

PID controller

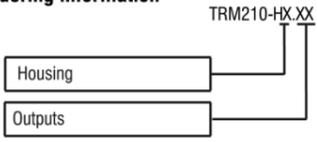
TRM210

PID controller
Short guide
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1. Scope of delivery

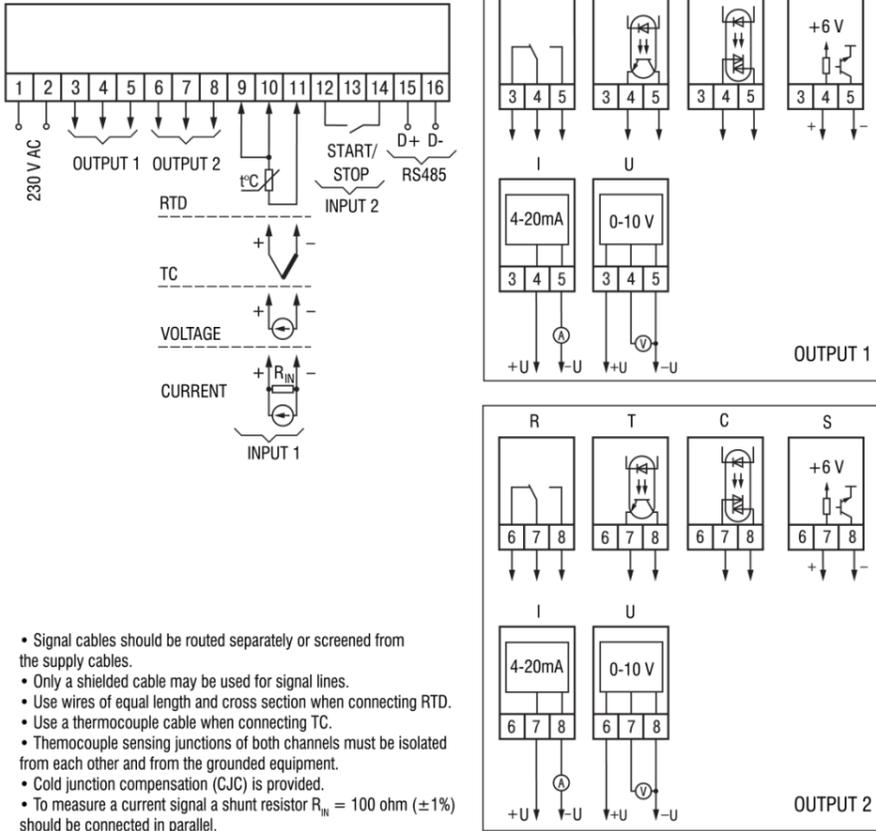
- TRM210 - 1
- Short guide - 1
- Mounting kit - 1
- Gasket - 1

2. Ordering information



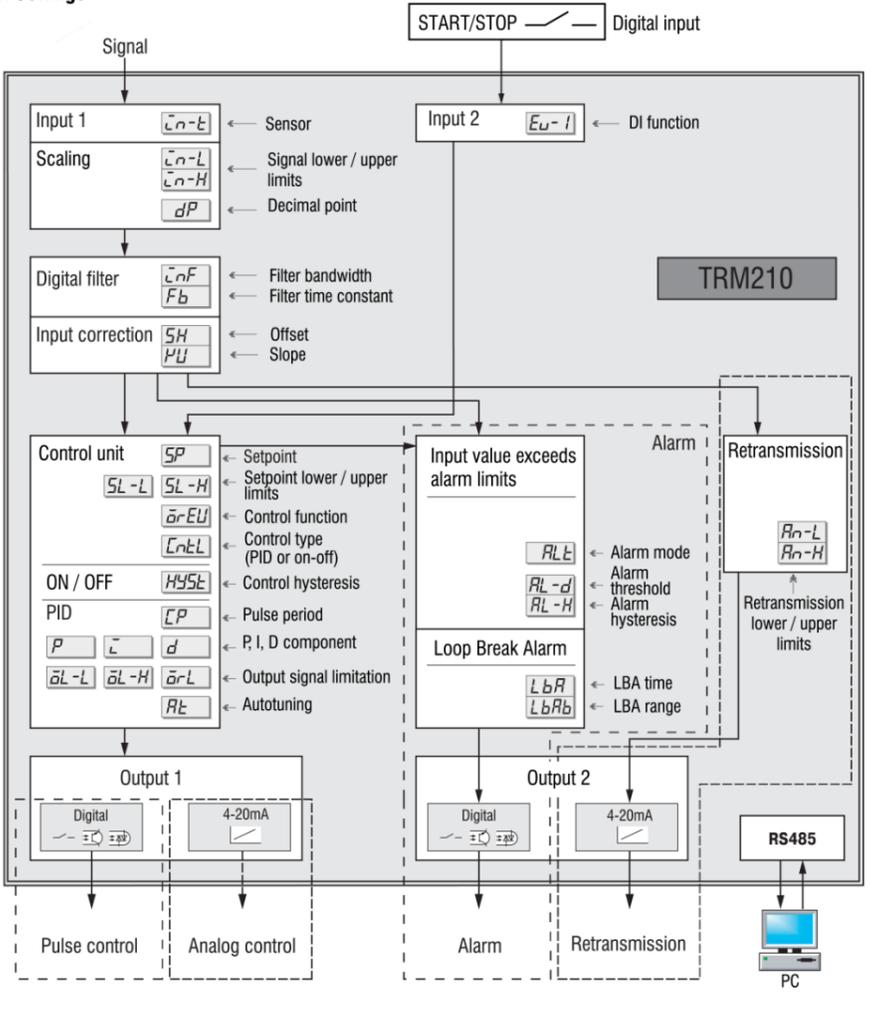
- Housing:**
- H1 - panel mount (96 x 96 x 70 mm)
 - H2 - panel mount (96 x 48 x 100 mm)
 - H3 - wall mount (105 x 130 x 65 mm)
- Outputs:**
- R - Relay
 - T - NPN transistor
 - C - TRIAC
 - S - Solid state relay
 - I - 4-20 mA
 - U - 0-10 V

3. Wiring



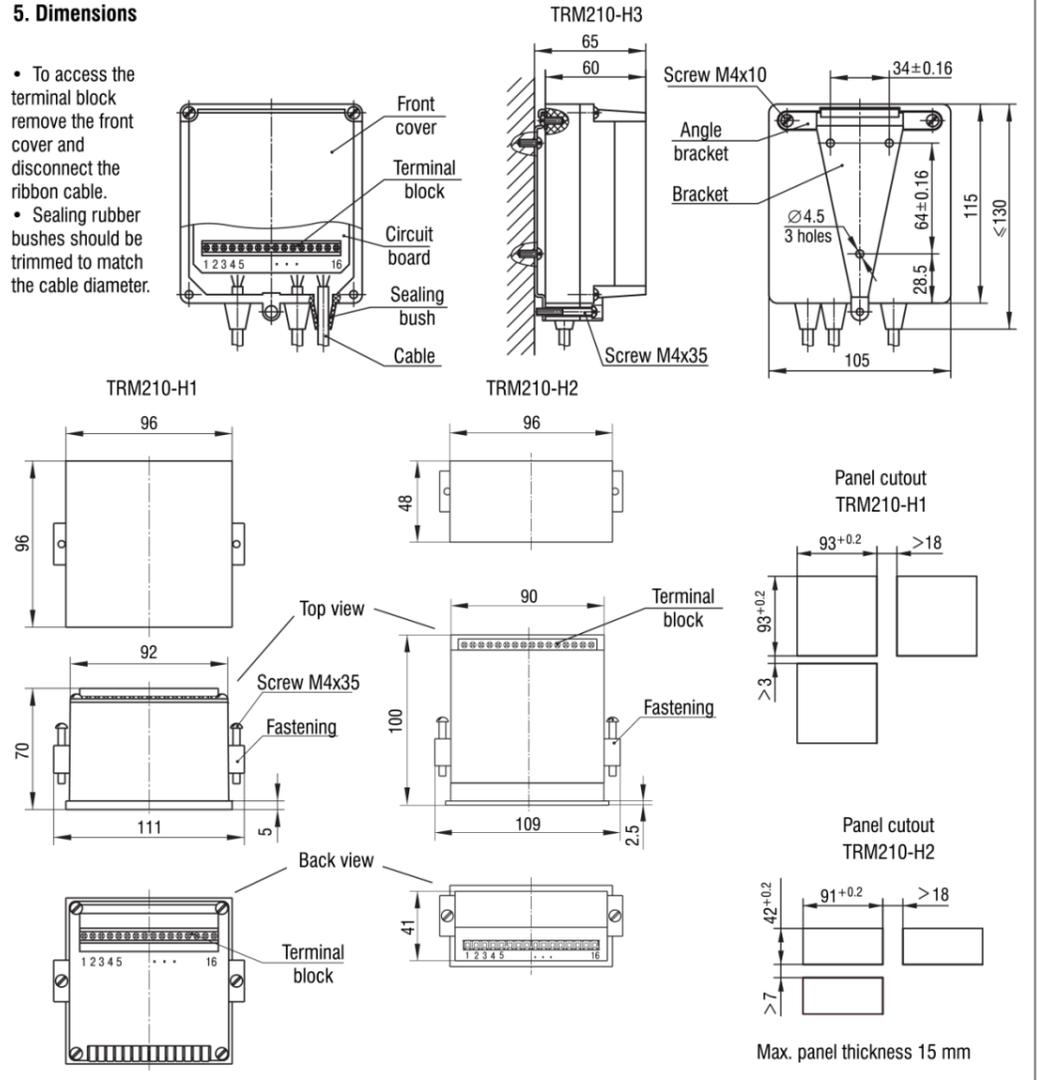
- Signal cables should be routed separately or screened from the supply cables.
- Only a shielded cable may be used for signal lines.
- Use wires of equal length and cross section when connecting RTD.
- Use a thermocouple cable when connecting TC.
- Thermocouple sensing junctions of both channels must be isolated from each other and from the grounded equipment.
- Cold junction compensation (CJC) is provided.
- To measure a current signal a shunt resistor $R_{sh} = 100 \text{ ohm} (\pm 1\%)$ should be connected in parallel.

4. Settings



5. Dimensions

- To access the terminal block remove the front cover and disconnect the ribbon cable.
- Sealing rubber bushes should be trimmed to match the cable diameter.



6. Safety

- Ensure that the device is provided with its own power supply line and electric fuse
- Ensure that the mains voltage matches the rated voltage specified on the nameplate
- Connect the power supply only after the wiring of inputs and outputs has been completed
- Do not use the device where it is subjected to flammable or explosive gases

7. Specifications

Power supply	230 (90...245) V AC, (47...63 Hz)		
Power consumption, max.	6 VA		
Inputs			
Analog inputs	1		
Sampling time, max.	1 s		
Input resistance	4-20 mA	external resistor $R_{sh} = 100 \text{ ohm}$ (in parallel)	
	0-1 V	$\geq 100 \text{ kohm}$	
Basic error	RTD	$\pm 0.25\%$	
	TC	$\pm 0.5\%$	
	Linear signals	$\pm 0.5\%$	
	Digital input	1	
	ON resistance	$< 1 \text{ kohm}$	
	OFF resistance	$> 100 \text{ kohm}$	
Outputs			
Optional output	2		
Digital	Relay	1 A (PID control) / 8 A (alarm) 30 V DC / 230 V AC, $\cos \phi \geq 0.4$	
	NPN transistor	200 mA, 40 V DC	
	TRIAC	50 mA, 240 V AC (constant operation) 0.5A ($f \leq 50 \text{ Hz}$, pulse duration $\leq 5 \text{ ms}$)	
	Solid state relay	100 mA, 4...6 V DC	
Analog	4-20 mA	10...36 V, max. 1 kohm	
	0-10 V	15...36 V, min 2 kohm	
Network			
RS485 interface	Terminals	D+, D-	
	Protocols	Modbus RTU/ASCII, akytec	
	Baud rate	2.4...115.2 kbit/s	
	Cable	Shielded twisted pair (STP)	
Housing			
Enclosure	H1	H2	H3
Dimension, mm	96 x 96 x 70	96 x 48 x 100	105 x 130 x 65
IP Code	front IP54	front IP54	IP44
Environmental conditions			
Ambient temperature	+1...+50°C		
Storage temperature	-25...+55°C		
Relative humidity	up to 80% (at +35°C, non-condensing)		
Altitude	up to 2000 m above sea level		

8. Inputs (parametr in-t)

Display	Input signal	Measurement range
Linear signals		
$\overline{0-5}$	0 - 5 mA	0...100 %
$\overline{0-20}$	0 - 20 mA	0...100 %
$\overline{4-20}$	4 - 20 mA	0...100 %
$\overline{U-50}$	-50...+50 mV	0...100 %
$\overline{U-1}$	0 - 1 V	0...100 %
RTD according to IEC 60751:2008		
$\overline{r-385}$	Pt50	-200...+750 °C
$\overline{r-385}$	Pt100	-200...+750 °C
RTD according to GOST 6651		
$\overline{r-391}$	50P	-200...+750 °C
$\overline{r-428}$	50M	-190...+200 °C
$\overline{r-426}$	Cu50	-50...+200 °C
$\overline{r-391}$	100P	-200...+750 °C
$\overline{r-428}$	100M	190...+200 °C
$\overline{r-426}$	Cu100	-50...+200 °C
$\overline{r-23}$	53M	-50...+200 °C
$\overline{r-46}$	46P	-200...+750 °C
TC according to IEC 60584-1:2013		
$\overline{E-J}$	J	-200...+1200 °C
$\overline{E-N}$	N	-200...+1300 °C
$\overline{E-K}$	K	-200...+1300 °C
$\overline{E-S}$	S	0...+1750 °C
$\overline{E-R}$	R	0...+1750 °C
$\overline{E-A1}$	A	0...+2500 °C
$\overline{E-T}$	T	-200...+400 °C
$\overline{E-B}$	B	+200...+1800 °C
TC according to GOST 8.585		
$\overline{E-L}$	L	-200...+800 °C
$\overline{E-A2}$	A-2	0...+1800 °C
$\overline{E-A3}$	A-3	0...+1800 °C

PID controller

9. Configuration

Upper display (red) shows
 — Process value (Operation)
 — Parameter name (Configuration)
 — "MENU" (Menu)
 — Error name (Error)
 Lower display (green) shows
 — Setpoint (Operation)
 — Parameter value (Configuration)
 — Parameter group (Menu)

Control elements (H2)



Function keys

- [Up] - Increase value or menu navigation
- [Down] - Decrease value or menu navigation
- PROG - press > 3 s
 - enter the configuration mode
 - exit the parameter group
 - press < 1 s
 - enter the parameter group
 - save the parameter and go the next one

Key combinations

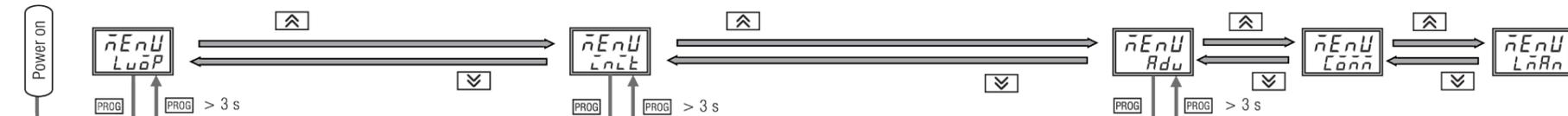
- PROG + [Up] + [Down] - passcode access
- PROG + [Up] - Modify the decimal part of parameter (Configuration)
- PROG + [Down] - Go back to modify the integer part of parameter (Configuration)

Autotuning

To start the Autotuning set **r-S=rUn** and **At=rUn**
 The approximate values of coefficients **P**, **i**, **d** and the parameters **inF**, **CP**, **rAmP** will be calculated. After the autotuning is successfully completed, the parameter **At** is set to **StoP**. The LED „AT“ lights during the Autotuning. After the parameter **rAmP**, **P**, **i** or **d** is changed, the autotuning should be carried out.

LEDs:

- „OUT1“ - lights output 1 is ON
- „OUT2“ - lights output 2 is ON
- „ALR“ - blinks if the alarm is active
- „LBA“ - blinks when Loop Break Alarm is activated
- „STOP“ - lights when control is stopped by user blinks when control is stopped due to a hardware error or LBA
- „AT“ - lights while Autotuning in progress blinks when Autotuning failure
- „COM“ - flashes for 0.1 s on data transmission
- „MAN“ - lights when manual control is activated



Operation (LvoP)

Display

Upper display (red) shows measured value

Lower display (green) shows setpoint SP
 Setpoint can be changed using keys [Down] and [Up]

(r-S) Remote Start/Stop
 rUn = Start
 StoP = Stop

(At) Autotuning
 rUn = Start
 StoP = Stop

(a) Control
 0...100% (read only)

Basic settings (init)

(in-I) Sensor (see Table 2)

(dPt) Decimal point displayed (1, 0)

(dP) Decimal point (0...3)

(in-L) Signal lower limit (-1999...9999) affected by dP

(in-H) Signal upper limit (-1999...9999) affected by dP

(SL-L) Setpoint lower limit (-1999...9999) affected by dP

(SL-H) Setpoint upper limit (-1999...9999) affected by dP

(SH) Offset (-500...+500) affected by dP

(KU) Slope (0.5...2.0)

(Fb) Filter bandwidth (0...9999) affected by dP

(inF) Filter time constant (0...999 s)

(ALt) Alarm mode (see Table 3)

(AL-d) Alarm threshold (in-L...in-H) disabled when ALt = 0

(AL-H) Alarm hysteresis (in-L...in-H) disabled when ALt = 0

(An-L) Retransmission lower limit (-1999...9999) affected by dP

(An-H) Retransmission upper limit (-1999...9999) affected by dP

(Ev-1) DI function
 nonE = OFF
 n-o = Start with open contact
 n-C = Start with closed contact

(orEU) Control function
 or-d = Cooling
 or-r = Heating

(CP) Pulse period (1...250)

Advanced settings / LBA (Adv)

(vSP) Setpoint Ramp (0...9999) affected by dP

(CntL) Control type
 Pid = PID
 onof = on-off

(HYSt) Control hysteresis (0...9999) affected by dP

(onSt) On-off stop state
 oFF = OFF
 on = ON

(onEr) On-off safe state
 oFF = OFF
 on = ON

(rAmP) "Quickly to Setpoint" mode
 ON / OFF

(P) P component (proportional band) (1...9999) affected by dP

(i) I component (integral time) (0...3999 s)
 When 0, the integral term is not included

(d) D component (derivative time) (0...3999 s)
 When 0, the derivative term is not included

(db) Deadband (0...200) affected by dP

(oL-L) Output lower limit (0...oL-H) in %

(oL-H) Output upper limit (oL-L...100) in %

(orL) Output signal ramp (0.2...100 %/s)

(mvEr) PID safe state (0...100%)

(mdSt) PID stop state
 mvSt = mvSt value
 o = last output value

(mvSt) PID stop level (0...100%)

(LbA) LBA time (0...9999 s)
 disabled when LbA = 0

(LbAb) LBA range (0...9999)
 not displayed when LbA = 0

Alarm mode

Table 3

Parameter ALt	Mode	Output state
00	Alarm disabled (default)	OFF
01	Value outside range SP ± AL-d	on off
02	Value greater than SP + AL-d	on off
03	Value less than SP - AL-d	on off
04	Value inside range SP ± AL-d	on off
05	As for 01 but with the blocking of the first alarm	
06	As for 02 but with the blocking of the first alarm	
07	As for 03 but with the blocking of the first alarm	
08	Value greater than AL-d	on off
09	Value less than AL-d	on off
10	As for 08 but with the blocking of the first alarm	
11	As for 09 but with the blocking of the first alarm	

From any display

PROG + [Up] + [Down] (PASS) Enter the access code 100 using keys [Up] and [Down]

PROG > 3 s

Access protection (SECr)

EdPt (EdPt) Service function

Displayed if CntL = Pid and r-S = rUn and At = StoP

PROG > 3 s

Manual control (LmAn)

Upper display shows the input signal
 Lower display shows the manually modified output signal o-Ed (0...100%)
 o-Ed can be changed using keys [Down] and [Up]

(o.) Manual control (0...100%). It may differ from o-Ed due to the parameter orL (group Adv)

PROG > 3 s

RS485 network (Comm)

(Prot) Protocol
 aSEn = akYtec
 n-rEU = Modbus RTU
 n-RSC = Modbus ASCII

(bPS) Baud rate (2.4...115.2 kbit/s)

(ALEn) Address bits
 8 bit
 11 bit

(Addr) Address
 0...255 for Prot = aSEn and ALEn = 8
 0...2047 for Prot = aSEn and ALEn = 11
 1...247 for Prot = n-rEU or n-RSC
 Doubled addressing is not allowed

(rSdL) Response delay (1...45 ms)