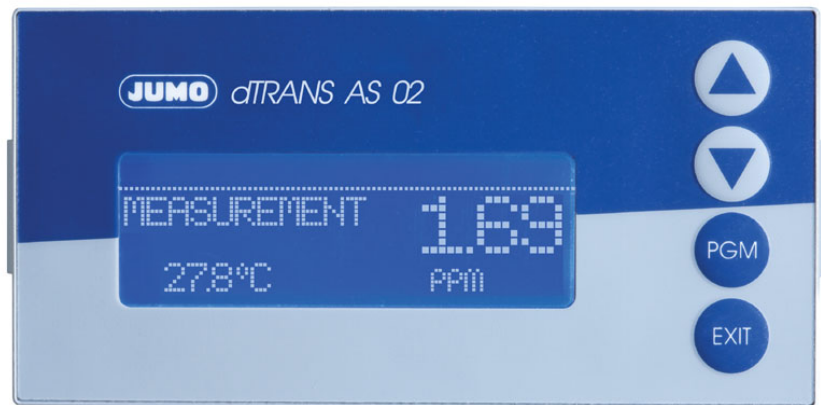


JUMO dTRANS AS 02

Transmitter/controller
for standard signals and temperature
Type 202553



Operating Manual



20255300T90Z002K000

V3.00/EN/00541524

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1 Typographical conventions

1.1 Warning signs



Danger

This symbol is used when there may be **danger to personnel** if the instructions are ignored or not followed correctly!



Caution

This symbol is used when there may be **damage to equipment or data** if the instructions are ignored or not followed correctly!



Read documentation!

This symbol – placed on the device – indicates that the associated **device documentation has to be observed**. This is necessary to recognize the kind of the potential hazards as well as to take the measures to avoid them.

1.2 Reference signs



Note

This symbol is used to draw your **special attention** to a remark.

abc¹

Footnote

Footnotes are remarks that **refer to specific points** in the text. Footnotes consist of two parts:

A marker in the text and the footnote text.

The markers in the text are arranged as consecutive superscript numbers.

*

Instruction

This symbol indicates the description of an **action to be performed**.

The individual steps are marked by this asterisk.

Example:

* Briefly press the  key.

2 Description

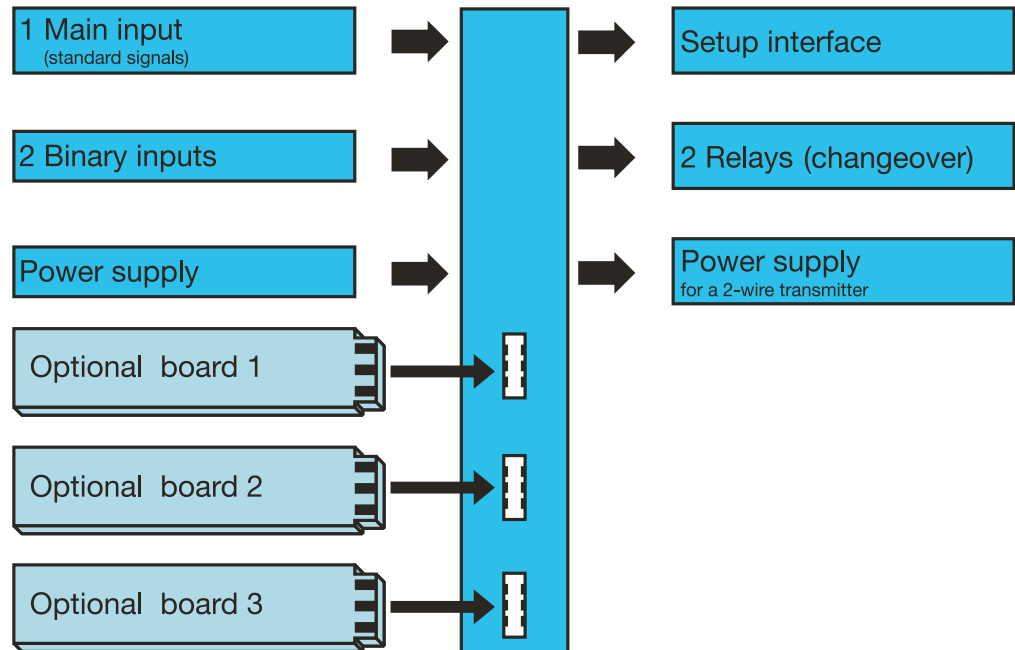
Inputs/outputs

In addition to the main input (conductivity, TDS, resistance) and the secondary input (temperature compensation), the basic device alone has two binary inputs, two relays, one power supply for external sensors and a setup interface.

Input signals can be shown as numbers or as a bar graph on the graphic display. Parameters are displayed in plain text for easily comprehensible and reliable operation.

Optional

Three further slots can be fitted with extensive additional configurable inputs and outputs and interfaces.



Application

The device is suitable, for example, for displaying, measuring and controlling:

- Conductivity, TDS and resistance.
- Free chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid, in combination with sensors as per data sheet 202630.
- (Hydrostatic) liquid levels with 2-wire transmitters (level probes) as per data sheet 402090 or data sheet 404390.
- Flow rate in conjunction with transmitters as per data sheet 406010.
- Two temperature measuring points.
- Most sensors and transmitters that output standard signals (0 to 10 V or 0(4) to 20 mA).

Because temperature measurement is integrated, temperature compensation takes place quickly and precisely, which is particularly important for many analytical measurements.

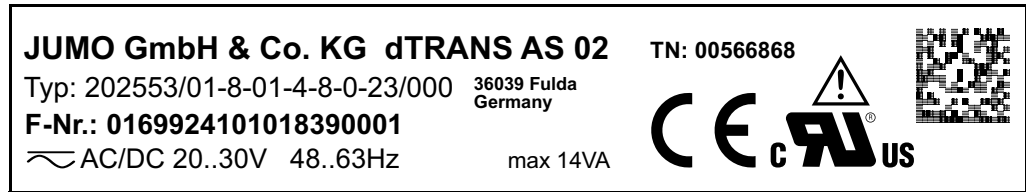
2 Description

- Special features**
- Display: mS/cm, μ S/cm, MOhm $\times$ cm, mg/l, pH, mV, etc. Special settings are also possible with the setup program
 - Configurable display text (operator level)
 - A choice of display visualizations: large numbers, bar graph or tendency (trend) display
 - Four limit controllers
 - Integrated calibration routines: with 1, 2 and 3 points
 - Math and logic module (optional)
 - Calibration logbook
 - Three optional slots
 - Selectable languages: English, German, French, etc.
 - Setup program provides: convenient programming, system documentation
 - RS422/485 interface (optional)
 - PROFIBUS-DP interface (optional)

3 Identifying the device version

3.1 Nameplate

on the transmitter



	The date of manufacture is encoded in the "F No." (serial number): 1839 means year of manufacture 2018 / calendar week 39
---	--

3.2 Order details

(1) Basic type	
202553	JUMO dTRANS AS 02 - Transmitter/controller
(2) Basic type extension	
01	In the panel enclosure
05	In the surface-mounted enclosure
(3) Version	
8	Standard with factory setting
9	Programming to customer specification
(4) Operating language^a	
01	German
02	English
03	French
04	Dutch
05	Russian
06	Italian
07	Hungarian
08	Czech
09	Swedish
10	Polish
13	Portuguese
14	Spanish
16	Rumanian

3 Identifying the device version

(5) Optional slot 1	
0	Not used
1	Analog input (universal)
2	Relay (1× changeover)
3	Relay (2× normally open)
4	Analog output
5	2 PhotoMOS [®] relays ^b
6	Solid state relay 1 A
8	Voltage supply output DC 12 V (e.g. for inductive proximity switch)
(6) Optional slot 2	
0	Not used
1	Analog input (universal)
2	Relay (1x changeover)
4	Analog output
5	2 PhotoMOS [®] relays
6	Solid state relay 1 A
8	Voltage supply output DC 12 V (e.g. for inductive proximity switch)
(7) Optional slot 3	
0	Not used
1	Analog input (universal)
2	Relay (1x changeover)
3	Relay (2x normally open)
4	Analog output
5	2 PhotoMOS [®] relays
6	Solid state relay 1 A
8	Voltage supply output DC 12 V (e.g. for inductive proximity switch)
10	RS485 interface
11	Datalogger with interface RS485 ^c
12	PROFIBUS-DP interface
(8) Power supply	
23	AC 110 to 230 V, -15/+10 %, 48 to 63 Hz
25	AC/DC 20 to 30 V, 48 to 63 Hz
(9) Extra codes^d	
000	None

^a All languages are available on the device and can be changed by the customer at any time. Factory default setting to a language (other than "German") is available for a charge.

^b PhotoMOS[®] is a registered trademark of Panasonic Corporation.

^c The only way to read files is with the PC setup software!

^d List extra codes in sequence, separated by commas.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Order code		/	-	-	-	-	-	-	/	, ...
Order example	202553	/ 01	- 8	- 01	- 2	- 2	- 4	- 23	/ 000	

3 Identifying the device version

3.3 Accessories (included in delivery)

4× fastening elements, complete^a

3× CON plug-in link^a

3× jumper wire^b

1× seal for panel^a

1× fastening elements, complete^b

- 1× DIN rail fastening left

- 1× DIN rail fastening right

- 3× wall mount

- 3× fastening screw

^a For basic type extension 01 only (in the panel enclosure)

^b For basic type extension 05 only (in the surface-mounted enclosure)

3.4 Accessories (optional)

Type	Part no.
Holder for C rail	00375749
Dummy cover 96 mm × 48 mm	00069680
Pipe mounting set	00398162
Weather protection roof complete for basic type extension 05	00401174
PC setup software	00560380
PC interface cable including USB/TTL converter and two adapters (USB connecting cable)	00456352

Optional board	Code	Part no.
Analog input (universal)	1	00442785
Relay (1× changeover)	2	00442786
Relay (2× NO)	3	00442787
Analog output	4	00442788
2 PhotoMOS [®] relays	5	00566677
Solid state relay 1 A	6	00442790
Voltage supply output DC ±5 V (e.g. for ISFET)	7	00566681
Voltage supply output DC 12 V (e.g. for inductive proximity switch)	8	00566682
Interface - RS422/485	10	00442782
Data logger with RS485 interface	11	00566678
PROFIBUS-DP interface	12	00566679

4.1 General information

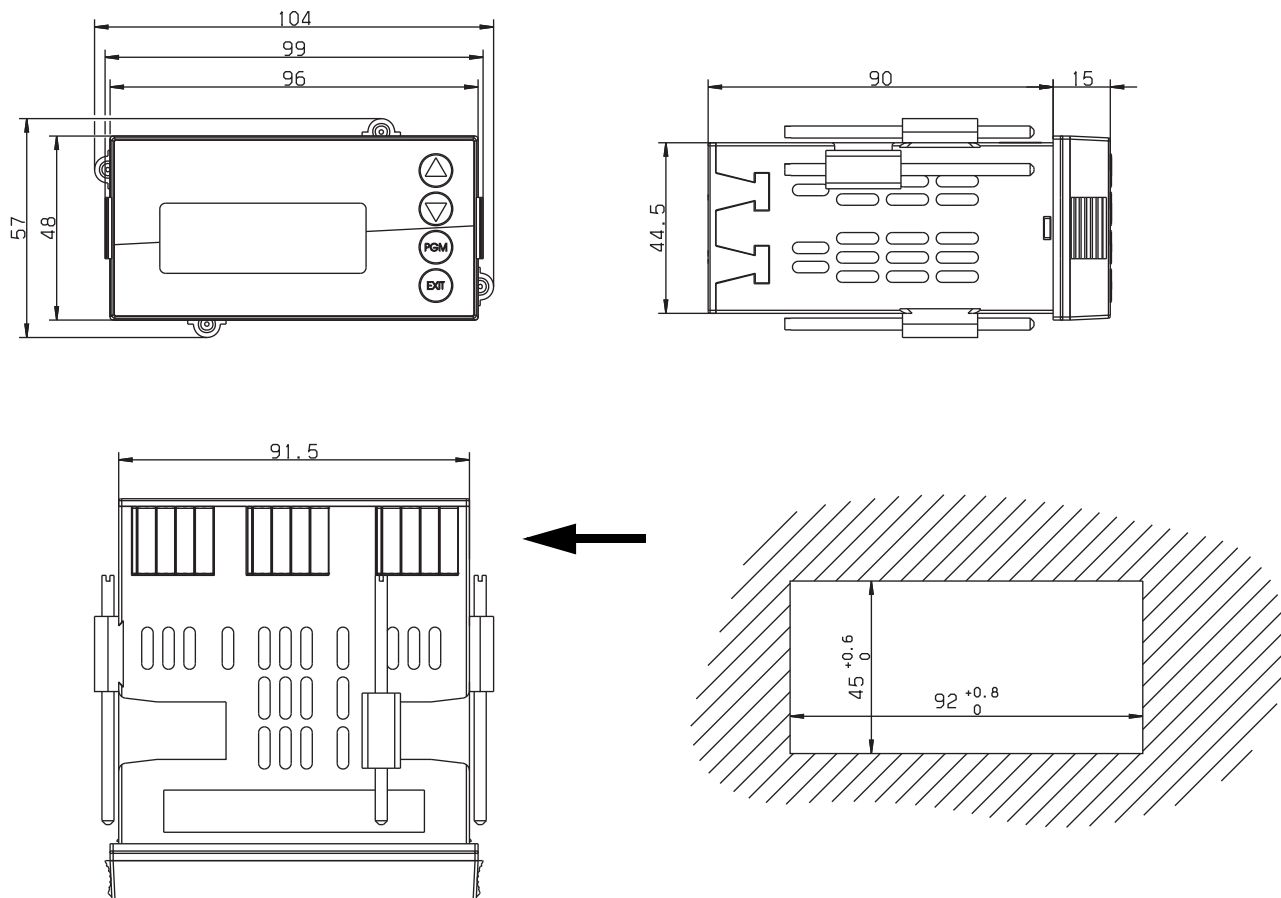
Mounting location

Find a location that ensures easy accessibility for the later calibration.
The fastening must be secure and must ensure low vibration for the device.
Avoid direct sunlight!
Permissible ambient temperature at the installation location: -10 to +55 °C with max. 95 % rel. humidity, no condensation.

Installation position

The device can be mounted in any position.

4.2 Dimensions



Close mounting

Minimum spacing of panel cutouts	Horizontal	Vertical
Without setup connector:	30 mm	11 mm
With setup connector (see arrow):	65 mm	11 mm

5 Installation

5.1 Installation instructions



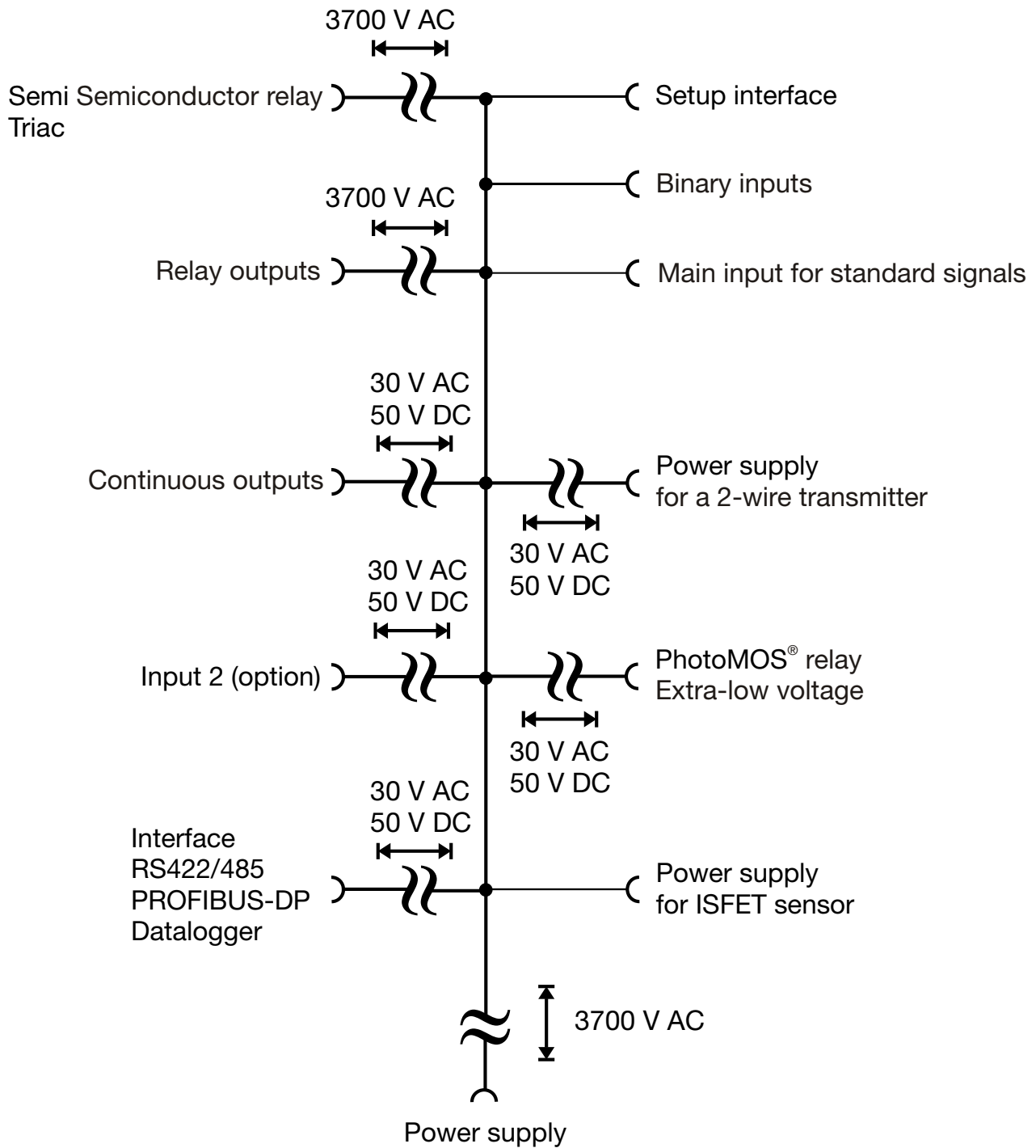
The electrical connection must only be performed by qualified personnel!

- ☐ The choice of cable, the installation and the electrical connection must conform to the requirements of VDE 0100 "Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V" and the relevant local regulations.
- ☐ At maximum load, the cable must be heat resistant up to at least 80 °C.
- ☐ The device shall be operated by mains protected with a branch circuitry overcurrent protection device **not more** than 20 Amps.
For servicing/repairing a Disconnecting Device shall be provided to disconnect all conductors.
- ☐ The load circuits must be fused for the maximum load currents in each case to prevent the relay contacts from becoming welded in the event of a short circuit.
- ☐ Electromagnetic compatibility meets the requirements of EN 61326.
- ☐ Lay the input, output, and supply lines so they are physically separated from each other and are not parallel.
- ☐ Use twisted and shielded probe cables. If possible, do not lay these cables close to components or cables through which current is flowing. Ground the shielding at one end.
- ☐ The probe cables must have an uninterrupted run (do not route them via terminal blocks or similar arrangements).
- ☐ No other consumers can be connected to the power terminals of the device.
- ☐ The device is not suitable for installation in areas with an explosion hazard.
- ☐ Apart from faulty installation, incorrect settings on the device may also affect the proper functioning of the subsequent process or lead to damage. You should therefore always provide safety equipment that is independent of the device and it should only be possible for qualified personnel to make settings.

Mounting information for conductor cross-sections and ferrules

Ferrule	Conductor cross-section		Minimum length of ferrule or stripping
	Minimum	Maximum	
Without ferrule	0.34 mm ²	2.5 mm ²	10 mm (stripping)
Without collar	0.25 mm ²	2.5 mm ²	10 mm
With collar up to 1.5 mm ²	0.25 mm ²	1.5 mm ²	10 mm
Twin, with collar	0.25 mm ²	1.5 mm ²	12 mm

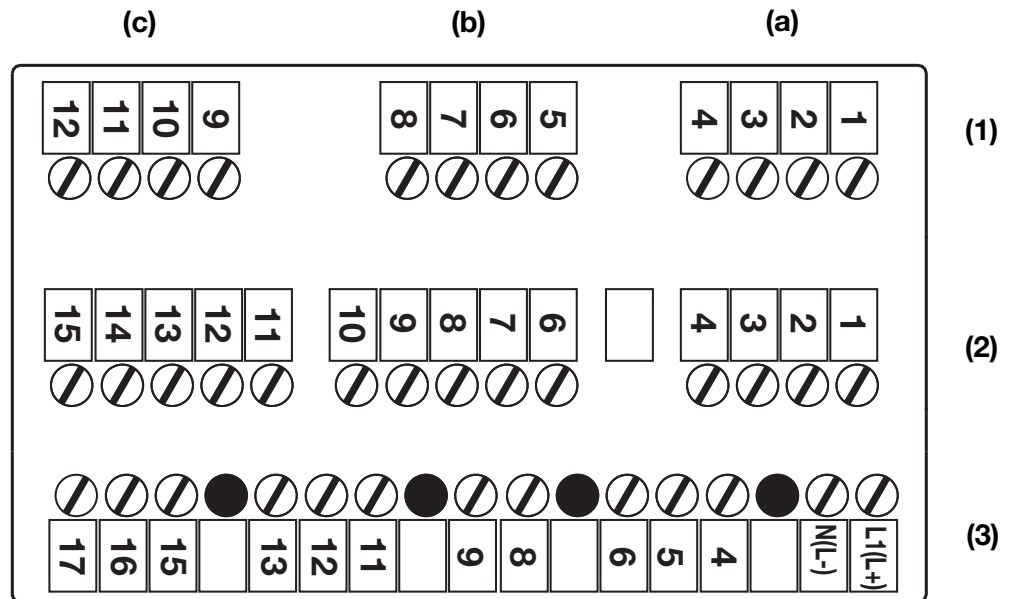
5.2 Electrical isolation



5 Installation

5.3 Connection

5.3.1 Terminal assignment

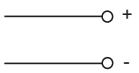
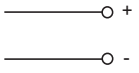
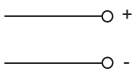
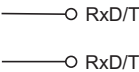
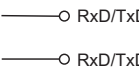
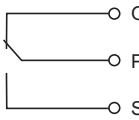
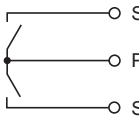
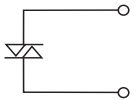
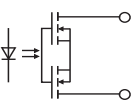
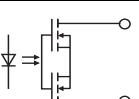


(1)	Row 1	(a)	Option 1	(b)	Option 2	(c)	Option 3
(2)	Row 2	Main input board (standard signal and temperature)					
(3)	Row 3	PSU board (power supply/2× relays)					

5.3.2 Optional board (row 1, slot a, b or c)

Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
Analog input				
Temperature sensor in a two-wire circuit Pt100 or Pt1000		2 4	6 8	10 12
Temperature sensor in a three-wire circuit Pt100 or Pt1000		2 3 4	6 7 8	10 11 12
Resistance transmitter		2 3 4	6 7 8	10 11 12
Electrical current		3 4	7 8	11 12

5 Installation

Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
Voltage 0(2) to 10 V		1 2	5 6	9 10
Voltage 0 to 1 V		2 3	6 7	10 11
Continuous output				
Current or voltage		2 3	6 7	10 11
Modbus interface				
RS422				9 10 11 12
RS485				11 12
PROFIBUS-DP interface				
				9 10 11 12
Datalogger interface				
RS485				10 11
Relay (1× changeover)				
		K3 1 2 3	K4 5 6 7	K5 9 10 11
Relay (2× NO, common pin)				
		K3 1 2 K6 3		K5 9 10 K8 11
Triac (1 A)				
		K3 2 3	K4 6 7	K5 10 11
PhotoMOS[®] relay (0.2 A)				
		K3 1 2	K4 5 6	K5 9 10
		K6 3 4	K7 7 8	K8 11 12

5 Installation

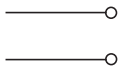
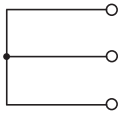
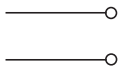
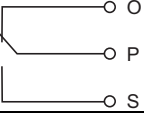
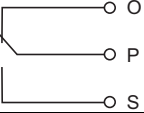
Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
Power supply voltage for proximity switch				
DC +12 V		1	5	9
GND		2	6	10

5.3.3 Main board (row 2)

Function	Symbol	Terminal
Standard signal input for electrical current 0(4) to 20 mA	 	3 4
Standard signal input for voltage 0(2) to 10 V or 10 to 0(2) V	 	1 2
Standard signal input for voltage 0 to 1 V	 	2 3
Temperature sensor in a two-wire circuit Pt100 or Pt1000		2 3 4
Temperature sensor in a three-wire circuit Pt100 or Pt1000		2 3 4
Temperature sensor in a four-wire circuit Pt100 or Pt1000		1 2 3 4
Resistance transmitter		4 3 2
Binary inputs		
Binary input 1		6+ 10
Binary input 2		7+ 10

5 Installation

5.3.4 PSU board (row 3)

Function	Symbol	Terminal
Power supply for JUMO dTRANS 02		
Power supply: AC 110 to 240 V		1 L1 (L+) 2 N (L-)
Power supply: AC/DC 20 to 30 V		
n.c.		4 5 6
Supply voltage for external 2-wire transmitter		
DC 24 V (-15/+20 %)		8 L+ 9 L -
Relay 1		
Switching output K1 (floating)		11 12 13
Relay 2		
Switching output K2 (floating)		15 16 17

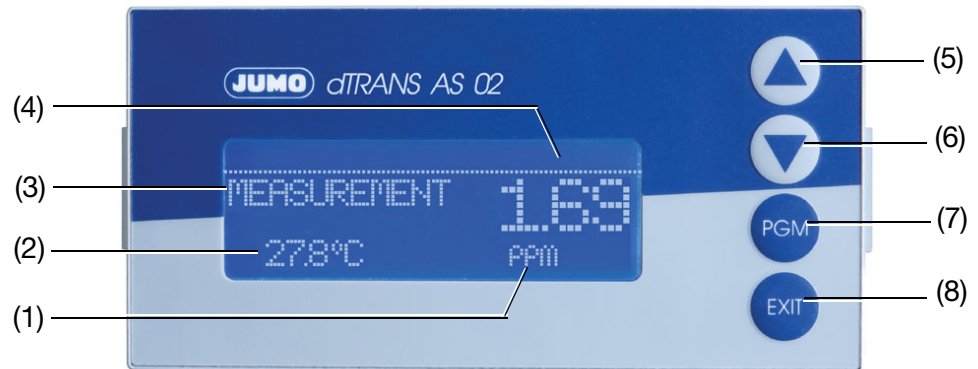
6 Operation



Operation via the device keypad is described below.

device operation via the optional set-up program, See section 11 "Setup program", page 75.

6.1 Controls

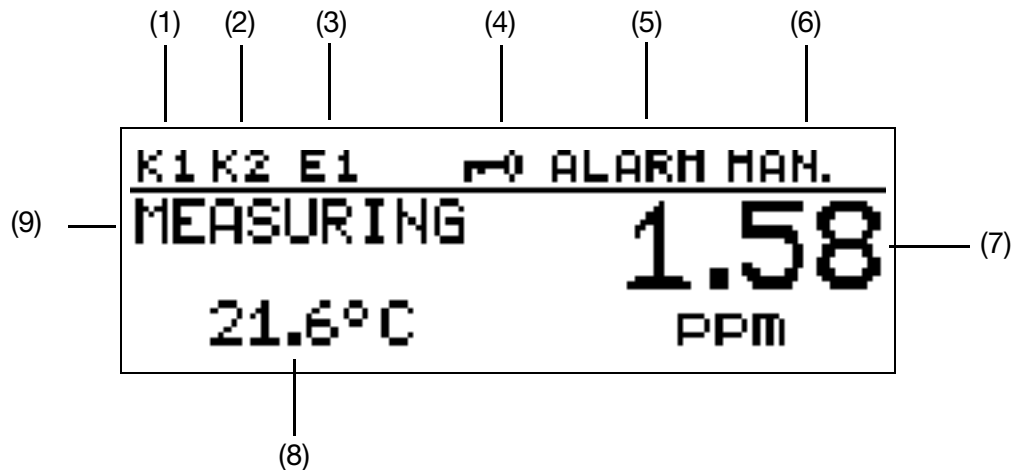


- (1) Measurement unit
- (2) Temperature
- (3) Operating mode
- (4) Measured value
- (5) ▲ key Increase numerical value/Forward selection
- (6) ▼ key Decrease numerical value/Forward selection
- (7) PGM key Change level/Forward selection/Confirm selection
- (8) EXIT key Cancel entry/Exit level

6.2 Display

6.2.1 Measuring mode (normal display)

Example



- (1) Binary output (relay) K1 is active
- (2) Binary output (relay) K2 is active
- (3) Binary input is active
- (4) Keypad is locked
- (5) Device status
 - ALARM (flashing): Broken sensor or overrange, etc.
 - AL R1: Controller monitoring alarm from controller channel 1
 - AL R2: Controller monitoring alarm from controller channel 2
 - CALIB: Calibration mode active
 - CALIB (flashing): Calibration timer elapsed
- (6) Output mode
 - MAN.: Manual mode and/or simulation mode active
 - HOLD: Hold mode active
- (7) Top display
 - Measured value and unit of the variable set by parameter "Top display"
- (8) Bottom display
 - Measured value and unit of the variable set by parameter "Bottom display"
- (9) Operating mode
 - MEASURING: Standard measuring mode is active



To return to Measuring mode (MEASURING):
Press the EXIT key or wait for a "timeout".

6 Operation

6.3 Principle of operation

6.3.1 Operation in levels

See page

Measurement mode

Normal display	23
Min/max values of the main input	25
Min/max values of the optional inputs	26
Output display	26
Current values of the main input	26
Current values of the optional inputs	27
Current values of the math channels	27
States of the binary inputs and outputs	27
Manual mode overview	28
Hardware information	28
Device information	29
User data	76
Calibration (depending on the basic setting)	45
Manual mode/simulation	33
Hold mode	36

Main menu

User level	29
Analog input	100
Input temperature	101
Optional inputs	101
Analog input 1, 2, 3	
Binary inputs	103
Binary input 1, 2	
Controllers	103
Controller 1	
Parameter set 1, 2	
Configuration	
Controller 2	
Parameter set 1, 2	
Configuration	
Controller special functions	105
Limit value control	105
Limit value 1, 2, 3	
Binary outputs	103
Binary output 1, 2, 3, ... 8	
Analog outputs	107
Analog output 1, 2, 3	
Interface	108
Wash timer	109
Datalogger	109

Display	110
Administrator level (password)	30
Parameter level	30
Parameters as above for "User level"	
Release level	30
Parameters as above for "User level"	
Basic setting	30
Calibration level	33
Main input (depending on the basic setting)	
Temperature coefficient, linear	
Temperature coefficient, curve	
Relative cell constant	
Zero point	
Limit point	
2-point	
3-point	
Optional input 1, 2, 3	
Temperature coefficient, linear	
Temperature coefficient, curve	
Relative cell constant	
Zero point	
Limit point	
2-point	
3-point	
Calibration release	33
Main input (depending on the basic setting)	
Temperature coefficient, linear	
Temperature coefficient, curve	
Relative cell constant	
Zero point	
Limit point	
2-point	
3-point	
Optional input 1, 2, 3	
Temperature coefficient, linear	
Temperature coefficient, curve	
Relative cell constant	
Zero point	
Limit point	
2-point	
3-point	
Delete min/max values	33
Main input	
Optional input 1, 2, 3	

6 Operation

	Delete logbook	33
	Main input	
	Optional input 1, 2, 3	
	Delete daily batch	33
	Delete total batch	33
	Calibration level (depending on the basic setting)	45
	Main input	
	Temperature coefficient, linear	
	Temperature coefficient, curve	
	Relative cell constant	
	Zero point	
	Limit point	
	2-point	
	3-point	
	Optional input 1, 2, 3	101
	Temperature coefficient, linear	
	Temperature coefficient, curve	
	Relative cell constant	
	Zero point	
	Limit point	
	2-point	
	3-point	
	Calibration logbook	67
	Main input	
	Optional input 1, 2, 3	
	Device information	29

6.4 Measuring mode



Different display types can be configured, See "Display of measured values STANDARD" page 87.

To return to Measuring mode:
press the **EXIT** key or wait for a "timeout".

Measurements with "out of range" are ignored.

The min./max. value memory can be reset:
Administrator level/Delete min/max.

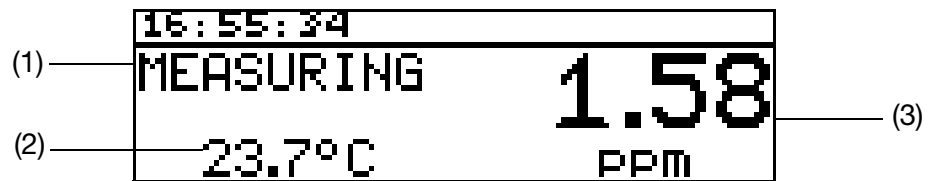
When the basic setting is changed, the min and max values are deleted.

6.4.1 Normal display

Visualization

The following are displayed in Measuring mode:

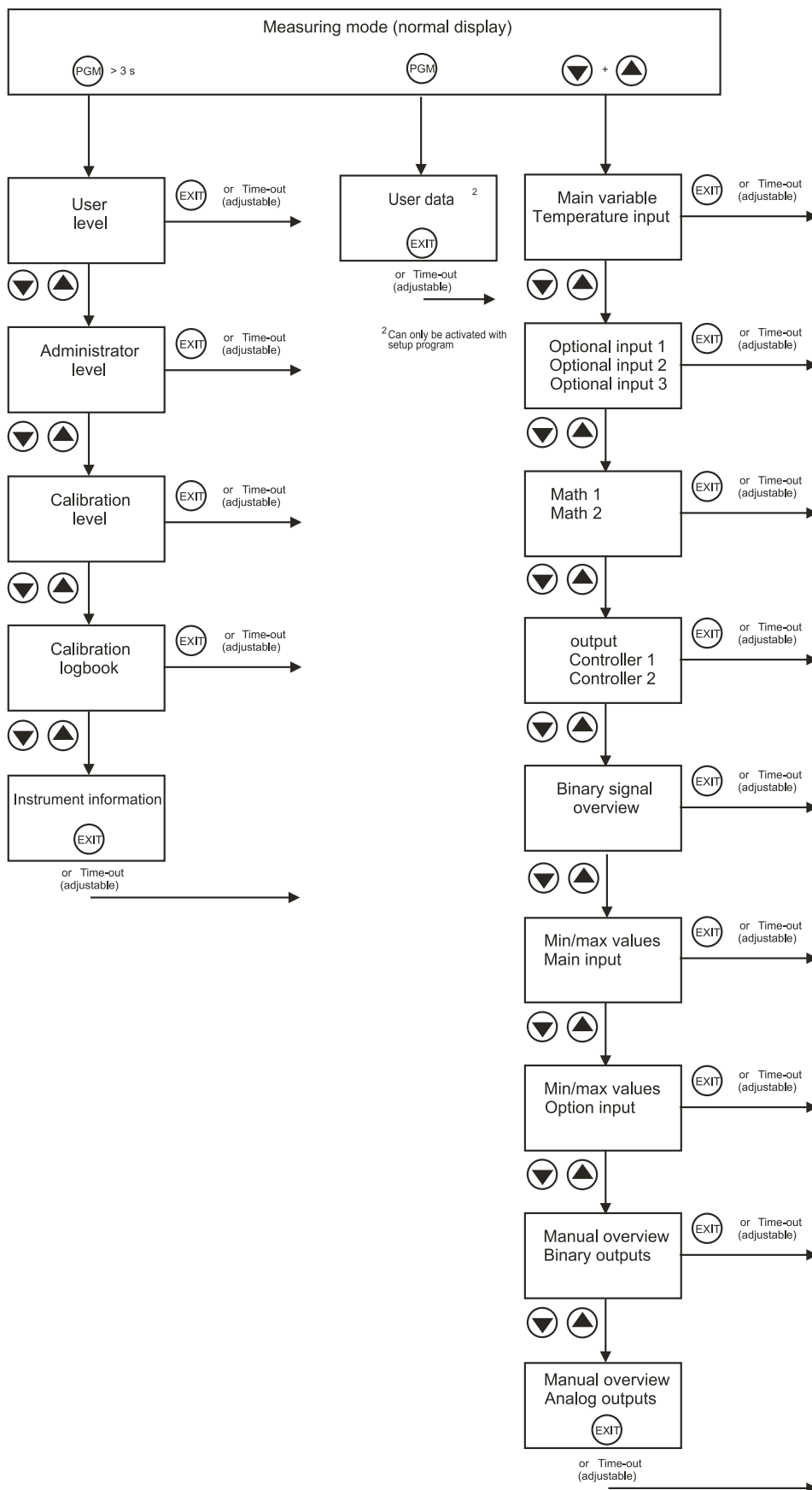
- Analog input signal
- Unit (for example ppm)
- Temperature of the sample medium

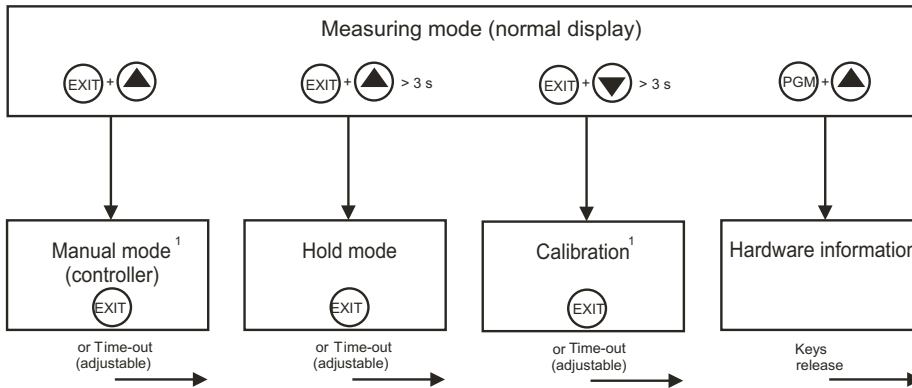


- (1) MEASURING -> Measuring mode
- (2) 23.7 °C -> Temperature of the sample medium
- (3) 1.58 ppm -> measured value

6 Operation

6.5 Input/output information





¹ Only if released

6.5.1 User data

```

SP 1 Reservoir II
0.73 ppm
  
```

Up to 8 parameters that are frequently changed by the user can be combined in the user level under "User data" (via setup program only).

Activating the display

The device is in Measuring mode (normal display)

- * Briefly press the **PGM** key.
- * Select the required "quick setting" with the **▲** and **▼** keys.

Editing

- * Briefly press the **PGM** key.
- * Edit the setting with the **▲** and **▼** keys.

6.5.2 Min/max values of the main input

```

MIN/MAX MAIN INP.
1: 0.81 0.81 ppm
T: 24.3 74.5 °C
  
```

Activating the display

The device is in Measuring mode (normal display)

- * Briefly press the **▲** or **▼** key (several times if necessary).
Minimum and maximum values of the main value "1:" (mS/cm, µS/cm,

6 Operation

MOhm × cm, mV, %, ppm) and the temperature "T:" are displayed.

The extreme values of the main measurement variable and the temperature are **not** mutually assigned (e.g. not 813 µS/cm at 24.3 °C).

6.5.3 Min/max values of the optional inputs

MIN/MAX OPT. INP.		
1:	----	----
2:	-0.01	5.00 pH
3:	-93.25	----

Activating the display

The device is in Measuring mode (normal display)

- * Briefly press the ▲ or ▼ key (several times if necessary).
Minimum and maximum values of the optional inputs (1, 2 and 3) are displayed

6.5.4 Output level

OUTPUT		
CTRL. 1	0 %	
CTRL. 2	100 %	

Activating the display

The device is in Measuring mode (normal display)

- * Briefly press the ▲ or ▼ key (several times if necessary).
The current output levels of the controller outputs.

6.5.5 Current values of the main entries

08:01:30		
MAIN VAL.	0.81 ppm	
TEMP. INP.	24.4 °C	

Activating the display

The device is in Measuring mode (normal display)

- * Briefly press the or ▼ key (several times if necessary).
The current values of the main output are displayed.

6.5.6 Current values of the optional entries

OPT. IN 1	0
OPT. IN 2	0
OPT. IN 3	0

Activating the display

The device is in Measuring mode (normal display)

- * Briefly press the ▲ or ▼ key (several times if necessary).
The current values of the optional inputs (1, 2 and 3) are displayed

6.5.7 Current values of the math channels

MATHS 1	8888
MATHS 2	8888

Activating the display

The device is in Measuring mode (normal display)

- * Briefly press the ▲ or ▼ key (several times if necessary).
The current values of the main output are displayed.

6.5.8 States of the binary inputs and outputs

OVERVIEW BIN. SIG.							
E1	0	E2	0				
K1	⊗	K2	0	K3	0	K4	0
K5	0	K6	0	K7	0	K8	0

Activating the display

The device is in Measuring mode (normal display)

- * Briefly press the ▲ or ▼ key (several times if necessary).
The states of binary inputs E1 and E2 and of relays K1 through K8 are displayed. In the example shown here, relay K1 is active.

6 Operation

6.5.9 Manual mode overview

Analog outputs (optional boards)

In this example, analog outputs 2 and 3 are working normally.

```
MANUAL OVERVIEW
ANALOG INPUT 1  MAN.
ANALOG INPUT 2  ----
ANALOG INPUT 3  ----
```

Switching outputs (PSU board and optional boards)

In this example relay output 2 is in Manual mode.

```
MANUAL OVERVIEW
BINARY OUTPUTS
K1 0 K2 0 K3 0 K4 0
K5 0 K6 0 K7 0 K8 0
```

The device is in "normal display" mode

* Briefly press the ▲ or ▼ key (several times if necessary).



Manual mode can only be displayed if at least one output is in Manual mode. For example Administrator level/Parameter level/Binary outputs/Binary output 1/Manual mode "Active" or "Simulation".

To return to Measuring mode:
press the  key or wait for a "timeout".

6.5.10 Hardware info



These displays are required for phone support.

The device is in Measuring mode (normal display)

* Press and hold the  and ▲ keys.

```
MAIN CPU 268.01.01-34
MAIN INPUT 269.01.01-04
```

Alternating display

```
OPTION 1      200.01.02
OPTION 2
OPTION 3      193.02.01
BOOTLOADER    297.00.01
```

6.5.11 Device info



These displays provide an overview of fitted hardware options and the settings of inputs (helpful for troubleshooting, etc.).

- * Press the  key for longer than 3 seconds.
- * Briefly press the  or  key (several times if necessary).
- * Select Device info

```
ADMINISTR. -LEVEL >
CALIBR. -LEVEL    >
CALIBR. -LOGBOOK >
DEVICE INFO       >
```

- * Press the  keys.

```
MAIN INP. AS
OPTION 1: ANALOGOUT
OPTION 2: ANALOG IN
OPTION 3: DATALOG.
```

- * Briefly press the  or  key (several times if necessary).
For further information about the inputs, press the  or  keys.

6.6 User level

All the parameters that the Administrator (See section 6.7 "Administrator level", page 30) has released can be edited at this level. All the other parameters (marked by a key ) are read only.

- * Press the  key for longer than 2 seconds.
- * Select "USER LEVEL".

```
USER LEVEL >
ADMINISTR. -LEVEL >
CALIBR. -LEVEL    >
CALIBR. -LOGBOOK >
```

6 Operation

All possible parameters are accessed below. Depending on the configuration of a specific device, some of these parameters may not appear.

6.6.1 Parameters of the User level

See section 15.2 "Parameters of the User level", page 100

6.7 Administrator level

- All the parameters can be edited at this level.
- At this level, it is also possible to define which parameters can be edited by a "normal" user (operator) and which calibrations can be performed.

To get to the Administrator level, proceed as follows:

- * Press the  key for longer than 2 seconds.
- * Use the  or  keys to select "ADMINISTR. LEVEL".
- * Use the  and  keys to enter the password 300 (factory setting).
- * Confirm the  key.

6.7.1 Parameter level

The settings that can be made here are the same as those at the User level, See "User level" page 29. As the operator (user) has administrator rights here, the parameters that are locked in the User level can now also be modified.

6.7.2 Release level

All parameters can be released (modification possible) or locked (no modification possible) for editing at the User level.

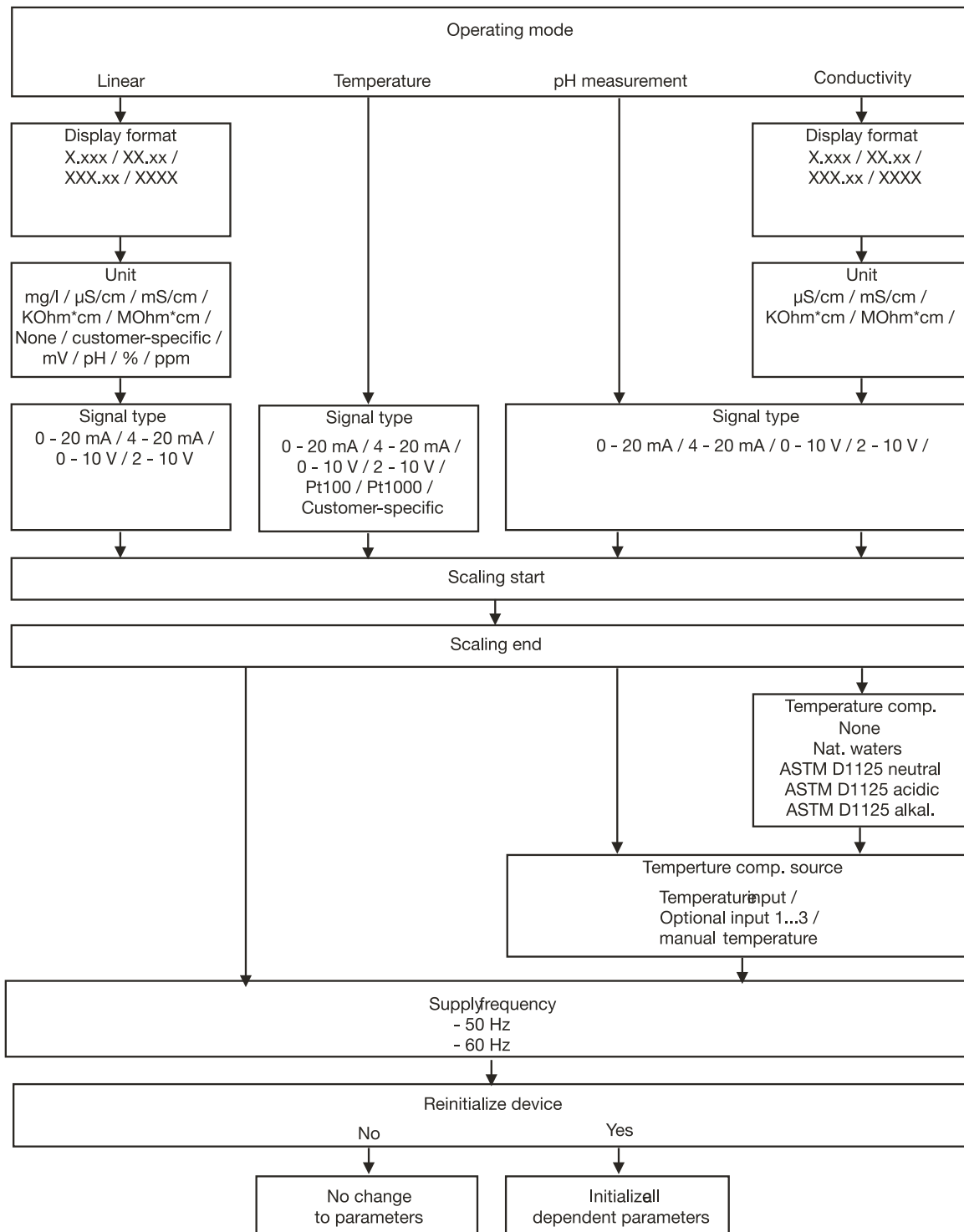
6.7.3 Basic setting

The JUMO dTRANS 02 AS has a basic setting wizard, to make it easier for the user to configure the extensive setting options of the device and to avoid configuration conflicts.

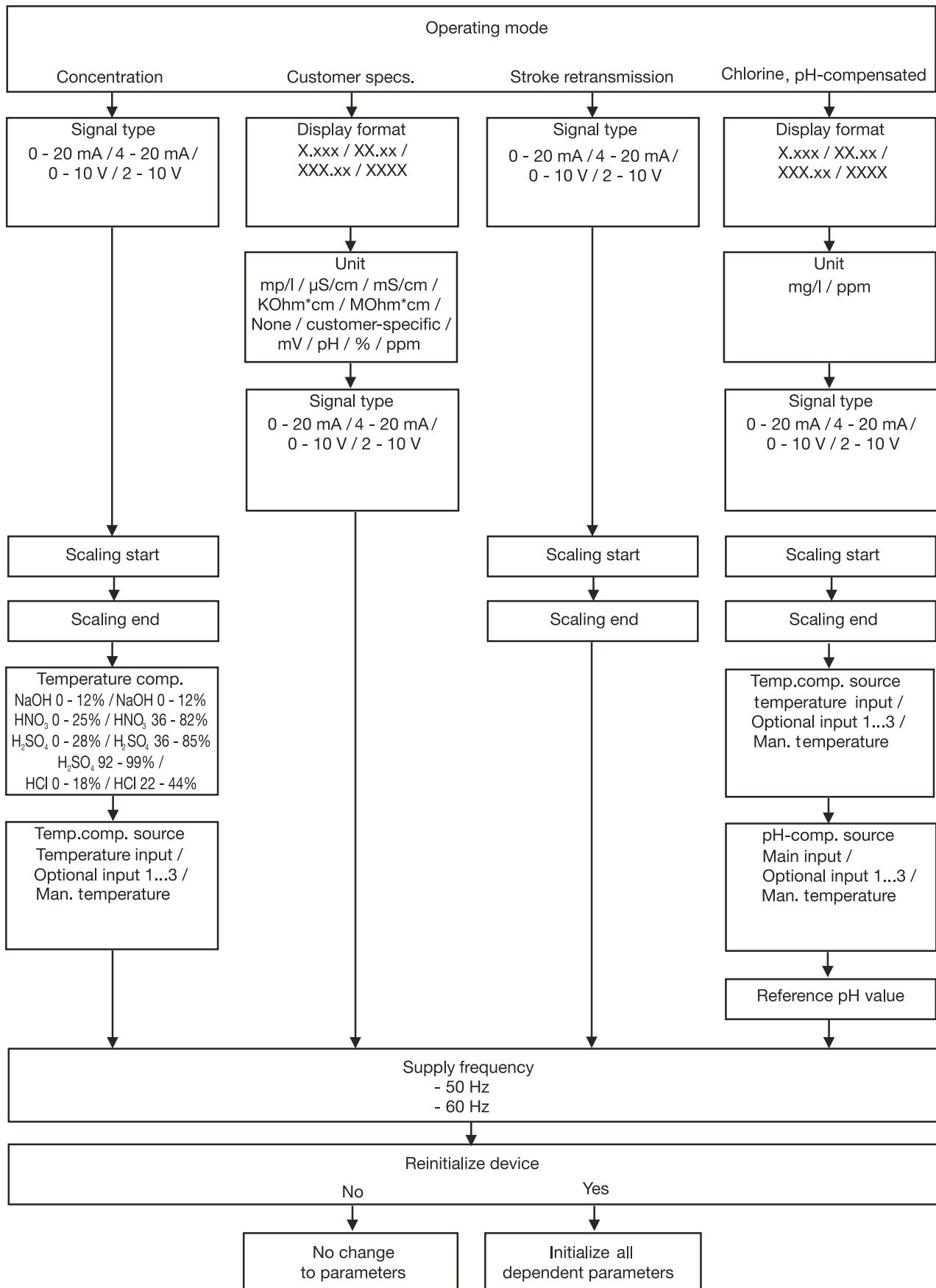
The basic settings are reached via ADMINISTR.-LEVEL/PASSWORD/BASIC SETTING.

All the important settings are systematically polled here. At the end, once a request for conformation has been acknowledged, the device is initialized with the new settings. Dependent parameters are checked and adjusted.

Basic setting wizard



6 Operation



6.7.4 Calibration level

Depending on which operating mode has been configured (in the Basic setting menu), one or more of the following calibration options will be available:

- Cell constant
- Temperature coefficient

6.7.5 Calibration release

Which calibration procedure may be performed directly and which may not can be configured here, See section 8.2.3 "Ways to start the calibration", page 46.

6.7.6 Delete min/max values

If required, the values can be deleted once a request for confirmation has been acknowledged.

See "Min/max values of the main input" page 25 or

See "Min/max values of the optional inputs" page 26.

6.7.7 Delete logbook

The last five calibration processes for each input are archived in the calibration logbook. If a "Datalogger" optional board is fitted, the date and time are also archived.

If necessary the logbook can be deleted after a confirmation prompt.

6.7.8 Delete daily batch

If required, the counter can be deleted once a request for confirmation has been acknowledged.

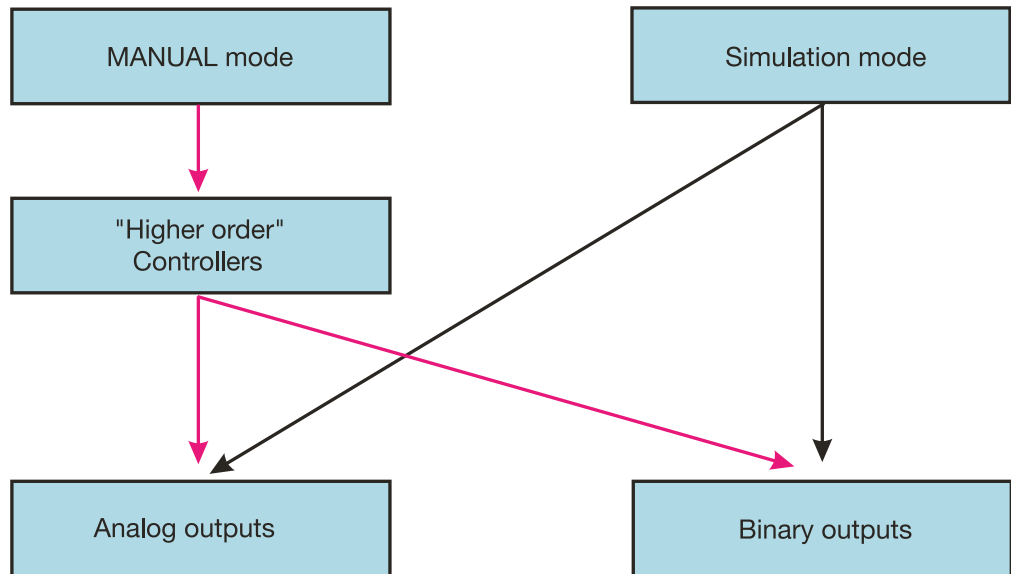
6.7.9 Delete total batch

If required, the counter can be deleted once a request for confirmation has been acknowledged.

6.8 MANUAL mode/Simulation mode

These functions can be used to set the switching outputs and analog outputs of the device manually to a defined state. This facilitates dry startup, troubleshooting and customer service, etc.

6 Operation



Simulation mode accesses the analog outputs and binary outputs **directly**. When simulation mode has been selected, MANUAL mode is **not** possible!

In MANUAL mode the settings for "higher order controllers" are taken into consideration.

6.8.1 MANUAL mode only via "higher order" controller functions

Select Manual mode



In the factory setting of the device the MANUAL mode parameter is locked and can **only be activated by the administrator!**

This parameter must first be released for other users, See "Release level" page 30.

- * Set ADMINISTR. LEVEL/PARAMETER LEVEL/CONTROLLER/CTRL.SPEC. FUNCT./MANUAL MODE "Locked, **Coding** or **Switching**."

Locked = No Manual mode, control is via device.

Coding = The outputs are active as long as the ▼ or ▲ key is pressed.

Switching = the outputs are active if the ▼ or ▲ key is pressed. If the corresponding key is pressed again, the output becomes inactive again.

Activate Manual mode

The device is in Display mode

- * Press the  and  keys for less than 2 seconds.
The word MANUAL appears in the status line of the display.



If the  keys (alone) are pressed for longer than 3 seconds, the device switches to language selection.

If the  and  keys are pressed for longer than 3 seconds, the device goes into HOLD mode.

Then the outputs of the device respond according to the default settings.

To exit HOLD mode, press the  and  keys for longer than 3 seconds.

Control is not longer via the device. The output level of the controllers is 0 %.

Controller 1 is activated by the  key. In this case the output level of controller 1 is 100 %.

Controller 2 is activated by the  key. In this case the output level of controller 2 is 100 %.

Deactivation

* Press the  key.

Control is once again through the outputs of the device.

The word MANUAL appears in the status line of the display.

6.8.2 Simulation of binary outputs

Activate simulation



In the factory setting of the device the MANUAL mode parameter is set to "No simulation" and can **only be activated by the administrator!**

This parameter must first be released for other users, See "Release level" page 30.

If a higher order switching function has been assigned to an output, Simulation mode is not possible for that output.

* Set ADMINISTR. LEVEL/PARAMETER LEVEL/BINARY OUTPUTS/
BINARY OUTPUT1 (... 8) "Manual mode no simulation, **Inactive** or **Active**".

No simulation = No Manual mode, control is via device.

Inactive = Relay K1 or K2 is de-energized; the word MANUAL appears in the status line of the display

Active = Relay K1 or K2 is energized; the word MANUAL appears in the status line of the display

Deactivate Manual mode

No simulation = No Manual mode, control is via device.

When the device is in display mode, the word MANUAL disappears from the status line of the display.

6 Operation

6.8.3 Simulation of analog outputs via MANUAL mode

Release and activation

- * Select activation of simulation of the actual value output:
ADMINISTR. LEVEL/PARAMETER LEVEL/ANALOG OUTPUTS/
ANALOG OUTPUT 1 (2, 3)/SIMULATION/ON.

With "On" the output takes on the value of the "Simulation value" parameter.

When the device is in display mode, the word MANUAL appears in the status line of the display.

Deactivation

- * ADMINISTR. LEVEL/PARAMETER LEVEL/ANALOG OUTPUTS/
ANALOG OUTPUT 1 (2, 3)/SIMULATION/OFF.

The corresponding output of the device works again.

When the device is in display mode, the word MANUAL disappears from the status line of the display.

6.9 HOLD mode

In HOLD status the outputs take on the states programmed in the relevant parameter (controller channel, switching output or analog output).

This function can be used to "freeze" switching outputs and the analog outputs of the device. This means the current status of the output will be retained even when the measured value changes. Control is not via the device.



If MANUAL mode is activated while HOLD mode is activated, MANUAL mode takes precedence and MANUAL then appears in the status line of the display! MANUAL mode can be terminated by pressing the  key.

If HOLD mode is still activated (by the binary input or by keyboard), the device then returns to HOLD mode!

HOLD mode can be activated by pressing the key or by the binary input.

Activation by pressing key

- * Press and hold the  and  keys longer than 3 seconds.
Then the outputs of the device respond according to the default settings.
The word HOLD appears in the status line of the display.



If the  and  keys are pressed for less than 3 seconds, the device goes into Manual mode.

Then the outputs of the device respond according to the default settings.

Pressing a key to deactivate HOLD mode

* Press the  and  keys for longer than 3 seconds.



If the  and  keys are pressed for less than 3 seconds, the device goes into Manual mode.

Then the outputs of the device respond according to the default settings.

Control is through the outputs of the device again. The word MANUAL disappears from the status line of the display.

7 Commissioning

7.1 Getting started



Some suggestions follow for configuring the device reliably in little time.

- * Mount the device, siehe Kapitel 4 „Mounting“, Seite 11.
- * Install the device, siehe Kapitel 5 „Installation“, Seite 12 ff.
- * Call up Administrator level (ADMINISTR. LEVEL).
- * Enter password 0300 (factory setting).
- * Call up PARAMETER LEVEL/DISPLAY/OPERAT. TIMEOUT.
- * Set OPERAT. TIMEOUT to 0 minutes (no timeout).
- * Leave the Display level with "EXIT"
- * Leave the Parameter level with "EXIT"
- * Select BASIC SETTING and work through all the menu items, siehe Kapitel 6.7.3 „Basic setting“, Seite 30.
- * Answer "YES" to the "Reinitialize device" query
- * Configure the required additional parameters.
- * Calibrate the device to the sensor and sample medium.

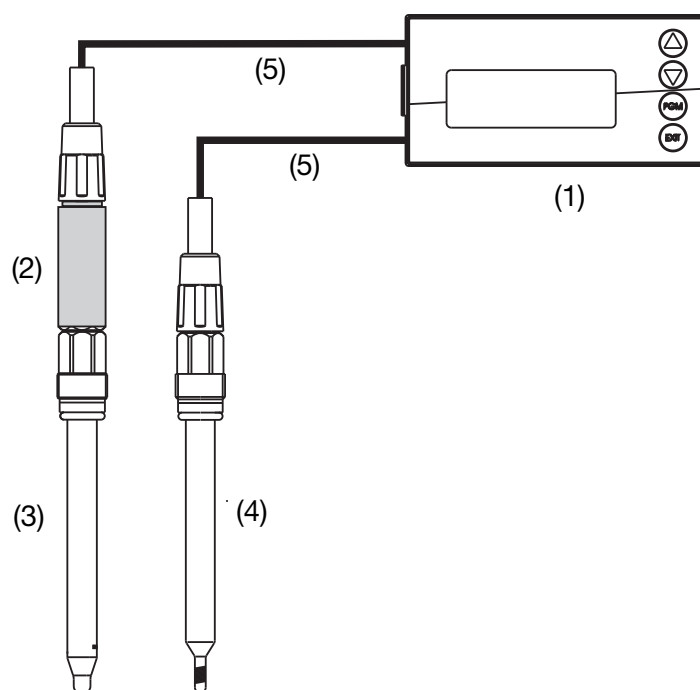
7.2 Setting examples

7.2.1 Indicator/controller for pH (temperature compensated)



Measurement of drinking water.

Layout



	Data sheet
(1) Transmitter/controller type 202553	202553
(2) JUMO digiLine pH with analog output on main board	202705
(3) pH combination electrode	201020
(4) Compensation thermometer on optional board	201085
(5) Connecting cables	202950

Electrical connection

siehe Kapitel 5 „Installation“, Seite 12.

Task

Measuring range:	2 to 12.00 pH
Output signal:	4 to 20 mA
Temperature measurement	Pt100
Limit monitoring:	Limit value function
Limit value1:	7.5 pH

7 Commissioning

Basic setting



Start the basic settingsiehe Kapitel 6.7.3 „Basic setting“, Seite 30
Diagrammatic overview, siehe Kapitel „Basic setting wizard“, Seite 31.

Operating mode	pH measurement
Signal type	4 to 20 mA
Scaling start	-600 mV ^a
Scaling end	+600 mV ^a
Temperature compensation source	Optional input 1
Supply frequency	50 Hz

Reinitialize device Yes

^a Depending on the delivery status of the pH sensor.

pH/Redox input

Administrator level/Password/Parameter level/Input pH/Redox

Zero point	7.00 pH
Slope acid/alkaline	100 %
Temperature compensation source	Option input 3
Filter time constant	2.0 sec.
Calibration intervall	customer specific
Difference measurement	off
Supply frequency	customer specific

Temperature input

Administrator level/Password/Parameter level/Optional inputs/Analog input 3

Operating mode	Temperature
Signal type	Pt100
Connection type	2-wire
Filter time constant	2.0 sec.

Analog output

Administrator level/Password/Parameter level/Analog outputs/Analog output 1

Signal source	Main variable
Signal type	4 to 20 mA
Start of scaling	2.00 pH
End of scaling	12.00 pH

Controller settings

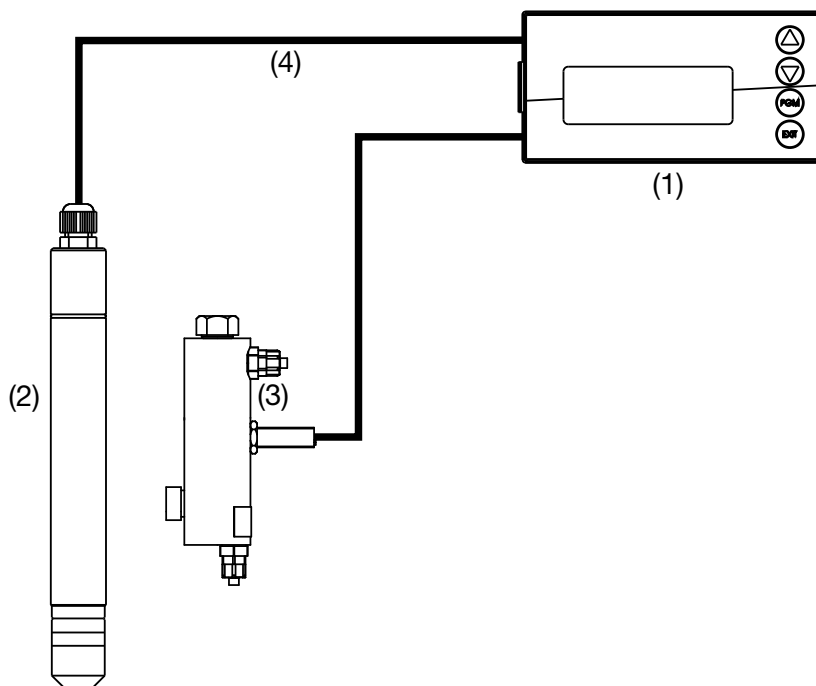
siehe Kapitel 10.6.1 „Simple limit monitoring (min. function)“, Seite 72.

7.2.2 Indicator/controller for free chlorine, chlorine dioxide, hydrogen peroxide, peracetic acid or ozone (with flow monitoring)



Swimming pool water monitoring

Layout



- | | |
|-----|---|
| (1) | Transmitter/controller type 202553 |
| (2) | Conductivity sensor for free chlorine on main board |
| (3) | Flow monitor, type 202811/20 on main board |
| (4) | Connecting cable |

Data sheet
202553
202630
202811
202950

Electrical connection

siehe Kapitel 5 „Installation“, Seite 12.

Task

Measuring range:	0 to 2.00 ppm
Output signal:	4 to 20 mA
Flow monitoring:	Flow monitor
Limit monitoring:	Limit value function
Limit value 1:	0.60 ppm

7 Commissioning

Basic setting



Start the basic settingsiehe Kapitel 6.7.3 „Basic setting“, Seite 30
Diagrammatic overview, siehe Kapitel „Basic setting wizard“, Seite 31.

Operating mode	Linear
Display format	XX.xx
Unit	ppm
Signal type	4 to 20 mA
Scaling start	0.00 ppm
Scaling end	2.00 ppm
Supply frequency	50 Hz
Reinitialize device	Yes

Analog output

Administrator level/Password/Parameter level/Analog outputs/Analog output 1

Signal source	Main variable
Signal type	4 to 20 mA
Start of scaling	0.00 ppm
End of scaling	2.00 ppm

Binary inputs

Administrator level/Password/Parameter level/Binary inputs/Binary input 1

Function	HOLD mode inverse
----------	-------------------

Controller settings

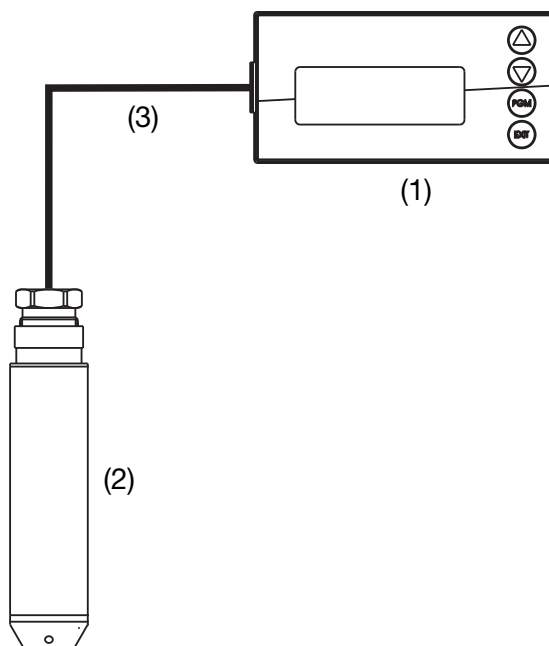
siehe Kapitel 10.6.2 „Simple limit monitoring (max. function)“, Seite 72.

7.2.3 Indicator/controller for level or liquid level measurement



Tank monitoring.

Layout



- (1) Transmitter/controller type 202553
- (2) Level measurement probe
- (3) Connecting cable (part of the level measurement probe)

Data sheet
202553
404390

Electrical connection

siehe Kapitel 5 „Installation“, Seite 12.

Task

Measuring range:	0 to 100 % (0 to 1 bar)
Output signal:	4 to 20 mA
Limit monitoring :	Limit value function
Limit value 1:	10 %
Limit value 2:	80 %

7 Commissioning

Basic setting



Start the basic settingsiehe Kapitel 6.7.3 „Basic setting“, Seite 30
Diagrammatic overview, siehe Kapitel „Basic setting wizard“, Seite 31.

Operating mode	Linear
Display format	XXXX
Unit	%
Signal type	4 to 20 mA
Scaling start	0 %
Scaling end	100 %
Supply frequency	50 Hz
Reinitialize device	Yes

Analog output

Administrator level/Password/Parameter level/Analog outputs/Analog output 1

Signal source	Main variable
Signal type	4 to 20 mA
Start of scaling	0 %
End of scaling	100 %

Controller settings

siehe Kapitel 10.6.3 „Controller with limit value function“, Seite 73.

8.1 Notes



During calibration, relays and analog output signals adopt their configured states!



The sensors connected to the device should be cleaned and the device itself calibrated, at regular intervals (subject to the sample medium).

Every successfully completed calibration is documented in the calibration logbook, siehe Kapitel 9 „Calibration logbook“, Seite 67.

8.2 General information

The electrical properties of all sensors vary slightly from instance to instance and also change during operation (due to deposits or wear, etc.). This changes the output signal of the sensor.

8.2.1 Measurements in highly-purified water

Measurements in highly-purified water (measured values < approx. 10 $\mu\text{S}/\text{cm}$) make special demands on the metrology and the measurement environment.

The following points should therefore be considered and checked first before attempting a calibration:

- Basically sensors with ASTM certificate are recommended for measurements in highly-purified water. Their cell constants are measured by the manufacturer and can be found in the certificate.
- Ready-to-use calibration solutions in the range < 5 $\mu\text{S}/\text{cm}$ are difficult or impossible to get. Effort and error rate are very high when handling these.
- Reliable comparative measurements are often problematic due to unknown or insufficient quality of the comparison device. In addition, the reference junction is often not close enough to the actual measuring point.
- If minor measurement errors exist despite of entering the exact cell constant, these can manually be adjusted in the range of several percent by changing the relative cell constant. Possible causes are installation conditions and flow dependencies.
- **Larger deviations (> approx. 10 %) mostly have other causes, such as contamination of the sensor by mishandling or EMC.**

More information on highly-purified water measurement in form of a scientific paper can be found on the Internet at **www.jumo.de**.

For this purpose, enter the keyword "FAS 614" into the search box.

8 Calibration

8.2.2 Requirements

- The device must be supplied with voltage, siehe Kapitel 5 „Installation“, Seite 12 ff.
- A sensor must be connected to the transmitter.



For a configuration example siehe Kapitel 7.2.1 „Indicator/controller for pH (temperature compensated)“, Seite 39.

A sensor (via a transmitter) can be

- connected directly to the main input or
- to the optional board "Analog input (universal)"

-
- The appropriate operating mode (Linear, Temperature, Conductivity, Concentration, etc.) must be configured in the basic setting.
 - The device is in Measuring mode.

8.2.3 Ways to start the calibration

Select the input to which the sensor (transmitter) is connected.

If Calibration level is not released

- Press the  key for longer than 3 seconds/ADMINISTR. LEVEL/PASSWORD/CALIBR. LEVEL/MAIN INPUT or ANALOG INPUT.

If Calibration level is released

- Press the  and  keys simultaneously/MAIN INPUT or ANALOG INPUT.

If Calibration level is released

- Press the  key for longer than 3 seconds/CALIBR. LEVEL/MAIN INPUT or ANALOG INPUT.

8.2.4 Operating modes

The operating mode selection depends on which sensor (transmitter) is connected.

Linear

For example sensor for free chlorine, redo, pressure, liquid level or humidity

Temperature (for main board only)

For example Pt100

pH measurement

For example pH sensor

Conductivity

For example sensor for conductivity

Concentration (for main board only)

For example sensor for conductivity

Customer specs.

For sensors with non-linear characteristics.

Up to 20 interpolation points can be defined in an device table.

This allows for an excellent approximation of a non-linear characteristic.

Stroke retransmission (for main board only)

For example valve settings

Chlorine, pH and temperature-compensated

Combination of chlorine sensor and pH sensor and temperature sensor.

The measured value for chlorine often depends to a great extent on the pH value of the solution.

The chlorine measurement is compensated depending on the pH value in this operating mode. The pH measurement is temperature-compensated

Off (for main board only)

If only the optional boards will be used.

8 Calibration

8.2.5 Calibration options

Different calibration options are available depending on the operating mode.

Operating mode	Calibration options					Page
	1-point	2-point	Limit point	Rel. cell const.	Temp. coeffic.	
Linear	X	X	X	-	-	49
Temperature	No calibration required					
pH ^a	X	X	-	-	-	53
Conductivity	-	-	-	X	X	57
Concentration	-	-	-	X		63
Customer specs.	Due to the table with interpolation points, no calibration is required					
Stroke retransmission	No calibration required					
Chlorine, pH-compensated	-	-	X	-	-	65

^a When configuring the device in the "pH" operating mode, set the "zero point" parameter of the relevant input once to the value "7".

- With **one-point (offset) calibration**, the zero point of the sensor is calibrated.
- With **two-point calibration**, the zero point and slope of the sensor are calibrated. This is the recommended calibration for most sensors.
- With **one-point final value calibration**, the slope of the sensor is calibrated. This is the recommended calibration for chlorine sensors, for example.
- **Calibration of relative cell constant**
With conductivity sensors only.
- **Calibration of the temperature coefficient**
With conductivity sensors only.

8.3 Linear operating mode

8.3.1 1-point calibration



This example is based on a liquid level measurement (as a %).
The input signal is provided by a pressure transmitter.

- The transmitter is in "Measuring mode".

MAIN VAL.	6.89 µS/cm
TEMP. INP.	25.0 °C
OPT. IN 3	2.5 %

- * Now bring the system to a defined state (e.g. when measuring liquid level, empty the container).
- * Start the calibration, siehe "Ways to start the calibration" Seite 46.
- * Select the zero point calibration with the PGM key.

ZERO POINT	>
LIMIT POINT	>
2-POINT	>

- * Wait until the display value has stabilized; then press PGM to continue.

CALIB	
MEASUREM.	2.5
REFERENCE	%

Set the displayed value to the required value (usually 0 %) with the ▼ and ▲ keys; then press PGM to continue.

CALIB	
INPUT	+000.0
REFERENCE	%

The zero point determined by the device is displayed.

Use the PGM key to accept the value or
the EXIT key to reject it.

8 Calibration

The device returns to Measuring mode.

MAIN VAL. 6.89 µS/cm	
TEMP. INP.	25.0 °C
OPT. IN 3	0.0 %

Calibration is complete

After rinsing, the sensor can again be used to take measurements.

8.3.2 Two-point calibration



The values determined during calibration (zero point and slope) work out as follows:

$$\text{Anzeige} = \frac{\text{Eingangswert}}{\text{Steilheit}} + \text{Nullpunkt}$$

This example is based on a liquid level measurement. The input signal is provided by a pressure transmitter.

- The transmitter is in "Measuring mode".

MAIN VAL. 6.89 µS/cm	
TEMP. INP.	25.0 °C
OPT. IN 3	2.5 %

- * Now bring the system to a defined state (e.g. when measuring liquid level, empty the container).
- * Start the calibration, siehe "Ways to start the calibration" Seite 46.
- * Select the 2-point calibration with the  key.

ZERO POINT	>
LIMIT POINT	>
2-POINT	>

- * Wait until the display value has stabilized; then press  to continue.

CALIB	
MEASUREM.	2.5
REF. 1	%

- * Set the displayed value to the required value (usually 0) with the  and

8 Calibration

▲ keys; then press **PGM** to continue.

CALIB	
INPUT	0.0
REF. 1	%

- * Now bring the system to a second defined state (e.g. when measuring liquid level, container full).

Wait until the display value has stabilized; then press **PGM** to continue

CALIB	
MEASUREM.	94.9
REF. 2	%

- * Set the displayed value to "Maximum" (usually 100 %) with the ▼ and ▲ keys; then press **PGM** to continue.

CALIB	
INPUT	100.0
REF. 2	%

The zero point and slope determined by the device are displayed.

- * Use the **PGM** key to accept the calibrated values or reject them with the **EXIT** key.

CALIB	
ZERO POINT	-2.7%
SLOPE	108.2%

- * The device returns to Measuring mode.

MAIN VAL.	6.89 μ S/cm
TEMP. INP.	25.0 °C
OPT. IN 3	100.0 %

Calibration is complete

After rinsing, the sensor can again be used to take measurements.

8 Calibration

8.3.3 Calibration limit point



This example is based on a measurement of free chlorine. The input signal is provided by a corresponding transmitter.

- The transmitter is in "Measuring mode".

MAIN VAL.	6.89 $\mu\text{S}/\text{cm}$
TEMP. INP.	25.0 $^{\circ}\text{C}$
OPT. IN 3	1.61 PPM

- * The process must now be brought to the state that is as relevant as possible to the final value (e.g. when measuring chlorine, the required concentration).
- * Start the calibration, siehe "Ways to start the calibration" Seite 46.
- * Select the limit point calibration with the PGM key.

ZERO POINT	>
LIMIT POINT	>
2-POINT	>

- * Wait until the display value has stabilized; then press PGM to continue.

CALIB	
MEASUREM.	1.94
REFERENCE	PPM

Set the displayed value to the measured reference value with the ▼ or ▲ keys; then press PGM to continue.

CALIB	
INPUT	+02.00
REFERENCE	PPM

The slope determined by the device is displayed.

- * Use the **PGM** key to accept the value or the **EXIT** key to reject it.

CALIB	
SLOPE	97.5%

- * The device returns to Measuring mode.

MAIN VAL.	6.89 $\mu\text{S}/\text{cm}$
TEMP. INP.	25.0 °C
OPT. IN 3	1.61 PPM

Calibration is complete

After rinsing, the sensor can again be used to take measurements.

8.4 pH operating mode

8.4.1 Zero point (1-point) calibration



This example is based on a glass combination electrode with a connected two-wire transmitter.

- The transmitter is in "Measuring mode".

10:42:08	
MAIN VAL.	0.99 PPM
OPT. IN 2	5.00 pH
TEMP. INP.	24.4 °C

- * Perform calibration as follows.

Zero point (1-point) calibration

- * Make preparations, siehe Kapitel 8.2 „General information“, Seite 45 .
- * Start calibration, siehe Kapitel 8.2.3 „Ways to start the calibration“, Seite 46.

8 Calibration

- * Select zero point calibration.

ZERO POINT	>
2-POINT	>
3-POINT	>

- * Immerse the combination electrode in a buffer solution with a known pH value.

- * Start the zero point calibration with the  key.



Now the source of temperature acquisition can be selected (manually, or using the temperature input of the PSU board, or the temperature input via the optional board). This source will be active for the duration of the calibration.

An example follows: manual temperature entry.

CALIB	
TEMP. -COMP. SOURCE	
MAN. TEMPERATURE	

- * To enter the temperature manually, use the  and  keys to set the calibration solution temperature and confirm your entry with the  key.

E1	CALIB
INPUT	+025.0 °C
TEMP.	

- * Wait until the display value has stabilized; then press  to continue.

CALIB	
MEASUREM.	6.02
REFERENCE	pH
	25.0 °C

- * Set the displayed value to the buffer solution value with the  or  keys; then press  to continue.

E1	CALIB
INPUT	+06.10
REFERENCE	pH

- * Use the  key to accept the zero point or the  key to reject it.

CALIB	
ZERO POINT	7.10pH

The device returns to Measuring mode.

10:42:08	
MAIN VAL.	0.99 ppm
OPT. IN 2	5.00 pH
TEMP. INP.	24.4 °C

8.4.2 2-point calibration



This example is based on a glass combination electrode with a connected two-wire transmitter.

- The transmitter is in "Measuring mode".

10:42:08	
MAIN VAL.	0.99 ppm
OPT. IN 2	5.00 pH
TEMP. INP.	24.4 °C

- * Perform calibration as follows:

2-point calibration



The buffer solutions (reference solutions) used for calibration must differ by at least 2 pH!

During the calibration, the temperature of the two buffer solutions must be identical and remain constant!

- * Make preparations, siehe Kapitel 8.2 „General information“, Seite 45 .
- * Start calibration, siehe Kapitel 8.2.3 „Ways to start the calibration“, Seite 46.
- * Select 2-point calibration.

ZERO POINT	>
2-POINT	>
3-POINT	>

8 Calibration

- * Immerse the combination electrode in the first buffer solution with the known pH value.
- * Start the two-point calibration with the  key.



Now the source of temperature acquisition can be selected (manually, or using the temperature input of the PSU board, or the temperature input via the optional board). This source will be active for the duration of the calibration.

An example follows: manual temperature entry.

CALIB	
TEMP. -COMP. SOURCE	
MAN. TEMPERATURE	

- * To enter the temperature manually, use the  and  keys to set the calibration solution temperature and confirm your entry with the  key.

E1	CALIB
INPUT	+025.0 °C
TEMP.	

- * Wait until the display value has stabilized; then press  to continue.

CALIB	
MEASUREM.	7.06
REF. 1	pH
	25.0 °C

- * Set the displayed value to the value of the first buffer solution with the  and  keys; then press  to continue.

CALIB	
INPUT	+07.03
REF. 1	pH

- * Rinse and dry the pH combination electrode.
- * Immerse the pH combination electrode in the second buffer solution.
- * Wait until the display value has stabilized; then press  to continue.

CALIB	
MEASUREM.	4.03
REF. 2	pH
	25.0 °C

- * Set the displayed value to the second buffer solution value with the  or  keys; then press  to continue.

CALIB	
INPUT	+04.01
REF. 2	pH

The zero point and slope determined by the device are displayed.

- * Use the  key to accept the calibrated values or reject them with the  key.

CALIB	
ZERO POINT	7.03pH
SLOPE	99.4%

The device returns to Measuring mode.

10:42:08	
MAIN VAL.	0.99 ppm
OPT. IN 2	5.00 pH
TEMP. INP.	24.4 °C

8.5 Conductivity operating mode

8.5.1 Calibration of the relative cell constant



This example is based on a conductivity sensor with a connected two-wire transmitter.

- The transmitter is in "Measuring mode".

MAIN VAL.	6.89 µS/cm
TEMP. INP.	25.0 °C
OPT. IN 3	109 µS/cm

- * Immerse the conductivity sensor in a reference solution with a known conductivity.
- * Start the calibration, siehe "Ways to start the calibration" Seite 46.
- * Select REL. CELL CONST.
- * Press the  key.

8 Calibration

TEMP. COEFF. LIN.	>
REL. CELL CONST.	>

- * When the measured value is stable, press the PGM key

CALIB	
MEASUREMENT	1950
REFERENCE	$\mu\text{S}/\text{cm}$

- * The measured conductivity value flashes on the display.

CALIB	
INPUT	+02000
REFERENCE	$\mu\text{S}/\text{cm}$

- * Use the ▼ or ▲ keys to set the value to the actual conductivity.
- * Press the PGM key;
the relative cell constant determined by the device is displayed
(as a %).

CALIB	
CELL CONST	102.6 %

- * Use the PGM key to accept the temperature coefficient or
the EXIT key to reject it.

MAIN VAL.	6.89 $\mu\text{S}/\text{cm}$
TEMP. INP.	25.0 °C
OPT. IN 3	2001 $\mu\text{S}/\text{cm}$

The current measurement value and the temperature are displayed.

Calibration is complete

After rinsing, the sensor can again be used to take measurements.

8.5.2 Calibration of the temperature coefficient

Linear temperature coefficient



This example is based on a conductivity sensor with a connected two-wire transmitter.

- The transmitter is in "Measuring mode".

MAIN VAL.		6.89 $\mu\text{S}/\text{cm}$
TEMP. INP.		25.0 $^{\circ}\text{C}$
OPT. IN 3		109 $\mu\text{S}/\text{cm}$

- * Immerse the conductivity sensor in the sample medium.

Start the calibration, siehe "Ways to start the calibration" Seite 46.

- * Select "TEMP.COEFF. LIN.".

TEMP.COEFF. LIN.		>
REL. CELL CONST.		>

The current sensor temperature flashes in the display (1).

CALIB	
INPUT	024.4 $^{\circ}\text{C}$
WORK-TEMP.	
< 20.0 $^{\circ}\text{C}$	> 30.0 $^{\circ}\text{C}$

(1)



The working temperature must be at least 5 $^{\circ}\text{C}$ above or below the reference temperature (25.0 $^{\circ}\text{C}$).

- * Enter the required working temperature and confirm your entry.
The LC display now shows the selected working temperature (flashing) (2).

CALIB	
INPUT	+075.0 $^{\circ}\text{C}$
WORK-TEMP.	
< 20.0 $^{\circ}\text{C}$	> 30.0 $^{\circ}\text{C}$

(2)

8 Calibration

- * Press the  key.

CALIB		
T1	25.0 °C	416
T2	74.4 °C	μS/cm
		24.5 °C

The conductivity (399 μS/cm) at the current temperature (24.3 °C) now appears on the right of the LC display.

The temperatures T1 (25 °C) and T2 (70.0 °C) that have yet to be triggered are shown on the left.

- * Press the  key.

- * Heat the sample medium until the working temperature is reached.



During calibration, the rate of temperature change in the measurement solution must not exceed 10 °C/min.

Calibration is also possible in the cooling process (with a falling temperature). It starts above the working temperature and ends below the working temperature.

As soon as the temperature of the sample medium exceeds T1 (25 °C), this is hidden on the display. The uncompensated conductivity at the current temperature is displayed on the right.

CALIB		
		833
T2	75.0 °C	μS/cm
		74.6 °C

If the temperature of the medium exceeded T2 (73.0 °C), the device determines the temperature coefficient.

The LC display now shows the determined temperature coefficient as %/K.

CALIB	
TEMP. COEFF	1.99 %/K

- * Use the  key to accept the temperature coefficient or the  key to reject it.

MAIN VAL.	6.89 μS/cm
TEMP. INP.	25.0 °C
OPT. IN 3	423 μS/cm

The transmitter is in "Measuring mode" and displays the compensated con-

ductivity of the solution.

Calibration is complete

After rinsing, the sensor can again be used to take measurements.

With non-linear temperature coefficient (TEMP. COEF. CURVE)



This example is based on a conductivity sensor with a connected two-wire transmitter.

The non-linear temperature coefficient can **only** be calibrated with a rising temperature!

The start temperature **must be below** the configured reference temperature (usually 25 °C)!

The "TEMP.COEF. CURVE" menu item is only displayed if a temperature sensor is connected and "TEMP.COEFF. CURVE" is configured as the type of temperature compensation.

- The transmitter is in "Measuring mode".

MAIN VAL. 6.89 µS/cm	
TEMP. INP.	25.0 °C
OPT. IN 3	109 µS/cm

- * Immerse the conductivity sensor in the sample medium.

Start the calibration, siehe "Ways to start the calibration" Seite 46.

- * Select "TEMP.COEFF. CURVE" and press the  key.

TEMP. COEFF. CURVE >	
REL. CELL CONST.	>

- * Enter the required start temperature (1) for the temp. coef. curve.

CALIB	
INPUT	+024.0 °C
START TEMP	

 (1)

- * Enter the required end temperature (2) for the temp. coef. curve.

CALIB	
INPUT	+075.0 °C
END TEMP	

 (2)

8 Calibration

- * Heat the sample medium continuously
 - (3) the current uncompensated conductivity
 - (4) the current temperature of the sample medium
 - (5) the first target temperature

CALIB	
NEXT	416
TEMP.	$\mu\text{S}/\text{cm}$
24.0°C	22.3 °C

(5)

(3)

(4)



During calibration, the rate of temperature change in the measurement solution must not exceed 10 °C/min.

During the calibration process, the device displays values for the following five temperature interpolation points.

CALIB	
NEXT	416
TEMP.	$\mu\text{S}/\text{cm}$
24.0°C	22.3 °C

The end temperature has been reached

Use the key to accept the temperature coefficients or the key to reject the calibration result.

CALIB	
1: 3.91 %/K	2: 3.67 %/K
3: 3.35 %/K	4: 3.12 %/K
5: 2.87 %/K	6: 2.51 %/K

The LC display now shows the determined temperature coefficients as %/K.

- * Use the key to accept the temperature coefficients or the key to reject the values.

MAIN VAL.	6.89 $\mu\text{S}/\text{cm}$
TEMP. INP.	25.0 °C
OPT. IN 3	423 $\mu\text{S}/\text{cm}$

The transmitter is in "Measuring mode" and displays the compensated conductivity of the solution.

Calibration is complete

After rinsing, the sensor can again be used to take measurements.

8.6 Concentration operating mode

8.6.1 Calibration of the relative cell constant



This example is based on a conductivity sensor with a connected two-wire transmitter.

The conductivity of a caustic solution is converted into a concentration value [%] by the device.

- The transmitter is in "Measuring mode".

MAIN VAL. 6.89 $\mu\text{S}/\text{cm}$	
TEMP. INP.	25.0 $^{\circ}\text{C}$
OPT. IN 3	1.4 %

- * Immerse the conductivity sensor in a sample medium with a known conductivity.
- * Start the calibration, siehe "Ways to start the calibration" Seite 46.
- * Press the  key.

REL. CELL CONST. >	

The measured conductivity value is displayed.

- * Wait until the measurement value has stabilized.
- * Press the  key.

CALIB	
INPUT	+02000
REFERENCE	$\mu\text{S}/\text{cm}$

- * Use the  and  keys to set the value to the actual conductivity.

CALIB	
CELL CONST	102.6 %

8 Calibration

- * Press the key;
the relative cell constant determined by the device is displayed
(as a %).

CALIB	
CELL CONST	103.3 %

- * Use the key to accept the relative cell constant or
the key to reject the values.

MAIN VAL.	6.89 $\mu\text{S}/\text{cm}$
TEMP. INP.	25.0 $^{\circ}\text{C}$
OPT. IN 3	1.4 %

The transmitter is in "Measuring mode" and displays the compensated conductivity of the solution.

Calibration is complete

After rinsing, the sensor can again be used to take measurements.

8.7 Chlorine measurement operating mode, pH-compensated

8.7.1 Final value calibration



The pH signal and temperature signal are supplied via the main input, the chlorine signal (standard signal) via the optional input.

- The transmitter is in "Measuring mode".

MAIN VAL.		7.00 pH
TEMP. INP.		24.2 °C
OPT. IN 3	1.04 PPM	

Calibrate pH sensor

- * Perform calibration, siehe "pH operating mode" Seite 53.

Calibrate chlorine sensor

- * The process must now be brought to the state that is as relevant as possible to the final value (e.g. when measuring chlorine, the required concentration).
- * Start the calibration, siehe "Ways to start the calibration" Seite 46.
- * Select the limit point calibration with the  key.

LIMIT POINT		>

- * Wait until the display value has stabilized; then press  to continue.

CALIB	
MEASUREM.	1.94
REFERENCE	PPM

Set the displayed value to the measured reference value with the  or  keys; then press  to continue.

8 Calibration

CALIB	
INPUT	+02.00
REFERENCE	PPM

The slope determined by the device is displayed.

* Use the key to accept the value or the key to reject it.

CALIB	
SLOPE	97.5%

The device returns to Measuring mode.

MAIN VAL.		6.89 $\mu\text{S}/\text{cm}$
TEMP. INP.		25.0 $^{\circ}\text{C}$
OPT. IN 3		1.61 PPM

Calibration is complete

After rinsing, the sensor can again be used to take measurements.

9.1 General information

The characteristic data for the last 5 successful calibration processed are documented in the calibration logbook.

Calling up

The device is in Measuring mode.

* Press the  key for longer than 3 seconds.

```
USER LEVEL >
ADMINISTR.-LEVEL >
CALIBR.-LEVEL >
CALIBR.-LOGBOOK >
```

Select input

Briefly press the  key.

```
MAIN INPUT >
OPT. INPUT 1 >
OPT. INPUT 2 >
OPT. INPUT 3 >
```

Most recent successful calibration



The "time stamp" in the following screen printouts (top left, for example 11-06-06 12:02) only appears if optional slot 3 is fitted with the "Datalogger with interface RS485"!

* Briefly press the  key.

```
11-06-15 08:46
STEILHEIT 100.1 %
```

Next most recent successful calibration

* Briefly press the  key.

```
11-06-14 14:57
STEILHEIT 73.9 %
```

10 Controller

10.1 General information

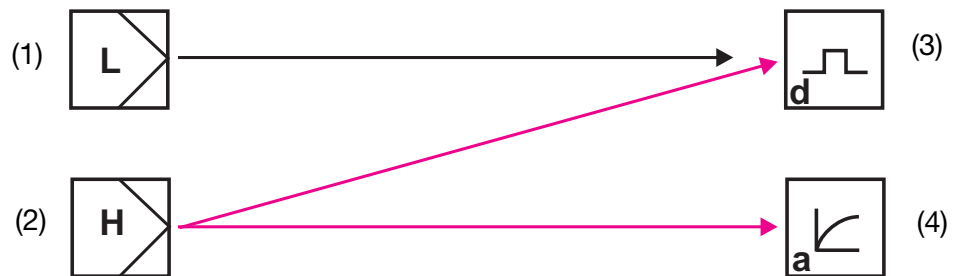


Apart from faulty installation, incorrect settings on the device may also affect the proper functioning of the subsequent process or lead to damage. You should therefore always provide safety equipment that is independent of the device and it should only be possible for qualified personnel to make settings.

10.2 Controller functions



"Software" control functions are assigned to "Hardware" outputs for this device.



- 1 Software controller for "simple" switching functions (e.g. alarm control)
 - 2 Software controller for "higher order" switching functions (e.g. PID controller)
 - 3 "Switching" hardware output (e.g. relay)
 - 3 "Continuous" hardware output (analog output)
-

10.2.1 Simple switching functions

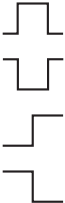
Up to four switching functions can be set (limit value 1, 2, 3, 4)
ADMINISTR.-LEVEL/PARAMETER LEVEL/LIMIT VALUE CONTR./
LIMIT VALUE x.

10.2.2 Higher order switching functions (PID)

Higher order switching functions are configured at the parameter level via the parameters of "Controller 1 or 2".

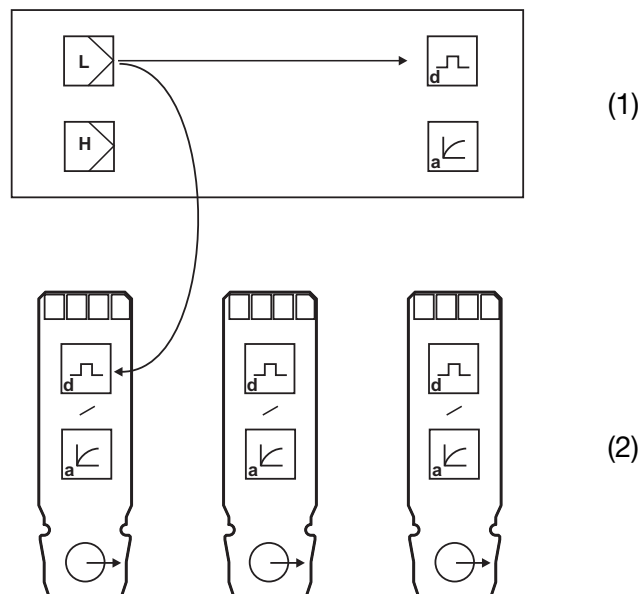
ADMINISTR.-LEVEL/PARAMETER LEVEL/CONTROLLER/CONTROLLER 1(2)/
CONFIGURATION/CONTROLLER TYPE/e.g. PULSE LENGTHS

10.2.3 Typical operator level parameters

Binary outputs	Explanation
Signal source	
No signal	No switching function desired
Limit control 1 to 4	"Simple" switching functions
Alarm function (AF1)	
Alarm function (AF2)	
Alarm function (AF7)	
Alarm function (AF8)	
Controller 1(2)	"Higher order" switching functions
Limit value Pulse width Pulse frequency Steady Modulating	

10.3 Software controllers and outputs

Simple controller functions



- 1 Main board
- 2 Optional board
- L Simple controller
- H Higher order controller
- d Digital output

10 Controller

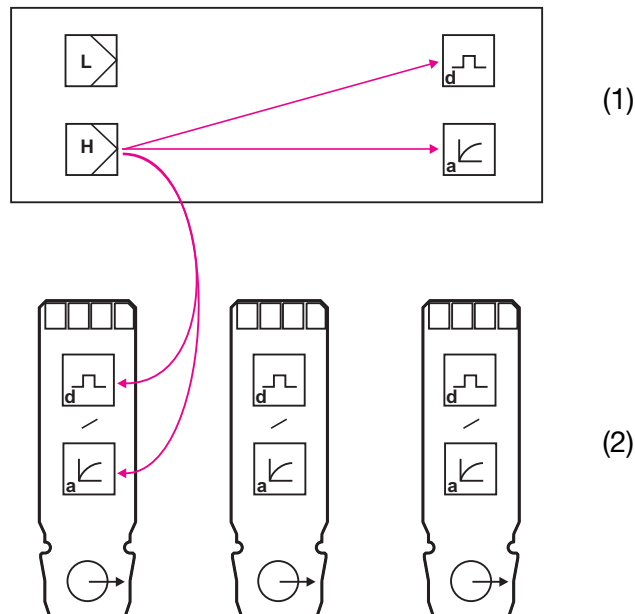
a Analog output



If "Simple controller functions" have been configured, only the digital outputs can be controlled!

The operator must configure which of the digital outputs will be controlled - the main board or optional board 1, 2 or 3.

Higher order controller functions



- 1 Main board
- 2 Optional board
- L Simple controller
- H Higher order controller
- d Digital output
- a Analog output



If "higher order controller functions" have been configured, both the digital outputs and the analog outputs can be controlled.

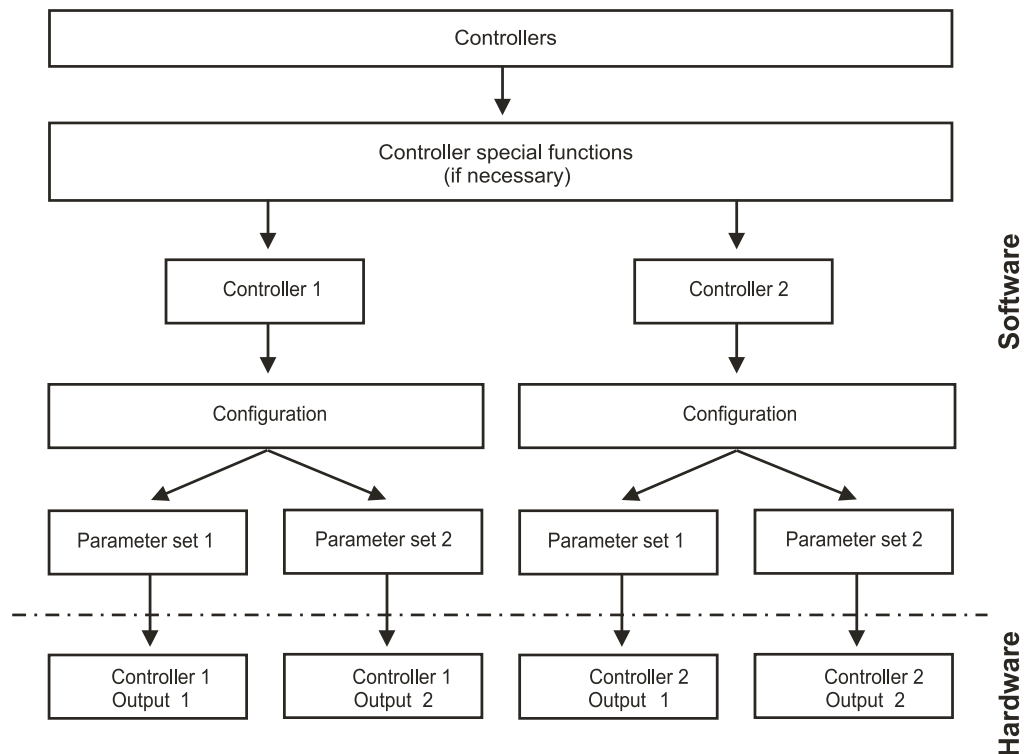
The operator must configure which of the outputs will be controlled - the main board or optional board 1, 2 or 3.



Additional explanations, See section 15.1 "Glossary", page 87.

10.4 Configuration of higher order controllers

10.4.1 Structure



10.5 Parameter sets



Different process steps may require different controller settings. The device offers the option of creating two parameter sets and then switching between them by means of a binary input.

Defining a parameter set

ADMINISTR.-LEVEL/PARAMETER LEVEL/CONTROLLER 1(2)/
PARAMETER SET 1(2)
See "Controller" page 103.

Configuring parameter set switchover

ADMINISTR.-LEVEL/PARAMETER LEVEL/BINARY INPUTS/
BINARY INPUT 1(2)/PARAMET. SWITCHOVER
See "Binary inputs" page 103.

10 Controller

10.6 Sample configurations

10.6.1 Simple limit monitoring (min. function)

Configuration

Limit monitoring

Limit value 1

Signal source:	Main value
Switching function:	Alarm function  (AF8)
Switching point:	7.50 pH
Hysteresis:	0.30 pH

Configuration of binary output, e.g. relay)

Binary outputs

Binary output 1

Signal source:	Limit monitoring 1
At calibration:	Standard operation
Error:	Inactive
HOLD mode:	Frozen
Turn-on delay:	0 seconds
Turn-off delay:	0 seconds
Wiper time:	0 seconds
Manual mode:	No simulation

10.6.2 Simple limit monitoring (max. function)

Configuration

Limit monitoring

Limit value 1

Signal source:	Main value
Switching function:	Alarm function  (AF7)
Switching point:	0.60 ppm
Hysteresis:	0.05 ppm

Configuration of binary output, e.g. relay)

Binary outputs

Binary output 1

Signal source:	Limit monitoring 1
At calibration:	Standard operation

Error:	Inactive
HOLD mode:	Frozen
Turn-on delay:	0 seconds
Turn-off delay:	0 seconds
Wiper time:	0 seconds
Manual mode:	No simulation

10.6.3 Controller with limit value function

Configuration of software controllers

Controller 1

Configuration

Controller type:	Pulse value
Controller actual value:	Main variable
Stroke retransmission:	No signal
Additive disturbance:	No signal
Multiplicative disturbance:	No signal
Min./max. contact:	Min. contact
Inactive/active contact:	Active contact
HOLD mode	0 %
HOLD output:	0 %
Error:	0 %
Alarm control:	Off

Parameter set 1

Min. setpoint:	As required
Max. setpoint:	As required
Setpoint:	10%
Hysteresis:	As required
On-delay:	As required
Delayed release:	As required
Alarm delay:	As required 2

Controller 2

Configuration

Controller type:	Pulse value
Controller actual value:	Main variable
Stroke retransmission:	No signal
Additive disturbance:	No signal
Multiplicative disturbance:	No signal
Min./max. contact:	Max. contact
Inactive/active contact:	Active contact

10 Controller

HOLD mode	0 %
HOLD output:	0 %
Error:	0 %
Alarm control:	Off

Parameter set 1

Min. setpoint:	As required
Max. setpoint:	As required
Setpoint:	80%
Hysteresis:	As required
On-delay:	As required
Delayed release:	As required
Alarm delay:	As required

Configuration of binary output, e.g. relay)

Binary outputs

Binary output 1

Signal source:	Controller 1 output 1
----------------	-----------------------

Binary output 2

Signal source:	Controller 2 output 1
----------------	-----------------------

11.1 Configurable parameters

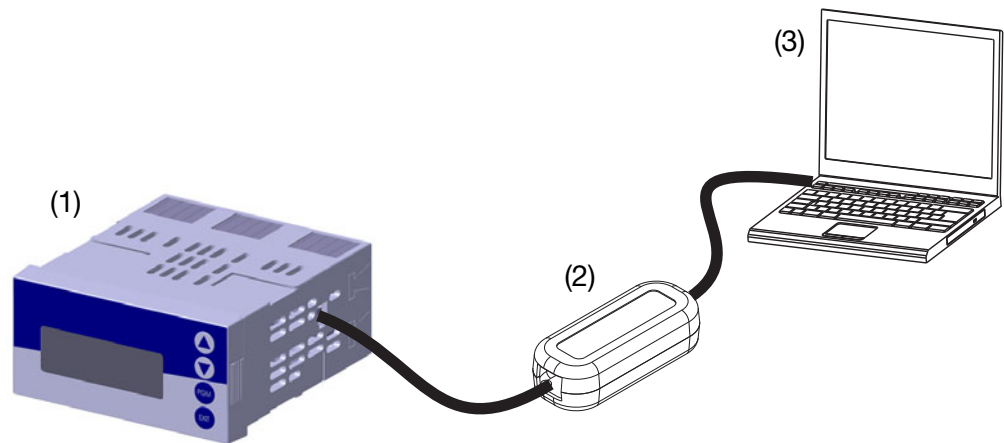
Both the setup program (Part no. 00560380) and the PC interface cable with USB/TTL converter (Part no. 00456352) are available as options and provide a convenient way to adapt the transmitter to meet requirements:

- Setting the measuring range.
- Setting the behavior of outputs when the measuring range is exceeded.
- Setting the functions of switching outputs K1 to K8.
- Setting the functions of the binary inputs.
- Setting a customized characteristic
- etc.



Data can only be transferred from or to the transmitter if it is supplied with voltage, See section 5 "Installation", page 12ff.

Connection



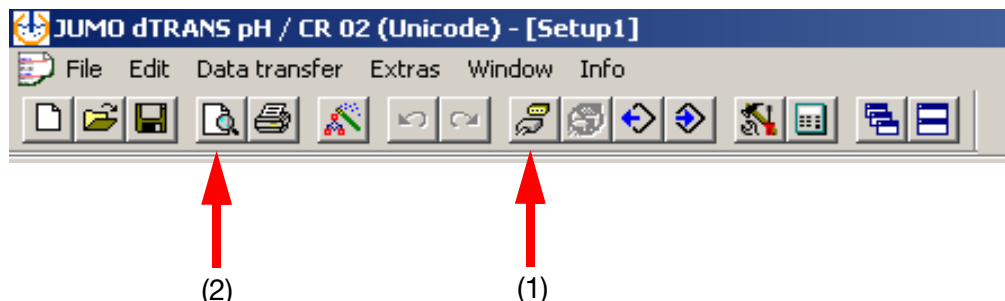
- (1) JUMO dTRANS 02 AS
- (2) PC interface cable with USB/TTL converter, Part no.: 00456352
- (3) PC or notebook

11 Setup program

11.2 Documenting the device configuration

- * Start the setup program
- * Establish the connection to the device (1).

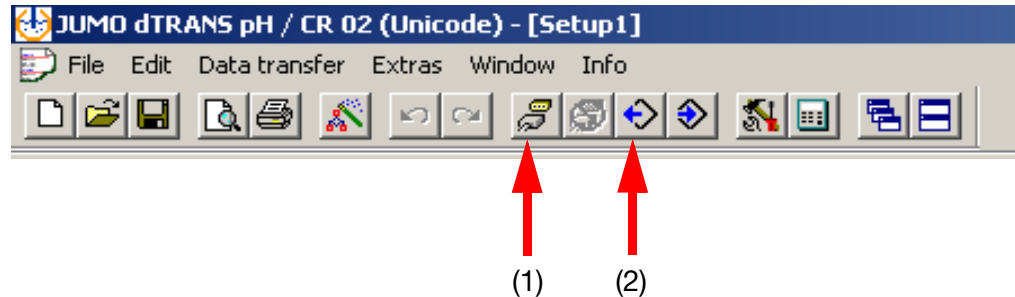
Read the device configuration (2).



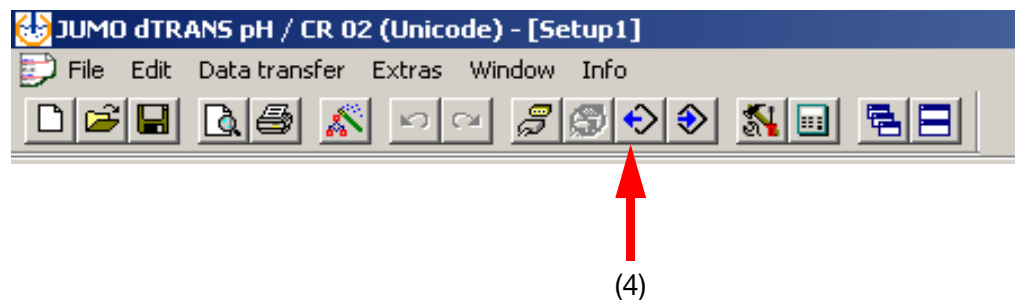
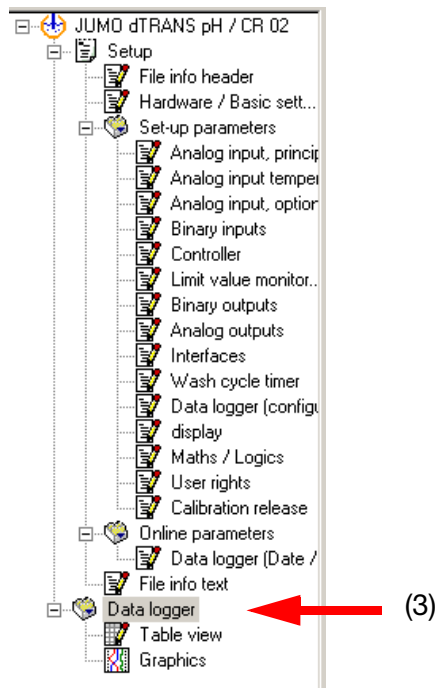
File info header:			
Device name:	dTRANS02	Creation date:	10.09.2011
Device SW version:	269.01.xx	Date of change:	10.09.2011
VDN:		Program version:	1.01J
Short info:			
Programmer:			
Type code:			
Job:			
Extra info:			
Hardware / Basic setting:			
Hardware type:			
CR (conductive conductivity)			
Controller			
Variant:			
Default			
Basic setting			
Operating mode:		Conductivity measurement	
Input, range 1:		mS/cm	
Decimal format, range 1:		XX.xx	
2nd measuring range:		OFF	
Cell type:		2 electrodes	
Optionally fitted:			
Not available!			
Analog input, principal value:			
Conductivity CR			
Nominal cell constant:	1.0 1/cm		
Offset MB1:	0.00 mS/cm		
Temperature compensation:	Linear		
Compensation source:	Temperature input		
Reference temperature:	25.0 °C		
Probe break detection:	OFF		
Filter time:	2.0 s		
Calibration interval:	0 Tage		
Supply frequency:	50 Hz		
Analog input: temperature:			
Sensor type:	PT100		
Filter time:	2.0 s		
Manual temperature provision:	25.0 °C		
Offset:	0.0 °C		
Analog input, optional cards:			
No optional analog input card is fitted!			
Binary inputs:			
Binary input 1			
Function:	no function		
Binary input 2			
Programmer:		Document:	
Device name:	dTRANS02	Date created:	Setup1
Device SW version:	269.01.xx	Date of change:	10.09.2011
Program SW version:	1.01J	Page/All pages:	1/7

11.3 Special features for "Datalogger"

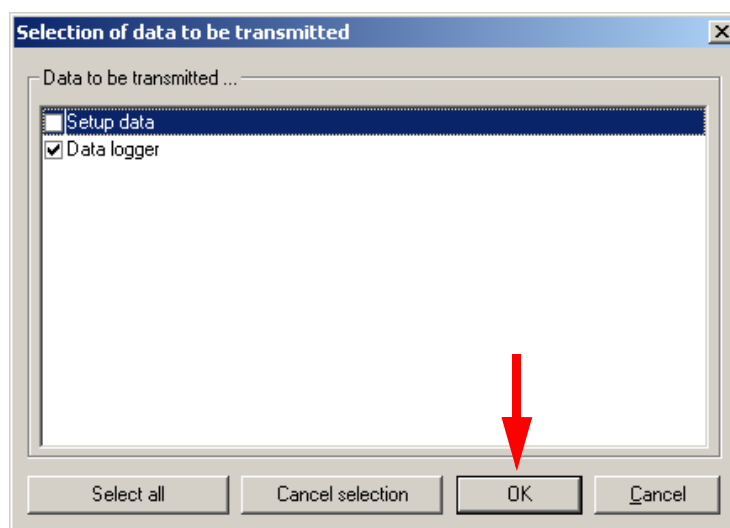
- * Start the setup program
- * Establish the connection to the device (1).
- * Read the device configuration (2).



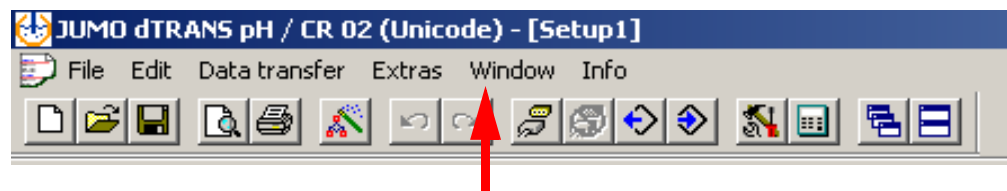
- * Read data from datalogger (for example table view)
 - Mark datalogger icon (3)
 - Read values from the device (4)



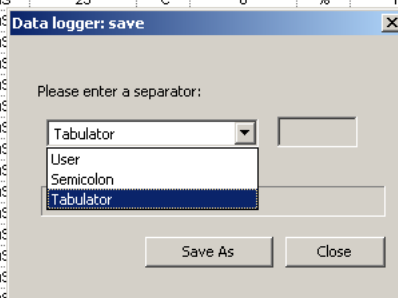
11 Setup program



* Export data (for processing in an external program).



Device ID												
	Date	Time	Analog value 1	Unit 1	Analog value 2	Unit 2	Analog value 3	Unit 3	Analog value 4	Unit 4	Binary output	Binary output
1	10.08.2011	13:30:49	1995.779	µS	25	°C	0	%	100	%	0	1
2	10.08.2011	13:29:25	1995.779	µS	25	°C	0	%	100	%	0	1
3	10.08.2011	13:28:25	1995.779	µS	25	°C	0	%	100	%	0	1
4	10.08.2011	13:27:25	1995.779	µS	25	°C	0	%	100	%	0	1
5	10.08.2011	13:26:25	1995.779	µS	25	°C	0	%	100	%	0	1
6	10.08.2011	13:25:25	1995.779	µS	25	°C	0	%	100	%	0	1
7	10.08.2011	13:24:25	1995.779	µS	25	°C	0	%	100	%	0	1
8	10.08.2011	13:23:25	1995.779	µS	25	°C	0	%	100	%	0	1
9	10.08.2011	13:22:25	1995.779	µS	25	°C	0	%	100	%	0	1
10	10.08.2011	13:21:25	1995.779	µS	25	°C	0	%	100	%	0	1
11	10.08.2011	13:20:25	1995.779	µS	25	°C	0	%	100	%	0	1
12	10.08.2011	13:19:25	1995.779	µS	25	°C	0	%	100	%	0	1
13	10.08.2011	13:18:25	1995.779	µS	25	°C	0	%	100	%	0	1
14	10.08.2011	13:17:25	1995.779	µS	25	°C	0	%	100	%	0	1
15	10.08.2011	13:16:25	1995.779	µS	25	°C	0	%	100	%	0	1
16	10.08.2011	13:15:25	1995.779	µS	25	°C	0	%	100	%	0	1
17	10.08.2011	13:14:25	1995.779	µS	25	°C	0	%	100	%	0	1
18	10.08.2011	13:13:25	1995.779	µS	25	°C	0	%	100	%	0	1
19	10.08.2011	13:12:25	1995.779	µS	25	°C	0	%	100	%	0	1
20	10.08.2011	13:11:25	1995.779	µS	25	°C	0	%	100	%	0	1
21	10.08.2011	13:10:25	1995.779	µS	25	°C	0	%	100	%	0	1
22	10.08.2011	13:09:25	1995.779	µS	25	°C	0	%	100	%	0	1
23	10.08.2011	13:08:25	1995.779	µS	25	°C	0	%	100	%	0	1
24	10.08.2011	13:07:25	1995.779	µS	25	°C	0	%	100	%	0	1
25	10.08.2011	13:06:25	1995.779	µS	25	°C	0	%	100	%	0	1
26	10.08.2011	13:05:25	1995.779	µS	25	°C	0	%	100	%	0	1



12 Eliminating faults and malfunctions

Problem	Possible cause	Action
No measurement display or current output	There is no supply voltage	Check the power supply
Measurement display 0000 or current output 4 mA	Sensor not immersed in medium; level in container too low	Top up the container
	Flow-through fitting is blocked	Clean the flow-through fitting
	Sensor faulty	Replace the sensor
Incorrect or fluctuating measurement display	Sensor faulty	Replace the sensor
	Sensor positioning incorrect	Choose another installation location
	Air bubbles	Optimize assembly
MAIN VALUE INPUT OVERRANGE	Measurement overrange	Choose a suitable measuring range
MAIN VALUE INPUT UNDERANGE	Measurement underrange	
ALARM MEASURING 8888 27.4°C pH	Main input: Measurement range "out of range"	
MAIN INPUT COMPENS. RANGE	Compensation range has been left	
TEMPERATURE INPUT OVERRANGE	Measurement overrange	Choose a suitable measuring range
TEMPERATURE INPUT UNDERANGE	Measurement underrange	
ALARM MEASURING 8888 8888 °C pH	Temperature input: Measurement range "out of range"	
OPTION INPUT 1. COMPENS. RANGE	Compensation range has been left	
OPTION INPUT 1. OUT OF RANGE	Temperature input: Measurement range "out of range"	Choose a suitable measuring range
DEPENDENT PARAMETERS ADJUSTED	Configuration change	

12 Eliminating faults and malfunctions

DATALOGGER IS DELETED	Configuration change	OK
LEVEL LOCKED	Inhibit via binary contact	Check configuration and unlock if necessary
PARAMETER LOCKED	Do not release	If appropriate release in the release level
WRONG PASSWORD		Test
KEYPAD LOCKED	Inhibit via binary contact	Check configuration and unlock if necessary
CONFIGURATION RE-ESTABLISHED	Cancel in basic setting	OK
ERROR PROFIBUS		Check hardware
UNDULY HARDWARE EQUIPMENT		Check fitting, adjust if necessary
ERROR TIMER TIME RE-ADJUSTMENT	device had no power supply for a very long time	Establish power supply Set the datalogger time

Inputs (main board)

	Measuring range/control range	Accuracy	Effect of temperature
Standard signal	0(4) to 20 mA, 0 to 1 V, 0 to 10 V	0.25 % of range	0.2 %/10 K
Secondary input			
Temperature Pt100/1000	-50 to +250 °C ^a	≤ 0.25 % of range	0.2 %/10 K
Temperature NTC/PTC	0.1 to 30 kΩ Entry via table with 20 value pairs	≤ 1.5 % of range	0.2 %/10 K
Resistance transmitter	Minimum: 100 Ω Maximum: 3 kΩ	±5 Ω	0.1 %/10 K

^a Selectable in °F.

Resistance thermometer inputs (optional board)

Designation	Connection type	Measuring range	Measuring accuracy		Effect of ambient temperature
			3-wire/4-wire	2-wire	
Pt100 DIN EN 60751 (factory-set)	2-wire/3-wire/4-wire	-200 to +850 °C	≤ 0.05 %	≤ 0.4 %	50 ppm/K
Pt1000 DIN EN 60751 (factory-set)	2-wire/3-wire/4-wire	-200 to +850 °C	≤ 0.1 %	≤ 0.2 %	50 ppm/K
Sensor lead resistance	Maximum 30 Ω per line with 3- and 4-wire circuit				
Measurement current	Approx. 250 µA				
Lead compensation	Not required for 3- and 4-wire circuit. With a 2-wire circuit, lead resistance can be compensated in the software by correcting the process value.				

Standard signals inputs (optional board)

Designation	Measuring range	Measuring accuracy	Effect of ambient temperature
Voltage	0(2) to 10 V, 0 to 1 V Input resistance _E > 100 kΩ	≤ 0.05 %	100 ppm/K
Electrical current	0(4) to 20 mA, voltage drop ≤ 1.5 V	≤ 0.05 %	100 ppm/K
Resistance transmitter	Minimum: 100 Ω Maximum: 4 kΩ	±4 Ω	100 ppm/K

Temperature compensation

Type of compensation	Range ^a
Linear 0 to 8 %/K	-10 to +160 °C
ASTM D1125 - 95 (ultra-pure water)	0 to 100 °C
Natural waters (ISO 7888)	0 to 36 °C
Reference temperature	
Adjustable from 15 to 30 °C; preset to 25 °C (default)	

^a Note the sensor operating temperature range!

Measuring circuit monitoring

Inputs	Underrange/overrange	Short circuit	Broken lead
Temperature	Yes	Yes	Yes
Voltage 2 to 10 V 0 to 10 V 0 to 1 V	Yes	Yes	Yes
	Yes	No	No
	Yes	No	No
Current 4 to 20 mA 0 to 20 mA	Yes	Yes	Yes
	Yes	No	No
Resistance transmitter	No	No	Yes

13 Technical data

Binary input

Activation	Floating contact is open: function is not active Floating contact is closed: function is active
Function	Key lock, manual mode, HOLD, HOLD inverse, alarm suppression, freeze measured value, level lock, reset partial quantity, reset total quantity, parameter set switchover

Controller

Controller type	Limit comparators, limit controllers, pulse length controllers, pulse frequency controllers, modulating controllers, continuous controllers
Controller structure	P/PI/PD/PID

Outputs

Relay (changeover) Contact rating Contact service life	PSU board	5 A at AC 240 V resistive load 350,000 operations at nominal load/750,000 operations at 1 A
Voltage supply for 2-wire transmitter	PSU board	Electrically isolated, non-controlled DC 17 V at 20 mA, open-circuit voltage approx. DC 25 V
Voltage supply for inductive proximity switch	Optional board	DC 12 V; 10 mA
Relay (changeover) Contact rating Contact service life	Optional board	8 A at AC 240 V resistive load 100,000 operations at nominal load/350,000 operations at 3 A
Relay SPST (normally open) Contact rating Contact service life	Optional board	3 A at AC 240 V resistive load 350,000 operations at nominal load/900,000 operations at 1 A
Semiconductor relay Contact rating Protective circuit	Optional board	1 A at 240 V Varistor
PhotoMOS [®] relays	Optional board	$U \leq \text{AC/DC } 50 \text{ V}$ $I \leq 200 \text{ mA}$
Voltage Output signals Load resistance Accuracy	Optional board	0 to 10 V or 2 to 10 V $R_{\text{load}} \geq 500 \Omega$ $\leq 0.5 \%$
Electrical current Output signals Load resistance Accuracy	Optional board	0 to 20 mA or 4 to 20 mA $R_{\text{load}} \leq 500 \Omega$ $\leq 0.5\%$

Display

Type	LC graphic display, blue with background lighting, 122 × 32 pixels
------	--

Electrical data

Voltage supply (switch-mode PSU)	AC 110 to 240 V +10/-15 %; 48 to 63 Hz or AC/DC 20 to 30 V; 48 to 63 Hz
Electrical safety	To DIN EN 61010, Part 1 overvoltage category II, pollution degree 2
Power consumption	Max. 14 VA (20 A fuse max.)
Data backup	EEPROM
Electrical connection	On the back via screw terminals, conductor cross-section up to max. 2.5 mm ²
Electromagnetic Compatibility (EMC) Interference emission Interference immunity	DIN EN 61326-1 Class A To industrial requirements

13 Technical data

Enclosure

Enclosure type	Plastic enclosure for panel mounting to DIN IEC 61554 (indoor use)
Depth behind panel	90 mm
Ambient temperature Storage temperature	-5 to +55 °C -30 to +70 °C
Climatic rating	Rel. humidity $\leq$ 90 % annual mean, no condensation
Site altitude	Up to 2000 m above sea level
Operating position	Horizontal
Enclosure protection In the panel enclosure In the surface-mounted enclosure	To DIN EN 60529 Front IP65, rear IP20 IP65
Weight (fully fitted)	About 380 g

Interface

Modbus	
Interface type	RS422/RS485
Protocol	Modbus, Modbus Integer
Baud rate	9600, 19200, 38400
Device address	0 to 255
Max. number of nodes	32
PROFIBUS-DP	
Device address	0 to 255

Approvals/marks of conformity

Mark of conformity	Testing laboratory	Certificates/certification numbers	Test basis	valid for
c UL us	Underwriters Laboratories	E 201387	UL 61010-1 CAN/CSA-C22.2 No. 61010-1	Type 202553/01...

14 Retrofitting optional boards



Caution:

The device **must** be de-energized on the input and output sides!
Optional boards must only be retrofitted by qualified specialists.

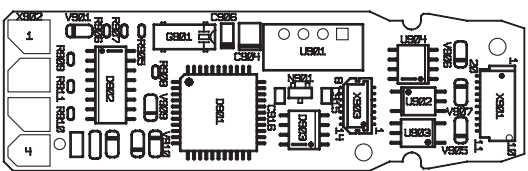
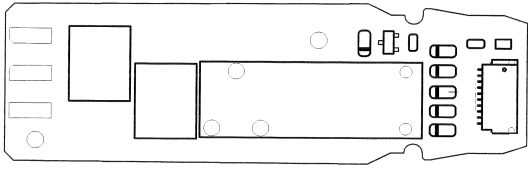
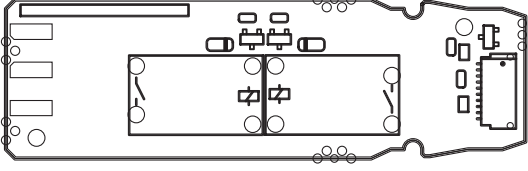
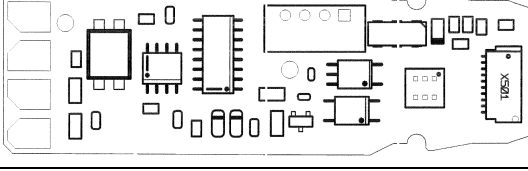


ESD:

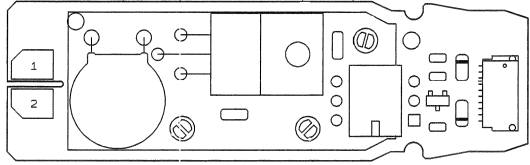
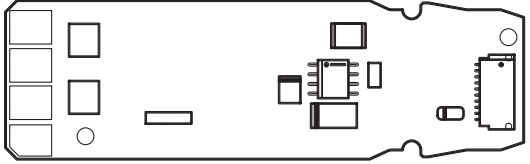
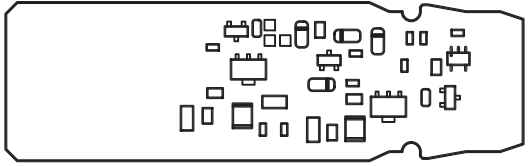
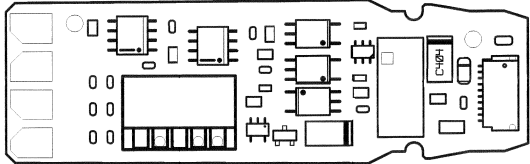
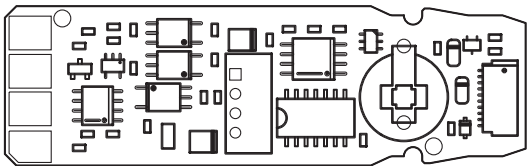
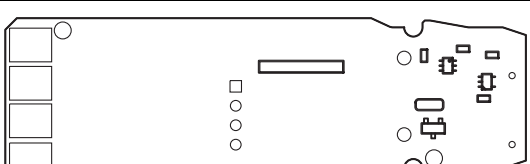
Optional boards can be damaged by electrostatic discharge. You must therefore prevent electrostatic charges from accumulating during installation and removal. Optional boards should be retrofitted at a grounded workstation.

14.1 Identifying an optional board

The packaging of the optional board is identified by a sales number.

Optional board	Code	Part no.	Board view
Analog input (universal)	1	00442785	
Relay (1× changeover)	2	00442786	
Relay (2× NO) This board must only be inserted in optional slot 1 or 3!	3	00442787	
Analog output	4	00442788	
2 PhotoMOS [®] -Relais	5	00566677	

14 Retrofitting optional boards

Optional board	Code	Part no.	Board view
Solid state relay 1 A	6	00442790	
Supply voltage output DC ± 5 V (e.g. for ISFET)	7	00566681	
Supply voltage output DC 12 V (e.g. for inductive proximity switch)	8	00566682	
Interface - RS422/485 This board must only be inserted in optional slot 3!	10	00442782	
Datalogger with interface RS422/485 and real-time clock This board must only be inserted in optional slot 3!	11	00566678	
PROFIBUS-DP interface This board must only be inserted in optional slot 3!	12	00566679	

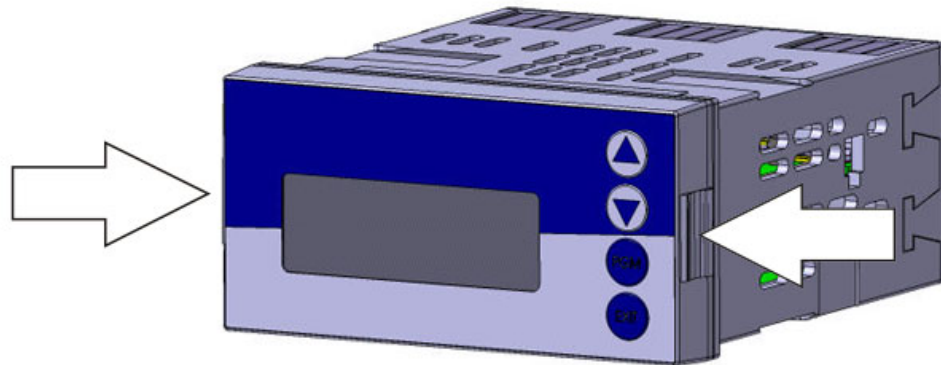


Note:

The optional boards detected by the device are displayed in "Device information" (See section 6.5.11 "Device info", page 29).

14 Retrofitting optional boards

14.2 Removing a plug-in module



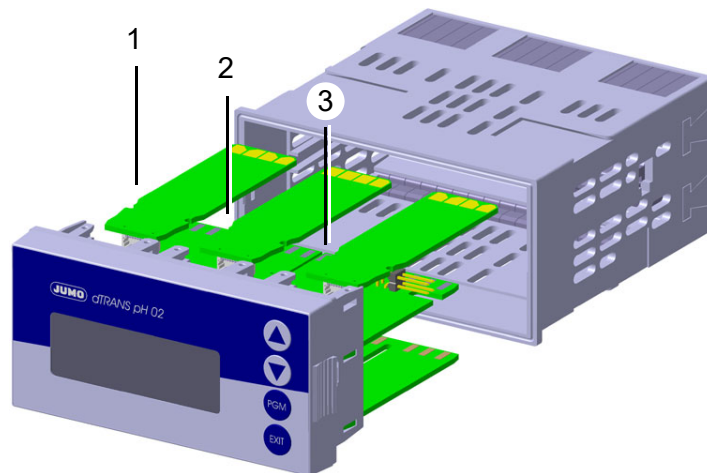
- (1) Squeeze the front panel together by the left and right sides and remove the plug-in module.

14.3 Inserting a plug-in module



Caution:

No "3" relays (2× SPST/normally open) may be inserted in slot 2!

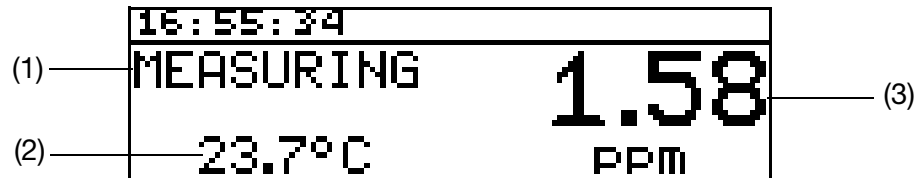


- (1) Slot 1 for optional board
 - (2) Slot 2 for optional board
 - (3) Slot 3 for optional board
- (1) Push the optional board into the slot until it locks in place.
 - (2) Push the device plug-in into the enclosure until it locks in place.

15.1 Glossary

Display of measured values STANDARD

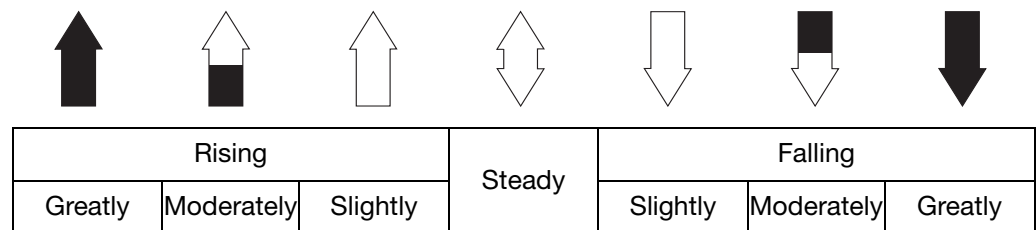
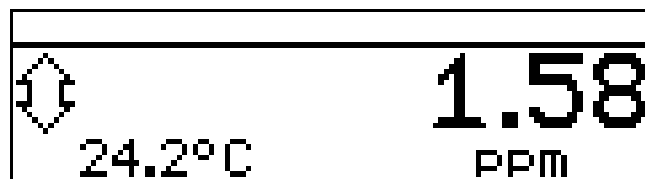
The measurement value, measurement variable and temperature of the measuring material are shown in standard display.



- (1) Operating mode
- (2) Display bottom (temperature input)
- (3) Display top (analog input measurement value)

Display of measured values TENDENCY

The operator can quickly see the direction in which the measurement is changing.



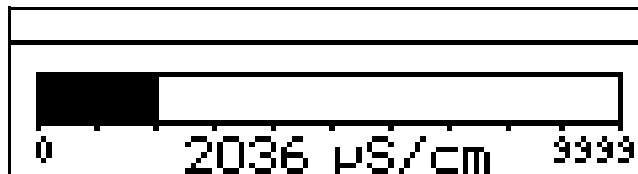
The measurement tendency (trend) is calculated over the last 10 measurement values.

So with a sampling interval of 500 ms, the last 5 seconds are considered.

15 Appendix

Display of measured values BARGRAPH

- Values of the main inputs, input options or math channels (signal source) can be represented as a variable bar (a bar graph).



Scaling the bar

- * Activate "BARGRAPH" as the display of measured values.
- * Select "SCALE START" with .
- * Confirm the selection with .
- * Use  and  to enter the lower limit of the range to be displayed.
- * Confirm the selection with .
- * Select "SCALE END" with .
- * Use  or  to enter the upper limit of the range to be displayed.
- * Confirm the selection with .



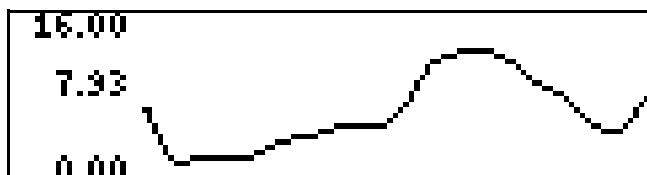
To return to measuring mode:

Press the  key repeatedly or wait for a "timeout".

Display of measured values TREND CHART

Values of the main inputs, input options or math channels (signal source) can be represented as a graph.

The current values appear to the right on the screen.



Scaling the display

- * Activate "TREND CHART" as the display of measured values.
 - * Select "SCALE START" with .
 - * Confirm the selection with .
 - * Use  and  to enter the lower limit of the range to be displayed.
-

- * Confirm the selection with .
- * Select "SCALE END" with .
- * Use  or  to enter the upper limit of the range to be displayed.
- * Confirm the selection with .



To return to measuring mode:
Press the  key repeatedly or wait for a "timeout".

Display of measured values LARGE DISPLAY

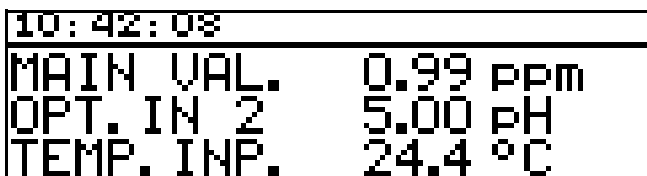
Values of the main inputs, input options or math channels (signal source) can be displayed in large format.



Display of measured values 3 MEAS. VALUES

Three values of the main inputs, input options or math channels (signal source) can be displayed simultaneously.

The position of the value to be displayed can be set to "Top", "Center" or "Bottom".



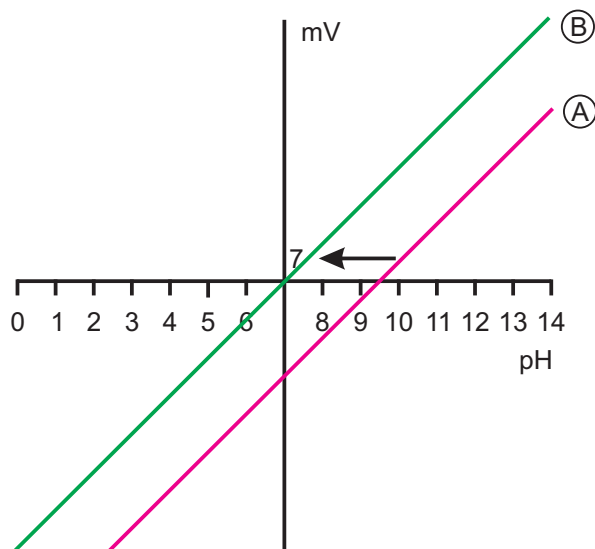
10:42:08	
MAIN VAL.	0.99 ppm
OPT. IN 2	5.00 pH
TEMP. INP.	24.4 °C

Relative cell constant

Mechanical or chemical effects can change the electrical properties of a conductivity sensor. This will result in a measurement error. This deviation (and thus the measurement error as well) can be compensated for by adjusting the relative cell constant in the transmitter. The relative cell constant defines the deviation of the actual cell constant of the conductivity sensor from its nominal value.

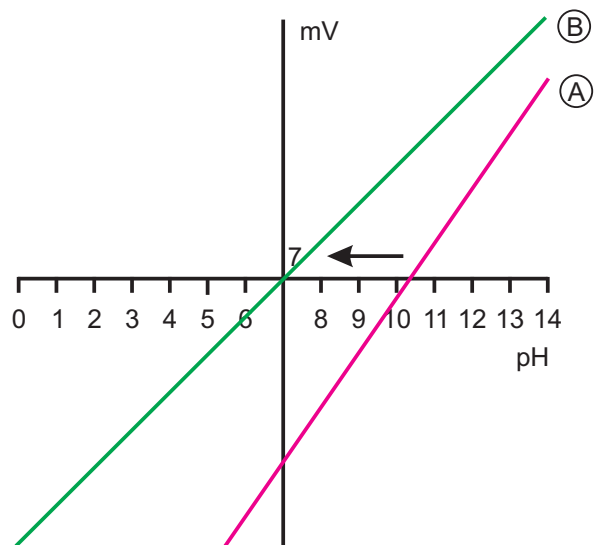
15 Appendix

Zero point (1-point) calibration



- With one-point offset calibration, the zero point of the pH combination electrode is calculated, See section "Zero point (1-point) calibration", page 53.
Recommended only for special applications, such as ultra-pure water.

2-point calibration



- With two-point calibration, the zero point and slope of the combination electrode are calibrated.
This is the recommended calibration for most sensors.

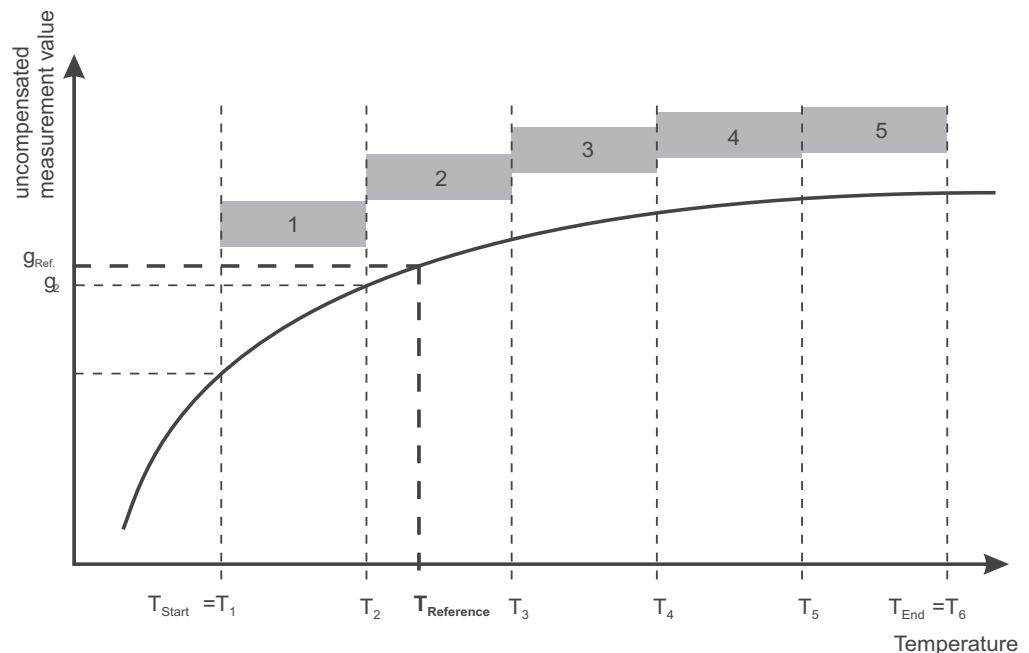
Temperature compensation (conductivity or resistance)

The conductivity of a measurement solution is temperature-dependent (the conductivity of a solution rises as the temperature increases). The dependency of conductivity and temperature describes the **temperature coefficient** of the measurement solution. As conductivity is not always measured for the reference temperature, automatic temperature compensation is integrated in

this device. The transmitter uses the temperature coefficient to calculate the conductivity that would exist for a reference temperature from the current conductivity and the current temperature. This is then displayed. This process is called temperature compensation. Modern transmitters offer different ways to perform this temperature compensation.

- Linear compensation (constant temperature coefficient).
This type of compensation can be applied to many kinds of normal water, with acceptable accuracy. The temperature coefficient used is then approx. 2.2 %/°C
- Natural water (EN27888 or ISO 7888).
In this case, so-called non-linear temperature compensation is used. According to the standard cited above, the relevant type of compensation can be applied to natural groundwater, spring water and surface water. The definition range for the water temperature is as follows:
 $0\text{ °C} \leq T < 36\text{ °C}$
Conductivity of the water is compensated in the range from 0 °C to 36 °C.
- ASTM1125-95.
This type of temperature compensation is used in measurements of ultra-pure water. The highly non-linear nature of the temperature dependency for neutral, acidic and alkaline impurities is taken into consideration in accordance with the standard.
The definition range for the water temperature is as follows:
 $0\text{ °C} < T < 100\text{ °C}$.
Conductivity of the water is compensated in the range from 0 °C to 100 °C.

Determining the temp. coef. curve



15 Appendix

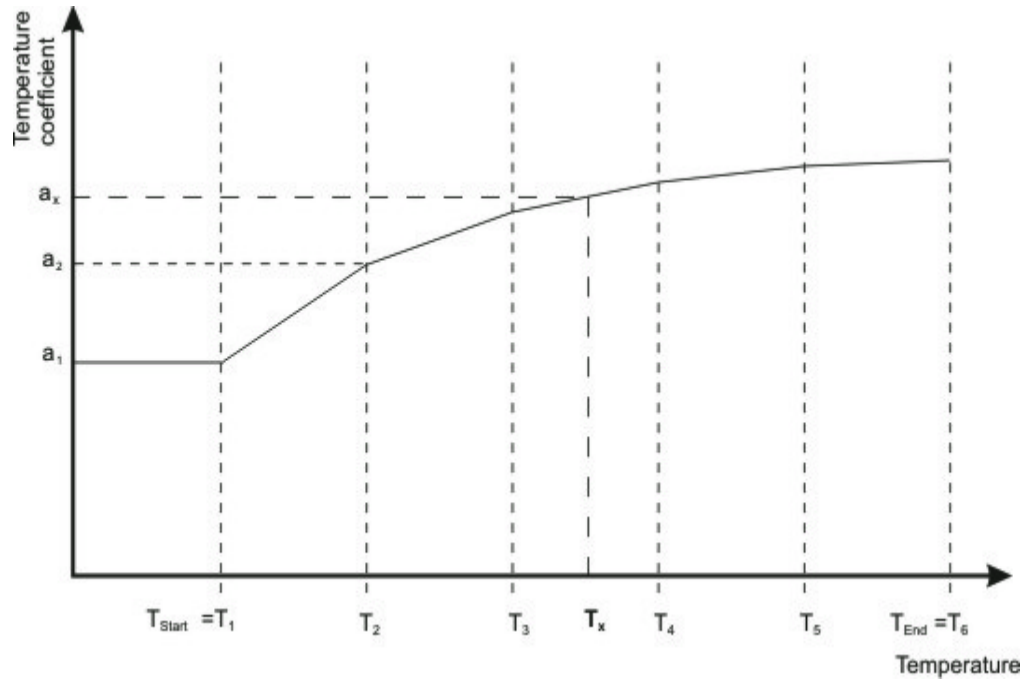
Calculating a temperature coefficient

$$\alpha_1 = \frac{\left(\frac{\gamma_1}{\gamma_{\text{Ref}}} - 1 \right) \times 100}{T_1 - T_{\text{Ref}}}$$

α = temperature coefficient (TC)

γ = uncompensated measurement value

Temp. coef. curve



Temperature compensation with the temp. coef. curve

The relevant temperature coefficient is determined from the temp. coef. curve by means of the current temperature of the medium.

Intermediate values, such as (α_x at T_x) between the two ascertained values (α_3 at T_3) and (α_4 at T_4) are linearly approximated.

As with linear temperature compensation, the compensated measurement value is calculated with the ascertained TC.

If the measured temperature is lower than the temperature at the beginning, the first TC is used for compensation.

If the measured temperature is higher than the temperature at the end, the last TC is used for compensation.

$$\gamma_{(\text{Comp})} = \frac{\gamma_{(\text{Meas})}}{\left(1 + \frac{\alpha_x}{100} * (T_x - T_{\text{Ref}}) \right)}$$

Temperature compensation (pH or ammonia)

The pH value of a measurement solution depends on the temperature. Since the pH value is not always measured at the reference temperature, the device is able to perform a temperature compensation.

The sensor signal for the ammonia measurement is temperature-dependent. The device can perform temperature compensation.



The redox potential of a measurement solution is **not** temperature-dependent! Temperature compensation is not required.

Concentration measurement

The device can calculate the concentration of different measuring materials from the current measurement values of uncompensated conductivity and temperature.

Choice of concentration calculations:

NaOH (caustic soda)

- Range 1: 0 to 12 % by weight
- Range 2: 25 to 50 % by weight

HNO₃ (nitric acid)

- Range 1: 0 to 25 % by weight
- Range 2: 36 to 82 % by weight

H₂SO₄ (sulfuric acid)

- Range 1: 0 to 28 % by weight
- Range 2: 36 to 85 % by weight
- Range 3: 92 to 99 % by weight

HCl (hydrochloric acid)

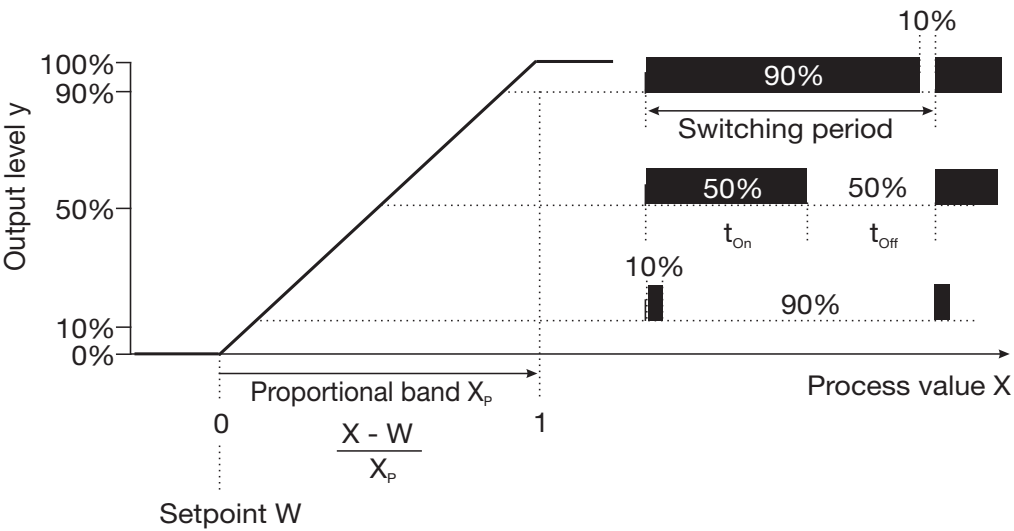
- Range 1: 0 to 18 % by weight
- Range 2: 22 to 44 % by weight

15 Appendix

Limit value (alarm) function of the binary outputs

	AF1	
	AF2	
	AF7	
	AF8	

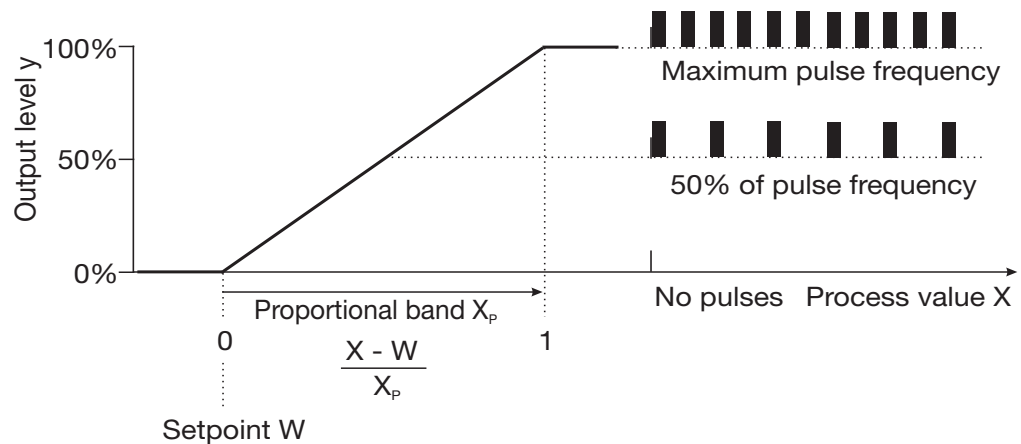
Pulse length controller (output active with $x > w$ and P control structure)



If actual value x exceeds setpoint W , the P controller will control in proportion

to the control deviation. When the proportional range is exceeded, the controller operates with an output level of 100 % (100 % clock ratio).

Pulse frequency controller (output active with $x > w$ and P control structure)



If actual value x exceeds setpoint W , the P controller will control in proportion to the control deviation. When the proportional range is exceeded, the controller operates with an output level of 100 % (maximum switching frequency).

Special controller functions: Separate controllers

This function is normally deactivated (factory setting or select "No").

In the deactivated state, the software prevents the two controller outputs from being able to work "against each other". So, for example, it is not possible to dose acid and lye at the same time.

If the controllers are separate ("Yes" selection), each controller can be freely configured.

Switch-off of the I-component

This function is normally deactivated (factory setting or select "No").

In the deactivated state, the controller works in accordance with general controller theory.

When I-component switch-off is activated ("Yes" selection), the part of the output level that can be traced back to the I-component is set to zero when the setpoint is reached.

This can be useful with mutual neutralization (acid and lye dosing both possible) in one treatment tank.

Calibration timer

The calibration timer indicates (on request) a required routine calibration. The calibration timer is activated by entering the number of days that must expire before there is a scheduled re-calibration (specified by the system or the operator).

Wash timer

The wash timer can be used to implement automated sensor cleaning. To do this, the function is assigned to a switching output.

15 Appendix

The cycle time (cleaning interval) can be adjusted in the range from 0.0 to 240.0 hours.

A cycle time of "0.0" means the wash timer is deactivated.

The wash time (cleaning duration) is adjustable from 1 to 1800 seconds.

During the wash time the controller goes into the HOLD state, which is maintained for 10 seconds after completion of the wash time. A sensor calibration within the cycle time restarts the wash timer.

USP contact (for ultra-pure water)

The USP contact makes it possible to monitor the quality of ultra-pure water according to the requirements of USP <645>. USP <645> contains a table that assigns a limit value for conductivity depending on the temperature. If the conductivity stays below this limit value, the ultra-pure water meets the requirements of USP <645>.

If the conductivity of the water is greater than what is specified in the USP table for a given temperature, the USP contact switches the device.

Limit values are defined in levels. For example, a value of 5 °C is used at 8 °C.

Note:

During monitoring, temperature compensation must be turned off (temperature coefficient = 0)!

To do this, select Administrator Level/Basic Setting/Temperature Compensation/None.

Excerpt from USP <645>

Temperature °C	Max. conductivity µS/cm (uncompensated)	Temperature °C	Max. conductivity µS/cm (uncompensated)
0	0.6	55	2.1
5	0.8	60	2.2
10	0.9	65	2.4
15	1.0	70	2.5
20	1.1	75	2.7
25	1.3	80	2.7
30	1.4	85	2.7
35	1.5	90	2.7
40	1.7	95	2.9
45	1.8	100	3.1
50	1.9		

If the conductivity is exceeded at the relevant temperature, the configured contact switches.

USP warning alarm

The USP warning alarm switches before the water quality reaches the set limit value.

This parameter (0 to 100) is used to set the distance as a percentage (relative to the active limit value) to be maintained from the USP limit.

Ultra-pure water per Ph. Eur.

The limit comparators of the device switch, depending on the corresponding configuration, according to the limit valued of the European Pharmacopeia (Ph. Eur.) for purified water.

Temperature °C	Max. conductivity µS/cm
0	0.6
10	0.9
15	1.0
20	1.1
25	1.3
30	1.4
35	1.5
40	1.7
45	1.8
50	1.9

Ph. Eur. warning alarm

The Ph. Eur. warning alarm switches before the water quality reaches the set limit value.

This parameter (0 to 100) is used to set the distance as a percentage (relative to the active limit value) to be maintained from the USP limit.

TDS

Display/control with the unit ppm.

The specific TDS factor can also be entered in this mode.

TDS (Total **D**issolved **S**olids, also commonly referred to in Germany as filtrate dry residue (Filtrattrockenrückstand).

This value is important in areas such as groundwater analysis and power plants.

The value is also used in evaluating drinking water quality (for example in the USA, Arab and Asian countries).

Various organizations have published limit values on this topic.

- WHO (**W**orld **H**ealth **O**rganization) <1000mg/l
- USEPA (**U**nited **S**tates **E**nvironmental **P**rotection **A**gency) <500mg/l

Standardized determination is performed gravimetrically, i.e.:

- Filter sample
- Evaporate filtrate
- Weigh residue

A conductivity measurement is used for the online measurement. A single time is sufficient to determine the conversion factor. It corresponds to the ratio of the conductivity value of the water to the value of the gravimetrically determined filtrate dry residue (TDS). The factor moves within the range from 0.55 to 1.0. A typical value for drinking water is about 0.67.

With modern devices, this factor can be entered individually to achieve the most accurate measurement possible.

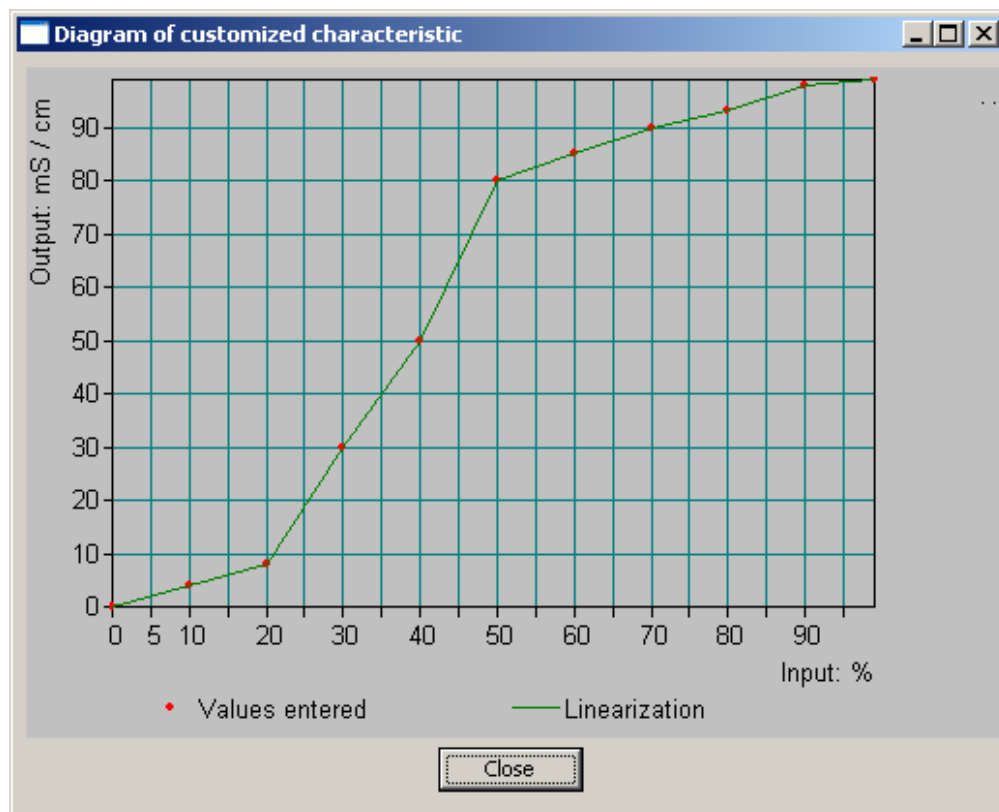
15 Appendix

Customer specs. table

In this mode, the input value can be displayed based on a table (max. 20 value pairs). This function is used to display and linearize non-linear input variables. Values can only be entered in the table using the optional setup program.

Cust. specs. characteristic

In this mode, the device can model a monotonically increasing input variable to any output value.



The optional setup program is used to enter the requisite value table.

The dialog box displays a table for entering input/output values. The table has columns for 'Input' and 'Output'. The 'Note' section provides instructions on how to use the customized table, including the maximum number of interpolation points (20) and the value range for the input variable (0.00 ... 100.00 %).

	Input	Output
1	0.00	0.0000
2	10.00	4.0000
3	20.00	8.0000
4	30.00	30.0000
5	40.00	50.0000
6	50.00	80.0000
7	60.00	85.0000
8	70.00	90.0000
9	80.00	93.0000
10	90.00	98.0000
11	99.00	99.0000
12		
13		
14		

Note

With the customized table, you can enter a maximum of 20 interpolation points in the table.

Value range, input variable: 0.00 ... 100.00 %

Value range, output variable: -99.9900 ... 99.9900 mS / cm

Please note that the input variables must be ascending.

OK Cancel

Min./max. value memory

This storage records the minimum and maximum input quantities that have occurred. This information can be used, for example, to assess whether the design of the connected sensor is suitable for the values that actually occur.

The max./min. value memory can be reset, See section 6.7.6 "Delete min/max values", page 33:

Datalogger

Recording duration = about 10 hours with a storage interval of 1 second

Recording duration = about 150 days with a storage interval of 300 seconds

Parameter set switchover

In some processes (different process steps) it is advantageous to have two complete parameter sets available.

Define the parameter sets See section 10.5 "Parameter sets", page 71.

The predefined parameter sets are activated by a binary input.

15 Appendix

15.2 Parameters of the User level

When there are numerous device parameters to configure, it is advisable to make a note in the table below of all the parameters to be changed and to work through these parameters in the given order.



The following list shows the maximum number of parameters that can be modified.

Some of these parameters will not be visible (and therefore not editable) for your particular device, depending on the configuration.

Parameter	Selection/value range Factory setting	New setting
Input pH/redox		
Zero point	5.00 to 7.00 to 9.00 or -9999.99 to 0.00 to +9999.99 mV	
Slope - acidic	xx.xx to 100.0 to xx.xx %	
Slope - alkaline	xx.xx to 100.0 to xx.xx %	
Temperature compensation source	Option input 1 Option input 2 Option input 3 Manual temperature input	
Filter time constant	0.0 to 2.0 to 25.0 seconds	
Calibration interval	0 to 99 days (0 = timer not active)	
Supply frequency	50 Hz 60 Hz	
Conductivity input		
Cell constant	0.01/0.1/0.5/ 1.0 /3.0/10.0	
Relative cell constant and Relative cell constant MB 2	20.0 to 100.0 to 500.0	
Offset and offset MB 2	-20.00 to 0.00 to 20.00 % of the display range	
Temperature compensation and temperature compensation MB 2	None Linear Natural waters ASTM 1125 neutral ASTM 1125 acidic ASTM 1125 alkaline	
Temperature compensation source	Temperature input Option input 1 Option input 2 Option input 3 Manual temperature input	

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Parameter	Selection/value range Factory setting	New setting
Temperature coefficient and temperature coefficient MB 2	0.00 to 2.20 to 8.00 %/K	
Reference temperature	15.0 to 25.0 to 35.0 °C	
Pollution recognition	Off On	
Broken sensor detection	Off On	
Filter time constant	0.0 to 2.0 to 25.0 seconds	
Calibration interval	0 to 99 days (0 = timer not active)	
Differential measurement	Off Main input - (minus) Option input 1 Main input - (minus) Option input 2 Main input - (minus) Option input 3 Option input 1 - (minus) Main input Option input 2 - (minus) Main input Option input 3 - (minus) Main input	
Supply frequency	50 Hz 60 Hz	
Temperature input		
Temperature sensor	No sensor Pt100 Pt1000 Cust. specs. 0 to 20 mA 4 to 20 mA 0 to 10 V 2 to 10 V Resistance transmitter	
Unit	°C/°F % Without unit Cust. specs.	
Scaling start	-100.0 to 0.0 to 499.9 °C	
Scaling end	-99.9 to 100.0 to 500.0 °C	
Filter time constant	0.0 to- 2.0 to 25.0 seconds	
Manual temperature	-99.9 to 25.0 to +99.9 °C	
Offset	-99.9 to 0.0 to +99.9 °C	
Optional inputs		
Analog inputs 1 to 3		

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Parameter	Selection/value range Factory setting	New setting
Operating mode	Off Linear Temperature pH measurement Conductivity Concentration Cust. specs. Stroke feedback Chlorine, pH-compensated	
Signal type	0 to 20 mA 4 to 20 mA 0 to 10 V 2 to 10 V 0 to 1 V Pt100 Pt1000 Cust. specs.	
Connection type	2-wire 3-wire 4-wire	
Display format	XXXX XXX.x XX.xx X.xxx	
Unit	$\mu\text{S/cm}$ mS/cm k Ω *cm M Ω *cm None Cust. specs. mV pH % ppm mg/l	
Scaling start	-9999 to +9998	
Scaling end	-9998 to +9999	
Temperature compensation source	Temperature input Option input 1 Option input 2 Option input 3 Manual temperature	
pH compensation source	Main input Option input 1 Option input 2 Option input 3	

15 Appendix

Parameter	Selection/value range Factory setting	New setting
Temperature compensation	None Linear TC graph Natural waters ASTM D1125 neutral ASTM D1125 acidic ASTM D1125 alkaline NaOH 0 to 12 % NaOH 25 to 50 % HNO ₃ 0 to 25 % HNO ₃ 36 to 82 % H ₂ SO ₄ 0 to 28 % H ₂ SO ₄ 36 to 85 % H ₂ SO ₄ 92 to 99 % HCl 0 to 18 % HCl 22 to 44 %	
Reference temperature	15.0 to 25.0 to 30.0 °C	
Filter time constant	0.0 to 2.0 to 25.0 seconds	
Relative cell constant	20.0 to 100.0 to 500.0 1/cm	
Temperature coefficient	0.00 to 2.20 to 8.00 1/cm	
Zero point	-9999 to 0 to +9999	
Slope	-999.9 to 100.0 to +999.9 %	
Binary inputs		
Binary input 1 or 2		
Function	No function Manual mode Hold mode Hold mode inverse Alarm stop Freeze measured value Key lock Lock levels Reset day counter Reset total counter Range switchover	
Controller		
Controller 1 or 2		
Parameter set 1 or 2		
Min. setpoint	0 to 9999	
Max. setpoint	0 to 9999	
Setpoint	0 to 9999	
Setpoint 2	0 to 9999	
Proportional range	0 to 9999	
Reset time	0.00 to 9999 s	
Derivative time	0.00 to 9999 s	
Period time	2.00 to 60.0 to 999.9 s	

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Parameter	Selection/value range Factory setting	New setting
Hysteresis	0 to 200 to 9999	
On-delay	0.00 to 999.5 s	
Delayed release	0.00 to 999.5 s	
Output limit	0 to 100 %	
Min. turn-on time	0.20 to 0.50 to 99.50 s	
Actuator time	10 to 60 to- 3000 s	
Max. pulse frequency	1 to 60 to 80 1/s	
Alarm tolerance	0.00 to 1.00 to 16.00	
Alarm delay	0.00 to 9999 s	
Configuration		
Controller type	Off Limit value Pulse lengths Pulse frequency Continuous Modulating	
Controller actual value	Main value Not comp. Main value Temperature Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2 Differential signal	
Stroke retransmission	No signal Main value Not comp. Main value Temperature Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2	

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Parameter	Selection/value range Factory setting	New setting
Additive disturbance	No signal Main value Not comp. Main value Temperature Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2	
Multiplicative disturbance	No signal Main value Not comp. Main value Temperature Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2	
Min/max contact	Min contact Max contact	
Make/break contact	Make contact Break contact	
Hold mode	0% 100% Frozen Hold output	
Hold reg. ratio	0 to 100 %	
Error	0 % 100 % Frozen Hold output	
Alarm control	Off On	
Controller special functions		
I-switch-off	Inactive (the controller is working normally) Active (special behavior)	
Separate controllers	No Yes	
Manual mode	Locked Coding Switching	
Limit value control		

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Parameter	Selection/value range Factory setting	New setting
Limit values 1 to 4		
Signal source	No signal Main value Not comp. Main value Temperature Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2 Differential signal Flow rate Partial quantity Total quantity Output controller 1 Output controller 2 Setpoint 1 controller 1 Setpoint 2 controller 1 Setpoint 1 controller 2 Setpoint 2 controller 2	
Switching function	Alarm function  (AF1) Alarm function  (AF2) Alarm function  (AF7) Alarm function  (AF8)	
Switching point	0 to 9999	
Hysteresis	0 to 9999	
Binary outputs		
Binary outputs 1 to 8		

Parameter	Selection/value range Factory setting	New setting
Signal source	No signal Limit value control 1 Limit value control 2 Limit value control 3 Limit value control 4 Controller 1 output 1 Controller 1 output 2 Controller 2 output 1 Controller 2 output 2 Controller alarm 1 Controller alarm 2 Controller alarm Sensor warnings Sensor error Warnings and errors Calibration timer Wash timer Logic 1 Logic 2 Autorange	
At calibration	Standard operation Inactive Active Frozen	
Error	Inactive Active Frozen	
Hold mode	Inactive Active Frozen Standard operation	
Switch-on delay	0.0 to 3600 s	
Switch-off delay	0.0 to 3600 s	
Pulse time ^a	0.0 to 3600 s	
Manual mode	No simulation Inactive Active	
Analog outputs		
Analog outputs 1 to 3		

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Parameter	Selection/value range Factory setting	New setting
Signal source	No signal Main value Not comp. Main value Temperature Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2 Differential signal Flow rate Partial quantity Total quantity Output controller 1 Output controller 2 Setpoint 1 controller 1 Setpoint 2 controller 1 Setpoint 1 controller 2 Setpoint 2 controller 2	
Signal type	0 to 20 mA 4 to 20 mA 20 to 0 mA 20 to 4 mA 0 to 10 V 10 to 0 V	
Scaling start	0 to 9999	
Scaling end	0 to 9999	
At calibration	Moving Frozen Safe value	
In case of error (output signal, of the controller in case of error)	0/4 mA/0 V 20 mA/10 V Frozen Safety value	
Hold mode (output signal, of the controller in Hold mode)	Frozen Safety value Standard mode 0/4 mA/0 V 20 mA/10 V	
Safety value	0.0 - 20.0 mA	
Simulation	Off On	
Simulation value	Off 0.0 to 20.0 mA	
Interface		

15 Appendix

Parameter	Selection/value range Factory setting	New setting
Modbus address	1 to 254	
Baud rate	9600 19200 38400	
Parity	None Even Odd	
Stop bits	1 2	
PROFIBUS-DP address	0 to 99	
EEPROM marking	Off On	
Wash timer		
Cycle time	0.0 to 240.0 hours (0.0 = Wash contact is not active)	
Wash time	1 to 60 to 1800 seconds	
Datalogger		
Storage interval	1 to 60 to 300 seconds	
Channels 1 to 4	No signal Main value (standard for channel 1) Not comp. Main value Temperature (standard for channel 2) Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2 Differential signal Flow rate Partial quantity Total quantity Output controller 1 (standard for channel 3) Output controller 2 (standard for channel 4) Setpoint 1 controller 1 Setpoint 2 controller 1 Setpoint 1 controller 2 Setpoint 2 controller 2	
Date year	20xx	
Date month	1 to 12	
Date day	1 to 31	
Time hour	0 to 24	
Time minute	0 to 59	

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Parameter	Selection/value range Factory setting	New setting
Time second	0 to 59	
Display		
Lighting	On With operation	
Display of measured value	Standard Tendency Bargraph Trend chart Large display 3 measured values Time	
Display Top/Center/ Bottom	No signal Main value (standard for "Top") Not comp. Main value Temperature (standard for "Center" and "Bottom") Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2 Differential signal Flow rate Partial quantity Total quantity Output controller 1 Output controller 2 Setpoint 1 controller 1 Setpoint 2 controller 1 Setpoint 1 controller 2 Setpoint 2 controller 2	
Operating timeout	0 to 1 to 10 minutes (0 = operating timeout is turned off)	
Scaling start	0 to 9999	
Scaling end	0 to 9999	

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Parameter	Selection/value range Factory setting	New setting
Signal source	Main value Not comp. Main value Temperature Option input 1 Option input 1 not compensated Option input 2 Option input 2 not compensated Option input 3 Option input 3 not compensated Math 1 Math 2 Differential signal Flow rate Partial quantity Total quantity	
Temperature unit	°C °F	
LCD inverse	Off On	
Contrast	0 - 10 - 20	

^a Delayed release is automatically deactivated when wiper times are greater than 0 seconds.

16 China RoHS

	 More than  automation					
产品组别 Product group: 202553	产品中有害物质的名称及含量 China EEP Hazardous Substances Information					
部件名称 Component Name						
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
外壳 Housing (Gehäuse)	○	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)	○	○	○	○	○	○
螺母 Nuts (Mutter)	○	○	○	○	○	○
螺栓 Screw (Schraube)	X	○	○	○	○	○
本表格依据SJ/T 11364的规定编制。 This table is prepared in accordance with the provisions SJ/T 11364. ○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。 Indicate the hazardous substances in all homogeneous materials' for the part is below the limit of the GB/T 26572. ×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。 Indicate the hazardous substances in at least one homogeneous materials' of the part is exceeded the limit of the GB/T 26572.						

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