Technical Manual

Cold Storage Controller

ELREHA

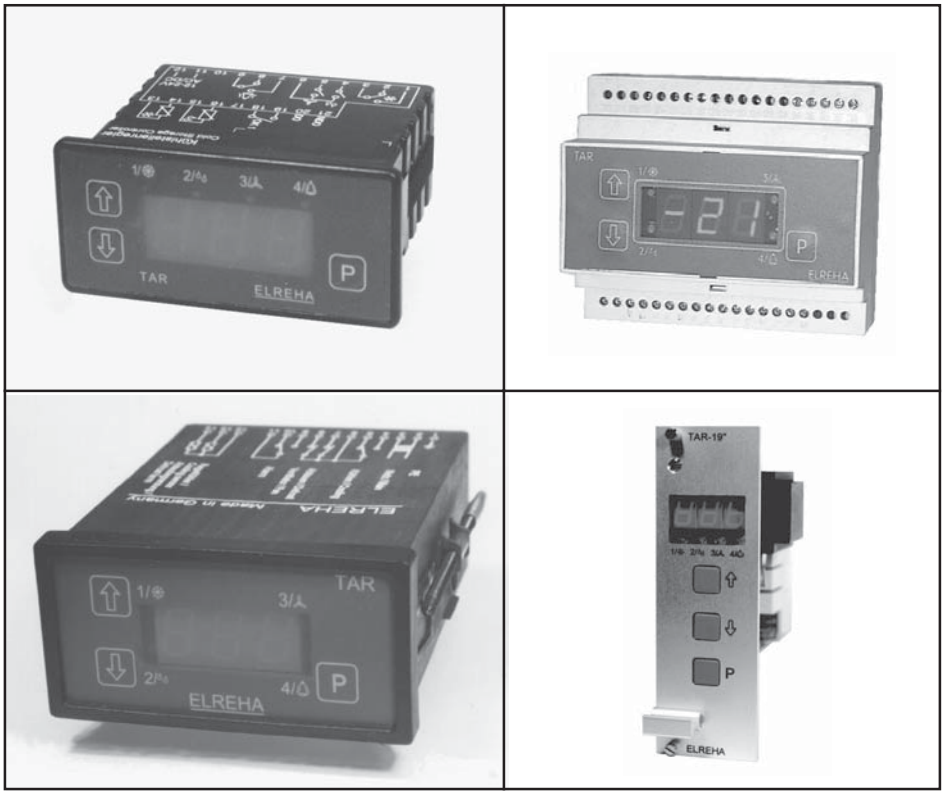
TAR / TARP

from Software Version 021028

Nr. 5311009-00/18E

TAR	1810
TARP	1860
TAR	(2)3810
TARP	(2)3860
TAR	(2)5810
TARP	(2)5860
TAR	(1)9810
TARP	(1)9860

Please note Safety Informations !



- **Cold Storage Controller drives Solenoid Valve, Defrost Heater, Alarm Device and Fan**
- **Available in 5 housings**
- **Digital Input for door-contact**
- **Switching Mode selectable**
- **Defrost Mode selectable, Manual Defrost**
- **Defrost Termination by time / temperature**
- **Fan Control by time / temperature**
- **Over-/Undertemperature Alarm**
- **Analogue Output** (TARP only)
- **Protocol Memory, e.g. for HACCP purposes** (TARP only)
- **Alarm Buzzer and Alarm Relay**

Contents

Type Overview

TAR 1810 ..... panel housing . 12-24V AC/DC
TARP 1860 ..... like obove, with additional protocol memory and Analogue-Output 0-10V DC
TAR 3810 ..... for 35mm DIN-rail, 230V
TAR 23810 ..... for 35mm DIN-rail, 115V / 60 Hz
TARP 3860 ..... protocol mem., 230V, Output 0-10V DC
TARP 23860 ..... protocol mem., 115V, Output 0-10V DC
TAR 5810 ..... panel housing 96x48mm, 230V
TAR 5810 V ..... like above, reinforced relay K1
TAR 25810 ..... panel housing 96x48mm, 115V / 60Hz
TARP 5860 ..... protocol mem., 230V, Output 0-10V DC
TARP 25860 ..... protocol mem., 115V, Output 0-10V DC
TAR 6810 ..... for refrigerated cases, 230V
TAR 19810 ..... 19"-module, 8TE 230V
TAR 29810 ..... 19"-module, 8TE 115V
TARP 19860 ..... protocol mem., 230V, Output 0-10V DC
TARP 29860 ..... protocol mem., 115V, Output 0-10V DC

Technical Data

Supply Voltage ..... see Type Overview
Power Consumption ..... appr. 3,5 VA
Contact Rating ..... 8A cos phi = 1, 3A ind. / 250V
Operating temperature ..... -10...+55°C (14...131°F)
Storage temperature ..... -30...+70°C (-22...158°F)
Relative Humidity ..... max. 80% r.H.
Display ..... LED,7-segment,red,character height 13mm (.51) 19"-module : 10mm
Resolution ..... 0,1°C / 0,2°F
Accuracy ..... typ. +/- 1K
Temperature sensors ..... TF 201 (PTC) or TF 501 (Pt1000)
Control-/Display Range
with TF 201 ..... -55...+105°C / -67...221°F
with TF 501 ..... -110...+120°C / -166...248°F
Data storage parameters ... unlimited
Clock backup ..... typ. 10 days after mains is lost
Relay indicators ..... 3 mm, red
Digital input ..... mains voltage (1xxx/4xxx: external N/O)
Interface ..... E-Link (RS-485)
Electrical connection ..... screw terminals 2,5mm (.1) 19"-module : "F"-connector
Protection ..... IP 30
1810/5810 ... IP 54 from front

Recording Function (**TARP** only)
Storage interval ..... adjustable, 1...90 minutes
Capacity ..... 39 days (at 15 min. interval, appr. 3770 values)
Analogue Output ..... 0-10V DC, 3 mA max.

On the parameter page you will find further informations.

Accessories (please order separately)

- Temperature Sensors TF 201 or TF 501

For TAR 1xxx:

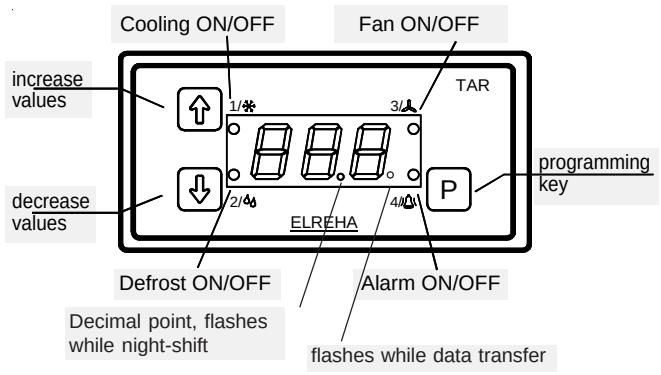
- Transformer 107-1300-0017 (230V/14V / 5VA) or
- Transformer 107-1300-0018 (230V/22V / 5VA) or
- Transformer 107-1300-0052 (230V/12V / 5VA)

For 19"-units:

- Subrack or Panel Housing

Operating

Operating Elements



All TAR-versions are marked in the same way

Auto scrolling

Hold '⇧/⇩'-keys to scroll values automatically.

Manual Defrost

While the actual control value is displayed, a defrost cycle can be initiated by holding the '⇧'-key for more than 3 seconds.
The defrost cycle can be terminated holding the '⇩'-key for more than 3 seconds.

Wake-Up

If the controller was de-activated via interface (e.g. by a PC), the display shows '**oFF**'. Holding the '⇩'-key for more than 3 seconds 'wakes up' the unit manually.

Parameters

All selectable parameters hold a parameter number (e.g. P03), you will find a listing on the next page.

Calling up and editing

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

Unlock Keys

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 beforehand. This means that at parameter **P50** (older versions: P44) a certain value is to be set (see parameter listing) :

Press key "P" ..... parameter number appears
Use "⇧/⇩" ..... select code parameter (P44)
Press "P" again ..... parameter value appears
Use "⇧" ..... set value to --88--
Press "P" again ..... value is stored, back to parameter no.

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

Failure Handling

Sensor short circuit or broken

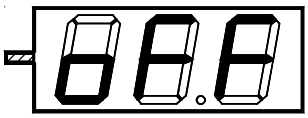
The display flashes if one of the two sensors is short or broken or if the actual value exceeds the specified range.
The internal buzzer and the alarm relay will be activated after 1 minute, like preset with **P30**.

Control sensor disturbance

If the control sensor fails, all control functions will be disabled by de-activating the relay outputs.

Exception: If switching mode 'freezing' is selected, the fan relay will be activated to prevent from icing. If the evaporator sensor fails, all control functions will work normally, but no defrost cycle can be initiated.

Display shows "oFF" if:



1. ...controller unit is disabled via digital input OK1 resp. via network.
2. ...you select parameters P02 or P20 and the Limit Sensor is disabled.

Display flashes with any value. One of the two sensors is short or broken or the actual value exceeds the specified range.

Param. No.	Dis onl.	Code	Description	Range	Default	Your value
P01	X		Actual temperature control sensor (°C / °F)			
P02	X		Actual temperature evaporator sensor (°C / °F)			
P03		no	Control setpoint	Low limit P08...high limit P07	0 °C	
P04		88	Control setpoint 2 (night-setpoint)	± 100 °C (°F)	0 °C	
P05		88	ON-time control setpoint 2 (e.g. 193=19:30)	0...235, oFF	oFF	
P06		88	OFF-time control setpoint 2 (e.g. 070=07:00)	0...235, oFF	oFF	
P07		88	Highest adjustable Control setpoint	± 100 °C (-148...212 °F)	+50 °C	
P08		88	Lowest adjustable Control setpoint	-100°C / -148°F up to (P07)	-50°C	
P09		88	Control differential (Hysteresis)	0,3...20,0 K resp. F	2 K	
P10		88	Switching mode cooling relay	1= refrigeration, 2= freezing, 3= heating	1 (refrig.)	
P11		88	Compressor pause delay (cooling relay)	0...59 minutes	2 minutes	
P12		88	Fan stop/go temperature	-100°C... +100°C (hyst. 3K fixed)	50°C	
P13		88	Fan mode	1=, 2=, 3=, 4=, see text	1	
P14		88	Fan delay after defrost	0...30 minutes	3 minutes	
P15	X		Minutes remaining until defrost termination			
P16	X		Minutes remaining until refrig. restarts after defrost			
P17	X		Minutes remaining until fan restarts			
P18	X		Minutes remaining until alarm is activated			
P19		88	Control sensor correction	+/-10,0 K/F	0 K	
P20		88	Evaporator sensor correction / switch off	+/-10,0 K/F, off	0 K	
P21		70	Sensor type / physical dimension / temp. range	1= TF 501 / °C / -110...+120°C 2= TF 201 / °C / -55...+105°C 3= TF 501 / °F / -166...248°F 4= TF 201 / °F / -67...221°F 5= no function	2	
P22		88	Defrost termination temperature	0,0...30,0°C / 118,0°F	10°C	
P23		88	Defrost method	1= electric, 2= hot gas, 3= electric+AZV, 4= hot gas+AZV	1	
P24		88	Defrost time # 1 000...235, oFF	(1.+.2 position = hours,	oFF	
P25		88	Defrost time # 2 000...235, oFF	3.position = minutes x 10)	oFF	
P26		88	Defrost time # 3 000...235, oFF		oFF	
P27		88	Defrost time # 4 000...235, oFF		oFF	
P28		88	Defrost (safety) time	1...120 minutes	30 min.	
P29		88	Drain time (refrigeration delay after defrost)	0...99 minutes	0 min.	
P30		88	Alarm mode	0= Alarm relay active ON 1= Alarm relay active OFF 2= like "0", internal buzzer off 3= like "1", internal buzzer off 4= Alarm relay like internal buzzer 5= Rel.4 switches with setpoint 2 alarm message by buzzer/LED 6= Alarm relay switched via DDC onl.	1	
P31		88	Alarm delay	1...99 minutes, if sensor fails always automatically < 1 minute	5 minutes	
P32		88	Alarm high limit temperature (relative to P03)	0...100 K	100K	
P33		88	Alarm low limit (absolute value)	± 100 °C	-100°C	
P34		88	Digital input (optocoupler input resp. OK1)	0= input de-activated 1= door contact (fan OFF immediately, refrig. OFF after 3 min., alarm after P35) 2= alarm input (alarm after P35) 3= control setpoint 2 (after P35, priority higher than by time) 4= defrost (with P35 as 'OFF' time) 5= controller OFF	0	

Param. No.	Dis onl.	Code	Description	Range	Default	Your value
P35		88	Control input delay	0...99 minutes	2	
P36		88	Analogue output high limit	± 100 °C (-148...212 °F)	0	
P37		88	Analogue output low limit	± 100 °C (-148...212 °F) max. P36	0	
P38		88	Analogue output mode	0= OFF, 1= proportional 2= antiproportional	0	
P39		88	State of built in data logger (TARP-types only)	0= OFF, 1= ON, 2= data logging impossible because no memory present	0	
P40			Protocol interval (locked if P39=1)	1...90 minutes	15 min.	
P41		no	Date year (locked if P39=1)			
P42		no	Date month (locked if P39=1)			
P43		no	Datum day (locked if P39=1)			
P44		no	Time hours (locked if P39=1)			
P45		no	Time minutes (locked if P39=1)			
P46		no	Time seconds (locked if P39=1)			
P47		88	Baudrate, data transfer speed via interface	1= 1200 Baud, 2= 2400 Baud, 3= 4800 Baud, 4= 9600 Baud, 5= 19200 Baud	4	
P48		88	Adress of unit in a network	0...78	78	
P49		no	Manual defrost	"⇧"= Start defrost cycle "⇩"= Terminate defrost cycle		
P50	X	no	Access Code	0...99	0	

Parameter listing

Please note that you need a different code for changing sensor type.

Default values and settings are factory settings.

Set parameters to factory default:

- Switch off supply voltage,
- press and hold the 'P'-key
- switch on supply voltage
- hold the key for about 5 more seconds

While holding the key, the display shows one by one:
software- version, date and 'def.'.
'def' signifies that all parameters are set to default values now.

Clear protocol memory (TARP-types only)

- switch off supply voltage
- press and hold the 'P'-key
- switch on supply voltage
- hold the 'P'-key longer. Before softwareversion is over
- hold '⇩'-key, display shows 3 horizontal segments and '00'
- A value from 00 to FF (hex) will be increased.

Clearing the complete memory can last up to 17 minutes.

Functional description

Display & Sensors

All temperature values can be displayed in °C or °F. Parameter **P21** allows toggling between these two display modes and to change the type of sensor. The actual display of both inputs has a resolution of 0,1K (0,2°F). Both, TF201 (PTC) and TF501 (Pt1000) sensors can be used, but note that this results in different display ranges. If not required, sensor 2 (Limit Sensor) can be disabled.

Temperature Control

The temperature setpoint can be predefined with **(P03).** The controller compares the actual room temperature with this setpoint and energizes or de-energizes relay K1. Temperature control will be realized by switching a solenoid valve or a compressor with this relay.
In order to be fail-safe in case of any internal power failure, there is a possibility of selecting the correct switching mode (**P10**). In refrigeration mode the N/O relay contacts are used so that the load is shut off in case of failure.
In freezing mode the load is connected to the N/C contact, with the load running constantly in case of failure.
The switching hysteresis (differential) is adjustable to prevent the system from short cycling (**P09**). A pause delay (**P11**) prevents a compressor from switching ON again immeditaly.

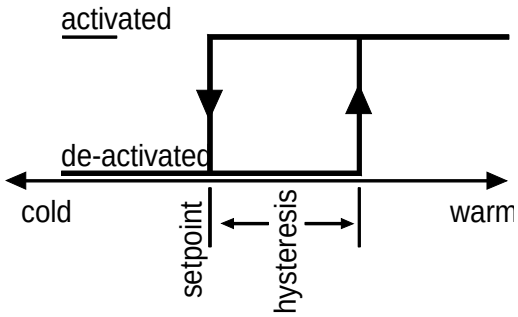
Setpoint range

With parameters **P07/P08** you can limit the setpoint range.

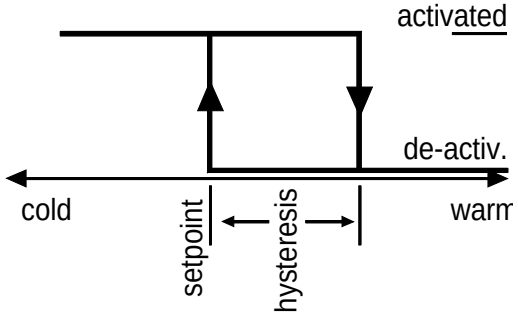
Switching mode relay K1

The switching characteristic of relay K1 (= cooling mode) is defined by parameter **P10** (as explained above).

1= refrigeration

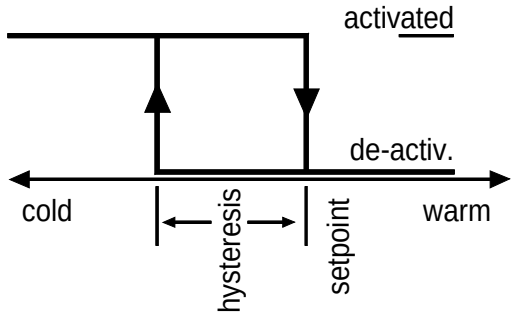


2= freezing



Connect load to N/C contact of relay K1.

3= heating



2. Setpoint / 'Night'-setpoint / day-night-shift

To economize energy, e.g. at night, the unit can be work with a second setpoint **P04**. This setpoint can be activated by the internal time-switch (**P05/P06**) or the digital input OK1.
The decimal point of the display flashes to indicate that the second setpont is present.

Temperature alarm

An alarm relay (K4) and a built-in buzzer are available for warning purposes.
A delay timer (**P31**) starts, if the temperature measured by the control sensor exceeds the range set by parameters **P32/P33**.
After this timer is run down, the alarm relay and the buzzer will be activated. **P32** is relative to setpoint **P03**, so **P32** will be shifted the same amount as the setpoint.

-- Any key resets the buzzer. --

If the temperature has left the range, **P18** shows the remaining time until an alarm occurs.
If the temperature comes back to the working range, relay and buzzer will be reset automatically.

Alarm relay operation modes

With parameter **P30** you select the mode of alarm relay and internal buzzer:

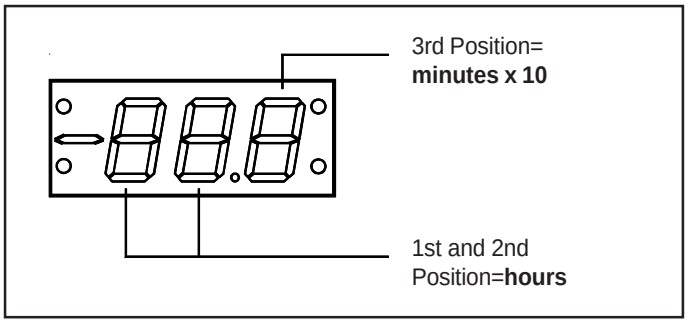
0 = Alarm relay active ON, buzzer activated
1 = Alarm relay active OFF, buzzer activated
2 = Alarm relay active ON, buzzer de-activated
3 = Alarm relay active OFF, buzzer de-activated
4 = Alarm relay works like the built-in buzzer, to connect an external horn
5 = Continuous ON of relay K4 if control setpoint 2 is being activated. Alarm messages will be forwarded by buzzer and alarm-LED only. With this function light can be switched by time control.
6 = Alarm relay can be switched via DDC (interface) only. This works as well as the controller is de-activated by DDC or control input. The switching command keeps stored, so the relay position will be restored after a breakdown of supply voltage.

The alarm function can be started too by interrupting mains voltage at digital input OK1 (see **P34**)
(TAR 18xx versions: open external switch between terminals 18 and 19)

Real time clock

The **TAR** Cold Storage Controller contains a real time clock which allows you to initiate four (8 with AZV) defrost cycless a day.
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 **P41** thru **P45**.
The defrost times are set with **P24** thru **P27** in 10 minute increments in a 24 hour (military) format. Example: 13.20 = 01:20 p.m.
The second setpoint switch is made with **P05/P06**.

Because the display has only three digits, the time value comes in the following format:



Switch times can be de-activated by setting to '**oFF**'.

While the data recording function is active, time and date cannot be adjusted.
To adjust the clock, first de-activate data logger (**P39**=0).

Defrost

One relay output (K2) is used to control a defrost device.

Defrost Initiation

A. by internal timer, four times available (**P24** thru **P27**)
B. by digital input OK1 (see chapter 'digital input').
   In this case P35 will take effect as a 'defrost OFF' time.
C. manually (**P43**).

The defrost device is always driven from the n/o contact of relay K2. There is no need for external interlocking the defrost output with the cooling output since the temperature controller is disabled while a defrost cycle.
With **P23** you can select four different defrost modes, which are working independent from switching mode of relay K1.
For information there is parameter **P15** showing the remaining time of the momentary defrost cycle until termination by time.

Defrost Modes

With **P23** a defrost mode can be set.

1 = *Heater or Free Air Defrost*
If a defrost cycle starts, relay K2 is energized (= heater ON) and K1 terminates cooling. (relay de-activated if P10=1, activated if P10=2)

2 = *Hot Gas Defrost*
If a defrost cycle starts relays K2 (bypass-valve open) and K1 are energized (solenoid valve open, relay activated if P10=1, de-activated if P10=2).

3 = *Heater or Free Air Defrost + defrost time doubling (**AZV**)*
If a defrost cycle starts, relay K2 is energized (= heater ON) and K1 terminates cooling. (relay de-activated if P10=1, activated if P10=2)

4 = *Hot Gas Defrost + defrost time doubling (**AZV**)*
If a defrost cycle starts relays K2 (bypass-valve open) and K1 are energized (solenoid valve open, relay activated if P10=1, de-activated if P10=2).

Defrost time doubling (AZV)

This is a simple function to double the quantity of the potential defrost cycles (4 --> 8). The unit generates new defrost times automatically by adding 12 hours to existing times.

Example:
If a defrost cycle is fixed at 14:30, the unit starts an additional cycle at 2:30 (am) without entering this time.

Manual Defrost

A. Parameter **P49** allows you starting a defrost cycle with the "⇧" key, unless the sensor is already above termination temp.
B. While the actual temperature is on the display, a defrost cycle can be initiated by holding the "⇧" key for more than 2,5 seconds.

Defrost Termination

A defrost cycle can be terminated by :

A: Thermal termination.
Whenever the evaporator sensor temperature (**P02**) is warmer than the temperature limit set with parameter **P22**, defrosting will be terminated. If not necessary, switch off the evaporator sensor at **P20**.

B: Termination by (safety) time.
The time set with parameter **P28** is the maximum time a defrost cycle can last before it is terminated automatically.

C: Manual termination.
With parameter **P49** you can terminate a defrost cycle by pressing the "⇩" key.
While the actual temperature (**P01**) is on the display, a defrost cycle can be terminated by holding the "⇩" key for more than 2,5 seconds.

D. If the defrost limit sensor is interrupted, the defrost cycle will be stopped immediately.

After the defrost cycle is terminated, the beginning of the cooling function is delayed (**P29**). This prevents freezing water drops on the evaporators surface.
P16 shows the remaining time until cooling starts again.

Evaporator Fan Control

Three different modes of fan operation can be selected with parameter **P13**.
A temporal fan-ON delay is active after a defrost cycle (**P14**).
A thermostatic delay is always active, that means the fan starts only if the temperature measured with the evaporator sensor is 3K below the fan stop/go temperature (**P12**).
If this function is not desired, **P12** can be set to its upper border to make it inefficient.
While the drain time (**P29**) the fan remains stopped.

Fan Modes

1 = *Fan runs if compressor output (K1) is on.*
After defrosting the fan output is OFF until the programmed Fan Delay Time (**P14**) is complete. .

2 = *Fan runs continously, except during defrost and Fan Delay Time (**P14**) after defrost.*
Thermostatic fan delay: The fan stops if the temperature measured with the evaporator sensor exceeds (**P12**). If this function is not desired, **P12** can be set to its upper border to make it inefficient.

3 = *Fan runs if the compressor output (K1) is on, and during defrost*.
The temporal fan delay must be set to "0". This mode can be used for free air defrost.

4 = *Fan runs permanently, except if unit is switched off via interface.*

(**P17**) informs about the remaining time until the fan starts again.

Special case

If digital input OK1 is used for door monitoring, the fan will stop immediately if the door is opened.

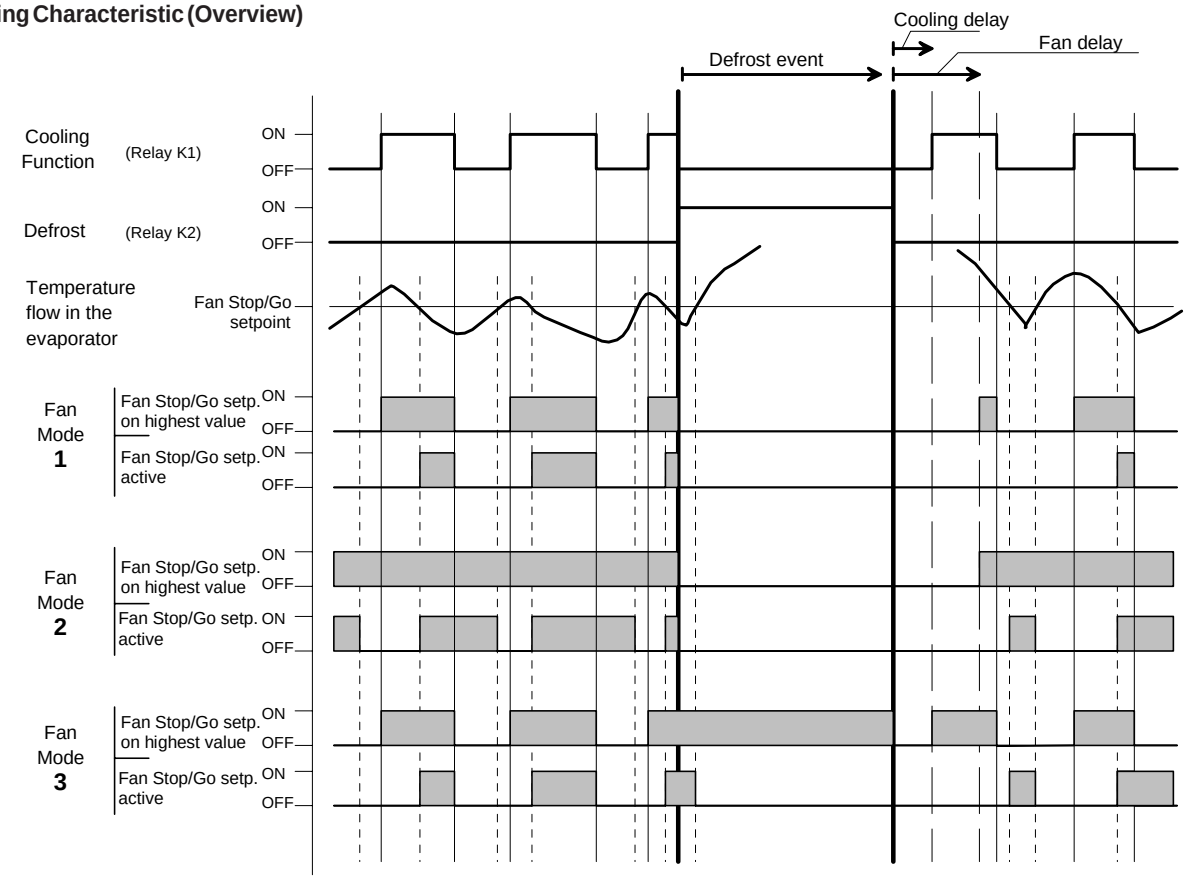
Practical conditions

The fan is always switched by the n/o contact of relay K3.

If you want to realize a thermostatic delay, select fan mode **2** and adjust setpoint **P12**.

If you want to realize a thermostatic delay and free air defrost, please realize a parallel connection of fan relay and defrost relay.

Switching Characteristic (Overview)



Digital Input

Digital input OK1 is normally connected to mains voltage. If this voltage is interrupted, the function set with **P34** will be initiated after a time delay (**P35**). **P35** is adjustable within 0...99 minutes, but at '0' the minium delay is appr. 4 seconds.

⚠ Using the **TAR 18xx** this function must be started by opening an external, potential free switch. **Never connect mains voltage to these terminals!** This external contact must be suitable for 5VDC/1mA.

0= Digital input OK 1 is de-activated

1= Digital input OK1 works as a door-switch.
- The fan stops immediately,
- Refrigeration stops after 3 minutes,
- after **P35** is run down an alarm will be generated, alarm relay and buzzer will be activated, refrigeration switches ON again.

2= Digital input OK1 works as alarm input. After **P35** is run down, alarm relay and buzzer will be activated.

3= Digital Setpoint 2 (night-setpoint) is active.

4= external defrost by time switch or similar
A defrost cycle will be started and terminated by time or temperature. After the cycle is started, no more cycle can be initiated while the time set with **P35**.

5= 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 the network. Relay 1-3 are de-activated, the alarm relay remains in a neutral position.

Protocol Memory

The Cold Storage Controller versions **TARP** contain an additional, nonvolatile memory.
Actual values of the control sensor can be stored in this memory with adjustable intervals (1...90 minutes, **P40**) together with their date and time. The capacity of this memory is rated in the way that always the last 30 days remains stored (15 min. intervals).
Stored values older than 30 days will be cleared automatically in favour of new values.
This function can be activated by parameter **P39**. If the value of P39 is '2', then data logging is impossible (TAR-types, no protocol memory).

These stored values cannot be read from the **TARP**'s display, they can only be read via interface by the PC-software '***COOLVision***'.
With this feature the TARP is qualified for executing the recording duty in a network as well as the host PC is defect or must be switched off.

Analogue Output (TARP-types only)

The Cold Storage Controller versions **TARP** contain an analogue output with a 0-10 V DC-signal. Because the output is scalable, it can be used either to forward the actual value (control sensor) or as a proportional controller output.

P36 describes the temperature the output amounts 10 V DC.
P37 describes the temperature the output amounts 0 V DC.
P38 switches the output on/off and fixes if the voltage output should rise or fall if the temperature rises.

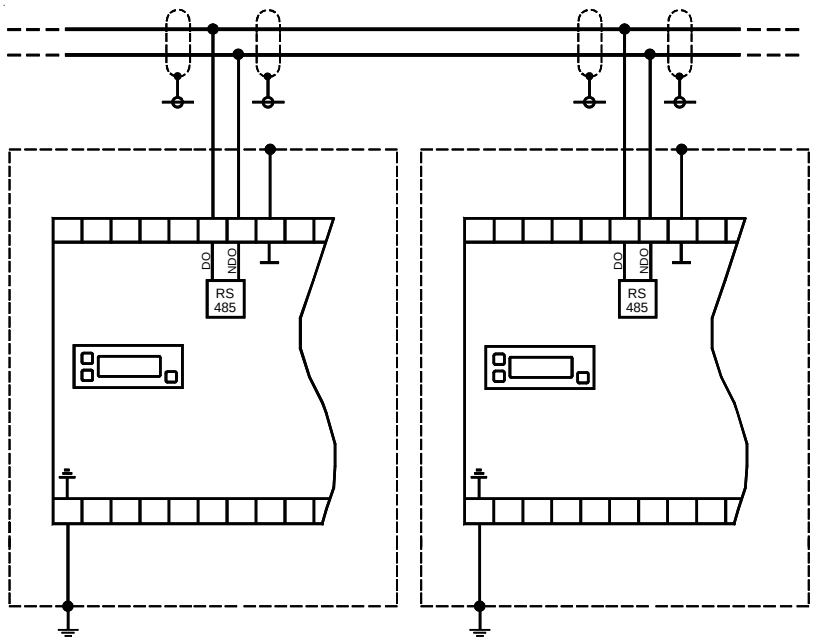
Example for Actual Value Forwarding:
You want to use a remote display or similar, which shows -40°C with 0V input and +50°C with 10V input.
P37 = '-40', P36 = '+50', P38 = '1'

Example for a Proportional Controller:
You want to control a three-way valve. This valve should be half open at +10°C. If the temperature falls the valve should open, from 8°C the valve should be full open. If the temperature rises, the valve should be narrowed, from 12°C it should be closed.
P37 = '+8', P36 = '+12', P38 = '2'

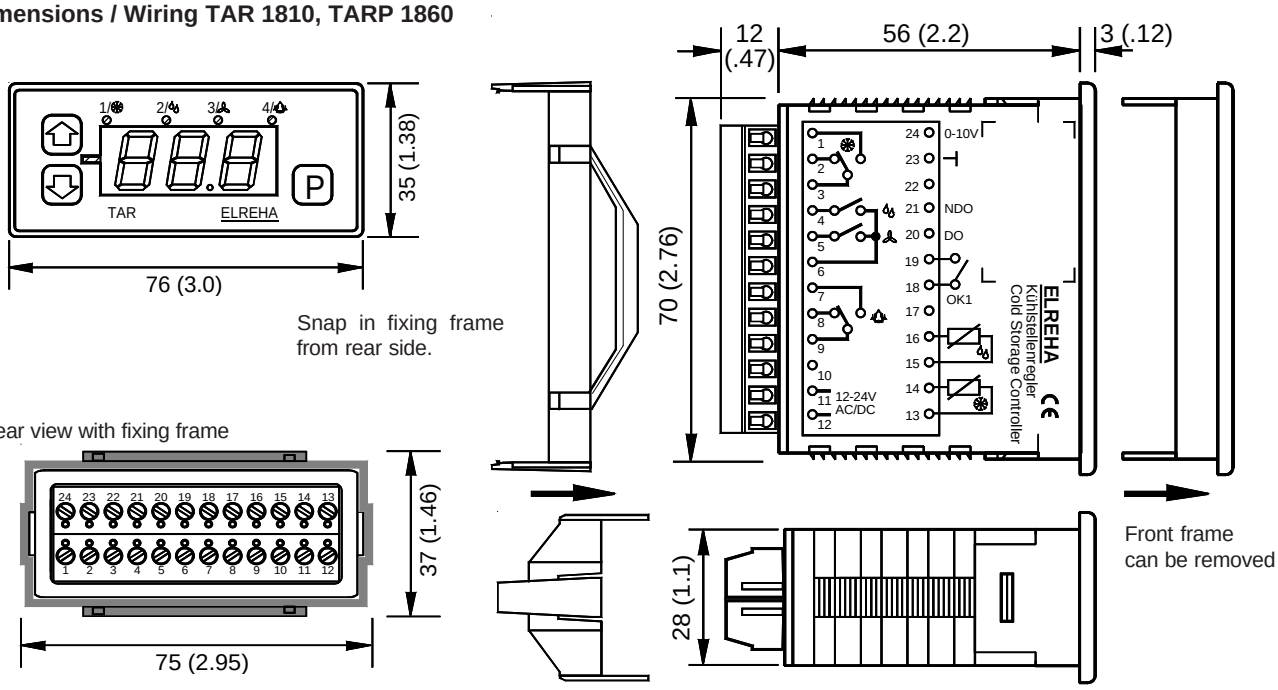
Networking of TAR-controllers

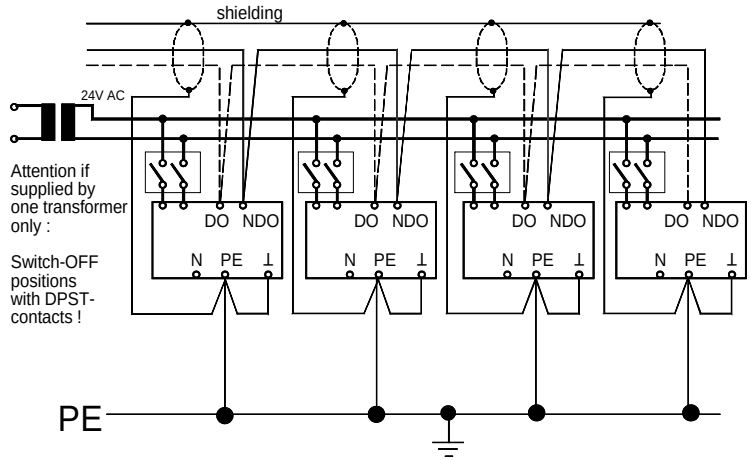
All TAR/TARP-x8xx controllers can be networked via their built-in RS-485-interface. This network can be controlled by a host unit.
This host can be a PC with a qualified software or SMZ-Frontend-System which allow remote control of units and recording of all parameters.

- Because all units are connected parallel on the data cable (party-line), every unit has its own network address (**P48**) to ensure a specific communication.
- The communication speed is fixed with **P47**, (Default value 9600 Baud).
- Connection is done by commercial databus cable
- Shielding and ground connectors must be connected to the nearest ground terminal in the cabinet or sim.
- The unshielded part of the data cable must be as short as possible



Dimensions / Wiring TAR 1810, TARP 1860



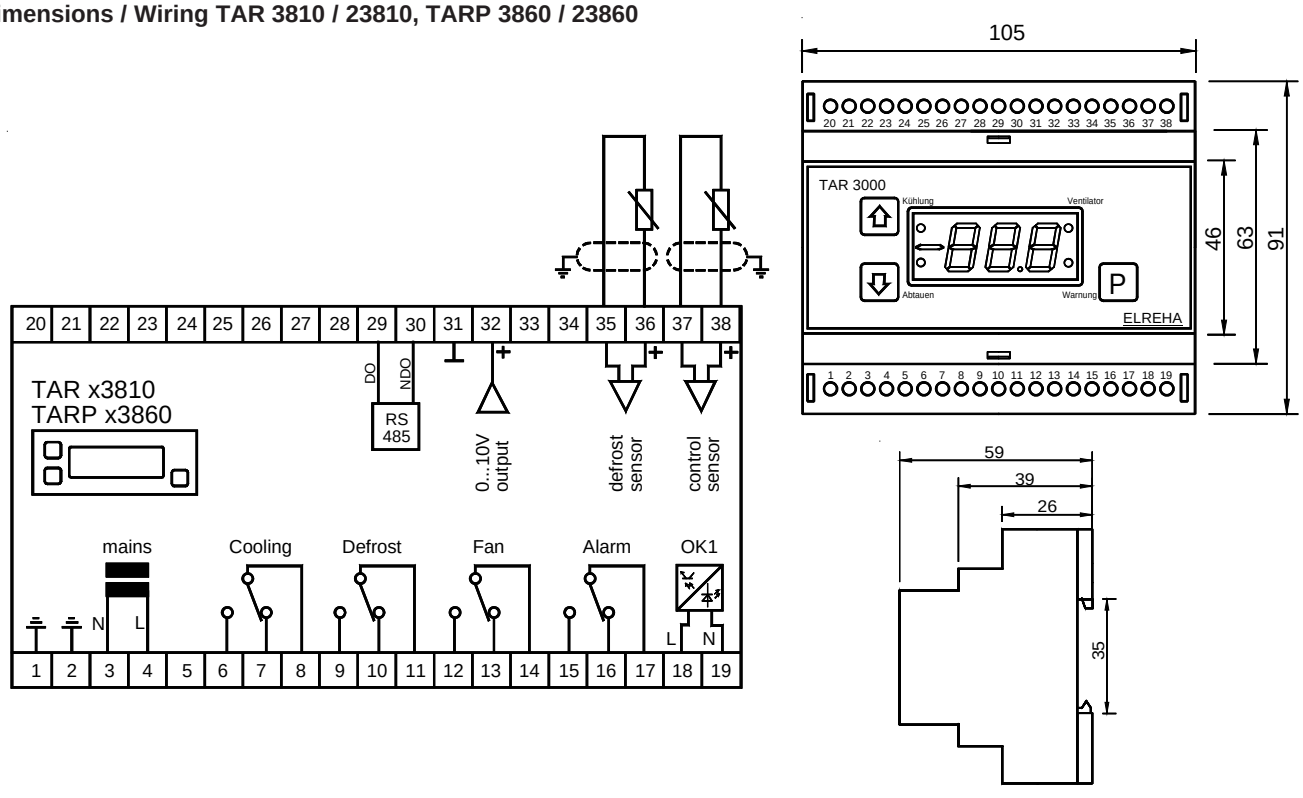


If networked controllers **(1xxx** types only) are supplied by one transformer only and the single positions must be switched off, use double-pole switches only.
If not, the unit will be supplied partially over the shielding of the data connection and continues operation depending on the secondary voltage of the transformer. Please note: If a unit is not supplied, the PC-software notifies a unit breakdown with complete justification !

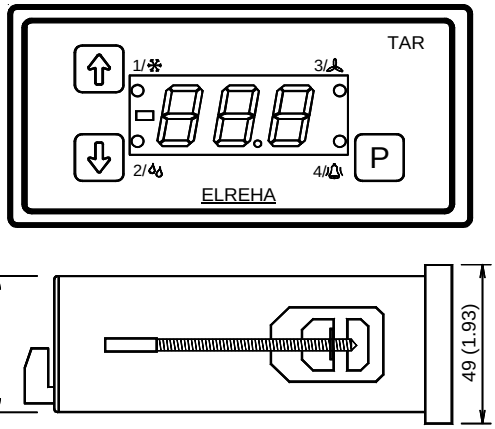
A better way is not to switch-off the supply voltage but to disable the unit by control input (P34 = 5).

Note: Never connect secondary coil of the transformer to PE !

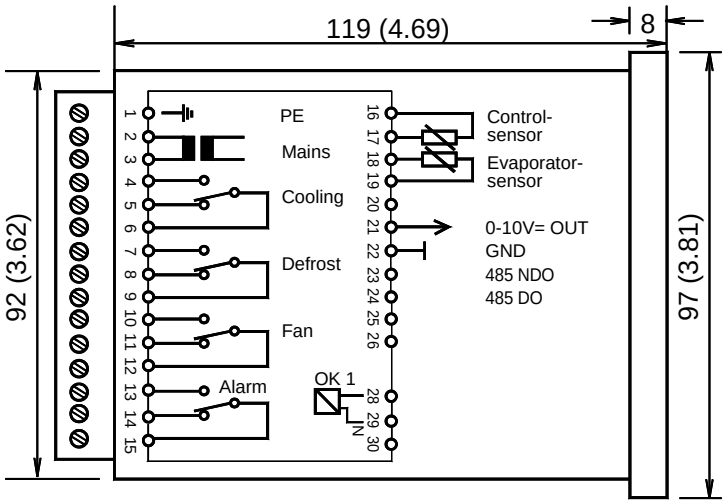
Dimensions / Wiring TAR 3810 / 23810, TARP 3860 / 23860



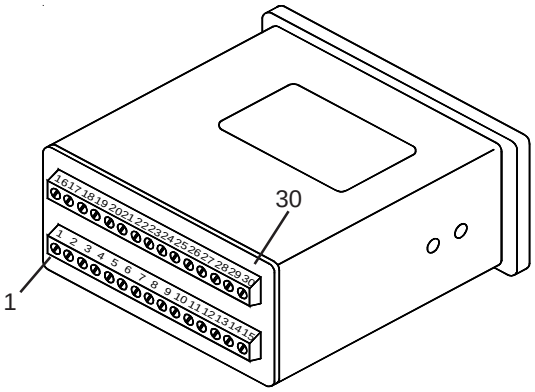
Dimensions / Wiring TAR 5810 / 25810, TAR 5860 / 25860



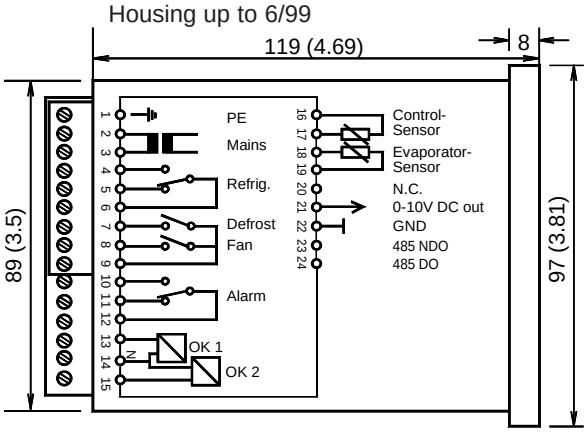
Housing from 6/99



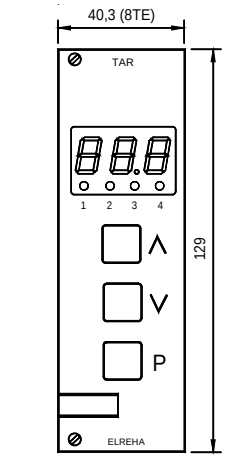
Panel housing acc. to DIN 43700 / IEC 61554
cut-out: 92 x 45 mm (w x h)
tolerances max: +0,8 (w), +0,6 (h)

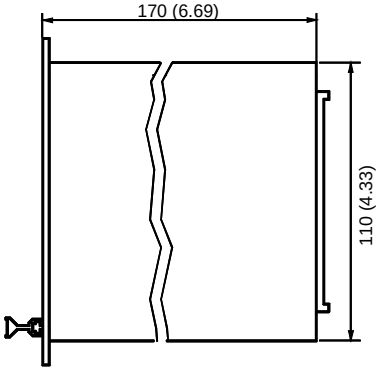


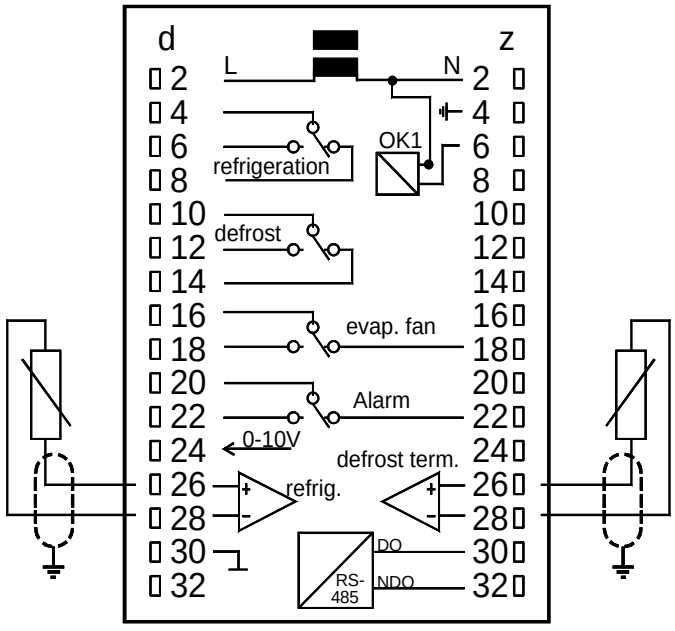
Housing up to 6/99



Dimensions / Wiring TAR(P) 19810 / 29810







Wiring diagram shows a connector equal to DIN 41612, type 'F', rear view.

Connection- and Safety Instructions

Please read before Start-up

- Electrical installation and putting into service must be done from authorized personnel.
- Please note the local safety instructions !
- Before using the controller, please check if the unit fits the application.
- Before applying voltage to the controller:
  Make sure that all wiring has been made in accordance with the wiring diagram in this manual.
  Check, if the supply voltage corresponds to the value printed on the unit's type label.
- **If transformers are used (TAR 1xxx only):**
  Never connect secondary coil of the transformer to PE !
- **Always connect the PE terminal to PE !**
- Please pay attention to the specified Temperature-/Humidity Limits. Outside these limits malfunctions may occur.
- **Never operate unit without housing.**
- In case of malfunction please contact our technical support.
- **Please note maximum load of relay contacts (see technical data).**
- **Important ! Please note the starting-currents and current timing of the load.**
- Sensor leads should be shielded cable with one end of the shielding connected to ground. This avoids irregular switching caused by electro-magnetic interference.
- The wire gauge of the sensor cables is not critical, if it should be lenghtened, 0,5 sqmm are adequate.
- Mounting the controller close to power relays is unfavourable in case of the electro-magnetic interference.
- Please note that TF-type temperature sensors are water-proof but not pressure protected.

Installation / Run-Up

Applications with Airflow Defrost

If this defrost method is used, there is no need for mounting a defrost sensor at the evaporator. In this case the sensor can be disabled. If the correction parameter P20 is set to -10,1, the display shows "oFF" and the sensor is disabled. Correcting the parameter upward enables the sensor again.

The controller then terminates a defrost cycle only by time which is set with parameter **P28**.
Upon applying voltage to the controller the display shows the temperature of the control (room) sensor. After you have entered the access code (see chapter "unlock keys") you have to program the configuration of the controller to suit your application:

- kind of temperature sensor and display value (°C/°F)
  Please note that you need the special access code '70' to change sensors. Please note that all temperature setpoints will be set to default.
- switching mode of relay K1: parameter P10
- defrost method: P23
- evaporator fan mode: P13
- alarm mode: P30

The basic setup is now complete and you can edit the missing setpoints, delay times etc.

Sensor correction

If for any reason the actual sensor values displayed should not match with the temperature you read from a high accuracy thermometer, you can correct the error with parameters **P19/P20.**

Help Overview

1. **Do you hold the correct manual ?**
2. With parameters P01 and P02 such as P15 thru P18 (actual temperatures and running delays) you get a first overview about the unit's states..

Number of parameters is not correct:
It's probably that you have a unit from an earlier charge, please contact us.

Troubleshooting

General: With parameters P01 and P02 and parameters P12 thru P15 (actual temperatures / running timers) you get a first overview.

problem	possible reason
Temperature display:	
Actual display flashes with "-110" appr. "-166"	Sensor type TF 501 with "°C" appr. "°F" selected, Short circuit in wiring or sensor itself
Actual display flashes with "-55" appr. "-67"	Sensor type TF 201 with "°C" appr. "°F" selected, Short circuit in wiring or sensor itself
Actual display flashes with "120" appr. "248"	Sensor type TF 501 with "°C" appr. "°F" selected, Wiring or sensor itself broken
Actual display flashes with "105" appr. "221"	Sensor type TF 501 with "°C" appr. "°F" selected, Wiring or sensor itself broken
Temp. display does not match with actual temperature.	Check if reference thermometer is placed at the same position as the sensor head. Then correct sensors. Check, if correct sensor type is set.
Programming:	
Setpoint cannot be adjusted	High and low limit of the setpoint range are identical (P07 / P08)
Real time clock cannot be adjusted	Recording function is ON, switch OFF before (P39=0)
Other values cannot be programmed	Enter Access Code.
Display is running. All 3 positions change from 111 thru 999	Unit works in selftest mode. Switch power OFF, switch power On again after 15 seconds. Please check sensor corrections now.
You want to set all parameters to default	Switch power OFF and wait for 15 seconds. Hold P-key, switch power ON, unhand P-key. (The display shows first the software-version and then 'deF'. Now all parameter values are lost and are set to default.
Temperature Control:	
Room temperature is shown too cold. Cooling is OFF although the room is too hot or: Cooling switches OFF too early.	Sensor 1 and sensor 2 are interchanged, see also above 'Temp.display'
Cooling is always running, although the room is cold enough and the indicator LED 1/Cooling is not ON.	Wrong switching mode K1 (P07) or N/O / N/C-contact interchanged (relay K1).
Temperature too high, indicator LED '1/Cooling' is ON, but cooling does not switch ON.	Wrong switching mode K1 (P07) or N/O / N/C-contact interchanged (relay K1).
Temperature too high, but cooling does not switch ON.	Check, if a defrost cycle or the drain time is running.
Cooling works, but fan is OFF.	Check, if 'fan stop/go temperature' should work and the evaporator temperature is below the setpoint. Check if the fan delay is running
You have selected fan mode 3, but the fan does not work during a defrost cycle.	In this mode the fan delay must be set to '0'. If the evaporator sensor reaches the fan stop/go setpoint, the fan will be switched OFF during the defrost cycle. (appr. short defrost and fan relay with external wiring).
You have selected fan mode 2, but fan switches ON and OFF during the cooling cycles.	Adjust fan stop/go temperature to the highest border
You want to use a thermostatic fan delay, but the fan switches always OFF if cooling switches OFF.	Set fan mode to '2', adjust fan stop/go temperature.
Defrost:	
Does not work.	Check evaporator sensor position. Check defrost method, -times, -safety time and -termination temperature. Check if fan delay time is too long. Check if fan runs correctly in cooling cycless
During a defrost cycle cooling even starts.	Defrost mode is set to 'hot gas'. Please set correctly.
Alarm:	
Constant alarm without a real failure.	Check wiring and alarm mode. Can be set to active or passive.
Internal buzzer does not work.	Check alarm mode. Is buzzer switched OFF or already reset ?

EG-Statement of Conformity

We state the following: When operated in accordance with the technical manual, the criteria have been met that are outlined in the guidelines of the council for alignment of statutory orders of the member states on electro-magnetic consistency (89/336/EWG). 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 confirmity testing with regard to electromagnetic consistency :

IEC 1000-4-1, IEC 1000-4-2, IEC 1000-4-3*, IEC 1000-4-4, IEC 1000-4-5,
EN 55011 B, EN 50081, part 1 and 2; EN 50082, part 1 and 2

This statement is made from the manufacturer / importer
ELREHA Elektronische Regelungen GmbH
68766 Hockenheim
(Name / Anschrift / *name / adress*)

by:
Klaus Birkner, **Developement and**
and leader of the EMC-Laboratory

Hockenheim Ort/*city*
10.3.98 Datum/*date*
..... Unterschrift/*sign*

**The conformity with IEC 1000-4-3 is derived from the IEC 1000-4-2 and IEC 1000-4-4 test results. The correlation with IEC 1000-4-3 is based on test results which are located on site at the manufacturer.*

This manual, which is part of the product, has been set up with care and our best knowledge, but mistakes are still possible.
Technical details can be changed without notice, especially the software. Please note that the described functions are only valid for units containing the software with the version-number shown on page 1. Units with an other software number can work a little bit different. You will find this software number on the label of the unit too.

set up by:	3.9.2003 tkd/jr	checked: by:	3.9.2003 ek/al	approved: by:	3.9.2003 mv/sha