



D-68766 Hockenheim, Germany
 Schwetzingen Str. 103
 phone (0049) (0) 62 05 / 2009-0
 fax (0049) (0) 62 05 / 2009-39

ELEKTRONISCHE REGELUNGEN GMBH

5310923- 00/04 E

Instruction Manual **TAR 1300 / 2300 / 4300** ab Softw.vers.960627/1
Cold Storage Controller **TAR 1309 / 2309 / 4309** ab Softw.vers.951108/1
TAR 1300 S(K)002 ab Softw.vers.960528/1

Contents Page

Operating 2
 Parameter Listing 3
 Function Descriptions 4
 Switching Characteristic Overview .. 6
 Installation 7
 Failure Handling 7
 Technical Data 7
 Dimensions / Wiring 8
 Declaration of Conformity 10

General

The TAR x30x series controllers are designed for controlling the most important parts of refrigeration and freezer devices.

There are standard relay outputs available and all operation can be made from the front panel.

Different housings but equal operating and equal functions allow to use this controller family in the most refrigeration or freezing applications.

Type Overview

Functions and Features	TAR 1300	1300 K002	TAR 1309	TAR 2300	TAR 4300	TAR 4309		
Displaying all actual/set temperatures (°C / °F)	X	X	X	X	X			
Display resolution 0,1K			X		X			
Temperature control, selectable characteristic								
Defrost control by timer interval, selectable characteristic (electric / hot gas)								
Defrost termination by time or temperature								
Cooling delay after defrost	X	X		X	X	X	X	X
Fan control by time or temperature								
Temperature alarm (too high/low, delay)								
Manual defrost								
Sensor adjust								
Selective fan relay or alarm relay	X		X	X	X	X		
Solid State Output for external alarm relay		X						
Supply voltage 12-24V AC/DC	X	X	X					
Supply voltage 230V AC				X	X	X		
Also available with 115VAC supply, Type TAR->				22300	24300	24309		
Panel-Housing 77 x 35 (3.03 x 1.38)	X	X	X					
Wall mounting IP 30					X			

Operating

Operating elements

Operating the **TAR** is very easy since all parameters can be shown and edited by means of only three keys.

Three seconds after applying voltage to the controller the actual temperature of the room sensor will be displayed.

All **TAR**-versions are labeled analogously.

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 P30 a certain value is to be set (---88---):

- Press key "P" parameter number appears
- Use "↑/↓" select code parameter (P30)
- 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 one minute, the access code is cancelled and the editing function is locked automatically.

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.

Parameter listing

Default values and settings are factory settings. Values marked 'X' are for information only and can not be edited.

Note:
It is possible to reset all parameters to 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.



Parameter	Disp only	no Code	Description	Range	Default value
P01	X		Actual Temperature Control Sensor (°C / °F)		
P02	X		Actual Temp. Evaporator Sensor (°C / °F)		
P03		X	Control Setpoint	Upper P05...lower limit P06, steps 1K/1F	°0 C
P04			Control differential (hysteresis)	0...10K / 0...17 F, steps 1K/1F	2K
P05			Setpoint high limit	-50°C...50°C / -57°F...121°F	50°C
P06			Setpoint low limit	-50°C / -57°F...upper limit	-50°C
P07			Switching Mode Relay K1	1= Refrigeration, 2= Freezing, 3= Heating	1 (Refrig.)
P08			Display Mode	1= °Celsius 2= °Fahrenheit	1 (°Celsius)
P09			Correction Control Sensor	-10K...10K / -17F...17F	0K
P10			Correction Evaporator Sensor (Defrost term.)	-10K...10K / -17F...17F	0K
P11			Defrost Termination Temperature	0...30°C / 32...85°F	10°C
P12			Defrost Method	1=, 2=, 3=, 4=, depends on (P07) setting, see text	
P13			Defrost cycle / compressor runtime	1...99 hours	24 hours
P14			Defrost (safety) Time, defrost duration	1...99 minutes	30 minutes
P15			Defrost delay after power-on	0...99 minutes	30 minutes
P16			Cooling delay (relay K1, after defrost)	0...99 minutes	0 minutes
P17			Fan Stop/Go Temperature	-50°C...50°C	50°C
P18			Fan Mode	1=, 2=, 3=, see text	1
P19			Fan delay (after defrost)	0...30 minutes	3 minutes
P20			Alarm high limit	-50°C...50°C / -57°F...121°F	50°C
P21			Alarm low limit	-50°C / -57°F...high limit	-50°C
P22			Alarm Delay	1...99 minutes	10 minutes
P23			Alarm / Fan Mode	0= no alarm relay, K3 is fan relay 1= no fan control, K3 warns de-energized 2= no fan control, K3 warns energized see text for differences of TAR 1300 S(K)002	0
P24	X		minutes until next defrost event		
P25	X		minutes until actual defrost is terminated		
P26	X		minutes until cooling restarts		
P27	X		minutes until fan restarts		
P28	X		minutes until alarm is activated		
P29		X	Manual Defrost	"key up"= Start Defrost "key down"= Terminate Defrost	
P30		X	Acces Code (key unlock)	0...99	0

*) "Aus" means 'OFF'

Functional descriptions

Display

All temperature values can be displayed in °C or °F. Parameter **P08** allows toggling between these two display modes.

The actual display of both inputs has a resolution of 0,1K (units TAR xxx9 only) in the range between -19.9...+50.0°C (resp. -19.9...+99.9°F).

Temperature Control

The control setpoint can be predefined in 1K (1°F) steps with (**P03**). The controller compares the actual temperature with this setpoint and energizes or de-energizes relay K1. In order to be fail-safe in case of any internal power failure, there is a possibility of selecting the correct switching mode. In refrigeration mode the N/O 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 is adjustable to prevent the system from short cycling (parameter **P04**).

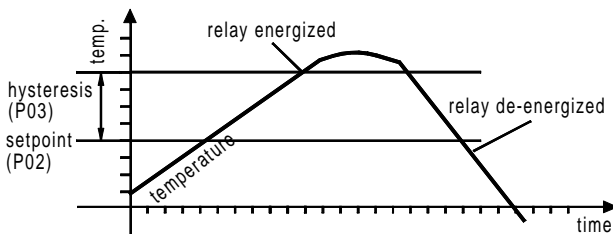
Setpoint range

With **P05/P06** you can limit the setpoint range.

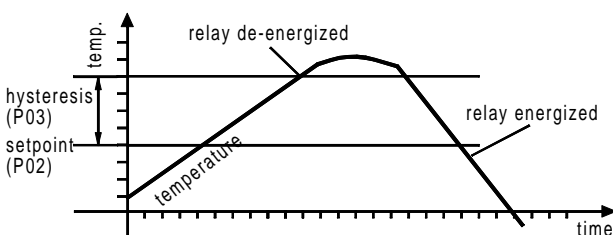
Switching mode

The switching mode (explained before) is set with parameter **P07**.

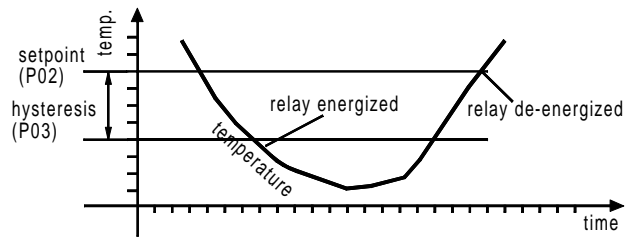
1= Refrigeration



2= Freezing. The compressor resp. the valve is controlled by the N/C contact of K1.



3= Heating



Temperature Warning

A relay output (K3) is available for remote warning purposes if it is not used for fan control.

The version TAR 1300 S(K)002 has no alarm relay but a Solid State Output (max. 100mA sink-current) to control an external alarm relay. K3 is always for fan control.

A built-in buzzer and the alarm relay (resp. solid state output) are activated if the room temperature exceeds the range set with parameters **P20/P21** and the delay time set with parameter **P22** is over. Buzzer alarm and relay can be cancelled by pressing any key. If the temperature remains out of range, buzzer and relay will come ON again after the set delay time as long and as often as the temperature stays in the warning area. Parameter **P28** indicates the time until the next warning occurs.

With parameter **P23** you set the alarm mode:

- 0= Buzzer only,
relay K3 is used for fan control
- 1= Buzzer + Relay K3; the relay operates fail-safe (de-energized on alarm)
- 2= Buzzer + Relay K3; the relay operates active (energized on alarm)

In version TAR 1300 S(K)002 the meaning of **P23** is a little bit different:

- 1= Solid-State (alarm) Output is high, a connected relay would be de-energized
- 2= Solid-State Output is switched to ground, a connected relay would be energized.

Defrosting

One relay output contact (K2) is used to control a defrosting device. Defrosting can be initiated by either: cyclic timing, compressor runtime or manually. The defrost device is always driven from the n/o contact of relay K2. There is no need for interlocking the defrost with the cooling function since with parameter **P12** you select the defrosting mode and the controller automatically decides on the cooling output.

For information there are two timers accessible, parameter **P24** showing the remaining time to the next defrost event and parameter **P25** showing the remaining time of the momentary defrost cycle until termination by time.

Defrost Modes

If **P07** (Switching Mode Relay K1) is preset to "refrigeration" (value=1) then **P12** means:

- 1= *Heater or Free Air Defrost by timer interval*
Relay K2 is energized and K1 is de-energized in cyclic intervals set with parameter **P13**.
- 2= *Hot Gas Defrost by compressor runtime*
Relays K2 and K1 are energized when compressor runtime is equal to time set with parameter **P13**.
- 3= *Heater or Free Air Defr. by compr. runtime*
Relay K2 is energized and K1 de-energized when compressor runtime is equal to time set with **P13**.
- 4= *Hot Gas Defrost by time interval*
Relays K2 and K1 are energized in cyclic intervals set with parameter **P13**.

If **P07** (Switching Mode Relay K1) is preset to "freezing" (value=2) then **P12** means:

- 1= *Hot Gas Defrost by timer interval*
Relay K2 is energized and K1 is de-energized in cyclic intervals set with parameter **P13**.
- 2= *Heater or Free Air Defrost by compr. runtime*
Relays K2 and K1 are energized when compressor runtime is equal to time set with parameter **P13**.

3= *Hot Gas Defrost by compressor runtime*
Relay K2 is energized and K1 de-energized when compressor running time is equal to time set with **P13**.

4= *Heater or Free Air Defrost by time interval*
Relays K2 and K1 are energized in cyclic intervals set with parameter **P13**.

Manual Defrost

Parameter **P29** allows you to start a defrost cycle with the "↑" key, unless the sensor is already above termination temperature.

Defrost Termination

There are three ways for terminating a defrost cycle:

- A:** thermal termination.
Whenever the evaporator sensor temperature (P02) exceeds the temperature limit set with parameter **P11**, defrosting is terminated.
- B:** termination by (safety) time.
The time set with parameter **P14** is the maximum time a defrost cycle can last before it is terminated automatically.
- C:** manual terminating.
With parameter **P29** you can terminate a defrost cycle by pressing the "↓" key.

After the defrost event is terminated, the beginning of the cooling function is delayed (**P16**).

This prevents freezing water drops on the evaporators surface.

At the same time the fan delay timer starts (**P19**).

Evaporator Fan Control



Attention: The K3 relay can be used to control the fan, if it is not used for alarm purposes (see **P23**).

Different modes of fan operation can be selected with parameter **P18**. The fan delay is always available; if no delay is desired, the setpoint can be set to 0 minutes.

Fan Modes (P18)

- 1 = Fan runs if compressor output (K1) is on. After defrosting the fan output is OFF until the programmed Fan Delay Time (**P19**) is complete.
- 2 = Fan runs continuously, except during defrost and Fan Delay Time (**P19**).
- 3 = Fan runs if the compressor output (K1) is on, and during defrost. The fan delay must be set to "0".

A thermostatic fan control is always available. Fan runs when:

- sensor temperature (P02) is 3K below setpoint for the programmed Fan Start/Stop Temperature (**P17**).

Fan stops if:

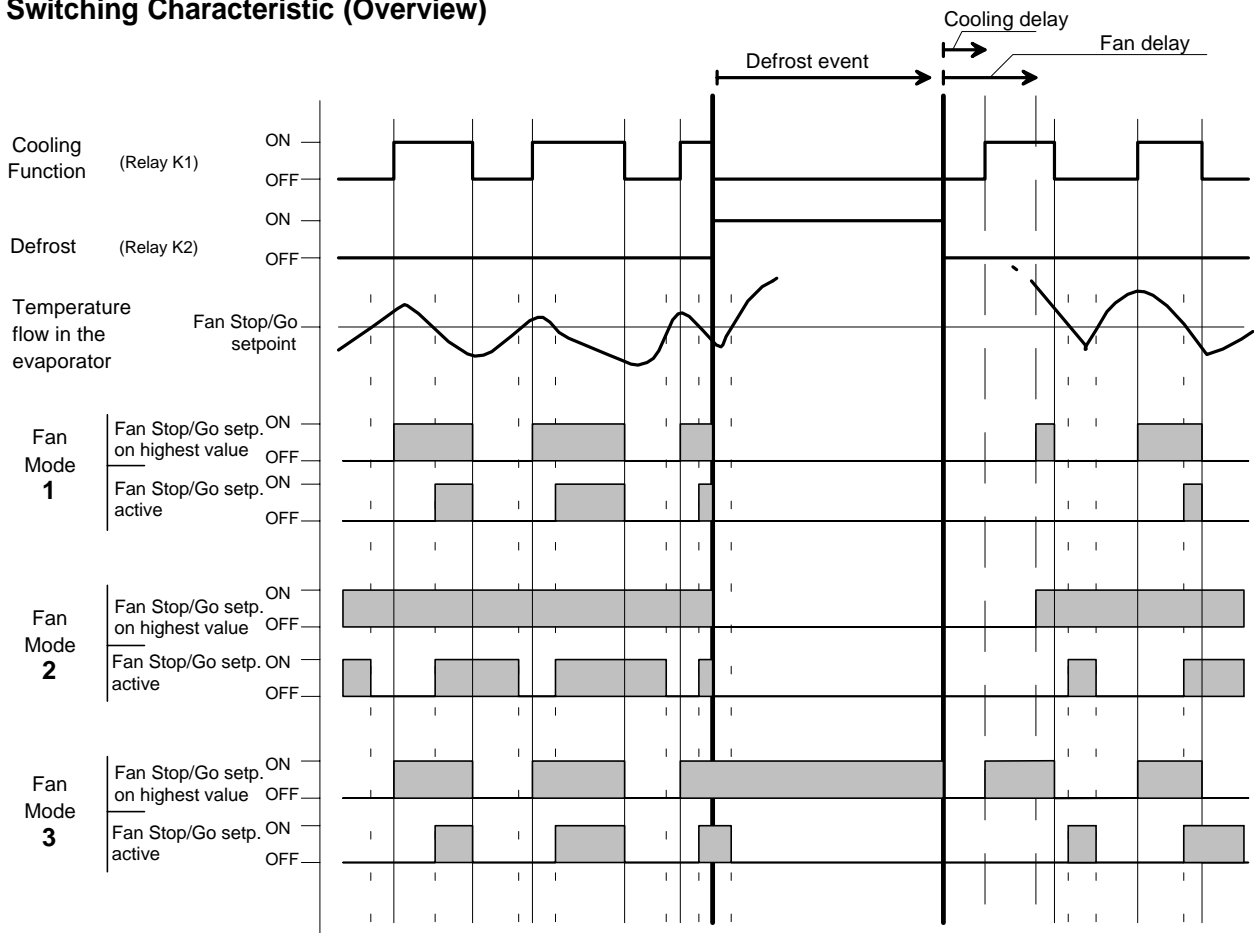
- sensor temperature (P02) is higher than Fan Start/Stop Temperature (**P17**).
- cooling is OFF (Fan Modes = 1 or 3)

During a defrost event and the cooling delay the fan stays locked. If you don't need a thermostatic fan control, set parameter **P17** to the highest value.

The fan is always run from the n/o contact of relay K3.

When fan delay is active, parameter **P27** shows the remaining time.

Switching Characteristic (Overview)



Installation / Run-Up



Before applying voltage to the controller make sure that all wiring has been made in accordance with the wiring diagram in this manual and fits the application.

Sensor leads may be up to some hundred meters, but should be shielded cable with one end of the shield connected to ground. This avoids irregular switching caused by electro-magnetic interference. Mounting the controller close to power relays is unfavourable. Please note that the temperature sensors are not pressure protected and not water-proof.

Applications with Free-Air Defrost

If this defrost method is used, there is no need for having a defrost sensor at the evaporator. In this case the sensor must be simulated by a fixed resistor (1.3 kOhms).

The controller then terminates a defrost cycle only by time which is set with parameter **P14**.

Getting Started

Upon applying voltage to the controller the display reads the temperature of the control (room) sensor. After you have entered the access code (see chapter "unlock keys") you program the configuration of the controller to suit your application:

- switching mode of relay K1: parameter P07,
- display mode: P08,
- defrost method: P12
- evaporator fan mode: P18,
or alarm mode: P23

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

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 parameter **P09/P10**.

Failure Mode

In case of sensor failure (short circuit or interrupt) the display starts flashing and all relays will be de-energized immediately.

If the control sensor fails, the internal buzzer is activated after the set alarm delay time (P22) is run down.

Technical Data

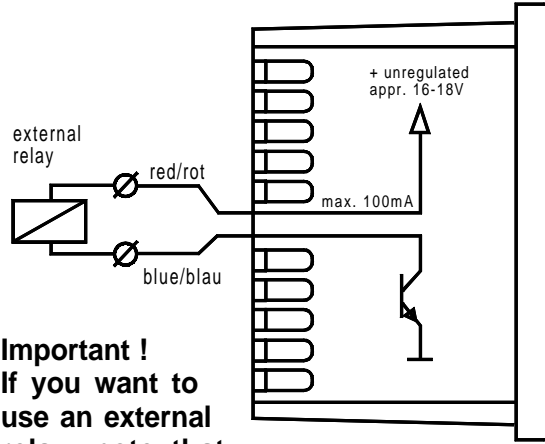
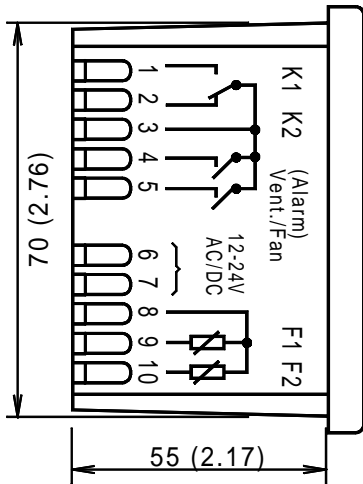
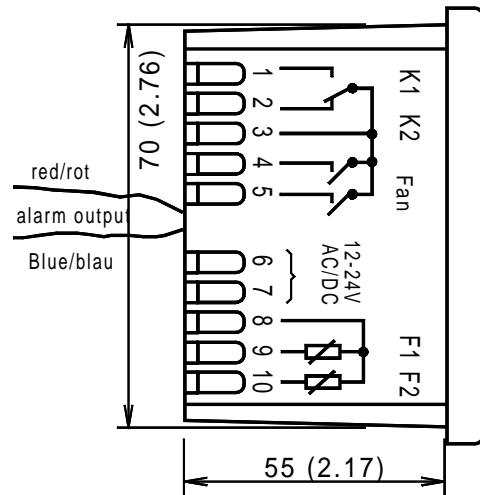
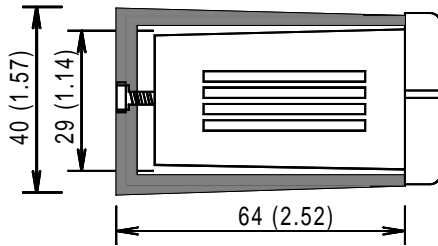
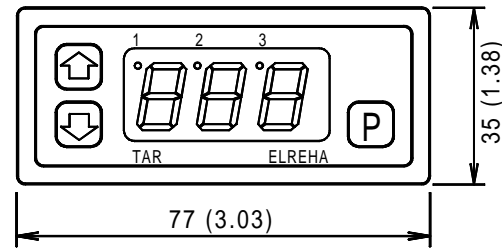
Supply voltage	see type overview on page 1
Power consumption	appr. 2,5 VA
230V/115V-types	appr. 3.5VA
Contact rating	8A cos phi = 1 3A ind. / 250V



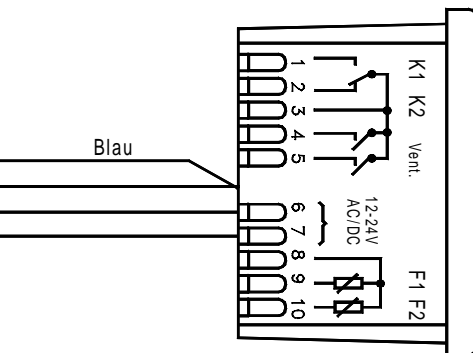
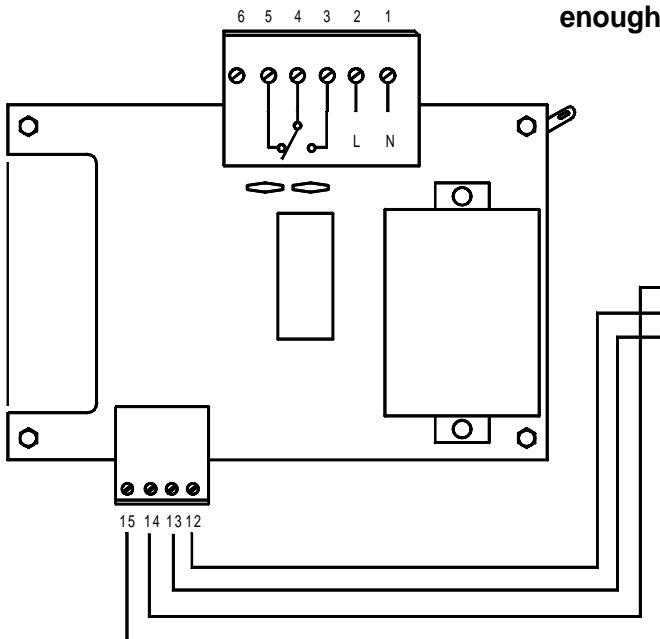
Because the relays have a common terminal, the total current over this terminal may not increase 12A !

Operating temperature	-10...+55°C (14..131°F)
Storage temperature	-30...+70°C (-22...158°F)
Data storage	unlimited (EEPROM)
Clock backup	typ. 10 days after mains is lost
Display	LED-7-segment, red, character height 13mm (.51) 19"-module : 10mm
Buzzer	3,5kHz, 84dB/30cm
Electrical connection	screw terminals 2,5mm (.1) 19"-module: "F"-connector
Protection	
TAR 1300/1309	IP 54 from front
TAR 2300/22300	IP 30
TAR 4300/4309	IP 54

Dimensions and Wiring TAR 1300, 1309, TAR 1300 K002



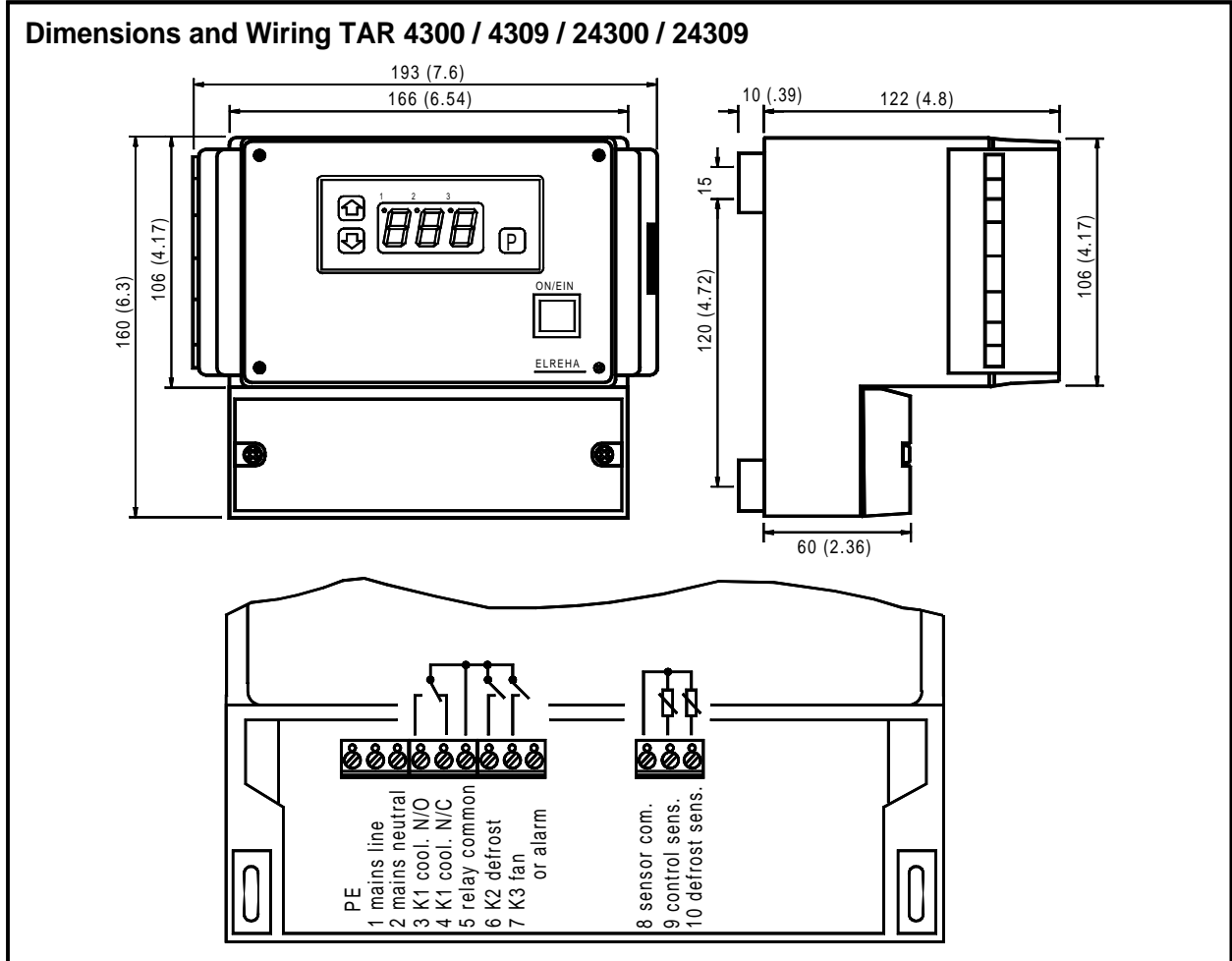
Important !
 If you want to use an external relay, note that our 2,7VA standard transformer is not powerful enough. Please select a more powerful type !



Wiring
 TAR 1300 S(K)002 --> RVM 113

- Accessories**
- Standard transf. 230/12V/ 2,7VA
 - 107-1300-0029 : flat plugs
 - 107-1300-0052 : screw terminals

- Fixing hanger, temperature sensor TFB 201
- RVM 113, module with transformer and alarm relay, especially for type TAR 1300 S(K)002



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 conformity 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, Teil 1 und 2; EN 50082, Teil 1 und 2**

This statement is made from the manufacturer / importer

by:

ELREHA Elektronische Regelungen GmbH
68766 Hockenheim

**Klaus Birkner, Development and
 and leader of the EMC-Laboratory**

(Name / Anschrift / name / adress)

Hockenheim

18.12.95

Ort/city

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 has been set up with care and to our best knowledge, but mistakes are still possible. If you have any problems, difficulties or questions please don't hesitate asking our technical support. 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 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: 26.8.97	checked: 26.8.97	approved: 26.8.97
by: tsd/jr	by: ek/sha	by: ek/sha