

2-Channel-Controller TTX-700

RTD(Pt100) - Thermocouple , Voltage - Current

Features

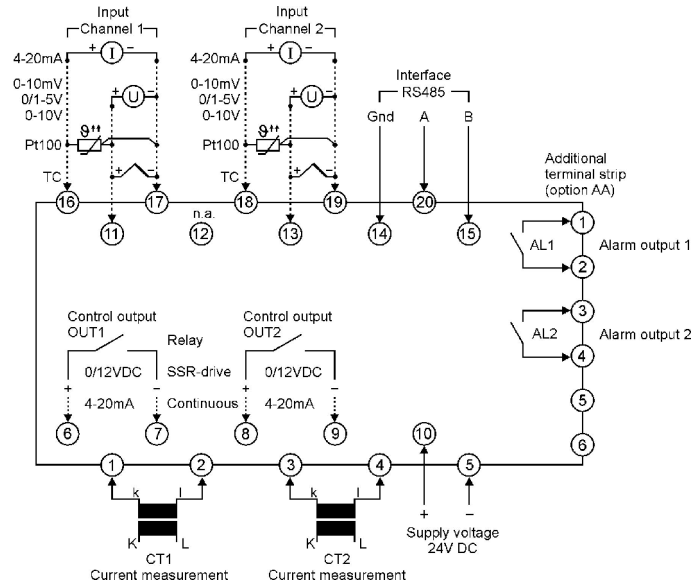
- 2-channel 2-point controller or 2-channel-continuous controller or 1-channel 3-point-controller
- Measuring inputs programmable for Pt100, Thermocouple (K, J, R, T, N, S and B), voltage or current
- Measuring ranges programmable
- Control performance PID with auto-tuning or ON/OFF control
- Process output relay SPST NO, SSR drive 0/12V or continuous output 4...20mA
- RS485-Interface for max. 31 devices
- Monitoring of heating current with external transmitter (included)
- Alarm output relay SPST NO, Alarm function programmable
- Screw terminals
- DIN rail mounting TS35



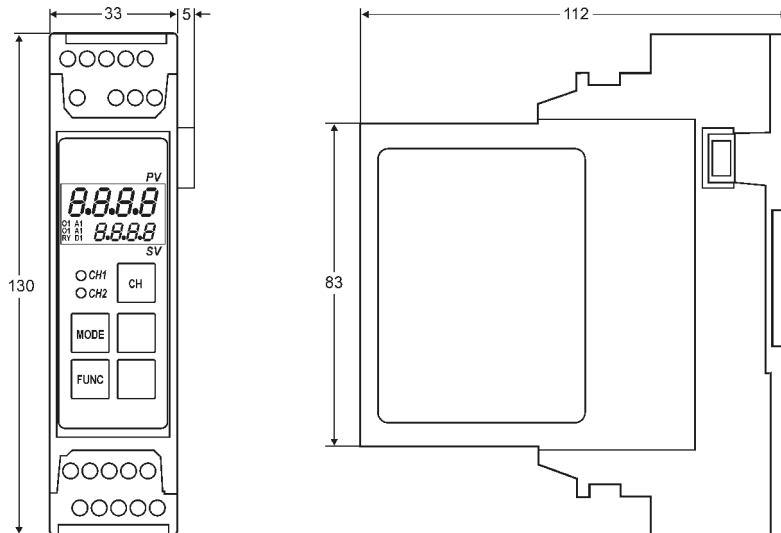
Technical data

Supply voltage	: 24V DC
Power consumption	: <4W
Working temperature	: 0 ... 50°C
CE - conformity	: EN50081-2, EN50082-2, EN61010 (IEC1010-1)
Measuring input	: programmable for
Pt100	: Pt100 DIN and JPt100 in range -199 ... 500 / -199.9 ... 500.0°C
	: 2- or 3-wire connection
- Line resistance	: up to 10 Ohm no adjustment necessary (3-wire connection)
- Accuracy	: ±0.3% + 1digit of measuring range
Thermocouple	: Typ K (NiCr-Ni) from -200 ... 1370°C Typ J (Fe-CuNi) from -200 ... 850°C Typ R (PtRh-Pt 87/13) from 0 ... 1700 °C Typ T (Cu-CuNi) from -200 ... 400°C Typ N (NiCrSi-NiSi) from -200 ... 1300°C Typ S (PtRh-Pt90/10) from 0 ... 1700°C Typ B (Pt30Rh /Pt6Rh) from 0 ... 1800°C monitoring break of sensor, built-in cold junction
Voltage	: 0...10mV, 0/1 ... 5V, 0...10V DC from -1999 ... 9999 Digit
Current	: 4 ... 20mA from -1999 ... 9999 Digit
Sensor correction	: programmable
Accuracy	: ± 0.3% + 1Digit of measuring range
Sampling rate	: 250ms
Current monitoring	: max 30A, with extern current transmitter (including)
Output	
Electronic	: 0/12V DC, max. 20mA for SSR drive
Relay	: Process output <250V AC<250VA<3A SPST NO Alarm output <250V AC<250VA<1A SPST NO
Continuous	: 4 ... 20mA , burden max 600Ω
Display	
Process value	: LED 4-Digit green 7.6mm height
Set value	: LED 4-Digit red 5.3mm height
Decimals	: programmable
Status indicators	: LED red (A1, A2, O1, O2, RY, D1) Green (CH1, CH2, serial interface)
Case	: DIN rail mounting DIN TS35
Dimensions	: 32x128mm floor space, mounting height 112mm, weight <200g
Protection	: IP30
Terminals	: Screw terminals max. 2,5mm² acc. to German BGV A2

Connection diagram



Dimensions

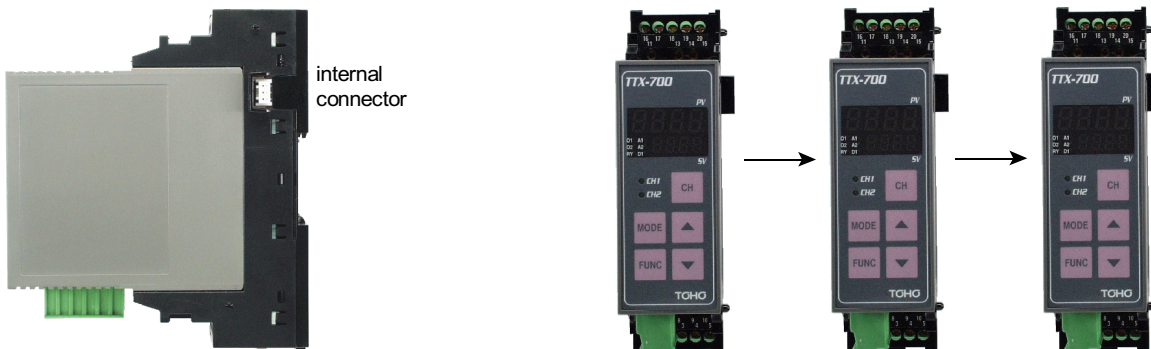


Serial interface

3 interface protocols are present

1. TOHO TTM-100 Protocol
2. Modbus (RTU)
3. Modbus (ASCII)

At least max 31 devices can operate in a distance up to 500m. Only the first device must be connected to the data line. The following can be connected with the internal connector



Controls and Displays

LED O1 = Output 1
 LED O2 = Output 2
 LED A1 = Alarm output 1
 LED A2 = Alarm output 2
 LED RY = no control
 LED CH1 = Channel 1 visible
 LED CH2 = Channel 2 visible



Process value (PV)
 Set value (SV) / Serial interface
 (indicator green decimalpoint)

Channel-selection

Parameter button

Up button

Function button

Down button

Description

Operating of the device is arranged in 2 levels. The requested parameter can be called by the **MODE** -button. For selection within a parameter or entering data takes place with buttons ▲ and ▼. The display scan takes place dynamically, i.e. the regulating speed increases with the operating time of the keys (1~10s = 1 digit/100ms, 10~20s = 10digit/100ms, > 20s = 100digit/100ms).

After switching on the supply voltage, the device initializes itself. The display shows the code of the input configuration. After the initializing procedure the device is operating in the **Working level**. Set value and process value are displayed. It is possible to change setpoint and switching between channel 1 and 2.

Activating the **MODE** - button for more than 2 seconds, the program is jumping into the **Configuration level**. Now all the parameters defining the function of the controller can be programmed. All data are stored zero-voltage safe.

After finishing the configuration or when longer than 120 seconds no button was pushed, the program jumps back to the working level. Leaving the configuration level is possible at any time by pushing the **MODE**-button for 2 seconds.

The programming procedure is identical for both controllers. Channel 1 and 2 can be operating as two stand-alone 2-point controller. It is possible to configure the TTX-700 as 3-point controller. Therefore the parameter C 2.4 page 6 (Output OUT2) must be programmed number 1 or 2.

The channel selection is only possible in the working level and in the configuration level at the selection *SET*.

Start-up note!

Before the device can be used, it must be configured for the intended use

Programming

Notes to representation



Parameter only appears with appropriate configuration



Parameter only appears with appropriate equipment

Notes to programming

1. During configuration a parameter will only be shown, if it is not excluded by another parameter setting
2. The change-over from 2-channel 2-point-controller to 1-channel 3-point-controller is possible in the configuration level. Parameter _Cnt (see 2.4 page 6) for C OUT2 in the menu Set2, must be number 1 or 2 . With selection of the control performance for C, channel 2 is not present and it is not possible to change-over from channel 1 to 2.
3. The alarm outputs are assigned to the controller channels. For using the TTX-700 as 2-channel 2-point-controller the alarm output 1 is assigned to channel 1 and alarm output 2 is assigned to channel 2. If the TTX-700 is operating as 1-channel 3-point controller both alarm outputs are assigned to channel 1.

Working level

Button	Display	Description
		Process value (PV)°C
		Set value (SV)°C Setting possible in the programmed measuring range with buttons and . The new value will be set after 3 seconds.
		Digit selection with button .The corresponding position is blinking.
	<ul style="list-style-type: none"> ● CH1 ● CH2 	The CH-button toggles between channel 1 and 2

Configuration level

Button	Display	Description	[Factory setting]
	320 320	Working level	
MODE		Press MODE -button 2s	
↓	1 SEt 1	Menu 1, Parameter measuring input/display setting	
MODE			
↓	1.1 - InP 00	Input configuration	[00]
		Selection with buttons ▲ and ▼ .	
		00 K Thermocouple NiCr-Ni	01 J Thermocouple Fe-CuNi
		02 R Thermocouple NiCr-CuNi	03 T Thermocouple Cu-CuNi
		04 N Thermocouple NiCrSi-NiSi	05 S Thermocouple PtRh-Pt90/10
		06 B Thermocouple Pt30Rh /Pt6Rh	09 0...10mV DC
		10 Pt100	11 JPt100
		20 0...10V DC*	21 0...5V DC*
		22 1...5V DC*	23 4...20mA
		* only order code 2 . input = 2	
MODE			
↓	1.2 - P v S 0	Process value correction [°C] (PV) zero point correction	[0]
		Setting possible from -1 999 ... 9999 digit with buttons ▲ and ▼ .	
MODE			
↓	1.3 - P d F 1	Input filter [s]	[1]
		Setting possible from 0 ... 99s with buttons ▲ and ▼ .	
MODE			
↓	1.4 - d P 0	Decimal points for set- and process value	[0]
		0 no decimals	
		0.0 1 decimal (only RTD, voltage and current)	
		0...0.000 0-3 decimals (only voltage and current input)	
		Selection with buttons ▲ and ▼ .	
MODE			
↓	1.5 - L o C 0	Programming lock	[0]
		0 no lock	
		1 all parameters locked	
		2 working level locked	
		3 configuration level locked	
		Selection with buttons ▲ and ▼ .	
MODE			
↓	1 SEt 1	Finish menu 1	
		With MODE - button back to parameter 1.1 of menu 1 or select next menu with button ▲	
MODE			

Button	Display	Description	[Factory setting]												
↓ MODE	² SEt 2	Menu 2, parameter control output													
↓ MODE	^{2.1} - SLH 1200	High limit set value [°C] Setting possible from <i>SLH</i> +50Digit ... max. measuring range with buttons ▲ and ▼.	[1200]												
↓ MODE	^{2.2} - SLL 0	Low limit set value [°C] Setting possible from <i>SLL</i> -50 Digit ... min. measuring range with buttons ▲ and ▼.	[0]												
↓ MODE	^{2.3} - nd run	Control setting mode <i>run</i> control performance <i>dy</i> non-control, low limit of manipulated OUT1 specifies control output <i>rrn</i> non control, manual manipulation of output variable Selection with buttons ▲ and ▼.	[run]												
↓ MODE	^{2.4} - Cnt ABC	Control type setting OUT 1 and OUT 2 (see page 4)	[110]												
		<table border="1"> <thead> <tr> <th>A (performance)</th> <th>B (output OUT1)</th> <th>C (output OUT2)</th> </tr> </thead> <tbody> <tr> <td>0: PID with over shot</td> <td>1: PID control</td> <td>0: no function</td> </tr> <tr> <td>1: PID without over shot</td> <td>2: ON/OFF</td> <td>1: PID control</td> </tr> <tr> <td></td> <td></td> <td>2: ON/OFF</td> </tr> </tbody> </table>	A (performance)	B (output OUT1)	C (output OUT2)	0: PID with over shot	1: PID control	0: no function	1: PID without over shot	2: ON/OFF	1: PID control			2: ON/OFF	
A (performance)	B (output OUT1)	C (output OUT2)													
0: PID with over shot	1: PID control	0: no function													
1: PID without over shot	2: ON/OFF	1: PID control													
		2: ON/OFF													
		Selection with buttons ▲ and ▼.													
↓ MODE	^{2.5} - dir 0	Heating or cooling function 0 = heating 1 = cooling Selection with buttons ▲ and ▼.	[0]												
↓ MODE	^{2.6} - nu1 0.0	Actual manipulated value OUT1 [%] Setting possible from <i>nu1</i> ... <i>nu1</i> with buttons ▲ and ▼, only if parameter 2.3 " <i>rrn</i> " was selected If parameter 2.4 for output OUT1 ON/OFF mode would be selected, continue with parameter 2.20	[0.0]												
↓ MODE	^{2.7} - tun 2	Auto tuning; single shot (1, 3, 5) or permanent (2, 4) Parameter 1,3 or 5 enables the controlled Start of the auto tuning. Parameter <i>P</i> , <i>I</i> and <i>d</i> are determined by the controller. These values can be manipulated at any time. With the choice 2 or 4 the values <i>P</i> , <i>I</i> and <i>d</i> are monitored permanently and calculated, if the set value was changed. Manipulation of the parameters <i>P</i> , <i>I</i> and <i>d</i> are not possible in permanent mode. <i>1</i> Single shot auto tuning for output OUT 1 with the FUNC -button. <i>2</i> permanent auto tuning <i>3</i> as <i>1</i> , but for output OUT2 <i>4</i> as <i>2</i> , but for output OUT 2 <i>5</i> controlled Start auto tuning for output 1and 2 with the FUNC -button. Selection with buttons ▲ and ▼.	[2]												

Button
continue
page 7

Display

Description

[Factory setting]

↓	2.8 - P1 1.0	Proportional band setting output OUT1 [%] [3.0] Setting possible from 0.1 ... 200.0% of the programmed measuring range with buttons ▲ and ▼ . (Recommend value for first setting 3.0%)
MODE		
↓	2.9 - I 0	Integral time setting [s] [150] Setting possible from 0 ... 3600 s with buttons ▲ and ▼ . (Recommend value for first setting 150s)
MODE		
↓	2.10 - D 0	Derivate time setting [s] [30] Setting possible from 0 ... 3600 s with buttons ▲ and ▼ . (Recommend value for first setting 30s)
MODE		
↓	2.11 - t1 10	Proportional cycle time setting output OUT1 [s] [10] Setting possible from 1 ... 120 s with buttons ▲ and ▼ . (Relay output = 10s , SSR-drive output = 1s)
MODE		
↓	2.12 - NH1 100.0	High limit manipulated value output OUT1 [%] [100.0] Setting possible from 0.1 ... 100.0% with buttons ▲ and ▼ .
MODE		
↓	2.13 - NL1 0.0	Low limit manipulated value output OUT1 [%] [0.0] Setting possible from 0.0 ... NH1 % with buttons ▲ and ▼ . <i>If parameter 2.4 C (OUT2) = 0 , continue with parameter 2.19</i>
MODE		
↓	2.14 - NU2 0.0	Manipulated value output OUT2 [%] [0.0] Setting possible from NL2 ... NH2 with buttons ▲ and ▼ only if parameter 2.3 "N R n" would be selected. <i>If parameter 2.4 C (OUT2) = 2 , continue with parameter 2.22</i>
MODE		
↓	2.15 - P2 1.00	Proportional band setting output OUT2 [factor] [3.0] Setting possible from 0.10 ... 10.00 with buttons ▲ and ▼ .
MODE		
↓	2.16 - t2 20	Proportional cycle time setting output OUT2 [s] [0] Setting possible from 0 ... 120 s with buttons ▲ and ▼ . (recommend value = 10s)
MODE		

Button	Display	Description	[Factory setting]
↓	2.17 - NH2 100.0	High limit manipulated value output OUT2 [%] Setting possible from $NH2 \dots 100.0\%$ with buttons ▲ and ▼ .	[100.0]
MODE			
↓	2.18 - NL2 0.0	Low limit manipulated value output OUT2 [%] Setting possible from $0.0 \dots NH2\%$ with buttons ▲ and ▼ .	[0.0]
MODE			
↓	2.19 - Pbb 0.0	Proportional band correction [%] Setting possible from $0.0 (-100.0) \dots 100.0\%$ with buttons ▲ and ▼ . <i>Parameter 2.20 - 2.23 are only valid for OUT1 and OUT2 in ON/OFF mode</i>	[0.0]
MODE			
↓	2.20 - C1 0	Hysteresis for ON/OFF mode output OUT1 [°C] Setting possible from $0 \dots 9999$ digit with buttons ▲ and ▼ .	[0]
MODE			
↓	2.21 - CP1 0	OFF position setting OUT1 [°C] related to the set value Setting possible from $-1999 \dots 9999$ digit with buttons ▲ and ▼ .	[0]
MODE			
↓	2.22 - C2 0	Hysteresis for ON/OFF mode output OUT2 [°C] Setting possible from $0 \dots 9999$ digit with buttons ▲ and ▼ .	[0]
MODE			
↓	2.23 - CP2 0	OFF position setting output OUT2 [°C] depending on set value Setting possible from $-1999 \dots 9999$ digit with buttons ▲ and ▼ .	[0]
MODE			
↓	2.24 - db 0.0	Dead band for 3-point control [°C] Setting possible from $-100.0 \dots 100.0^\circ\text{C}$ with buttons ▲ and ▼ .	[0.0]
MODE			
↓	2 SEt 2	Finish menu 2 With MODE - button back to parameter 2.1 of menu 2 or select next menu with button ▲ .	
MODE			

Button	Display	Description	[Factory setting]
↓ MODE	3 SEt 3	Menu 3, parameter alarm output	
↓ MODE	3.1 - E 1 F 00	Switching function alarm output X0 no alarm function X1 Limit comparator 1 - 0 - 1 (depends on SV) X2 Signal contact max. 0 - 1 (depends on SV) X3 Signal contact min. 1 - 0 (depends on SV) X4 Limit comparator 0 - 1 - 0 (depends on SV) X5 Limit comparator 1 - 0 - 1 (absolute value) X6 Limit contact max. 0 - 1 (absolute value) X7 Limit contact min. 1 - 0 (absolute value) X8 Limit comparator 0 - 1 - 0 (absolute value) 0X no additional function 1X with hold function 2X with start-up alarm suppression 3X with hold and start-up alarm suppression Selection with buttons ▲ and ▼ .	[00]
↓ MODE	3.2 - E 1 H 0	High limit setting alarm output [°C] Setting possible from -1999 ... 9999 digit with buttons ▲ and ▼ .	[0]
↓ MODE	3.3 - E 1 L 0	Low limit setting alarm output [°C] Setting possible from -1999 ... 9999 digit with buttons ▲ and ▼ .	[0]
↓ MODE	3.4 - E 1 C 0	Hysteresis alarm output [°C] Setting possible from 0 ... 9999 digit with buttons ▲ and ▼ .	[0]
↓ MODE	3.5 - E 1 t 0	Delay time alarm output [s] Setting possible from 0 ... 9999 s with buttons ▲ and ▼ .	[0]
↓ MODE	3.6 - E 1 b 00	Monitoring break of wire and hold function* alarm output 0x no hold function 1x hold function x0 no additional function x1 monitoring break of wire x2 monitoring heating current x3 heating current and break of wire Selection with buttons ▲ and ▼ . (* reset with power-off)	[00]

Button	Display	Description	[Factory setting]																
↓ MODE	3.7 - E I P 0	Actuation alarm output 0 = relay NO, 1 = relay NC Selection with buttons ▲ and ▼ .	[0]																
↓ MODE	3.8 - C t 1	Process value of heating current																	
↓ MODE	3.9 - C t 1 1	Setpoint heater current abnormal Setting possible from 0 ... 30 A with buttons ▲ and ▼ .	[1]																
↓ MODE	3 S E t 3	Finish menu 3 With MODE - button back to parameter 3.1 of menu 3 or select next menu with button ▲																	
↓ MODE	6 S E t 6	Menu 6, parameter serial interface																	
↓ MODE	6.1 - P r t 0	Communication protocol 0 Toho TTM-100 1 Modbus (RTU) 2 Modbus (ASCII) Selection with buttons ▲ and ▼ .	[0]																
↓ MODE	6.2 - C o n A B C D	Interface parameter <table border="1"> <thead> <tr> <th>A BCC-check</th> <th>B Data length</th> <th>C Parity-check</th> <th>D Stop-Bit</th> </tr> </thead> <tbody> <tr> <td>n no</td> <td>7 7-Bit</td> <td>n no</td> <td>1 1-Bit</td> </tr> <tr> <td>b yes</td> <td>8 8-Bit</td> <td>o odd</td> <td>2 2-Bit</td> </tr> <tr> <td></td> <td></td> <td>E even</td> <td></td> </tr> </tbody> </table> 7 0 1, 7 E 1 und 7 n 2 only available with Modbus ASCII 8 0 1, 8 E 1 und 8 n 2 only available with Modbus RTU Selection with buttons ▲ and ▼ .	A BCC-check	B Data length	C Parity-check	D Stop-Bit	n no	7 7-Bit	n no	1 1-Bit	b yes	8 8-Bit	o odd	2 2-Bit			E even		[b 0 n 2]
A BCC-check	B Data length	C Parity-check	D Stop-Bit																
n no	7 7-Bit	n no	1 1-Bit																
b yes	8 8-Bit	o odd	2 2-Bit																
		E even																	
↓ MODE	6.3 - b P S 0	Baud rate 1.2 1200 Baud 2.4 2400 Baud 4.8 4800 Baud 9.6 9600 Baud 19.2 19200 Baud Selection with button ▲ and ▼ .	[9.6]																



Button	Display	Description	[Factory setting]
↓ MODE	6.4 - A d r 0	Device address channel 1 Address for channel 2: channel 1 + 1 (if parameter 2.4 C = 0) Setting possible from 1 ... 99 or 1 ... 247 (Modbus) with button and .	[9600]
↓ MODE	6.5 - A U t 0	Delay time for data request Setting possible 0 ... 250 ms with buttons and .	[0]
↓ MODE	6.6 - M o d r o	Data transfer selection r o reading only r U reading and writing possible	[r o]
MODE	6 S E t 6	Finish menu 6 With MODE - button back to parameter 6.1 of menu 6 or press MODE - button for 2s to leave the configuration level	

Display messages

Display	Description / trouble shooting
---	Displayed whenever input value exceeds the high limit of Display range. Also displayed at break of wire of sensor (thermocouple, and RTD).
---	Displayed whenever input value exceeds the low limit of Display range. Check short circuit of input lines .
Err0	Memory error. If the message still appears after Power-on, please ship the controller to factory for repair service.
Err1	A/D converter error. If the message still appears after Power-on, please ship the controller to factory for repair service.
Err2	Auto-tuning error. Check sensor connection or change to other tuning mode.
Loc	Programming lock See configuration level page 5
At	Display toggles between At and working level, during auto-tuning.
LINE	Setpoint manipulation during timer function

Order code:

1. 2. 3.
TTX-700 - - -

1. Input

- 0 Thermocouple (Typ K, J, R, T, N, S, B); RTD (Pt100, JPt100)
0...10mV DC
- 2 Current (4-20mA), Voltage (0/1...5V; 0...10V)

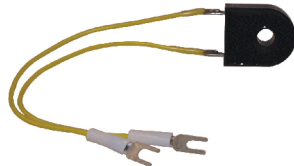
2. Control output OUT1 and OUT2

- RR Relay SPST NO
- PP 0/12V DC SSR-drive
- RP Relay SPST NO, 0/12V DC SSR-drive
- RI Relay SPST NO, continuous current 4...20mA
- II Continuous current 4...20mA

3. Option

- 00 without Options
- AA each channel 1alarm output (Relay SPST NO)
and monitoring of heating current with external transmitter
(included by delivery)

Current transmitter CT1, CT2



The transmitter was designed for cable diameter of 6mm. For better mounting the transmitter has 160mm connection cable and will be mounted direct to the controller.