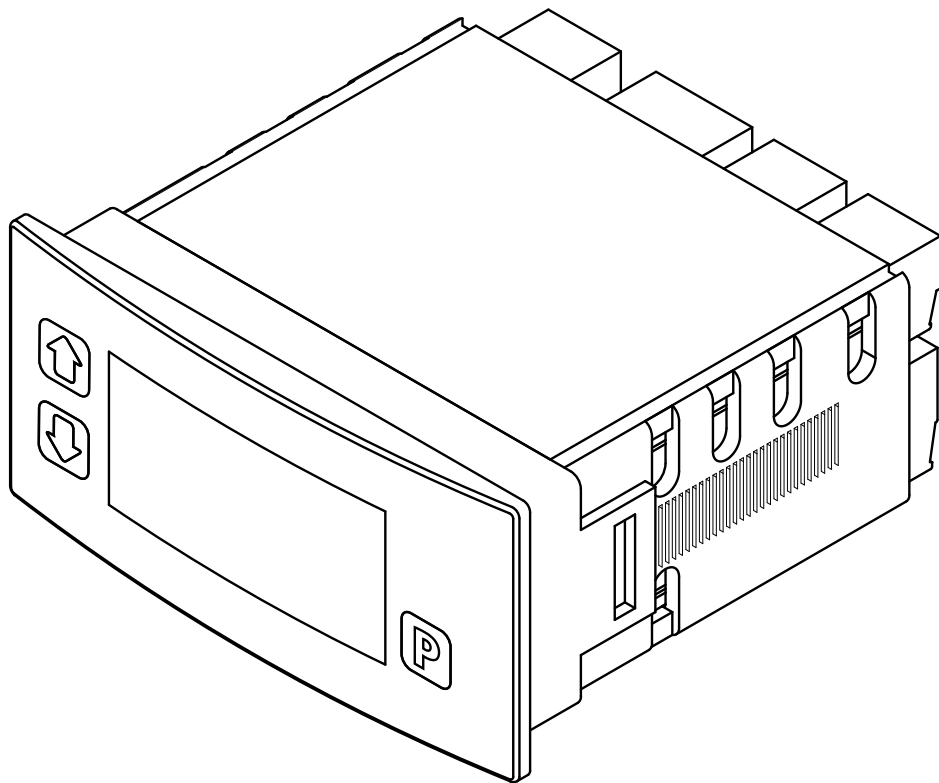


# OPERATION- MANUAL



## ELTC-41 and ELTC-42

Temperature controller up to 999°C  
for front installation

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Helpful downloads for this or other products can be found at the following link:

<https://eltherm.com/downloads>



## RESERVATION

Subject to technical changes. Changes, errors and misprints do not constitute grounds for claims for damages.

For safety components and systems, the assembly instructions as well as the relevant and currently valid standards and regulations must be observed.

eltherm GmbH Ernst-Heinkel-Str. 6-10 57299 Burbach T.: +49 2736 4413-0 F.: +49 2736 4413-50 info@eltherm.com	Document: 864305062004X <b>BU-106</b>		<b>Operation manual</b> <b>ELTC-41 and ELTC-42 Temperature controller up to 99°C for front installation</b>	
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	Revision: <b>6</b>	Julian Engel	Date:	17.08.2023

## INTRODUCTION

The electronic temperature controller of the ELTC type series is a controller with digital display and additional alarm relay for front mounting. The controller is able to work with 2 Pt100 3-wire/2-wire or 2 thermocouple type K temperature sensors.

Suitable for use with ELTF-PTEx temperature sensors.

A ModBus-Interface is integrated

### Display conventions

Particularly important points in these instructions are indicated by the following symbols:



#### DANGER

indicates an extremely dangerous situation.  
If it is not avoided, there is a danger to life or at least a high risk of serious injury.



#### ATTENTION

indicates a potentially dangerous situation.  
If not avoided, there is a risk of damage or malfunction.



#### WARNING

indicates a potentially dangerous situation.  
If it is not avoided, there is a risk of injury or at least a high risk of damage.



#### NOTE

important information and instructions for safe, effective and environmentally sound use.



For proper and safe use of the ELTC-41 and ELTC-42 temperature controller, please follow these instructions.

Please keep these instructions for future reference (e.g. in the system documentation).

### STORAGE



#### NOTE

Storage should be in a dry place at an ambient temperature of -30°C to 60°C.

### RECEIPT OF GOODS

Upon receipt of the goods, check the controllers and accessories and compare the information on the type plate with the information on the delivery bill to ensure that the correct material has been delivered.

### SCOPE OF DELIVERY

The scope of delivery of the article includes:

Qty.	Item
1 Pcs.	Temperature controller
1 Pcs.	Operation manual DE & EN
1 Pcs.	sealing
2 Pcs.	mounting-latches
2 Pcs.	mating plugs 5mm-spacing, coded
5 Pcs.	mating plugs 3,5mm-spacing, coded

### DISPOSAL



#### NOTE

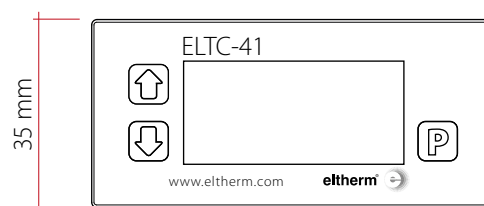
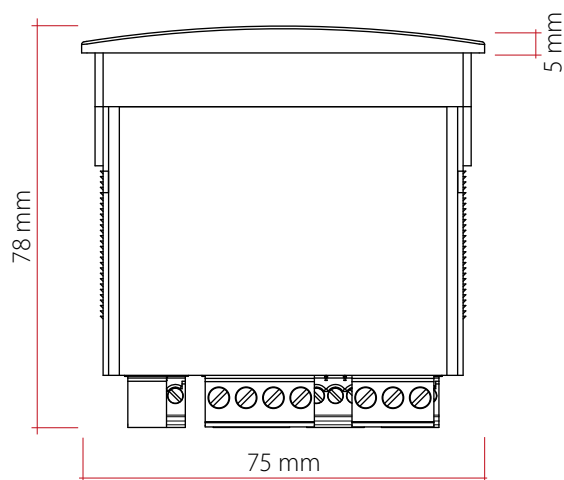
The WEEE logo (shown above) indicates that this product should not be disposed of with other waste.  
For more information on disposal and recovery of waste electrical and electronic equipment  
For more information on the disposal and recovery of waste electrical and electronic equipment (WEEE) and collection points, please contact your local waste management company or the manufacturer from whom you purchased the product.

## FUNCTIONAL DESCRIPTION & TECHNICAL DATA

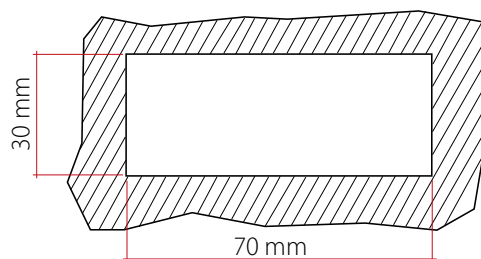
### TECHNICAL DATA

Controller type	ELTC-41 (0620041)	ELTC-42 (0620042)
Nominal voltage	90...260 VAC, 50/60 Hz	24 VDC $\pm$ 10 %, 22...28 VAC
Power consumption	max. 5 W	max. 100 mA
Relays K1	12 A res. resp. AC1/max. 240 VAC	12 A res. resp. AC1/max. 240 VAC
Relay K2 (alarm)	8 A res. / max. 240 VAC (changeover); resp. 1 A/24 VDC	8 A res. / max. 240 VAC (changeover); resp. 1 A/24 VDC
Operating temperature	-25 to +55°C	-25 to +55°C
Storage temperature	-30 to +60°C	-30 to +60°C
Humidity	max. 80% r.F. (not condensing)	max. 80% r.F. (not condensing)
Setting range	-50 to +390°C with Pt100 / -50 to +950°C with thermocouple type K	-50 to +390°C with Pt100 / -50 to +950°C with thermocouple type K
Display range/ resolution	-60 to +410°C with Pt100 / 1 K (2°F) / -50 to +999°C with thermocouple type K / 1 K (2°F)	-60 to +410°C with Pt100 / 1 K (2°F) / -50 to +999°C with thermocouple type K / 1 K (2°F)
Accuracy	$\pm$ 1K, $\pm$ 2 Digits with Pt100 / +/- 0.5% F.S. (with thermocouple type K)	$\pm$ 1K, $\pm$ 2 Digits with Pt100 / +/- 0.5% F.S. (with thermocouple type K)
Display	3-digit, LED, red, 11 mm / 2 mm, red	3-digit, LED, red, 11 mm / 2 mm, red
Sensor connection	2 each Pt100 2-wire & Pt100 3-wire or thermocouple type K	2 each Pt100 2-wire & Pt100 3-wire or thermocouple type Kp K
Connection terminals	X1/X2 max. 2,5mm <sup>2</sup> / X3-X7 max. 1,5mm <sup>2</sup> copper wire, stripping length 8mm	X1/X2 max. 2,5mm <sup>2</sup> / X3-X7 max. 1,5mm <sup>2</sup> copper wire, stripping length 8mm
Housing material	ABS, black	ABS, black
Housing dimension	75 x 35 x 78 mm (WxHxD)	75 x 35 x 78 mm (WxHxD)
Protection class	IP 54 from front, IP 30	IP 54 from front, IP 30
Type of mounting	Front installation	Front installation
Weight	approx.. 0,2 kg	approx.. 0,2 kg

### Dimensions



### Cutout

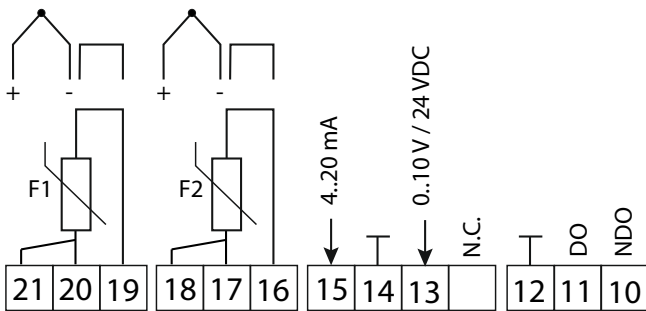


## FUNCTIONAL DESCRIPTION

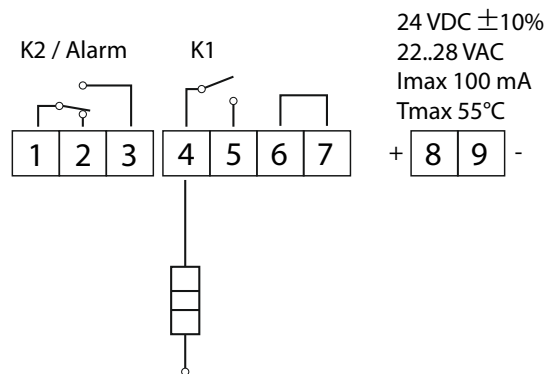
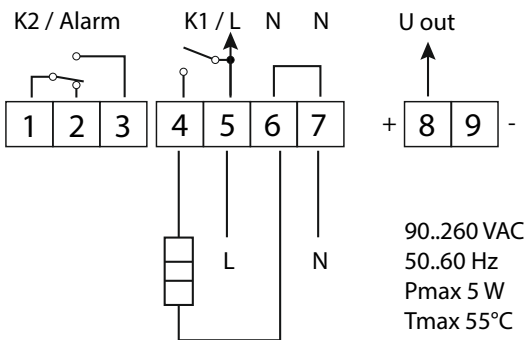
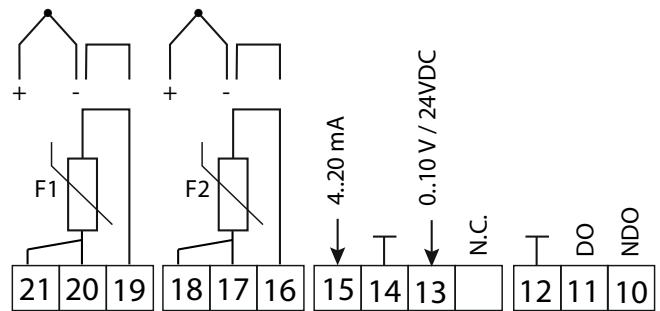
If the actual temperature (P01) falls below the control set point (P10 minus hysteresis P12), the power relay K1 switches the heating ON. The integrated alarm relay K2 allows to forward error messages with occurring under- / over-temperature, sensor break or short circuit. While sensor malfunctions, the control relay switches the heating on or off, depending on configuration. If the actual temperature (P02) falls below the control set point (P20 minus hysteresis P22), the relay K2 switches on resp. off when exceeding the actual set-point. All other functions of relay K2 depend on the configuration of parameter P35.

## CONNECTION PLAN

ELTC-41



ELTC-42



## OPERATING MODES

The 2 temperature-inputs enable the following operation-modes of K2:

- as alarm-enabling- or check-back relay dependent on K1.  
(P11=1; P21=5; P35=0...5; input F1 linked to K1 and to K2)
- as overtemperature protection with fixed set-point 2 or as second independent controller.  
Load to be switched by separate contactor.  
(P11=1; P21=2; P29=0; input F1 linked to K1, input F2 linked to K2)
- as overtemperature protection with sliding set-point 2 dependent of set-point 1.  
Load to be switched by separate contactor.  
(P11=1; P21=2; P29=1; input F1 linked to K1, input F2 linked to K2)

## SPECIAL NOTES

### Installation and safety information

#### **ATTENTION**

- Electrical connection / commissioning must be carried out by a qualified electrician.
- The relevant local safety regulations must be observed. Observe the connection values according to the type plate and these instructions.
- When selecting the installation site, observe the IP protection class and permissible operating temperature. Locations protected from direct precipitation and sunlight are advantageous.
- Operation only with closed cover, tightened screw connections / blind plugs and installed seals. Avoid damage, tensile stress, kinking and torsion of the connected lines.
- The sensor lines must be shielded when extended, the shielding must be grounded on one side near the controller. The cable must not be laid parallel to lines carrying mains voltage. The total line resistance must not exceed 10 ohms.
- Make sure that the connection terminals have the correct size and dimensioning to accommodate the conductors.

#### **ATTENTION**

- Persons involved in installations and testing of electrical trace heating systems should be appropriately qualified to perform the required actions
- Electrical heat-tracing systems should be installed under the direction of a qualified electrician who has completed supplemental training on electrical heat-tracing systems
- Critical work, such as making connections or terminations, should be performed only by qualified personnel

#### **DANGER**

A residual current circuit breaker is required for each circuit.

#### **DANGER**

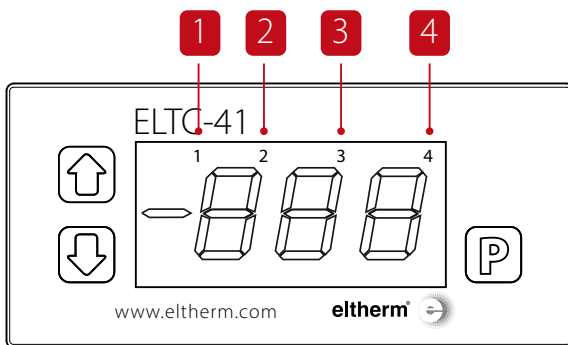
Before starting work on heating or connection lines or terminals, make sure that the corresponding circuit is switched off and secured against unintentional reconnection

#### **NOTE**

After switching on the controller, the display shows the current actual value.

## OPERATION

### OPERATING PANEL



After switching on, the type number ("C41" for ELTC-41 and "C42" for ELTC-42) and software version of the device appear and after approx. three seconds the measured actual value. If the "P" key is pressed briefly, the displays "SP1" and "SP2" appear one after the other, followed by the displays of setpoints 1 and 2 with an automatic return after 5 seconds. If the "P" key is pressed for approx. 3 seconds, the parameter list "P10" is displayed. If the "P" key is held down for a further 3 seconds, "dC" for degrees Celsius or "dF" for degrees Fahrenheit is displayed.

If the "P" key is pressed for longer, the device type, version and build-state are displayed.

#### Selecting and changing parameters

To reach the parameter list, "P" must be pressed for approx. 3 seconds until "P10" appears in the display.

#### Press „P“ for 3 seconds

Parameter no. appears

#### Press „↑/↓“

Select parameters

#### Press „P“

Parameter value appears

#### Press „↑/↓“

Change parameters

#### Press „P“

New value saved, back to parameter no.

#### Press „↑/↓“ till „P01“ or T > 1 minute

Exit input mode

#### LEDs in Display

"1" = Control relay ON

"2" = Ramp ON

"3" = Status remote operation

"4" = Alarm relay activated (=switched OFF)

A flashing of the LEDs indicates a function delay.

#### Keys

"↑" = Increase values

"↓" = Decrease values

"P" = Programming key

#### Protection against unauthorized operation

The control setpoints can basically be set without restriction, provided they are not limited by (P14/P15) resp. (P24/P25). All other parameters are protected by a code.

If a code is required, the display shows "C00". Use the arrow keys "↑/↓" to set the required code number "C42" and confirm with "P".

After approx. 1 minute without pressing any key, the code is requested again.

#### Autoscrolling

If you hold down the arrow keys "↑/↓", the values continue to scroll automatically.

#### Error messages

In the event of an error, the display shows an error code. Sensor errors are displayed with a delay of approx. 20 seconds.

#### Error codes

- E01 = Sensor 1, sensor short circuit or temperature < -60°C
  - E02 = Sensor 1, sensor broken
  - E03 = sensor 1, 3rd wire missing or R ≥ 10Ω
  - E04 = sensor 2, sensor short circuit or temperature < -60°C
  - E05 = sensor 2, sensor broken
  - E06 = Sensor 2, 3rd wire missing or R ≥ 10Ω
  - E07 = Error voltage input
  - E08 = Error current input
  - E09 = Internal error
- C00 = Protected parameters, code entry required

With error E09, further operation of the device is prevented.

#### Warning codes

- AL1 = over-/undertemperature sensor 1
- AL2 = over-/undertemperature sensor 2

## PARAMETERS AND THEIR MEANING

In [...] the factory settings are indicated.

Parameter	Meaning and range	Parameter	Meaning and range
P01 Actual value sensor 1	display only	P22 Switching hysteresis 2 of P20	Range 0/2...10K, [2K] (0=0,5K for Pt100) (2=2K for thermocouple)
P02 Actual value sensor 2	display only	P23 Min. relay idle time (relay K2)	0...30 Min., [0 Min]
P03 Actual voltage input	0-10 V ;display only	P24 Highest adjustable control setpoint 2	Range P25...+950°C, [+950°C]
P04 Actual current input	4-20 mA ; display only	P25 Lowest adjustable control setpoint 2	Range -50°C...P24, [-50°C]
P10 Control setpoint 1 (Affects to relay 1)	Range P14...P15, [5°C]	P26 sensor correction 2 (for P02)	-30...+10K, [0K]
P11 Input setpoint 1	[1] = P01 2 = P02 3 = P03 4 = P04	P27 Overtemp. alarm 2	P28...999°C, [999°C]
P12 Switching hysteresis 1 of P10	Range 0/2...10K, [2K] (0=0,5K for Pt100) (2=2K for thermocouple)	P28 Undertemp. alarm 2	-99...P27, [-99°C]
P13 Relay idle time (relay K1)	0...30 Min., [0 Min]	P29 Mode control setpoint 2	[0] = Absolut 1 = relatively to setpoint 1 0 = Pt100, 3-wire, °C [1] = Pt100, 2-wire, °C 2 = Pt100, 3-wire, °F 3 = Pt100, 2-wire, °F 4 = Thermocouple K, °C 5 = Thermocouple K, °F
P14 Highest adjustable control setpoint 1	Range P15...+950°C, [+950°C]	P30 Sensor type	0 = sensor off (fixed to 0°C [1 ] = sensor on
P15 Lowest adjustable control setpoint 1	Range -50°C...P14, [-50°C]	P32 Mode sensor 2	0 = sensor off (fixed to 0°C [1 ] = sensor on
P16 sensor correction 1 (for P01)	-30...+10 K, [0 K]	P33 Alarm delay while operation	0...99 Min., [0 Min.]
P17 Overtemp. alarm 1	P18...999°C, [999°C]	P34 Alarm delay after power on	0...500 Min., [0 Min.]
P18 Undertemp. alarm 1	-99...P17, [-99°C]	P35 Alarm mode	0 = relais on when error [1] = relais off when error 2 = mode release relais 3 = like 0, but heating on 4 = like 1, but heating on 5 = like 2, but heating on
P20 Control setpoint 2	Range -50...950°C, [5°C]		
P21 Input setpoint 2	1 = P01 [2] = P02 3 = P03 4 = P04 5 = Alarmrelais		



Parameter	Meaning and range
P36 Selection of default Display P01...P04	1...4 [1]
P40 Mode voltage input	[0] = off, P03 is set to the value of P41 1 = on 2 = Ext. controller release (on U>4VDC/U>10VAC) (off U<2VDC/U<5VAC);alarm active; values AC: half-cycle rectifier 3 = setpoint setting 1 (0-10V input) will be replaced by P03
P41 Indication at 0V	-99...999, [0]
P42 Indication at 10V	-99...999, [100]
P50 Mode current input	[0] = off, P04 is set to the value of P51 1 = on 2 = Setpoint 1 replaced by P04
P51 Indication at 4mA	-99...999, [0]
P52 Indication at 20mA	-99...999, [200]
P60 Baud rate	1 = 9600 Baud [2] = 19200 Baud 3 = 38400 Baud
P61 Network address	0 = interface deactivated 0...247, [1]
P62 Status network	0...999 Sek., indication last telegram
P70 Working hours relay K1	0...65534 hrs.
P71 Working hours relay K2	0...65534 hrs.

### HINWEIS

Desired default display P01..P04 can be set by P36

### Mode Alarm relay

If, with power-on, the actual temperature is located below P18 (P28), P34 will be used as alarm delay to grant more time for the equipment. During normal operation, P33 is used as alarm delay parameter.

### Notes on commissioning



### ATTENTION

The settings of the controller must be checked during commissioning.



### NOTE

The temperature control device and the temperature sensor(s) should be calibrated against the factory setting during commissioning if necessary.

### Declaration of Conformity



We declare that the described product fully complies with Directives 2014/35/EU, 2014/30/EU and 2011/65/EU. If you need a detailed declaration of conformity, please contact us.

## MODBUS

### ModBus-Interface

Type	RS485 (Physical Layer)
Baud rate	max. 38400 Baud
Protocoll	N,8,S / ModBus
Number of devices	max. 32

### ModBus-Parameters

#### Bit 0...15 output states

Alarm delay: Temperature limits exceeded, parameter P33 active

Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
LED relay 1	LED relay 2	LED 3	LED Alarm	Relay 1	Relay 2	-	Remote SP1
Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
Alarm sensor 1	Alarm delay sensor 1	Alarm sensor 2	Alarm delay sensor 2	-	-	-	-

#### Bit 16...31 error codes

Bit 16	Bit 17	Bit 18	Bit 19	Bit 20	Bit 21	Bit 22	Bit 23
sensor 1 short	sensor 1 open	sensor 1 3-wire	sensor 2 short	sensor 2 open	sensor 2 3-wire	Fault voltage	Fault current
Bit 24	Bit 25	Bit 26	Bit 27	Bit 28	Bit 29	Bit 31	Bit 31
-	-	-	-	-	Fault internal temperature	Fault reference voltage	Internal error

### Read discrete inputs

Function = 0x02  
Address = 0  
QTY = 16

### Read device ID

Function = 0x02B  
Address = 0x0E  
ID Code= 0X01  
Object ID = 0x00

Object ID 00 = eltherm GmbH  
Object ID 01 = ELTC-41/42  
Object ID 02 = Rev03, Bxxx

### Read input register

Function = 0x04 HiByte Hardware ID: 41 (for ELTC-41/42)  
Address = 0 LowByte Param.-list ID: 3 (for version 03)

i **HINWEIS**

all temperature values are with resolution 1K  
Communication setting is N,8,2 (None parity, 8 data bits, 2 stop bits)

**ModBus-Parameterslist**

Par.	Description	Default	Scale 1 digit	Range	ModBus Input (0x04)	ModBus Holding (0x03,0x06)	Format	Code	Comments
1	Actual value display temperature input 1	-	1 °C	-50(-60)..410(999)	1		s16	-	PT100: -60 ... 310°C, thermocouple type K: -50 ... 999°C
2	Actual value display temperature input 2	-	1 °C	-50(-60)..410(999)	2		s16	-	PT100: -60 ... 310°C, thermocouple type K: -50 ... 999°C
3	Actual value display voltage input	-	1	-99 .. 999	3		s16	-	display only
4	Actual value display current input	-	1	-99 .. 999	4		s16	-	display only
10	Setpoint 1	5	1 °C	P15 .. P14		0	s16	-	Adjustable without code
11	Control input for setpoint 1	1	1	1..4	1		s16	42	1 = P01; 2= P02; 3=P03; 4=P04 This setting also determines which input is shown in the basic display (e.g. 3 corresponds to the voltage input).
12	Hysteresis 1	2K	1 K	0 / 2 .. 10	4		s16	42	0 corresponds to 0.5K incl. display "0.5" For thermocouple input min. hysteresis = 2K
13	Minimum standstill time relay 1	0.0 min	0.1 min	0..300	5		s16	42	
14	Upper adjustment limit setpoint 1	950	1 °C	P15 .. 950	6		s16	42	
15	Lower adjustment limit setpoint 1	-50	1 °C	-50 .. P14	7		s16	42	
16	Sensor correction 1 (to P01)	0K	1 K	-30..10	9		s16	42	
17	Upper alarm temperature 1	999	1 °C	P18 .. 999	11		s16	42	
18	Lower alarm temperature 1	-99	1 °C	-99 .. P17	12		s16	42	
20	Setpoint 2	5°C	1 °C	P25 .. P24	2		s16	-	Adjustable without code
21	Control input for setpoint 2	2	1	1..5	3		s16	42	1 = P01; 2= P02; 3=P03; 4=P04; 5= Alarm relay From control loop 1
22	Hysteresis 2	2K	1 K	0 / 2 .. 10	24		s16	42	0 corresponds to 0.5K incl. display "0.5" For thermocouple input min. hysteresis = 2K
23	Minimum standstill time relay 2	0.0 min	0.1 min	0..300	25		s16	42	
24	Upper adjustment limit setpoint 2	950	1 °C	P25 .. 950	26		s16	42	
25	Lower adjustment limit setpoint 2	-50	1 °C	-50 .. P24	27		s16	42	
26	Sensor correction 2 (to P02)	0K	1 K	-30..10	10		s16	42	
27	Upper alarm temperature 2	999	1 °C	P28 .. 999	13		s16	42	
28	Lower alarm temperature 2	-99	1 °C	-99 .. P27	14		s16	42	

Par.	Description	Default	Scale 1digit	Range	ModBus Input (0x04)	ModBus Holding (0x03,0x06)	Format	Code	Comments
29	Mode Setpoint 2	0	1	0,1	28		s16	42	0 = Absolute, 1 = Relative to setpoint 1 0=PT100 3W [°C], 1=PT100 2W[°C]
30	Type temperature probe	1	1	0.5	8		s16	42	2=PT100 3W [°F], 3=PT100 2W[°F] 4=thermocouple K [°C], 5=thermocouple K [°F]
31	Sensor 1 mode	1	1	0,1	29		s16	42	0 = sensor off (fixed at 0°C), 1 = sensor on
32	Sensor 2 mode	1	1	0,1	30		s16	42	0 = sensor off (fixed at 0°C), 1 = sensor on
33	Default Alarm Delay Time	0.0 min	0.1 min	0 .. 99.0	15		s16	42	
34	Startup alarm delay time	0 min	1 min	0 .. 500	16		s16	42	
35	Alarm mode	1	1	0..5	17		s16	42	0= alarm relay on in case of error 1= alarm relay off on error 2 = mode enable relay 3 = like 0, but heating output additionally on 4 = like 1, but heating output additionally on 5= like 2, but heating output additionally on. 0 = Off (P03 is fixed to the value of P41); 1 = On 2=external controller enable (int. setpoint = -100°C, alarm monitoring remains active) 3=Setpoint input, setpoint1 (function of 0..10V input) is replaced with P43
40	Mode voltage input	0	1	0,1	18		s16	42	
41	Display value at 0V	0	1 °C	-99 .. 999	19		s16	42	
42	Display value at 10V	100	1 °C	-99 .. 999	20		s16	42	
50	Current input mode	0	1	0,1	21		s16	42	0 = Off (P04 is fixed to the value of P51); 1 = On
51	Display value at 4mA	0	1 °C	-99 .. 999	22		s16	42	
52	Display value at 20mA	200	1 °C	-99 .. 999	23		s16	42	
60	Baud rate	2	1	1..3			s16	42	1 = 9600 baud; 2=19200 baud; 3 = 38400 baud
61	Network address	1	1	0..247			s16	42	0 = interface disabled
62	Network status	-	1 sec	0..999	5		s16	-	Display seconds when last valid telegram was received
70	Operating hours relay 1	-	1 h	0.65534	6		u16	-	Operating time relay 1, resolution hours
71	Operating hours relay 2	-	1 h	0.65534	7		u16	-	Operating time relay 2, resolution hours