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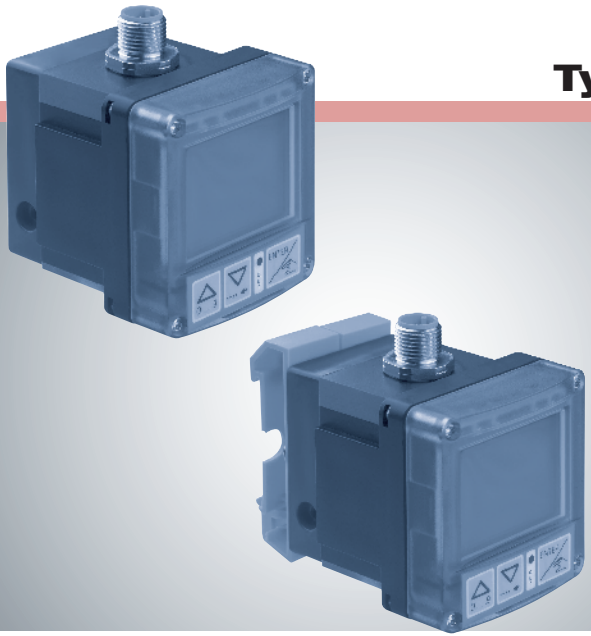
Operating Instructions

Bedienungsanleitung
Instructions de Service



Type 8611

eCONTROL

Compact Process controller for

Temperature-, pressure- and flow control

bürkert
FLUID CONTROL SYSTEMS

GB

We reserve the right to make technical changes without notice.
Technische Änderungen vorbehalten.
Sous reséve de modification techniques.

Operating Instructions 0703/00_EU-EN_00805625

eCONTROL Type 8611

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1 GENERAL

1.1 The Operating Manual

The operating manual describes the entire life cycle of the device. Store this manual in such a way that is easily accessible to every user and is available to every new owner of the device.

WARNING!

The operating instructions has to be read and understood.

- Read the operating instructions carefully.
- Observe the precautions contained in chapter *Safety*!

1.2 Symbols

The following symbols are used throughout this operating manual:

DANGER!

High risk

- Risk of serious or even fatal injuries - if the safety regulations are not observed.

WARNING!

Medium risk

- Risk of injuries or serious equipment damage - if the safety regulations are not observed.

CAUTION!

Low risk

- Risk of serious equipment damage - if the safety regulations are not observed.

NOTE!

Describes important additional information, tips and recommendations that are important for your safety and the proper functioning of the device.

NOTE!

Refers to information in this operating manual or in other documents.

→ Indicates a work step which you must carry out.

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2 SAFETY

2.1 Intended use

The eCONTROL 8611 may only be used for the applications and ordering codes provided for in chapter *Device description,* and only in connection with third-party devices or components recommended or permitted by Bürkert. Use in any other way does not constitute an intended use.
Observe the instructions in this operating manual, as well as the conditions of use and permissible data specified in the chapter *Device description*. The proper and safe function of the eCONTROL 8611 depends on proper transport, storage and installation, and on careful operation and maintenance.

2.2 General safety precautions

DANGER!

Hazard due to high pressure in the system!

Interference with the system will result in an acute risk of injury.

- Switch off the pressure and depressurise the system before loosening pipes and modules!

Hazard due to electrical voltage in the system!

Interference with the system will result in an acute risk of injury.

- Before starting work, be sure to switch off the supply voltage and secure it to prevent restarting!
- Observe all applicable accident prevention and safety regulations for electrical equipment.

WARNING!

Unintentional operation or impermissible damage can lead to dangerous situations including physical injury.

- Take suitable measures to prevent unintentional operation or inadmissible damage!
- Ensure that the process is restarted in a defined and controlled manner after an interruption in the electrical or pneumatic power supply!

Dangerous situations may occur during installation and maintenance work.

- This work may only be carried out by specialist personnel using appropriate tools!

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CAUTION!

The general rules of technology apply to the planning and operation of the device!

Failure to observe these rules may result in injury and / or damage to the equipment or its surroundings:

- Observe the general rules of technology!

Electrostatically sensitive components / modules

The system contains electronic components that react sensitively to electrostatic discharge (ESD). Touching by electrostatically charged persons or objects can endanger these components. In the worst case they may be immediately destroyed or fail after commissioning.

- Observe the requirements of EN 100 015 - 1 in order to avoid or minimise the risk of damage caused by sudden electrostatic discharges.
- Pay attention also not to touch electronic components when the supply voltage is switched on.

NOTE!

The eCONTROL 8611 was developed having regard to recognized safety engineering regulations and represents the state of the art. However, risks may nevertheless arise.
Operate the eCONTROL 8611 only when it is in perfect condition and in accordance with the operating manual.

Failure to observe this information and unauthorised intervention in the eCONTROL 8611 releases is from all liability and annuls the guarantees applicable to the devices and accessories!

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3 GENERAL NOTES

3.1 Scope of supply

Immediately upon receipt of delivery, check that the contents have not been damaged and that the delivery matches the delivery note or packing list in type and scope. Please contact us immediately in the event of discrepancies.

Germany

Contact Address:

Bürkert Fluid Control System
Sales Centre
Chr.-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. : 07940 - 10 111
Fax: 07940 - 10 448
E-mail: info@de.buerkert.com

International

Contact addresses are found on the final pages of this operating manual.

You can also find information on the Internet under:

www.burkert.com ➔ Bürkert ➔ Company ➔ Locations

3.2 Warranty terms

This document does not offer any form of warranty. Please refer to our general terms and conditions of business. The guarantee is only valid if the eCONTROL 8611 has been used correctly in accordance with the specified operating conditions.

NOTE!

This guarantee only covers the fault-free operating of the eCONTROL 8611 and its components.
We accept no liability for consequential damage of any kind which may arise from the failure or incorrect operation of the device.

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4 DEVICE DESCRIPTION

4.1 Approvals

The approval mark shown on the Bürkert rating plates refers to the Bürkert products.

4.2 Functions

In a fluidic system the eCONTROL 8611 maintains the process parameters (pressure, temperature, flow rate) constant or regulates them to a given setpoint in conjunction with a solenoid control valve or process control valve and a sensor for pressure, temperature or flow rate.

The function of the device is characterised by:

- compact form
- output of the controlled variables in the form of PWM signals directly to a Solenoid control valve or Process control valve (via an electromagnetic actuator system)
- to the actually demanded control range of a scalable standard signal input
- setpoint input via standard signal 4 to 20 mA (0 to 10 V optional)
- actual value output via standard signal 4 to 20 mA
- binary input
- binary output
- optionally display of setpoint or actual value in the LCD
- operation and configuration with three keys
- sensor input PT100, 4 to 20 mA or frequency (NPN)

4.3 Ordering chart for eCONTROL 8611

A fitting mounted controller Type 8611, consists of: - an electronic module 8611
- an INLIN fitting SO30 (DN06-DN65) [1)]

Sensor input	Control variable	Controllers outputs[2)]	Voltage supply	Setpoint setting	Process value output	Electrical connection	Item no.
Hall (internal)	Flow	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 4-pin M8 plug	00177455
Pt100 und Hall	Temperature	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 3-pin M8 plug, 4-pin M8 plug	00177458
4 ... 20 mA and Hall	Pressure, temperature or flow	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 3-pin M8 plug, 4-pin M8 plug	00177463

[1)] Refer to corresponding datasheet - has to be ordered separately.
[2)] PWM: Puls Wide Modulated output for actuating Solenoid control valves or Process control valves; 4 ... 20 mA controller output on request.

A wall-mounted controller Type 8611, consists of: - an electronic module 8611
- an wall-mounted adapter

Sensor input	Control variable	Controllers outputs[2)]	Voltage supply	Setpoint setting	Process value output	Electrical connection	Item no.
Frequency (NPN)	Flow	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 3-pin M8 plug, 4-pin M8 plug	00177454
Pt100	Temperature	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 3-pin M8 plug, 4-pin M8 plug	00177457
4 ... 20 mA	Pressure, temperature or flow	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 3-pin M8 plug, 4-pin M8 plug	00177462

A rail-mounted controller Type 8611, consists of: - an electronic module 8611
- a rail-mounted adapter

Sensor input	Control variable	Controllers outputs[2)]	Voltage supply	Setpoint setting	Process value output	Electrical connection	Item no.
Frequency (NPN)	Flow	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 3-pin M8 plug, 4-pin M8 plug	00177091
Pt100	Temperature	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 3-pin M8 plug, 4-pin M8 plug	00177456
4 ... 20 mA	Pressure, temperature or flow	2 x PWM	24 V DC	4 ... 20 mA	4 ... 20 mA	8-pin M12 plug, 3-pin M8 plug, 4-pin M8 plug	00177460

Table 4.1 Ordering chart for eCONTROL 8611

4.4 Ordering chart for accessories

(to be ordered separately)

Description	Item no.
Wall-mounted adapter	00427098
Rail-mounted adapter	00655980
Positioning system 6104 for Actuating process valve	00161802
4-pin M8 female right angle connector with self-locking threaded joint and 2 m molded cable	00918718
3-pin M8 female right angle connector with self-locking threaded joint and 2 m molded cable	00918717
8-pin M12 female connector with self-locking threaded joint and 2 m molded cable	00918991

Table 4.2 Ordering chart for accessories

4.5 Field of application

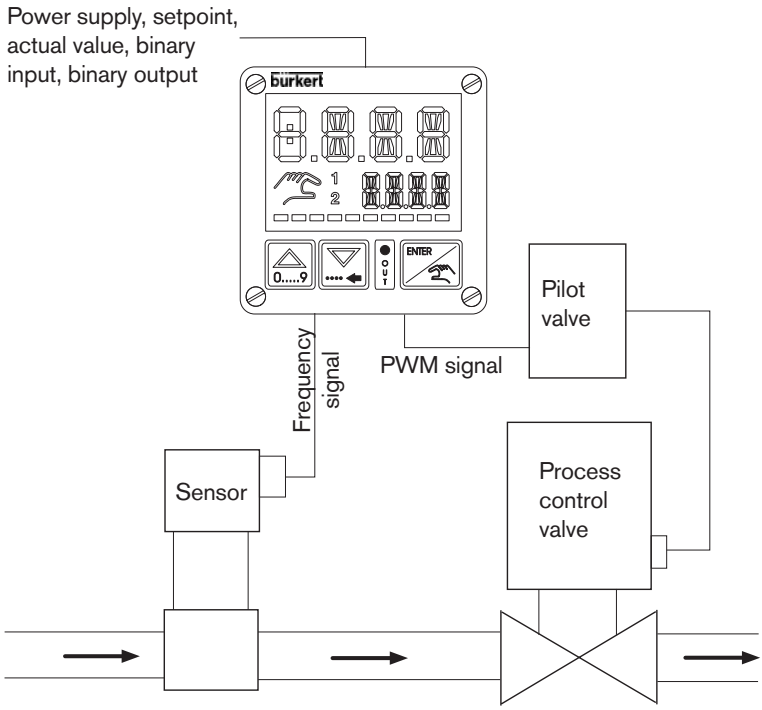

Illustration 4.1: Principle of flow rate control with Process control valve (schematic)

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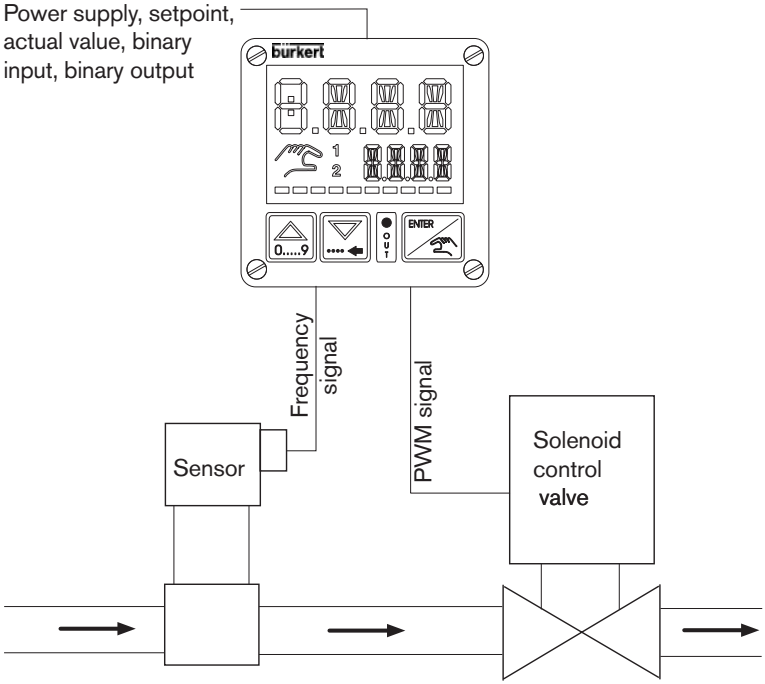

Illustration 4.2: Principle of flow rate control with Solenoid control valve (schematic)

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4.6 Technical data

General data	
Materials	
Housing, Cover	PC, +20 % glass fibre
Front panel film / screws	Polyester / stainless steel
Multi-pin	CuZn, nickel-plated
Wall mounting bracket	PVC
Installation	Random installation position
Compact device	with fitting SO30
	Wall mounting
	DIN rail mounting
Display	8-character LCD
Electrical connections	Multi-pin: 3-pin and / or 4-pin M8, 8-pin M12
Power supply cable	0.5 mm^2 max. cross-section; max. 100 m long, screened

Table 4.3 General data

Surroundings	
Ambient temperature	-20 °C to +70 °C (-4 °F to 158 °F) (operation and storage)
Relative humidity	≤ 80 %, non-condensing

Table 4.4 Environmental data

Standards and approvals	
Protection class to DIN EN 60529	IP65
Conformity with standards	
CE	in accordance with EMC Directive
	EN50081.1
	EN50082.2

Table 4.5 Standards and approvals

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Electrical data	
Operating voltage	24 V DC ±10%, filtered and controlled
Power consumption	ca. 2 W (without valves)
Controller scanning frquency	600 Hz
Inputs	
Setpoint	Max. input impedance: 70 Ω
Standard 4 to 20 mA	Resolution: 5.5 µA
	Max. input impedance: 11.5 kΩ
Standard 0 to 10 V	Resolution: 2.7 mV (on request)
Sensors	
Standard 4 to 20 mA	Max. input impedance: 70 W Resolution: 5.5 µA
Frequency	Input 1: external sensor min: 0.25 Hz / max. 5 kHz Input resistance:> 1 kΩ Signal types: sinus, square, delta (> 3000 mVpp, max. 30 Vpp) Input 2: Internal Hall sensor min: 0.25 Hz / max. 5 kHz (only in conjunction with Bürkert Type S030 Flow rate fitting)
Pt100	Pt100 (2-conductor) Measuring range: 0 °C to 100 °C Measuring current amperage: 1 mA Measuring error: < 0.5 °C
Sensor supply	24 V DC, max. 1 A
Binary input	Input impedance: 10 kΩ Response threshold: 2 V ... 30 V Max. frequency: 5 kHz
Outputs	
Continuous signal	Standard signal 4 to 20 mA max. wiper resistance: 680 Ω Precision: 1%
Discontinuous signal	2 transistor outputs (PNP) for PWM signal Control frequency 1 kHz to 20 Hz Resolution max.: 16 Bit (frequency-related) max. current load: 1 A Switching voltage: 24 V DC
Binary output	Transistor output (PNP) (configurable) max. current load: 1 A Switching voltage: 24 V DC

Table 4.6 Electrical data

5 ELECTRICAL INSTALLATION

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CAUTION!

Hazard with incorrect installation!

Incorrect installation can damage or even destroy the universal controller.

- The eCONTROL 8611 may only be installed by qualified personnel.

5.1 Pin assignment of the eCONTROL 8611

5.1.1 Model variants

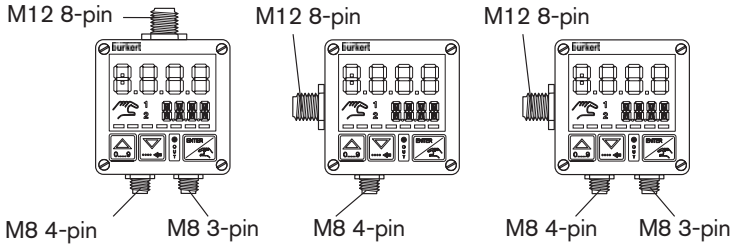

Illustration 5.1: Model variants of the eCONTROL 8611

M12 8-pin plug: Connection of supply voltage, setpoint input, actual value output, binary input, binary output

M8 3-pin plug: Sensor connection

M8 4-pin plug: Actuator connection
- Solenoid control valve,
- Process control valve or
- 4 ... 20 mA control

Illustration 5.2: Pin assignment of the eCONTROL 8611

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M12 8-pin plug:
Connection of supply voltage, setpoint input, actual value output, binary input, binary output

Pin	Colour*	Allocation
1	white	24 V DC Power supply voltage
2	brown	Binary input
3	green	GND supply voltage and binary input reference
4	yellow	Actual value (4 ... 20 mA) + not occupied at 4 to 20 mA controlled variable output
5	grey	Setpoint (4 to 20 mA) +
6	pink	GND actual value not occupied at 4 to 20 mA controlled variable output
7	blue	GND setpoint
8	red	Binary output

* Cable colors when using standard cables (e. g. Lumberg, Burkert ID 00918991)

M8 3-pin plug:
Sensor connection

Input type	Pin	Colour*	Allocation / external connection
4 ... 20 mA	1	brown	+24 V supply transmitter
	3	blue	not connected
2-conductor	4	black	output transmitter (4 ... 20 mA)
Sensor supply by 8611			→ 1 +24 V ← 4 4 ... 20 mA transmitter

* Cable colors when using standard cables
(e. g. Lumberg, Burkert ID 00918717)

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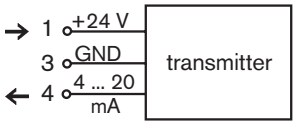
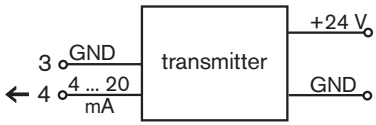
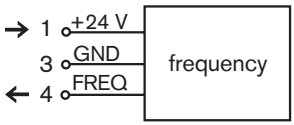
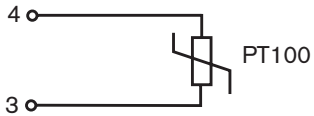
M8 3-pin plug:
Sensor connection

Input type	Pin	Colour*	Allocation / external connection
4 ... 20 mA	1	brown	+24 V supply transmitter
	3	blue	GND
3-wire	4	black	output transmitter (4 ... 20 mA)
Sensor supply by 8611, max. 1 A			
4 ... 20 mA	1	brown	not connected
	3	blue	GND
4-wire	4	black	output transmitter (4 ... 20 mA)
Sensor supply external			
Frequency	1	brown	+24 V supply transmitter
3-wire	3	blue	GND
(NPN)	4	black	Clock input
Sensor supply by 8611, max. 1 A			
PT100	1	brown	not connected
2-wire	3	blue	Process actual value (GND)
	4	black	Process actual value (current supply)
			

* Cable colors when using standard cables
(e. g. Lumberg, Burkert ID 00918717)

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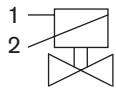
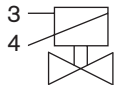
M8 4-pin plug:
Valve connection

Output type	Pin	Colour*	Allocation	
4 ... 20 mA	1	brown	Actuator output	
	2	white	GND	
	3	blue	not connected	
	4	black	not connected	
Process control valve	1	brown	Air supply +	 NC Normal closed
	2	white	Air supply -	
	3	blue	Exhausting -	 NO Normal open
	4	black	Exhausting +	
Solenoid control valve	1	brown	not connected	
	2	white	not connected	
	3	blue	Solenoid control valve -	
	4	black	Solenoid control valve +	

* Cable colors when using standard cables (e. g. Lumberg, Burkert ID 00918718)

6 OPERATION OF THE eCONTROL 8611

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WARNING!

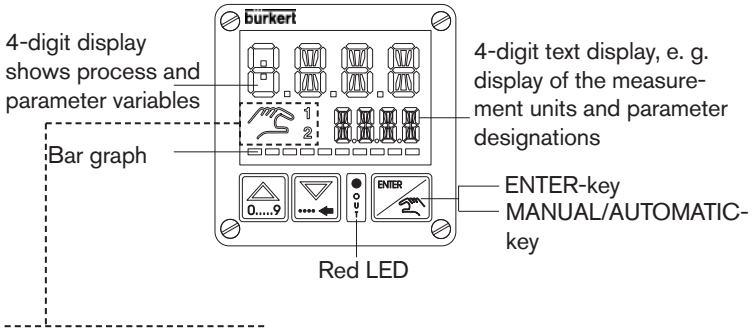
Danger by improper operation!

Improper operation can result in personal injury or damages on the universal controller.

- The eCONTROL 8611 must only be used by qualified personnel.

6.1 Display elements

The eCONTROL 8611 is equipped with an operating and display element with 3 keys and LCD matrix display. The function of the keys is described in the following chapters.



	Manual mode
1	External setpoint input
2	Controller active / inactive
Bar graph	10-segment bar graph for the analog display of the controlled variable in % (only with MODE = SCV and 4 to 20 mA)

Illustration 6.1: Display of the eCONTROL 8611

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6.2 Operating states

Three operating states are possible during operation of the eCONTROL 8611:

- Operating mode
- Configuration mode
- Autoscaling mode

When the supply voltage is switched on, the software version of the controller appears on the display for approx. 2 seconds. The controller is then in operating mode.

Switching to the other modes is possible with the actions shown in the figure. On exiting from configuration mode, the set parameters are stored in the memory of the controller.

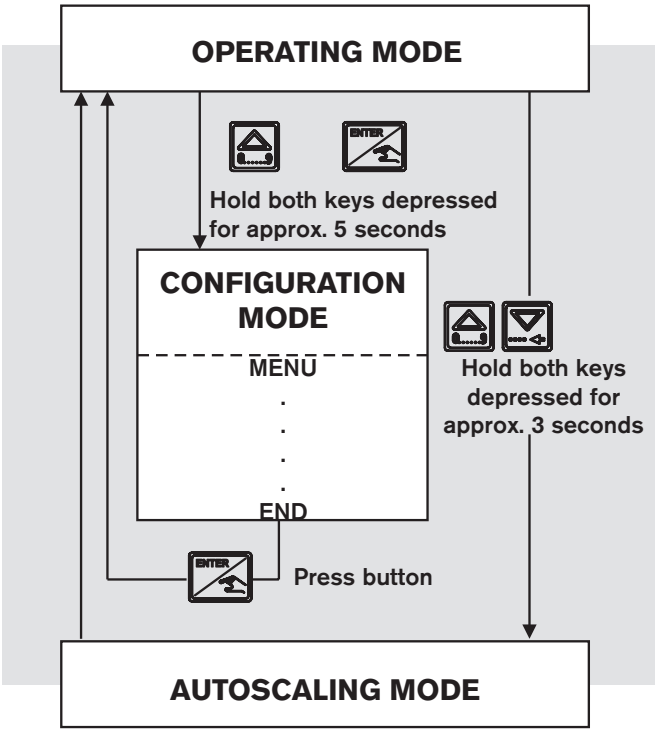

Illustration 6.2: Switch over between the operating modes

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6.3 Key assignment

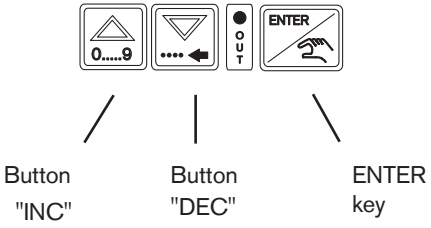

Illustration 6.3: Keys of the eCONTROL 8611

Modus	 **Press button:**	 **Press button:**	 **Press button:**
Operating mode	Display switchover between setpoint, actual value and control variable	Display switchover between setpoint, actual value and control variable	Setting of set-point internal Setting valve offset
Configura-tion mode menu items	in the menu back	in the menu for-wards	Terminate setting, back to menu item
Autoscaling mode menu items	in the menu back	in the menu for-wards	Terminate setting, back to menu item

Table 6.1 Key assignment

6.4 Operating mode

After setting the operating voltage, the device operates in this mode.
The current process value is then displayed, depending on the set process parameter (L/M, L/H, ML/H, BAR, °C, °F, etc.).

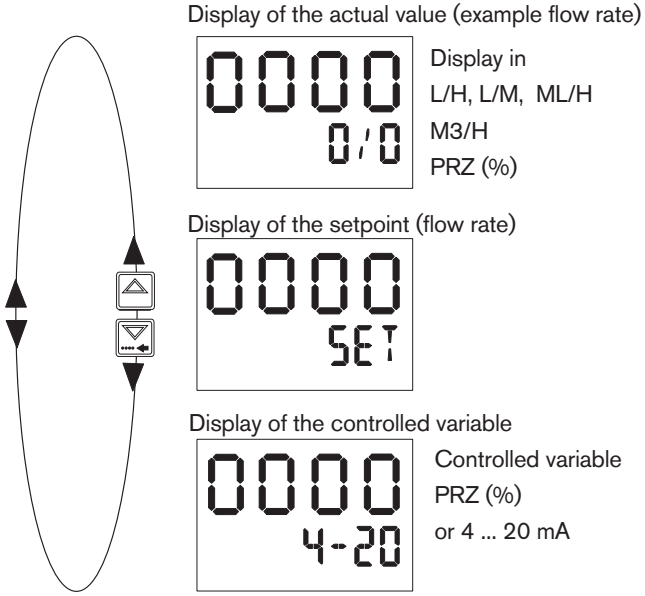

Illustration 6.4: Possible display in operating mode

6.4.1 Setpoint and offset setting of the valve in operating mode

In operating mode the setpoint and offset setting of the valve can be input via the keypad.

NOTE!

For this the setting INT must be selected in the configuration menu under the menu item SETP. (See Chapter 6.5.3)

Display of the decimal point according to the decimal point selected in the menu item UNIT!

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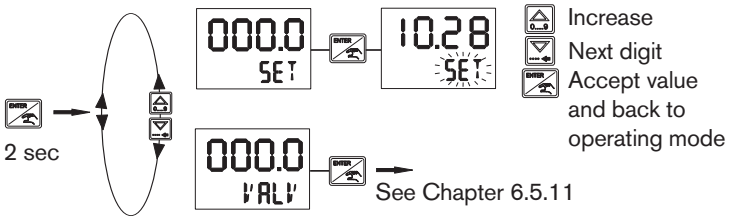

Illustration 6.5: Setpoint input in operating mode

6.5 Configuration mode

In configuration mode, the settings of the controller can be adapted to the application in question. The control continues to run in the background with the previously active parameters.

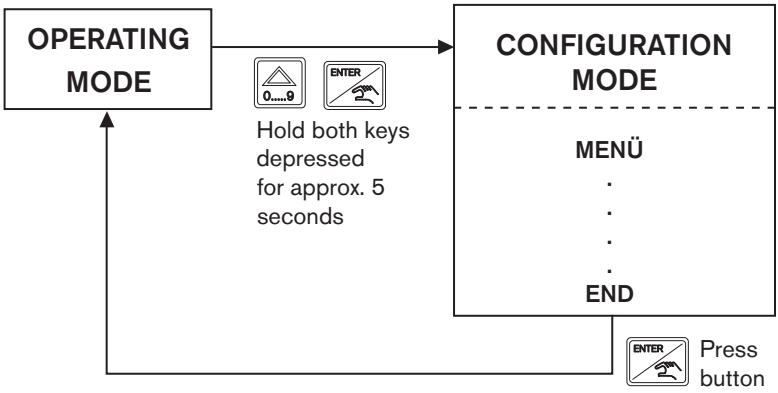

Illustration 6.6: Switch over from operating mode to configuration mode

NOTE!

Values changed in configuration mode are only active when the configuration mode has been terminated in the menu item "END" with the button or after switching the device off and on again.

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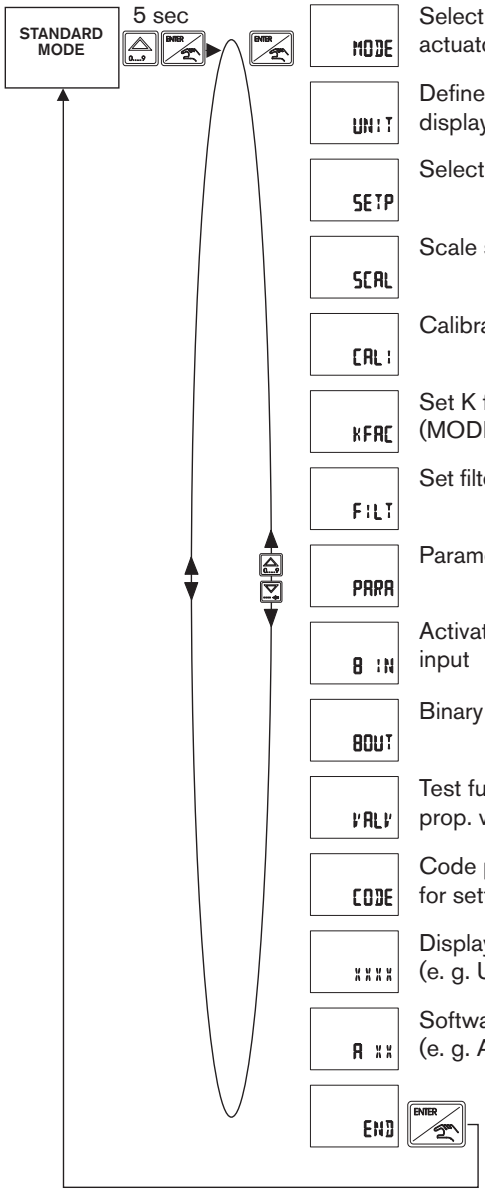

Display	Settings	Chapter
MODE	Selection of process parameter, actuator and sensor input	6.5.1
UNIT	Define units, decimal point and display	6.5.2
SETP	Select and scale setpoint input	6.5.3
SCAL	Scale sensor input and output	6.5.4
CALI	Calibrate inputs and outputs	6.5.5
KFAC	Set K factor (for flow meter) (MODE=FREQ)	6.5.6
FILT	Set filter of the sensor input	6.5.7
PARA	Parameterise controller	6.5.8
B IN	Activate or deactivate binary input	6.5.9
BOUT	Binary output	6.5.10
VALV	Test function, setting of offset prop. valve	6.5.11
CODE	Code protection for settings	6.5.12
x.x.x.x	Display of software version (e. g. U_01)	6.5.13
A xx	Software version (e. g. A_01)	6.5.13
END	Store set values	

Illustration 6.7: Menu of the configuration mode
(The description of the menu items can be found on the following pages.)

6.5.1 MODE – Selection of process parameter, actuator and sensor input

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In this menu item the process parameter (pressure, temperature, flow rate), the actuator (Solenoid control valve, Process control valve or 4 to 20 mA) and the type of sensor input (RTD 4 to 20, frequency) is selected.

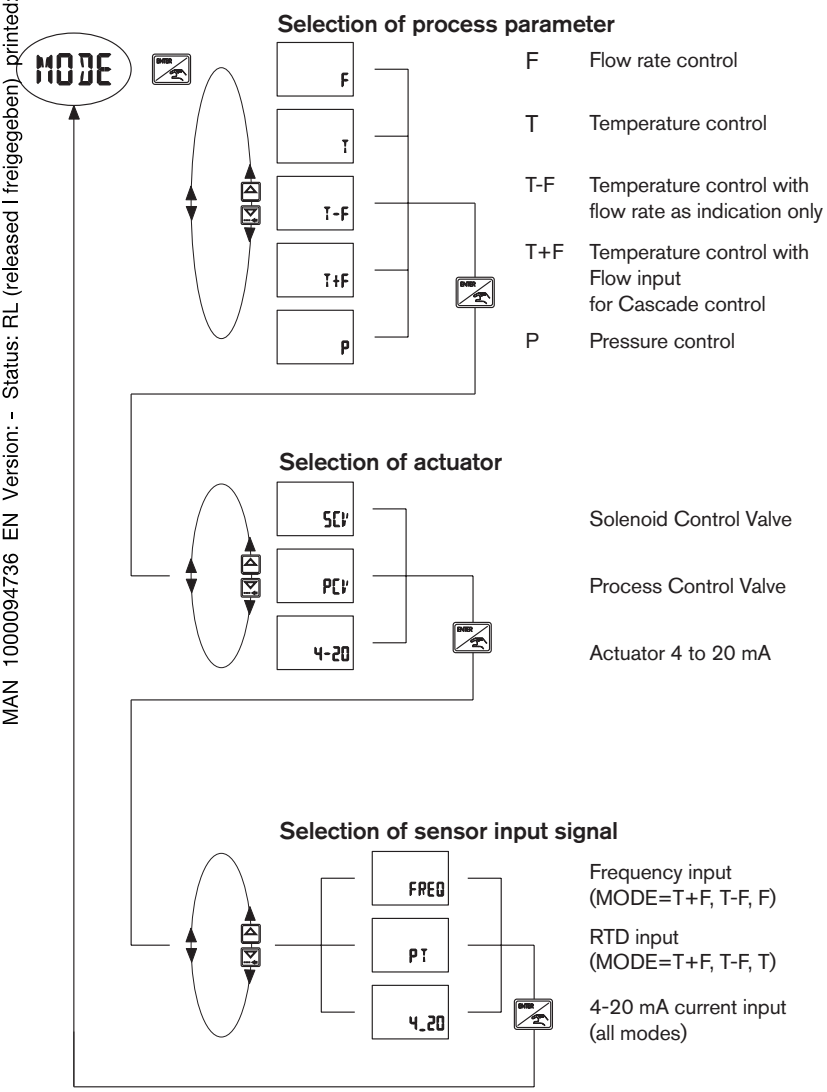

Illustration 6.8: MODE - Selection of process parameter, actuator and sensor input

NOTE!

In the event of a change in the process parameter, e. g. from F to T, all the parameters are reset to the factory settings. The factory settings can be found in the chapter *Installation*.

6.5.2 UNIT – Selection of units, decimal point and display

Depending on the MODE, various units are available for selection.

MODE = F :	L/M, L/H, M3/H, ML/H, G/M, G/H
MODE = P :	MBAR, BAR, PSI
MODE = T :	°C, °F
MODE = T + F, T - F :	°C, °F, L/M, L/H, M3/H, ML/H, G/M, G/H

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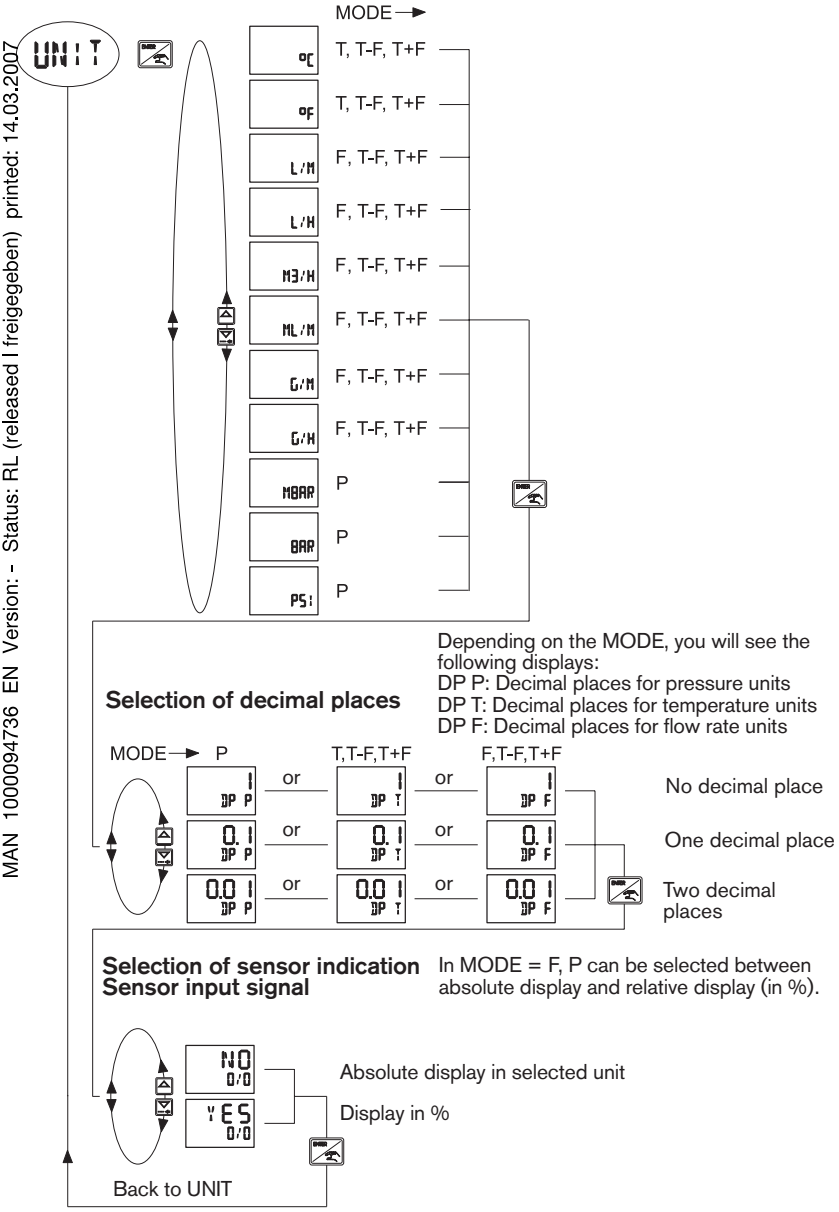

Illustration 6.9: UNIT - Define units

6.5.3 SETP - Select input signal for setpoint input and scaling of input signal (0 to 10 V, 4 to 20 mA)

Internal setpoint input

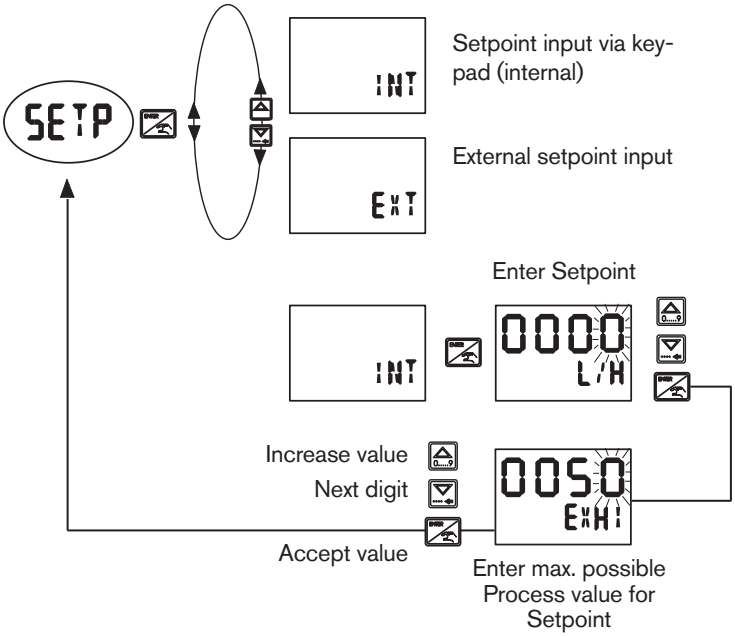

Illustration 6.10: SETP - Setpoint input for internal setpoint

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External setpoint

In EXT mode, the "1" appears on the display

NOTE!

Please note!
EXHI ≥ EXLO

NOTE!

The selection "4 to 20" or "0 to 10" is dependent on the controller model.
Note here the indication on the type plate!

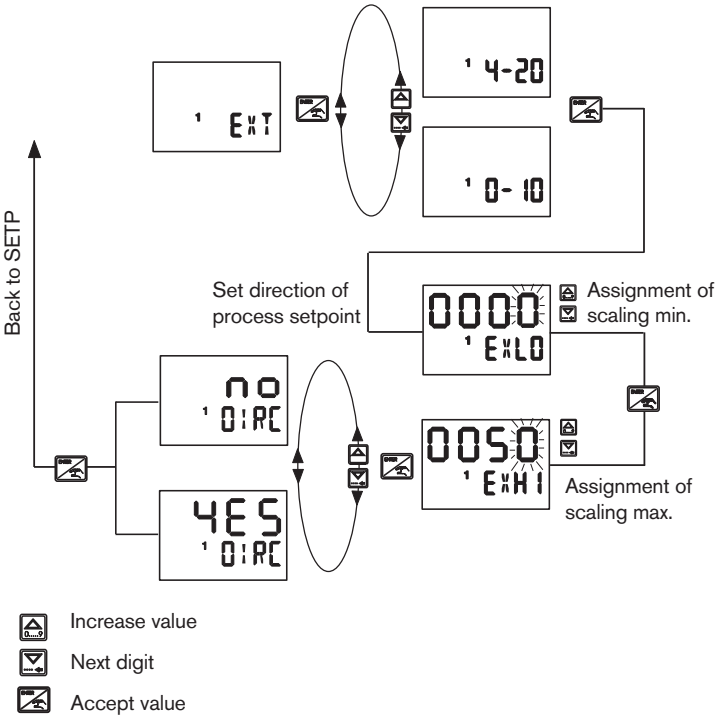

Illustration 6.11: SETP - Setpoint input for external setpoint

DIRC – Effective direction between input signal and process setpoint

The relationship in direction between the input signal (SETP) and the process setpoint is set with this function.

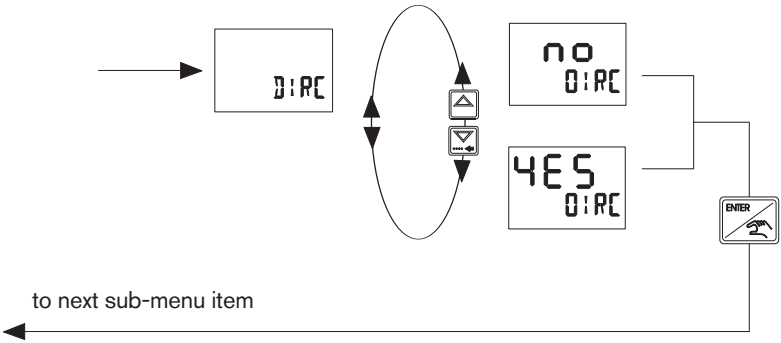

Illustration 6.12: Effective direction between input signal and process setpoint

NO Direct effective direction
e. g. 4 mA setpoint => 0 % actual value
20 mA setpoint => 100 % actual value

YES Inverse effective direction
e. g. 4 mA setpoint => 100 % actual value
20 mA setpoint => 0 % actual value

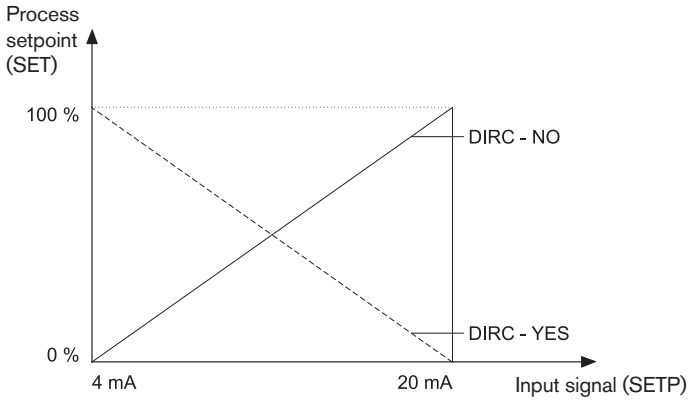

Illustration 6.13: Effective direction between input signal and process setpoint

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6.5.4 SCAL - Scaling of input and output signal of process actual value

The sensor input signal and the output signal of the process actual value can be scaled in this menu item.

Possible sensor input signals:

Frequency or 4 to 20 mA.

NOTE!

A scaling of the RTD input is not necessary!

Possible output signals of the process actual value:

MODE	Output
P	Pressure value
F	Flow rate value
T	Temperature value
T+F, T-F	Temperature or flow rate value

Table 6.2 Output signals of the process actual value

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6.5.4.1 Control via Solenoid control valve or Process control valve MODE = SCV or PCV

a) Sensor input signal = 4 to 20 mA

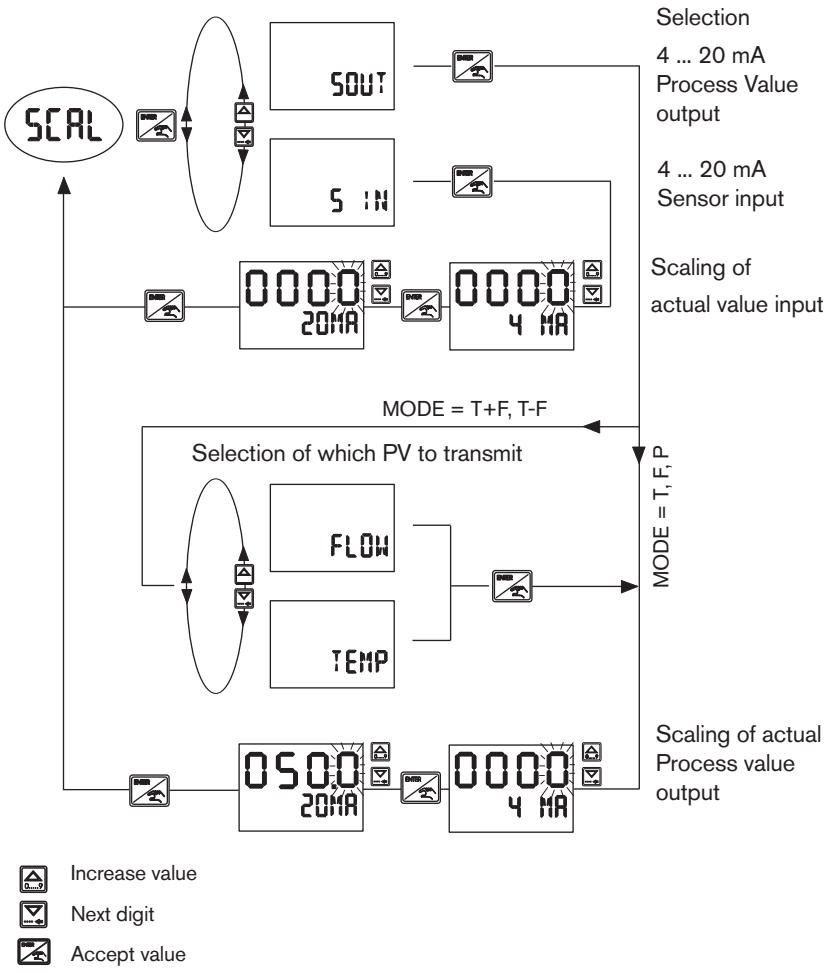

Illustration 6.14: SCAL - Scale actual value

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b) Sensor input signal = FREQ or PT

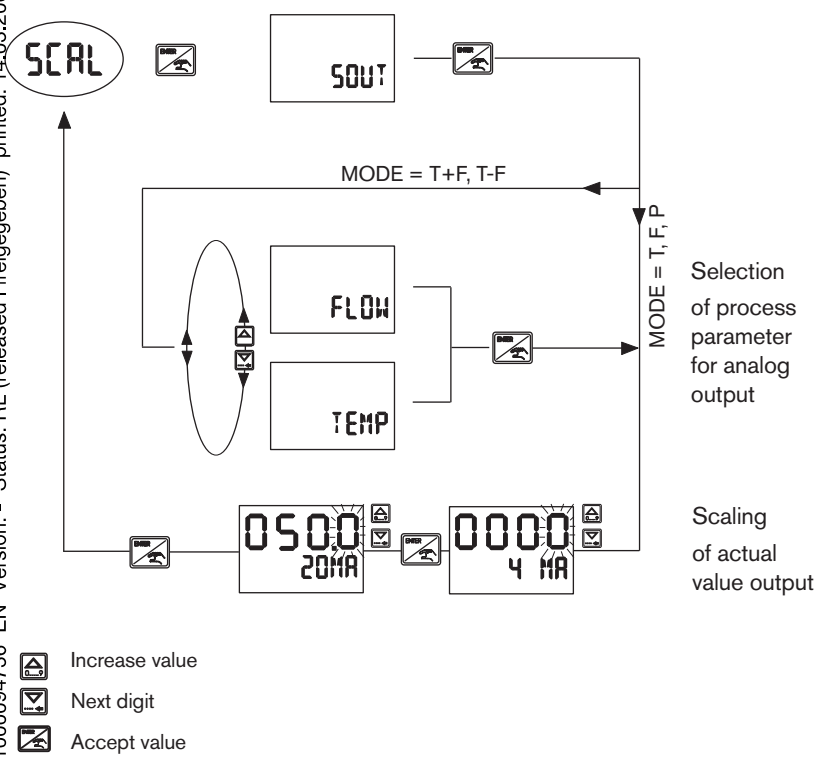

Illustration 6.15: SCAL - Scale actual value

NOTE!

Menu S_IN is not available for sensor input FREQ or PT.
Scaling is not necessary.

6.5.4.2 Control via 4 to 20 mA actuator controlled variable

MODE = 4 ... 20

NOTE!

In this MODE, Process value is not available as an output signal!

a) Sensor input signal = 4 to 20 mA

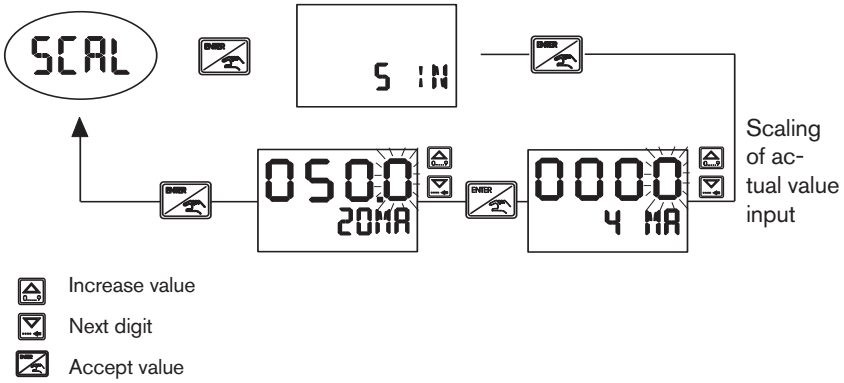

Illustration 6.16: SCAL - Scale actual value

b) Sensor input signal = FREQ or PT

No scaling is necessary in this mode.

6.5.5 CALI - Calibrate inputs and outputs

Depending on the device version, the following inputs and outputs can be calibrated:

- Setpoint input 4 to 20 mA or 0 to 10 V
- Setpoint output 4 to 20 mA
- Temperature input PT 100
- Sensor input 4 to 20 mA

CAUTION!

Functional impairments due to incorrect calibration

- The calibration may only be carried out by qualified personnel.

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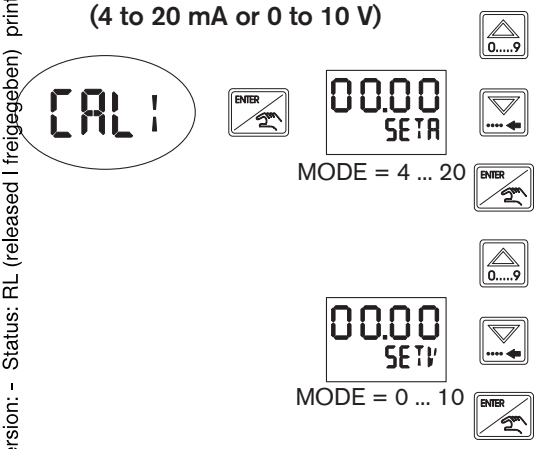
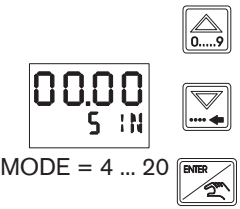
Calibration of setpoint input signal (4 to 20 mA or 0 to 10 V)



Depending on the selection in SETP-EXT, connect a defined voltage (max. 10 V) or defined current (max. 20 mA) to M12 8-pin (terminals 5 + 7). Adjust the value with the keys or until the display corresponds to the setpoint.

Calibration of sensor input signal (4 to 20 mA)



Connect a defined current to the sensor input (plug M8 3-pin, terminals 3 + 4). Adjust the value with the keys or until the display corresponds to the setpoint.

Increase value

Reduce value

Accept value

Illustration 6.17a: CALI - Calibrate inputs and outputs

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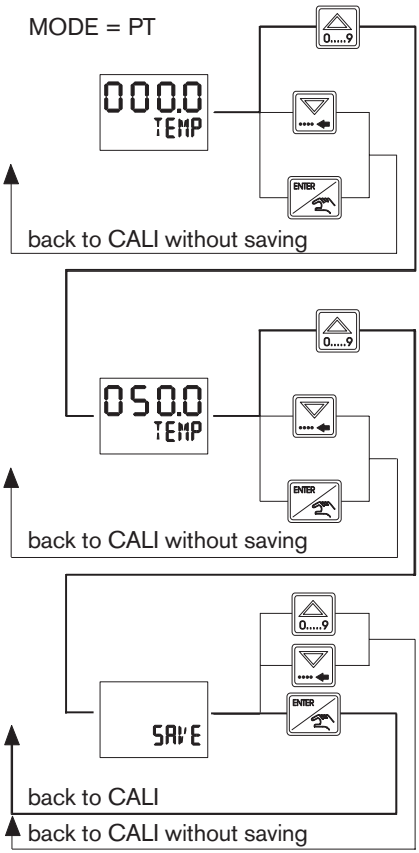
Calibration of sensor input signal PT 100



Connect a resistance of 100 Ω to plug M8 3-pin (terminals 3 + 4) to simulate a temperature of 0 °C. Accept with key .

Connect a resistance of 119.4 Ω to plug M8 3-pin (terminals 3+4) to simulate a temperature of 50 °C. Accept with key .

Saving the temperature calibration

Increase value

Reduce value

Accept value

Illustration 6.17b: CALI - Calibrate inputs and outputs

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Calibration of actual value output 4 to 20 mA

MODE = SCV or PCV

Connect a multimeter to plug M12 8-pin (terminals 4 + 6) and measure the amperage. Adjust the amperage with the buttons 0.....9 or until the display shows 20 mA.

Calibration of controlled variable output 4 to 20 mA

MODE = 4 ... 20 (Control)

Connect a multimeter to plug M8 4-pin (terminals 1 + 2) and measure the amperage. Adjust the amperage with the buttons 0.....9 or until the display shows 20 mA.

- Increase value
- Reduce value
- Accept value

Illustration 6.17c: CALI - Calibrate inputs and outputs

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6.5.6 KFAC - Set K factor

The K factor standardises the input frequency of a flow rate sensor.

$Q = \frac{f}{K}$

f – Input frequency in Hz

K – K factor in pulses / litre

Q Flow rate in litres / sec.

The K factor indicates the number of pulses per litre. $K = \frac{\text{pulses}}{\text{litres}}$

NOTE!

The K factor can be taken out of the Flow meter manual.

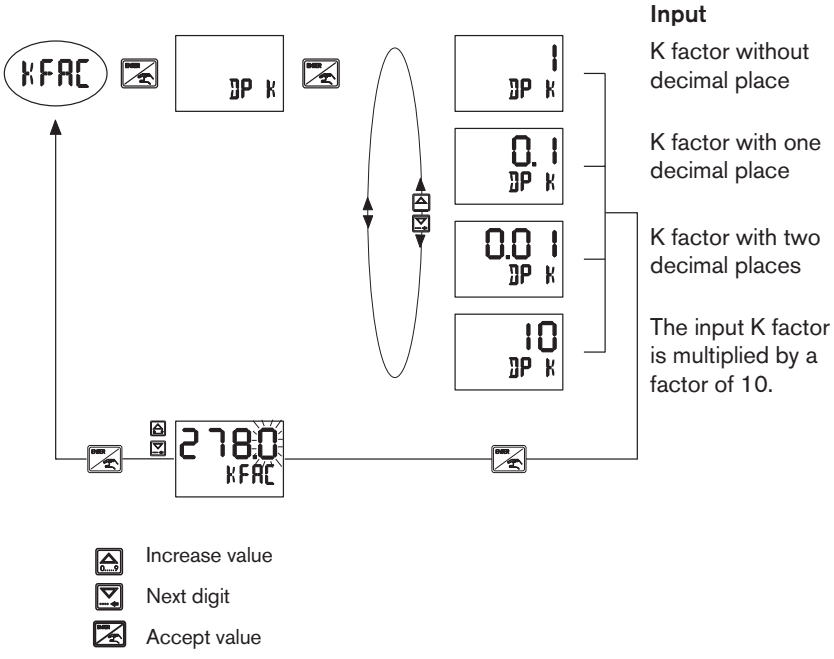

Illustration 6.18: KFAC - Set K factor

NOTE!

Input K factor larger than 9999:

- Select DP_K = 10
- Divide the K - factor according to data sheet by ten and enter

Example:

K factor according to data sheet: 21000

K factor to be entered: 2100

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6.5.7 FILT - Set filter factor

Filter factors can be set between 2 to 20.

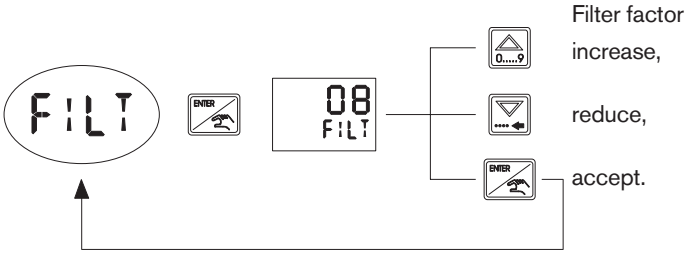


Illustration 6.19: FILT - Set filter factor

Estimation of T90-time for sensor input 4 ... 20 mA and RTD

T90 = 6.4 ms x FILT

For frequency input the T90-time is dependent of the time period of the frequency signal.

Recommendation:

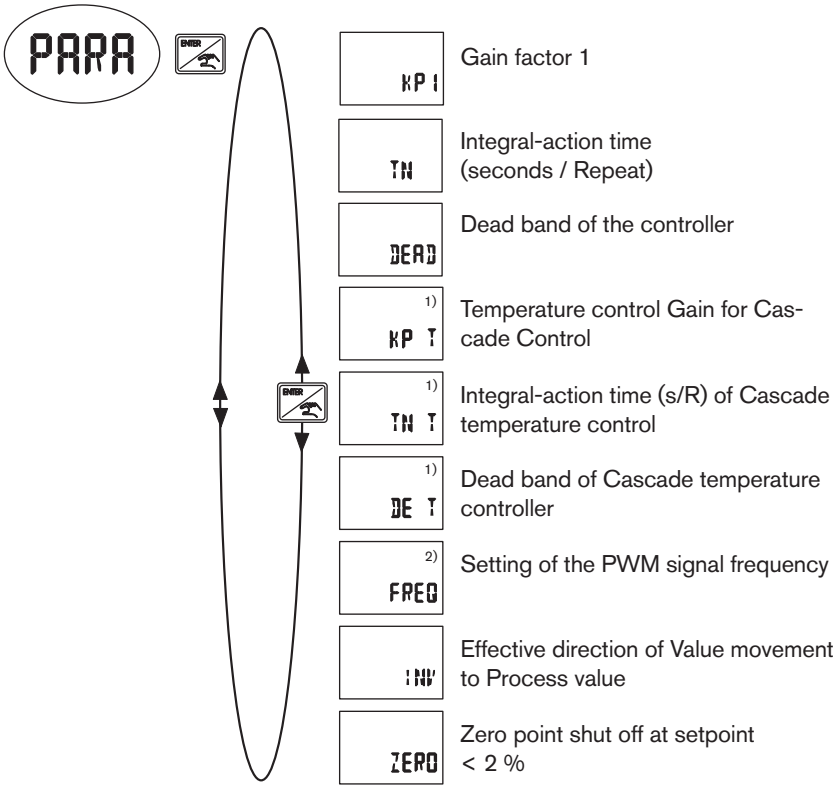
4 ... 20 mA, RTD: FILT 8

FREQ input: FILT 12

6.5.8 PARA - Parameterise controller

Depending on the choice of MODE, the following functions are available:

MODE = SCV or 4 ... 20 mA



[1] Only available with T+F mode
[2] Only available with MODE = SCV

Illustration 6.20: PARA - Parameterise controller SCV mode or 4 ... 20 Mode (description, see following pages)

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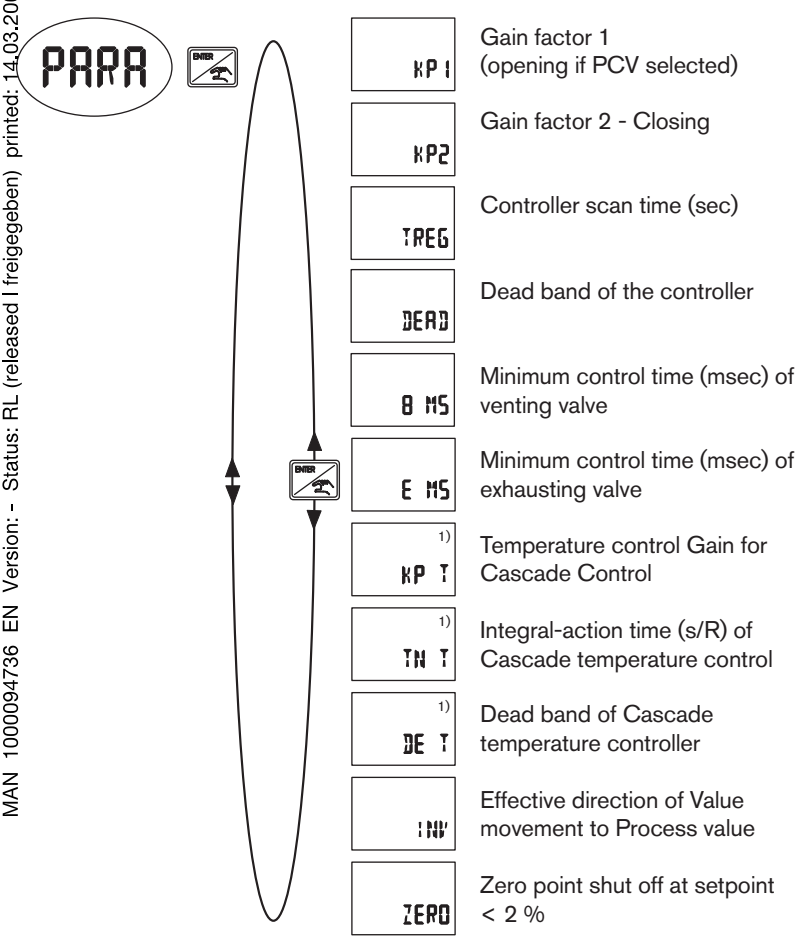
PCV MODE



[1] Only available with T+F mode

Illustration 6.21: PARA - Parameterise controller PCV mode (description, see following pages)

KP1, KP2 - Setting of the gain factor

Depending on the MODE, the gain factors have the following influence:

MODE	Influence of the gain factor	Setting
SCV	Gain factor for **opening** and **closing** of the Solenoid control valve (KP 1)	% /selected unit
4 ... 20	Gain factor for **opening** and **closing** the 4 to 20 mA actuator (KP 1)	% / selected unit
PCV	Gain factor for **opening** the Pneumatic process valve (KP 1) **closing** the Pneumatic process valve (KP 2)	sec / selected unit x 100

Table 6.2: Influence of the gain factor

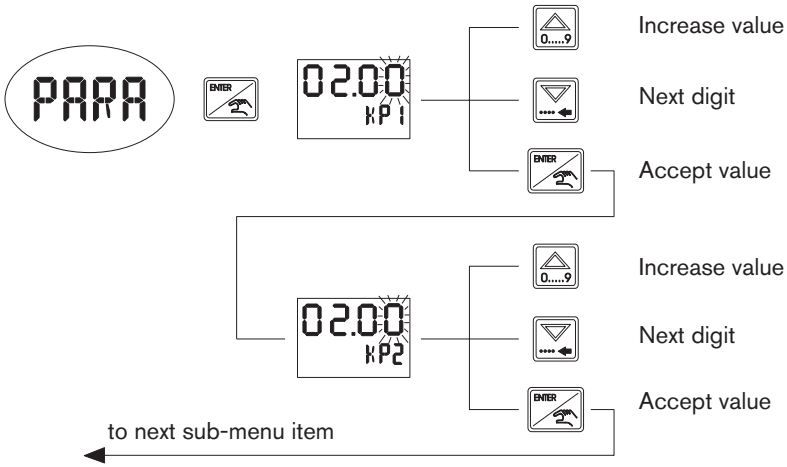


Illustration 6.22: KP1, KP2 - Setting of the gain factor

NOTE!

Setting aid

- If impermissibly high overswinging occurs after setpoint changes or the control becomes unstable at the set value for K_P, K_P should be reduced.
- On the other hand, an unsatisfactory dynamics of the control can be improved by increasing K_P as long as the instability described above does not occur.

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TREG - Setting of the controller Scan Time

This parameter is available under MODE = PCV. In this MODE the controller functions as a pure Gain controller.
The scan time is seconds within which a comparison between setpoint and actual value is to be performed can be set with the parameter "TREG". TREG defines the scan time is in seconds within which a setpoint / actual value comparison is regularly performed and a new controlled variable is calculated.

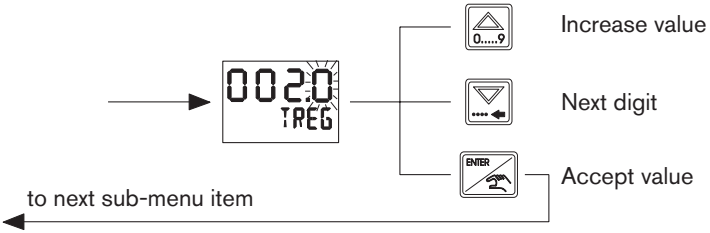

Illustration 6.23: TREG - Setting of the controller cycle time

TN - Setting of the integral-action time

This parameter can be selected under MODE = SCV or MODE = 4 to 20.

The integral action time T_N (in sec) is the time required to achieve an equally large change in the controlled parameter with the I action as caused by the P action.

T_N can be selected between 0.01 and 999.9 sec. A setting of 999.9 deactivates the I action.

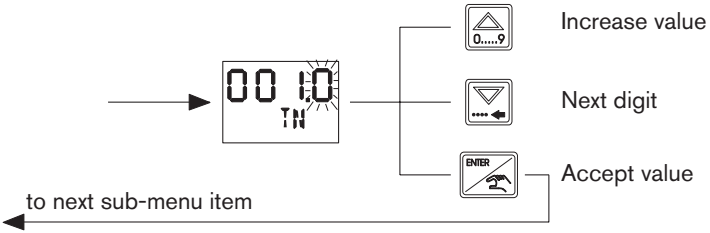

Illustration 6.24: TN - Setting of the integral-action time

DEAD - Dead band

This function ensures that the process controller only reacts above a give control difference. This reduces the wear on the control valves and the pneumatic drive.

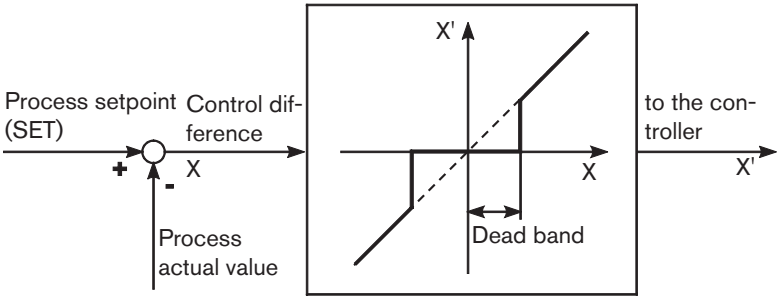

Illustration 6.25: Dead band of the controller

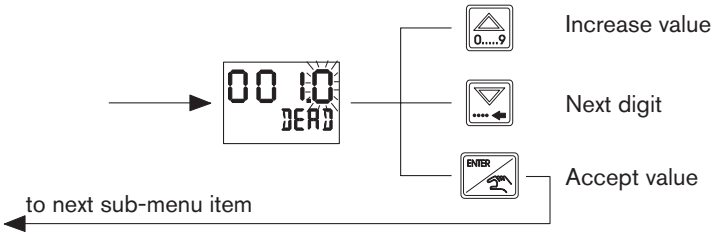

Illustration 6.26: DEAD - Input of the absolute dead band

The dead band is input as an absolute value according to the unit selected in UNIT and the setpoint range selected in SET-EXT.

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B_MS, E_MS - Minimum control time of the venting and exhausting valves

Venting and exhausting valves are required for the control of pneumatic process valves that are controlled by the controller, Type 8611. The control time of these valves determines the opening and closing travel of the process valve.

B_MS defines the minimum time in msec that the venting valve (1) requires for an air current to flow through the valve.

E_MS defines the time in msec that the exhausting valve (2) requires to permit an exhausting of the drive.

See illustration 6.27: B_MS, E_MS - Minimum control time for the valves

NOTE!

Max. size of B_MS and E_MS

B_MS and E_MS should not be selected larger than the opening time or closing time of the venting and exhausting valves.
When using the actuator system based on valves Type 6104, the value 5 msec can be selected for B_MS and E_MS.

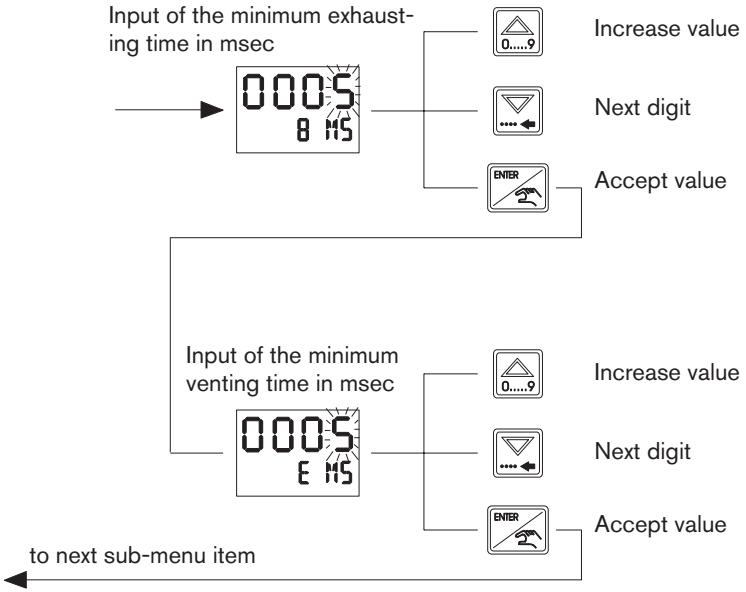

Illustration 6.27: B_MS, E_MS - Minimum control time for the valves

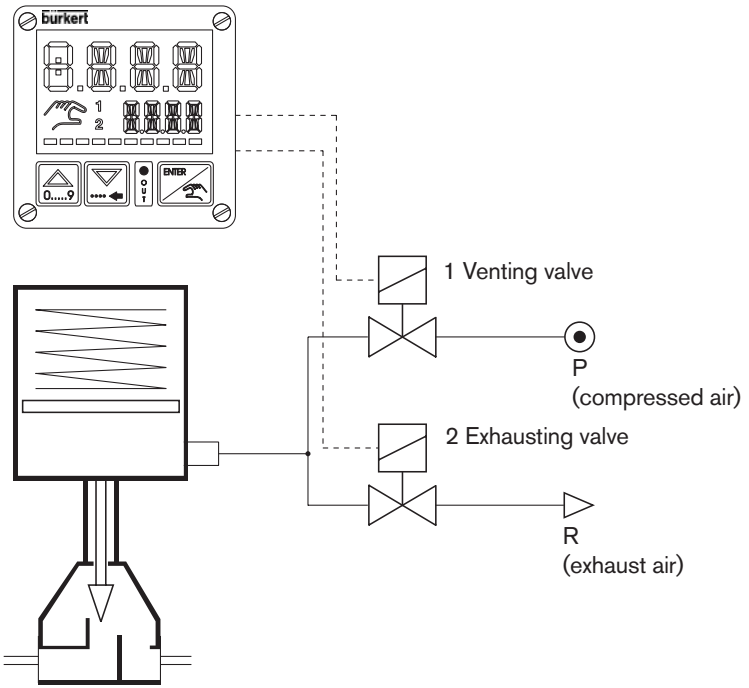

Illustration 6.28: Functional diagram of the process control with process valve

KP_T – Gain factor of the cascaded temperature control

This parameter can only be selected with MODE = T + F.

Scaling KP_T: Unit selected under UNIT / 1 °C

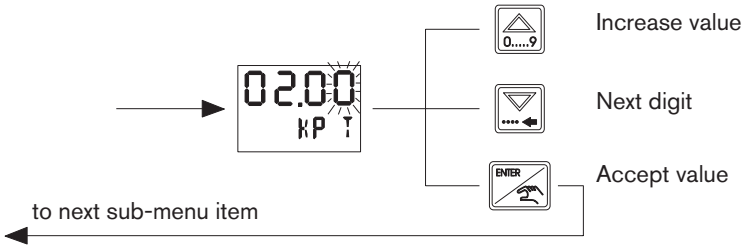

Illustration 6.29: Input of gain factor

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TN_T – Integral-action time of the cascaded temperature control

This parameter can only be selected with MODE = T + F.

The integral action time T_N (in sec) is the time required to achieve an equally large change in the controlled parameter with the I action as caused by the P action.

T_N can be selected between 0.1 and 999.9 sec.

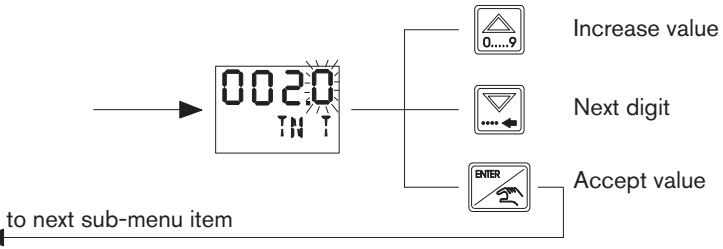


Illustration 6.30: Input of integral-action time in sec

NOTE!

Setting instructions:

For the commissioning of the cascaded controller it is expedient to first optimise only the flow rate control. For this, set the parameters KP_T to 0.0 and TN_T to 999.9. The temperature control is then deactivated.
The setpoint for the temperature control is then used as the setpoint for the flow rate control.

DE_T – Dead band of the cascaded temperature control

This function ensures that the temperature controller only reacts above a give control difference.

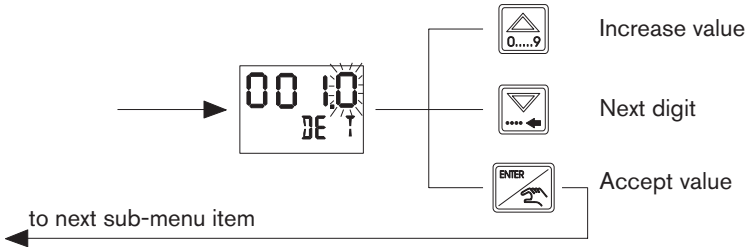
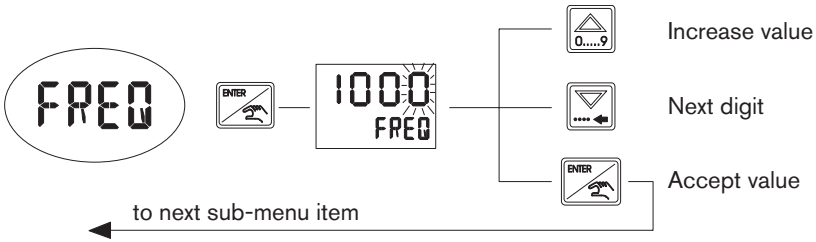


Illustration 6.31: Input of absolute dead band

The dead band is input as an absolute value according to the selected temperature unit and the setpoint range selected in SET - EXT.

FREQ – Setting of the PWM frequency

The basic frequency of the PWM signal for control of Solenoid control valves can be set in this menu item.



Ilustration 6.32: Setting of PWM frequency

The control frequency can be input in the range from 0 to 9999.

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The following table shows indicative values for the setting of the control frequency of the Bürkert Solenoid control valves.

Type	Frequency range [Hz]	Type	Frequency range [Hz]
2821	650 - 800	2833	1000 - 1200
2822	1000 - 1200	2834	180 - 280
2824		2835	600 - 800
2832	300 - 400	6223 DN10	180 - 280
6021	650 - 800	6223 DN13	
6022	300 - 400	6223 DN20	
6023	180 - 280		
6024			

Table 6.3 Control frequency of the Bürkert Solenoid control valve

NOTE!

Setting of the PWM frequency

The setting of the PWM frequency takes account of the different dynamics of the spring mass system of the valves. In principle the valves can be operated with any of the control frequencies listed above, but the indicated values represent an optimum with respect to hysteresis and noise development. (As a general rule of thumb: Lower frequency = smaller hysteresis, but higher noise development).

Should you notice a tendency of the system to oscillate in an application with high medium pressure, the use of the next-higher control frequency in the table is to be recommended.

INV – Inverted / non-inverted control

The effective direction between the input signal of the Process and the control direction of the valve is set with this function.

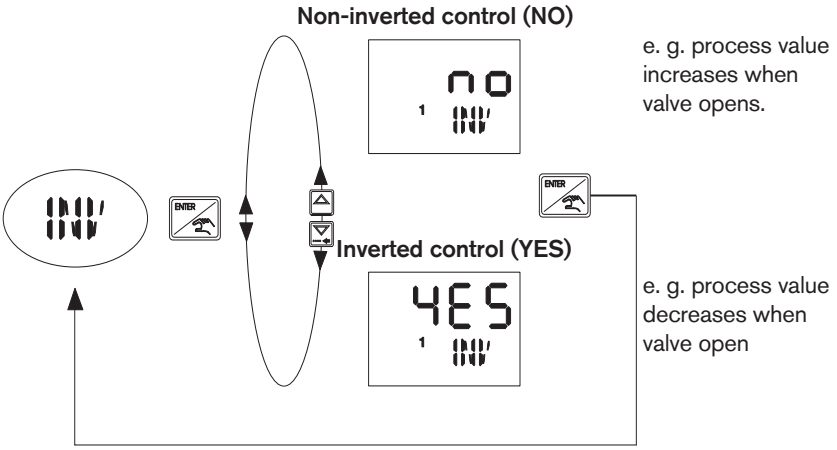

Illustration 6.33: INV – Inverted / non-inverted control

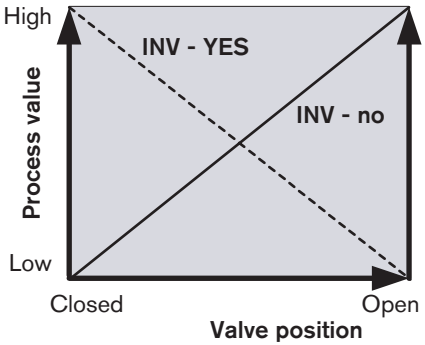

Illustration 6.34: Effective direction between Process value and Valve position

Example of an inverted control

In the following system, the actual value at the output of the non-controllable pump is to be controlled by changing the opening of the Solenoid control valve in a return channel. If the actual value is too high (xd < 0), the controlled variable thus has to be increased (inverted control).

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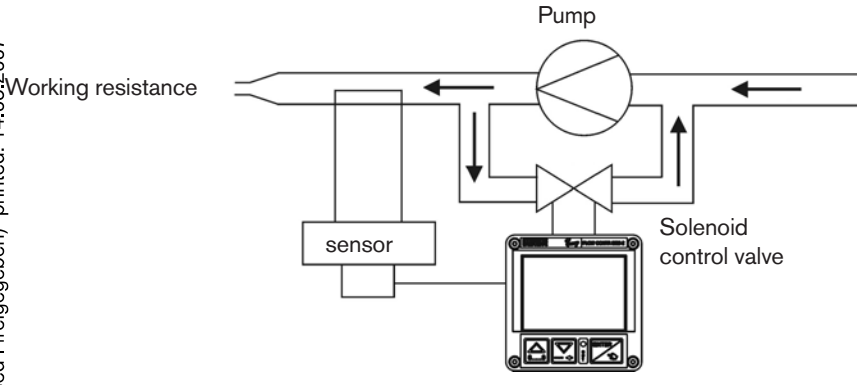

Illustration 6.35: Example of an inverted control

ZERO – Zero point shutoff

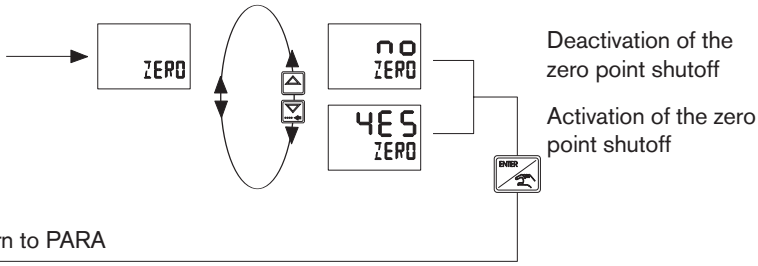

Illustration 6.36: ZERO – Zero point shutoff

NO **No zero point shutoff**

The control is constant down to the lower limit value of the range set in SETP-EXLO or to the lower limit value of the range defined in VALV-MIN. The larger of the two values takes priority.

YES **Zero point shutoff active**

The control is constant down to the setpoint < 2% of the range defined under SETP-EXHI. The valve then closes.

SETP see 6.5.3

VALV see 6.5.11

NOTE!

ZERO point shutoff only possible when non-inverted control is selected (INV = no).

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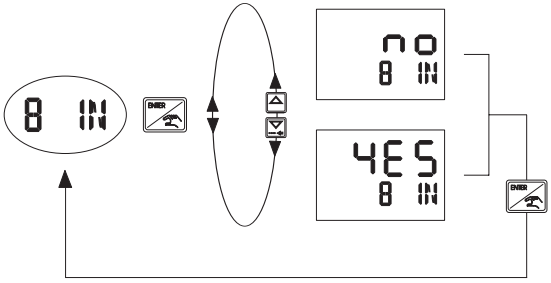
6.5.9 B_IN - Binary input

With the binary input, the control can be activated or deactivated externally.



(Default)

Illustration 6.37: B_IN - Binary input activated / deactivated

B _IN NO Binary input is deactivated.
The control is permanently active („2“ is shown on the display).

B _IN YES Binary input is activated.
The control is active as long as 24 V is received at the binary input.

24 V = Control active („2“ is shown on the display)

0 V = Control deactivated (Valve stops in last position.)

NOTE!

Intended characteristic!

- If the control is deactivated, the actuator stops at its last selected operating point.

6.5.10 BOUT - Binary output

The binary output can be used to monitor the controller or for the monitoring of limit values. 1 binary output is available.

Depending on the selected MODE, the following parameters can be selected:

Parameter	Description	Mode
CTRL	Monitoring of the setpoint deviation	all Modi
PRES	Pressure monitoring	P
TEMP	Temperature monitoring	T, T+F, T-F
FLOW	Flow rate monitoring	F, T+F, T-F

Table 6.4 Parameters of the binary output

Possible states of the binary output:

HIGH → 24 V

LOW → 0 V

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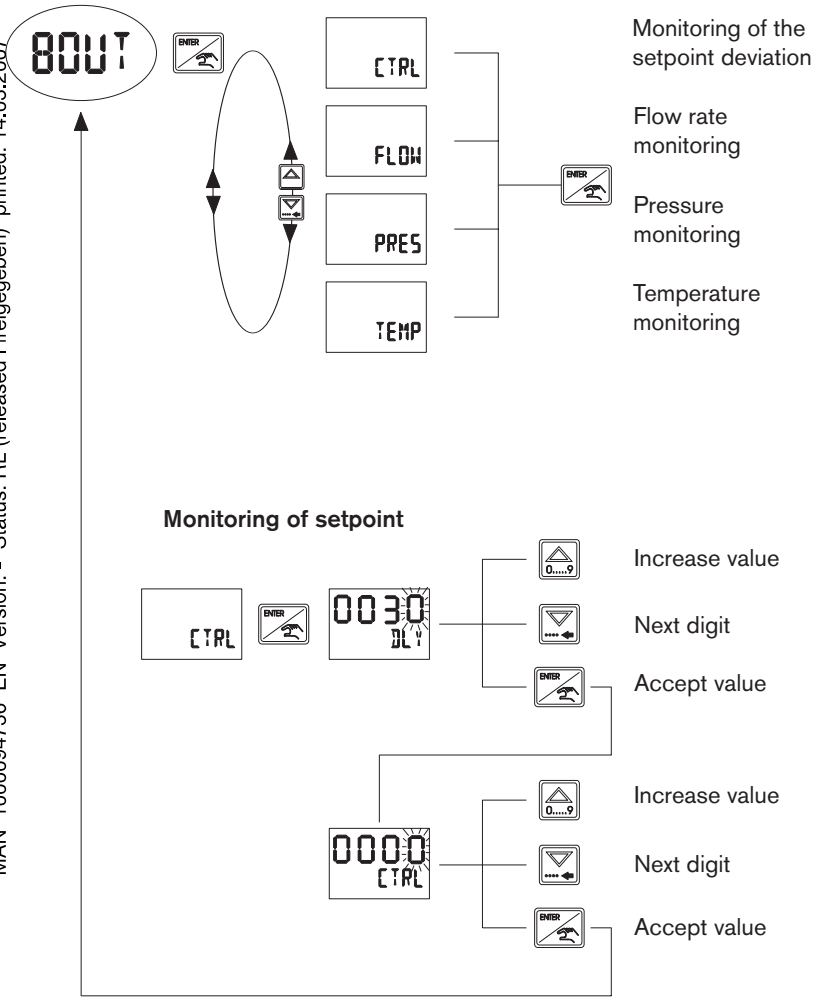

Illustration 6.38: BOUT - Binary output

DLY	Time in seconds for which the control deviation must continuously exist.
CTRL	Admissible setpoint deviation (absolute in mbar, L/M, °C, etc.). The values are monitored relative to the respective setpoint.

Monitoring of flow rate, temperature, pressure

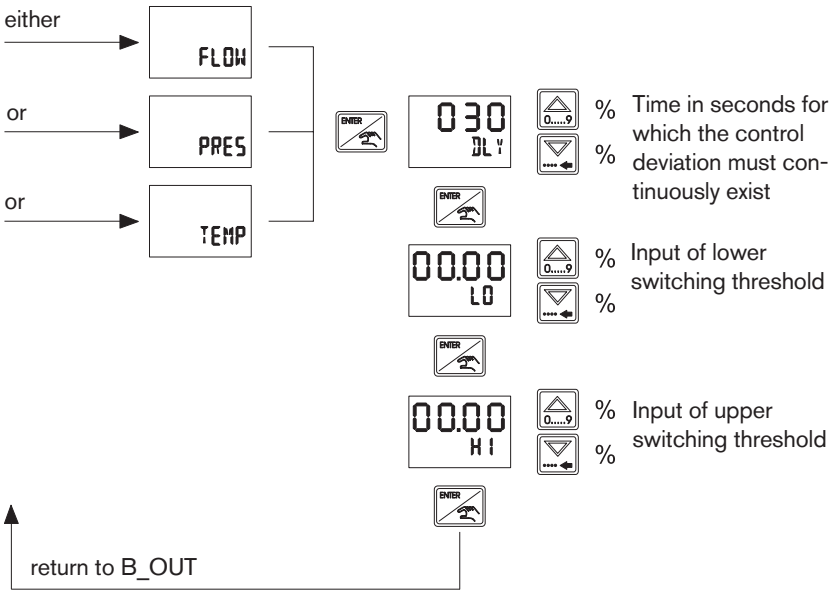

Illustration 6.39: Monitoring of flow rate, temperature, pressure

Error messages

ERR1 Display ERR1 appears if measured values are outside the control window. The last measured value is constantly displayed and the red LED lights up.

Binary output is set LOW (0 V).

ERR2 Display ERR2 if the actual value is below LO or above HI. The last measured value is constantly displayed and the red LED lights up.

Binary output is set LOW (0 V).

RESET Press button

Binary output is set HIGH (24 V).

The function of the controller remains active during the display of the error message.

6.5.11 VALV - Test function and setting of control range

In this function the valve can be opened and closed manually and the control range can be set specifically for the valve in relationship to the process pressure.

Recommend performins this function under actual operating pressure.

NOTE!

MAX and MIN values can be set howerer each value must be set independirly of each other.

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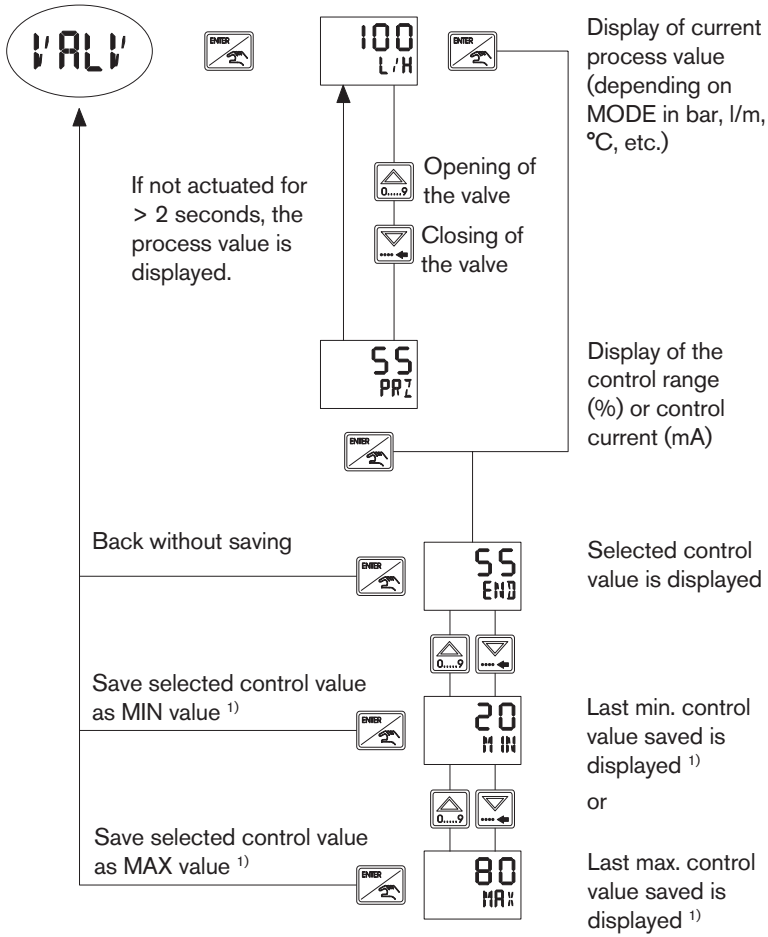
6.5.11.1 Control of SCV or 4 to 20 mA actuator - MODE F, T and P



1) See note chapter 6.5.11 VALV - Test function and setting of control range

Illustration 6.40: VALV - test function control SCV and 4 to 20 mA (MODE F, T, P)

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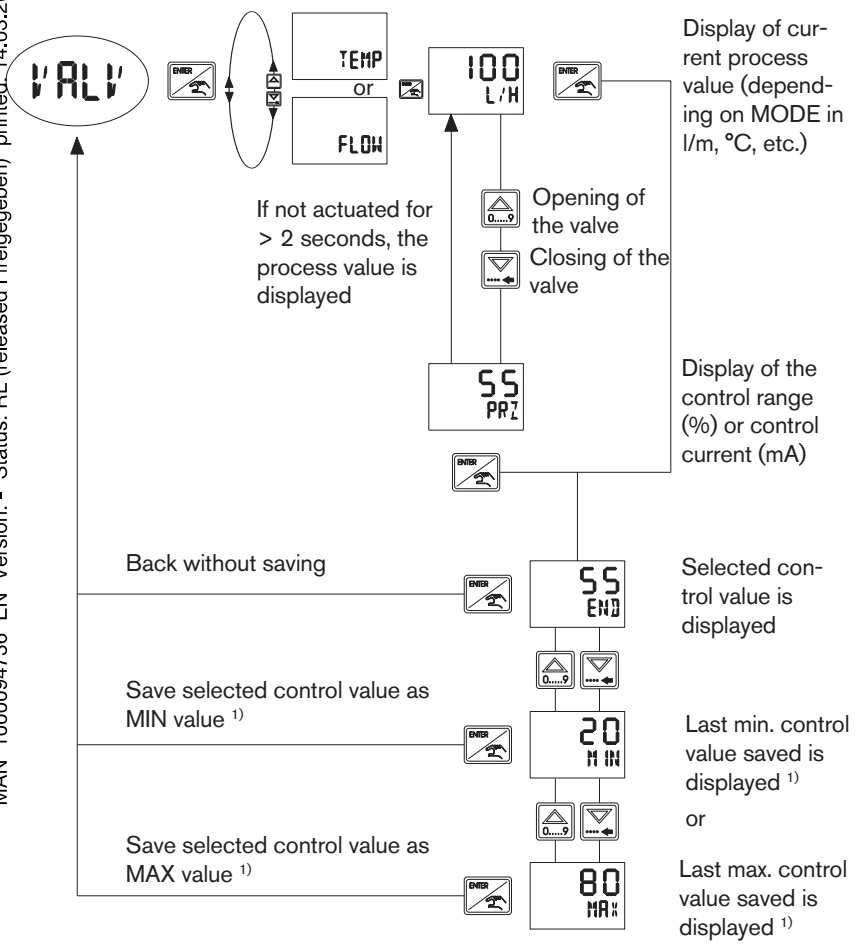
6.5.11.2 Control of SCV or 4 to 20 mA actuator - MODE T + F, T - F



1) See note chapter 6.5.11 VALV - Test function and setting of control range

Illustration 6.41: VALV - test function control SCV and 4 to 20 (MODE T + F, T - F)

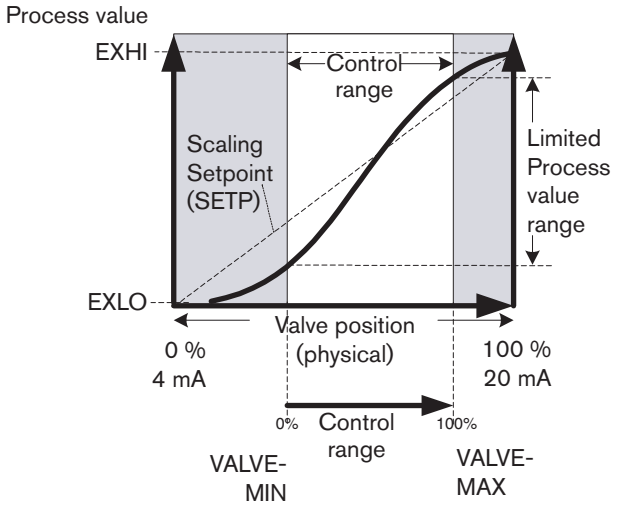


Illustration 6.42: VALV - Setting of control range

Setting of minimum control value

Increase the control of the valve with the -key until the valve just opens. Reduce the selected control by approx. 5% then use - or -key, MIN is in view, then save as MIN value with the -key.

Setting of maximum control value

Increase the control of the valve with the -key until the valve reaches the max. process value. Reduce the control with the -key until the process value drops and then use - or -key, MAX is in view, then save as MAX value with the -key.

NOTE!

Change in the pressure conditions

In the event of a change in the pressure conditions, the control values may have to be changed.

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6.5.11.3 Control of PCV - MODE F, T, P

NOTE!

MAX and MIN values can be set howerer each value must be set indepentendly of each other.

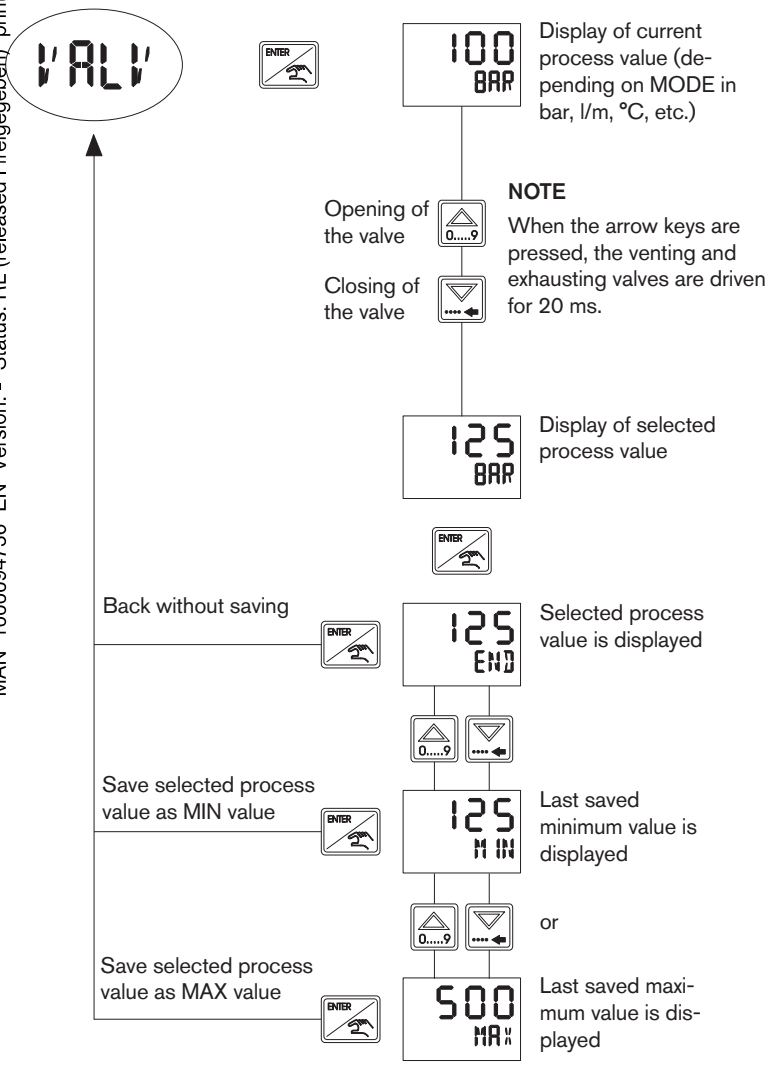
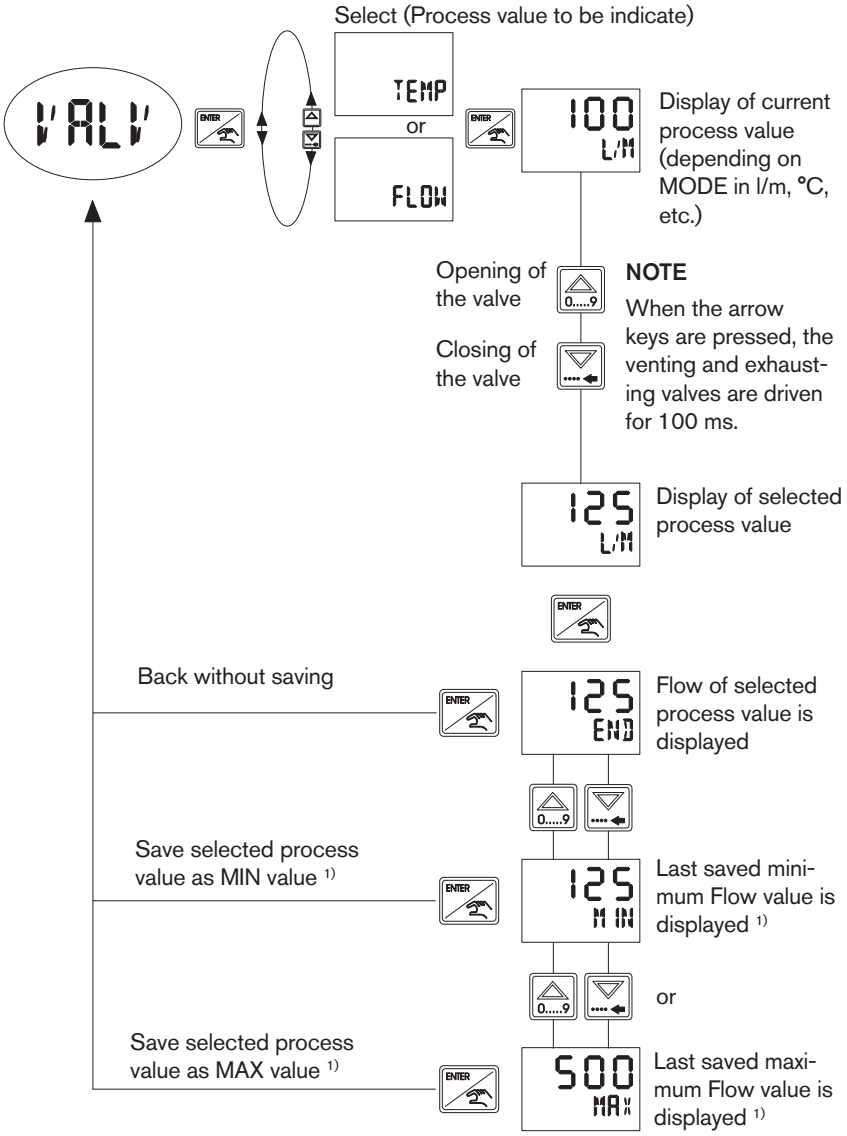


Illustration 6.43: VALV - Test function control PCV, MODE F, T, P

6.5.11.4 Control of PCV - MODE T + F



1) See note chapter 6.5.11.3 Control of PCV - MODE F, T, P

Illustration 6.44: VALV - Test function control PCV, MODE T + F

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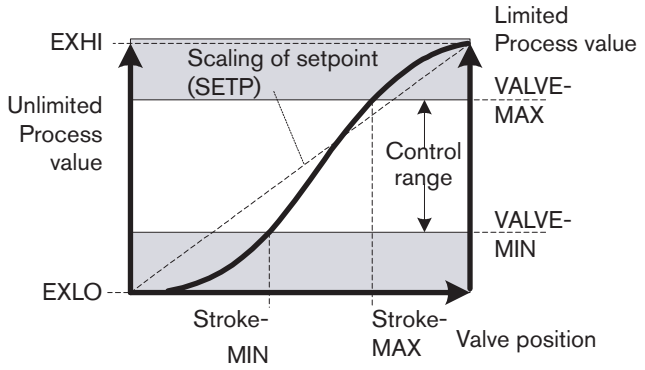


Illustration 6.45: VALV - Setting of control range

6.5.12 CODE - Code input for access to the configuration menu

Factory setting: CODE 0000

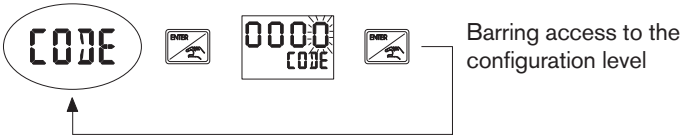


Illustration 6.46: CODE - Code input for access to the configuration menu

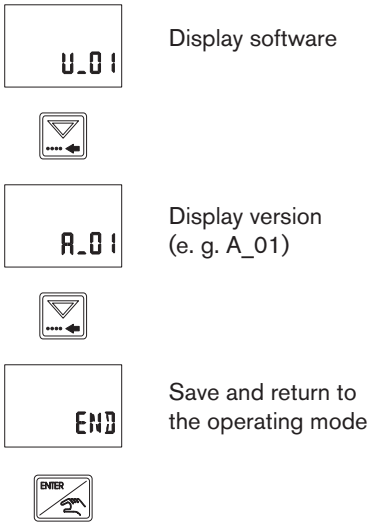
CODE XXXX	If the CODE protection is active, the input of the code is required first for all barred actions.
CODE 0000	CODE protection not activated
CODE >0	CODE protection activated
	Increase the value of the flashing digit
	Jump to next digit
	Confirm CODE

Note your CODE here .....

6.5.13 Display software, software version and save values

NOTE!

The parameters to be set in the individual menu items of the configuration mode are only saved after quitting configuration mode in the menu item END with -key.



Display software

Display version
(e. g. A_01)

Save and return to
the operating mode

Illustration 6.47: Display software, software version and save values

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6.6 Autoscaling mode

This function is available only in MODE = F.

The measuring range of the universal controller can be automatically determined in autoscaling mode.

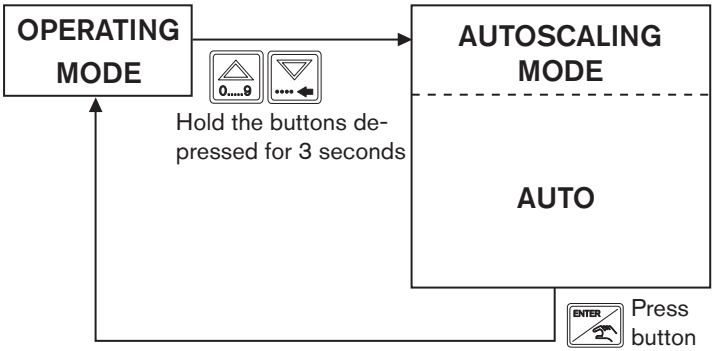

Illustration 6.48: Switch from operating to autoscaling mode

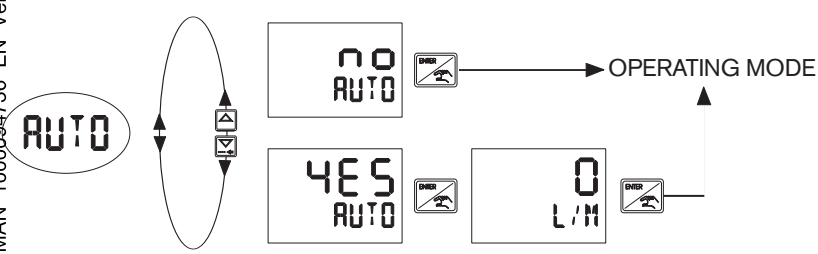

Illustration 6.49: Autoscaling mode menu

AUTO = "Yes"

After selecting "YES" and pressing the -key, the valve opens fully and the controller measures the flow rate for 5 seconds. The measured flow rate is reduced by 5 % and assigned to the parameter EXHI (under menu SETP). The measured value remains displayed until is pressed.

NOTE!

If the error ERR3 is displayed, there is no flow rate.

A flow rate <1 % under the range set under SETP-EXHI is interpreted as "No flow rate".

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7 INSTALLATION

7.1 Fitting mounting version

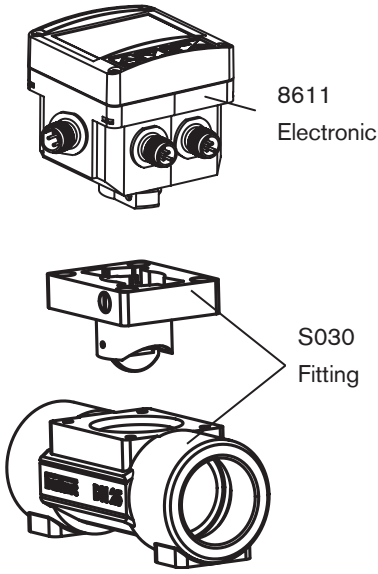

Illustration 7.1 Fitting mounting version

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7.2 Wall mounting version

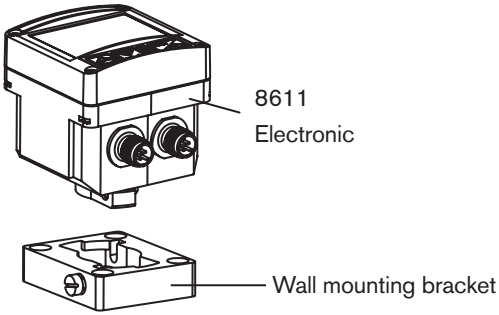

Illustration 7.2 Wall mounting with a bracket

7.3 DIN rail mounting version

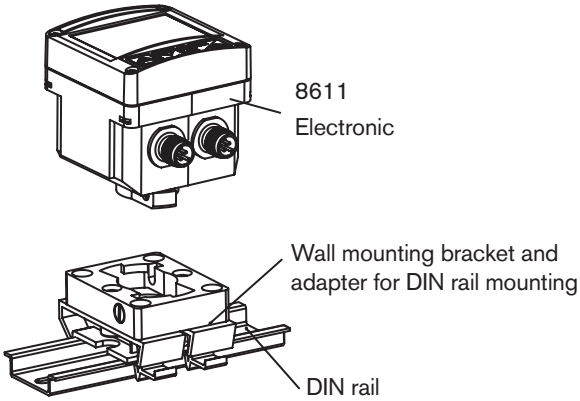

Illustration 7.3 Rail mounting with a DIN rail

7.4 Factory settings

Factory settings MODE F Flow rate control							customer-specific settings
				SCV	**PCV**	**4 ... 20**	
UNIT	DP_T			0.1	0.1	0.1	
				L/M	L/M	L/M	
SETP	INT			50.0	50.0	50.0	
			EXHI	50.0	50.0	50.0	
	EXT	4 ... 20 / 0 ... 10	EXLO	0.0	0.0	0.0	
			EXHI	50.0	50.0	50.0	
			DIRC	no	no	no	
SCAL	S_IN / S_OUT	4_MA		0.0	0.0	0.0	
		20_MA		50.0	50.0	50.0	
KFAC				200.0	200.0	200.0	
FILT				8	8	8	
PARA	KP1			2.0	2.0	2.0	
	KP2			na	2.0	na	
	TN			0.2	na	0.2	
	TREG			na	2.0	na	
	DEAD			1.0	1.0	1.0	
	B_MS			na	5	na	
	E_MS			na	5	na	
	KP_T			na	na	na	
	TN_T			na	na	na	
	DE_T			na	na	na	
	FREQ			1000	na	na	
	INV			no	no	no	
	ZERO			no	no	no	
B_IN				no	no	no	
BOUT	CTRL	DLY		30	30	30	
		CTRL		0.0	0.0	0.0	
	FLOW	DLY		30	30	30	
		LO		0	0	0	
		HI		0	0	0	
VALV	MIN			0.0 %	0	4 mA	
	MAX			100.0 %	0	20 mA	

na: not available

Table 7.1 Factory settings MODE F

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Factory settings MODE T Temperature control							customer-specific settings
				SCV	**PCV**	**4 ... 20**	
UNIT	DP_T			0.1	0.1	0.1	
				°C	°C	°C	
SETP	INT			50.0	50.0	50.0	
			EXHI	50.0	50.0	50.0	
	EXT	4 ... 20 / 0 ... 10	EXLO	0.0	0.0	0.0	
			EXHI	50.0	50.0	50.0	
			DIRC	no	no	no	
KFAC				na	na	na	
FILT				8	8	8	
PARA	KP1			2.0	2.0	2.0	
	KP2			na	2.0	na	
	TN			2.0	na	2.0	
	TREG			na	2.0	na	
	DEAD			1.0	1.0	1.0	
	B_MS			na	5	na	
	E_MS			na	5	na	
	KP_T			na	na	na	
	TN_T			na	na	na	
	DE_T			na	na	na	
	FREQ			1000	na	na	
	INV			no	no	no	
	ZERO			no	no	no	
B_IN				no	no	no	
BOUT	CTRL	DLY		30	30	30	
		CTRL		0.0	0.0	0.0	
	TEMP	DLY		30	30	30	
		LO		0.0	0.0	0.0	
		HI		0.0	0.0	0.0	
VALV	MIN			0.0 %	na	4 mA	
	MAX			100.0 %	na	20 mA	

na: not available

Table 7.2 Factroy setting MODE T

Factory setting MODE P Pressure control						customer-specific settings
			SCV	**PCV**	**4 ... 20**	
UNIT	DP_T		0.1	0.1	0.1	
			bar	bar	bar	
SETP	INT		50.0	50.0	50.0	
			EXHI	50.0	50.0	50.0	
	EXT	4 ... 20 / 0 ... 10	EXLO	0.0	0.0	0.0	
			EXHI	50.0	50.0	50.0	
			DIRC	no	no	no	
KFAC				na	na	na	
FILT				8	8	8	
PARA	KP1			2.0	2.0	2.0	
	KP2			na	2.0	na	
	TN			0.2	na	0.2	
	TREG			na	2.0	na	
	DEAD			1.0	1.0	1.0	
	B_MS			na	5	na	
	E_MS			na	5	na	
	KP_T			na	na	na	
	TN_T			na	na	na	
	DE_T			na	na	na	
	FREQ			1000	na	na	
	INV			no	no	no	
	ZERO			no	no	no	
B_IN				no	no	no	
BOUT	CTRL	DLY		30	30	30	
		CTRL		0.0	0.0	0.0	
	PRES	DLY		30	30	30	
		LO		0	0	0	
		HI		0	0	0	
VALV	MIN			0.0 %	0	4 mA	
	MAX			100.0 %	0	20 mA	

na: not available

Table 7.3 Factory settings MODE P

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Factory settings MODE T - F Temperature control with flow rate indicator							customer-specific settings
				SCV	**PCV**	**4 ... 20**	
UNIT	DP_T			0.1	0.1	0.1	
				°C + L/M	°C + L/M	°C + L/M	
SETP	INT			50.0	50.0	50.0	
			EXHI	50.0	50.0	50.0	
	EXT	4 ... 20 / 0 ... 10	EXLO	0.0	0.0	0.0	
			EXHI	50.0	50.0	50.0	
			DIRC	no	no	no	
KFAC				na	na	na	
FILT				8	8	8	
PARA	KP1			2.0	2.0	2.0	
	KP2			na	2.0	na	
	TN			2.0	na	2.0	
	TREG			na	2.0	na	
	DEAD			1.0	1.0	1.0	
	B_MS			na	5	na	
	E_MS			na	5	na	
	KP_T			na	na	na	
	TN_T			na	na	na	
	DE_T			na	na	na	
	FREQ			1000	na	na	
	INV			no	no	no	
	ZERO			no	no	no	
B_IN				no	no	no	
BOUT	CTRL	DLY		30	30	30	
		CTRL		0.0	0.0	0.0	
TEMP/ FLOW	PRES	DLY		30	30	30	
		LO		0.0	0.0	0.0	
		HI		0.0	0.0	0.0	
VALV	MIN			0.0 %	na	4 mA	
	MAX			100.0 %	na	20 mA	

na: not available

Table 7.4 Factory settings MODE T - F

Factory settings MODE T + F Temperature control with superordinate flow rate control							customer-specific settings
				SCV	**PCV**	**4 ... 20**	
UNIT	DP_T			0.1	0.1	0.1	
				°C + L/M	°C + L/M	°C + L/M	
SETP	INT			50.0	50.0	50.0	
			EXHI	50.0	50.0	50.0	
	EXT	4 ... 20 / 0 ... 10	EXLO	0.0	0.0	0.0	
			EXHI	50.0	50.0	50.0	
			DIRC	no	no	no	
KFAC				200.0	200.0	200.0	
FILT				8	8	8	
PARA	KP1			2.0	2.0	2.0	
	KP2			na	2.0	na	
	TN			0.2	na	0.2	
	TREG			na	2.0	na	
	DEAD			1.0	1.0	1.0	
	B_MS			na	5	na	
	E_MS			na	5	na	
	KP_T			2.0	2.0	2.0	
	TN_T			2.0	2.0	2.0	
	DE_T			1.0	1.0	1.0	
	FREQ			1000	na	na	
	INV			no	no	no	
	ZERO			no	no	no	
B_IN				no	no	no	
BOUT	CTRL	DLY		30	30	30	
		CTRL		0.0	0.0	0.0	
	TEMP/ FLOW	DLY		30	30	30	
		LO		0	0	0	
		HI		0	0	0	
VALV	MIN			0.0 %	0	4 mA	
	MAX			100.0 %	0	20 mA	

na: not available

Table 7.5 Factory settings MODE T + F

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7.5 Connection exambles of eCONTROL 8611 with Buerkert devices

7.5.1 Connecting of Flow meter with Frequency signal

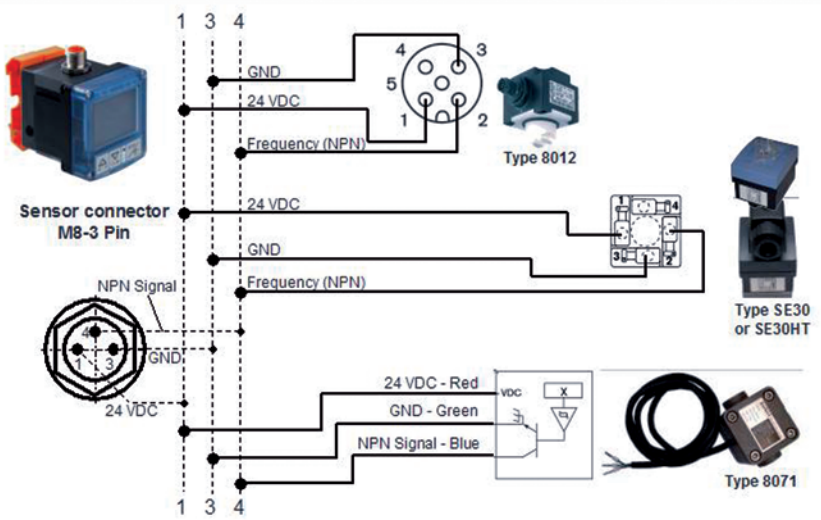

Illustration 7.6 Connecting of Flow meter with Frequency signal (examble 1)

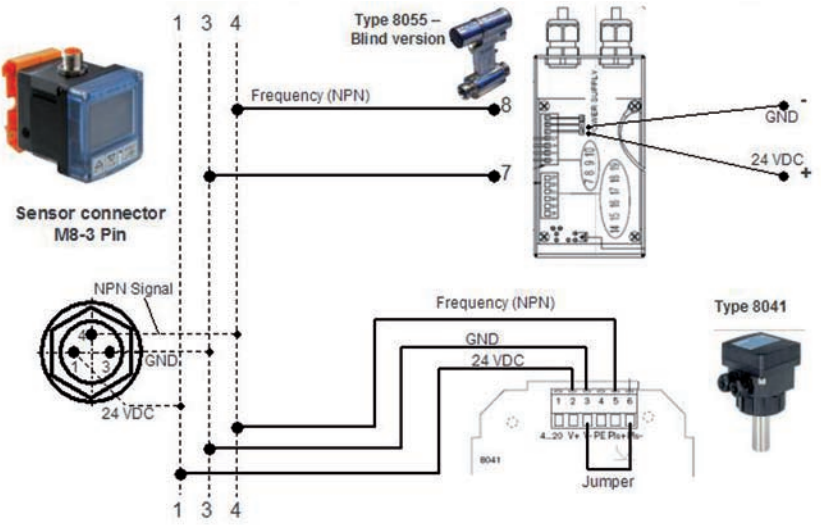

Illustration 7.7 Connecting of Flow meter with Frequency signal (examble 2)

7.5.2 Connecting to Sensors with 4 ... 20 mA signal

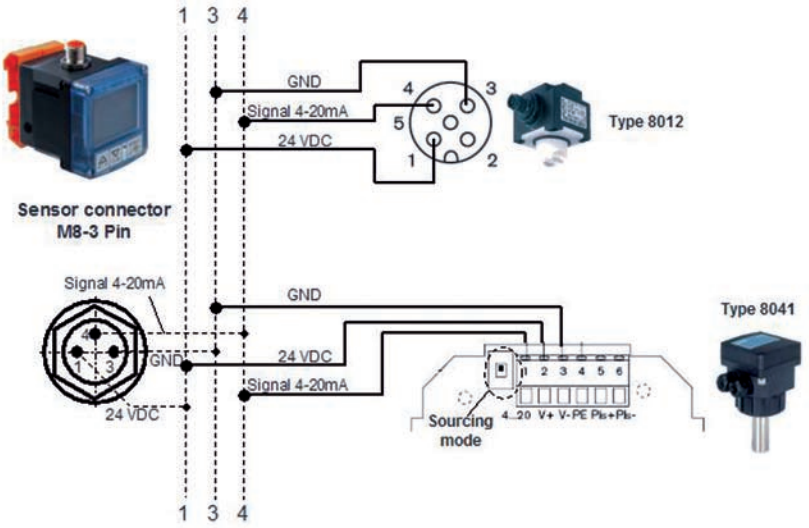

Illustration 7.8 Connecting to Sensors with 4 ... 20 mA signal (examble 1)

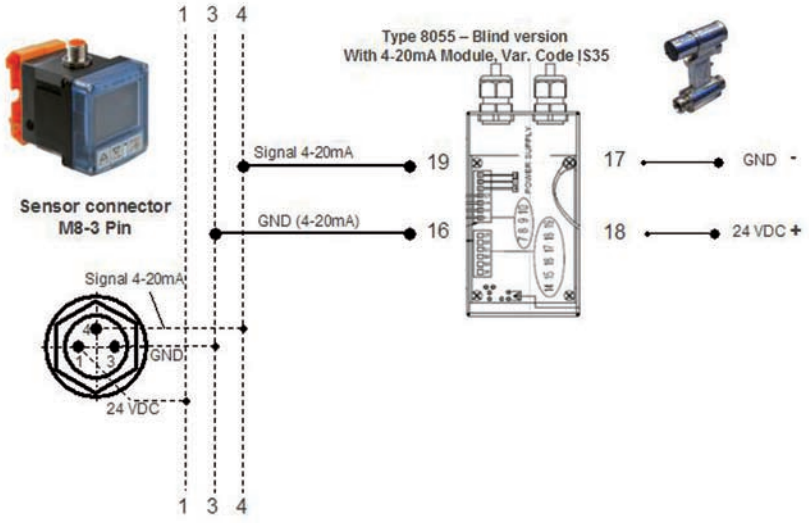

Illustration 7.9 Connecting to Sensors with 4 ... 20 mA signal (examble 2)

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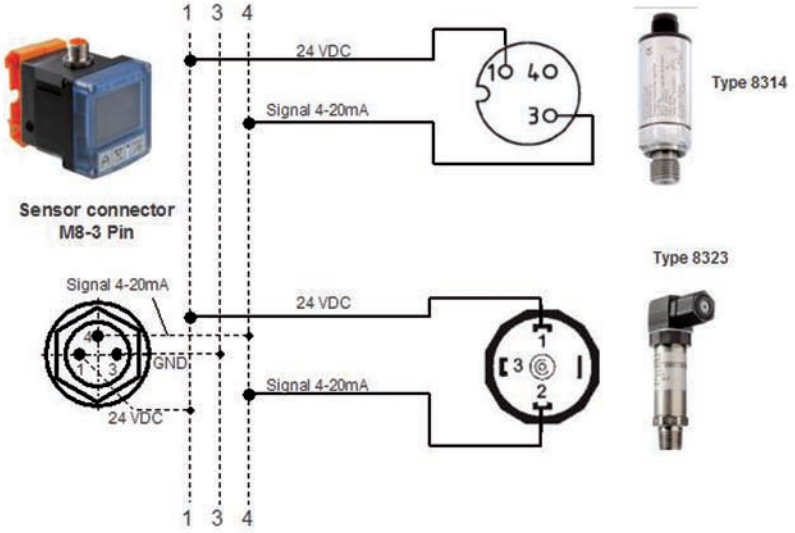

Illustration 7.10 Connecting to Sensors with 4 ... 20 mA signal (examble 3)

7.5.3 Connecting of Solenoid control valve or Process control valve

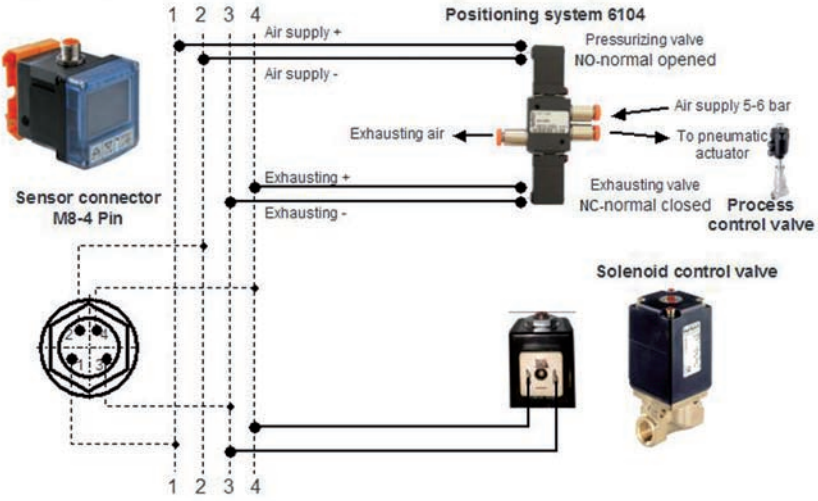

Illustration 7.11 Connecting of Solenoid control valve or Process control valve

8 MAINTENANCE AND TROUBLESHOOTING

When used in accordance with the instructions given in this operating manual, the eCONTROL 8611 is maintenance-free.

8.1 Faults / Error messages

Display	Cause	Remedy	RESET
ERR1:	Constant setpoint deviations (variable) after a given time (variable). (Input in BOUT)	Optimise control parameter	Controller remains active. Reset error with Enter key.
ERR2:	Actual value above or below the maximum or minimum process value. (Input in BOUT)	Optimise control parameter	Controller remains active. Reset error with Enter key.
ERR3	There is no flow rate during autoscaling mode. A flow rate < 1% under the range set under SETP-EXHI is interpreted as „Now flow rate".	Check control loop	Reset error with Enter key.
ERR4	Sensor input signal <2mA	Check sensor input for broken sensor	Controller is deactivated. The valve closes. Reset error with Enter key.
ERR5	Setpoint input signal <2mA	Check input signal setpoint	Controller is deactivated. Valve closes. Reset error with Enter key.

Table 8.1 Error messages

The function of the controller remains active during the display of the error message.

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9 PACKING, TRANSPORT

CAUTION!

Wrong packaging and improper transport result in damage to the eCONTROL 8611.

- Cover the electrical and pneumatic connectors with protective caps to protect them against mechanical damage.
- Pack the eCONTROL 8611 carefully in the original packaging or similar packaging.

  Transport the eCONTROL 8611 safely protected from damp and contamination, only in the original packaging or in similar protective packaging.

10 STORAGE

CAUTION!

Incorrect storage will damage the eCONTROL 8611.

- Store the eCONTROL 8611 in a dry and dust-free location!

  Storage temperature: **-40 ... +55 °C**

11 DISPOSAL OF THE eCONTROL 8611

→ Observe the national standards for refuse disposal.
Dispose of the eCONTROL 8611 and the packaging in an environmentally safe manner.

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