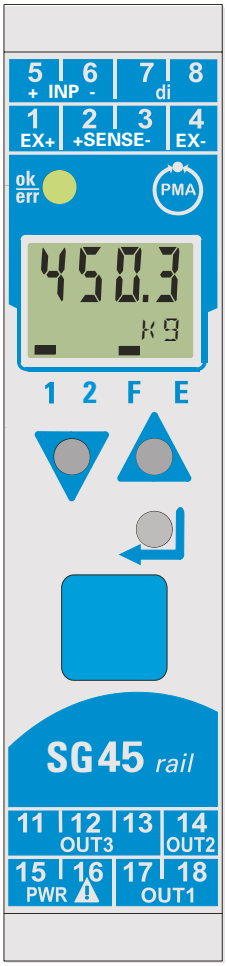
PMA Prozeß- und Maschinen-Automation GmbH

Transmitter UNIFLEX SG45



UNIFLEX SG 45

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Operating manual

English

9499-040-82311

valid from: 10/2009

BlueControl®

More efficiency in engineering, more overview in operating:

**The projecting environment for the BluePort® controllers,
indicators and *rail line* - measuring converters / universal controllers, temperature limiters**

ATTENTION!
Mini Version and Updates on
www.pma-online.de
or on PMA-CD

Explanation of symbols:

General information

General warning

Caution: ESD-sensitive components

Caution: Read the operating instructions

Read the operating instructions

Note

A publication of
PMA Prozeß- und Maschinen Automation
P.O.Box 310229
Germany

Content

1 General

Thank you very much for buying a transmitter for load cells, strain gauges, and melt pressure sensors UNIFLEX SG 45. The UNIFLEX SG 45 transmitters are suitable for precise, cost-efficient contol tasks in all industrial applications. Every SG 45 is equipped with a strain gauge signal input, an universal output and two relays. Optionally the tranmitter can be fitted with various interfaces.

Galvanic isolation is provided between inputs and outputs as well as from the supply voltage and the communication interfaces.

Applications

CI 45 is used for measurement, scaling of electrical signals, e.g. for
- Strain gauges
- Load cells
- Melt pressure sensors
- Pressure sensors

...

At-a-glance survey of advantages

Compact construction, only 22,5 mm wide
Clips onto top-hat DIN rail
Plug-in screw terminals or spring clamp connectors
Dual-line LC display with additional display elements
Process values always in view
Convenient 3-key operation
Ability for wireless cross-communication with other units mounted on top-hat rail
Strain gauge input with high signal resolution (>15 bits)
Universal output with high resolution (14 bits) as combined current / voltage output
Quick response, only 50 ms cycle time, i.e. also suitable for fast signals
Two relay outputs
Customer-specific linearization
Tare function
Min/max indicator (‘slave pointer’)
Logical linking of digital outputs, e.g. for common alarms
Preset for output value

Further documentation for DMS Messumformer SG 45:

– This operating manual	9499 040 82318
– Data sheet SG 45	9498 737 57333
– Operating note SG 45	9499 040 82441
– Interface description	9499 040 72018

2 Safety hints

This unit was built and tested in compliance with VDE 0411-1 / EN 61010-1 and was delivered in safe condition.
The unit complies with European guideline 89/336/EWG (EMC) and is provided with CE marking.
The unit was tested before delivery and has passed the tests required by the test schedule. To maintain this condition and to ensure safe operation, the user must follow the hints and warnings given in this operating manual and operate this instrument in compliance with the instructions given in this manual.

The unit is intended exclusively for use as a measurement and control instrument in technical installations.

Warning
If the unit is damaged to an extent that safe operation seems impossible, the unit must not be taken into operation.

ELECTRICAL CONNECTIONS

The electrical wiring must conform to local standards (e.g. VDE 0100). The input measurement and control leads must be kept separate from signal and power supply leads.
Using **screened cables** is mandatory! The screening must be connected to ground potential.
In the installation of the controller a switch or a circuit-breaker must be used and signified. The switch or circuit-breaker must be installed near by the controller and the user must have easy access to the controller.

COMMISSIONING

Before instrument switch-on, check that the following information is taken into account:

- **Ensure that the supply voltage corresponds to the specifications on the type label.**
- **All covers required for contact protection must be fitted.**
- **If the controller is connected with other units in the same signal loop, check that the equipment in the output circuit is not affected before switch-on. If necessary, suitable protective measures must be taken.**
- **The unit may be operated only in installed condition.**
- **Before and during operation, the temperature restrictions specified for controller operation must be met.**

Warning
During operation, the ventilation slots of the housing must not be covered.

The measurement inputs are designed for measurement of circuits which are not connected directly with the mains supply (CAT I). The measurement inputs are designed for transient voltage peaks up to 800V against PE.

Warning
The ventilation slots must not be covered during operation.

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SHUT-DOWN

For taking the unit out of operation, disconnect it from all voltage sources and protect it against accidental operation.
If the controller is connected with other equipment in the same signal loop, check that other equipment in the output circuit is not affected before switch-off. If necessary, suitable protective measures must be taken.

2.1 MAINTENANCE, REPAIR AND MODIFICATION

The units do not need particular maintenance.
There are no operable elements inside the device, so the user must not open the unit

Modification, maintenance and repair work may be done only by trained and authorized personnel. For this purpose, the PMA service should be contacted.

Warning
When opening the units, or when removing covers or components, live parts and terminals may be exposed. Connecting points can also carry voltage.

Caution
When opening the units, components which are sensitive to electrostatic discharge (ESD) can be exposed.

You can contact the PMA-Service under:

PMA Prozeß- und Maschinen-Automation GmbH
Miramstraße 87
D-34123 Kassel

Tel. +49 (0)561 / 505-1257
Fax +49 (0)561 / 505-1357
e-mail: mailbox@pma-online.de

2.2 Cleaning

The cleaning of the front of the controller should be done with a dry or a wetted (spirit, water) handkerchief.

2.3 Spare parts

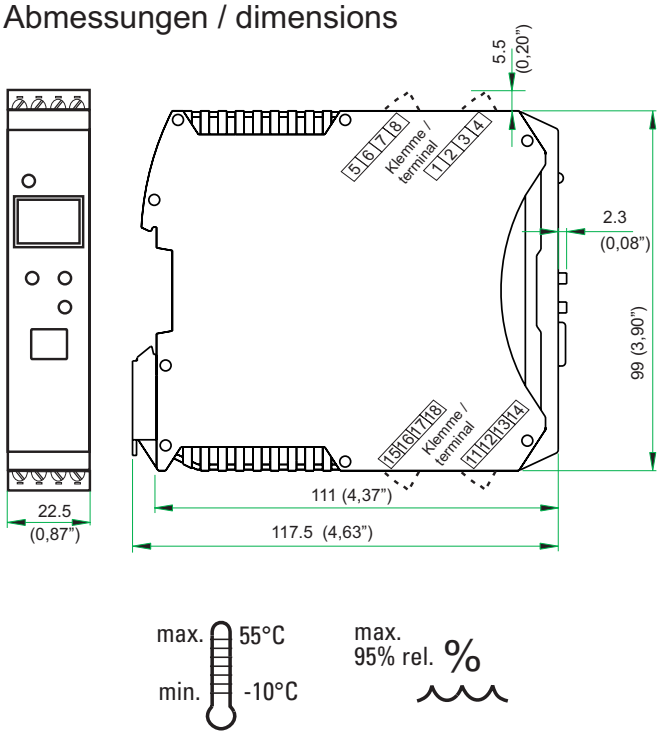
As spare parts für the devices the following accessory parts are allowed:

Description	Order-No.
Connector set with screw terminals	9407-998-07101
Connector set with spring-clamp terminals	9407-998-07111
Bus connector for fitting in top-hat rail	9407-998-07121
Connector for bus connector inverted, left side, horizontal cable outlet *1	9407-998-07131
Connector for bus connector inverted, right side, vertical cable outlet *11	9407-998-07141

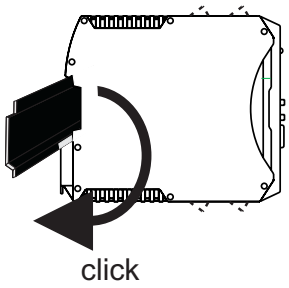
*1 screw connection

3 Mounting

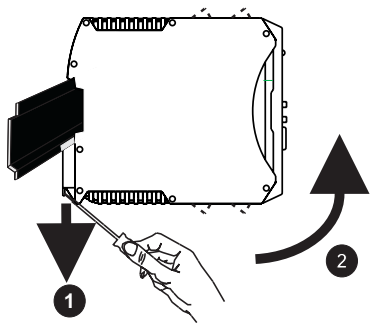
Abmessungen / dimensions



Montage / mounting



Demontage / dismantling



The unit is provided for vertical mounting on 35 mm top-hat rails to EN 50022.

If possible, the place of installation should be exempt of vibration, aggressive media (e.g. acid, lye), liquid, dust or aerosol.

The instruments of the *rail line* series can be mounted directly side by side. For mounting and dismounting, min. 8 cm free space above and below the units should be provided.

For mounting, simply clip the unit onto the top-hat rail from top and click it in position.
To dismount the unit, pull the bottom catch down using a screwdriver and remove the unit upwards.

The transmitter SG 45 does not contain any maintenance parts, i.e. the unit need not be opened by the customer.

The unit may be operated only in environments for which it is suitable due to its protection type.

The housing ventilation slots must not be covered.

In plants where transient voltage peaks are susceptible to occur, the instruments must be equipped with additional protective filters or voltage limiters!

Caution! The instrument contains electrostatically sensitive components.

Please, follow the instructions given in the safety hints.

To maintain contamination degree 2 acc. to EN 61010-1, the instrument must not be installed below contactors or similar units from which conducting dust or particles might trickle down.

3.1 Connectors

The four instrument connectors are of the plug-in type. They plug into the housing from top or bottom and click in position (audible latching). Releasing the connectors should be done by means of a screwdriver.
Two connector types are available:

- **Screw terminals for max. 2,5 mm^2 conductors**
- **Spring-clamp terminals for max. 2,5 mm^2 conductors**

Before handling the connectors, the unit must be disconnected from the supply voltage.

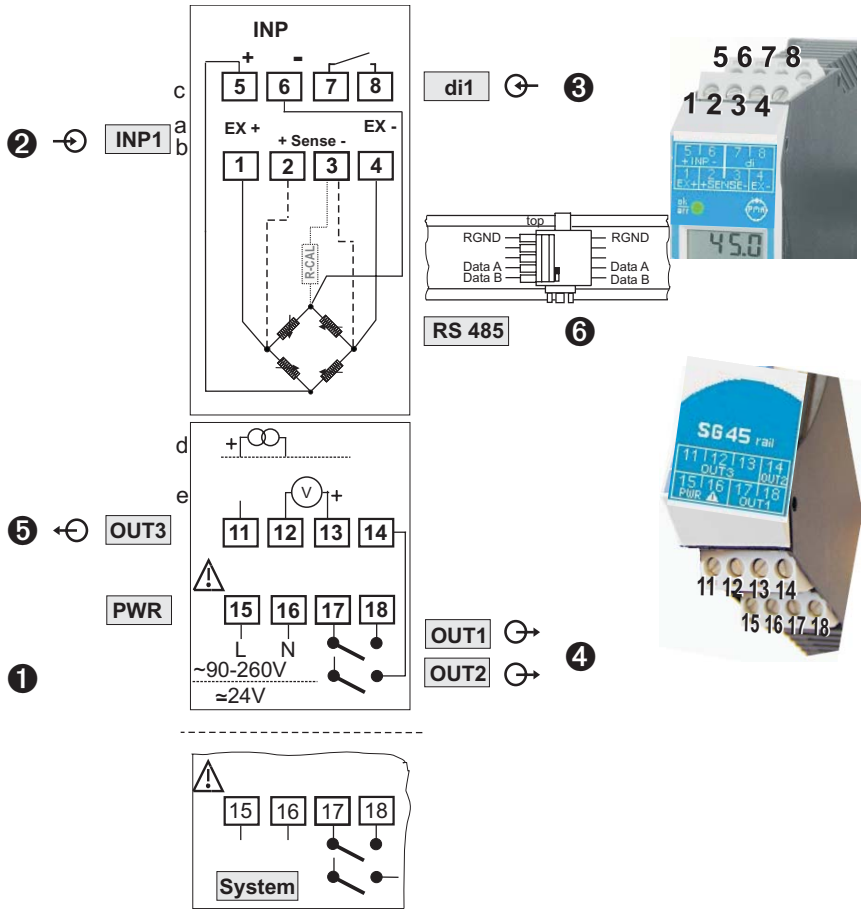
Tighten the screw terminals with a torque of 0,5 - 0,6 Nm.

With spring-clamp terminals, stiff and flexible wires with end crimp can be introduced into the clamping hole directly. For releasing, actuate the (orange) opening lever.

Contact protection: Terminal blocks which are not connected should remain in the socket.

4 Electrical connections

4.1 Connecting diagram



4.2 Terminal connections

Faulty connection might cause destruction of the instrument !

❶ Connecting the supply voltage

Dependent on order

- **90 … 260 V AC** — **terminals: 15,16**
- **24 V AC / DC** — **terminals: 15,16**

For further information, see section "Technical data"

Instruments with optional system interface:
Energization is via the bus connector of field bus coupler or power supply module. Terminals 15, 16 must not be used.

❷ Connecting input INP1

Input for strain gauge (in 4 and 6-wire connection) or for melt pressure sensors (with/without calibration shunt).

- **a** Excitation voltage for bridge (EXITATION) — **terminals: 1, 4**
- **b** Excitation voltage measuring signal (Sense) — **terminals: 2, 3**
- **c** Bridge signal (input) — **terminals: 5, 6**

❸ Connecting input di1

Digital input

control input (as a potentialfree contact) terminals: 7, 8

❹ Connecting outputs OUT1 / OUT2 (optional)

Relay outputs max. 250V/2A NO contacts with a common terminal.

- **OUT1** **terminals: 17, 18**
- **OUT2** **terminals: 17, 14**

❺ Connecting output OUT3

Universal output

d current (0...20mA) **terminals: 11, 12**

e voltage (0...10V) **terminals: 12, 13**

❻ Connecting the bus interface (optional exept d)

RS 485 interface with MODBUS RTU protocol

* see interface description MODBUS RTU: (9499-040-72011)

4.3 Connecting diagram

The instrument terminals used for the engineering can be displayed and printed out via BlueControl ® (menu File \ Print preview - Connection diagram).

Example:

Device1.bct **BlueControl ®**

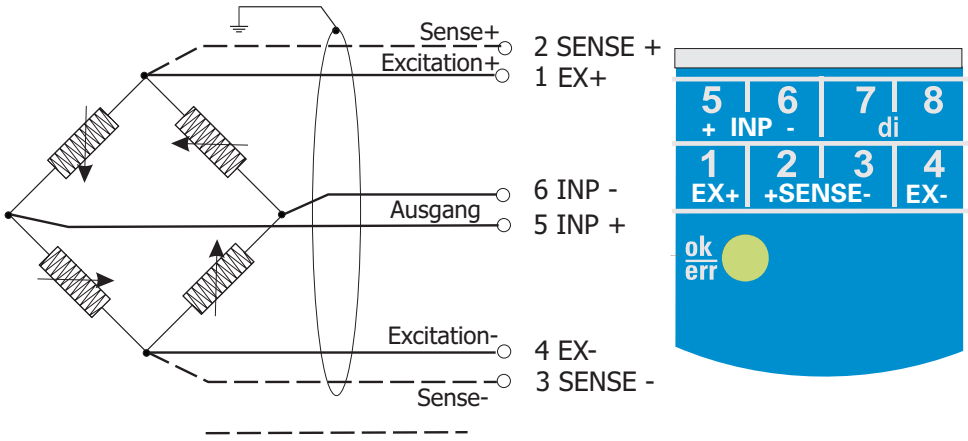
Connecting plan		
Terminal connector 1		
Pin	**Name**	**Description**
1	EX+	**Sensor supply**
2	SENSE+	**Probe cable**
3	SENSE-	
4	EX-	
5	INP+	**Process value X1**
6	INP-	
7	di1 contact	
8	di1 contact	

Terminal connector 2		
Pin	**Name**	**Description**
11	OUT3 +I	**0...20 mA continuous, signal source: Process value**
12	OUT3 -I	
13	---	
14	OUT2	**Alarm INP1-Error**
15	PWR L 90...250V	
16	PWR N 90...250V	
17	OUT1 / OUT2	
18	OUT1	**Alarm Limit 1, Alarm INP1-Error**

Terminal connector 3		
Pin	**Name**	**Description**
BC1	RS485	RGND
BC2	NC	
BC3	NC	
BC4	RS485	Data A
BC5	RS485	Data B

4.4 Connection examples

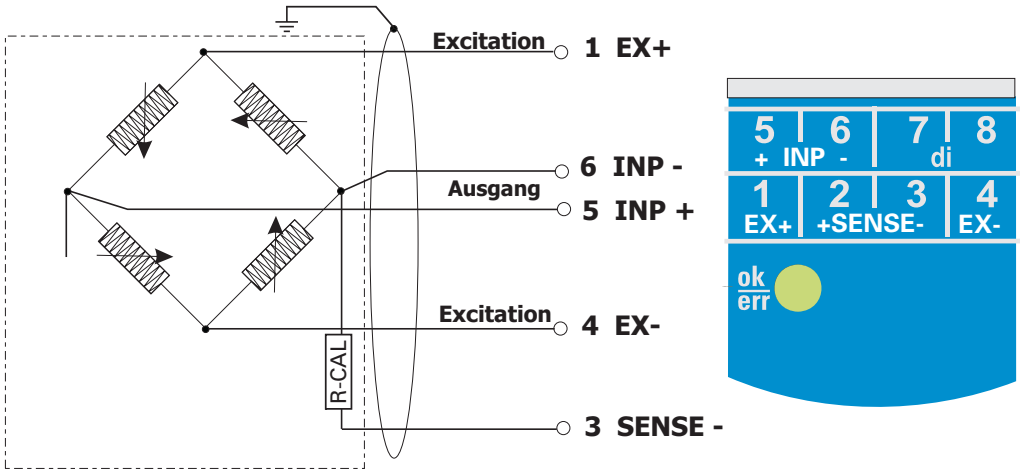
Example: Connection load cell with 4 or 6-wire bridge



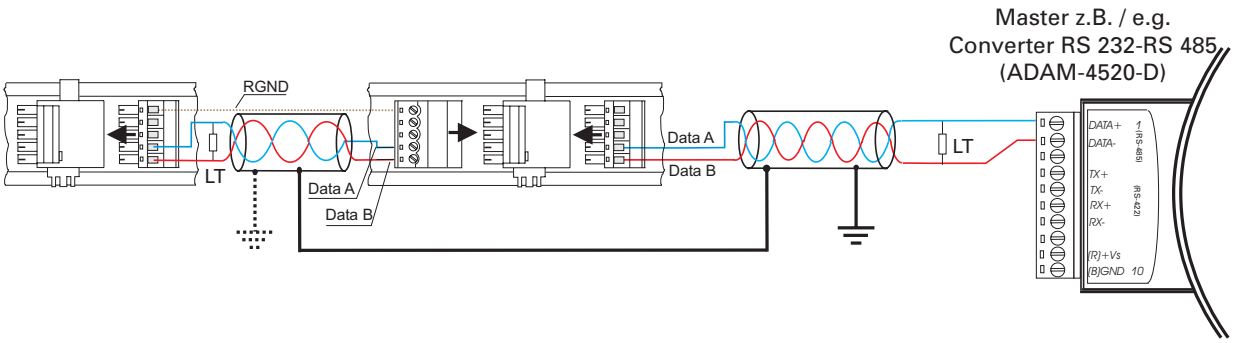
only with 6-wire bridge

After initialization, a test for connection of the sense signal is made automatically (6-wire connections)

Example: Connection of a (melt) pressure sensor in 4-wire technology with a calibrating resistor



Example: RS 485 interface with RS 485-RS 232 converter
See documentation 9499-040-72011



4.5 Hints for installation

- Measurement and data lines should be kept separate from control and power supply cables.
- Sensor measuring cables should be twisted and screened, with the screening connected to earth.
- External contactors, relays, motors, etc. must be fitted with RC snubber circuits to manufacturer specifications.
- The unit must not be installed near strong electric and magnetic fields.
- The temperature resistance of connecting cables should be selected in accordance with the local conditions.

The unit is not suitable for installation in explosion-hazarded areas.

Faulty connection can lead to the destruction of the instrument.

The measurement inputs are designed for measurement of circuits which are not connected directly with the mains supply (CAT I). The measurement inputs are designed for transient voltage peaks up to 800V against PE.

Please, follow the instructions given in the safety hints.

4.6 UL approval (optional)

For compliance with UL regulations, the following points must be taken into account:

- ❑ Use only copper (Cu) wires for 60 / 75 °C ambient temperature.
- ❑ The connecting terminals are designed for 0,5 – 2,5 mm^2 Cu (12-30 AWG) conductors.
- ❑ The screw terminals must be tightened using a torque of 0,5 – 0,6 Nm.
- ❑ The instrument must be used exclusively for indoor applications.
- ❑ Max. ambient temperature: 55°C.
- ❑ Maximum operating voltage: see technical data.
- ❑ Max. ratings of relay contacts: 250VAC, 2A (resistive)

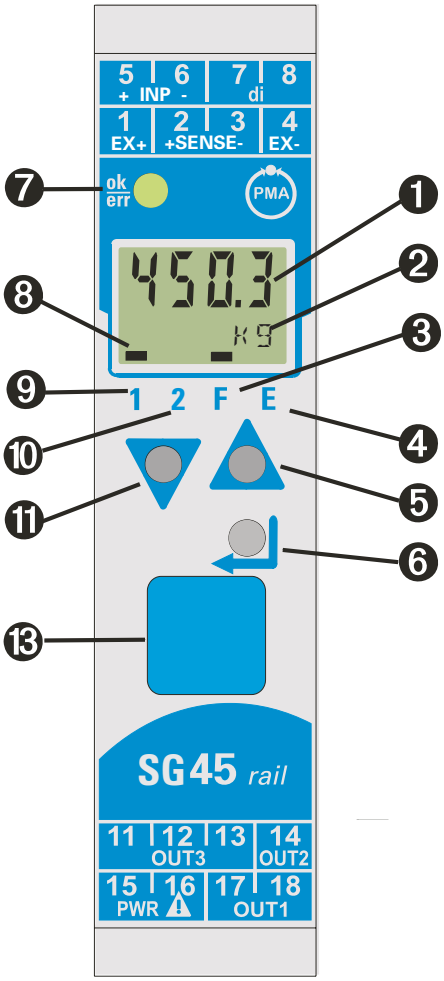
5 Operation

5.1 Front view

❶ Line 1: process value display
❷ Line 2: display of unit / extended operating level / error list / ConF and PAr A level values
❸ Tare / sample & hold activated
❹ Error list (2 x ↵), e.g.
- FbF.x sensor fault INP. X
- Pol.x wrong polarity INP. X
- Lim.x limit value alarm
- ...

❺ Increment key / "slave pointer", maximum value
❻ Enter key to select extended operating level or error list Parameter-, Konfigurations-, Installations-Ebene
❼ Status indicator LEDs
- green: limit value 1 OK
- green blinking: no data exchange with bus coupler (only on instruments with optional system interface)
- red: limit value 1 active
- red blinking: instrument fault, configuration mistake

❽ Display elements, active as bars
❾ Status of switching output OUT1 active
❿ Status of switching output OUT2 active
⓫ Decrement key/ "slave pointer", minimum value
⓭ PC connection for the **BlueControl**® engineering tool

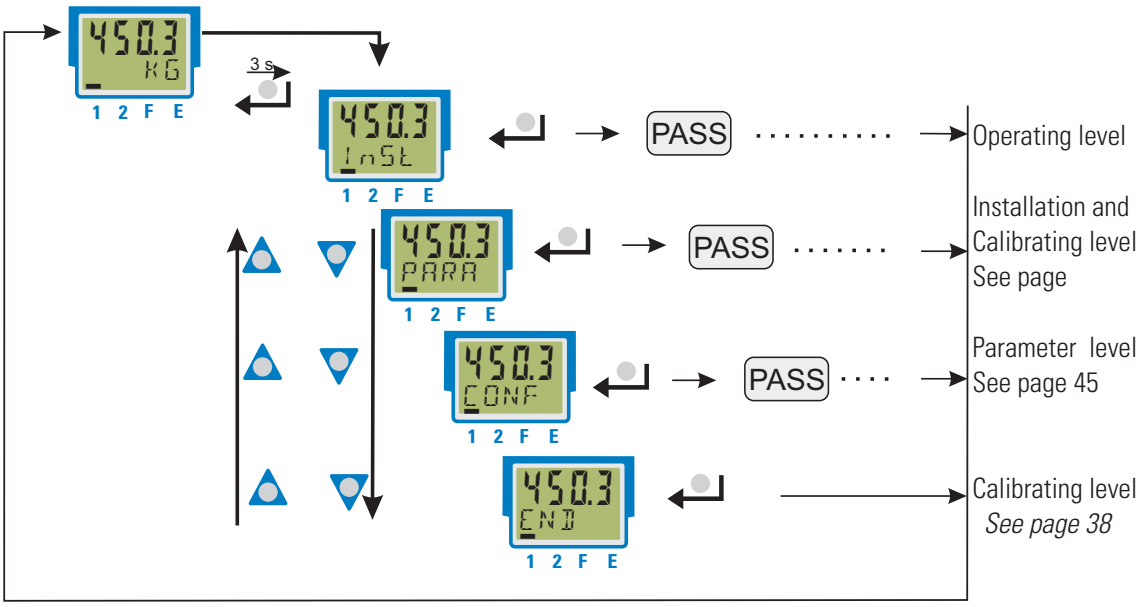


In the first LCD-display line the measured value is shown. The second LCD-line normally shows the setpoint. When changing over to the parameter setting, configuration or calibration level and at the extended operating level, the parameter name and value are displayed alternately.

⓭ : To facilitate withdrawal of the PC connector from the instrument, please, press the cable left.

5.2 Operating structure

The instrument operation is divided into four levels:



The access to the parameter, configuration and calibrating level can be disabled using the following two methods:

- Level disabling by adjustment in the engineering tool (IPar, ICnf, ICal). Display of disabled levels is suppressed.
- The access to a level can be disabled by entry of a pass number (0 … 9999). After entry of the adjusted pass number, all values of the level are available.
  With faulty input, the unit returns to the operating level.
  Adjusting the pass number is done via BlueControl®.

Individual parameters which must be accessible without pass number, or from a disabled parameter level, must be copied into the extended operating level.

Factory-setting: all levels are accessible without restrictions, pass number PASS =OFF

PASS

5.3 Behaviour after supply voltage switch-on

After switching on the supply voltage, the instrument starts with the operating level.
The operating status is as before power-off.

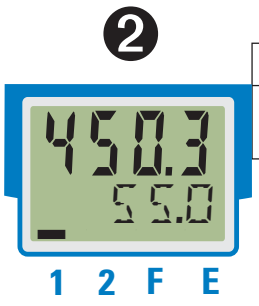
5.4 Displays in the operating level

5.4.1 Display line 1

The display value is the value resulting from function.1, function.2, function.3 handling.
It is also called process value (see also section/page 23.)

5.4.2 Display line 2

The value to be displayed continuously in the second LCD line can be selected from different values via the **BlueControl**® engineering tool.
As default, the adjusted engineering unit is displayed.



❶	Default settings as setpoint
❷	Display of output OUT3 in % (with corresponding scaling)

The values in display line 2 can only be displayed, but not changed.

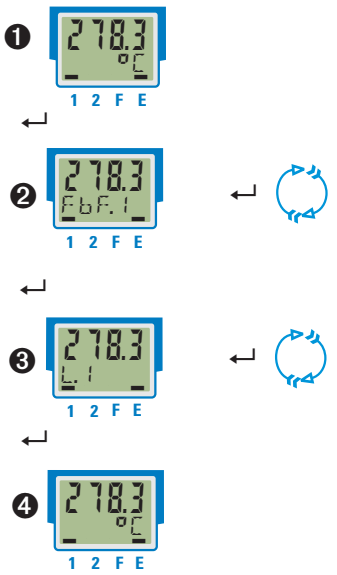
Reset to display of the engineering unit is possible by deleting the entry for line 2..

With faulty input values, signals dependent on the inputs (e.g. Inp1, Inp2, display value, Out3) also indicate FAIL.

5.4.3 Switch-over with the enter-key

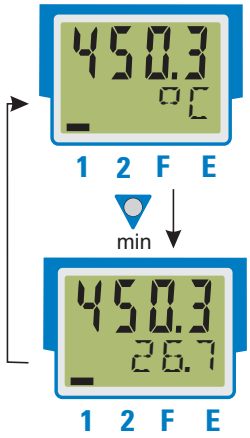
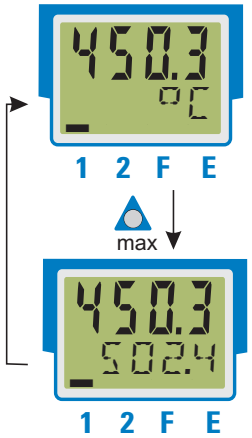
By using the enter-key, different values can be called in display 2.

- ❶ Displaying the defined display 2 value (via BlueControl®). Standard setting is unit
- ❷ Calling up the error list, if messages are supplied. If there is more than one message with every push of the enter key the next message is displayed.!!!
- ❸ Calling up the extended operating level, if messages are supplied. If there is more than one message with every push of the enter key the next message is displayed.!!!!
- ❹ Returning to the original displayed value. If for 30 s no key is pushed, the display automatically returns to the origin.



5.4.4 Slave pointer function

The minimum and maximum input values are stored in the unit.

	
The minimum input value is displayed as long as key ▼ is pressed.	The maximum input value is displayed as long as key ▲ is pressed.

Deleting the minimum value
The minimum value is deleted by pressing key ▲ whilst key ▼ is kept pressed.
Whether the minimum value should be deleted also by the digital input (r ES.L) can be determined during configuration.
Deleting the maximum value
To delete the maximum value, press key ▼ whilst keeping key ▲ pressed.
Whether the maximum value should be deleted also by the digital input (r ES.H) can be determined during configuration.

Deleting the minimum and maximum values is possible also via interface.

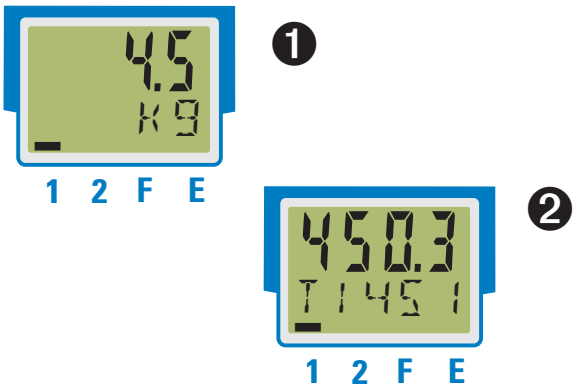
When de-energizing UNIFLEX SG 45 the minimum and maximum values are deleted.

In case of error of the display value (e.g. input fail behaviour), the minimum and maximum values are also set to FAIL. When a valid value is displayed again, the minimum and maximum value are deleted.

5.4.5 Selecting the units

The unit to be displayed is determined via configuration UNIT.

By selecting UNIT = 22, display of any max. 5-digit unit or text can be determined.



❶	Unit (example): kilogram
❷	Text (example): TAG no.

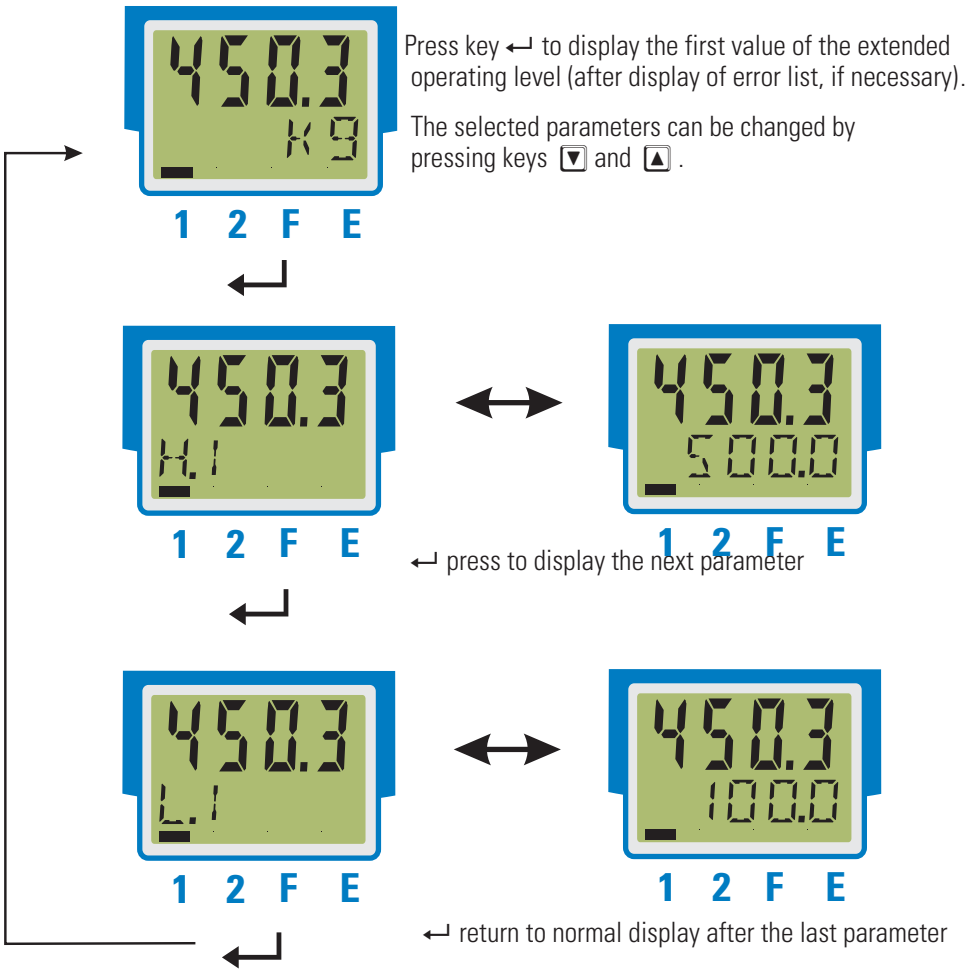
5.4.6 Extended operating level

The operation of important or frequently used parameters and signals can be allocated to the extended operating level.

This facilitates the access, e.g. travelling through long menu trees is omitted, or only selected values are operable, the other data of the parameter level are e.g. disabled.

Display of the max. 8 available values of the extended operating level is in the second LCD line.

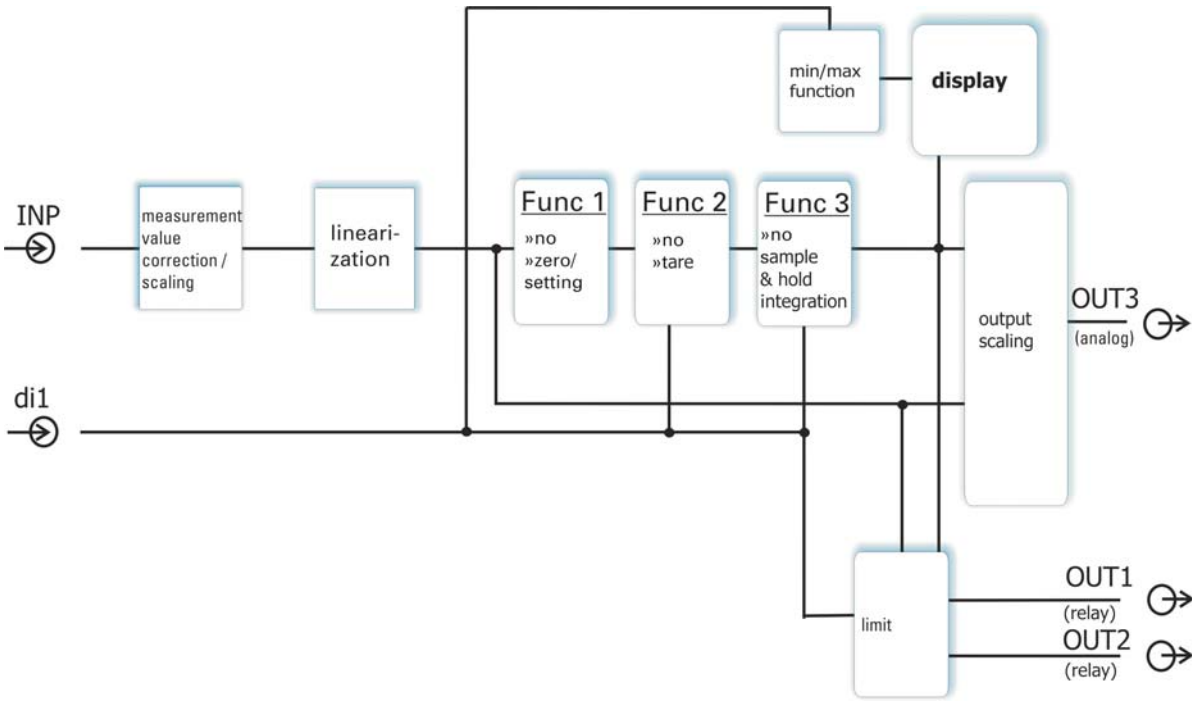
The content of the extended operating level is determined by means of the **BlueControl**® engineering tool. For this, select entry "Operation level" in the "Mode" selection menu. Further information is given in the on-line help of the engi - neering tool.



Unless a key is pressed within a defined time (timeout = 30 s), the operating level is displayed again.

6 Functions

The signal data flow of transmitter SG 45 is shown in the following diagram:



6.1 Measuring input INP

Measuring range	Configuration SL YP
0.5 mV/V (5 mV)	60
1 mV/V (10 mV)	61
2 mV/V (20 mV)	62
4 mV/V (40 mV)	63

Input for bridge circuit (3 possibilities):

- Bridge supply + mV input (4-wire)
- Bridge supply + mV input + Sense input (for measuring the bridge voltage applied to the sensor) (6-wire):
- Bridge supply + mV input + calibration output (for defined change of the bridge resistance): Using a built-in switch, a known resistor is switched in parallel to one of the 4 bridge resistors, configurable via CAL..M.

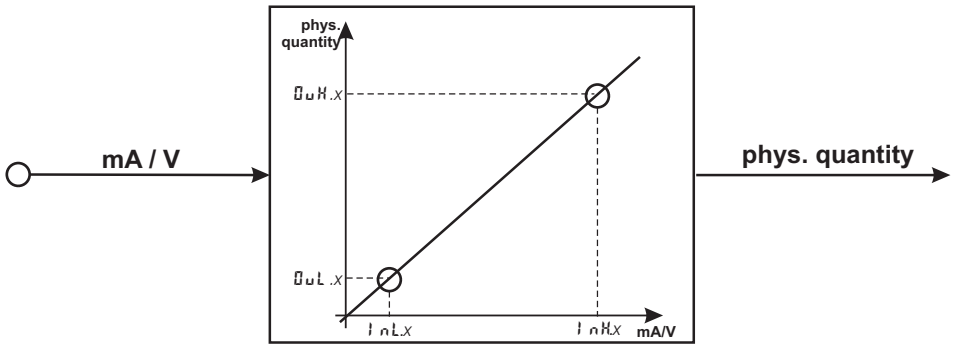
☞ **Automatic 4 or 6-wire detection after start-up**
Automatic detection, if the sense signal is connected: This function is active during start-up (after switch-on or re-con - figuration).
See circuit example on page 9.

☞ Due to 6-wire connection, errors caused by voltage drops on the supply leads are prevented.

6.2 Input scaling

Scaling of input values is possible. This correction influences the measured value after an eventually executed linearization.

Specification of the input value of the lower and upper scaling point is in units of the relevant physical quantity.



Example for %

The Parameters InL, OuL, InH and OuH are always visible. These are created during calibration.

Parameters InL and InH determine the input range.

Example with %:
InL = 4 and InH = 10 means that measuring from 4 to 10 % is required.

For resetting the input scaling, the settings for InL and OuL as well as InH and OuH must correspond.

6.3 Linearization

The input values of the input can be linearized via a table.

This feature can be used e.g. to realize linearizations to specification for non-linear curves.
The "L i n" table is always used when SL i n = 1: "Linearization to specification" is set in INPm. The input signals are filled in in units of the physical quantity (scaling result).

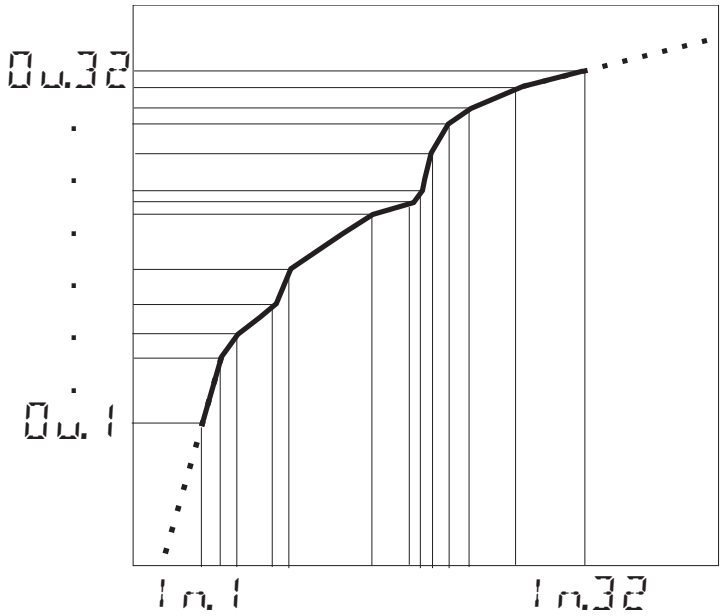
Non-linear signals can be linearized using up to 32 segment points. Each segment point comprises an input (I n. 1 ... I n.32) and an output (O u. 1 ... O u.32).
These segment points are interconnected automatically by straight lines. The straight line between the first two segment points is extended downwards and the straight line between the two highest segment points is extended upwards, i.e. a defined output value for each input value is provided.

With an I n.x value switched to OFF, all further segments are switched off.

Required: Condition for the input values is an ascending order.

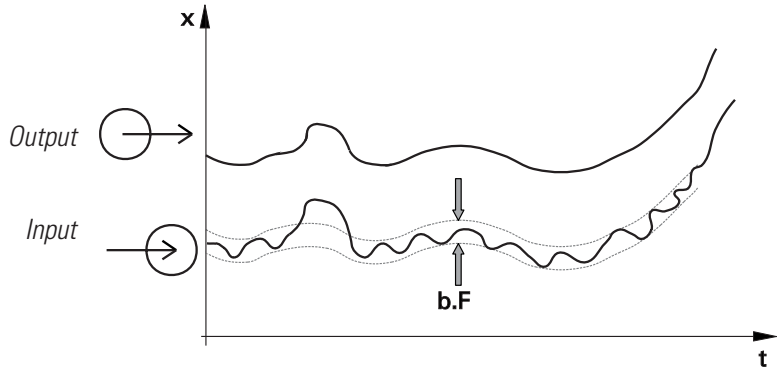
I n.1 < I n.2 <...< I n.32.

See also page 44.



6.4 Filter

A 1st order mathematical filter with adjustable time constant and bandwidth is built in.



The filter bandwidth b.F 1 is the adjustable tolerance around the measured value within which the filter is active. Measurement value changes in excess of the adjusted bandwidth are not filtered.

6.5 Substitue value for inputs

If a substitute value for an input is activated, this value is used for further calculation with a sensor fault, independent of the selected input function. The selected controller output reaction on sensor fault, configuration FAIL, is omitted.

With factory setting, the substitute value is switched off.

Before activation of a substitute value In.F, the effect on the control loop must be considered.

6.6 Input forcing

Setting f.AIx = 1 (only via BlueControl®) can be used for configuring the input for value entry via the interface (=forcing).

Please, check the effect on the control loop in case of failure of input value / communication and exceeded measuring range.

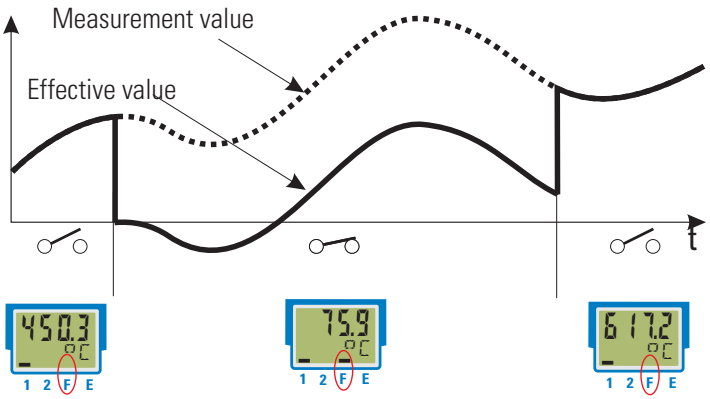
Tip: The selected unit can be displayed on line 2.

6.7 Set zero

The function is enabled during configuration (Func → Func.1 =1.
Due to its effect, the display is reset to zero, when e.g. small rest quantities are still on the scale and cannot be re - moved immediately.
To prevent excessive use of the zero setting function, the zero offset (page 30) can be provided with an alarm. After cleaning the scale, zero setting must be repeated.
Dependent on configuration, the zero setting function can become effective by a **pulse** on digital input di1, a limit value, by pressing a combination of keys or via an interface signal (LOG1 → tArA) . See page 41.

6.8 Tare function

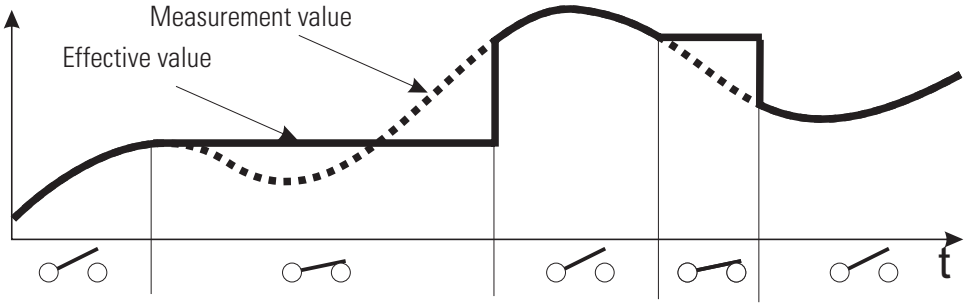
Switching on the tare function sets the instantaneous input value to zero and measurement is continued with this off - set z.B. um ein Leergewicht abzuziehen.
By switching off the tare function, the actual measurement value is displayed again.



The tare function is enabled during configuration (Func → Fnc.3 = 1).
Dependent on configuration, the tare function can be activated by digital input di1 a limit value, a key combination or interface (LOG1 → tArA. See page 41
An active tare function is displayed as an active bar for display element 'F' .

6.9 Sample&hold amplifier

With the sample & hold function activated, the measured value is held on the display. After de-activating the sample & hold function, the actual measurement value is displayed again.



The sample&hold amplifier function can be activated during configuration (Func → Fnc.3 = 2).
Dependent on configuration, the sample&hold function can be activated by digital input di1 a limit value, a key combi - nation or interface (LOG1 → HOLd).
An active sample&hold amplifier function is displayed as an active bar for display element 'F' .

6.10 Integrator function

The input signal can be totalized by means of a selectable integrator (ConF \Func \Fnc.3 = 3).

Function:

Integrator with adjustable time constant (PAr A \Func \t.I) [specified in minutes] and adjustable input offset (PAr A \Func \P.I)

Formula:

$$y(t) = y(t-Tr) + Tr/t * (x + P.I)$$

y(t)	= integrator output
y(t-Tr)	= integrator output of the last cycle
Tr	= cycle time (100ms INP1, 140ms INP1 + INP2)
t	= time constant
x	= integrator input
P.I	= input offset (zero offset)

With a constant input value, the integrator output reaches the specified value after elapse of the adjusted time constant t.I.

Reset:

Dependent on selection (ConF\Log\r ES.I), the integrator can be reset via:

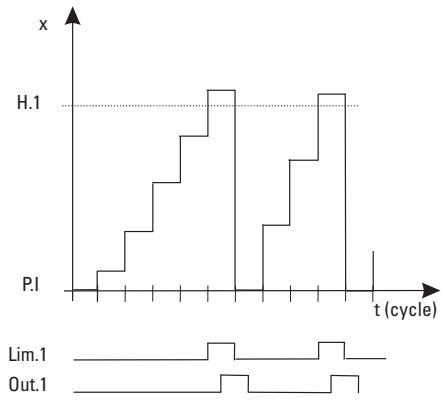
- Digital input di1
- Key combination Enter + increment key
  (keep the Enter key pressed and actuate the increment key)
- Limit values Limit1 to Limit3

Example 1:

A flow in m^3/h is measured. The integrator should measure the overall flow quantity. The measured flow is related to time unit hours, i.e. time constant t.I = 1 hour = 60 min must be used. Parameter P.I can be used for zero correction.

Example 2: pulse output

The integrator is activated. The resulting process value is monitored using a limit value (without memory) , e.g. Lim1. Lim.1 is defined as integrator reset function. Limit value Lim.1 is output e.g. on ouput 1 (OUT.1).
When exceeding limit value Lim1, there is a signal change at OUT1 during a period (50ms).



6.11 Limit value processing

Max. three limit values can be configured for the outputs. Generally, each one of outputs OUt.1 ... OUt.2 can be used for limit value or alarm signalling.

Several signals allocated to an output are linked by a logic OR function.

6.11.1 Input value monitoring

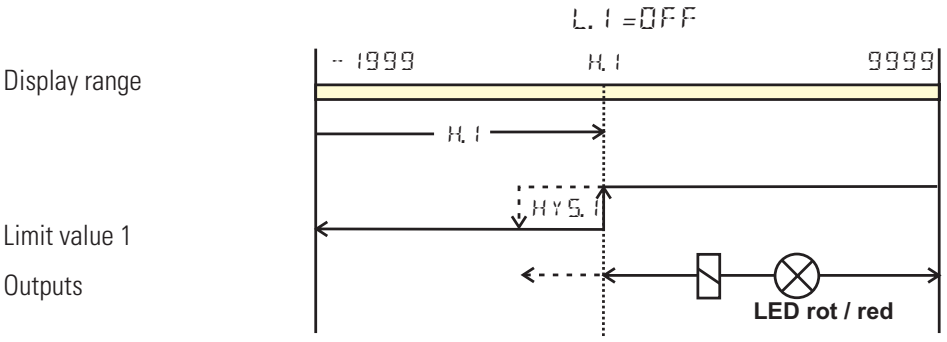
The signal to be monitored can be selected separately for each alarm in the configuration. The following signals are available:

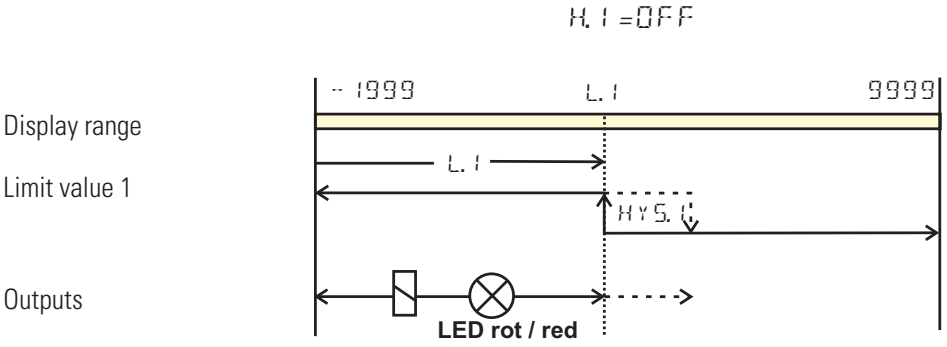
- **Process value (display value)**
- **Measured value INP**
- **Zero adjustment**

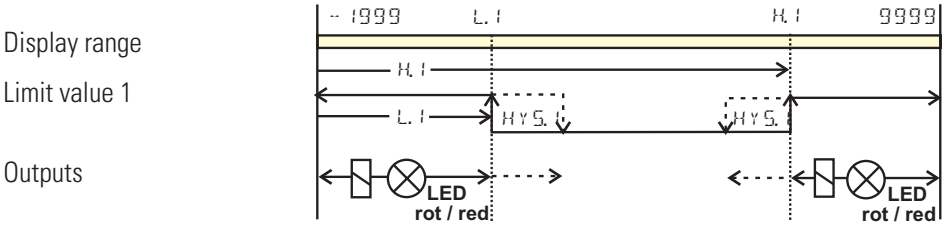
Each of the 3 limit values LIm.1 ... LIm.3 has 2 trigger points H.x (Max) and L.x (Min), which can be switched off individually (parameter = "OFF"). The hysteresis HYS.x of each limit value is adjustable.

Input value monitoring is as shown below:

operating principle with absolute alarm (Ex. Lim.1)





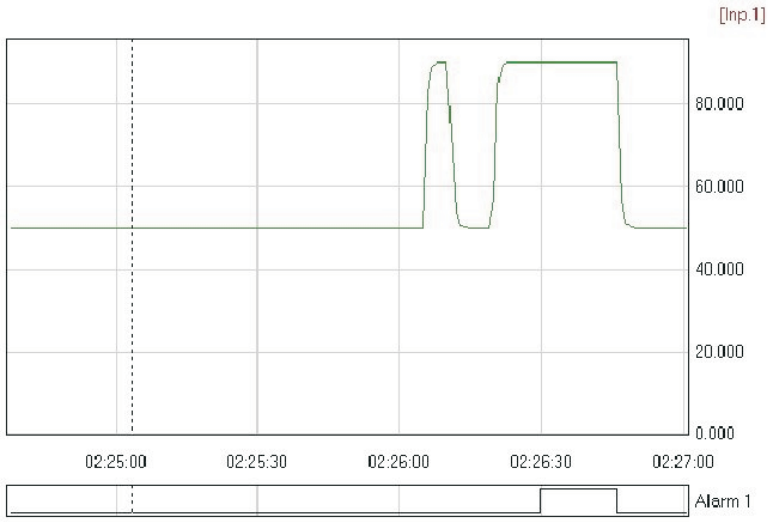


Normally open: (ConF / OUt.x / OAct = 0) (as shown in the example)
Normally closed: (ConF / OUt.x / OAct = 1) (inverted output relay action)

Alarm delay

An alarm can become effective with a delay: the alarm output is set only after elapse of the adjusted delay time, provided that the limit value is still exceeded. Shorter alarms than the adjusted delay are ignored.

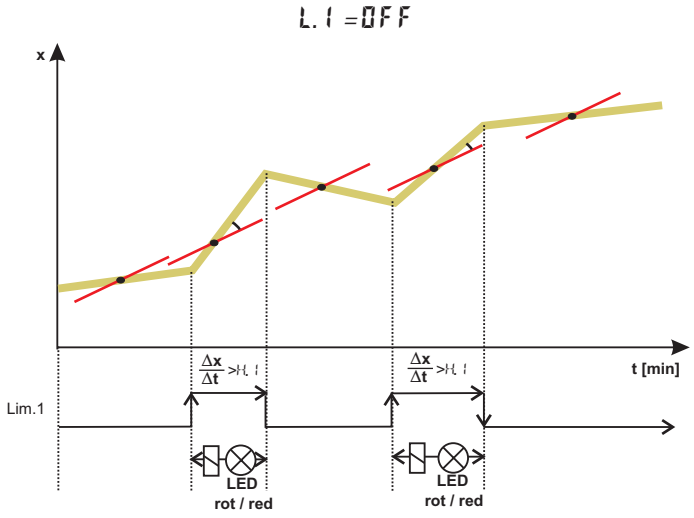
Example: Alarm delay



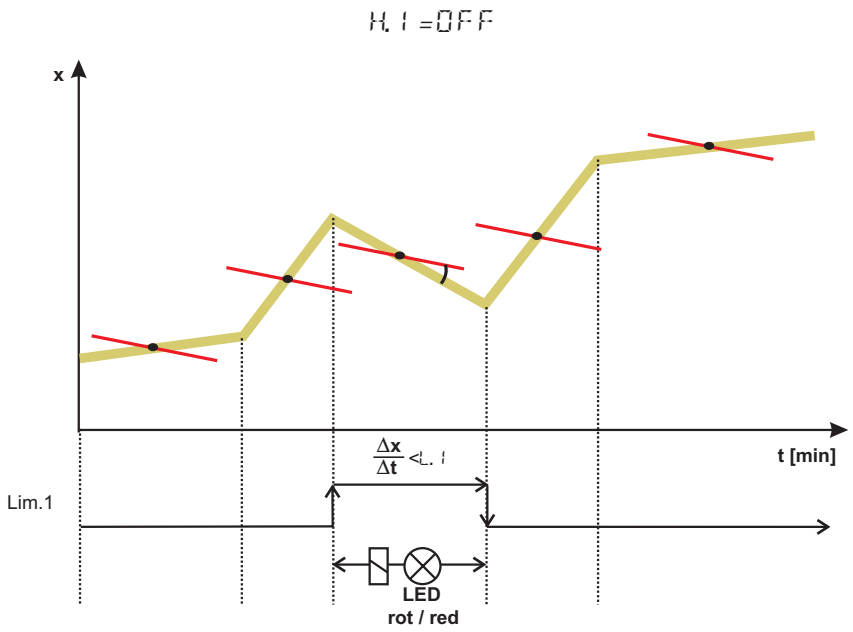
Signal change monitoring

Another limit value processing function is signal change monitoring (per minute).

Behaviour with signal change (Ex. Lim1)



With measurement value or signal change with latch selected (ConF /Lim /Fnc.x = 2,4), the alarm relay remains set, until it was reset in the error list,
This alarm can be reset via:
di1 or
a limit value
a key combination
or via **interface** (Lim1 ... Lim3 = 1).
For this, reset value 0 must be specified in the error list or via the interface. (→ page 36).



After power on or an engineering download an used input filter has an effect on the gradient of the input signal. Therefore a valid alarm monitoring can only be processed after a certain rise up time. This time depends on the value of the filter time constant t.F.
For t.F = 0 the monitoring results are valid immediately.

6.11.2 Monitoring the number of operating hours and switching cycles

Operating hours

The number of operating hours can be monitored. When reaching or exceeding the adjusted value, signal InF.1 is activated (in the error list and via an output, if configured).

The monitoring timer starts when setting limit value C.Std. Reset of signal InF.1 in the error list will start a new monitoring timer. Monitoring can be stopped by switching off limit value C.Std.

Adjusting the limit value for operating hours C.Std can be done only via BlueControl®.
The current counter state can be displayed in the BlueControl® expert version.

The number of operating hours is saved once per hour. Intermediate values are lost when switching off.

Number of switching cycles

The output number of switching cycles can be monitored. When reaching or exceeding the adjusted limit value, signal InF.2 is activated (in the error list and via an output, if configured).

The monitoring timer starts when setting limit value C.Sch. Reset of signal InF.2 in the error list will start a new monitoring timer. Monitoring can be stopped by switching off limit value C.Sch.

A switching cycle counter is allocated to each output. Limit value C.Sch acts on all switching cycle counters.

Adjusting the limit value for the number of switching cycles C.Sch can be done only via BlueControl®.
The current counter state can be displayed in the BlueControl® expert version.

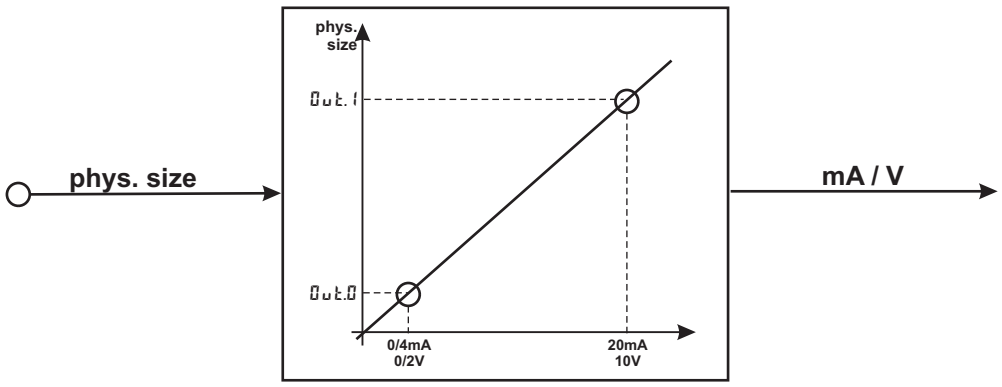
The number of switching cycles is saved once per hour. When switching off, intermediate values are lost.

6.12 Analog output configuration

6.12.1 Analog output

The two output signals (current and voltage) are available simultaneously. Adjust ConF / Out.3 / O.tYP to select the output type which should be calibrated.

ConF / Out.3: O.tYP	=	1	Out.3 0...20mA continuous
	=	2	Out.3 4...20mA continuous
	=	3	Out.3 0...10V continuous
	=	4	Out.3 2...10V continuous



Parameter O.Src defines the signal source of the output value.

Example:

O.Src = 3 signal source for Out.3 is the process value

Scaling of the output range is done via parameters Out.0 and Out.1. The values are specified in units of the physical quantity.

Out.0	=	-1999...9999	scaling Out.3 for 0/4mA or 0/2V
Out.1	=	-1999...9999	scaling Out.3 for 20mA or 10V

Example: Output of the full input range (0 … 100)

Out.0 = -100

Out.1 = 1200

Example: output of a limited input range, e.g. 60.5 … 63.7 °C)

Out.0 = 60.5

Out.1 = 63.7

The output behaviour in the event of an input value error can be determined using O.FAI .

Please, note: the smaller the span, the higher the effect of input variations and resolution.

Using current and voltage output in parallel is possible only in galvanically isolated circuits.

Configuration O.tYP = 2 (4 … 20mA) or 4 (2...10V) means only allocation of the reference value (4 mA or 2V) for scaling of output configuration Out.0. Therefore, output of smaller values is also possible rather than output limiting by reference value 4mA / 2V.

Configuration O.tYP = 0/1 (0/4...20mA) or 2/3 (0/2...10V) determines, which output should be used as a calibrated reference output.

6.12.2 Analog output forcing

By adjusting f.Out = 1 (only via BlueControl®), the output can be configured for value input via interface, or by means of an input value at extended operating level (=Forcing).

This setting can be used also for e.g. testing the cables and units connected in the output circuit.

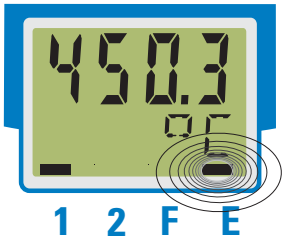
This function can also realize a setpoint potentiometer.

6.13 Maintenance manager / error list

In case of one or several errors, the error list is always displayed at the beginning of the extended operating level .

A current input in the error list (alarm or error) is always indicated by display of letter E .

For display of the error list, press key ↵ once.



E- display element	Description	Possible remedial action
blinks	Alarm due to existing error	- Determine the error type in the error list via the error number - remove error
on	Error removed, Alarm not acknowledged	- acknowledge alarm in the error list by pressing the ▲ - or the ▼ -key - the alarm entry is deleted by doing so
off	no error, all alarm entrys deleted	

Error list:

Name	Description	Cause	Possible remedial action
E.1	Internal error, cannot be corrected	E.g. defective EEPROM	Contact PMA service Return device to manufacturer
E.2	Internal error, resettable	E.g. EMC trouble	Keep measuring and supply cables separate. Protect contactors by means of RC snubber circuits
E.3	Configuration error, resettable	Missing or faulty configuration	Check interdependencies for configurations and parameters
E.4	Hardware error	Code number and hardware not identical	Contact PMA service
FbF.1	INP*) sensor break	Defective sensor	Replace INP sensor
		Wiring error	Check INP connection
		Overshoot	Change the measuring range
POL.1	INP*) polarity error	Wiring error	Change INP polarity
Lim.1 Lim.2 Lim.3	Latched limit value alarm 1/2/3	Adjusted limit value 1/2/3 exceeded	Check process
InF.1	Time limit value message	Preset number of operating hours reached	Application-specific
InF.2	Switching cycle message(digital outputs)	Preset number of switching cycles reached	Application-specific

*) " FAIL " is shown on the process value display.

Latched alarms Lim1/2/3 (E-element displayed) can be acknowledged, i.e. reset via digital alarm di1.

For Configuration, see page 41: ConF /LOGI /Err.r

When an alarm is still pending, i.e. unless the error cause was removed (E display blinks), latched alarms cannot be acknowledged and reset.

Error-state	Signification	
2	Pending error	Change to error status 1after error removal
1	Stored error	Change to error status 0 after acknowledgement in error list 0
0	no error/message	Not visible, except during acknowledgement

If sensor errors should not be on the error list any more after error correction without manual reset in the error list, suppression via BlueControl® is possible by means of setting ILat.

CONF / othr / ILat	1	blocked

This setting is without effect on limit values Lim.1 … 3 configured for storage.

6.14 Detection and display of sensor and wiring errors

- **Break of the supply-[1], measuring or sense lines: "FAIL " on the process value display and "FbF. 1" in the error list are displayed.**
- **Wrong polarity of supply, sense and input signal lines: "FAIL " on process value display and "POL. 1" in error list are displayed. Detection of wrong polarity of sense takes place during instrument start-up.**

  Subsequent correction of the sense wiring is detected only after instrument re-start. (i.e. **the instrument must be switched off and on again.)**
- **Short circuit of supply and sense lines ==> behaviour as with break of the supply lines: "FAIL " on the process value display and "FbF. 1" in the error list are shown.**
- **Short circuit of measuring lines: measuring signal = 0**
- **Overshoot of measurement input: "FAIL " on process value display and "FbF. 1" in the error list are displayed.**

Entry of a substitute value (InF) effective in the event of a sensor error is possible.

* *With 4-wire connection, the EX+ line is monitored in addition to the measurement lines. After a break of the EX minus line, the measured value is not plausible.*

6.15 Resetting to factory setting

In case of faulty configuration, the SG 45 can be reset to the default manufacturers condition.

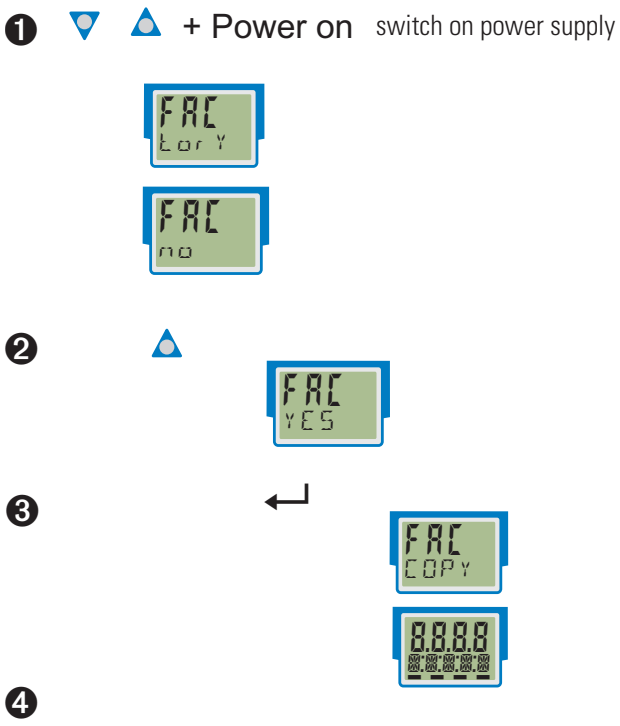
❶ For this, the operator must keep the keys increment and decrement pressed during power-on.

❷ Then, press key increment to select YES.

❸ Confirm factory resetting with Enter and the copy procedure is started (display COPY).

❹ Afterwards the device restarts.

In all other cases, no reset will occur (timeout abortion).



If one of the operating levels was blocked in BlueControl®, reset to factory setting is not possible.

If a pass number was defined (via BlueControl®), but no operating level was blocked, enter the correct pass number when prompted with the text PASS in ❸. A wrong pass number aborts the reset action.

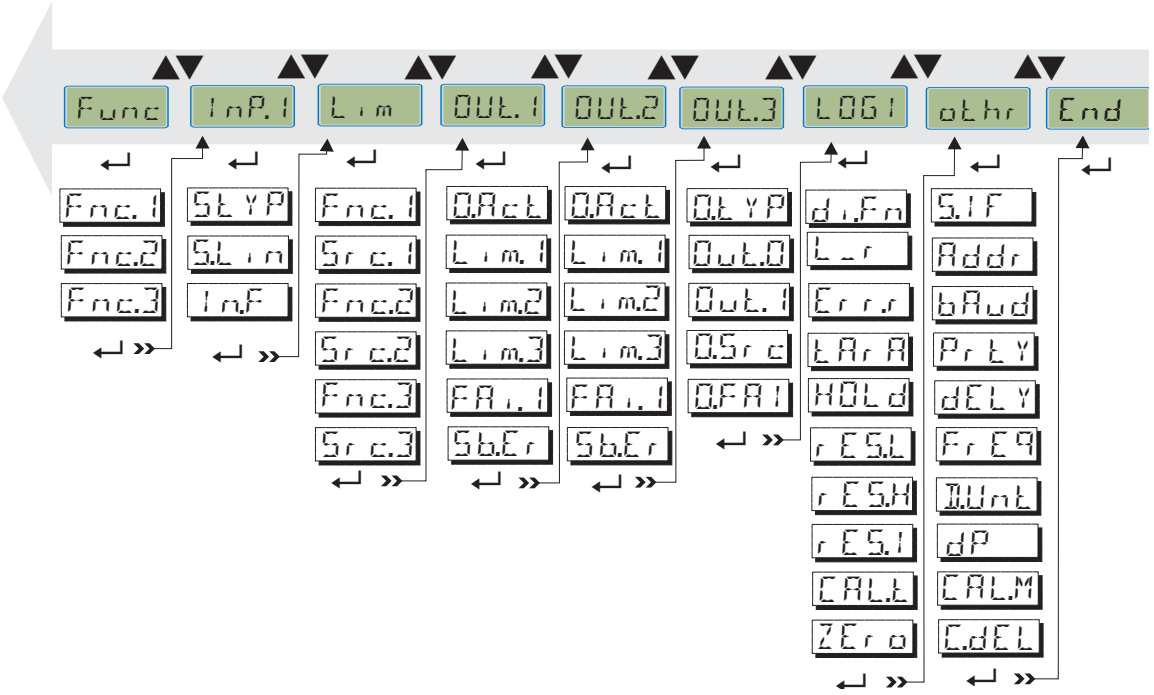
The copy procedure (COPY) can take some seconds.

Now, the transmitter is in normal operation.

7 Configuration level

7.1 Configuration survey

Dependent on the device version and further adjusted configurations, configurationdata can be hidden.
The data which can be operated via the front panel are shown below.



7.2 Adjustment:

- **The configuratiuons can be adjusted by means of keys ▲▼ .**
- **Transition to the next configurationelement is by pressing key ↵.**
- **After the last configuration of a group, donE is displayed and followed by automatic change to the next group**

Return to the beginning of a group is by pressing the ↵key for 3 sec.

Please check all interdependent parameters for their validity.

7.3 Configurations

Dependent on device version und adjusted configurations values not needed become hidden.

✪ Entrys marked with this symbol are selectable only with existing device-option.

Selection of functions Func

Name	Value range	Description	
Fnc 1		Function 1	
	0	No function	
	1	Zero setting	
Fnc.2		Function 2	
	0	No function	
	3	Tare	
Fnc.3		Function 3	
	0	No function	
	2	Sample & Hold	
	3	Integrator	

Input INP

Name	Value range	Description	
S.TYP		Sensor type	
	60	0,5 mV/V	
	61	1 mV/V	
	62	2 mV/V	
	63	4 mV/V (the selection for sensors with 3,33mV/V)	
S.Lin		Linearization	
	0	No linearization	
	1	Special linearization	
InF		Alternative value	

Limit values Lim1 … Lim3

Name	Value range	Description	
Fnc.1 (Fnc.2) (Fnc.3)		Function of limit 1 (2, 3)	
	0	Switched off	
	1	Measurement value	
	2	Measured value monitoring + alarm status latch. A stored limit value can be reset via error list or a digital input (→ LOG!/Err.r).	
	3	Signal change (in minutes).	
	4	Signal monitoring for rate of change (per minute) + storage of the alarm status. A stored limit value can be reset via error list or a digital input (→ LOG!/Err.r).	
Src.1 (Src.2) (Src.3)		Source of limit 1 (2, 3)	
	0	process value = displayed value	
	3	Measured value INP	
	12	Zero offset (difference between the calibrated zero and the value at the time of zero setting)	
C.Std	OFF; 1 … 9999999	Control operating hours (only visible with BlueControl®!)	
C.Sch	OFF; 1 … 9999999	Control switching cycles (only visible with BlueControl®!)	

Outputs Out.1 and Out.2 (relay)

Name	Value range	Description	
O.Act		Direction of operation OUT1	
	0	Direct / normally open	
	1	Inverse / normally closed	
Lim.1		Signal limit 1	
	0	not active	
	1	active	
Lim.2		Signal limit 2	
	0	not active	
	1	active	
Lim.3		Signal limit 3	
	0	not active	
	1	active	
FAi.1		Signal INP fail	
	0	not active	
	1	active	
Sb.Er		System bus error message ✪ (only visible with BlueControl®!)	
	0	not active	
	1	active	
Inf.1		Status message for operating hours (only visible with BlueControl®!)	
	0	not active	
	1	active	
Inf.2		Status message for number of switching cycles (only visible with BlueControl®!)	
	0	not active	
	1	active	
fOut		Forcing of the output (only visible with BlueControl®!)	
	0	not active	
	1	The value for this analog output is defined via interface.	

Output Out.3 (analog)

Name	Value range	Description	
O.typ		Signal type OUT3	
	1	0 ... 20 mA continuous	
	2	4 ... 20 mA continuous	
	3	0...10V continuous	
	4	2...10V continuous	
OuL.0	-1999 ...9999	Skaling of analog output for 0% (0/4mA e.g.. 0/2V)	
OuL.1	-1999 ...9999	Skaling of analog output for 100% (20mA e.g. 10V)	
O.Src		Signal source for analog output OUT3	
	3	Process value (scaled and corrected)	
	7	Measured value (raw value of bridge signal)	
O.FAi		Fail behaviour	
	0	upscale	
	1	downscale	
fOut		Forcing of the output (only visible with BlueControl®!)	
	0	not active	
	1	the value for this analog input is defined via interface.	

Signal definition LOGI

Name	Value range	Description	
di.Fn		Function of inputs (valid for all inputs)	
	0	direct	
	1	inverse	
	2	toggle key function (adjustable for 2-point-operation with interface and di1)	
L_r		Local / remote switchover (Remote: Adjustment of all values via the front panel is blocked)	
	0	Interface only (local, value adjustment via front-panel controls is possible)	
	1	always active (remote)	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
Err.r		Resetting of all stored entrys of the error list	
	0	Interface only	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
	10	Enter/Inc keys switch ①	
	11	Enter/Dec key switch ①	
tArA		Tare-function (Function must be akctivated (CONF /FUNC / Fnc.2= 3))	
	0	Interface only	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
	10	Enter/Inc keys switch ①	
	11	Enter/Dec key switch ①	
HoLd		Sample & Hold-Fctn. (Function must be akctivated (CONF /FUNC / Fnc.2 = 2))	
	0	Interface only	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
	10	Enter/Inc keys switch ①	
	11	Enter/Dec key switch ①	
rESL		Reset minimum value	
	0	Interface only	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
	10	Enter/Inc keys switch ①	
	11	Enter/Dec key switch ①	

Name	Value range	Description	
rESH		Reset maximum value	
	0	Interface only	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
	10	Enter/Inc keys switch ①	
	11	Enter/Dec key switch ①	
rESI		Reset Integrator	
	0	Interface only	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
	10	Enter/Inc keys switch ①	
	11	Enter/Dec key switch ①	
CALt		Calibration test (activation bridge resistance change)	
	0	Interface only	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
	10	Enter/Inc keys switch ①	
	11	Enter/Dec key switch ①	
ZEro		Zero setting	
	0	Interface only	
	2	di1 switches	
	7	Limit 1 switches	
	8	Limit 2 switches	
	9	Limit 3 switches	
	10	Enter/Inc keys switch ①	
	11	Enter/Dec key switch ①	
fDI1		Forcing of the digital input (only visible with BlueControl®!)	
	0	not active	
	1	The value for this input is defined via interface.	

Miscellaneous (other)

Name	Value range	Description	
S.IF		System interface✪	
	0	switched off	
	1	switched on	
Addr	1...247	Address on the interface ✪	
bAud		Baudrate on the interface ✪	
	0	2400 Baud	
	1	4800 Baud	
	2	9600 Baud	
	3	19200 Baud	
	4	38400 Baud	
PrtY		Parity of data on the interface ✪	
	0	No parity (2 Stoppbits)	
	1	even parity	
	2	odd parity	
	3	no parity with 1 stopbit	
dELY	0...200	Response delay [ms] ✪	
FrEQ		Switch over 50/60 Hz	
	0	Netfrequency 50 Hz	
	1	Netfrequency 60 Hz	
I.Unt		Anzeigeeinheit (Darstellung auf Display)	
	0	no unit	
	3	%	
	4	bar	
	5	mbar	
	6	Pa	
	7	kPa	
	8	psi	
	18	mV	
	19	kg	
	20	g	
	21	t	
	22	Text of phys. Unit / preset via BlueControl	
	23	lb	
	24	N	
	25	kN	
dP		Decimal point (max. no of decimals)	
	0	no decimal points	
	1	1 digit behind the decimal point	
	2	2 digits behind the decimal point	
	3	3 digits behind the decimal point	
CAL.M		Calibration mode	
	0	without shunt calibration	
	1	with shunt calibration	
C.dEl	0..200	Modem delay [ms]	
IExo		Block extended operating level (only visible with BlueControl®!)	
	0	Released	
	1	Blocked	

Name	Value range	Description	
ILat		Block error memory (only visible with BlueControl®!)	
	0	Released	
	1	Blocked	
Pass	OFF...9999	Password (only visible with BlueControl®!)	
IPar		Block parameter level (only visible with BlueControl®!)	
	0	Released	
	1	Blocked	
ICnf		Block configuration level (only visible with BlueControl®!)	
	0	Released	
	1	Blocked	
IInst		Block installation level (only visible with BlueControl®!)	
	0	Released	
	1	Blocked	
T.Dis2		Settings for text in display 2 (max. 5 digits) (only visible with BlueControl®!) ☞ Enter the corresponding number of spaces for right-adjusted display of less than 5 characters.	

❶ Hold down the Enter key first and then press the increment or decrement key.

Linearization Lin

Only when INP.1 SL in=1 (only visible with BlueControl®!)

Name	Value range	Description	
In.1 … In.32	OFF (ab In.3) -1999...9999	Input 1 … Input 32	
Ou.1 … Ou.32	-999.0 … 9999	Output 1 … Output 32	

- The input signals are entered in %.

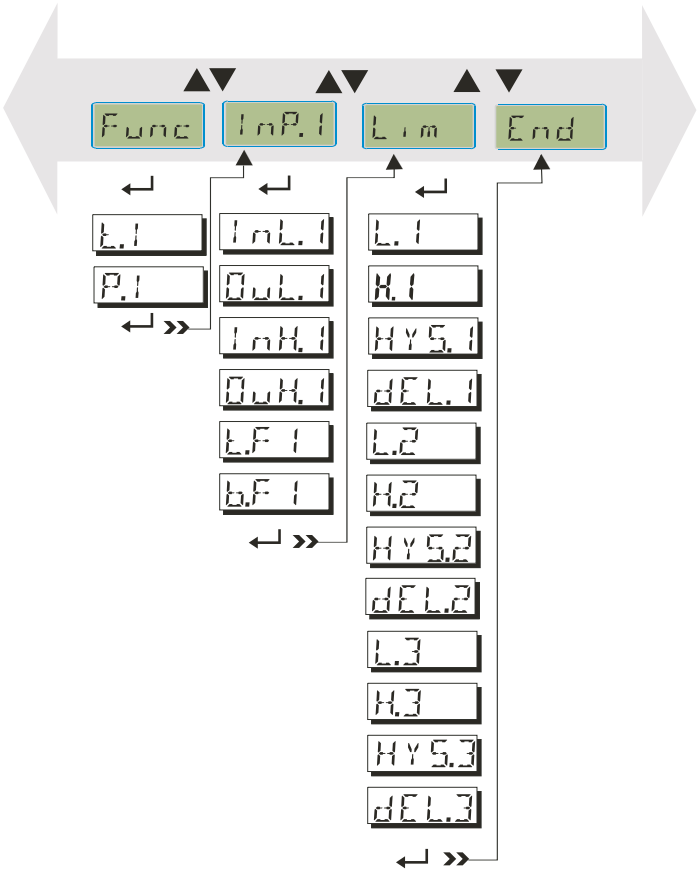
Resetting to factory setting (default)

→ See page 3736

8 Parameter-level

8.1 Parameter-survey

Dependent on device version und adjusted configurations values not needed become hidden. The data which can be operated via the front panel are shown below.



8.2 Adjustment:

- **Parameters can be adjusted with ▲▼ - keys.**
- **Stepping to the next parameter by pressing the ↵- key.**
- **After the last parameter of a group donE appears in the display and the controller steps automatically to the next group.**

Stepping back to the beginning of a group is done by pressing the ↵- key for 3 s.
If, for 30 s no key is pressed, the controller returns to the operating level (Timeout = 30 s).

8.3 Parameters

Selection of functions Func

Name	Value range	Description	
t.1	0,1...9999	Integrator timeconstant (in minutes)	
P.1	-1999...9999	Integrator-Offset	

Inputs InP.1

Name	Value range	Description	
InL.1	-1999...9999	Lower input value (Span start)	
OuI.1	-1999...9999	Lower output value	
InH.1	-1999...9999	Upper input value (Span end)	
OuH.1	-1999...9999	Upper output value	
t.F 1	0...999.9	Filter time [s]	
b.F 1	0...9999	Filterbandwidth	

Limit values Lim1 … Lim 3

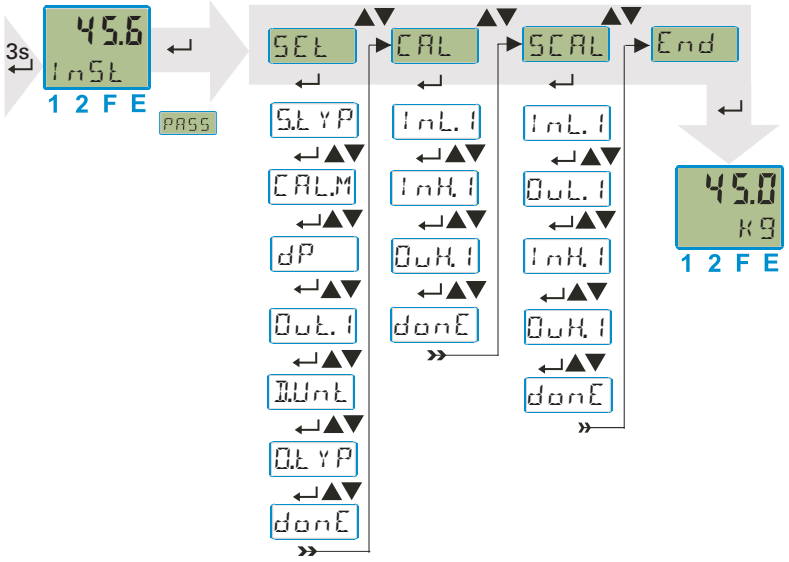
Name	Value range	Description	
L. 1	-1999...9999	lower limit 1 (L. 1 < -1999 ≙ off)	
H. 1	-1999...9999	upper limit 1 (H. 1 < -1999 ≙ off)	
HYS.1	0...9999	Hysteresis of limit value 1	
dEL.1	0...9999	Alarm 1 delay	
L.2	-1999...9999	lower limit 2 (L.2 < -1999 ≙ off)	
H.2	-1999...9999	upper limit 2 (H.2 < -1999 ≙ off)	
HYS.2	0...9999	Hysteresis of limit value 2	
dEL.2	0...9999	Alarm 2 delay	
L.3	-1999...9999	lower limit 3 (L.3 < -1999 ≙ off)	
H.3	-1999...9999	upper limit 3 (H.3 < -1999 ≙ off)	
HYS.3	0...9999	Hysteresis of limit value 3	
dEL.3	0...9999	Alarm 3 delay	

Resetting to factory setting (default)

→ Page 36

9 Installation and calibration

When the operating voltage is applied to SG45 after connecting e.g. the load cells, the unit starts running.
An automatic check for connection of the Sense lines takes place. This check is done also after configuration changes.
For installation, press ↵ during 3 sec to change over to installation mode InSt .
Select SEt ↵ and adjust S.tYP (cell type) to select calibrating method CAL.M.



SEt see 9.1

CAL see 9.2 Page 43

SCAL see 9.3 Page 49

9.1 Initial setting (SEt)

S.tYP for selecting the sensor type, see page 39.

CAL.M shunt calibration
When connecting load cells, set CAL.M = **0** (without shunt calibration).

CAL.M = **1** (with shunt calibration ①)

During calibration, the calibrating resistor at the sense connection ② ↔s included automatically during calibration of the upper calibration point (InH.1 / OuH.1)

❶ Only purposeful for melt pressure sensors with integrated calibrating resistor. The specifications of the sensor manufacturer related to the operating temperature must be taken into account..

❷ Simulates a bridge load

Execute the other entries accordingly.

dP decimal point
OUt.1 analog output scaling
d.Unt unit of display shown on the 2nd display line
O.tYP output signal type OUT3

donE Subsequently, calibration (CAL) takes place.

9.2 Calibration (CAL)

☞ Before calibration, allow the unit to warm up (see Technical Data on page 54).
After delivery, a % value is displayed as a measured value (related to the adjusted measuring range).
For this reason, the Uniflex SG 45 must be adapted to its measuring task accordingly. To adapt the unit, realize the calibration correctly.

☞ If necessary, the required display unit (UNIT) must be selected accordingly.

ⓘ **Load cells: the dead load (raw value) provides a signal. Set InL.1 = 0 to set this signal to zero (span start).**

ⓘ **With pressure sensors, the sensor should be de-pressurized, or pressure setting for span start:**

Calibration 1. step: Define span start		
Display: InL.1 = OFF	Press keys ▲/▼ to display the current measurement value. InL.1 = % measured value (display changes between InL.1 and instantaneous measured value). With ↵ followed by storage of InL.1 = instantaneous measured value, related display value OuL.1 = 0 When the enter key ↵is pressed immediately, without pressing ▲/▼ the increment / decrement keys, InL.1 = 0 %, OuL.1 = 0 is taken over as standard value.	
Calibration 2. step: Define calibration value		
ⓘ	**Load cell**	**melt pressure sensors:**
	Load load cells with a defined load (reference weight; e.g. 75kg)	Enter pressure for span end or a defined known calibration value. For sensors with integrated calibration resistor an automatic switching of the calibration resistor is done. For the first calibration SEL it is recommended to configure CALM = 1 , -> S. 47
InH.1 =OFF	Press keys ▲/▼ to display the instantaneous measured value. InH.1 = swaps with the display of the measured value With the enter key ↵ the instantaneous mesured value is taken over to InH.1 When the enter key ↵is pressed immediately, without pressing ▲/▼ the increment / decrement keys, InH.1 = 100 %, OuH.1 = OuL.1 is taken over.	
		(The calibrating resistor is switched off automatically)
Calibration 3. step: Calculation of the upper calibrationpoint		
OuH.1	With OuH.1 the upper calibrating point is realized using the ▲/▼ keys according to the calculated value	
		Calculation for calibrating resistor (e.g. **80%**) Example: The calibrating resistor has a range from 0..400 Bar; the calibrating resistor simulates 80% of the endvalue, 80% of 400 results 320. OuH.1 is adjusted to 320.
	Press ↵ to store OuH.1 = adjusted upper calibration point	
ⓘ DonE	donE (duration 1s) storage of InL.1, OuL.1, InH.1, OuH.1 takes place. Additionally, any previously realized zero setting (function 1) is deleted.	

☞ A tare function activated before calibration must be de-activated. Normally, it is not purposeful to keep the old tare condition. If necessary, the tare function can be re-activated.
The zero offset is deleted automatically.

☞ The InL.1 and InH.1 values stored during calibration are stored with full resolution.

9.3 Scaling (SCAL)

- (Menu with SEt – CAL – SCAL – End)
  ▼ ⇒ possibility for read out of the scaling determined under CAL or for direct input of scaling parameters
  InL.1 ↵
  OuL.1 ↵
  InH.1 ↵
  OuH.1 ↵
  donE .
- End
  ↵
- Operating level

Note related to melt pressure sensor

Adjust gradient 4mV/V for 3,33mV/V of the sensor.

Please note that the InL.1 and InH.1 values are displayed with a resolution of 4 digits. The lossless transfer to another device can only be managed via serial interface (Front or Bus) e.g. by means of BlueControl®.

10 Engineering Tool BlueControl®

The Engineering Tool BlueControl® is the projecting environment for the BluePort® controller series as for the ***rail line*** family of PMA. The following 3 versions with graded functionality are available:

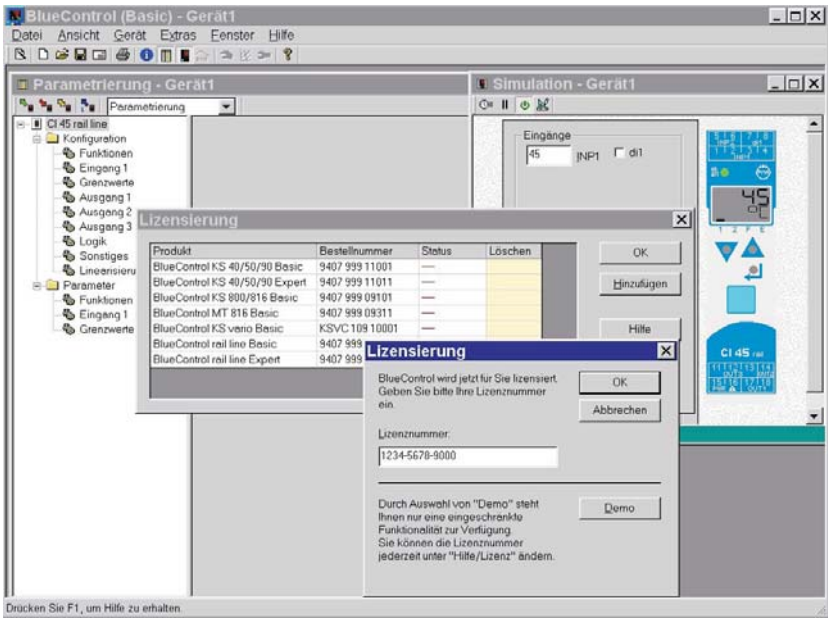
Functionality	Mini	Basic	Expert*
parameter and configuration setting	yes	yes	yes
download: transfer of an engineering to the controller	yes	yes	yes
online-mode / visualization	SIM only	yes	yes
defining an application specific linearization	SIM only	yes	yes
configuration in the extended operating level	yes	yes	yes
upload: reading an engineering from the controller	SIM only	yes	yes
basic diagnostic functions	no	no	yes
saving data file and engineering	no	yes	yes
printer function	no	yes	yes
online documentation, help	yes	yes	yes
implementation of measurement value correction	yes	yes	yes
data acquisition and trend display	SIM only	yes	yes
net- / multiple licence	no	nein	yes
wizard function	yes	yes	yes
Personal assistant function			

* on request

The mini version is - free of charge - at your disposal as download at PMA homepage *www.pma-online.de* or on the PMA-CD (please ask for).

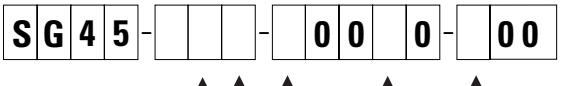
At the end of the installation the licence number has to be stated or DEMO mode must be chosen.

At DEMO mode the licence number can be stated subsequently under *Help → Licence → Change*.



11 Versions

Transmitter
UNIFLEX SG 45



1 measuring input, 1 digital input
with display and BluePort®-interface

without plug-in connector terminals	**0**
with screw-terminal connectors	**1**
90..260V AC, mA/V/logic + 2 relays	**4**
18...30VAC/18..31VDC, mA/V/logic+2 relays	**5**
no option	**0**
RS 485 / MODBUS - protocol	**1**
Systeminterface (24V versions only)	**2**
Standard configuration	**0**
Configuration to order	**9**
Standard (CE-certification)	**0**
cULus - certified	**U**

Accessories delivered with the controller:

- **Operating note**
- **Rail-to-bus connector for the interface option**

Documentation	(Please order the corresponding documentation)	
operation manual SG 45	german	9499-040-82318
operation manual SG 45	english	9499-040-82311
interface description MODBUS rail line	german	9499-040-72018
interface description MODBUS rail line	english	9499-040-72011

Additional devices:

Description		Order-No.
PC-Adapter for BluePort® interface		9407-998-00001
BlueControl® Mini		www.pma-online.de
BlueControl® with Basic - licence rail line		9407-999-12001
BlueControl® with Expert - licence rail line		9407-999-12011

12 Technical data

INPUTS

SIGNAL INPUT INP

Accuracy:	0,01% at 25°C
Decimal point:	0 bis 3 decimals
Input filter:	adjustable 0.0...999.9 s
Scanning cycle:	50 ms with 19 bit
Linearization:	31 Segments, adaptable with BlueControl®
Calibration:	with/without shunt calibration
Measurement value correction:	2-point
Limiting frequency	1.7Hz
Measurement value correction:	Sensor break, short circuit and polarity
Connection technology:	4-wire bridge 6-wire bridge (Sense line)
Input range	
Span start, span end	any, within measuring range
Scaling	any, -1999 ...9999

Measurement span:

		with Us = 10V
Slope/ sensitivity	0.5 mV/V	5 mV
	1 mV/V	10 mV
	2 mV/V	20 mV
	4 mV/V	40 mV

DIGITALINPUT DI1

Operation as

Contact input

Connection of a potential-free contact that is suitable for switching 'dry' circuits.

Switched voltage:	5 V
Current:	0.5 mA

Function

Configurable as direct or inverse switch or push button!

Functions:	Operation disabling, reset of stored alarms and the min/max indicator (slave pointer), the integrator, enabling the tare function,Sample&Hold amplifier function, Cal-Test , and zero setting.

OUTPUTS

RELAY OUTPUTS OUT1, OUT2

Contact type:	2 normally open with common contact connection
Max. contact rating:	500 VA, max. 250 V, max. 2A at 48...62 Hz, ohmic load
Min. contact rating:	6V, 1 mA DC
Swithing cycles (electrical):	for I=1A/2A: ≥ 800,000/500,000 (at~250V (ohmic load))

Note:

If the relays OUT1, 2 and 3 are used to operate external contactors, these must be fitted with RC snubber circuits to manufacturer specifications to prevent excessive voltage peaks at switch-off.

OUT3 AS UNIVERSAL OUTPUT

Parallel current/voltage output with common 'minus' terminal (combined use only in galvanically isolated circuits).

Freely scalable	
Resolution:	14 Bit
Dynamic response (step change of input signal) T_{90}:	Output follows the input within 300 ms
Tracking error I/U:	≤ 2 %
Residual ripple: (rel. to range end)	≤±1% 0...130 kHz

Current output

0/4...20 mA, configurable, short-circuit proof.

Control range:	-0.5....23 mA
Load:	≤ 600 Ω
Load effect:	≤0.02%
Resolution:	≤ 1.5 µA
Error:	≤ 0.1%

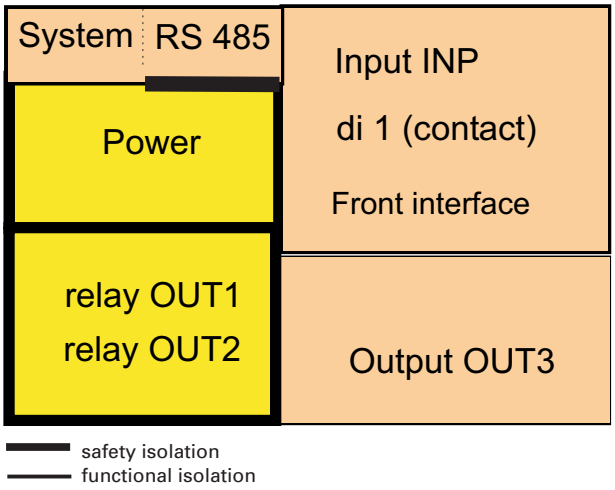
Voltage output

0/2...10V, configurable, not permanently short-circuit proof

Control range:	0.15...11.5 V
Load:	≥ 2 kΩ
Load effect:	≤0.06%
Resolution:	≤ 0.75 mV
Error:	≤ 0.1%
Additional error when using simultaneously the current output	≤+0.09%

Output values can be preset via interface (Forcing)

GALVANIC ISOLATION



Galvanic isolation between inputs and outputs as well as from the supply voltage is provided.

Test voltages:

Between power supply and inputs/outputs:	2.3 kV AC, 1 min
Between inputs and outputs:	500 V AC; 1min

Max. permissible voltages:

Between inputs/outputs against earth:	≤ 33 V AC

POWER SUPPLY

Depending on ordered version:

AC supply

Voltage:	90...260 V AC
Frequency:	48...62 Hz
Consumption:	approx. 11.5 VA max.

Universal supply 24 V UC

AC supply:	18...30 V AC
Frequency:	48...62 Hz
DC supply:	18...31 V DC
Consumption:	approx. 8.5 VA / 5.8 W max.

* Instruments with optional system interface:
energization is via the bus connector from field bus coupler or power supply module
cULus: class 2 only!

Behaviour with power failure

Configuration and parameter settings:Permanent storage in EEPROM

BLUEPORT® FRONT INTERFACE

Connection to the controller front via a PC adapter (see 'Additional Accessories'). The BlueControl® software enables the KS 45 to be configured, parameters set, and operated.

BUS INTERFACE (OPTIONAL)

RS 485

Connection via bus connector fitted in the top-hat rail. Screened cables should be used.

Type:	RS 485, copper
Transmission speed:	2,400, 4,800, 9,600, 19,200, 38,400 Bit/sec
Parity:	even, odd, none
Address range:	1...247
Number of controllers per bus segment:	32

Moreover, repeaters must be used.

Protocol

MODBUS RTU

SYSTEM INTERFACE

For connection to fieldbus couplers
(see system components)
Connection via bus connector fitted in the top-hat rail.
Technical data see data sheet 9498-737-50911.

ENVIRONMENTAL CONDITIONS

Protection mode

Front panel:	IP 20
Housing:	IP 20
Terminals:	IP 20

Permissible temperatures

For specified accuracy:	-10...55°C
Warm-up time:	< 20 minutes
Temperature effect:	≤ 0.02 % / 10 K
add. influence to coldjunction compensation:	≤ 0.05 % / 10 K
Operating limits:	-20...60°C
Storage:	-30...70°C

Humidity

Max. 95%, 75% yearly average, no condensation

Shock and vibration

Vibration test Fc (DIN EN 60 068-2-6)

Frequency:	10...150 Hz
Unit in operation:	1g or 0.075 mm
Unit not in operation:	2g or 0.15 mm

Shock test Ea (DIN EN 60 068-2-27)

Shock:	15 g
Duration:	11 ms

Electromagnetic compatibility

Meets the test requirements for instruments in industrial areas.
Interference radiation:

- Within the limits for class A instruments.

Immunity to interference:

- Meets EN 61326-1 for continuous, unattended operation.

GENERAL

Housing front

Material:	Polyamide PA 6.6
Flammability class:	V0 (UL 94)

Connecting terminals

Material:	Polyamide PA
Flammability class:	V2 (UL 94) for screw terminals V0 (UL 94) for spring-clamp terminals and bus connector

Electrical safety

Complies with EN 61 010-1

Over-voltage category II
Contamination degree 2
Protection class II

Certifications

CE marking

Meets the EuropeanDirectives regarding „Electromagnetic Compatibility“ and „Low-voltage equipment“ (see also „Safety tests“)

cUL certification

(Type 1, indoor use)
File: E 208286
For compliance with UL certificate, the following information must be taken into account:

- Use only 60/75°C copper (Cu, 12-30 AWG) conductors .
- Tighten the terminal-screws with a torque of 0.5 – 0.6 Nm.
- Max. ambient temperature: 55 °C
- Max. ratings of relay contacts: 250VAC, 2A (resistive)
- Power supply from class II

Electrical connections

Plug-in connector strips:
Screw terminals for lead cross-sections from 0.2 to 2.5 mm^2.
(AWG24-12)

Mounting method

Clip-on rail mounting (35 mm top-hat rail to EN 50 022).
Locked by means of metal catch in housing base.
Close-packed mounting possible.

Mounting position:	vertical
Weight:	0.18 kg

Standard accessories:

- Operating notes
- Devices with ‘Interface’ option: bus connector for fitting into top-hat rail

13 Index

A4, unibind, SW-Druck, Normalpapier 80g weiß