Baumer
Passion for Sensors

EN-US

Operating Manual

PAC50H/S

Conductivity measurement

EN-US

List of contents

1   About this document

1.1   Purpose

This operating manual (subsequently referred to as *manual*) allows the safe and efficient handling of the product .

The manual does not provide instructions on operating the machine in which the product is integrated. Information on this is found in the operating manual of the machine.

The manual is a constituent part of the product. It must be kept in the immediate vicinity of the product and must be accessible to personnel at all times.

Personnel must have carefully read and understood this manual before beginning any work. The basic prerequisite for safe working is compliance with all safety instructions and handling instructions given in this manual.

In addition, the local occupational health and safety regulations and general safety regulations apply.

The illustrations in this manual are examples only. Deviations are at the discretion of Baumer at all times.

1.2   Warnings in this manual

Warnings draw attention to potential personal injury or material damage. The warnings in this manual indicate different hazard levels:

Symbol	Warning term	Explanation
	DANGER	Indicates an imminent potential danger with high risk of death or serious personal injury if not being avoided.
	WARNING	Indicates potential danger with medium risk of death or (serious) personal injury if not being avoided.
	CAUTION	Indicates a danger with low risk, which could lead to light or medium injury if not avoided.
	NOTE	Indicates a warning of material damage.
	INFO	Indicates practical information and tips that enable optimal use of the devices.

1.3   Labels in this manual

Identifier	Use	Example
Dialog element	Indicates dialog elements.	Click the *OK* button.
Unique name	Indicates the names of products, files, etc.	*Internet Explorer* is not supported in any version.
`Code`	Indicates entries.	Enter the following IP address: `192.168.0.250`

1.4   Scope of delivery

The scope of delivery includes:

- 1 x sensor
- 1 x quickstart
- 1 x General information leaflet

In addition, you can find the following information, among other things, in digital format at www.baumer.com:

- Operating manual
- Data sheet
- 3D CAD drawing
- Quickstart
- Dimensional drawing
- Connection diagram & pin assignment
- IODD file
- Certificates (EU conformity declaration, etc.)

1.5   Name plate

The name plate can be found on the sensor and provides the following information:
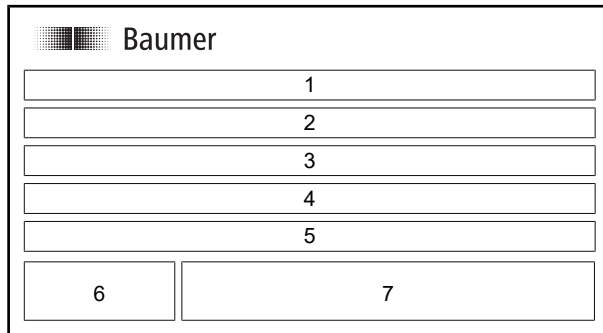
III. 1: Name plate

1	Type	2	Material number
3	Serial number	4	TAG text
5	Date of manufacture	6	Manufacturer
7	Markings (CE, etc.)		

1.6   Accessories

You can find accessories at the website at:

https://www.baumer.com

2   General information

Intended use

This product is a precision device and serves the detection of items, objects, or physical measurement variables and the preparation or provision of measured values as electric variables for the higher-level system.

Unless specifically labeled, this product may not be used in explosive environments.

The product is exclusively intended for use in industrial working environments.

The application range relates to conductible fluids with the following properties:

- Conductivity: ≥ 1 µS/cm (+15 µS / -1 µS)
- Conductivity: 0 - 1000 mS (+/-15 µS +/-2 %)

Sensor use is only intended for media to which housing material and sensor tip are resistant.

Commissioning

Assembly, installation, and calibration of this product may only be performed by a specialist.

Installation

Only use the fasteners and fastener accessories intended for this product for installation. Outputs not in use must not be wired. Unused wires of cable outputs must be insulated. Do not go below the permissible cable bending radii. Disconnect the system from power before the product is electrically connected. Use shielded cables to prevent electro-magnetic interference. If the customer assembles plug connections on shielded cables, then EMC-version plug connections should be used and the cable shield must be connected to the plug housing across a large surface area.

Disposal (environmental protection)

Used electrical and electronic devices may not be disposed of in household waste. The product contains valuable raw materials that can be recycled. Therefore dispose of this product at the appropriate collection point. For additional information visit www.baumer.com.

3   Security

> ⚠ **WARNING**
>
> **Danger caused by leaking system**
>
> Sensor installation in pipe systems may cause leaks. Such leaks may cause a great number of hazards.
>
> Therefore, it is imperative to observe the following during sensor mount:
>
>   a) Only use welding sleeves and adapters from Baumer.
>
>   b) Always check seals for damage and cleanliness.
>
>   c) The welding should only be carried out by persons who are trained in the hygiene sector.
>
>   d) Never seal process connections with Teflon tape (PTFE) or elastomer.

> **NOTICE**
>
> **Risk of damage to equipment by contamination**
>
> Contamination may penetrate into the system and result in material damage.
>
>   a) Always cover exposed system parts before carrying out any work, e.g. drilling.
>
>   b) Immediately collect any dust and chips produced during installation work.

> **NOTICE**
>
> **Damage to seal or push-in fitting**
>
> Excessive tightening of the union nut may damage the connection or the O-seal provided at the M12 cable.
>
>   a) Tighten the union nut to a maximum torque of 0.6 Nm.
>
>   b) Never use any tools to tighten the union nut.

> 💡 **INFO**
>
> **Weld-in sleeves or adapters in hygienic applications**
>
> It is recommended to use weld-in sleeves or adapters for sensor installation.
> Observe the following:
>
>   a) 3-A mark or arrow must point upward.
>
>   b) The leakage hole must point downwards.
>
>   c) Hygienically and internally flush.
>
>   d) Grind welding to Ra ≤ 0.8.

4   Description

4.1   Structure

The sensor measures the conductivity and temperature of liquids and optionally calculates concentration values.
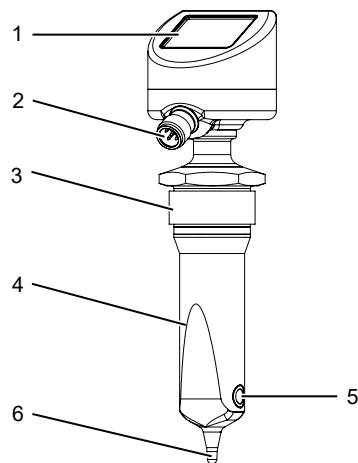
Ill. 2: Structure

1	Display	2	Electrical connection
3	Process connection	4	Sensor tip
5	Medium bore hole	6	Temperature sensor

The sensor consists of display, transmitter and sensing tip.

System parameters and measured values are indicated on the display.

Sensor parameterization is either via the display or using *FlexProgram* or the IO-Link master.

Sensor mount is by screwing-in the thread.

Measurements are made by the sensor's measuring hole and temperature probe.

Also see about this

📄 Operating and display elements [▶ 9]

📄 Functional description [▶ 9]

4.2   Product versions

Version	Area of application
PAC50H	Hygienic applications
PAC50S	Industrial applications

The sensor is available in different variants:

- Short sensor tip
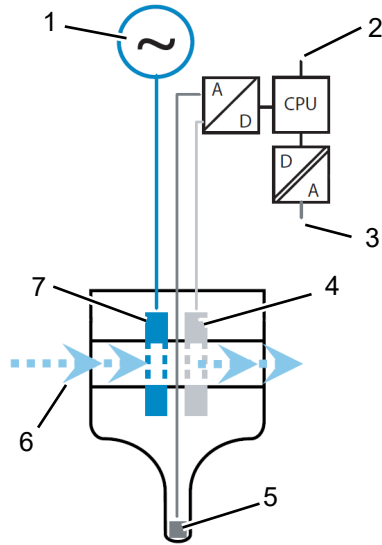- Medium sensor tip
- Long sensor tip

In addition, each sensor variant is available with or without display.

In addition, each sensor variant is available with 90° rotated hole orientation.

For variant-specific specifications please refer to the related data sheet.

4.3 Functional description

Ill. 3: Functional description (schematic)

1	Oscillator	2	Select range: R1 or R2; Output selection: conductivity or temperature (4 - 20 mA)
3	Output (4 - 20 mA) optionally conductivity or temperature	4	Secondary coil
5	Temperature sensor Pt100	6	Media
7	Primary coil		

The sensor measures the conductivity and temperature of liquids, and optional calculates concentration values.

Sensor operation utilizes the inductive sensing principle without mechanical or process-interfering components.

The hole in the sensor tip is surrounded by 2 coils. The primary coil is supplied with AC voltage. The secondary coil measures the induced current of the fluid in the measuring hole. The fluid's temperature is measured at the Pt100 sensor tip. This will ensure temperature compensation of the conductivity signal.

4.4 Operating and display elements

System parameters and the measured values of the sensor are shown on the display.

Sensor parameterization is by the following options:

- Display
- *FlexProgram*
- IO-Link master

Also see about this

5 Transport and storage

5.1 Transport

NOTICE

Material damage due to improper transport.

a) Ensure maximum diligence when unloading the delivered packages as well as when transporting them inside the company.

b) Note the information and symbols on the packaging.

c) Only remove packaging immediately before mounting.

5.2 Delivery inspection

Upon receipt immediately inspect the delivery for completeness and transport damage.

Claim any defect as soon as it is detected. Damages can only be claimed within the applicable claims deadlines.

In case of externally visible transport damage, proceed as follows:

Instruction:

a) Do not accept the delivery or only with reservations.

b) Note the scope of the damage on the transport documents or the delivery slip of the carrier.

c) Initiate the claim.

5.3 Storage

Store the product at the following conditions:

- Only transport or store the device in its original packaging.
- Do not store outdoors.
- Store dry and free from dust.
- Do not expose to aggressive media.
- Keep away from the sun.
- Avoid mechanical agitation.
- Storage temperature: -40 ... 85 °C.
- Ambient humidity:. 0 ... 100 %
- When storing for longer than 3 months, regularly check the general state of all parts and the packaging.

6 Installation

6.1 Introduction

Prior to installation ensure the following:

- During sensor installation, the higher-level machine is in a safe state.
- The sensor's installation position considers plant-specific criteria and sensor requirements.

Also see about this

6.2 Mounting prerequisites

For sensor installation in the higher-level machine consider the following:

- The installation site will not expose the sensor to excessive vibration.
- The installation site will not expose the sensor to excessive dirt and contamination.
- At the installation site, the sensor is protected against direct sunlight.
- The installation site enables appropriate sensor grounding.
- The installation site allows for appropriate electrical sensor connection.
- The installation site allows for free sensor access at all times.
- Any mechanical impacts on the sensor during operation are excluded.
- Mounting does consider the installation positions.

Also see about this

6.3 Installation positions
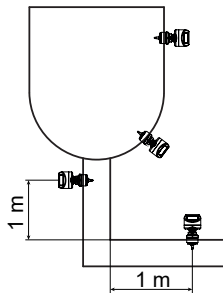

- For proper function, make sure the sensor is always fully immersed in the liquid under all operating conditions.
- Align the bore to the flow direction to ensure self-cleaning of the sensor.
- Install the sensor in a centered position inside the pipe.
- Baumer recommends to install the sensor at least one meter away from bends to eliminate problems by turbulences in the flow direction.

Weld-in sleeve with draining feature
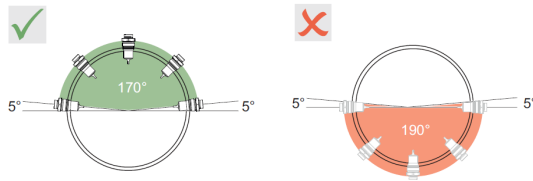
Install some weld-in sleeves at the proper angle to ensure automatic draining.

6.4 Installation factor
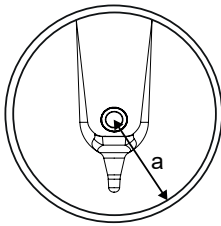
Where installation space is tight, walls have an impact on the ion flow in the liquid. This effect can be compensated by the installation factor.

Installation factor in the transmitter is set via display, IO-Link or *FlexProgram*.

The installation factor depends on diameter and conductivity of the pipe socket as well as the distance from wall to sensor.

In case of sufficient distance to wall (a > 20 mm), the installation factor f can be ignored (f = 1.00).

In case of inferior wall distance, the installation factor for electrically insulated pipes is larger (f > 1) respectively smaller (f < 1) for case electrically conductive pipes.

The installation factor can be identified by calibration solutions or approximately derived from the diagram below.
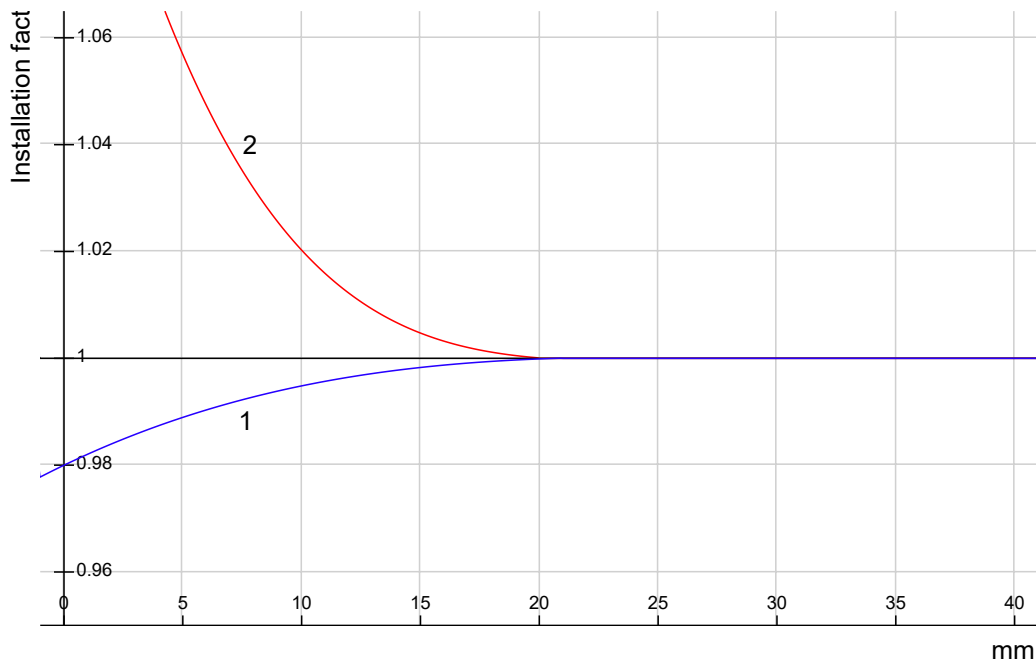
1	Pipe wall electrically conductive	2	Pipe wall electrically insulated

6.5   Mounting the sensor

> ⚠ **WARNING**
>
> **Health hazard from contaminated media**
>
>   a) Only use welding sleeves and adapters from Baumer.
>
>   b) <u>Do not</u> seal the process connection with Teflon tape (PTFE) or elastomer.
>
>   c) The welding should only be carried out by persons who are trained in the hygiene sector.

> 💡 **INFO**
>
> **Weld-in sleeves or adapters in hygienic applications**
>
> It is recommended to use weld-in sleeves or adapters for sensor installation.
> Observe the following:
>
>   a) 3-A mark or arrow must point upward.
>
>   b) The leakage hole must point downwards.
>
>   c) Hygienically and internally flush.
>
>   d) Grind welding to Ra ≤ 0.8.

> ⚠ **WARNING**
>
> **Danger caused by leaking system**
>
> Sensor installation in pipe systems may cause leaks. Such leaks may cause a great number of hazards.
>
> Therefore, it is imperative to observe the following during sensor mount:
>
>   a) Only use welding sleeves and adapters from Baumer.
>
>   b) Always check seals for damage and cleanliness.
>
>   c) The welding should only be carried out by persons who are trained in the hygiene sector.
>
>   d) Never seal process connections with Teflon tape (PTFE) or elastomer.

a) Select a suitable installation location for the sensor.
   Observe the installation requirements.

b) Make sure that the pipes are free from any pressure.

c) Make sure no media can escape at the installation site.

d) Mount the sensor in the intended position.
   Apply 20 - 25 Nm to screw in the sensor.

e) Check the pipe system in the sensor area upon any leak.

f) Perform electrical sensor connection.

g) Check leak-tightness of the sleeve.

h) Check M12 connector upon tightness.
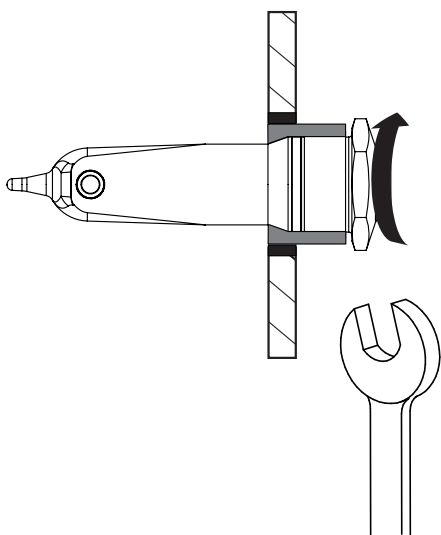
Also see about this

📄 Mounting prerequisites [▶ 11]

6.6   Mounting example with weld-in socket ZPW2-521
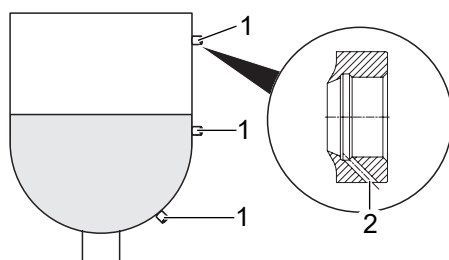
1	ZPW2-521	2	Leakage hole

7   Certifications

EHEDG certification is only valid when using the corresponding installation parts. These are marked with the logo "EHEDG Certified".
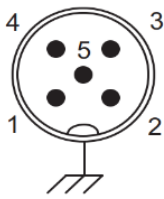
The requirements of the 3-A Sanitary Standard are only fulfilled when using corresponding installation parts. These are marked with the 3-A logo.

For more information on approvals and certifications refer to the product page at www.baumer.com.

8 Electrical installation

8.1 Pin assignment

1	Vs +	Power supply (+)
3	GND (0 V)	Power supply (-)
5	Select	Select range: R1 or R2 Select output: conductivity or temperature 4 ... 20 mA
2	Iout + / SW2	Conductivity / temperature / SW
4	IO-LINK / SW1	IO-Link / SW

8.2 Electrical connection

Condition:

⇨ Mains voltage supply must be within the admitted sensor limits (11 - 35 V_{DC}).

⇨ Power supply provides external overload protection.

⇨ Connections will use only approved fire protection cables.

⇨ Any long or hanging cables are secured by approved fastening systems.

⇨ All electrical connections are clean.

⚠ **CAUTION**

Risk of damage to equipment by electric current

NOTICE

Risk of damage to equipment by contamination

NOTICE

Damage to seal or push-in fitting
Excessive tightening of the union nut may damage the connection or the O-seal provided at the M12 cable.

a) Tighten the union nut to a maximum torque of 0.6 Nm.

b) Never use any tools to tighten the union nut.

NOTICE

Observe circuit diagram
Observe the wiring and circuit diagrams when preparing electrical connection.

Instruction:

a) Make sure the higher-level machine is safely switched off and not under supply.
   If necessary, disconnect the higher-level machine and secure the control cabinet against inadvertent power-on.

b) Connect the sensor to the control cabinet using the connector.

c) Ensure correct pin assignment.
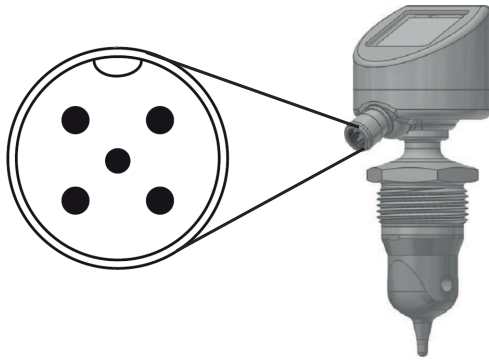
Also see about this

Pin assignment [▶ 16]

9 Commissioning

9.1 Commissioning- preamble

Putting the sensor into operation is only in the form of a component within the piping system. Therefore, besides the operator's specifications and overall system settings, all safety warnings and instructions in the present manual must be observed.

- The sensor must be installed.
- Electrical sensor connection must be present.

System parameterization must be completed prior to commissioning.

Sensor parameterization is by the following options:

- Display
- *FlexProgram*
- IO-Link master

Also see about this

9.2 Factory settings

Sensor parameters	Value
Output mode	Conductivity
Conductivity Range 1	0 ... 200 mS/cm
Conductivity Range 2	0 ... 2 mS/cm
Temperature output	0 ... 150 °C
Output damping	0.0 s
Temperature compensation Range 1-2	2.0 %/K
Output lower limit	3.7 mA
Output upper limit	21 mA

9.3 Parameterization using the integrated display

Sensor settings can be entered via the display.

Parameterization options (example)

- Define the conductivity range.
- Define output damping.
- Define the measuring mode.
- Parameterization of temperature compensation.
- Parameterization of switching output.
- Select the temperature source for compensation.

- Sensor and media calibration.
- Select language.
- Select display views
- Select background colors.
- Setting a password.
- Zero point calibration.
- Define warning and error messages.

Also see about this

9.3.1   Select language, example

The following example shows how to select the language via the sensor display.

Instruction:

a) Click the additional bar on the display.
   ✓ Button **Menu** appears in the additional bar.
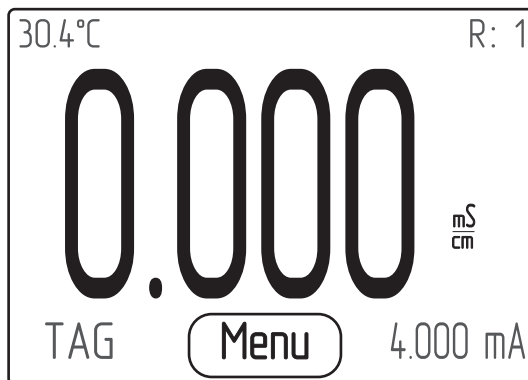
b) Click on ***menu*** to open the display menu.
   ✓ ***Menu*** opens.

c) Select ***Display setup*** by help of the arrows ***Up/Down***.
   ✓ Menu item ***Display setup*** is highlighted in a dark color.
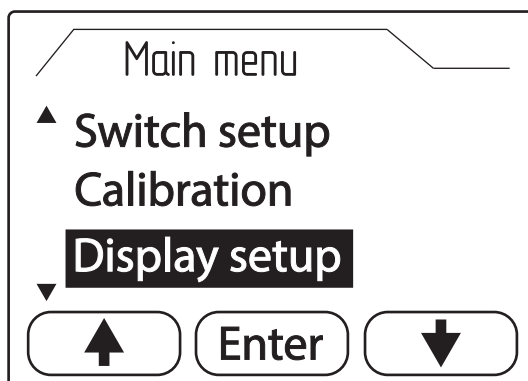
d) Open submenu ***Display setup*** by pressing ***Enter***.
   ✓ Submenu ***Display setup*** opens.

e) Select ***Language*** by help of the arrows ***Up/Down***.
   ✓ ***Language*** is highlighted in a dark color.

f) Open *Language* by pressing *Enter*.

    ✓ *Language* opens.

g) Select the desired language using the arrows *Up/Down*.

    ✓ The language is highlighted in a dark color.

h) Confirm your selection by clicking on *Set*.

Result:

    ✓ The selected language has been adopted.

Also see about this

📄 Display menu navigation [▷ 28]

9.3.2   Example Change display orientation

For convenient reading in any sensor installation position, the display swivels through 180°. The following example shows how to change the display orientation via the sensor display.
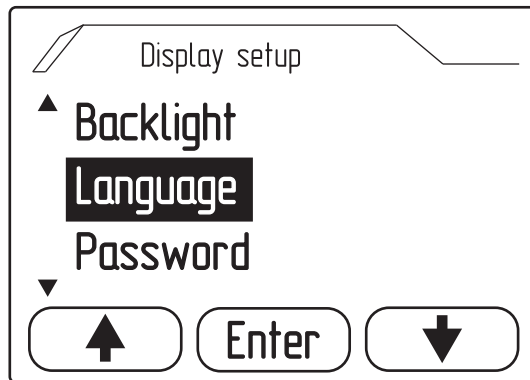
Instruction:

a) Click the additional bar on the display.

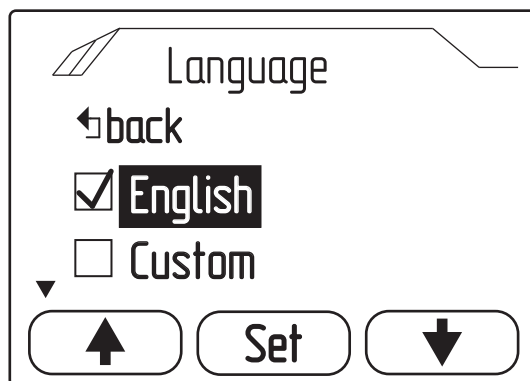   ✓ *Menu* appears in the additional bar.
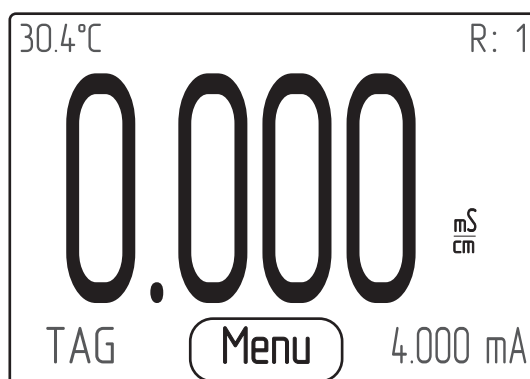
b) Click on **Menu** to open the display menu.
   - ✓ The **menu** opens.

c) Select **Display setup** by help of the arrows **Up/Down**.
   - ✓ Menu item **Display setup** is highlighted in a dark color.
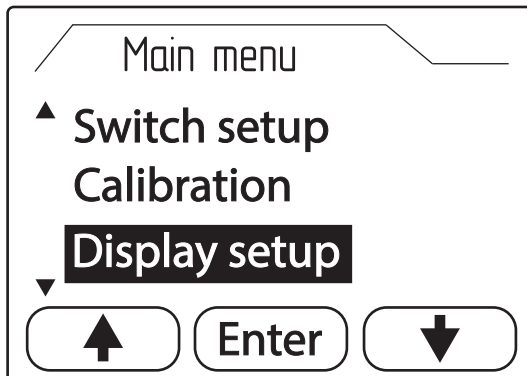
d) Open submenu **Display setup** by pressing **Enter**.
   - ✓ Submenu **Display setup** opens.

e) Select **Orientation** with the arrows **Up/Down**.
   - ✓ **Orientation** is highlighted in dark color.
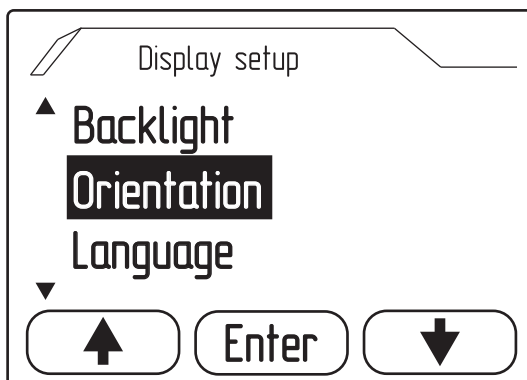
f) Open **Orientation** by clicking **Enter**.
   - ✓ **Orientation** window opens. The currently applied orientation is ticked.
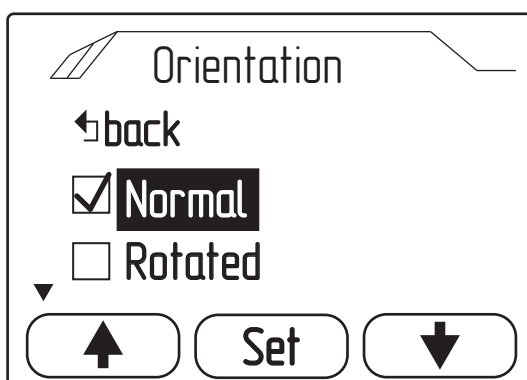
g) Select **Rotated** using the arrow **Up/Down**.
   - ✓ Selection **Rotated** is highlighted in a dark color.
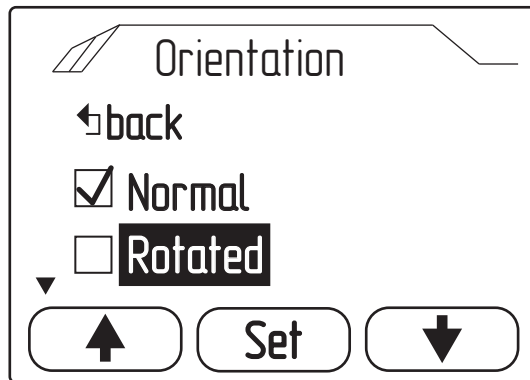
h) Confirm your selection by clicking on **Set**.

Result:
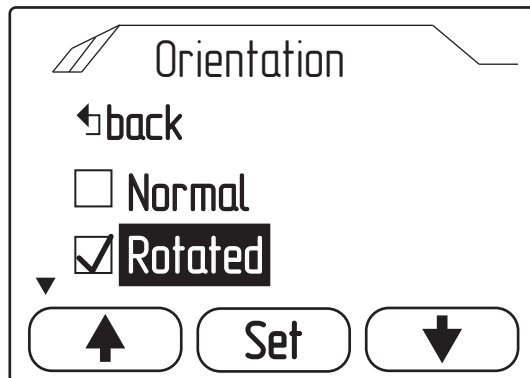
✓ The display orientation is changed. Display returns to main screen and is rotated by 180°.

Also see about this

📄 Display menu navigation [▷ 28]

9.4   Parameterization via *FlexProgram*

Condition:

⇨ Cable and PC with *FlexProgram* and *FlexProgrammer 9701*

Instruction:

a) Connect *FlexProgrammer 9701* to sensor using the 5-pin M12 connector.

b) Connect *FlexProgrammer 9701* to a PC.
   The PC must have the latest version of *FlexProgrammer* installed.

c) Proceed with sensor parameterization:

Sensor parameterization options (example):

- Parameterization of switching output.
- Parameterization of temperature compensation.
- Select the temperature source for compensation.
- Define the conductivity range.
- Defining the current limits.
- Proceed with data collection.
- Sensor and media calibration.
- Define the measuring mode.
- Define output damping.

Configuration of the sensor display (example):

- Select display views.
- Select background colors.
- Setting a password.
- Define warning and error messages.

INFO

Helpdesk *FlexProgram*

For more information, see the ***Help*** menu *FlexProgram*.

9.5   Parameterization via IO-Link master

Condition:

⇨ IO-Link master and PC

Instruction:

a) Connect IO-Link master to sensor.

b) Connect IO-Link master to a PC

.

NOTICE

The sensor must not be directly connected to a class B Master.

c) Proceed with sensor parameterization:

Parameterization options (example)

- Define the conductivity range.
- Define output damping.
- Define the measuring mode.
- Parameterization of temperature compensation.
- Parameterization of switching output.
- Select the temperature source for compensation.
- Sensor and media calibration.
- Select language.
- Select display views
- Select background colors.
- Setting a password.
- Zero point calibration.

INFO

Sensor product page at www.baumer.com

A detailed description of the IODD parameters and process data is available on the sensor product page at www.baumer.com.

9.6   Media calibration

💡 **INFO**

This task can be done either using the *FlexProgram* or via IO-Link (e.g. *BSS*). The following example shows calibration with *FlexProgram*.

Media calibration for the different ranges is by calculating the temperature compensation after 3 measuring operations.

Condition:

⇨ The sensor is connected to a PC with software *FlexProgram* installed.

⇨ The sensor is switched on.

⇨ Calibration is performed in a controlled environment.

Instruction:

a) Open software *FlexProgram* on the PC.

b) Open setting *PAC50* in the left column.

c) Click on icon 🖼 *Measuring (Online)*.

d) Click on button *Calibrate Media* below the visualization.

　✓ Dialog window opens.

```
┌─ Calibrate media ─────────────────────────────────────────────┐
│                                                                │
│  Select range              │ Range 1          │ ▼ │           │
│                                                                │
│ ───────────────────────────────────────────────────────────  │
│                                                                │
│           Temperature           Conductivity                  │
│                                                                │
│   1.  │           │  °C    │           │  µS/cm  │ Measure │   │
│   2.  │           │  °C    │           │  µS/cm  │ Measure │   │
│   3.  │           │  °C    │           │  µS/cm  │ Measure │   │
│                                                                │
│                          │ Calculate │                        │
│                                                                │
│              S1        % / K      % / K²     Target temperature│
│                                                                │
│   Range 1    0        │ 0.00 │  │ 0.000000000 │  │ 25.00 │ °C  │
│   Range 2    1        │ 2.00 │  │ 0.000000000 │  │ 25.00 │ °C  │
│                                                                │
└────────────────────────────────────────────────────────────────┘
```

e) Select the calibration range from the Drop-Down menu *Select range*.

f) Start the measuring operation by clicking on button *Measure*.
　Repeat the measuring operation in the same medium at 3 different temperatures
　NOTICE! . In each measuring operation, the sensor tip must be immersed in the medium for at least 1 minute.

g) Calculate the media temperature compensation by clicking on button *Calculate*.
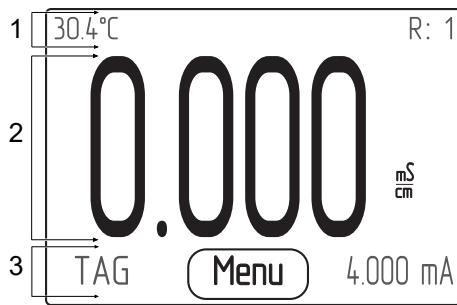
Result:

✓ Calibration completed.

INFO

Helpdesk *FlexProgram*

For more information, see the ***Help*** menu *FlexProgram*.

10   Description Display

Ill. 4: Display

1	Status bar	2	Main section
3	Additional bar		

System parameters and measured values are indicated on the display.

The display is divided into 3 sections:

- **Status bar**
  Display of selected range R1/R2, media temperature or TAG.
- **Main area**
  The following measured values are displayed in the main area depending on the selected display view:
  - Conductivity
  - Concentration
  - Details
  - Medium
  - Measuring point
  - Bar chart
- **Additional bar**
  Display of measuring unit, analog output 4 ... 20 mA or TAG. Clicking on the additional bar opens the display menu.

Clicking the additional bar opens the display menu.

INFO
By default, TAG provides the text on the product label / nameplate. This can be individually changed via IO-Link or in the *FlexProgram*.

10.1   Display status bar

The status bar in the display provides the following pictograms:

R: Display of defined range R1/R2.

10.2   Display screen layout

The screen layout can be defined via *Menu | Display setup | Screen layout*.

You can select the following display views:

View	Object settings
30.4°C R: 1 0.000 mS/cm User label 4.000 mA	▪ *Value (large) + det*
R: 1 0.000 mS/cm	▪ *Value (large)*
User label R: 1 0.000 mS/cm 30.6 °C 4.000 mA	▪ *Value, Temp + Tag*
R: 1 Media1 Label User label	▪ *Media label + tag*
30.4°C R: 1 Undef Label 0.000 mS/cm 4.000 mA	▪ *Media label + det*

Visual display of alarm messages

–149.0 °C R: 1 ERROR Error: 0x00000006 App Specific 3.500 mA	▪ Red background and error message

Also see about this

📄 Error alarms [▶ 41]

10.3   Display menu navigation
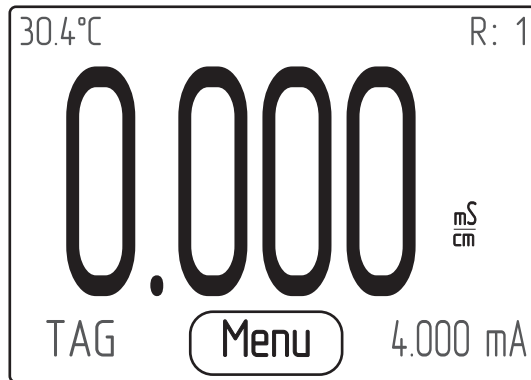
The button **Menu** appears by pressing the display on the additional bar. Click on **Menu** to open the display menu. Navigation in the menu and selection of functions on the display is using the following buttons:

Enter / Set	■ Open menus.
	■ Activate value editing.
	■ Confirm selection.
	■ Confirm entries.
	■ Activation/deactivation of functions.
Arrow buttons (up/down)	■ Selection of menus and functions.
	■ Set values.
Arrow buttons (left/right)	■ Select values.
	■ Set values.
Back	■ Close menus.
	■ Cancel selection.

10.4   Menu structure
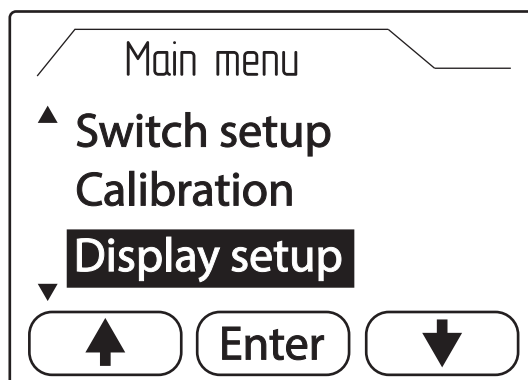
The display menu enables access to important system parameters and sensor settings. Pressing the additional bar on the display opens button **Menu**. Click on **Menu** to open the display menu.

The following can be selected from the display menu:

- ■ *Basic Setup*
- ■ *Input Setup*
- ■ *Output Setup*

- ▪ *Switch Setup*
- ▪ *Display Setup*
- ▪ *Calibration*
- ▪ *Identification*
- ▪ *Diagnostics*

10.4.1   Submenu *Basic setup*
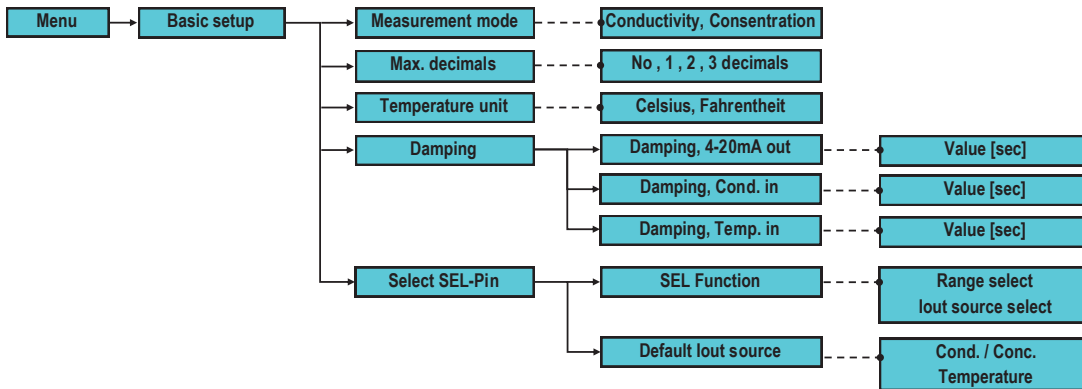
Submenu *Basic setup* is for basic sensor parameterization.

Measurement mode	▪ **Measuring mode**: ▪ Select measuring mode.
Max. decimals	▪ **Decimal Places**: ▪ Define number of decimal digits assigned to the measured values.
Temperature unit	▪ **Temperature unit**: ▪ Select temperature unit.
Damping	▪ **Damping**: ▪ Select damping settings.
Select SEL pin	▪ **Multifunction input**: ▪ Select function of multifunction input (**Select**, see pin assignment) Defines whether the multifunction input will trigger the switching operations between range 1 and 2 or as current output between temperature and conductivity.

10.4.2   Submenu *Input setup*
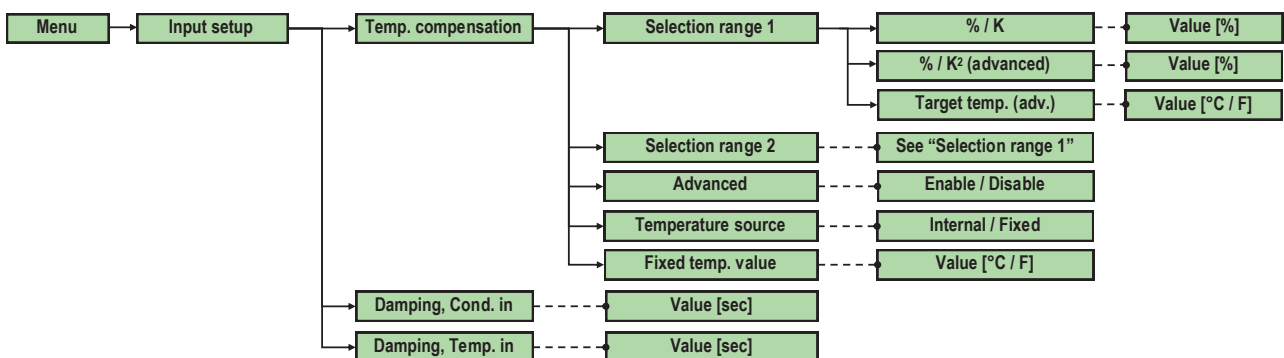
Submenu *Input setup* is for parameterization of the sensor inputs.

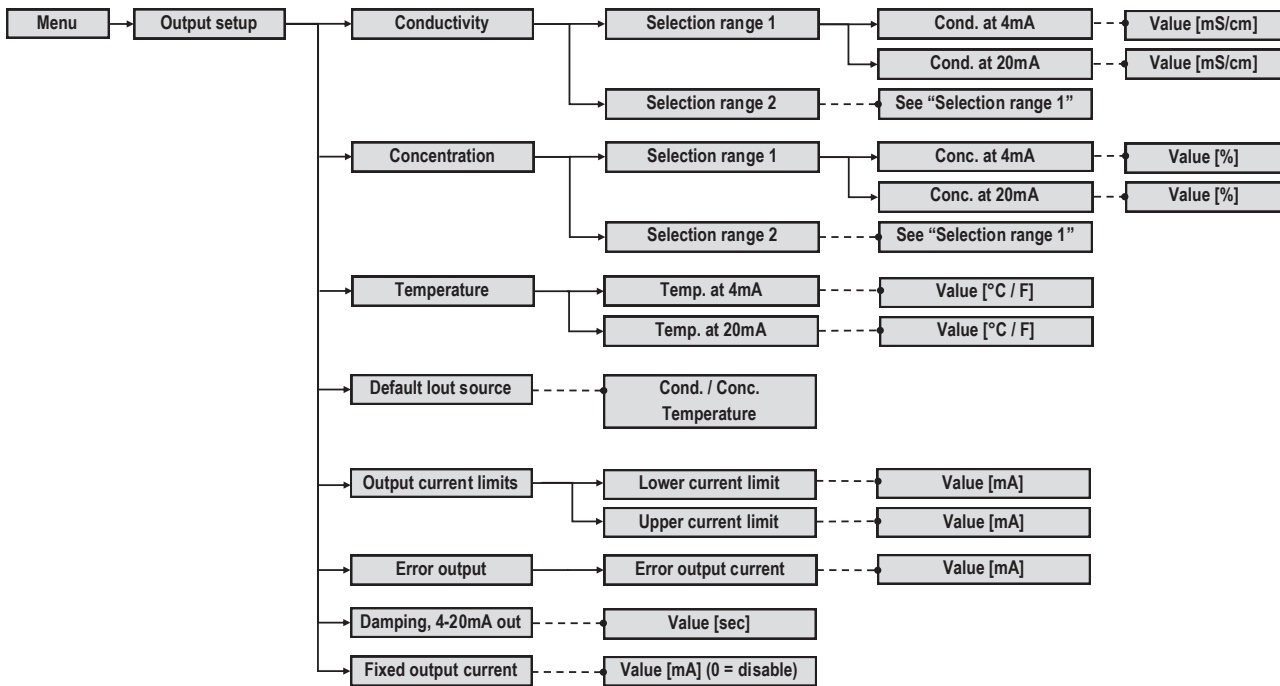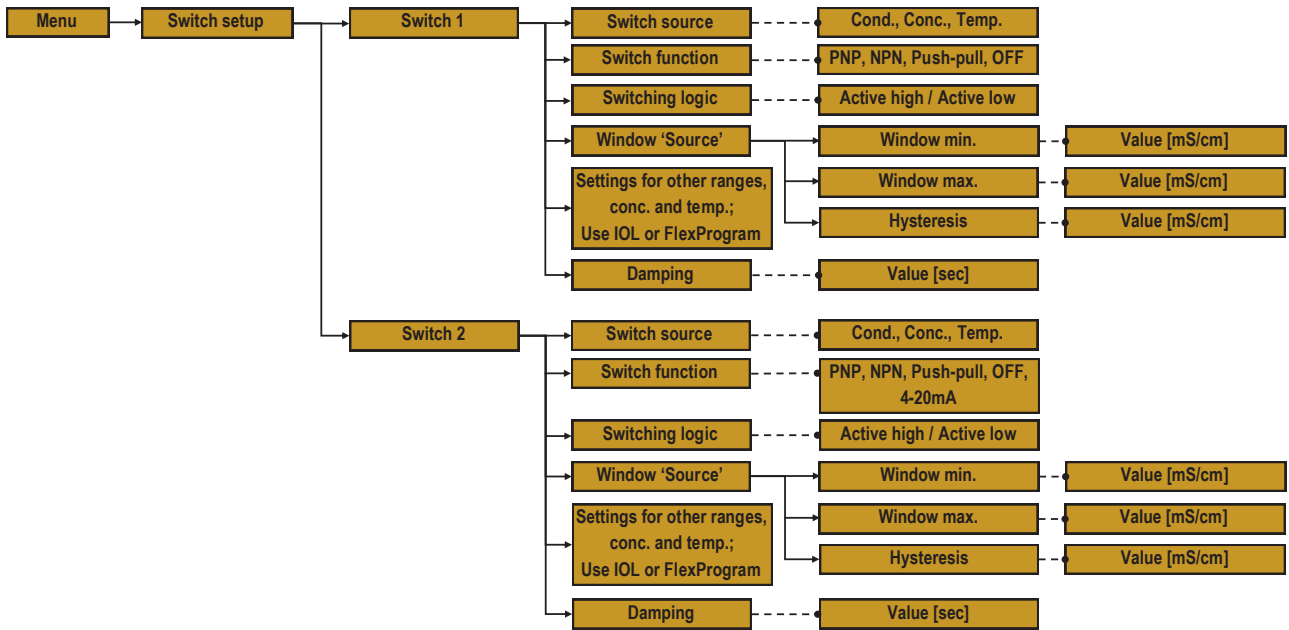|	
Temp. compensation	▪ **Temperature compensation**: ▫ Setting and parameterization of the temperature compensation.
Damping, Cond. in	▪ **Damping parameter for conductivity**: ▫ Input of damping parameter for conductivity.
Damping, Temp. in	▪ **Damping value for temperature**: ▫ Input of damping parameter for temperature.

10.4.3 Submenu *Output setup*

```
Menu → Output setup → Conductivity → Selection range 1 → Cond. at 4mA --- Value [mS/cm]
                                                          Cond. at 20mA --- Value [mS/cm]
                                      Selection range 2 ---- See "Selection range 1"

                    → Concentration → Selection range 1 → Conc. at 4mA --- Value [%]
                                                           Conc. at 20mA --- Value [%]
                                       Selection range 2 ---- See "Selection range 1"

                    → Temperature → Temp. at 4mA ---- Value [°C / F]
                                    Temp. at 20mA ---- Value [°C / F]

                    → Default Iout source ---- Cond. / Conc.
                                               Temperature

                    → Output current limits → Lower current limit ---- Value [mA]
                                               Upper current limit ---- Value [mA]

                    → Error output → Error output current ---- Value [mA]

                    → Damping, 4-20mA out ---- Value [sec]

                    → Fixed output current ---- Value [mA] (0 = disable)
```

Submenu **Output setup** is for parameterization of the sensor outputs.

Conductivity	▪ **Conductivity**: ▫ Setting the conductivity values.
Concentration	▪ **Concentration**: ▫ Setting the concentration values.
Temperature	▪ **Temperature**: ▫ Setting the temperature values.
Default Iout source	▪ **Iout source:** ▫ Setting the standard Iout source (conductivity, concentration or temperature).
Output current limits	▪ **Limit output**: ▫ Setting of the output max and min current limit.
Error output	▪ **Error indication**: ▫ Set the current parameters at which an error is indicated.
Damping, 4-20mA out	▪ **Damping of 4-20mA current output**: ▫ Settings of linear damping at the 4-20mA current output.
Fixed output current	▪ **Correction value**: ▫ Enter tolerance value for error indication.

10.4.4   Submenu *Switch setup*

```
Menu  →  Switch setup  →  Switch 1  →  Switch source      ------ Cond., Conc., Temp.
                                       Switch function    ------ PNP, NPN, Push-pull, OFF
                                       Switching logic    ------ Active high / Active low
                                       Window 'Source'    →  Window min.  -- Value [mS/cm]
                         Settings for other ranges,          Window max.     Value [mS/cm]
                         conc. and temp.;                    Hysteresis      Value [mS/cm]
                         Use IOL or FlexProgram
                                       Damping            ------ Value [sec]

                         Switch 2  →  Switch source      ------ Cond., Conc., Temp.
                                       Switch function    ------ PNP, NPN, Push-pull, OFF,
                                                                 4-20mA
                                       Switching logic    ------ Active high / Active low
                                       Window 'Source'    →  Window min.  -- Value [mS/cm]
                         Settings for other ranges,          Window max.  -- Value [mS/cm]
                         conc. and temp.;                    Hysteresis   -- Value [mS/cm]
                         Use IOL or FlexProgram
                                       Damping            ------ Value [sec]
```

Submenu ***Switch setup*** is for parameterization of the sensor's the switching behavior.
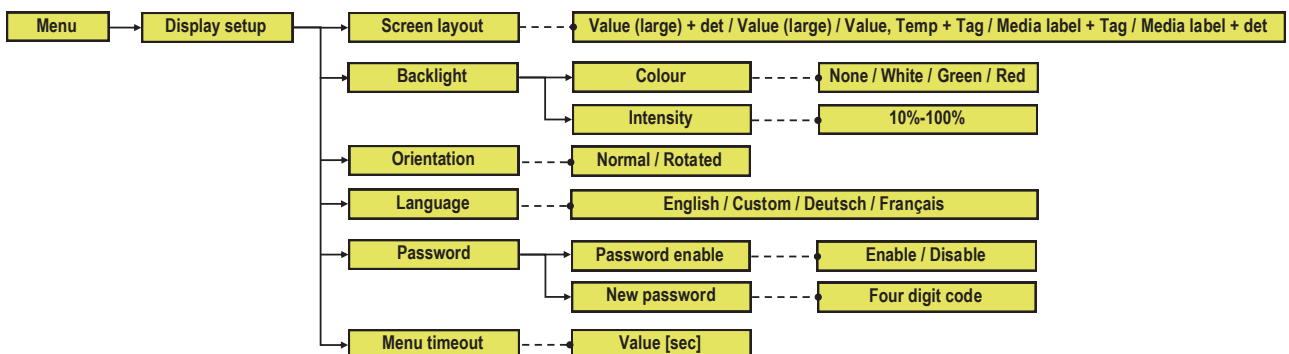
| *Switch 1*	▪ **Switch 1**: Selection of functions and values for the sensor switching behavior at Switch 1: ▪ Switching source ▪ Switching function ▪ Switching logic ▪ Window setup of selected source (Conductivity/Concentration/Temperature) ▪ Damping
Switch 2	▪ **Switch 2**: Selection of functions and values for the sensor switching behavior at Switch 2: ▪ Switching source ▪ Switching function ▪ Switching logic ▪ Window setup of selected source (Conductivity/Concentration/Temperature) ▪ Damping

10.4.5   Submenu *Display setup*

```
Menu  →  Display setup  →  Screen layout  ------ Value (large) + det / Value (large) / Value, Temp + Tag / Media label + Tag / Media label + det
                           Backlight     →  Colour     ------ None / White / Green / Red
                                            Intensity  ------ 10%-100%
                           Orientation   ------ Normal / Rotated
                           Language      ------ English / Custom / Deutsch / Français
                           Password      →  Password enable ------ Enable / Disable
                                            New password    ------ Four digit code
                           Menu timeout  ------ Value [sec]
```

Submenu **Display setup** is for configuration of the sensor display layout.

|	
Screen layout	▪ **Display layout**: ▫ Setting the display layout.
Backlight	▪ **Backlight color**: ▫ Setting the display backlight color. ▫ Setting the display brightness.
Orientation	▪ **Orientation**: ▫ Select display orientation.
Language	▪ **Language selection**: ▫ *English*: English ▫ *German*: German ▫ *Français*: French ▫ *Custom*: Customized
Password	▪ **Password** ▫ Activate protection by password. ▫ Setting a password.
Menu timeout	▪ **Menu Timeout** ▫ Setting the inactivity timeout for lock of display menu. Password required.

10.4.6 Submenu *Calibration*
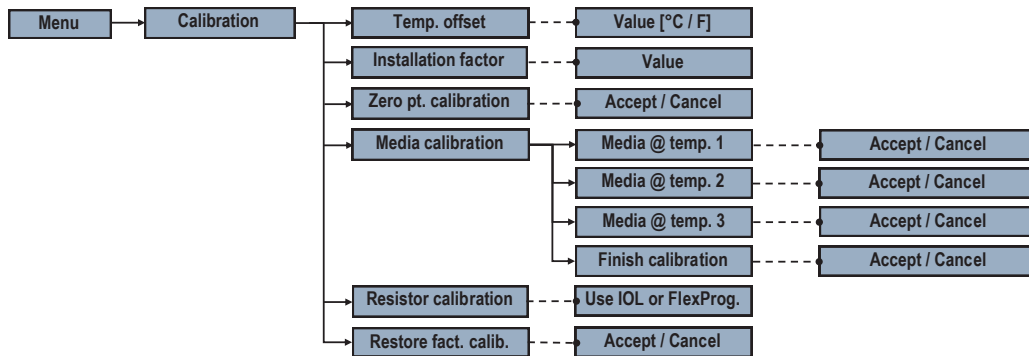
Submenu **Calibration** is for sensor calibration.

|	
Temp. offset	▪ **Temperature offset**: Enter the temperature offset.
Installation factor	▪ **Installation factor**: Enter the value to adapt the sensor to the installation conditions.
Zero pt. calibration	▪ **Zero point calibration**
Media calibration	▪ **Media calibration**
Resistor calibration	▪ **Resistance calibration**
Restore fact. calib	▪ **Restoring the factory calibration**

10.4.7   Submenu *Identification*
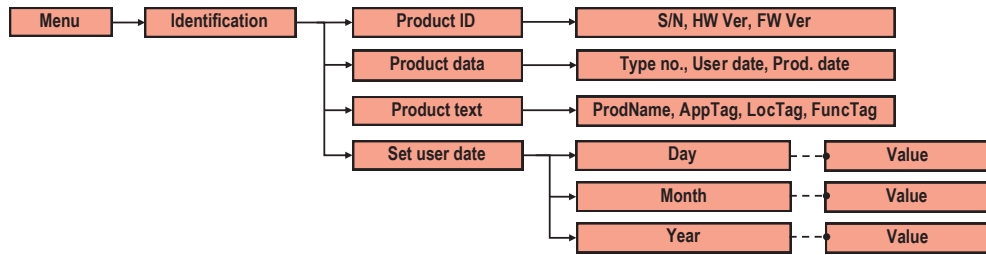
Submenu ***Identification*** is for setting the date and for indicating the product data.

Product ID	▪ **Product identification**: Provides information on product identification.
Product data	▪ **Product data**: Provides information on product data.
Product text	▪ **Product text**: Provides sensor information.
Set user date	▪ **Date**: To indicate and enter the date.

10.4.8   Submenu *Diagnostics*
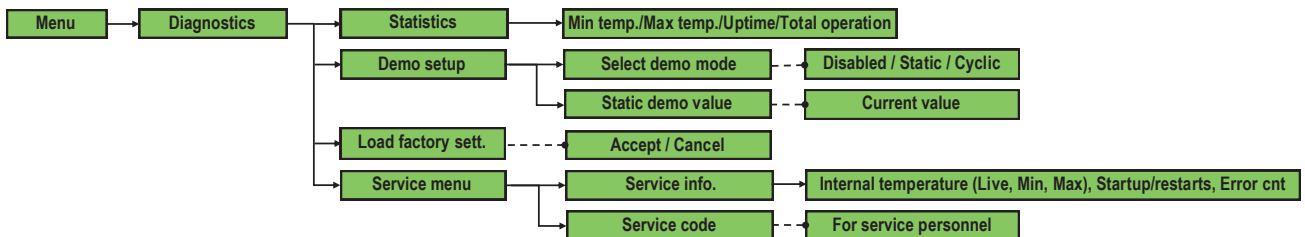
Submenu ***Diagnostics*** is for administration of diagnostic settings.

Statistics	▪ **Statistics**: Provides statistical data of the flow sensor.
Demo setup	▪ **Demo mode**: for selection and setting of the sensor demo mode.
Load factory sett.	▪ **Factory settings**: Restores the sensor factory settings.
Service menu	▪ **Service menu**: only available to servicing personnel.

11   Preventive maintenance

11.1   Maintenance chart

Interval	Maintenance work
Weekly	Check and clean the plugged connections.
Weekly	Check the sensor upon firm installation and the installation site upon tightness.
Regularly depending on require-ments and operating conditions	Check the weld-in sleeves: ▪ Clean the weld-in sleeves. ▪ Check alignment of the weld-in sleeves. ▪ Make sure the weld-in sleeves are mounted in a way al-lowing for automatic draining.
	Calibrate the sensor.

11.2   Cleaning the sensor

Outside cleaning

When cleaning the outside of the sensor, make sure to use cleaning agents that do not affect housing surface and seals.

NOTICE

Material damage due to improper cleaning.
Unsuitable cleaning agents and methods can cause leaks and damage the rotary encoder, the seals or the connections.

  a) Always check the suitability of the cleaning agent for the surface to be cleaned.

  b) Do not use scouring agents, solvents or other aggressive cleaning agents.

  c) Do not scrape off soiling with sharp-edged items.

Inside cleaning

Clean, disinfect or sterilize sensor if required (CIP/SIP).

Cleaning the display

Observe the following when cleaning the display:
▪ Use a soft cloth for cleaning.
▪ When using cleaning agents, apply them on the cloth instead of directly on the display.
▪ Always wipe the display from the inside out.
▪ The display requires regular disinfection.

11.3   Sensor calibration

The sensor has been factory-calibrated at Baumer prior to delivery. As an option, a 5-point con-ductivity calibration certificate and/or a 3-point temperature calibration certificate can be ordered to come with the sensor.

According to the prevailing operating conditions and requirements, the sensor may require regular recalibration to ensure proper functionality. The relevant intervals for recalibration, if any, must be defined by the user according to the very individual requirements.

There are different options for sensor calibration:

- Sensor calibration at Baumer (return sensor for maintenance)
- Sensor calibration with the aid of a reference sensor
- Sensor calibration with the aid of a reference medium
- Sensor calibration using the Baumer calibration box (dry calibration)

11.3.1   Sensor calibration with the aid of a reference sensor

In this method, the medium values for conductivity and temperature are measured both by an appropriate reference sensor and the sensor which is to be calibrated. Deviations in the two measurement results are saved as offset in the sensor to be calibrated.

INFO

This task can be done either using the *FlexProgram* or via IO-Link (e.g. *BSS*). The following example shows calibration with *FlexProgram*.
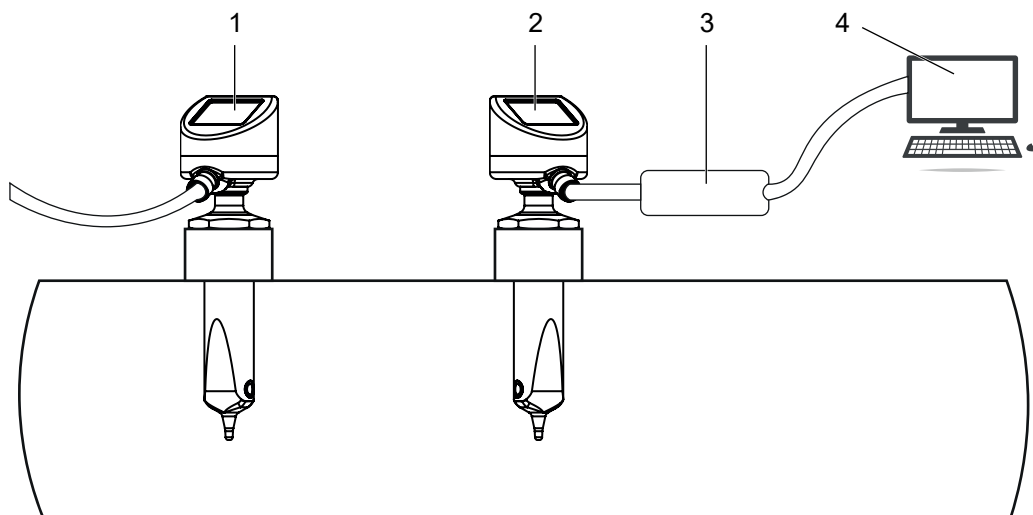
1	Reference sensor	2	PAC50
3	FlexProgrammer	4	PC with FlexProgram

Condition:

⇨ The sensor is connected to a PC with software *FlexProgram* installed.

⇨ The sensor and the reference sensor are mounted in one medium.

Instruction:

a) Open software *FlexProgram* on the PC.

b) Open setting *PAC50* in the left column.

c) Click on icon 🔲 *Measuring (Online)*.

d) Click on button *Calibrate Sensor* below the visualization.

  ✓ Dialog window opens.

e) Navigate to *Calibrate offset*.

```
┌─ Calibrate offset ────────────────────────────────────────────────────┐
│                                                                        │
│  Input externally measured conductivity or temperature, and press the  │
│  respective Calibrate button. Alternatively the offset can be input    │
│  manually in the input dialog.                                         │
│                                                                        │
│  Conductivity                                                          │
│  ┌──────────────┐    µS/cm      ┌──────────────┐                        │
│  │              │               │   Calibrate  │                        │
│  └──────────────┘               └──────────────┘                        │
│  Temperature                                                           │
│  ┌──────────────┐    °C         ┌──────────────┐                        │
│  │              │               │   Calibrate  │                        │
│  └──────────────┘               └──────────────┘                        │
└────────────────────────────────────────────────────────────────────────┘
```

f) Enter the conductivity value measured by the reference sensor.
For air calibration enter 0.

g) Click on **Calibrate**.

h) Enter the temperature measured by the reference sensor.

i) Click on **Calibrate**.

Result:

✓ Calibration completed.

INFO

Helpdesk *FlexProgram*

For more information, see the **Help** menu *FlexProgram*.

INFO

Alternatively the offset value, i.e. the divergence between the two measurement results of reference sensor and sensor to be calibrated, can be directly entered in the *Input*-settings.

Also see about this

📄 Reset user calibration [▷ 39]

11.3.2 **Sensor calibration with the aid of a reference medium**

In this method, sensor calibration uses an appropriate reference medium.

INFO

This task can be done either using the *FlexProgram* or via IO-Link (e.g. *BSS*). The following example shows calibration with *FlexProgram*.

Condition:

⇨ The sensor is connected to a PC with software *FlexProgram* installed.

⇨ The sensor is mounted in a medium.

⇨ The medium's conductivity is known.

Instruction:

a) Open software *FlexProgram* on the PC.

b) Open setting *PAC50* in the left column.

c) Click on icon 🗺 **Measuring (Online)**.

d) Click on button **Calibrate Sensor** below the visualization.

✓ Dialog window opens.

e) Navigate to **Calibrate offset**.

f) Enter the given conductivity value of the reference medium in field **Conductivity**.

g) Click on **Calibrate**.

Result:

✓ Calibration completed.

INFO

Helpdesk *FlexProgram*

For more information, see the **Help** menu *FlexProgram*.

Also see about this

📄 Reset user calibration [▷ 39]

11.3.3   Sensor calibration using the Baumer calibration box

In this method, sensor calibration uses calibrated resistors (dry calibration). For doing so, deinstall the sensor.

INFO

This task can be done either using the *FlexProgram* or via IO-Link (e.g. *BSS*). The following example shows calibration with *FlexProgram*.

Condition:

⇨ The sensor is connected to a PC with software *FlexProgram* installed.

⇨ The sensor is switched on.

⇨ The calibration box with measurement record is ready for use.

Instruction:

a) Open software *FlexProgram* on the PC.

b) Open setting *PAC50* in the left column.

c) Click on icon 📟 **Measuring (Online)**.

d) Click on button **Calibrate Sensor** below the visualization.

✓ Dialog window opens.

e) Navigate to **Resistance calibration section**.

f) Select the required number of measuring points (calibration points) per measuring range from the drop-down list **Calibration points per range**.

g) Insert the cable of the calibration box into the bore hole receiving the medium.
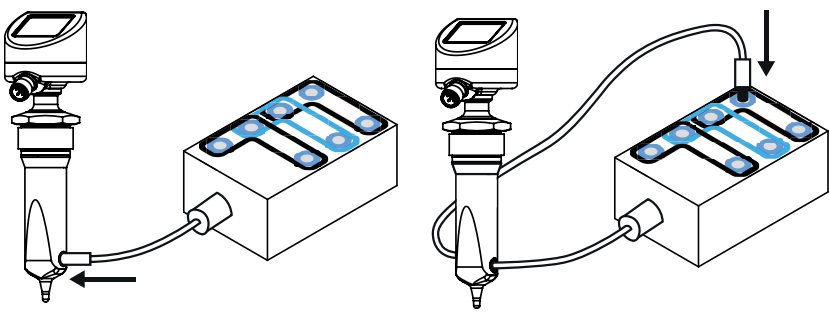
h) Connect the cable plug with the first calibration point in the measuring range (see box mark).
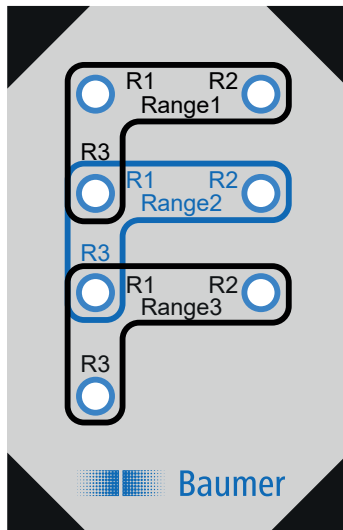
i) Enter the measured resistance value according to the measuring record of the calibration box in the text field.

j) Click on **Calibrate**.

k) Repeat steps i to k for all measuring points that are to be measured.
Connect the cable plug with the corresponding resistor.

l) Press button **Finalize calibration**.

Result:

✓ Calibration of measuring range completed.

INFO

This calibration method does not consider any change in the sensor geometry (e.g. by abrasion). If the sensor tip changes dimensions, the measured conductivity value will be different from the previous one measured with the original tip geometry.

Any change in geometry can be compensated with the *installation factor*.

INFO

Helpdesk *FlexProgram*

For more information, see the **Help** menu *FlexProgram*.

Also see about this

📄 Reset user calibration [▶ 39]

11.3.4   Reset user calibration

INFO

This task can be done either using the *FlexProgram* or via IO-Link (e.g. *BSS*). The following example shows calibration with *FlexProgram*.

Instruction:

a) Open software *FlexProgram* on the PC.

b) Open setting *PAC50* in the left column.

c) Click on icon 📊 **Measuring (Online)**.

d) Click on button **Reset User Calibration** below the visualization.

Result:

    ✓ The calibration is reset to the factory state. Offsets are set to 0.

Result:

    ✓ The calibration is reset to the factory state. Offsets are set to 0.

12 Troubleshooting

12.1 Error messages

During operation, the sensor monitors itself.

Any error having occurred is indicated on the display.

What to do in the event of error

Instruction:

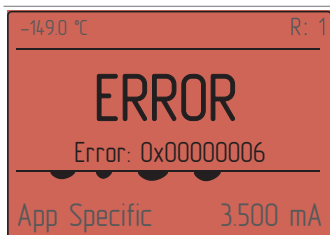 ◆ Note the error code and contact your Baumer sales company.

Also see about this

  📄 Error alarms [▶ 41]

12.2 Error alarms

There are two types of errors:

  ▪ **MEM ERROR!** means memory damage and the device is no longer operational.

  ▪ **ERROR!** comes together with an error code.

In the event of error, always contact your Baumer sales company.

12.3 Return and repair

In case of complaints, please contact the relevant sales company.

List of illustrations

Glossary

Baumer

Passion for Sensors

www.baumer.com/worldwide