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# Introduction

Please read through this operation guide carefully before using the product.

## ■ Notice

- The contents of this manual are subject to change without notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made to ensure accuracy in the preparation of this manual. Should any errors or omissions come to your attention, however, please inform Yokogawa Electric's sales office or sales representative.
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# Replacement Guide for TC10 Temperature Controller

TI 05C01E81-01EN




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# 1. Specification Overview Comparison

Model	TC10	UT130	UT150
			
Display	4 digits, 2 groups	3 digits, 1 group	4 digits, 2 groups
	Green/red/orange (active display)	Red	Red
	Green	Green	Green
Key	4	3	3
Input	TC, RTD, mV, V, mA	TC, RTD	TC, RTD, mV, V
Input accuracy	±0.5%	±0.3%	±0.3%
Output	Relay, SSR, mA	Relay, SSR	Relay, SSR, mA
DI	2 points max.	-	2 points
DO (alarm)	3 points max.	2 points	2 points
SP	4 points	1 point	2 points
Control functions	ON/OFF control	ON/OFF control	ON/OFF control
	PID control	PID control	PID control
	Heating/cooling control	Heating/cooling control	Heating/cooling control
Control period	130 msec	500msec	500msec
Overshoot suppressing function	Yes	Yes	Yes
Auto/Man switch	Yes	No	No
Setpoint transmission (communication)	Yes	No	No
Two input correction	Yes	No	No
Power consumption, running time display	Yes	No	No
Retransmission output	Possible on some models (*1)	No	Option
Heater disconnection alarm	No	Option	Option
Communication function	RS485	RS485	RS485
Security	Parameter access restriction function	Key lock	Key lock
Depth (mm)	62	100	100
Terminal type	Clamp terminal	M3.5 screw	M3.5 screw
Side-by-side mounting	No	Yes (side by side)	Yes (side by side)
Dust and water protection	IP65 (gasket option)	IP65	IP65
Standard	cUL/CE	UL/CSA/CE	UL/CSA/CE
Power supply	AC 100-240V	AC 100-240V	AC 100-240V
	-	DC 24V	DC 24V

\*1: If you use retransmission output, you cannot use current/voltage output as control output. Control output will be either relay output or voltage pulse output.

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## 2. Checking the Model and Suffix Code

Refer to the following lookup table of model and suffix codes when replacing a UT130, UT150, UD310 with a TC10.

(Next page)

## 2.1 UT130

Model	Option	Output	Standard Type	Recommended Model	Remarks		
UT130	No alarm	No option	Relay output	UT130 – RN	TC10-NHCRNNDNF/GK		
			Voltage pulse output	UT130 – VN	TC10-NHCVNNDNF/GK		
	Two alarms		Relay output	UT130 – RN/AL	TC10-NHCRRRDNF/GK		
			Voltage pulse output	UT130 – VN/AL	TC10-NHCVRRDNF/GK		
			Communication function	Relay output	UT130 – RN/AL/RS	TC10-NHCRRRDSF/GK	TC10 communication is MOBUS/RTU only.
				Voltage pulse output	UT130 – VN/AL/RS	TC10-NHCVRRDSF/GK	

## 2.2 UT150

Model	Option	Output	Standard Type	Recommended Model	Remarks	
UT150	No alarm	No option	Relay output	UT150 – RN	TC10-NHCRNNDNF/GK	
			Voltage pulse output	UT150 – VN	TC10-NHCVNNDNF/GK	
			Current output	UT150 – AN	TC10-NHCARRDNF/GK	
			Relay output	UT150 – RN/AL	TC10-NHCRRRDNF/GK	
			Voltage pulse output	UT150 – VN/AL	TC10-NHCVRRDNF/GK	
			Current output	UT150 – AN/AL	TC10-NHCARRDNF/GK	
	Two alarms	Retransmission output	Relay output	UT150 – RN/AL/RET	UT32A-000-11-00	The size is different.
			Voltage pulse output	UT150 – VN/AL/RET	TC10-NHCARRDNF/GK	Voltage pulse output uses OP4.
			Current output	UT150 – AN/AL/RET	UT32A-000-11-00	The size is different.
		External contact input	Relay output	UT150 – RN/AL/EX	TC10-NHCRRRDNF/GK	TC10 does not have a timer function.
			Voltage pulse output	UT150 – VN/AL/EX	TC10-NHCVRRDNF/GK	
			Current output	UT150 – AN/AL/EX	TC10-NHCARRDNF/GK	
		Communication function	Relay output	UT150 – RN/AL/RS	TC10-NHCRRRDSF/GK	TC10 communication is MOBUS/RTU only.
			Voltage pulse output	UT150 – VN/AL/RS	TC10-NHCVRRDSF/GK	
			Current output	UT150 – AN/AL/RS	TC10-NHCARRDSF/GK	
		Retransmission output and External contact input	Relay output	UT150 – RN/AL/RET/EX	UT32A-000-11-00	The size is different.
			Voltage pulse output	UT150 – VN/AL/RET/EX	TC10-NHCARRDNF/GK	Contact input is one point.
			Current output	UT150 – AN/AL/RET/EX	UT32A-000-11-00	The size is different.



## 2.3 UD310

Model	Output	Standard type	Recommended Model	Remarks
UD310	Current output	UD310-00	TC10-NHCARRDNF/GK	Use the current output as retransmission output (SP transmission) (PV transmission cannot be used.)

## 3. Replacement Notes

### ■ Input Type

Because the TC10 does not have thermocouple types E, B, N, L, U, Platinel 2, RTD JPt100, or DC voltage 0 to 100 m, change to an input type available on the TC10.

Input Type	Range(°C)	Range(°F)	
Thermocouple	K	-199 to 999°C	-199 to 999°F
		0 to 600°C	32 to 999°F
		0 to 400°C	32 to 750°F
		-199 to 200°C	-199 to 400°F
	J	-199 to 999°C	-199 to 999°F
	T	-199 to 400°C	-199 to 750°F
	E	-199 to 999°C	-199 to 999°F
RTD	Pt100	-199 to 850°C	-199 to 999°F
		0 to 400°C	32 to 750°F
		-199 to 200°C	-199 to 400°F
		-19.9 to 99.9°C	-199 to 999°F
	JPt100	-199 to 500°C	

Input Type	Range(°C)	Range(°F)	
Thermocouple	K	-270 to 1370°C	-300 to 2500°F
		0.0 to 600.0°C	32.0 to 999.9°F
		0.0 to 400.0°C	32.0 to 750.0°F
		-199.9 to 200.0°C	-300.0 to 400.0°F
	J	-199.9 to 999.9°C	-300.0 to 2100°F
	T	-199.9 to 400.0°C	-300.0 to 750.0°F
	E	-199.9 to 999.9°C	-300.0 to 1800.0°F
	R	0 to 1700°C	32 to 3100°F
	S	0 to 1700°C	32 to 3100°F
	B	0 to 1800°C	32 to 3200°F
	N	-200 to 1300°C	-300 to 2400°F
	L	-199.9 to 900.0°C	-300 to 1600°F
	U	-199.9 to 400.0°C	-300 to 750°F
	Platinel 2	0 to 1390°C	32 to 2500°F
RTD	Pt100	-199.9 to 850.0°C	-199.9 to 999.9°F
		0.0 to 400.0°C	32.0 to 750.0°F
		-199.9 to 200.0°C	-300 to 400°F
		-19.9 to 99.9°C	-199.9 to 999.9°F
JPt100	-199.9 to 500.0°C		
DC voltage	0 to 100 mV	0.0 to 100.0	Note: Scaling is enable in the following 4 range. -1999 to 9999, -199.9 to 999.9, -199.99 to 99.99, -1.999 to 9.999
	0 to 5 V	0.000 to 5.000	
	1 to 5 V	1.000 to 5.000	
	0 to 10 V	0.00 to 10.00	

TC10 Input Type			
Thermocouple	TC J	-50 to 1000°C	-58 to +1832°F
	TC K	-50 to 1370°C	-58 to +2498°F
	TC S	-50 to 1760°C	-58 to +3200°F
	TC R	-50 to 1760°C	-58 to +3200°F
	TC T	-70 to 400°C	-94 to +752°F
RTD	Pt100	-200 to 850°C	-328 to +1562°F
	Pt1000	-200 to 850°C	-328 to +1562°F
DC voltage/ current	Linear 0 to 60 mV		
	Linear 12 to 60 mV		
	Linear 0 to 20 mA (this selection forces Out 4 = TX)		
	Linear 4 to 20 mA (this selection forces Out 4 = TX)		
	Linear 0 to 5 V		
	Linear 1 to 5 V		
	Linear 0 to 10 V		
	Linear 2 to 10 V		

### ■ Control Function

TC10 does not have a dynamic auto tune control function.

When the TC10 input is disconnected, the measured value is set to the lower end of the range (burn down).

## ■ Installation and Wiring

With the TC10, close contact installation is not possible.

The TC10 has clamp terminals. (The UT100 has M3.5 screw terminals.)

The TC10 does not have a terminal cover.

## ■ Options

TC10 does not have a heater disconnection alarm.

TC10 does not have a timer function.

The only available TC10 RS485 communication protocol is Modbus/RTU. Ladder communication and PC link communication protocols are not available.

## ■ UD310

PV retransmission output is not possible on the TC10. (There is only a single current output and is used for SP retransmission output.)

The TC10 does not have a function for turning off the PV display area.

## ■ UT152 and UT155 Replacement

The size of the UT152 and UT155 is different from that of the TC10. Consider replacing with the UTAdvanced series UT32A and UT35A.

Model	Option	Output	Standard Type	Recommended Model	
UT152	No alarm	No option	Relay output	UT152 – RN	UT32A-000-11-00
			Voltage pulse output	UT152 – VN	UT32A-000-11-00
			Current output	UT152 – AN	UT32A-000-11-00
	Relay output		UT152 – RN/AL	UT32A-000-11-00	
	Voltage pulse output		UT152 – VN/AL	UT32A-000-11-00	
	Current output		UT152 – AN/AL	UT32A-000-11-00	
	Two alarms	Retransmission outp	Relay output	UT152 – RN/AL/RET	UT32A-000-11-00
			Voltage pulse output	UT152 – VN/AL/RET	UT32A-000-11-00
			Current output	UT152 – AN/AL/RET	UT32A-000-11-00
		External contact input	Relay output	UT152 – RN/AL/EX	UT32A-000-11-00
			Voltage pulse output	UT152 – VN/AL/EX	UT32A-000-11-00
			Current output	UT152 – AN/AL/EX	UT32A-000-11-00
		Communication function	Relay output	UT152 – RN/AL/RS	UT32A-010-11-00
			Voltage pulse output	UT152 – VN/AL/RS	UT32A-010-11-00
			Current output	UT152 – AN/AL/RS	UT32A-010-11-00
		Retransmission output and External contact input	Relay output	UT152 – RN/AL/RET/EX	UT32A-000-11-00
			Voltage pulse output	UT152 – VN/AL/RET/EX	UT32A-000-11-00
			Current output	UT152 – AN/AL/RET/EX	UT32A-000-11-00

Model	Option	Output	Standard Type	Recommended Model	
UT155	No alarm	No option	Relay output	UT155 – RN	UT35A-000-11-00
			Voltage pulse output	UT155 – VN	UT35A-000-11-00
			Current output	UT155 – AN	UT35A-000-11-00
	Relay output		UT155 – RN/AL	UT35A-000-11-00	
	Voltage pulse output		UT155 – VN/AL	UT35A-000-11-00	
	Current output		UT155 – AN/AL	UT35A-000-11-00	
	Two alarms	Retransmission output	Relay output	UT155 – RN/AL/RET	UT35A-000-11-00
			Voltage pulse output	UT155 – VN/AL/RET	UT35A-000-11-00
			Current output	UT155 – AN/AL/RET	UT35A-000-11-00
		External contact input	Relay output	UT155 – RN/AL/EX	UT35A-000-11-00
			Voltage pulse output	UT155 – VN/AL/EX	UT35A-000-11-00
			Current output	UT155 – AN/AL/EX	UT35A-000-11-00
		Communication function	Relay output	UT155 – RN/AL/RS	UT35A-001-11-00
			Voltage pulse output	UT155 – VN/AL/RS	UT35A-001-11-00
			Current output	UT155 – AN/AL/RS	UT35A-001-11-00
		Retransmission output and External contact input	Relay output	UT155 – RN/AL/RET/EX	UT35A-000-11-00
			Voltage pulse output	UT155 – VN/AL/RET/EX	UT35A-000-11-00
			Current output	UT155 – AN/AL/RET/EX	UT35A-000-11-00

## ■ UD320 and UD350 Replacement

Consider replacing the UD320 and UD350 with the UTAdvanced series UT32A and UT35A.

Model	Output	Standard type	Recommended Model	Remarks
UD320	Current output	UD320-00	UT32A-000-11-00	

Model	Output	Standard type	Recommended Model	Remarks
UD350	Current output	UD350-00	UT35A-000-11-00	

## 4. Quick Configuration Example

### 4.1 PID Control

#### ■ Overview

This section describes the configuration procedure to use PID control.

For details, see the TC10 Temperature Controller Engineering Manual (IM 05C01E81-02EN).

#### ■ Models and Suffix Codes

TC10-NHCR■■D□F

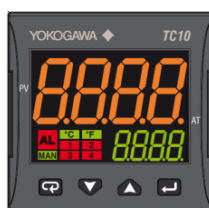
TC10-NHCV■■D□F

TC10-NHCARRD□F

■■ = NN or RR

□ = N or S

#### ■ Key Operation



Key	Name	Operation
	Entry key	Confirms or applies settings or moves to the next parameter.
	Inc. key	Increases a parameter, SP, control output, and other value. Or selects the next parameter.
	Dec key	Decreases a parameter, SP, control output, and other value. Or selects the previous parameter.
	Programmable key	Finishes parameter settings or selects the next parameter group.

## ■ Configuration Example

Parameter configuration example are shown below.

Input type: Thermocouple type K (range: -50 to 1370 (°C))

Output type: Relay output, voltage pulse output, current output

Control type: PID control SP = 500°C, P = 142 (E.U), I = 240 s, D = 60 s

Group	Parameter	Name	Value	Note
Input	SEnS	PV input type	crAL (thermocouple K)	*1
	Dp	Decimal place	0	*3
Output	o1t	Output 1 (OP1) type	4–20mA	*3
	o1F	Output 1 (OP1) function	H.rEG: Heating control	*2
	o1Ac	Output 1 action	dir: Forward operation	*3
Control	cont	Control type	Pid: PID control	*2
	Pb	Proportional band (E.U)	142	*3
	Ti	Integral time (s)	240	*3
	Td	Derivative time (s)	60	*3
	tcH	Heating output cycle time	30	*3
SP	nSP	Number of target setpoints	1	*3
	SPLL	Low target setpoint limit	-50	*3
	SPHL	High target setpoint limit	1370	*3
	SP	Target setpoint 1	500	*3

\*1: Set the PV input type (SEnS) according to the sensor.

\*2: A setting required for PID control. Use the values shown in the table.

\*3: Set according to the usage conditions.

### Parameter Map and Settings

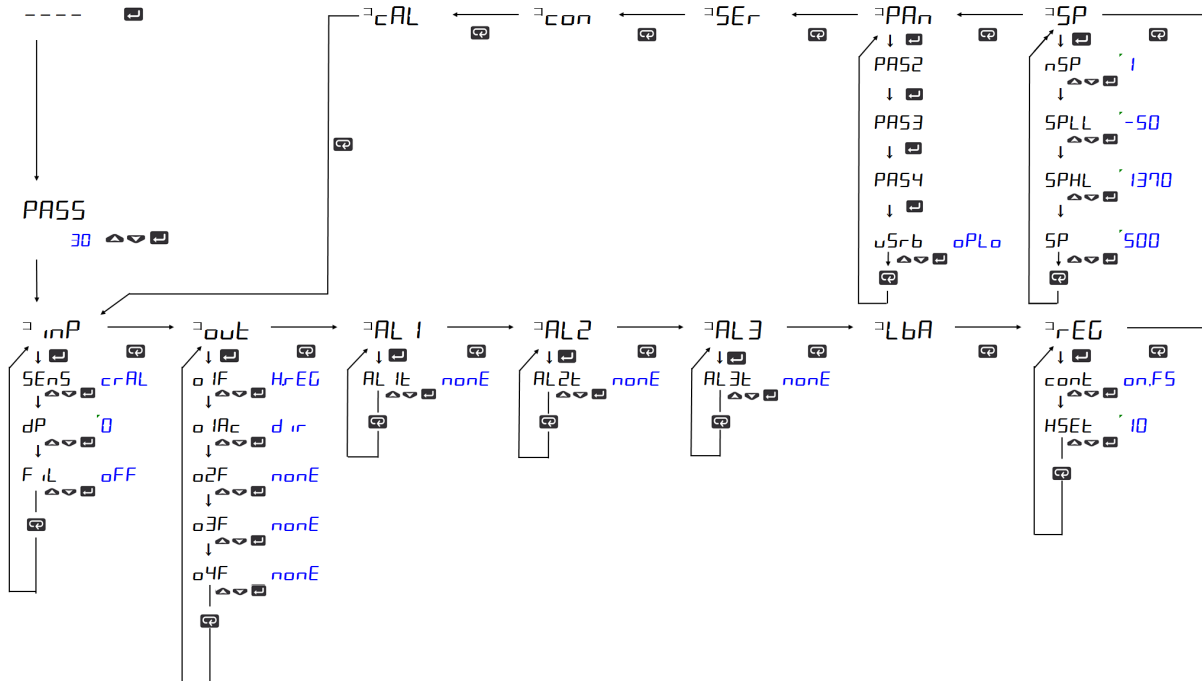
Parameters and settings related to the retransmission output function are shown below. (Values are indicated in blue next to the parameter symbols.)

On the operation screen, hold down the key for at least 3 seconds.

PASS will be displayed. Enter “30,” and press the key. (The mode changes to detail parameter setting.)

Set the required parameters for the following retransmission output function (blue).

To end the parameter setting mode, hold down the key for at least 3 seconds.



### Operation and Control

Example of heating control (H.rEG):

	PV>SP	PV<SP
Control output	Decrease	Increase

#### How to change the SP value and tune the PID

- To change the SP value, press the key, and then use the and keys.
- (When the operation mode is Auto,) to perform PID auto tuning, hold down the key for at least 1 second on the operation screen.

### Note

- If the PV input (input signal) goes over the range or the sensor is disconnected, a preset output (oPE) is transmitted. Check the wiring and input sensor.

## 4.2 ON/OFF Control

### ■ Overview

This section describes the configuration procedure to use ON/OFF control.

For details, see the TC10 Temperature Controller Engineering Manual (IM 05C01E81-02EN).

### ■ Models and Suffix Codes

TC10-NHCR■■D□F

■■ = NN or RR

□ = N or S

### ■ Key Operation



Key	Name	Operation
	Entry key	Confirms or applies settings or moves to the next parameter.
	Inc. key	Increases a parameter, SP, control output, and other value. Or selects the next parameter.
	Dec key	Decreases a parameter, SP, control output, and other value. Or selects the previous parameter.
	Programmable key	Finishes parameter settings or selects the next parameter group.



## ■ Configuration Example

Parameter configuration example are shown below.

Input type: Thermocouple type K (range: -50 to 1370 (°C))

Output type: Relay output

Control type: ON/OFF symmetric hysteresis SP = 500°C, hysteresis = 10°C

Group	Parameter	Name	Value	Note
Input	SEnS	PV input type	crAL (thermocouple K)	*1
	Dp	Decimal place	0	*1
Output	o1F	Output 1 (OP1) function	H.rEG: Heating control	*2
	o1Ac	Output 1 action	dir: Forward operation	*3
Control	cont	Control type	On.FS: ON/OFF symmetric hysteresis	*2
	HSEt	Hysteresis	10	*3
SP	nSP	Number of target setpoints	1	*3
	SPLL	Low target setpoint limit	-50	*3
	SPHL	Low target setpoint limit	1370	*3
	SP	Target setpoint 1	500	*3

\*1: Set the PV input type (SEnS) according to the sensor.


\*2: A setting required for ON/OFF control. Use the values shown in the table.

\*3: Set according to the usage conditions.


### ■ Parameter Map and Settings

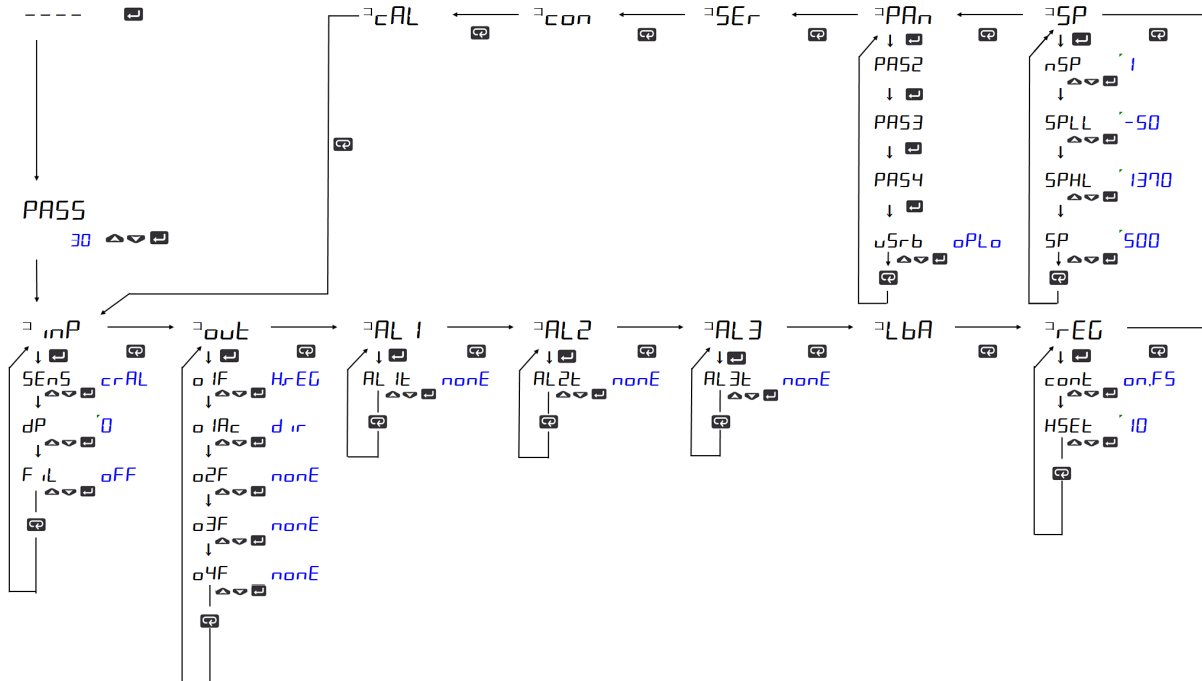
Parameters and settings related to the retransmission output function are shown below. (Values are indicated in blue next to the parameter symbols.)

On the operation screen, hold down the  key for at least 3 seconds.

PASS will be displayed. Enter “30,” and press the  key. (The mode changes to detail parameter setting.)

Set the required parameters for the following retransmission output function (blue).

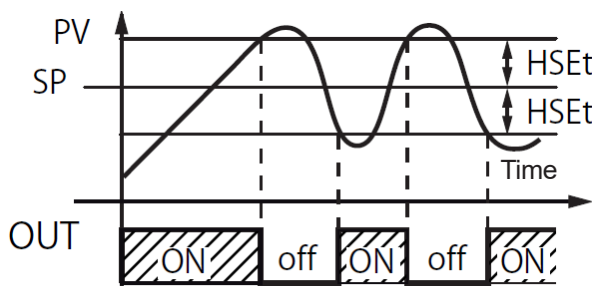
To end the parameter setting mode, hold down the  key for at least 3 seconds.



### ■ Operation and Control

When  $PV \geq (SP + \text{hysteresis})$ , control output is turned off.

When  $PV \leq (SP - \text{hysteresis})$ , control output is turned on.



### ■ Note

- If the PV input (input signal) goes over the range or the sensor is disconnected, a preset output (oPE) is transmitted. Check the wiring and input sensor.
- Set the preset output (oPE) to 0% (default value).

## 4.3 Alarm Function

### ■ Overview

This section describes the configuration procedure to use the alarm function.

For details, see the TC10 Temperature Controller Engineering Manual (IM 05C01E81-02EN).

### ■ Models and Suffix Codes

TC10-NHC■RRD□F

■ = R, V or A

□ = N or S

### ■ Key Operation



Key	Name	Operation
	Entry key	Confirms or applies settings or moves to the next parameter.
	Inc. key	Increases a parameter, SP, control output, and other value. Or selects the next parameter.
	Dec key	Decreases a parameter, SP, control output, and other value. Or selects the previous parameter.
	Programmable key	Finishes parameter settings or selects the next parameter group.

## ■ Configuration Example

Parameter configuration example are shown below.

Input type: Thermocouple type K (range: -50 to 1370 (°C))

Output type: Relay output

Alarm type: Alarm 1 = Absolute value high limit alarm (700°C or more), Alarm 2 = Absolute value low limit alarm (200°C or less)

Group	Parameter	Name	Value	Note
Input	SEnS	PV input type	crAL (thermocouple K)	*1
	Dp	Decimal place	0	*1
Output	o2F	Output 2 (OP2) function	AL: Alarm output	*2
	o2AL	Output 2 alarm assignment	1: Alarm 1	*2
	o2Ac	Output 2 action	dir: Forward operation	*3
	o3F	Output 3 (OP3) function	AL: Alarm output	*2
	o3Ac	Output 3 alarm assignment	2: Alarm 2	*2
	o3AL	Output 3 action	dir: Forward operation	*3
Alarm 1	AL1t	Alarm 1 type	HiAb: Absolute value high limit alarm	*3
	Ab1	Alarm 1 function	0	*3
	AL1L	Alarm 1 low limit	-50	*3
	AL1H	Alarm 1 high limit	1370	*3
	AL1	Alarm 1 setpoint	700	*3
	HAL1	Alarm 1 hysteresis	10	*3
	AL1d	Alarm 1 on-delay	OFF	*3
	AL1o	Alarm 1 mode	0	*3
Alarm 2	AL2t	Alarm 2 type	LoAb: Absolute value low limit alarm	*3
	Ab2	Alarm 2 function	0	*3
	AL2L	Alarm 2 low limit	-50	*3
	AL2H	Alarm 2 high limit	1370	*3
	AL2	Alarm 2 setpoint	200	*3
	HAL2	Alarm 2 hysteresis	10	*3
	AL2d	Alarm 2 on-delay	OFF	*3
	AL2o	Alarm 2 mode	0	*3


\*1: Set the PV input type (SEnS) according to the sensor.


\*2: A setting required for alarm output. Use the values shown in the table.

\*3: Set according to the usage conditions.


### ■ Parameter Map and Settings

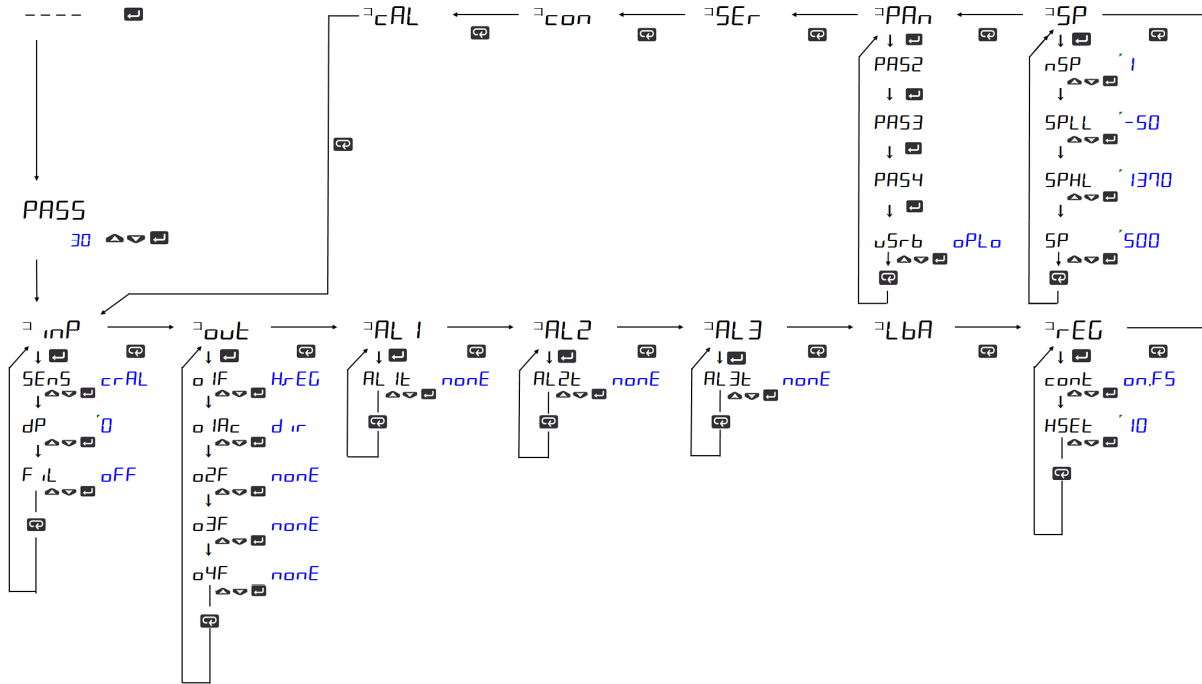
Parameters and settings related to the retransmission output function are shown below. (Values are indicated in blue next to the parameter symbols.)

On the operation screen, hold down the  key for at least 3 seconds.

PASS will be displayed. Enter "30," and press the  key. (The mode changes to detail parameter setting.)

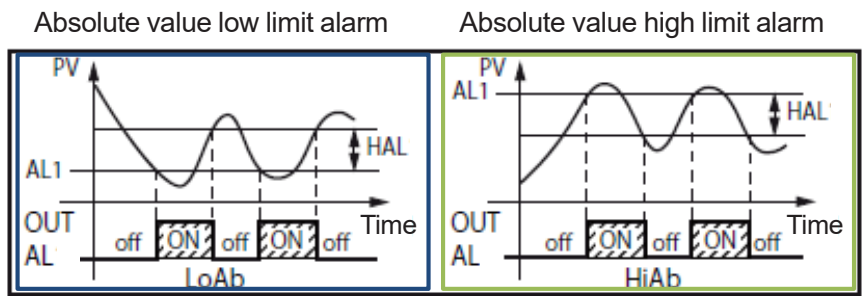
Set the required parameters for the following retransmission output function (blue).

To end the parameter setting mode, hold down the  key for at least 3 seconds.



### ■ Operation and Control

Examples of alarm operation are shown below.



## 4.4 PV Retransmission Output

### ■ Overview

This section describes the configuration procedure to use the retransmission output.

For details, see the TC10 Temperature Controller Engineering Manual (IM 05C01E81-02EN).

### ■ Models and Suffix Codes

TC10-NHCARRD□F

(□ = N or S) Use a model with a current output.

### ■ Key Operation



Key	Name	Operation
	Entry key	Confirms or applies settings or moves to the next parameter.
	Inc. key	Increases a parameter, SP, control output, and other value. Or selects the next parameter.
	Dec key	Decreases a parameter, SP, control output, and other value. Or selects the previous parameter.
	Programmable key	Finishes parameter settings or selects the next parameter group.

### ■ Configuration Example

Parameter configuration example are shown below.

Input type: Thermocouple type K (range: -50 to 1370 (°C))

Output type: Current output 4-20 mA

Analog output range (scale): 0 to 500 (°C)

Group	Parameter	Name	Value	Note
Input	SEnS	PV input type	crAL (thermocouple K)	*1
	Dp	Decimal place	0	*3
Output	o1t	Output 1 (OP1) type	4-20mA	*2
	o1F	Output 1 (OP1) function	r.inp: PV transmission	*2
	Ao1L	Analog output low limit	0	*3
	Ao1H	Analog output high limit	500	*3
	o1Ac	Output 1 action	dir: Forward operation	*2
	o4F	Output 4 (OP4) function	H.rEG	

\*1: Set the PV input type (SEnS) according to the sensor.


\*2: Use the values shown in the table to perform retransmission output.

\*3: Set the PV input decimal place (Dp) and output range (Ao1L, Ao1H) according to the range you are using.


## ■ Parameter Map and Settings

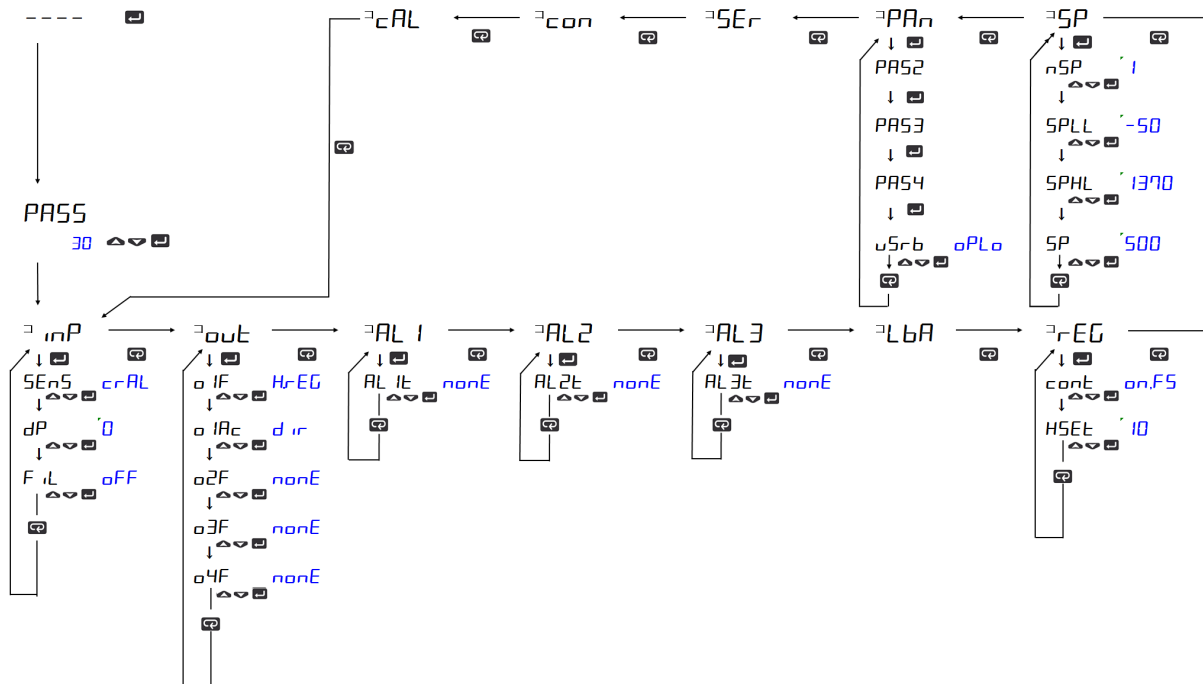
Parameters and settings related to the retransmission output function are shown below. (Values are indicated in blue next to the parameter symbols.)

On the operation screen, hold down the  key for at least 3 seconds.

PASS will be displayed. Enter "30," and press the  key. (The mode changes to detail parameter setting.)

Set the required parameters for the following retransmission output function (blue).

To end the parameter setting mode, hold down the  key for at least 3 seconds.



## ■ Operating procedure

- Output the PV input (PV) at 4-20 mA DC.
- Retransmission output can be scaled. (Parameters: Ao1L analog output low limit, Ao1H analog output high limit)

## ■ Note

- Set the control output to o2F (output 2 function), o3F (output 3 function), or o4F (output 4 function).
- If the PV input (input signal) goes over the range or the sensor is disconnected, 0 mA is transmitted. Check the wiring and input sensor.

## 4.5 Manual Setting Device

### ■ Overview

This section describes the configuration procedure to use the TC10 as a manual setting device. For details, see the TC10 Temperature Controller Engineering Manual (IM 05C01E81-02EN).

### ■ Models and Suffix Codes

TC10-NHCARRD□F

(□ = N or S) Use a model with a current output.

### ■ Key Operation



Key	Name	Operation
	Entry key	Confirms or applies settings or moves to the next parameter.
	Inc. key	Increases a parameter, SP, control output, and other value. Or selects the next parameter.
	Dec key	Decreases a parameter, SP, control output, and other value. Or selects the previous parameter.
	Programmable key	Finishes parameter settings or selects the next parameter group.



## ■ Configuration Example

Parameter configuration example are shown below.

Input type: 4-20mA, input range: 0.0 to 500.0 (°C)

Output type: Current output 4-20 mA

Manual setting/output range (scale): 0.0 to 500.0 (°C)

Group	Parameter	Name	Value	Note
Input	SEnS	PV input type	4–20mA	*1
	Dp	Decimal place	1	*3
	SSc	PV input low limit	0	*3
	FSc	PV input high limit	500	*3
Output	o1t	Output 1 (OP1) type	4–20mA	*2
	o1F	Output 1 (OP1) function	r.SP: SP transmission	*2
	Ao1L	Analog output low limit	0	*3
	Ao1H	Analog output high limit	500	*3
	o1Ac	Output 1 action	dir: Forward operation	*2
	o4F	Output 4 (OP4) function	H.rEG	*2

\*1: Set the PV input type (SEnS) according to the sensor.


\*2: Use the values shown in the table to perform manual setting output.

\*3: Set the PV input range (Dp, SSc, FSc) and output range (Ao1L, Ao1H) according to the range you are using.


## ■ Parameter Map and Settings

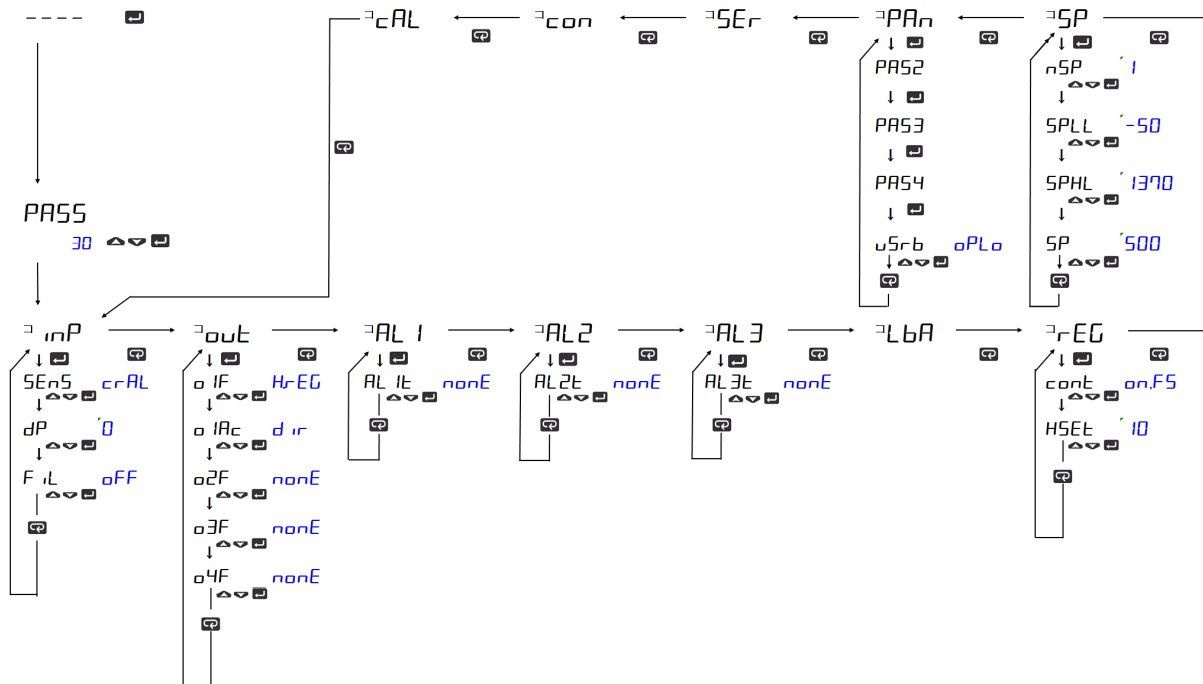
Parameters and settings related to the manual setting function are shown below. (Values are indicated in blue next to the parameter symbols.)

On the operation screen, hold down the  key for at least 3 seconds.

PASS will be displayed. Enter “30,” and press the  key. (The mode changes to detail parameter setting.)







Set the required parameters for the following manual setting function (blue).

To end the parameter setting mode, hold down the  key for at least 3 seconds.



## ■ Operating procedure

There are two methods to change the SP target setpoint.

1. To change the SP value, press the  key, and then use the  and  keys. After changing the value, pressing Enter again causes the value to be applied.
2. Pressing  key the SP value to be changed directly. Change the value using the  and  keys.

## ■ Note

- You need to set the control output (H.rEG) for the SP retransmission output. Set o4F (output 4 function) to control output (H.rEG).
- The LED of the display number (No. 4 output in this example) set to control output will light or blink, but it will not affect the operation of the manual setting function.
- If the PV input (input signal) goes over the range or the sensor is disconnected, the TC10 (transmission) output value is retained. The SP target setpoint cannot be changed. Check the wiring and input sensor.
- The PV display area cannot be turned off.

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## 4. Parameters

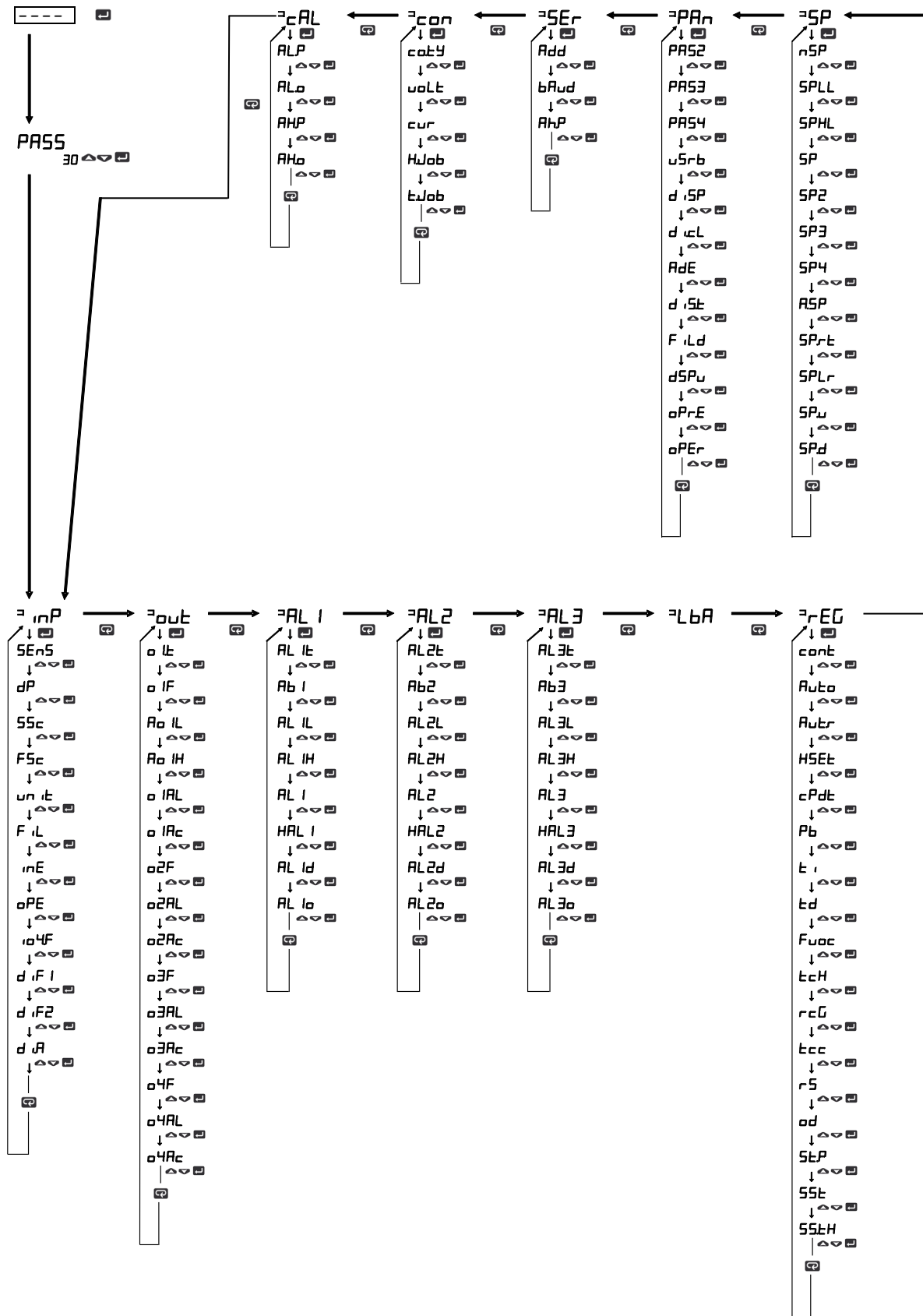
There are two methods to set parameters: code setting method and detail parameter setting method.

In the code setting method, the input type, control output type, and alarm type are set in configuration mode (PASS = 300), and these parameter values are set with a parameter list (PASS = 20). For details, see the TC10 Temperature Controller Quick Guide (IM 05C01E81-01EN).

In the detail parameter setting method, all parameters can be set. Detail parameters (PASS = 30) are used.

The default analog output for control output and retransmission output is set to 0 to 20 mA DC. To change to 4 to 20 mA DC, you need to use the detail parameter setting method.

# 5.1 Parameter Map



## 5.2 List of Parameters

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
inP (inP)	1	SEnS (SEnS)	Sensor selection	0	J = TC J, crAL = TC K, S = TC S, r = TC R, t = TC T, Pt1 = RTD Pt100, Pt10 = RTD Pt1000, 0.60 = 0 to 60 mV, 12.60 = 12 to 60 mV, 0.20 = 0 to 20 mA, 4.20 = 4 to 20 mA, 0.5 = 0 to 5 V, 1.5 = 1 to 5 V, 0.10 = 0 to 10 V, 2.10 = 2 to 10 V	J	
	2	dP (dp)	Decimal Point Position (linear inputs)	0	0 to 3	0	
			Decimal Point Position (different than linear inputs)		0/1		
	3	SSC (SSC)	Initial scale read-out for linear inputs	dp	-1999 to 9999	0	
	4	FSC (FSc)	Full Scale Readout for linear inputs	dp	-1999 to 9999	1000	
	5	unit (unit)	Engineer unit		°C/°F	°C	
	6	FiL (Fil)	Digital filter on the measured value	1	0 (= OFF) to 20.0 s	1	
	7	inE (inE)	Sensor error used to enable the safety output value		or = Over range ou = Under range our = Over and under range	our	
	8	oPE (oPE)	Safety output value (% of the output)		-100 to 100	0	
9	io4F (io4.F)	I/O 4 function		on = Output used as PWS for TX, out4 = Output 4 (digital output 4), dG2c = Digital input 2 driven by contact, dG2U = Digital input 2 driven by voltage	out4		

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
INP (inP)	10	diF1 (diF1)	Digital Input 1 function		oFF = Not used, 1 = Alarm reset, 2 = Alarm acknowledge (ACK), 3 = Hold of the measured value, 4 = Stand by mode, 5 = Manual mode, 6 = HEAt with SP1 and Cool with SP2, 7 to 17 = No action 18 = Sequential SP selection, 19 = SP1 - SP2 selection, 20 = SP1 to SP4 binary selection, 21 = Digital inputs in parallel to ▲ and ▼ keys	oFF	
	11	diF2 (diF2)	Digital Input 2 function			oFF	
	12	diA (di.A)	Digital Inputs Action (DI2 only if configured)		0 = DI1 direct action, DI2 direct action 1 = DI1 reverse action, DI2 direct action 2 = DI1 direct action, DI2 reverse action 3 = DI1 reverse action, DI2 reverse action	0	
OUT (OUT)	13	o1t (o1t)	Output 1 type (when Out 1 is an analog output)		0-20 = 0 to 20 mA; 4-20 = 4 to 20 mA; 0-10 = 0 to 10 V; 2-10 = 2 to 10 V.	0-20	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
OUT (OUT)	14	oIF (o1F)	Out 1 function (when Out 1 is an analog output)	0	NonE = Output not used; H.rEG = Heating output; c.rEG = Cooling output; r.inP = Measure retransmission; r.Err = Error (SP - PV) retransmission; r.SP = Set point retransmission; r.SEr = Serial value retransmission.	H.rEG	
			Out 1 function	0	NonE = Output not used H.rEG = Heating output c.rEG = Cooling output AL = Alarm output t.out = Reserved t.HoF = Reserved P.End = Reserved P.HLd = Reserved P.uit = Reserved P.run = Reserved P.Et1 = Reserved P.Et2 = Reserved or.bo = Out-of-range or burn out indicator P.FAL = Power failure indicator bo.PF = Out-of-range, burn out and Power failure indicator St.bY = Stand by status indicator diF.1 = The output repeats the digital input 1 status diF.2 = The output repeats the digital input 2 status on = Out 1 always ON riSP = Inspection requested (the worked hours/days counter has reached the programmed threshold)	H.rEG	
	15	AOIL (Ao1L)	Initial scale value of the analog retransmission (when Out 1 is an analog output)		-1999 ... Ao1H	-1999	
	16	AOIH (Ao1H)	Full scale value of the analog retransmission (when Out 1 is an analog output)		Ao1L ... 9999.	9999	
	17	oIAL (o1AL)	Alarms linked up with the out 1	0	0 to 63 +1 = Alarm 1 +2 = Alarm 2 +4 = Alarm 3 +8 = Loop break alarm +16 = Sensor Break +32 = Overload on output 4	1	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
OUT (OUT)	18	o1Ac	Out 1 action	0	dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED	dir	
	19	o2F	Out 2 function	0	NonE = Output not used H.rEG = Heating output c.rEG = Cooling output AL = Alarm output t.out = Reserved t.HoF = Reserved P.End = Reserved P.HLd = Reserved P.uit = Reserved P.run = Reserved P.Et1 = Reserved P.Et2 = Reserved or.bo = Out-of-range or burn out indicator P.FAL = Power failure indicator bo.PF = Out-of-range, burn out and Power failure indicator St.bY = Stand by status indicator diF.1 = The output repeats the digital input 1 status diF.2 = The output repeats the digital input 2 status on = Out 2 always ON riSP = Inspection requested (the worked hours/days counter has reached the programmed threshold)	AL	
	20	o2AL	Alarms linked up with the out 2	0	0 to 63 +1 = Alarm 1 +2 = Alarm 2 +4 = Alarm 3 +8 = Loop break alarm +16 = Sensor Break +32 = Overload on output 4	1	
	21	o2Ac	Out 2 action	0	dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED	dir	



Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
OUT (OUT)	22	o3F (o3F)	Out 3 function	0	NonE = Output not used H.rEG = Heating output c.rEG = Cooling output AL = Alarm output t.out = Reserved t.HoF = Reserved P.End = Reserved P.HLd = Reserved P.uit = Reserved P.run = Reserved P.Et1 = Reserved P.Et2 = Reserved or.bo = Out-of-range or burn out indicator P.FAL = Power failure indicator bo.PF = Out-of-range, burn out and Power failure indicator St.bY = Stand by status indicator diF.1 = The output repeats the digital input 1 status diF.2 = The output repeats the digital input 2 status on = Out 3 always ON riSP = Inspection requested (the worked hours/days counter has reached the programmed threshold)	AL	
	23	o3AL (o3AL)	Alarms linked up with the out 3	0	0 to 63 +1 = Alarm 1 +2 = Alarm 2 +4 = Alarm 3 +8 = Loop break alarm +16 = Sensor Break +32 = Overload on output 4	2	
	24	o3Ac (o3Ac)	Out 3 action	0	dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED	dir	
	25	o4F (o4F)	Out 4 function	0	NonE = Output not used H.rEG = Heating output c.rEG = Cooling output AL = Alarm output t.out = Reserved t.HoF = Reserved P.End = Reserved P.HLd = Reserved P.uit = Reserved P.run = Reserved P.Et1 = Reserved P.Et2 = Reserved or.bo = Out-of-range or burn out indicator P.FAL = Power failure indicator bo.PF = Out-of-range, burn out and Power failure indicator St.bY = Stand by status indicator	AL	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
OUT (OUT)	26	o4AL (o4AL)	Alarms linked up with the out 4	0	0 to 63 +1 = Alarm 1 +2 = Alarm 2 +4 = Alarm 3 +8 = Loop break alarm +16 = Sensor Break +32 = Overload on output 4	A L 1 + AL2	
	27	o4Ac (o4Ac)	Out 4 action	0	dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED	dir	
AL 1 (AL1)	28	AL It (AL1t)	Alarm 1 type	0	nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAi = Windows alarm in alarm inside the windows SE.br = Sensor Break LodE = Deviation low alarm (relative) HidE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band	HiAb	
	29	Ab 1 (Ab1)	Alarm 1 function	0	0 to 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change	0	
	30	AL lL (AL1L)	-- For High and low alarms, it is the low limit of the AL1 threshold; -- For band alarm, it is low alarm threshold	dp	From -1999 to AL1H (E.U.)	-1999	
	31	AL iH (AL1H)	-- For High and low alarms, it is the high limit of the AL1 threshold; -- For band alarm, it is high alarm threshold	dp	From AL1L to 9999 (E.U.)	9999	
	32	AL 1 (AL1)	AL1 threshold	dp	From AL1L to AL1H (E.U.)	0	
	33	HAL 1 (HAL1)	AL1 hysteresis	dp	1 to 9999 (E.U.)	1	
	34	AL 1d (AL1d)	AL1 delay	0	From 0 (oFF) to 9999 (s)	oFF	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
AL 1 (AL1)	35	AL 1o (AL1o)	Alarm 1 enabling during Stand-by mode and out of range conditions	0	0 = Alarm 1 disabled during Stand by and out of range 1 = Alarm 1 enabled in stand by mode 2 = Alarm 1 enabled in out of range condition 3 = Alarm 1 enabled in stand by mode and in overrange condition	0	
AL 2 (AL2)	36	AL 2t (AL2t)	Alarm 2 type	0	nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAi = Windows alarm in alarm inside the windows SE.br = Sensor Break LodE = Deviation low alarm (relative) HidE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band	Loab	
	37	Ab 2 (Ab2)	Alarm 2 function	0	0 to 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change	0	
	38	AL 2L (AL2L)	-- For High and low alarms, it is the low limit of the AL2 threshold; -- For band alarm, it is low alarm threshold	dp	From -1999 to AL2H (E.U.)	-1999	
	39	AL 2H (AL2H)	-- For High and low alarms, it is the high limit of the AL2 threshold; -- For band alarm, it is high alarm threshold	dp	From AL2L to 9999 (E.U.)	9999	
	40	AL 2 (AL2)	AL2 threshold	dp	From AL2L to AL2H (E.U.)	0	
	41	HAL 2 (HAL2)	AL2 hysteresis	dp	1 to 9999 (E.U.)	1	
	42	AL 2d (AL2d)	AL2 delay	0	From 0 (oFF) to 9999 (s)	oFF	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
AL2 (AL2)	43	AL2o (AL2o)	Alarm 2 enabling during Stand-by mode and out of range conditions	0	0 = Alarm 2 disabled during Stand by and out of range 1 = Alarm 2 enabled in stand by mode 2 = Alarm 2 enabled in out of range condition 3 = Alarm 2 enabled in stand by mode and in overrange condition	0	
AL3 (AL3)	44	AL3t (AL3t)	Alarm 3 type	0	nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAi = Windows alarm in alarm inside the windows SE.br = Sensor Break LodE = Deviation low alarm (relative) HidE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band	nonE	
	45	Ab3 (Ab3)	Alarm 3 function	0	0 to 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change	0	
	46	AL3L (AL3L)	-- For High and low alarms, it is the low limit of the AL3 threshold; -- For band alarm, it is low alarm threshold	dp	From -1999 to AL3H (E.U.)	-1999	
	47	AL3H (AL3H)	-- For High and low alarms, it is the high limit of the AL3 threshold; -- For band alarm, it is high alarm threshold	dp	From AL3L to 9999 (E.U.)	9999	
	48	AL3 (AL3)	AL3 threshold	dp	From AL3L to AL3H (E.U.)	0	
	49	HAL3 (HAL3)	AL3 hysteresis	dp	1 to 9999 (E.U.)	1	
	50	AL3d (AL3d)	AL3 delay	0	From 0 (oFF) to 9999 (s)	oFF	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
AL3 (AL3)	51	AL3o (AL3o)	Alarm 3 enabling during Stand-by mode and out of range conditions	0	0 = Alarm 3 disabled during Stand by and out of range 1 = Alarm 3 enabled in stand by mode 2 = Alarm 3 enabled in out of range condition 3 = Alarm 3 enabled in stand by mode and in overrange condition	0	
LBA (LBA)	52	Reserved	Reserved			oFF	
	53	Reserved	Reserved			10	
	54	Reserved	Reserved			20	
	55	Reserved	Reserved			both	
rEG (rEg)	56	cont (cont)	Control type	0	Pid = PID (heat and/or) On.FA = ON/OFF asymmetric hysteresis On.FS = ON/OFF symmetric hysteresis nr = Heat/Cool ON/OFF control with neutral zone	Pid	
rEG (rEg)	57	Auto (Auto)	Autotuning selection	0	-4 = Oscillating auto-tune with automatic restart at power up and after all point change -3 = Oscillating auto-tune with manual start -2 = Oscillating -tune with auto-matic start at the first power up only -1 = Oscillating auto-tune with auto-matic restart at every power up 0 = Not used 1 = Fast auto tuning with automatic restart at every power up 2 = Fast auto-tune with automatic start the first power up only 3 = FAST auto-tune with manual start 4 = FAST auto-tune with automatic restart at power up and after a set point change 5 = Evo-tune with automatic restart at every power up 6 = Evo-tune with automatic start the first power up only 7 = Evo-tune with manual start 8 = Evo-tune with automatic restart at power up and after a set point change	7	
	58	Aut.r (Aut.r)	Manual start of the Autotuning	0	oFF = Not active on = Active	oFF	
	59	Reserved	Reserved			no	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
rEE (rEg)	60	HSEt (HSEt)	Hysteresis of the ON/OFF control	dP	0 to 9999 (E.U.)	1	
	61	cPdt (cPdt)	Time for compressor protection	0	From 0 (oFF) to 9999 (s)	oFF	
	62	Pb (Pb)	Proportional band	dP	1 to 9999 (E.U.)	50	
	63	ti (ti)	Integral time	0	From 0 (oFF) to 9999 (s)	200	
	64	td (td)	Derivative time	0	From 0 (oFF) to 9999 (s)	50	
	65	Fuoc (Fuoc)	Fuzzy overshoot control	2	0.00 to 2.00	0.5	
	66	tcH (tcH)	Heating output cycle time	1	0.1 to 130.0 (s)	20	
	67	rcG (rcG)	Power ratio between heating and cooling action	2	0.01 to 99.99	1	
	68	tcc (tcc)	Cooling output cycle time	1	0.1 to 130.0 (s)	20	
	69	rS (rS)	Manual reset (Integral pre-load)	1	-100.0 to +100.0 (%)	0.0	
	70	Reserved	Reserved			60	
	71	Reserved	Reserved			50	
	72	od (od)	Delay at power up	2	From 0.00 (oFF) to 99.59 (hh.mm)	oFF	
	73	St.P (St.P)	Maximum power output used during soft start	0	-100 to 100 (%)	0	
	74	SSt (SSt)	Soft start time	2	-- 0.00 (oFF); -- 0.01 to 7.59 (hh.mm); -- inF (always ON).	oFF	
75	SSt.H (SSt.H)	Threshold for soft start disabling	dP	-1999 to +9999 (E.U.)	9999		
SP (SP)	76	nSP (nSP)	Number of used set points	0	1 to 4	1	
	77	SPLL (SPLL)	Minimum set point value	dP	From -1999 to SPHL	-1999	
	78	SPHL (SPHL)	Maximum set point value	dP	From SPLL to 9999	9999	
	79	SP (SP)	Set point 1	dP	From SPLL to SPLH	0	
	80	SP 2 (SP 2)	Set point 2	dP	From SPLL to SPLH	0	
	81	SP 3 (SP 3)	Set point 3	dP	From SPLL to SPLH	0	
	82	SP 4 (SP 4)	Set point 4	dP	From SPLL to SPLH	0	
	83	A.SP (A.SP)	Selection of the active set point	0	From 1 (SP 1) to nSP	SP	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
SP (SP)	84	SP <sub>rt</sub> (SP.rt)	Remote set point type	0	RSP = The value coming from serial link is used as remote set point; trin = The value will be added to the local set point selected by A.SP and the sum becomes the operative set point; PErc = The value will be scaled on the input range and this value will be used as remote SP.	trin	
	85	SPL <sub>r</sub> (SPLr)	Local/remote set point selection	0	Loc = local; rEn = remote.	Loc	
	86	SP <sub>u</sub> (SP.u)	Rate of rise for POSITIVE set point change (ramp UP)	2	0.01 to 99.99 (inF) Eng. units per minute	inF	
	87	SP <sub>d</sub> (SP.d)	Rate of rise for NEGATIVE set point change (ramp DOWN)	2	0.01 to 99.99 (inF) Eng. units per minute	inF	
Reserved	88 to 117						
PAn (PAn)	118	PAS2 (PAS2)	Level 2 password (limited access level)	0	-- oFF (Level 2 not protected by password); -- 1 to 200.	20	
	119	PAS3 (PAS3)	Level 3 password (complete configuration level)	0	3 to 200	30	
	120	PAS4 (PAS4)	Level 4 password (CODE configuration level)	0	201 to 400	300	
	121	uSrb (uSrb)	Programmable key function during RUN TIME		nonE = No function; tunE = Auto-tune/self-tune enabling. A single press (longer than 1 second) starts the auto-tune; oPLo = Manual mode. The first pressure puts the instrument in manual mode (OPLO) while a second one puts the instrument in Auto mode; AAc = Alarm reset; ASi = Alarm acknowledge; chSP = Sequential set point selection; St.by = Stand by mode. The first press puts the instrument in stand by mode while a second one puts the instrument in Auto mode; Str.t = Reserved; P.run = Reserved; P.rES = Reserved; P.r.H.r = Reserved.	tunE	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
PAn (PAn)	122	d iSP (diSP)	Display management		nonE = Standard display; Pou = Power output; SPF = Final set point; SPo = Operative set point; AL1 = Alarm 1 threshold; AL2 = Alarm 2 threshold; AL3 = Alarm 3 threshold; Pr.tu = Reserved; Pr.td = Reserved; P.t.tu = Reserved; P.t.td = Reserved; ti.uP = Reserved; ti.du = Reserved; PErc = Percent of the power output used during soft start (when the soft start time is equal to infinite, the limit is ever active and it can be used also when ON/OFF control is selected); PoS = Reserved.	0	
	123	d iCL (di.cL)	Display colour		0 = The display colour is used to show the actual deviation (PV - SP); 1 = Display red (fix); 2 = Display green (fix); 3 = Display orange (fix).	0	
	124	AdE (AdE)	Deviation for display colour management		1 to 999 (E.U.)	5	
	125	d iSt (diSt)	Display Timeout	2	-- oFF (display always ON); -- 0.1 to 99.59 (mm.ss).	oFF	
	126	fiLd (fiLd)	Filter on the displayed value	1	-- oFF (filter disabled) -- From 0.0 (oFF) to 20.0 (E.U.)	oFF	
	127	Reserved	Reserved				
	128	dSPu (dSPu)	Instrument status at power ON		AS.Pr = Starts in the same way it was prior to the power down; Auto = Starts in Auto mode; oP.0 = Starts in manual mode with a power output equal to zero; St.bY = Starts in stand-by mode.	AS.Pr	
	129	oPr.E (oPr.E)	Operative modes enabling		ALL = All modes will be selectable by the next parameter; Au.oP = Auto and manual (OPLO) mode only will be selectable by the next parameter; Au.Sb = Auto and Stand-by modes only will be selectable by the next parameter.	ALL	



Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
<i>PAn</i> (PAn)	130	<i>oPEr</i> (oPEr)	Operative mode selection		If oPr.E = ALL: - Auto = Auto mode; - oPLo = Manual mode; - St.bY = Stand by mode. If oPr.E = Au.oP: - Auto = Auto mode; - oPLo = Manual mode. If oPr.E = Au.Sb: - Auto = Auto mode; - St.bY = Stand by mode.	Auto	
<i>SER</i> (Ser)	131	<i>Add</i> (Add)	Instrument address		-- oFF -- 1 to 254	1	
	132	<i>bAud</i> (bAud)	baud rate		1200 = 1200 baud 2400 = 2400 baud 9600 = 9600 baud 19.2 = 19200 baud 38.4 = 38400 baud	9600	
	133	<i>trSP</i> (trSP)	Selection of the value to be retransmitted (Master)		nonE = Retransmission not used (the instrument is a slave); rSP = The instrument becomes a Master and retransmits the operative set point; PErc = The instrument become a Master and it retransmits the power output.	nonE	
The parity is fixed to NONE.							

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
COn (COn)	134	CotY (Co.tY)	Count type		<p>oFF = Not used;            1 = Instantaneous power (kW);            2 = Power consumption (kW/h);            3 = Reserved;            4 = Total worked days: number of hours the instrument is turned ON divided by 24;            5 = Total worked hours: number of hours the instrument is turned ON;            6 = Total worked days with threshold: number of hours the instrument is turned ON divided by 24, the controller is forced in standby when Co.ty value reaches the threshold set in [137] h.Job;            7 = Total worked hours with threshold: number of hours the instrument is turned ON, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job;            8 = Totalizer of control relay worked days: number of hours the control relay has been in ON condition, divided by 24;            9 = Totalizer of control relay worked hours: number of hours the control relay has been in ON condition;            10 = Totalizer of control relay worked days with threshold: number of hours the control relay has been in ON condition divided by 24, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job;            11 = Totalizer of control relay worked hours with threshold: number of hours the control relay has been in ON condition, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job.</p>	oFF	
	135	UoLt (UoLt)	Nominal Voltage of the load		1 to 9999 (V)	230	
	136	cur (cur)	Nominal current of the load		1 to 999 (A)	10	

Group	no.	Param.	Description	Dec. Point	Values	Default	User Setting
COn (CO <sub>n</sub> )	137	hJob (h.Job)	Threshold of the working period		oFF = threshold not used 0 to 9999 days (when [133] cotY = 4) 0 to 9999 hours (when [133] cotY = 5)	0	
	138	tJob (t.Job)	Worked time (not resettable)		0 to 9999 days		
CAL (CAI)	139	ALP (AL.P)	Adjust Low Point		From -1999 to (AH.P - 10) in engineering units	0	
	140	ALo (AL.o)	Adjust Low Offset		-300 to +300 (E.U.)	0	
	141	AHP (AH.P)	Adjust High Point		From (AL.P + 10) to 9999 engineering units	9999	
	142	AHo (AH.o)	Adjust High Offset		-300 to +300	0	

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