

Temperature indicators and sensor switches

Temperature controllers „ST.....01/03/10/100“ with up to three switching outputs

PID controllers „ST...-... .02/32/102” with up to four switching outputs

Differential controllers „ST...-... .04” with up to four switching outputs

Two-channel controllers „ST 05/25“ with up to three switching outputs

Timer switches „ST..... 07“ with two switching outputs

Multi-stage controllers „ST..... 16/26“ with up to six switching outputs

Controllers for cooling applications „ST 11/12/13/14/15/34“,
cold room controllers

Other controllers

Modular systems ST501, ST605, TRB, TRS

Data logger

Sensors and accessories

Software descriptions, parameter lists

Interference suppression, LON-System description,

ST58-03.02



PRODUCT DESCRIPTION

The temperature indicator ST58-03.02 was developed for applications in the cooling field. Its 3 digit display permits the indication of temperatures between -50...150°C. The indicator simply works with 230V AC and has flat plugs for the connection of supply voltage and sensor. Any temperature derivations can be adjusted by help of the inserted potentiometer.

- Sensor:** PTC
- Range:** -50...150°C
- Front Size:** 62mm x 28mm
- Panel cut-out:** 58.2mm x 25.2mm

ST58-09.01



Connector: flat plug

PRODUCT DESCRIPTION

The sensor switch ST58-09.01 serves for the connection of up to 5 sensors with an indicator or with a controller. The gold-coated contacts prevent all kind of falsification of the measured values. The installed highly precise resistance permits control of the connected display.

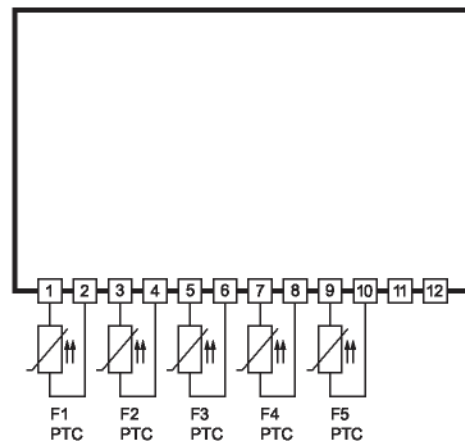
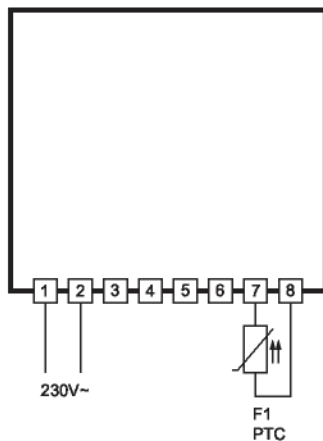
- Sensor:** PTC
- Front Size:** 62mm x 28mm
- Panel cut-out:** 58.2mm x 25.2mm
- Connector:** flat plug

SIMILAR PRODUCTS

Order No. 210351 with Pt100 Sensor

ORDER NUMBER 300368

ORDER NUMBER 211821



ST70-01.01



PRODUCT DESCRIPTION

The temperature indicator ST70-01.01 is used for the indication and control of a temperature value. Its 3 digit display permits the indication of temperatures between -50...105°C. The indicator works with 12-24V AC or DC and has screw terminals for the connection of supply voltage and sensor. Any temperature derivations can be adjusted by help of the inserted potentiometer.

- Sensor:** PTC
- Range:** -50...105°C
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminals

SIMILAR PRODUCTS

- Order No. 210534:** front tightness IP63
- Order No. 195990:** Pt100

ST70-02.01



PRODUCT DESCRIPTION

The temperature indicator ST70-02.01 is used for the indication and control of a temperature value. Its 4 digit display permits the indication of temperatures between -49.9...109.9°C. The indicator works with 12-24V AC or DC and has screw terminals for the connection of supply voltage and sensor. Any temperature derivations can be adjusted by help of the inserted potentiometer.

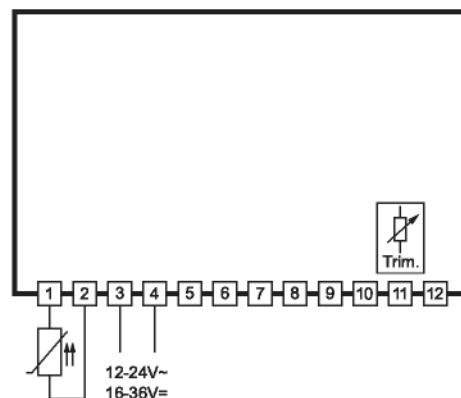
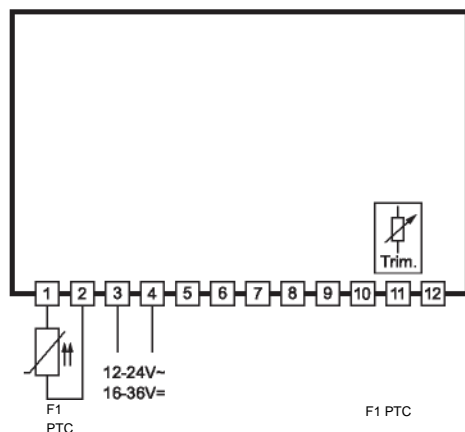
- Sensor:** PTC
- Range:** -49.9...109.9°C
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminals

SIMILAR PRODUCTS

- Order-No. 300079:** front tightness IP63
- Order-No. 202007:** Pt100

ORDER NUMBER 196006

ORDER NUMBER 202069



ST70-09.01



PRODUCT DESCRIPTION

The measuring point switch ST70-09.01 serves for the connection of up to 5 sensors with a display or with a controller.

The gold-coated contacts prevent all kind of falsification of the measured values. The installed highly precise resistance permits control of the connected display.

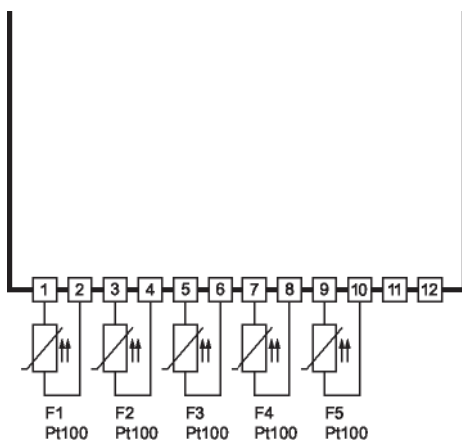
- Sensor:** Pt100
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminal

SIMILAR PRODUCTS

Order No. 199653: PTC sensor

ORDER NUMBER

199646



ST46-31.10



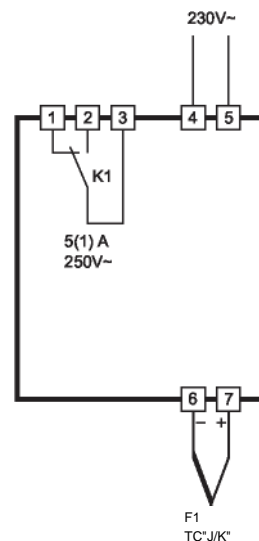
PRODUCT DESCRIPTION

The controller ST46-31.10 J/K is intended for the assembly on DIN rail, which allows easy installation in the switch gear cabinet. The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard. The controller is supplied with 230V AC and has an exit relay with an Ohm maximum electric load of 5A. Inductive loads can be connected with up to max. 1A permanent current.

- Sensor:** thermo element J/K
- Range:** type J -99...700°C
- Range:** type K -99...999°C
- Housing size(L x W x H):** 95 x 53 x 59mm
- Installation:** Clip-on mounting on DIN-Rail 35 x 7.5mm
- Connector:** screw terminal
- Software:** p. 102

ORDER NUMBER

200000



ST46-31.1 0



PRODUCT DESCRIPTION

The controller ST46-31.10 is intended for the assembly on DIN rail, which allows easy installation in the switch gear cabinet. The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard. The controller is supplied with 230V AC and has an exit relay with an Ohm maximum electric load of 5A. Inductive loads can be connected with up to max. 1A permanent current.

Sensor: Pt100

Range: -99...600°C

Housing size(L x W x H): 95 x 53 x 59mm **Installation:** clip-on mounting on DIN-Rail 35 x 7.5mm **Connector:** screw terminal

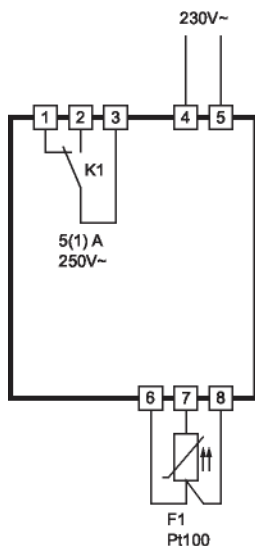
Software: p. 102

SIMILAR PRODUCTS

Order-No. 227017: Power supply 12-24V~/16-36V=

ORDER NUMBER

206334



ST46-31.1 0



PRODUCT DESCRIPTION

The controller ST46-31.10 is intended for the assembly on DIN rail, which allows easy installation in the switch gear cabinet. The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard. The controller is supplied with 230V AC and has an exit relay with an Ohm maximum electric load of 5A. Inductive loads can be connected with up to max. 1A permanent current.

Sensor: PTC

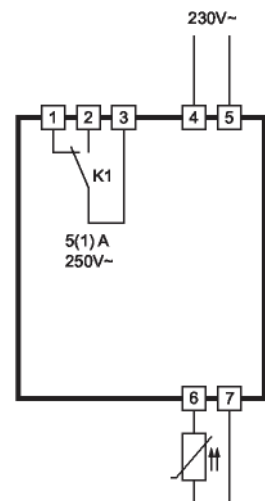
Range: -50...150°C

Housing size(L x W x H): 95 x 53 x 59mm **Installation:** Clip-on mounting on DIN-Rail 35 x 7.5mm **Connector:** screw terminal

Software: p. 102

ORDER NUMBER

206342



ST48-J BUA.100

ST48-JGUA.100



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PRODUCT DESCRIPTION

The controller ST48-JBUA.100 was developed for simple thermostatic controls. The setpoint, all parameters of the controller and the activation of the stand-by function are set on a four-field plastic foil keyboard. The controller can be supplied with a tension of 230V AC. The installed relay has a maximum electric Ohm load of 6A. Inductive loads can be switched up to 2.2A.

Sensor: universal sensor input

Range: dependent on the type of sensor

Front Size: 48mm x 48mm **Panel cut-out:** 45.2mm x 45.2mm

Tightness: front IP65

Connector: plug and socket

Software: p. 113

PRODUCT DESCRIPTION

SIMILAR PRODUCTS

Order No. 169763: Power supply 12-24V~/16-36V=

The thermostat controller ST48-JGUA.100 was specifically developed for direct high performances. The controller can be supplied with 230V AC and has as a switching exit, which guarantees maximum switching frequency even during high stress. The controller has 4 keys. Three of them are there to controller adjustments. The fourth key activates stand-by function.

Sensor: universal sensor input

Range: dependent on the type of sensor

Front Size: 48mm x 48mm

Panel cut-out: 45.2mm x 45.2mm

Tightness: front IP65 **Connector:** plug and socket

Software: p. 113

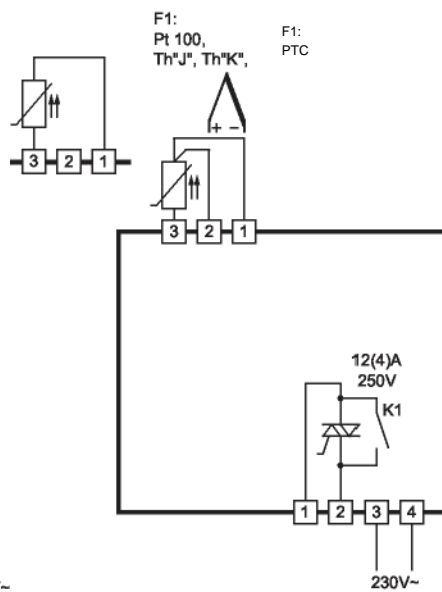
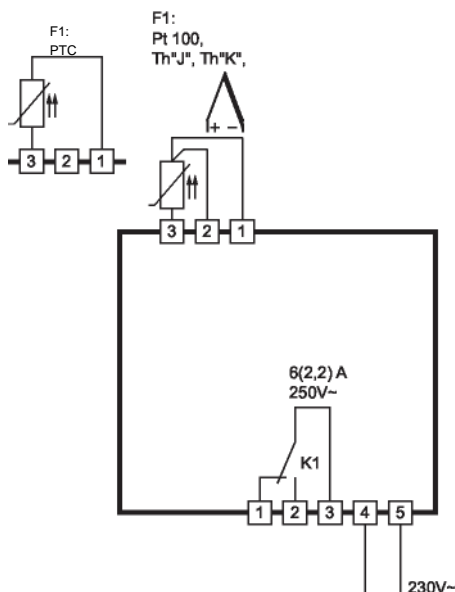
JGUA.100 switching at be supplied hybrid maximum stress. The are there to key activates

ORDER NUMBER

169789

ORDER NUMBER

170498



ST58-G B 1 TA.1 0**ST58-GB1TV.10****PRODUCT DESCRIPTION**

The controller ST58-GB1TA.10 was developed for simple thermostatic applications.

The unit disposes of a connection for resistance sensor PTC or Pt100. It is supplied with a voltage of 230V AC and has an exit relay with an Ohm maximum electric load of 16A. Inductive loads can be connected with up to max. 2.2A permanent current.

Sensor: Pt100, PTC

Range: dependent on the type of sensor

Front Size: 62mm x 28mm **Panel cut-out:**

58.2mm x 25.2mm **Tightness:** front IP50

Connector: screw terminal

Software: p. 102

PRODUCT DESCRIPTION

The controller ST58-GB1TV.10 was developed for simple thermostatic applications.

The unit disposes of a connection for resistance sensor PTC or Pt100. It is supplied with a voltage of 12-24V AC or 16-36V DC and has an exit relay with an Ohm maximum electric load of 16A. Inductive loads can be connected with up to max. 2.2A permanent current.

Sensor: Pt100, PTC

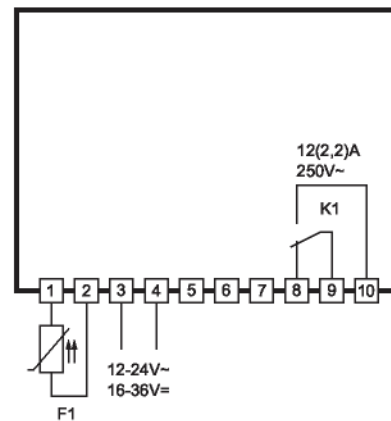
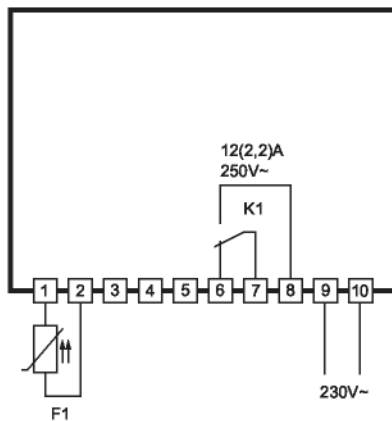
Range: dependent on the type of sensor

Front Size: 62mm x 28mm **Panel cut-out:**

58.2mm x 25.2mm **Tightness:** front IP50

Connector: screw terminal **Software:** p.

102

ORDER NUMBER**326413****ORDER NUMBER****15602**

ST64-31.1 0**PRODUCT DESCRIPTION**

The controller ST64-31.10 was developed for simple thermostatic controls.

The round housing allows applications at locations in which formerly only mechanical controls were in use. The timer is supplied with a tension of 230V AC. The installed relay has a maximum electric Ohm load of 16A. Inductive loads can be switched up to 2.2A.

Sensor: Pt100-2 wire

Range: -60...400°C **Front Size:**

64mm round **Panel cut-out:**

60.5mm round **Tightness:** front

IP65 **Connector:** flat plug

6.3mm **Software:** p. 102

SIMILAR PRODUCTS

ST64-31.10**PRODUCT DESCRIPTION**

The controller ST64-31.10 was developed for simple thermostatic controls.

The round housing allows applications at locations in which formerly only mechanical controls were in use. The timer is supplied with a tension of 230V AC. The installed relay has a maximum electric Ohm load of 16A. Inductive loads can be switched up to 2.2A.

Sensor: PTC

Range: -50...140°C **Front Size:**

64mm round **Panel cut-out:**

60.5mm round **Tightness:** IP65

Connector: Flat plug 6.3mm

Software: p. 102

386169

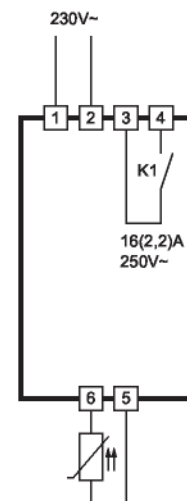
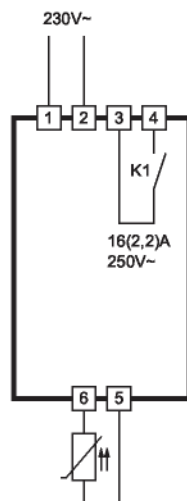
Order-No. 92387: K1 + buzzer
Order-No. 294371: 12-24V~/16-36V=
Order-No. 222026: 12-24V~/16-36V= + buzzer

SIMILAR PRODUCTS

Order No. 316166: K1 + buzzer
Order No. 219345: 12-24V~/16-36V=

ORDER NUMBER **87064**

ORDER NUMBER



ST70-31.1 0



PRODUCT DESCRIPTION

The humidity controller ST70-31.10 was developed for easy humidity regulations. The setpoint and parameters are adjusted with a 3-field plastic foil keyboard. The controller can be supplied with a tension of 12-24V~/16-36V=. The installed relay has a maximum electric Ohm load of 7A. Inductive loads can be switched up to 2.2A.

- Input:** 4...20mA
- Range:** with parameter A10+A11
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminal
- Software:** p. 102

PRODUCT DESCRIPTION

SIMILAR PRODUCTS

Order No. 201207: foil „°C“

ST70-31.1 0



The controller ST70-31.10 was developed for simple thermostatic controls. The setpoint and parameters are adjusted with a 3-field plastic foil keyboard. The controller can be supplied with a tension of 12-24V~/16-36V=. The installed relay has a maximum electric Ohm load of 7A. Inductive loads can be switched up to 2.2A.

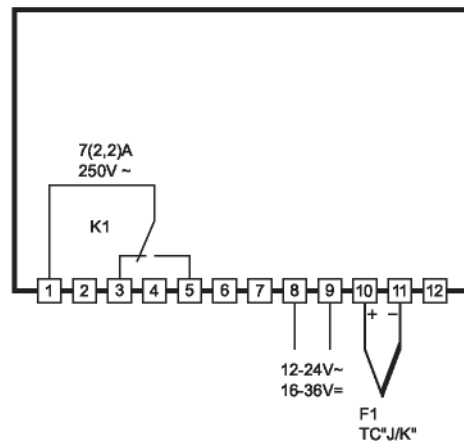
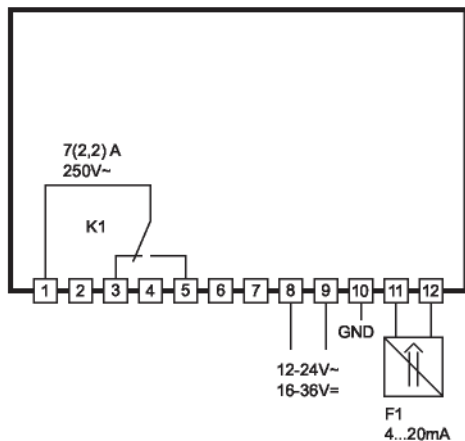
- Sensor:** Thermo couple
- Range:** type J -99...700°C
- Range:** type K -99...999°C
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminal
- Software:** p. 102

SIMILAR PRODUCTS

Order-No. 211979: front tightness IP63

ORDER NUMBER **209387**

ORDER NUMBER **201681**



ST70-31.1 0



PRODUCT DESCRIPTION

The controller ST70-31.10 was developed for simple thermostatic controls. The setpoint and parameters are adjusted with a 3-field plastic foil keyboard. The controller can be supplied with a tension of 12-24V~/16-36V=. The installed relay has a maximum electric Ohm load of 7A. Inductive loads can be switched up to 2.2A.

- Sensor:** Pt100
- Range:** -99...600°C
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminal
- Software:** p. 102

PRODUCT DESCRIPTION

SIMILAR PRODUCTS

- Order-No. 208579:** front tightness IP63
- Order-No. 204735:** K1 output for SSR
- Order-No. 204719:** cooling controller

ORDER NUMBER

201673

ST70-31.1 0



The controller ST70-31.10 was developed for simple thermostatic controls. The setpoint and parameters are adjusted with a 3-field plastic foil keyboard. The controller can be supplied with a tension of 12-24V~/16-36V=. The installed relay has a maximum electric Ohm load of 7A. Inductive loads can be switched up to 2.2A.

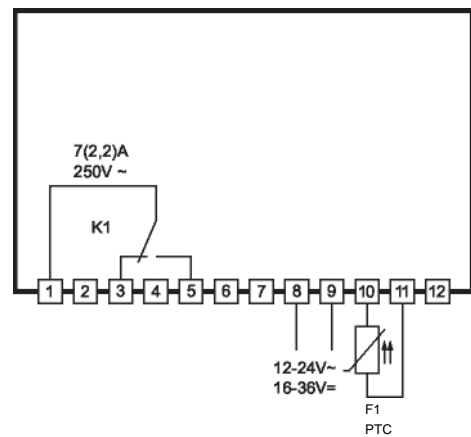
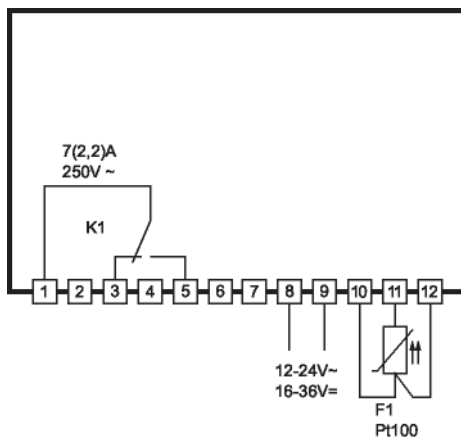
- Sensor:** PTC
- Range:** -50...150°C
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminal
- Software:** p. 102

SIMILAR PRODUCTS

- Order-No. 206490:** front tightness IP63
- Order-No. 210633:** S1 for SSR

ORDER NUMBER

201665



ST501-JA 1 TA.1 0**ST502-JA1TA.10****PRODUCT DESCRIPTION**

Due to the complete equipment of the installation controller ST501-JA1TA.10, it can do without any further components in many cases, e.g. cut-out relay or main switch. The controller is supplied with 230V AC and has an exit relay with an Ohm maximum electric load of 12A. Inductive loads (e.g. engines) can be connected with up to max. 6A permanent current.

Sensor: PTC, Pt100

Range: dependent on type of sensor

Front Size: 106mm x 68mm **Panel cut-**

out: 87.5mm x 56.5mm **Tightness:**

front IP65

Connector: screw terminal

Software: p. 102

PRODUCT DESCRIPTION

Due to the complete equipment of the installation controller ST502-JA1TA.10, it can do without any further components in many cases, e.g. cut-out relay or main switch. The controller is supplied with 230V AC and has an exit relay with an Ohm maximum electric load of 12A. Inductive loads (e.g. engines) can be connected with up to max. 6A permanent current.

Sensor: PTC, Pt100

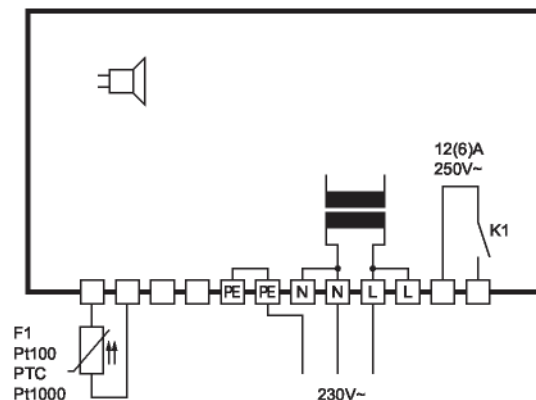
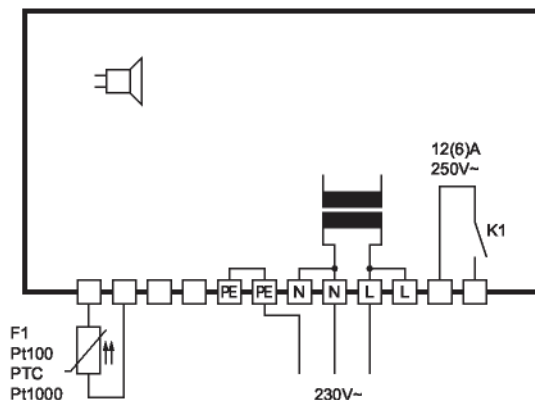
Range: dependent on type of sensor

Front Size: 87mm x 66mm

Installation Size: 106mm x 80mm

Tightness: front IP65 **Connector:**

screw terminal **Software:** p. 102

ORDER NUMBER**124289****ORDER NUMBER****245316**

ST503-JA1 TA.1 0



PRODUCT DESCRIPTION

Due to the complete equipment of the installation controller ST503-JA1 TA.10, it can do without any further components in many cases, e.g. cut-out relay or main switch. The controller is supplied with 230V AC and has an exit relay with an Ohm maximum electric load of 12A. Inductive loads (e.g. engines) can be connected with up to max. 6A permanent current.

Sensor: PTC, Pt100

Range: dependent on the type of sensor

Front Size: 106mm x 68mm **Installation**

Depth: 41mm **Tightness:** IP64

Connector: screw terminal

Software: p. 102

PRODUCT DESCRIPTION

The controller ST710-JB1BA.10 was developed for simple thermostatic applications. Due to its complete equipment it can operate without any further components in many cases,

ST710-JB1BA.10



e.g. cut-out relay or main switch.

The controller is supplied with 230V AC an output relay with an Ohm maximum load of 12A. The controller has 4 keys. Three of them are there to controller adjustments. fourth key activates stand-by function.

Sensor: Pt100

Range: -80...400°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65 **Connector:** screw terminal **Software:** p. 102

SIMILAR PRODUCTS Order-No. 350199:

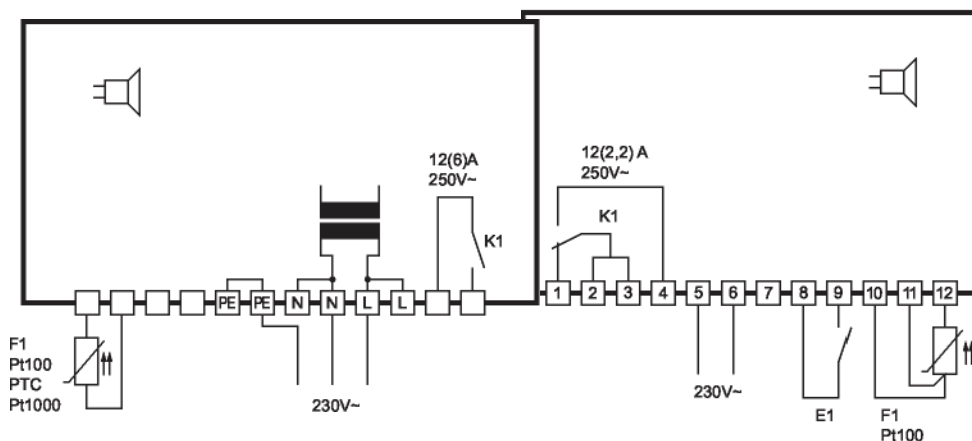
plug and socket **Order-No. 115733:** neutral foil

ORDER NUMBER

124271

ORDER NUMBER

191908



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ST71 0-J B 1 BV.1 0**PRODUCT DESCRIPTION**

The controller ST710-JB1 BV.10 was developed for simple thermostatic applications. Due to its complete equipment it can operate without any further components in many cases, e.g. cut-out relay or main switch.

The controller is supplied with 12-24V AC or 16-36V DC and has an output relay with an Ohm maximum electric load of 12A. The controller has 4 keys. Three of them are there to controller adjustments. The fourth key activates stand-by function.

PRODUCT DESCRIPTION

Sensor: Pt100

Range: -80...400°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65

Connector: screw terminal

Software: p. 102

SIMILAR PRODUCTS

Order-No. 126367: plug and socket

ST710-JB1JA.10

The controller ST710-JB1JA.10 was developed for simple thermostatic applications. Due to its complete equipment it can operate without any further components in many cases, e.g. cut-out relay or main switch.

The controller is supplied with 230V AC and has an output relay with an Ohm maximum electric load of 12A. The controller has 4 keys. Three of them are there to controller adjustments. The fourth key activates stand-by function.

Sensor: PTC

Range: -50...140°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65

Connector: screw terminal

Software: p. 102

SIMILAR PRODUCTS

Order-No. 289157: Pt100

Order-No. 157065: plug and socket

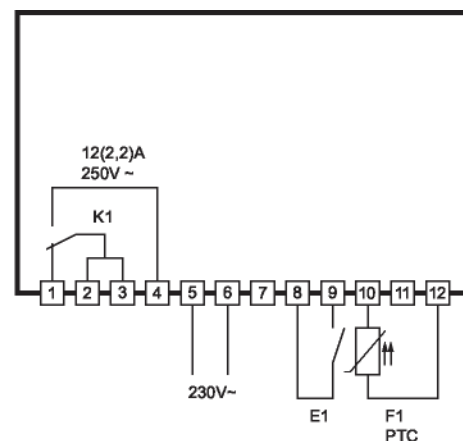
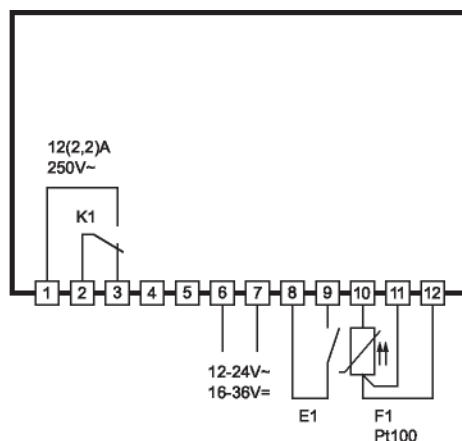
Order-No. 357293: ST71 housing

ORDER NUMBER

123729

ORDER NUMBER

147439



ST71 0-J B 1 JV .1 0

ST710-JXAA.10



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PRODUCT DESCRIPTION

The controller ST710-JB1JV.10 was developed for simple thermostatic applications. Due to its complete equipment it can operate without any further components in many cases, e.g. cut-out relay or main switch. The controller is supplied with 12-24V AC or 16-36V DC and has an output relay with an Ohm maximum electric load of 12A. The controller has 4 keys. Three of them are there to controller adjustments. The fourth key activates stand-by function.

controller has 4 keys. Three of them are there to controller adjustments. The fourth key activates stand-by function.

Sensor: Pt100-2 wire
Range: -60...400°C
Front Size: 84mm x 42mm
Panel cut-out: 67.5mm x 31.5mm
Tightness: front IP65 **Connector:** screw terminal **Software:** p. 102

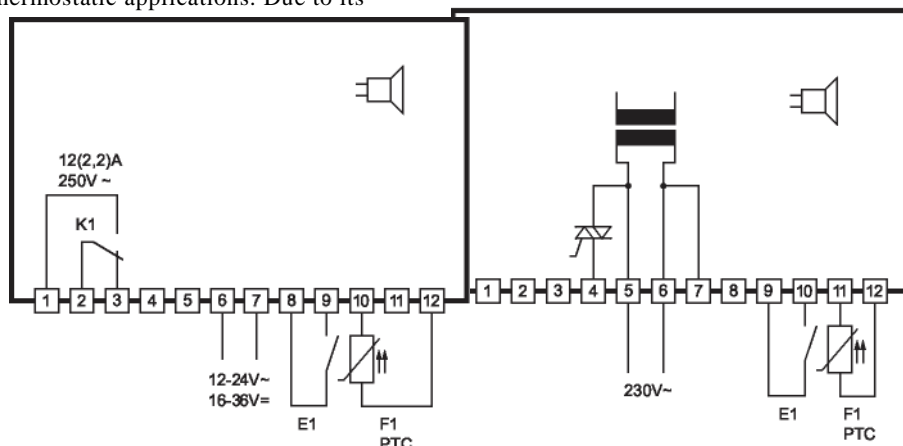
Sensor: PTC
ORDER NUMBER **Range:** -50...150°C **219048**
Front Size: 84mm x 42mm

ORDER NUMBER **256362**

Panel cut-out: 67.5mm x 31.5mm **Tightness:** front IP65 **Connector:** screw terminal **Software:** p. 102

PRODUCT DESCRIPTION

The controller ST710-JXAA.10 was developed for simple thermostatic applications. Due to its



complete equipment it can operate without any further components in many cases, e.g. cut-out relay or main switch. The controller is supplied with 230V AC. The

SIMILAR PRODUCTS

Order-No. 126383: plug and socket

ST71 0-JG 1 JA.1 0

ST710-JB1VA.10



PRODUCT DESCRIPTION

The controller ST710-JG1JA.10 was developed for simple thermostatic applications. Due to its complete equipment it can operate without any further components in many cases, e.g. cut-out relay or main switch. The controller is supplied with 230V AC and has a hybrid switch which guarantees maximum switching frequency even at high stress. The controller has 4 keys. Three of them are there to controller adjustments. The fourth key activates stand-by function.

PRODUCT DESCRIPTION

The controller ST710-JB1VA.10 was developed for simple humidity regulations. Due to its complete equipment it can operate without any further components in many cases, e.g. cut-out relay or main switch. The controller is supplied with 230V AC and has an output relay with an Ohm maximum electric load of 12A. The controller has 4 keys. Three of them are there to controller adjustments. The fourth key activates stand-by function.

Sensor: PTC
Range: -50...130°C
Front Size: 84mm x 42mm
Panel cut-out: 67.5mm x 31.5mm
Tightness: front IP65
Connector: screw terminal
Software: p. 102

Input: 4...20mA
Range: parameter A10+A11
Front Size: 84mm x 42mm
Panel cut-out: 67.5mm x 31.5mm
Tightness: front IP65
Connector: screw terminal
Software: p. 102

SIMILAR PRODUCTS

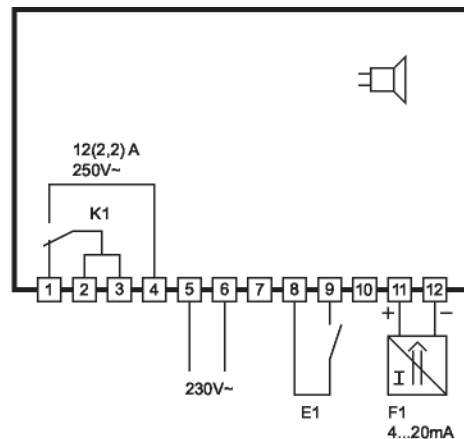
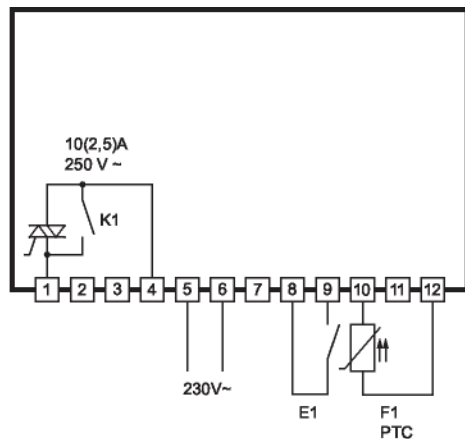
Order-No. 296822: plug and socket
Order-No. 301085: plug and socket, Pt100

SIMILAR PRODUCTS

Order-No. 283150: foil „°C“

ORDER NUMBER 308320

ORDER NUMBER 165654



ST72-31.1 0



PRODUCT DESCRIPTION

The controller ST72-31.10 was developed for simple humidity regulations. The desired value and all parameters of the controller are set on a three-field plastic foil keyboard. The unit is supplied with 230V AC. The installed relay has a maximum electric Ohm load of 5A. Inductive loads can be switched up to 1 A.

Input: 4...20mA

Range: with parameter A10 + A11

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket

Software: p. 102

ST72-31.1 0



PRODUCT DESCRIPTION

The controller ST72-31.10 was developed for simple thermostatic applications. The desired value and all parameters of the controller are set on a three-field plastic foil keyboard. The unit is supplied with 230V AC. The installed relay has a maximum electric Ohm load of 5A. Inductive loads can be switched up to 1 A.

Sensor Input: Thermo element J/K

Range: type J -99...700°C **Range:** type K -99...999°C

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket

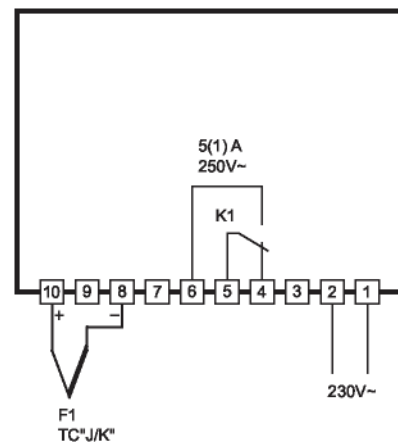
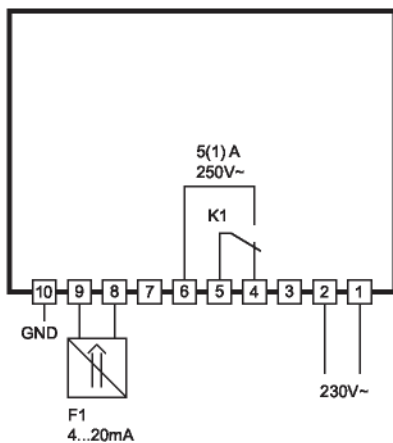
Software: p. 102

ORDER NUMBER

210559

ORDER NUMBER

202036



ST72-31.1 0**PRODUCT DESCRIPTION**

The controller ST72-31.10 was developed for simple thermostatic applications. The desired value and all parameters of the controller are set on a three-field plastic foil keyboard. The unit is supplied with 230V AC. The installed relay has a maximum electric Ohm load of 5A. Inductive loads can be switched up to 1A.

Sensor: Pt100

Range: -99...600°C

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket

Software: p. 102

PRODUCT DESCRIPTION**SIMILAR PRODUCTS**

Order-No. 202028: PTC

ST73-31.1 0

The controller ST73-31.10 was developed for simple thermostatic applications. The round housing allows applications at locations in which formerly only mechanical controls were in use. The unit is supplied with 230V AC. The installed relay has a maximum electric Ohm load of 16A. Inductive loads can be switched up to 2.2A.

Sensor: Pt100-2 wire

Range: -60...400°C

Front Size: 72mm x 72mm

Panel cut-out: 60.5mm round

Tightness: front IP65

Connector: flat plug 6.3mm

Software: p. 102

SIMILAR PRODUCTS

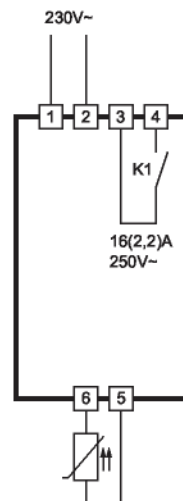
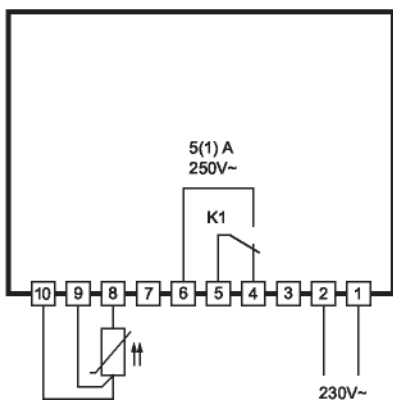
Order-No. 145573: K1 + buzzer

ORDER NUMBER

202010

ORDER NUMBER

174300



ST73-31.1 0



PRODUCT DESCRIPTION

The controller ST73-31.10 was developed for simple thermostatic applications. The round housing allows applications at locations in which formerly only mechanical controls were in use. The unit is supplied with 230V AC. The installed relay has a maximum electric Ohm load of 16A. Inductive loads can be switched up to 2.2A.

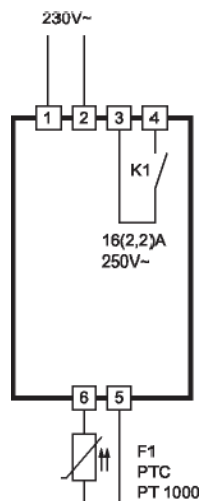
- Sensor:** PTC
- Range:** -50...140°C
- Front Size:** 72mm x 72mm
- Panel cut-out:** 60.5mm round
- Tightness:** front IP65
- Connector:** flat plug 6.3mm
- Software:** p. 102

SIMILAR PRODUCTS

Order-No. 145250: K1 + buzzer

ORDER NUMBER

151704



ST73-31.10



PRODUCT DESCRIPTION

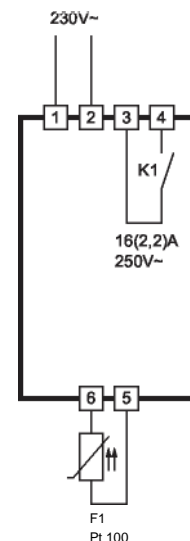
The controller ST73-31.10 was developed for simple thermostatic applications. It has a standby key, so that many applications require no main switch. The unit is supplied with 230V AC. The installed relay has a maximum electric Ohm load of 16A. Inductive loads can be switched up to 2.2A.

- Sensor:** Pt100-2 wire
- Range:** -60...400°C
- Front Size:** 72mm x 72mm
- Panel cut-out:** 60.5mm round
- Tightness:** front IP65
- Connector:** flat plug 6.3mm
- Software:** p. 102

SIMILAR PRODUCTS
Order-No. 197616: PTC

ORDER NUMBER

378091



ST96-30.01



PRODUCT DESCRIPTION

The controller ST96-30.01 with setpoint and actual value display was developed for thermostatic applications. The switching outputs can be programmed as two-point controller with alarm contact, three-point controller or two-stage controller.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard. The controller is supplied with 230V.

Sensor: thermo element type J (Fe-CuNi)

Range: -99...999°C

Front Size: 96mm x 96mm

Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

Software: p. 102

PRODUCT DESCRIPTION

The controller ST96-31.01 was developed for thermostatic applications. The switching outputs can be programmed as two-point controller with alarm contact, three-point controller or two-stage controller.

The setpoint and all parameters of the controller are set on a

Order-No. 202176: Th "K"

Order-No. 202150: Pt100

ST96-31.01



three-field plastic foil keyboard. The controller is supplied with 230V.

Sensor: Pt100-3 wire

Range: -80...600°C

Front Size: 96mm x 96mm

Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

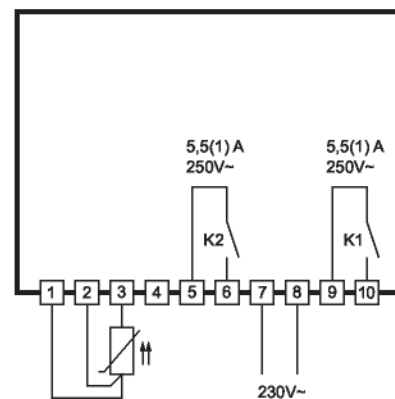
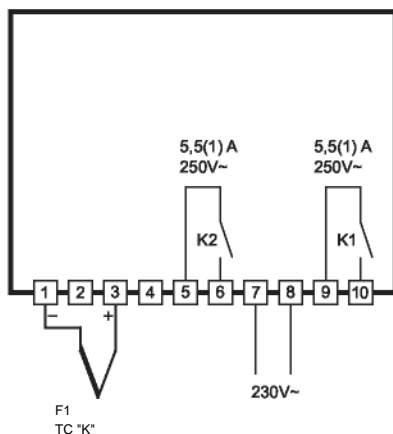
Software: p. 102

Order-No. 200527: Th "J", 115/230 V~

Order-No. 204933: Th "J", 12-24 V=/~

ORDER NUMBER 202168

ORDER NUMBER 185728



SIMILAR PRODUCTS
SIMILAR PRODUCTS

ST96-31.01



ST96-31.01



PRODUCT DESCRIPTION

The controller ST96-31.01 was developed for thermostatic applications. The switching outputs can be programmed as two-point controller with alarm contact, three-point controller or two-stage controller.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard. The controller is supplied with 230V.

Sensor: thermo element type J(Fe-CuNi)

Range: -99...999°C

Front Size: 96mm x 96mm

Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

Software: p. 102

PRODUCT DESCRIPTION

SIMILAR PRODUCTS

Order-No. 200527: Th^{“J”}, 115/230V~

Order-No. 204933: Th^{“J”}, 12-24V =/~

The controller ST96-31.01 was developed for thermostatic applications. The switching outputs can be programmed as two-point controller with alarm contact, three-point controller or two-stage controller.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard. The controller is supplied with 230V.

Sensor: thermo element type K(NiCr-Ni)

Range: -99...999°C

Front Size: 96mm x 96mm

Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

Software: p. 102

SIMILAR PRODUCTS

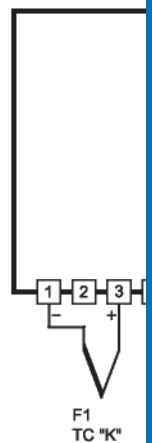
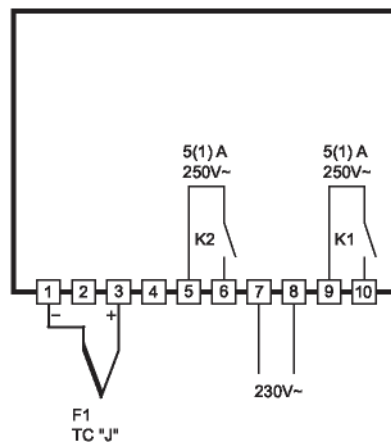
Order-No. 200527: Th^{“J”}, 115/230 V~

Order-No. 204933: Th^{“J”}, 12-24V AC/DC

ORDER NUMBER

189639

ORDER NUMBER



ST46-31.03

ST46-31.03



PRODUCT DESCRIPTION

The switching outputs of the thermal controller can be programmed as

- two-point controller with alarm contact - three-point controller
- two-step controller with alarm contact - controller with ramp profile.

The controller is intended for the assembly on DIN rail, which allows easy installation in the switch gear cabinet.

Sensor: Pt100-3 wire

Range: -99...600°C

Housing size(L x W x H): 95 x 53 x 59mm **Installation:**

Clip-on mounting on DIN rail 35 x 7.5mm **Connector:** screw terminal

Software: p. 102

PRODUCT DESCRIPTION

The switching outputs of the thermal controller can be programmed as

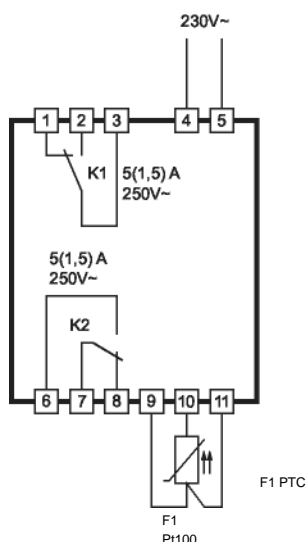
SIMILAR PRODUCTS

Order No. 286120: K1 K3

Order No. 294504: PTC, K1 K3

ORDER NUMBER

381178



- two-point controller with alarm contact - three-point controller - two-step controller with alarm contact - controller with ramp profile.

The controller is intended for the assembly on DIN rail, which allows easy installation in the switch gear cabinet.

Sensor: PTC

Range: -50...150°C

Housing size(L x W x H): 95 x 53 x 59mm **Installation:**

Clip-on mounting on DIN rail 35 x 7.5mm **Connector:** screw terminal **Software:** p. 102

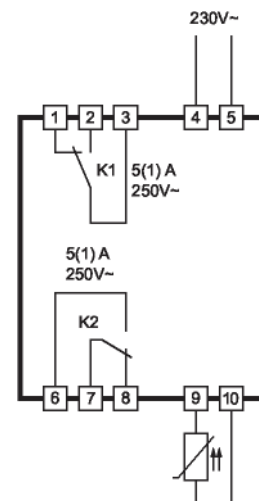
SIMILAR PRODUCTS

Order No. 286120: Pt100, K1 K3

Order No. 294504: PTC, K1 K3

ORDER NUMBER

167726



ST49-J H 1 UA.100

ST49-JH1UV.100



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PRODUCT DESCRIPTION

This micro-processed controller with limit value alarm serves for temperature control at high measuring accuracy. Beside resistance sensors the multi-sensor input can equally process semiconductor thermo element. The setting of parameters permits any assignment of the two control circuits and/or the range alarm to the existing switching relays. The control setpoints and parameters determining the process are adjusted with a 4-field plastic foil keyboard.

Sensor: universal sensor input
Range: dependent on the type of sensor
Front Size: 75mm x 55mm **Installation:** clip-on mounting on rail
Connector: screw terminal **Software:** p. 113

PRODUCT DESCRIPTION

This micro-processed controller with limit value alarm serves

for temperature control at high accuracy. Beside resistance sensors the input can equally process semiconductor thermo element. The parameters permits any assignment of control circuits and/or the range alarm existing switching relays. The control and parameters determining the process with a 4-field plastic foil keyboard.

Sensor: universal sensor input
Range: dependent on the type of sensor
Front Size: 75mm x 55mm
Installation: clip-on mounting on rail
Connector: screw terminal **Software:** p. 113

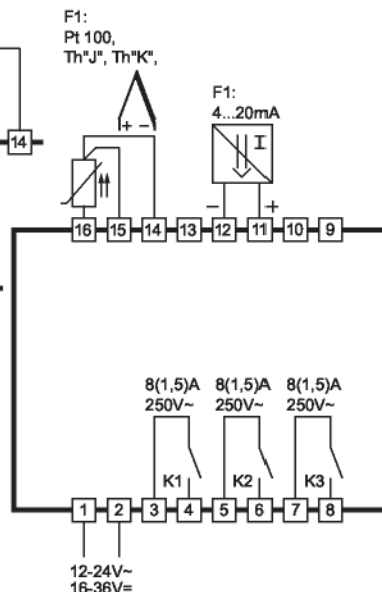
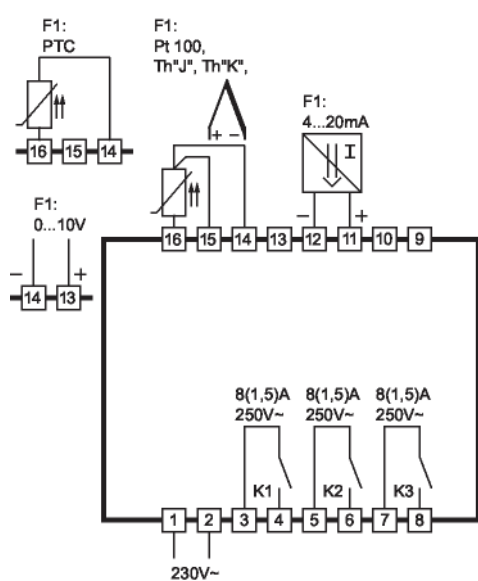
measuring multi-sensor setting of the two to the setpoints are adjusted

ORDER NUMBER

229286

ORDER NUMBER

155960



ST48-J E UA.100

ST48-J H U V .100



PRODUCT DESCRIPTION

This micro-processed controller serves for temperature control at high measuring accuracy. Beside resistance sensors the multi-sensor input can equally process semiconductor thermo element. Outputs are two relay contacts. The setting of parameters permits any assignment of the two control circuits and/or the range alarm to the existing switching relays. The control setpoints and parameters determining the process are adjusted with a 4-field plastic foil keyboard.

Sensor: universal sensor input
Range: dependent on the type of sensor
Front Size: 48mm x 48mm **Panel cut-out:** 45.2mm x 45.2mm **Connector:** plug and socket **Software:** p. 113
PRODUCT DESCRIPTION

This micro-processed controller serves for temperature control at high measuring accuracy. Beside resistance sensors the multi-sensor input can equally process semiconductor thermo element. Outputs are three relay contacts. The setting of parameters permits any assignment of the control circuits and/or the range alarm to the existing switching relays. The control setpoints and parameters determining the process are adjusted with a 4-field plastic foil keyboard.

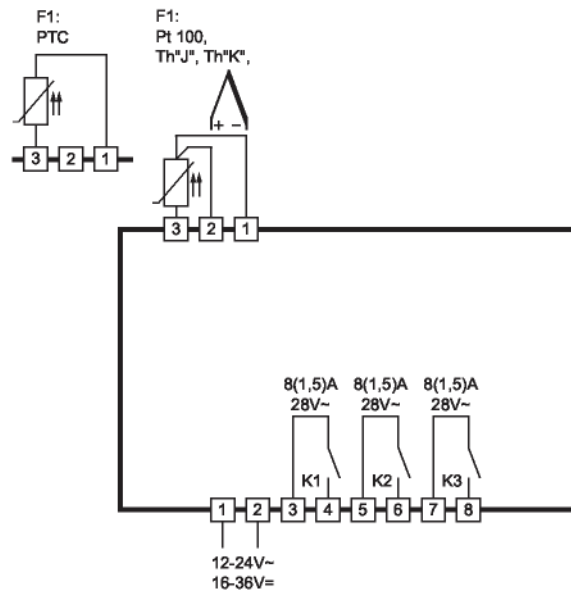
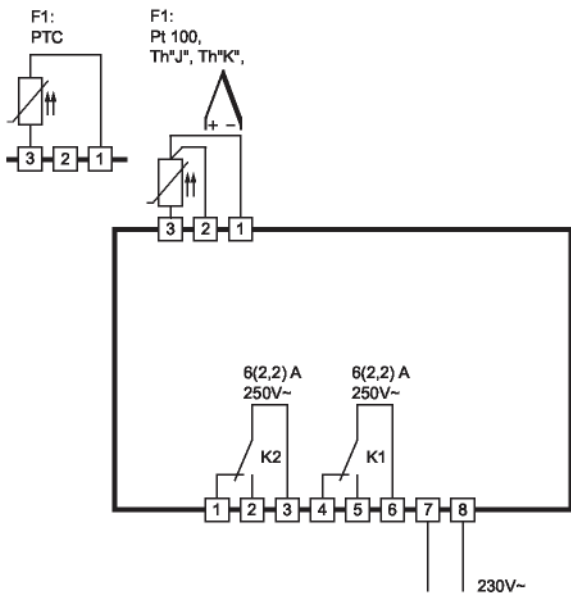
Sensor: universal sensor input
Range: dependent on the type of sensor
Front Size: 48mm x 48mm **Panel cut-out:** 45.2mm x 45.2mm **Tightness:** front IP65 **Connector:** plug and socket **Software:** p. 113

ORDER NUMBER

170464

ORDER NUMBER

248716



ST70-31.03



PRODUCT DESCRIPTION

The switching exits of the thermostatic controller can be programmed as

- two-point controller with alarm
- three-point controller
- two-stage controller
- controller with ramp profile.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard.

Sensor: Thermo element J + K

Range: type J -99...700°C

Range: type K -99...999°C

Front Size: 72mm x 36mm

Panel cut-out: 68.5mm x 28.5mm

Connector: screw terminal

Software: p. 102

PRODUCT DESCRIPTION

The switching exits of the thermostatic controller can be programmed as

- two-point controller with alarm
- three-point controller
- two-stage controller
- controller with ramp profile.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard.

SIMILAR PRODUCTS

ORDER NUMBER 208322

ST70-31.03



Sensor: Pt100-3 wire

Range: -99...600°C

Front Size: 72mm x 36mm

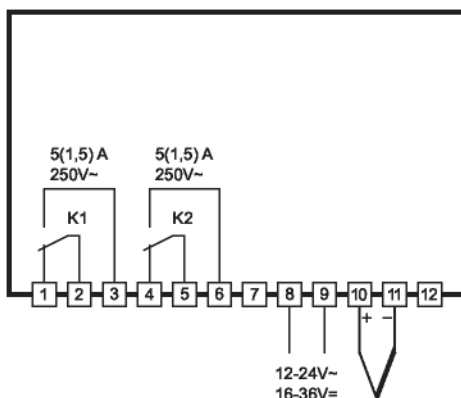
Panel cut-out: 68.5mm x 28.5mm

Connector: screw terminal

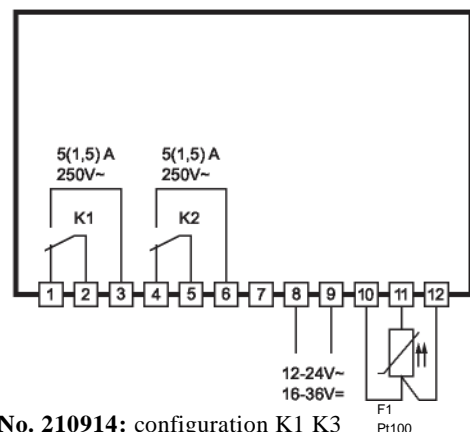
Software: p. 102

SIMILAR PRODUCTS

ORDER NUMBER 208298



Order-No. 179143: configuration K1 K3



Order-No. 210914: configuration K1 K3

ST70-31.03



PRODUCT DESCRIPTION

The switching exits of the thermostatic controller can be programmed as
 -two-point controller with alarm
 -three-point controller
 -two-stage controller
 -controller with ramp profile.
 The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard.

Sensor: PTC
Range: -50...150°C
Front Size: 72mm x 36mm
Panel cut-out: 68.5mm x 28.5mm
Connector: screw terminal
Software: p. 102

SIMILAR PRODUCTS

ST70-31.03



Order-No. 210906: configuration K1 K3
Order-No. 209866: front IP54
Order-No. 209890: front IP54, K1 K3

ORDER NUMBER

208306

PRODUCT DESCRIPTION

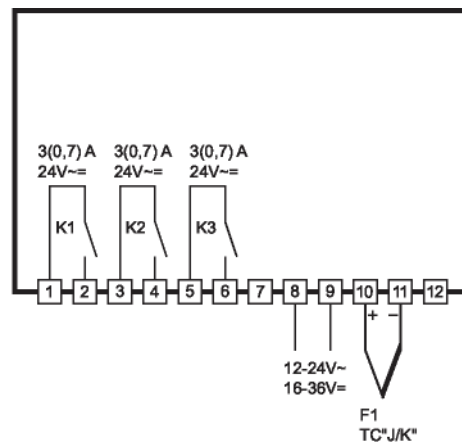
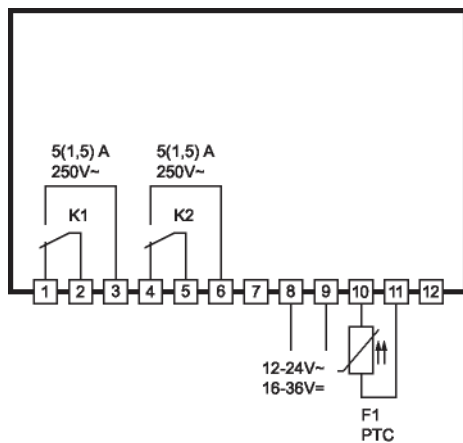
The switching exits of the thermostatic controller can be programmed as
 -two-point controller with alarm -three-point controller with alarm contact -two-stage controller with alarm contact -three-stage controller.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard.

Sensor: Thermo element J + K
Range: type J -99...700°C
Range: type K -99...999°C **Front Size:** 72mm x 36mm
Panel cut-out: 68.5mm x 28.5mm
Connector: screw terminal
Software: p. 102

ORDER NUMBER

209692



ST501-KT1 TA.03



PRODUCT DESCRIPTION

The switching exits of the thermal controller can be programmed as

- two-point controller with alarm contact -
- three-point controller with alarm contact -
- two-stage controller with alarm contact -
- three-stage controller.

Beside the standby key there is a second key to set functions, which can be variously parametered.

Sensor: multi resistance input **Range:** dependent on type of sensor **Front Size:** 106mm x 68mm

Size: 106mm x 68mm **Panel cut-out:** 87.5mm x 56.5mm **Tightness:** front IP64 **Connector:** screw terminal

Software: p. 102

PRODUCT DESCRIPTION

The switching exits of the thermal controller can be programmed as

- two-point controller with alarm contact -
- three-point controller with alarm contact -
- two-stage controller with alarm contact -
- three-stage controller.

Beside the standby key there is a second key to set functions, which can be variously parametered.

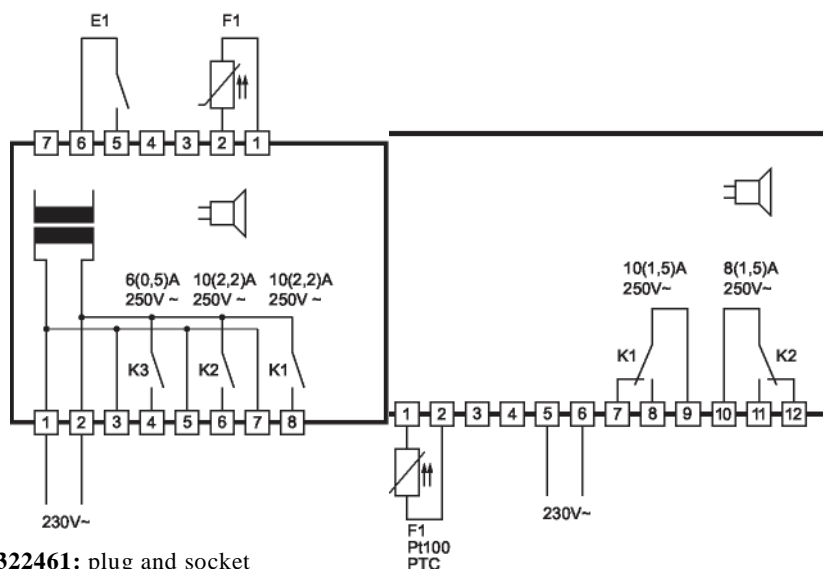
SIMILAR PRODUCTS

ORDER NUMBER

322487

ORDER NUMBER

172163



Order-No. 322461: plug and socket

ST503-KE1TA.03



Sensor: multi resistance input

Range: dependent on type of sensor

Front Size: 106mm x 68mm

Installation Depth: 41mm

Tightness: front IP64 **Connector:** screw terminal

Software: p. 102



ST71 0-KCBA.03

ST710-KEJA.03



PRODUCT DESCRIPTION

The switching outputs of the thermal controller can be programmed as

- two-point controller with alarm contact
- three-point controller
- two-stage controller.

Beside the standby key there is a second key to set functions, which can be variously parametered.

Sensor: Pt100-3 wire

Range: -80...400°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65 **Connector:**

plug and socket **Power supply:**

230V~ **Software:** p. 102

PRODUCT DESCRIPTION

SIMILAR PRODUCTS

Order-No.291880: screw terminal, PTC

The switching outputs of the thermal controller can be programmed as

- two-point controller with alarm contact -
- three-point controller -two-stage controller.

Beside the standby key there is a second key to set functions, which can be variously parametered.

Sensor: PTC

Range: -50...150°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65 **Connector:**

plug and socket **Power supply:**

230V~ **Software:** p. 102

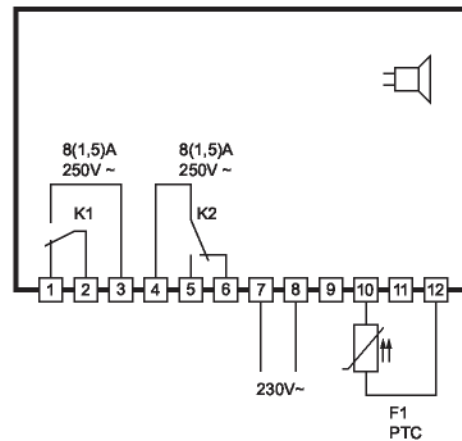
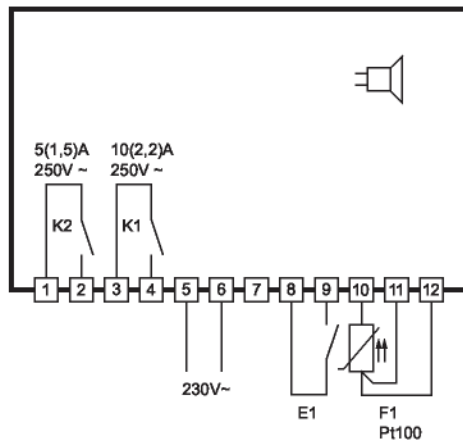
SIMILAR PRODUCTS

Order-No.321646: screw terminal

Order-No.355149: Power supply 12-24V~/16-36V=

ORDER NUMBER **292326**

ORDER NUMBER **352583**



ST71 0-KEBV.03



PRODUCT DESCRIPTION

The switching outputs of the thermal controller can be programmed as

- two-point controller with alarm contact
- three-point controller
- two-stage controller.

Beside the standby key there is a second key to set functions, which can be variously parametered.

Sensor: Pt100-3 wire

Range: -60...400°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65 **Connector:**

plug and socket **Power supply:** 12-

24V~/16-36V= **Software:** p. 102

PRODUCT DESCRIPTION

The switching outputs of the thermal controller can be programmed as

- two-point controller with alarm
- three-point controller with alarm contact
- two-stage controller with alarm contact
- three-stage controller.

Order-No. 192237: Power supply 230V~

ST710-KHBA.03



Beside the standby key there is a second key to set functions, which can be variously parametered.

Sensor: Pt100-3 wire

Range: -80...400°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65 **Connector:**

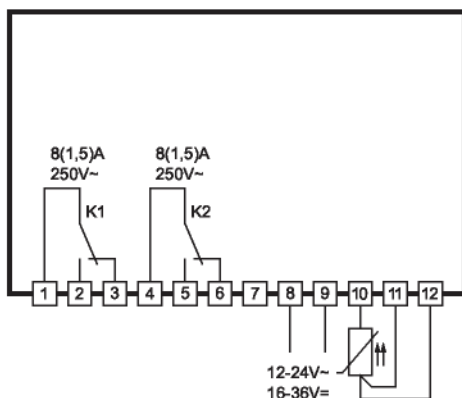
plug and socket **Power supply:**

230V~ **Software:** p. 102

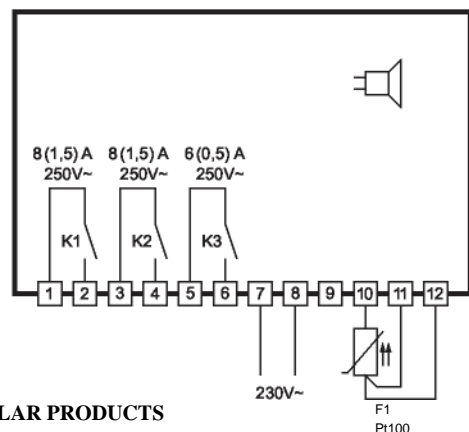
Order-No. 365346: Power supply 12-24V~/16-36V=

ORDER NUMBER 170381

ORDER NUMBER 362723



SIMILAR PRODUCTS



SIMILAR PRODUCTS

F1 Pt100

ST71 0-KHJA.03

ST72-30.03



PRODUCT DESCRIPTION

The switching outputs of the thermal controller can be programmed as

- two-point controller with alarm
- three-point controller with alarm contact -
- two-stage controller with alarm contact -
- three-stage controller.

Beside the standby key there is a second key to set functions, which can be variously parametered.

Sensor: PTC

Range: -50...150°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65

Connector: plug and socket

Power supply: 230V~

Software: p. 102

SIMILAR PRODUCTS

Order-No.369595: Power supply 12-24V~/16-36V=

PRODUCT DESCRIPTION

The switching exits of the thermal controller can be programmed as

- two-point controller with alarm contact -
- three-point controller with alarm contact -
- two-stage controller with alarm contact -
- three-stage controller -controller with ramp profile.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard.

Sensor: Pt100-3 wire

Range: -80...600°C

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket **Power**

supply: 230V~ **Software:** p. 102

SIMILAR PRODUCTS

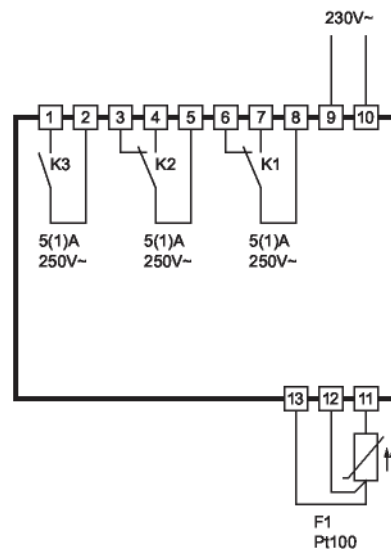
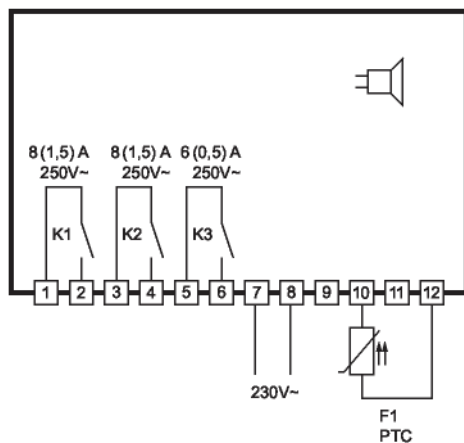
Order-No. 216192: Power supply 12-24V~/16-36V=

ORDER NUMBER

363077

ORDER NUMBER

208058



ST72-31.03

ST72-31.03



PRODUCT DESCRIPTION

The switching exits of the thermal controller can be programmed as

- two-point controller with alarm contact -
- three-point controller with alarm contact -
- two-stage controller with alarm contact -
- three-stage controller
- controller with ramp profile.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard.

Sensor Input: 4...20mA

Range: with parameter A10 + A11

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket **Power supply:** 12-24V~/16-36V= **Software:** p. 102

SIMILAR PRODUCTS
SIMILAR PRODUCTS

Order-No. 208066: power supply 230V~

ORDER NUMBER

252361

PRODUCT DESCRIPTION

The switching exits of the controller can be programmed

- two-point controller with alarm contact -
- three-point controller with alarm contact -
- two-stage controller with alarm contact -
- three-stage controller -
- controller with ramp profile.

The setpoint and all parameters are set on a three-field plastic

Sensor: thermo element type J + K

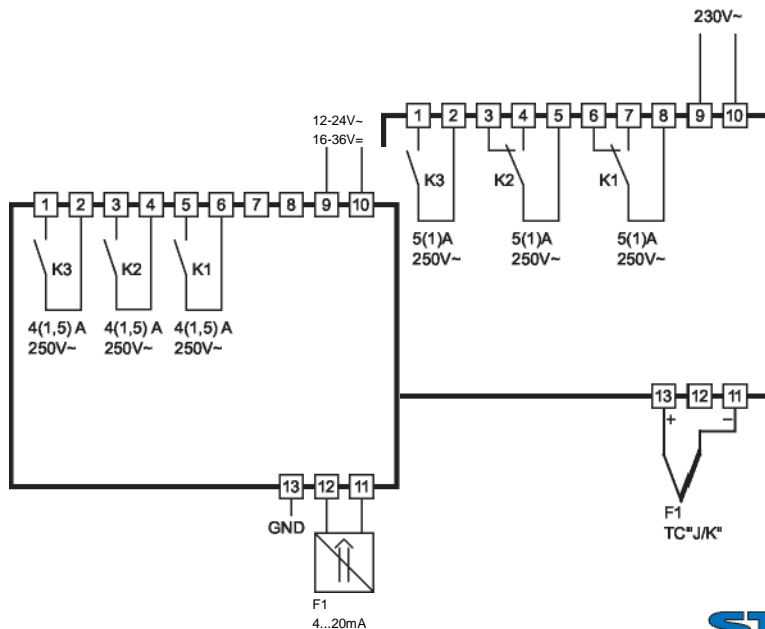
Range: type J -99...700°C **Range:** type K -99...999°C **Front Size:** 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm **Connector:** plug and socket **Power supply:** 230V~ **Software:** p. 102

Order-No. 209635: Power supply 12-24V~/16-36V=

ORDER NUMBER

208264



ST72-31.03

ST72-31.03



PRODUCT DESCRIPTION

The switching exits of the thermal controller can be programmed as

- two-point controller with alarm contact
- three-point controller with alarm contact
- two-stage controller with alarm contact
- three-stage controller
- controller with ramp profile.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard.

Sensor: Pt100-3 wire

Range: -80...600°C

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket

Power supply: 230V~ **Software:** p. 102

PRODUCT DESCRIPTION

SIMILAR PRODUCTS

Order-No. 208819: power supply 12-24V~/16-36V=

Order-No. 311746: power supply 12-24V~/16-36V=

ORDER NUMBER

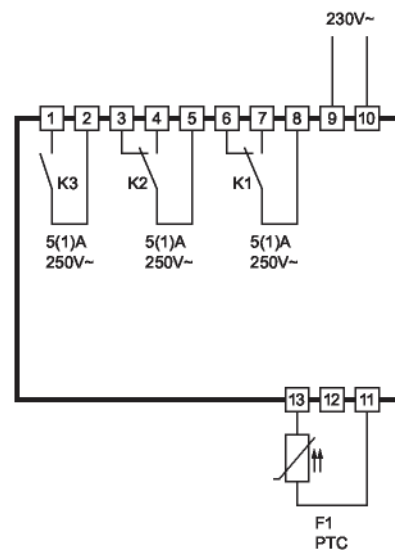
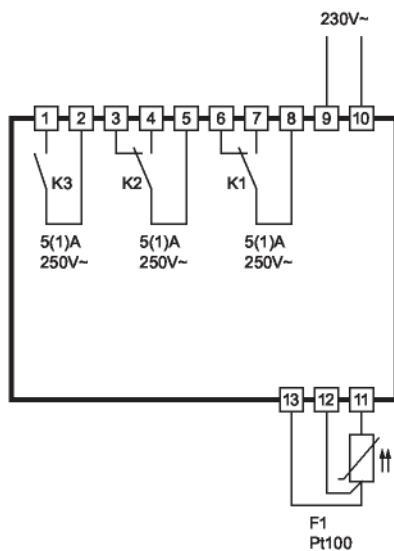
208033

SIMILAR PRODUCTS

Order-No. 308239: front tightness IP63

ORDER NUMBER

208074



ST72-38.03



PRODUCT DESCRIPTION

The switching exits of the thermal controller can be programmed as

- two-point controller with alarm contact -
- three-point controller with alarm contact -
- two-stage controller with alarm contact -
- three-stage controller
- controller with ramp profile.

The setpoint and all parameters of the controller are set on a four-field plastic foil keyboard.

Sensor: thermo element J/K

Range: type J -99...700°C

Range: type K -99...999°C

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket

Power supply: 230V~ **Software:** p. 102

PRODUCT DESCRIPTION

The switching exits of the thermal controller can be programmed as

- two-point controller with alarm contact -
- three-point controller with alarm contact -
- two-stage controller with alarm contact -
- three-stage controller -controller with ramp profile.

The setpoint and all parameters of the controller are set on a four-field plastic foil keyboard.

ORDER NUMBER

210211

ST72-38.03



Sensor: Pt100-3 wire

Range: -80...600°C

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

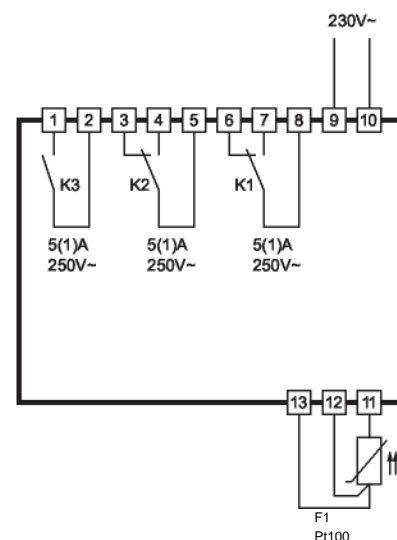
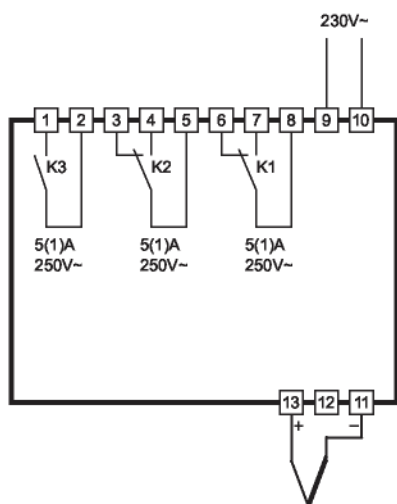
Connector: plug and socket

Power supply: 230V~ **Software:** p. 102

Order No. 209072: Power supply 12-24V~/16-36V=

ORDER NUMBER

208041



ST48-WEUAL.32

ST48-WHUVM.32



PRODUCT DESCRIPTION

The PID controller with two 3-digit LED displays for control setpoint and actual value, 4 keys and 2 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multi-sensor sensor entrance can equally process 0...10V and 4...20mA. The analogue exit permits the access to control valves and invertors. The cross-linking of the controller takes place via standard LON interface. The general functions which can be freely parametered open the way for a broad application area.

The PID controller with two 3-digit LED displays for control setpoint and actual value, 4 keys and 3 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multi-sensor sensor entrance can equally process 0...10V and 4...20mA. The analogue exit permits the access to control valves and invertors. The cross-linking of the controller takes place via standard LON interface. The general functions which can be freely parametered open the way for a broad application area.

Range: dependent on the type of sensor
Front Size: 48mm x 48mm **Panel cut-out:** 45.2mm x 45.2mm **Connector:** plug and socket **Software:** p. 107

Range: dependent on the type of sensor
Front Size: 48mm x 48mm **Panel cut-out:** 45.2mm x 45.2mm **Connector:** plug and socket **Software:** p. 107

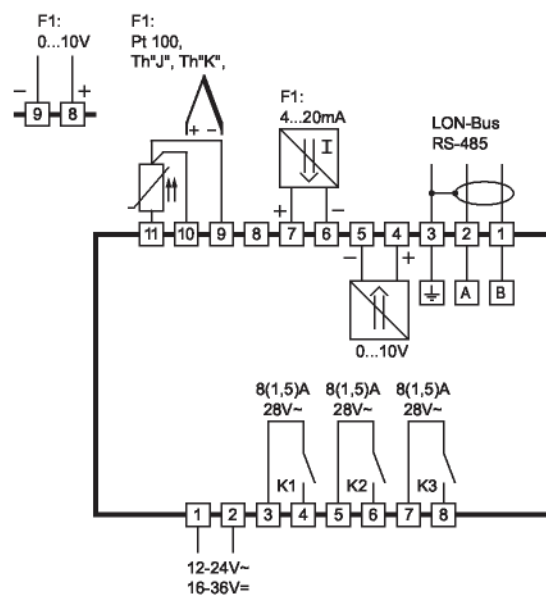
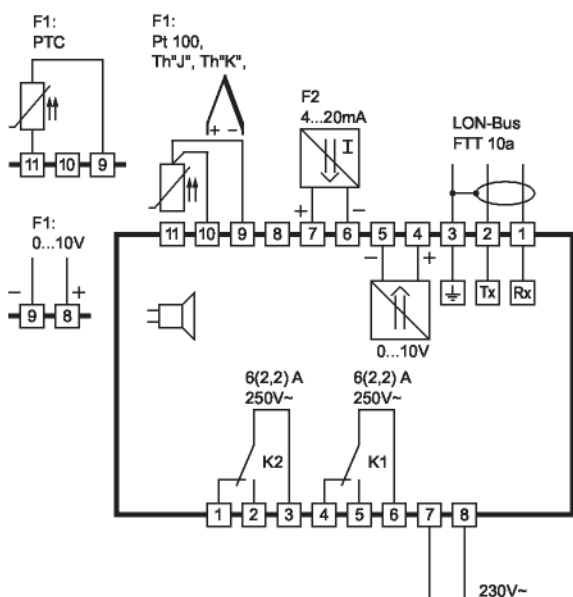
PRODUCT DESCRIPTION

SIMILAR PRODUCTS

Order No. 341693: LON-interface RS485

ORDER NUMBER 321844

ORDER NUMBER 19711



ST48-WEUA.102

ST48-WHUV.102



PRODUCT DESCRIPTION

This micro-processed controller serves for temperature control at high measuring accuracy. Beside resistance sensors and semiconductor thermo element the multi-sensor sensor entrance can equally process 0...10V and 4...20mA. The PID regulation and/or thermostat regulation can be activated via parameter setting. Outputs are two relay contacts and an analogue output. Red LED lamps indicate the status of the output relays. The desired values and parameters determining the process are adjusted with a 4-field plastic foil keyboard.

Range: dependent on the type of sensor
Front Size: 48mm x 48mm **Panel cut-out:** 45.2mm x 45.2mm **Connector:** plug and socket **Software:** p. 113

PRODUCT DESCRIPTION

This micro-processed controller serves for temperature control at high measuring accuracy. Beside resistance sensors

and semiconductor thermo element the multi-sensor sensor entrance can equally process 0...10V and 4...20mA. The PID regulation and/or thermostat regulation can be activated via parameter setting. Outputs are three relay contacts and an analogue output. Red LED lamps indicate the status of the output relays. The desired values and parameters determining the process are adjusted with a 4field plastic foil keyboard.

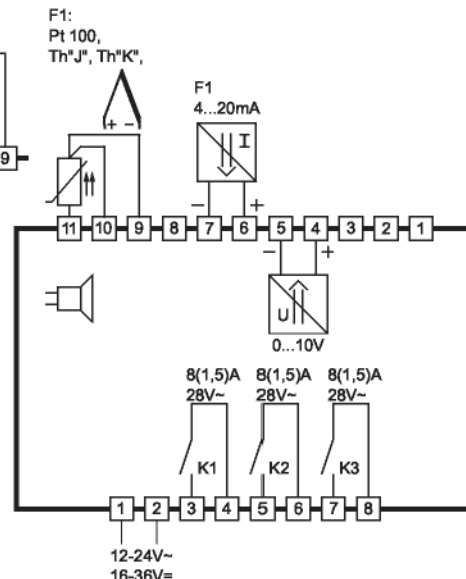
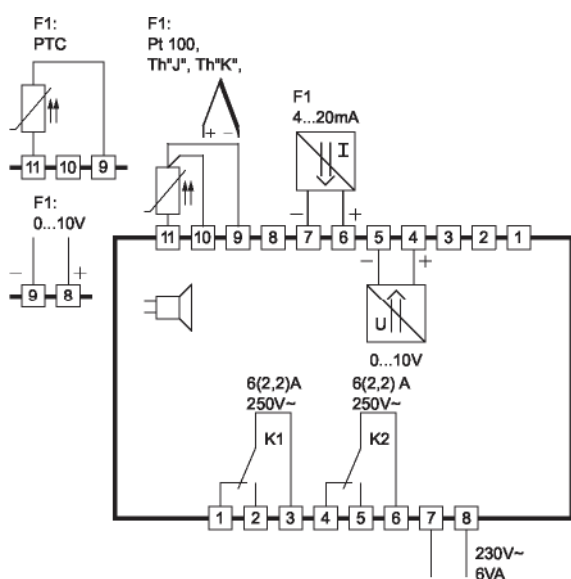
Range: dependent on the type of sensor **Front Size:** 48mm x 48mm **Panel cut-out:** 45.2mm x 45.2mm **Connector:** plug and socket **Software:** p. 113

ORDER NUMBER

172957

ORDER NUMBER

375709



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ST70-31.02**PRODUCT DESCRIPTION**

The compact execution of the PID controller with 3-digit LED seven segment display, 3 keys and 3 transistor outputs perfectly qualifies it for space-saving mountings. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three point PID controllers. The third output can be configured as range or boundary alarm. The general functions which can be freely parametered open the way for a broad application area.

Sensor: Pt100

Range: -99...850°C

Front Size: 72mm x 36mm

Panel cut-out: 68.5mm x 28.5mm

Connector: screw terminal

Software: p. 107

PRODUCT DESCRIPTION**SIMILAR PRODUCTS**

Order No. 224733: PTC

ST70-34.02

The compact execution of the PID controller with 4-digit LED seven segment display, 3 keys and 3 transistor outputs perfectly qualifies it for space-saving mountings. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The third output can be configured as range or boundary alarm with absolute or relative values. The general functions which can be freely parametered open the way for a broad application area.

Sensor: Pt100

Range: -200...850°C

Front Size: 72mm x 36mm

Panel cut-out: 68.5mm x 28.5mm

Connector: screw terminal

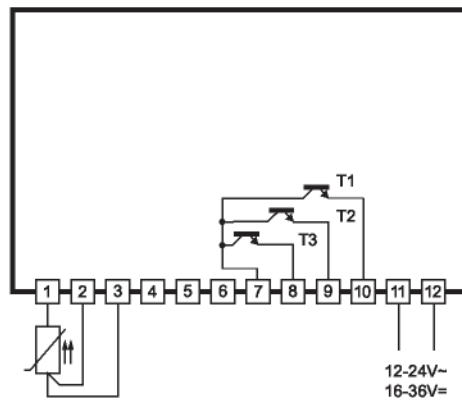
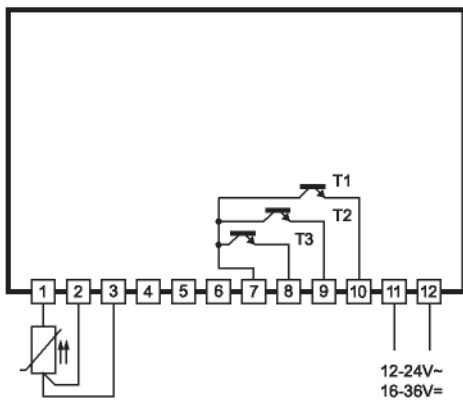
Software: p. 107

ORDER NUMBER

193599

ORDER NUMBER

196733



ST70-31.02



PRODUCT DESCRIPTION

The compact execution of the PID controller with 3-digit LED seven segment display, 3 keys, 1 analogue output and 1 relay perfectly qualifies it for space-saving mountings. The analogue output permits the access to control valves and invertors. The relay K2 can be configured as limit value or release contact. The general functions which can be freely parametered open the way for a broad application area.

- Sensor:** Pt100
- Range:** -99...850°C
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminal
- Software:** p. 107

SIMILAR PRODUCTS

Order No. 206144: K1 + analogue output

ST71-PNUVL.32



The PID controller with a 4-digit LED display, 5 keys and 4 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multi-sensor entrance can equally process 0...10V 4...20mA. The cross-linking of the controller takes place via standard LON interface. The general functions which can be freely parametered open the way for a broad application area.

- Range:** dependent on the type of sensor
- Front Size:** 72mm x 36mm
- Panel cut-out:** 67.5mm x 31.5mm
- Connector:** plug and socket
- Software:** p. 107

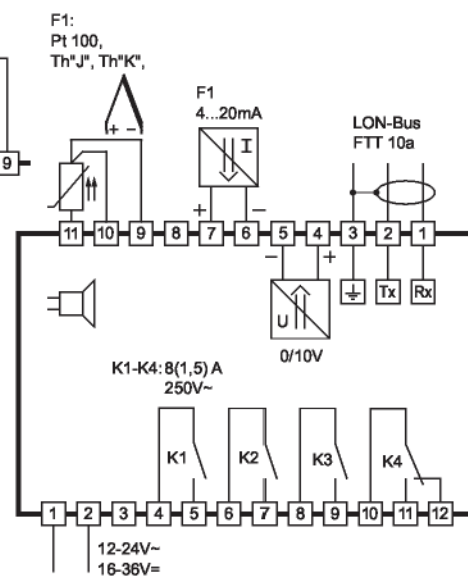
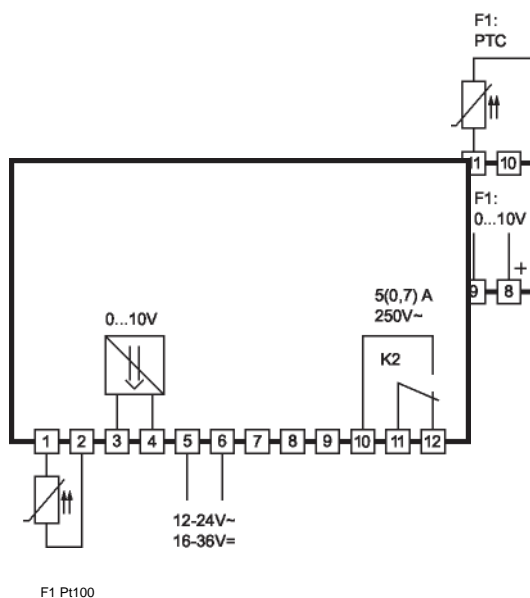
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ORDER NUMBER

162677

ORDER NUMBER

317479



ST71 0-PNUVL.32

ST710-KEUA.102



PRODUCT DESCRIPTION

The PID controller with a 4-digit LED display, 5 keys and 4 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multisensor sensor entrance can equally process 0...10V and 4...20mA. The cross-linking of the controller takes place via standard LON interface. The general functions which can be freely parametered open the way for a broad application area.

PRODUCT DESCRIPTION

The PID controller with one 4-digit LED display, 5 keys and 2 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multi-sensor sensor entrance can equally process 0...10V and 4...20mA. The general functions which can be freely parametered open the way for a broad application area.

Range: dependent on the type of sensor
Front Size: 84mm x 42mm **Panel cut-out:** 67.5mm x 31.5mm **Connector:** plug and socket **Software:** p. 107

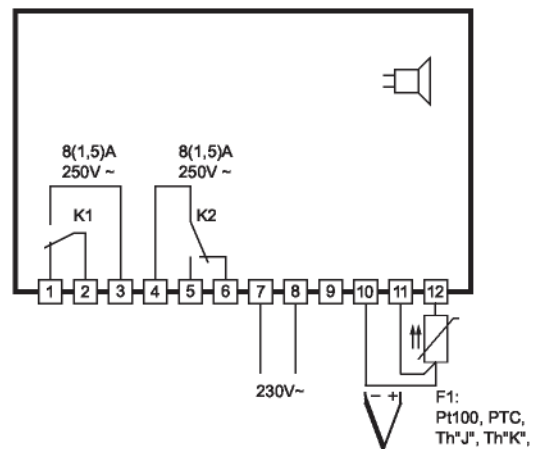
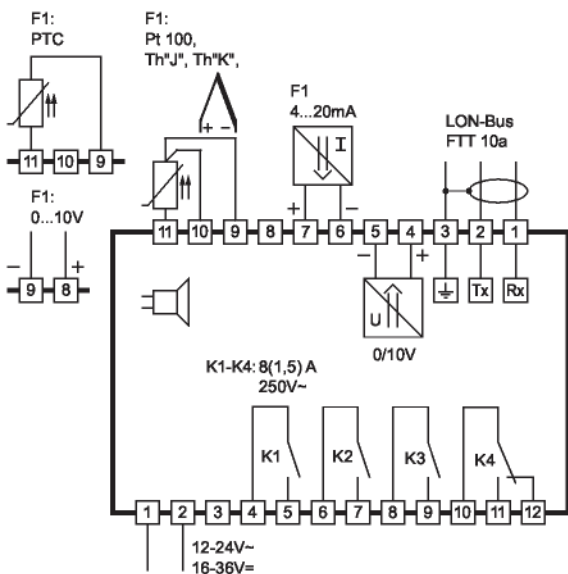
Measuring Range: dependent on the type of sensor
Front Size: 84mm x 42mm **Panel cut-out:** 67.5mm x 31.5mm **Connector:** plug and socket **Software:** p. 113

SIMILAR PRODUCTS

Order No. 312488: LON-interface RS485

ORDER NUMBER **242255**

ORDER NUMBER **154633**



ST71 0-KEUV.102



PRODUCT DESCRIPTION

The PID controller with one 4-digit LED display, 5 keys and 2 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multi-sensor sensor entrance can equally process 0...10V and 4...20mA. The general functions which can be freely parametered open the way for a broad application area.

Measuring Range: dependent on the type of sensor

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Connector: plug and socket

Software: p. 113

PRODUCT DESCRIPTION

The PID controller with two 3-digit LED displays for control

ST72-30.02



setpoint and actual value, 3 keys and 3 foreseen as universal controller. Beside resistance sensors and semiconductor thermo the multi-sensor sensor entrance can process 4...20mA. The switching outputs programmed as two or three-point controllers or as two or three-point PID The third output can be configured as boundary alarm with absolute or relative

Range: dependent on the type of sensor

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket

Software: p. 107

SIMILAR PRODUCTS

Order No. 198739: Power supply 12-24V~/16-36V=

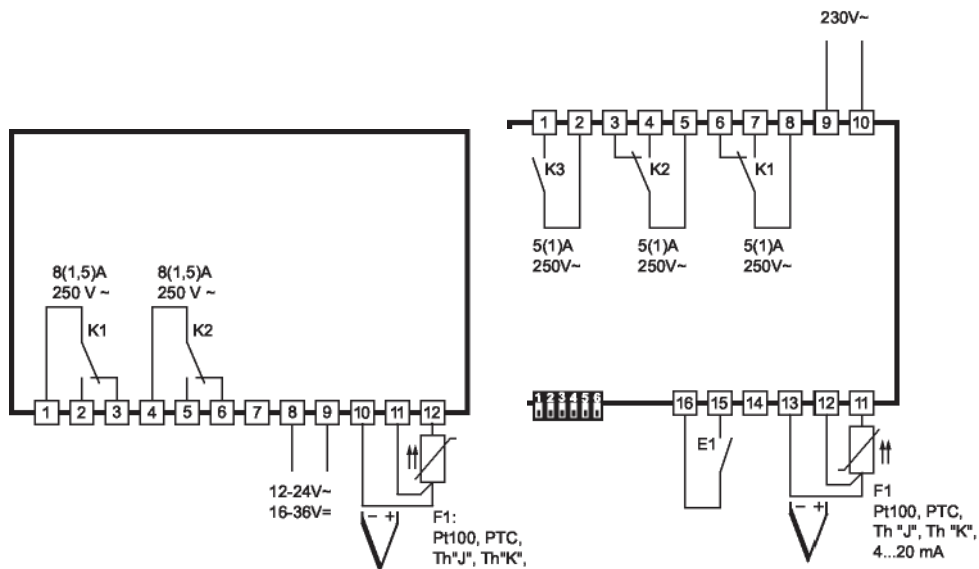
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ORDER NUMBER

154658

ORDER NUMBER

214478



ST72-31 .02

ST72-31.02



PRODUCT DESCRIPTION

The PID controller with 3-digit LED display, 3 keys and 3 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multisensor sensor entrance can equally process 4...20mA. The switching outputs can be programmed as two or threepoint thermostat controllers or as two or three-point PID controllers. The third output can be configured as range or boundary alarm with absolute or relative values.

Range: dependent on the type of sensor
Front Size: 72mm x 72mm **Panel cut-out:** 66.5mm x 66.5mm **Connector:** plug and socket **Software:** p. 107

PRODUCT DESCRIPTION

SIMILAR PRODUCTS

Order No. 275875: S1 (output for SSR), K2, K3

The PID controller with 3-digit LED display, 3 keys and 3 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multisensor sensor entrance can equally process 4...20mA. The switching outputs can be programmed as two or threepoint thermostat controllers or as two or three-point PID controllers. The third output can be configured as range or boundary alarm with absolute or relative values.

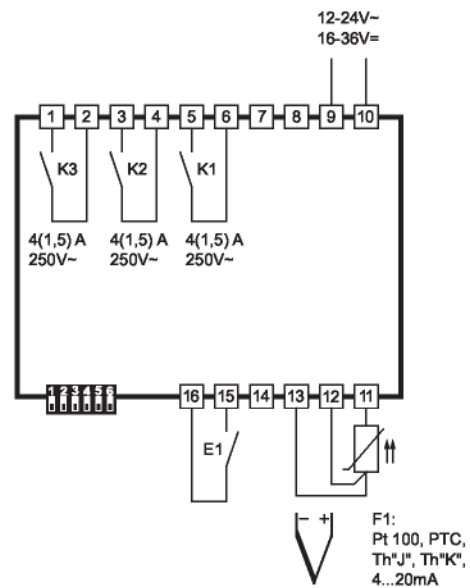
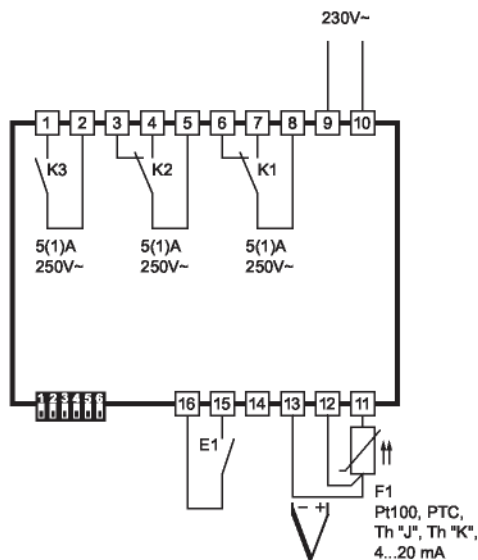
Range: dependent on the type of sensor
Front Size: 72mm x 72mm **Panel cut-out:** 66.5mm x 66.5mm **Connector:** plug and socket **Software:** p. 107

ORDER NUMBER

210922

ORDER NUMBER

210989



ST72-34.02



PRODUCT DESCRIPTION

The PID controller with a 4-digit LED seven segment display, 3 keys and 3 relays is foreseen as universal controller. Beside resistance sensors and semiconductor thermo element the multi-sensor sensor entrance can equally process 4...20mA. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The third output can be configured as range or boundary alarm with absolute or relative values.

Range: dependent on the type of sensor
Front Size: 72mm x 72mm **Panel cut-out:** 66.5mm x 66.5mm **Connector:** plug and socket **Software:** p. 107

PRODUCT DESCRIPTION

The PID controller equipped with two 3-digit LED displays,

ST96-30.02



3 keys and 2 relays qualifies itself for various applications due to its simple handling and robust construction. The switching outputs can be programmed as two or threepoint thermostat controllers or as two or three-point PID controllers. The second exit of two-point controllers can be configured as limit value, release or alarm contact. The general functions which can be freely parametered open the way for a broad application area.

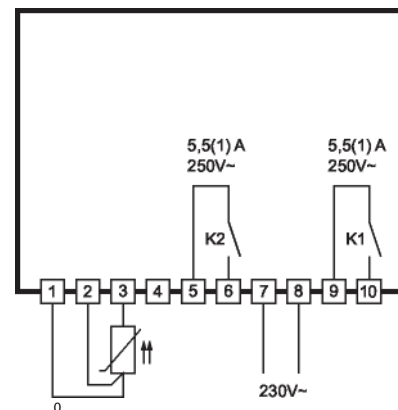
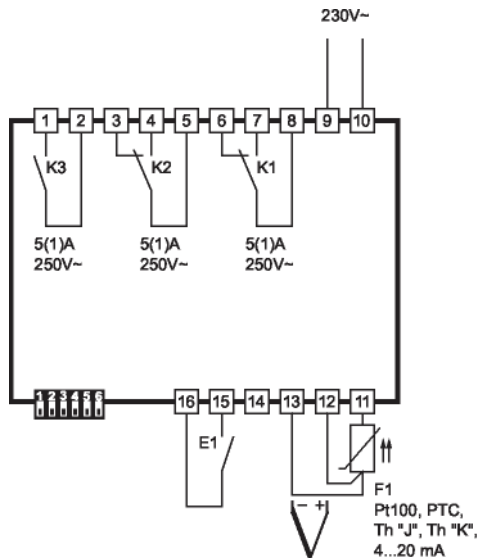
Sensor: Pt100
Range: -99...850°C
Front Size: 96mm x 96mm
Panel cut-out: 90.5mm x 90.5mm
Connector: plug and socket
Software: p. 107

ORDER NUMBER

211151

ORDER NUMBER

202184



ST96-31.02



PRODUCT DESCRIPTION

The PID controller equipped with a 3-digit LED display, 3 keys and 2 relays qualifies itself for various applications due to its simple handling and robust construction. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The second exit of two-point controllers can be configured as limit value, release or alarm contact. The general functions which can be freely parametered open the way for a broad application area.

Sensor: Th^{“J”}

Range: -99...999°C

Front Size: 96mm x 96mm

Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

Software: p. 107

PRODUCT DESCRIPTION

The PID controller equipped with a 3-digit LED display, 3 keys and 2 relays qualifies itself for various applications due to its simple handling and robust construction. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The second exit of two-point controllers can be configured as limit value, release or alarm contact. The general functions which can be freely parametered open the way for a broad application area.

Sensor: Pt100

Range: -99...850°C

SIMILAR PRODUCTS
ORDER NUMBER

197566

ST96-31.02



Front Size: 96mm x 96mm

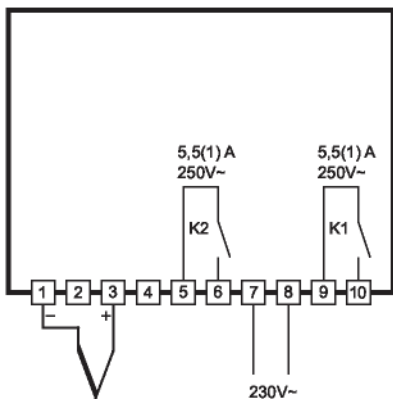
Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

Software: p. 107

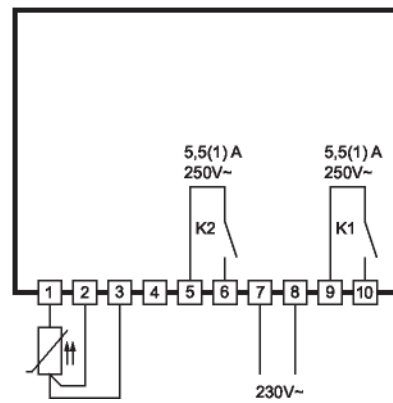
SIMILAR PRODUCTS
ORDER NUMBER

192815



Order No. 205914: Power supply 12-24V~/16-36V=

Order No. 197582: Th^{“K”}, 230V~



Order No. 197731: Power supply 12-24V~/16-36V=

ST96-31.02



PRODUCT DESCRIPTION

The PID controller equipped with a 3-digit LED display, 3 keys and 3 relays qualifies itself for various applications due to its simple handling and robust construction. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The third exit can be configured as range or boundary alarm with absolute or relative values. The general functions which can be freely parametered open the way for a broad application area.

Sensor: Pt100

Range: -99...850°C

Front Size: 96mm x 96mm

Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

Software: p. 107

PRODUCT DESCRIPTION

ST96-35.02



The PID controller with two 4-digit LED displays for control setpoint and actual value, keys and 3 output relays is foreseen as universal controller. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The third exit can be configured as range or boundary alarm. The analogue output allows access to control valves and invertors, the switching input E1 effects the change-over of control setpoint.

Sensor: Pt100

Range: -200...850°C

Front Size: 96mm x 96mm

Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

Software: p. 107

SIMILAR PRODUCTS

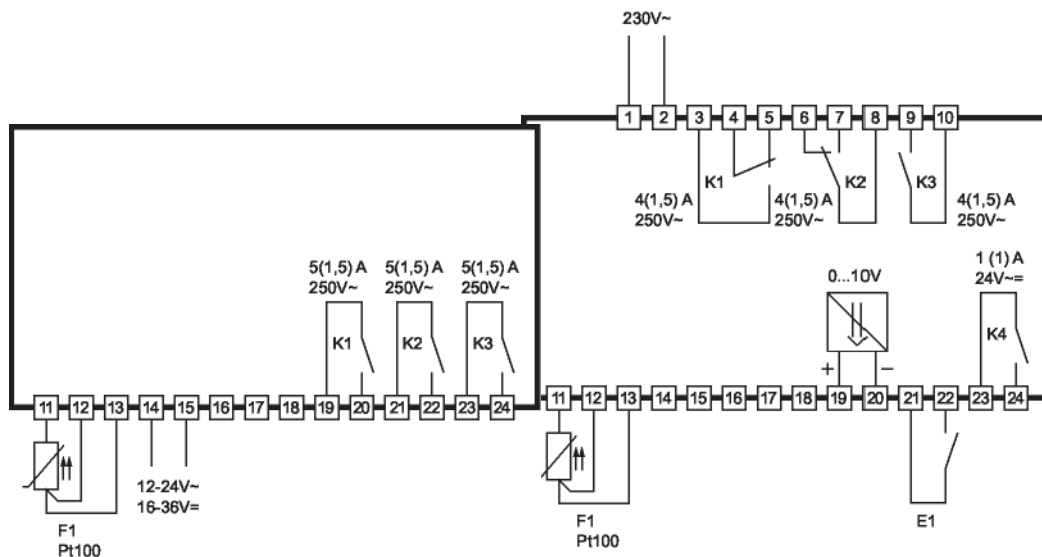
Order No. 201004: Power supply 12-24V~/16-36V=

ORDER NUMBER

211656

ORDER NUMBER

199760



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ST96-35.02



PRODUCT DESCRIPTION

The PID controller with two 4-digit LED displays for control setpoint and actual value, 3 keys and 3 output relays is foreseen as universal controller. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three point PID controllers. The third exit can be configured as range or boundary alarm. The switching input E1 effects the change-over of the control setpoint. The general functions which can be freely parametered open the way for a broad application area.

Sensor: Pt100
Range: -200...850°C
Front Size: 96mm x 96mm
Panel cut-out: 90.5mm x 90.5mm
Connector: plug and socket
Software: p. 107

SIMILAR PRODUCTS Order
 No. 198515: Th“J“ Order

ST96-33.08



No. 198523: Th“K“ Order
 No. 199612: Th“S“

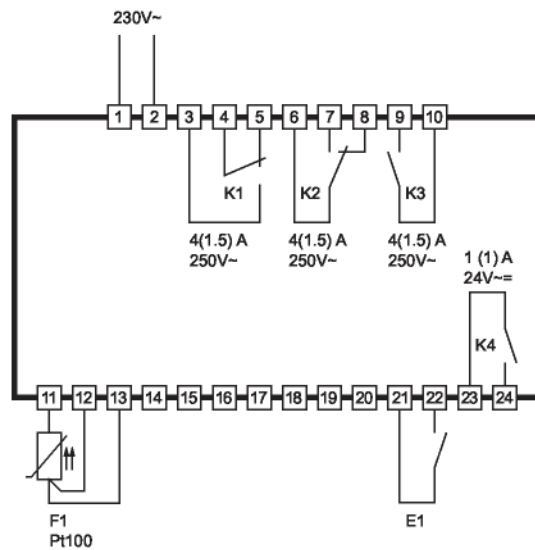
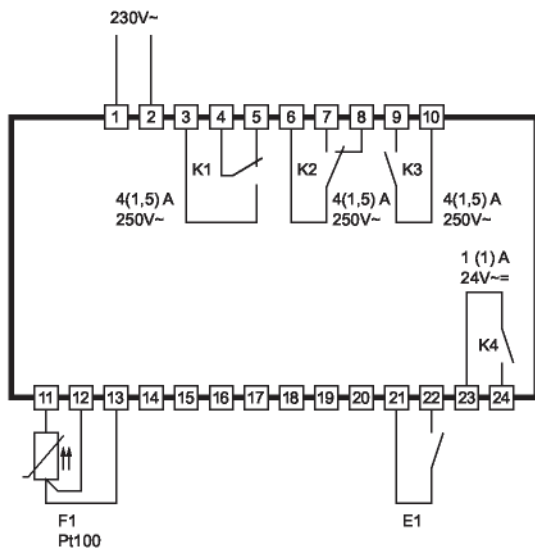
PRODUCT DESCRIPTION

The PID ramp temperature controller equipped with 4-digit LED temperature indication display, 4-digit LED time indication display and 3 output relays controls a ramp profile with a time preservation value. The switching outputs can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The third exit can be configured as range or boundary alarm. The general functions which can be freely parametered open the way for a broad application area.

Sensor: Pt100
Range: -200...850°C
Front Size: 96mm x 96mm
Panel cut-out: 90.5mm x 90.5mm
Connector: plug and socket
Software: p. 107

ORDER NUMBER 195321

ORDER NUMBER 201483



ST180-PVUA.02



PRODUCT DESCRIPTION

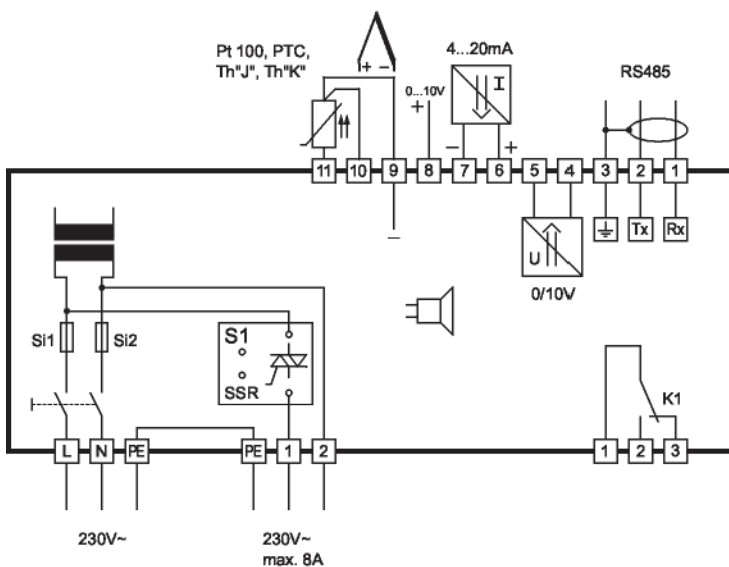
In the laboratory field, automatic controllers are often used for the most diverse heating purposes. The ST180-PVUA.02 PID controller is set on the table and wired with prepared net and output plugs within shortest time. The multi-sensor input allows the use of all common temperature sensors or value measurers (0... 10V, 4... 20mA). The installed electronic power switch element is optimal for a fast and highly precise regulation and this at basically infinite endurance. In most cases a power output of 1.8kW is completely sufficient.

A programmable second contact makes alarm signals possible. The controller can be very well interlaced. This opens possibilities of remote control, remote parameter setting and data logger functions. For this purpose, we recommend the components of our proven data logger system. Additionally, for the realisation of several heating circles the compact

housing of the ST180 of PID controller can be handily stacked.

- Sensor:** multi-sensor
- Range:** dependent on the type sensor
- Front Size:** 158mm x 44mm
- Installation data:** desk casing
- Tightness:** front IP20
- Connector:** plug and socket
- Software:** p. 107

ORDER NUMBER 389163



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ST 142



PRODUCT DESCRIPTION

The PID temperature controller equipped with 4-digit LED temperature indication display, 3-digit LED time indication display, 25 keys and 3 relays qualifies itself for various applications in the range of heating engineering due to its simple handling and robust construction. Parameters of a ramp are the ramp time, temperature preservation and the time preservation.

Each individual phase of the 5 ramps, switched one after another, can be parametered and/or changed without programming know-how. It is possible to combine three ramps altogether and to save them securely in the programme memory.

In addition to this, a pause can be programmed before each process start. The switching outputs can be programmed as two- or three-point thermostat controller or as two- or three-point PID controller.

The third exit can be configured as boundary alarm or range alarm with absolute or relative values. The switching input E1 permits fixed value control.

Sensor: Th^{“S”}

Range: -50...1750°C

Front Size: 144mm x 96mm

Panel cut-out: 136.5mm x 90.5mm

Software: p. 107

SIMILAR PRODUCTS

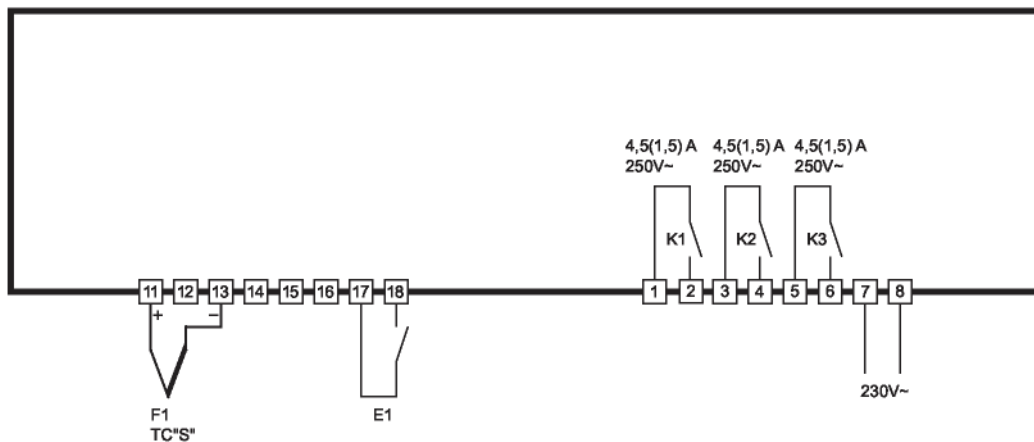
Order No. 201236: Th^{“K”}, S1 (for SSR), K2, K3

Order No. 195891: Th^{“K”} **Order No. 193185:**

Pt100 **Order No. 95950:** Pt100, S1 (for SSR), K2, K3

ORDER NUMBER

195909



ST48-W H DV M. 04

ST48-WEDAL.04



PRODUCT DESCRIPTION

The PID differential temperature controller with two 3digit LED seven segment displays, 4 keys and 3 relays is variably applicable due to its freely programmable general functions. The relay contact K1 directly affects the main setpoint, formed by reference variable and the given offset temperature. Contact K2 affects the secondary setpoint which is formed by the main setpoint via overlap or which alternatively can be freely defined. Contact K3 affects adjustable limit values.

- Sensor:** Pt100
- Range:** -99...850°C
- Front Size:** 48mm x 48mm
- Panel cut-out:** 45.2mm x 45.2mm
- Connector:** plug and socket
- Software:** p. 121

PRODUCT DESCRIPTION

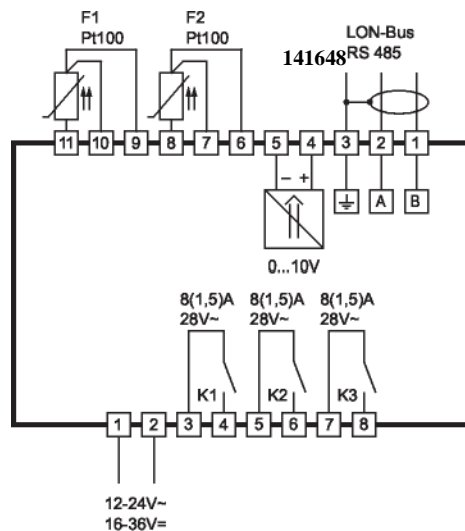
SIMILAR PRODUCTS

- Order-No. 139220:** LON FTT10a
- Order-No. 141549:** 230V~, K1, K2

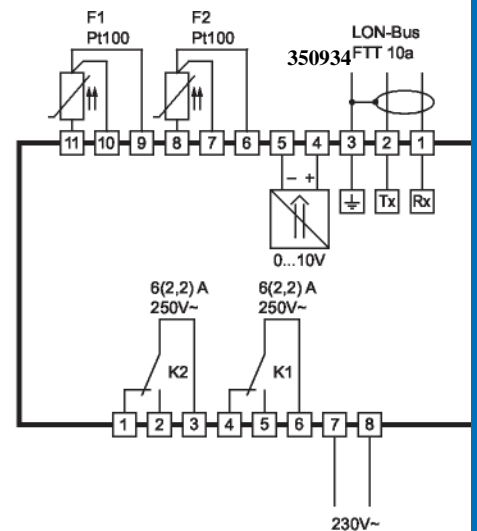
The PID differential temperature controller with two 3digit LED seven segment displays, 4 keys and 2 relays is variably applicable due to its freely programmable general functions. The relay contact K1 directly affects the main setpoint, formed by reference variable and the given offset temperature. Contact K2 affects the secondary setpoint which is formed by the main setpoint via overlap or which alternatively can be freely defined.

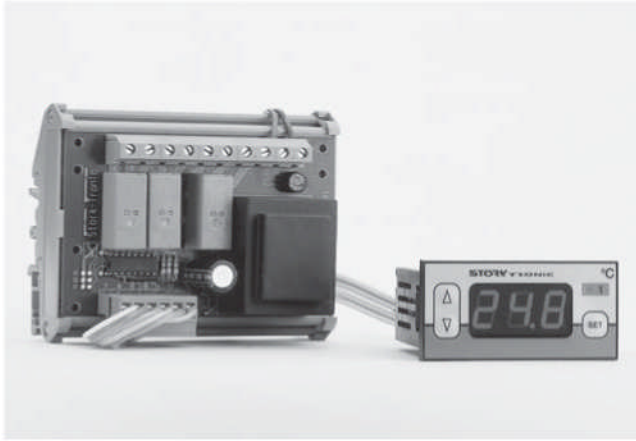
- Sensor:** Pt100
- Range:** -99...850°C
- Front Size:** 48mm x 48mm
- Panel cut-out:** 45.2mm x 45.2mm
- Connector:** plug and socket
- Software:** p. 121

ORDER NUMBER



ORDER NUMBER



ST70-31.04**PRODUCT DESCRIPTION**

The differential temperature controller with 4-digit LED seven segment display, 5 keys and 4 relays is variably applicable due to its freely programmable general functions. The relay contact K1 directly affects the main setpoint, formed by reference variable and the given offset temperature, K2 affects the secondary setpoint which is formed by the main setpoint via overlap or which alternatively can be freely defined. The contact K3 affects adjustable limit values.

Sensor: Pt100

Range: -200...850°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Connector: plug and socket

Software: p. 121

ST710-PNCVM.04**PRODUCT DESCRIPTION**

The PID differential temperature controller with a 3-digit LED seven segment displays, 3 keys and 3 transistor outputs is perfectly suitable for space-saving mountings due to its compact execution. T1 directly affects the main setpoint, formed by reference variable and adjusted offset temperature. T2 affects the secondary setpoint which is formed by the main setpoint via overlap or which alternatively can be freely defined. Exit T3 affects adjustable limit values.

F1
Pt100

F2
Pt100

Sensor: Pt100

Range: -99...850°C

Front Size: 72mm x 36mm

STÖRK **Panel cut-out:**
68.5mm x 28.5mm

terminal **Software:** p. 121

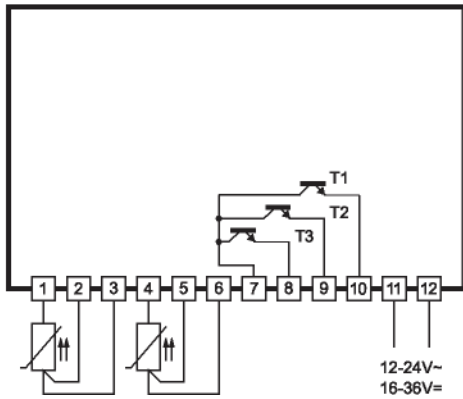
SIMILAR PRODUCTS

Order-No. 219469: 2xPTC

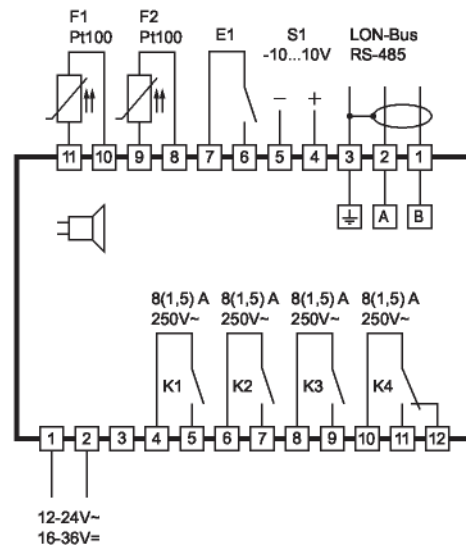
SIMILAR PRODUCTS

Order-No. 188508: LON FTT10a

ORDER NUMBER 208447



ORDER NUMBER 322503



ST96-35.04



PRODUCT DESCRIPTION

The differential temperature controller with two 4-digit LED seven segment display, 3 keys and 4 relays is variably applicable due to its freely programmable general functions. The relay contact K1 directly affects the main setpoint, formed by reference variable and the given offset temperature. Contact K2 affects the secondary setpoint which is formed by the main desired value via overlap or which alternatively can be freely defined. Contact K3 affects adjustable limit values

- Sensor:** Pt100
- Range:** -200...850°C
- Front Size:** 96mm x 96mm
- Panel cut-out:** 90.5mm x 90.5mm
- Connector:** plug and socket
- Software:** p. 121

SIMILAR PRODUCTS

- Order-No. 152769:** K1, K2, K3, analogue output
- Order-No. 207985:** 230V~, K1, K2, K3
- Order-No. 217307:** 230V~, K1, K2, K3, analogue output

ST96-33.05



PRODUCT DESCRIPTION

Its simple handling and robust structure prepare the two-channel temperature controller with two 4-digit LED displays, 5 keys and 3 relays for various employment. The switching outputs K1 and K2 of the first channel can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The third output forms the second channel and can be variously configured as thermostat controller.

- Sensor:** Pt100
- Range:** -99...850°C
- Front Size:** 96mm x 96mm
- Panel cut-out:** 90.5mm x 90.5mm
- Connector:** plug and socket
- Software:** p. 127

SIMILAR PRODUCTS

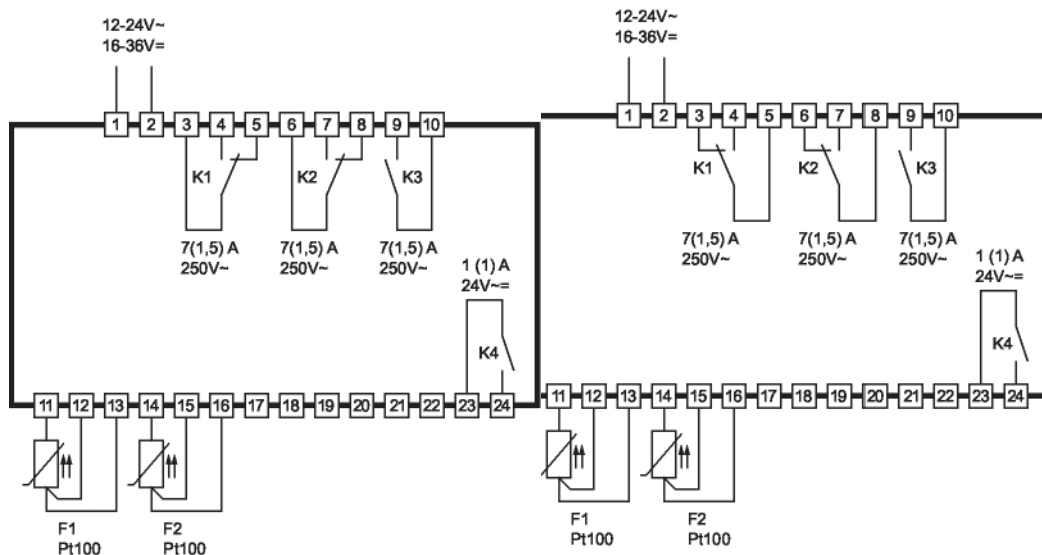
- Order-No. 195222:** power supply 230V~
- Order-No. 201533:** ST72 housing, 230V~
- Order-No. 311134:** ST72 housing, 12-24V AC/DC

ORDER NUMBER

225201

ORDER NUMBER

203737



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14

ST96-36.05

**PRODUCT DESCRIPTION**

The two-channel temperature and humidity controller with two 4-digit LED-displays, 4 keys and 3 relays was developed especially for the signal processing of humidity temperature sensors (FF16). The switching outputs K1 and K2 of the first channel can be programmed as two or three-point thermostat controllers or as two or three-point PID controllers. The third output forms the second channel and can be variously configured as thermostat controller.

Sensor: FF16

Range: -99...850°C, 0...100%rH

Front Size: 96mm x 96mm

Panel cut-out: 90.5mm x 90.5mm

Connector: plug and socket

Software: p. 127

ST501-LSTA.25

**PRODUCT DESCRIPTION**

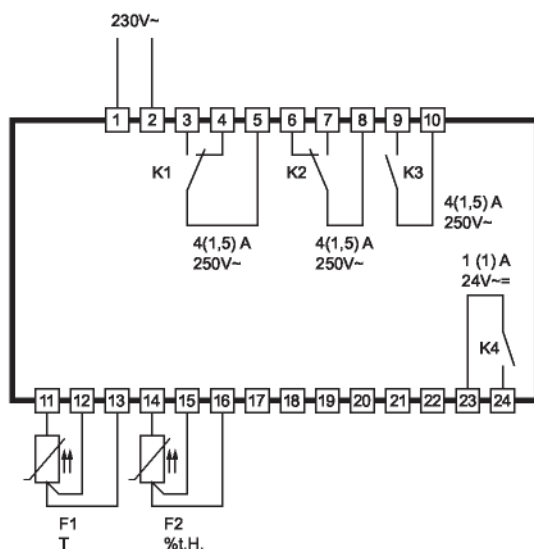
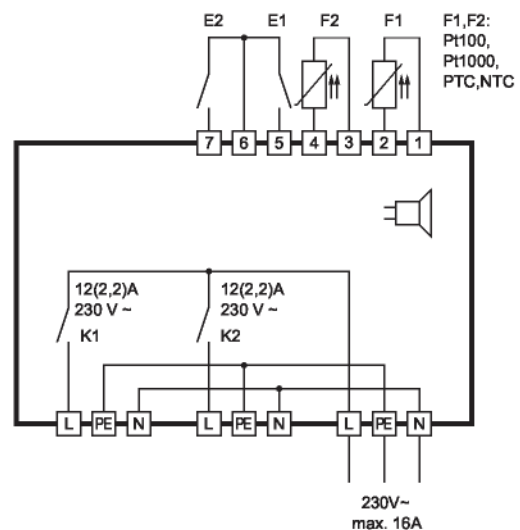
Its simple handling and robust structure prepare the two-channel temperature controller with 4-digit LED display, 6 keys and two relays for various employment. Channel selection and setpoint default are directly accessible with respectively assigned keys. A selective activation of the channels is possible with the standby key. The two channels can be linked with one another. The freely programmable general functions qualify the ST501 for a broad application area.

Range: dependent on type of sensor

Front Size: 106mm x 68mm **Panel cut-**

out: 87.5mm x 56.5mm **Connector:**

plug and socket **Software:** p. 128

ORDER NUMBER**195255****ORDER NUMBER****196782**

ST503-QE 1 TA. 25



PRODUCT DESCRIPTION

Its simple handling and robust structure prepare the two-channel temperature controller with 4-digit LED display, 6 keys and two relays for various employment. Channel selection and setpoint default are directly accessible with respectively assigned keys. A selective activation of the channels is possible with the standby key. The freely programmable general functions qualify the ST503 for a broad application area.

Measuring Range: dependent on the type of sensor

Front Size: 106mm x 68mm

Depth: 41 mm

Connector: screw terminal

Software: p. 128

PRODUCT DESCRIPTION

ST70-34.07



The freely programmable timer switch combined with the temperature controller ST70, available in the same design. Together with the possibility of various par-output contacts and two switching inputs will allow the employment of any one can think of. The timer can be stopped both with the front buttons and with the switching inputs.

Time interval: 0.1s...99.99s/1min...99h59min

Front Size: 72mm x 36mm **Panel cut-out:**

68.5mm x 28.5mm **Connector:** screw terminal

Software: p. 133

SIMILAR PRODUCTS

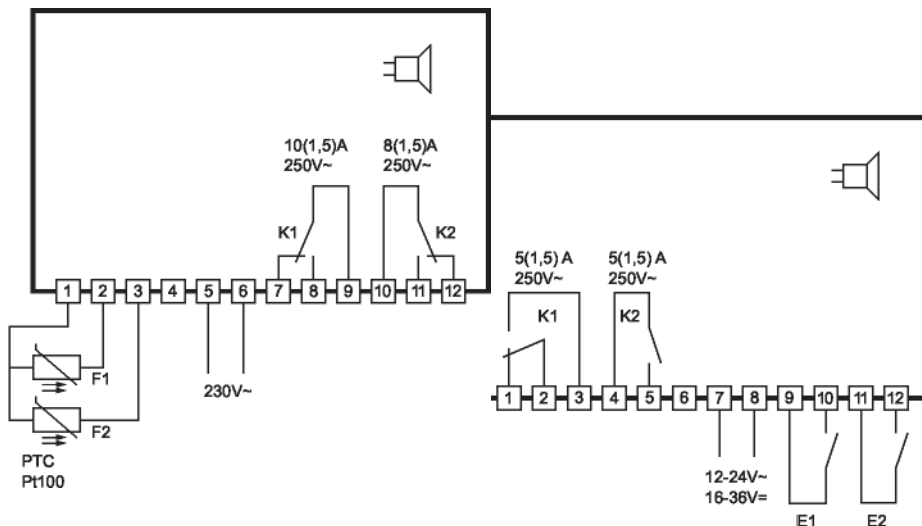
Order-No. 210542: front tightness IP63

ORDER NUMBER

167064

ORDER NUMBER

201269



ST72-34.07

ST501-QHXA.07



PRODUCT DESCRIPTION

The freely programmable timer is preferably combined with the temperature controllers ST72, available in the same design. Together with the possibility of various parameters, two output contacts and two switching inputs will allow the employment of any applications one can think of. The timer can be started and stopped both with the front buttons and with the switch entries.

- Time interval:** 0.1s... 99.99s/1min... 99h59min.
- Front Size:** 72mm x 72mm
- Panel cut-out:** 66.5mm x 66.5mm
- Connector:** plug and socket
- Software:** p. 133

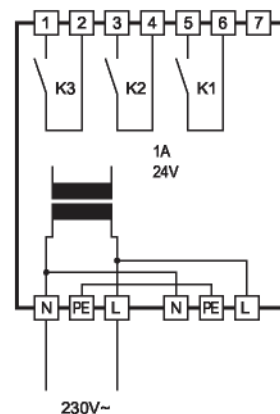
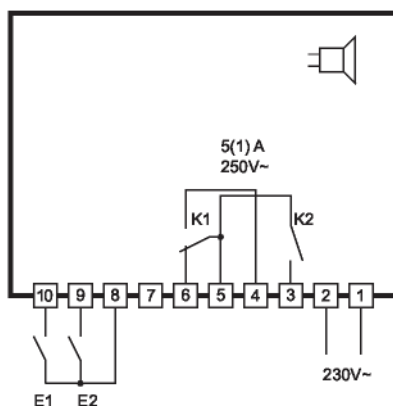
PRODUCT DESCRIPTION

The week-timer was developed for the real time control of succeeding regulation and control components. Battery back-up guarantees the operability of the timer without mains voltage over several years. Particular importance was attached to the very easy programmability of the 3 outputs. Altogether it is possible to program three daily switching phases within the period of a week. The minimum cyclic duration is 1 minute, switching times over several days are also possible.

- Front Size:** 106mm x 68mm **Panel cut-out:** 87.5mm x 56.5mm
- Connector:** screw terminal

ORDER NUMBER 210591

ORDER NUMBER 562



ST64-31.07



PRODUCT DESCRIPTION

The timer ST64-31.07 was developed for simple process control. The round housing allows applications at locations in which formerly only mechanical controls were in use. The timer is supplied with a tension of 230V AC. The installed relay has a maximum electric Ohm load of 16A. Inductive loads can be switched up to 2.2A.

- Front Size:** 64mm round
- Panel cut-out:** 60mm round
- Tightness:** front IP65
- Connector:** flat plug 6.3mm
- Software:** p. 133

PRODUCT DESCRIPTION

ST70-31.16



The two-stage controller with 3-digit LED display, 3 keys and two relays is perfectly suitable for space-saving mountings due to its compact execution. The switching outputs can be programmed as thermostat controllers with additional protection times for the compressor. The sequential change-over supports the even wear of both connected compressors.

- Sensor:** PTC
- Range:** -50...150°C
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Connector:** screw terminal
- Software:** p. 135

SIMILAR PRODUCTS

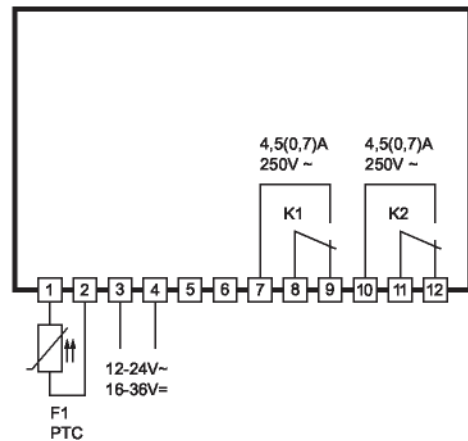
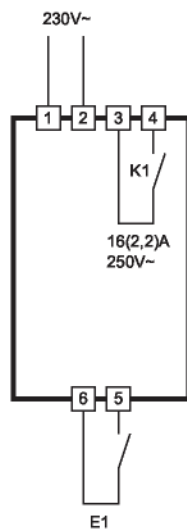
Order-No. 300087: front tightness IP63

ORDER NUMBER

369132

ORDER NUMBER

204511



ST71 0-KHJV .16



PRODUCT DESCRIPTION

The three-stage controller has 3-digit LED display, 5 keys and 3 relays. Additionally, a mutual start delay is possible. The switching exits can be programmed as thermostat controllers with additional protection times for the compressor. The sequential change-over supports the even wear of both connected compressors. Additionally, a mutual start delay is possible.

Sensor: PTC

Range: -50...150°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

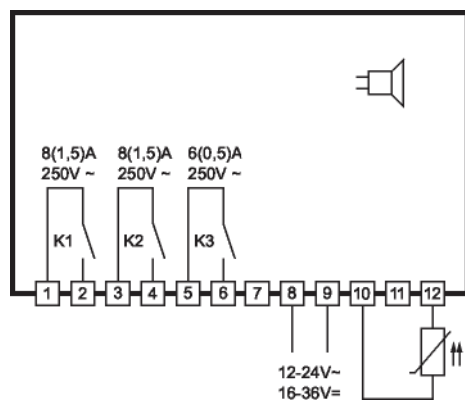
Tightness: front IP65

Connector: plug and socket

Power supply: 12-24V~/16-36V=

ORDER NUMBER

351692



ST72-31.16



PRODUCT DESCRIPTION

The three-stage controller with 3-digit LED display, 3 keys and three relays is perfectly suitable for space-saving mountings due to its compact execution

The switching exits can be programmed as thermostat controllers with additional protection times for the compressor. The sequential change-over supports the even wear of both connected compressors. The switching entrance E1 allows change-over of the setpoint.

Sensor: PTC

Range: -50...150°C

Front Size: 72mm x 72mm

Panel cut-out: 66.5mm x 66.5mm

Connector: plug and socket

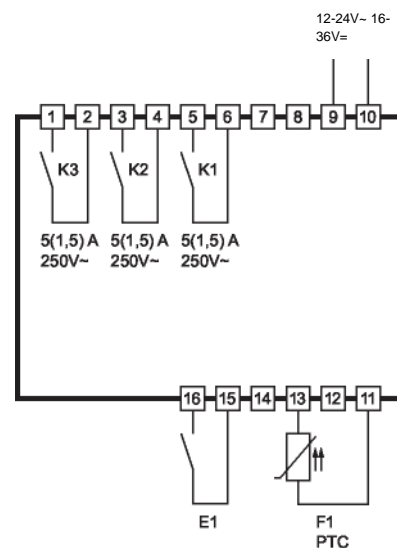
Software: p. 135

SIMILAR PRODUCTS

Order-No. 134742: power supply 230V~

ORDER NUMBER

328492



ST96-35.16



PRODUCT DESCRIPTION

The four-stage controller with 4-digit setpoint and actual value display, 3 keys and 4 relays was developed for the control of compressor groups of up to 4 machines. The switching exits can be programmed as thermostat controllers with additional protection times for the compressor. The switching input E1 allows change-over of the setpoint. The general functions which can be freely parametered open the way for a broad application area.

- Sensor:** Pt100
- Range:** -200...850°C
- Front Size:** 96mm x 96mm
- Panel cut-out:** 90.5mm x 90.5mm
- Connector:** plug and socket
- Software:** p. 135

PRODUCT DESCRIPTION
SIMILAR PRODUCTS

Order-No. 152652: power supply 230V~

ST710-PWHVM.26



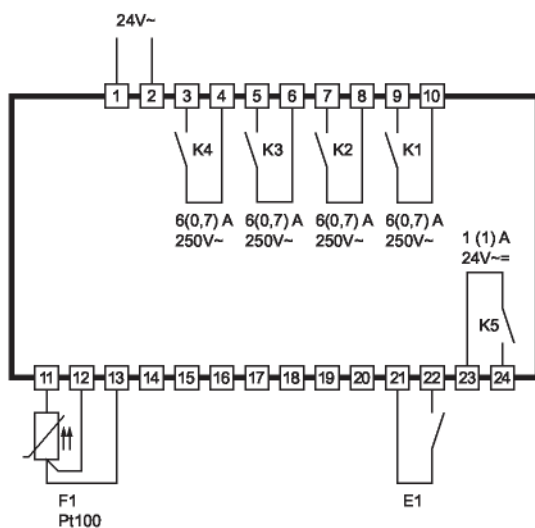
The six-stage controller was developed for the control of compressor groups of up to 6 machines, and/or the control of compressors with bypass-valves (max. 3 machines). The basic gas characteristics are part of the fixed programme data – therefore, it is possible to execute a pressure control (4...20mA) and to show the temperature values at the same time. The compressor running times can be optimised by help of the sequential or time-conditioned changeover. The controller that can be parametered in various ways has an alarm contact and an hour meter.

- Front Size:** 84mm x 42mm
- Panel cut-out:** 67.5mm x 31.5mm
- Connector:** plug and socket
- Software:** p. 137

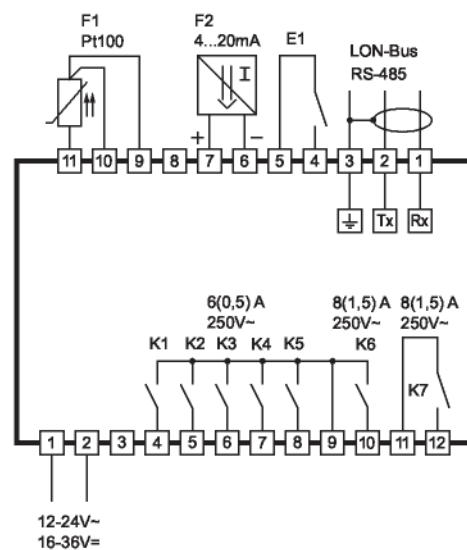
SIMILAR PRODUCTS

Order-No. 319079: LON FTT10a

ORDER NUMBER 329789



ORDER NUMBER 175539



ST46-36.15**PRODUCT DESCRIPTION**

The cooling controller ST46-36.15 is supplied with 230V and intended for the assembly on DIN rails. It possesses two analogue inputs for temperature sensors and four relays. The fourth relay configured for the alarm function extends the operational functions of this controller with regard to cooling applications. All parameters are freely adjustable and pre-set ex works on a practice-oriented basis.

Sensor: PTC

Range: -55...99°C

Housing size(L x W x H): 95 x 53 x 59mm **Installation:**

Clip-on mounting on DIN-Rail 35 x 7.5mm **Tightness:** front IP50

Connector: screw terminal

Software: p. 144

ST70-36.11**PRODUCT DESCRIPTION**

The cooling controller ST70-36.11 is a controller with a timed defrost function. It has an analogue input for PTC resistance sensor and a relay. All parameters are freely adjustable and pre-set ex works on a practice-oriented basis.

The red, 13 mm high display is a 2-digit execution with minus signs. It is an easy-handling controller that has proven itself in various standard applications for many years.

Sensor: PTC

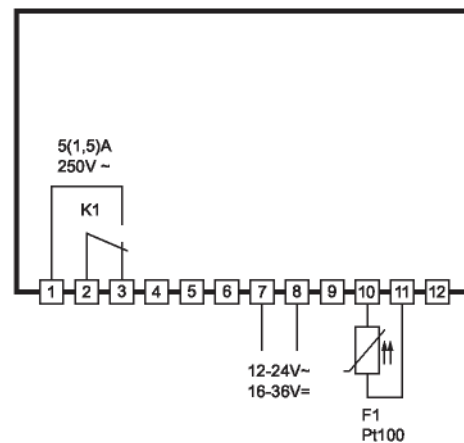
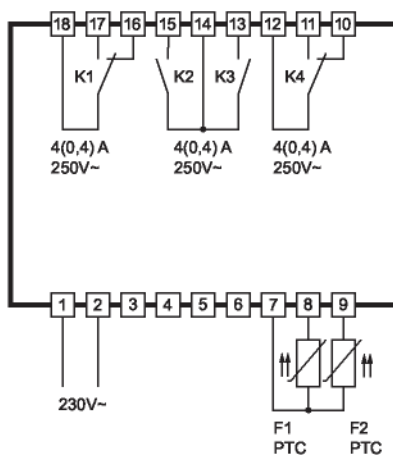
Range: -55...99°C

Front Size: 72mm x 36mm

Panel cut-out: 68.5mm x 28.5mm

Tightness: front IP50 **Connector:**

screw terminal **Software:** p. 144

ORDER NUMBER**298612****ORDER NUMBER****201772**

ST70-36.13



PRODUCT DESCRIPTION

The cooling controller ST70-36.13 is a controller with a timed defrost function. It has two analogue inputs for PTC resistance sensor and three relays. All parameters are freely adjustable and pre-set ex works on a practice-oriented basis. An external defrost process can be started at the digital switching input. It is an easy-handling controller that has proven itself in various standard applications for many years.

Sensor: PTC
Range: -55...99°C
Front Size: 72mm x 36mm
Panel cut-out: 68.5mm x 28.5mm
Tightness: front IP50 **Connector:** screw terminal **Software:** p. 144

ST70-36.15A



PRODUCT DESCRIPTION

The cooling controller ST70-36.15A is a controller with a timed defrost function. It has two analogue input for PTC resistance sensor and four relays. The fourth relay configured for the alarm function (potential-free) extends the operational functions of this controller with regard to cooling applications. All parameters are freely adjustable and pre-set ex works on a practice-oriented basis. It is an easyhandling controller that has proven itself in various standard applications for many years.

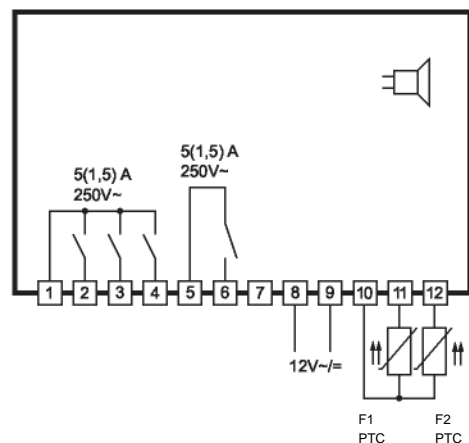
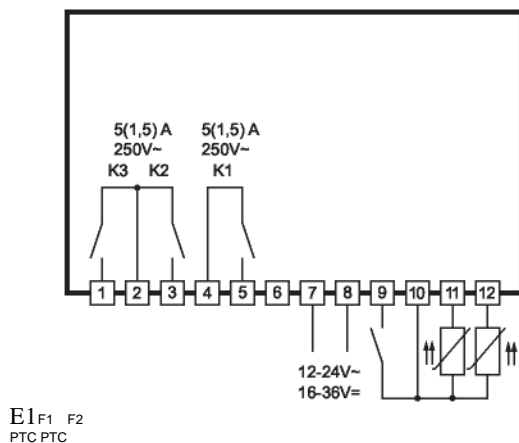
Sensor: PTC
Range: -55...99°C
Front Size: 72mm x 36mm
Panel cut-out: 68.5mm x 28.5mm
Tightness: front IP50 **Connector:** screw terminal **Software:** p. 144

SIMILAR PRODUCTS

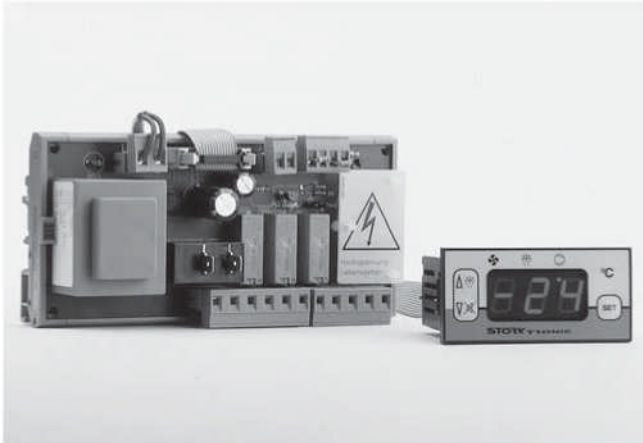
Order-No. 201939: alarm relay potential-afflicted

ORDER NUMBER **201764**

ORDER NUMBER **349241**



ST70-36.14



PRODUCT DESCRIPTION

The ST70-36.14 is a cooling controller with time-controlled defrost function. A characteristic of this controller is the separate system supply module, which creates a certain constructional freedom. That way, the controller can be installed in the instrument panel and the system supply module on the standard rail. All inputs and outputs are connected with the system supply module, which communicates with the controller via separate cable connection. The system supply module has two analogue inputs for PTC resistance sensors and two digital inputs for the external switching functions defrost start and alarm entry.

Function jumper:

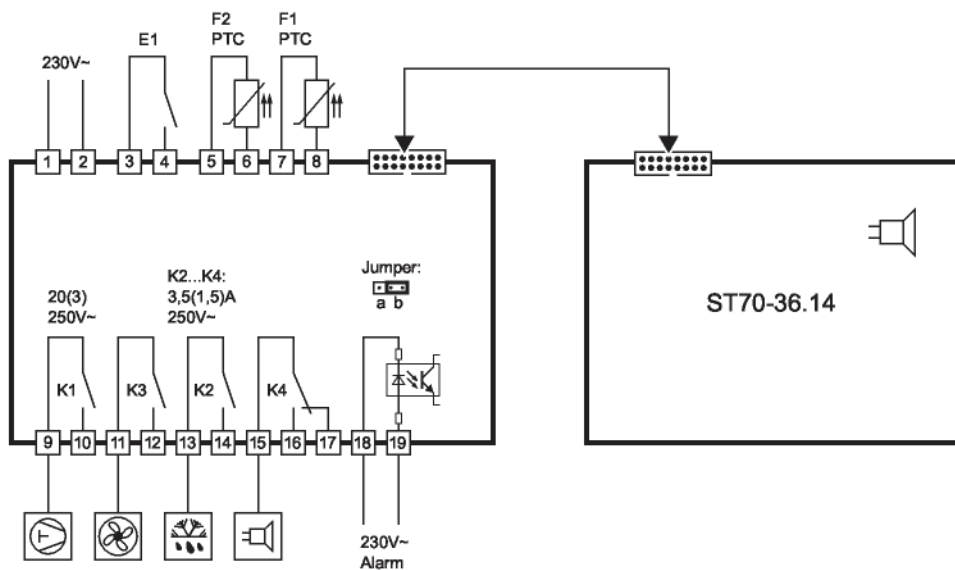
position „a“: relay tightened at alarm, otherwise open
 position „b“: relay open at alarm, otherwise tightened
 It has to be stressed that the alarm entry is set for 230V mains voltage, so that the safety chain can be set directly. Additionally, four relays with increased switching power are employed. All parameters are freely adjustable and preset ex works on a practice-oriented basis. The controller is simple to handle and has proved itself in various standard applications for many years.

The delivery programme of this controller includes a controller with 1.5m cable, a system supply module and two temperature sensors with 4m cable each.

- Sensor:** PTC
- Range:** -55...99°C
- Front Size:** 72mm x 36mm
- Panel cut-out:** 68.5mm x 28.5mm
- Tightness:** front IP50 **Connector:** plug and socket
- Software:** p. 144

ORDER NUMBER

203125



Universal flush panel controls for cooling and hot bars

Mechanics

There are two series with a housing of 158 x 44 mm at disposal. The units of series ST181 with a front height of 52 mm and width of 180 mm are installed from the front, whereas the devices of the series ST182 with a front height of 71 mm and width of 180 mm are installed from the back.

The control unit is installed with four screws in the front or respectively six screws in the back.

A contact-voltage-proof connection allows an open assembly of the unit. The stylish, slim design demands a concession regarding the installation depth, which is approximately 160 mm, including plug connector and cable.

Plug-in technology

In the back, the control units are equipped with 2 -, 3- and 4-pole plug connectors. The 2-pole plug connectors are exclusively used for temperature sensor connections. Mechanical and colour coding eliminates mistakes in confusing the chamber and evaporator temperature sensor. There are 3-pole plug connectors for mains connections and outlets. The plug connectors are equipped with a leading protective ground contact as well as with phase and neutral conductor. The maximum current load of this type of plug connector is 230 V alternating current 16 A. This plug-in technology allows operation without an additional switch-box in nearly all applications. Generally, the final consumers, i.e. compressors, lamps, ventilators etc. are pre-mounted both with a 3-pole cable and a plug and connected only at final assembly or at the customer's premises. The control units are always delivered with all connection plugs. They are, however, also available as spare parts. In addition to their function as power connection, the plug connectors function as bolt and cable strain relief. This technology permits installation and exchange of control units without any special expertise within five minutes.

Current load

The output relays are intended for 16 A

permanent current with 230 V. This means that one could switch an Ohm's load (e.g. defrosting unit) with 3.5 KW with the relays. Restrictively, it has to be mentioned however, that the maximum output for the control unit provided by the power line is also limited to 16 A, i.e. all connected consumers would have to be operated with a total of 16 A. The control units are equipped with 6.3 A fuses. Exceptions are the 4 A fuse for the number of revolutions and the compressor exit. The latter is intended to work without fuse. Due to the installed 6.3 A fuses, the power output is limited to approximately 1.4 KW at Ohm's stress. Higher currents require an inquiry with Störk-Tronic. With regard to engine loads (compressors), apart from the permanent current, the start-up surge current and the blocked motor current are to be considered. The installed 16 A relays can withstand maximally 25 A for a short period, so that a blocked motor current or starting current is tolerable up to this limit value. However, these current values are not uniform with the different compressors, not even at the same output. Back-up contact with Störk-Tronic or the compressor manufacturer may be required under certain circumstances. Based on our experience we can recommend the installed relay for an engine performance of up to 1 HP (736 W) without any reservation.

Keys

Depending on execution, the control units are provided with 4 – 7 keys in the front. Three keys are for the adjustment of the control unit; the fourth key is intended as standard stand-by. The function of the optionally available further keys is determined via parameters by the user himself, depending upon need.

Temperature control

The temperature control is ensured by a special software. A listing of the respective parameters starts on page 147. Extensive parameter settings of the temperature control unit permit adjustment to the most different applications. The basic setting of the controller is suitable for the application at a bakery bar with electrical defrosting. On request the temperature control units

can, of course, be pre-parametered at our works, i.e. parameter-setting at serial production is rendered void. At this point we would like to stress the technical expertise and advice that we can offer at the customer's premises when it comes to the adjustment of the first control units. Except for the smallest versions, our control units are always delivered with two sensor connections to feel the room and evaporator temperature. The latter sensor serves to feel the surface temperature of the evaporator during an energy-optimised defrosting process. Should this sensor not be used, it can be switched off via parameters. Upon request, the second sensor can operate as independent thermostat, which permits a simple double regulation.

Front foils

Installing the control unit, a front tightness of IP65 is reached. A stand-by key fulfills the function of the main switch. Therefore, a 2-pole mains separation does not take place in these control units and a possibly necessary mains separation should take place outside the unit.

Revolution number control

Some devices of the ST181-series are equipped with a revolution number control. This allows the gradual regulation of the ventilator revolution number. There are versions for AC ventilators and for DC ventilators. A kick-start circuit always puts the ventilators into operation at a maximum tension which, after a few seconds, is reduced to the number of revolutions pre-set by the user. This circuit ensures a reliable ventilation start also at low tension. The ventilation revolution number is set with control unit parameters. AC ventilators allow a max. ventilator current load of 2.5 A, i.e. a total ventilator output of approx. 500 W is possible. Control units provide DC ventilators with a 10 W cable connection.

Real-time clock

Some bar applications, primarily in the butchery sector, may necessitate an adjustment of the defrosting periods to the opening hours of the store. Some

devices of the ST181-series are therefore equipped with a real-time clock for real-time defrosting. In the simplest way, this permits adjustment of the clock, respectively the change from summer to winter time and vice versa. It is equally possible to couple the clock function with lighting or a day/night change-over.

Adjustment of the setpoint

The temperature of a cooling bar should be somewhat lower during the opening hours of a store than during the night or on the weekend. This finds reason in the additional heating sources of lighting and customers in the store. The control unit ST181 makes it possible to adjust both the bar temperature and the ventilation revolution number by help of a feeler. This patented solution also economises current consumption.

Customised executions

Design-technical adjustments of serial devices in colour, marking, etc. are possible at a low up-charge. Customised executions requiring circuit-technical adjustments can equally be provided, however at a minimum purchase quantity.

Network compatibility

All ST181-control units specified in the catalogue can be equipped with a BUS interface. In the case of respective requirements by the customer, we recommend to get in touch with our technical department.

ST181-KH4JA.12



PRODUCT DESCRIPTION

This installation controller was intended for the solution of simpler cooling techniques. The three outputs for compressor, light and fan are intended for high performances, and thus for direct switching from maximally 1HP engine power. Front tightness and perfect protection of the rear wall against condensation water dripping down offer optimal installation possibilities of coolers in fine steel execution to the customer.

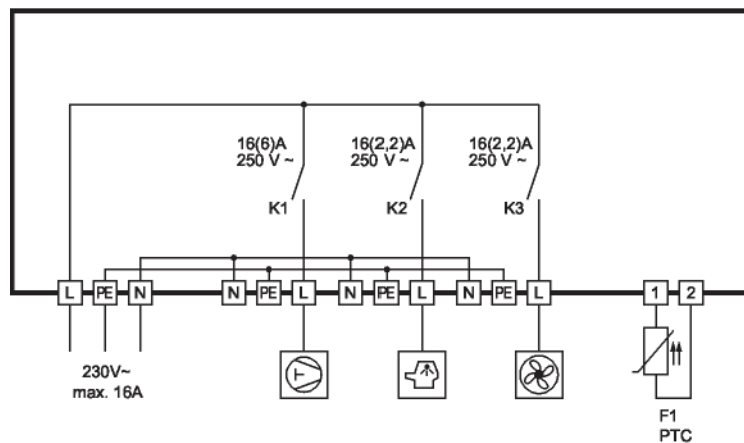
As it often is the simple coolers that are very price sensitive,

the complete execution of the controller (no terminal box, no power switch) and its wiring ensure a cost-saving assembly within few minutes. Both the net plugs and the temperature sensors are mechanic and colour-coded.

- Sensor:** PTC
- Range:** -55...99°C
- Front Size:** 180mm x 52mm
- Panel cut-out:** 159mm x 45mm
- Tightness:** front IP65 **Connector:** Wieland terminal
- Software:** p. 147

ORDER NUMBER _____

144352



ST182-LP4KA.12



PRODUCT DESCRIPTION

The flush panel control ST181-LP4KA.12 offers high power at considerably small size, and thus optimal installation possibilities for design-oriented refrigerators. Behind the elegant front, four power exits run a high switching performance. The relays can switch 16A each at 230V mains voltage, for engines (compressors) 1HP is the maximum performance. Beside the refrigerating chamber sensor, a second temperature sensor for the evaporator can be activated. This allows economic and technically optimised defrosting, both with passive and active cooling with electrical heating elements or hot gas.

There is a reserve output for lighting or other functions. When installed in fine-steel refrigerators, its front execution turns the ST182 into a genuine designer masterpiece. And all that at a front tightness of IP65.

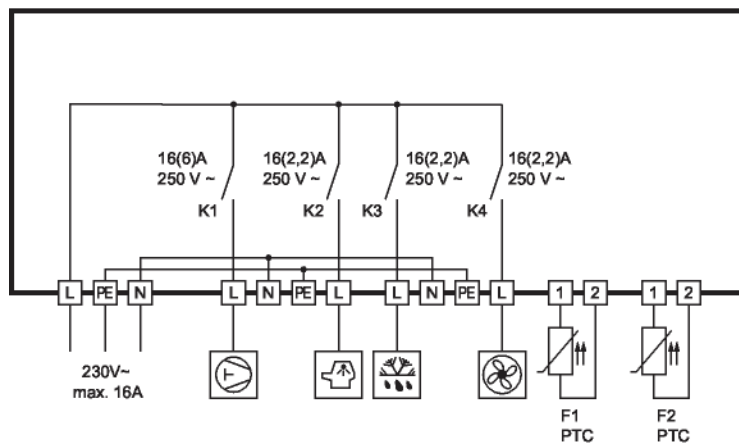
Sensor: PTC
Range: -55...99°C
Front Size: 158mm x 49mm
Installation Size: 180mm x 71mm
Tightness: Front IP65 **Connector:** Wieland terminal **Software:** p. 147

SIMILAR PRODUCTS

Order No.193391: ST181 version

ORDER NUMBER

358655



ST181-LM4KA.12



PRODUCT DESCRIPTION

The cooling controller ST181-LM4KA.12 is a control unit specifically designed for 24V DC ventilation adjustment. The maximum ventilation power is 10W. The number of revolutions can be decreased to 20% and thus create a minimum air speed. Due to the galvanic separation of the ST181-controller the low-voltage ventilator can also be safely operated in a wet environment.

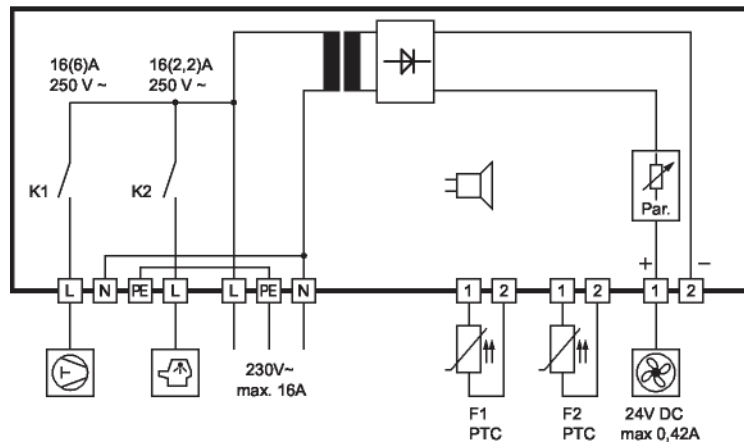
The two switching outputs for 16A each (engine load max.

1 HP) supply the compressor, lighting or other necessary exits.

- Sensor:** PTC
- Range:** -55...99°C
- Front Size:** 180mm x 52mm
- Panel cut-out:** 159mm x 45mm
- Tightness:** Front IP65
- Connector:** Wieland terminal
- Software:** p. 147

ORDER NUMBER

127092



ST182-VM4KA.12



PRODUCT DESCRIPTION

The cooling controller ST181-LM4KA.12 is a control unit specifically designed for 24V DC ventilation adjustment. The maximum ventilation power is 10W. The number of revolutions can be decreased to 20% and thus create a minimum air speed. Due to the galvanic separation of the ST181-controller the low-voltage ventilator can also be safely operated in a wet environment.

The two switching outputs with our proven 16A relay allow complete operation of the cooling circle as well as further additional features, as for example the lighting and many other functions.

The timer allows a 1-week time management for the defrosting periods as well as for setting the cooling chamber temperature at night or on the weekend. With regard to the parameter level, programming of this timer is easy and user-friendly. The actual time can be re-set simply directly on the operator surface.

Sensor: PTC

Range: -55...130°C

Front Size: 158mm x 49mm

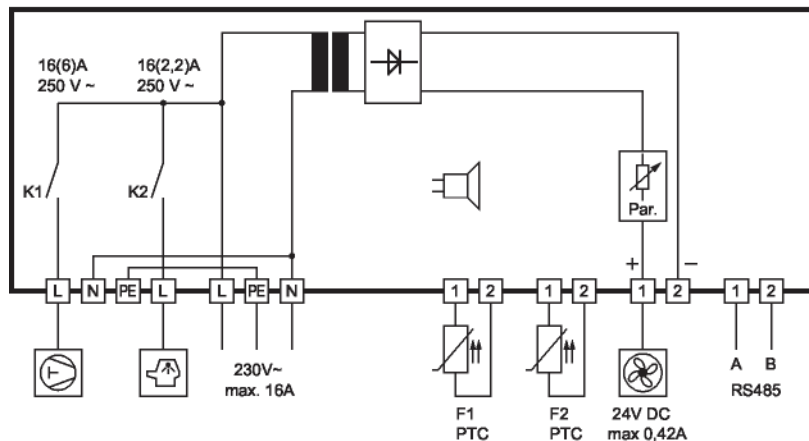
Installation Size: 180mm x 71mm

Tightness: front IP65 **Connector:** Wieland terminal

Software: p. 147

ORDER NUMBER

378117



ST185-LP4KA.12



PRODUCT DESCRIPTION

The flush panel control ST185-LP4KA.12 offers high power at considerably small size, and thus optimal installation possibilities for design-oriented refrigerators. Behind the elegant front, four power exits run a high switching performance. The relays can switch 16A each at 230V mains voltage, for engines (compressors) 1 HP is the maximum performance. Beside the refrigerating chamber sensor, a second temperature sensor for the evaporator can be activated. This allows economic and technically optimised defrosting, both with passive and active cooling with electrical heating elements or hot gas.

There is a reserve output for lighting or other functions. When installed in fine-steel refrigerators, its front execution turns the controller into a genuine designer masterpiece. And all that at a front tightness of IP65.

Sensor: PTC

Range: -55...99°C

Front Size: 52mm x 180mm

Panel cut-out: 45mm x 159mm

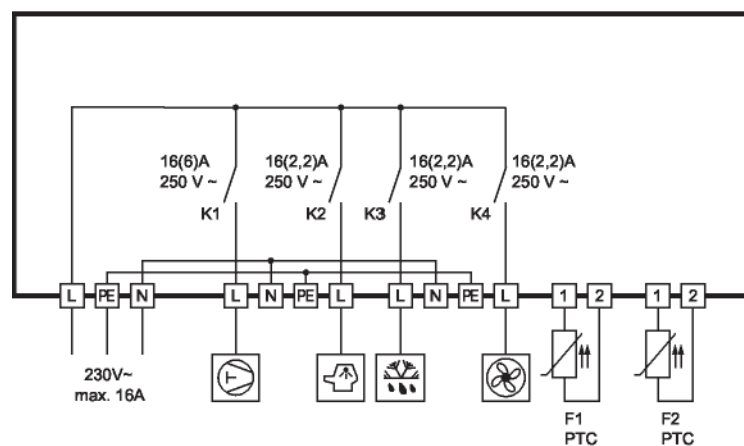
Tightness: Front IP65

Connector: Wieland terminal

Software: p. 147

ORDER NUMBER

229294



ST186-LM4KA.12



PRODUCT DESCRIPTION

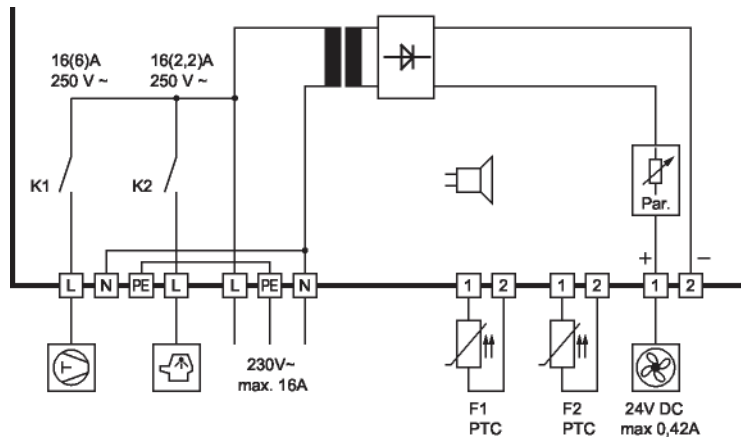
The cooling controller ST186-LM4KA.12 is a control unit specifically designed for 24V DC ventilation adjustment. The maximum ventilation power is 10W. The number of revolutions can be decreased to 20% and thus create a minimum air speed. Due to the galvanic separation of the ST181-controller the low-voltage ventilator can also be safely operated in a wet environment.

The two switching outputs for 16A each (engine load max. 1 HP) supply the compressor, lighting or other necessary exits.

Sensor: PTC
Range: -55...99°C
Front Size: 49mm x 158mm
Installation Size: 71 mm x 180mm
Tightness: Front IP65 **Connector:** Wieland terminal
Software: p. 147

ORDER NUMBER

151993



ST 189-VRXA.12



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PRODUCT DESCRIPTION

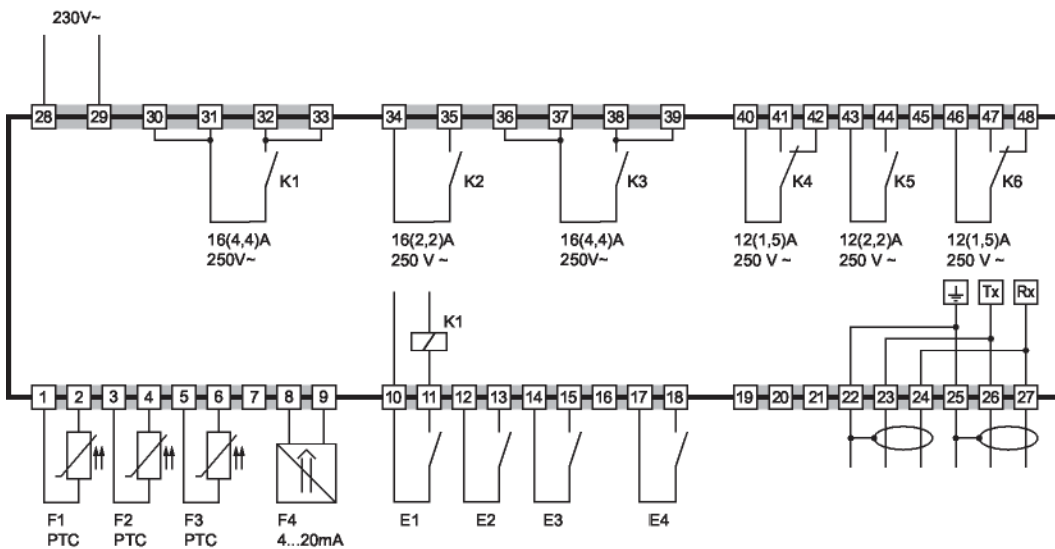
The ST189-VRXA.12 is a large-scale cooling controller. The DIN rail installation control usually finds its place in switch-gear cabinets, despite the fact that the astonishing switching exit performance in many cases renders succeeding cut-out relays redundant. Thanks to the parameter options, the unit can be programmed for the most different tasks. Among others, during the pumping down circuit, four switching entrances allow connections to pressure monitors and further monitoring contacts.

The number of sensor inputs makes the operation of several cooling circles possible or additional regulation of a condensing ventilator, at case also by means of a 4-20mA pressure sensor. The installed week-timer is equipped with a battery back-up (min. 10 years). The advantages present themselves in defrosting management. The ST189-VRXA.12 regulates the employment at different day as well as the automatic cooling chamber temperature adjustments on the weekend.

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the
times

ORDER NUMBER

389106



Sensor: PTC, 4...20mA
Range: -55...130°C, 0...20 Bar Front
Size: 158mm x 45mm Installation

IP20

Connector: screw terminal

Software: p. 147

ST501-KPKA.12



PRODUCT DESCRIPTION

The cooling controller ST501-KPKA.12 has a specially slim housing shape in depth. This opens new ways for construction and front design to the user. The functions of the inputs, outputs and selected keys can be freely selected, whereas various applications with only one controller are possible. The controller, for example, can operate with two coolers if the evaporator sensor is parametered as sensor for a second refrigerating chamber.

Sensor: PTC

Range: -50...150°C

Front Size: 106mm x 68mm **Panel**

cut-out: 87.3mm x 56.1mm

Tightness: Front IP65 **Connector:**

plug and socket **Software:** p. 147

PRODUCT DESCRIPTION

ST502-KS3KA.12



The micro-processed controller ST502-KS3KA.12 is used for the thermostatic temperature control of simple refrigerating plants. It is supplied with 230V AC and has two exit relays. The relays can be used for different functions, e.g. for a compressor, a defroster, an alarm relay, etc. Two resistance sensors can be connected. A sensor seizes the refrigerating chamber temperature, and the function of the second sensor can be differently parametered.

Sensor: PTC

Range: -50...130°C

Front Size: 87mm x 66mm

Installation Size: 106mm x 80mm

Tightness: front IP65 **Connector:**

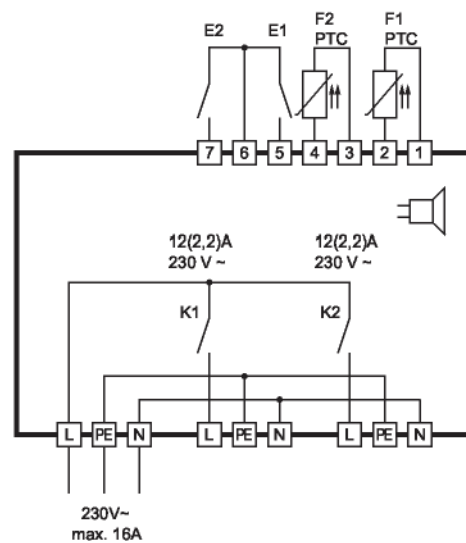
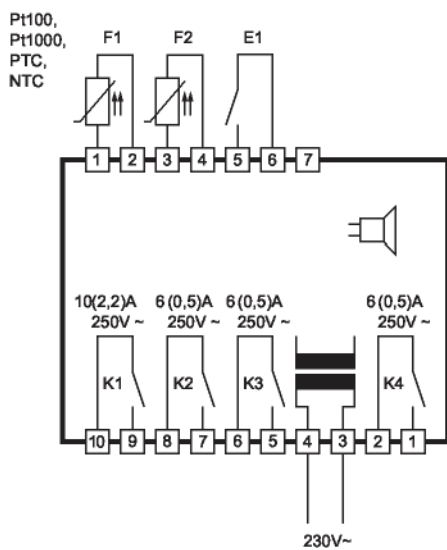
cage clamp **Software:** p. 147

ORDER NUMBER

141853

ORDER NUMBER

135723



ST502-KV 1 TA.12



PRODUCT DESCRIPTION

The micro-processed controller ST502-KV1TA.12 is used for the thermostatic temperature control of simple refrigerating plants. It is supplied with 230V AC and has one exit relays and an adjustable output for a AC voltage ventilator. The relay can be programmed for different functions. The ventilator output (TRIAC) regulates the ventilation speed via gradually adjustable tension.

- Sensor:** multi-resistance input
- Range:** dependent on the type of sensor
- Front Size:** 87mm x 66mm **Tightness:** front IP65
- Connector:** screw terminal, optional flat plug
- Software:** p. 147

ST710-KOKA.12



PRODUCT DESCRIPTION

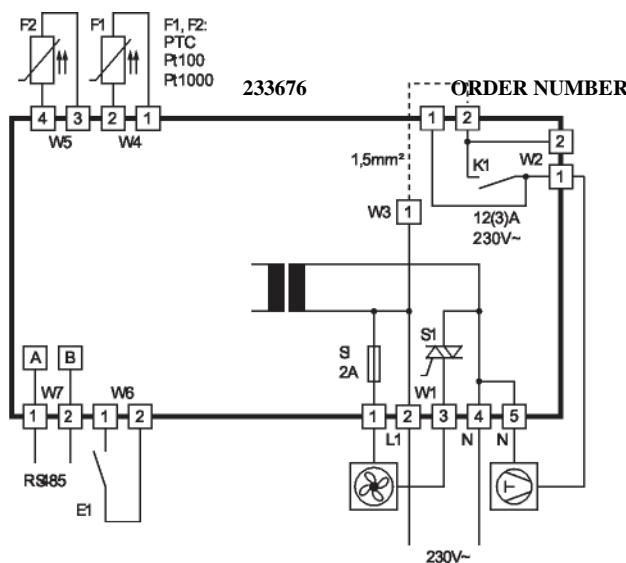
The cooling controller ST710-KOKA.12 is supplied with 230V AC and can be employed in many cooling applications. It has two sensor inputs, five keys and four relays. The functions of the inputs, outputs and special keys can be freely selected, whereas various applications with only one automatic controller are possible. The controller, for example, can operate with two coolers if the evaporator sensor is parametered as sensor for a second refrigerating chamber.

- Sensor:** PTC
- Range:** -50...150°C
- Front Size:** 84mm x 42mm
- Panel cut-out:** 67.5mm x 31.5mm
- Tightness:** front IP65 **Connector:** plug and socket
- Software:** p. 147

SIMILAR PRODUCTS

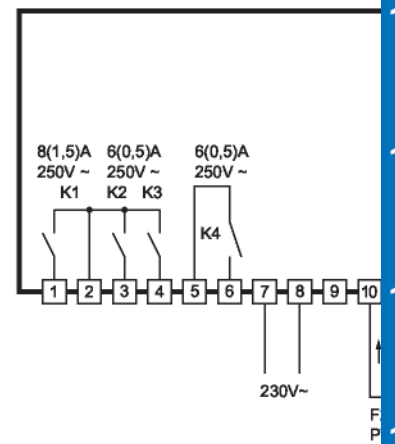
Order No.221028: screw terminal

ORDER NUMBER



233676

ORDER NUMBER



292490

ST71 0-KO1 KA.12



PRODUCT DESCRIPTION

The cooling controller ST710-KO1 KA.12 is supplied with 230V AC and can be employed in many cooling applications. It has two sensor inputs, five keys and four relays. The functions of the inputs, outputs and special keys can be freely selected, whereas various applications with only one automatic controller are possible. The controller, for example, can operate with two coolers if the evaporator sensor is parametered as sensor for a second refrigerating chamber.

- Sensor:** PTC
- Range:** -50...150°C
- Front Size:** 84mm x 42mm
- Panel cut-out:** 67.5mm x 31.5mm
- Tightness:** front IP65
- Connector:** screw terminal
- Software:** p. 147

ORDER NUMBER **221028**

ST710-KCKA.12



PRODUCT DESCRIPTION

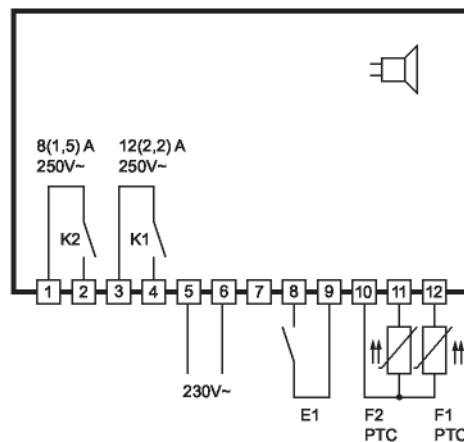
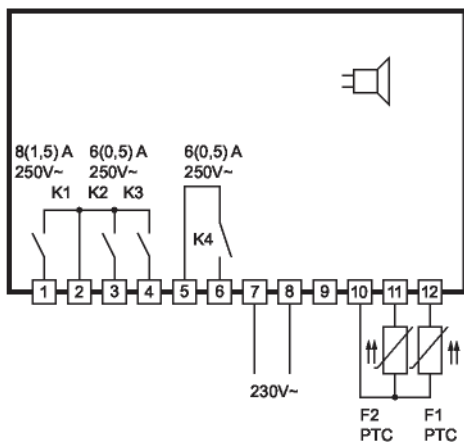
The cooling controller ST710-KCKA.12 is supplied with 230V AC and can be employed in many cooling applications. It has two sensor inputs, five keys and two relays. The functions of the inputs, outputs and special keys can be freely selected, whereas various applications with only one automatic controller are possible. The controller, for example, can operate with two coolers if the evaporator sensor is parametered as sensor for a second refrigerating chamber.

- Sensor:** PTC
- Range:** -50...150°C
- Front Size:** 84mm x 42mm
- Panel cut-out:** 67.5mm x 31.5mm
- Tightness:** front IP65
- Connector:** plug and socket
- Software:** p. 147

SIMILAR PRODUCTS

Order-No. 220871: screw terminal

ORDER NUMBER **126763**



ST71 0-KSKA.12



PRODUCT DESCRIPTION

The cooling controller ST710-KSKA.12 is supplied with 230V AC and can be employed in many cooling applications. It has two sensor inputs, five keys and four relays. The functions of the inputs, outputs and special keys can be freely selected, whereas various applications with only one automatic controller are possible. The intern wiring of the relays with 230V and additional clamps for N and PE permit the direct connection of the consumers.

Sensor: PTC

Range: -50...150°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65 **Connector:**

plug and socket **Software:** p. 147

PRODUCT DESCRIPTION

SIMILAR PRODUCTS

Order-No. 221168: screw terminal

ST715-KSKA.12



The cooling controller ST715-KSKA.12 has special housing shape which opens new for construction to the user. It has two sensor inputs, five keys and four relays. The functions of inputs, outputs and special keys can be selected, whereas various applications with one automatic controller are possible. The wiring of the relays with 230V and additional clamps for N and PE permit the connection of the consumers.

Sensor: PTC

Range: -50...150°C

Front Size: 42mm x 84mm

Panel cut-out: 31.5mm x 67.5mm

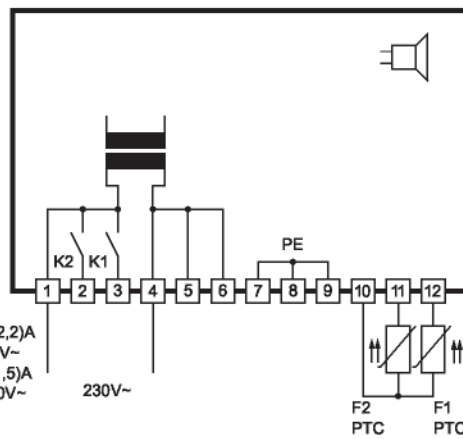
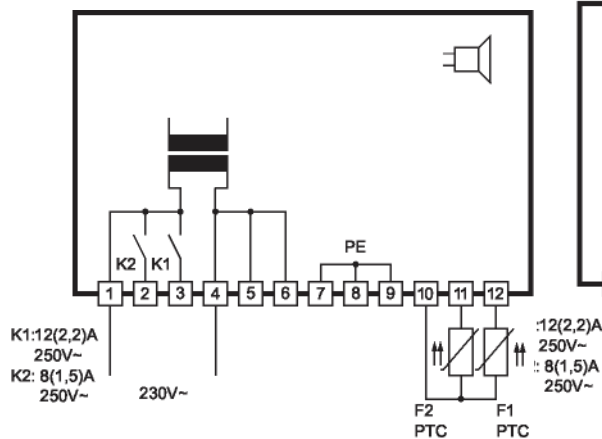
Tightness: front IP65 **Connector:** plug and socket **Software:** p. 147

ORDER NUMBER

220996

ORDER NUMBER

346247



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ST71 0-KN KVL.34



PRODUCT DESCRIPTION

The cooling controller ST710-KNKVL.34 has an interface for LON networks (FTT10A).

Besides PTC, the two sensor entrances are applicable also for Pt1000 resistance, which clearly increases the measuring range. The functions of the two switching inputs and the four switching relays can be freely set. This permits a

connection with

high functionality of the LON-network in

the LON interface.

Sensor: PTC/Pt1000

Range: -50...150°C

SIMILAR PRODUCTS

Order-No. 161083: front size 72mm x 36mm

ST710-KNOVL.34



Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm **Tightness:** front IP65

Connector: plug and socket

PRODUCT DESCRIPTION

The cooling controller ST710-KNOVL.34 has an interface for LON networks (FTT10A).

Besides PTC, the two sensor entrances are applicable also for Pt1000 resistance, which clearly increases the measuring range. A third analogue input for 4-20mA together with the adjustable function of the switching outputs permits the installation of another control circuit. This guarantees a high functionality especially of the LON-network.

Sensor: PTC/Pt1000

Range: -50...150°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

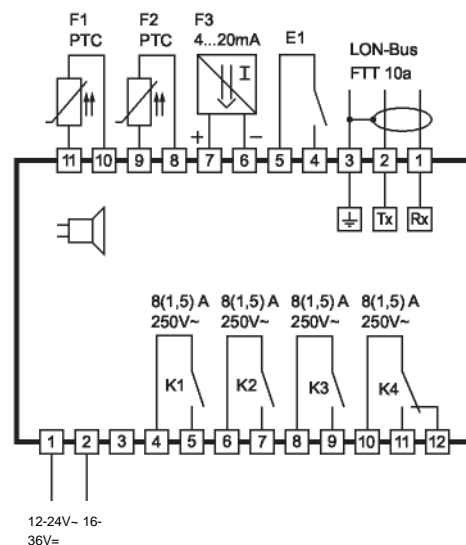
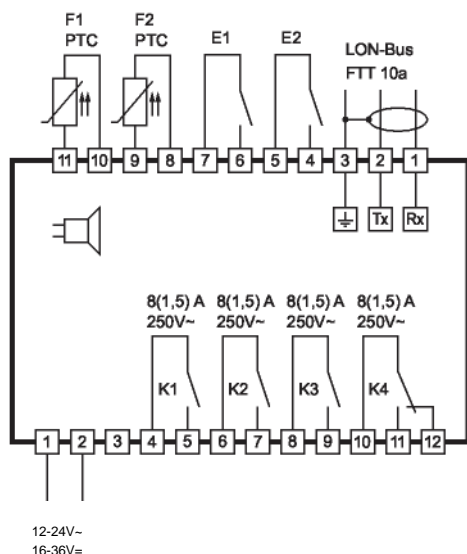
Tightness: front IP65 **Connector:** plug and socket

ORDER NUMBER

228106

ORDER NUMBER

228189



ST71 0-KNKV.15



PRODUCT DESCRIPTION

The cooling controller ST710-KNKV.15 has the special feature of a connection option with remote control ST501. This offers the possibility of remote temperature indication and the complete remote control of the controller for cable lengths of up to 50m. Different functions can be opted for the two digital switching inputs and the four relay exits by means of setting the parameters.

Sensor: PTC/NTC

Range: -50...150°C

Front Size: 84mm x 42mm

Panel cut-out: 67.5mm x 31.5mm

Tightness: front IP65 **Connector:** plug and socket

SIMILAR PRODUCTS

Order-No. 217281: front size: 72mm x 36mm

ST 501



PRODUCT DESCRIPTION

The indicator module ST501 serves as remote control for the temperature controller ST71/ST710-KNKV.15. The remote control has the same displays and function keys as at the temperature controller and they are operated in the same way.

Data exchange is effected by a two-wire communication interface with up to 50 meters conduit length. With just one more line the electricity supply can take place directly from the temperature controller

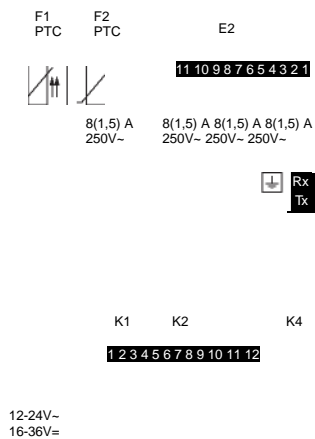
Front Size: 106mm x 68mm **Panel**

cut-out: 87.3mmx 56.1mm

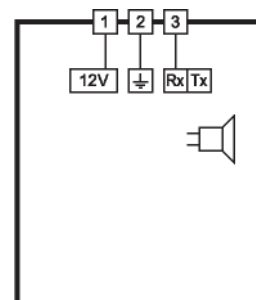
Tightness: front IP65 **Connector:** screw terminal

ORDER NUMBER

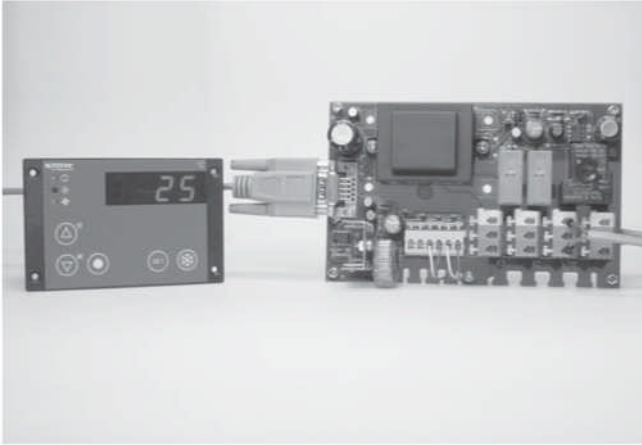
345991



ORDER NUMBER



ST501-KL3KA.12



PRODUCT DESCRIPTION

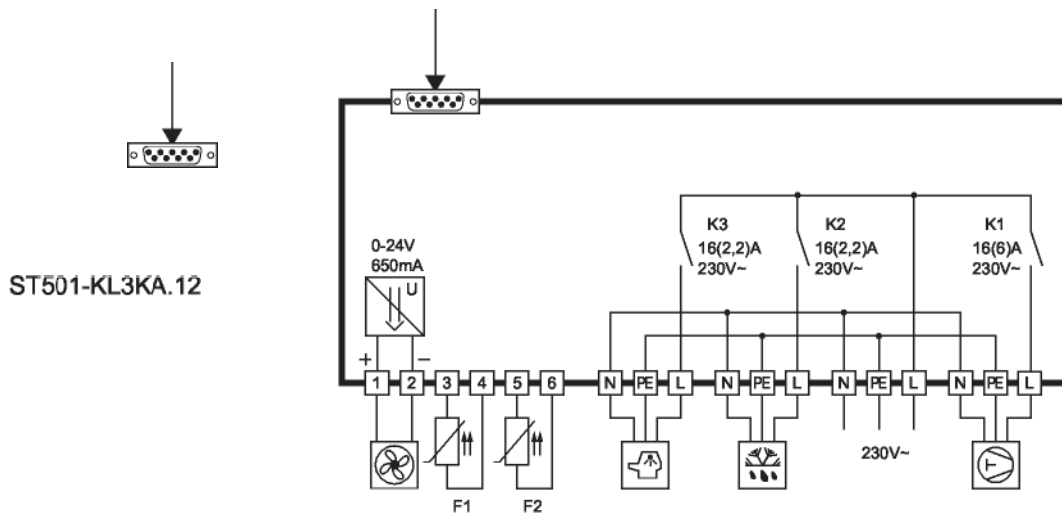
The microprocessor-controlled controller ST501-KL3KA.12 consists of a service and a separate power pack plate and is used for thermostatic temperature regulation in simple refrigerating plants. It is supplied with 230V AC and has three relay outputs as well as an exit for a DC voltage fan.

The relays can be used for different functions, e.g. for a compressor, a defroster, an alarm relay, etc.. (see parameters U1-U4). The two resistance sensors seize the refrigerating chamber temperature and the evaporator temperature.

Sensor: PTC
Range: -55...99°C
Front Size: 106mm x 68mm **Panel cut-out:** 87.5mm x 56.5mm
Tightness: front IP65 **Connector:** cage clamp **Software:** p. 147

ORDER NUMBER

357723



ST181-KL3KA.12



PRODUCT DESCRIPTION

The microprocessor-controlled controller ST181-KL3KA.12 consists of a service and a separate power pack plate and is used for thermostatic temperature regulation in simple refrigerating plants.

The specially low housing depth of the service unit opens new ways for construction and front design to the user. It is supplied with 230V AC and has three relay outputs as well as an exit for a DC voltage fan.

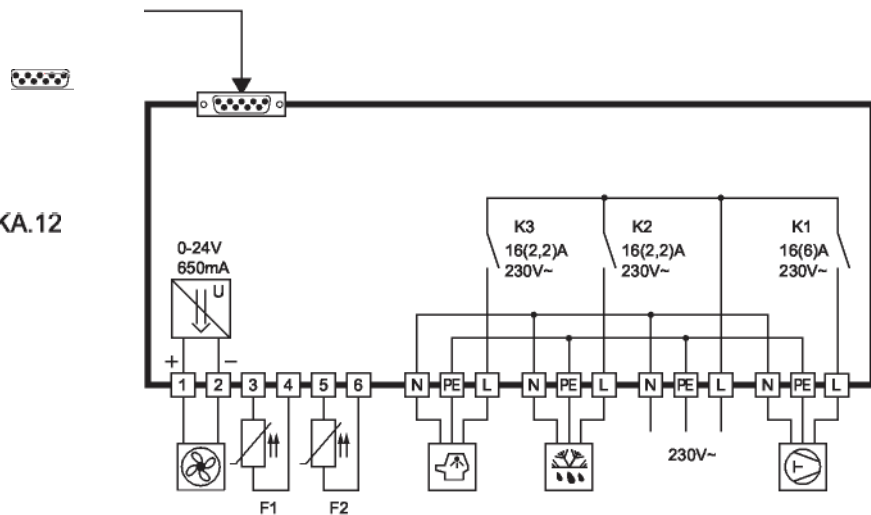
The relays can be used for different functions, e.g. for a compressor, a defroster, an alarm relay, etc.. (see parameters U1-U4). The two resistance sensors seize the refrigerating chamber temperature and the evaporator temperature.

- Sensor:** PTC
- Range:** -55...99°C
- Front Size:** 180mm x 52mm
- Panel cut-out:** 159mm x 45mm
- Tightness:** front IP65
- Connector:** cage clamp
- Software:** p. 147

ORDER NUMBER

240895

ST181-KL3KA.12



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ST181-VRMA

**PRODUCT DESCRIPTION**

The flush panel control ST181-VRMA was specifically conceived for the requirements of hot bars. The continuous frontal plastic foil keyboard ensures the high density absolutely required for this application. Depending on the parameters, the control can operate 1 - 4 independent warm water baths. For the registration of the warm-water temperature, PTC temperature sensors are used in each case. A special feature of this control is the possibility of the free allocation of the individual output contacts. That way, among other, it is possible to operate a warm water bath with several output contacts, and thus several heating elements.

The output contacts can be maximally loaded with 12A at

250V. Two independent outputs operable with assigned front keys are intended for switching of lighting and/or infrared or other surface jet heating elements. For water baths an automatic water level regulation is programmable. At the input side, there is a switching or capacitive transmitter, at the output side, there is a water valve.

Sensor: PTC

Range: -55...130°C

Front Size: 180mm x 52mm

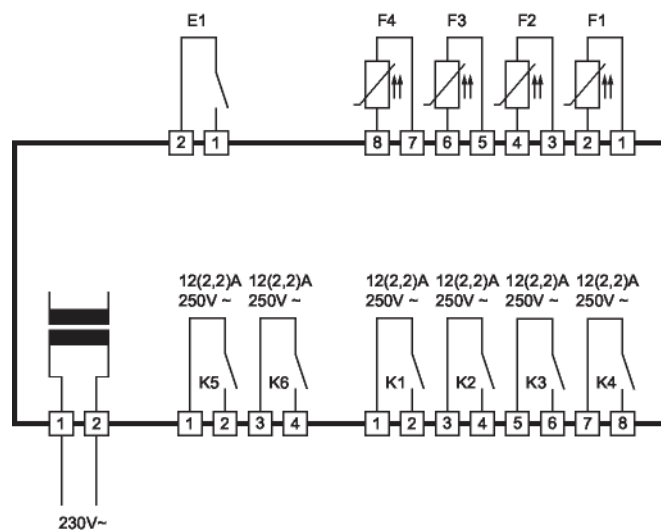
Panel cut-out: 159mm x 45mm

Tightness: front IP65

Connector: plug and socket

SIMILAR PRODUCTS

Order-No. 388850: ST182 Version

ORDER NUMBER**263962**

ST181



PRODUCT DESCRIPTION

The switch box ST181 presents an extension of control ST181. With its assistance a two-pole net separation serves to control DC ventilators with a max. capacity of 30 is possible. In addition, further needed consumers can be Watt. Adjustable voltage allows very exact setting of the switched directly.

- Front Size:** 180mm x 52mm
- Panel cut-out:** 159mm x 45mm
- Tightness:** front IP65

TRS200-01



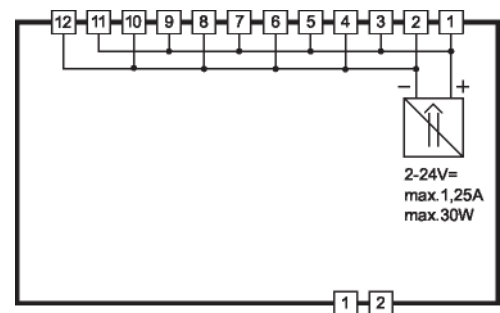
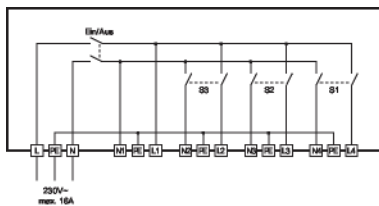
PRODUCT DESCRIPTION

The microprocessor-controlled blower regulator TRS200-01 series Watt. Adjustable voltage allows very exact setting of the switched revolution number.

ORDER NUMBER

ORDER NUMBER

284828



230V-

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TRT252-30.34



PRODUCT DESCRIPTION

The flush panel control TRT252-30.34, designed as ready to plug-in unit, is specifically intended for refrigerators. It has two inputs for temperature sensors, six relays and an adjustable tension exit (ventilator). With this model, the rotation number adjustment is effected by means of parameters. In connection with a wide parameter structure, the stand-by key and other keys permit employment of the most different tasks. The compact control is easy to operate, and at the same time very easy to assemble and service. That way, refrigerators of minor performance can be connected directly. Contacts of all inputs and outputs are special plug-in connectors at the back of the control unit and easily accessible.

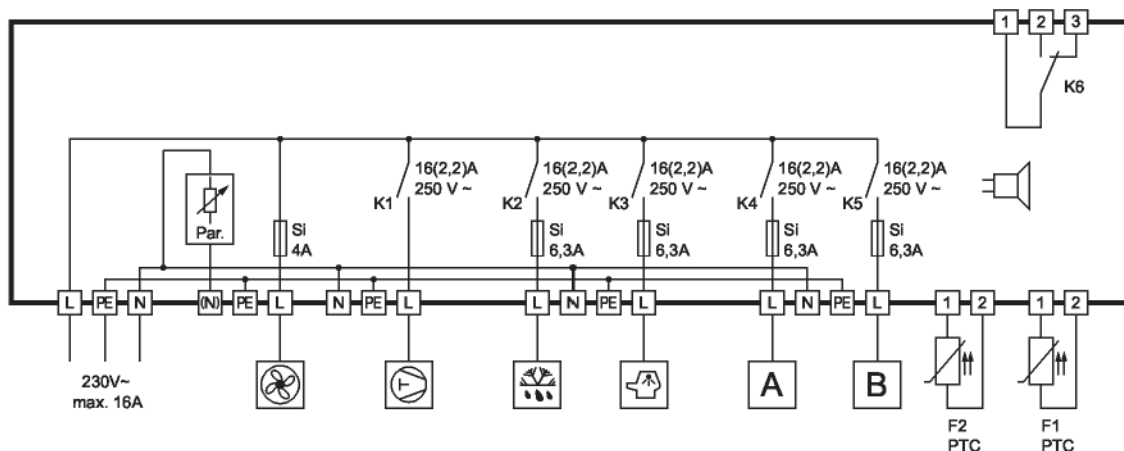
They are unmistakably marked with coloured and mechanical coding, strain-free and have a lock. Complex installations and wiring, therefore become redundant. Various possibilities in the organisation of the front design and a flexible control concept create options for customer-optimised solutions which hardly set any limits to wishes regarding service and installation comfort. The delivery programme of this control unit includes a temperature sensor with plug, all accessory plugs and an assembly set.

Sensor: PTC
Range: -55...99°C
Front Size: 252mm x 72mm **Panel cut-out:** 243mm x 51mm
Tightness: front IP63 **Connector:** plug and socket

SIMILAR PRODUCTS

Order-No. 293670: with real-time clock

ORDER NUMBER **215558**



TRT252-31.34



PRODUCT DESCRIPTION

The flush panel control TRT252-30.34, designed as ready to plug-in unit, is specifically intended for refrigerators with complex control functions. It has two inputs for temperature sensors, five relays and an adjustable tension exit (ventilator). The LON interface FTT10 permits communication with superordinate systems.

The integrated real-time clock, however, is a special feature of this control. It is possible to adapt the general functions and thus the gradient of the temperature in the refrigerator to the currently needed times.

Various parameters and an additional current- and/or switching input and a external satellite temperature display permit employment of the most various tasks.

Contacts of all inputs and outputs are special plug-in con-

nectors. They are unmistakably marked with coloured and mechanical coding, strain-free and have a lock. Complex installations and wiring, therefore become redundant. Various possibilities in the organisation of the front design and a flexible control concept create options for customer-optimised solutions which hardly set any limits to wishes regarding service and installation comfort.

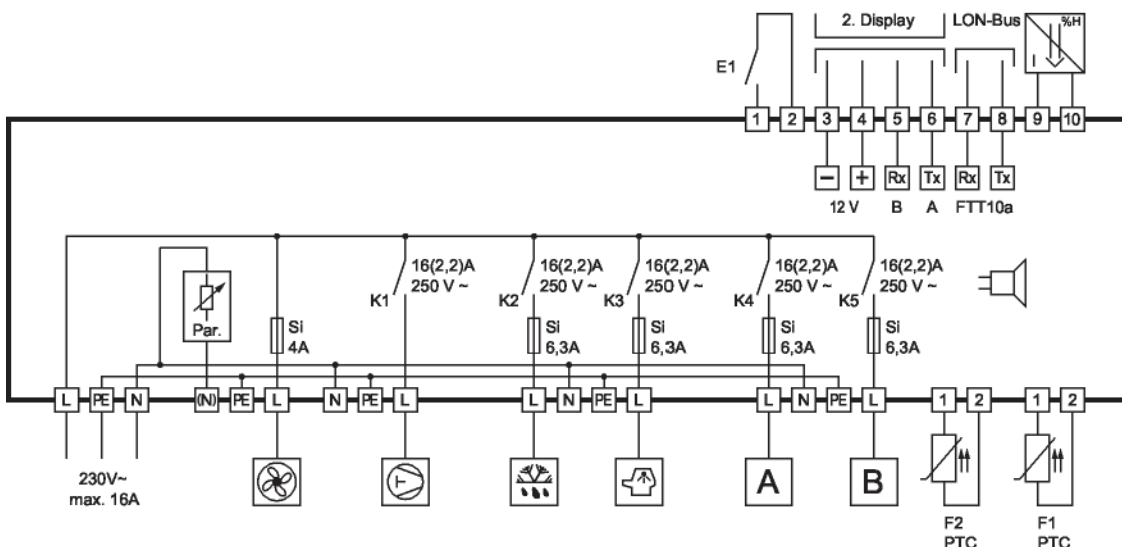
- Sensor:** PTC
- Range:** -55...99°C
- Front Size:** 252mm x 72mm
- Panel cut-out:** 243mm x 51 mm
- Tightness:** front IP63 **Connector:** plug and socket

SIMILAR PRODUCTS

- Order-No. 292656:** Interface RS485
- Order-No. 119990:** Satellite display

ORDER NUMBER

199927



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TRW230-100.14

**PRODUCT DESCRIPTION**

The installation unit TRW230-100.14 for refrigerating chambers and cooling cells unites control and power section in a compact and at the same time optically fastidious way. This extremely compact control ranks among the classics of its kind and proves its high functionality until today. That way, the cooling regulation contains all functions and components, in order to control compressors with electrical power of up to 0.8kW at 230V directly. The control has a 2-pole main switch as well as three potential-afflicted relays for a compressor, a ventilator and a defroster.

Together with the separate clamps for N and PE, this permits a fast and easy assembly without any additional wiring. An potential-afflicted alarm relay and two analogue inputs for temperature sensors make part of the standard equipment. The digital switching input for the external alarm switch is potential-afflicted and switched in series to the compressor relay. This provides, for instance, the possibility to supervise the switching status of a pilot switch to influence the regulation, and additionally to release an alarm. The delivery programme includes two PTC temperature sensors with a cable length of 4 meters each.

Sensor: PTC

Range: -55...99°C

Housing size (L x W x H): 186 x 161 x 121mm

Installation: surface mounting **Tightness:** front IP65

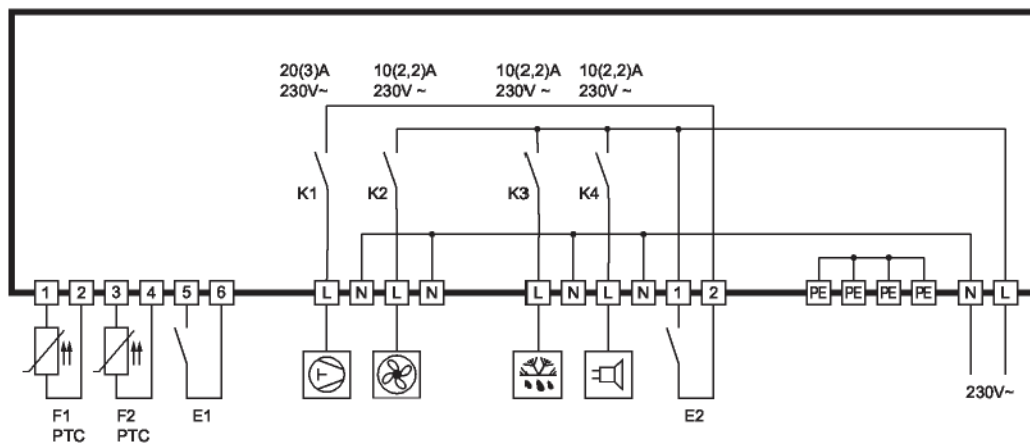
Connector: screw terminal

SIMILAR PRODUCTS

Order-No. 304246: alarm relay potential-free

ORDER NUMBER

209031



TRW230-200.14

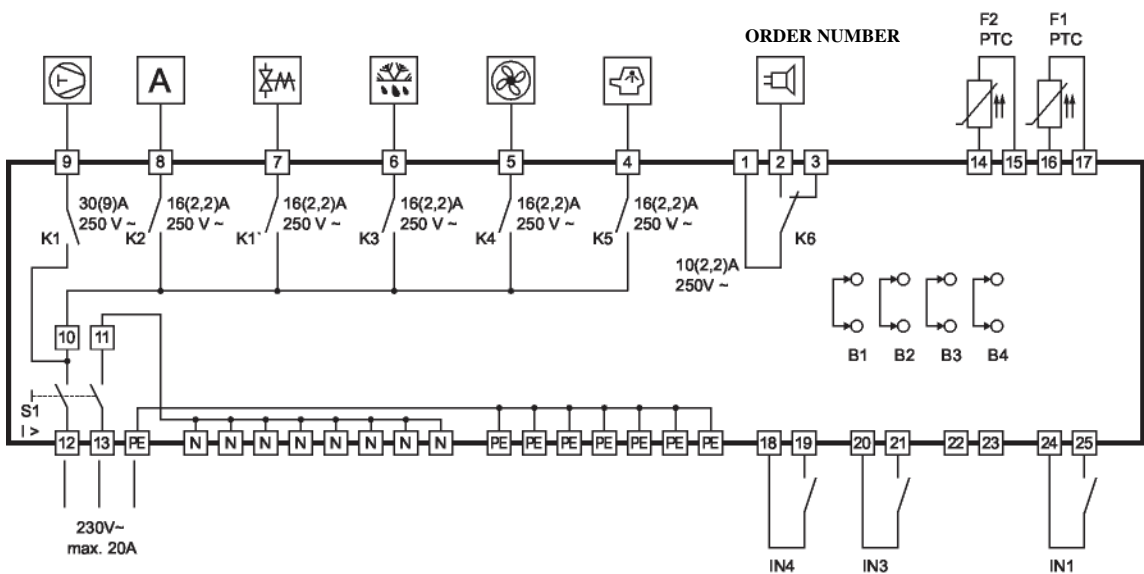


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PRODUCT DESCRIPTION

The installation unit TRW230-100.14 for refrigerating chambers and cooling cells unites control and power section in a complex and at the same time optically fastidious way. That way, the cooling regulation contains all functions and components, in order to control compressors with electrical power of up to 2.2kW at 230V directly. The control has a 2-pole main switch with an integrated overload safety fuse, as well as five potential-afflicted relays for a compressor, a

A potential-free alarm relay with adjustable switching sense and two analogue inputs for temperature sensors are standard. A special characteristic, however, are the four digital switching inputs to register the external switching status of pressure and interactive switches. In connection with the freely adjustable functions of the control, the latter, for example, is intended for



cooling valve, oil sump heating, a ventilator and a defroster. Together with the separate clamp-strips for N + PE, this permits a fast and easy assembly without any additional

the pump down operation mode and other applications. The delivery programme includes two PTC temperature sensors with a cable length of 4 meters each



Sensor: PTC
Range: -55...99°C
Housing Size (L x B x H): 210 x 200 x 129mm

Installation: surface mounting **Tightness:** front
IP65
Connector: screw terminal

TRW230-200.34



PRODUCT DESCRIPTION

The installation unit TRW230-100.14 for refrigerating chambers and cooling cells unites control and power section in a complex and at the same time optically fastidious way. That way, the cooling regulation contains all functions and components, in order to control compressors with electrical power of up to 2.2kW at 230V directly and to connect it to the LON field bus system. The control has a 2-pole main switch with an integrated overload safety fuse, as well as six potential-afflicted relays for a compressor, a cooling valve, oil sump heating, a ventilator, a defroster and light. Together with the separate clamp-strips for N + PE, this permits a fast and easy assembly without any additional wiring.

A potential-free alarm relay with adjustable switching sense and two analogue inputs for temperature sensors are standard.

A special characteristic, however, are the four digital switching inputs to register the external switching status of pressure and interactive switches. In connection with the freely adjustable functions of the control, the latter, for example, is intended for the pump down operation mode and other applications. The LON interface FTT10 permits communication with super-ordinate systems. The delivery programme includes two PTC temperature sensors with a cable length of 4 meters each.

Sensor: PTC

Range: -55...99°C

Housing Size (L x B x H): 210 x 200 x 129mm

Installation: surface mounting **Tightness:** front IP65

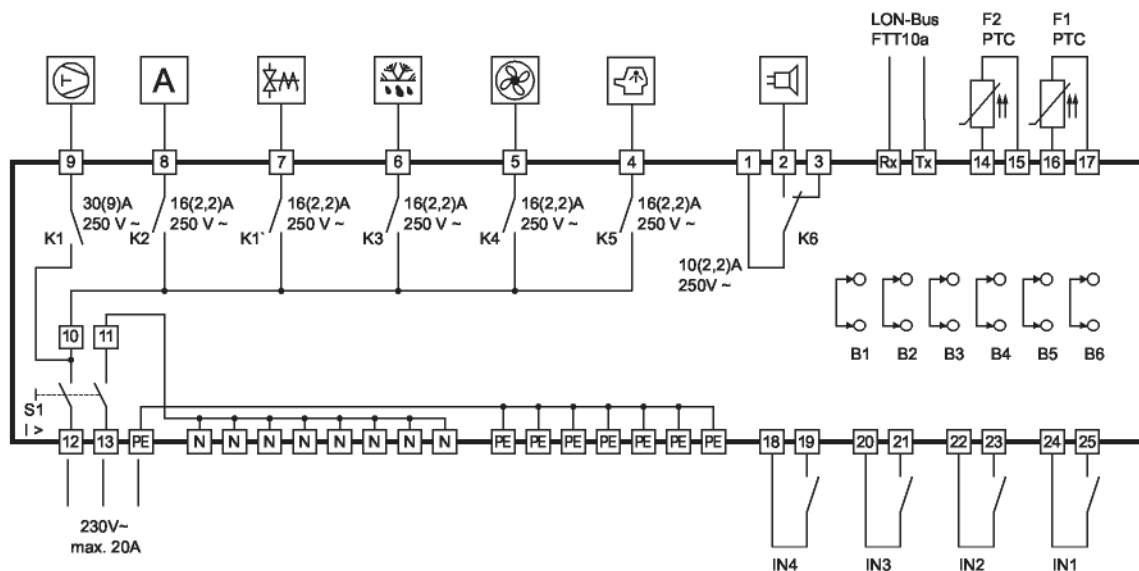
Connector: screw terminal

SIMILAR PRODUCTS

Order-No. 351627: RS485

ORDER NUMBER

390583



ST180



PRODUCT DESCRIPTION

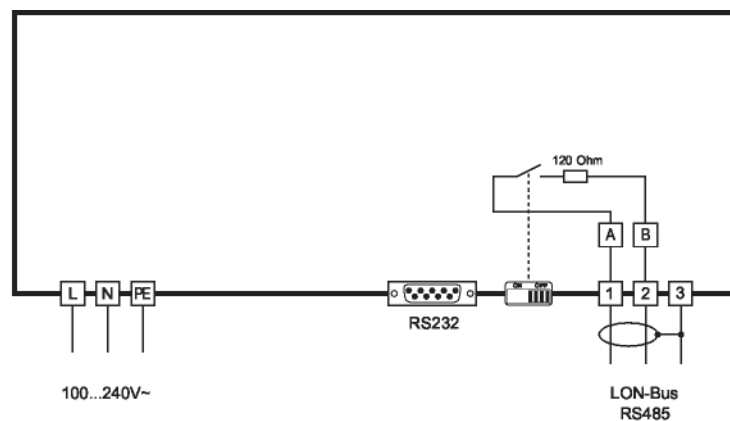
More and more often, bus systems find their application in the industry. Depending on the application field, one or more, more or less known bus systems are at disposal. The connection of different bus systems rarely poses a problem with regard to this. STOERK TRONIC is an well-established supplier of LON (local operating network) components, and LON is spread world-wide in the ranges of building engineering, cooling and air condition technology as well as construction planning. However, often the question arises: How can the „LON world“ be connected with the „PC world“?

Our ST180-Interface Module offers the solution. In addition to the universal and world-wide applicable electricity supply, it is equipped with the corresponding clamps for both the LON world and the PC world. For support with regard to possible software adjustments our development department will stand by your side.

Front Size: 158mm x 44mm
Installation data: desk casing
Tightness: front IP20
Connector: plug and socket

ORDER NUMBER

266379



ST181-VRXV



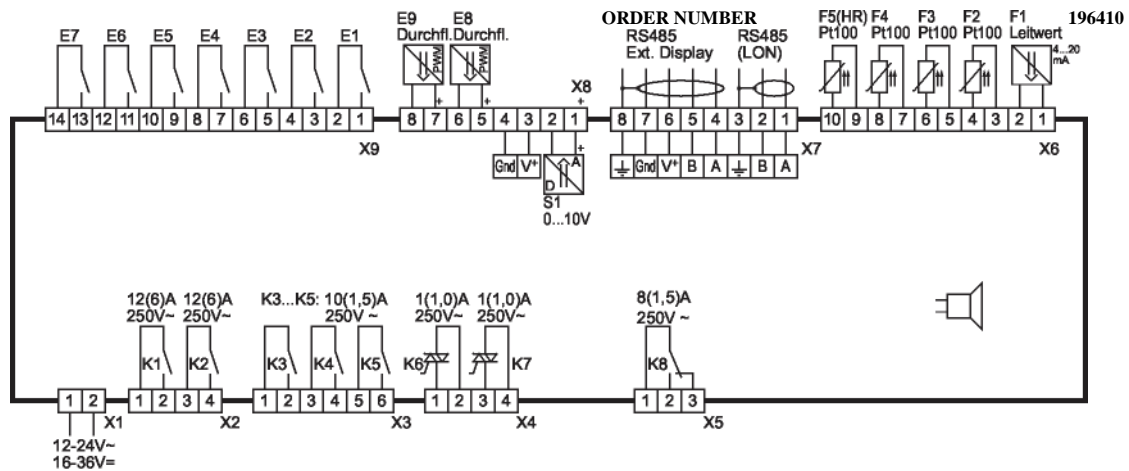
PRODUCT DESCRIPTION

The automatic controller ST181-VRXA is particularly suitable for the regulation of a water cooling for industrial cooling systems. It disposes of a PID water temperature regulation (0.01 K measuring) with cooling and heating function. In addition, the automatic controller has an exit for a compressor and an exit for a hot-gas bypass valve. Furthermore, the PID variable is passed on the constant exit as signal 0...10V.

Further details of the controller:

- regulation of the conductor value (threshold switch for ion exchangers)
- water cycle monitoring with water level and flow, control of a water pump
- alarm monitoring in the cooling cycle for high and low pressure, control of the condenser ventilator
- bus interface RS485 with data access on all measured values, alarm signals and parameters.

Measurement Range: dependent on type of sensor
Front Size: 180mm x 52mm **Panel cut-out:** 159mm x 45mm **Tightness:** front IP65
Connector: plug and socket



ST501-QA1TV.07



PRODUCT DESCRIPTION

The unit is developed with a front control surface as plug-finished installation unit and fulfils the function of a temperature controller, which can be switched on and off with the integrated week-timer. Daily, the programming cycle can be pre-set with three switch on and off times. The programming cycle runs through all set positions in a continuous loop. The display indicates the current selection.

Measurement Range: dependent on type of sensor
Front Size: 106mm x 68mm
Panel cut-out: 87.5mm x 56.5mm

ST501-QE1TA.09



Connector: screw terminal

PRODUCT DESCRIPTION

The controller ST501-QE1TA.09 fulfils the function of a temperature controller to the use with deep fryers. It has a 4-digit LED display, 6 keys, 2 relays and a multi-resistance input.

The different temperature setpoints defaults can be parametered directly by the keys.

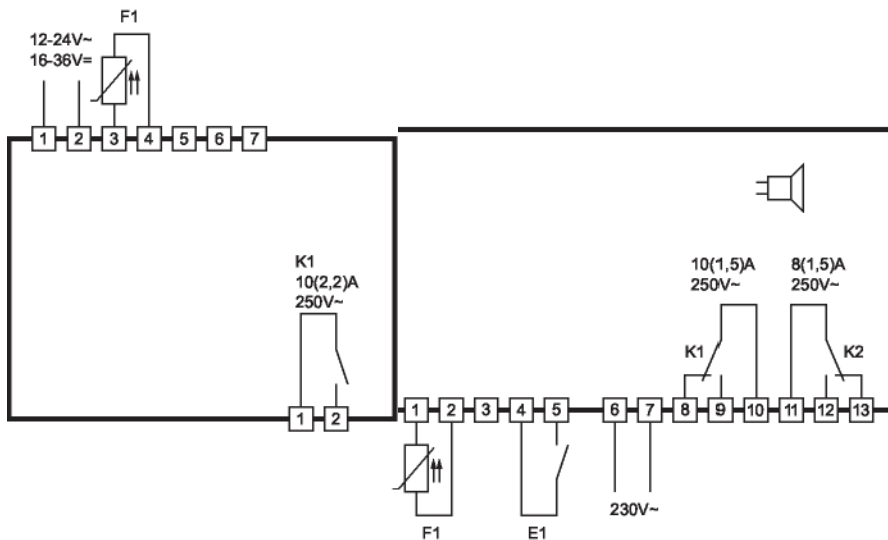
Sensor: multi-resistance input
Range: dependent on the type of sensor
Front Size: 106mm x 68mm **Panel cut-out:** 87.5mm x 56.5mm **Tightness:** front IP64 **Connector:** screw terminal

ORDER NUMBER

141739

ORDER NUMBER

154435



ST601

**PRODUCT DESCRIPTION**

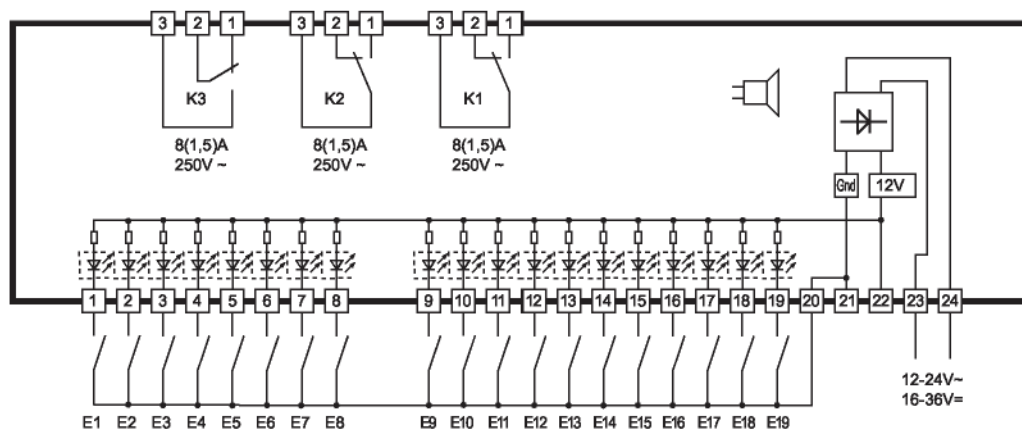
The alarm unit is a programmable monitoring module for 18 input ports, 3 relays and a buzzer. All relevant features can be freely programmed by help of a 3-digit seven segment display. The input status messages are signalled with a light emitting diode for each channel, which can be red, green and yellow. The indication lights are numbered and can be marked manually or with pre-fabricated labels.

Beside the RESET key, there are two more covered keys for programming (UP and DOWN).

Front Size: 166mm x 106mm
Panel cut-out: 157mm x 97mm
Tightness: front IP65
Connector: plug and socket

ORDER NUMBER

282962



ST 501



PRODUCT DESCRIPTION

Objective when developing the ST501-Control was the construction of an inexpensive, but nevertheless very flexible unit for the accomplishment of simple and/or mediumsized regulation and control tasks.

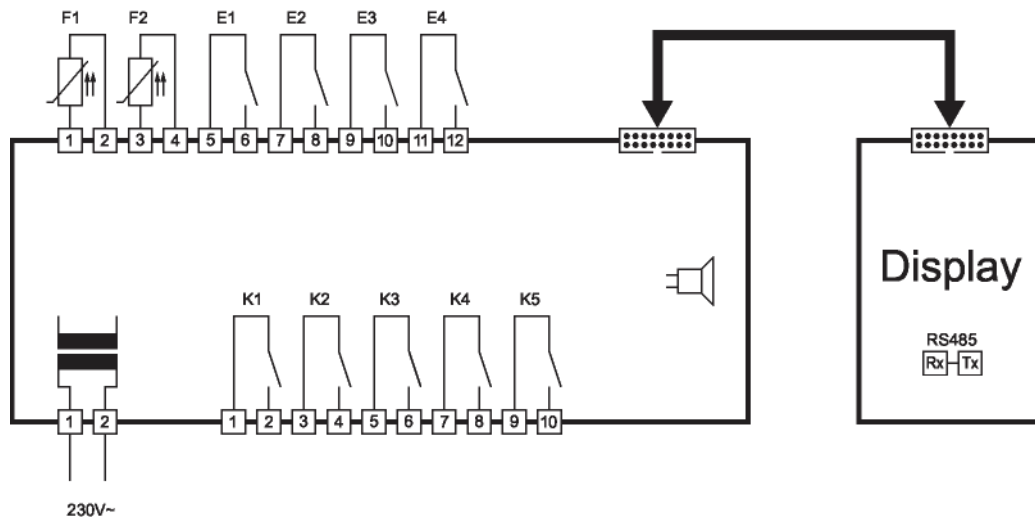
Depending on application, this display unit is equipped with different control foils. The connection between display unit and/or customised power plate is installed with a 16-fold flat cable (max. length 2m).

A unit fitted to its maximum offers the connection of 2 analogue inputs (temperature sensors or linear inputs). 4 switching inputs for potential-free contacts and 6 switching outputs (relays) are available for the most diverse applications.

The optionally available RS485-Interface of the unit allows serial programming and/or cross-linking of devices.

ORDER NUMBER

152058



ST 605



PRODUCT DESCRIPTION

The ST605 with 106mm x 166mm front measure in horizontal or vertical execution was originally developed for also feasible, with display and control unit as well as control module. The LON interface is standard equipment of employed for other applications.

the ST605.

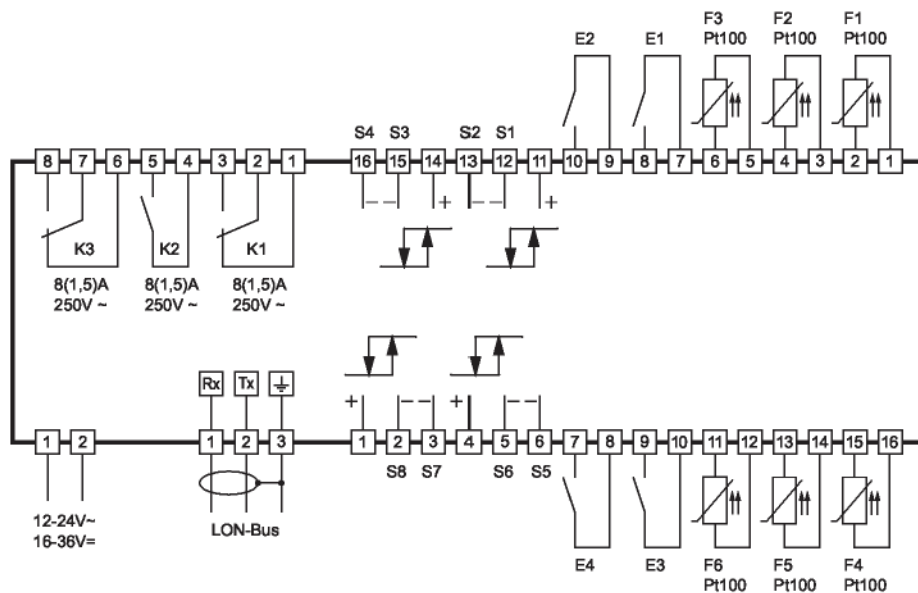
Despite compact dimensions, there are numerous analogue and digital inputs as well as outputs for different applications.

Semiconductor switches (SSR) can be operated with several exits 0/10V.

The low-voltage current supply allows small depth installation. In addition to this, it is easier to adapt the current supply tension to the international standards with an external transformer.

ORDER NUMBER

151977



ST 656



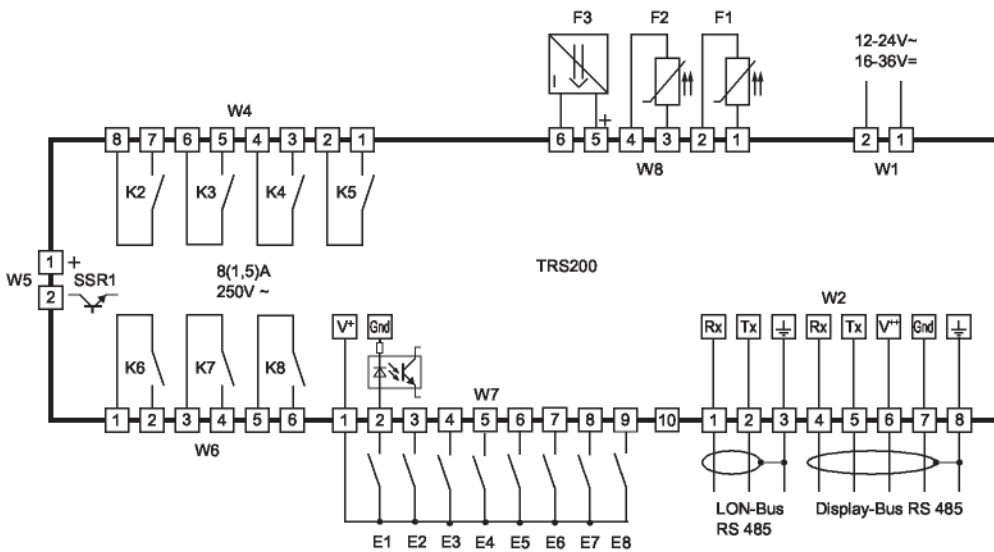
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PRODUCT DESCRIPTION

This large-scale catering equipment control is a split system, consisting of a mounting regulation unit and a control unit. By means of a temperature sensor this control unit regulates a one- or two-stage heating circle via PID- or thermostat regulation. In addition, it disposes of several PID parameter sets, to be activated with program keys. This secures fast and optimal selection of parameters for different goods to be cooked, simmered or roasted. The control offers the pre-

Options are a pressure-cooking function as well as several changeable temperature sensors. The third display shows the current temperature (or pressure) value. The indicated values can be changed directly with keys for quick adjustment, also during the process of cooking itself. All parameters, as for instance maximum/minimum temperature and time

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selection of two adjustable times: One to adjust the waiting period prior to the beginning of the heating phase, and another one to set the cooking time.

adjusted via parameters.



Range: -99...400°C

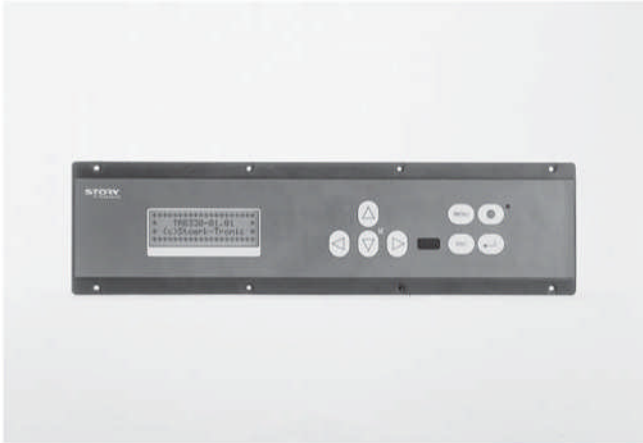
Front size control unit: 109.5mm x 250mm

Connector: plug and socket

ORDER NUMBER

156059

TRB



PRODUCT DESCRIPTION

The employment of the TRB control with 348mm x 91 mm front measure is possible both for standardised as well as for customised controls. Special characteristics are the background-lit LCD display with 4 x 20 characters, the possibility of a battery backup with NiMH or lead accumulators, as well as the possibility of a real-time clock and a LON or RS485-interface.

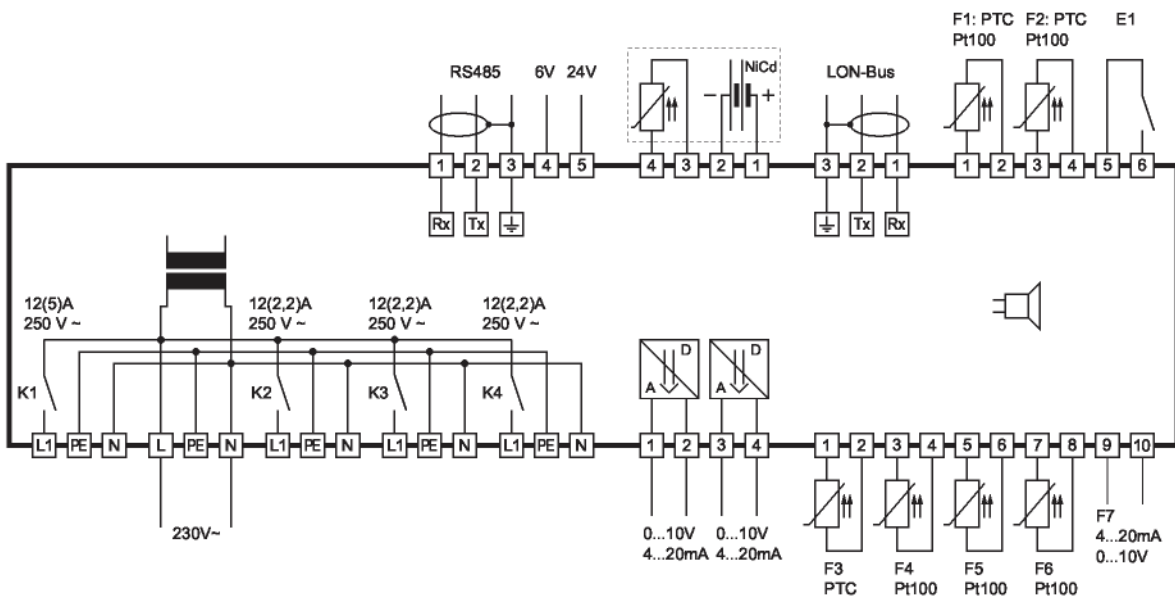
There is a 16 bit high-speed micro-processor for the most diverse applications. The analogue range provides 7 inputs for temperature sensors and/or linear signals. Two analogue outputs 0-10V and 4-20mA master the control of inverters, control valves etc.

A sufficient number of switching inputs and outputs are available for complex applications as well. Depending on execution of the unit, compact solutions or split solutions (separate power pack plate with additional entrances and exits) can be realised.

The front tightness of IP65 also allows employment at rough site conditions.

ORDER NUMBER

151936



TR B 330

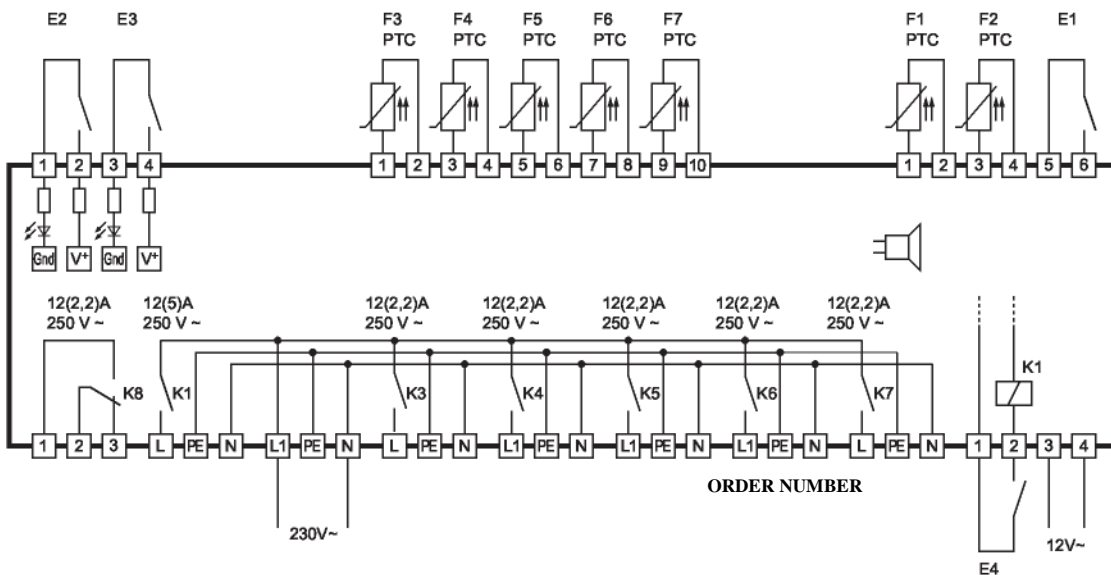


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PRODUCT DESCRIPTION

The microprocessor-controlled TRB is used in applications for heat pumps. It consists of a control unit with display front and a separate relay plate. This regulation is applicable with heat pumps of the following types: brine/water, air/water or

The TRB control has 7 inputs for temperature sensors PTC and 4 freely programmable switching inputs. The tightness of IP65 ensures employment also under circumstances.



ORDER NUMBER

135640

water/water. One or two water reservoirs (buffer storage, boiler) can be used.

Sensor: PTC

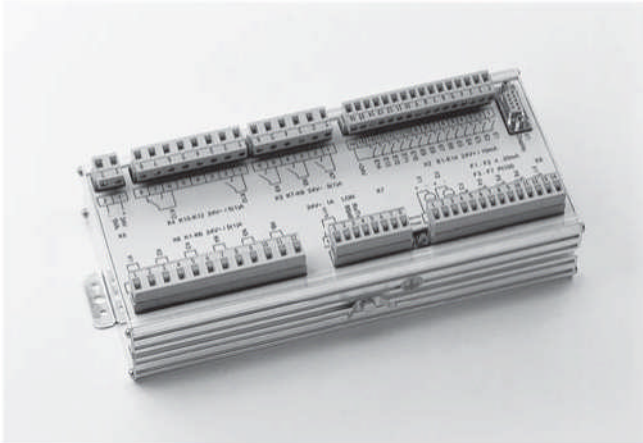
characters, a buffered real-time clock with different week programs and an outside temperature guidance.

Front Size: 348mm x 91mm

Tightness: front IP65

Connector: plug and socket

TRS



PRODUCT DESCRIPTION

The TRS unit is a basis module for the installation of both various customised and standard solutions.

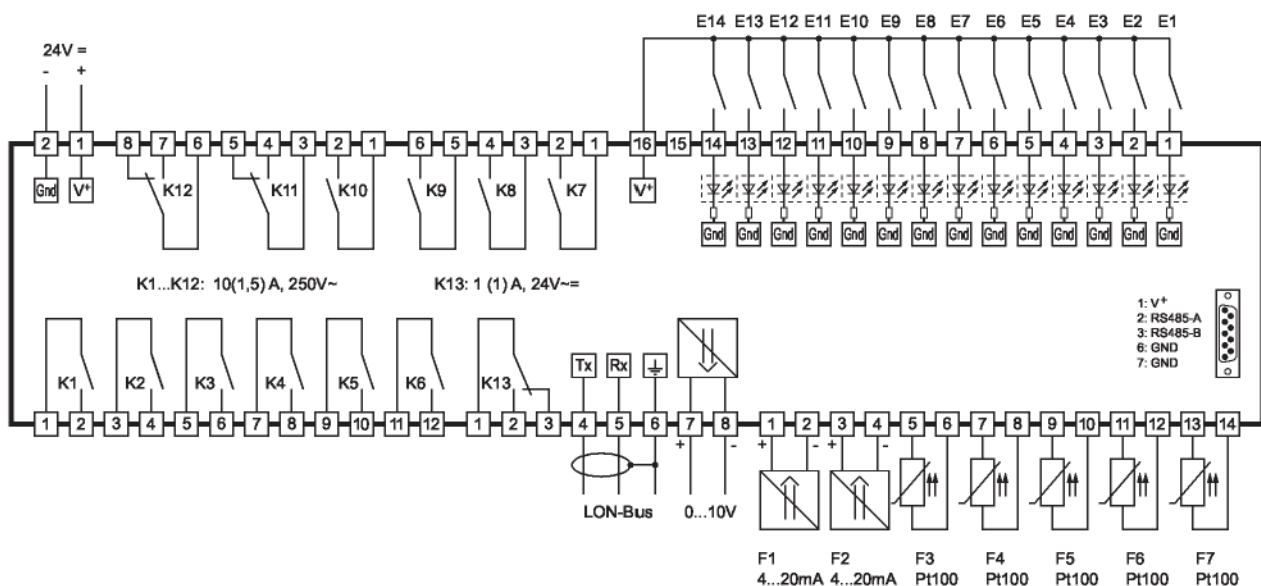
With robust aluminium profile allows to build controllers of up to 240mm width. The height is 110mm. Depth at use of the common ready to plug-in clamp strips is no more than 80mm, which permits very slim installations.

The unit is mounted with 2 accessory parts on the DIN rail or with 2 screws. Ready to plug-in clamp strips or RAST5 clamps are intended as connecting clamps for different applications.

The large front allows very clear labelling of the different controls. The below circuit is to show only one of many examples for possible controls in a TRS module.

ORDER NUMBER

151845



The manipulation-safe Data Logger TRL 1 is the core component of the Störk-Tronic data acquisition and visualisation system. Due to its special features, the TRL 1 is applicable wherever continuous and cyclic processes are to be supervised and wherever registration and long-term measurements have to be accomplished.

The TRL 1 operates either manual-led with an easily legible illuminated LCD display or with the serial RS-232 interface equally integrated in the TRL 1. The latter can be connected directly to a PC or alternatively to a common commercial modem for remote supervision. The modem is automatically recognised by the TRL 1 and configured accordingly.

Basic functions

With the LON interface integrated in the TRL 1 up to 224 analogue or digital sensor signals can be queried out of up to 44 of the most different control units (LON-node). Out of these 224 sensor signals, up to 32 selectable analogue values (e.g. temperature, humidity, pressure, frequency, ...) can be cyclically registered, and changes in condition of up to 240 different digital values (e.g. relay, valves, boundary alarms, switching inputs...) can be logged in the TRL 1.

Recording of the 32 analogue values for each measuring channel can take place continuously (circular buffer) or individually (block memory). The recording intervals for each measuring channel are independently adjustable in seconds in a range from 10s to 12h. At each change, however, the digital values are saved at least once per hour.

A correspondingly configured TRL 1 can thus also perform recordings according to the conditions of the hygiene regulation HACCP (logging at 15-minute-intervals for at least 1 year).

Alarm administration

For each analogue value different functions (boundary alarm, range alarm, ..) can be defined. These again, can be split up into 12 alarm levels. Further, each digital value can be coupled with a function and consequently also with one of the 12 alarm levels.

The 4 relays and the acoustic signal generator integrated in the TRL 1 can be assigned individually to each of these alarm levels. In addition to that, a modem connected to the TRL 1 can send a freely definable SMS text to up to 3 different GSM phones. This function gains particular importance when it comes to remote supervision of plants in continuous operation (maintenance contracts, customer service, ...).

The time base for the recording is a battery back-up precision real-time clock (<50ppm) with automatic winter/summer time change-over.

Week-timer

The TRL 1 also contains a freely programmable week-timer. The latter can activate up to 220 switching functions (e.g. real-time defrosting, night-time temperature reduction, lighting, cooling,...) in the connected control units (LON nodes) per week.

Parameters and setpoint adjustment

Current data, stored data and important status information can be directly requested on LCD display of the TRL 1. Once the correct password has been entered, the display and change of parameters and setpoints of all Störk-Tronic LON control units connected to the TRL 1 is possible, too.

Alternatively, the complete operation of the TRL 1 can be rendered substantially more comfortable via PC.

Visualisation software David V1.0

The PC visualisation software David V1.0 is conceived in a way that it can administer several TRL 1 data loggers. Furthermore, the TRL 1 can be accessed from different PCs. With each access the configuration data is automatically updated. The software automatically recognises each TRL 1 by a clear identification code. Password protected, all settings and configurations of the TRL 1 as well as the setpoints and parameters of all connected control units can be displayed and changed via David V1.0. Moreover, arbitrary time frames of the registered data can be transferred from the TRL 1 to the PC. The program differentiates between the two operating modes „on-line“ and „off-line“.

On-line operation mode

The on-line operation mode provides a direct connection to the TRL 1 via modem or directly via PC. In this mode of operation, there is also a direct LON link to all connected control units (LON knots). The latter checks whether all configured control units are in function and demand their status information. Defective or missing control units are therefore automatically recognised and the respective error message will be displayed. This operation mode also allows the direct measured value display of all 224 configured and analogue or digital sensor signals in the corresponding physical value. The output is possible both graphically and numerically. In each case, they are updated in a freely adjustable interval.

Telephone directory

For the administration of several plants, the different numbers of the individually installed modems can be listed in a directory.

Auxiliary functions

Comfortable „drag & drop“ functions permit the combination and comparison of arbitrary sensor signals, transmitted also by different control units. The software offers numerous aids, as for example two measuring cursors with a display of date, time, measured value and their differences. Additionally, extensive zoom and scaling functions as well as statistic functions are implemented. At analogue sensor signals, the limit values (min., max.) and the average value are calculated within a freely selectable time frame. At digital sensor signals the on/off-relation is determined in per cent.

Read/save parameter sets Additionally, the David V1.0 can read and store complete setpoints and parameter sets on a control unit connected to the TRL 1 and copy this information into another control unit of the same type. Of course, the information can also be printed out with a computer printer or saved as text file for documentation reasons.

Off-line operation mode

In the off-line operation mode, data transmitted in the on-line operation can be further worked on, converted, exported as ASCII file and printed out for documentation purposes. The TRL 1 configuration settings as well as the parameters and the setpoints of the different control units connected to the TRL 1 can be changed „off-line“, too. These changes are immediately updated at the next on-line operation.

Application areas

In a simple way, complex plants can be conceived and realised in connection with the Störk-Tronic LON controllers, the TRL sensor box and the data logger TRL 1. The BUS conception also allows the extension of an existing plant at any time. For bigger plants several TRL 1 units can be coupled parallel to an existing LON net.

A combination with the free Internet PC visualisation software download David V1.0 makes it easy to fully supervise, control and maintain several plants. The possibility of a remote supervision with a SMS failure report is an important aid for the manufacturer to maintain his units word-wide and to react in time in the event of an error.

TRL1-01.01

TRL 1 WG



PRODUCT DESCRIPTION

By help of field bus system LON (here bus driver FTT10a) the Data Logger TRL1 collects measured values of up to 32 different controllers and stores them safe from any kind of data manipulation. It deposes of recording channels for 32 analogue values (e.g. temperatures, pressures...) and 240 digital values (e.g. switching status).

The data can also be visualised on the PC with PC software DAVID. The PC then equally allows the configuration of data logger and controllers. It is either connected locally directly with interface RS232 with the TRL1, or installed with a modem, thus permitting remote control.

PRODUCT DESCRIPTION

The TRL assembly set contains a wall mounted housing for the Data Logger TRL1. Together with the Data Logger TRL1 (to be ordered separately), the compact and robust design permits the decentralised installation of the logger and opens new fields for various applications. The data logger can, for instance, apart from its main function of archiving data, be used as remote indication of the measured values in marketing head-offices or service centres. Easy connection to PC or modem is possible via the serial interface installed at the housing.

Housing size (W x H x D): 195mm x 160mm x 120mm

Installation: wall mounting **Tightness:** front IP65

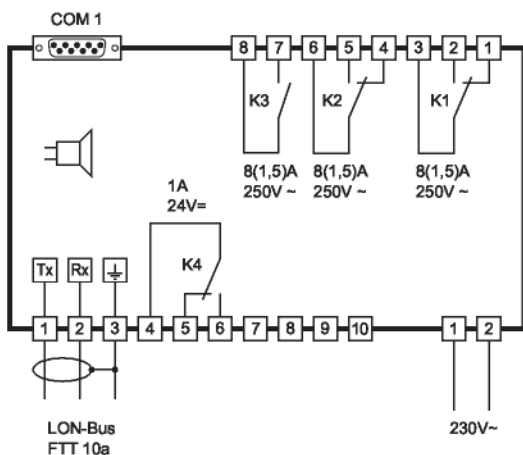
Connector: screw terminal

ORDER NUMBER

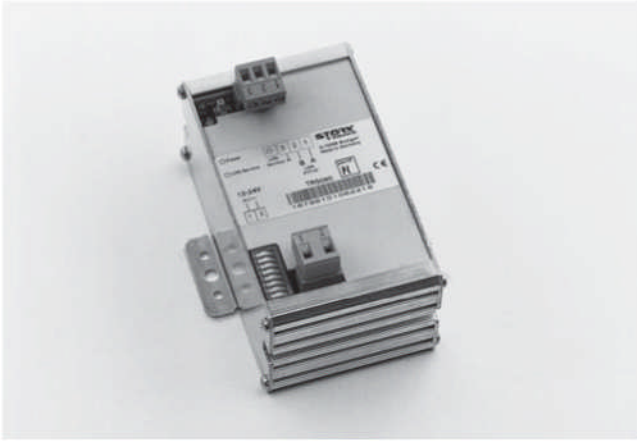
333187

ORDER NUMBER

143107



TRL



PRODUCT DESCRIPTION

The TRL gateway is a required accessory for the Data Logger TRL1 if the latter has to register measured values of the type SNVT of the field bus system LON. The gateway converts SNVT data to a format, which Data Logger TRL1 is able to evaluate and with which it can independently demand measuring values. The gateway then works comparable to a buffer memory. Upon request it puts the values at the data logger's disposal. Up to 60 SNVTs can be packed on the TRL gateway. All SNVTs are defined as INPUT.

**ZB
GATEWAY**



PRODUCT DESCRIPTION

The RS232/RS485 gateway makes it possible to convert respective signal levels (RS232 +/-15V) to RS485 level (+/-20mA). Often the response speed of the RS485 node is too fast, so that data packets get lost. The conversion, therefore, takes place buffered so that the PC operating system will have sufficient time to switch its COM interface to Receive. Furthermore, the signal conversion takes place galvanically de-coupled, thus electronic devices as notebooks for instance, may be safely connected with other devices.

Size: ca. 102mm x 55mm x 20mm
Installation data: desk casing

SIMILAR PRODUCTS

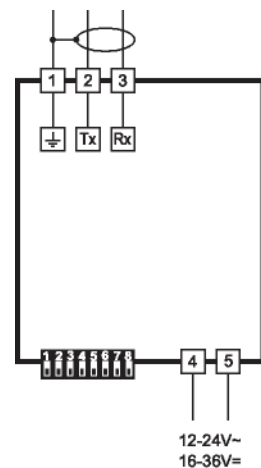
Order-No. 259986: Gateway USB/RS485

LON-Bus
 FTT 10a

ORDER NUMBER

ORDER NUMBER

139873



TRLSM-01.01



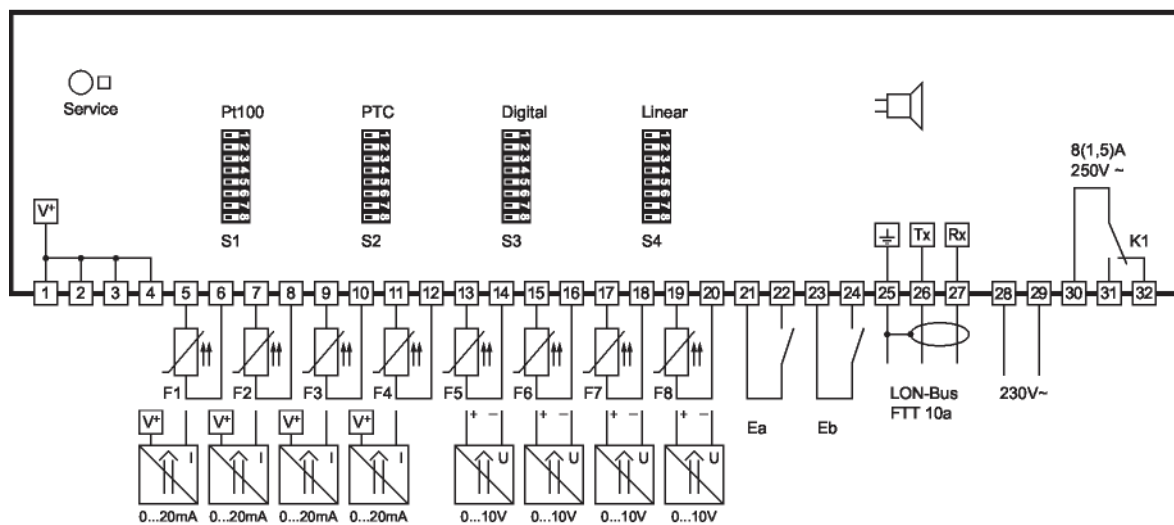
PRODUCT DESCRIPTION

The sensor module was conceived as extension module to the Data Logger TRL1 with field bus interface LON. It offers the pre-condition for a decentralised registration and evaluation of external sensors and actuators that cannot be seized by the temperature controllers in the LON network. This could e.g. be temperature sensors or switching contacts connected in a short way to the sensor box, the measured values of which are transferred loss-free to the data logger via the Two-Wire LON Field Bus. Resistance thermometers (PT100, PTC), linear signals (electricity, tension) or digital switching signals can be set at eight multisensor entrances.

The type of sensor can be separately set for each of these entrances. There are two further entrances for the registration of PWM signals. The configuration of the individual measuring points takes place by means of parameters. The front part of the sensor box contains a 4-digit LED measuring data display and a 1-digit LED measuring channel display for the visualisation of the measured values and/or signal status. In connection with function keys this permits the indication of both the manually selected channel and the measured value at the same time. A collective alarm can be indicated by means of an integrated buzzer and also be passed on via potential-free relay. The high functionality of the sensor box permits a variety of operations, not only in field bus applications.

- Sensor:** multi-sensor
- Housing size (W x H x D):** 200mm x 150mm x 82mm
- Installation:** surface mounting **Tightness:** front IP65
- Connector:** screw terminal

ORDER NUMBER **133496**



ST 189

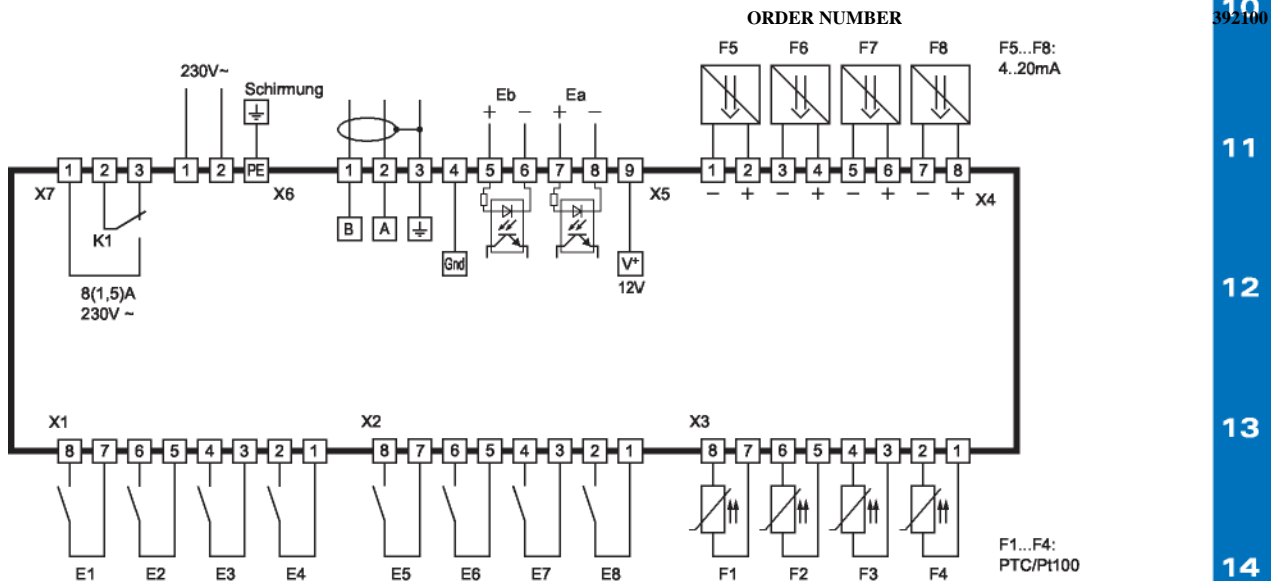


PRODUCT DESCRIPTION

The sensor module was conceived as extension module to the Data Logger TRL1 with field bus interface LON. It offers the pre-condition for a decentralised registration and evaluation of external sensors and actuators that cannot be seized by the temperature controllers in the LON network. This could e.g. be temperature sensors or switching contacts connected in a short way to the sensor box, the measured values of which are transferred loss-free to the data logger via the Two-Wire LON Field Bus. The unit is intended for the connection of 4 resistance sensors Pt100 and 4 analogue inputs with 4...20mA.

There are two further entrances for the registration of PWM signals. The configuration of the individual measuring takes place with temperature controllers by of parameters. The front part of the sensor contains a 4-digit LED measuring data display and a 1-digit LED measuring channel display for the visualisation of the measured values and/or signal status. In connection with function keys this permits indication of both the manually selected channel and the measured value at the same A collective alarm can be indicated by of an integrated buzzer and also be passed potential-free relay. The high functionality sensor box permits a variety of operations, only in field bus applications

Sensor: multi sensor
Front Size: 158mm x 45mm **Installation Size:** 158mm x 90mm **Tightness:** front IP20
Connector: plug and socket



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392100

TF6



PRODUCT DESCRIPTION

The Immersion Sensor TF6 can be equipped with the sensor elements KTY81-121 or PT100 and is available with different case forms and conduit lengths. The sensor is soldered to the line and electrically isolated installed in the case. For strain relief reasons, the case is flush-mounted or waterproof drummed with the line. The necessary line materials depend on the maximum application temperature. The standard sensors have V4A case materials (food genuine). Alternatively, there is a polycarbonate housing for outside and

FT20



room sensors. For the assembly of the sensors with V4A case, there are several screw connections available in V4A or brass.

PRODUCT DESCRIPTION

The FT20 is a channel sensor with capacitive humidity sensor and a temperature sensor PTC for the registration of temperature. The signals of both channels are passed on to the respective measuring and/or controlling instrument as 4-20mA exit in two-wire technology. Due to its fast reaction and the robust construction, the FT20 can be employed in many climate and/or cooling applications.

SIMILAR PRODUCTS

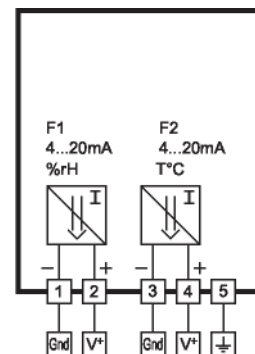
Order-No. 208462: only humidity

ORDER NUMBER

152389

ORDER NUMBER

208470



DF17



FT21

PRODUCT DESCRIPTION

The FT21 is a surface mounting channel sensor with capacitive moisture test and a temperature sensor PTC for the registration of temperature. The signals of both channels are passed on to the respective measuring and/or controlling instrument as 4-20mA exit in two-wire technology. Due to its fast reaction and the robust construction, the FT21 can be employed in many climate and/or cooling applications.

PRODUCT DESCRIPTION

The Pressure Sensors DF17 are extremely robust built in a stainless steel housing. The piezo-resistive pressure transmitter is separated from the measuring medium with a steel diaphragm, so that the sensor is suitable also for aggressive gases and/or liquids.

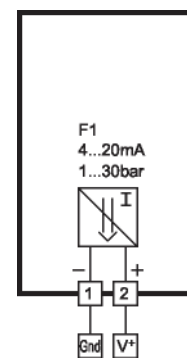
Measuring Range: 1...30Bar abs.

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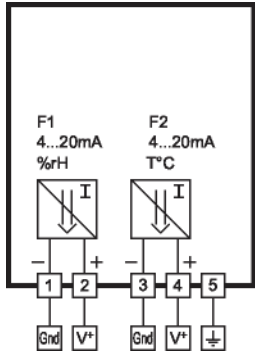
356287

ORDER NUMBER

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TRANSFORMER



PRODUCT DESCRIPTION

Stoerk-Tronic transformers are accommodated in a plastic housing specifically developed for wall assembly. Screw terminals allow durable optimal contacting of the connecting lines. The transformers are conditional short circuit proof on primary side and provided with a thermal protection. The transformers are examined by VDE (Verband Deutscher Elektrotechniker = German Electrotechnology Federation) and marked accordingly.

Primary voltage: 230V
Secondary voltage: 12V
Rated power: 3VA

PRODUCT DESCRIPTION

Solid state relays must be installed with a heat sink of suf-

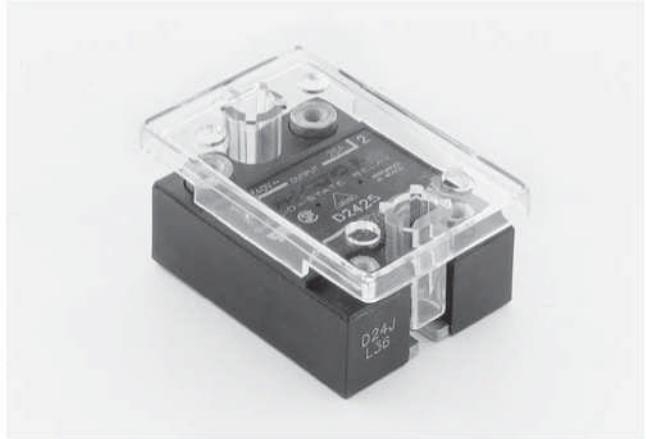
SIMILAR PRODUCTS

- Order-No. 206847: 230V/12V 6VA
- Order-No. 132977: 230V/24V 8VA
- Order-No. 198440: 115V/12V 3VA
- Order-No. 169748: 115V/230V 3VA
- Order-No. 219394: 230V/24V 3VA

ORDER NUMBER

198432

SSR



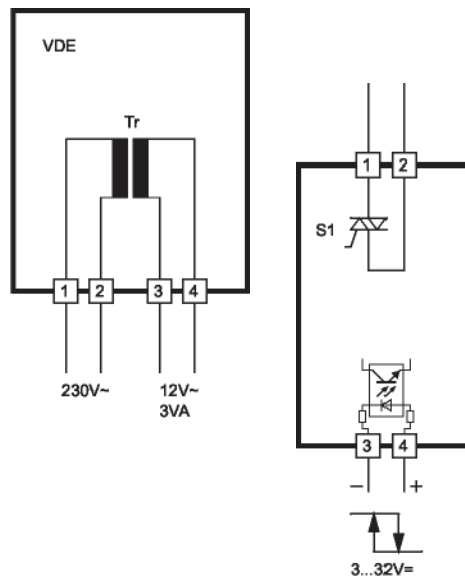
ficient size to protect against overheating. Thermo-lubricant must be used for installation. Varistors, RC-elements or special protection elements should be used to ensure that the maximum peak reverse voltage in the load circuit is not exceeded. In order to protect against excess current the increased starting current required by some consumers must be taken into account. Fast semiconductor fuses should be used to protect against accidental short circuit.

Load switching in zero crossing
Control voltage: 3...32V=
Operating voltage Range: 24...480V~
Peak reverse voltage: 1200V_s
Nominal current: 0.1...25A~
Peak current: 1000A_s for max. 10ms
I²t value(t=1...10ms): <= 6600A²s
Integrated varistor
Size: 57mm x 44mm x 27mm

ORDER NUMBER

197814

25A
250V~



The adjustment of the controllers, the so-called parametering, takes place in three control levels. These control levels can be accessed using the keys on the front foil. However, access to some safety relevant parameters has been intentionally made difficult.

In the first control level you can only adjust the setpoint and, if applicable, the parameter which have been allocated additional keys. These settings are made by simply pressing the respective key.

In the second control level you can adjust the control parameters. These settings are more complex as keys have to be pressed in combinations to prevent unintentionally changes of values.

The third control level provides the adjustment of the basic functions of the controller. As these settings may result in hazardous alterations of functions which may not be noticed immediately, the entire adjustment process has been encoded to make it even more difficult.

End users should not be informed of the adjustment process of the second and third control level. Any changes of the customer in these control levels are to be made with utmost care regarding the possibility of functional hazards.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

First control level

Parameter setting for the main setpoint

If none of the keys is pressed, the display indicates the actual value of the temperature. Pressing the SET key, the setpoint S1 shows on the display.

If the setpoint is to be changed, the SET key is to be kept pressed while adjusting the setpoint with the keys UP and DOWN.

Please note that the setpoint can only be changed within the set setpoint limits. The setpoint S1' (if available) can be adjusted in the same way. If setpoint S1' is activated it is indicated and relevant for the control in

case of closed switching input.

Second control level

Setting of control parameters

The parameters can also be set in standby mode. Simultaneously pressing the UP and DOWN key for at least 4 seconds opens a parameter list containing control parameters.

With the UP and DOWN keys the list can be scrolled in both directions.

Pressing the SET key will give you the value of the respective parameter. Pressing also the UP or DOWN key at the same time the value can be adjusted. Return to the initial position takes place automatically, if no key is pressed for 60 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds.

Third control level

Access to the third control level is granted when selecting the last P-parameter on the second control level. Continue to press the UP key for approximately 10 seconds until "PA" appears. Continue to press the UP key and additionally press the DOWN key for about 4 seconds and the first A-parameter of the third control level is indicated.

Caution: For software of cooling controllers (.1115) access to the third control level is granted when selecting parameter PA on the second control level. Parame

ter PA is to be set at -19° . Then the key UP and DOWN have to be simultaneously pressed for approx. 4 seconds which will give access to the third control level, beginning with parameter P0.

With the keys UP and DOWN you can scroll the list in both directions. Pressing the SET key will give you the value of the respective parameter. By pressing the UP or DOWN key at the same time the value can be adjusted.

Return to the initial position takes place automatically, if no key is pressed for 60 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds.

Note: The adjustment options of the controller types **.100/102** are different from this scheme and are explained in the relevant software description **.100/102**.

Adjustment options



Key 1: UP

Pressing this key you can increase the parameter or parameter value or scroll the parameter list.



Key 2: DOWN

Pressing this key you can decrease the parameter or parameter value or scroll the parameter list. At alarm the buzzer function can be switched off with this key.

Key 3: (if available)

Different functions are assigned to this key by help of parameters, see parameter A83. (Standby-Mode, direct switching of a contact, setpoint P1)



Key 4: SET



**Key 5:
Standby**

Holding this key, the setpoint is indicated. Additionally, this key is used for setting parameters.

Different functions are assigned to this key by help of parameters, see parameter A82. (Standby-Mode, direct switching of a contact, setpoint P1)

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain (e.g. A3) to one and the same function is guaranteed.

Parameter description second control level

P0: Actual value

The here indicated temperature presents the actual measured value. If the control setpoint is indicated by the help of parameter A32, the actual value can only be seen with this parameter.

P1: Setpoint / DeltaW for control circuit 2

Adjusting the setpoint of control circuit 2.

If A5=1, the setpoints for control circuit 1 and 2 are linked with one another

via switching difference DeltaW, which can be adjusted with P1. (operation with DeltaW)

The following applies: setpoint thermostat 2 = setpoint control circuit 1 + delta W2. This difference can take positive or negative values. Thus, a leading or following contact can be realised.

P2: Hysteresis contact K1

P3: Hysteresis contact K2

The hysteresis can be set symmetrically or one-sided at the setpoint. At one-sided setting, the hysteresis works downward with heating contact and upward with cooling contact (see fig. 1 – 2).

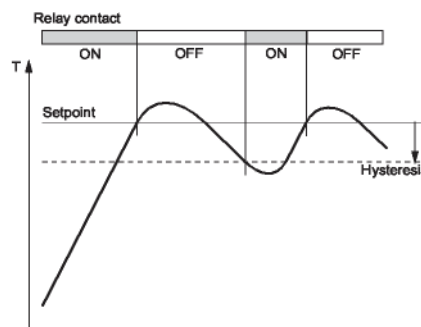


Fig. 1: Heating controller, one-sided hysteresis

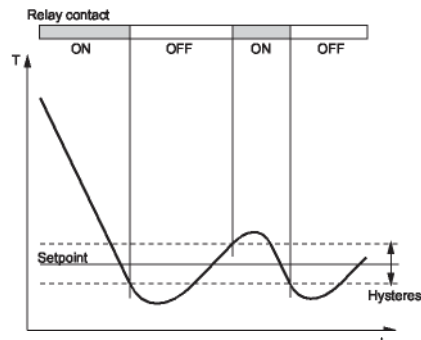


Fig. 2: Cooling controller, symmetrical hysteresis

P4: Control range limitation – minimum setpoint P5: Control range limitation – maximum setpoint

The adjustment range of the setpoint can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

P6: Actual value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here

adjusted value.

P11: Employment point of the ramp phase

The regulator type is freely selectable for ramp start temperature if ramp function is activated:

1. The main desired value S1 and the point of ramp employment are linked as difference with one another. This difference can take positive or negative values, i.e. starting point for the ramp can be above the setpoint at cooling function or below the setpoint at heating function, and automatically runs along with adjustments of the desired value.
2. Main setpoint S1 and ramp employment point are independent from each other.

P12: Ramp gradient

The ramp gradient sets the degree applied to change the (internal) setpoint in a ramp phase.

P19: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message „====“ appears in the display.

P30: Lower alarm value

P31: Upper alarm value

The exit alarm is a boundary alarm or a range alarm with one-sided hysteresis (see parameter P32). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint S1/S1', or absolute, i.e. independent of the setpoint S1/S1'. At boundary alarm the hysteresis works one-sided inwardly, and at range alarm outwardly (see fig. 3-6, next side).

P32: Hysteresis alarm circuit

Hysteresis is set one-sided at the adjusted limit value. It becomes effective depending on alarm definition (see fig. 3-6).

d0: Defrosting interval

The „defrosting interval“ defines the time, after which a defrosting process is started. After each defrosting start, this time is reset and runs the next interval.

d2: Defrosting temperature limit

This permits to terminate defrosting when the adjusted desired temperature value is reached. The defrosting time set with „d3“ nevertheless runs at the same time, i.e. it functions as safety net to terminate the defrosting process in case the defrosting temperature is not reached.

d3: Defrosting time limit

After the here set time the defrosting process is terminated.

Parameter description third control level**A1: Switch mode contact K1****A2: Switch mode contact K2**

The switch mode for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint. (see fig. 1 + 2)

A3: Function of contact K1 at sensor error**A4: Function of contact K2 at sensor error**

At sensor error the selected relay falls back into the condition pre-set here.

A5: Selection setpoint 2 or DeltaW This parameter determines whether the setpoints for thermostat 1 and 2 independently adjustable (A5=0) or whether they are tied with one another via a switching offset DeltaW (A5=1). This parameter applies only to contact K2 (see parameter P1).

A6: Control characteristics contact K1 Contact K1 can be set as thermostatic contact or as contact with ramp profile. Additionally it is possible to determine if the employment point of the ramp phase is either a value relative to setpoint 1 or an absolute value which is independent from setpoint 1.

A8: Display mode

The value can be indicated in integrals or with decimals in 0,5°K or 0,1°K. At indication in 0,5°K the value is rounded up or down. In general, all parameter indications are presented in 0,1°K.

A9: Weighing factor

With this parameter the actual value can be submitted to weighing. The measured value is multiplied by it and both indicated in the display and applied for regulation.

A10: Indication value for lower value linear analogue input**A11: Indication value for upper value linear analogue input**

Only relevant, if the controller is programmed for a voltage input (0...10V linear) or a current input (4...20mA linear). These parameters allow scaling of the linear analogue input. The value to be indicated for the lower and upper entrance value then defines the range the controller will indicate. For input range 4...20mA the display will show sensor error if the input signal drops below 4mA.

A19: Parameter lock

This parameter enables locking of each parameter level. If third level is locked, only parameter A19 may be changed.

A20: Activation of key acknowledgement

This parameter permits to switch on/off the key confirmation by internal buzzer.

A30: Function alarm exit

The alarm exit evaluates an upper and a lower limit value (see parameters P30 and P31), whereas a selection is possible as to whether the alarm is active if the temperature lies within these two limits, or whether the alarm is released if the temperature lies beyond them. In the case of sensor error, the alarm is activated independently of this adjustment. The exit can also be inverted, so that it functions like a release (see fig. 3 – 6).

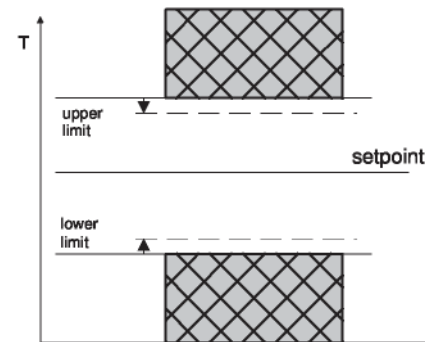
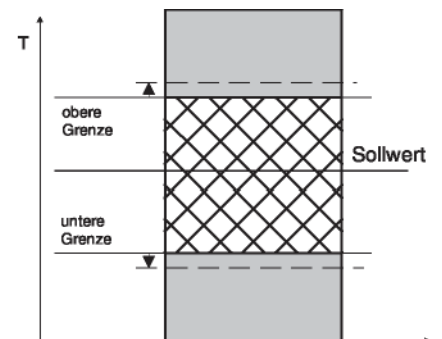
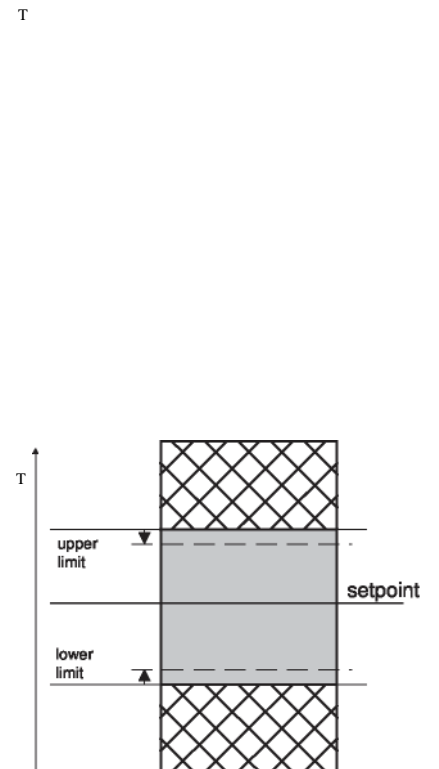



Fig. 3: Boundary alarm, alarm contact normal
A30=0 limits relative
A30=1 limits absolute



Alarm, buzzer on  Relay active

Alarm, buzzer on and relay active  Hysteresis (P32)

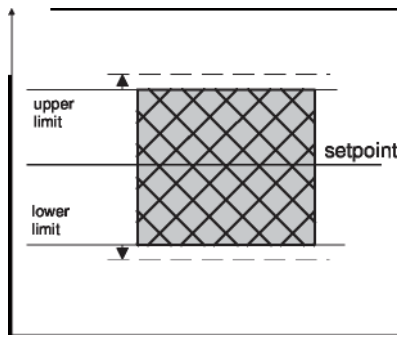


Fig. 4: Range alarm, alarm contact normal
 A30=2 limits relative A30=3 limits
 absolute

Fig. 5: Boundary alarm, alarm contact inverts
 A30=4 limits relative A30=5 limits
 absolute

Fig. 6: Range alarm, alarm contact inverts A30=6
 limits relative A30=7 limits absolute



A31: Special function at boundary or range alarm

Here can be selected whether, in the case of an alarm, the indication to flash and/or the buzzer is to start. Sensor alarm (display FIL or FIH) is indicated independently thereof by flashing display and the buzzer.

A32: Setpoint display

A32=0 indicates the actual value, A32=1 statically indicates the setpoint in the display. Therefore, the current actual value can only be indicated with parameter P0.

A33: Adjustment of setpoint S1' (not available on all types of controllers)

By closing switching input E1, setpoint S1 can be switched to a setpoint S1'. Setpoint S1' can be either relative to setpoint S1 or an independent, freely adjustable, control setting.

The setpoint S1' can only be accessed if input E1 is closed. The setpoint S1' can only be activated, if the external input is configured for setpoint change-over (parameter A81=2 or 3).

A40: Hysteresis mode contact K1

A41: Hysteresis mode contact K2 These parameters allow selection as to whether the hysteresis values which are adjustable with P32, are set symmetrically or one-sided at the respective switching point. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact. (see fig. 1 + 2)

A50: Minimum action time contact K1 "On"**A51: Minimum action time contact K1 "Off"****A52: Minimum action time contact K2 "On"****A53: Minimum action time contact K2 "Off"**

These parameters permit a delay in switching on/off the relay in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-on or switching-off phase.

A54: Delay after "Power-on"

This parameter allows a switching-on delay of relays after switching-on the mains voltage. This delay corresponds with the time set here.

A55: Mutual delay of contacts K1 and K2

This parameter makes a mutual switching on delay of relays possible, depending on whichever contact is switched first.

A56: Alarm suppression after „Power-On“ or setpoint change-over

This parameter allows a switching-on delay of the alarm contact after switching on the mains voltage or setpoint change-over. This delay corresponds with the time set here.

A60: Sensor type

These parameter permits selection of the sensor type, if the needed hardware prerequisites are available.

A70: Software filter

With several measuring values, it is possible to obtain an average value. This parameter can determine by how many measured values an average value is to be formed. If a sensor with a very fast reaction to external influences is used, an average value ensures a calm signal process.

A80: Temperature scale

Indication can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range. (Example: A controller with the desired value of 0°C is switched to Fahrenheit. The new desired value is then interpreted as 0°F, which corresponds to a temperature of -18°C).

NOTE: Indication limits with °F can be smaller than the actual measuring range!

A81: Function E1

With this parameter function of the ext. input E1 can be set. With A81=0 the E1 is not evaluated. With A81=1 the controller is switched to the standby mode. With A81=2 or A81=3 setpoint S1 is switched to setpoint S1' when input E1 is closed. With A81=3 the status of E1 is indicated by LED3 in the display.

A82: Function „key 5“ (Standby)**A83: Function „key 3“**

The following functions are available: 0 the respective key has no function

- 1 the controller is switched to standby mode
- 2 the key is linked with the function of parameter P1
- 3 a relay (indicated with parameter A90 92) can be switched on or off directly with the key. In standby mode the key is locked and the corresponding relay switched off. After restarting the corresponding relay remains switched off
- 4 like 3, but the relay is switched despite of the standby mode.

A90: Output connection relay K1**A91: Output connection relay K2 A92:**

Output connection relay K3 Depending on existing hardware there may not be all output relays. This parameter assigns the respective relay to the internal controller outputs, to key 3 or 5, to the alarm contact or the buzzer.

Status messages in the display**ON/OFF**

Standby modus, no regulation. Switch on by key or switching entrance.

FIL

Sensor error, short-circuit at sensor F1. Check sensor.

FIH

Sensor error, open-circuit at sensor F1. Check sensor.

== =

Key-lock active. Change parameter P19 or A19.

EP, display flashes

Data loss at parameter memory. If error cannot be eliminated by switching on/off, the controller must be repaired

Buzzer

Temperature alarm at too high or too low temperature (if activated). The buzzer function can be switched off with the DOWN-key.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Parameter	Function	Adjustable range
S1	Setpoint contact K1	P4 ... P5
S1'	If A33=0 and A81=2 or 3: Setpoint at closed input E1	-99 ... +99.9 K if A33=1 P4 ... P5, if A33=2
P0	Actual value	-
P1	Setpoint or DeltaW	P4 ... P5 -99.9 ... +99.9 K
P2	Hysteresis contact K1	0.1 ... 99.0 K
P3	Hysteresis contact K2	0.1 ... 99.0 K
P4	Control range limitation – minimum setpoint	-99°C ... P5
P5	Control range limitation – maximum setpoint	P4 ... 999°C
P6	Actual value correction	-20.0 ... +20.0 K
P11	Relative or absolute employment point of the ramp phase (only ST70-31.03 and ST72-31.03)	-99 ... 99K -99 ... 999°C
P12	Ramp gradient (only ST70-31.03 and ST72-31.03)	0.1 ... 100K/min.
P19	Key-lock	0: no key-lock 1: key-lock
P30	Lower alarm value	-99 ... 999°C/K
P31	Upper alarm value	-99 ... 999°C/K
P32	Hysteresis alarm circuit	0.1 ... 99.9 K
d0	Defrosting interval	1 ... 99 h 0 = no defrosting
d2	Defrosting temperature limit	-99.0 ... 999.9°C
d3	Defrosting time limit	0 ... 99 min. 0 = without time limit
A1	Switch mode contact K1	0: heating contact 1: cooling contact
A2	Switch mode contact K2	0: heating contact 1: cooling contact
A3	Function of contact K1 at sensor error	0: relay off 1: relay on
A4	Function of contact K2 at sensor error	0: relay off 1: relay on
A5	Selection setpoint 2 or DeltaW	0: operation with setpoint 2 1: operation with DeltaW
A8	Display mode (all parameter indications are presented in 0,1°K)	0: integrals 1: decimals in 0,5°C 2: decimals in 0,1°C
A9	Weighing factor	0.50 ... 1.50
A10	Indication value for lower value linear analogue input	-99 ... 999°C
A11	Indication value for upper value linear analogue input	-99 ... 999°C
A19	Parameter lock	0: no lock 1: A-parameter locked 2: A- and P-parameter locked
A20	Key acknowledgement	0: no 1: yes
A30	Function alarm exit	0: Boundary alarm, relative 1: Boundary alarm, absolute 2: Range alarm, relative 3: Range alarm, absolute 4: Boundary alarm, relative, alarm contact inverted 5: Boundary alarm, absolute, alarm contact inverted 6: Range alarm, relative, alarm contact inverted 7: Range alarm, absolute, alarm contact inverted
A31	Special function at boundary or range alarm	0: no special function 1: flashing display 2: buzzer 3: flashing display and buzzer 4: like 3, buzzer can be cancelled 5: like 4, cancelled buzzer restarts after 10 min. 6: like 4, cancelled buzzer restarts after 30 min
A32	Setpoint display	0: display shows actual value 1: display shows setpoint S1 (S1')
A33	Type of setpoint S1'	0: not activated 1: relative to setpoint S1 2: absolute (freely adjustable)
A40	Hysteresis mode contact K1	0: symmetrically 1: one-sided
A41	Hysteresis mode contact K2	0: symmetrically 1: one-sided

Parameter	Function	Adjustable range
A50	Minimum action time contact K1 "On"	0...600 sec.
A51	Minimum action time contact K1 "Off"	0...600 sec.
A52	Minimum action time contact K2 "On"	0...600 sec.
A53	Minimum action time contact K2 "Off"	0...600 sec.
A54	Delay after "Power-on"	0...600 sec.
A55	Mutual delay of contacts K1 and K2	0...600 sec.
A56	Alarm suppression after „Power-On“	0...60 min.
A60	Sensor type	11: PT100 two-wire 12: PT100 three-wire 21: PTC 22: PT1000 two-wire 23: PT1000 three-wire 31: voltage input 2-10V or current input 4-20mA 32: voltage input 0-10V or current input 0-20mA
A70	Software filter	1: inactive average value with: 2: 2 measuring values (ca. 0.6s) 4: 4 measuring values (ca. 1.2s) 8: 8 measuring values (ca. 2.4s) 16: 16 measuring values (ca. 4.8s) 32: 32 measuring values (ca. 9.6s) 64: 64 measuring values (ca. 19.2s) 128: 128 measuring values (ca. 38.4s)
A80	Temperature scale and display when in Standby-Mode	0: Fahrenheit ("AUS") 1: Celsius ("AUS") 2: Fahrenheit ("OFF") 3: Celsius ("OFF")
A81	Function input E1	0: no function 1: controller On/Off (Standby) 2: setpoint S1' activated 3: like 2, status indicated by LED3
A82	Function key 5	0: no function 1: controller On/Off (Standby) 2: setpoint P1 3: switching a relay selected by A90-92, relay switched off in standby mode 4: switching a relay selected by A90-92, relay independent of standby mode
A83	Function key 3	0: no function 1: controller On/Off (Standby) 2: setpoint P13: switching a relay selected by A90-92, relay switched off in standby mode 4: switching a relay selected by A90-92, relay independent of standby mode
A90	Output connection relay K1	0: no connection 1: connection to contact K1 2: connection to contact K2 3: connection to alarm contact 4: connection to buzzer 5: connection to key 3 or 5 6: connection, if controller switched on
A91	Output connection relay K2	0: no connection 1: connection to contact K1 2: connection to contact K2 3: connection to alarm contact 4: connection to buzzer 5: connection to key 3 or 5 6: connection, if controller switched on
A92	Output connection relay K3	0: no connection 1: connection to contact K1 2: connection to contact K2 3: connection to alarm contact 4: connection to buzzer 5: connection to key 3 or 5 6: connection, if controller switched on
Pro	Program version	-

Adjustment options



Key 1: UP

Pressing this key you can increase the parameter or parameter value or scroll the parameter list.

Key 2: DOWN



Pressing this key you can decrease the

**Key 3:
(if available)**

parameter or parameter value or scroll the parameter list. The alarm buzzer and the result message of the auto-tuning can be switched off with this key.



Different functions are assigned to this key by help of parameters, see parameter b2. If the key is pressed for min. 3 sec. the auto-tuning process will be started or aborted.



**Key 4: SET
Key 5: Standby**

Holding this key, the setpoint is indicated. Additionally, this key is used for setting parameters.



Different functions are assigned to this key by help of parameters, see parameter b1. (Standby-Mode)

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Parameter description second control level

P1: Setpoint / DeltaW for control circuit 2

Adjusting the setpoint of control circuit 2. If A5=1, the setpoints for control circuit 1 and

2 are linked with one another via switching difference DeltaW, which can be adjusted with P1. (operation with DeltaW)

The following applies: setpoint thermostat 2 = setpoint control circuit 1 + delta W2. This difference can take positive or negative values. Thus, a leading or following

contact can be realised. If A5=0, the setpoints for control circuit 1 and 2 are independently adjustable.

P2: Hysteresis contact K1 (only available if K1 in thermostatic mode)

P3: Hysteresis contact K2 (only available if K2 in thermostatic mode) The hysteresis can be set symmetrically or one-sided at the setpoint. At one-sided setting, the hysteresis works downward with heating contact and upward with cooling contact (see A40 + A41).

P4: Control range limitation – minimum setpoint

P5: Control range limitation – maximum setpoint

The adjustment range of the setpoint can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

P6: Actual value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

P7: Proportional band at PID regulation

The proportional part works in such a way that with approximation of the actual value to the setpoint the variable is reduced linearly from +-100% to 0%.

P8: I-factor

[Software .02!]

Setting the integral factor determines the intensity and effect of the I-portion. The proportional controller as such has a remaining deviation of the actual value from the setpoint. The integral portion provides for a complete compensation of this offset. If „0“ is set, then the I-portion is inactive.

P8: Reset time Tn (Integral-portion)

[Software .32!]

The proportional controller as such has a remaining deviation of the actual value from the setpoint. The integral portion provides for a complete compensation of this offset

The reset time is a measure for the period of time needed to adjust a remaining temperature deviation of the size of the proportional range.

If a small reset time is set, a fast post-adjustment will take place. At a too small reset time, however, the system may tend to vibrate

P9: D-portion

[Software .02!]

Setting the derivative factor determines the intensity and effect of the D portion. The D-factor reacts to control deviations. The faster the change of control deviation, the larger the control output.

P9: Lead time Tv (Differential-portion) [

Software .32!]

The differential portion dampens temperature changes. If a long lead time Tv is set, damping is strong. At too long lead time, however, the system may tend to vibrate. At setting 0 the values are ineffective. It is therefore possible to realise a pure PI or PD regulation.

P10: Cycle time Tp

The cycle time is the time, in which the control output runs through one switching period, i.e. once switched out and once switched on. The smaller the cycle time, the faster the regulation. By consequence, however, there is also an increased switching frequency of the exit, which can lead to rapid wear of relay contacts. For very fast control ways with the respective high switching frequency a voltage output is therefore of advantage.

P11: Employment point of the ramp phase

[Software .32!]

Before reaching the point of ramp employment the controller works at full heating/cooling power. After reaching the point of ramp employment regulation to reach the setpoint is effected by help of a ramp profile. The ramp is ascending at heating function with employment points below the setpoint. At cooling function it is falling with employment points above the setpoint. After the setpoint is reached, the ramp function becomes inactive, unless the temperature exceeds the point of ramp employment again in either direction, due to external influences. Changes of ramp parameters are not considered once the ramp has started, but become effective only thereafter. In the case of activated ramp function, there are two employment points for the ramp:

Relative values

The main setpoint S1 and the point of ramp employment are linked as difference with one another. This difference can take positive or negative values, i.e. starting point for the ramp can be above the setpoint at cooling function or below the setpoint at heating function, and automatically runs along with adjustments of the desired value.

Absolute values

Main setpoint S1 and ramp employment point are independent from each other.

P12: Ramp gradient

[Software .32!]

The ramp gradient sets the degree applied to change the (internal) setpoint in a ramp phase.

P19: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message „==“ appears in the display.

P30: Lower alarm value**P31: Upper alarm value**

The exit alarm is a boundary alarm or a range alarm with one-sided hysteresis (see parameter P32). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint S1/S1', or absolute, i.e. independent of the setpoint S1/S1'. At boundary alarm the hysteresis works one-sided inwardly, and at range alarm outwardly. If only one switching point is required in case of boundary alarm, the not-used second switching point should be adjusted to a value above or below the control range and the limit values should be absolute (see parameter A30).

P32 Hysteresis alarm circuit

The hysteresis can be set symmetrically or one-sided at the adjusted limit value.

P40: Analogue output**P41: Indication value for 0V at analogue output****P42: Indication value for 10V at analogue output**

Indication of the actual value (see P40) is subject to the following range adjustment:

If the indication value reaches the value set in P41, voltage is 0 V.

If the indication value reaches the value set in P42, voltage is 10 V.

P43: Indication value full heating performance (100%)**P44: Indication value „0“ performance****P45: Indication value full cooling performance (-100,0%)**

Indication of the PID control output (see P40) is subject to the following range adjustment:

If heating is to be performed with 100 % heating performance, voltage is as set in P43.

If neither heating nor cooling is required, voltage is as set in P44.

If cooling is to be performed with 100% cooling performance, voltage is as set in P45.

Parameter description third control level**A1: Switch mode contact K1****A2: Switch mode contact K2**

The switch mode for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint.

A3: Function of contact K1 at sensor error**A3: Function of contact K2 at sensor error**

At sensor error the selected relay falls back into the condition pre-set here.

A5: Selection setpoint 2 or DeltaW This parameter determines whether the setpoints for thermostat 1 and 2 independently adjustable (A5=0) or whether they are tied with one another via a switching offset DeltaW (A5=1). This parameter applies only to contact K2 (see parameter P1).

A6: Control characteristics contact K1**A7: Control characteristics contact K2**

Independent choice of either PID or thermostatic characteristics for each contact. With software “.02” it is possible to set both A6 and A7 to “1” and therefore both outputs have the same setpoint. This setting is used i.e. to control a motor valve. With software “.32” a ramp profile can be additionally applied to control circuit 1.

A8: Display mode

The value can be indicated in integrals or with decimals.

A9: Weighing factor

With this parameter the actual value can be submitted to weighing. The measured value is multiplied by it and both indicated in the display and applied for regulation.

A10: Indication value for lower value linear analogue input**A11: Indication value for upper value linear analogue input**

Only relevant, if the controller is programmed for a voltage input (0...10V linear) or a current input (4...20mA linear). These parameters allow scaling of the linear analogue input. The value to be indicated for the lower and upper entrance

value then defines the range the controller

will indicate. For input range 4...20mA the display will show sensor error if the input signal drops below 4mA.

A19 Parameter lock

This parameter enables locking of each parameter level. If third level is locked, only parameter A19 may be changed.

A30: Function alarm exit

The alarm exit evaluates an upper and a lower limit value (see parameters P30 and P31), whereas a selection is possible as to whether the alarm is active if the temperature lies within these two limits, or whether the alarm is released if the temperature lies beyond them. In the case of sensor error, the alarm is activated independently of this adjustment.

A31: Special function at boundary alarm

Here can be selected whether, in the case of an alarm, the indication to flash and/or the buzzer is to start. Sensor alarm (display F1L or F1H) is indicated independently thereof by flashing display and the buzzer.

A32: Setpoint display

A32=0 indicates the actual value, A32=1 statically indicates the setpoint in the display.

A33: Adjustment of setpoint S1' (not available on all types of controllers)

By closing switching input E1, setpoint S1 can be switched to a setpoint S1'. Setpoint S1' can be either relative to setpoint S1 or an independent, freely adjustable, control setting.

The setpoint S1' can only be accessed if input E1 is closed. The setpoint S1' can only be activated, if the external input is configured for setpoint change-over (parameter b3=1).

A40: Hysteresis mode contact K1**A41: Hysteresis mode contact K2 A42: Hysteresis mode alarm contact**

These parameters allow selection as to whether the hysteresis values are set symmetrically or one-sided at the respective switching point. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact.

A60: Sensor type

These parameters permit selection of the sensor type, if the needed hardware prerequisites are available.

A70: Software filter

With several measuring values, it is possible to obtain an average value. This parameter can determine by how many measured values an average value is to be formed. If a sensor with a very fast reaction to external influences is used, an average value ensures a calm signal process.

A80: Temperature scale

Indication can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range. (Example: A controller with the desired value of 0°C is switched to Fahrenheit. The new desired value is then interpreted as 0°F, which corresponds to a temperature of -18°C).

NOTE: Indication limits with °F can be smaller than the actual measuring range!

U0: Function output K1**U1: Function output K2****U2: Function output K3****U3: Function output K4**

Generally, the outputs are exchangeable with parameter adjustments, in order to achieve an optimal relation of the existing hardware with regard to contact rating, kind of contact and cycle number. Therefore, these parameters first assign the outputs to the controller function.

b1: Function key 5

If the Standby key is not used, the controller is active after switching on the mains voltage. If the key is activated, the controller can be switched to Standby-mode (display indicates "OFF" or "AUS").

b2: Function key 3

This key can be parametered to start the auto-tuning process.

A81: Function E1

With this parameter function of the ext. input E1 can be set. With A81=0 the E1 is not evaluated. With A81=1 setpoint S1 is switched to setpoint S1' when input E1 is closed. A81=2 the controller is switched to the standby mode

Parameter for serial interface**L0: Individual address (Node) L1:****Individual address (Subnet) STOERK**

TRONIC devices can be hooked with „self installation“. In this case, however, each participant has to be assigned a clear address. This address corresponds to the knot address and subnet address with Domain=0.

The address of the knot can only be changed, if the knot was not tied externally (SNVT „nciNetConfig“ = CFG_LOCAL),

otherwise the changed value is not saved (after releasing the set key the old value is reset).

Lr: Reset parameters

This parameter is special as it can reset all parameters to the condition ex works. At setting Lr = 1 reset takes place, and Lr itself is reset to zero again. Note that customised values will become effective if these were adjusted prior to delivery.

Auto-tuning

The auto-tuning mode serves to automate the time-consuming procedure of adjusting PID parameters. The automatic tuning cycle drives a measuring curve, which provides the controller with a model conception of the control system. Based on this data it calculates the requested PID parameters.

For optimal results the starting temperature should have the highest possible difference to the desired value (a stationary condition of the controlled system prior to start is favourable, but not absolutely necessary). There may be an occasional excess of the desired value during the learning phase.

During the automatic tuning cycle the following messages successively appear in the display:

Au0	phase 1 of the measuring curve
Au1	phase 2 of the measuring curve
Au2	phase 3 of the measuring curve

Upon successful termination of the automatic tuning, control automatically continues with the new PID parameters. Parameters P7, P8, P9 and P10 are replaced by the new values.

Status messages following the automatic tuning cycle:

- E-0:** Error-free termination of automatic tuning. New PID values saved.
- E-4:** Actual value and desired value too close together when starting the cycle. Desired value exceeded at measurement. For safety reasons switched to thermostat control. No new PID parameters defined. Select appropriate desired value or lower start temperature and repeat procedure.
- E-5:** Error desired value for this procedure.

Example: Heating controller with a desired value below the actual value. Controller switches to PID mode with former parameters.

All messages can be acknowledged with the SET key.

The values determined in the automatic tuning mode are saved on the captive memory and are valid also after interruption by voltage failure. The measuring procedure can be repeated as many times as desired.

In case of interruption of the automatic tuning cycle due to voltage failure, the controller takes up operation with the settings valid before restart.

Status messages in the display**AUS or OFF**

Standby modus, no regulation. Switch on by key or switching entrance.

F0

Pt100: Error in neutralisation line. Thermo element: Error at clamp compensation. Check compensation line. Exchange controller.

F1

Sensor error, short-circuit at sensor. Check sensor.

FIH

Sensor error, open-circuit at sensor. Check sensor.

= = =

Key-lock active. Change parameter P19 or A19.

EP, display flashes

Data loss at parameter memory. If error cannot be eliminated by switching on/off, the controller must be repaired

Buzzer

Temperature alarm at too high or too low temperature (if activated). The buzzer function can be switched off with the DOWN-key.

Au1

Auto-tuning process running.

Au2

Auto-tuning process running.

E-0

Auto-tuning terminated error-free. New PID values saved. Confirm with SET key.

E-4

Auto-tuning interrupted, no new PID-parameters defined. Actual value and setpoint too close together at auto-tuning cycle start. Actual value exceeded at measuring. Controller switches to thermostat mode.

Confirm with SET key. Select an appropriate desired value for auto-tuning process or bring control system to a lower starting temperature.

E-5

Auto-tuning stopped, no new PID parameters defined. Error in setpoint for auto-tuning cycle (e.g. setpoint of the heating controller was below the actual value). Controller switches to PID mode with former parameters.

Confirm with SET key.

F90

Network error, serial interface. Check connecting lines. Check address L0.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Parameter	Function	Adjustable range
S1	Setpoint contact K1	P4 ... P5
S1*	If A33=0 and A81=2 or 3: Setpoint at closed input E1	-99 ... +99.9 K if A33=1 P4 ... P5, if A33=2
P1	Setpoint or DeltaW	-99.9 ... 999°C -99.9 ... 99.9 K
P2	Hysteresis contact K1	0.1 ... 99.9 K
P3	Hysteresis contact K2	0.1 ... 99.9 K
P4	Control range limitation – minimum setpoint	-99.9 ... P5°C
P5	Control range limitation – maximum setpoint	P4 ... 999.9°C
P6	Actual value correction	-99.9 ... +99.9 K
P7	Proportional band	0.1 ... 99.9 K
P8	I-factor (software .02) Reset time Tn (software .32)	0 ... 15 0 ... 999 sec. (0 sec. = inactive)
P9	D-factor (software .02) Lead time Tv (software .32)	0 ... 15 0 ... 999 sec. (0 sec. = inactive)
P10	Cycle time Tp	2 ... 100 sec.
P11	Employment point of the ramp phase (software .32)	P4...P5
P12	Ramp gradient (software .32)	0.01 ... 99.9 K/Min
P19	Key-lock	0: no key-lock 1: key-lock
P30	Lower alarm value	-99.9°C/K ... P31
P31	Upper alarm value	P30 ... 999.9°C/K
P32	Hysteresis alarm circuit	0.1 ... 99.9 K
P40	Analogue output	0: control output PID 1: actual value
P41	Indication value for 0V at analogue output	-99.9 ... 999.9°C
P42	Indication value for 10V at analogue output	-99.9 ... 999.9°C
P43	Indication value full heating performance (+100 %)	-10.0 ... 10.0 V
P44	Indication value „0“ performance (0 %)	-10.0 ... 10.0 V
P45	Indication value full cooling performance (-100 %)	-10.0 ... 10.0 V
A1	Switch mode contact K1	0: heating contact 1: cooling contact
A2	Switch mode contact K2	0: heating contact 1: cooling contact
A3	Function of contact K1 at sensor error	0: relay off 1: relay on
A4	Function of contact K2 at sensor error	0: relay off 1: relay on
A5	Selection setpoint 2 or DeltaW	0: operation with setpoint 2 1: operation with DeltaW
A6	Control characteristics contact K1	0: thermostatic 1: PID 2: thermostatic with relative ramp (Software .32) 3: thermostatic with absolute ramp (Software .32) 4: relative ramp (PID) (Software .32) 5: absolute ramp (PID) (Software .32)
A7	Control characteristics contact K2	0: thermostatic 1: PID
A8	Display mode	0: decimals 1: integrals
A9	Weighing factor	no function
A10	Indication value for lower value linear analogue input	-99.9 ... 999.9 °C
A11	Indication value for upper value linear analogue input	-99.9 ... 999.9°C
A19	Parameter lock	0: no lock 1: A-parameter locked 2: A- and P-parameter locked

Parameter	Function	Adjustable range
A30	Function alarm exit	0: Boundary alarm, relative 1: Boundary alarm, absolute 2: Range alarm, relative 3: Range alarm, absolute
A31	Special function at boundary or range alarm	0: no special function 1: flashing display 2: buzzer 3: flashing display and buzzer 4: like 3, buzzer can be cancelled 5: like 4, cancelled buzzer restarts after 10 min. 6: like 4, cancelled buzzer restarts after 30 min
A32	Setpoint display	0: display shows actual value 1: display shows setpoint S1 (S1')
A33	Type of setpoint S1'	0: not activated 1: absolute (freely adjustable) 2: relative to setpoint S1
A40	Hysteresis mode contact K1	0: symmetrically 1: one-sided
A41	Hysteresis mode contact K2	0: symmetrically 1: one-sided
A42	Hysteresis mode alarm contact	0: symmetrically 1: one-sided
A60	Sensor type	0: Thermo element type J 1: Thermo element type K 2: Pt100 two-wire 3: Pt100 three-wire 4: PTC (KTY81-110) 5: 2...10V 6: 0...10V 7: 4...20mA 8: 0...20mA
A70	Software filter	0...10 (0 = inactive)
A80	Temperature scale	0: Fahrenheit (50 Hz) 1: Celsius (50 Hz) 2: Fahrenheit (60 Hz) 3: Celsius (60 Hz)
U1	Function output K1	0: inactive 1: control circuit 1 2: control circuit 2 3: alarm relay 4: connected to key 3 (if set with b2) 5: on with key 5
U2	Function output K2	0...5 (see U1)
U3	Function output K3	0...5 (see U1)
U4	Function output K4	0...5 (see U1)
b1	Function key 5	0: inactive 1: controller On/Off („OFF“) 2: controller On/Off („AUS“) 3: controller On/Off („OFF“), status saved 4: controller On/Off („AUS“), status saved
b2	Function key 3	0: inactive 1: start auto-tuning 2: switching an output activated with U1-4, independent from Standby 3: switching an output activated with U1-4, dependent from Standby
b3	Function input E1	0: inactive 1: setpoint S1' activated 2: controller On/Off (Standby)
S/A	Start auto-tuning	0: no start 1: start auto-tuning
L0	Individual address (Node)	0...126
L1	Individual address (Subnet)	1...255
Lr	Reset parameters	0: no reset 1: reset parameters, including Lr

Adjustment options

The adjustment of the controller takes place in several menu levels. The respective sub-menu can be secured with passwords to prevent the unauthorised access of some safety-relevant parameters.



Key UP

Pressing this key you can increase the parameter or parameter value or scroll the parameter list.



Key DOWN



Standby key
(function key 1)

Switching the controller on or off After power interruption, parameter H17 is automatically set.



Key SET

Pressing this key you can decrease the parameter or parameter value or scroll the parameter list. At alarm the buzzer function can be switched off with this key.

Holding this key, the setpoint is indicated. Additionally, this key is used for setting parameters.

Parameter setting of the setpoint

The setpoint C1 is accessible directly with SET key. Pressing also the UP or DOWN key it can be adjusted.

The activation of the second setpoint C2 is indicated on the display with a flashing point to the right. It can either be activated via switching input or with function key 1 (depending on parameter).

Software version

The version number of the software will show when pressing SET + UP + DOWN at the same time.

Menu level

When simultaneously pressing the UP and DOWN key for at least 4 seconds, the controller changes to menu level. It consists of several sub-menus listed by the respective initial letter followed by 2 lines (e.g. C -- for the C-level).

Parameter C - - (controller level):

Application parameter

Parameter b - - (between-level):

Combination parameter

Parameter H - - (hardware-level):

Hardware-parameter

Parameter d - - (defrost-level):

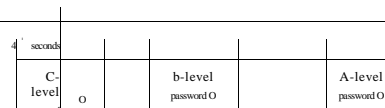
Defrosting parameter (control circuit 1)

Parameter A - - (analogue-level):

Parameter for analogue inputs and outputs

Adjustment of parameters

Selection of the sub-menu is effected by scrolling with the UP and DOWN key. Upon pressure of the SET key the password of the respective level is requested. The password must be adjusted by additionally



pressing the UP or DOWN key (standard value: 0).

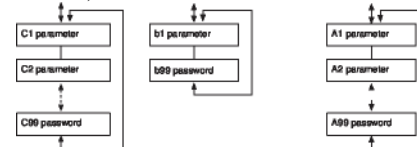


Fig. 1: level structure

The last parameter of the respective sub-menu (e.g. C99, b99...) corresponds to the current password of this level and can be changed there.

NOTE: Forgetting the password requires sending the controller to Stoerk Tronic.

If the password is correct, the display jumps to the sub-menu and shows the first listed parameters when the set key is released. Pressing the SET key, the value of the selected parameter is indicated. Additionally pressing the UP or DOWN key, the value can be adjusted. Releasing all keys, the new value is saved long term.

If UP and DOWN keys are simultaneously pressed again for at least 4 seconds, the display switches to the menu level again. Upon repeated pressing for 4 seconds or no pressing of any key for more than 60 seconds, the system jumps back to the initial state.

C-level (controller)

This level contains the application param-

eters.

The activation of the second setpoint C2 is indicated on the display with a flashing point to the right. It can either be activated via switching entrance or with function key 1 (depending on parameter).

C1: Setpoint control circuit 1 (thermostat)

This value corresponds with the setpoint set at the first control level.

C2: Setpoint control circuit 1 (thermostat) at closed switching input By closing switching input E1, setpoint C1 can be switched to a setpoint C2.

The setpoint C2 can only be accessed if input E1 is closed. The setpoint C2 can only be activated, if the external input is configured for setpoint change-over.

C3: Setpoint offset C1/C2

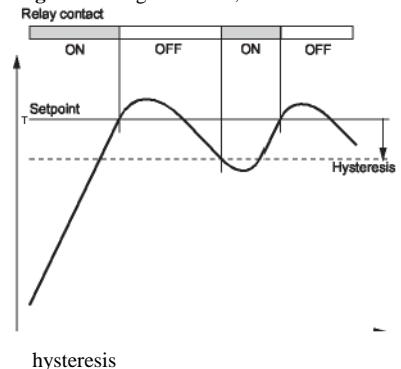
This adjusted value will build the difference to the set setpoint for control circuit 1, i.e. there is no regulation according to the pre-set value, but according to the sum of setpoint and the value of C3.

C4: Switching sense control circuit 1 The switching sense for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact falls as soon as the pre-set setpoint is reached, thus power interruption. At cooling function the contact only tightens, if the actual value is above the required setpoint.

C5: Hysteresis control circuit 1

The hysteresis can be set symmetrically or one-sided at the setpoint (see C6). At one-sided setting, the hysteresis works downward with heating contact and upward with cooling contact. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point (see fig. 2 and 3).

Fig. 2: Heating controller, one-sided



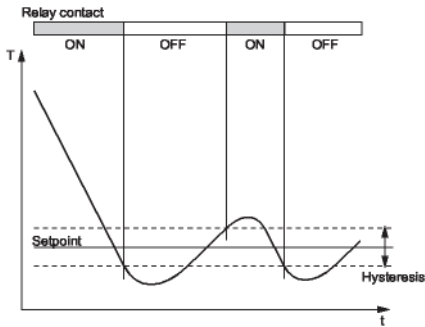


Fig. 3: Cooling controller, symmetrical hysteresis

C6: Hysteresis mode control circuit 1

These parameters allow selection as to whether the hysteresis values which are adjustable with C5, are set symmetrically or one-sided at the respective switching point. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact.

C7/C8: Minimum action time control circuit 1 „On“/“Off“

These parameters permit a delay in switching on/off the relay in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-on or switching-off phase.

C9: Function control circuit 1 at sensor error

At sensor error the selected relay (see H41, 42, 43) falls back into the condition pre-set here.

C10: Setpoint limit (minimum) setpoint 1

C11: Setpoint limit (maximum) setpoint 1

The adjustment range of the setpoint can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

C21: Setpoint control circuit 2 (thermostat) (b1=0) If b1=1, this value is ineffective.

C23: Value deltaW2 (b1=1)

If b1=1, the setpoints for control circuit 1 and 2 are linked with one another via switching difference deltaW2 (C23) (operation with deltaW).

The following applies: Setpoint thermostat 2 = setpoint control circuit 1 (C1/C2) + deltaW2.

This difference can take positive or negative values. Thus, a leading or following

contact can be realised.

C24: Switching sense control circuit 2

The switching sense for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact falls as soon as the pre-set setpoint is reached, thus power interruption. At cooling function the contact only tightens, when the actual value is above the required setpoint.

C25: Hysteresis control circuit 2

The hysteresis can be set symmetrically or one-sided at the setpoint (see C26). At one-sided setting, the hysteresis works downward with heating contact and upward with cooling contact. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point (see fig. 2 and 3).

C26: Hysteresis mode control circuit 2

These parameters allow selection as to whether the hysteresis values which are adjustable with C25, are set symmetrically or one-sided at the respective switching point.

At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact.

C27: Minimum action time control circuit 2 „On“

C28: Minimum action time control circuit 2 „Off“

These parameters permit a delay in switching on/off the relay, in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-on or switching-off phase.

C29: Function control circuit 2 at sensor error

At sensor error the selected relay (see H41, 42, 43) falls back into the condition pre-set here.

C41: Setpoint thermostat 3 (b2=0) If b2=1, this value is ineffective.

C43: Value deltaW3 (b2=1)

If b2=1, the setpoints for thermostat 1 and 3 are linked with one another via switching difference deltaW3 (operation with deltaW).

The following applies: Setpoint thermostat 3 = setpoint thermostat 1 (C1/C2) + deltaW3.

This difference can take positive or negative values. Thus a leading or following

contact can be realised.

C44: Switching sense control circuit 3

The switching sense for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact falls as soon as the pre-set setpoint is reached, thus power interruption. At cooling function the contact only tightens, if the actual value is above the required setpoint.

C45: Hysteresis control circuit 3

The hysteresis can be set symmetrically or one-sided at the setpoint (see C6). At one-sided setting, the hysteresis works downward with heating contact and upward with cooling contact. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point (see fig. 2 and 3).

C46: Hysteresis mode control circuit 3

These parameters allow selection as to whether the hysteresis values which are adjustable with C45, are set symmetrically or one-sided at the respective switching point.

At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact.

C47: Minimum action time control circuit 3 „On“

C48: Minimum action time control circuit 3 „Off“

These parameters permit a delay in switching on/off the relay in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-on or switching-off phase.

C49: Function control circuit 3 at sensor error

At sensor error the selected relay (see H41, 42, 43) falls back into the condition pre-set here.

C61: Lower alarm value

C62: Upper alarm value

The exit alarm is a limit value alarm or a volume alarm with one-sided hysteresis (see parameter C65). Both at the limit value alarm and the volume alarm, limit values can be relative, i.e. going along with the setpoint C1/C2, or absolute, i.e. independent of the setpoint C1/C2. At limit value alarm the hysteresis works one-sided inwardly, and at volume alarm outwardly (see fig. 4-7, next side).

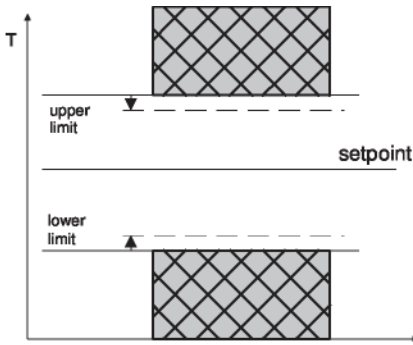


Fig. 4: Boundary alarm, alarm contact normal
C63=0 limits relative C63=1 limits absolute

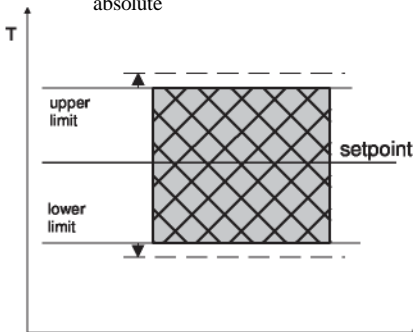
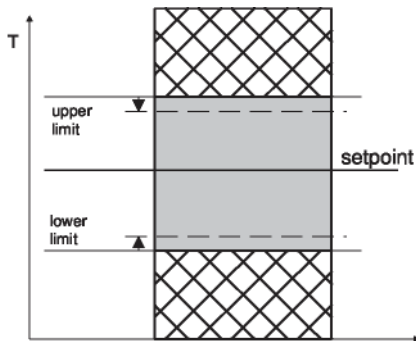


Fig. 5: Range alarm, alarm contact normal
C63=2 limits relative C63=3 limits absolute

Fig. 6: Boundary alarm, alarm contact invers



C63=4 limits relative C63=5 limits absolute

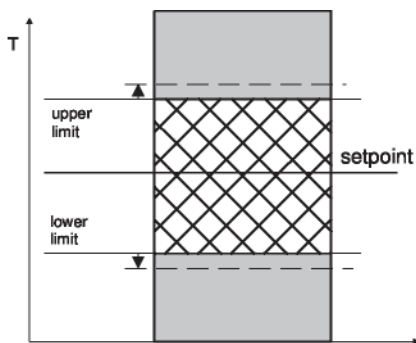
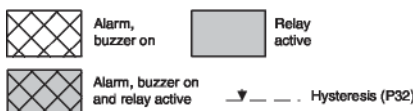


Fig. 7: Range alarm, alarm contact invers
C63=6 limits relative C63=7 limits absolute



C63: Function exit alarm

The exit alarm evaluates an upper and a lower limit value (see parameters C61 and C62), whereas a selection is possible as to whether the alarm is active if the temperature lies within these two limits, or whether the alarm is released if the temperature lies beyond them. In the case of sensor error, the alarm is activated independently of this adjustment. The exit can also be inverted, so that it functions like a release (see fig. 4 – 7).

C64: Special function at alarm

Here can be selected whether, in the case of emergency, the indication to flash and/or the buzzer is to start. Sensor alarm (display F1L or F1H) is indicated independently thereof by flashing display and the buzzer runs off.

C65: Hysteresis alarm circuit Hysteresis is set one-sided at the adjusted limit value. It becomes effective depending on alarm definition (see fig. 4-7).

ATTENTION: The following parameters C82...C89 are only available for PID-Software .102!

C82: Proportional band at PID regulation

The proportional band works in such a way that with approximation of the actual value to the setpoint the variable is reduced linearly from +-100% to 0%.

C83: Reset time at PID regulation (I-portion)

C84: Lead time at PID regulation (D-portion)

The proportional controller as such has a remaining deviation of the actual value from the setpoint. The integral portion provides for a complete compensation of this offset.

The reset time is a measure for the period of time needed to adjust a remaining temperature deviation of the size of the proportional range.

If a small reset time is set, a fast post-adjustment will take place. At a too small reset time, however, the system may tend to vibrate.

The differential portion dampens temperature changes.

If lead time is set for long, damping is strong. At too long lead time, however, the system may tend to vibrate. At setting 0 the values are ineffective. It is therefore possible to realise a pure PI or PD regulation.

C85: Cycle time at PID regulation

The cycle time is the time, in which the control exit runs through one switching

period, i.e. once switched out and once switched on. The smaller the cycle time, the faster the regulation. By consequence, however, there is also an increased switching frequency of the output, which can lead to rapid wear of relay contacts. For very fast control ways with the respective high switching frequency a voltage output is therefore of advantage.

C86: Control variable dead volume With parameter C86 the size of the dead volume is adjustable in % of the PID variable.

Usually this finds application with phased PID controllers (relays), in order to obtain a minimum switch-on time. At C88 = 1 (differential PID) a pseudo hysteresis can be realised this way. This leads to a decrease in the switching frequency, if actual value ~ setpoint. For C88 = 2 the dead volume is made available at the analogue output as well (fig. 8).

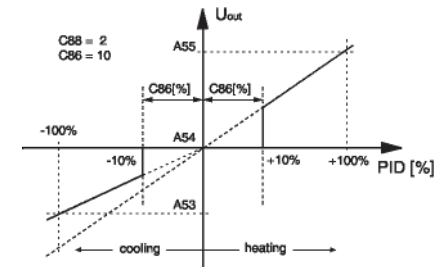


Fig. 8: Dead volume

C87: Function PID control circuit at sensor error

In the case a sensor error, the PID variable automatically goes to the condition set here.

C88: PID mode

Switching between PID standard (C88=0) and PID differential (C88=1).

PID differential: The differential mode is particularly suitable for the use of control valves (e.g. K1=OPEN, K2=CLOSED). As long as the value computed by the PID circuit remains constant, both exits remain inactive, i.e. the valve stops at the current position.

		PID-standard (C88=0)	
	PID	K1: heating	K2: cooling
1	20%	20%	0%
2	25%	25%	0%
3	25%	25%	0%
4	10%	10%	0%
5	-20%	0%	20%

		PID-differential (C88=1)	
	DiffPID	K1: heating	K2: cooling
1	+20%	20%	0%
2	+5%	5%	0%
3	±0%	0%	0%
4	-15%	0%	15%
5	-30%	0%	30%

Thus, control valves almost show the same controlling results as analogue valves. The table shows the different behaviour of both modes within the same control system.

C89: Cycle time control valve (DiffPID)

This parameter sets the time the control valve needs to go from 0% to 100%. If C88=1, the PID variable is converted to this interval. The PID cycle time (C85) remains unaffected by this. When this time is defined, indication with a rounded up value in seconds is recommended. Furthermore C85 should be \geq C89. At $\pm 100\%$ the respective exit remains durably active (synchronisation).

C99: Password

This parameter is to set the password for the C—level.

b-level (between)

This level contains the parameters for different combinations.

b1: Activation setpoint combination for thermostat 1 and thermostat 2 (deltaW2)

This parameter determines whether the setpoints for thermostat 1 and 2 independently adjustable (parameter C21) or whether they are tied with one another via a switching offset deltaW2 (parameter C23).

b2: Activation setpoint combination for thermostat 1 and thermostat 3 (deltaW3)

This parameter determines whether the setpoints for thermostat 1 and 3 independently adjustable (parameter C41) or whether they are tied with one another via a

switching offset deltaW2 (parameter C43).

b11: Delay control circuit 1, 2, 3 after „Power-On“

This parameter allows a switching-on delay of relays after switching-on the mains voltage. This delay corresponds with the time set here.

b12: Mutual delay control circuit 1, 2, 3

This parameter makes a mutual switching-on delay of relays possible, depending on whichever contact is switched first.

b13: Alarm suppression after „Power-On“, „setpoint“

This parameter allows a switching-on delay of the alarm contact after switching on the mains voltage. This delay corresponds with the time set here.

b21: Linkage analogue output

This is to specify whether the analogue output carries the variable (PID), the actual value or the setpoint. The allocation of the output voltage (max. 0 ... 10.0V) in correspondence with the indicated value is effected via parameters A51 and A52. Output of voltages is always positive only.

b99: Password

This parameter is to set the password for the b—level.

H-level (hardware)

This level contains the hardware parameters.

H1: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message „==“ appears in the display.

H11: Indication mode display 1

The value can be indicated in integrals or with decimals in 0.5°K or 0.1°K. At indication in 0.5°K the value is rounded up or down. In general, all parameter indications are presented in 0.1°K.

H12: Display 1 mode

H12=1 indicates the actual value, H12=2 indicates the setpoint C1 or C2 and H12=3 statically indicates the PID variable in the display. Therefore, the current actual value can only be indicated with parameter A01.

H13: Indicator mode display 2

The value can be indicated in integrals or

with decimals in 0.5°K, 0.1°C or 0.01°K. When indicating in 0.5°K, the value is rounded up or down. In general, all parameter indications are presented in 0.1°C.

H14: Display 2 mode

H14=1 indicates the actual value, H14=2 indicates the setpoint C1 or C2 and H14=3 statically indicates the PID variable in the display. H14=0 deactivates the display.

H15: Temperature scale

Indication can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range. (Example: A controller with the setpoint of 0°C is switched to Fahrenheit. The new setpoint is then interpreted as 0°F, which corresponds to a temperature of -18°C). NOTE: Indication limits with °F can be smaller than the actual measuring range!

H16: Indication standby

In standby mode the here set value appears in the display.

H17: Mode following „Power-On“

After switching on the mains voltage the controller automatically goes to the condition set here. H17=2 applies to the condition prior to the separation from the net.

H31: Assigning function key 1

Setting H31=0 deactivates the key, H31=1 functions as standby key.

H31=2 thus allows to change between setpoint 1 (C1) and setpoint 2 (C2).

H35: Activation of key acknowledgement

This parameter permits to switch the internal buzzer on/off by key confirmation.

H41-43: Function output K1-3

H44: Function hybrid output K1

Generally, the exits are exchangeable with parameter adjustments, in order to achieve an optimal relation of the existing hardware with regard to contact rating, kind of contact and cycle number. Therefore, these parameters first assign the exits to the controller function. Activation of H44 deactivates H41 and H43.

H51: Mains frequency

This parameter is to select the mains frequency.

H99: Password

This parameter is to adjust the password for the H—level.

d-level (defrosting functions)

This level contains the parameters for defrosting.

NOTE: Defrosting parameter only affects control circuit 1

d0: Defrosting interval

The „defrosting interval“ defines the time, after which a defrosting process is started. After each defrosting start, this time is reset and runs the next interval.

Manual defrosting:

Pressing the key UP for at least 3 sec. the defrosting interval is activated earlier. Alternatively parameter d9 can be applied for this function, too. The next automatic defrosting process takes place again after the time d0. (defrosting synchronisation)

d2: Defrosting temperature

This permits to terminate defrosting when the adjusted desired temperature value is reached. The defrosting time set with „d3“ nevertheless runs at the same time, i.e. it functions as safety net to terminate the defrosting process in case the defrosting temperature is not reached.

d3: Defrosting time limit

After the here set time the defrosting process is terminated.

d9: Defrosting time limit

At change of 0 -> 1 the defrosting process is started and the defrosting interval is reset. (defrosting synchronisation)

d99: Password

This parameter is to set the password for the d-level.

A-level (analogue values)

This level contains the parameters for analogue inputs and outputs.

A1: Indication of actual value analogue input

The here indicated temperature value is the sum of the actual measured value of sensor F1 and the actual value correction according to parameter A2.

A2: Actual value correction analogue input

With this parameter it is possible to correct actual value deviations caused by sensor tolerances or extremely long sensor lines for example. The control measuring value is increased or decreased by the here set value.

A3: Weighing factor analogue input (without U, I-entrance)

With this parameter the actual value can be submitted to weighing. The measured value is multiplied by it and both indicated in the display and applied for regulation.

A4: Analogue input type

These parameters permit selection of the sensor type, respectively the type of analogue input if the needed hardware prerequisites are available.

A5: Indication value for lower value linear analogue input

A6: Indication value for upper value linear analogue input
These parameters allow scaling of the linear analogue input. The value to be indicated for the lower and upper input value then defines the range the controller will indicate.

A40: Time constant of the software filter

With several measuring values, it is possible to obtain an average value. If a sensor with a very fast reaction to external influences is used, an average value ensures a calm signal process.

A50: Indication of the PID variable

Indication of the internally computed PID variable from -100%... 100%.

A51: Indication value for lower value at analogue output (0V)**A52: Indication value for upper value at analogue output (10V)**

Indication of the actual value (see b21) is subject to the following range adjustment: If the indication value reaches the value set in A51, voltage is 0 V. If the indication value reaches the value set in A52, voltage is 10 V.

A53: Indication value full cooling performance (-100,0..0%)**A54: Indication value „0“ performance**
A55: Indication value full heating performance (0..100,0%)

Indication of the actual value (see b21) is subject to the following range adjustment: If cooling is to be performed with 100% cooling performance, voltage is as set in A53.

If neither heating nor cooling is required, tension is as set in A54.

If heating is to be performed with 100 % heating performance, voltage is as set in A55.

A99: Password

This parameter permits setting of the password for the A-level.

Status indications and error messages

Message	Cause	Error elimination
F 1_	Sensor error (H: open-circuit or L: short-circuit at sensor F1)	Check sensor
F 2_	Sensor error (H: open-circuit or L: short-circuit at 3-wire correction)	Check sensor
EP_	0: Error program memory 1: Error parameter memory => ALL EXITS WILL BE SWITCHED OFF	Repair controller
-	- Display overrun or key-lock	
flashing display	Temperature alarm at too high or too low temperatur (if activated)	

If an error is recognised in the parameter memory (indication EP) and therefore the saved settings cannot to be used, relays are set out of power supply.

Parameter	Function	Adjustable range
C1	Setpoint control circuit 1	-99...999°C
C2	Setpoint control circuit 1 (*)	-99.0 ... 99.0°K
C3	Setpoint offset for C1/C2	-99.0 ... 99.0°K
C4	Switching sense control circuit 1	0: heating function 1: cooling function
C5	Hysteresis control circuit 1	0.1 ... 99.9°K
C6	Hysteresis mode control circuit 1	0: symmetrically 1: one-sided
C7	Minimum action time control circuit 1 „On“	0...400 sec.
C8	Minimum action time control circuit 1 „Off“	0...400 sec.
C9	Function control circuit 1 at sensor error	0: relay off 1: relay on
C10	Setpoint limit (minimum) setpoint 1	-99.0°C ... C11
C11	Sollwert limit (maximum) setpoint 1	C10 ... 999.0°C
C21	Setpoint control circuit 2 (b1=0)	-99...999°C
C23	Value deltaW2 (b1=1)	-99...99°K
C24	Switching sense control circuit 2	0: heating function 1: cooling function
C25	Hysteresis control circuit 2	0.1 ... 99.9°K
C26	Hysteresis mode control circuit 2	0: symmetrically 1: one-sided
C27	Minimum action time control circuit 2 „On“	0...400 sec.
C28	Minimum action time control circuit 2 „Off“	0...400 sec.
C29	Function control circuit 2 at sensor error	0: relay off 1: relay on
C41	Setpoint control circuit 3 (b2=0)	-99 ... 999°C
C43	Value deltaW3 (b2=1)	-99.0 ... 99.0°K
C44	Switching sense control circuit 3	0: heating function 1: cooling function
C45	Hysteresis control circuit 3	0.1 ... 99.9°K
C46	Hysteresis mode control circuit 3	0: symmetrically 1: one-sided
C47	Minimum action time control circuit 3 „On“	0...400 sec.
C48	Minimum action time control circuit 3 „Off“	0...400 sec.
C49	Function control circuit 3 at sensor error	0: relay off 1: relay on
C61	Lower alarm value	-99.0 ... C62
C62	Upper alarm value	C61 ... 999.0
C63	Function alarm exit	0: Boundary alarm, relative 1: Boundary alarm, absolute 2: Range alarm, relative 3: Range alarm, absolute 4: Boundary alarm, relative, alarm contact inverted 5: Boundary alarm, absolute, alarm contact inverted 6: Range alarm, relative, alarm contact inverted 7: Range alarm, absolute, alarm contact inverted
C64	Special function at boundary or range alarm	0: no special function 1: flashing display 2: buzzer 3: flashing display and buzzer 4: like 3, buzzer can be cancelled 5: like 4, cancelled buzzer restarts after 10 min. 6: like 4, cancelled buzzer restarts after 30 min
C65	Hysteresis alarm circuit	0.1 ... 99.9°K
ATTENTION: The following parameters C82...C89 are only available for PID-Software .102!		
C82	Proportional band for PID-regulation	0.1 ... 999.0°K
C83	Reset time for PID-regulation	0 ... 999 sec., 0: inactive
C84	Lead time for PID-regulation	0 ... 999 sec., 0: inactive
C85	Cycle time for PID-Regelung	2 ... 100 sec
C86	Control variable dead volume	0.0 .. 100,0%

C87

Function PID control circuit at sensor error

-100.0% ... 0 ... 100.0%

Parameter	Function	Adjustable range
C88	PID-Mode	0: PID 1: DiffPID (2 relays – heating, cooling) 2: PID with dead volume and analogue output
C89	Cycle time control valve (DiffPID)	2 ... 100 sec.
C99	Password C-level	-99 ... 999
b1	Activation setpoint combination for thermostat 1 and thermostat 2 (deltaW2)	0: no combination 1: Setpoint thermostat 2 = C1/C2 + C23
b2	Activation setpoint combination for thermostat 1 and thermostat 3 (deltaW3)	0: no combination 1: setpoint thermostat 3 = C1/C2 + C43
b11	Delay control circuit 1, 2, 3 after „Power-On“	0...400 sec.
b12	Mutual delay control circuit 1, 2, 3	0...400 sec.
b13	Alarm suppression after „Power-On“, „setpoint“	0...60 min.
b21	Linkage analogue output	0: PID variable 1: actual value 2: setpoint
b99	Password b-level	-99 ... 999
H1	Key-lock	0: no key-lock 1: key-lock
H11	Indication mode display 1	0: integrals 1: decimals in 0.5°K 2: decimals in 0.1°K
H12	Display 1 mode	1: actual value 2: setpoint 3: PID variable
H13	Indication mode display 2	0: integrals 1: decimals in 0.5°K 2: decimals in 0.1°K 3: decimals in 0.01°K
H14	Display 2 mode	0: display deactivated 1: actual value 2: setpoint 3: PID variable
H15	Temperature scale	0: Celsius 1: Fahrenheit
H16	Indication standby	0: display deactivated (point to the right) 1: AUS 2: OFF
H17	Mode following „Power-On“	0: Off 1: On 2: Auto
H31	Assigning function key 1	0: no function 1: standby key 2: setpoint 1 / setpoint 2
H35	Activation of key acknowledgement	0: no key acknowledgement 1: key acknowledgement with buzzer
H41	Function output K1	0: no connection 1: thermostat 1 2: thermostat 2 3: thermostat 3 4: alarm function 5: PID-mode heating 6: PID-mode cooling
H42	Function output K2	see H41
H43	Function output K3	see H41
H44	Function hybrid output K1	see H41
H51	Mains frequency	0: 50Hz 1: 60Hz
H99	Password H-level	-99..999
d0	Defrosting interval TH1	1 ... 99h 0: no defrosting
d2	Defrosting temperature TH1	-99.0 ... 999.0°C
d3	Defrosting time limit TH1	1 ... 99 min. 0: no time limit
d9	Manual defrosting TH1	0...1
d99	Password d-level	-99 ... 999

A1	Indication of actual value analogue input	-
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Parameter	Function	Adjustable range
A2	Actual value correction analogue input	-99.0 ... 99.9 °K
A3	Weighing factor analogue input (without U, I-entrance)	0.50 ... 1.50
A4	Sensor type	1: Thermo element type J 2: Thermo element type K 11: Pt100 two-wire 12: Pt100 three-wire 13: Pt1000 two-wire 14: Pt1000 three-wire 21: KTY81-121 two-wire 31: Voltage input 0...10V 32: Voltage input 2...10V 41: Current input 0...20mA 42: Current input 4...20mA
A5	Indication value for lower value linear analogue input	-99.0 ... 999.0
A6	Indication value for upper value linear analogue input	-99.0 ... 999.0
A40	Time constant of the software filter	0: not active, average value with 1: 2 measuring values (ca. 2*X s) 2: 4 measuring values (ca. 4*X s) 3: 8 measuring values (ca. 8*X s) 4: 16 measuring values (ca. 16*X s) 5: 32 measuring values (ca. 32*X s) 6: 64 measuring values (ca. 64*X s) 7: 128 measuring values (ca. 128*X s)
A50	Indication of the PID variable	-
A51	Indication value for lower value at analogue output (0V)	-99.0 ... (A52-0.5) 0V if sensor error (b21 = 1)
A52	Indication value for upper value at analogue output (10V)	(A51+0.5) ... 999.0
A53	Indication value full cooling performance (-100,0..0%)	0 ... 10.0V
A54	Indication value „0“ performance	0 ... 10.0V
A55	Indication value full heating performance (0..100,0%)	0 ... 10.0V

A99	Password A-level	-99 ... 999
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General information

The relay contact K1 directly affects the main setpoint, formed by reference variable and the given offset temperature. Contact K2 affects the secondary setpoint which is formed by the main setpoint via overlap or which alternatively can be freely defined. An alarm contact affects adjustable limit values. The outputs are exchangeable with parameter adjustments, in order to achieve an optimal relation of the existing hardware with regard to contact rating, kind of contact and cycle number.

Parameter description second control level

P1: Setpoint / DeltaW for control circuit 2

Adjusting the setpoint of control circuit 2. If A5=1, the setpoints for control circuit 1 and 2 are linked with one another via switching difference DeltaW, which can be adjusted with P1. (operation with DeltaW)

The following applies: setpoint thermostat 2 = setpoint control circuit 1 + delta W2. This difference can take positive or negative values. Thus, a leading or following contact can be realised. If A5=0, the setpoints for control circuit 1 and 2 are independently adjustable.

P2: Hysteresis contact K1 (only available if K1 in thermostatic mode) P3:

Hysteresis contact K2 (only available if K2 in thermostatic mode) The hysteresis can be set symmetrically or one-sided at the setpoint. At one-sided setting, the hysteresis works downward with heating contact and upward with cooling contact (see A40 + A41).

P4: Control range limitation – minimum setpoint

P5: Control range limitation – maximum setpoint

The adjustment range of the setpoint can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

P7: Proportional band at PID regulation

The proportional part works in such a way that with approximation of the actual value to the setpoint the variable is reduced linearly from +100% to 0%.

P8: Reset time Tn (Integral-portion) P9: Lead time Tv (Differential-portion)

These settings determine the intensity and effect of the I- and D-portion. If „0“ is set, then the portion is inactive.

P10: Cycle time Tp

The cycle time is the time, in which the control output runs through one switching period, i.e. once switched out and once switched on. The smaller the cycle time, the faster the regulation. By consequence, however, there is also an increased switching frequency of the exit, which can lead to rapid wear of relay contacts. For very fast control ways with the respective high switching frequency a voltage output is therefore of advantage.

P19: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message „====“ appears in the display.

P20: Following value display

When this parameter is selected, pressing the SET key display the actual value of the following input. The value can be adjusted with parameter P21.

P21: Following value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

P22: Leading value display

When this parameter is selected, pressing the SET key display the actual value of the leading input. The value can be adjusted with parameter P23.

P23: Leading value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

P30: Lower alarm value

P31: Upper alarm value

The exit alarm is a boundary alarm or a range alarm with one-sided hysteresis (see parameter P32). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint S1/S1', or absolute, i.e. independent of the setpoint S1/S1'. At boundary alarm the hysteresis works one-sided inwardly, and at range alarm outwardly. If only one switching point is required in case of boundary alarm, the not-used second switching point should be adjusted to a value above or below the control range and the limit values should be absolute (see

parameter A30).

P32 Hysteresis alarm contact

The hysteresis can be set symmetrically or one-sided at the adjusted limit values. (see A42). It becomes effective depending on alarm definition. At one-sided setting and boundary alarm the hysteresis is effective above the lower and below the upper limit value. At one-sided setting and range alarm the hysteresis is effective above the upper and below the lower limit value. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point.

P33: Lower range limitation for fixed setpoint control on following sensor P34: Upper range limitation for fixed setpoint control on following sensor

P33 and P34 are the limit values for the main setpoint, formed by reference variable and the given offset temperature. If the main setpoint is above the upper or below the lower limit value the value of P33 or P34 becomes effective as new setpoint and the leading value has no more effect on the setpoint. When the temperature range between P33 and P34 is reached again the control returns to the main setpoint as before.

P40: Analogue output

This is to define whether the analogue output carries reference variable, the actual following value or the actual leading value. In case of reference variable display, the sign can change, depending on whether heating or cooling is required. The actual values, however, are always indicated with positive sign.

P41: Indication value for 0V at analogue output

P42: Indication value for 10V at analogue output

Indication of the actual value is subject to the following range adjustment: If temperature reaches the value set in P41, voltage is 0 V.

If temperature reaches the value set in P42, voltage is 10 V.

P43: Indication value full heating performance (100%)

P44: Indication value „0“ performance

P45: Indication value full cooling performance (-100,0%)

Indication of the variable is subject to the following range adjustment: If heating is to be performed with 100 %, voltage is as set at P43. If neither heating nor cooling is requested, voltage is as set at P44. If cooling is to be performed with 100 %, voltage is as set at P45.

L0: Individual address (Node)**L1: Individual address (Subnet)**

STOERK TRONIC devices can be hooked with „self installation“. In this case, however, each participant has to be assigned a clear address. This address corresponds to the knot address and subnet address with Domain=0.

The address of the knot can only be changed, if the knot was not tied externally (SNVT „nciNetConfig“ = CFG_LOCAL), otherwise the changed value is not saved (after releasing the set key the old value is reset).

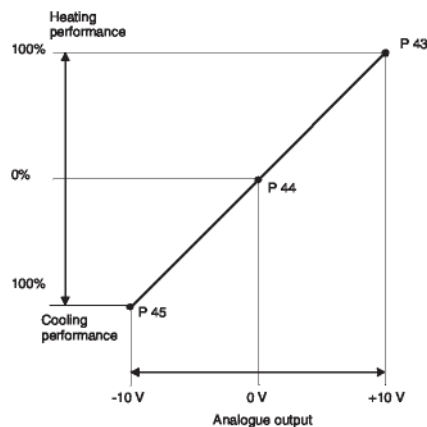
Pr

Program version.

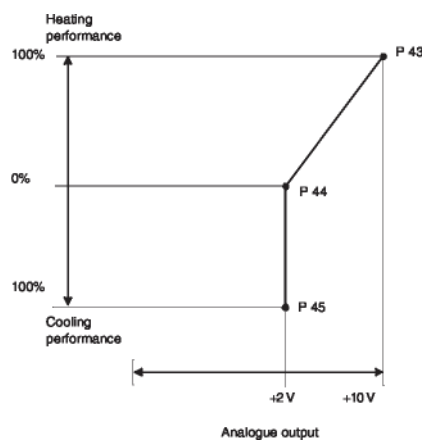
Scaling examples of analogue output:**Scaling example 1:**

Indication range of the variable for heating and cooling is $-10,0 \dots +10,0$ V with $P43 = 10,0$; $P44 = 0,0$;

$P45 = -10,0$. This is the standard setting.

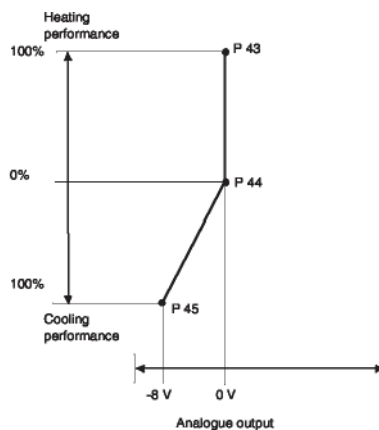
**Scaling example 2:**

Indication range of the variable for heating is $+2,0 \dots +10,0$ V with $P43 = 10,0$; $P44 = 2,0$; $P45 = 2,0$.

**Scaling example 3:**

Indication range of the variable for cooling

is $-2,0 \dots -8,0$ V with $P43 = -2,0$; $P44 = -2,0$; $P45 = 8,0$.

**Notes concerning parameters P40 - P45:**

If the reference variable is selected with parameter P40, the parameters P41 and P42 are still adjustable, but without function. The same applies to the parameters P43-P45, if the actual value is selected with parameter P40.

A1: Switch mode contact K1**A2: Switch mode contact K2**

The switch mode for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint.

A3: Function of contact K1 at sensor error**A3: Function of contact K2 at sensor error**

At sensor error the selected relay falls back into the condition pre-set here.

A5: Selection setpoint 2 or DeltaW This parameter determines whether the setpoints for thermostat 1 and 2 independently adjustable ($A5=0$) or whether they are tied with one another via a switching offset DeltaW ($A5=1$). This parameter applies only to contact K2 (see parameter P1).

A6: Control characteristics contact K1**A7: Control characteristics contact K2**

Independent choice of either PID or thermostatic characteristics for each contact. If contact K2 is set as PID-contact, it operates with setpoint 1.

A8: Display mode

The value can be indicated in integrals or with decimals. In general, all parameter indications are presented with decimals.

A10: Indication value for lower value linear analogue input**A11: Indication value for upper value linear analogue input**

Only relevant, if the controller is programmed for a voltage input ($0 \dots 10$ V linear) or a current input ($4 \dots 20$ mA linear). These parameters allow scaling of the linear analogue input. The value to be indicated for the lower and upper entrance value then defines the range the controller will indicate. For input range $4 \dots 20$ mA the display will show sensor error if the input signal drops below 4 mA.

A19 Parameter lock

This parameter enables locking of each parameter level. If third level is locked, only parameter A19 may be changed.

A20: Minimum action time contact K1 "Off"**A21: Minimum action time contact K2 "Off"**

These parameters permit a delay in switching off the relay in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-off phase. If PID characteristics are selected the minimum action times are set to zero.

A22: Delay after "Power-on"

This parameter allows a switching-on delay of relays after switching-on the mains voltage. This delay corresponds with the time set here. The delay is only active when the controller is switched on the first time. The delay applies not to the alarm contact.

A23: Alarm suppression after „Power-On“

This parameter allows a switching-on delay of the alarm contact after switching on the mains voltage. This suppression corresponds with the time set here. The suppression is only active when the alarm is activated the first time. The suppression not to the contacts K1 and K2.

A30: Function alarm exit

The alarm exit evaluates an upper and a lower limit value (see parameters P30 and P31), whereas a selection is possible as to whether the alarm is active if the temperature lies within these two limits, or whether the alarm is released if the temperature lies beyond them. In the case of sensor error, the alarm is activated independently of this adjustment.

A31: Special function at boundary or range alarm

Here can be selected whether, in the case of an alarm, the indication to flash and/or the buzzer is to start. Sensor alarm (display F1L or F1H) is indicated independently thereof by flashing display and the buzzer.

A32: Special function of upper display**A33: Special function of lower display**

This parameter permits a permanent special display in the upper or lower display. It is possible to indicate the setpoint, formed by reference variable and the given offset temperature, the offset temperature (if differential control) or the actual difference value. In this case, the usually indicated following or leading value is not available in the first parameter level. Note: If offset temperature is selected and there is no differential control, the following value is indicated in the upper display and the lower display is off. The lower display stays off, if no special function is selected or if there is no differential control.

A34: Indication with key 3

If activated with b1=2, key 3 can be parametered to indicate the leading value, the setpoint or the actual difference. This feature is important especially for units with only one display.

A35: Adjustment of setpoint S1' (not available on all types of controllers)

The functions of this parameter are only effective if there is a switching input E1 available. By closing switching input E1, setpoint S1 can be switched to a setpoint S1'. Setpoint S1' can be either relative to the difference value or an independent, freely adjustable, difference value or an independent, freely adjustable setpoint. In case of a freely adjustable setpoint the leading value has no more influence on the setpoint and the respective sensor can be disconnected; an error message will be suppressed. The lower display remains deactivated as long as there is no special function set with parameter A33. The setpoint S1' can only be indicated and adjusted if input E1 is closed.

A40: Hysteresis mode contact K1

A41: Hysteresis mode contact K2 These parameters allow selection as to whether the hysteresis values which are adjustable with P2 and P3, are set symmetrically or one-sided at the respective switching point. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact

and upward with cooling contact. The hysteresis is only effective in case of thermostat control. With PID characteristics the hysteresis has no effect.

A42: Hysteresis mode alarm contact

These parameters allow selection as to whether the hysteresis value which is adjustable with P32, is set symmetrically or one-sided at the respective switching point. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact.

A60: Sensor type

These parameters permit selection of the sensor type, if the needed hardware prerequisites are available.

A70: Software filter

With several measuring values, it is possible to obtain an average value. This parameter can determine by how many measured values an average value is to be formed. If a sensor with a very fast reaction to external influences is used, an average value ensures a calm signal process.

A80: Temperature scale

Indication can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range. (Example: A controller with the desired value of 0°C is switched to Fahrenheit. The new desired value is then interpreted as 0°F, which corresponds to a temperature of -18°C).

NOTE: Indication limits with °F can be smaller than the actual measuring range!

U1: Function output K1**U2: Function output K2****U3: Function output K3****U4: Function output K4**

Generally, the outputs are exchangeable with parameter adjustments, in order to achieve an optimal relation of the existing hardware with regard to contact rating, kind of contact and cycle number. Therefore, these parameters first assign the outputs to the controller function.

b0: Function E1

With this parameter function of the ext. input E1 can be set. With b0=0 the E1 is not evaluated. With b0=1 setpoint S1 is switched to setpoint S1' when input E1 is closed. With b0=2 the controller is switched to the standby mode.

b1: Function key 3

This parameter activates a special function for key 3. This can be either the standby or the auto-tuning function or the activation of the display according to parameter A34. If the standby function is set parameter b3 selects an English or German text.

b1: Function key 5

If the standby key is not used, the controller is active after switching on the mains voltage. If the key is activated, the controller can be switched to standby mode (display indicates "OFF" or "AUS" depending on parameter b3).

b3: Text if in standby mode

With this parameter one can select the text to be displayed if the controller is in standby mode. A German or an English text can be selected.

Lr: Reset parameters

This parameter is special as it can reset all parameters to the condition ex works. At setting Lr = 1 reset takes place, and Lr itself is reset to zero again. Note that customised values will become effective if these were adjusted prior to delivery.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Parameter	Function	Adjustable range
S1	Setpoint 1, difference value	P4 ... P5
S1'	Setpoint 1' (if switching input exists), difference value or freely adjustable setpoint	-99 ... +99.9 K if A33=1 P4 ... P5, if A33=2
P1	Setpoint 2 or Delta W	-99 ... 999°C -99 ... 99.9 K
P2	Hysteresis contact K1	0.1 ... 99.9 K
P3	Hysteresis contact K2	0.1 ... 99.9 K
P4	Control range limitation – minimum difference value	-99°C ... P5
P5	Control range limitation – maximum difference value	P4 ... 99.0°C
P7	Proportional band	0.1 ... 99.9 K
P8	Reset time Tn, I-factor	0 ... 999 sec. (0 sec. = inactive)
P9	Lead time Tv, D-factor	0 ... 999 sec. (0 sec. = inactive)
P10	Cycle time	2 ... 100 sec.
P19	Key-lock	0: no key-lock 1: key-lock
P20	Following value display	----
P21	Following value correction	-10.0 ... 10.0 K
P22	Leading value display	----
P23	Leading value correction	-10 ... 10.0 K
P30	Lower alarm value	-99°C/K ... P31
P31	Upper alarm value	P30 ... 999°C/K
P32	Hysteresis alarm contact	0.1 ... 99.9 K
P33	Lower range limitation for fixed setpoint control	-99 ... 999°C
P34	Upper range limitation for fixed setpoint control	-99 ... 999°C
P40	Analogue output	0: PID-control value (P43-P45) 1: following value (P41, P42) 2: leading value (P41, P42)
P41	Indication value for 0V at analogue output	-99 ... 999°C
P42	Indication value for 10V at analogue output	-99 ... 999°C
P43	Indication value full heating performance (100%)	-10.0 ... +10.0 V
P44	Indication value „0“ performance	-10.0 ... +10.0 V
P45	Indication value full cooling performance (100%)	-10.0 ... +10.0 V
P46	Lower limit of the following value for 0 or 10V at analogue output	-99 ... 999°C
P47	Output voltage for values lower than P46	0: 0V 1: 10V
P48	Upper limit of the following value for 0 or 10V at analogue output	-99 ... 999°C
P49	Output voltage for values higher than P48	0: 0V 1: 10V
P50	Hysteresis at limit values P46 and P48	0.1 ... 99.9K
Pr	Program version	-
A1	Switch mode contact K1	0: heating contact 1: cooling contact
A2	Switch mode contact K2	0: heating contact 1: cooling contact
A3	Function of contact K1 at sensor error	0: relay off 1: relay on
A4	Function of contact K2 at sensor error	0: relay off 1: relay on
A5	Selection setpoint 2 or DeltaW	0: operation with setpoint 2 1: operation with DeltaW
A6	Control characteristics contact K1	0: thermostatic 1: PID

Parameter	Function	Adjustable range
A7	Control characteristics contact K2	0: thermostatic 1: PID
A8	Display mode	0: decimals (both displays) 1: integrals (both displays)
A10	Indication value for lower value linear analogue input	-99 ... 999°C
A11	Indication value for upper value linear analogue input	-99 ... 999°C
A19	Parameter lock	0: no lock 1: A-parameter locked 2: A- and P-parameter locked
A20	Minimum action time contact K1 "Off"	0...999 sec.
A21	Minimum action time contact K2 "Off"	0...999 sec.
A22	Delay after "Power-on"	0...999 sec.
A23	Alarm suppression after „Power-On“	0...999 min.
A30	Function alarm exit	0: Boundary alarm, relative 1: Boundary alarm, absolute 2: Range alarm, relative 3: Range alarm, absolute
A31	Special function at boundary alarm	0: no special function 1: flashing display 2: buzzer 3: flashing display and buzzer 4: like 3, buzzer can be cancelled 5: like 4, cancelled buzzer restarts after 10 min. 6: like 4, cancelled buzzer restarts after 30 min
A32	Special function of upper display	0: following value 1: setpoint 2: setpoint, if no differential control 3: offset temperature, if differential control 4: actual difference value
A33	Special function of lower display	0: following value 1: setpoint 2: setpoint, if no differential control 3: offset temperature, if differential control 4: actual difference value
A34	Indication with key 3, if b1=2	0: leading value 1: setpoint 2: actual difference value
A35	Type of setpoint S1 ⁺ if b1=0	0: additive differential temperature 1: alternate differential temperature 2: freely adjustable setpoint
A40	Hysteresis mode contact K1	0: symmetrically 1: one-sided
A41	Hysteresis mode contact K2	0: symmetrically 1: one-sided
A42	Hysteresis mode alarm contact	0: symmetrically 1: one-sided
A60	Sensor type	4: Pt100 two-wire 5: PTC (KTY81-110) 6: 0...10 V, 0...20 mA 7: 2...10 V, 4...20 mA
A70	Software filter	0...10 (0 = inactive)
A80	Temperature scale	0: Fahrenheit (50 Hz) 1: Celsius (50 Hz) 2: Fahrenheit (60 Hz) 3: Celsius (60 Hz)
U1	Function output K1	0: no connection 1: connection to contact K1 2: connection to contact K2 3: connection to alarm contact 4: connection to ready message
U2	Function output K2	0: no connection 1: connection to contact K1 2: connection to contact K2 3: connection to alarm contact 4: connection to ready message

U3	Function output K3	0: no connection 1: connection to contact K1 2: connection to contact K2 3: connection to alarm contact 4: connection to ready message
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Parameter	Function	Adjustable range
U4	Function output K4	0: no connection 1: connection to contact K1 2: connection to contact K2 3: connection to alarm contact 4: connection to ready message
b0	Function input E1	0: no function 1: controller On/Off (Standby) 2: setpoint S1' activated
b1	Function key 3	0: no function 1: controller On/Off (Standby) 2. display according to parameter A34
b3	Text if in standby mode, if b0=2, b1=1	0: standby text „OFF“ 1: standby text „AUS“
L0	Individual address (Node)	1...126
L1	Individual address (Subnet)	0...255

Lr	Reset parameters	0: no reset 1: reset parameters, including Lr
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Software .05

Parameter description second control level

P1: Hysteresis K1

P2: Hysteresis K2

P3: Hysteresis K3

The hysteresis is separately adjustable for the three contacts and is set symmetrically at the switching points, i.e. half of the overall hysteresis' value is effective below and half of the value above the switching point. However, with low hysteresis values there is also an increased switching frequency of the exit, which can lead to rapid wear of relay contact. In critical circumstances the controller can be equipped with a semiconductor relay. Attention: Parameter „P1“ is only available if K1 operates as thermostat.

P4: Control range limitation – minimum setpoint S1/ST, S2 P5: Control range limitation – maximum setpoint S1/ST, S2

The adjustment range of the setpoints can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

P6: Control range limitation – minimum setpoint S3/SH

P7: Control range limitation – maximum setpoint S3/SH

The adjustment range of the setpoints can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

P8: Actual value correction, sensor 1 P9: Actual value correction, sensor 2 This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here-adjusted value.

P19: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message „====“ appears in the display.

P20: Proportional band at PID regulation

The proportional band works in such a way that with approximation of the actual value to the setpoint the variable is reduced linearly from +100% to 0%. Attention: parameter is only available if K1 operates in PID mode.

P21: I-factor

Setting the integral factor determines the intensity and effect of the I-portion. The proportional controller as such has a remaining deviation of the actual value from the setpoint. The integral portion provides for a complete compensation of this offset. If „0“ is set, then the I-portion is inactive.

Attention: parameter is only available if K1 operates in PID mode.

P22: D-factor

Setting the derivative factor determines the intensity and effect of the D portion. This setting together with the cycle time T_p determines the lead time T_v . If „0“ is set, then the D portion is inactive. Attention: parameter is only available if K1 operates in PID mode.

P23: Cycle time T_p

The cycle time is the time, in which the control output runs through one switching period, i.e. once switched out and once switched on. The smaller the cycle time, the faster the regulation. By consequence, however, there is also an increased switching frequency of the exit, which can lead to rapid wear of relay contacts. For very fast control ways with the respective high switching frequency a voltage output is therefore of advantage. Attention: parameter is only available if K1 operates in PID mode.

P30: Lower limit value K4 for sensor 1

P31: Upper limit value K4 for sensor 1

The ready-message function at the lightduty relay K4, causing the output contact to open in case of sensor errors, may be supplemented by a monitoring function. If the actual value 1 exceeds the limit values, K4 opens too. For this reason, only the range alarm with absolute (freely adjustable) values may be set. In case of standard setting and usage of resistance thermometers the limit values are beyond the operating range of the controller and though remain without effect if not adjusted.

P32: Lower limit value K4 for sensor 1

P33: Upper limit value K4 for sensor 1 Same function as parameters P30 and P31 for actual value 2.

Available types of controllers

Types for channel 1

Two types of output relay control are available for channel 1 (see A7)

First control variation:

Contacts K1 and K2 of channel 1 are tied with one another via an adjustable switch

ing offset DeltaW1 (operation with DeltaW1). This offset (set by using the S2/SH key) can have either a positive or a negative value to provide a leading or trailing secondary contact K2. With this configuration the controller can also be used as three-point controller. On the humidity controller the S” key is hidden between the ST and SH keys. To use S2, simply press on the front surface between these two keys.

Second control variation:

Contacts K1 and K2 of channel 1 are independently adjustable (operation with setpoint 2). Contact K1 operates as setpoint 1 and can be adjusted by the S1/ST key. K2 operates as setpoint 2, adjusted by the S2 key and can be set as a limit value. In this configuration, both contacts K1 and K2 operate according the values set for setpoint 1 and 2 and the input signal of channel 1.

Types for channel 2

Two types of output relay control are also available for channel 2(see A8)

First control variation:

Contacts K1 of channel 1 and K3 of channel 2 are tied with one another via an adjustable switching offset DeltaW2 (operation with DeltaW2). This offset (set by using the S3/SH key) can have either a positive or a negative value to provide a leading or trailing secondary contact K3. Both channels operate according to setpoint 1 and may be simultaneously adjusted by the S1/ST key.

Second control variation:

Contacts K1 of channel 1 and K3 of channel 2 are independently adjustable (operation with setpoint 3). Contact K1 operates as setpoint 1 and can be adjusted by the S1/ST key. K3 operates as setpoint 3, adjusted by the S3/SH key. The setpoints of the channels are separately adjusted. In this configuration relay K3 operates according the values set for setpoint 3 and the input signal from channel 2.

Parameter description third control level

A1: Switch mode contact K1

A2: Switch mode contact K2

The switch mode for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint.

A3: Switch mode contact K3

The switch mode for the relay, i.e. cooling (dehumidifying) or heating (humidifying) function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint.

A4: Function of contact K1 at sensor error**A5: Function of contact K2 at sensor error****A6: Function of contact K3 at sensor error**

At sensor error (short circuit or open circuit) the display indicates "F1-" (sensor 1) or "F2-" (sensor 2) and the selected relay falls back into the condition pre-set here.

A7: Selection setpoint 2 or DeltaW1 This parameter determines whether the setpoints for thermostat 1 and 2 independently adjustable (A7=0) or whether they are tied with one another via a switching offset DeltaW1 (A7=1). This parameter applies only to contact K2. See also "Types of channel 2" in section "Available types".

A8: Selection setpoint 3 or DeltaW2 This parameter determines whether the setpoints for contact 1 and 3 independently adjustable (A8=0) or whether they are tied with one another via a switching offset DeltaW2 (A8=1). This parameter applies only to contact K3. See also "Types of channel 1" in section "Available types".

A9: Control characteristics contact K1 Independent choice of either PID or thermostatic characteristics for contact K1.

A19: Parameter lock

This parameter enables locking of each parameter level. If third level is locked, only parameter A19 may be changed.

Software .25**Key 1: UP**

Pressing this key you can increase the parameter or parameter value or scroll the parameter list.

Key 2: DOWN

Pressing this key you can decrease the parameter or parameter value or scroll the parameter list. At alarm the buzzer function can be switched off with this key.

Key 3: SET 2

Shortly pressing this key the display switches to channel 2. Holding this key, the setpoint or parameters of channel 2 are indicated.

Additionally, this key is used for setting parameters.

Key 4: Standby 2

Shortly pressing this key the display switches to channel 2. Holding this key control circuit 2 is switched to standby mode, holding the key again control circuit 2 is switched on again.

Key 5: SET 1

Shortly pressing this key the display switches to channel 1. Holding this key, the setpoint or parameters of channel 1 are indicated.

Additionally, this key is used for setting parameters.

Taste 6: Standby 1

Shortly pressing this key the display switches to channel 1. Holding this key control circuit 1 is switched to standby mode, holding the key again control circuit 1 is switched on again. The LEDs „SET 1“ and „SET 2“ indicate the control circuit that is viewable in the display. Either the actual value or the setpoint is displayed. (See parameter A32). Both control circuit are separated from each other and are they control even when they are not indicated in the display. Shortly pressing key 3 (SET2) or key4 (Standby 2) indicates the control circuit 2 in the display and by shortly pressing key 5 (SET1) or key6 (Standby 1) the display is switched to control circuit 1. The LEDs "1" and "2" indicate the state of the respective controller. LED "3" is on, when an alarm is activated in one of the two control circuits.

LEDs „K1“ und „K2“ indicate the state of the switching outputs K1 and K2.

First control level, adjustment of main setpoint

If none of the keys is pressed, the display indicates the actual value of the temperature. Pressing the key 5 (SET 1) or the key 3 (SET 2), the actual setpoint of the

respective control circuit (1 or 2) shows on the display.

If the setpoint is to be changed, the SET key is to be kept pressed while adjusting the setpoint with the keys UP and DOWN. Both setpoints are adjusted independently and operate only on the respective relay. With according parameter settings (see parameters A33 and A81) a setpoint change-over (night-time reduction) can be realised in case of closed switching input E1.

By closing switching input E1, setpoint S1 (S2) can be switched to a setpoint S1' (S2'). Setpoint S1' (S2') can be either relative to setpoint S1 (S2) or an independent, freely adjustable, control setting (see parameter A33).

Second control level, adjustment of control parameters

Simultaneously pressing the UP and DOWN key for at least 4 seconds opens a parameter list containing control parameters. The control parameters of the activated control circle (indicated by the LEDs "SET1" or "SET2") are shown in the display.

With the UP and DOWN keys the list can be scrolled in both directions. Pressing a SET key will give you the value of the respective parameter of the according control circuit. Pressing also the UP or DOWN key at the same time the value can be adjusted.

Return to the initial position takes place automatically, if no key is pressed for 60 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds

Parameter description second control level**P0: Actual value**

The here indicated temperature presents the actual measured value. If the control setpoint is indicated with parameter A32, the actual value can only be seen with this parameter.

P2: Hysteresis

The hysteresis is set one-sided at the setpoint. The hysteresis works downward with heating contact and upward with cooling contact.

P4: Control range limitation – minimum setpoint P5: Control range limitation – maximum setpoint

The adjustment range of the setpoints S1/S1' and S2/S2' can be limited in both directions. This is to prevent the end user

of a unit from setting inadmissible or dangerous setpoints.

P6: Actual value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here-adjusted value.

P19: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message „====“ appears in the display.

P30: Lower alarm value

P31: Upper alarm value

The exit alarm is a boundary alarm or a range alarm with one-sided hysteresis (see parameter P32). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the actual setpoint, or absolute, i.e. independent of the actual setpoint. At boundary alarm the hysteresis works one-sided inwardly, and at range alarm outwardly.

P32: Hysteresis alarm circuit Hysteresis is set one-sided at the adjusted limit value. It becomes effective depending on alarm.

d0: Defrosting interval

The „defrosting interval“ defines the time, after which a defrosting process is started. After each defrosting start, this time is reset and runs the next interval. The defrosting can be deactivated by parameter setting d0=0. In this case, it is possible to defrost with key 5.

d2: Defrosting temperature limit

This permits to terminate defrosting when the adjusted desired temperature value is reached. The defrosting time set with „d3“ nevertheless runs at the same time, i.e. it functions as safety net to terminate the defrosting process in case the defrosting temperature is not reached.

d3: Defrosting time limit

After the here set time the defrosting process is terminated. If this time is exceeded the defrost process will be terminated. The time limit is inactive with the parameter setting d3=0.

Parameter description third control level

A1: Switch mode contact K1

The switch mode for the relay, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint.

A3: Function of contact K1 at sensor error

At sensor error the relay falls back into the condition pre-set here. If there is a data-loss in parameter memory (display indicates “EP”) both contacts K1 and K2 are switched off.

A8: Display mode

The value can be indicated in integrals or with decimals in 0,5°K or 0,1°K. At indication in 0,5°K the value is rounded up or down. In general, all parameter indications are presented in 0,1°K.

A10: Indication value for lower value linear analogue input

A11: Indication value for upper value linear analogue input

Only relevant, if the controller is programmed for a voltage input (0...10V linear) or a current input (4...20mA linear). These parameters allow scaling of the linear analogue input. The value to be indicated for the lower and upper entrance value then defines the range the controller will indicate. For input range 4...20mA the display will show sensor error if the input signal drops below 4mA.

A19 Parameter lock

This parameter enables locking of each parameter level. If third level is locked, only parameter A19 may be changed.

A20: Activation of key acknowledgement

This parameter permits to switch on/off the key confirmation by internal buzzer.

A30: Function alarm exit

The alarm exit evaluates an upper and a lower limit value (see parameters P30 and P31), whereas a selection is possible as to whether the alarm is active if the temperature lies within these two limits, or whether the alarm is released if the temperature lies beyond them. In the case of sensor error, the alarm is activated independently of this adjustment. The exit can also be inverted, so that it functions like a release

A31: Special function at boundary or range alarm

Here can be selected whether, in the case of an alarm, the indication to flash and/or the buzzer is to start. Sensor alarm (display F1L or F1H) is indicated independently thereof by flashing display and the buzzer. In alarm case LED 3 is on independently of this setting.

A32: Setpoint display

A32=0 indicates the actual value, A32=1 statically indicates the setpoint S1/S1' or S2/S2' in the display. Therefore, the current actual value can only be indicated with parameter P0.

A33: Adjustment of setpoint S1' (not available on all types of controllers)

By closing switching input E1, setpoint S1 (S2) can be switched to a setpoint S1' (S2'). Setpoint S1' (S2') can be either relative to setpoint S1 (S2) or an independent, freely adjustable, control setting. The setpoint S1' (S2') can only be accessed if input E1 is closed. The setpoint S1' (S2') can only be activated, if the external input is configured for setpoint change-over (parameter A81=2).

A40: Hysteresis mode control contact

These parameters allow selection as to whether the hysteresis values are set symmetrically or one-sided at the respective switching point. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact.

A50: Minimum action time contact K1 "On"

A51: Minimum action time contact K1 "Off"

These parameters permit a delay in switching on/off the relay in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-on or switching-off phase.

A54: Delay after "Power-on"

This parameter allows a switching-on delay of relays after switching-on the mains voltage. This delay corresponds with the time set here.

A56: Alarm suppression after „Power-On“ or setpoint change-over

This parameter allows a switching-on delay of the alarm contact after switching on the mains voltage or setpoint changeover. This delay corresponds with the time set here.

A60: Sensor type

These parameter permits selection of the sensor type, if the needed hardware prerequisites are available.

A70: Software filter

With several measuring values, it is possible to obtain an average value. This parameter can determine by how many measured values an average value is to be formed. If a sensor with a very fast reaction to external influences is used, an average value ensures a calm signal process.

A80: Temperature scale

Indication can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range. (Example: A controller with the desired value of 0°C is switched to Fahrenheit. The new desired value is then interpreted as 0°F, which corresponds to a temperature of -18°C).

NOTE: Indication limits with °F can be smaller than the actual measuring range!

A81: Function E1

With this parameter function of the ext. input E1 can be set. With A81=0 the E1 is not evaluated. With A81=1 the controller is switched to the standby mode. With A81=2 setpoint S1/S2 is switched to setpoint S1'/S2' when input E1 is closed.

Status messages in the display**ON/OFF**

Standby modus, no regulation. Switch on by key or switching entrance.

FIL

Sensor error, short-circuit at sensor F1.
Check sensor.

FIH

Sensor error, open-circuit at sensor F1.
Check sensor.

== =

Key-lock active. Change parameter P19 or A19.

EP, display flashes

Data loss at parameter memory. If error cannot be eliminated by switching on/off, the controller must be repaired

Buzzer

Temperature alarm at too high or too low temperature (if activated). The buzzer function can be switched off with the DOWN-key.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Parameter	Function	Adjustable range
Software .05		
S1	Setpoint 1	P4 ... P5
S2	Setpoint 2	P4 ... P5
S3	Setpoint 3	P6 ... P7
P1	Hysteresis K1	0.1 ... 99.9 K
P2	Hysteresis K2	0.1 ... 99.9 K
P3	Hysteresis K3	0.1 ... 99.9 K
P4	Control range limitation – minimum setpoint S1/ST, S2	-99 ... 999°C
P5	Control range limitation – maximum setpoint S1/ST, S2	-99 ... 999°C
P6	Control range limitation – minimum setpoint S3/SH	-99 ... 999°C
P7	Control range limitation – maximum setpoint S3/SH	-99 ... 999°C
P8	Actual value correction, sensor 1	-10.0 ... +10.0 K
P9	Actual value correction, sensor 2	-10.0 ... +10.0 K
P19	Key-lock	0: no key-lock 1: key-lock
P20	Proportional band	0.1 ... 99 K
P21	I-factor	0 ... 15
P22	D-factor	0 ... 15
P23	Cycle time	8 ... 100 sec.
P30	Lower limit value K4 for sensor 1	-99 ... 999 (-250 ... 1750)°C
P31	Upper limit value K4 for sensor 1	-99 ... 999 (-250 ... 1750)°C
P32	Lower limit value K4 for sensor 2	-99 ... 999 (-250 ... 1750)°C
P33	Upper limit value K4 for sensor 2	-99 ... 999 (-250 ... 1750) °C
A1	Switch mode contact K1	0: heating contact 1: cooling contact
A2	Switch mode contact K2	0: heating contact 1: cooling contact
A3	Switch mode contact K3	0: heating (humidifying) contact 1: cooling (dehumidifying) contact
A4	Function of contact K1 at sensor error	0: relay off 1: relay on
A5	Function of contact K2 at sensor error	0: relay off 1: relay on
A6	Function of contact K3 at sensor error	0: relay off 1: relay on
A7	Selection setpoint 2 or DeltaW1	0: operation with setpoint 2 1: operation with DeltaW1
A8	Selection setpoint 3 or DeltaW2	0: operation with setpoint 3 1: operation with DeltaW2
A9	Control characteristics contact K1	0: thermostatic 1: PID
A19	Parameter lock	0: no lock 1: A-parameter locked 2: A- and P-parameter locked
Software .25		
Control circuit 1 (affects relay K1):		
S1	Setpoint	P4 ... P5
S1'	If A33=0 and A81=2: Setpoint at closed input E1	-99 ... +99.9 K if A33=1 P4 ... P5, if A33=2
Control circuit 2 (affects relay K2):		
S2	Setpoint	P4 ... P5
S2'	If A33=0 and A81=2: Setpoint at closed input E2	-99 ... +99.9 K if A33=1 P4 ... P5, if A33=2
P0	Actual value	-
P2	Hysteresis	0.1 ... 99.0 K
P4	Control range limitation – minimum setpoint	-99°C ... P5

Parameter	Function	Adjustable range
P5	Control range limitation – maximum setpoint	P4 ... 999°C
P6	Actual value correction	-20.0 ... +20.0 K
P19	Key-lock	0: no key-lock 1: key-lock
P30	Lower alarm value	-99 ... 999°C/K
P31	Upper alarm value	-99 ... 999°C/K
P32	Hysteresis alarm circuit	0.1 ... 99.9 K
d0	Defrosting interval	1 ... 99 h 0 = no defrosting
d2	Defrosting temperature limit	-99.0 ... 999.9°C
d3	Defrosting time limit	0 ... 99 min. 0 = without time limit
A1	Switch mode contact K1	0: heating contact 1: cooling contact 2: alarm contact
A3	Function of contact K1 at sensor error	0: relay off 1: relay on
A5	Selection setpoint 2 or DeltaW	0: operation with setpoint 2 1: operation with DeltaW
A8	Display mode (all parameter indications are presented in 0,1 °K)	0: integrals 1: decimals in 0.5°C 2: decimals in 0.1 °C
A19	Parameter lock	0: no lock 1: A-parameter locked 2: A- and P-parameter locked
A30	Function alarm exit	0: Boundary alarm, relative 1: Boundary alarm, absolute 2: Range alarm, relative 3: Range alarm, absolute 4: Boundary alarm, relative, alarm contact inverted 5: Boundary alarm, absolute, alarm contact inverted 6: Range alarm, relative, alarm contact inverted 7: Range alarm, absolute, alarm contact inverted
A31	Special function at boundary or range alarm	0: no special function 1: flashing display 2: buzzer 3: flashing display and buzzer 4: like 3, buzzer can be cancelled 5: like 4, cancelled buzzer restarts after 10 min. 6: like 4, cancelled buzzer restarts after 30 min
A32	Setpoint display	0: display shows actual value 1: display shows setpoint S1/S2 (S1'/S2')
A33	Type of setpoint S1' (S2')	0: not activated 1: relative to setpoint S1 (S2) 2: absolute (freely adjustable)
A40	Hysteresis mode	0: symmetrically 1: one-sided
A50	Minimum action time contact "On"	0...600 s
A51	Minimum action time contact "Off"	0...600 s
A54	Delay after "Power-on"	0...600 s
A56	Alarm suppression after „Power-On“	0...60 min
A60	Sensor type	11: PT100 two-wire 21: PTC 22: PT1000 two-wire 24: NTC
A70	Software filter	1: inactive average value with: 2: 2 measuring values (ca. 0.8s) 4: 4 measuring values (ca. 1.6s) 8: 8 measuring values (ca. 3.2s) 16: 16 measuring values (ca. 6.4s) 32: 32 measuring values (ca. 12.8s) 64: 64 measuring values (ca. 25.6s)
A80	Temperature scale and display when in Standby-Mode	0: Fahrenheit ("AUS") 1: Celsius ("AUS") 2: Fahrenheit ("OFF") 3: Celsius ("OFF")
A81	Function input E1	0: no function 1: controller On/Off (Standby) 2: setpoint S1' or S2' activated

Pro	Program version	-
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Parameter description

P1: Operating range K1

There are three operating ranges available: 0...99.9 sec., 0...99 min. 59 sec. and 0...99 h. 59 min.

In operating range 0 ... 99.9 sec. the highest resolution of the display is 0.1 sec. and the digit of the hundredth second is always "0".

P2: Delay range TA1, TA2

The output relays K1 and K2 can be affected by the delay times TA1 and TA2. For this purpose delay ranges 0...99.9 sec. and 0...99 min. 59 sec. are available.

P3: Time delay TA1

The time delay for switching output K1 can be set according to parameter P2. If the parameter P3 is set to "0", the relay K1 has no time delay.

P4: Time delay TA2

The time delay for switching output K2 can be set according to parameter P2. If the parameter P4 is set to "0", the relay K2 has no time delay.

P5: Function input E1 (start)

The timer can be started with switching input E1 by a closed or opened contact.

P6: Function input E2 (stop)

The timer can be started with switching input E2 by a closed or opened contact.

P7: Function output K1

This parameter determines whether the switching output K1 is activated or deactivated during the operating time of K1.

P8: Function output K2

This parameter determines whether the switching output K2 is activated or deactivated during the operating time of K2.

P9: Buzzer function K2

The operating time of the buzzer corresponds to the operating time of output K2. This parameter is used to deactivate the buzzer or to choose either a permanent or an intermittent buzzer.

P10: Trigger start function

The timer can be started by the integrated "Start" key or by the switching input E1. With this parameter one can select either one or both of this functions.

P11: Trigger stop function

The timer can be stopped by the integrated "Stop" key or by the switching input E2. With this parameter one can select either one or both of this functions.

P12: Display mode K1 operating time

The display can indicate either elapsed or remaining operation time for K1.

P13: End of operating time K2

In general it is possible to deactivate contact K2 with a stop or a restart function. An additional option is to assign a specific operation time to the output K2 using parameters P14 and/or P15.

P14: Operating range K2

If output K2 is to be activated for a specified operating time (P13=2) this parameter is used to select the operating range.

P15: Operating time K2

This parameter is used to set the operating time for K2 within the range selected in parameter P14.

P16: Special function K2

Under certain circumstances it is required to have only the output function of K1 and/ or K2, however with two switching contacts. This parameter allows both relays to operate at K1 or K2.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. P1) to one and the same function is guaranteed.

Parameter	Function	Adjustable range
T1	Operating time K1 (setpoint)	see P1
P 1	Operating range K1	0: 0 ... 99.90 sec. 1: 0 ... 99 Min. 59 sec. 2: 0 ... 99 h 59 Min.
P 2	Delay range TA1, TA2	0: 99.90 sec. 1: 99 Min. 59 sec.
P 3	Time delay TA1	0... see P2
P 4	Time delay TA2	0... see P2
P 5	Function input E1 (START)	0: start with closed contact 1: start with opened contact
P6	Function input E2 (STOP)	0: stop with closed contact 1: stop with opened contact
P7	Function output K1	0: activated during operating time 1: deactivated during operating time
P8	Function output K2	0: activated during operating time 1: deactivated during operating time
P9	Buzzer function K2	0: buzzer off 1: continual buzzer 2: intermittent buzzer
P10	Trigger start function	0: key or switching input E1 1: key only 2: switching input only
P11	Trigger stop function	0: key or switching input E1 1: key only 2: switching input only
P12	Display mode K1 operating time	0: remaining time 1: elapsed time
P13	End of operating time K2	0: with STOP 1: with STOP or START 2: with time set in P15
P14	Operating range K2	0: 0 ... 99.9 sec. 1: 0 ... 99 Min. 59 sec.
P15	Operating time K2	0...(see P14)
P16	Special function K2	0: no special function 1: both relays operate at K1 2: both relays operate at K2

Adjustment options

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Software .16

Parameter description second control level

P1-P3: Delta W1-Delta W3

Main contact K1 and secondary contact K2 (K3, K4) are linked with one another via switching difference deltaW1 (W2, W3). This difference can take positive or negative values. Thus, a leading or trailing secondary contact can be realised. In this execution the controller can be used as three-point controller.

Attention: Parameters P2 and P3 are only effective if the corresponding output exists and is activated with parameter A44.

P6-P9: Hysteresis K1-K4

The hysteresis can be separately adjusted for each contact and is set symmetrically at the setpoints, i.e. half of the hysteresis' value is effective below and half of the value above the switching point. Note that a small hysteresis permits a more exact regulation, however also leads to more frequent switching frequency decreasing the lifetime of the relay. Under critical circumstances the controller can be equipped with a semiconductor relay.

Attention: Parameters P8 and P9 are only effective if the corresponding output exists and is activated with parameter A44.

P12: Control range limitation – minimum setpoint

P13: Control range limitation – maximum setpoint

The adjustment range of the setpoint can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

P20: Actual value

The here indicated temperature presents the actual measured value.

P6: Actual value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

P30: Lower alarm value

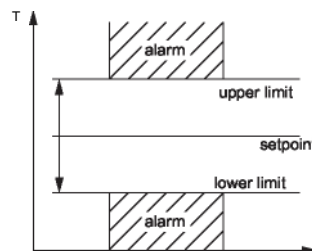
P31: Upper alarm value

The exit alarm is a boundary alarm or a range alarm with symmetrical hysteresis (see parameter P32). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint, or absolute, i.e. independent of the setpoint. The operation mode is set with parameter A44. If, in case of boundary alarm, only one switching point is required the not used second switching point should be adjusted to a value above or below the operating range of the controller.

Boundary alarm function (see fig. 1):

The alarm contact is closed if the process temperature is above the upper or below the lower boundary value.

Fig. 1: Boundary alarm, rel. boundaries



Range alarm function (see fig. 2): Opposite switching behaviour to the boundary value alarm. The alarm contact is closed if the actual value remains between the boundary values.

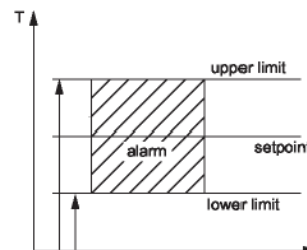


Fig 2: Range alarm, abs. boundaries

P32: Alarm hysteresis

Hysteresis is set symmetrically at the adjusted limit value, i.e. half of the hysteresis' value is effective below and half of the value above the switching point. It becomes effective depending on alarm definition.

P33: Total operating time contact K1 in years

P35: Total operating time contact K2 in years

P37: Total operating time contact K3 in years

P39: Total operating time contact K4 in years

This parameter indicates the total operating time in years elapsed with the respective contact switched on. The operating time recorded by parameters P33-P40 is mainly used in the field of refrigeration technology to register the operating time of the connected compressors.

P34: Total operating time contact K1 in days

P36: Total operating time contact K2 in days

P38: Total operating time contact K3 in days

P40: Total operating time contact K4 in days

This parameter indicates the remaining total operating time in days elapsed with the respective contact switched on. **Note:** Time is recorded in minute cycles. Periods shorter than one minute are ignored. Storage in the non-volatile memory takes place daily, so that an inaccuracy of max. 1 day may result if a power failure occurs.

Caution: Parameters P37-P40 are only effective when the pertinent output is available and activated by parameter A44. To avoid statistical errors, it is essential that the operating mode set in parameter 44 corresponds to the number of external loads (e.g. compressors) that are connected.

Failure to do this will result in incorrect operating times being recorded by parameter P33-P40.

Operating times can be updated after replacement of components if parameters P19 and A19 together with parameter A42 are unlocked. Otherwise data can be irretrievable lost.

Parameter description third control level

A1-A4: Switch mode K1-K4

The switch mode for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint.

A5-A8: Function of contact K1-K4 at sensor error

At sensor error the selected relay falls back into the condition pre-set here.

A10: Temperature scale

Indication can be switched between Fahrenheit, Celsius and Kelvin. At conversion, the parameters and setpoints maintain their numerical value and adjustment range.

A11: Display mode

The value can be indicated with or without decimals and with or without leading zeros.

switching frequency. The adjusted time sets

A12: Alarm mode

The alarm exit evaluates an upper and a lower limit value, whereas a selection is possible as to whether the alarm is a boundary or a range alarm.

A13: Special function at alarm

Here can be selected whether, in the case of an alarm, the indication to flash and/or the buzzer is to start.

A19: Parameter lock

This parameter enables locking of each parameter level. If third level is locked, only parameter A19 may be changed.

A20: Minimum action time contact K1 "On"**A21: Minimum action time contact K2 "On"****A22: Minimum action time contact K3 "On"****A23: Minimum action time contact K4 "On"**

These parameters permit a delay in switching off the relay in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-on phase.

Note: These times are also effective after switching on the supply voltage, after an external error message or after remedy of sensor errors.

Call LED "C", if applicable, flashes continuously during time periods when the output contacts are in a waiting function for their switching behaviour.

A24: Minimum action time contact K1 "Off"**A25: Minimum action time contact K2 "Off"****A26: Minimum action time contact K3 "Off"****A27: Minimum action time contact K4 "Off"**

These parameters permit a delay in switch

the entire minimum time period for a switching-off phase.

Caution: Parameters A3, A4, A7, A8, A22, A23, A26 and A27 are only effective if the relevant output is available and included in function by parameter A44.

A30: Mutual delay of contacts K1 and K2

This parameter makes a mutual switching-on delay of relays possible, depending on whichever contact is switched first. It ensures that two output contacts do not switch simultaneously.

ing on the relay in order to reduce the

A31: Delay after "Power-on"

This parameter allows a switching-on delay of relays after switching-on the mains voltage. This delay corresponds with the time set here. A mutual delay set by parameter A30 becomes effective as soon as the first contact is switched on.

A32: Alarm suppression after „Power-On“

This parameter allows a switching-on delay of the alarm contact after switching on the mains voltage. This delay corresponds with the time set here. This suppression does not apply to sensor error alarm or, if activated, external alarms.

A33: Operating time before time depending load replacement

Load replacement depending on time is mainly used in the field of refrigeration technology to balance the use of the connected compressors. If only some of the outputs are continuously active, outputs that have not yet been activated will be used.

This parameter determines the time to elapse before outputs are changed for the first time.

The LED "R", if applicable, switches on when the first time-dependent load replacement occurs. It indicates that additional compressor capacity is available. LED "R" switches off if either all compressors (100%) are in use or when no compressors (0%) are in use.

A34: Operating time range

If operating mode with time-dependent load replacement is activated these time ranges are available for parameter A33. .

A40: Activation of time-dependent load replacement

This parameter either activates or deactivates time-dependent load replacement.

A41: Activation of change over mode

Like time-dependent load replacement the change over mode is mainly used in the refrigeration technology. If outputs are often changed, change over mode contributes to evenly used compressors. Different outputs are activated at each change-over to a different output stage. The following applies in case of an output change:

If several outputs are on, the output first activated is switched off first. If several outputs are off, the output first deactivated is switched on first. This parameter either activates or deactivates change over mode.

Note: Time-dependent load replacement and change over mode make sense only if several components of the same output are switched in a control loop.

A42: Interlocking of total operating times

This parameter releases the locking of the total operating times according to parameter P33-P40.

The adjustment of time values resulting from time registration is only necessary for updating purposes when plant components are replaces.

A43: Adjustment of setpoint S1' (not available on all types of controllers)

By closing switching input E1, setpoint S1 can be switched to a setpoint S1'. Setpoint S1' can be either relative to setpoint S1 or an independent, freely adjustable, control setting. The setpoint S1' can only be accessed if input E1 is closed. If setpoint S1' is deactivated the display shows in case of closed switching input the alarm message "FEH" or "FEHL". The switching state of the output relays is according to parameters A5-A8. The alarm output selected by parameter A44 is not affected.

A44: Operating mode

The regulator program is provided for a maximum of 4 controlling output contacts plus an alarm contact. 5 output stages of 0%, 25%, 50%, 75% and 100% have been implemented. For types with less output contacts the operating mode can be adapted by means of this parameter as follows: for 4 output stages 0%, 33%, 66% and 100% or for 3 output stages 0%, 50% and 100%, each with an additional alarm contact.

The operating mode can be changed if the controlled plant has to be operated with a different number of external loads. The alarm relay is always next to the last controlling relay.

Software .26

After switching-on the mains voltage the display show "OFF" when standby mode is activated and the actual value if the controller is not in standby mode. The LEDs have the following functions: "°C" = temperature display in °C (upper LED)

"bar" = pressure display in bar (middle LED)

"%" = power display in % (lower LED).

Note: The setpoint can also be adjusted by the LON-network. On every setpoint adjustment via LON-network the new value will be verified if in control range limitations.

Second control level

P1-P5: Setpoint 2-6 / DeltaW1-5

Adjustment of the secondary setpoints. The respective secondary setpoint can be adjusted by parameters A10-A14 to be relative, i.e. going along with the main setpoint S1, or absolute, i.e. independent of the main setpoint.

Note that P3 together with P1 is effective for contact K2 if operating mode is A44=12.

P11-P16: Hysteresis K1-K6

The hysteresis can be separately adjusted for the main setpoint (P11) and the secondary setpoints (P12-P16) and is set symmetrically at the setpoints, i.e. half of the hysteresis' value is effective below and half of the value above the switching point. Note that a small hysteresis permits a more exact regulation, however also leads to more frequent switching frequency decreasing the lifetime of the relay.

P17: Control range limitation – minimum setpoint

P18: Control range limitation – maximum setpoint

The adjustment range of the setpoint can be limited in both directions. This is to prevent the end user of a unit from

P19: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message „====“ appears in the display.

P20: Actual value

The here indicated temperature presents the actual measured value.

P21: Actual value correction

This parameter allows the correction of

actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

P30: Lower alarm value

P31: Upper alarm value

The alarm exit K7 evaluates an upper and a lower limit value, whereas a selection is possible (with parameter A17) as to whether the alarm is active if the temperature lies within these two limits (range alarm), or whether the alarm is released if the temperature lies beyond them (boundary alarm). In the case of sensor error, the alarm is activated independently of this adjustment.

Depending on parameter A17 both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint, or absolute, i.e. independent of the setpoint.

P32: Hysteresis alarm circuit

Hysteresis is set symmetrically at the adjusted limit value. It becomes effective depending on alarm definition The operating time recorded by parameters P33-P40 is mainly used in the field of refrigeration technology to register the operating time of the connected compressors.

P33: Total operating time contact K1 in years

P35: Total operating time contact K2 in years

P37: Total operating time contact K3 in years

P39: Total operating time contact K4 in years

P41: Total operating time contact K4 in years

P43: Total operating time contact K4 in years

This parameter indicates the total operating time in years elapsed with the respective contact switched on.

P34: Total operating time contact K1 in days

P36: Total operating time contact K2 in days

P38: Total operating time contact K3 in days

P40: Total operating time contact K4 in days

P42: Total operating time contact K4 in days

P44: Total operating time contact K4 in days

This parameter indicates the remaining total operating time in days elapsed with the

respective contact switched on. Note: Time is recorded in minute cycles. Periods shorter than one minute are ignored.

Storage in the non-volatile memory takes place twice daily, so that an inaccuracy of max. 12 hours may result if a power failure occurs.

Caution: Parameters P37-P44 are only effective when the pertinent output is available and activated by parameter A44. To avoid statistical errors, it is essential that the operating mode set in parameter 44 corresponds to the number of external loads (e.g. compressors) that are connected.

Failure to do this will result in incorrect operating times being recorded by parameter P33-P44.

Operating times can be updated after replacement of components if parameters P19 and A19 together with parameter A42 are unlocked. Otherwise data can be irretrievable lost.

Third control level

A1-A6: Function of contact K1-K6 at sensor error

At sensor error the selected relay falls back into the condition pre-set here.

A10-A14: Selection setpoint 2-6 or DeltaW1-5

This parameter determines whether the setpoints for thermostat 1 and 2-6 are independently adjustable (Ax=0) or whether they are tied with one another via a switching offset DeltaW (Ax=1). (see parameter P1-P5)

A15: Display value

The display can indicate either a temperature or a pressure value. Measured value and indicated value must not be identical, therefore a calculated value can be indicated also. The measuring input is set with parameter A35. The calculation of the corresponding value depends on the selected refrigerant according to the setting of parameter A37.

A16: Display mode

The value can be indicated with or without decimals. In general, all parameter indications are presented in 0,1°K

A17: Alarm mode

The alarm exit evaluates an upper and a lower limit value, whereas a selection is possible as to whether the alarm is a boundary or a range alarm and whether it has absolute or relative limit values.

A18: Special function at alarm

Here can be selected whether, in the case of an alarm, the indication to flash.

A20-25: Minimum action time contact K1-K6 "Off"

These parameters permit a delay in switching on the relay in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-off phase.

A30: Mutual delay of contacts

This parameter makes a mutual switching-on delay of relays possible, depending on whichever contact is switched first. It ensures that two output contacts do not switch simultaneously. If there are multiple bypass groups defined with parameter A44 the mutual delay affects entire groups. The mutual delay affects no free contacts that are not involved in the load replacement. With A44=0 the delay is always effective.

A31: Delay after "Power-on"

This parameter allows a switching-on delay of relays after switching-on the mains voltage. This delay corresponds with the time set here. A mutual delay set by parameter A30 becomes effective as soon as the first contact is switched on. The delay applies not to alarm contact K7

A32: Alarm suppression after „Power-On“

If boundary alarm is selected with parameter A17 this parameter allows a switching-on delay of the alarm contact K7 after switching on the mains voltage. This delay corresponds with the time set here. This suppression does not apply to sensor error alarm or, if activated, external alarms. If range alarm is selected, this parameter is ineffective.

A33: Operating time before time depending load replacement

Load replacement depending on time is mainly used in the field of refrigeration technology to balance the use of the connected compressors. If only some of the outputs are continuously active, outputs that have not yet been activated will be used. This parameter determines the time to elapse before outputs are changed for the first time. If there are multiple bypass groups defined with parameter A44 the load replacement affects entire groups.

A34: Operating time range

If operating mode with time-dependent load replacement is activated these time ranges are available for parameter A33.

A35: Measuring input

This parameter selects either temperature or pressure measuring. Deactivated sensors can be connected; their measuring input causes no error message. Note the selection of the display value with parameter A15. Measured and indicated value must not be the same. It is possible to indicate a temperature value calculated by a pressure value or to indicate a pressure value calculated by a temperature value.

A36: Temperature scale

Indication can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range

A37: Refrigerant

Selection of the used refrigerant in the plant.

A38: Indication value for lower value at pressure measuring**A39: Indication value for upper value at pressure measuring**

If pressure measuring is selected with parameter A35 these parameters allow scaling of the measuring input. The value to be indicated for the lower and upper measuring value then defines the range the controller will indicate.

A40: Activation of time-dependent load replacement

This parameter either activates or deactivates time-dependent load replacement to balance the use of the connected compressors. The replacement takes place after the operating time set with parameter A33.

A41: Sequential operation mode

This parameter either activates or deactivates the sequential operation mode. If this mode is activated different compressors or bypass-groups will be activated or deactivated (if possible) at each change of output stage to ensure an even load of the compressors.

Concerning the switching of the compressors or bypass-groups the following applies:

If several compressors or bypass-groups are activated the first started unit will be deactivated first.

If several units are deactivated the first stopped unit will be activated first. If in sequential operation mode the connections of the units to the respective output stage is ineffective. The control prevents the switching of valves if the compressor has not started and assures the simultaneous switch-off of valves when the compressor is switched off. The minimum action times

(parameters A21-A25)

concerning valves will be adjusted to the times of the respective compressors.

A42: Interlocking of total operating times

This parameter releases the locking of the total operating times according to parameter P33-P44.

The adjustment of time values resulting from time registration is only necessary for updating purposes when plant components are replaced.

A43: Adjustment of setpoint S1' (not available on all types of controllers)

By closing switching input E1, setpoint S1 can be switched to a setpoint S1'. Setpoint S1' can be either relative to setpoint S1 or an independent, freely adjustable, control setting. The setpoint S1' can only be accessed if input E1 is closed. An additional option is to activate the standby mode with the switching input E1. This mode has priority and is not affected by the setting of parameter A45.

A44: Operation mode

If a sequential operation mode or the time-dependent load replacement is activated with parameter A40 and A41, parameter A44 selects which outputs are involved in this mode.

Additionally it is possible to define pairs of outputs that work as bypass-groups. In this case the activation of the valve output leads to a smaller cooling performance. In the bypass-groups there is a standard linkage of the outputs, i.e. K1=compressor, K2=bypass, K3=compressor, K4=bypass, K5=compressor, K6=bypass. Bypassgroups with an inverted valve output are intended for plants where the bypass is switched on together with the compressor and switched off together with the valve output. A special function allows the operation of two compressors together with a common bypass with K1+K3=compressor, K2=bypass. In this case K4 becomes inactive, because parameters P3 and P14 are reserved. A further special function is intended for the operation with double bypass-groups with K1=compressor, K2+K3=bypass, K4=compressor, K5+K6=bypass. Not that the sequential operation mode and the time-dependent load replacement are effective independently of each other if activated with parameters A40 and A41.

A45: Standby mode

Activation or deactivation of the standby key. In standby mode the display indicates "OFF".

A51-A56: Switch mode K1-K6

The switching sense for the relays, i.e. cooling or heating function, can be programmed independently. The respective relay may not be part of the load replacement mode (see parameter A44) or part of any bypass-group. If this applies the respective relay it switches to cooling function independently of this parameter.

A59: Setpoint offset

This adjusted value will build the difference to the activated setpoint, i.e. there is no regulation according to the pre-set value, but according to the sum of setpoint and the value of A59. All secondary setpoints that apply to outputs involved in the load replacement or bypass-groups are affected by this parameter as well. The remaining free outputs and the alarm limit values are not affected.

L0: Individual address in LON-network (Node)**L1: Individual address in LON-network (Subnet)**

STOERK TRONIC devices can be hooked with „self installation“. In this case, however, each participant has to be assigned a clear address. This address corresponds to the knot address and subnet address with Domain=0.

The address of the knot can only be changed, if the knot was not tied externally (SNVT „nciNetConfig“ = CFG_LOCAL), otherwise the changed value is not saved (after releasing the set key the old value is reset).

Status messages**F 1**

Sensor error
(Open- or short-circuit of Pt100 sensor or error of pressure sensor) Solution: check sensor.

F b

Exceeding of operating range.
If the measured value (P35) and the indicated value (P15) are different this will be interpreted as error.
Solution: do not exceed the operating range

EP

Data loss at parameter memory Solution: the controller must be repaired

Temperature indication flashes

Refrigerating chamber temperature beyond alarm limits

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. P1) to one and the same function is guaranteed.

Parameter	Function	Adjustable range
Software .16		
S1	Setpoint	P12 ... P13
P1	DeltaW1	-99 ... 99.0 K
P2	DeltaW2	-99 ... 99.0 K
P3	DeltaW3	-99 ... 99.0 K
P6	Hysteresis K1	0,1 ... 99.0 K
P7	Hysteresis K2	0,1 ... 99.0 K
P8	Hysteresis K3	0,1 ... 99.0 K
P9	Hysteresis K4	0,1 ... 99.0 K
P12	Control range limitation – minimum setpoint	-99 ... 999°C
P13	Control range limitation – maximum setpoint	-99 ... 999°C
P19	Key lock	0: no key-lock 1: key-lock
P20	Actual value 1	
P21	Actual value correction	-10 ... +10 K
P30	Lower alarm value	-99 ... 999°C
P31	Upper alarm value	-99 ... 999°C
P32	Alarm hysteresis	0,1 ... 99,0 K
P33	Total operating time contact K1 in years	0 ... 25 years
P34	Total operating time contact K1 in days	0 ... 364 days
P35	Total operating time contact K2 in years	0 ... 25 years
P36	Total operating time contact K2 in days	0 ... 364 days
P37	Total operating time contact K3 in years	0 ... 25 years
P38	Total operating time contact K3 in days	0 ... 364 days
P39	Total operating time contact K4 in years	0 ... 25 years
P40	Total operating time contact K4 in days	0 ... 364 days
A1	Switch mode K1	0: heating contact 1: cooling contact
A2	Switch mode K2	0: heating contact 1: cooling contact
A3	Switch mode K3	0: heating contact 1: cooling contact
A4	Switch mode K4	0: heating contact 1: cooling contact
A5	Function of contact K1 at sensor error	0: relay off 1: relay on
A6	Function of contact K2 at sensor error	0: relay off 1: relay on
A7	Function of contact K3 at sensor error	0: relay off 1: relay on
A8	Function of contact K4 at sensor error	0: relay off 1: relay on
A10	Temperature scale	0: Celsius 1: Fahrenheit 2: Kelvin
A11	Display mode	0: without decimals, without leading zeros 1: with decimals, without leading zeros 2: without decimals, with leading zeros 3: with decimals, with leading zeros
A12	Alarm mode	0: boundary alarm 1: range alarm
A13	Special function at alarm	0: no function 1: active, no flashing display 2: active, flashing display

A19	Parameter lock	0: no lock 1: A-parameter locked 2: A- and P-parameter locked
A20	Minimum action time contact K1 "On"	0 ... 999 sec.
A21	Minimum action time contact K2 "On"	0 ... 999 sec.
A22	Minimum action time contact K3 "On"	0 ... 999 sec.
A23	Minimum action time contact K4 "On"	0 ... 999 sec.
A24	Minimum action time contact K1 "Off"	0 ... 999 sec.
A25	Minimum action time contact K2 "Off"	0 ... 999 sec.
A26*	Minimum action time contact K3 "Off"	0 ... 999 sec.
A27*	Minimum action time contact K4 "Off"	0 ... 999 sec.
A30	Mutual delay of contacts K1 and K2	0 ... 999 sec.
A31	Delay after "Power-on"	0 ... 999 sec.
A32	Alarm suppression after „Power-On“	0 ... 999 sec.
A33	Operating time before time depending load replacement	0 ... 999 sec. or min.
A34	Operating time range for parameter A33	0: seconds 1: minutes
A40	Activation of time-dependent load replacement	0: no 1: time-dependent
A41	Activation of change over mode	0: no 1: change over mode
A42	Interlocking of total operating times	0: no lock 1: lock
A43*	Adjustment of setpoint S1 ⁴	0: inactive 1: relative of setpoint 1 2: absolute value
A44	Operating mode	0: 2 compressors K1, K2, alarm at K3 1: 3 compressors K1, K2, K3, alarm at K4 2: 4 compressors K1, K2, K3, K4, alarm at K5
Software .26		
S1	Setpoint S1	P17 ... P18
S1 ⁴	Setpoint S1 ⁴ (E1 closed)	-99.9 ... +99.9 K or P17 ... P18
P1	Sollwert 2 Delta W1	-99.9 ... 999.0°C -99.9 ... 99.9 K
P2	Sollwert 3 Delta W2	-99.9 ... 999.0°C -99.9 ... 99.9 K
P3	Sollwert 4 Delta W3	-99.9 ... 999.0°C -99.9 ... 99.9 K
P4	Sollwert 5 Delta W4	-99.9 ... 999.0°C -99.9 ... 99.9 K
P5	Sollwert 6 Delta W5	-99.9 ... 999.0°C -99.9 ... 99.9 K
P11	Hysteresis contact K1	0.1 ... 99.9 K
P12	Hysteresis contact K2	0.1 ... 99.9 K
P13	Hysteresis contact K3	0.1 ... 99.9 K
P14	Hysteresis contact K4	0.1 ... 99.9 K
P15	Hysteresis contact K5	0.1 ... 99.9 K
P16	Hysteresis contact K6	0.1 ... 99.9 K
P17	Control range limitation – minimum setpoint	-99.9°C ... P18
P18	Control range limitation – maximum setpoint	P17 ... 999.0°C
P19	Key-lock	0: no key-lock 1: key-lock
P20	Actual value	-
P21	Actual value correction	-30.0 ... +30.0 K
P30	Lower alarm value	-99.9°C ... P31 or -99.9 ... 999.0 K
P31	Upper alarm value	P30 ... 999.0°C or -99.9 ... 999.0 K
P32	Alarm hysteresis	0.1 ... 99.9 K
P33	Total operating time contact K1 in years	0 ... 25 years
P34	Total operating time contact K1 in days	0 ... 364 days

Parameter	Function	Adjustable range
P35	Total operating time contact K2 in years	0 ... 25 years
P36	Total operating time contact K2 in days	0 ... 364 days
P37	Total operating time contact K3 in years	0 ... 25 years
P38	Total operating time contact K3 in days	0 ... 364 days
P39	Total operating time contact K4 in years	0 ... 25 years
P40	Total operating time contact K4 in days	0 ... 364 days
P41	Total operating time contact K5 in years	0 ... 25 years
P42	Total operating time contact K5 in days	0 ... 364 days
P43	Total operating time contact K6 in years	0 ... 25 years
P44	Total operating time contact K6 in days	0 ... 364 days
A1	Function of contact K1 at sensor error	0: relay off 1: relay on
A2	Function of contact K2 at sensor error	0: relay off 1: relay on
A3	Function of contact K3 at sensor error	0: relay off 1: relay on
A4	Function of contact K4 at sensor error	0: relay off 1: relay on
A5	Function of contact K5 at sensor error	0: relay off 1: relay on
A6	Function of contact K6 at sensor error	0: relay off 1: relay on
A10	Selection setpoint 2 or DeltaW1	0: operation with setpoint 2 1: operation with deltaW1
A11	Selection setpoint 3 or DeltaW2	0: operation with setpoint 3 1: operation with deltaW2
A12	Selection setpoint 4 or DeltaW3	0: operation with setpoint 4 1: operation with deltaW3
A13	Selection setpoint 5 or DeltaW4	0: operation with setpoint 5 1: operation with deltaW4
A14	Selection setpoint 6 or DeltaW5	0: operation with setpoint 6 1: operation with deltaW5
A15	Display value	0: temperature display 1: pressure display
A16	Display mode	0: integrals 1: with decimals
A17	Alarm mode	0: Boundary alarm, relative boundaries 1: Boundary alarm, absolute boundaries 2: Range alarm, relative boundaries 3: Range alarm, absolute boundaries
A18	Special function at boundary alarm	0: not activated 1: flashing display
A20	Minimum action time contact K1 "Off"	0 ... 999 sec.
A21	Minimum action time contact K2 "Off"	0 ... 999 sec.
A22	Minimum action time contact K3 "Off"	0 ... 999 sec.
A23	Minimum action time contact K4 "Off"	0 ... 999 sec.
A24	Minimum action time contact K5 "Off"	0 ... 999 sec.
A25	Minimum action time contact K6 "Off"	0 ... 999 sec.
A30	Mutual delay of contacts	0 ... 999 sec.
A31	Delay after "Power-on"	0 ... 999 sec.
A32	Alarm suppression after „Power-On“	0 ... 999 sec.
A33	Operating time before time depending load replacement	0 ... 999 sec. or min.
A34	Operating time range for parameter A33	0: seconds 1: minutes
A35	Measuring input	0: temperature measuring input 1: pressure measuring input

A36	Temperature scale	0: Fahrenheit (50 Hz) 1: Celsius (50 Hz) 2: Fahrenheit (60 Hz) 3: Celsius (60 Hz)
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Parameter	Function	Adjustable range
A37	Refrigerant	0: R134A 1: R22 2: R407C 3: R404A
A38	Indication value for lower value at pressure measuring	-99 ... 999
A39	Indication value for upper value at pressure measuring	-99 ... 999
A40	Activation of time-dependent load replacement	0: not activated 1: activated
A41	Sequential operation mode	0: not activated 1: activated
A42	Interlocking of total operating times	0: not locked 1: locked
A43	Adjustment of switching input E1	0: no function 1: S1' activated relative to setpoint S1 2: S1' activated absolute (freely adjustable) 3: switch to standby mode by closing E1 4: switch to standby mode by opening E1
A44	Operation mode	0: K1-K6 without load replacement 1: K1+K2 with load replacement 2: K1+K2 as bypass-group (K1 = compressor) 3: K1-K3 with load replacement 4: K1-K4 with load replacement 5: K1-K4 as bypass- group (K1+K3 = compressor) 6: K1-K5 with load replacement 7: K1-K6 with load replacement 8: K1-K6 as bypass- group (K1+K3+K5 = compressor) 9: like 2, but K2 inverted 10: like 5, but K2+K4 inverted 11: like8,butK2+K4+K6inverted 12: K1-K3 as Bypass- group (K1+K3 = compressor, K4 = inactive) 13: K1-K6 as double bypass-groups (K1+K4 = compressor)
A45	Function of standby key	0: no function 1: standby function
A51	Switch mode K1 (only effective if A44 = 0)	0: heating contact 1: cooling contact
A52	Switch mode K2 (only effective if A44 = 0)	0: heating contact 1: cooling contact
A53	Switch mode K3 (only effective if A44=0, 1, 2, 9)	0: heating contact 1: cooling contact
A54	Switch mode K4 (only effective if A44=0, 1, 2, 3, 9)	0: heating contact 1: cooling contact
A55	Switch mode K5 (only effective if A44=0, 1, 2, 3, 4, 5, 9, 10, 12)	0: heating contact 1: cooling contact
A56	Switch mode K6 (only effective if A44=0, 1, 2, 3, 4, 5, 6, 9, 10, 12)	0: heating contact 1: cooling contact
A59	Setpoint offset	-99.9 ... 99.9 K
L0	Individual address LON-network, Node	1 ... 126 (0 reserved for data logger)
L1	Individual address LON-network, Subnet	0 ... 255

Adjustment options

In the second control level some frequently used parameters (r0, dA) are available and adjustable. (The complete list of all parameters is to be found on the third control level.)

Parameter description:

/0: Sensor type

This parameter makes it possible to adjust the type of the sensor. At the moment only hardware for sensor type KTY81-121 is available.

/1: Calibration of sensor

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The measured value is increased or decreased by the here adjusted value.

/2: Software filter

This parameter can determine by how many measured values an average value is to be formed.

r0: Hysteresis for the compressor contact

Parameter r0 sets the temperature margin between switching off and switching on of the compressor. A small hysteresis permits a more exact regulation, however also leads to more frequent switching of the compressor. The hysteresis is set on one side above the setpoint.

r1: Setpoint limitation (minimum)

r2: Setpoint limitation (maximum) These parameters limit the adjustment range of the setpoint S1, in order to avoid that the end user sets inadmissible values for the plant. The entire adjustment range is equivalent to the maximum operating range of a PTC sensor.

c0: Start protection of the compressor after „cooling on“

After cooling is switched on (e.g. by switching on the mains voltage) the start of the compressor is retarded until this start protection time is over. This secures e.g. that several cooling units do not start at the same time and load the electricity supply net.

c1: Start protection of the compressor after compressor start

This time protection starts when the compressor is switched on. After switching the compressor off, a renewed switching on is impossible until this protection time runs out. This prevents from too frequent switching-on of the compressor and thus increases its life span.

c2: Start protection of the compressor after compressor stop

This time protection starts when the compressor is switched off. After switching the compressor off, a renewed switching on is impossible until this protection time runs out.

c3: Function in the case of error of refrigerating chamber sensor

Here is determined whether the compressor keeps running or not in the case of an error of the refrigerating chamber sensor. When deep-freezing, the compressor should normally continue running, in order to prevent de-frosting of the goods. At the normal cooling range above 0 °C, a continuation, however, could lead to frost damages.

c4: Switching delay compressor relay

With this parameter set to "1" the switching of the compressor relay can be additionally delayed for 3 seconds.

d0: Defrosting interval

The defrosting interval defines the time, after which a defrosting process is started. With the beginning of the defrosting process, the defrosting interval starts anew, which results in periodic defrosting in firm intervals.

Defrosting can also be started by pressing the key „manual defrosting“ (UP key) for at least 3 seconds. This automatically restarts the defrosting interval.

d1: Defrosting mode

This parameter determines whether defrosting is effected by an electrical heating coil (d1=0) or by means of hot gas (d1=1).

d2: Defrosting temperature

The defrosting process is terminated when the evaporator has reached the adjusted temperature. (Always provide good thermal contact between evaporator sensors and lamellas). In case that defrosting takes too long, the time limit set in „d3“ will come into effect.

d3: Defrosting time limit

Here the maximal defrosting time can be adjusted. According to this time frame, defrosting is terminated even if the evaporator is not warm enough to be ice-free.

d4: Function after “Mains On”

The time elapsed during the defrosting interval is not stored when the mains are switched off. For this reason defrosting should be started in the deep-freezing range. This is especially recommended in case of thermal defrosting limitation in

order to terminate defrosting optimally. Otherwise ice may be formed on the evaporator coils if defrosting was to start when switching off the mains.

d5: Defrost delay after “Mains On”

Defrosting is delayed by the time period set here. Energy peaks are avoided. (only effective if d4=1)

d6: Indication of the refrigerating chamber temperature during defrosting

It is to be assumed that the refrigerating chamber temperature slightly rises during the defrosting process. d6=0 indicates the actual refrigerating chamber temperature during the defrosting process. d6=1 indicates the temperature determined just before the start of defrosting until the setpoint of the refrigerating chamber is reached again after the defrosting process is completed. Thus, an irritation of the operator during defrosting can be avoided.

d7: Drainage time

Completed defrosting is immediately followed by a drainage period, in order to let the evaporator drip off. During drainage time, the exits compressor and ventilator are switched off.

d8: Alarm suppression after defrosting A temperature alarm activated during the defrosting will be suppressed after defrosting during this adjusted time period.

d9: Defrost suppression

With this parameter set to "0" defrosting will be delayed according to the time delays set with parameters c0, c1 and c2. With d9=1 defrosting is immediately initiated.

dA: Indication of the evaporator temperature

This parameter allows the indication of the surface temperature of the evaporator. This allows simple monitoring of the defrosting temperature and assistance at maintenance work.

db: Defrosting cycle time base

This parameter changes the time base for the defrosting cycle. With parameter set to "1" hours become minutes and minute become seconds. This allows a quick control and monitoring of the refrigeration plant during installation and maintenance.

A0: Switching hysteresis for alarm The hysteresis of the alarm contact is asymmetrically set downward at the maximum alarm value and upward at the minimum alarm value.

A1/A2: Minimum/maximum limit values

The limit values serve for monitoring of the refrigerating chamber temperature. Alarm is released when exceeding maximum limit value or when falling below the minimum limit value.

A3: Alarm suppression time after “cooling on”

After switching cooling on, an alarm is suppressed for the adjusted time, i.e. the refrigerant plant can get to work temperature without releasing alarm.

A4: External alarm input

This parameter determines if the control is deactivated in case of an external alarm.

F0: Fan control

At setting “0” the control is dependent of temperature with the fan setpoint F1 or according to the setting F6=1 (dynamic control).

At setting “1” the fans are permanently on assumed that they are not stopped by the setting F3=1 (off at compressor stop) or F4=1 (off at defrosting).

F1: Fan setpoint

As soon as the evaporator temperature falls below the fan setpoint (with hysteresis) the fan is switched on and vice versa. Above the fan setpoint the fan is off.

F2: Hysteresis fan output

The hysteresis is set one-sided and below the fan setpoint.

F3: Behaviour at compressor stop With F3=0 the fan operation is independent of the compressor (standard refrigeration range above 0°C).

With F3=1 the fan is switched off if the compressor is switched off.

F4: Behaviour during defrost

With F4=0 the fan continues to run during defrost (standard refrigeration range above 0°C).

With F4=1 the fan is stopped during defrost (deep-frying range).

F5: Fan delay time after defrost

Following drainage time d7, start of the ventilator can be delayed until the evaporator has sufficiently cold air again. If the ventilator started immediately, the warm air resulting from the defrosting process would probably be blown into the refrigerating chamber.

F6: Fan control

With F6=0 the fan is controlled depending on fan setpoint F1

With F6=1 the fan control is dynamic.

In this case the absolute setpoint adjusted with F1 is no more effective but the fan setpoint depends directly on actual value of the refrigerating chamber. The fan setpoint results of the refrigerating chamber temperature minus the relative evaluated temperature set in F1. Example: settings F1 = 5, F2 = 2, F6 = 1 The fan setpoint is always 5K below the refrigerating chamber temperature. If the refrigerating chamber temperature is 10°C the fan will switch off if the evaporator temperature is above 5°C and the fan will switch on if the evaporator temperature falls below 3°C. If the refrigerating chamber temperature is 9°C the fan will switch off if the evaporator temperature is above 4°C and the fan will switch on if the evaporator temperature falls below 3°C. This variant makes it possible to switch the fans delayed dependent on temperature at each temperature start (start-up relief) or to switch them off delayed after compressor stop (usage of the refrigerating capacity of the evaporator).

Status messages:

E0 Refrigerating chamber sensor F1 error, open- or short-circuit, check sensor

E1 Evaporator sensor F2 error, open- or short-circuit, check sensor

E2 Data loss at parameter memory **E3** External alarm

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

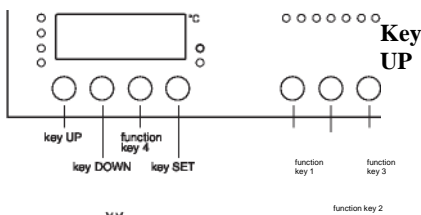
Parameter	Function	Adjustable range
/0	Sensor type At the moment only hardware for sensor type KTY81-121 is available.	0: PT100 1: KTY81-121 2: KTY81-110 3: NTC 4. linear input: 0...10V, 2...10V, 0...20mA, 4...20mA
/1	Calibration of sensor	-5.5 ... 9.9 K
/2	Software filter actual value	0: no filter 1: 0.4 sec. 2: 1.4 sec. 3: 3.0 sec. 4: 8.0 sec. 5: 19.8 sec. 6: 48.0 sec.
r0	Hysteresis for the compressor	1...15 K
r1	Setpoint limitation (minimum)	-55°C...r2
r2	Setpoint limitation (maximum)	r1...+99°C
c0	Start protection of the compressor after „cooling on“	0...15 Min.
c1	Start protection of the compressor after compressor start	0...15 Min.
c2	Start protection of the compressor after compressor stop	0...15 Min.
c3	Function in the case of sensor error	0: compressor off 1: compressor on
c4	Switching delay compressor relay	0: no delay 1: 3 sec. delay
d0	Defrosting interval	0...99 h
d1*	Defrosting mode	0: electric 1: with hot gas
d2*	Defrosting temperature	-55...+99°C
d3	Defrosting time limit	1...99 Min.
d4	Function after “Mains On”	0: cooling, no defrost 1: first defrost, than cooling
d5	Defrost delay after “Mains On”	0...31 Min.
d6	Indication of the refrigerating chamber temperature during defrosting	0: actual refrigerating chamber temperature 1: temperature determined just before the start of defrosting
d7*	Drainage time	0...15 Min
d8	Alarm suppression after defrosting	0...15 Std.
d9*	Defrost suppression	0: delay corresponding parameters c0, c1, c2 1: no suppression
dA*	Indication of the evaporator temperature	
db*	Defrosting cycle time base	0: normal time basis 1: shortened time base
A0	Switching hysteresis for alarm	1...15 K
A1	Minimum limit value	-55...0 K
A2	Maximum limit value	0...+99 K
A3	Alarm suppression time after “cooling on”	0...15 h
A4**	External alarm input	0: control active 1: control deactivated
F0*	Fan control	0: on depending on temperature 1: always on
F1*	Fan setpoint	-55...+99°C
F2*	Hysteresis fan output	2...15 K
F3*	Behaviour at compressor stop	0: fan independent of compressor 1: fan off if compressor off
F4*	Behaviour during defrost	0: fan independent of defrosting 1: fan off during defrosting
F5*	Fan delay time after defrost	0...15 Min.
F6*	Fan control	0: absolute control 1: dynamic control

* Parameter only available for type ST 70-36.13 and .14 **

Parameter only available for type ST 70-36.14

Adjustment options

Key assignment ST181:



Key DOWN

Defrosting can be started any time by pressing the UP-key for 3 seconds. During the process of defrosting the respective LED is illuminated. The LED flashes if defrosting is requested, but may not be started yet due to interlock conditions.

The DOWN key, among other functions, can acknowledge an alarm. The internal buzzer is then switched off.

While SET key is pressed, the desired value is indicated.



Key SET

In addition, the SET key is used for setting parameters.

Function key 1 (if available)

Different functions are assigned to this key by help of parameters, see parameter b1. (Direct switching of a contact, setpoint indication thermostat 2). The key must be pressed for at least half a second.

Function key 2

Different functions are assigned to this key by help of parameters, see parameter b2.



Function key 3
(Standby)

(Direct switching of a contact, desired value indication thermostat 2). The key must be pressed for at least half a second.

With this key the controller is switched to standby mode. With parameter b3 it can be deactivated.

Function key 4 (only controllers with real time clock)



Shortly pressing this key the actual time of the internal real time clock is indicated in

the display for 4 seconds. The colon of the time display flashes. Pressing also the UP or DOWN key at the same time the clock can be adjusted.

Pressing the key for 5 seconds the switch-over to data record 2 is deactivated for the actual day. The data record switch-over can be deactivated permanently by parametring.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Second control level:

In this level some frequently used parameters and in case of controllers with real time clock the H-parameters defining the switch times are available. (The complete list of all parameters is to be found on the third control level.)

Programming cycle for switching times (all H-parameters are only available for units with real time clock, see parameter table)

Selection and adjustment:

By pressing the function key 4 after selection of the value to be adjusted, the respective switch-on or switch-off time is indicated and can be set by additionally pressing the UP or DOWN key. Releasing all keys, the new value is saved long term.

The programming is analogue to a mechanic timer switch, where a marker for switch-on and one for switch-off times can be set daily. Note that there is no switching if the adjusted switch-on and switch-off times of an output are the same on the same day. A cross-over of the time values of a contact is possible, but the respective times then are ineffective.

Between 23:59 and 0:00 there is the special position “----”. With this setting the respective time is deactivated and has no more influence on the according switching output. This setting is used to allow outputs to be switched on for several days.

Third control level:

Parameter description:

P0: Indication of refrigerating chamber temperature F1

The here indicated temperature presents the sum of actual measured value of sensor F1 and the actual value correction according to parameter P1.

P1: Calibration refrigerating chamber sensor F1, actual value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The measured value is increased or decreased by the here adjusted value.

P2: Indication of actual value of sensor F2

The here indicated temperature presents the sum of actual measured value of sensor F2 and the actual value correction according parameter P3.

P3: Calibration sensor F2, actual value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The measured value is increased or decreased by the here adjusted value.

P4: Evaluation of sensor F2

Sensor F2 can be used for the determination of the evaporator temperature (P4=1) or for the second thermostat (P4=2). If, in simpler refrigerant plants only the refrigerating chamber sensor is used, the sensor input for sensor F2 as well as its data recording can be deactivated here (P4=0). Among other, parameter d2 has no meaning in the deactivated condition.

P5: Indication mode

The actual value can be indicated with different accuracy. Actual values and parameter values are always set for highest accuracy.

P6: Temperature scale, indication in standby mode

This parameter allows display settings (°F or °C) and („AUS“ or „OFF“) in standby mode.

P7: Sensor type

This parameter makes it is possible to adjust the type of both sensors. Depending on the hardware not all sensor settings are possible.

P8: Software filter

This parameter can determine by how many measured values an average value is to be formed.

r0: Hysteresis for the compressor contact

Parameter r0 sets the temperature margin between switching off and switching on of the compressor. A small hysteresis permits a more exact regulation, however also leads to more frequent switching of the compressor. The hysteresis is set onesided above the setpoint.

r1: Setpoint limitation (minimum)

r2: Setpoint limitation (maximum) These parameters limit the adjustment range of the setpoint S1, in order to avoid that the end user sets inadmissible values for the plant. The entire adjustment range is equivalent to the maximum operating range of a PTC sensor.

c0: Start protection of the compressor after „cooling on“

After cooling is switched on (e.g. by switching on the mains voltage) the start of the compressor is retarded until this start protection time is over. This secures e.g. that several cooling units do not start at the same time and load the electricity supply net.

c1: Start protection of the compressor after compressor start

This time protection starts when the compressor is switched on. After switching the compressor off, a renewed switching on is impossible until this protection time runs out. This prevents from too frequent switching-on of the compressor and thus increases its life span.

c2: Start protection of the compressor after compressor stop

This time protection starts when the compressor is switched off. After switching the compressor off, a renewed switching on is impossible until this protection time runs out.

c3: Function in the case of error of refrigerating chamber sensor F1

Here is determined whether the compressor keeps running or not in the case of an error of the refrigerating chamber sensor F1. When deep-freezing, the compressor should normally continue running, in order to prevent de-frosting of the goods. At the normal cooling range above 0 °C, a continuation, however, could lead to frost damages.

In the operation mode „emergency operation“ the compressor is switched on and

off in 5 minute intervals. This results in a clock operation with 50 % cooling performance.

d0: Defrosting interval

The defrosting interval defines the time, after which a defrosting process is started. With the beginning of the defrosting process, the defrosting interval starts anew, which results in periodic defrosting in firm intervals.

Defrosting can also be started by pressing the key „manual defrosting“ (UP key) for at least 3 seconds. This automatically restarts the defrosting interval.

After switching-on cooling, the controller immediately initiates cooling and starts the first defrosting process after this interval.

d1: Defrosting mode

This parameter determines whether defrosting is effected by an electrical heating coil (d1=0) or by means of hot gas (d1=1).

d2: Defrosting temperature

The defrosting process is terminated when the evaporator has reached the adjusted temperature. (Always provide good thermal contact between evaporator sensors and lamellas). In case that defrosting takes too long, the time limit set in „d3“ will come into effect.

d3: Defrosting time limit

Here the maximal defrosting time can be adjusted. According to this time frame, defrosting is terminated even if the evaporator is not warm enough to be ice-free.

d6: Indication of the refrigerating chamber temperature during defrosting

It is to be assumed that the refrigerating chamber temperature slightly rises during the defrosting process. d6=0 indicates the actual refrigerating chamber temperature during the defrosting process. d6=1 indicates the temperature determined just before the start of defrosting until the setpoint of the refrigerating chamber is reached again after the defrosting process is completed. Thus, an irritation of the operator during defrosting can be avoided. In the case of emergency, the display flashes and the actual temperature of the refrigerating chamber is indicated.

d7: Drainage time

Completed defrosting is immediately followed by a drainage period, in order to let the evaporator drip off. During drainage time, the exits compressor and ventilator are switched off.

A0: Switching hysteresis for alarm The

hysteresis of the alarm contact is asymmetrically set downward at the maximum alarm value and upward at the minimum alarm value.

A1/A2: Minimum/maximum limit values

The limit values serve for monitoring of the refrigerating chamber temperature. They are relative, i.e. going along with the setpoint S1 of the refrigerating chamber. Alarm is released when exceeding maximum limit value or when falling below the minimum limit value: The actual value display flashes, the buzzer (if available) goes off intermittently and the actual temperature of sensor F1 is indicated (if there is no sensor error). At A1=0 or A2=0 the respective limit value alarm is inactive.

The buzzer can be turned off with the DOWN key, the display continues flashing until the alarm is turned off.

A3: Alarm suppression time after „cooling on“

After switching cooling on, an alarm is suppressed for the adjusted time, i.e. the refrigerant plant can get to work temperature without releasing alarm.

A6: Alarm suppression time after temperature alarm

If the refrigerating chamber temperature exceeds the limit values adjusted at A1, A2, normally a temperature alarm should be released.

With the suppression time set at A6 the alarm release can be delayed.

A7: Alarm suppression time after defrosting

Temperature alarm is avoided for the adjusted time after defrosting, in order to enable the plant to get back to the normal operating conditions (see A1, A2).

A9: Switching sense alarm exit

Depending on application, the alarm output requires a normally-close or a normally-open contact. At setting A9=1 the relay tightens in normal operation and opens in the case of emergency. That way also a voltage failure of the controller can be detected (relay dead = alarm) for an external alarm chain.

F4: Defrosting behaviour

At F4=0 the ventilator is switched off during defrosting.

At F4=1 the ventilator continues to run also during defrosting (normal cooling range above 0°C).

F5: Ventilator deceleration time after defrosting

Following drainage time $d7$, start of the ventilator can be delayed until the evaporator has sufficiently cold air again. If the ventilator started immediately, the warm air resulting from the defrosting process would probably be blown into the refrigerating chamber.

F7: Ventilator function at cooling operation

At $F7=1$ the ventilator is always on (except for a defrosting process possibly, see parameter $F4$).

At $F7=2$ the ventilator is always on or off together with the compressor. At $F7=3$ the ventilator is switched on whenever the compressor is on and the evaporator temperature (sensor $F2$) is below the refrigerating chamber temperature (sensor $F1$). The ventilator is switched off whenever the evaporator is switched off, whereas parameter $F5$ is not active. In the case of sensor error the ventilator reacts as in the setting $F7=2$.

F8: Ventilator revolution number (data record 1) at normal cooling operation

Variable 1 for ventilator revolution number at normal cooling operation.

F9: Ventilator revolution number (data record 1) at defrosting

Variable 1 for ventilator revolution number at defrosting.

F10: Kick-start (in seconds)

If necessary, this is an option to set a time during which the ventilator starts with the maximum number of revolutions for stable operation. This parameter is only efficient, if the ventilator is newly started.

F11: Ventilator revolution number (data record 2) at normal cooling operation

Variable 2 for ventilator revolution number at normal cooling operation.

F12: Ventilator revolution number (data record 2) at defrosting

Variable 2 for ventilator revolution number at defrosting.

Y0: Indication mode of the actual value of sensor F2

At $Y0=0$ the actual value of sensor $F1$ is always indicated. The actual value of sensor $F2$ can be indicated with parameter $P2$ (second control level).

At $Y0=1$ the actual values of sensors $F1$ and $F2$ are indicated in turns every approx. 4 seconds. To distinguish them, the display marks the respective actual value with „-1-“

and „-2-“ for approx. 1 second.

At $Y0=2$ the display switches between the actual values for $F1$ and $F2$, if the respective function key ($bx=5$) is pressed. **Y1: Desired value thermostat 2** In case that sensor 2 is not used as evaporator feeler, but as actual value for a second independent thermostat, $Y1$ has the function of setting the desired value for the latter.

Y2: Switching hysteresis thermostat 2

The hysteresis is set asymmetrically at the setpoint. At cooling contact the hysteresis works on one-sided upward and at heating contact one-sided downward.

Y3/Y4: Setpoint limitation (minimum/maximum)

These parameters limit the adjustment range of the setpoint $Y1$, in order to avoid that the end user sets inadmissible values for the plant. The entire adjustment range is equivalent to the maximum work range of the PTC sensor.

Y5: Switching sense for the output of thermostat 2

Heating function means that the contact falls when the pre-set setpoint is reached, i.e. power interruption. In cooling functions the contact only tightens if the actual value is above the pre-set setpoint.

Y6: Function at error of sensor F2

Here is determined whether the respective output contact opens or tightens in case of a sensor $F2$ error.

Y7: Defrosting intervals thermostat 2

The defrosting interval defines the time, after which each defrosting process starts. With the beginning of the defrosting process, the defrosting interval starts anew, which results in the periodic defrosting in firm intervals.

Y8: Defrosting time limit thermostat 2

Here the maximal defrosting time can be set.

Depending on hardware not all key are available.

b1: Function key 1**b2: Function key 2**

- setting = 0 the respective key has no function.
- setting = 1 the controller is switched to standby mode.
- setting = 2 the key is linked with the function „ventilator revolution number“. Depending on which data record is set (1 or 2) parameters $F8$ or $F11$ is indicated and can be adjusted. If a defrost process is started parameters $F9$ or $F12$ are indicated and can be adjusted.

- setting = 3 a relay (indicated with

parameter Ux) can be switched on or off directly with the key. In standby mode the key is locked and the corresponding relay switched off. After restarting the corresponding relay remains switched off. At setting = 4 a relay (indicated with parameter Ux) is switched despite of the standby mode. The condition of the exit is maintained until the key is pressed again or until it is changed by an external switching input. After power interruption, the condition before power failure is re-installed.

At setting = 5 the actual value of sensor 2 can be indicated. At setting $P4=0$ the key has no function.

At setting = 6 the control is switched to data record 1 by additionally pressing the UP key and switched to data record 2 with the DOWN key. The data record changes the following parameters:

Description	Data record 1	Data record 2
Setpoint	S1	S2
Revolution number cooling operation	F8	F11
Revolution number defrosting	F9	F12

The actual setpoint can be displayed and adjusted by pressing the SET key. If only the ventilator revolution number has to be adjusted both data records must have the same setpoint.

b3: Function key 3 (standby)

At setting $b3=0$ the function of the key can be deactivated.

b4: Function key 4 (if available)

In case of controllers with real time clock this key is defined as TIME key. Otherwise its function is according to $b1/b2$.

b11: Function switching input E1**b12: Function switching input E2 b13:****Function switching input E3 b14:**

Function switching input E4 Depending on existing hardware there are no or not all external switching inputs. At setting = 1 the controller is switched to the standby mode. At setting = 2 defrosting of both controllers is started.

At setting = 3 a relay (indicated with parameter Ux) is switched on or off directly. In standby mode it is locked and the relay is switched off. At setting = 4 a relay is switched directly (indicated with parameter Ux) regardless of the standby mode. After net interruption the condition before power failure is re-installed.

U1: Exit connection K1**U2: Exit connection K2****U3: Exit connection K3****U4: Exit connection K4**

Depending on existing hardware there may not be all output relays. This parameter assigns the respective relay to the internal controller exits, to function key 1 and/or 2, to one external input or the buzzer.

At setting = 6 and/or = 7 the relay is switched manually. It changes its condition with each pressure of the key and adopts the condition of the respective switching input whenever the latter changes. If the corresponding key or switching input has not been released for this function (see parameters b1, b2 and b11 to b14), the relay remains switched off. The buzzer connection in its function is comparable to the alarm connection. The buzzer, however, can be switched off with the DOWN key.

L0: Individual address**L1: Amount of slaves****L2: Address of the first slave (if L1>0)****L4: Defrost suppression after network command**

Parameters of the interface. If L1>0 the controller is set as master automatically. The slaves react to the instructions of the master (defrosting, switching data record 1/2, status messages).

Status messages:

Message	Cause	Error elimination
ON/OFF	Standby modus, no regulation	Switch on by key or switching input
Temperature indication flashes	Refrigerating chamber temperature beyond alarm limits (parameter A1, A2)	
E0 flashes	Refrigerating chamber sensor F1 error, break or short-circuit	Control sensor. Controller operates according to parameter c3.
E flashes	Sensor F2 error, break or short-circuit	Control sensor. At setting [c3=1] the controller operates in timed defrosting modus (defrosting time as set in d3). At setting [c3=2] see parameter Y6.
EP	Data loss at parameter memory (control contact 1 and 2 are dead)	If error cannot be eliminated by switching on/off, the controller must be repaired.

Error message E0, E1 and EP changes in the display with the actual value of sensor F1, unless the latter is defective. This happens independently from the selected indication mode. After the error is eliminated and confirmed with the DOWN key, the previously set indication mode becomes active again.

If there is a connection to the buzzer with parameters U1... U4, the buzzer can be switched off with the DOWN key.

Depending on the function range of the individual control unit not all of the following parameters are available. Within a software family, however, the assignment of a certain parameter (e.g. A3) to one and the same function is guaranteed.

Parameter	Function	Adjustable range
Parameters second control level:		
r0	Hysteresis for the compressor	0.1 ... 15.0 K
P2	Actual value of sensor F2(only available if P4=0)	----
Y1	Setpoint thermostat 2(only available if P4=2)	-50...+150°C
Y2	Hysteresis for thermostat 2(only available if P4=2)	0.5 ... 15 K
H0	Activation of data record 2	0: not active 1: active depending on switching time
H1	Setpoint rise at data record 2	-50...+50.0 K
H2	Display manual reset at data record 2	0: flashing point if key pressed 1: flashing point until end of day
H11	Time to switch to data record 2, Monday	0:00...23:59
H12	Time to switch to data record 1, Monday	0:00...23:59
H21	see H11, Tuesday	0:00...23:59
H22	see H12, Tuesday	0:00...23:59
H21	see H11, Wednesday	0:00...23:59
H22	see H12, Wednesday	0:00...23:59
H21	see H11, Thursday	0:00...23:59
H22	see H12, Thursday	0:00...23:59
H21	see H11, Friday	0:00...23:59
H22	see H12, Friday	0:00...23:59
H21	see H11, Saturday	0:00...23:59
H22	see H12, Saturday	0:00...23:59
H21	see H11, Sunday	0:00...23:59
H22	see H12, Sunday	0:00...23:59
H81	Starting time 1. defrost, daily	0:00...23:59
H82	Starting time 2. defrost, daily	0:00...23:59
H83	Starting time 3. defrost, daily	0:00...23:59
H84	Starting time 4. defrost, daily	0:00...23:59
H85	Starting time 5. defrost, daily	0:00...23:59
PA	Access to parameters of third control levelPassword: „-19“	-99...+99
Parameters third control level:		
P0	Actual value refrigerating chamber sensor F1	
P1	Calibration refrigerating chamber sensor (actual value correction)	-99...+99 K
P2	Actual value of sensor F2 (only available if P4=0)	
P3	Calibration sensor F2 (actual value correction) (only available if P4=0)	-99...+99 K
P4	Evaluation of sensor F2	0: deactivated 1: evaporator temperature 2: thermostat 2
P5	Indication mode	0: integrals 1: resolution 0.5 °C 2: resolution 0.1 °C
P6	Temperature scale	0: Fahrenheit (AUS) 1: Celsius (AUS) 2: Fahrenheit (OFF) 3: Celsius (OFF)
P7	Sensor type (applies to both sensors)	11: Pt100 two-wire 21: PTC two-wire 22: PT1000 two-wire
P8	Software filter (applies to both sensors)	1: not active average value with: 2: 2 measuring values (ca. 0.6s) 4: 4 measuring values (ca. 1.2s) 8: 8 measuring values (ca. 2.4s) 16: 16 measuring values (ca. 4.8s) 32: 32 measuring values (ca. 9.6s) 64: 64 measuring values (ca. 19.2s)
r0	Hysteresis for the compressor	1...15 K

Parameter	Function	Adjustable range
r1	Setpoint limitation (minimum)	-50 °C...r2
r2	Setpoint limitation (maximum)	r1...+150 °C
c0	Start protection of the compressor after „cooling on“	0...240 Min.
c1	Start protection after compressor start	0...240 Min.
c2	Start protection after compressor stop	0...240 Min.
c3	Function in the case of error of refrigerating chamber sensor F1	0: compressor off 1: compressor on 2: emergency operation
d0	Defrosting interval	0 = inactive, no defrost 1...99 Std.
d1	Defrosting mode	0: electrical 1: with hot gas
d2	Defrosting temperature	-50...+150 °C
d3	Defrosting time limit	1...99 Min.
d6	Indication of the refrigerating chamber temperature during defrosting	0: actual refrigerating chamber temperature 1: temperature determined just before the start of defrosting
d7	Drainage time	0...15 min.
A0	Hysteresis for alarm contact	1...15 K
A1	Minimum limit values	-99.0 ... -0.1 K 0 = inactive
A2	Maximum limit values	+0.1 ... +99.0 K 0 = inactive
A3	Alarm suppression time after “cooling on”	0...240 min.
A6	Alarm suppression time after temperature alarm	0...240 min.
A7	Alarm suppression time after defrosting	0...240 min
A9	Switching sense alarm contact	0: relay on 1: relay off
F4	Defrosting behaviour	0: ventilator is switched off during defrosting 1: ventilator is switched on during defrosting
F5	Ventilator deceleration time after defrosting	0...240 min.
F7	Ventilator function at cooling operation	1: always on 2: on or off together with the compressor 3: on whenever the compressor is on and sensor F2 < sensor F1
F8	Ventilator revolution number (data record 1) at normal cooling operation	0..100%
F9	Ventilator revolution number (data record 1) at defrosting	0..100%
F10	Kick-start	0..60s
F11	Ventilator revolution number (data record 2) at normal cooling operation	0..100%
F12	Ventilator revolution number (data record 2) at defrosting	0..100%
Y0	Indication mode of the actual value of sensor F2	0: manual with P2 1: in turns with actual value of F1 2: with function key (bx=5)
Y1	Setpoint thermostat 2	-50...+150°C
Y2	Hysteresis thermostat 2	0.5...15 K
Y3	Setpoint limitation (minimum)	-50°C...Y4
Y4	Setpoint limitation (maximum)	Y3...150°C
Y5	Switching sense thermostat 2	0: heating contact 1: cooling contact
Y6	Function at error of sensor F2	0: relay off 1: relay on
Y7	Defrosting intervals thermostat 2	0: no defrost 1...99 h

Y8	Defrosting time limit thermostat 2	1...99 Min
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Parameter	Function	Adjustable range
b1	Function key 1	0: no function 1: controller on/off (standby) 2: Setpoint ventilator revolution number (F8/F11) 3: relay directly, switched off in standby mode 4: relay directly, regardless of standby mode 5: actual value sensor F2 6: switching data record 1 and 2; after power-on data record 1 is active 7: like 6, after power-on, last data record is active
b2	Function key 2	see b1
b3	Function key 3 (standby)	0: no function 1: controller on/off (standby)
b4	Function key 4 (time) (if available)	TIME key (if real time clock) otherwise see b1
b11	Function switching input E1 (if available)	0: no function 1: controller on/off (standby) 2: starting defrost 3: relay directly, switched off in standby mode 4: relay directly, regardless of standby mode
b12	Function switching input E2 (if available)	see b11
b13	Function switching input E3 (if available)	see b11
b14	Function switching input E4 (if available)	see b11
U1	Exit connection K1	0: no connection 1: connection to compressor 2: connection to defrost 3: connection to ventilator 4: connection to alarm 5: connection to thermostat 2 6: connection to function key 1, E1 or E3 7: connection to function key 2, E2 or E4 8: connection to buzzer 9: on, if controller on 10: on, if data record 2 activated
U2	Exit connection K2	see U1
U3	Exit connection K3 (or internal buzzer, if available)	see U1
U4	Exit connection K4 (if available)	see U1
L0	Individual address	0 = inactive for Bus 1...255
L1	Amount of slaves (if value > 0 the controller is set as master automatically)	0...254
L2	Address of the first slave (only relevant if L1>0)	2...255
L4	Defrost suppression after network command	---: no defrost 0 ... 240 Min. (0=defrost immediately)

Pro	Program version	
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Notes on installation and interference suppression

General notes

The use of microprocessors and regulations units allows complex tasks to be carried out without loss of operating flexibility and supervision. As the variety of tasks gets larger and measuring accuracy becomes more critical, however, susceptibility to interference similarly increases. VDE 0843 provides a European standard for the electromagnetic compatibility (EMC) of measuring, control and regulation devices for industrial process technology. Among other things, this standard lays down the interference levels which a device can be expected to tolerate. For the trouble-free operation of an installation, the interference should be well below guidelines. It is well-known, however, that far higher interference levels may occur in industrial practice where sources of interference cannot be completely eliminated.

Possible interference sources Interference can be spread through wiring or via electromagnetic radiation. The effects most damaging to control systems are normally the result of wire-borne interference. Possible sources of interference are:
 - contact bounce when switching loads - switching off inductive loads (contactors, motors, solenoid valves, ...) -unfavourable wiring paths - wire cross-sections too small -loose connections
 -switched power supplies converters, ...) - phase controllers, speed controls -isolating switches -high frequency generators

Basic rules for installation (power) Some basic principles must be observed for the installation of processor controlled regulation systems:

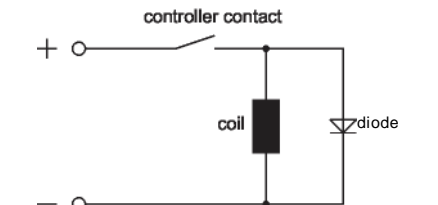
1. Keep sources of interference to a minimum, i.e. carry out suppression measures and keep interference levels as low as possible (VDE 0875 prescribes suppression to be carried out in accordance with VDE 0874). As a basic principle, interference must be suppressed at the point where it arises.
2. Locate unavoidable sources of interference as far away from the control systems as possible.
3. All sensor and signal lines should be spatially separated from control and mains-voltage cables. Capacitive or, possibly, inductive coupling might lead to

cross-talk from high-voltage cables to low-voltage lines installed parallel to them, falsifying measurement values and signals or even interfering with the control process. 4. Use screened measuring lines and earth the screening. Wherever possible, use only the common earth connection and make sure that there is no second earth connection (at the controller, for instance) to cause non-permissible ground loops giving rise to stray currents. The measuring points of many thermocouple sensors are in contact with their sheath and screening. In these cases the controller must not be earthed to the screening. 5. The installation of a separate power supply cable for the control system is recommended. This reduces interference levels transferred via the mains cable, and voltage drops caused by the switching of large loads are less noticeable. 6. If inductive loads such as contactors and solenoid valves are switched, induction voltages caused by switching should be reduced by suitable protection measures. These measures are dependent on whether DC or AC voltages are involved:

In the simplest cases in DC networks, a recovery diode with a high resistance to surge currents can limit the induction voltage (see fig. 1).

Fig. 1

For alternating voltage operation, an RC



filter is often used. It must be placed to suite inductivity. The filter values can either be calculated, provided that the inductivity of the coil is known, or they can be found by experiment. Only capacitors approved to VDE 0565 are to be used (see fig. 2).

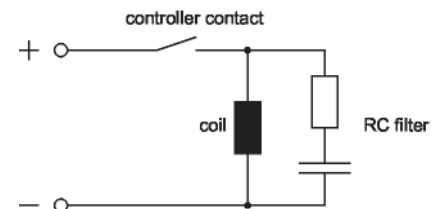


Fig. 2

The installation of a RC filter at the switching contact of the controller is very prob-

lematic, as even at an open switching position idle current passes the filter. The latter can exceed the holding current of the relay, whereas a closed contact does not open any more (see fig. 3).

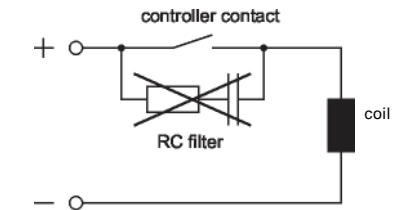


Fig. 3

7. Semiconductor switches (thyristors, triacs SSRs) generate interference voltages due to their non-linear characteristic curve and their finite gate-trigger voltage. Because of their limited blocking voltage, however, they themselves have to be protected against over voltage. Here, varistors, RC combinations or chokes are often used. Where semiconductor switching is employed, zero-voltage switches should be used whenever possible. 8. A mains filter should be used to protect the controller against severe mains power supply interference. The filter should be fitted as close to the controller as possible and be connected by short safe-to-touch leads. It is of paramount importance that the mains filter is earthed. Please note that a small current will flow through the filter circuit at all times. The mains power to consumers switched by the controller must never be supplied from the controller side of the mains filter.

All measures taken to suppress interference will also prolong the life of the components and consequently that of the plant. RC filters reduce contact erosion and increase contactor life. These instructions are only suggestions and they are not complete. If you want further information please contact the manufacturers of switching elements. Usually, these manufacturers also sell units for interference suppression.

Order No. RC filter

The filter should always be adapted to the inductivity. The following typical component is available and recommended: RC filter, 470 R + 0,47 µF, 230 V~ 200279

Order No. Mains filter

Mains filter with slip-on terminal, 230 V~ 205153

Measuring ranges

Resistance thermometer Pt100:
-200...850 °C
-99...600 °C (controllers with software .10 and .03)

PTC sensors KTY81-121 (990 Ohm at 25 °C): -
50...150 °C

Thermocouples type J (Fe-CuNi): -
200...1000 °C
-99...700 °C (controllers with software .10 und .03) -
99...600 °C (Euroseries)

Thermocouples type K (NiCr-Ni): -
200...1300 °C
-99...999 °C (controllers with software .10 und .03) -
99...600 °C (Euroseries)

Thermocouples type S (PtRh-Pt):
-50...1750 °C
(not for controllers with software .10 und .03 and Euroseries)

Measuring accuracy

Resistance thermometer:
0,5 K or 1 K, due to the resolution of the display

Thermocouple:
0,5 % +/- 2 K.

These values refer only to the controller.

Power supply

Supply voltage possible:
230 V AC, -15...+10 %
115 V AC, -15...+10 % 24
V AC, -15...+10 % 12-24 V
AC / 16-36V DC 24 V DC -
5...+5 %

Environmental conditions

Storage temperature: -20...70 °C

Operation temperature: 0...55 °C
Relative humidity: max. 75 %, without moistening

Error messages**Standard units**

F1H Sensor open circuit, sensor resistance to high
FIL Sensor short circuit, sensor resistance to low F0-
Actual value incorrectly calculated
F1- Sensor open circuit or short circuit at
sensor 1 F2-Sensor open circuit or short circuit at sensor 2 F3-
Sensor open circuit or short circuit at sensor 3 F4-Sensor open
circuit or short circuit at sensor 4 F5- Wrong setpoint in data storage
EP-EEPROM error in data storage

Defrost controllers

E0 Sensor error at cold room sensor E1
Sensor error at evaporator sensor E2
EEPROM error in data storage E3 Voltage
loss at extern alarm input

Notes and remedy

The errors F0-, EP- und E2 can only be remedied in the factory if
switching on and off does not reactivate the function.

The errors F2-, F3- und F4- may appear as "setpoint errors" in case
of units with external or analogue setpoint. Check the terminal.

If adjustable values appear with „L--“ or „H--“, the value range that
can be displayed may have been exceeded or not reached. You may
try to retrieve the desired value by pressing the SET + UP or SET +
DOWN key for a very long time.

Error messages not mentioned above are usually EEPROM errors.
The error messages of the TRK, TRL, TRM, TRS and TRW series
are different.

Safety regulations

The valid regulations for electric installations must be followed
during installation and connection of the controllers. If contactors
and other inductive loads are switched non-permissible functional
faults may occur and the controller may even be damaged. We
recommend that you connect contactor coils with spark traps (see
"Notes on installation").

The controller and some of the parts connected to it are electrically
charged. The customer must not open the controller. Only
authorized and expert personnel may access the connected parts.

A field bus concept for data exchange of small to medium-sized data packages in industrial plants (typical < 20 bytes)

Introduction

Advances in technology have resulted in rapid and continuous changes in the design and operation of all kinds of industrial plant and machinery. When viewed from the outside the equipment appears to be easy to understand and operate. Internally, the equipment has become more and more complex as designers strive to achieve the increasing demands of control engineering. Higher standards of precision, reliability and versatility of tasks and plant design are the norm and it is for this reason that the use of a field bus is becoming more and more common even in the most simple control systems.

In comparison with isolated controllers they clearly offer many advantages:

1. Data exchange, with external and overriding systems such as supervisory consoles, enables new functions to be undertaken including teleservice, data recording, alarm relaying or remote control. These functions are achieved without the need for additional modules or hardware.
2. Although certain functions within a plant are only available once, various units can participate. For instance a radio clock can provide all participants with precise time information, eliminating the need for additional timers for other network modules.
3. When individual components are capable of data exchange, complex tasks can be divided into segments, each with clear individual tasks. As a general rule, several small entities can respond more rapidly to changing circumstances and are less prone to faults and failure than a larger central intelligent I/O module. There is, however, an optimal segmenting value, and the quantity of exchanged data should be kept as small as possible to achieve good segmenting results and optimal self-regulating modules.
4. When the control is local to the actuator, installation is simplified. However, in many cases, the actuator is difficult to access and the controllers are installed some distance away. This results in the need for larger cable fit

tings to be installed and the connection of mains supply cables to the actuators. When systems with bus capability are used, only few low voltage cables need to be connected to intelligent actuators. As field bus systems become more common, an increasing number of controllers are available with field bus options. One may even say that the time for isolated control systems is over. Typical industrial applications no longer demand large amounts of data to be transferred at high transfer speeds. What is needed is a widely used field bus system, easy to install and available at a reasonable price.

LON system and LONTALK protocol

The LON system steps into this breach. It is designed to cover the enormous demand for intelligent control units; a field where mainly 8-bit-microprocessors have been used so far. The company ECHELON, manufacturer of LON, have created a multi-master-capable system, using a modified CSMA process (Carrier Sense Multiple Access) which can handle the complete data exchange for all seven layers of the model OSI. The LONTALK protocol is used.

The use of the LONTALK protocol is restricted by ECHELON to ensure the interchangeability and operability of the LON bus for various users. It ensures that different providers can connect their products with minimum effort. With a LON system you can be sure not to have bought a unique exotic system. There are numerous providers of similar and complementary equipment at very competitive prices. No one need be tied to one supplier for items within any given product range.

The LON system and the transfer by the LONTALK protocol have the following features:

The LON chip is a symmetric multi-processor with three functional units. One part serves the application, i.e. for the control tasks as such. The two remaining parts serve for network access and for the preparation of transferred data without interfering with or interrupting the process of the application part.

The application part is decoupled from the network installation.

LON is a multi-master system and can thus be used as a master-slave system

too.

All information necessary for network configuration, e.g. the node address, is stored in an EEPROM memory of the LON chip and can be changed. The network can be extended or restructured at any time.

Users can be selected by means of their address (explicit message). Point-to-point connections are possible. Furthermore, messages can be sent to groups or there are global messages to all users (broadcast).

Only single bits, integer variables or short telegrams can be transferred.

Some variables, the so-called SNVT (Standard Network Variable) are treated separately, their form and contents are standardised. They can be clearly interpreted by each receiver.

Acknowledge or request-response, with automatic repetition in case of transfer errors, is used to achieve reliable data transfer.

Safe data transfer is achieved by authentication.

The maximum number of users in one LON net is 32385 nodes. Thus, the address range is large. It is hierarchical in structure and subdivided into domains and subnets.

Short response times are ensured by collision detect or by establishing priority for data transfer. In real-time mode it is essential that response times are predictable.

The data packets are checked for validity or loss of data by 2 bytes CRC.

The manufacturer has allocated a 48-bit identification number for each of the worldwide nodes.

Transmission media available

Infrared, radar, radio, through the 230 V AC supply (Power Line), through a 48 V direct voltage supply (Link Power). Twisted-Pair (twisted two-wire connection, either isolated or not), telephone via modem. Currently the most widely used system is networking by twisted-pair lines using ECHELON standardised drivers FTT10.

Features of data transfer by twisted-pair lines

Transfer rates are 1.25 MBaud or 78 kBaud. The line load is non-polar due to usage of Manchester codes (the two lines may be interchanged). The transceivers FTT10 allow for any type of wiring. This results in data of approx. 1.4 V, with a maximum line length of 2000 metres.

Network information

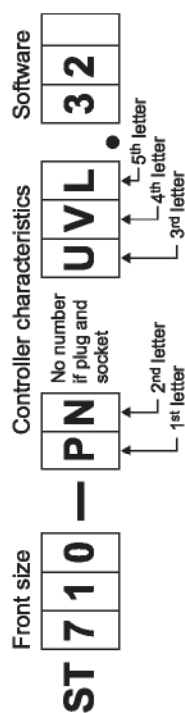
The LON chip firmware provides many functions and diagnostic messages for network management. For example an external request can make a node send its identification number or address to the net. The net can also request the nodes to provide their transmit and receive variables. By means of suitable linkage tools these variables can be selectively linked to other nodes having similar variables.

A network may be installed in various ways. In the simplest case the configuration for linkage information is factory-set, resulting in a plug-and-play system. In the case of more complex networks such as building management systems, installation is usually made on site, using linkage tools.

Line lengths can be extended by the use of repeaters, the transmission medium can be exchanged by means of routers, and the channel for data traffic may be selected. Gateways for communication with other field bus systems are available. Ultimately, access to the Internet is possible by PC boards with LON capability or by modem connection.

In conclusion:

The functionality of LON is almost without limitation and the system is ideally suited for use by industry as it enables innovative state of the art products to be employed. STÖRK-TRONIC is member of the LNO user organisation and participates in the relevant work groups in order to make use of the combined effect achieved by co-operation of partners working in different fields.



1st letter	2nd letter	Number	3rd letter	4th letter	5th letter
Displays / keys	Switching outputs	Connection	Inputs	Power supply	COM
A One 2-digit display	1 normally open contact	No number:	1 x Pt100 2L	230V AC	A
B One 3-digit display	1 changeover contact	plug and socket	1 x Pt100 3L	115V AC	B
C One 4-digit display	2 normally open contacts	1:	2 x Pt100 2L	24V AC	C
D	2 normally open contacts with common root	Screw terminal	2 x Pt100 3L	24V DC	D
E One 3-digit display, 2 keys	2 changeover contacts	2:	3 x Pt100 2L	24V DC/DC	E
F One 3-digit display, 3 keys	1 normally open contact, 1 changeover contact	Flat plug	5 x Pt100 2L		F
G One 3-digit display, 3 keys, 1 LED	1 hybrid contact				G
H	3 contacts		1 x Pt100 3L, 4...20mA		H
I One 3-digit display, 3 keys, 3 LED	3 normally open contacts with common root	3:			I
J One 3-digit display, 4 keys, 3 LED	2 contacts + AC ventilator	Cage Clamp	1 x PTC		J
K One 3-digit display, 5 keys, 3 LED	3 contacts + AC ventilator		2 x PTC		K
L One 3-digit display, 6 keys	3 contacts + DC ventilator		3 x PTC	LON/FTT	L
M One 4-digit display, 3 keys, 1 LED	2 contacts + DC ventilator	4:	4 x PTC	LON/485	M
N One 4-digit display, 3 keys, 3 LED	3 normally open contacts, 1 changeover contact	Wieland terminal, plug and socket	5 x PTC	LON+485	N
O	3 normally open contacts with common root, 1 normally open contact		2 x PTC + 4-20mA		O
P One 4-digit display, 5 keys, 3 LED	4 Kontakte		1 x thermocouple J/K	Profibus	P
Q One 4-digit display, 6 keys	5 Kontakte		1 x thermocouple S		Q
R Two 3-digit display, 3 keys	6 Kontakte		2 x thermocouple J/K	RS485	R
S Two 3-digit display, 5 keys	2 normally open contacts with common root L, 3xN, 3xPE			RS232	S
T Two 4-digit display, 3 keys	3 normally open contacts with common root L, 3xN		Multi sensor input		T
U Two 4-digit display, 4 keys			Universal sensor input	90...250 V AC	U
Y Two 4-digit display, 5 keys					Y
W Two 3-digit display, 4 keys	6 normally open contacts with common root, 1 normally open contact		1 x 0...10V		W
V One 4-digit display, 7 keys	1 normally open contact, 1 SSR		1 x 4...20mA	12-24V AC 16-36V DC	V
Z					Z
X Special execution	Special execution	Special execution	Special execution	Special execution	X

ST
TRTFront
sizeFront
design type ControllerDesignation system for
front panel elements

ST

Front size Type of
installation

Type of controller

Code no.	Front size (width x height)
46	Rail mounted controller
48	48 x 48 m m
50	48 x 96 mm
58	62 x 28 mm
64	64 mm round
70	72 x 36 mm
71	72 x 36 mm
72	72 x 72 m m
73	72 x 72 mm, housing 60mm round
710	84 x 42 m m
715	42 x 84 mm
90	96 x 48 m m
96	96 x 96 mm
142	144 x 96 mm
174	174 x 72 mm
175	72 x 174 mm
252	252 x 72 mm

Front size	Type of installation
18	0 Desk casing (only ST180)
50	1 Front side mounting horizontal
60	2 Back side mounting horizontal
65	3 Wall mounting horizontal
70	4 Back side mounting horizontal without foil
80	5 Front side mounting vertical
	6 Back side mounting vertical
	7 Wall mounting vertical
	8 Back side mounting vertical without foil
	9 Customised design

Example: ST605 = Front side mounting 106 x 166mm,
vertical execution

Front design indicator units

Code no.	Displays
01	One 3-digit display
02	One 4-digit display
03	One 2-digit display with minus sign
09	Selector switch

Front design controller with setting knob

Code No.	Displays
27	One 3-digit display
44	One 3-digit display

Front design controller with keypad

Code no.	Displays, no. of keys
30	Two 3-digit displays, 3 keys
31	One 3-digit display, 3 keys
32	One 3(4)-digit display, 5 keys
33	Two 4-digit displays, 5 keys
34	One 4-digit display, 3 keys
35	Two 4-digit displays, 3 keys
36	Two 4-digit displays, 4 keys
37	Two 3-digit displays 3-stellig, 5 keys
38	One 3(4)-digit display, 4 keys
51	One 3-digit display, 2 keys

Exceptions: ST70-36..., TRT...

Controller type

Code no.	Controller type, outputs (max.)
01	Thermostat, 2+1 outputs
02	PID-Regler, 3+1 outputs
03	Thermostat, 3 outputs
04	Differential controller, 3+1 outputs
05	Two-channel controller, 2+1+1 outputs
06	Four-stage controller, 4+1 outputs
07	Timer switch, 2 outputs
08	Controller with ramp profile, 3+1 outputs
09	Deep-frying controller, 1 output
10	Thermostat, 1 output
11	Refrigerating controller, 1 output
12	Refrigerating controller, 2-4 outputs
13	Refrigerating controller, 3 outputs
14	Refrigerating controller, 4 outputs
15	Refrigerating controller, 4 outputs
16	Multi-stage controller
20	Thermostat, 2 outputs
25	Two-channel controller
26	Six-stage controller
3...	Controller with communication interface
100	Thermostat new generation
102	PID-Controller new generation

Exceptions: ST142-..., TRT...

The designation code does not apply to units of the series TRK,
TRL, TRM, TRS und TRW.

