

Brief Operating Instructions Nivotester FTL325P, 3-channel

Vibronic

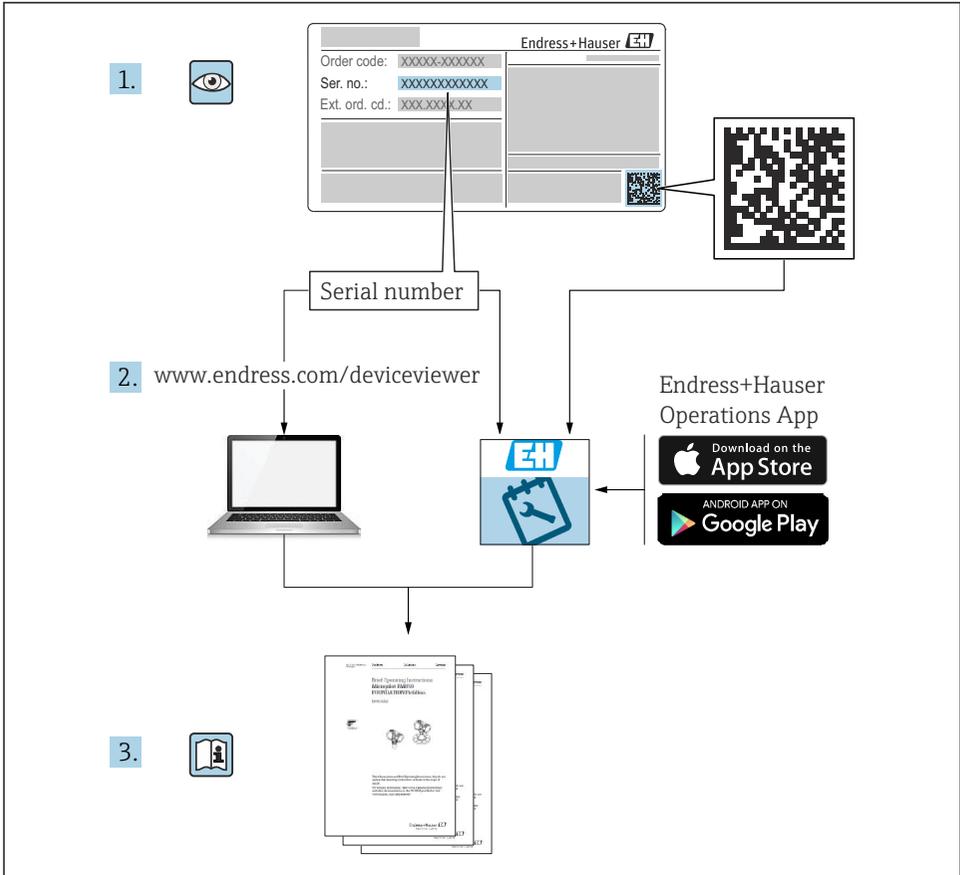
Level detector with PFM input and intrinsically safe signal circuit



These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

Detailed information about the device can be found in the Operating Instructions and the other documentation:
Available for all device versions via:

- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*



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1 About this document

1.1 Symbols

1.1.1 Safety symbols



This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.



This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE

This symbol contains information on procedures and other facts which do not result in personal injury.

1.1.2 Electrical symbols

⊥ Ground connection

⊥ Grounded clamp, which is grounded via a grounding system.

⊕ Protective earth (PE)

Ground terminals, which must be grounded prior to establishing any other connections. The ground terminals are located on the inside and outside of the device.

↻ Output

↻ Input

⌋ Fault

✂ No fault

▶ Limit signal

Light emitting diodes (LED)

● LED not lit

☀ LED lit

✂ LED flashing

1.1.3 Symbols for certain types of information and graphics

i Tip

Indicates additional information

📖 Reference to documentation

📄 Reference to another section

1, 2, 3 Series of steps

A, B, C ... View

⚠ Hazardous area

✂ Safe area (non-hazardous area)

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel must fulfill the following requirements to carry out their tasks, e. g. commissioning and maintenance:

- ▶ Trained specialists must have a qualification that is relevant to the specific function and task.
- ▶ Must be authorized by the plant owner/operator.
- ▶ Must be familiar with national regulations.
- ▶ Must have read and understood the instructions in the manual and supplementary documentation.
- ▶ Personnel must follow instructions and comply with general policies.

2.2 Designated use

- Use only as a transmitter supply unit
- Use only for point level switches from Endress+Hauser with two-wire-PFM signal
- Use only tools that have been insulated against ground
- Use only original parts

2.2.1 Incorrect use

The manufacturer is not liable for damage caused by improper or non-designated use.

Deviating application conditions may affect the level of protection. The correct functioning of the device cannot be guaranteed.

2.3 Workplace safety

For work on and with the device:

- ▶ Wear the required protective equipment according to federal/national regulations.

2.4 Operational safety

Risk of injury!

- ▶ Operate the device only if it is in proper technical condition, free from errors and faults.
- ▶ The operator is responsible for ensuring failure-free operation of the device.

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers.

- ▶ If, despite this, modifications are required, consult with Endress+Hauser.

Repair

To ensure continued operational safety and reliability:

- ▶ Only perform repair work on the device if this is expressly permitted.
- ▶ Observe federal/national regulations pertaining to the repair of an electrical device.
- ▶ Use original spare parts and accessories from Endress+Hauser only.

2.5 Product safety

This device has been constructed and tested to state-of-the-art operational safety standards and in accordance with good engineering practice. The device left the factory in a safe operating condition.

2.5.1 CE mark

The device meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

2.5.2 EAC conformity

The device meets the legal requirements of the applicable EAC Directives. These are listed in the corresponding EAC Declaration of Conformity along with the standards applied. Endress+Hauser confirms successful testing of the device by affixing to it the EAC mark.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

Check the following during goods acceptance:

- Are the order codes on the delivery note and the product sticker identical?
- Are the goods undamaged?
- Do the nameplate data match the ordering information on the delivery note?
- If necessary (see nameplate), are the Safety Instructions, e. g. XA, provided?



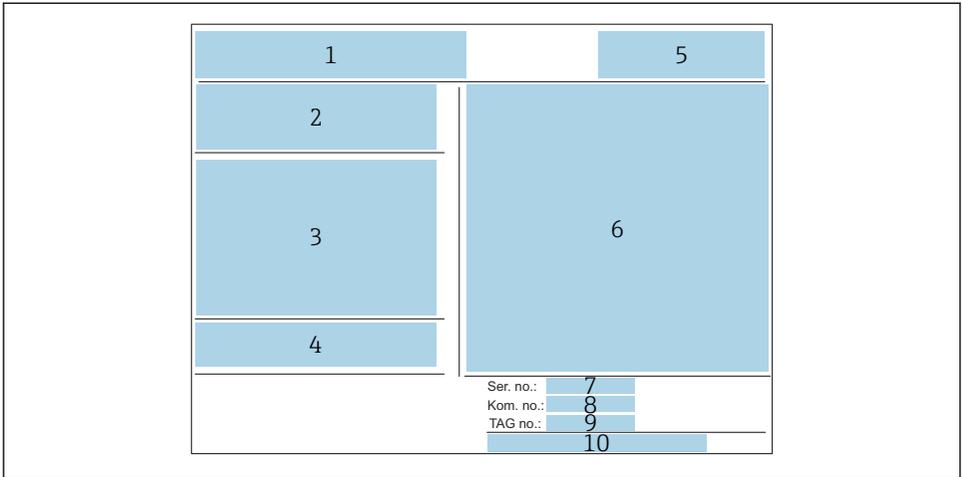
If one of these conditions is not satisfied, contact your Sales Center.

3.2 Product identification

Nameplate data on the device

- ▶ Enter the serial number of the nameplates into *W@M Device Viewer* www.endress.com/deviceviewer
 - ↳ All information about the measuring device and the scope of the associated Technical Documentation is displayed.
- ▶ Enter the serial number from the nameplate in the *Endress+Hauser Operations app*.
 - ↳ All information about the measuring device and the scope of the associated Technical Documentation is displayed.

3.2.1 Nameplate



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1 Nameplate

- 1 *Manufacturer's logo, product name*
- 2 *Supply voltage*
- 3 *Electrical connection*
- 4 *Temperature specifications and reference to additional safety-related documentation (only for certified device versions)*
- 5 *Reference to certifications*
- 6 *Identification in accordance with Directive 94/9/EC and identification of type of explosion protection (only for certified device versions)*
- 7 *Serial number*
- 8 *Kom. number*
- 9 *TAG number*
- 10 *Manufacturer's address*

3.2.2 Manufacturer address

Endress+Hauser SE+Co. KG
 Hauptstraße 1
 79689 Maulburg, Germany

Place of manufacture: See nameplate.

3.3 Storage, transport

- Pack the device so that it is protected against impact
 The original packaging offers the best protection
- Permitted storage temperature: -20 to +85 °C (-4 to +185 °F)

3.3.1 Transporting the product to the measuring point

Transport the measuring device to the measuring point in the original packaging.

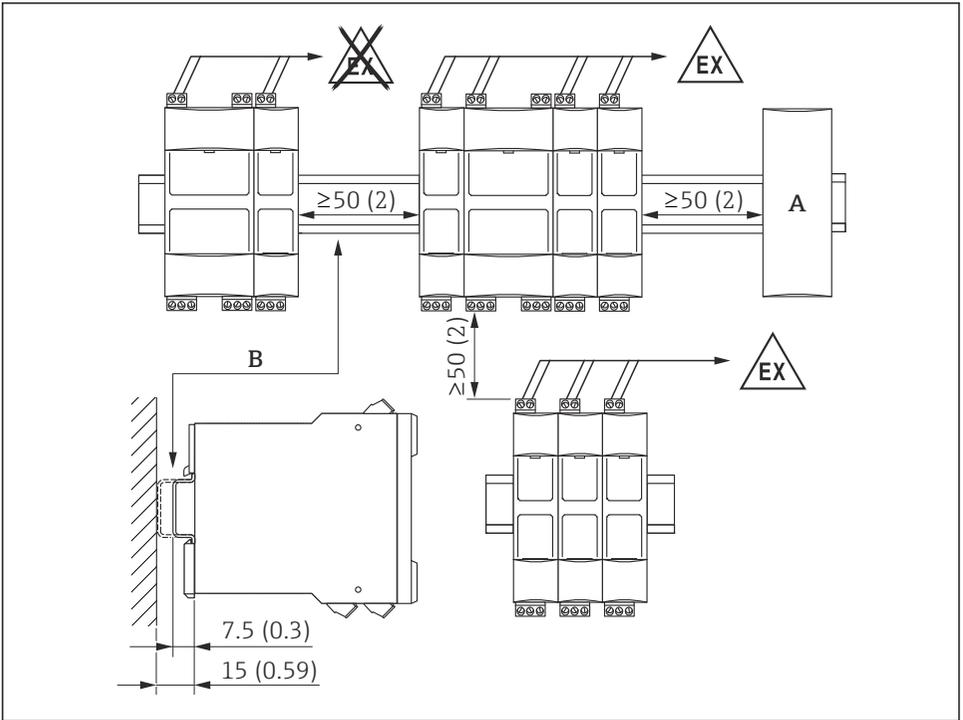
4 Installation

4.1 Mounting conditions

- If using outside the hazardous area, mount the device in a cabinet.
- Mount the device so that it is protected against weather and impact.
If operating outdoors and in warmer climates, avoid direct sunlight.
Protective housing (IP65) is available for up to four single-channel Nivotester devices or two 3-channel Nivotester devices.

4.2 Mounting the measuring device

4.2.1 Horizontal orientation



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2 Minimum spacing, horizontal orientation. Unit of measurement mm (in)

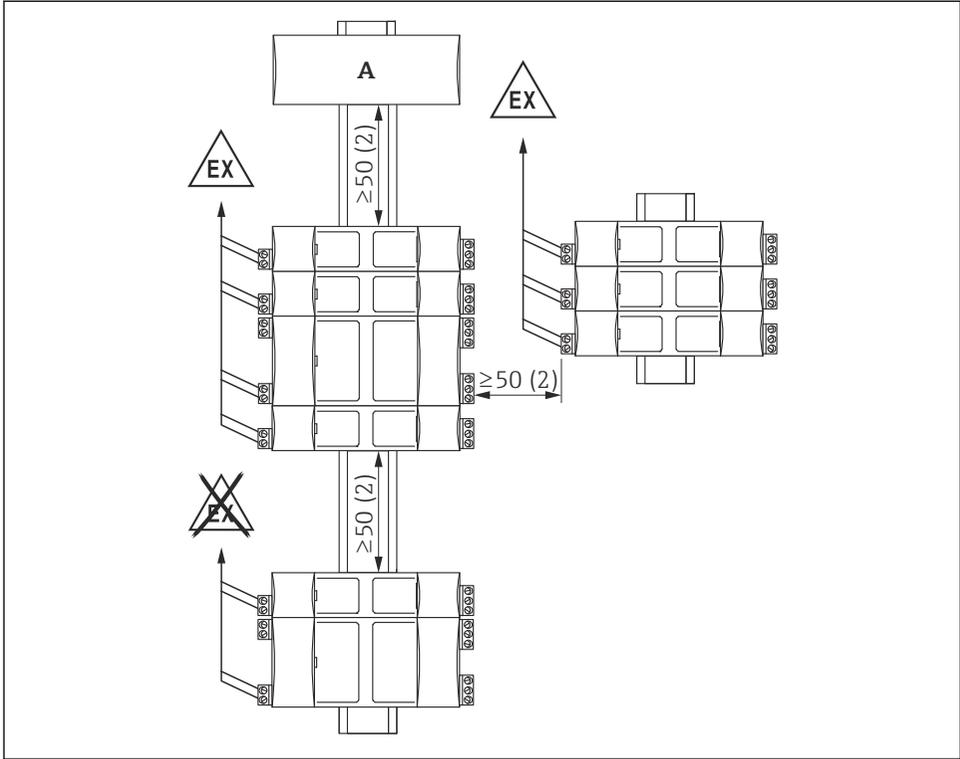
A Connection of another device type

B DIN rail in accordance with EN 60715 TH35-7.5/15



A horizontal installation ensures better dissipation of heat than a vertical orientation.

4.2.2 Vertical orientation

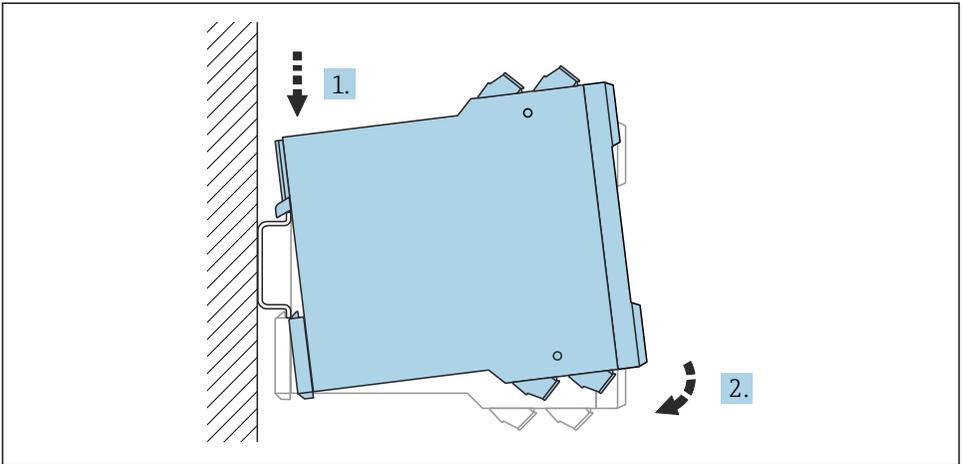


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3 Minimum spacing, vertical orientation. Unit of measurement mm (in)

A Connection of another device type

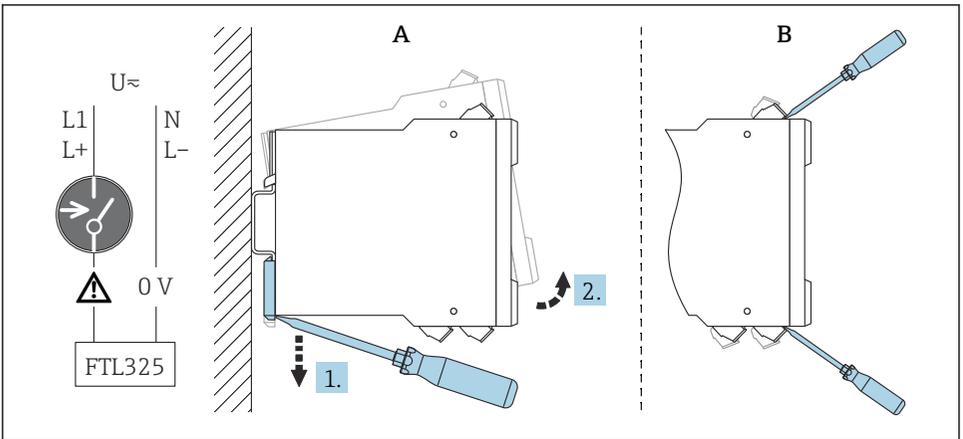
4.2.3 Mounting the device



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4 Mounting; DIN rail as per EN 60715 TH35-7.5/EN 60715 TH35-15

4.2.4 Removing the device



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5 Removing

A Remove from DIN rail.

B For quick replacement of devices without a cable, remove the terminal strips.

4.3 Post-installation check

Is the measuring device undamaged (visual inspection)?

Does the measuring device conform to the measuring point specifications?

For example:

- Supply voltage
- Ambient temperature range

Are the measuring point number and labeling correct (visual inspection)?

Is the measuring device adequately protected against precipitation and direct sunlight?

5 Electrical connection

5.1 Connection conditions

WARNING

Risk of explosion due to faulty connection.

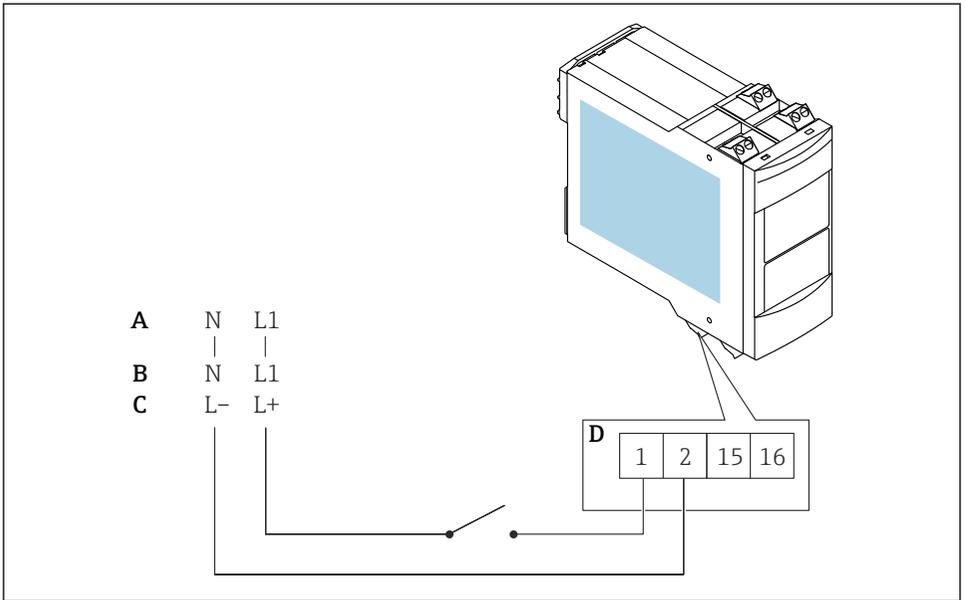
- ▶ Observe applicable national standards.
- ▶ Comply with the specifications in the Safety Instructions (XA).
- ▶ Check to ensure that the power supply matches the information on the nameplate.
- ▶ Switch off the supply voltage before connecting.
- ▶ When connecting to the public mains, install a mains switch for the device such that it is within easy reach of the device. Mark the power switch as a disconnecter for the device (IEC/EN61010).

5.2 Connecting the measuring device

 The removable terminal blocks are color-coded into intrinsically safe and non-intrinsically safe terminals. This difference helps to ensure safe wiring.

5.2.1 Arrangement of terminals

 Observe the specifications on the nameplate of the device.

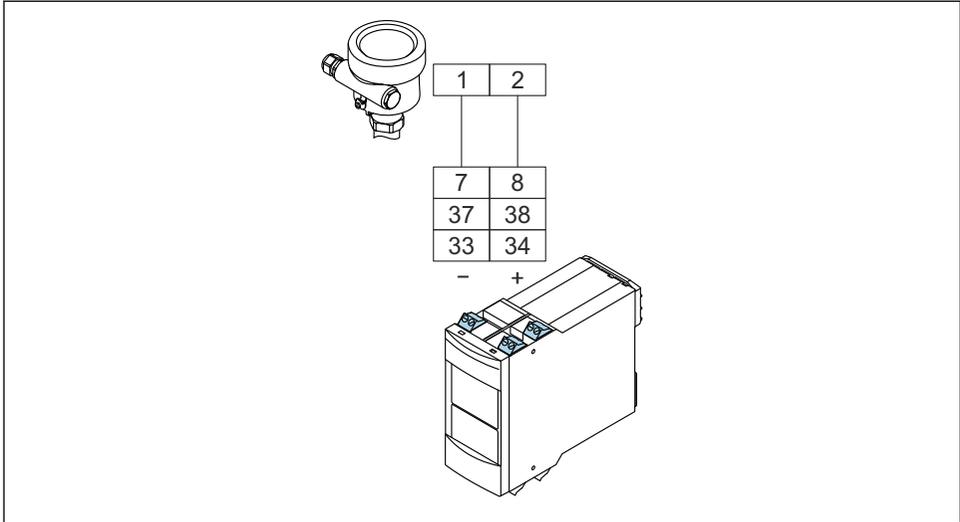


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6 Arrangement of terminals

- A $U \sim 85$ to $253 V_{AC}$, 50/60 Hz
 B $U \sim 20$ to $30 V_{AC}$, 50/60 Hz
 C $U = 20$ to $60 V_{DC}$
 D Max. 1.5 mm^2 (max. AWG 16)

5.2.2 Connecting the sensor



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7 Connecting the sensor to the Nivotester

Connectable sensors:

- Liquiphant FTL51B, FTL62, FTL64 with FEL67
- Liquiphant M FTL50(H), FTL51(H), FTL51C with FEL57
- Liquiphant S FTL70/71 with FEL57
- Soliphant M FTM50, FTM51, FTM52 with FEM57

Blue terminal blocks at top for hazardous area

- Twin-core connecting cable between the Nivotester and sensor, e. g. commercially available instrument cable or cores in a multi-core cable for measurement purposes
- Use a shielded cable in the event of increased electromagnetic interference, e. g. from machines or radio equipment. Only connect the shield to the grounding terminal in the sensor. Do not connect it to the Nivotester.

5.2.3 Connecting the signal and control systems

Gray terminal blocks at bottom for the non-hazardous area

Relay function depending on the level and safety mode

If a device with high inductance is connected (e. g. contactor, solenoid valve), a spark arrestor must be installed to protect the relay contact .

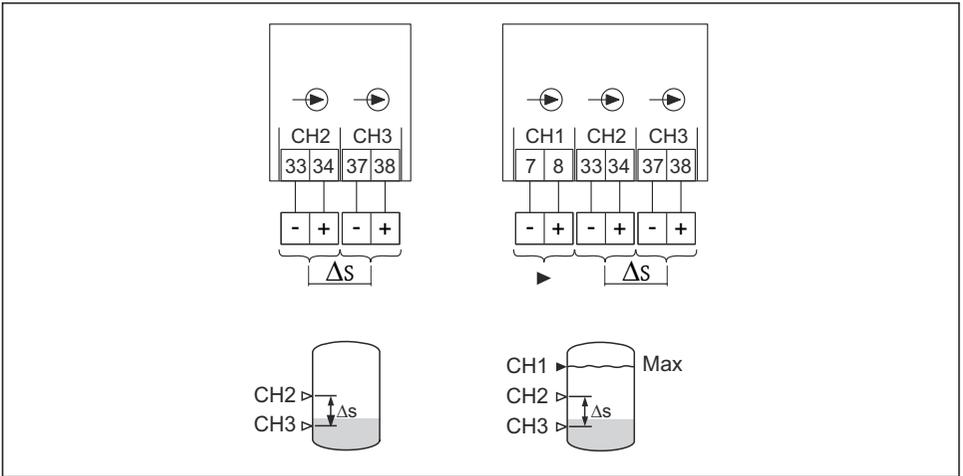
5.2.4 Connecting the supply voltage

Green terminal block at bottom

A fuse is integrated into the power supply circuit. An additional fine-wire fuse is not necessary. The Nivotester is equipped with reverse polarity protection.

5.3 Special connection instructions

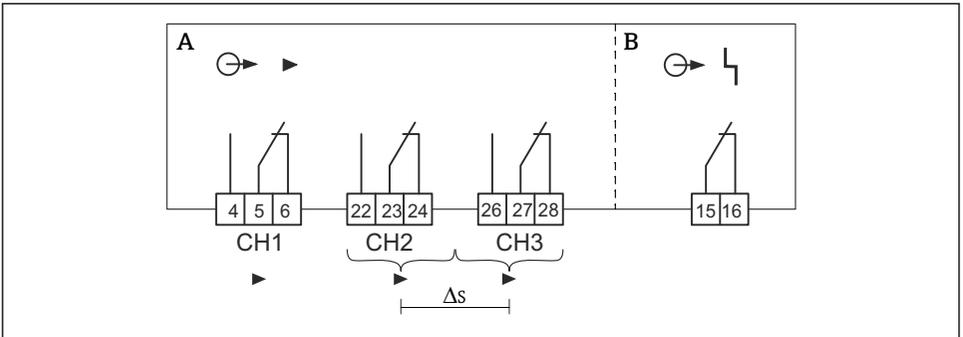
5.3.1 Connecting the sensors for two-point control Δs



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8 Connecting the sensors for two-point control Δs

5.3.2 Connecting the outputs



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9 Connecting the outputs

- A Level, limit signal
- B Fault, alarm

5.4 Ensuring the degree of protection

- IP20 (as per IEC/EN 60529)
- IK06 (as per IEC/EN 62262)

5.5 Post-connection check

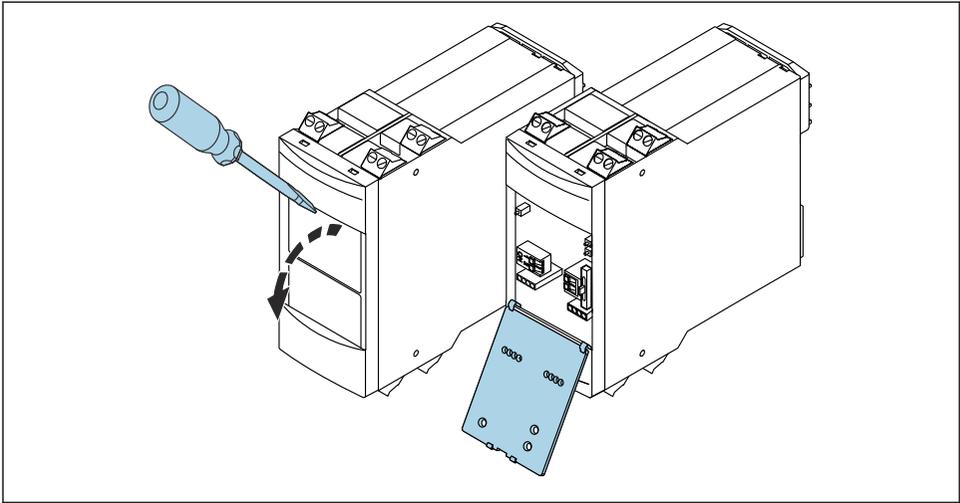
- Is the device or cable undamaged (visual inspection)?
- Do the mounted cables have adequate strain relief?
- Does the supply voltage match the specifications on the nameplate?
- No reverse polarity, is terminal assignment correct?
- Do the cables used comply with the requirements?
- If necessary, has a protective ground connection been established?
- If supply voltage is present, is the device operational and does a screen appear?

6 Operation options

6.1 Operation concept

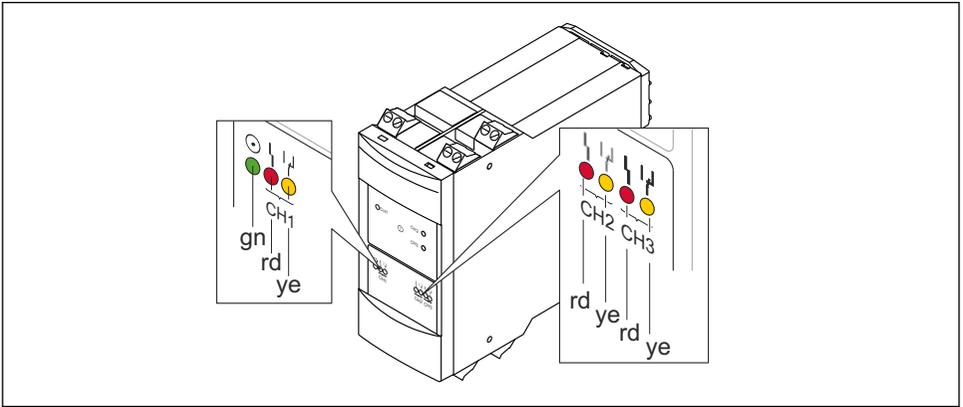
Onsite configuration with DIL switches behind fold-down front panel.

6.2 Opening the front panel



 10 *Opening the front panel*

6.3 Display elements



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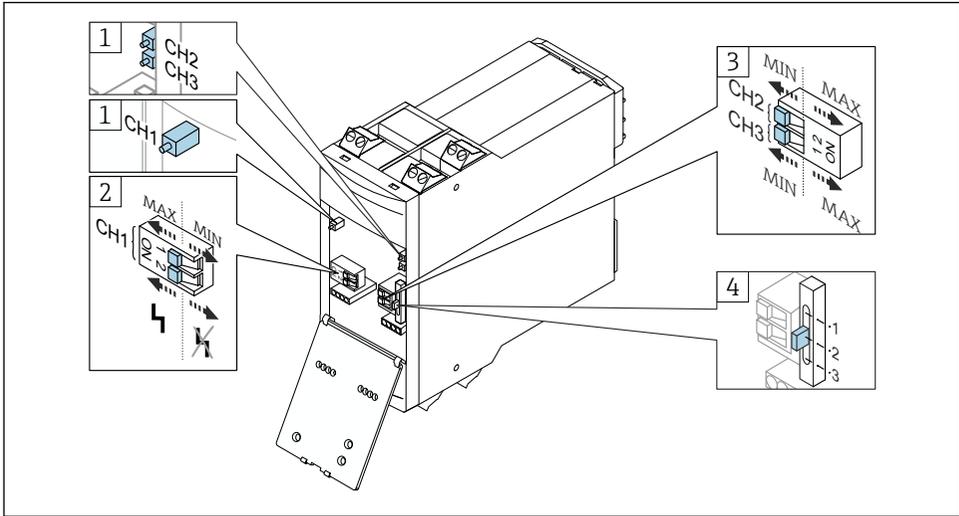
11 Nivotester, light emitting diodes (LEDs)

gn Green LED; ready for operation

rd One red LED per channel: fault signal

ye One yellow LED per channel: level relay picked up

6.4 Operating elements



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12 Operating elements

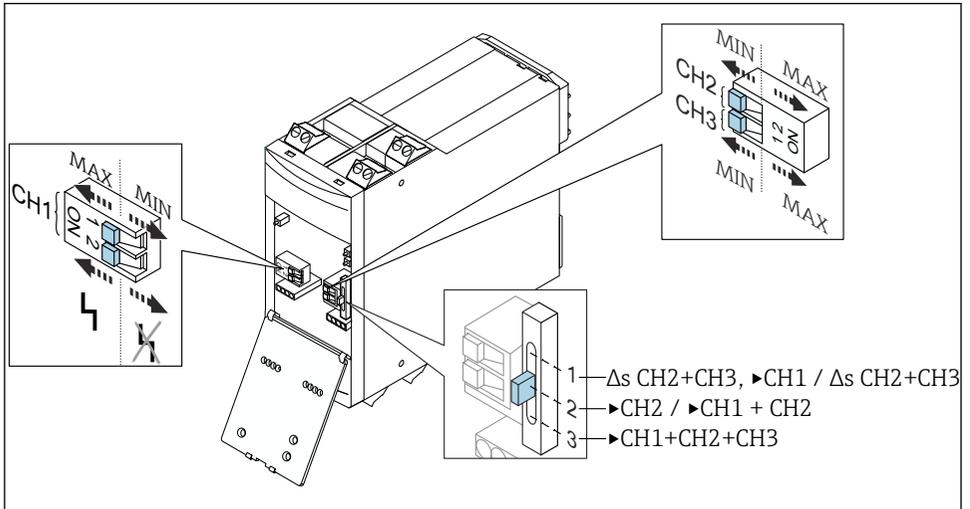
- 1 Test button, can also be operated when the front panel is closed
- 2 DIL switch, single-channel (CH1): MAX/MIN, fault ON/OFF
- 3 DIL switch, 2-/3-channel (CH2+CH3): MAX/MIN
- 4 Switch for MODE settings

7 Commissioning

7.1 Function check

- Perform installation check.
- Perform function check.

7.2 Setting the functions



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13 Switches for setting the functions

DIL switch CH1

- Set CH1 MAX/MIN (1)
- Set CH1 fault ON/OFF (2)

DIL switch CH2 + CH3

- Set CH2 MIN/MAX
- Set CH3 MIN/MAX

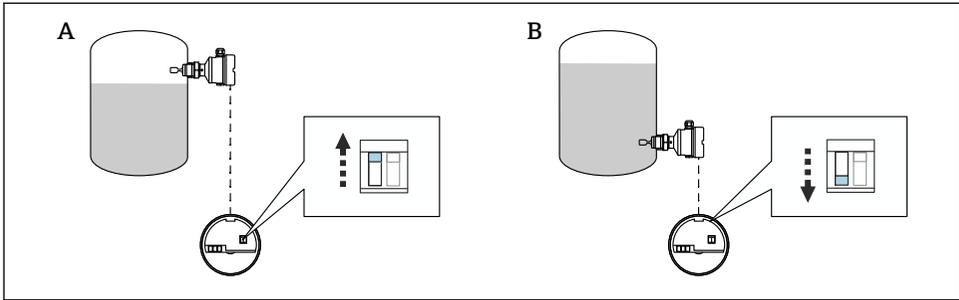
Switch for MODE settings

- (1) Δs , e.g. pump control
- (2) Two level relays
- (3) Single channels



For applications requiring functional safety in accordance with IEC 61508 (SIL), see the Functional Safety Manual. For WHG applications, see the associated WHG documents.

7.2.1 Switch position on electronic insert



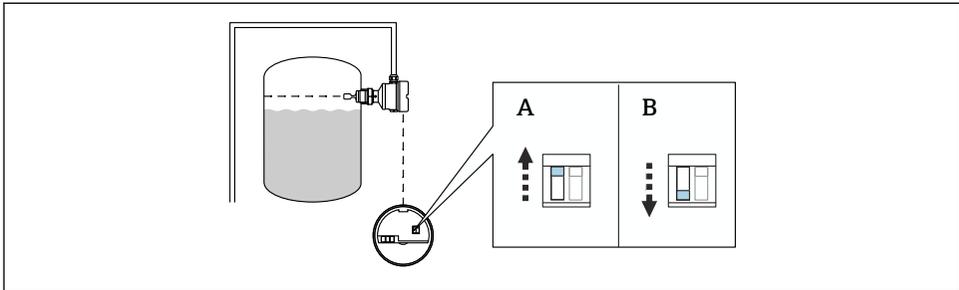
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 14 Switch position on electronic insert (FEL67)

A MAX

B MIN

When using the Liquiphant FTL51B, FTL62, FTL64 sensor with electronic insert FEL67, sensor (H level) FEL67 must be set to MAX safety and sensor (L level) FEL67 must be set to MIN safety.



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 15 Switch position on electronic insert FEL57

A STD (standard)

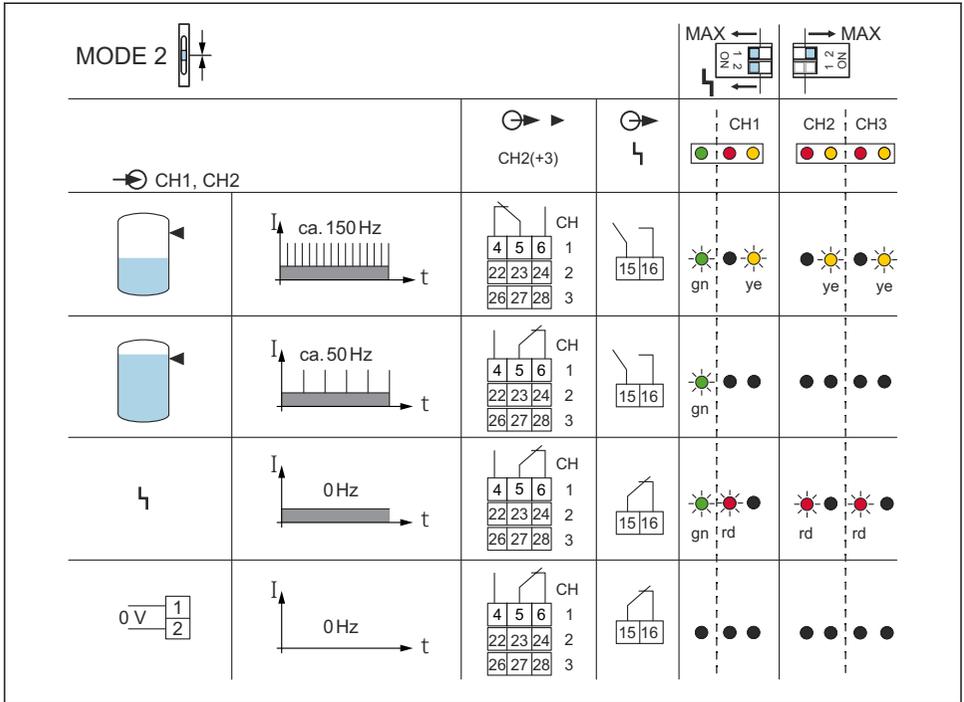
B EXT (extended)

 This setting is only relevant for the function test.

7.2.2 Switching behaviour and signaling for all functions without fault signaling

 See Operating Instructions.

7.2.3 CH1 + CH2, MAX safety mode with fault signaling CH1



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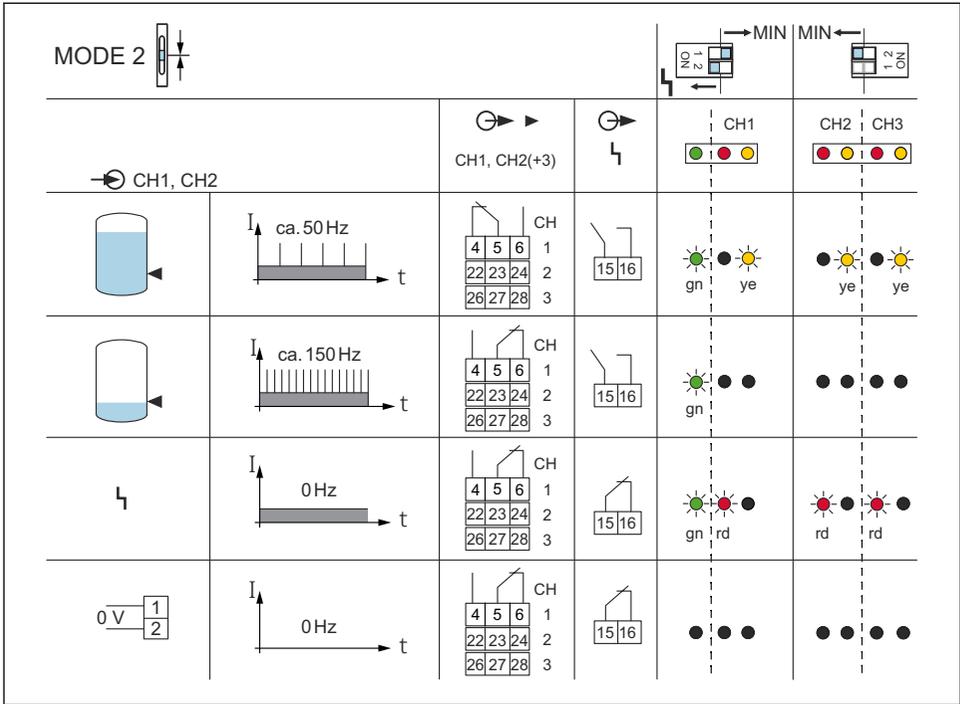
16 Switching behavior and signaling

Point level at two tanks

- 1 sensor connected at input channel 1 (terminals 7 and 8)
Relay output of channel 1 switches in accordance with input channel 1
- 1 sensor connected at input channel 2 (terminals 33 and 34)
Relay outputs of output channels 2 and 3 switch simultaneously in accordance with input channel 2

Fault signaling for input channels 1 and 2 is switched on.

7.2.4 CH1 + CH2, MIN safety mode with fault signaling CH1



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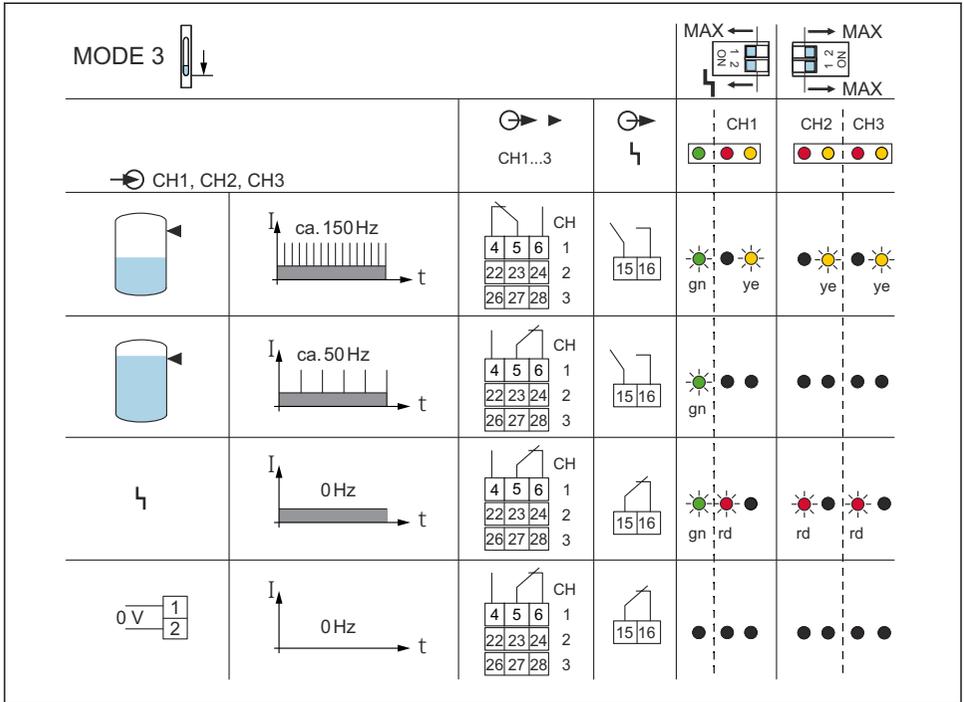
17 Switching behavior and signaling

Point level at two tanks

- 1 sensor connected at input channel 1 (terminals 7 and 8)
Relay output of channel 1 switches in accordance with input channel 1
- 1 sensor connected at input channel 2 (terminals 33 and 34)
Relay outputs of output channels 2 and 3 switch simultaneously in accordance with input channel 2

Fault signaling for input channel 1 is switched on.

7.2.5 CH1 + CH2 + CH3, MAX safety mode with fault signaling CH1



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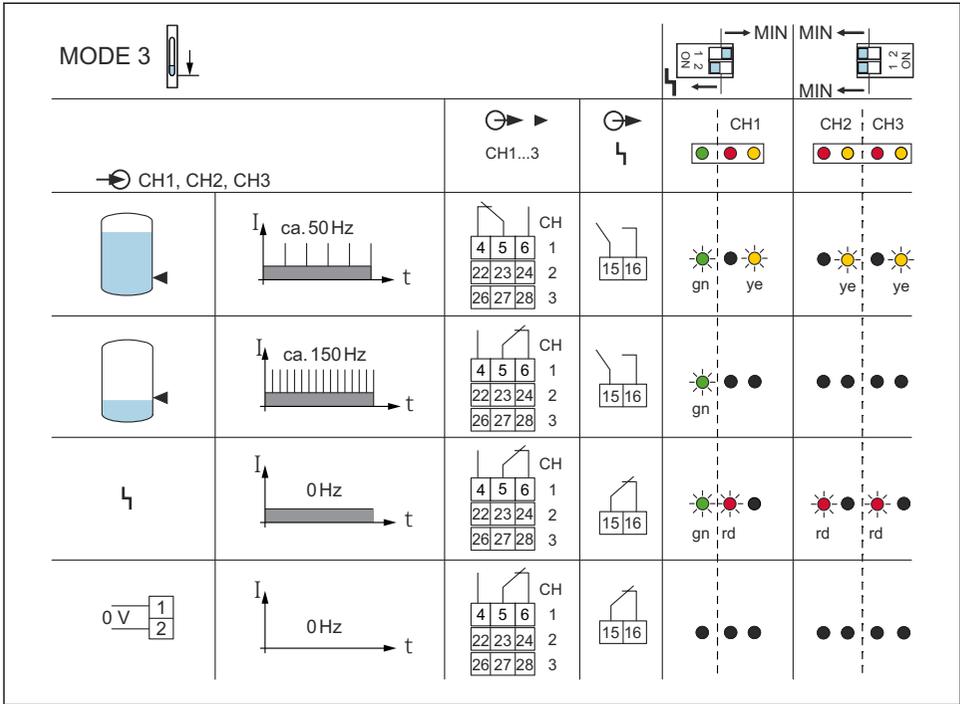
18 Switching behavior and signaling

Point level at three tanks

- 1 sensor connected at input channel 1 (terminals 7 and 8)
Relay output of channel 1 switches in accordance with input channel 1
- 1 sensor connected at input channel 2 (terminals 33 and 34)
Relay output of channel 2 switches in accordance with input channel 2
- 1 sensor connected at input channel 3 (terminals 37 and 38)
Relay output of channel 3 switches in accordance with input channel 3

Fault signaling for input channels 1, 2 and 3 is switched on.

7.2.6 CH1 + CH2 + CH3, MIN safety mode with fault signaling CH1



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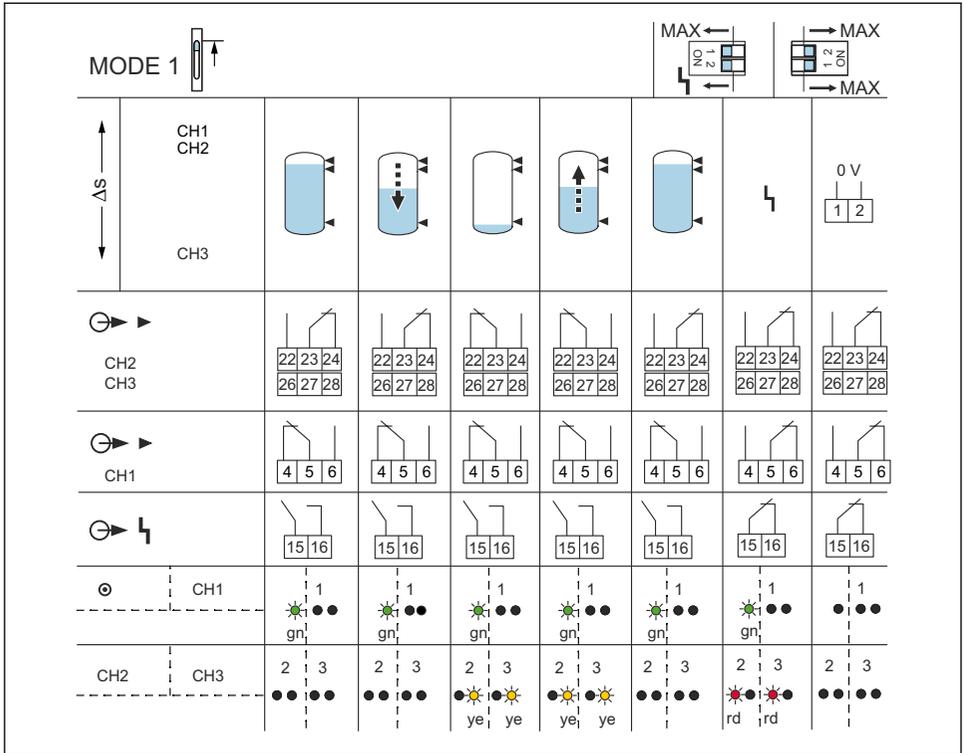
19 Switching behavior and signaling

Point level at three tanks

- 1 sensor connected at input channel 1 (terminals 7 and 8)
Relay output of channel 1 switches in accordance with input channel 1
- 1 sensor connected at input channel 2 (terminals 33 and 34)
Relay output of channel 2 switches in accordance with input channel 2
- 1 sensor connected at input channel 3 (terminals 37 and 38)
Relay output of channel 3 switches in accordance with input channel 3

Fault signaling for input channels 1, 2 and 3 is switched on.

7.2.7 CH2 - CH3 (Δs) + CH1, MAX safety mode with fault signaling CH1



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20 Switching behavior and signaling

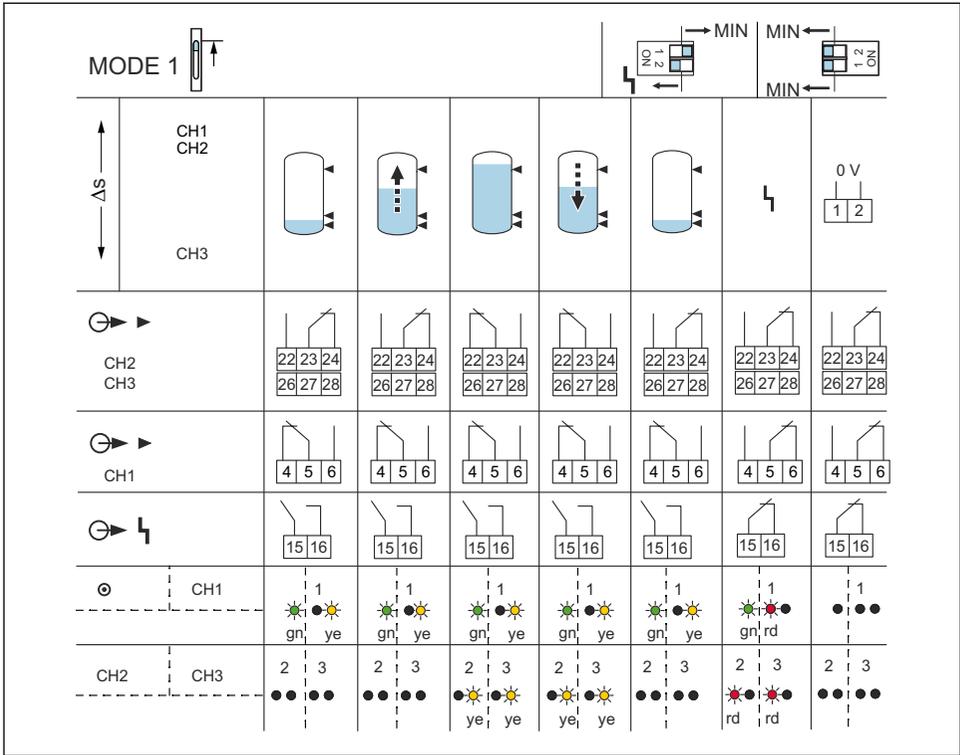
Δs , e. g. Pump control at one tank and additional overfill prevention (HH level)

- 1 sensor for overfill prevention (HH level) connected at input channel 1 (terminals 7 and 8)
- 1 sensor (H-level pump control) connected at input channel 2 (terminals 33 and 34)
- 1 sensor (L-level pump control) connected at input channel 3 (terminals 37 and 38)

Relay outputs of output channels 2 and 3 switch simultaneously → 20, 25. This ensures, for example, that a pump can be switched on at L level and switched off at H level. Relay output 1 does not switch until the HH level at input channel 1 has been reached.

Fault signaling for input channels 1, 2 and 3 is switched on.

7.2.8 CH2 - CH3 (Δs) + CH1, MIN safety mode with fault signaling CH1



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21 Switching behavior and signaling

Δs , e. g. pump control at one tank and additional minimum detection (LL level)

- 1 sensor for minimum detection (LL level) connected at input channel 1 (terminals 7 and 8)
- 1 sensor (H-level pump control) connected at input channel 2 (terminals 33 and 34)
- 1 sensor (L-level pump control) connected at input channel 3 (terminals 37 and 38)

Relay outputs of output channels 2 and 3 switch simultaneously → 21, 26. This ensures, for example, that a pump can be switched on at H level and switched off at L level.

Relay output 1 does not switch until the LL level at input channel 1 has been reached.

Fault signaling for input channels 1, 2 and 3 is switched on.

7.3 Function testing of measuring system

Function testing of measuring system without a change in level

- Function testing of Liquiphant M/S FTL50/51/50H/51H/51C; FTL70/71 with electronic insert FEL57, see KA00147F
- Proof testing of Liquiphant FTL51B, FTL62, FTL64 with electronic insert FEL67 as per SIL and WHG (German Water Resources Act)

See the Functional Safety Manual and WHG approval



The certificates, approvals and other documentation currently available can be accessed as follows:

Endress+Hauser website: www.endress.com → Downloads.



In the event of a power failure, the self-test runs automatically.

Consider the impact on the function of the system. Provide a switching delay if required.



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