

GESTRA Steam Systems

ER 50-1
ER 56-1

EN
English

Installation Instructions 818781-02

Level Electrode
ER 50-1, ER 56-1

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Important Notes

Usage for the intended purpose

The level electrodes ER 50-1 and ER 56-1 are designed for signalling liquid levels.

Safety note

The equipment must only be installed and commissioned by qualified and competent staff. Retrofitting and maintenance work must only be performed by qualified staff – who through adequate training – have achieved a recognised level of competence.



Danger

When loosening the electrode steam or hot water might escape.

This presents the danger of severe scalds to the whole body.

Before removing the electrode make sure that the boiler pressure is zero bar.

The electrode becomes hot during operation. Touching the hot equipment presents the risk of severe burns to hands and arms. All installation and maintenance work must only be performed when the equipment is cold.



Attention

The name plate specifies the technical features of the equipment. Note that any piece of equipment without its specific name plate must neither be commissioned nor operated.

ATEX (Atmosphère Explosible)

The equipment constitutes a simple item of electrical equipment as defined in DIN EN 60079-11 section 5.7. According to the European Directive ATEX 94/9/EC the equipment may only be used in potentially explosive atmospheres if it is provided with approved Zener barriers.

Applicable in Ex zones 1, 2 (1999/92/EC). The equipment does not bear an Ex marking. The suitability of the Zener barriers is certified in a separate document.

Explanatory Notes

Scope of supply

ER 50-1

1 Level electrode ER 50-1, four-pole connector
1 Joint ring D 33 x 39 DIN 7603-1.4301
1 Installation manual

ER 50-1

1 Level electrode ER 50-1, six-pole connector
1 Joint ring D 33 x 39 DIN 7603-1.4301
1 Installation manual

ER 56-1

1 Level electrode ER 56-1, four-pole connector
1 Joint ring D 33 x 39 DIN 7603-1.4301
1 Installation manual

ER 56-1

1 Level electrode ER 56-1, six-pole connector
1 Joint ring D 33 x 39 DIN 7603-1.4301
1 Installation manual

Description

The level electrodes ER 50-1 and ER 56-1 work according to the conductivity measurement principle. The ER 50-1/56-1 can signal a maximum of four levels in electrically conductive liquids:

■ High level alarm (MAX), low level alarm (MIN alarm), pump ON, pump OFF with one NO contact

ER 50-1 for vessels up to PN 6, e. g. for condensate and low-pressure systems as well as (pressurised) hot-water installations, concrete vessels, feedwater tanks. PN 6 flanges only available on request.

ER 56-1 for vessels up to PN 40, e. g. in high-pressure steam plants.

For the operation of the level electrodes ER 50-1 and ER 56-1 an external GESTA level switch is required, e. g. NRS 1-1 for fill and discharge control with first low-level alarm, NRS 1-5 for fill and discharge control with high-level alarm, NRS 1-2 as first low-level alarm and high-level alarm or NRS 1-3 as water level limiter with test button.

Function

The conductivity of the liquid is used to signal the liquid level. Some liquids are conductive, which means that they allow an electric current to flow through them. For the safe functioning of this device a minimum conductivity of the liquid to be monitored is required.

The conductivity measurement method can detect two conditions: electrode rod submerged or exposed, meaning switchpoint reached (or exceeded) or not yet reached. Before installation, the length of the electrode rod must be cut to the required switching levels, e. g. for limit alarm or the switching of a valve or pump.

Design

ER 50-1: Screwed 1" to EN ISO 228-1, PN 6

ER 56-1: Screwed 1" to EN ISO 228-1, PN 40

Technical Data

ER 50-1, ER 56-1

Type approval

TÜV WR/WB · 08-302

TÜV WRB/WB · 06-263

Service pressure

ER 50-1: 6 bar g at 159 °C

ER 56-1: 32 bar g at 238 °C

Connection

Screwed 1" to EN ISO 228-1

Materials

Sheath: 1.4301 X5 CrNi18-10

Body: 1.4571 X6 CrNiMoTi17-12-2

Flange: 1.0460 C22.8

Measuring electrodes: 1.4571 X6 CrNiMoTi17-12-2

Electrode insulation: PTFE

Spacer disks: PTFE

Lengths supplied

1000 mm, 1500 mm

Response sensitivity

0.5 µS/cm or 10 µS/cm (at 25 °C),

depending on level switch NRS 1-...

Electrical connection

Four-pole connector or six-pole connector (optional extra), cable gland M 16

Protection

IP 65 to EN 60529

Max. admissible ambient temperature

70 °C

Weight

Approx. 0.8 kg

Corrosion resistance

If the equipment is used for the intended purpose, its safety is not impaired by corrosion.

Sizing

The electrode body must not be subjected to pulsating loads. Welds and flanges of the electrode are designed to withstand dynamic loading (bending and alternating stress). The dimensional allowances for corrosion and anti-corrosive additives reflect the latest state of technology.

Technical Data – continued –

Name plate / marking

Equipment designation

ER 50-1			Betriebsanleitung beachten See installation instructions Voir instructions de montage	
DN	G 1	IP 65		
	6 bar (87psi) 164°C (327°F) T amb = 60°C (140°F)	TÜV . WRB / WB . 00-263 TÜV . WR / WB . 08-302		
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Fig. 1

ER 56-1			Betriebsanleitung beachten See installation instructions Voir instructions de montage	
DN	G 1	IP 65		
	32 bar (464psi) 238°C (460°F) T amb = 60°C (140°F)	TÜV . WRB / WB .00-263 TÜV . WR / WB . 08-302		
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Fig. 2

Dimensions

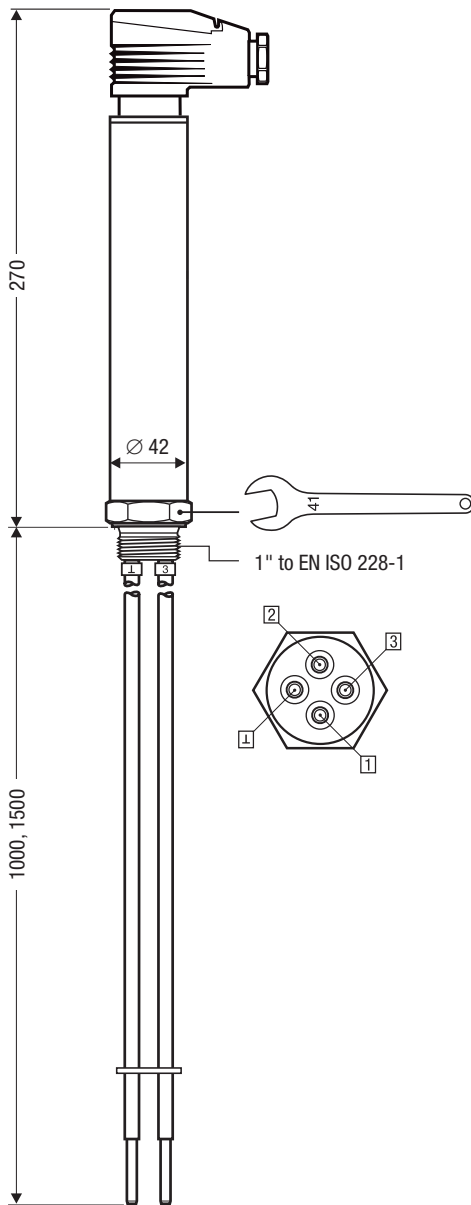


Fig. 3

Design

ER 50-1, ER 56-1

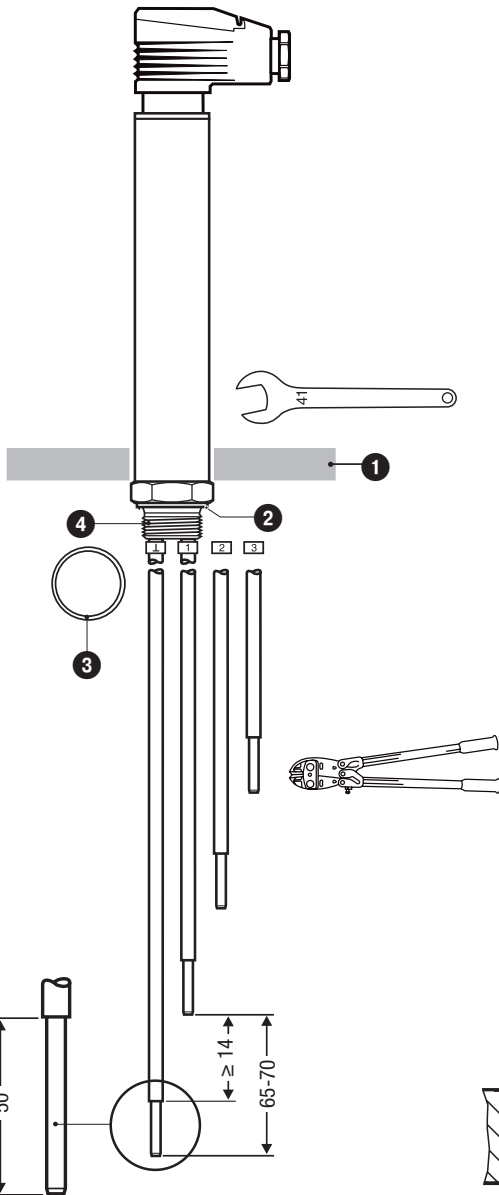


Fig. 4

Fig. 5

Functional Elements

ER 50-1, ER 56-1

MAX 70°C

MAX 95%

IP 65

CE

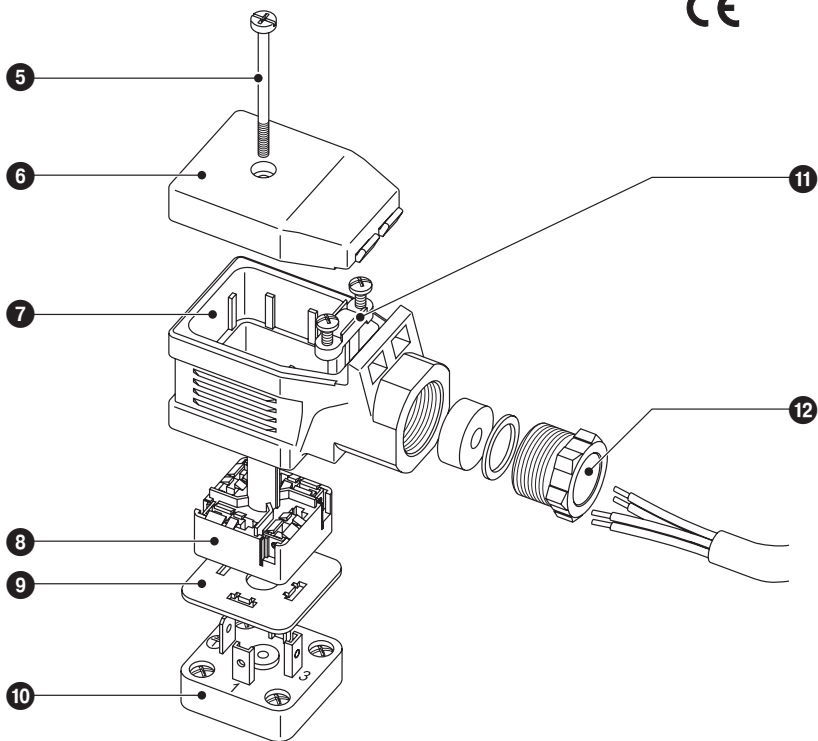


Fig. 6

Key

- ① Thermal insulation, provided on site, $d = 20$ mm (outside of thermal insulation of steam generating unit)
- ② Seating surface
- ③ Joint ring D 33 x 39 to DIN ISO 7603 – 1.4301
- ④ Electrode thread 1" to EN ISO 228-1
- ⑤ Screw M4
- ⑥ Cover
- ⑦ Upper part of terminal box
- ⑧ Connecting plate
- ⑨ Sealing element
- ⑩ Contact plate for level electrode
- ⑪ Cable clamp
- ⑫ Cable gland M 16 (PG 9)

Installation

ER 50-1, ER 56-1

1. Determine required measuring lengths of the electrode tips and enter data in the **table “Functions”**, **Fig. 4**.
2. Cut electrode tips **1**, **2**, **3** and **⊥** accordingly (four-pole connector)
3. Cut electrode tips **2**, **3**, **4** and **5** accordingly (six-pole connector)
4. Deburr faces of electrode tips.
5. Strip off 50 mm of PTFE insulation from the ends of the electrode tips.
6. Check seating surfaces of threads or flange provided on vessel or boiler standpipe, **Fig. 5**.
7. Place joint ring **3** onto seating **2** of the electrode, **Fig. 4**.
Use only joint ring (of stainless steel 1.4301) D 33 x 39 to DIN 7603 supplied with electrode.
8. Apply a light smear of silicone grease (e. g. DOW Corning 111 Compound) to electrode thread **4**.
9. Screw level electrode into threads or flange provided on vessel or boiler standpipe and tighten with a 41 mm open-end spanner. The torque required is 140 Nm when cold.

Table “Functions”

Function	Function	Electrode tip	Length [mm]
Reference electrode		⊥	
E. g. pump OFF		1	
E. g. pump ON		2	
E. g. high-level alarm		3	

Please enter data.

Function	Function	Electrode tip	Length [mm]
Electrode body	Reference electrode		
E. g. pump protection against running dry		2	
E. g. pump OFF		3	
E. g. pump ON		4	
E. g. high-level alarm		5	
Not assigned		6	

Please enter data.



Attention

- The seating surfaces of the threads or flange provided on the vessel or boiler standpipe must be accurately machined, **Fig. 5**.
- Do not bend electrode tips when mounting.
- Do not include electrode body in the thermal insulation of the boiler.



Note

- For the approval of the boiler standpipe with connecting flange the relevant local and national regulations must be considered.
- See four examples of installation on page 14.

Tools

- Open-end spanner 41 mm A. F.
- Bolt cutter
- Hacksaw
- Flat file, medium cut

Examples of installation

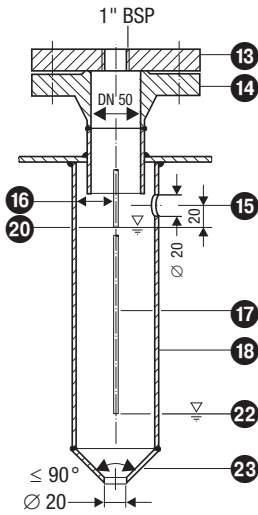


Fig. 7

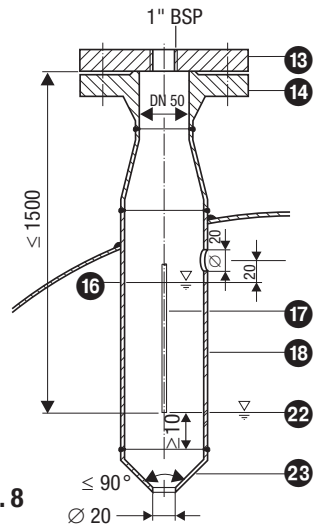


Fig. 8

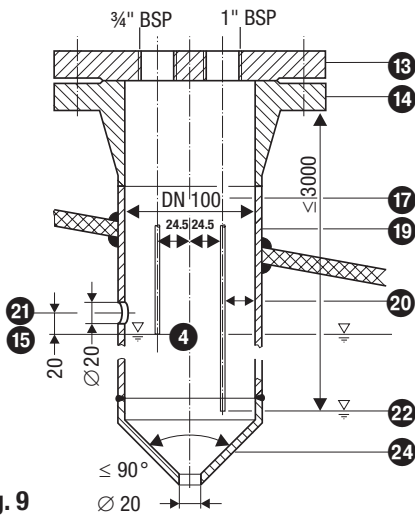


Fig. 9

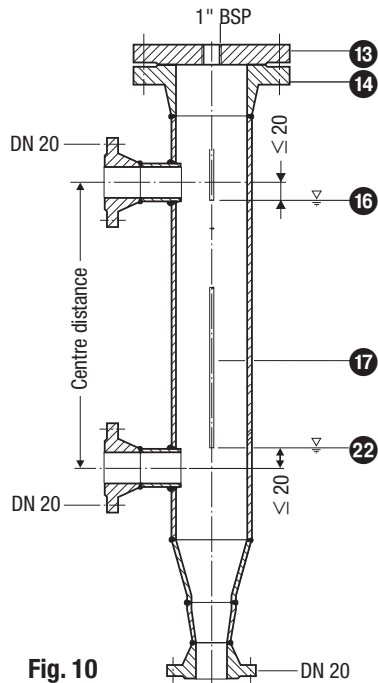


Fig. 10

Key

- 13 Flange PN 40, DN 50, DIN 2527
Flange PN 40, DN 100, DIN 2527
- 14 For the approval of the boiler standpipe with connecting flange the relevant regulations must be considered.
- 15 Vent hole
- 16 High water (HW)
- 17 Electrode tip $\varnothing = 5$ mm
- 18 Protection tube DN 80
- 19 Protection tube DN 100
- 20 Electrode distance ≥ 14 mm
- 21 Electrode distance ≥ 40 mm
- 22 Low water (LW)
- 23 Reducer DIN 2616, part 2 K-88.9 x 3.2 – 42.4 x 2.6 W
- 24 Reducer DIN 2616, part 2 K-114.3 x 3.6 – 48.3 x 2.9 W

Electrical Connection

ER 50-1, ER 56-1

Wiring via four-pole connector, or six-pole connector (not shown).

Screened four-core cable, e. g. I-Y(St)Y 2 x 2 x 0.8 or LIYCY 4 x 0.5 mm² required for electrode line.

Max. length 100 m with conductivities from 10 µS/cm.

Max. length 30 m with conductivities from 0.5 µS/cm.

Max. length 15 m with conductivities from 0.5 µS/cm and application of the ancillary unit URN 1 (24 V DC).

1. Loosen screw ⑤, Fig. 6.
2. Take the terminal box off the level electrode, leaving the sealing element ⑨ on the contact plate ⑩.
3. Remove cover ⑥.
4. Press connecting plate ⑧ out of the upper part of the terminal box ⑦.
The upper part of the terminal box can be turned in steps of 90°.
5. Detach cable gland and cable clamp ⑪ from the upper part of the terminal box ⑦.
6. Run cable through cable gland ⑫ and upper terminal box ⑦ and connect the terminals of the connecting plate ⑧ according to the wiring diagram.
7. Press connecting plate ⑧ into the upper part of the terminal box and align the cable.
8. Hold cable with cable clamp ⑪ and cable gland ⑫ in position.
9. Mount cover ⑥ and insert screw ⑤.
10. Put upper part of the terminal box onto the level electrode and fix it firmly with screw ⑤.

Wiring diagram

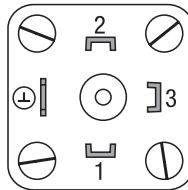


Fig. 11

Four-pole connector

Tools

- Screwdriver for cross-recess head screws, size 1
- Screwdriver for slotted screws, size 2.5, completely insulated according to DIN VDE 0680
- Open-end spanner 17 mm A. F.

Commissioning

Checking electrical connection

1. Make sure that the system ER 50-1/ ER 56-1 has been wired in accordance with the wiring diagram, **Fig. 11**.
2. Make sure that the mains supply corresponds to the wiring carried out on the equipment.

Checking the assignment of the switching functions

1. Check the switching function “High Level Alarm (HW)” of the electrode tip **3** / **5** (six pole connector).
For this purpose raise the water level in the vessel above the high water mark.
As soon as the water exceeds the high level mark the level switch must trigger a high level alarm.
2. Check the switching functions “Pump ON” and “Pump OFF”, **see table “Functions”**.

Operation

ER 50-1, ER 56-1

Operation in conjunction with level switch NRS 1-1 for fill and discharge control with first low level alarm.

Operation in conjunction with NRS 1-5 for fill and discharge control with high-level alarm.

Operation in conjunction with NRS 1-2 as first low-level alarm and high-level alarm in (pressurised) hot water and steam plants to TRD 401, TRD 602, TRD 604, EN 12952, EN 12953 or according to national regulations.

Operation in conjunction with NRS 1-3 as water level limiter with test button for steam boilers up to max. 0.5 bar or in feedwater or condensate tanks.

Water level limiter



Note

- Should malfunctions occur during the commissioning procedure refer to chapter “Troubleshooting” on page 18 in order to analyse and correct them.

Troubleshooting

Fault finding list

Level has exceeded switchpoint “High Water” – no function

Fault: The electrode body does not have earth connection to the boiler.
Remedy: Clean seating surfaces and insert metal joint ring as shown in the drawing.
Do not insulate compact system with hemp or PTFE tape!

Fault: Mains voltage has not been applied to the control equipment.
Remedy: Apply mains voltage. Wire equipment according to the wiring diagram.

Fault: Electrode tip(s) submerged but no HW alarm.
Remedy: The electrical conductivity of the fluid to be monitored is below 10 $\mu\text{S/cm}$.
Increase the electrical conductivity of the fluid or use a level switch with higher response sensitivity ($> 0.5 \mu\text{S/cm}$).

Level has fallen below switchpoint “Low Water” – no function

Fault: The vent hole in the protection tube does not exist, is obstructed or flooded.
Remedy: Check protection tube and, if necessary, provide vent hole.

Fault: The isolating valves of the external measuring pot are closed.
Remedy: Open isolating valves.

Fault: The electrode tips have earth connection.
Remedy: Check and change installation position.

Switchpoint has been reached – incorrect function

Fault: The switching function has not been correctly allocated.
Electrode tips have been cut to the wrong length.
Remedy: Identify electrode supply wire and reconnect accordingly.

If faults occur that are not listed above or cannot be corrected, please contact our service centre or authorized agency in your country.

For your notes



Agencies all over the world:

www.gestra.de