JUMO DICON 400/500

Universal Process Controller

Type 703575/2...

Type 703575/1...

Type 703570/0...

B 70.3570

Operating Manual

JUMO

2008-12-09/00370043

Please read this operating manual before commissioning the instrument. Keep the manual in a place which is accessible to all users at all times.

Your comments are appreciated and may help us in improving this manual.

All necessary settings are described in this operating manual. Manipulations not described in the manual or expressly forbidden will jeopardize your warranty rights. Please contact the nearest subsidiary or the head office, should you encounter problems.

When accessing the inner parts of the unit and returning modules, assemblies or components, please observe the regulations accordings to EN 61340-5-1 and EN 61340-5-2 „Protection of electrostatic sensitive devices“. Only use **ESD** packaging for transport.

Please note that we cannot accept any liability for damage caused by ESD.

ESD=**E**lectro **S**tatic **D**ischarge

Contents

Contents

1.1 Description

This series of universal, freely configurable process controllers is available in the formats 96mm x 96mm and 96mm x 48mm (portrait and landscape).

The instruments feature two 4-digit 7-segment displays, five or eight LEDs for indicating the switching status and operating modes, an 8-digit matrix display, as well as six keys for operation and configuration.

The controller slots can be assigned flexibly by the user, according to the block structure.

Additional functions include self-optimisation, parameter set switching, and up to eight limit comparators.

Linearisations for conventional transducers are held in the memory; a customized linearisation table can be programmed.

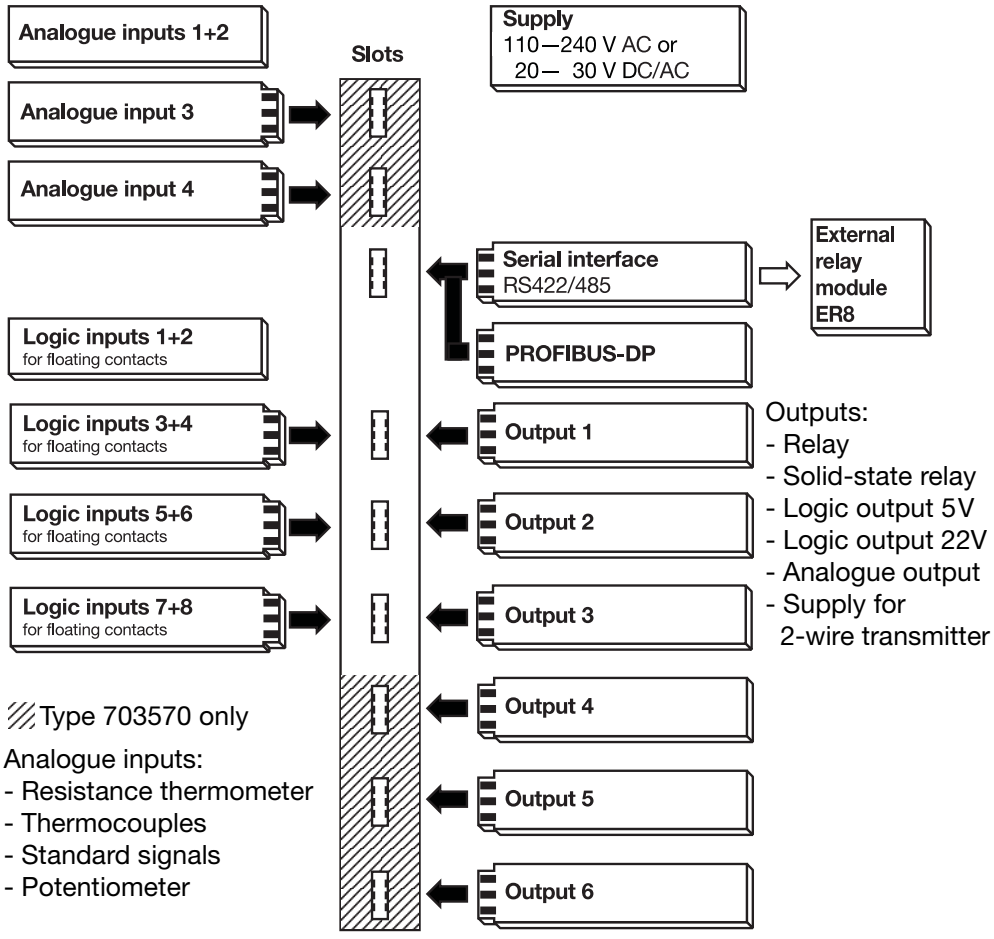
The process controller can be adapted to a variety of tasks with the aid of a maths module.

The instruments can be integrated into a data network via a serial interface, or can be expanded through an external relay module.

A setup program is available for easy configuration from a PC.

The electrical connection is at the rear by screw terminals.

1.2 Block structure



1 Introduction

1.3 Typographical conventions

1.3.1 Warning signs

The signs for **Danger** and **Warning** are used in this manual under the following conditions:

Danger This sign is used when there may be **danger to personnel** if the instructions are disregarded or not followed accurately.

Warning This sign is used when there may be **damage to equipment or data** if the instructions are disregarded or not followed accurately.

Warning This sign is used when special care must be taken when handling components that are sensitive to electrostatic discharges.

1.3.2 Note signs

Note This symbol is used when your attention is drawn to a **specific remark**.

Reference This symbol refers to additional information in other manuals, chapters or sections.

*** Action** This sign refers to an action to be performed.

The individual steps are marked by this asterisk, e. g.

* Press ▲ key

1.3.3 Presentation

ENTER + ▲ **Key combination** The depiction of keys together with a plus sign means that first the ENTER key has to be pressed and held down, and then a further key is pressed.

CONFIG 1 **Dot-matrix display** Texts and messages are visualised on the dot-matrix display.

2.1 Type designation

(1) (2) (3) (4) (5) (6) (7)

703570/ 0 □□ – □□□□ – □□□□□□ – □□ – □□ / □□ , □□□

Format 96mm x 96mm

703575/ □□□ – □□ 0 0 – □□□ 0 0 0 – □□ – □□ / □□ , □□□

Formats 48mm x 96mm and 96mm x 48mm

(1) Basic type extension			
Format:			
96mm x 96mm	0		
48mm x 96mm portrait	1		
96mm x 48mm landscape	2		
Version:			
Standard with factory settings		8	
Customized programming		9	
Language for instrument texts:			
German			1
English			2
French			3

(2) Analogue input	**1**	**2**	**3**	**4**
not assigned	0	0	0	0
Universal input (all transducers except voltage -10/2/0 — 10V)	1	1	1	1
voltage -10/2/0 — 10V	2	2	2	2

(3) Output	**1**	**2**	**3**	**4**	**5**	**6**
not assigned	0	0	0	0	0	0
Relay (changeover contact)	1	1	1	1	1	1
Solid-state relay 230V 1A	2	2	2	2	2	2
Logic 0/5V	3	3	3	3	3	3
Logic 0/22V	4	4	4	4	4	4
Analogue output	5	5	5	5	5	5
Supply for 2-wire transmitter	6	6	6	6	6	6
Two logic inputs	7	7	7	-	-	-

(4) Supply		
110 — 240V AC -15/+10% 48 — 63Hz	2	3
20 — 30V DC/AC 48 — 63Hz	2	5

(5) Interface		
not assigned	0	0
RS422/485	5	4
PROFIBUS-DP (no GL approval)	6	4

(6) Maths and logic module		
not available	0	0
available	0	3

(7) Approvals			
DIN EN 14597*	0	5	6
Germanischer Lloyd (GL)*	0	6	2
DIN EN 14597 and GL*	0	6	3
DIN EN 14597 and UL*	0	6	4
GL and UL*	0	6	5
DIN EN 14597, GL and UL*	0	6	6

* only for Type 703570

Delivery package:

- controller
- 2 fixing brackets
- seal
- Operating Manual B 70.3570

2.2 Accessories

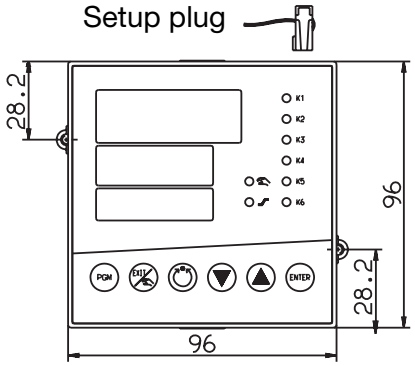
External relay module ER8 Supply 93 — 263V AC Sales No. 70/00325805 (no GL approval)
External relay module ER8 Supply 20 — 53V DC/AC Sales No. 70/00325806 (no GL approval)
PC interface for setup program Sales No. 70/00301315
Setup program for Windows® 95/98 and NT4.0/2000/XP Hardware requirements: - PC-486DX-2-100 - 16 Mbyte RAM - 15 Mbyte available on hard disk - CD-ROM - 1 free serial interface

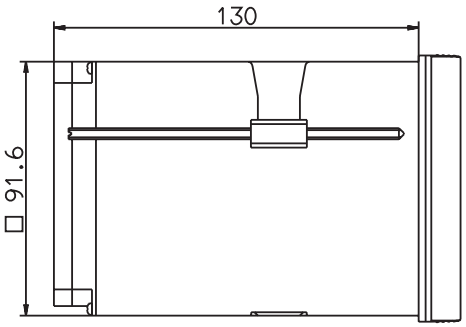
3.1 Location and climatic conditions

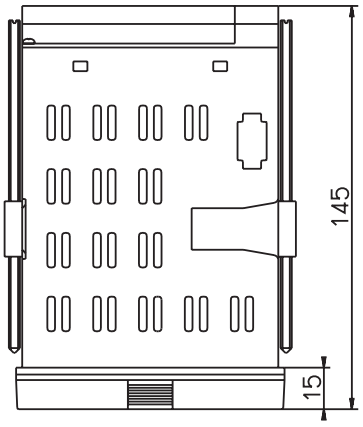
The instrument location must conform to the requirements specified under Technical Data. The ambient temperature at the location can be between -5 and 55 °C, at a relative humidity of not more than 95 %.

3.2 Dimensions

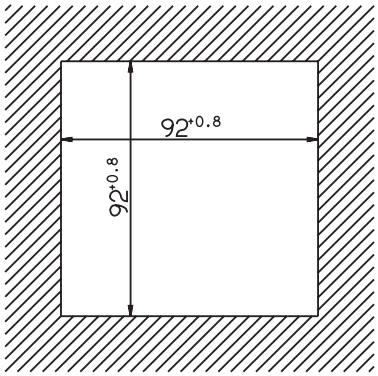
3.2.1 Type 703570/0...



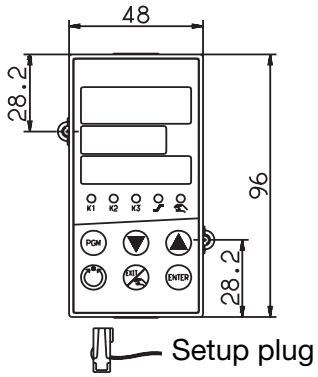


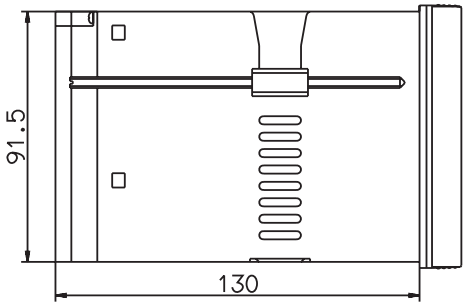


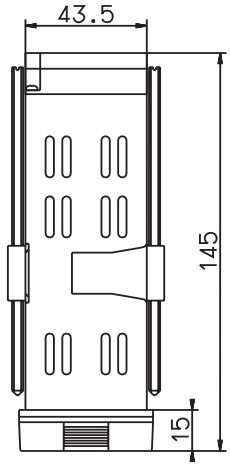
panel cut-out to IEC 61554



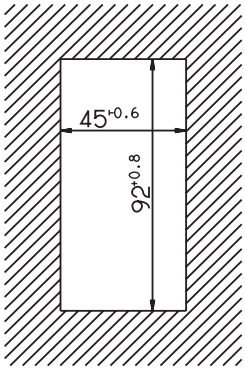
3.2.2 Type 703575/1...



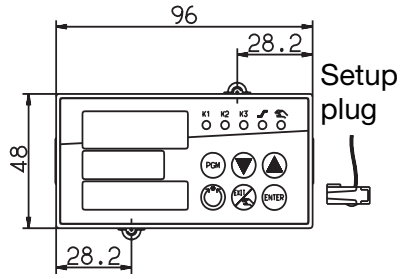


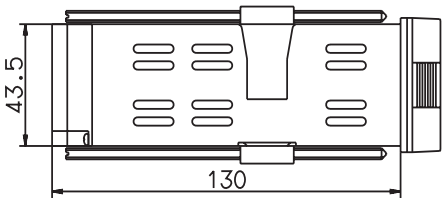


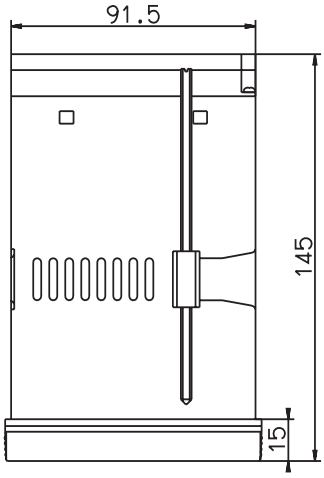
panel cut-out to
IEC 61554



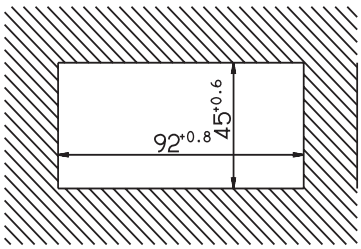
3.2.3 Type 703575/2...







panel cut-out to IEC 61554

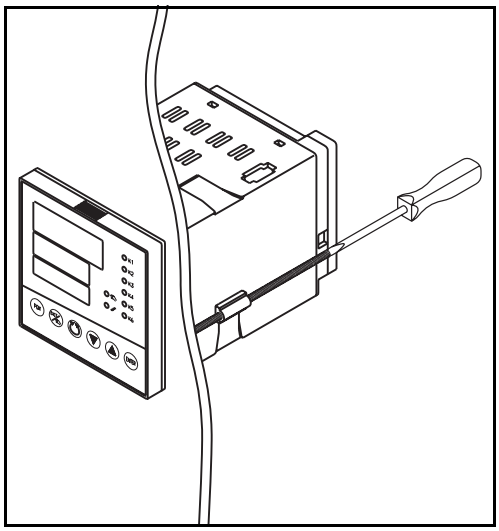


3.3 Edge-to-edge mounting

Minimum spacing of the panel cut-outs		
Type	horizontal	vertical
without setup plug:		
703570/0...	11mm	30mm
703575/1... (portrait format)	11mm	30mm
703575/2... (landscape format)	30mm	11mm
with setup plug:		
703570/0...	11mm	65mm
703575/1... (portrait format)	11mm	65mm
703575/2... (landscape format)	65mm	11mm

3.4 Fitting in position

* Fit the seal provided onto the instrument housing.
* Insert the controller from the front into the panel cutout.
* Insert the mounting brackets from the rear of the panel into the guide slots at the sides of the housing. The flat sides of the brackets must be against the housing.
* Place the brackets against the rear of the panel and tighten them evenly using a screwdriver.



3.5 Cleaning the front panel

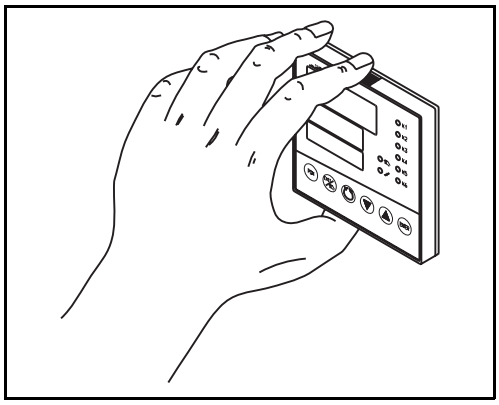
The front panel can be cleaned with the usual rinsing and cleaning agents. It has limited resistance to organic solvents (e. g. methylated spirits, white spirit, P1, xylol and similar.). Do not use high-pressure cleaning equipment.

3 Installation

3.6 Removing the controller chassis

The controller chassis can be removed from the housing for servicing.

* Press the knurled areas together at top and bottom (left and right with landscape format) on the front panel and pull out the controller chassis.



☞ When inserting the controller chassis, care must be taken that the lugs (underneath the knurled areas) snap into position.

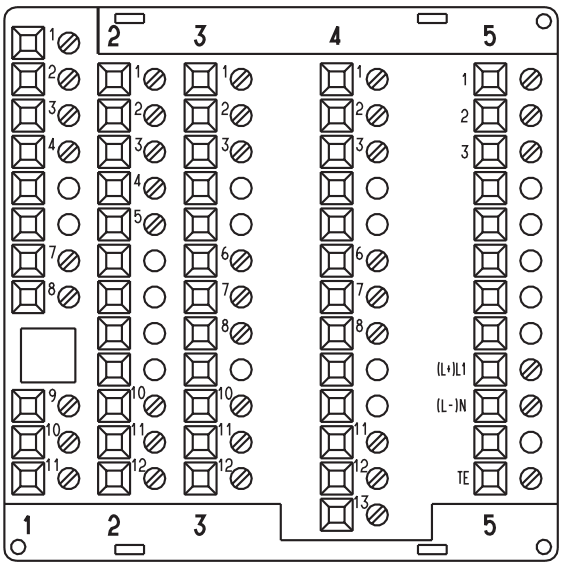
4.1 Installation notes

- ❑ The choice of cable, the installation and the electrical connection of the instrument must meet the requirements of VDE 0100 “Regulations on the installation of power circuits with nominal voltages below 1000 V” or the appropriate local regulations.
- ❑ The electrical connection must only be carried out by qualified personnel.
- ❑ The instrument shall be operated by mains protected with a branch circuitry overcurrent protection device not more than 20 Amps.
  For servicing/repairing a Disconnecting Device shall be provided to disconnect all conductors.
- ❑ A current-limiting resistor interrupts the supply circuit in the event of a short circuit. The load circuit has to be fused for the maximum relay current in order to prevent welding of the output relay contacts in the event of a short-circuit.
- ❑ Electromagnetic compatibility conforms to the standards and regulations specified under Technical data.
- ❑ Input, output and supply lines should be routed separately, not parallel to one another.
- ❑ Arrange sensor and interface cables as twisted and screened cables. Do not run them close to power cables or components. Earth the screen at one end at the instrument, to the TE terminal.
- ❑ Earth the instrument at terminal TE to the earth conductor. This line must have at least the same cross-section as the supply lines. Earth lines should be run in a star layout to a common earth point which is connected to the earth conductor of the supply. Do not loop the earth connections, i. e. do not run them from one instrument to another.
- ❑ Do not connect additional loads to the supply terminals of the instrument.
- ❑ The instrument is not suitable for installation in hazardous areas.
- ❑ Apart from faulty installation, there is a possibility of interference or damage to controlled processes due to incorrect settings on the controller (setpoint, data of parameter and configuration levels, internal adjustments). Safety devices independent of the controller, such as overpressure valves or temperature limiters/monitors, should always be provided and should be capable of adjustment only by specialist personnel. Please refer to the appropriate safety regulations in this connection. Since adaptation (self-optimisation) cannot be expected to handle all possible control loops, there is a theoretical possibility of unstable parameter settings. The resulting process value should therefore be monitored for its stability.
- ❑ The maximum permitted voltage difference between the inputs of the controller and TE is 30 V AC or 50 V DC.

4 Electrical connection

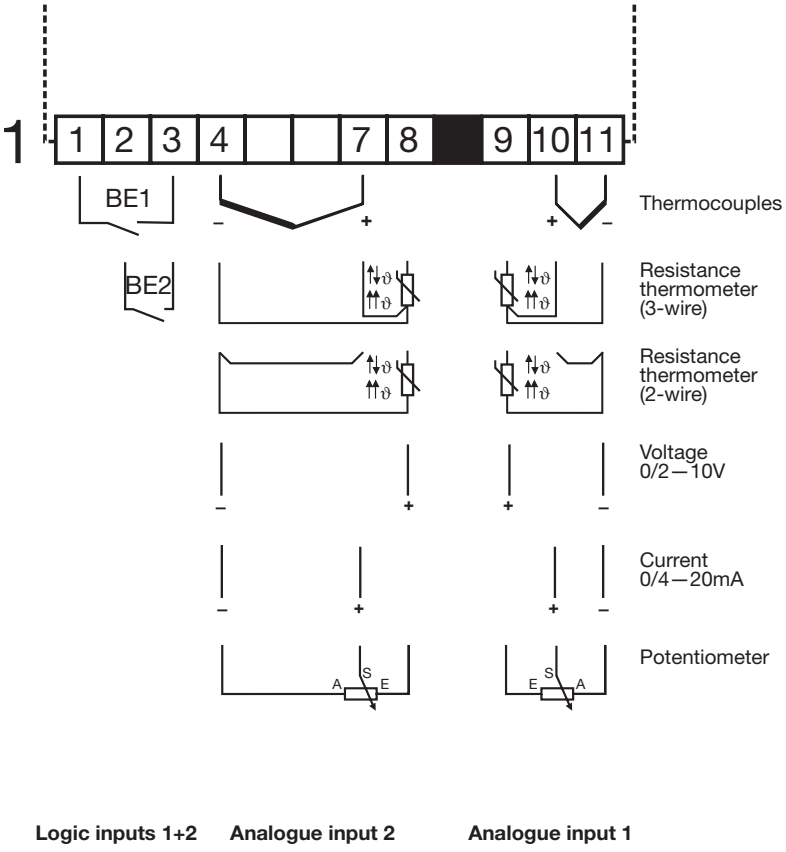
4.2 Connection diagrams

4.2.1 Type 703570



The electrical connection must only be made by suitably qualified personnel.

The instrument version can be identified by the type code.

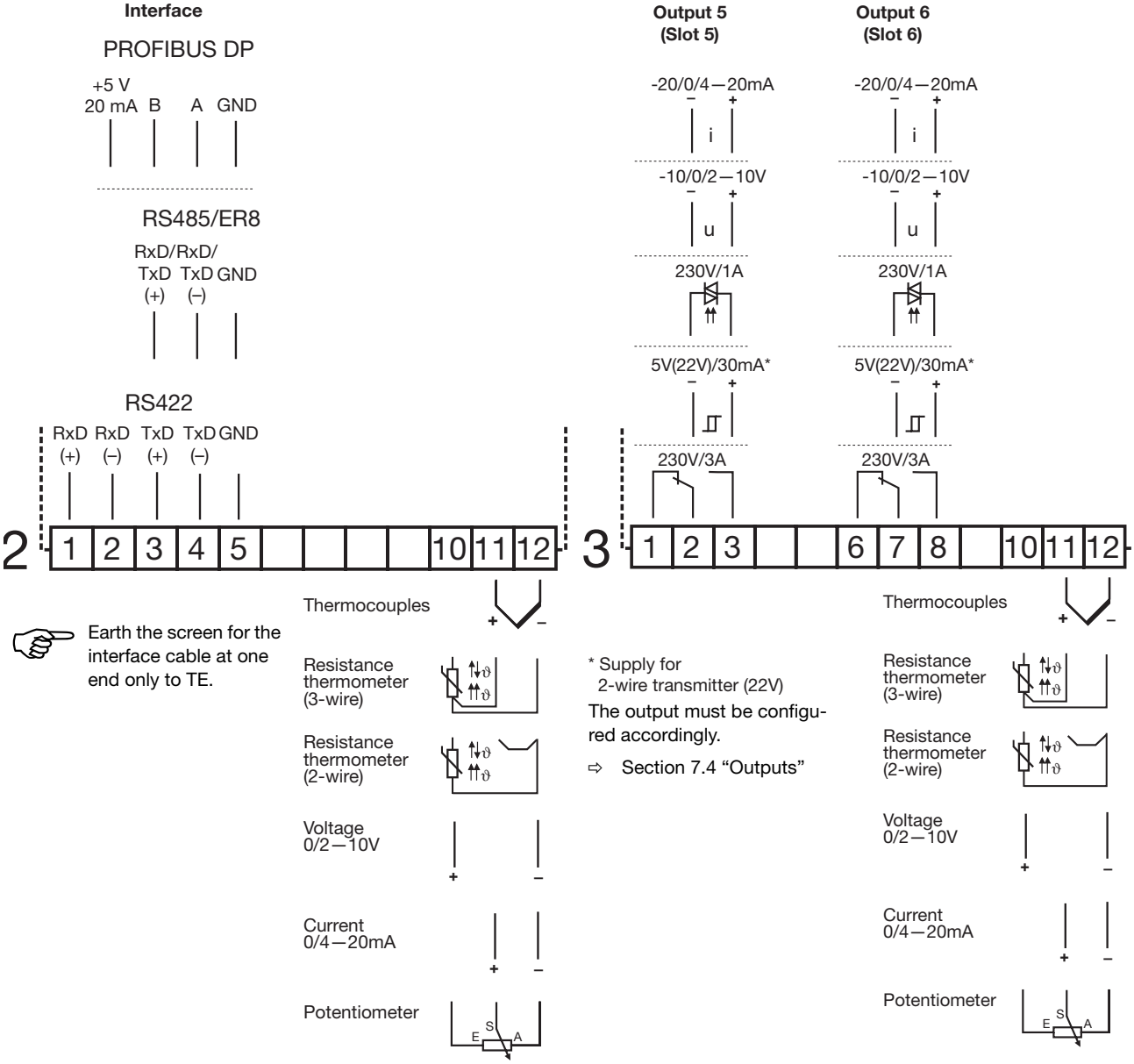


⇨ Section 9 “Retrofitting of cards”

Additional analogue input signals	
Signal	**Connection like**
0—1V	0—10V
-1to +1V	0—10V
-10 to +10V	0—10V
0—100mV	thermocouple
-100 to +100mV	thermocouple

When a thermocouple with internal temperature compensation is wired up to the analogue inputs 1, 3 or 4, Pt500, Pt1000 or KTY must not be connected to analogue input 2.

Type 703570

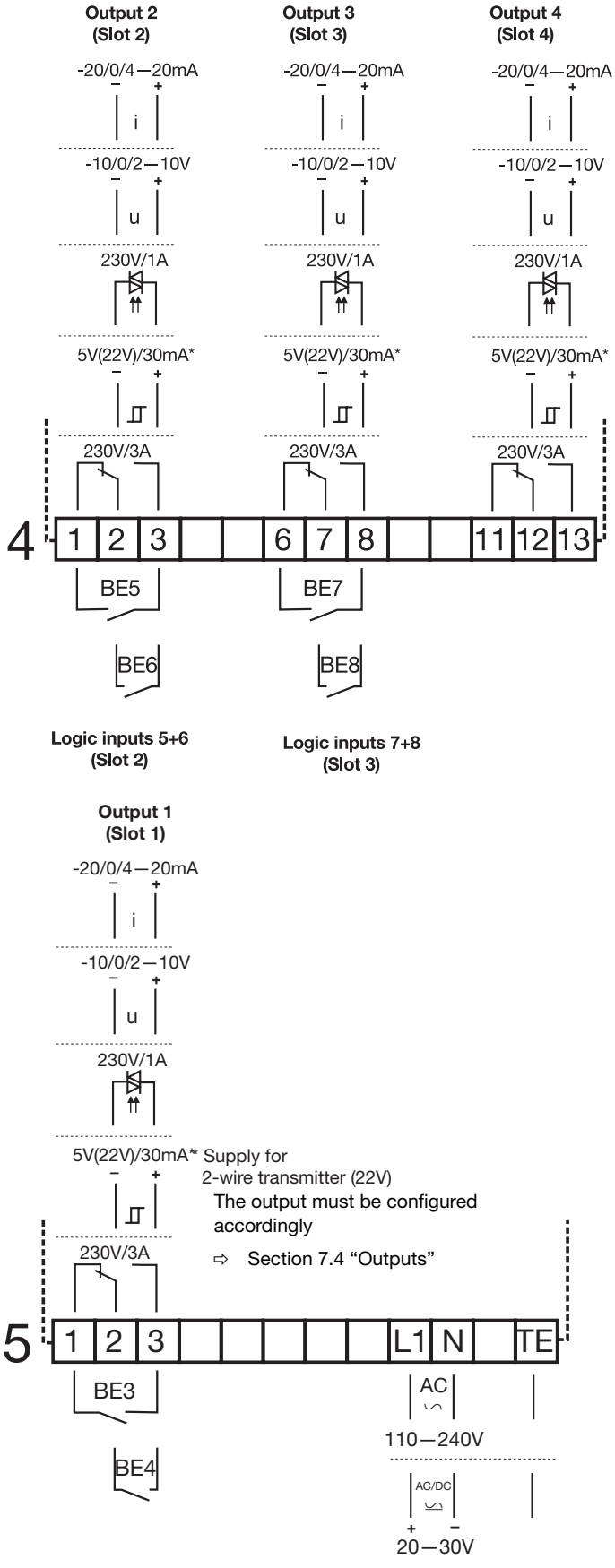


⇨ Section 9 “Retrofitting of cards”

Additional analogue input signals	
Signal	**Connection like**
0—1V	0—10V
-1to +1V	0—10V
-10 to +10V	0—10V
0—100mV	thermocouple
-100 to +100mV	thermocouple

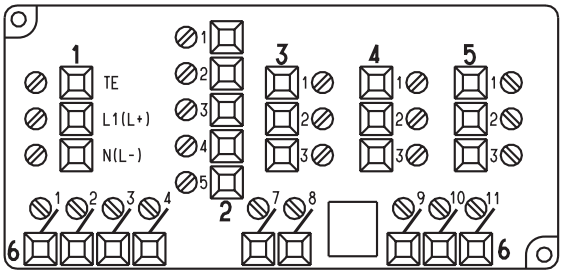
Contact protection circuit (relays):
56Ω/15nF between common-make/common-break

Type 703570



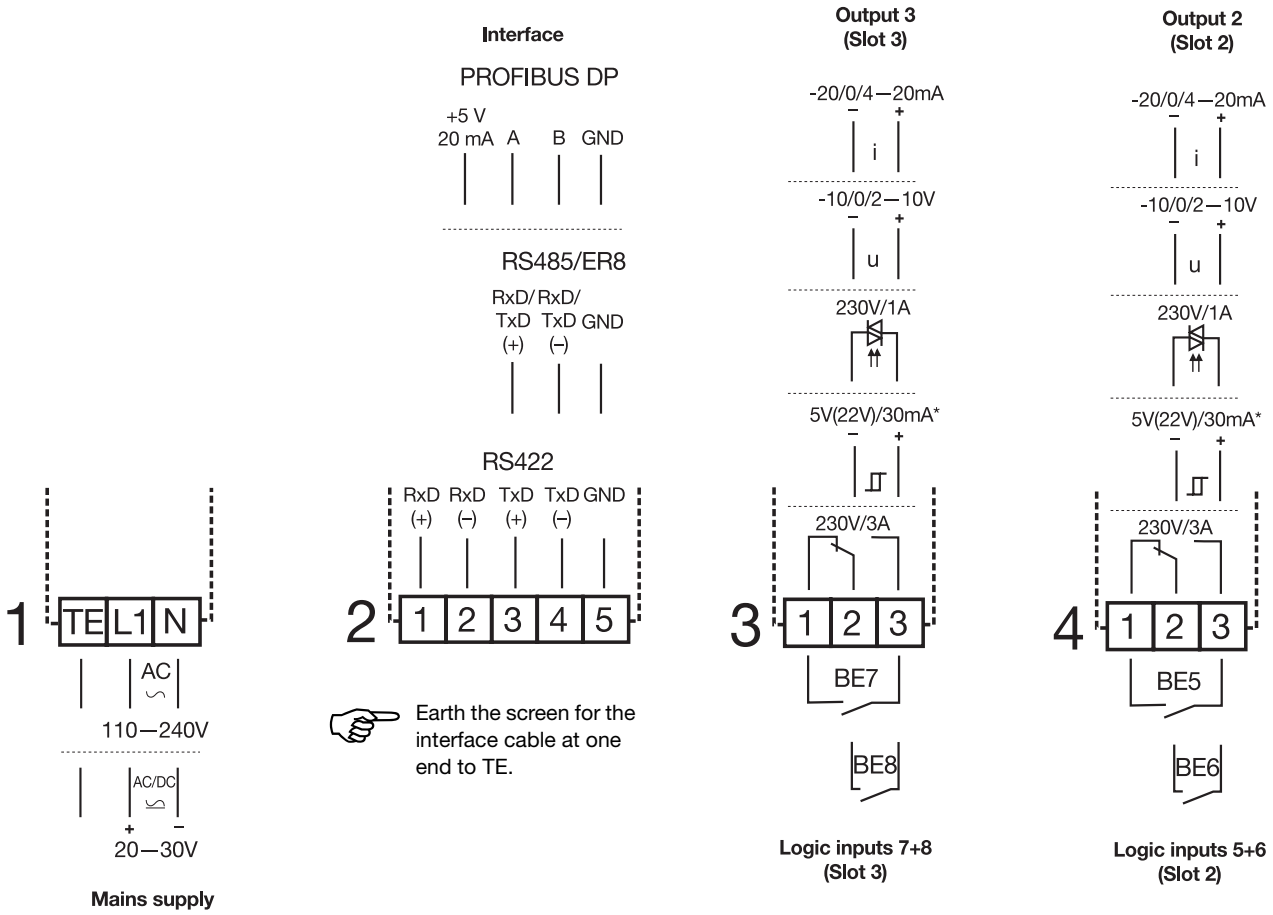
Contact protection circuit (relays):
56Ω/15nF between common-make/common-break

4.2.2 Type 703575 (portrait and landscape format)



The electrical connection must only be carried out by properly qualified personnel

The instrument version can be identified by the type code.



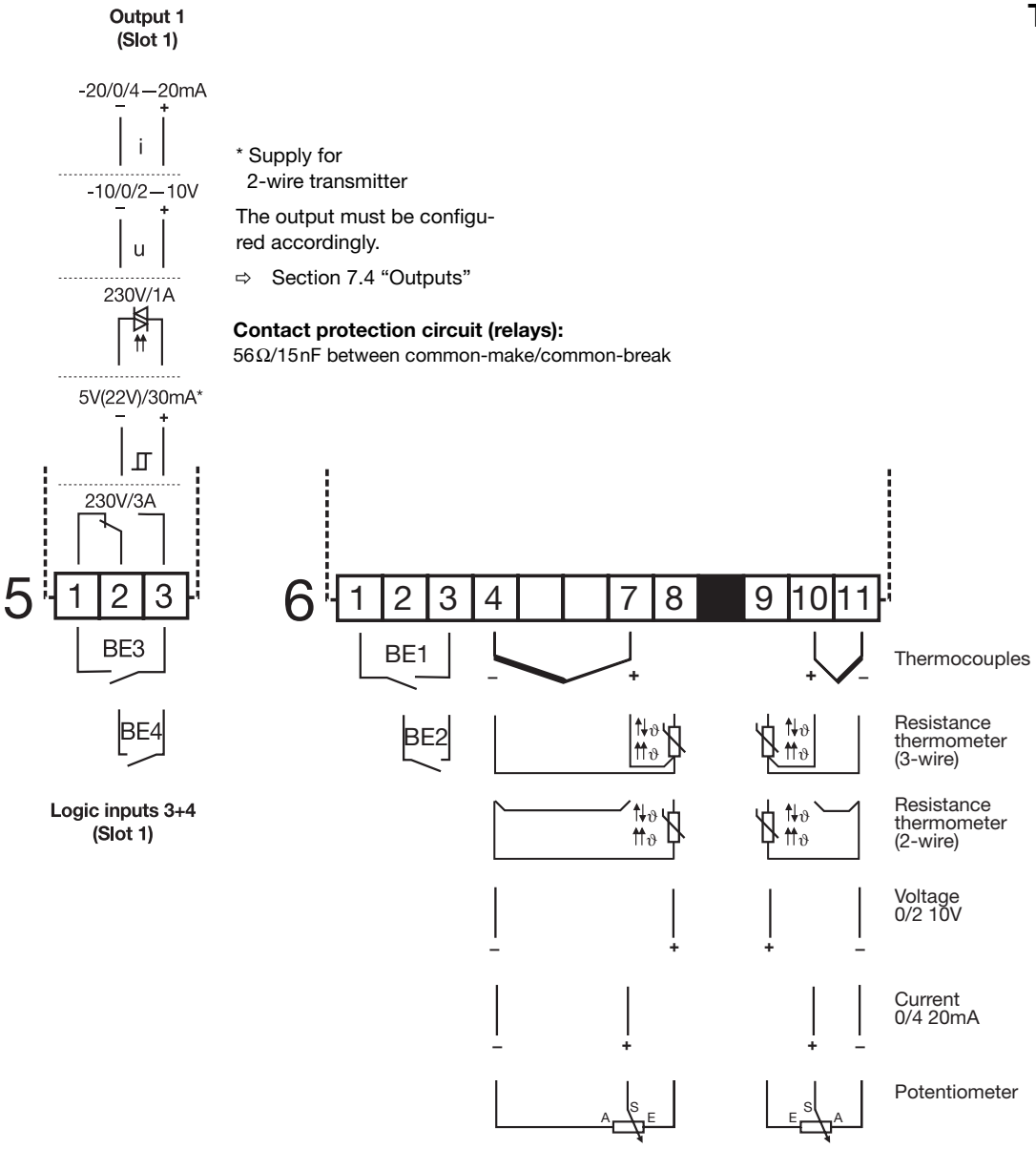
Earth the screen for the interface cable at one end to TE.

* Supply for 2-wire transmitter

The output must be configured accordingly.

⇨ Section 7.4 “Outputs”

Contact protection circuit (relays):
56Ω/15nF between common-make/common-break



* Supply for
2-wire transmitter

The output must be configured accordingly.

⇨ Section 7.4 “Outputs”

Contact protection circuit (relays):
56Ω/15nF between common-make/common-break

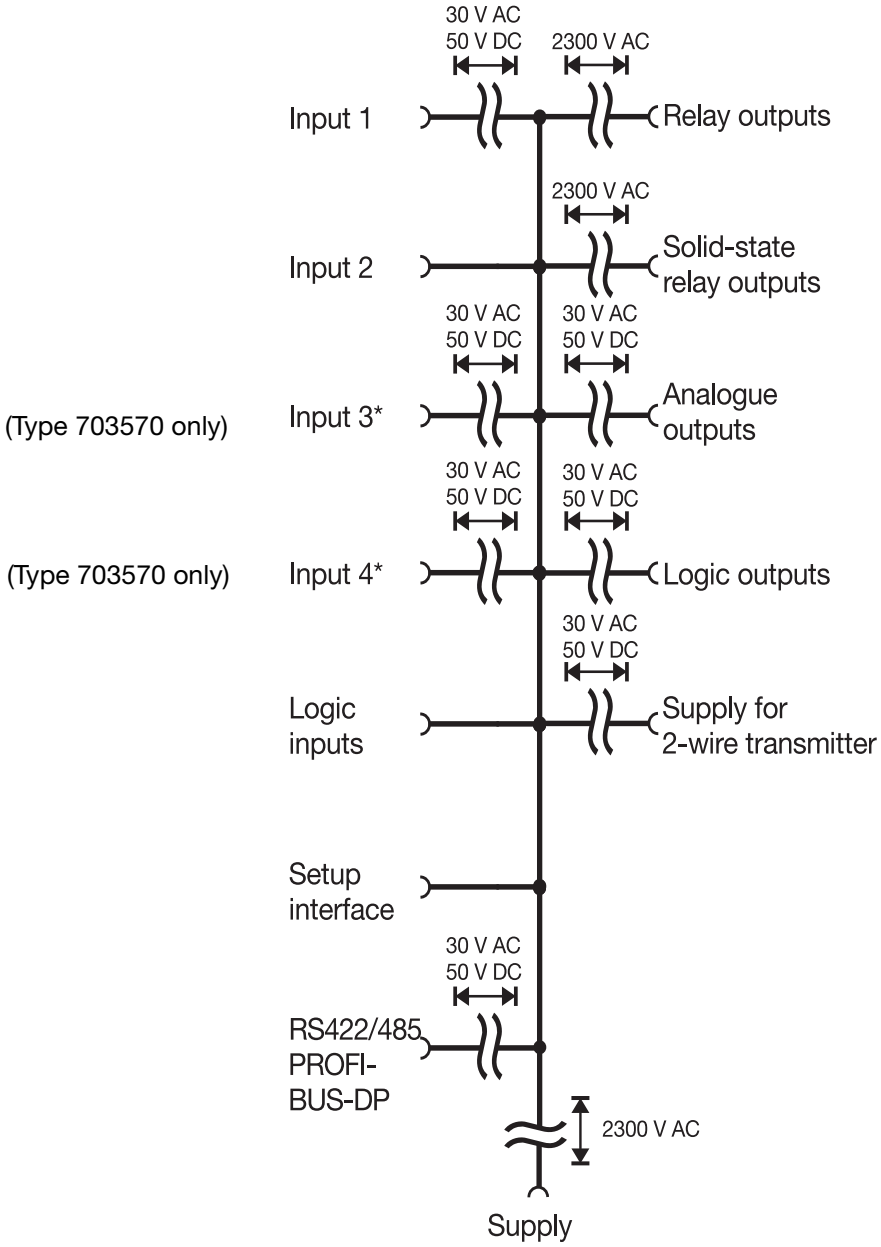
⇨ Section 9 “Retrofitting of cards”

Additional analogue input signals	
Signal	**Connection like**
0—1V	0—10V
-1 to +1V	0—10V
-10 to +10V	0—10V
0—100mV	thermocouple
-100 to +100mV	thermocouple

When a thermocouple with internal temperature compensation is wired up to analogue input 1, a Pt500, Pt1000 or KTY must not be connected to analogue input 2.

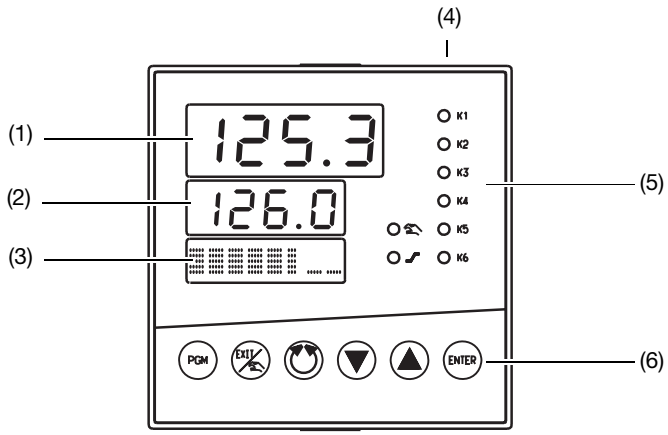
4.3 Isolation

For Type 703570 and Type 703575



4 Electrical connection

5.1 Displays and controls



(1)	**configurable** **7-segment display (display 1)** 4 digits, red Type / Height: 703570 / 13mm; 703575 / 10mm factory setting: process value	**(4)**	**Setup interface** Position depends on Style; see dimensional drawings ⇨ Section 3.2 “Dimensions”
(2)	**configurable** **7-segment display (display 2)** 4 digits, green Type / Height: 703570 / 10mm; 703575 / 7mm factory setting: setpoint	**(5)**	**Status indication** 6 (3) yellow LEDs for status indication of the outputs[1] 2 green LEDs to display “manual mode” and “ramp/profile program function”
(3)	**configurable dot-matrix display (display 3)** 8 digits, green factory setting: output (bar graph)	**(6)**	**Keys** see below

1. no display with analogue inputs

⇨ Section 7.7 “Display”

Key designation

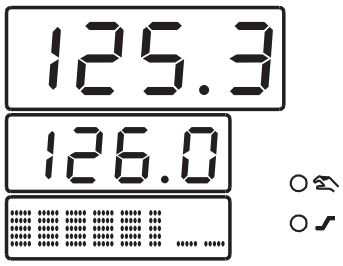
Keys from left to right:

PGM	for programming
Exit/Hand	for programming and for manual mode[1]
Automatic	to start programs
Increment	to increase parameter values
Decrement	to decrease parameter values
Enter	for programming and display switching

1. In the description below the key is shown according to its function (EXIT or ✋).

5 Operation

5.2 Operating modes and states

Operating mode/ state	Display	Notes
Normal display		The displays present the values according to the display configuration. ⇨ Section 5.7 “Display switching” factory setting: - process value - setpoint - output (bar graph)
Ramp and profile program function	○ ●	A ramp or a profile is run. ⇨ Section 7.5 “Ramp and profile program function”
Manual mode	● ○	The output is modified by hand. ⇨ Section 5.6 “Manual mode”
Self-optimisation		Self-optimisation is running. ⇨ Section 8.1 “Self-optimisation”
Alarm messages	-	⇨ Section 12.2 “Alarm messages and display priorities in the normal display”
○ - LED is off; ● - LED is on		

5.3 Principle of operation

Normal display Initial status

Profile program function Eight segments of the program function are programmed here.

This level only appears when the profile program function has been activated.

Operating level This level can be used to program setpoints and indicate process variables.

Parameter level The parameters at this level are used to adapt the controller to the control loop.

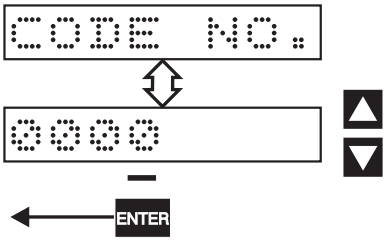
Configuration level 1 This level serves to adapt the controller to the control task.

Configuration level 2 The software version and the hardware specifications of the controller are indicated here.

Service Only accessible to service personnel.

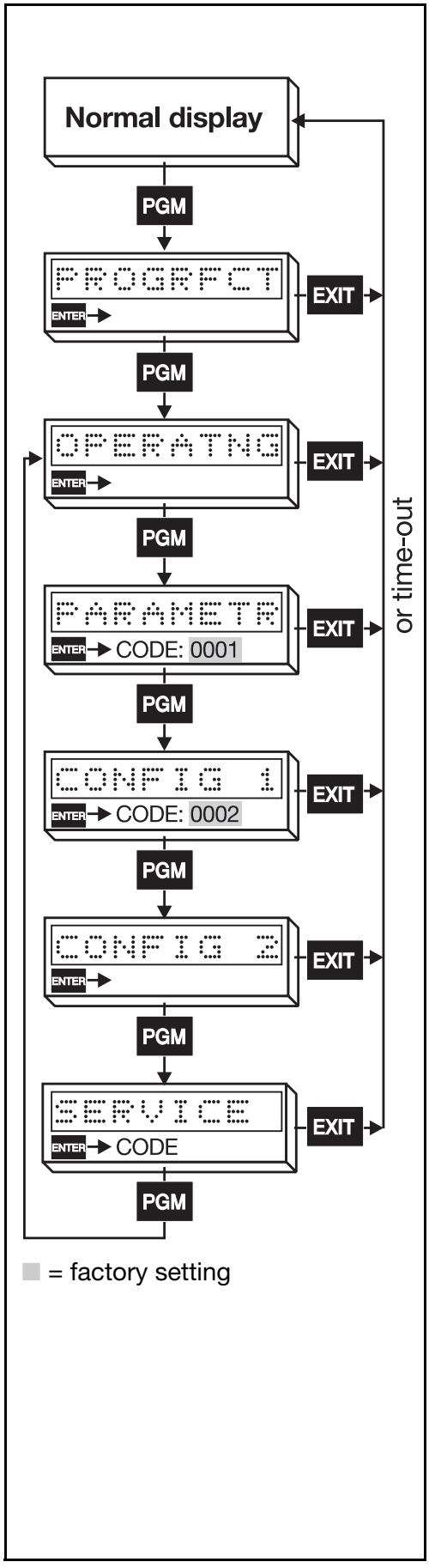
Time-out If no key has been pressed during a configurable period of time (factory setting: 30sec), the controller automatically returns to normal display.

Code request In order to access some levels, a code has to be entered first. The codes can be changed via the setup program.



Codes are entered digit by digit.

* Enter the digit with ▲ and ▼
* Step on to the next digit with ENTER

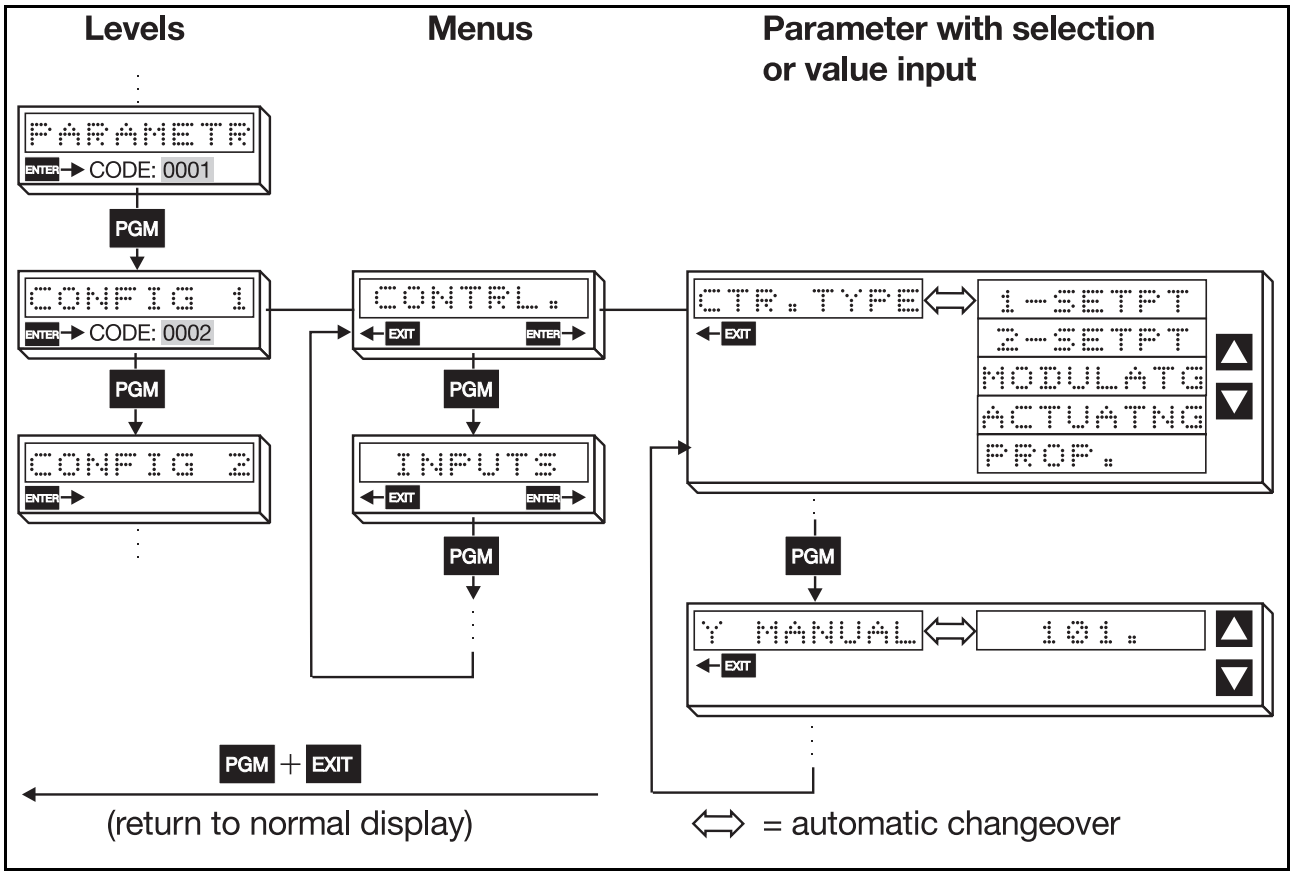


■ = factory setting

5 Operation

Levels and menus

Each level is divided into menus, thus creating a tree structure which has a selection or a value input at the end of each branch.



5.4 Entering values and selecting settings

Value input

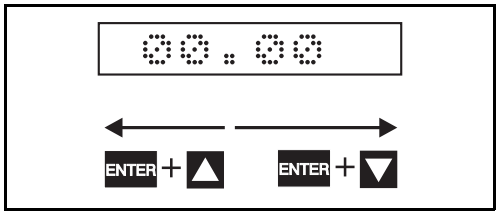
* Increase the parameter value with ▲
* Decrease the parameter value with ▼

The longer the key is pressed, the more quickly the value changes. Approx. 1 sec after releasing the key, the entry is accepted automatically (display flashes briefly).

Parameters can be altered within their value range, or within the maximum values that can be displayed (e. g. 2 decimal places: -99.99 to +99.99).

Shift decimal point

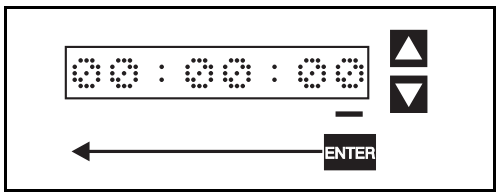
* Increase the decimal places with ENTER + ▲
* Decrease the decimal places with ENTER + ▼ (the last digit must be 0)



Code and time input

Time inputs and codes are entered digit by digit.

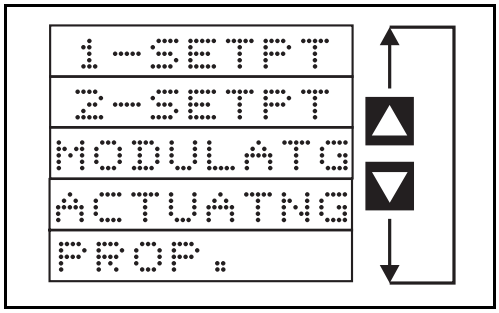
* Increase or decrease the value (digit) with ▲ and ▼
* Confirm the entry and select the next digit with ENTER



Selection

* Step upwards in the selection list with ▲
* Step downwards in the selection list with ▼

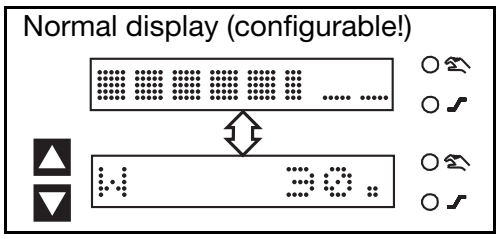
The selection will be automatically accepted after approx. 1 sec.



5.5 Altering setpoints

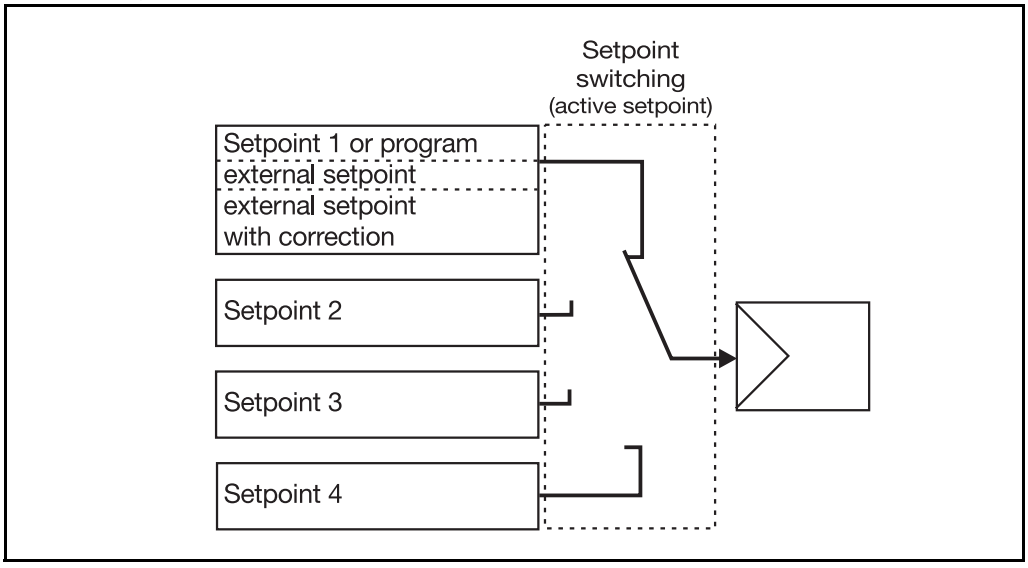
The active setpoint (see setpoint switching) is altered in normal display.

* Alter the setpoint with ▲ and ▼
  shift decimal point with ENTER + ▲ and ENTER + ▼
  (The entry is documented in the matrix display)



Setpoint switching

If setpoint switching is programmed, the active setpoint is altered in the normal display.



Setpoint inputs via the interface have priority.

Relevant settings

Operating level ➔ *Setpoints*

Configuration level 1 ➔ *Controller* ➔ *Controller inputs*

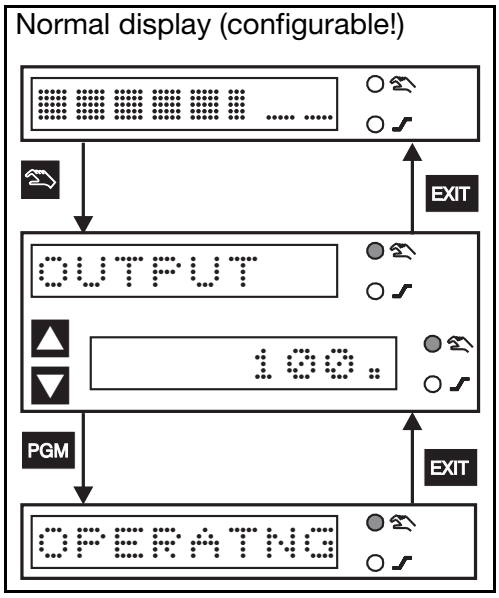
Configuration level 1 ➔ *Controller* ➔ *Setpoint limits*

Configuration level 1 ➔ *Logic functions*

5.6 Manual mode

The control loop can be opened by changing over to manual mode, and the output is then adjusted manually.

* Change to manual mode with
* Alter the controller output with ▲ and ▼ (The output is accepted automatically after approx. 2 sec)
* Terminate manual mode with EXIT



With modulating controllers, the ▲ and ▼ keys are used to adjust the clockwise/anticlockwise rotation of a motorised actuator. The output is only indicated with the stroke retransmission connected.

▲ - open actuator

▼ - close actuator

The levels can also be accessed from the manual mode. The manual mode can be inhibited.

⇨ Section 7.1 “Controller”

Relevant settings

Configuration level 1 ➔ *Controller* ➔ *Controller inputs*

Configuration level 1 ➔ *Controller* ➔ *Manual output*

Configuration level 1 ➔ *Controller* ➔ *Manual mode*

Configuration level 1 ➔ *Logic functions*

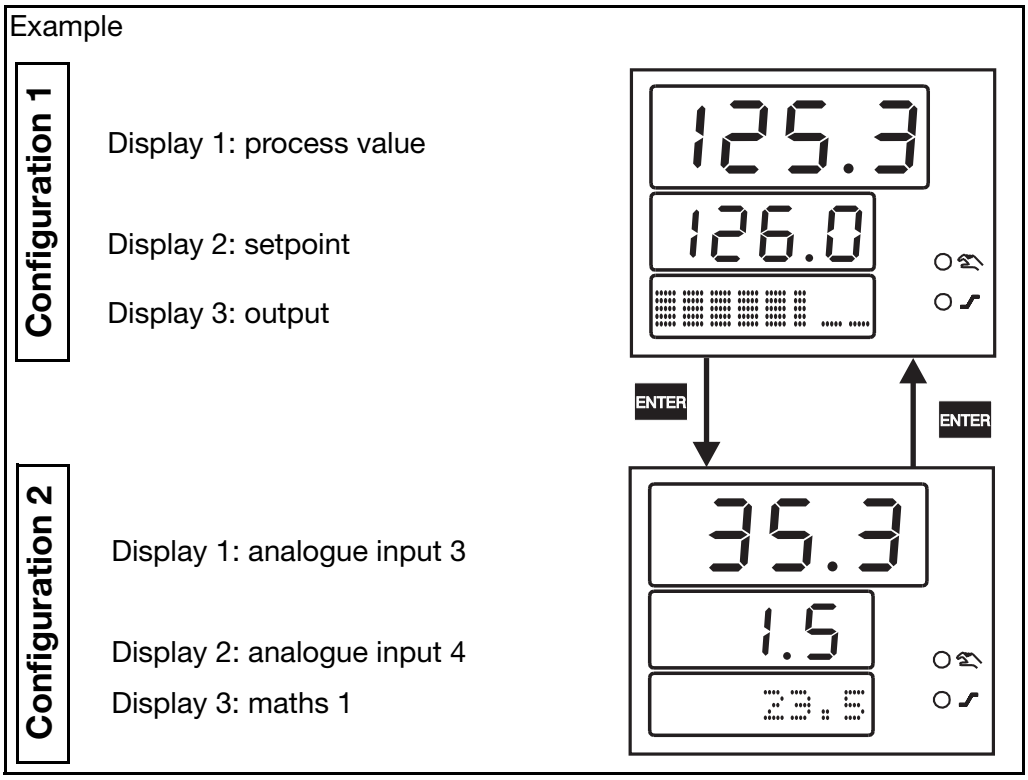
5.7 Display switching

Two display configurations can be provided that determine the visualisation of values and process variables on the 7-segment displays and the dot-matrix display.

* Switch display over with ENTER

or automatic changeover after an adjustable interval

Display switching can be deactivated.



Relevant settings

Configuration level 1 ➔ *Display* ➔ *Configuration 1+2*

Configuration level 1 ➔ *Display* ➔ *Automatic display switching*

5 Operation

5.8 Operating level

General

Four setpoints can be indicated and altered at the operating level, in addition different process variables can be displayed.

Access the level by ...

* pressing PGM (2x PGM with activated program function) in normal display or in manual mode

OPERATNG

Parameter	Value/selection	Description
Setpoints		
Setpoint 1	➔ W1 0.	Value input within the defined setpoint limits
Setpoint 2	➔ W2 0.	
Setpoint 3	➔ W3 0.	
Setpoint 4	➔ W4 0.	
Process variables		
Analogue input 1	➔ ANALOG 1 0.	Value display
Analogue input 2	➔ ANALOG 2 0.	
Analogue input 3	➔ ANALOG 3 0.	
Analogue input 4	➔ ANALOG 4 0.	
Mathematics 1	➔ MATHS 1 0.	
Mathematics 2	➔ MATHS 2 0.	
Output	➔ OUTPUT 0.	

General Two parameter sets can be stored.

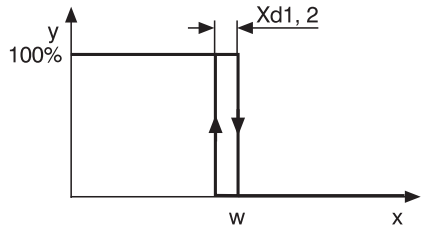
Access the level by ... * pressing PGM twice (3x PGM with activated program function) in normal display or in manual mode.

Access code The level is protected by a code.

factory-set code: 0001

Select parameter set * Select parameter set with PGM

PARAMETR → PARASET1

Parameters	Display	Value range	factory-set	Meaning
Controller structure	STR 1	P, I, PD, PI, PID	PID	Structure 2[1] refers to the second output in the case of a double-setpoint controller. With modulating controllers, only PI and PID are possible.
	STR 2	P, I, PD, PI, PID	PID	
Proportional band	XP1	0 — 9999 digit	0 digit	Size of the proportional band At Xp1,2 =0 the controller structure is not effective!(Limit comparator response) With proportional controllers, Xp1,2 must be >0
	XP2	0 — 9999 digit	0 digit	
Derivative time	TV1	0 — 9999 sec	80 sec	Influences the differential component of the controller output signal
	TV2	0 — 9999 sec	80 sec	
Reset time	TN1	0 — 9999 sec	350 sec	Influences the integral component of the controller output signal
	TN2	0 — 9999 sec	350 sec	
Switching cyle time	CY1	0 — 9999 sec	20 sec	For a switching output, the cycle time should be selected so that no impermissible fluctuations of the process value are caused by the switched energy supply, while, at the same time, not overloading the switching devices.
	CY2	0 — 9999 sec	20 sec	
Contact spacing	XSH	0 — 999 digit	0 digit	Spacing between two control contacts for double-setpoint controllers, modulating controllers and proportional controllers with integral actuator driver.
Switching differential	XD1	0 — 999 digit	1 digit	Differential of switching controllers for Xp = 0. 
	XD2	0 — 999 digit	1 digit	
Stroke time	TT	5 — 3000 sec	60 sec	Utilised stroke time of the control valve on modulating controllers and proportional controllers with integral actuator driver.
Working point	Y0	-100 to +100%	0%	Output for P and PD controllers (y = Y0 at x = w).

1. also Xp2, Tv2, Tn2; Cy2; Xd2

6 Parameter level

PARAMETR → PARASET1

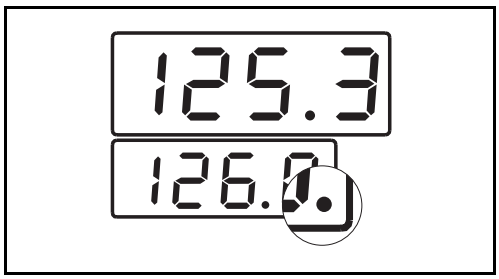
Output limiting	Y1	0 — 100%	100%	Maximum output limit
	Y2	-100 to +100 %	-100%	Minimum output limit
Minimum relay ON time	TK1	0 — 60sec	0sec	Limitation of the switching rate on switching outputs
	TK2	0 — 60sec	0sec	

☞ The display of the parameters on the unit depend on the controller type that was selected.

⇨ Section 7.1 “Controller”

Active parameter set

When parameter set 2 is active, the decimal point is lit up on the right of display 2.



General

The following applies to the representation of parameters and functions on the unit:

The parameter is not displayed when

- the instrument features do not permit the function assigned to the parameter.
  Example: Output 3 cannot be configured when output 3 is not available to the instrument.
- the parameter is irrelevant for the function that was previously configured.
  Example: Analogue input 1 is configured to “Pt100”, which means that display start / end for standard signals will not be indicated.

Access the level by ...

* pressing PGM 3 times (4x PGM with activated program function) in normal display or in manual mode.

Access code

The level is protected by a code.

factory-set code: 0002

Overview

➔ Controller ⇨ Page 35	➔ controller type control direction controller inputs	➔ process value external setpoint external setpoint with correction stroke retransmission additive disturbance multiplying disturbance	
	setpoint limits	➔ setpoint start setpoint end	
	manual output self-optimisation output 1+ 2 for self-optimisation dead band fuzzy control 1 fuzzy control 2		
➔ Limit comparators ⇨ Page 37	➔ limit comparator 1—8	➔ function action switching differential limit value function on over/ underrange switch-on delay pulse function	
		LK inputs	➔ limit comparator PV limit comparator setpoint

➔ = press ENTER !

7 Configuration level 1

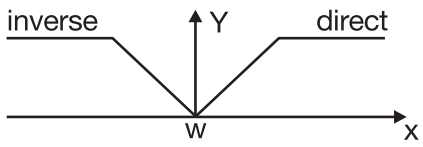
➔ Inputs ⇨ Page 40	➔ analogue input 1 — 4	➔ transducer linearisation measurement correction constant cold-junction temperature external cold-junction temperature display start display end range start range end filter time constant customized recalibration	➔ start value end value
	supply frequency unit		
➔ Outputs ⇨ Page 44	➔ output 1 — 6	➔ function output signal zero point end value output signal on under/overrange	
➔ Ramp and program function ⇨ Page 46	➔ function ramp slope unit of slope		
➔ Maths/logic ⇨ Page 48	➔ mathematics 1+2	➔ function variable a variable b range start range end linearisation	
	logic 1+2		
➔ Display ⇨ Page 53	➔ configuration 1+2 time-out automatic display switching	➔ display 1—3	➔ display value decimal point
➔ Logic function ⇨ Page 56	➔ logic input 1 — 8 limit comparator 1 — 8 logic output 1+2		
➔ Interface ⇨ Page 58	➔ type of protocol data format instrument address minimum response time	➔ baud rate parity stop bit	

➔ = press ENTER !

7.1 Controller

The following are set here: controller type and input variables of the controller, setpoint limits, conditions for manual mode, the presettings for self-optimisation and the fuzzy logic.

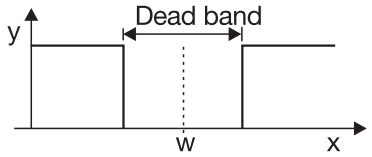
CONFIG 1 ➔ CONTRL.

	Parameters	Value/selection	Description
Controller type	➔CTR.TYPE	1-SETPT 2-SETPT MODULTNG ACTUATNG PROP.	**single-setpoint controller** double-setpoint controller modulating controller proportional controller with integral actuator driver proportional controller
Control direction	➔DIRECTN.	DIRECT INVERSE	Direct **Inverse**  inverse: The controller output Y is > 0 when the process value is smaller than the setpoint (e. g. heating). direct: The controller output Y is > 0 when the process value is larger than the setpoint (e. g. cooling).
Inputs of the controller process value external setpoint external setpoint with correction stroke retransmission additive disturbance multiplying disturbance	➔INPUTS ➔ PV ➔ EXTSET ➔ EXTCORR ➔ Y RETRM ➔ ADD DIST ➔ MUL DIST	NO FUNCT ANALOG 1 ANALOG 2 ANALOG 3 ANALOG 4 MATHS 1 MATHS 2	**no function*** **analogue input 1**** analogue input 2 analogue input 3 analogue input 4 Mathematics 1 Mathematics 2 Defines from which analogue inputs or maths functions the controller receives the signals. Stroke retransmission has to be configured in the case of a proportional controller with integral actuator driver! External setpoint with correction: External setpoint + setpoint 1 = present setpoint The external setpoint can be corrected upwards or downwards from the keys (setpoint 1). The present setpoint appears on the (LED) display. * factory-set for all, except process value ** factory-set for process value

Factory settings are shown **bold**.

7 Configuration level 1

CONFIG 1 ➔ CONTRL.

	Parameters	Value/selection	Description
Setpoint limits setpoint start setpoint end	➔WLIMITS ➔ STARTVAL ➔ END VAL	 0. 400.	 -1999 — **0** to +9999 -1999 — **400** to +9999 The setpoint limits are ineffective with setpoint input via the interface. For external setpoint with correction, the correction value is limited.
Manual output	➔Y MANUAL	101.	-100 — 100 **101** = last output Defines the output after changing over to manual mode.
Manual mode	➔MAN.MODE	ENABLED INHIBTD	**enabled** inhibited
Self-optimisation	➔TUNE	ENABLED INHIBTD	**enabled** inhibited
Output 1 for self-optimisation	➔TUNEOUT1	RELAY SSRELAY ANOUTPUT	**Relay** solid-state relay and logic output analogue output type of controller output 1 on self-optimisation
Output 2 for self-optimisation	➔TUNEOUT2	RELAY SSRELAY ANOUTPUT	**Relay** solid-state relay and logic output analogue output type of controller output 2 on self-optimisation
Dead band	➔DEADBAND	0.	**0** — 100 digit serves to minimise the output movement within the dead band; e. g. with noisy signals.  The deadband is only effective with controller structures with I-component.
Fuzzy control 1	➔FC1	0.	**0** — 100 0 = fuzzy control off Intensity of the fuzzy signal added to the controller output to improve the control quality.
Fuzzy control 2	➔FC2	30.	0 — **30** — 100 Influences the controller parameters during activated fuzzy module to improve the control quality.

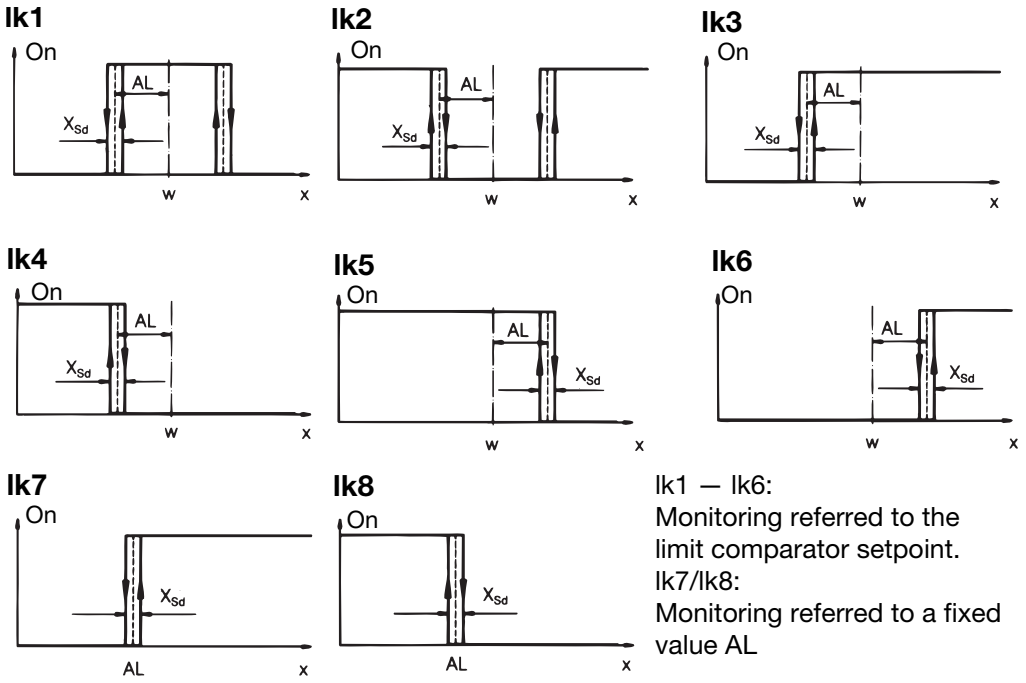
Factory settings are shown **bold**.

7.2 Limit comparators

Limit comparators (limit monitors, limit contacts) can be used to monitor an input variable (limit comparator process value) against a fixed limit value or another variable (limit comparator setpoint). When a limit is exceeded, a signal can be output or an internal controller function initiated.

Limit comparator functions

Limit comparators can have different switching functions.



lk1 — lk6:
Monitoring referred to the limit comparator setpoint.
lk7/lk8:
Monitoring referred to a fixed value AL

w = limit comparator setpoint, AL = limit,
x = limit comparator process value, X_{Sd} = differential

CONFIG 1 → LIMITC

	Parameters	Value/selection	Description
Limit comparator 1	→ LIMITC1	-	Configuration of limit comparators as in example “limit comparator 1” below.
...	...	-	
Limit comparator 8	→ LIMITC8	-	

Factory settings are shown **bold**.

CONFIG 1 → LIMITC → LIMITC1

	Parameters	Value/selection	Description
Function	→ FUNCTION	NO FUNCT LK1 ... LK8	**no function** function lk1 ... function lk8

Factory settings are shown **bold**.

7 Configuration level 1

CONFIG 1 ➔ LIMITC ➔ LIMITC1

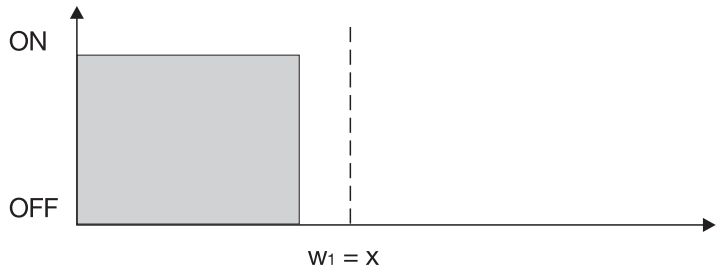
	Parameters	Value/selection	Description
Action	➔ACTION	ABSOLUTE RELATIVE	**absolute** relative
Switching differential X_{sd}	➔DIFFERTL	1.	0 — **1** — 100 digit
Limit value AL	➔LIMIT	0.	-1999 — **0** to +9999 digit
Function on over/underrange	➔RANGEFCT	RELDE-EN RELENERG	**relay de-energised** relay energised
	☞ If a limit comparator is connected to an output, then the setting “Output signal on over/underrange” of the output has priority. ⇨ Section 7.4 “Outputs”		
Switch-on delay	➔DELAY	0.	**0** — 9999sec
Pulse function	➔PULSEFCT	0.	-1 — **0** to +9999s The limit comparator is automatically reset after an adjustable interval. -1= The limit comparator has to be reset with the ENTER key or the logic function (all displays off).
Limit comparator inputs limit comparator process value limit comparator setpoint	➔ INPUTS ➔ PV LK ➔ SET LK	ANALOG 1 ... ANALOG 4 MATHS 1 MATHS 2 PV SETPOINT RAMPENDV CNTRLDEV OUTPUT	**analogue input 1*** ... analogue input 4 mathematics 1 mathematics 2 process value **setpoint (present)**** ramp end value control deviation output * factory-set for LK process value ** factory-set for LK setpoint

Factory settings are shown **bold**.

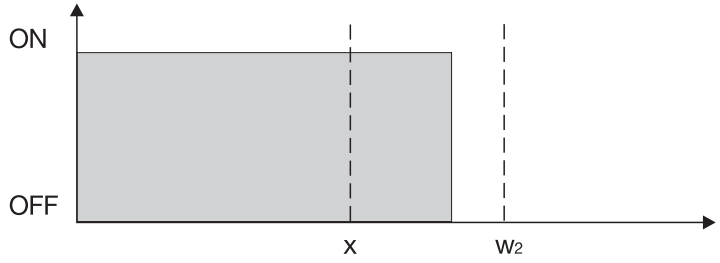
Absolute At the time of the alteration, the limit comparator acts in accordance with its function.

Relative The limit comparator is in the OFF status.
An alteration of the limit or the (limit comparator) setpoint could cause the limit comparator to switch ON. Such a reaction will be suppressed, and this condition maintained until the (limit comparator) process value has moved away from the switch-on region (grey area)**.**

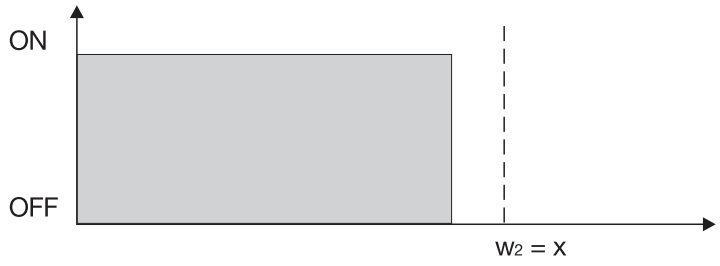
Example:
Monitoring the (controller) process value x with function lk4
Setpoint alteration $w_1 \rightarrow w_2$
a) Initial status



b) Status at the time of the alteration.
The limit comparator remains on “OFF” although the process value is within the switch-on region.



c) Control stabilised
The limit comparator again operates according to its function.



This function also prevents a limit comparator from being triggered during the start-up phase.

7 Configuration level 1

7.3 Inputs

The analogue inputs are configured here.

CONFIG 1 ➔ INPUTS

	Parameters	Value/selection	Description
Analogue input 1	➔ANALOG 1		Configuration of the analogue inputs as in the example “analogue input 1” below.
...	...		
Analogue input 4	➔ANALOG 4		
Supply frequency	➔PWRFREQ	50 HZ 60 HZ	**50Hz** 60 Hz
Unit	➔UNIT	DEGREE C DEGREE F	**°C** °F

Factory setting are shown **bold**.

CONFIG 1 ➔ INPUTS ➔ ANALOG 1

	Parameters	Value/selection	Description
Transducer	➔PROBE	NO FUNCT	**no function***
		RTD	**resistance thermometer****
		TC INTRN	thermocouple (internal cold junction)
		TC EXTRN	thermocouple (external cold junction)
		TC CONST	thermocouple (constant cold junction)
		RESTRANS	potentiometer
		0 — 20mA	0—20mA
		0 — 1 V	0—1V
		0 —100mV	0—100mV
		—1 — 1V	-1to +1V
		+/—100mV	-100to +100mV
		4 — 20mA	4—20mA
		0 — 10V	0—10V
		2 — 10V	2—10V
		+/—10V	-10Vto +10V
			* factory-set on analogue input 2, 3, 4
			** factory-set on analogue input 1

The selection of the transducers depends on the hardware configuration of the analogue inputs. -10/0/2 — 10V and -1 — 1V will only be indicated with the appropriate hardware configuration.

⇨ Section 9 “Retrofitting of cards”

Factory settings are shown **bold**.

CONFIG 1 → INPUTS → ANALOG 1

	Parameters	Value/selection	Description
Linearisation	→LINTAB	LINEAR	linear
		PT100	**Pt 100**
		PT1000	Pt 1000
		PT500	Pt 500
		PT50	Pt 50
		CU50	Cu 50
		KTY	KTY21-6 (1 kΩ at 25°C)*
		PTK9	Pt K9
		NI100	Ni 100
		TC TPE J	Fe-Con J
		TC TPE E	NiCr-Con E
		TC TPE K	NiCr-Ni K
		TC TPE N	NiCrSi-NiSi N
		TC TPE T	Cu-Con T
		TC TPE B	Pt30Rh-Pt6Rh B
		TC TPE R	Pt13Rh-Pt R
		TC TPE S	Pt10Rh-Pt S
		TC TPE U	Cu-Con U
		TC TPE L	Fe-Con L
		CUST LIN	customized linearisation
		W5RE W26	W5Re-W26Re
		W3RE W25	W3Re-W25Re
		W3RE W26	W3Re-W26Re
			* for other types, see setup program (*extended configuration*) ** for customized linearisation up to 20 interpolation points can be realised (with setup program only). x = physical measured value y = displayed value
Measurement correction	→OFFSET	0.	-1999 — **0** to +9999 digit Measurement correction can be used to correct a measured value by a certain amount upwards or downwards. Examples: measured value / offset / displayed value 294.7 / +0.3 / 295.0 295.3 / - 0.3 / 295.0 The controller uses the corrected value (= displayed value) for its calculation. This value does not correspond to the actually measured value. If incorrectly applied, this can result in impermissible values of the control variable.

Factory settings are shown **bold**.

7 Configuration level 1

CONFIG 1 ➔ INPUTS ➔ ANALOG 1

	Parameters	Value/selection	Description
Constant cold-junction temperature for thermocouples	➔CJTEMP	50.	0 — **50** — 100 digit Temperature of the cold-junction thermostat
External cold-junction temperature for thermocouples	➔EXTTEMP	ANALOG 1 ... ANALOG 4	**Analogue input 1** ... Analogue input 4 Measurement of the cold-junction temperature with a temperature probe.
Display start	➔DSPLSTRT	0.	-1999 — **0** to +9999 digit
Display end	➔DISPLEND	100.	-1999 — **100** to +9999 digit On transducers with standard signal and on potentiometers, a displayed value is assigned to the actual signal. Example: 0 — 20 mA ≙ 0 — 1500°C. The range of the physical signal can be 20 % wider or narrower without signalling out-of-range.
Range start	➔RNGESTRT	-1999.	**-1999** to +9999 digit
Range end	➔RANGEEND	9999.	-1999 to **+9999** digit When the measuring range is restricted, the controller will switch to the response defined for going out-of-range at an earlier point. Example: Pt100 (range: -200 to +850°C). An alarm message is to be output for temperatures outside the range 15 — 200°C. → range start: 15 range end: 200
Filter time constant	➔FILTER	0.6	0 — **0.6** — 100 sec To adjust the digital input filter (0sec = filter off). At a signal jump, 63% of the changes are registered after 2 x filter time constant. If the filter time constant is large: - high damping of disturbance signals - slow reaction of process value indication to PV changes - low limit-frequency (2nd order low-pass filter)

Factory settings are shown **bold**.

CONFIG 1 → INPUTS → ANALOG 1

Parameters	Value/selection	Description
→ RECAL		
→ STARTVAL	0.	-1999 — **0** to +9999 digit
→ ENDVALUE	1.	-1999 — **1** to +9999 digit
		(for explanation, see below)
		factory-set access code: 0004
		☞ In contrast to all other settings, input of the start and end values is linked to the present measured value at the corresponding measurement input. These values cannot simply be read in by another instrument.

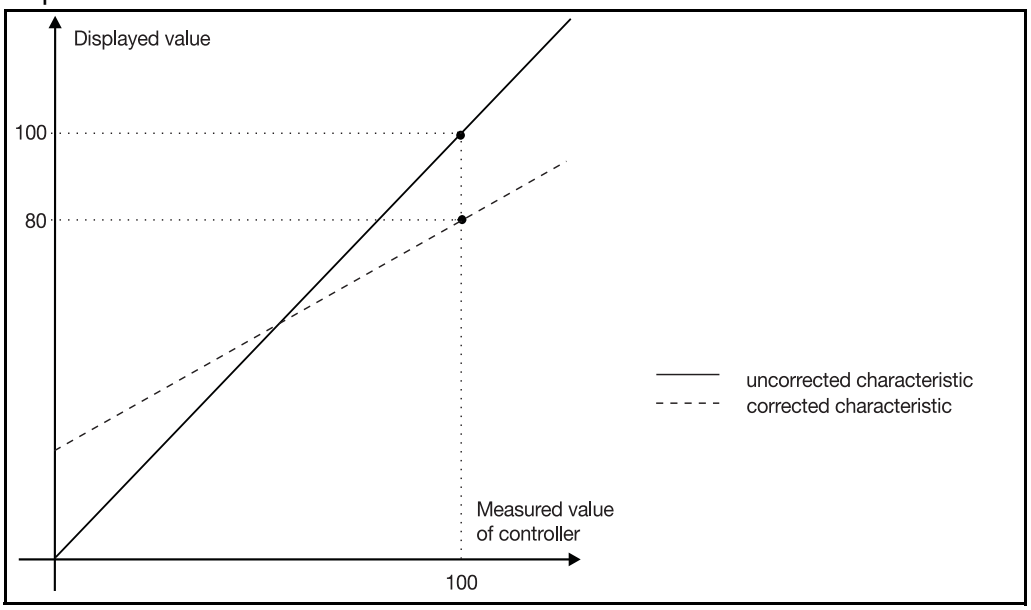
Customized recalibration
Start value
End value

Factory settings are shown **bold**.

Customized recalibration

A signal is processed electronically (conversion, linearisation …) to produce a measured value via the analogue inputs of the controller. This measured value enters into the calculations of the controller and can be visualised on the displays (measured value = indicated value).

This fixed relationship can be modified if required, i. e. the position and the slope of the measurement characteristic can be altered.



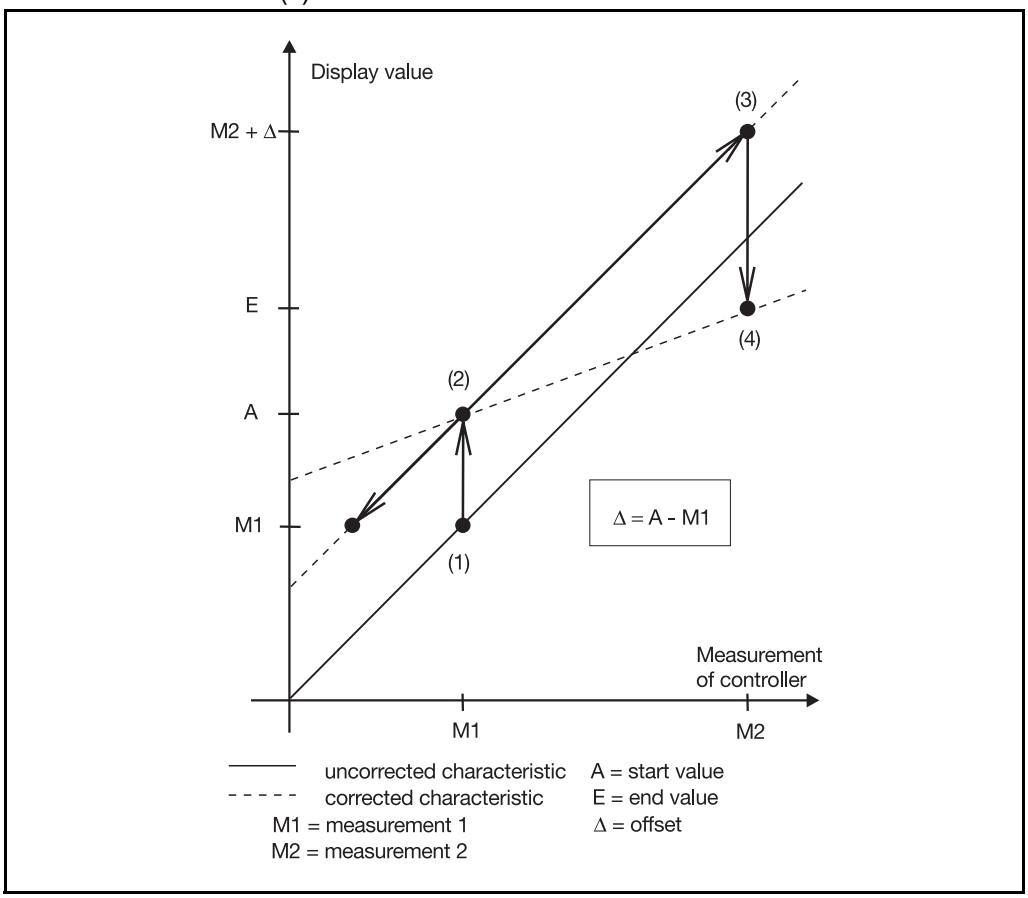
Procedure

Apply two measurement points ((1), (3)), one after another, to the controller; they should be as far apart as possible.
At these measurement points, enter the required display value (start value, end value) in the controller. A reference instrument is most convenient for determining the measured values M1 and M2.
Measurement conditions must remain stable during programming.

Programming

* Move to measurement point (1)
* Enter start value (2) [1]
* Move to measurement point (3)

✱ Enter end value E (4) [1]



☞ If recalibration is carried out without reference instrument, the offset Δ must be taken into account when moving to measurement point (3).

To cancel recalibration, the start and end values have to be programmed to the same value. This sets the start value to 0 and the end value to 1.

Any subsequent recalibration will otherwise be based on the corrected characteristic.

7.4 Outputs

The outputs are configured here.

CONFIG 1 → OUTPUTS

	Parameters	Value/selection	Description
Output 1	→ OUTPUT1	-----	Configuration of the outputs as shown in the example “Output 1” below.
...	...	-----	
Output 6	→ OUTPUT6	-----	

Factory settings are shown **bold**.

1. If start value=0 or end value =1 is to be set, then the value must first be altered using ▲ or ▼ to enable correction.

CONFIG 1 → OUTPUTS → OUTPUT1

	Parameters	Value/selection	Description
Function	→FUNCTION	NO FUNCT	**no function***
		ANALOG1	analogue input 1
		...	...
		ANALOG4	analogue input 4
		MATHS 1	mathematics 1
		MATHS 2	mathematics 2
		PV	process value
		SETPOINT	setpoint
		RAMPENDV	ramp end value
		CNTRLDEV	control deviation
		OUTPUT	output
		W1	setpoint 1
		...	...
		W4	setpoint 4
		CTRLOUT1	**controller output 1****
		CTRLOUT2	controller output 2
		VALUE XY	address value
		OUT LK1	limit comparator output 1
		...	...
		OUT LK8	limit comparator output 8
		LOGIN B1	logic input 1
		...	...
		LOGIN B8	logic input 8
		LOGIC 1	logic 1
		LOGIC 2	logic 2
		MAN.MODE	manual mode
		TRNSMITT	supply for 2-wire transmitter
			* factory-set on all outputs except output 1 ** factory-set on output 1
Output signal for analogue output	→SIGNAL	0 – 10 V	0 — 10V
		2 – 10 V	2 — 10V
		–10– 10V	-10 to +10V
		0 – 20mV	0 — 20mA
		4 – 20mA	4 — 20mA
		–20–20mA	-20 to +20mA

Factory settings are shown **bold**.

CONFIG 1 → OUTPUTS → OUTPUT1

	Parameters	Value/selection	Description
Zero for analogue signals	→STARTVAL	0.	-1999 — **0** to +9999 digit
End value for analogue signals	→ENDVALUE	100.	-1999 — **100** to +9999 digit A physical output signal is assigned to the value range of an output variable. Example: Setpoint 1 (value range: 150—500°C) is to be output via the analogue output (0—20mA). i.e.: 150 — 500°C ≙ 0 — 20mA zero: 150 / end value: 500 ☞ Setting for controller outputs for cooling. For 2-setpoint controllers, the following settings have to be predefined: zero: 0 / end value: -100
Output signal for over/underrange	→RANGEFCT	0.	**0** — 101* 101 = last output signal The output produces a defined signal. ☞ If the output is a controller output, the controller switches over to manual mode and produces an output of 0% or the actuator is closed (modulating controller). ⇨ Section 7.1 “Controller” * for switching outputs: 0 = off, 1 — 100 = on

Factory settings are shown **bold**.

7.5 Ramp and profile program function

The ramp or profile program function is activated here.

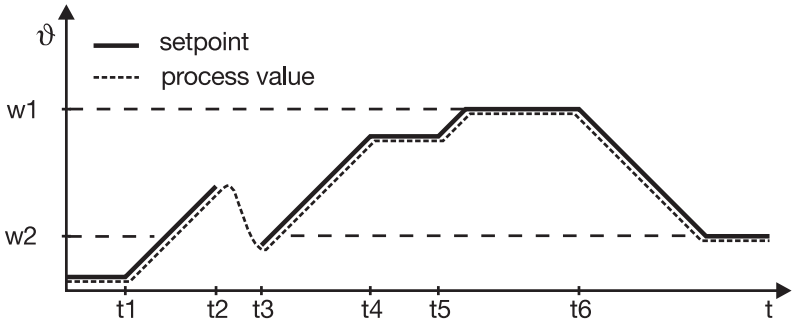
CONFIG 1 → RAMP

	Parameters	Value/selection	Description
Function	→FUNCTION	NO FUNCT RAMP PROGRFCT	**no function** ramp function profile program function
Ramp slope	→SLOPE	0.	**0** — 999
Unit of slope	→UNIT	DEGC/MIN DEGC/HR DEGC/DAY	**degree Celsius/minute** degree Celsius/hour degree Celsius/day

Factory setting are shown **bold**.

Ramp function

A rising or a falling ramp function can be implemented. The ramp end-value is determined by the setpoint input.

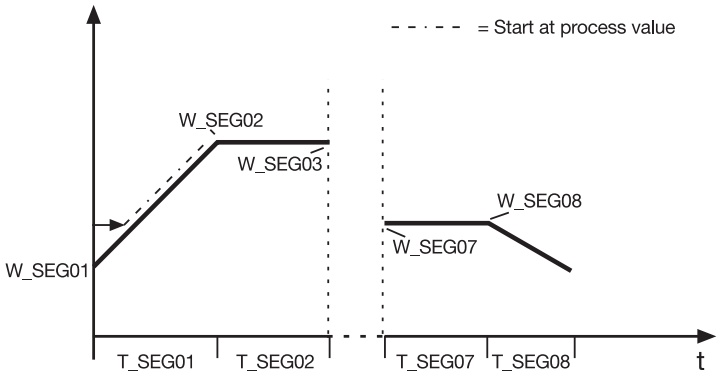


t1	power on (w1 active)
t2—t3	power failure/manual mode/probe break
t4—t5	ramp stop
t6	setpoint switching to w2

☞ The ramp function is interrupted on a probe break or for manual mode. The outputs react as for over/underrange (configurable).

Profile program function

It is possible to produce a profile program with up to eight segments. When this function is activated, an additional level (PROGRFCT) appears on the screen at which the eight segment setpoints (W SEG01 — W SEG08) and the eight segment times (T SEG01 — T SEG08) are programmed.



The program starts at the process value or the program start (adjustable via the setup program only!). When starting at the process value, the profile is searched to find a setpoint that corresponds to the process value at the instant of the start. The program sequence starts at this point. If the process value is outside the profile, a start is made at the first program segment. With segments that are not required, the segment time must be 0.

Starting the program

* Start and cancel program with or via the logic function

Holding the program

* Hold and continue program with or via the logic function

7 Configuration level 1

7.6 Maths and logic module

This menu is shown only with enabled maths and logic module.

CONFIG 1 ➔ MATHSLOG

	Parameters	Value/selection	Description
Mathematics 1	➔MATHS 1	—	Configuration of mathematics as shown in example “Maths 1” below.
Mathematics 2	➔MATHS 2	—	
Logic 1	➔LOGIC 1	NO FUNCT FORMULA	**no function** logic formula (setup program)
Logic 2	➔LOGIC 2	NO FUNCT FORMULA	**no function** logic formula (setup program)

Factory settings are shown **bold**.

CONFIG 1 ➔ MATHSLOG ➔ MATHS 1

	Parameters	Value/selection	Description
Function	➔FUNCTION	NO FUNCT DIFFERNC RATIO HUMIDITY FORMULA	**no function** difference (a-b) ratio (a/b) humidity (a;b) maths formula (setup program)
Variable a	➔VAR A	ANALOG1 ... ANALOG4 MATHS 1 MATHS 2	**analogue input 1** ... analogue input 4 mathematics 1 mathematics 2
Variable b	➔VAR B	ANALOG1 ANALOG2 ANALOG3 ANALOG4 MATHS 1 MATHS 2	analogue input 1 **analogue input 2** analogue input 3 analogue input 4 mathematics 1 mathematics 2
Range start	➔RNGESTRT	-1999.	**-1999** to +9999 digit
Range end	➔RANGEEND	9999.	-1999 to **+9999** digit Definition of a value range for the result of a mathematical calculation. If the value range is infringed (above or below), an out-of range condition is signalled.

Factory settings are shown **bold**.

CONFIG 1 → MATHSLOG → MATHS 1

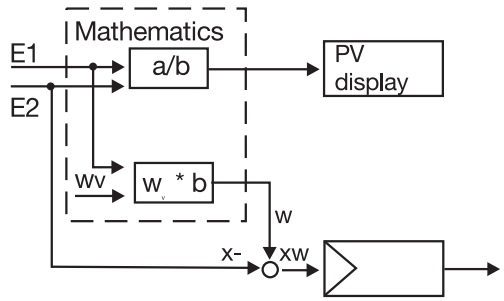
Linearisation

Parameters	Value/selection	Description
→LINTAB	LINEAR	**linear**
	PT100	Pt 100
	PT1000	Pt 1000
	PT500	Pt 500
	PT50	Pt 50
	CU50	Cu 50
	KTY	KTY21-6
	PTK9	Pt K9
	NI100	Ni 100
	TC TPE J	Fe-Con J
	TC TPE E	NiCr-Con E
	TC TPE K	NiCr-Ni K
	TC TPE N	NiCrSi-NiSi N
	TC TPE T	Cu-Con T
	TC TPE B	Pt30Rh-Pt6Rh B
	TC TPE R	Pt13Rh-Pt R
	TC TPE S	Pt10Rh-Pt S
	TC TPE U	Cu-Con U
	TC TPE L	Fe-Con L
	CUST LIN	customized linearisation
	W5RE W26	W5Re-W26Re
	W3RE W25	W3Re-W25Re
	W3RE W26	W3Re-W26Re

Factory settings are shown **bold**.

Ratio control

The control is always based on variable a.
The maths module forms the ratio of the measurements a and b (a/b) and produces the setpoint for the controller. The ratio of the measured values a and b can be called up and indicated via the “Maths 1” or “Maths 2” functions.
The required ratio a/b is programmed in the setpoint input as setpoint (ratio setpoint).



E1 = analogue input 1 (variable b)
E2 = analogue input 2 (variable a)
w = setpoint
wv = ratio setpoint
x = process value
xw = control deviation controller

Humidity control

The humidity controller receives the process value from a psychrometric humidity probe through the mathematical linkage of wet bulb and dry bulb temperatures.

Variable a - dry bulb temperature
Variable b - wet bulb temperature

Formula input

- The formula character string consists of ASCII-characters and has a maximum length of 70 characters.
- The formula can only be entered in the setup program.
- The formulae can be entered freely according the the usual mathematical rules.
- Spaces can be inserted in the formula character string without restriction. No spaces are allowed within function designations, variable names and constants.

Mathematical formula

Mathematical signs and functions

Priority	Mathematical sign/function	Note
high	( )	brackets
	SQRT, MIN, MAX, LOG, LN, SIN, COS, TAN, ABS, EXP, INT, FRC	functions
	**	exponent (x^y)
	+, -	sign
	*, /	multiplication, division
low	+, -	addition, subtraction

Variables

Variable name	Note
E1 … E4	analogue input 1 … analogue input 4
M1 M2	mathematics 1 mathematics 2
X	process value
WR	controller setpoint
WE	ramp end value
XW	control deviation
Y	output
W1 … W4	setpoint 1 (operating level) … setpoint 4 (operating level)
YH	output heating
YK	output cooling
ADRA	storage address (analogue)
TEMP	temperature at terminals
T0	sampling time
RXK1 RXK2	controller output 1 controller output 2

Variable name	Note
ADRZ	storage address: time
ADRB	storage address (binary)
LK1 … LK8	output limit comparator 1 … output limit comparator 8
B1 … B8	logic input 1 logic input 8
L1 L2	logic 1 logic 2
HAND	manual mode

Functions

Syntax	Function
SQRT(a)	square root of a Examples: SQRT(E2) SQRT(13.5+E3)
MIN (a1, a2 …)	returns the smallest value of a series of arguments Examples: MIN(3, 7) (returns the value 3) MIN(E1, E2, E3, 0.1)
MAX (a1, a2 …)	returns the largest value of a series of arguments Examples: MAX(3, 7) (returns the value 7) MAX(E1, E2, E3, 0.1)
LOG(a)	logarithm to base 10 Examples: LOG(1000) (returns the value 3) LOG(E1/100)
LN(a)	logarithm to base e Examples: LN(2.71828128) (returns the value 1) LN(E1/100)
SIN(a)	sine of a a in degrees (0 — 360°C) Examples: SIN(90) (returns the value 1) SIN(E1*360/100)
COS(a)	cosine of a a in degrees (0 — 360°C) Examples: COS(180) (returns the value -1) COS (E1*360/100)
TAN(a)	tangent of a a in degrees (0 — 360°C) Examples: TAN(45) (returns the value 1) TAN(E1*45/100)
ABS(a)	absolute value of a Examples: ABS(-12) (returns the value 12) ABS(13.5+E3)

Syntax	Function
EXP(a)	exponential function e^a Examples: ÊXP(1) (returns the value 2.718) EXP(E1/100)
INT(a)	integer portion of a Examples: INT(8.3) (returns the value 8) INT(E1)
FRC(a)	decimal portion of a Examples: FRC(8.3) (returns the value 0.3) FRC(E1)

Logic formula

Logic operators

Priority	Operator	Note
high	( )	brackets
▼	NOT, !	negation
	AND, &	AND linkage
	XOR, ^	exclusive OR linkage
low	OR, ¦	OR linkage

Variables

Variable names	Note
RXK1 RXK2	controller output 1 controller output 2
ADRB	storage address (binary)
Lk1 … LK8	output limit comparator 1 … output limit comparator 8
B1 … B8	logic input 1 … logic input 8
HAND	manual mode

Edge recognition

Edge	Note
/	variable is “TRUE” only with rising edge (e. g. /B1)
\	variable is “TRUE” only with falling edge (e. g. \B1)

Constants

Constant name	Note
TRUE	logic 1
FALSE	logic 0

Enabling maths and logic module

The maths and logic module can be enabled through a code via the setup program.

⇨ *Extras* ➔ *Enabling extra Codes*

7.7 Display

The two display configurations are set here, as well as the time-out during configuration at the levels.

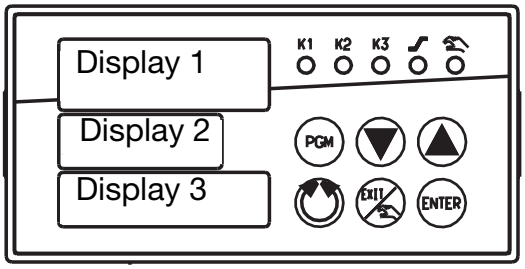
CONFIG 1 ➔ DISPLAY

	Parameters	Value/selection	Description
Configuration 1	➔ DSPCONF1		Configuration of the displays as shown in the example “Configuration 1” below.
Configuration 2	➔ DSPCONF2		
Time-Out	➔ TIMEOUT	30.	0 — **30** — 9999 sec 0 = time-out OFF Interval after which an automatic return to normal display occurs if no key is pressed.
Automatic display switching	➔ SCROLL	0.	-1 — **0** — 9999 sec 0 = automatic changeover OFF -1 = changeover via keypad is not possible Interval between the changeover of the two display configurations.

Factory settings are shown **bold**.

7 Configuration level 1

Assignment of the displays



CONFIG 1 ➔ DISPLAY ➔ DSPCONF1

	Parameters	Value/selection	Description
Display 1	➔DISPLAY1		
Display value	➔ DISPLVAL	NO FUNCT	no function
		ANALOG 1	analogue input 1
		...	...
		ANALOG 4	analogue input 4
		MATHS 1	mathematics 1
		MATHS 2	mathematics 2
		PV	**process value**
		SETPOINT	setpoint (present)
		RAMPENDV	ramp end value
		CNTRLDEV	control deviation
		OUTPUT	output
		VALDISPL	display of a storage address value
Decimal point	➔ DECPOINT	XXXX.	**XXXX.** — X.XXX
Display 2	➔DISPLAY2		
Display value	➔ DISPLVAL	NO FUNCT	no function
		ANALOG 1	analogue input 1
		...	...
		ANALOG 4	analogue input 4
		MATHS 1	mathematics 1
		MATHS 2	mathematics 2
		PV	process value
		SETPOINT	**setpoint (present)**
		RAMPENDV	ramp end value
		CNTRLDEV	control deviation
		OUTPUT	output
		VALDISPL	display of a storage address value
Decimal point	➔ DECPOINT	XXXX.	**XXXX.**...X.XXX

Factory settings are shown **bold**.

CONFIG 1 ➔ DISPLAY ➔ DSPCONF1

	Parameters	Value/selection	Description
Display 3	➔DISPLAY3		
Display value	➔ DISPLVAL	NO FUNCT	no function
		ANALOG 1	analogue input 1
		...	...
		ANALOG 4	analogue input 4
		MATHS 1	mathematics 1
		MATHS 2	mathematics 2
		PV	process value
		SETPOINT	setpoint (present)
		RAMPENDV	ramp end value
		CNTRLDEV	control deviation
		OUTPUT	output
		VALDISPL	display of a storage address value
		LIMITC	limit comparators (switching states)
		BARG Y	**bar graph output**
		BARG XW	bar graph control deviation
		TXTDISPL	text display
			switching states of limit comparators: 8 7 6 5 4 3 2 1 ○○○○○○○○
			bar graph output: 1-setpoint ctrl. and prop. ctrl. 0% 100% ▀▀▀▀▀▀▀▀ ▁
			2-setpoint ctrl. -100% 0% 100% ▁▁▁▁▀▁▁▁
			bar graph control deviation: 50°C 0°C 50°C ▁▁▁▁▀▁▁▁
Decimal point	➔ DECPOINT	XXXX.	**XXXX.** — X.XXX

Factory settings are shown **bold**.

Decimal point

If the value to be displayed can no longer be represented with the programmed decimal place, then the number of decimal places will be automatically reduced. If, subsequently, the measurement becomes smaller then the number will be increased to the programmed decimal point value.

7 Configuration level 1

7.8 Logic functions

Functions are assigned here to the logic signals of the logic inputs, limit comparators and the logic module.

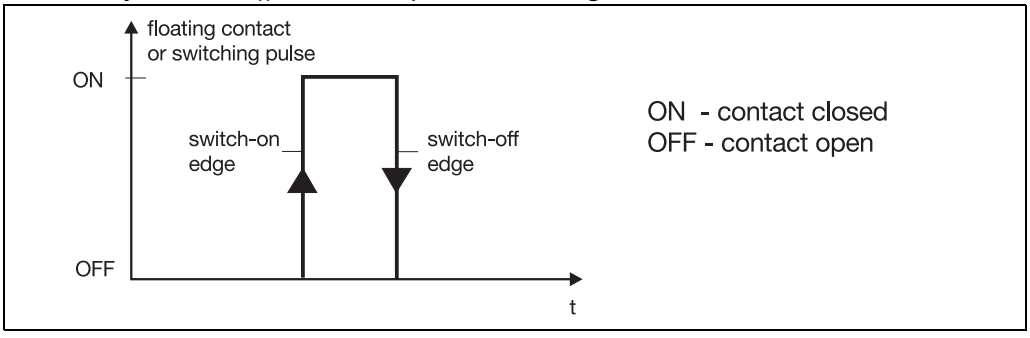
CONFIG 1 ➔ LOGICFCT

	Parameters	Value/selection	Description
Logic input 1	➔LOGIN B1	NO FUNCT	**no function**
...	...	TUNESTRT	start self-optimisation
Logic input 8	➔LOGIN B8	TUNESTOP	cancel self-optimisation
Limit comparator 1	➔OUT LK1	MAN.MODE	changeover to manual mode
...	...	MANINHBT	manual mode inhibit
Limit comparator 8	➔OUT LK8	RAMPSTOP	ramp stop/profile programm stop
Logic 1	➔LOGIC 1	RAMP OFF	ramp off/profile programm abort
Logic 2	➔LOGIC 2	W SWITCH	setpoint switching
		X SWITCH	process value switching
		P SWITCH	parameter set switching
		KEYINHBT	key inhibit
		LEVINHBT	level inhibit
		TXTDISPL	text display*
		DISPLOFF	all displays off/acknowledgement of limitcomparators
			* A maximum of 10 texts are input and assigned to the logic functions in the setup program
			The functions are active when the contact is closed or the switching status is “ON”.
			All displays off: - all displays are switched off - limit comparators are acknowledged
			Text display and all displays off: response according to priority list

! Factory settings are shown **bold**.

Switching action

The logic functions are activated via the logic inputs (floating contacts (switches/relay contacts)), limit comparators or logic.



The functions are divided into two groups:

Edge-triggered functions

The logic function reacts to switch-on edges.

The following functions are edge-triggered:

- start/stop self-optimisation
- acknowledge limit comparators

State-triggered functions

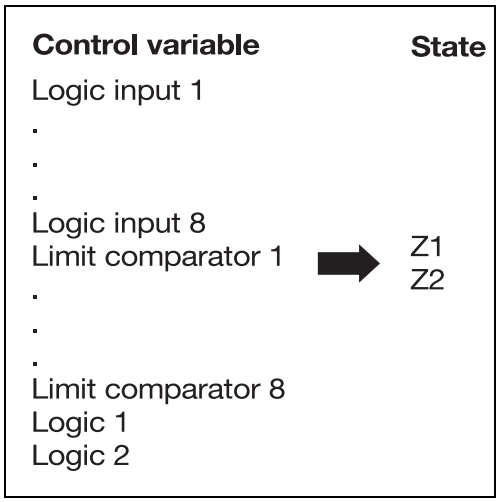
The logic function reacts to ON or OFF switching states.

- all other functions

Combined logic functions

A combination of two control variables (logic inputs, limit comparators and logic) is used to implement the functions setpoint/process value switching.

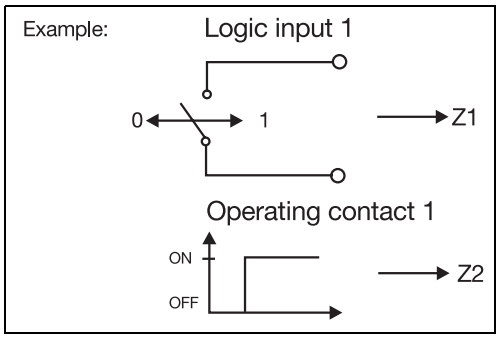
Any control variable can be selected. The states Z1 — Z2 are assigned to the control variables in descending order of the control variables (see list on the right).



Example:

The process value is to be selected via one logic input and the state of one limit comparator.

This results in the following assignment:
Z1 - logic input 1
Z2 - limit comparator 1



Setpoint switching	Process value switching	Z2	Z1
setpoint 1/external setpoint/ program	configured controller process value	0	0
setpoint 2	analogue input 2	0	1
setpoint 3	analogue input 3	1	0
setpoint 4	analogue input 4	1	1

0 = contact open /OFF 1 = contact closed /ON

☞ If switching between two setpoints or process values only is required, then only one logic function has to be configured.

If more than two logic functions are configured to setpoint switching (process value switching), then only the first two (see list “Control variable - State”) are significant.

7 Configuration level 1

7.9 Interface

CONFIG 1 ➔ INTERFCE

	Parameters	Value/selection	Description
Protocol type	➔PROTOCOL	MODBUS MODINT	**MODbus/Jbus** MODbus int
Data format	➔DATAFMT		
Baud rate	➔ BAUDRATE	1200 2400 4800 9600 1920	1200 baud 2400 baud 4800 baud **9600 baud** 19200 baud
Parity	➔ PARITY	NONE ODD EVEN ZERO	**no parity** odd parity even parity zero parity
Stop bit	➔ STOPBIT	1 2	**1 stop bit** 2 stop bits
Unit address	➔UNITADDR	0.	0 — **1** — 254
Minimum response time	➔MIN TIME	0.	**0** — 500 msec Minimum period of time that elapses between the request of an instrument within a data network and the response of the controller.

Factory settings are shown **bold**.

Interface description B 70.3570.2
Interface description B 70.3560.2.1

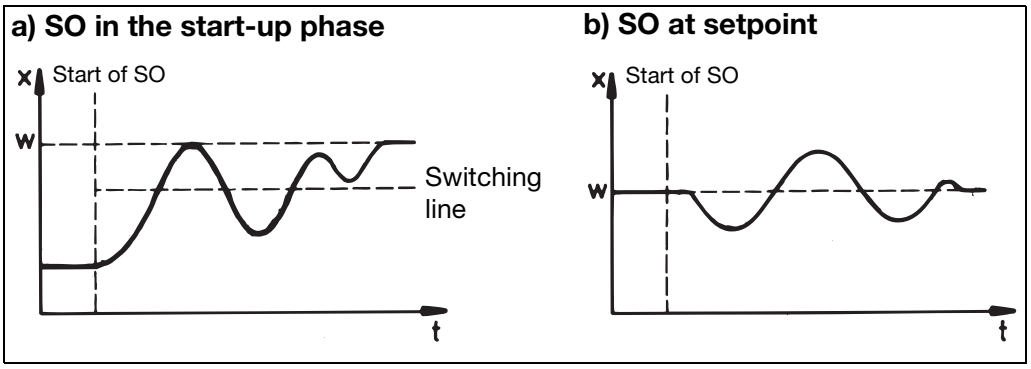
8.1 Self-optimisation

Procedure

Self-optimisation SO establishes the optimum controller parameters for PID or PI controllers.

Depending on the controller type, the following controller parameters are defined:
Reset time (Tn1, Tn2), derivative time (Tv1, Tv2), proportional band (Xp1, Xp2), switching cycle time (Cy1, Cy2), filter time constant (dF)

The controller selects one of two procedures (**a** or **b**) in accordance with the size of the control deviation.

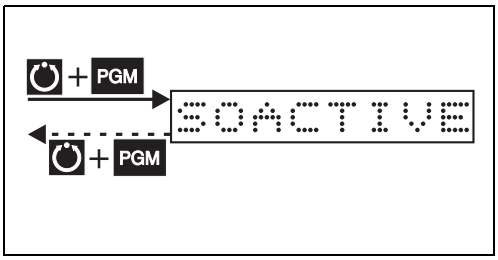


☞ The types of the controller outputs have to be defined for self-optimisation.

⇨ Section 7.1 “Controller”

Start of self-optimisation

Self-optimisation is automatically terminated, or can be cancelled.



☞ Starting self-optimisation is not possible with active level inhibit.

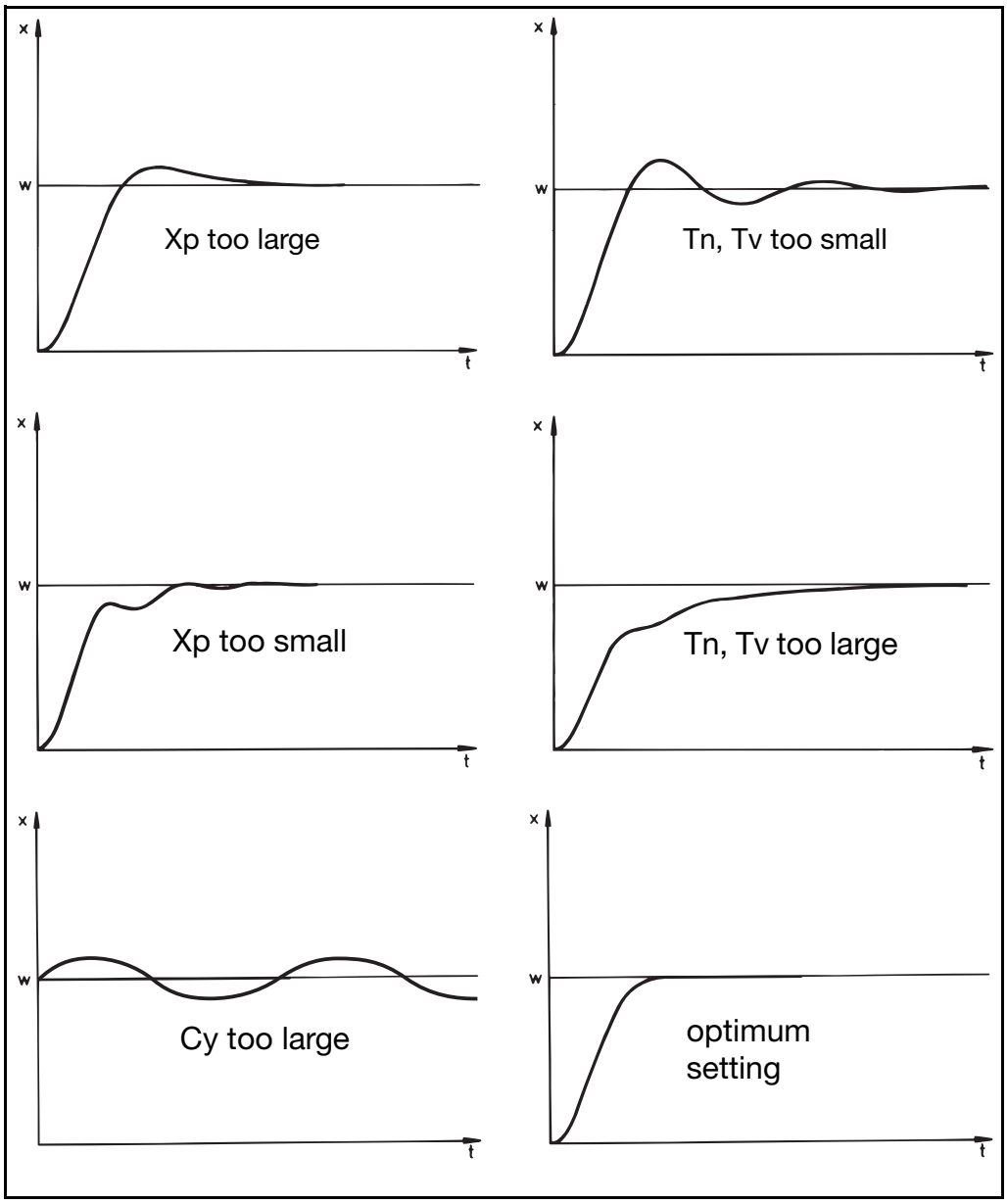
8.2 Checking the optimisation

Start-up procedure

The optimum adjustment of the controller to the process can be checked by recording the start-up with the control loop closed. The diagrams below indicate possible maladjustments and how these can be corrected.

Control response

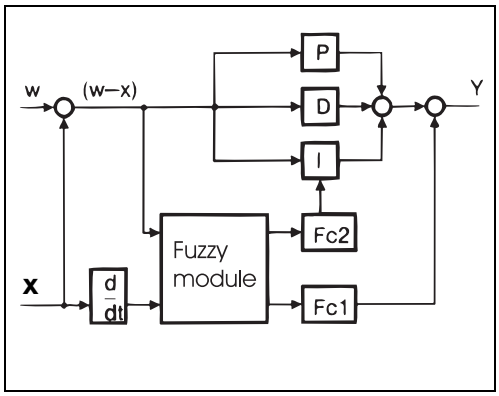
The control response of a third-order control loop of a PID controller is shown as example. However, the procedure for adjusting the controller parameters can also be applied to other control loops.



8.3 Fuzzy parameters

In addition to the algorithms for the various controller structures, the controller software also includes a fuzzy module. This can be used to improve both the control and the disturbance response of controllers with I-action.

When the fuzzy module is activated, the output y is made up of the controller output and the output signal of the fuzzy module.

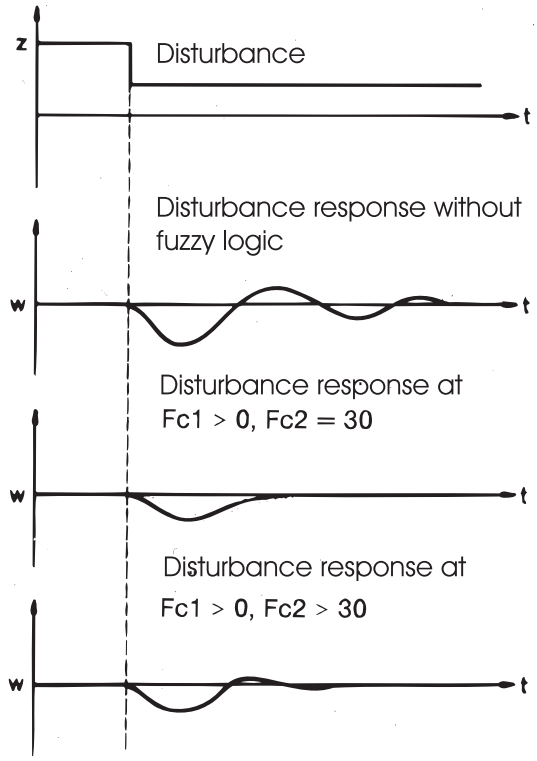


The parameter Fc1 affects the intensity of the fuzzy signal:
Fc1 = 0: Fuzzy module not activated
0<Fc1≤ 100: Fuzzy module activated

If the fuzzy module activated by Fc1 makes corrections to the output y, the reset time T_n is influenced during correction.
The parameter Fc2 is used to adjust the degree of influence on the reset time T_n.
Fc2 = 0: no influence on T_n
0<Fc2≤ 100: influence on T_n

When supplied, and also after self-optimisation, the fuzzy parameters are set to Fc1 = 0 and Fc2 = 30.
The fuzzy module can be activated at any time by setting Fc1 > 0.

The setting Fc2 = 30 is suitable for many applications. The optimum setting can be determined with the aid of the table below.



Action	Reaction
Fc1 ↑	disturbance amplitude reduced, stabilisation time increased
Fc1 ↓ ↑	disturbance amplitude increased, stabilisation time reduced
Fc2 ↓	stabilisation time reduced
Fc2	stabilisation time increased

☞ If the fuzzy module is inactivated (Fc1=0), Fc2 is also ineffective

The action and sensitivity of the fuzzy parameters depend largely on the process to be controlled.

The influence is greater in the case of proportional controllers than with switching controllers.

The following steps are necessary for retrofitting cards:

Only qualified personnel are permitted to retrofit cards.

The cards can be damaged by electrostatic discharge. Avoid electrostatic charges during fitting and removal. Carry out the card change on a workbench which is earthed.

Identifying the card

* Identify the card by the sales no. that is glued onto the packaging.

The instrument is fitted from device software version 50.02.XX on with a new type of analog input card. If analog input cards are retrofitted, it must be noted that they cannot be operated together with the older type of card (i.e. do not mix card types). Please note also that an update of the setup program may be required in order to carry out the configuration through the setup program.

The Software-Version appears on the Display if the keys PGM +“arrow up“ are pressed.

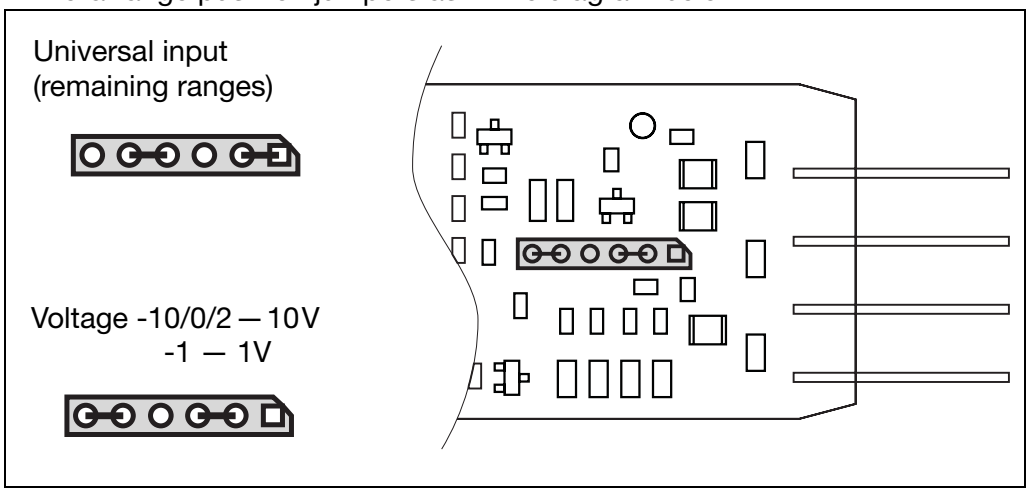
Cards	Code	Sales No.	Card No.
Analogue input 3 and 4:			
Universal input			
up to software version 50.01.XX	1/2	70/00366099	358457
from software version 50.02.XX on	1/2	70/00490339	483509
Outputs/logic inputs:			
Relay (changeover contact)	1	70/00366100	358444
Solid-state relay 230V 1A	2	70/00366101	358452
Logic 0/5V	3	70/00366102	358445
Logic 0/22V	4	70/00366103	358447
Analogue output	5	70/00366104	358449
Supply for	6	70/00366105	358447
2-wire transmitter			
Two logic inputs	7	70/00366106	358450
RS422/485 interface	54	70/00366107	358443
PROFIBUS-DP	64	70/00375280	368705

9 Retrofitting of cards

Configuring the analogue input

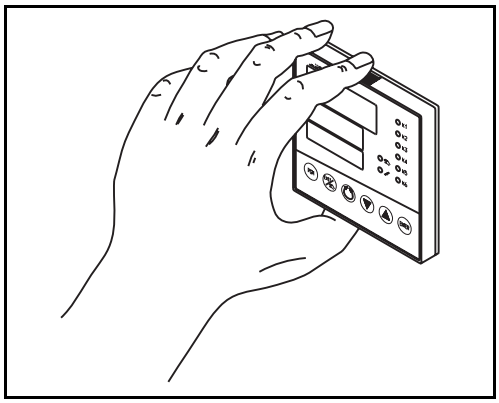
The analogue inputs are supplied ex-factory as universal inputs. They can be reconfigured to the standard signals -10/0/2 — 10V and -1V — 1V.

* Re-arrange push-on jumpers as in the diagram below



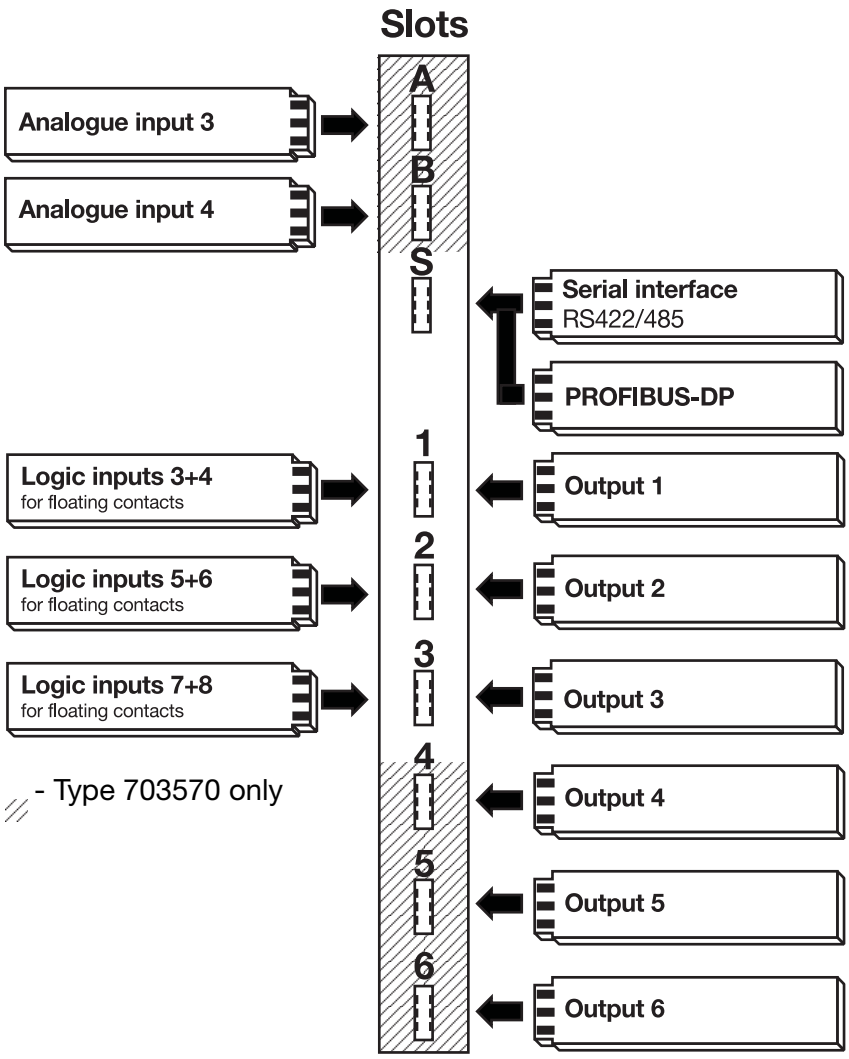
Removing the controller chassis

* Pull off setup plug
* Press together the knurled areas on the panel top and bottom (or left and right with landscape format) and pull out the controller chassis.

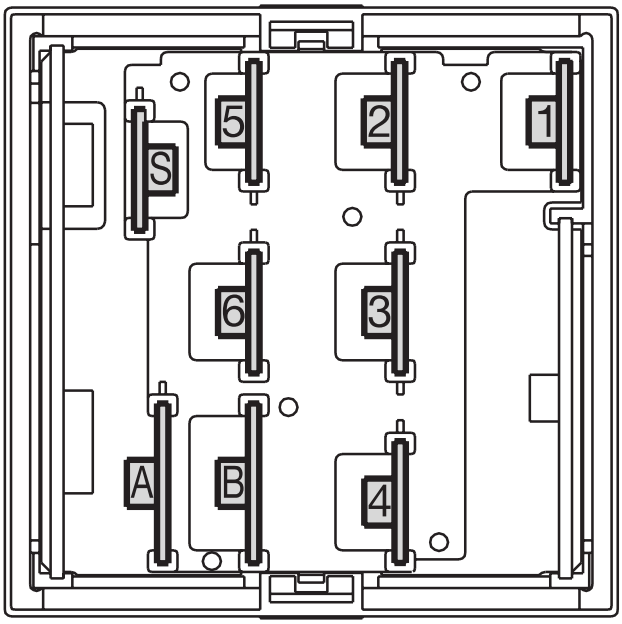


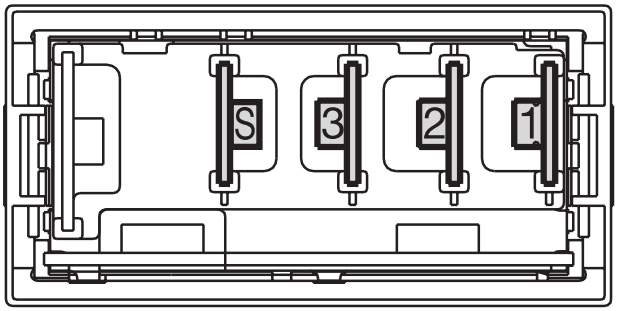
Assigning the slot

* Determine the corresponding slot for the card



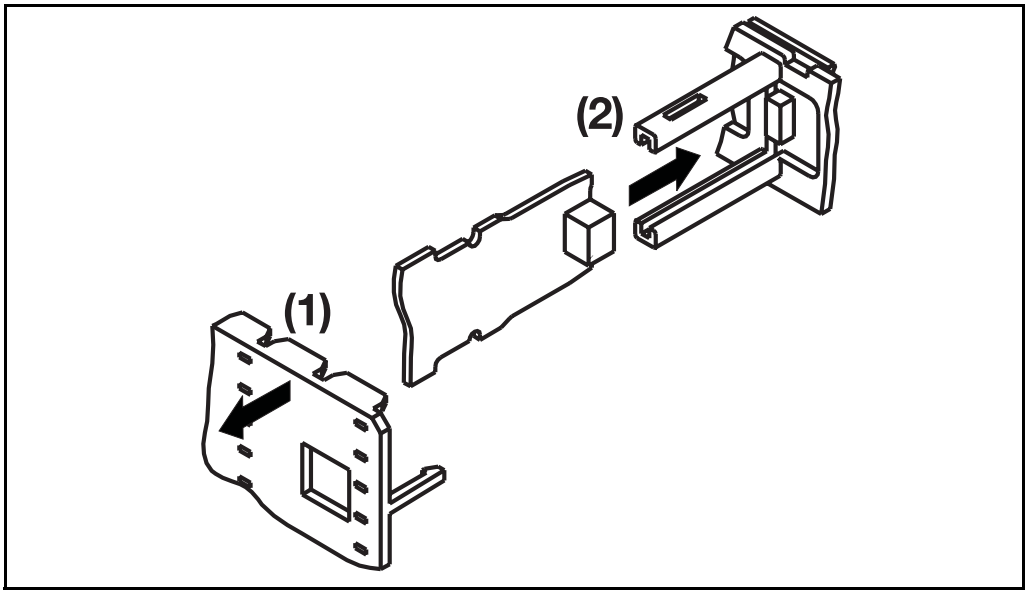
9 Retrofitting of cards





Inserting the card

* Pull off the guide plate (1)
* Insert the card into the guide until the projections on the card snap into the notches provided (2).



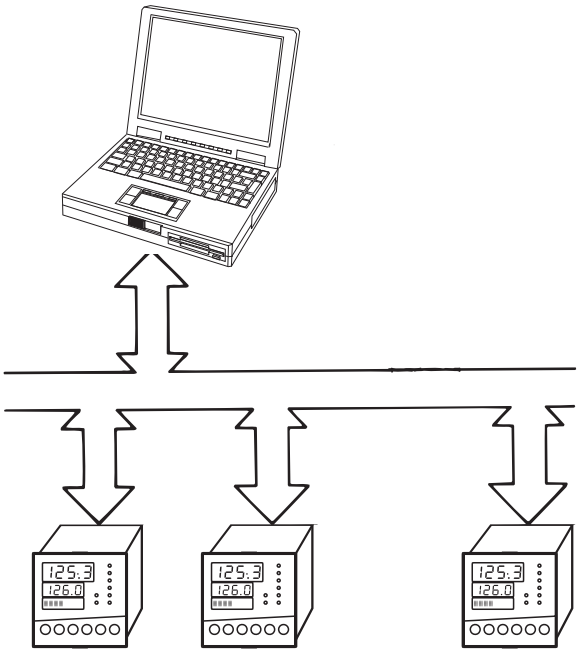
Inserting the controller chassis

* Fit on the guide plate
* Push the controller chassis into the case until the lugs (underneath the knurled area) snap into place.

10.1 RS422/485 interface

The controller can be integrated into a data network via the interface. The following applications can be implemented, for example:

- process visualisation
- system control
- generating a report
- configuration



The bus system is designed on the master-slave principle. A master computer can address up to 31 controllers and instruments (slaves). The interface is a serial interface to the RS422 and RS485 standards.

The following data protocols are possible:

- MODbus/Jbus protocol

☞ Interface description B70.3570.2

10.2 PROFIBUS-DP

Fieldbus

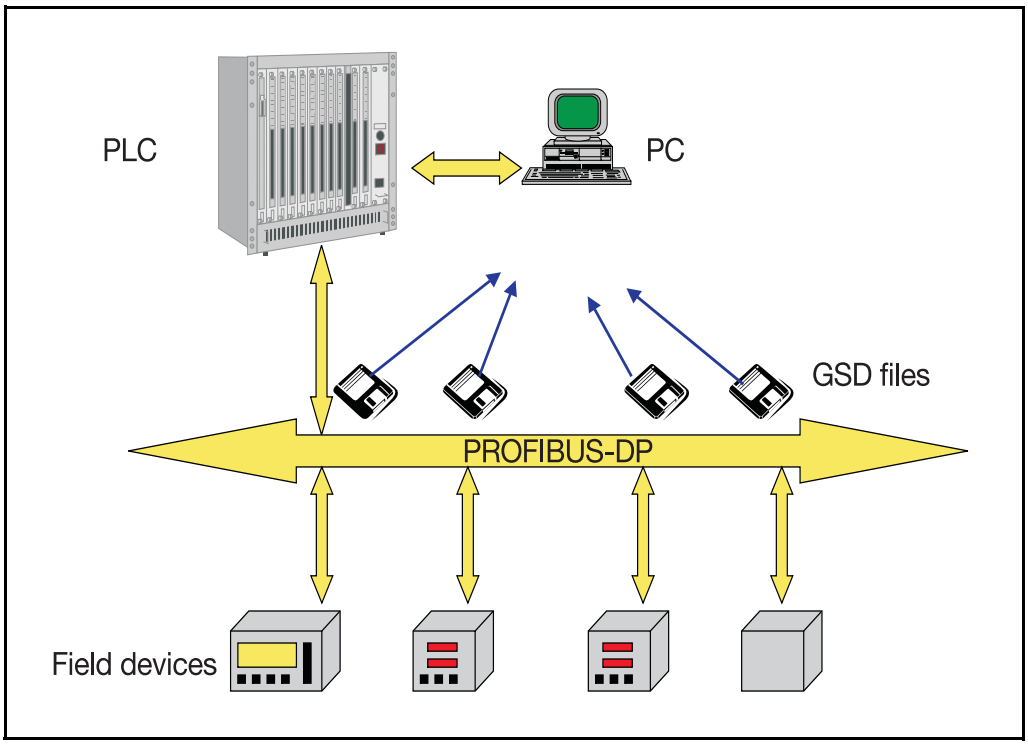
The controller can be incorporated into a fieldbus system according to the PROFIBUS-DP standard, via the PROFIBUS-DP interface. This PROFIBUS variant has been especially designed for the communication between automation systems and distributed peripheral devices at the fieldbus level, and is optimised for speed.

Data transmission

Data transmission is performed serially, according to the RS485 standard.

GSD generator

With the aid of the project design tool included in the delivery (GSD generator; GSD = Device Base Data), a standardised GSD file is created, which serves to integrate the controller into the fieldbus system, through the selection of characteristic controller features.



☞ Interface description B 70.3560.2.1

11.1 External relay module ER8

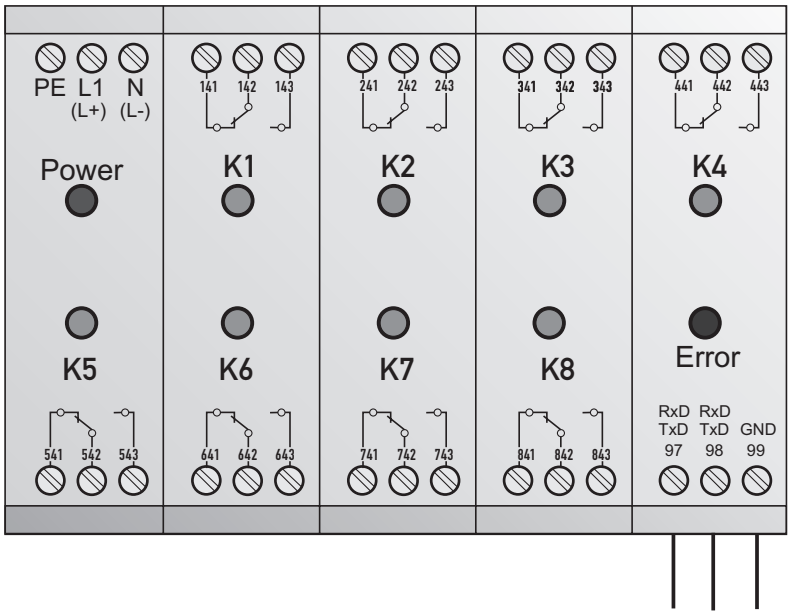
Through the use of the external relay module ER8, the controller can be expanded by eight relay outputs (changeover contacts). Communication with the controller is via the RS422/485 interface. All signals for switching outputs can be produced. Configuration is via the setup program only.

⇨ Section 7.4 “Outputs”

☞ If the relay module ER8 is connected to the interface, no further communication is possible via the interface.

Connection

The electrical connection is carried out like the connection to an RS485 interface.



Type 703570: Terminal strip 2, terminal	3 4 5
Type 703575: Terminal strip 2, terminal	3 4 5

Configuring the relay module

✱ Activate the relay module via the setup program
Edit ➔ *Settings only via setup* ➔ *Expanded configuration*

This activates the menu *Edit* ➔ *External relay module*.

✱ Configure the relay module

If the setup plug is connected to the controller, the relay module will not be operated and the relay contacts are de-energised.

11 Accessories

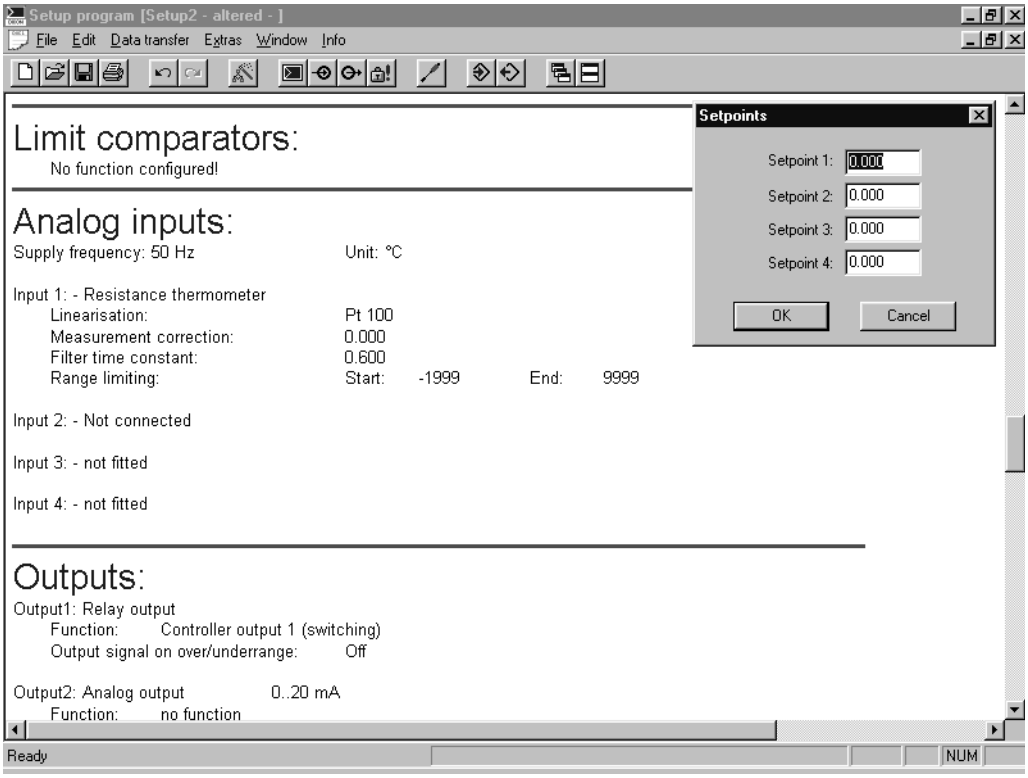
11.2 Setup program with commissioning software

Setup program

A setup program for Windows® 95/98/NT4.0/2000/XP is available for easy configuration of the controller.

Hardware requirements:
- PC-486DX-2-100
- 16 Mbyte RAM
- 15 Mbyte available on hard disk
- CD-ROM
- 1 free serial interface

The program shows the current configuration as a list in the background. The corresponding entry template is called up by double-clicking on the list, or via the menus.



Some controller functions can only be configured via the setup program:

- Customized linearisation (input of a linearisation table)
- Display brightness of display 3
- Switch off code request (extended configuration)
- Configure relay module
- Alter passwords

Commissioning software

The commissioning software is a part of the setup program and is available for adapting the controller to the control loop, optimally and conveniently.

Different process variables (e.g. setpoint, process value, control deviation, signals from the controller outputs) can be displayed graphically. The controller parameters can be altered and transferred to the controller via the setup/ RS422/485 interface.

Data recording is limited to 48 hours.

12.1 Technical data

Thermocouple input

Designation			Range[1]	Meas. accuracy	Ambient temperature error
Fe-Con	L		-200 +900°C	≤0.25%	100 ppm per °C
Fe-Con	J	EN 60584	-200 +1200°C	≤0.25%	100 ppm per °C
Cu-Con	U		-200 +600°C	≤0.25%	100 ppm per °C
Cu-Con	T	EN 60584	-200 +400°C	≤0.25%	100 ppm per °C
NiCr-Ni	K	EN 60584	-200 +1372°C	≤0.25%	100 ppm per °C
NiCr-Con	E		-200 +1000°C	≤0.25%	100 ppm per °C
NiCrSi-NiSi	N	EN 60584	-100 +1300°C	≤0.25%	100 ppm per °C
Pt10Rh-Pt	S	EN 60584	0 — 1768°C	≤0.25%	100 ppm per °C
Pt13Rh-Pt	R	EN 60584	0 — 1768°C	≤0.25%	100 ppm per °C
Pt30Rh-Pt6Rh	B	EN 60584	0 — 1820°C	≤0.25%[2]	100 ppm per °C
W5Re-W26Re			0 — 2320 °C	≤0.25%	100 ppm per °C
W3Re-W25Re			0 — 2400 °C	≤0.25%	100 ppm per °C
Cold junction			Pt100 internal, external or constant		

1. The specifications refer to an ambient temperature of 20°C.
2. within range 300 — 1820°C

Resistance thermometer input

Designation		Type of connection	Range	Meas. accuracy	Ambient temperature error
Pt100	EN 60751	2-wire/3-wire	-200 +850°C	≤0.05%	50 ppm per °C
Pt 50,500, 1000	EN 60751	2-wire/3-wire	-200 +850°C	≤0.1%	50 ppm per °C
KTY11-6		2-wire	-50 +150°C	≤1.0%	50 ppm per °C
PtK9		2-wire	lithium-chloride sensor		
Sensor lead resistance		max. 30Ω per conductor in 2-/3-wire circuit			
Measuring current		250µA			
Lead compensation		not required for 3-wire circuit. For 2-wire circuit, lead compensation can be provided in the software by process value correction.			

Input for standard signals

Designation	Range	Meas. accuracy	Ambient temperature error
Voltage	0 — 10V, input resistance R_E > 100kΩ	≤0.05%	100 ppm per °C
	-10 to +10V, input resistance R_E > 100kΩ	≤0.05%	100 ppm per °C
	-1 to +1V, input resistance R_E > 100kΩ	≤0.05%	100 ppm per °C
	0 — 1V, input resistance R_E > 100kΩ	≤0.05%	100 ppm per °C
	0 — 100mV, input resistance R_E > 100kΩ	≤0.05%	100 ppm per °C
	-100 to +100mV, input resistance R_E > 100kΩ	≤0.05%	100 ppm per °C
Current	4 — 20mA, voltage drop ≤ 1V	≤0.1%	100 ppm per °C
	0 — 20mA, voltage drop ≤ 1V	≤0.1%	100 ppm per °C
Potentiometer	min. 100Ω, max. 10kΩ		

Measurement circuit monitoring[1]

Transducer		Over/underrange	Probe/lead short circuit	Probe/lead break
Thermocouple		•	-	•
Resistance thermometer		•	•	•
Voltage	2 — 10V	•	•	•
	0 — 10V	•	-	-
Current	4 — 20mA	•	•	•
	0 — 20mA	•	-	-

●= recognised -= not recognised

1. In the event of an error, the outputs move to defined states (configurable).

Standard version

12 Appendix

Outputs

Relay contact rating contact life contact protection circuit	changeover contact 3A at 250VAC resistive load 150 000 operations at rated load 56Ω/15nF between common-make/common-break		
Logic current limiting	0/5V 20mA	or	0/12 30mA
Solid-state relay contact rating protection circuit	1A at 230V Varistor		
Voltage output signals load resistance	-10 to +10V / 0 — 10V / 2 — 10V R_{load} 500Ω min.		
Current output signals load resistance	-20 to +20mA / 0 — 20mA / 4 — 20mA R_{load} 450Ω max.		
Supply for 2-wire transmitter voltage current	22V 30mA		

Controller

Controller type	Single-setpoint controller, double-setpoint controller, modulating controller, proportional controller, proportional controller with integral actuator driver
Controller structures	P/PD/PI/PID/I
A/D converter	resolution better than 15 bit
Sampling time	210msec

Electrical data

Supply (switched mode power supply)	110 — 240V -15/+10% AC 48 — 63Hz 20 — 30V DC/AC 48 — 63Hz
Test voltages (type test)	to EN 61010, Part 1 overvoltage category II, pollution degree 2
Power consumption	24VA max. for Type 703570 14VA max. for Type 703575
Data backup	EEPROM
Electrical connection	at the rear via screw terminals, conductor cross-section up to 2.5mm^2 and core-end sleeve (length: 10mm)
Electromagnetic compatibility Interference emission Immunity to interference	EN 61326-1 Class A Industrial requirements
Safety standards	to EN 60730-1 for Type 703570 to EN 61010-1 for Type 703575

Housing

Housing type	plastic housing for panel mounting to IEC 61554		
Type	703575/1...	703575/2...	703570/0...
Bezel in mm	48 x 96 (portrait)	96 x 48 (landscape)	96 x 96
Depth behind panel in mm	130	130	130
Panel cut-out in mm	$45^{+0.6}$ x $92^{+0.8}$	$92^{+0.8}$ x $45^{+0.6}$	$92^{+0.8}$ x $92^{+0.8}$
Ambient/storage temperature range	-5 to 55°C / -40 to +70°C		
Climatic conditions	rel. humidity not exceeding 95% annual mean, no condensation		
Operating position	unrestricted		
Protection	to EN 60529, front IP65, rear IP20		
Weight (fully fitted)	approx. 420g	approx. 420g	approx. 730g

Standard version

Approvals/marks of conformity

Mark of conformity	Testing laboratory	Certificates/certification numbers	Test basis	valid for
ABS	American Bureau of shipping	Certificate No. 03-HG348501-PDA	ABS - Steel Vessel Rules	DICON 500
BV	Bureau Veritas	Certificate No. 10616/A0 BV File Number AP 3345 Product Code 2643H	B.V. Rules and Regulations for the Classification of Ships AUT-UMS, AUT-CCS, AUT-PORT, AUT-IMS	DICON 500
DIN	Deutsche Industrie Norm	Registernummer TR111704	DIN EN 14 597	DICON 500
DNV	Det Norske Veritas	Certificate No. A-10489	DNV Rules vor Ships Pt. 4 Ch. 9 - Control and Monitoring CLASSES Temperatur A Humidity B Vibration A EMC A	DICON 500
GL - Hardware GL - Software	Germanischer Lloyd	Certificate No. 15 694-00 HH	GL-Baumusterprüfung Kategorie C, EMC2	DICON 500
LR	Lloyd's Register	Certificate No. 00/20074 (E1)	LR Type Approval System Test Specification Number 1 Environmental categories ENV1 and ENV2	DICON 500
RINA	REGISTRO ITALIANO NAVALE	Certificate No. MAC82202CS1	RINA Type Approval System Rules for classification of ships - Part C-Machinery, systems and fire protection. - Ch. 3, Sect. 6, Table 1	DICON 500
c UL us	Underwriters Laboratories	E 201387	UL 61010-1 CAN/CSA-C22.2No.61010-1	DICON 400/500

12 Appendix

12.2 Alarm messages and display priorities in the normal display

Priority	Display		Possible error / notes	Assignment	Error handling check/repair/replacement
	Matrix	7-segment			
high	▦▦▦▦▦▦▦▦ +LEDs	8888. 8888. (blinks)	watchdog or power-on will trigger initialisation (reset)	controller	replace controller when initialisation is longer than 5sec
	(no display)	(no display)	- logic function “All displays off” is configured and active - controller faulty - supply faulty	- no error - controller - supply	- open logic input - replace controller - check supply
	BREAK E1 … BREAK E4	9999. (blinks) or ( )*	- probe/lead break of resistance thermometer (connection 1.9, 1.11, 1.4, 1.8, 2.10, 2.12, 3.20, 3.12) or standard-signal input - probe/lead short-circuit at standard-signal input - overrange at standard-signal input - underrange at standard-signal input	external signal generator	- check probe for break or short-circuit - check probe connection and terminals - check lead
	ORANGE 1 … ORANGE 4	9999. (blinks) or ( )*	- overrange of resistance thermometer and thermocouple input - probe/lead break of thermo-couple input	external signal generator	- is the medium to be measured within the measuring range (too hot - too cold?) - check probe for break and short-circuit - check probe connection and terminals - check lead
	URANGE 1 … URANGE 4	- 1999. (blinks) or ( )*	- underrange of resistance thermometer and thermocouple input - probe/lead short-circuit of resistance thermometer - probe/lead break of resistance thermometer 1.10, 1.7, 2.11, 3.11		
	ORANGEM1 ORANGEM2	( )*	overrange (maths module) (calculation result > range end)		
	URANGEM1 URANGEM2	( )*	underrange (maths module) (calculation result < range start)		
	MATH1 ERR MATH2 ERR	( )*	mathematical error (violation of mathematical rules; impermissible values)	controller	check maths formulae
	LOG1 ERR LOG2 ERR	( )*	logic error (violation of mathematical rules)	controller	check logic formulae
	ER8 ERR	( )*	error on relay module (not applicable with GL approval)	-	-
	BUSERROR	( )*	no communication	periphery	check periphery
	(Text) … (Text)	( )*	text display (logic input 1) … text display (logic input 8)	-	-
	(Text) … (Text)	( )*	text display (limit comparator 1) … text display (limit comparator 8)	-	-
	(Text)	( )*	text display (logic 1)	-	-
	(Text)	( )*	text display (logic 2)	-	-
low	* display according to configuration 1. can be acknowledged (continued on next page)				

Priority	Display		Possible error / notes	Assignment	Error handling check/repair/replacement
	Matrix	7-segment			
high	SOACTIVE	()*	self-optimisation has been activated	-	-
	····· ····· ····· ·····	---- or ()*	measurement input not available or not configured	controller	- configure measurement input - retrofit card
low	(display according to configuration)		-	-	-
	* display according to configuration				

Acknowledging alarm messages

On pressing the ENTER key, the message disappears.

Table: Assignment of the measurement inputs/response of the outputs in the event of an error (to be filled in by the user)

	Measurement input			Response of the outputs in the event of error					
No.	**Transducer**	**Measuring range**	**Measurement site**	**Output 1**	**Output 2**	**Output 3**	**Output 4**	**Output 5**	**Output 6**
1									
2									
3									
4									
Example:									
1	Pt100	20—500°C	Machinery room boiler temperature 1	Output 100%		Limit comparator off			

12.3 Character set for matrix display

The special characters for text entries in the setup program are shown below. They are entered from the keys using the key combination Alt + XXX

0		32		64	@	96	`	128	Ç	160	á	192		224	α
1		33	!	65	A	97	a	129	ü	161	í	193		225	β
2		34	"	66	B	98	b	130	é	162	ó	194		226	Γ
3		35	#	67	C	99	c	131	â	163	ú	195		227	Π
4		36	$	68	D	100	d	132	ä	164	ñ	196		228	Σ
5		37	%	69	E	101	e	133	à	165	Ñ	197		229	σ
6		38	&	70	F	102	f	134	å	166		198		230	µ
7		39	'	71	G	103	g	135	ç	167		199		231	γ
8		40	(	72	H	104	h	136	ê	168	¿	200		232	ϕ
9		41	)	73	I	105	i	137	ë	169		201		233	θ
10		42	*	74	J	106	j	138	è	170		202		234	Ω
11		43	+	75	K	107	k	139	ï	171		203		235	δ
12		44	,	76	L	108	l	140	î	172		204		236	∞
13		45	-	77	M	109	m	141	ì	173		205		237	∅
14		46	.	78	N	110	n	142	Ä	174		206		238	∈
15		47	/	79	O	111	o	143	Å	175		207		239	∩
16		48	0	80	P	112	p	144	É	176		208		240	
17		49	1	81	Q	113	q	145	æ	177		209		241	
18		50	2	82	R	114	r	146	Æ	178		210		242	
19		51	3	83	S	115	s	147	ô	179		211		243	
20		52	4	84	T	116	t	148	ö	180		212		244	
21		53	5	85	U	117	u	149	ò	181		213		245	
22		54	6	86	V	118	v	150	û	182		214		246	
23		55	7	87	W	119	w	151	ù	183		215		247	
24		56	8	88	X	120	x	152	ÿ	184		216		248	°
25		57	9	89	Y	121	y	153	Ö	185		217		249	·
26		58	:	90	Z	122	z	154	Ü	186		218		250	
27		59	;	91	[	123	{	155	¢	187		219		251	
28		60	<	92	\	124	|	156	£	188		220		252	
29		61	=	93	]	125	}	157	¥	189		221		253	
30		62	>	94	^	126	~	158		190		222		254	
31		63	?	95	_	127		159		191		223		255	

200 — 210 reserved for bar graph display

12 Appendix

12.4 Instrument features (configuration level 2)

The software version and the hardware features of the process controller are shown here

CONF 2

	Parameters	Value/selection	Description
Version	→VERSION	50.0X.0X	version number
VDN number	→VDN NO.	STANDARD XXX.XXXX	standard version VDN number (alteration to the standard version)
Analogue input 3 **Analogue input 4**	→IN3 →IN4	NO YES	not available available universal input
Analogue inp. 1 10V **Analogue inp. 2 10V** **Analogue inp. 3 10V** **Analogue inp. 4 10V**	→IN1 10V →IN2 10V →IN3 10V →IN4 10V	NO YES	not available available voltage input -10/0/2 — 10V
Slot 1 **Slot 2** **Slot 3** **Slot 4** **Slot 5** **Slot 6**	→OUTPUT1 →OUTPUT2 →OUTPUT3 →OUTPUT4 →OUTPUT5 →OUTPUT6	NO RELAY SSRELAY ANOUTPUT LOGIC 5V OUTP 22V LOGIN	not available relay solid-state relay analogue output logic output 5V logic output 22V or voltage output for 2-wire transmitter two logic inputs
Setup interface	SETUP	NO YES	not connected connected
Interface	INTERFCE	NO RS422/485 PROFIBUS	not available RS 422/485 PROFIBUS-DP
Mathematics	MATHLOG	NO YES	not available available

12.5 Notes for instruments with Germanischer Lloyd (GL) approval

The information below is intended to supplement or replace the details that have already been given.

12.5.1 Technical data

Ambient conditions according to application category C for enclosed areas

Temperature	-5 to 55°C
Relative humidity	≤100 % r. h.
Vibration	≤0.7 g

Electromagnetic compatibility

The electromagnetic compatibility corresponds to the GL guidelines for type examinations (10.97).

12.5.2 Alarm messages

⇨ Section 12.2

12.5.3 Inhibits

All levels are inhibited by codes. Alterations, whether accidental or deliberate, cannot be made easily. The operating level is not inhibited by a code. In this case, it is possible to lock the entire keypad via a logic contact (e.g. key-switch).

⇨ Section 5.3

12.5.4 Manual mode

⇨ Section 5.6

☞ Manual mode is only possible with a fully operational instrument!

12.5.5 Additional notes

☞ If servicing is required, the instrument has to be sent back to the main factory.
In accordance with the regulations of the Germanischer Lloyd, certain applications require the availability of a reserve instrument.

☞ The instrument can only be used with restrictions on the bridge, since a continuous dimming of the display brightness is not possible!

☞ it is recommended that a print-out of the setup program be kept on site, together with the technical documentation for the controller (can be requested, if necessary).

P

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