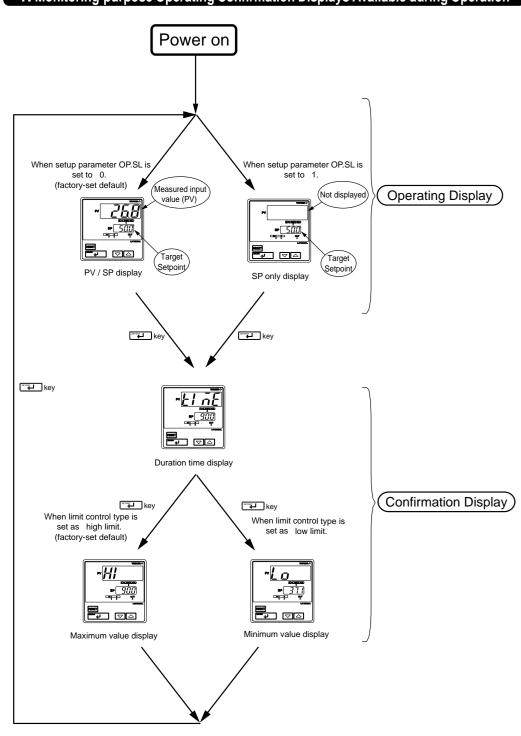
#### Contents

- 1. Monitoring-purpose Operating and Confirmation Displays Available during Operation
- 2. Setting Target Setpoint (SP)
- 3. Setting Alarm Setpoints
- 4. Confirmation of the Limit Output
- 5. Operation in Confirmation Display
- 6. Troubleshooting 7. Cleaning and Maintenance

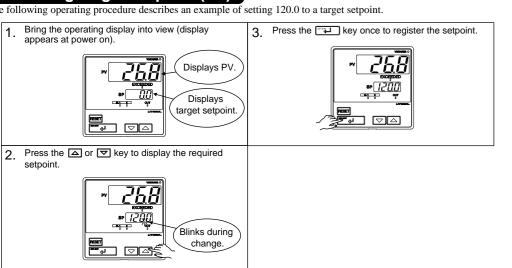
# ∧ NOTE

Do not use the instrument generating strong magnetic field such as radio equipment and the like near the controller. This may cause the fluctuation of the PV value.

# 1. Monitoring-purpose Operating Confirmation Displays Available during Operation



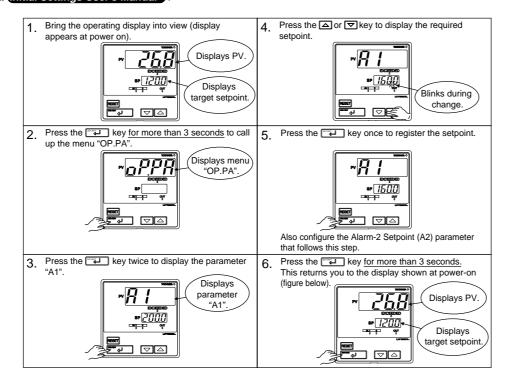
# 2. Setting Target Setpoint (SP)



# 3. Setting Alarm Setpoints

The following operating procedure describes an example of setting Alarm output terminals 160.0 to alarm-1 setpoint. Check alarm type before setting the alarm setpoint. To change the type of alarm, see "4. Changing Alarm Type"

Alarm-1 (terminal numbers (6)-(7))..........PV high limit alarm Alarm-2 (terminal numbers (5)-(7))........PV low limit alarm in Initial Settings User's Manual



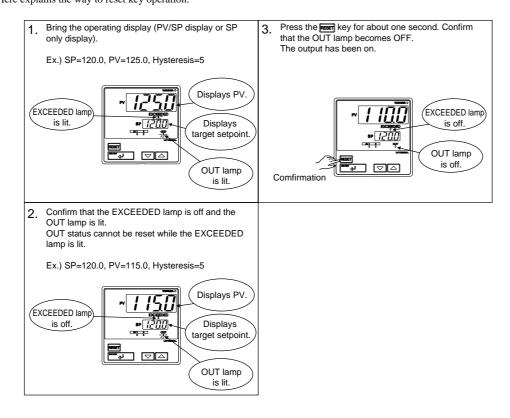
# 4. Confirmation of the Limit Output

Procedure 1) The exceeded lamp lights, and also the output lamp lights.

Procedure 2) Exceeded lamp is off when the PV recovers to the normal status where PV doesn't exceed SP, while OUTPUT lamp keeps lit until the confirmation is done.

Procedure 3) Confirmation of the limit output can be done either by a front panel or external contact input.

See "3. Description of Limit Control Functions" in Parameters and Functions User's Manual Here explains the way to reset key operation.



# ■ Confirmation of Limit Status

Limit control output and related parameter such as duration time and maximum / minimum PV value can be confirmed by a front key operation. It is possible to confirm limit control output by using external contact input. The way of confirmation

Table blow shows the item which can be confirmed by front key or external contact input according to the setting of DIS.

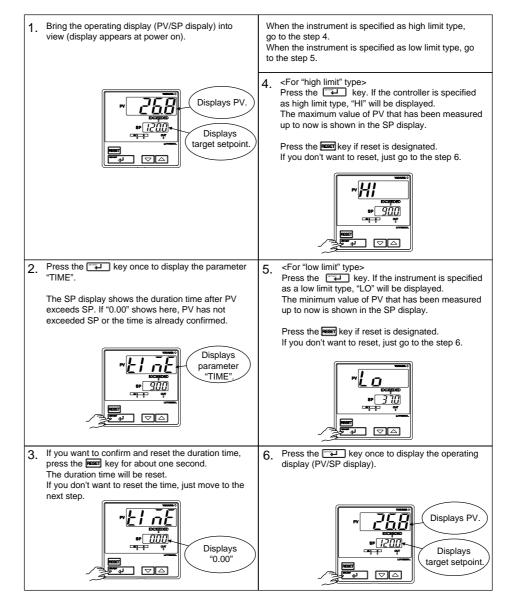
Item to be confirmed	DIS paramet	ter = KEY	DIS parameter = DI		
item to be committed	KEY	DI	KEY	DI	
Output relay	Able	Disable	Disable	Able	
Duration time	Able	Disable	Able	Disable	
Maximum / Minimum value	Able	Disable	Able	Disable	

# 5. Operation in Confirmation Display

Following parameters can be seen in the confirmation display. These parameters can be confirmed and reset by pressing the RESET key at each parameter display.

#### Duration time (TIME)

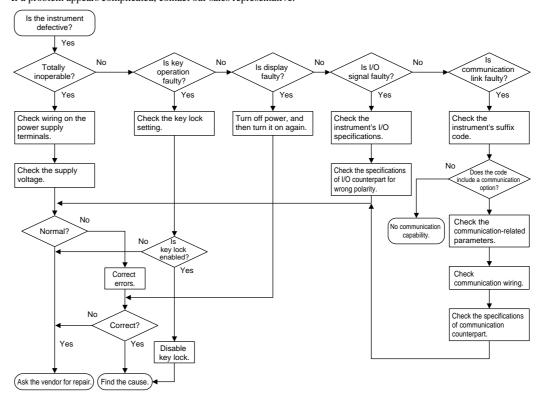
Maximum value of PV (HI) or Minimum value of PV (LO)



# 6. Troubleshooting

# ■ Troubleshooting Flow

If the operating display does not appear after turning on the controller's power, follow the measures in the procedure below. If a problem appears complicated, contact our sales representative.



# **IMPORTANT**

Take note of the parameter settings when asking the vendor for repair.

# ■ Errors at Power On

The following table shows errors that may be detected by the fault diagnosis function when the power is turned on.

Error indication (on PV display unit)	Description of error	PV	Control output	Alarm output	Retransmission output	Communi- cation	Remedy
<i>E [] [] []</i> (E000)	Faulty RAM				00/	0	
<i>E □□ 1</i> (E001)	Faulty ROM	None	0% or less or OFF	OFF	0% or less Stopped	Stopped	Faulty Contact us
<i>E002</i> (E002)	System data error	0%	01 01 1		0%		
PV decimal point blinks.	Faulty calibration value	Normal action (out of accuracy)	Normal action (out of accuracy)	Normal action (out of accuracy)	Normal action (out of accuracy)	Normal action	for repair.
<i>E Ч₿₿</i> (E400)	Parameter error	0%	OFF	OFF	0%		Check and set the parameters as they have been set to the limited values.

#### ■ Possible Errors during Operation

Error indication (on PV display unit)	Description of error	PV	Control output	Alarm output	Retransmis- sion output	Commu- nication	Remedy
Displays "RJC" and PV alternately	RJC error	Measured with RJC=0	Normal action	Normal action	Normal action	Normal action	Faulty Contact us for repair.
PV value blinks.	EEPROM error	Normal action	Normal action	Normal action	Normal action	Normal action	
<i>E ∃00</i> (E300)	A/DC error	105%	Normal action	Normal action	Normal action	Normal action	
b.o.ll.E (B.OUT)	PV burnout error	Dependent on the BSL parameter Up-scale: 105% Down-scale: -5%	Normal action	Normal action	Normal action	Normal action	Check wires and sensor.
ฉูนีr (OVER) or - ฉูนีr(-OVER)	Excessive PV Out of -5 to 105%	-5% or 105%	Normal action	Normal action	Normal action	Normal action	Check process.
SP decimal point blinks. (on setpoint display unit)	Faulty communi- cation line	Normal action	Normal action	Normal action	Normal action	Normal action	Check wires and communication parameters, and make resetting. Recovery at normal receipt
All indications off	Runaway (due to defective power or noise)	None	0% or less or OFF	OFF	0% or less	Stopped	Faulty if power off/on does not reset start the unit. Contact us for repair.
All indications off	Power off	None	0%	OFF	0%	Stopped	Check for abnormal power.

### ■ If a Power Failure Occurs during Operation

#### Momentary power failures shorter than 20 ms

The controller is not affected at all and continues normal operation.

#### Power failures of 20 ms or longer

- The alarm function of the controller continues to work normally. (Alarms with the stand-by feature temporarily return
- Setting parameters that have already been configured retain their settings. • After recovery from a power failure, limit control status is reset.

# ■ Troubleshooting When the Controller Fails to Operate Correctly

If your control tasks are not successful, check the preset parameters and controller wiring before concluding the controller to be defective. The following show examples of troubleshooting you should refer to in order to avoid the possibility of other problems.

# The controller does not show the correct measured value (PV).

• The UT350L controllers have a universal input.

The type of PV input can be set/changed using the parameter "IN". At this point, the controller must be wired correctly according to the selected type of PV input. Check the wiring first if the controller fails to show the correct PV. To do this, refer to Initial Settings User's Manual

With the parameters "RH", "RL", "SDP", "SH" and "SL", it is possible to scale the input signal and change its number of decimal places. Also check that these parameters are configured correctly.

# 7. Cleaning and Maintenance

# ■ Cleaning

Use a dry cloth and wipe gently to clean the product's front panel, keys, and other areas.

M NOTE

Do not use solvents such as alcohol or benzine

# ■ Replacing the Mounting Bracket

If the mounting bracket is damaged or lost, order a replacement using the following serial number and sales unit.

One pair (upper and lower bracket)

# ■ Limited Life Componets and Maintenance

The parts used in this product that have an especially limited life are shown below.

Part No.	Service Life
Aluminum electrolytic capacitor	About 10 years (Estimated)
Non-volatile memory	Can be written to up to 100,000 times
Alarm output relay	100,000 times
Limit control output relay (Note)	100,000 times

Note) Limit control output relay can be replaced by users

IM 05D01D21-02E (2)



# Model UT350L







# Parameters and Functions



4th Edition: Apr. 1, 2005

Yokogawa Electric Corporation

This manual contains a parameter map as a guideline for setting parameters, and lists of parameters for recording User

# Contents

- 1. Basic Key Operation Sequence and Parameter Map
- 2. Lists of Parameters
- 3. Description of Limit Control Functions 4. Parameters in the Confirmation Displays
- 5. Function Block Diagram

# 1. Basic Key Operation Sequence and Parameter Map



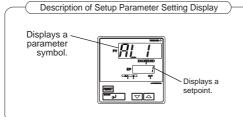
Displays the operating parameter menu symbol "OP.PA".

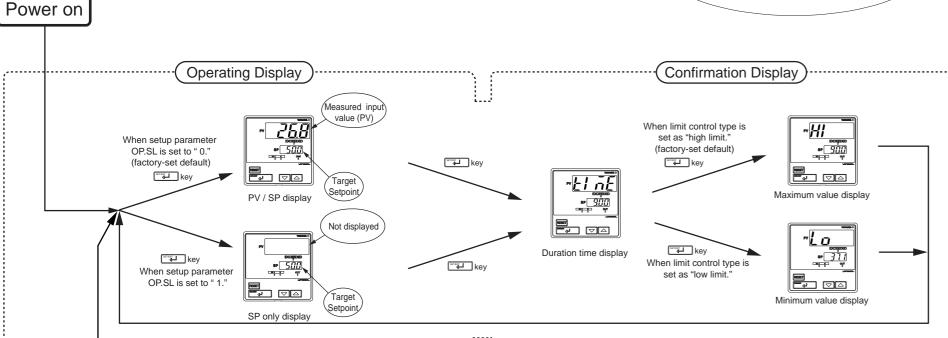
Description of Operating Parameter Menu Display

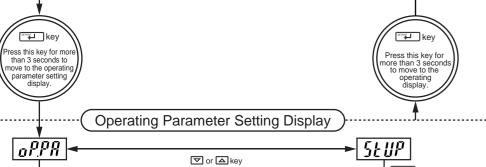
ap qr

Description of Operating Parameter Setting Display

· | | | |

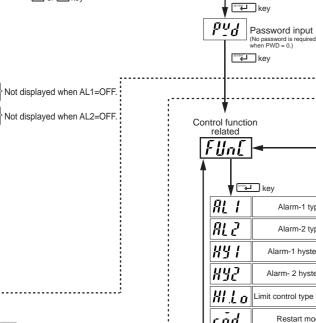






- (2) Pressing the key to register it.
- operating parameter setting display
- returns you to the operating display.
- returns you to the operating display.

# You cannot return to the operating parameter setting display from the setup parameter setting



dLn

Rdr

rPŁ

lkey ∟

Data length

Address

Minimum response time

Not displayed when AL2=OFF. Alarm-2 setpoint PV input filter PV input bias Limit control output hysteresis

To switch the parameter display, press the key.

key

Target setpoint

Alarm-1 setpoint

**-**| 5*P* |

RI

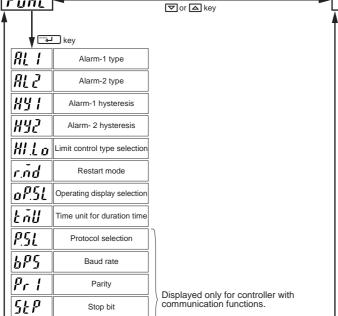
 $|R_{c}|$ 

FL

65

∧ NOTE

Changing the registered value of a setup parameter may cause the registered value of an operating parameter to be initialized automatically. Thus, when you have changed a setup parameter, always check that the registered value of the operating parameter is appropriate. If it is initialized to default, reset it to the required value.



PV input unit input range Minimum value of PV input range PV input SdP decimal point position Maximum value of PV input scale Displayed at voltage input. Minimum value of PV input scale Presence/absence of PV input rul reference junction compensa Selection of PV input burnout action 656 Retransmission output type rEE Maximum value of r <u>t</u> X retransmission output scale Minimum value of transmission output scale d! 5 The way of confirmation Loly Key lock

# setup parameter menu symbol "FUNC" or "I/O". \$P \_\_\_\_\_\_

Description of Setup Parameter Menu Display

If you become unsure of key operation during parameter

# setting, hold down the key for more than 3 seconds. This returns you to the display at power-on (i.e., operating display).



- 2. A numerical value is changed by (1) Using the ♥ or ▲ key to change a displayed value (decimal point blinking) and
- 3. Pressing the key on an operating display (for more than 3 seconds) brings you to the
- 4. Pressing the key on the operating parameter setting display (for more than 3 seconds)
- 5. Pressing the key on the setup parameter setting display (for more than 3 seconds)

Setup Parameter Setting Display

1 20 E≡⊒ key l n

> pud E key

.....

# 2. Lists of Parameters

# Operating Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setting
<b>5</b> p (SP)	Target setpoint	0.0 to 100.0% of PV input range	0.0% of PV input range	
(A1)	Alarm-1 setpoint	PV alarm: -100.0 to 100.0% of PV input range Deviation alarm: -100.0 to 100.0% of PV input range span	PV high limit alarm: 100.0% of PV input range Deviation alarm: 0.0% of PV	
[A2)	Alarm-2 setpoint	Tungo opun	input range span Other PV low limit alarm: 0.0% of PV input range	
F L	PV input filter	OFF, 1 to 120 seconds. Used when the PV input fluctuates.	OFF	
<b>L</b> (BS)	PV input bias	-100.0% to 100.0% of PV input range span Used to correct the PV input range.	0.0% of PV input range span	
<b>H</b> (H)	Limit control output hysteresis	O.0 to 100.0% of PV input range span  In case of HIGH LIMIT  Output  On  Off  In case of LOW LIMIT  Output  Output  Output  Output  On  Off  Off  Output  Outp	0.5% of PV input range span	

### ■ Setup Parameters

# Control Function-related Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	User Setti
AL1)	Alarm-1 type	OFF, 1 to 22  1: PV high limit (energized, no stand-by action)  2: PV low limit (energized, no stand-by action)  3: Deviation high limit (energized, no stand-by action)	1	
	Alarm-2 type	4: Deviation low limit (energized, no stand-by action) 5: Deviation high limit (de-energized, no stand-by action) 6: Deviation low limit (de-energized, no stand-by action) See "List of Alarm Types" in (nitial Settings User's Manual).	2	
HY1)	Alarm-1 hysteresis	0.0 to 100.0% of PV input range span  Hysteresis for PV high limit alarm Point of on-off action (Alarm setpoint)	0.5% of PV input range span	
HY2)	Alarm-2 hysteresis	Off		
HILLO) Q	Limit control type selection	HI: High limit, LO: Low limit	н	
r in di (R.MD)	Restart mode	0: Limit output is ON at power on in any cases, 1: Limit output is OFF at power on when PV doesn't exceed SP	0	
OP.SL)	Operating display selection	0: PV/SP display first, 1: SP only display first	0	
L , III	Time unit for duration time	0: hour and minute 1: minute and second	0	
[] [ ] [ [ ] [ ] [ ] [ ] [ ] [ ] [ ] [	Protocol selection	O: PC link communication 1: PC link communication (with sum check) 2: Ladder communication	0	
LITI DISI	Baud rate	0: 600, 1: 1200, 2: 2400, 3: 4800, 4: 9600 (bps)	4	
Fr.	Parity	0: None 1: Even 2: Odd	1	
STP)	Stop bit	1, 2	1	
<u>rii</u> n	Data length	7, 8: Fixed at 8, when the P.SL parameter is set to Ladder Communication.	8	
Äğr (ADR)	Address	1 to 99 However, the maximum number of stations connectable is 31.	1	
r j j (RP.T)	Minimum response time	0 to 10 (× 10 ms)	0	

# Input-/Output-related Parameters

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value	
i n	PV input type (INPUT terminals) (1) - (2) - (3)terminals	OFF, 1 to 18, 30, 31, 35 to 37, 40, 41, 50, 51, 55, 56 See Instrument Input Range Codes in <i>Initial Settings</i> User's Manual.	1	Ī
UNIT) L	PV input unit	°C: degree Celsius °F: Fahrenheit  (This parameter is not shown for voltage input.)	°F	
r H (RH)	Max. value of PV input range	Set the PV input range, however RL < RH.  -Temperature input Set the range of temperature that is actually controlled.  - Voltage input	Max. value of instrument input range	
(RL)	Min. value of PV input range	Set the range of a voltage signal that is applied.  The scale across which the voltage signal is actually controlled should be set using the parameters Maximum Value of PV Input Scale (SH) and Minimum Value of PV Input Scale (SL).	Min. value of instrument input range	
C J D J D D D D D D D D D D D D D D D D D	PV input decimal point position (displayed at voltage input)	0 to 3 Set the position of the decimal point of voltage-mode PV input. 0: No decimal place 1: One decimal place 2, 3: Two, three decimal places	1	
TH JH (SH)	Max. value of PV input scale (displayed at voltage input)	-1999 to 9999, however SL < SH Set the read-out scale of voltage-mode PV input.	100.0	
51 <sub>(SL)</sub>	Min. value of PV input scale (displayed at voltage input)		0.0	
(RJC)	Presence/absence of PV input reference junction compensation	OFF, ON	ON	
J T J D JL (BSL)	Selection of PV input burnout action	OFF 1: Up scale 2: Down scale	1	
r <b>F</b> J (RET)	Retransmission output type	1: PV, 2: SP	1	
(RTH)	Max. value of retransmission output scale	RTL + 1 digit to 100.0% of PV input range	100.0% of PV input range	
r <u>I I</u>	Min. value of retransmission output scale	0.0% of PV input range to RTH - 1 digit	0.0% of PV input range	
(DIS)	The way of confirmation	KEY: By key operation. DI: By contact output, only the limit output can be confirmed.	KEY	
L OCK)	Key lock	OFF: No key lock ON: Change to any parameter prohibited Prohibits any operating parameter or setup parameter from being changed. The setpoint of the LOCK parameter itself can be changed, however.	OFF	
būd	Password setting	0: Password not set 1 to 9999	0	Ī

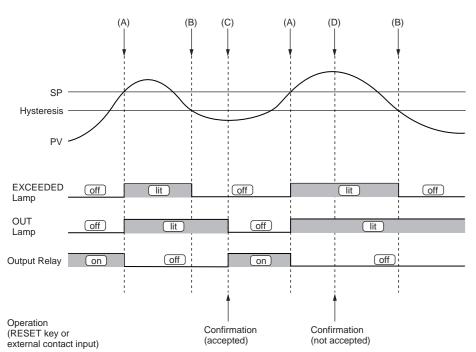
IM 05D01D21-03E (1)

# 3. Description of Limit Control Functions

### ■ In Case of High Limit Control

When a measured value (PV) exceeds a setpoint (SP). "EXCEEDED" lamp lights, and "OUT" lamp turns ON (point A). The limit control output relay is de-energized then.

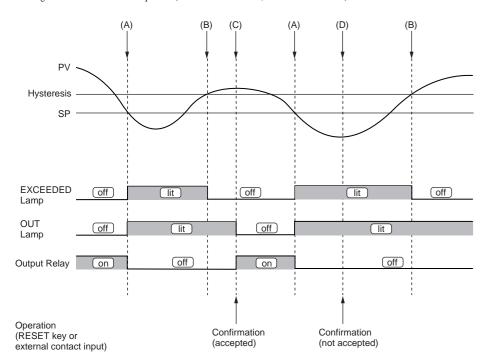
"EXCEEDED" lamp turns off when PV goes into normal condition, while "OUT" lamp stays on as it is (point B). "OUT" lamp turns off when a confirming operation is done by an operator (point C). The way to confirm is pushing the "RESET" key (or by an exeternal contact, according to the setting of setup parameter DIS). The confirming operation is not accepted during PV exceeds SP (point D). State of output relay is de-energized whenever "OUT" lamp is on. (NC terminal : CLOSE, NO terminal : OPEN)



# ■ In Case of Low Limit Control

When a measured value (PV) exceeds a setpoint (SP). "EXCEEDED" lamp lights, and "OUT" lamp turns ON (point A). The limit control output relay is de-energized then.

"EXCEEDED" lamp turns off when PV goes into normal condition, while "OUT" lamp stays on as it is (point B). "OUT" lamp turns off when a confirming operation is done by an operator (point C). The way to confirm is pushing the "RESET" key (or by an exeternal contact, according to the setting of setup parameter DIS). The confirming operation is not accepted during PV exceeds SP (point D). State of output relay is de-energized whenever "OUT" lamp is on. (NC terminal : CLOSE, NO terminal : OPEN)



### ■ Power on Status

The state of output relay at power-on can be set by a setup parameter restart mode R.MD.

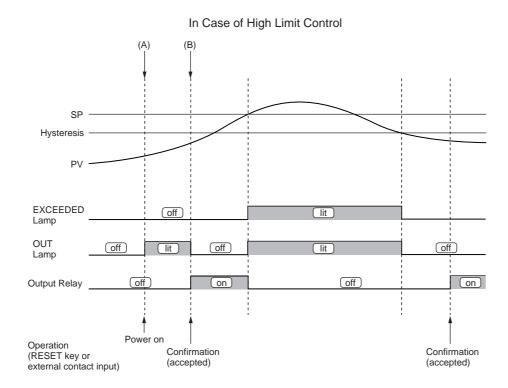
#### Setup Parameters

#### Restart mode R.MD:

- 0 : Limit output relay is de-energized at power on.
- 1 : Limit output relay is energized at power on.

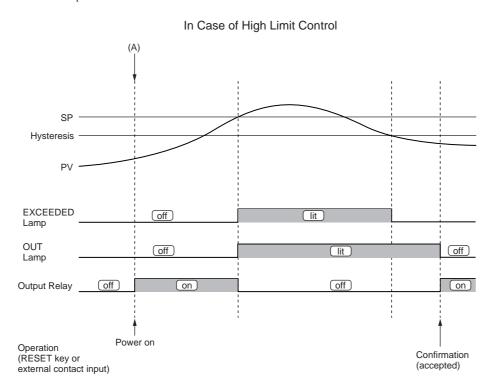
### When parameter R.MD is set to 0.

The limit output relay is always de-energized at power on, even if PV doesn't exceed SP (point A). (NC terminal : CLOSE, NO terminal : OPEN). "OUT" lamp is lit. After the confirmation, state of output relay is energized (NC terminal : OPEN, NO terminal : CLOSE) and "OUT" lamp turns off, if the PV doesn't exceed SP (point B).



#### When parameter R.MD is set to 1.

The limit output relay is always energized at power on (point A) (NC terminal : OPEN, NO terminal : CLOSE) and "OUT" lamp is off, except when PV exceeds SP at power on.



# 4. Parameters in the Confirmation Displays

#### ■ Duration Time

The time while PV exceeds SP is counted and stored in the memory. It is displayed in the "TIME" display in the confirmation display.

### Display time range: 0.00 to 99.59

Unit of time is be either "hour.minute" or "minute.second", and can be set by setup parameter TMU.

### - To RESET

- Push "RESET" key for about one second to reset the duration time in the confirmation display where "TIME" is displayed. When the count are reset, "0.00" is displayed until PV exceeds SP again.
- The time count are reset when power is turned on.
- If PV exceeds SP during the old time count data is retained in the memory, the old data should be automatically reset, and the new time counting starts from "0.00".
- It is impossible to reset the time count while PV exceeds SP by any operation. - Duration time cannot be reset by an external contact input.

### ■ Maximum / Minimum Value

The maximum value or minimum value of PV is stored in the memory and display in the "HI" or "LO" display in the confirmation display. When the control type is specified as high limit control, the maximum value is displayed in the "HI" display, and control type is specified as low limit control, the maximum value is displayed in the "LO" display. When the PV exceeds SP and then returns to the normal status, Maximum / Minimum Value is retained as it is, but when PV exceeds SP again,

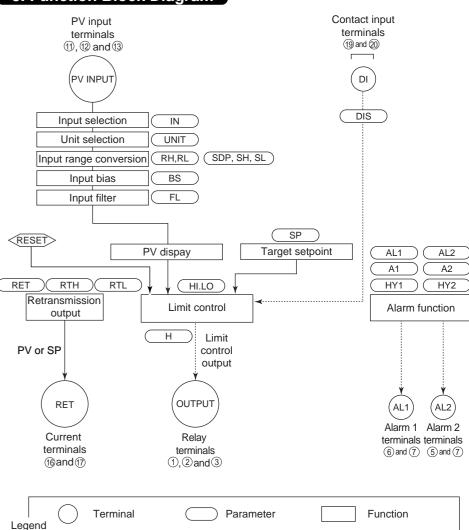
it is automatically reset and starts taking new value for its minimum / maximum value.

### - To RESET

- Push the "RESET" key for about one second to reset the maximum / minimum value in the confirmation display where "HI" or "LO" is displayed. The value is reset, and the value immediately after the confirmation should be recognized as a maximum or
- When the power is turn on, the memory should be reset and the first PV should be recognized as maximum.
- Maximum / Minimum value cannot be reset by an external contact input. - It is impossible to reset the maximum / minimum value while PV exceeds SP by any operation.

5. Function Block Diagram

→ Analog signal



·····> Contact signal

> Front panel key

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