

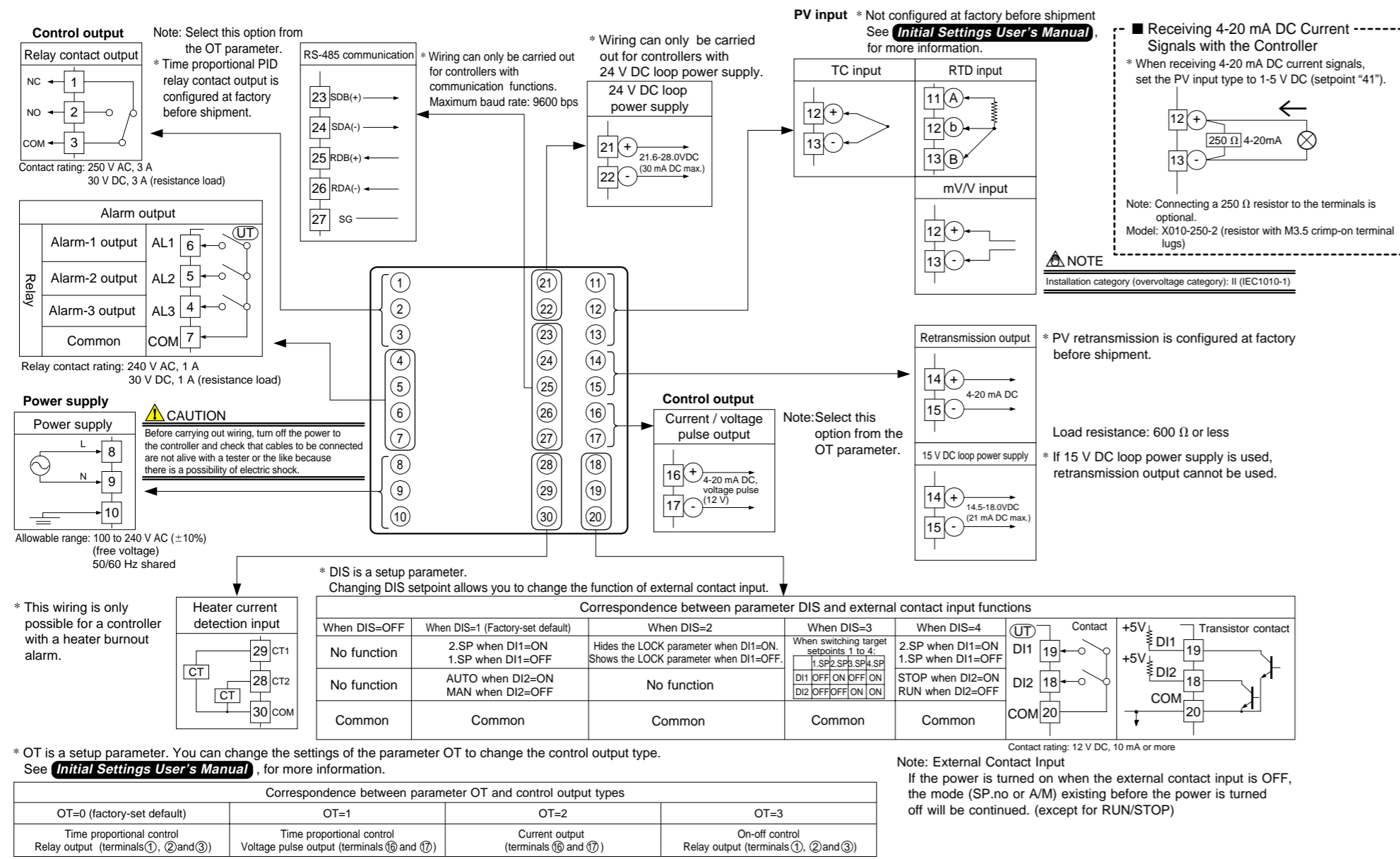


## 6. Terminal Wiring Diagrams

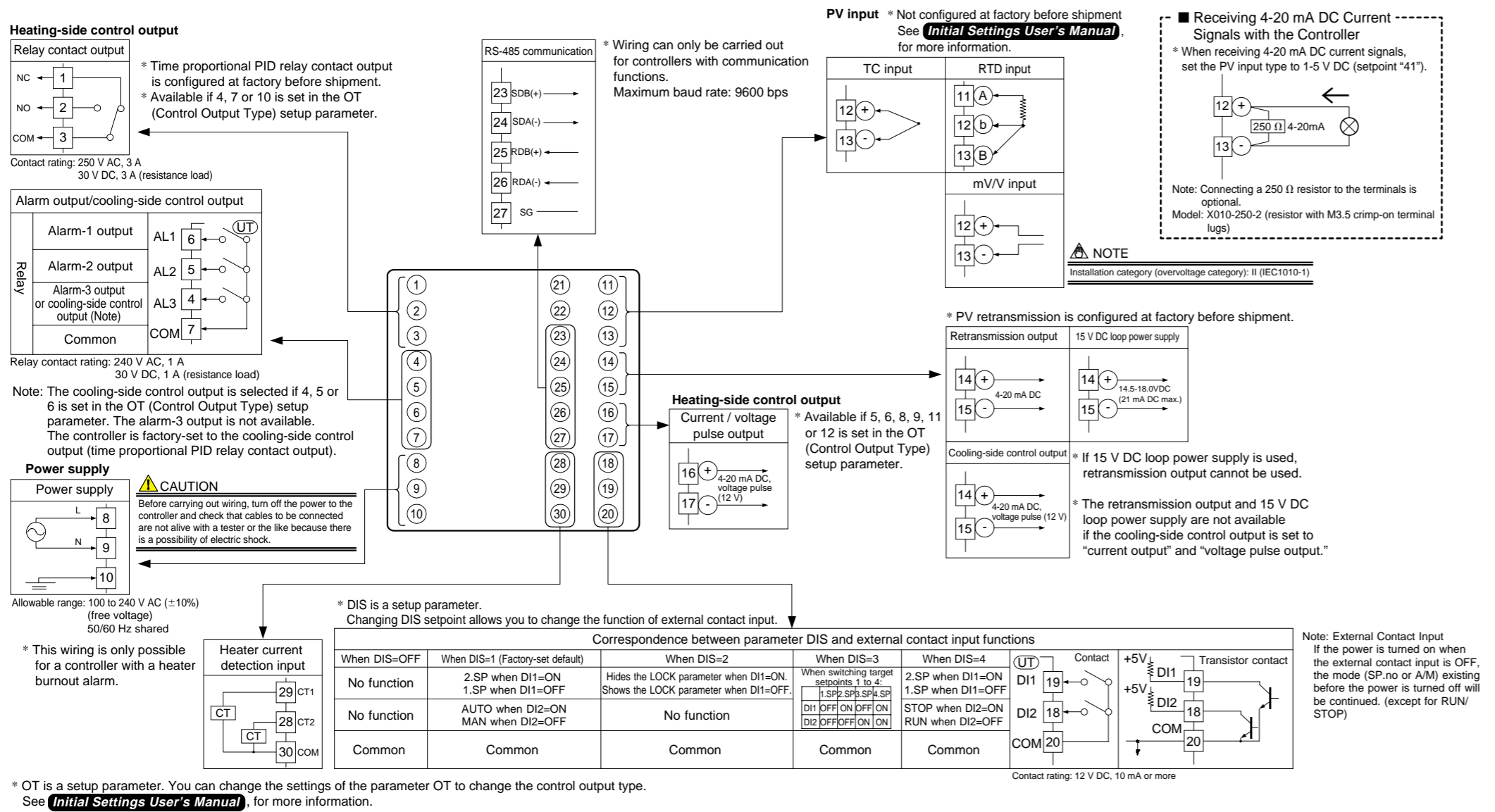
NOTE

Do not use unassigned terminals as relay terminals.

### UT350 Standard Type (Model UT350-0□ or UT350-3□) or Heating/Cooling type (Model UT350-2□)



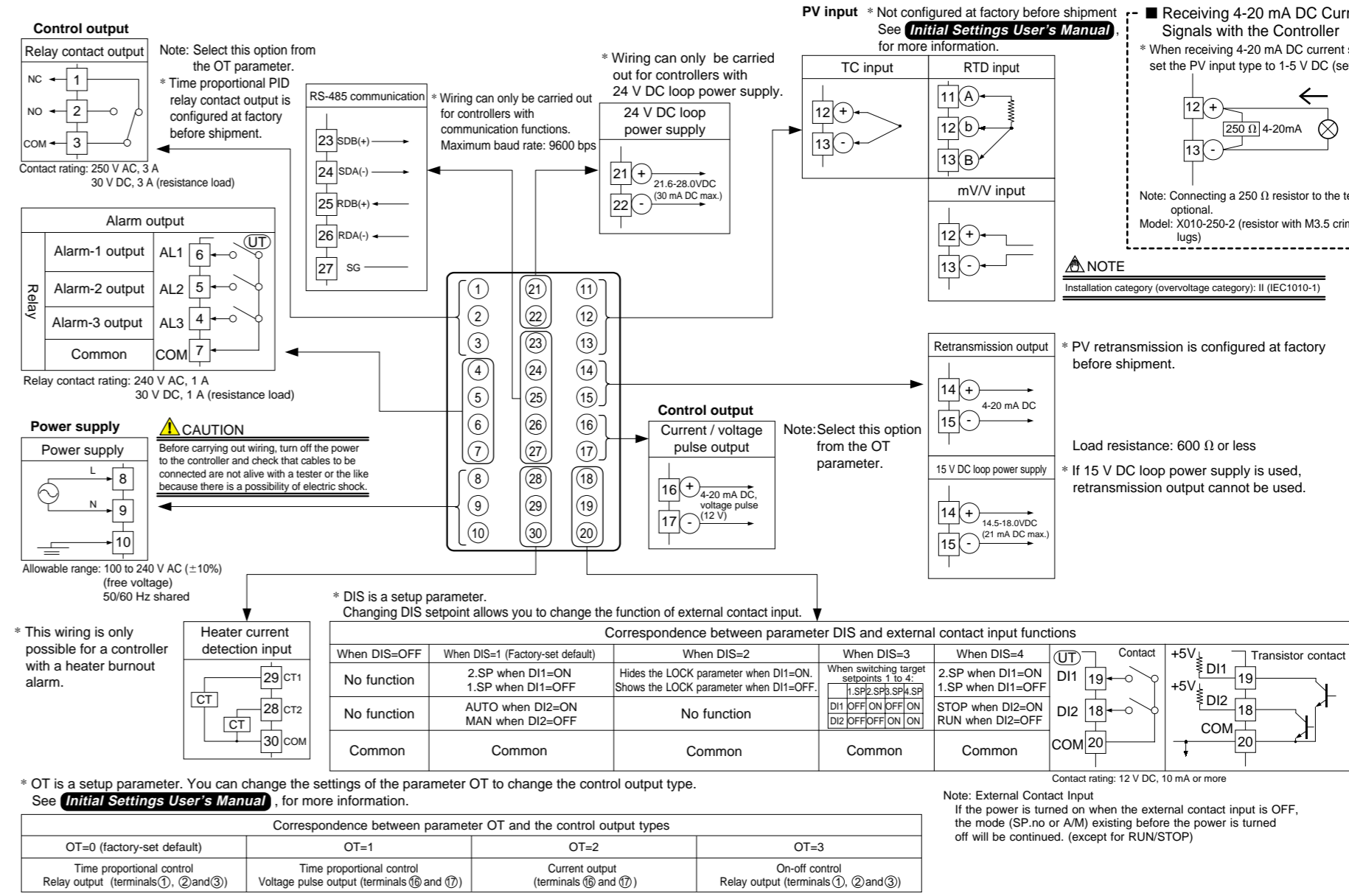
### UT350 Heating/Cooling Type (Model UT350-2□)



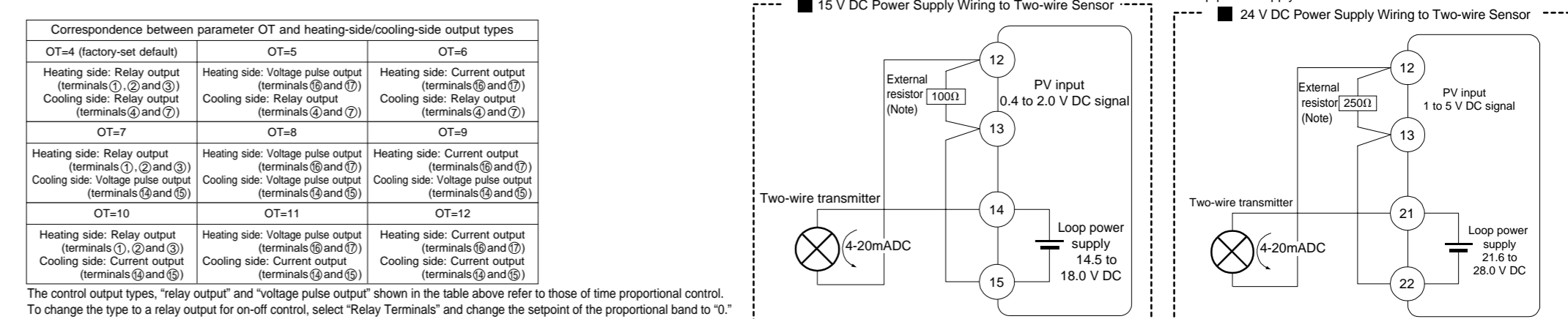
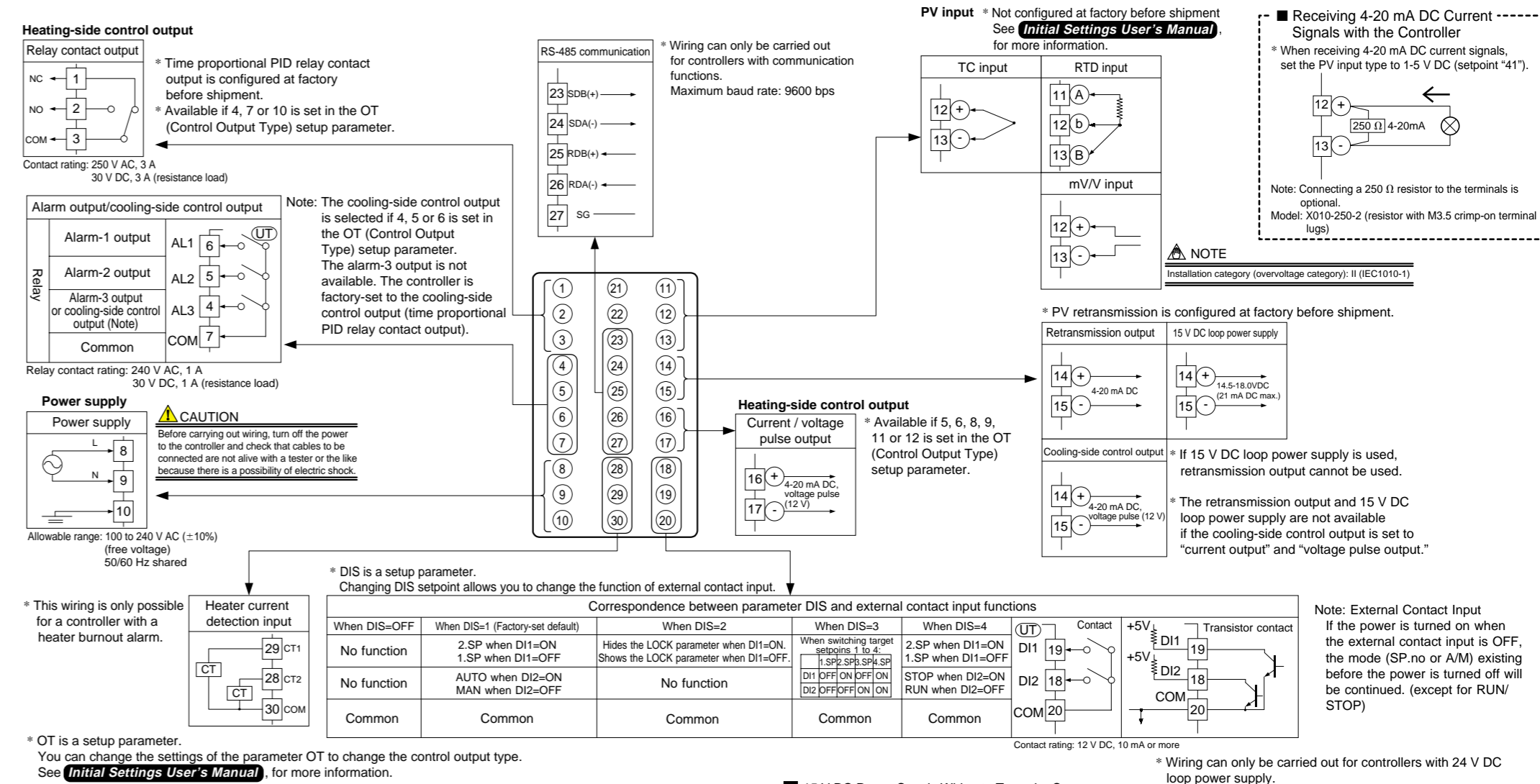
\* OT is a setup parameter. You can change the settings of the parameter OT to change the control output type. See **Initial Settings User's Manual** for more information.

The control output types, "relay output" and "voltage pulse output" shown in the table above refer to those of time proportional control. To change the type to a relay output for on-off control, select "Relay Terminals" and change the setpoint of the proportional band to "0."

### UT320 Standard Type (Model UT320-0□ or UT320-3□) or Heating/Cooling type (Model UT320-2□)



### UT320 Heating/Cooling Type (Model UT320-2□)

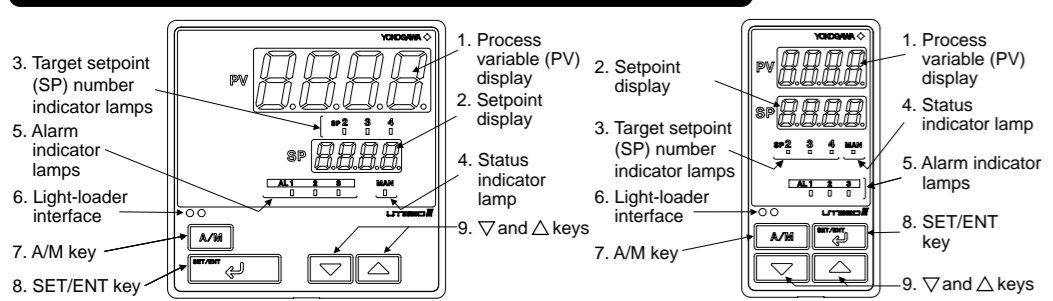


This manual describes examples of setting PV input types, control output types, and alarm types. Carrying out settings described herein allows you to perform basic control. Refer to examples of various settings to understand how to set parameters required. Refer to "1. Parameter Map" in *Parameters User's Manual* for an easy to understand explanation of setting various parameters. If you cannot remember how to carry out an operation during setting, press the  $\nabla$  and  $\Delta$  keys for more than 3 seconds. This brings you to the display (operating display) that appears at power-on.

**Contents**

- Names and Functions of Front Panel Parts
- Setting PV Input Type (Setting First at Power-on)
- Changing PV Input Type
- Setting Control Output Type
- Changing Alarm Type
- Description of Multiple Setpoints and PID

**1. Names and Functions of Front Panel Parts**



Name of Part	Function
1. Process variable (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) or the output value (OUT) during operation. Displays the set value of parameters on the parameter setting display.
3. Target setpoint (SP) number indicator lamps	When the SP number currently used for operation is 2, 3 or 4, the respective SP No. indicator lamp lights. When the SP number is 1, the lamp does not light.
4. Status indicator lamp	Is lit in green during manual operation. MAN: Is lit when in manual mode. Blinks during auto-tuning.
5. Alarm indicator lamps	If any of alarms 1 to 3 occurs, the respective alarm indicator lamp (AL1 to AL3) is lit (in orange).
6. Light-loader interface	Interface for an adapter cable used when setting and storing parameters from a PC. This requires an optional parameter setting tool.
7. A/M key	Used to switch between the AUTO and MAN modes. Each time you press the key, it switches to the AUTO or MAN mode alternately.
8. 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.
9. $\nabla$ and $\Delta$ keys	Used to change numerical values. On setting displays for various parameters, you can change target setpoints, parameters, and output values (in manual operation). Pressing the $\nabla$ key decreases a numerical value, while pressing the $\Delta$ 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.

Although only figures of the UT350 front panel are cited in "2. Setting PV Input Type (Setting First at Power-on)," and thereafter, the UT320 is identical to the UT350 in terms of front panel operation.

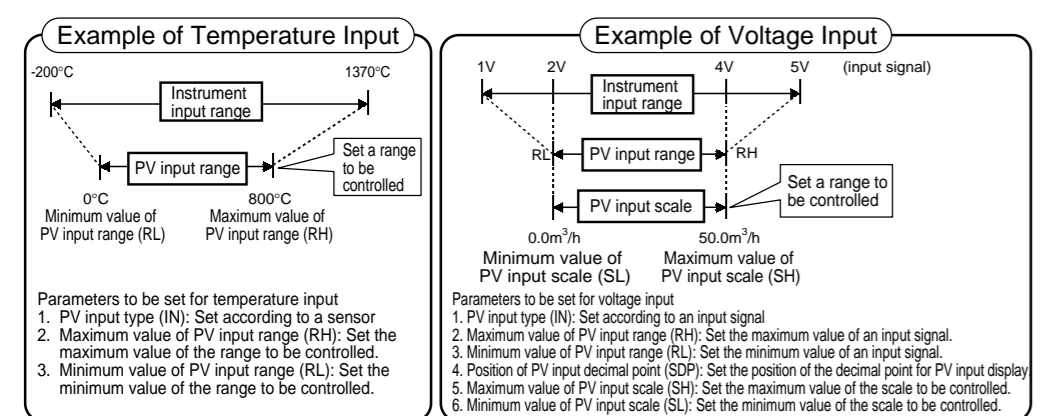
**Setting of Main Parameters at the Factory before Shipment**

Item	Factory-set defaults for standard type controllers	Factory-set defaults for heating/cooling type controllers
Control output	Time proportional PID relay output (variable)	Heating side: Time proportional PID relay output (variable) Cooling side: Time proportional PID relay output (variable)
Control action	Reverse action (variable)	Not specified
PID parameter	P = 5.0%, I = 240 seconds, D = 60 seconds.	
Alarm output	Alarm-1: PV high limit, Alarm-2: PV low limit, Alarm-3: PV high limit	

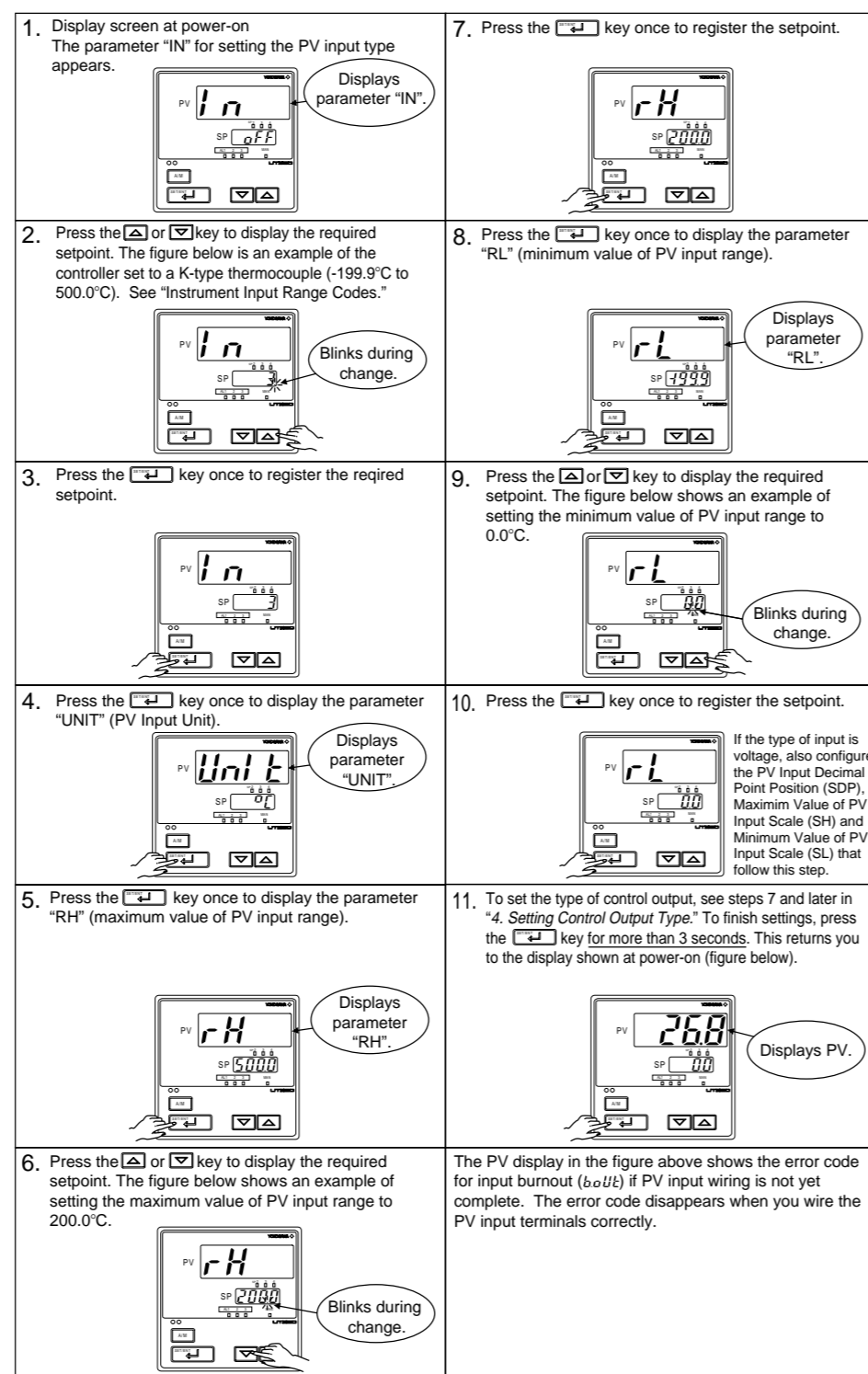
**2. Setting PV Input Type (Setting First at Power-on)**

**NOTE**

- The controller displays the operating display when the power is turned on. However, if PV input type has not been set, "IN" appears. In this case, first use the  $\Delta$  key to display the input range code to use, then press the  $\nabla$  key to register it. Then, set the maximum value (RH) and minimum value (RL) of the PV input range (for voltage input, set the maximum value (SH) and minimum value (SL) of the PV input scale).
- 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 User's Manual* and change parameter values as necessary.



The following operating procedure describes an example of setting the controller to a K-type thermocouple (-199.9°C to 500.0°C) and the measurement range of 0.0°C to 200.0°C.



**Instrument Input Range Codes**

Input	Type	Instrument Input Range Code	Instrument Input Range	Measurement Accuracy	
Unspecified		OFF	Set the data item PV Input Type 'IN' to the OFF option to leave the PV input type undefined.		
K		1	-200 to 1370°C -300 to 2500°F	Set the data item PV Input Type 'IN' to the OFF option to leave the PV input type undefined.	
		2	-199.9 to 999.9°C 0 to 2300°F		
		3	-199.9 to 500.0°C -199.9 to 999.9°F		±0.1% of instrument range ±1 digit for temperatures equal to or higher than 0°C
		4	-199.9 to 999.9°C -300 to 2300°F		±0.2% of instrument range ±1 digit for temperatures below 0°C
		5	-199.9 to 400.0°C -300 to 750°F		
		6	0.0 to 400.0°C -199.9 to 750.0°F		
J		7	0 to 1800°C 32 to 3300°F	±0.15% of instrument range ±1 digit for temperatures equal to or higher than 400°C ±5% of instrument range ±1 digit for temperatures below 400°C	
		8	0 to 1700°C 32 to 3100°F		
		9	0 to 1700°C 32 to 3100°F	±0.15% of instrument range ±1 digit	
		10	-200 to 1300°C -300 to 2400°F	±0.1% of instrument range ±1 digit ±0.25% of instrument range ±1 digit for temperatures below 0°C	
		11	-199.9 to 999.9°C -300 to 1800°F		
		12	-199.9 to 900.0°C -300 to 1300°F	±0.1% of instrument range ±1 digit for temperatures equal to or higher than 0°C	
T		13	-199.9 to 400.0°C -300 to 750°F	±0.2% of instrument range ±1 digit for temperatures below 0°C	
		14	0.0 to 400.0°C -199.9 to 750.0°F		
		15	0 to 2300°C 32 to 4200°F	±0.2% of instrument range ±1 digit	
		16	0 to 1390°C 32 to 2500°F	±0.1% of instrument range ±1 digit	
		17	0 to 1900°C 32 to 3400°F	±0.5% of instrument range ±1 digit for temperatures equal to or higher than 800°C No guarantee of accuracy for temperatures below 800°C	
		18	0 to 2000°C 32 to 3600°F	±0.2% of instrument range ±1 digit	
RTD		19	-199.9 to 500.0°C -199.9 to 999.9°F	±0.1% of instrument range ±1 digit (Note1) (Note2)	
		20	-150.0 to 150.0°C -199.9 to 300.0°F	±0.2% of instrument range ±1 digit (Note1)	
		21	-199.9 to 850.0°C -300 to 1560°F		
		22	-199.9 to 500.0°C -199.9 to 999.9°F	±0.1% of instrument range ±1 digit (Note1) (Note2)	
		23	-150.0 to 150.0°C -199.9 to 300.0°F	±0.2% of instrument range ±1 digit (Note1)	
		24	0 to 2000°C 32 to 3600°F		
Standard signal		25	0.4 to 2 V 1 to 5 V	±0.1% of instrument range ±1 digit	
		26	0 to 2 V 0 to 10 V	0.000 to 2.000 V 0.000 to 10.000 V	
		27	0 to 10 mV 0 to 100 mV	-10.00 to 20.00 mV 0.00 to 100.0 mV	
		28	1 to 5 V 1 to 5 V	1.000 to 5.000 V 0.000 to 2.000 V	
		29	0 to 2 V 0 to 10 V	0.000 to 2.000 V 0.000 to 10.000 V	
		30	0 to 10 mV 0 to 100 mV	-10.00 to 20.00 mV 0.00 to 100.0 mV	

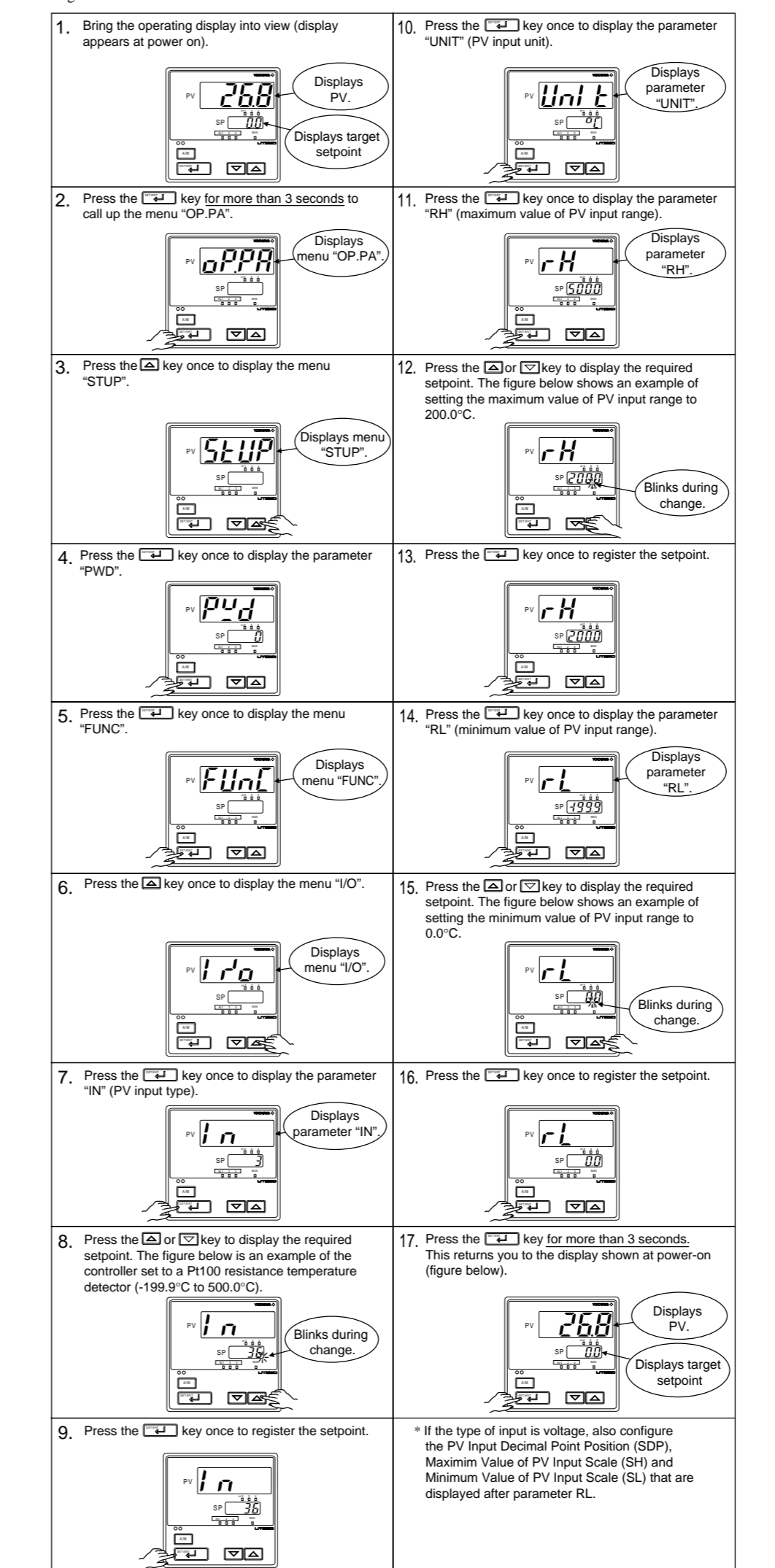
\* Performance in the standard operating condition (at 23±2°C, 55±10%RH, and 50/60Hz power frequency)  
 Note1: The accuracy is ±0.3°C of instrument range ±1 digit for a temperature range from 0°C to 100°C.  
 Note2: The accuracy is ±0.5°C of instrument range ±1 digit for a temperature range from -100°C 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 250Ω resistor. This resistor is optional.  
 Model: X010-250-2 (resistor with M3.5 crimp-on terminal lugs)

**NOTE**

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.

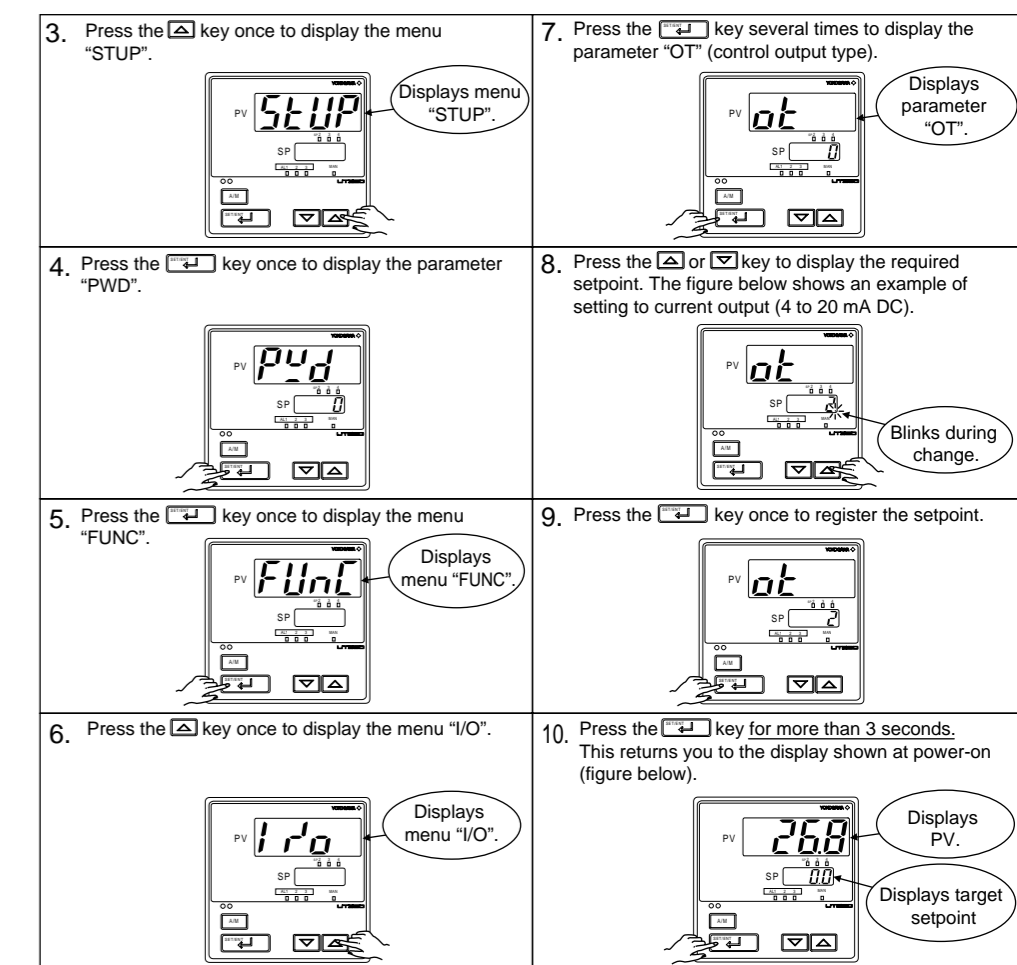
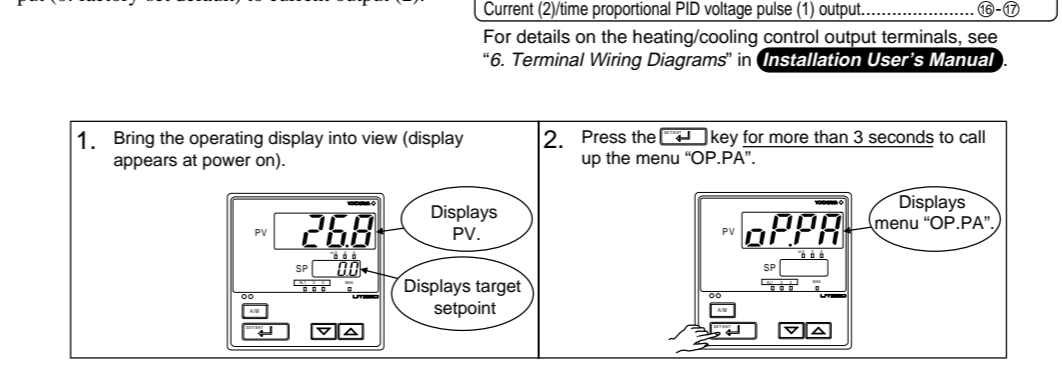
**3. Changing PV Input Type**

The following operating procedure describes an example of changing the K-type thermocouple (-199.9°C to 500.0°C) to a Pt100 resistance temperature detector (-199.9°C to 500.0°C) and setting the measurement range of 0.0°C to 200.0°C.



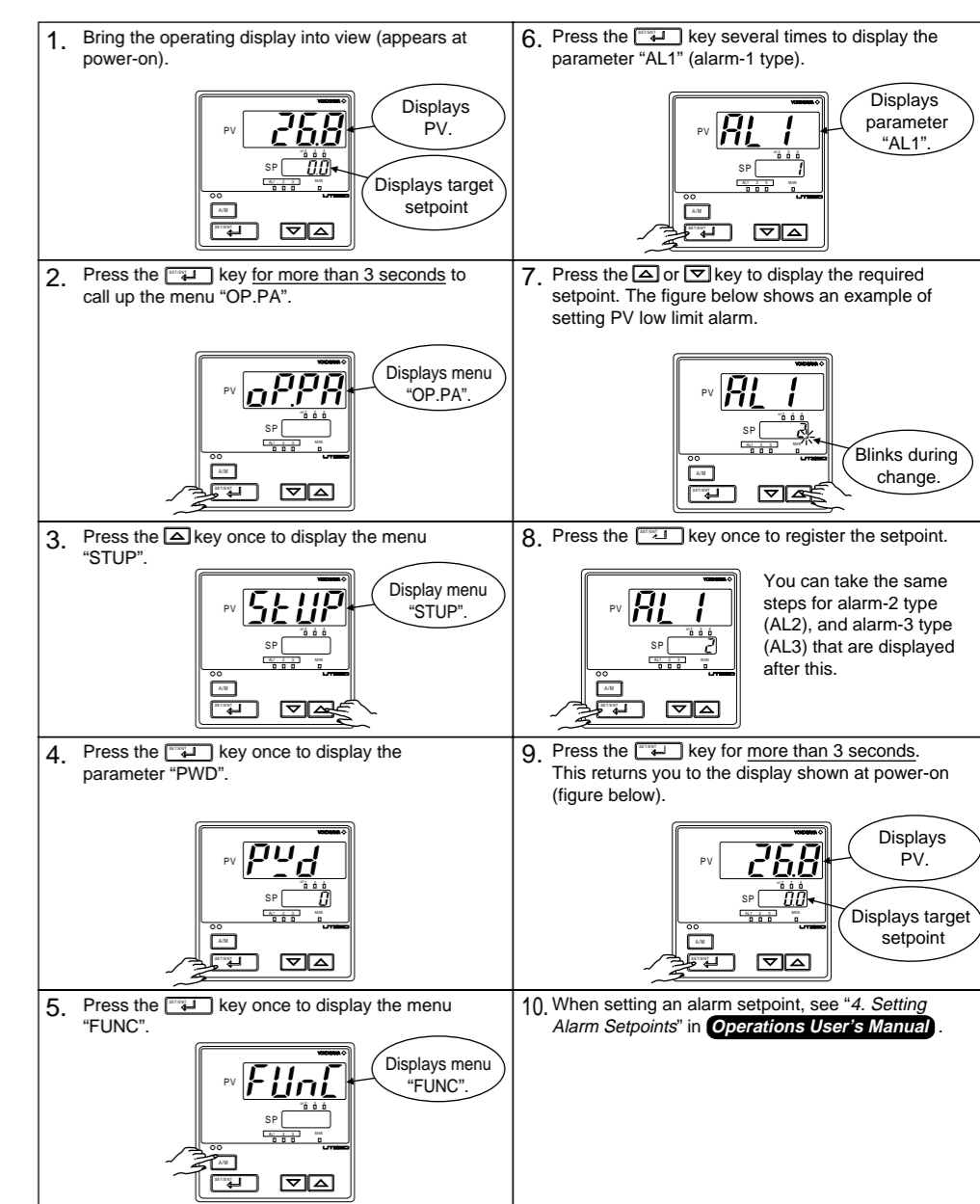
**4. Setting Control Output Type**

The following operating procedure describes an example of changing time proportional PID relay output (0: factory-set default) to current output (2).



**5. Changing Alarm Type**

The following operating procedure describes an example of changing alarm-1 (factory-set default: PV high limit alarm) to PV low limit alarm. When you have changed alarm type, the alarm setpoint will be initialized; set the alarm setpoint again.



**6. Description of Multiple Setpoints and PID**

The UT350/UT320 controllers have a maximum of four target setpoint (SP) parameters and has PID for each of these setpoints. The following shows the correspondence between the target setpoint numbers (SP.NO), target setpoints (SP), and PID parameters.

For example, if you have set "2" to the target setpoint number (SP.NO), the control parameters available are target setpoint (2.SP), proportional band (heating-side proportional band) (2.P), integral time (heating-side integral time) (2.I), derivative time (heating-side derivative time) (2.D), cooling-side proportional band (2.Pc), cooling-side integral time (2.Ic), and cooling-side derivative time (2.Dc).

To use multiple target setpoints, see the table below to check the corresponding parameters.

Target setpoint number (SP.NO)	Target setpoint (SP)	PID parameter					
		Proportional band (heating-side proportional band)	Integral time (heating-side integral time)	Derivative time (heating-side derivative time)	Cooling-side proportional band	Cooling-side integral time	Cooling-side derivative time
SP.NO=1	1.SP	1.P	1.I	1.D	1.Pc	1.Ic	1.Dc
SP.NO=2	2.SP	2.P	2.I	2.D	2.Pc	2.Ic	2.Dc
SP.NO=3	3.SP	3.P	3.I	3.D	3.Pc	3.Ic	3.Dc
SP.NO=4	4.SP	4.P	4.I	4.D	4.Pc	4.Ic	4.Dc



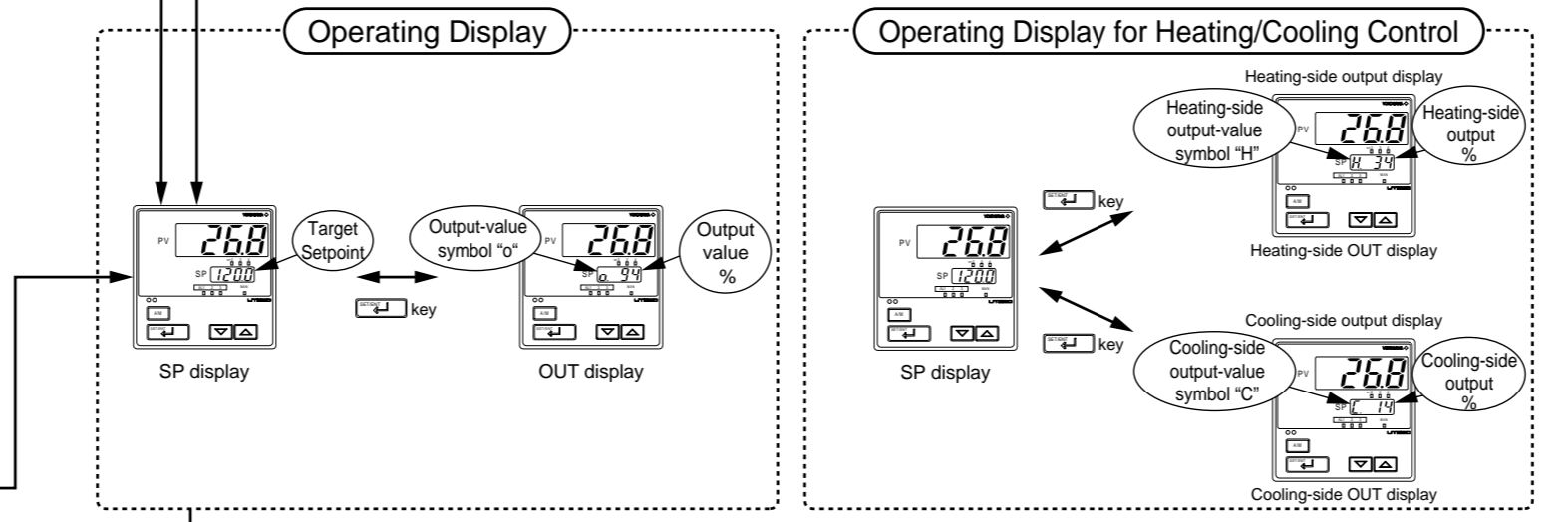
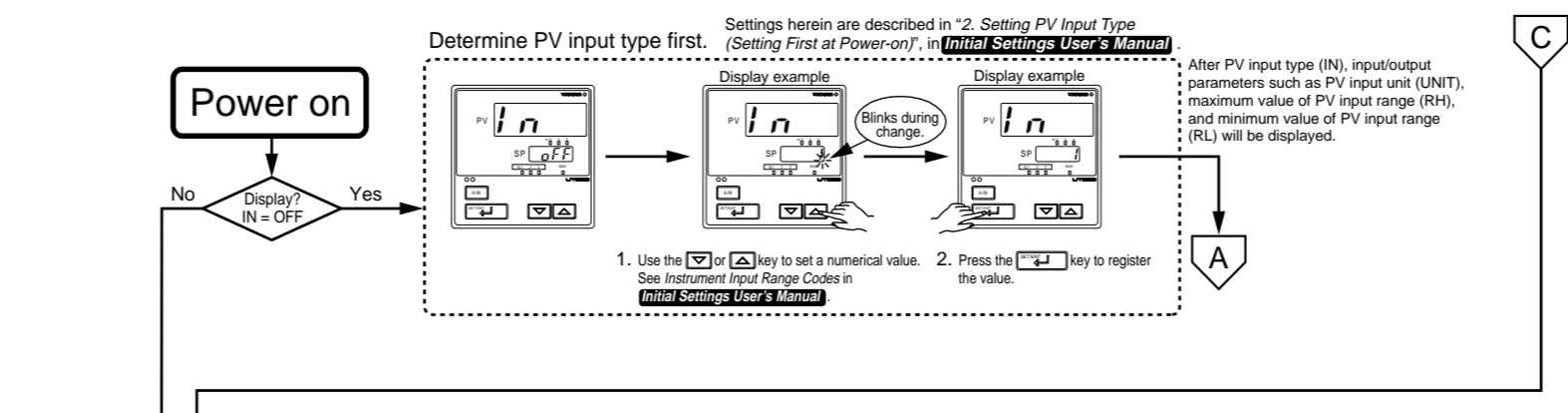
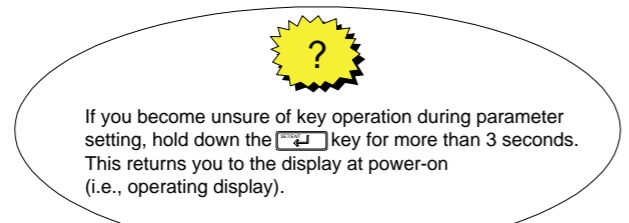
This manual contains a parameter map as a guideline for setting parameters, and lists of parameters for recording User Settings.

**Contents**

1. Basic Key Operation Sequence and Parameter Map
2. Lists of Parameters

**1. Basic Key Operation Sequence and Parameter Map**

- Basic Key Operation Sequence**
- Setting display can be switched (moved) using the **Menu** key.
  - A numerical value is changed by:
    - Using the **Up** or **Down** key to change a displayed value (decimal point blinking) and
    - Pressing the **Enter** key to register it.
  - Pressing the **Menu** key on an operating display (for more than 3 seconds) brings you to the operating parameter setting display.
  - Pressing the **Menu** key on the operating parameter setting display (for more than 3 seconds) returns you to the operating display.
  - Pressing the **Menu** key on the setup parameter setting display (for more than 3 seconds) returns you to the operating display. You cannot return to the operating parameter setting display from the setup parameter setting display.



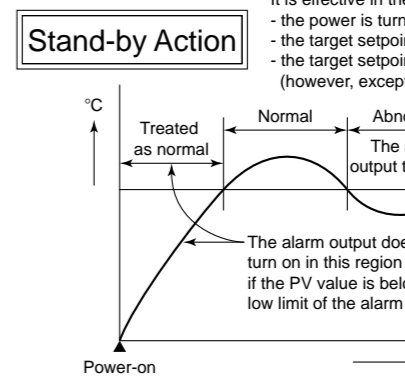
**NOTE**

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.

**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 type	Alarm action	Alarm type code	Alarm type	Alarm action	Alarm type code
No alarm		OFF			
PV high limit	Hysteresis Open (unlit) / Closed (lit)	1 11	De-energized on deviation low limit alarm	Hysteresis Open (lit) / Closed (unlit)	6 16
PV low limit	Hysteresis Closed (lit) / Open (unlit)	2 12	Deviation high and low limits	Hysteresis Closed (lit) / Open (unlit)	7 17
Deviation high limit	Hysteresis Open (unlit) / Closed (lit)	3 13	Deviation within high and low limits	Hysteresis Open (unlit) / Closed (lit)	8 18
Deviation low limit	Hysteresis Closed (lit) / Open (unlit)	4 14	De-energized on PV high limit	Hysteresis Closed (lit) / Open (unlit)	9 19
De-energized on deviation high limit alarm	Hysteresis Closed (unlit) / Open (lit)	5 15	De-energized on PV low limit	Hysteresis Open (lit) / Closed (unlit)	10 20
Fault diagnosis output (Note 1)	Fault diagnosis output	21	Heater burnout alarm 1		24
FAIL output (Note 2)	The controller stops when in a FAIL state. The control output is set to "OFF" or "0%".	22	Heater burnout alarm 2		25
Sensor grounding alarm	Sensor grounding alarm	23			
SP high limit	Hysteresis Open (unlit) / Closed (lit)	28	Output high limit	Hysteresis Open (unlit) / Closed (lit)	30
SP low limit	Hysteresis Closed (lit) / Open (unlit)	29	Output low limit	Hysteresis Closed (lit) / Open (unlit)	31



**Instrument Input Range Codes**

Input	Type	Instrument Input Range Code	Instrument Input Range		
Unspecified	OFF	1	Set the data item PV Input type "IN" to the OFF option to leave the PV input type undefined.		
		2	-199.9 to 999.9°C		
		3	-199.9 to 500.0°C		
		4	-199.9 to 999.9°C		
		5	-199.9 to 400.0°C		
		6	0.0 to 400.0°C		
		7	0 to 1800°C		
		8	0 to 1700°C		
		9	0 to 1700°C		
		10	-200 to 1300°C		
Thermocouple	K	11	-199.9 to 999.9°C		
		12	-199.9 to 900.0°C		
		13	-199.9 to 400.0°C		
		14	0.0 to 400.0°C		
		15	0 to 2300°C		
		16	0 to 1390°C		
		17	0 to 1900°C		
		RTD	Pt100	30	-199.9 to 500.0°C
				31	-150.0 to 150.0°C
				35	-199.9 to 640.0°C
Standard signal	0.4 to 2 V	40	0.400 to 2.000V		
		41	1.000 to 5.000V		
DC voltage	0 to 2 V	50	0.000 to 2.000V		
		51	0.00 to 10.00V		
		55	-10.00 to 20.00mV		
		56	0.0 to 100.0mV		

