



**Cold Storage Controller  
with cyclic defrost**

# TAR 1370 TAR 1370 H

# ELREHA

ELEKTRONISCHE REGELUNGEN GMBH

Manual No.  
Software Version

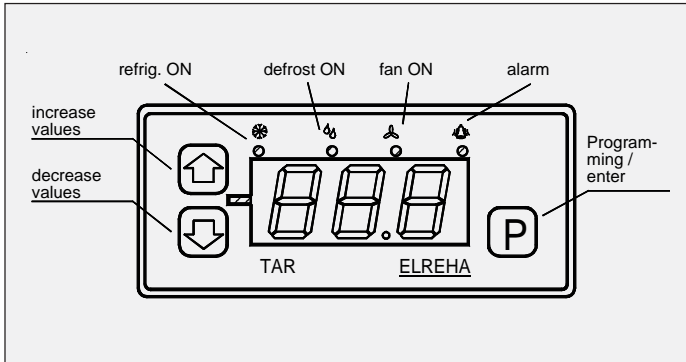
**5311009-05/04 E**  
011118

## Product Description

Cold Storage Controller with 4 relays for Solenoid Valve, Defrost heater, Fan and Alarm Forwarding. Usable for any kind of cold storages such as walk-in coolers/freezers, refrigerated shelves, refrigerated counters, etc..

**Start-up / Troubleshooting** information you will find on pages 4 + 5.

## Operating Elements



## 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.

- Press key "P" ..... parameter number appears
- Use "↑/↓" ..... select code parameter (P38)
- 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.

## Auto scrolling

Hold '↑/↓'-keys to scroll values automatically.

## Manual Defrost

Manual defrost can be initiated out of programming mode by depressing '↑' for more than 2 seconds - to terminate: press '↓' for more than 2 seconds.

## Reading the controller type

Hold key 'P' for more than 2 seconds, the display shows the type of the controller unit (137).

## 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.

## Reset internal Beeper (TAR 1370 H only)

The internal beeper can be reset by any keypress.

## Technical Data

- Supply Voltage ..... **12V AC/DC (11-18V DC)**
- Power Consumption ..... appr. 3 VA
- Contact Rating Cooling Relay ..... 10 A (peak 80 A / 10 msec)
- other relays ..... 8A cos phi = 1, 3A ind. / 250V
- The current over terminal 7 may not increase 12 A !**
- Operating temperature ..... -10...+55°C (14...131°F)
- Storage temperature ..... -30...+70°C (-22...158°F)
- Relative Humidity ..... max. 80% r.H., not condensing
- Display ..... LED, 7-segment, red, character height 13mm (.51)
- Resolution ..... 0,1°C / 0,2°F
- Accuracy ..... typ. +/- 1K
- Temperature sensors ..... TF 201, TF 202 or TF 501 (Pt1000)
- Control-/Display Range
  - with TF 201/202 ..... -55...+105°C / -67...221°F
  - with TF 501 ..... -110...+120°C / -166...248°F
- Data storage parameters ..... typ. unlimited
- Relay indicators ..... 3 mm, red
- Beeper (TAR 1370 H only) ..... 2x per second
- Electrical connection ..... screw terminals 2,5mm<sup>2</sup>
- Protection ..... IP 54 from front

## Accessories (please order separately)

- Temperature sensors ..... 2x TF 201 or TF 501
- Transformer ..... 107-1300-0052 (230V/ 12V / 5VA)



**Please Note Safety Instructions !  
Please note supply voltage when  
replacing older types !**

*Please read this manual carefully before using the product. 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, which is part of the product, has been set up with care and our best knowledge, but mistakes may occur. Technical details can be changed without notice, especially the software. Please note that the described functions are only valid for units containing the software version-number shown on page 1.*

**ELREHA Gmbh**

D-68766 Hockenheim, Germany, Schwetzingen Str. 103  
phone 0 62 05 / 2009-0 - fax 0 62 05 / 2009-39 - team@elreha.de

Param. No.	Code onl.	Description	Range	Default	Your value
P01		Actual temperature control sensor (°C or °F)	<i>display only</i>		
P02		Actual temperature evaporator sensor (°C or °F)	<i>display only</i>		
P03	no	Setpoint	Low limit P08...high limit P07	0 °C	
P07	88	Highest adjustable setpoint	± 100 °C (-148...212 °F)	+50 °C	
P08	88	Lowest adjustable setpoint	-100°C / -148°F up to (P07)	-50°C	
P09	88	Setpoint hysteresis	0,3...20,0 K	2 K	
P10	88	Switching mode cool. (compressor) relay	1= refrigeration, 2= heating	1 (refrig.)	
P11	88	Cooling relay idle time	0...59 minutes	2 minutes	
P12	88	Fan operation threshold	-100°C... +100°C (hyst. 3K fixed)	50°C	
P13	88	Fan operating mode	1=, 2=, 3=, see text	1	
P14	88	Fan delay after defrost	0...30 minutes	3 minutes	
P15		Remaining minutes till defrost ends	<i>display only</i>		
P16		Remaining minutes to activate cooling	<i>display only</i>		
P17		Remaining minutes to start fan relay	<i>display only</i>		
P18		Remaining minutes up to an alarm	<i>display only</i>		
P19	88	Calibration control sensor	+/-10,0 K/F	0 K	
P20	88	Calibration evap. sensor, resp. sensor OFF	+/-10,0 K/F, oFF	0 K	
P21	70	Sensor type / °C or °F / measuring 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= TF 202 / °C / -55...+105°C 6= TF 202 / °F / -67...221°F	2	
P22	88	Defrost termination temperature in °C or °F	0,0...30,0°C / 118,0°F	10°C	
P23	88	Defrost type	1= heater defrost by cyclic timer 2= hot gas defrost by cyclic timer 3= heater defr. by cooling runtime. 4= hot gas defrost by cooling runtm.	1	
P24	88	Defrost cycle	1...99 hours	4 hours	
P28	88	Defrost duration	0...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 (N / O) 1= Alarm relay active OFF (N / C) 2= no function 3= no function 4= Alarm relay resettable (see text)	1	
P31	88	Alarm delay	1...99 minutes (if sensor fails always < 1 minute + flashing display)	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	
P37	no	Manual defrost	"↑"= Start defrost event "↓"= Terminate defrost event		
P38	no	Access Code	0...99	0	

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

▲  
Default values are factory set values.

**Functional Description**

**Display & Sensors**

All temperature values can be displayed in °C or °F with a resolution of 0,1K (0,2°F). Parameter **P21** allows toggling between these two display modes and to change the type of sensor. TF201, TF 202 (PTC) as well as TF501 (Pt1000) sensors can be used, but note that this results in different temperature ranges. If not required, sensor 2 (Evap. Limit Sensor) can be disabled.

**Temperature Control**

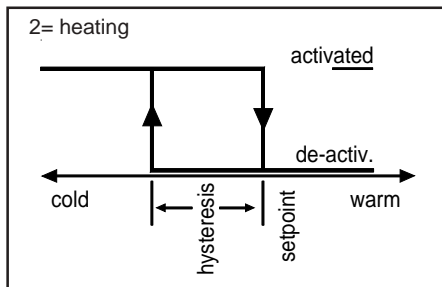
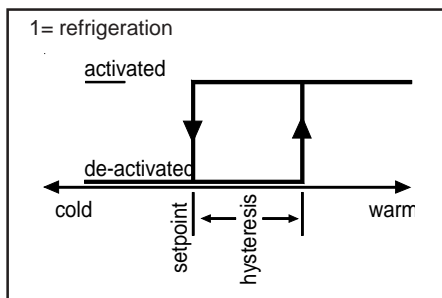
The controller compares the actual room temperature (**P01**) with the control setpoint (**P03**) and activates the cooling relay which is able to switch solenoid valves or compressors. The switching hysteresis (differential, **P09**) is adjustable to prevent the system from short cycling. An idle time (**P11**) prevents a compressor from switching ON again immediately.

**Setpoint range**

With **P07/P08** you can limit the setpoint range to prevent the end-user from entering a critical value.

**Switching mode of cooling relay**

The switching behavior of the cooling relay (= cooling mode) is defined by parameter **P10**.



**Temperature alarm**

An alarm relay is available for warning purposes. If the temperature measured by the control sensor exceeds the range set with parameters **P32/P33** a delay timer (**P31**) starts. After this timer is run down, the alarm relay will be activated. **P32** is located relative to setpoint **P03**, so **P32** will be shifted the same size the setpoint will be shifted.

If the alarm mode **P30** is set to '4', the alarm relay can be reset while the temperature is located within the alarm range.

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, the relay will be reset automatically.

**Alarm Beeper** (TAR 1370 H only)

This type owns an internal beeper, which will be activated together with the alarm output. It can be reset at any time by any keypress.

**Alarm relay operation modes**

With parameter **P30** you select the alarm relay mode:

- 0 = Alarm relay active ON
- 1 = Alarm relay active OFF
- 2/3= no function
- 4 = Alarm relay can be reset while temperature is located within the alarm range. Can be used to drive an external klaxon.

**Defrost**

One relay output is able to control a defrost device. There is no need for external interlocking the defrost output with the cooling output since the temperature controller is disabled while defrost.

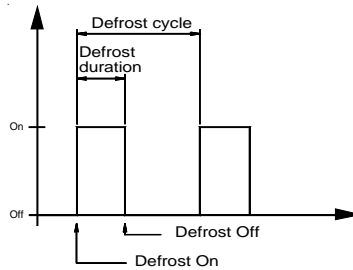
**Defrost Initiation**

- by a cyclic timer (**P23** = 1 or 2)
- by cooling runtime (**P23** = 3 or 4)
- manually (**P37**).

**Cyclic Timer**

Parameter **P24** defines the time till next defrost event, **P23** defines the defrost duration.

**P15** shows the remaining time of the running defrost cycle until termination by time.



The cyclic timer starts with power-up of the unit, the first defrost event can start after the first cycle time has been run down.

**Cooling Runtime**

If the added runtimes of the cooling relay exceed the value set by **P24**, a defrost event will be started.

**Defrost Modes**

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

- 1 = *Heater or Airflow Defrost by cyclic timer*  
Starting of defrost event switches ON defrost relay (i.e heater ON) and switches OFF the cooling.
- 2 = *Hot Gas Defrost by cyclic timer*  
Starting of defrost event switches ON defrost relay (i.e. bypass-valve open) and switches ON cooling relay (i.e. solenoid valve open).
- 3 = *Heater or Airflow Defrost by cooling runtime*  
Starting a defrost event switches ON defrost relay (i.e heater ON) and switches OFF the cooling.
- 4 = *Hot Gas Defrost by cooling runtime*  
Starting of defrost event switches ON defrost relay (i.e. bypass-valve open) and switches ON cooling relay (i.e. solenoid valve open).

**Manual Defrost**

- Parameter **P37** allows starting a defrost cycle with the "↑" key, unless the sensor is already above termination temp. or
- While the actual temperature can be read on display, a defrost event can be initiated by holding the "↑" key for more than 2 sec.

**Defrost Termination**

- **Thermal termination.**  
Whenever the evaporator sensor temperature (**P02**) is warmer than the temperature limit set with parameter **P22**, defrosting will be terminated.
- **Termination by time.**  
The time set with parameter **P28** is the maximum time a defrost cycle can last before it is terminated automatically.
- **Manual termination.**  
With parameter **P37** you can terminate a defrost cycle by pressing "↓" key.  
or  
While the actual temperature (**P01**) can be read on the display, a defrost event can be terminated by holding "↓" key for more than 2 seconds.
- If the defrost limit sensor is interrupted, the defrost event will be stopped immediately.

After the defrost event is terminated, the begin of the cooling function is delayed by (**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**.

**Fan Modes**

- 1 = *Fan runs if compressor output is on.*  
After defrosting the fan output is OFF until the programmed Fan Delay Time (**P14**) is complete.
- 2 = *Fan runs continuously, 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 is on, and during defrost.*  
The temporal fan delay must be set to "0".

**The end of a defrost cycle**

A temporal fan-ON delay is active after a defrost event (**P14**).

A thermostatic delay is always active, that means the fan starts only if the temperature measured with the evaporator (limit-) sensor is 3K below the fan operation threshold (**P12**). If this function is not desired, **P12** can be set to its upper border to make it inefficient. While drain time (**P29**) the fan remains stopped. (**P17**) informs about the remaining time until the fan starts again.

**i Practical conditions**

The fan is always run from the N/O contact of the fan relay.

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.

**CONNECTION INFORMATION & SAFETY INSTRUCTIONS**


**Installation / Run-Up**

**Please read before Start-up**

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.

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
- The device doesn't work
- After a long-time storage under unfavorable conditions
- After inadequate shipping conditions

 **The product may only be used for the described application.**

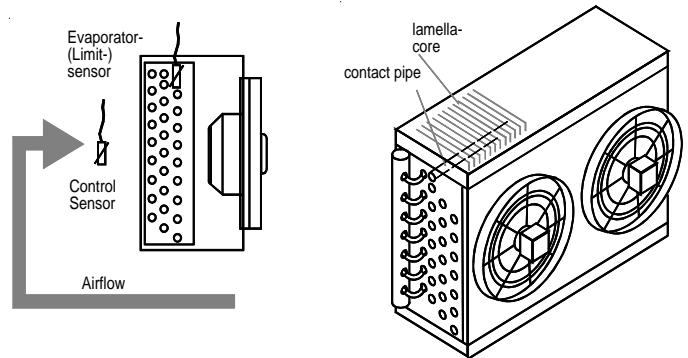
- **Electrical installation and putting into service must be done from authorized personnel.**
- Please note the local safety instructions !
- Before installation: Check the limits of the controller and your application. Before starting up we recommend you to read the manual for use, since only by doing so you can avoid damage or malfunction and you will benefit all the advantages offered by this product.

 **During installation and wiring never work when the electricity is not cut-off !**


- **Never operate unit without housing.**
- Mounting the controller close to power relays is unfavourable in case of the electro-magnetic interference.
- Before applying voltage to the controller: Make sure that all wiring has been made in accordance with the wiring diagram in this manual.
- Respect the environmental limits for temperature and humidity. Outside these limits malfunctions may occur.
- Observe the maximum admitted current rate for the relays (see technical data). Compare with the peak start-up current of the controlled devices (fan, compressor, etc.)
- Use shielded cable for sensor elongation only. Don't install them in parallel with high-current cables to prevent inductive interference. A wire gauge of min. 0,5mm<sup>2</sup> is sufficient.
- Connect shielding to PE at the end near the controller
- All used temperature sensors must be identical. Never use TF 201 and TF 501 mixed. This will not work.
- TF-type sensors are not designed for being immersed in water for a long period of time (not pressure-proof). In such a case, always use dip-fittings.

Sensor locations

Control Sensor: In the airflow, at the suction side of the evaporator.  
Limit Sensor: In the lamella core or the contact pipe of the evaporator, at the place ice remains the longest time.



Applications with Airflow-Defrost

 If this defrost method is used, there is no need for a defrost sensor in the evaporator, so 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.

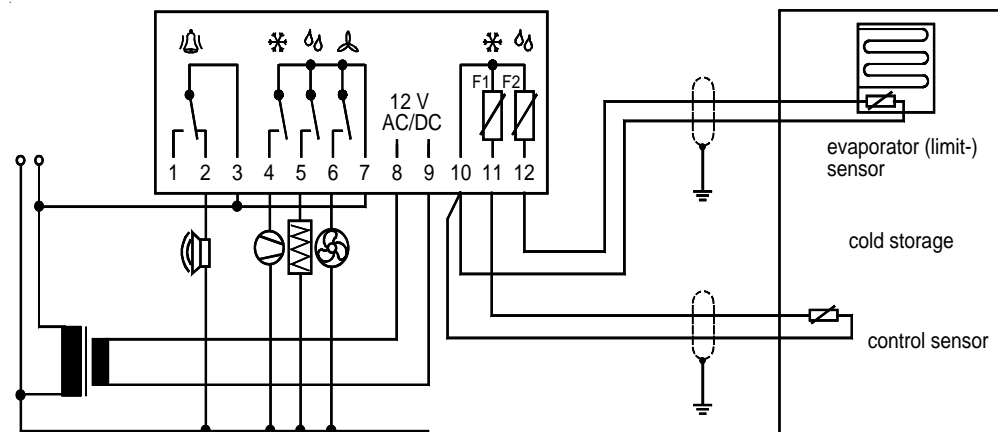
After power-up, the display shows the temperature of the control sensor. After entering the access code (see chapter "unlock keys") you have to set the basic configuration of the controller to suit your application:

- kind of temperature sensor and display value (°C/°F) (P21, Please note: special access code is '70').
- switching mode of cooling relay (parameter P10)
- defrost method (P23)
- evaporator fan mode (P13)
- alarm mode (P30)
- sensor correction if necessary by P19/P20.

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

**See troubleshooting help on next page**

**Application Example**



**Typical parameter values for a cold storage with heater defrost**

P03	-20
P07	-15
P08	-25
P09	2
P10	1
P11	2
P12	-2
P13	1
P14	3
P22	14
P23	1
P24	4
P28	30
P29	2
P30	1
P31	20
P32	7
P33	-35

**Troubleshooting**

**1. Which controller do you have ?**

Hold key 'P' for more than 2 seconds, display shows the type of the controller unit (137).

**2. Do you hold the correct manual ?**

3. With parameters P01 and P02 such as P15 till P18 (actual temperatures and running delays) you get a first survey about the unit's states.

problem	possible reason
<b>Temperature display:</b>	
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.
<b>Programming:</b>	
Setpoint cannot be adjusted	High and low limit of the setpoint range are identical
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 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.
<b>Temperature Control:</b>	
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 or output contact interchanged (cool. relay). <i>Note: If you change the switching mode, check the correct defrost mode !</i>
Temperature too high, indicator LED '1/Cooling' is ON, but cooling does not switch ON.	Wrong switching mode or output contact interchanged (cool. relay). <i>Note: If you change the switching mode, check the correct defrost mode !</i>
Temperature too high, but cooling does not switch ON.	Check, if a defrost event or the drain time is running.
Cooling works, but fan is OFF.	Check, if 'fan operation threshold' 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 event.	In this mode the fan delay must be set to '0'. If the evaporator sensor reaches the "fan operation threshold", the fan will be switched OFF during the defrost event. (appr. short defrost and fan relay with external wiring).
You have selected fan mode 2, but fan switches ON and OFF during the cooling phases.	Adjust "fan operation threshold" 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 operation threshold".
<b>Defrost:</b>	
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 phases
During a defrost event cooling starts.	Defrost mode is set to 'hot gas'. Please set correctly. <i>Note: If you change the switching mode, check or select the correct defrost mode !</i>
<b>Alarm:</b>	
Constant alarm without a real failure.	Check wiring and alarm mode. Can be set to active or passive. (active: relay ON; passive: relay OFF).

**Failure Handling**

If the display flashes with 'minus'-LED: = sensor short circuit.  
without 'minus'-LED: = sensor interrupted

Another possibility is that the sensor is the wrong type or out of its specified range. The alarm relay will be activated after 1 minute, like preset with **P30**.

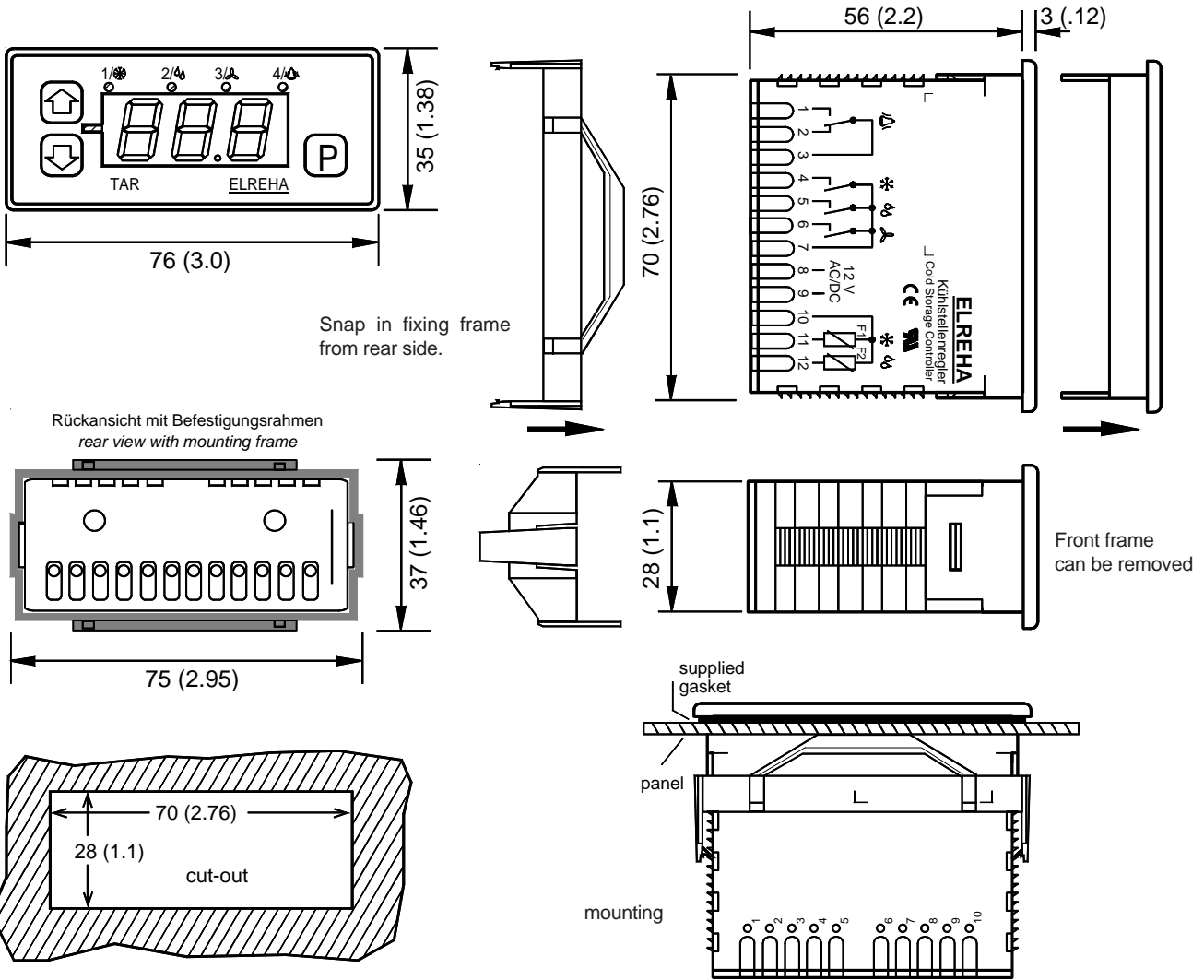


Control sensor disturbance

If the control sensor fails, all control functions will be disabled by de-activating the relay outputs. Display shows "oFF" if you select parameters P02 or P20 and the Limit Sensor is disabled.



**Dimensions / Wiring**



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

**Hockenheim**  
 Ort/city

**23.3.2000**  
 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. 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 version-number shown on page 1 of this manual. Units with an other version number may work a little bit different.

set up 19.7.2006/tkd/jr

checked: 19.7.2006/ek/al

approved: 19.7.2006/mv/sha