

## Operating Manual TR122D(A)

updated: 2017-11-08/Fu

- Switching-Relays Typs TR 122 D(A) monitor the input-signal for 2 limits.  
 The TR 122 DA transduces the measured temperature/resistance to a proportional DC-current.



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## 1 Factory Setting:

In case of program change all parameters are set back upon factory setting.

Menu-item	Parameter	Value		My Data
		Pr 1	Pr 2	
	LR (line compensation)	3-L	3-L	
Alarm 1 AL 1 (K1)	Limit 1	150	200	
	H (Hysteresis)	-2.0	-2.0	
	dRL (Alarm-delay)	0	0	
	doF (Delay-Alarm off)	0	0	
	rEL (Relaisfunktion)	r	r	
	Err (Sensor-Error)	on	on	
Alarm 2 AL 2 (K2)	Limit 2	100	100	
	H (Hysteresis)	-2.0	-2.0	
	dRL (Alarm-delay)	0	0	
	doF (Delay-Alarm off)	0	0	
	rEL (Relaisfunktion)	r	r	
	Err (Sensor-Error)	on	on	
S <sub>i</sub>		0.0	0.0	
out	Type	0-	4-	
	--- (Zero)	0.0	0.0	
	--- (Fullscale)	200	200	
Cod	oFF / EL / on	oFF	oFF	
	P <sub>in</sub>	504	504	

## 2 Programs

2 programs (Pr) can be selected for measuring of temperatures with Pt 100 (RTD) and for measuring resistances. Due to these programs, the device can be adapted very easily to the application. Choose the program, which fits to your application and after that change the parameters! In case of changing the program, each parameter is being resetted to "factory setting". (see chart "factory setting").

Choosing the programs:

When applying the power supply hold the pushbutton Set for 10 s. Then the program (Pr 1 or Pr 2) can be selected with the pushbuttons up/down and confirmed with Set.

Pr	Input	Measuring Range
1*	1 temperature-sensor Pt100 (RTD)	-200 ... +850 °C
2	1 resistance	0 ... 850 Ω

\* factory setting

## 3 Application and Short Description

Switching-Relays Typs TR 122 D(A) monitor the input-signal for 2 limits. The TR 122 DA transduces the measured temperature/resistance to a proportional DC-current.

Applications of the TR 122 D(A) are:

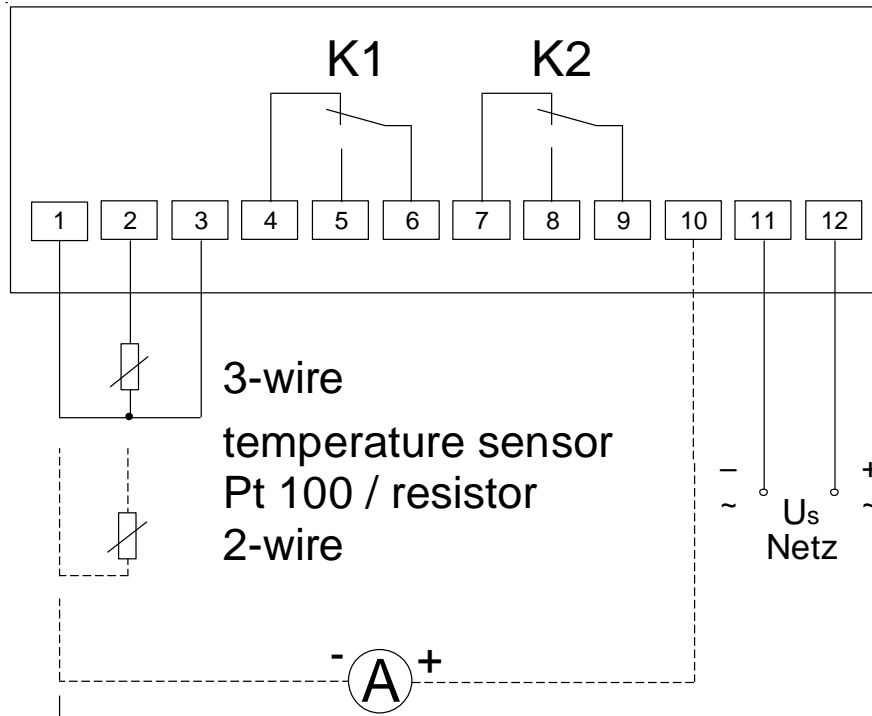
- Monitoring of temperatures with pre-alarm and alarm in machines and plants
- Controlling of temperatures e.g. for heated sample gas lines or refrigerating plants
- Transducer for Pt 100 (RTD) and resistance (TR 122 DA only)

## 4 Overview of Functions

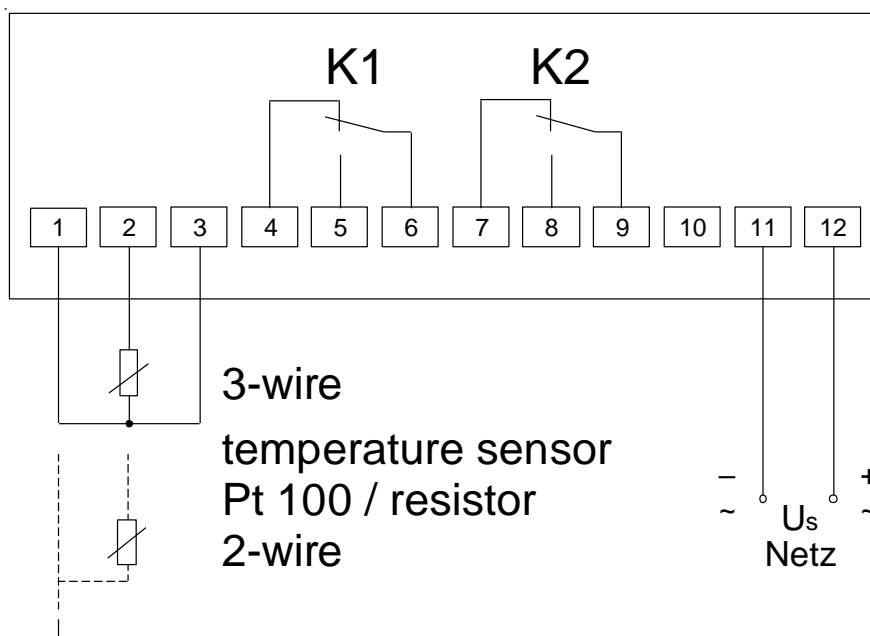
- 1 input sensor, Pt 100 (RTD) or resistance
- Measuring ranges  $-199...850^{\circ}\text{C}$  /  $0...850\ \Omega$   
Resolution  $0,1\ ^{\circ}\text{C}$  /  $\Omega$  within the ranges  $-19,9...99,9\ ^{\circ}\text{C}$  /  $0-99,9\ \Omega$
- 2 relay outputs (each 1 change-over contact)
- 1 analog output 0/4-20 mA scaleable  
(TR 122 DA only, not potentially separated from the inputs)
- Universal power supply AC/DC 24-240 V
- Storage and display of the measured MIN- and MAX-values

## 5 Connection Plans

TR 122 DA



TR 122 D



## 6 Important Information



### **ATTENTION**

**Dangerous electrical voltage!  
May lead to electrical shock and burn.  
Before beginning of work switch unit and equipment free of voltage.**

To use the equipment flawless and safe, transport and store properly, install and start professionally and operate as directed.

Only let persons work with the equipment who are familiar with installation, start and use and who have appropriate qualification corresponding to their function. They must observe the contents of the instructions manual, the information which are written on the equipment and the relevant security instructions for the setting up and the use of electrical units.

The equipments are built according to DIN / EN and checked and leave the plant according to security in perfect condition.

If, in any case the information in the instructions manual is not sufficient, please contact our company or the responsible representative.

Instead of the industrial norms and regulations written in this instructions manual valid for Europe, you must observe out of their geographical scope the valid and relevant regulations of the corresponding country.

**Observe the maximum temperature permissible when installing in switchgear cabinet. Make sure sufficient space to other equipment or heat sources. If the cooling becomes more difficult e.g. through close proximity of apparatus with elevated surface temperature or hindrance of the cooling air, the tolerable environmental temperature is diminishing.**

### **Attention! Universal power supply**

The unit is equipped with an universal power supply, that is suitable for DC- and AC-voltages. Before connecting the unit to the current, make sure that the allowed scope of voltage of the control voltage  $U_s$ , written on the lateral type plate, corresponds to the supply voltage of the unit!



### **Attention!**

**When all relays are programmed in operating-current mode (= pick up at alarm), a loss of supply-voltage or an instrument failure can remain unidentified. When the relay is applied as a monitoring instrument the operator must ensure, that this is recognized by regular examinations. We recommend to program and accordingly evaluate at least one relay in the closed-circuit current mode (released = alarm).**

## 7 Installation

The unit can be installed as follows:

- Installation in switchgear cabinet on 35 mm mounting rail according to EN 60715
- With screws M4 for installation on walls or panel.

Connection according to connection plan or type plate.

## 8 Putting into operation

Decimal point behind the last digit:

- Off = display mode
- On = menu mode, select the menu items
- blinking = parameter setting mode

### 8.1 Display Mode

Indication of the current measured value. The temperature is shown in degrees centigrade and the resistance in  $\Omega$ .

#### 8.1.1 Function of buttons UP/DOWN

- Push short change into menu mode
- Push for > 2 s Display of the stored MIN- or MAX-values

#### 8.1.2 Function of button SET/RESET

- Push short Display sensor / alarm limit 1 / alarm limit 2
- Push for 2 s Reset restart interlock
- Push for 4 s Display of chosen program
- Push for 10 s Display of software version

### 8.2 Menu mode (Decimal point behind the last digit ON)

Selection of the menu items for changing the parameters

#### 8.2.1 Function button UP/DOWN

- Push short Selection of menu item; change into display mode

#### 8.2.2 Function button SET/RESET

- Push short Change into parameter setting mode

### 8.3 Parameter setting mode (Decimal point behind the last digit FLASHES)

#### 8.3.1 Function button UP/DOWN

- Press short/long Adjustment of parameter value (slow/fast)

#### 8.3.2 Function button SET/RESET

- Press short Storage of setting and choice of next parameter.  
Change into menu mode after the last parameter

#### 8.3.3 Parameterizing the sensor:

Choose menu item with up/down until in display  $L_R$  and the line-resistance or  $\exists-L$  alternate. Enter with Set in parameterizing sensor.

Set cable resistance or 3-wire configuration (3-L).

2-wire configuration, cable resistance compensation:

Short-circuit the wires nearby the sensor and measure the cable resistance.

Set parameter „ $L_R$ “ on this value.

We recommend 3-wire connection.

### 8.3.4 Parameterizing of the alarms (RL1 / RL2):

Choose menu item with up/down until RL1 and limit (limit value) alternate in display, e.g. RL1 und 130 for 130 °C.

Begin to parameterize with Set.

Adjust limit with up/down. Adjust hysteresis. Negative hysteresis = MAX-switching point, the relay switches when the adjusted limit is reached and switches back when the signal is fallen by the hysteresis. E.g. limit 130 °C and hysteresis -5 °C: Relais switches at 130 °C and switches back at 125 °C. Positive hysteresis vice versa = MIN-switching point.

Alarm delay time  $d_{RL}$ : An alarm is suppressed for the adjusted time, short-timed exceeding of the limit does not cause an alarm.

Switch-back delay  $d_{oF}$ : An alarm is only switched off after the signal is below the limit and after delay of this time, e.g. a cooling ventilator can cool further on for this time to avoid, that it has to switch be switched on again after a short time.

Function of relay:

r-Closed-current circuit mode, relay is picked up in GOOD-state (=limit not reached) and releases when the limit is exceeded. Advantage: errors and faults normally cause an alarm. Disadvantage: alarm also when supply-voltage is switched off and after switching on until the relay has picked up. Unfavourable e.g. with transformers, particularly, when the supply-voltage of the TR 122 D(A) comes from a monitored transformer.

R-Operating-current mode: relay is released in GOOD-state and picks up when the limit is exceeded. No alarm at errors and when supply-voltage switched off. Used normally to switch ventilators or heatings or for tripping of transformers.

r-L / R-L: alarm switches locked. Reset with "Reset" only after value within the limit (with hysteresis) and end of the switch-back delay. Ready for Reset is indicated with „R L“ in the display mode.

Error report: With ERR it can be selected, if the relay switches in the alarm state in case of sensor-error ERR-2 (short circuit or break). (on / oFF)

### 8.3.5 Analog output (oUt): (TR 122 DA only)

Here the analog output can be parameterized and scaled. Enter with Set. Select between current-output 0- or 4- 20mA. Go on to scaling ZERO with button Set. Scale the value for Zero (0/4 mA) and confirm with Set. Scale the value for Full-Scale (20mA). Finish parameterizing of output with Set.

### 8.3.6 Sensor simulation (Si):

A measured temperature can be simulated with the buttons up/down. All functions of the unit work as if this temperature was really measured. If there is no button pushed for 15 minutes, the device automatically switches back into the display mode.

### 8.3.7 Cod:

After setting all parameters they can be protected by activating the code lock. After pushing Set, the display indicates P1 n. Adjust with buttons up/down P1 n 504 (factory setting). After pushing Set, code lock can be activated or switched off. After pushing Set again, an individual P1 n can be selected (write down).

When code lock is activated all parameters can be seen but not be changed anymore.

Setting of the lock:

„oFF“: all parameters can be changed

„EL“: only the limits (alarms) can be changed

„on“: no parameters can be changed

In case of problems with the code lock (forgotten P1 n) the lock can be switched off and the P1 n can be set back to 504, by pushing button set while connecting the device to supply-voltage until Cod / oFF is indicated in the display.

## 8.4 Tips:

- After finishing one menu item it is switched automatically on the next one.
- When the right decimal point in the 7 segment display is on, the display mode has been left, and the menu items can be chosen with up/down (menu mode).
- When the right decimal point blinks, you are in the parameter setting mode and can change the setting with up/down.
- Long pushing on up/down speeds up the changes in the display.
- Pushing button up and down at the same time sets values to zero.
- With reset (press set/reset for 2s) the display mode can be reached from every position (exception: simulation) of the parameter setting mode (the last selected value in is being stored).

## 9 Indication of the Digital Display:

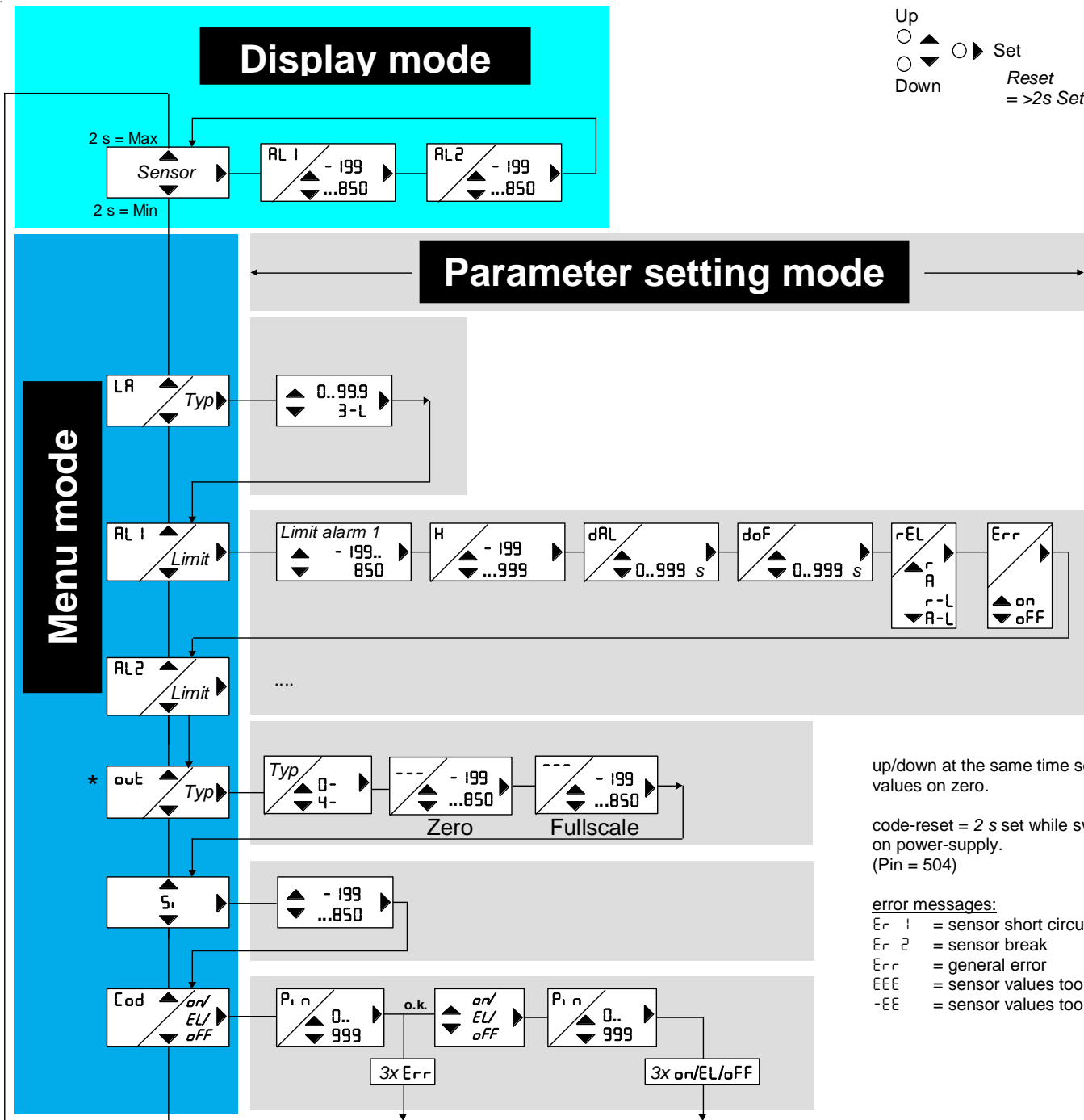
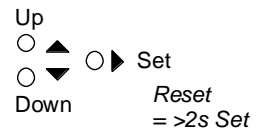
A1, A2	= alarm 1, alarm 2 active
A12	= alarm 1 and alarm 2 active
A1L, A2L	= alarm locked, for setting back „reset“ is necessary
LA	= 2-wire cable resistance
3-L	= 3-wire configuration
AL1, AL2	= alarm limit
H	= hysteresis
dAL	= alarm delay (time delay until alarm)
dof	= switch back delay (time delay until alarm switches back to good)
rEL	= function of relay
r	= closed-circuit current mode
A	= operating current mode
r-L,	= closed-circuit current with interlocked switching (Locked)
A-L	= operating current with interlocked switching (Locked)
out	= analog output: 0-20 mA, 4-20mA scalable
---	= value, at which 20 mA is put out
---	= value, at which 0/4 mA is put out
on, ofF	= on/off
S,	= simulation
Code	= code (pin)
EL	= Easy Limit, only limits adjustable
Pin	= PIN (factory-setting = 504)



# 10 Operation:

## 10.1 Pt 100 / Temperature-Measuring with Pt 100 (RTD)

Operation with pushbuttons:



up/down at the same time sets values on zero.

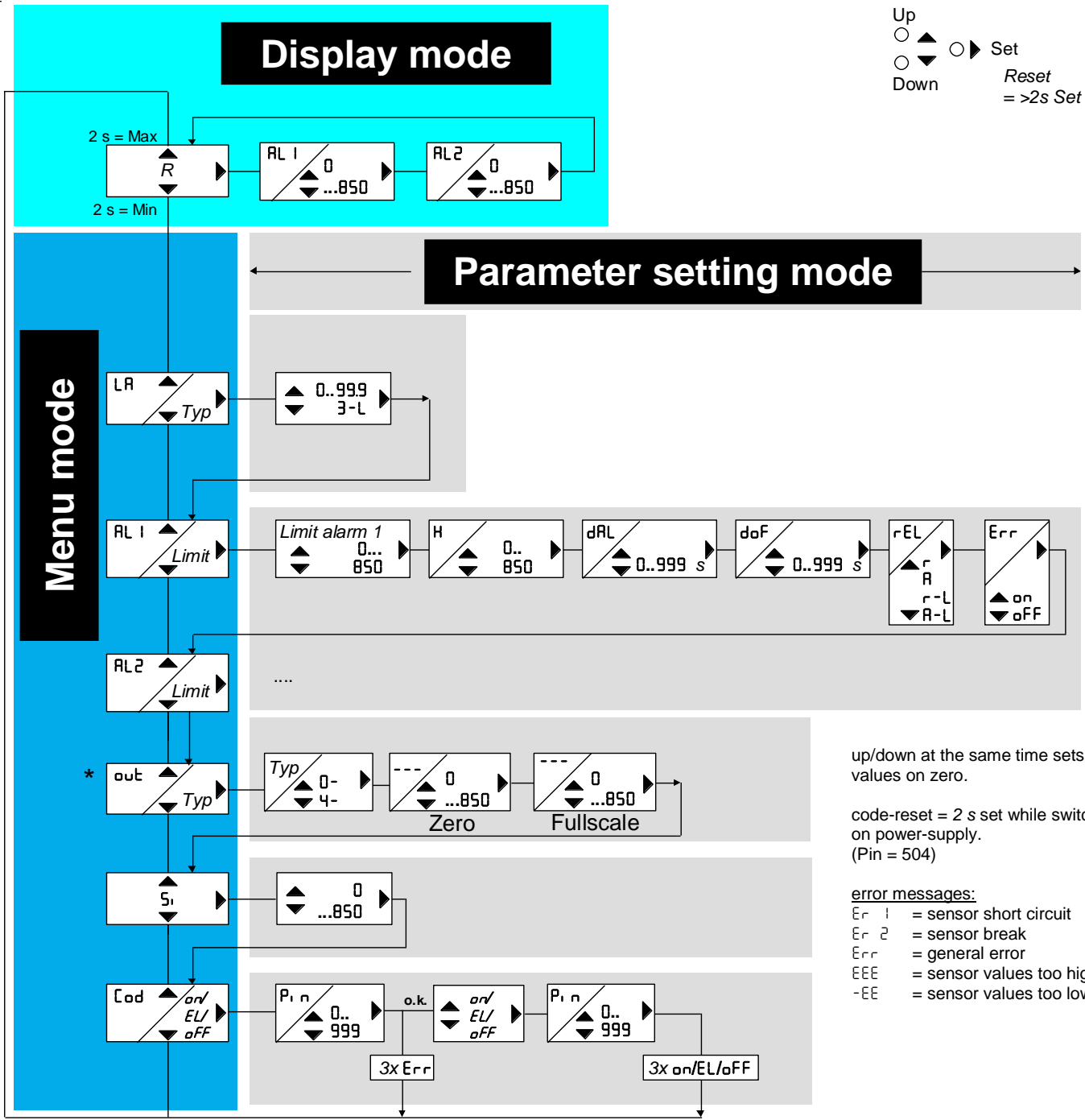
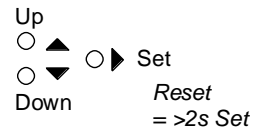
code-reset = 2 s set while switching on power-supply. (Pin = 504)

error messages:

- Err 1 = sensor short circuit
- Err 2 = sensor break
- Err = general error
- EEE = sensor values too high
- EE = sensor values too low

\* TR 122 DA only

Operation with pushbuttons:



up/down at the same time sets values on zero.

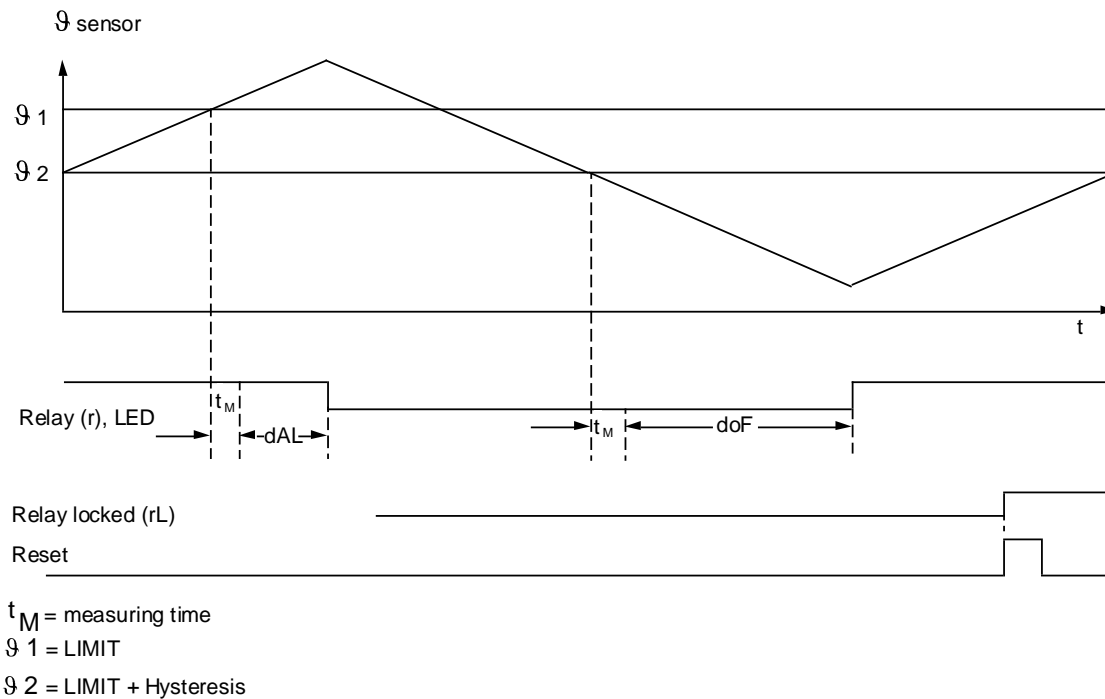
code-reset = 2 s set while switching on power-supply. (Pin = 504)

error messages:

- Er 1 = sensor short circuit
- Er 2 = sensor break
- Err = general error
- EEE = sensor values too high
- EE = sensor values too low

\* TR 122 DA only

## 11 Action Chart:



### Reaction time of the unit – measuring time $t_M$

If the temperature is changing constantly, the measuring time  $t_M$  is about 2 s. If the temperature is changing rapidly, e.g. through simulation of the temperature with an external potentiometer, the measuring time  $t_M$  is about 4 ... 6 s. In case of sensor error the measuring time  $t_M$  raises to 7...10 s.

## 12 Error search and measures

- Display  
 EEE sensor break or temperature too high  
 -EE sensor interruption or temperature too low
- Unit cannot be programmed – Code lock  
 The code lock gives protection against unauthorized manipulation of the unit. When code lock is activated the parameters cannot be changed. The pin can be set by the user.  
 Pin unknown? Make code-reset: When switching in supply-voltage keep pushed button „Set“ for 2 s.  
 Display indicates: "888"; "Cod"; "oFF"; "888" release button „Set“.  
 Code = oFF, Pin = 504.
- Indicated temperature does not correspond to the sensor temperature  
 Check connected sensor type  
 Check cable resistance
- Display indicates „Er 1 or Er 2“  
 Er 1 Sensor short circuit  
 Er 2 Sensor interruption

## 13 Technical data

Rated supply voltage Us: AC/DC 24 – 240 V, 0 / 50 / 60 Hz < 3 W < 5 VA  
Tolerance DC 20,4 - 297 V, AC 20 - 264 V

Relay output: 2 x 1 change-over contact (CO)

Switching voltage max. AC 415 V  
Switching current max. 5 A  
Switching capacity max. 1250 VA (ohmic load)  
max. 48 W at DC 24 V

Reduction factor for  $\cos \varphi$  0,7 0,5

Nominal operational current  $I_e$ :

AC15  $I_e = 1$  A  $U_e = 400$  V

$I_e = 2$  A  $U_e = 250$  V

DC13  $I_e = 2$  A  $U_e = 24$  V

$I_e = 0,2$  A  $U_e = 125$  V

$I_e = 0,1$  A  $U_e = 250$  V

Recommended fuse NO 4 A time-lag or miniature circuit-breaker MCB B4

Recommended fuse NC 3,15 A time-lag

Expected life mechanical  $1 \times 10^7$  switching cycles

Expected life electrical  $1 \times 10^5$  switching cycles at AC 250 V / 5 A

$2 \times 10^5$  switching cycles at AC 250 V / 3 A

$6 \times 10^5$  switching cycles at AC 250 V / 1 A

Test conditions EN 61010-1

Rated impulse voltage 4000 V

Contamination level 3

Rated insulation voltage  $U_i$  250 V

On-time 100 %

Rated ambient temperature range -20 °C ... +60 °C

EN 60068-2-2 dry heat

Emission EN 61326-1; CISPR 11 class B

Immunity EN 61326-1 industrial electromagnetic environment

Vibration resistance EN 60068-2-6 2...25 Hz  $\pm 1,6$  mm

25 ... 150 Hz 5 g

Sensor connection:

Measuring time  $t_M$  < 2,5 s  
< 5 s in case of changes > 5 K or < 1 K  
< 15 s in case of sensor error

Pt 100 (RTD) according to EN 60751:

Sensor	Measuring range °C		Short circuit Ohm	Break Ohm	Sensor resistance + line resistance Ohm
	min	max	<	>	max
Pt 100	-199	860	15	400	500

Tolerance  $\pm 0,3$  % of measured value  $\pm 0,5$  K

Sensor current  $\leq 0,8$  mA

Temperature drift < 0,04 °C/K

**Analog output:**

Current output 0/4-20 mA  
Temperature drift  
Error from impedance

not electrically insulated from the inputs  
max. 500 Ω, Precision 0,3 % of Full-Scale  
< 0,015 %/K  
(250 Ω - load)/250 Ω \* 0,3 % of current

At error short circuit  $E_r$  I:  
Other errors

output 0 mA  
output 22 mA

**Housing:**

Dimensions (height x width x depth)  
Wire connection, one wire  
Protection class housing  
Protection class terminal  
Mounting position  
Installation

Design S12  
82 x 42 x 121 mm  
12-pole, each 2 x 1,5 mm<sup>2</sup>  
IP 40  
IP 20  
any  
Snap mounting on DIN-rail 35 mm  
According to EN 60715 or screws M4  
app. 250 g

Weight

Subject to technical changes

**14 Design S12:**

Dimensions in mm

