ELREHA
ELEKTRONISCHE REGELUNGEN GMBH

Technical Manual **5311032-04/14e**
from Software Vers. **2.0.1**

Multistage Temperature Controller

Series: **TAR 1700-2** Ⓤ **TAR 3700-2** **TAR 5700-2**

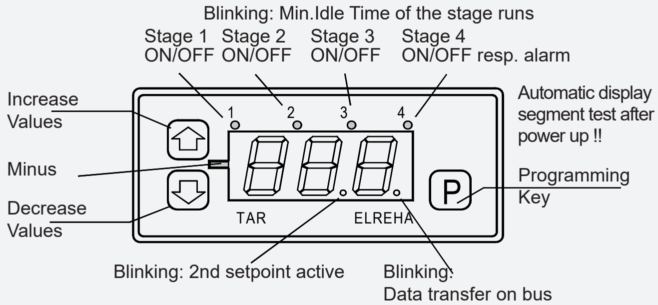
Brief Description

- Suitable as :
  Multistage Controller or
  Differential Controller with
  limitation contacts
- Operating Modes:
  4-Stage Controller,
  Double 2-Stage Controller,
  3-Stage-Controller + Alarm,
  Differential Controller
- Analog Output 0-10VDC for P/PI-control or Remote Displays
- Alarm Limits / Alarm Relay
- Different Sensor Types
- Setpoint shift by Real Time Clock
- Minimum Idle Time
- RS-485-Interface

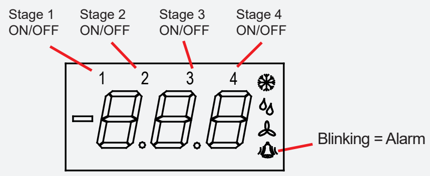
Can be used for

- Cooling, Heating and HVAC Applications

Operating Elements



New Display



TAR 1700-2
Panel mounting
12-24V AC, 50/60 Hz
18-33V DC, 5,5 VA max.

TAR 5700-2
Panel mounting
230V AC, 50/60 Hz
5,5 VA max.

TAR 3700-2
Rail mounting
230V AC, 50/60 Hz
5,5 VA max.

Parameters (setpoints, times, etc.)
All selectable parameters hold a parameter number (e.g. P04), you will find a listing on the next page.

Calling up and editing

Press key 'P' .... parameter number appears
Use '⇧/⇩' .... select desired parameter (hold key for autoscroll)
Press "P" again .... parameter value appears
Use keys '⇧/⇩' .... adjust parameter value (hold key for autoscroll)
Press 'P' again .... value is stored, back to parameter no.

Unlock Keys / Access code

To prevent un-authorized persons from editing parameter values, there is a locking function which allows only the most important parameters to be changed at any time. All other parameters must be unlocked as follows:

- enter access code before programming at parameter **P41** *or*
- directly at the parameter to be changed. If a code no. is necessary the display shows "C00". Set the matching code no. by the "⇧/⇩"-keys (70 or 88, see parameter listing) and confirm by "P".

If no key is hit for about four minutes, the access code is cancelled and the editing function is locked automatically.

After entering of the code '70' the control functions will be disabled. They will be restartet if the code will be changed manually (e.g. to 88 for other parameters) or will be resetted automatically after 4 minutes without any press on a button.

Start-up behavior

Directly after start-up the display shows "700" (controller type), after that a display test passes.

How to find out the controller type

- Press key "P" for > 2 sec. = Display shows controller type (**700**)
- Key "⇩" additionally = Software version is displayed

Manual controller "wake-up"

If the controller is switched off via interface (e.g. from a PC), the display shows "**oFF**". By holding key "⇩" for > 3 sec. the controller unit engage.

Reset parameters to factory settings

Switch OFF supply voltage, press and hold "P"-key, switch supply voltage ON again. Code request "C" appears. Enter "88", confirm by "P". One by one software version, date and "def" appear. With this, all values are reset to factory settings.

CAUTION
Please note Safety Instructions !
When replacing older types please note changed functions and connectors!

Technical Data (see parameter listing for more information)

Supply Voltage	see above
Output Relays	4x potential free
Contact Rating	8A resistive, 3A cos phi 0,4, 250V AC
TAR 1700-2 (UL)	resistive: 120/240V AC, 8A, 30 k cycles motor: 125/250V AC, ¼ HP, 30 k cycles
Ambient Temperature TAR 1700-2	-10..+65°C (14..149°F)
Ambient Temperature TAR 3700-2/5700-2	-10..+55°C (14..131°F)
Storage Temperature	-30..+70°C (-22..158°F)
Relative Humidity	max. 85% r.H., not condensing
Temperatur Sensor Inputs	2x TF 201 or TF 501 (Pt1000)
Display	LED, 7-segment, red, character height 13mm (.51 inch)
Resolution / Accuracy	0,1°C / 0,2°F / typ. ±1K
Control-/Display Range with Temperature Sensor Types	
with TF 201	-40...+80°C / -40...176°F
with TF 5xx (depending on type) up to..	-100...+300°C / -148...572°F
Data storage parameters	≥20 years
Relay indicators	3 mm, red
Analog Output	0-10V DC, max. 3 mA
Analog Output Resolution	8 bit within the set benchmarks
Interface	*E-Link* (RS-485)
Electrical connection	screw terminals 2,5mm² (.1 inch)
Housing / Protection / Digital Input	
TAR 1700-2	77 x 35 mm front frame, IP 54 from front Digital input for external, potential free contact
TAR 3700-2	for rail mounting, IP 30 Digital input for mains voltage, 50-60Hz, max. 3mA
TAR 5700-2	96 x 48 mm front frame, IP 54 from front Digital input for mains voltage, 50-60Hz, max. 3mA

Accessories (please order separately)

- Temperature sensor TF 201 (up to 80°C max.) *or*
- Temperature sensor TF 501 (PT1000, up to 300°C, dep. on type)

For type TAR 1700-2:

- Matching transformer, please contact us.

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Parameter-#	P19=1	P19=2	P19=3	P19=4	Code	Parameter Function	Range	Factory Settings
P01	x	x	x	x	-	Actual Value of Sensor 1	Display only!	-
P02			x	x	-	Actual Value of Sensor 2	Display only!	-
P03				x	-	Differential Value Sensor 1/Sensor 2	Display only!	-
P04	x	x	x	x	-	Control Setpoint 1 *(absolute value)* or Differential Setpoint (depends on Operating Mode)	Limited by P16/P17	0°C
P05	x	x	x	x	-	Control Setpoint 2 (*absolute/relative, dep. on P08*)	" / resp. ± 100	0°C
P06	x	x	x	x	-	Control Setpoint 3 (*absolute/relative, dep. on P08*)	" / resp. ± 100	0°C
P07	-	x	x	-	-	Control Setpoint 4 (*absolute/relative, dep. on P08*)	" / resp. ± 100	0°C
P08	x	x	x	-	-	Mode of Control Setpoints 2-4	1= absolute value 2= relative to P04 (*switching distance)*	1
P09	x	x	x	x	88	Setpoint-Offset (for day/night mode) *Amount all setpoints will be shifted after OK 1 resp. the internal clock has been activated.*	-100...+100°C (-148...+212°F)	0
P10	x	x	x	x	88	Switching characteristic of relay K1	1=RE, 2=FR, 3=HT	1
P11	x	x	x	x	88	Switching characteristic of relay K2	1=RE, 2=FR (not TAR 1700), 3 = HT	1
P12	x	x	x	x	88	Switching characteristic of relay K3	1=RE, 2=FR (not TAR 1700), 3 = HT	1
P13	-	x	x	-	88	Switching characteristic of relay K4	1=RE, 2=FR, 3=HT	1
P14	x	x	x	x	88	Setpoint-shift (day/night mode) ON time	0...235, oFF	oFF
P15	x	x	x	x	88	Setpoint-shift (day/night mode) OFF time	0...235, oFF	oFF
P16	x	x	x	x	88	Maximum setpoint value adjustable by P04	P17...+300°C	+50°C
P17	x	x	x	x	88	Minimum setpoint value adjustable by P04	-110°C...P16	-50
P18	x	x	x	x	88	Hysteresis of Control Setpoints 1 - 4	0,2...20	2.0
P19	x	x	x	x	**70**	Operating Mode	1 = 3 Stages + Alarm 2 = 4 Stages 3 = Double 3-Stages 4 = Differential control	1
P20	x	x	x	x	88	Minimium Idle Time (all relays)	0...59 min	0
P21	x	x	x	x	--	Remaining time of alarm delay	Display only !	
P22	x	x	x	x	--	Remaining time OK-input delay	Display only !	
P23	x	x	x	x	88	Calibration of Sensor 1	-10,0...+10,0	0
P24	x	x	x	x	88	Calibration of Sensor 2, switch oFF	-10,0...+10,0, oFF	0
P25	x	x	x	x	70*	Sensor Type and Kind of Degrees	1 = TF 201 (°C) 2 = TF 201 (°F) 3 = Pt1000 (°C). 4 = Pt1000 (°F)	1
P26	x	x	x	x	88	Alarm delay	1...99 min	5
P27	x	x	x	x	88	Upper alarm limit *(relative, in relation to the current, possibly shifted Control Setpoint 1)*	0...100	100
P28	x	x	x	x	88	Lower alarm limit *(absolute value)*	-100...+300°C	-100
P29	x	x	x	x	88	Control input (Optocoupler Input) DI/OK 1	oFF 1 = day/night mode 2 = external alarm 3 = controller OFF	oFF
P30	x	x	x	x	88	Delay time for DI/OK 1	0...99 min	2
P31	x	x	x	x	88	Analog output: 10V output voltage at	-100...+300°C	50
P32	x	x	x	x	88	Analog output: 0V output voltage at	-100°C...P31	-50
P33	x	x	x	x	88	Analog output: Integral time (I-part)	oFF 1 = appr. 0,25 min 2 = appr. 0,5 min 3 = appr. 1 min 4 = appr. 2 min 5 = appr. 4 min	oFF
P34	x	x	x	x	88	Analog output: Mode	oFF 1= proportional 2= inversely proport. 3= proportional, relative to the current setpoint 4= inversely proport., relative to the current setpoint	oFF
P35	x	x	x	x	-	Real time clock: Hours	0...23	
P36	x	x	x	x	-	Real time clock: Minutes	0...59	
P37	x	x	x	x	-	Real time clock: Seconds	Display only !	
P38	x	x	x	x	88	Data transmission speed (Baudrate)	1 = 1200, 2 = 2400, 3 = 4800, 4 = 9600 5 = 19200, 6 = 28800, 7 = 57600	4
P39	x	x	x	x	88	Adress of the controller in a network	1...78	78
P40	x	x	x	x	-	Current error + error listing	multiple errors present: scroll by up/down keys	
P41	x	x	x	x	-	Access Code	0...99	0

Notice

x = Functions available in this mode, without "x" = parameters invisible

Failure Display / Failure handling

Sensor short circuit or broken
If one of the sensors is broken, disconnected or hot-wired, or the value is located outside of the specified range, the display shows "- - -" at first. After 1 minute the display flashes and shows an error code. The alarm relay will be activated at the same time.

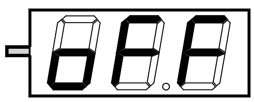
Error Codes

E00	ok	E05	sensor F2 broken
E01	sensor F1 broken	E06	sensor F2 short circuit
E02	sensor F1 short circuit	E07	sensor F2 overtemperature
E03	sensor F1 overtemperature	E08	sensor F2 low temperature
E04	sensor F1 low temperature	E09	failure at the digital input

Failure of Sensor 1
If this sensor fails, all relays will drop out.

Display shows "oFF" if:

1. ...controller unit is switched OFF via digital input OK1 or via network.
2. ...you select P02 or P24 and the evaporator sensor is switched off.



Functional Description

Signal Input
The controller unit is able to work with the temperature sensor types TF 201 and TF 501 (Pt1000). This must be preset by parameter **P25**.

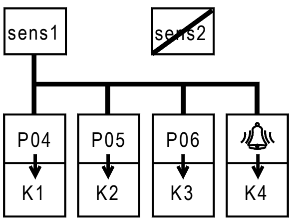
Ranges:
P25 = 1 (TF 201).......-50...+100°C
P25 = 3 (TF 501/Pt1000).......-100...+300°C
Please note the specific temperature restrictions of the different sensor types (e.g. -40...+80°C with standard-TF-types) and ask for matching products if necessary.

Actual Value- and Status Display
Temperature values can be displayed in °C or °F. This will be preset together with the sensor type.
P01 shows the measured value of sensor 1.
If other parameters are selected, 4 minutes after the last keypress the display switches back to P01 automatically. In operating mode 3+4, **P02** shows the measured value of sensor 2. In operating mode 'Differential control', **P03** shows additionally the differential value between sensor 1 and 2.

Display Correction
The Actual Value Display **P01** can be calibrated by **P23, P02** can be calibrated by **P24**.

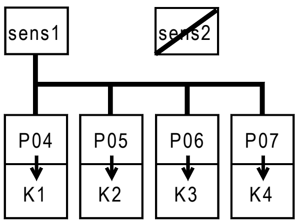
Operating Modes
The TAR controller knows 4 different operating modes, which can be preset by **P19**:

P19 = 1: **3 Stages + Alarm**.



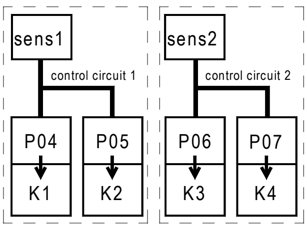
In this mode you realize a 3-stage controller, relay K4 works as a closed circuit alarm relay, sensor input 2 is disabled.
The value of sensor 1 will be compared with **P04, P05** and **P06**, the relays K1, K2 or K3 switch depending on the deviation. P04 is always an absolute value, the following setpoints can be either relative values or absolute values (preset by **P08**).
Relative values = Stage switches in a specific distance to the leading setpoint P04. If P04 will be changed, the relative setpoints will be changed the same amount.

P19 = 2 : **4-stage controller**



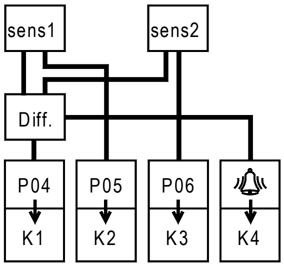
Sensor input 2 is disabled in this mode. The value of sensor 1 will be compared with **P04, P05, P06** and **P07**, the relays K1, K2, K3 or K4 switch depending on the deviation.
Control setpoint 1 (P04) is always an absolute value, the following setpoints can be either relative values or absolute values (preset by **P08**).

P19 = 3 : **Double 2-Stage Controller**



Sensor 1 affects on the control setpoints **P04/ P05** (= relays K1/K2=control circuit 1).
P04 is the leading setpoint of control circuit 1, control setpoint 2 (P05) can be either absolute or relative (**P08**). Sensor 2 affects on the control setpoints **P06/P07** (= relays K3-K4 = control circuit 2). P06 is the leading setpoint of control circuit 2, P07 can be either absolute or relative (**P08**).

P19 = 4 **Differential Controller**

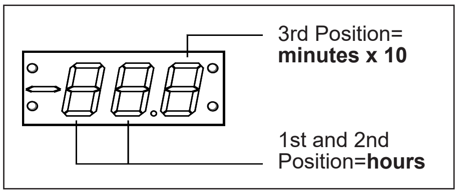


The calculated differential amount from "sensor 1 **minus** sensor 2" will be compared with **P04**.
Relay K1 switches, if the preset value **P04** + hysteresis **P18** is reached. The relay switches off again, if the differential amount decreases and reaches P04. The stages 2 (*relay K2, P05, assigned to sensor 1*) and 3 (*relay K3, P06, assigned to sensor 2*), can work independly as single stage controllers.
Relay K4 works as a closed circuit alarm relay.

Switching Hysteresis
With **P18** you set a switching hysteresis, which affects to all setpoints. The position of this hysteresis (above/below the setpoint) depends on the selected switching characteristics (**P10-P13**) of the single relays.

Setpoint Limits
To prevent that the final user adjusts the setpoints to an inadmissible value, the setpoint range can be limited by **P16** and **P17**.

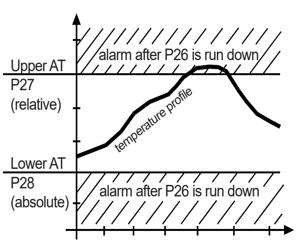
Real time clock
The integrated real time clock allows to change the setpoints at specific times. The timer has a power backup for about 10 days in case of power failure. The time of the day and the date can be set with parameters **P35**...**P36**.
Because the display has only three digits, the time value comes in the following format:



Day-/Night Mode / Setpoint Offset
Initiation by real-time clock
With **P14/P15** you can set a period of time within all setpoints will be shifted by the amount of **P09**. If not necessary, you can disable P14/P15 (display shows "**oFF**").

Initiation by Digital Input
Digital Input OK 1 can also be programmed to activate this offset (**P29=1**). An active 2nd setpoint is indicated by a flashing decimal point.

Temperature Alarm



If the temperature value measured with sensor 1 exceeds the range set by **P27** and **P28**, the alarm relay will be activated after the delay timer **P26** is run down.

Parameter **P21** shows the remaining time up to an alarm.
P28 (lower limit) is an absolute value, P27 is always a relative value in a distance to the actual setpoint 1 (P04 + potential shift).

Relay Switching Characteristic
The Switching Characteristic of the relay K1-K4 is defined by the parameters **P10...P13**. The following characteristics are possible:

1= *Refrigeration (RF)*
Used for standard applications (e.g. temperatures above 0°C). The load would be switched by the N/O-contact.
Actual value = setpoint + hysteresis: Relay on
2 = *Freezing (FR)*
The load would be switched by the N/C-contact, this enables that the load will be switched on permanently in case of mains loss or controller defect.
Actual value = setpoint + hysteresis: Relay off
3 = *Heating (HT)*
Usable for heating applications. Load would be switched off in case of mains fail or controller defect.
Actual value = setpoint **-** hysteresis: Relay on

Minimum Idle-Time
If a load is switched off by a relay, this relay cannot be switched on again before the time set with **P20** is over. P20 affects all relay stages.
The indicator LED's of the single stages flashes while this idle time runs.

The Minimum Idle-Time affects immediately after power-on of the controller.

Digital Input
Digital input DI1 is normally connected to mains voltage. If this voltage is interrupted, the function set with **P29** will be initiated after a time delay (**P30**). **P30** is adjustable within 0...99 minutes, but at '0' the minimum delay is appr. 4 seconds.

> CAUTION Using the **TAR 1700-2** this function must be started by opening an external, potential free contact connected to terminals 11/12. **Never connect mains voltage to these terminals, danger of destruction!** This contact must be suitable for 5VDC/1mA.

P29=oFF Digital input DI/OK 1 is de-activated

P29=1 **Control Setpoint 2** (night-setpoint) is active. The setpoints increase/ decrease by the amount of P09.

P29=2 An **external alarm** is detected after P30 is run down. LED 4 and the alarm relay are activated after P26 has been run down.

P29=3 **Controller unit oFF**. All control functions will be disabled, the display shows "oFF". This allows to switch off the unit without an alarm message in a network. Relays 1-3 are deactivated, the alarm relay remains in a neutral position.

Analogue output behaviour:
- Delivers 0V with op-mode proportional (P34=1 or 3).
- Delivers 10V with op-mode anti-proportional (P34 = 2 or 4)

P22 shows the remaining delay time of the digital input.

Voltage Output / Analog Output

The TAR contains an analogue 0-10V DC-signal output. Because the output is scalable, it can be used either to forward the actual value of sensor 1 (**P01**) or as a proportional /PI-controller output. In differential control mode the voltage output depends on the determined differential amount.

P31......actual temperature (resp. differential amount) the output voltage delivers 10V.
P32......actual temperature (resp. differential amount) the output voltage amounts 0V.
P33......integral part (I-part) of the output signal in 5 steps from appr. 0,25 to 4 minutes or oFF.

<u>Analog Output Modes</u>

P34 fixes the Analog Output Mode.

P34 = oFF Output is de-activated.

P34 = 1 Output works proportional, that means rising temperature -> rising output voltage. **P31/P32** are absolute values.

P34 = 2 Output works anti-proportional, that means rising temperature -> falling output voltage. **P31/P32** are absolute values.

P34 = 3 Like P34=1 but the values set by **P31/P32** work relative to the current setpoint 1 (P04 + offset).

Example:
P31 = 10°C, P32 = -10°C, P34 = 3,
P04 = 15°C, no current shift
Output Voltages:
10V at P04 + P31 = 25°C
0V at P04 - P32 = 5°C

P34 = 4 Like P34=2, but the values set by **P31/P32** work relative to the current setpoint 1 (P04 + offset).

Example:
P31 = 10°C, P32 = -10°C, P34 = 4,
P04 = 15°C, no current shift
Output Voltages:
0V at P04 + P31 = 25°C
10V at P04 - P32 = 5°C

Example: Actual value Image
You need a remote display or similar, which shows -50°C with 0V DC input voltage and +50°C with 10V DC input voltage:

P32 = "-50", P31 = "+10", P34 must be "1".

Example: Proportional Controller
You want to drive e.g. a motor valve with 0-10V DC input depending on a temperature. This valve should be half open at 15°C. If the temperature falls, the valves should open, if the temperature passes 10°C it must be full open. If the temperature rises, the valve should be closed, with 20°C and above it should remain closed.

P32 ="10.0", P31 ="20.0", P34 ="2"

<u>Slow-down time / I-part</u>
P33 (slow-down time) fixes the effect of the I-part to the control process in 5 steps. The I-part amount of the controlling variable is identical with the P-part and will be added. The full size of the I-part will effect after P33 is run down.

<u>Effects of the Slow-down time</u>
When P34 = 1
Act.Val. = Setpoint: Output 5V ± I-Part
Act.Val. > Setpoint: Output shifts with I-part to 10V
Act.Val. < Setpoint: Output shifts with I-part to 0V

When P34=2
Act.Val. = Setpoint: Output 5V ± I-Part
Act.Val. > Setpoint: Output shifts with I-part to 0V
Act.Val. < Setpoint: Output shifts with I-part to 10V

When P34 = 3
P31/P32 define a proportional band around the active setpoint. The output voltage is 10V at **P04 + P31** and 0V at **P04-P32**.
Act.Val. = Setpoint: Output 5V ± I-Part
Act.Val. > Setpoint: Output shifts with I-Part to 10V
Act.Val. < Setpoint: Output shifts with I-Part to 0V

When P34 = 4
P31/P32 define a proportional band around the active setpoint. The output voltage is 0V at **P04 + P31** and 10V at **P04-P32**.
Act.Val. = Setpoint: Output 5V ± I-Part
Act.Val. > Setpoint: Output shifts with I-Part to 0V
Act.Val. < Setpoint: Output shifts with I-Part to 10V

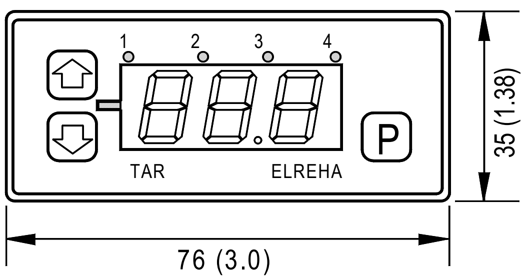
After an excursive change of the actual value the P-part is calculated from the max. output voltage and the proportional band:
Ux = (10V / (|P36 - P37| [K])) * delta Theta [K]

Example:
- 10V U_{out} at +10°C, 0V U_{out} at -10°C
- aimed setpoint 0°C = 5V U_{out}
- current actual value 0°C

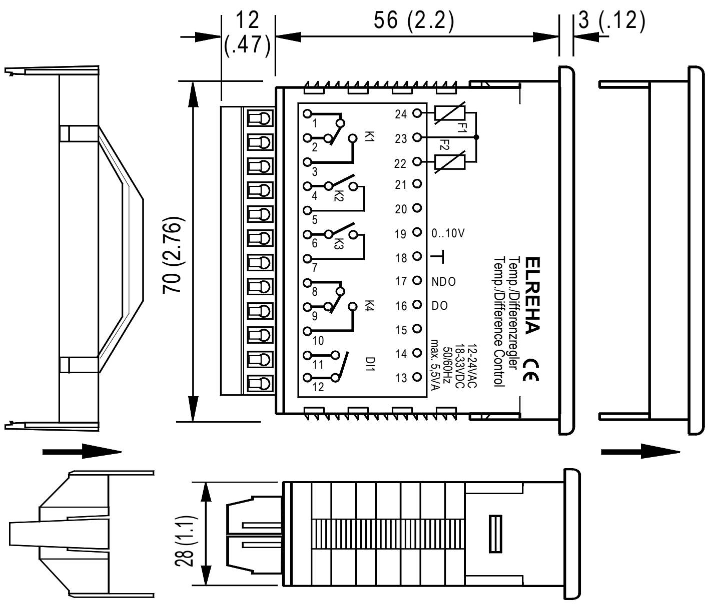
Actual value increases by 2K ->

- U_{out} rises to 6V immediately
- U_{aus} rises farther, after P38 is run down, 7V will be reached.

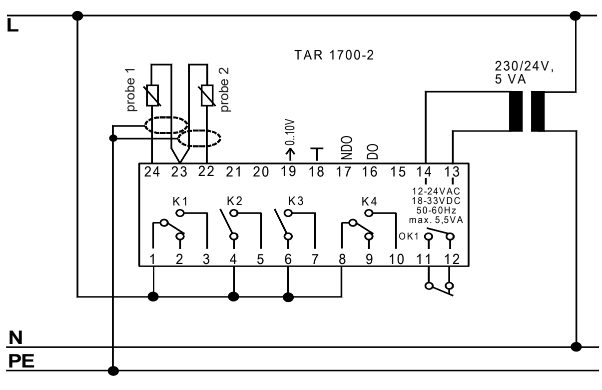
TAR 1700-2 - Dimensions and Connection



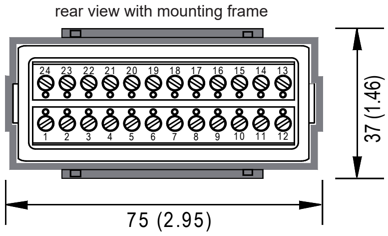
dimensions in: mm (inches)



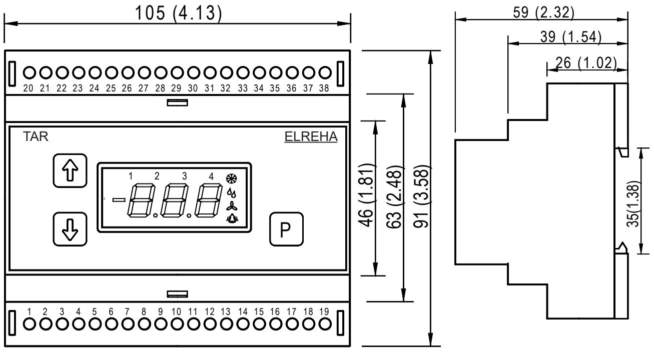
Connection Example (simplified)



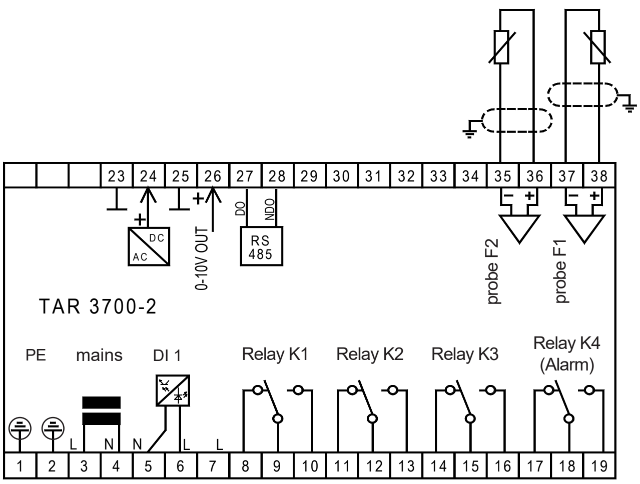
rear view with mounting frame



Dimensions / Connection TAR 3700-2



Temperature probe connection



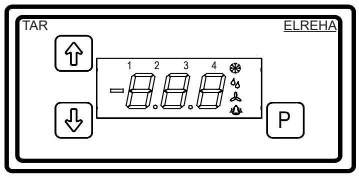
Note

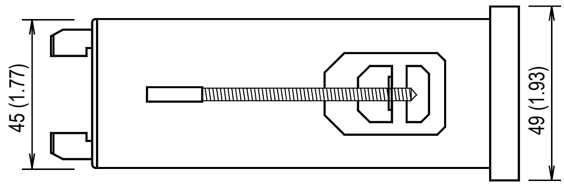
Protective Earth

Earth

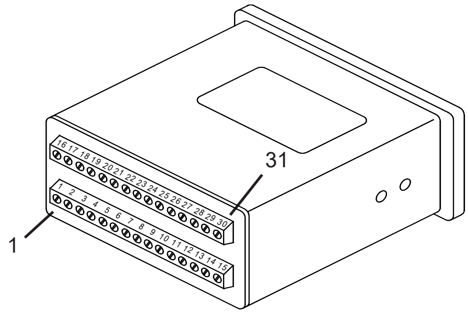
Dimensions in mm,
(in brackets = inches)

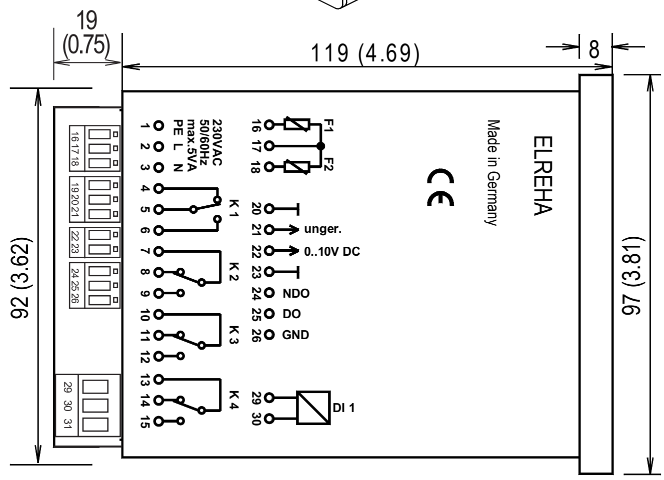
Dimensions / Connection TAR 5700-2





Panel housing dep. on DIN 43700/IEC 61554
Cut-out: 92 x 45 mm (b x h)
Tolerances max: +0,8 (b), +0,6 (h)





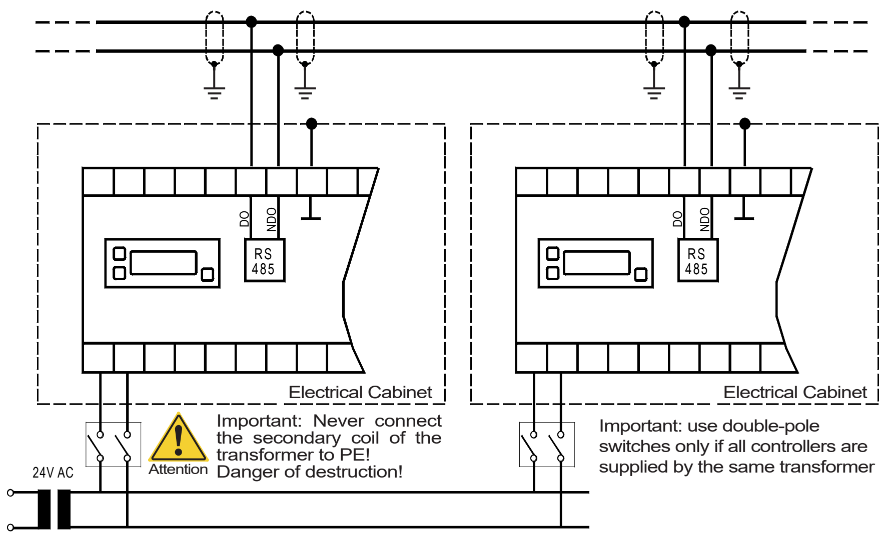
Networking of TAR controllers

All controllers can be networked to a host (PC or SMZ) via their built-in RS-485-interface.

- Because all units are connected parallel on the data cable, each unit has its own network address (**P39**) to ensure a specific communication.
  !! Never use address 64 !!
- The data transmission speed is fixed by **P38**, the default value is 9600 Baud.
- Wiring must be made by standard data cable.
- Shieldings must be connected to the nearest grounding terminal.
- The unshielded part of the data cable must be as short as possible.

If networked controllers (**1700-2** types only) are supplied by one transformer only and the single positions must be switched off, use double-pole switches only. If not, the unit will be supplied partially over the shielding of the data connection and continues operation, depending on the secondary voltage of the transformer. Please note: If a unit is not supplied, the PC-software notifies a unit breakdown !

A better way is not to switch-off the supply voltage but to disable the unit by Digital Input.



Installation / Start-up

Read Safety Instructions !
If the TAR unit is switched ON, the display shows the actual value of sensor 1. At first you have to set the basic parameters:

- Enter Access Code '70' at P41
- Operating mode (P19)
- Type of used sensor (P25)
- Enter Access Code '88' at P40
- Switching characteristic of the relays (P10-P13)
- Task of control input DI1 (OK1) (P29)
- If the unit is networked:
  Address in network (P39) and Baudrate (P38)
- Function of the Analogue Output (P31 - P34)

This was the basic configuration, now you can enter the specific setpoints, times, etc.

Display Adjust
To calibrate the two actual value displays, use parameters **P23** resp. **P24** to correct the value.

Installation hint:
If the measured values 'jump' check the following: Is the shielding of the sensor wire connected to PE near the controller unit? Is the PE terminal of the controller unit connected to PE? If the sensor wire is shielded correctly but the value on the display continues 'jumping', please try to solve the problem by removing the shield from PE and connecting it to a ground terminal of the TAR.

CONNECTION INFORMATION & SAFETY INSTRUCTIONS

Notice

The guarantee will lapse in case of damage caused by failure to comply with these operating instructions! We shall not be liable for any consequent loss! We do not accept liability for personal injury or damage to property caused by inadequate handling or non-observance of the safety instructions!
The guarantee will lapse in such cases.

This manual contains additional safety instructions in the functional description. Please note them!

DANGER

If you notice any damage, the product may not be connected to mains voltage! Danger of Life!
A riskless operation is impossible if:
- The device has visible damages or doesn't work
- After a long-time storage under unfavourable conditions
- The device is strongly draggled or wet
- After inadequate shipping conditions

- Never use this product in equipment or systems that are intended to be used under such circumstances that may affect human life. For applications requiring extremely high reliability, please contact the manufacturer first.
- **The product may only be used for the applications described on page 1.**
- **Electrical installation and putting into service must be done from qualified personnel.**
- **During installation and wiring never work when the electricity is not cut-off ! Danger of electric shock!**
- **Never operate unit without housing.**
  Danger of electric shock!
- **All 'PE' terminals must be connected to ground. Danger of electric shock!** Additionally, the internal noise filter will not work, faulty indicated values may occur.
- Please note the safety instructions and standards of your place of installation!

CAUTION

- Before installation: Check the limits of the controller and the application (see tech. data). Check amongst others:
  - Make sure that all wiring has been made in accordance with the wiring diagram in this manual.
  - Supply voltage (is printed on the type label).
  - Environmental limits for temperature/humidity.
  - Maximum admitted current rate for the relays. Compare it with the peak start-up currents of the controlled loads (motors, heaters,etc.).
    Outside these limits malfunction or damages may occur.
- Sensor/probe cables must be shielded. Don't install them in parallel to high-current cables. Shielding must be connected to PE at the end close to the controller.
  If not, inductive interferences may occur.
- Please note for elongation: The wire gauge is not critical, but should have 0,5mm² as a minimum.
- Mounting the controller close to power relays is unfavourable. Strong electro-magnetic interference, malfunction may occur!
- Take care that the wiring of interface lines meets the necessary requirements.
- All used temperature sensors must be identical. Never use different types at the same time. This will not work.
- TF-type sensors are not designed for being immersed in fluids permanently. In such a case, always use dip-fittings. With extreme temperature variations, the sensor may be damaged.

Notice

Cleaning
The use of a dry, lint-free cloth and household agents is sufficient to clean the product.
Never use acids or acidic fluids! Risk of damage!

EC Declaration of Conformity

CE

*For the devices **TAR 1700-2, TAR 3700-2 and TAR 5700-2** we state the following:*
*When operated in accordance with the technical manual, the criteria have been met that are outlined in the EMC Directive **2014/30/EC** and the Low Voltage Directive **2014/35/EC**. This declaration is valid for those products covered by the technical manual which itself is part of the declaration.*

Following standards were consulted for the conformity testing to meet the requirements of EMC and Low Voltage Guidelines:

EN 55011:2016, EN 61010-1:2010, EN 61326-1:2013 **CE marking of year: 2017**

This statement is made for the manufacturer / importer

ELREHA Elektronische Regelungen GmbH
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(Name / Address)

by:
Werner Roemer, *Technical Director*

Hockenheim ......**12.6.2017**..
City *Date* *Signature*

original set up: 9.3.18, tkd/jr	checked: 12.3.2018, ek/ha	approved: 12.3.2018, mv/mh	transl.():	corr: