GESTRA®

Level Electrode

NRG 26-21

EN
English

Original Installation Instructions

818774-05

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Important notes

Usage for the intended purpose

The level electrode NRG 26-21 is used for continuous level monitoring in steam boilers and (pressurized) hot-water installations or in condensate and feedwater tanks. In conjunction with the level switch NRS 2-.. and the level controller NRR 2-.. the electrode can be used as water level controller with MIN/MAX alarm.

The level electrode is designed for use in conjunction with the following level switches/controllers: NRS 2-50, NRS 2-51, NRR 2-50, NRR 2-51, NRR 2-52 and NRR 2-53 or NRS 2-1, NRR 2-1, NRR 2-2 and NRT 2-1.

The electrode can be used in electrically conductive and non-conductive fluids.

Function

The level electrode and the electronic module NRV 2-29 work according to the capacitance measurement principle and translate the level changes into a level-dependent current signal, with the length of the electrode rod determining the measuring range.

The level electrode is installed inside steam boilers, vessels or in an external level pot. If the electrode is installed inside the boiler or vessel, a protection tube provided on side ensures correct functioning. (see section **Examples of installation** (page 10).

The level electrode can be installed together with one GESTRA level electrode for water level limiting or for high-level alarm in a single protection tube or external level pot.

Safety note

The equipment must only be installed, wired 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 level electrode steam or hot water might escape!
This presents the risk of severe scalding all over the body!
It is therefore essential not to dismantle the electrode unless the boiler pressure is verified to be 0 bar.

The level electrode becomes hot during operation.
Risk of severe burns to hands and arms.
Before carrying out installation and maintenance work make sure that the equipment is cold.

Attention

The name plate specifies the technical features of the equipment. Do not commission or operate any item of equipment that does not bear its specific name plate.

Directives and standards

VdTÜV Bulletin "Wasserstand 100" (= Water Level 100)

The level electrode NRG 26-21 in conjunction with the following level switches / controllers is type approved according to VdTÜV Bulletin "Wasserstand (= Water Level) 100": NRS 2-50, NRS 2-51, NRR 2-50, NRR 2-51, NRR 2-52 and NRR 2-53 or NRS 2-1, NRR 2-1, NRR 2-2 and NRT 2-1.

The VdTÜV Bulletin "Wasserstand (=Water Level) 100" specifies the requirements made on water level control and limiting equipment for boilers.

ATEX (Atmosphère Explosible)

According to the European Directive 2014/34/EU the equipment must **not** be used in explosion risk areas.

UL/cUL (CSA) Approval

The equipment meets the requirements of Directives: UL 508 and CSA C22.2 No. 14-13, Standards for Industrial Control Equipment. File E243189.

Note on the Declaration of Conformity / Declaration by the Manufacturer CE

For details on the conformity of our equipment according to the European Directives see our Declaration of Conformity or our Declaration of Manufacturer.
The current Declaration of Conformity and Declaration of Manufacturer are available in the Internet under www.gestra.com ► documents or can be requested from us.

Technical data

NRG 26-21

Level electrode
Service pressure
PN 40, 32 bar at 238 °C

Mechanical connection
Screwed G¾ A, DIN ISO 228

Materials
Screw-in body: 1.4571, X6CrNiMoTi17-12-2
Electrode rod insulation: PTFE

Length of installation at 238°C	373	477	583	688	794	899	1004	1110
Measuring range	300	400	500	600	700	800	900	1000

Length of installation at 238°C	1214	1319	1423	1528	1636	2156
Measuring range	1100	1200	1300	1400	1500	2000

Weight
Approx. 1.8 kg (NRG 26-21 L=1000 mm)

Electronic module NRV 2-29
Supply voltage
12 V DC

Response sensitivity
Range 1: Water ≥ 0.5 μS/cm
Range 2: Water ≥ 20 μS/cm
Range 3: Fuel oil EL ε_r 2,3

Output
≥ 0 – ≤ 7 V DC, level proportional

Adjustors
1 Code switch with 6 poles for setting the measuring range

Housing
PPO (Noryl®)

Electrical connection
1 Screw-type terminal strip with 3 poles, cable gland with integrated cable clamp M 16

Protection
IP 65 to EN 60529

Admissible ambient temperature
Max. 70 °C

Technical Data - continued -

NRG 26-21 - continued -

Approvals:

TÜV certificate	VdTÜV Bulletin "Water Level 100" Requirements made on water level limiting & control equipment. Type approval no. TÜV · WR · XX-317, XX-320, XX-425, XX-426, XX-427 (see name plate)
UL/cUL (CSA) Approval	UL 508 and CSA C22.2 No. 14-13, Standards for Industrial Control Equipment. File E243189.

Scope of supply

NRG 26-21

1 Level electrode NRG 26-21
1 Joint ring 27 x 32, form D, DIN 7603, 2.4068, bright annealed
1 Installation manual

Name plate/marking

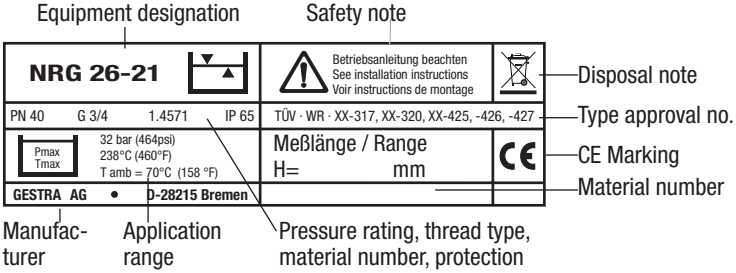

Fig. 1

Installation

Dimensions NRG 26-21

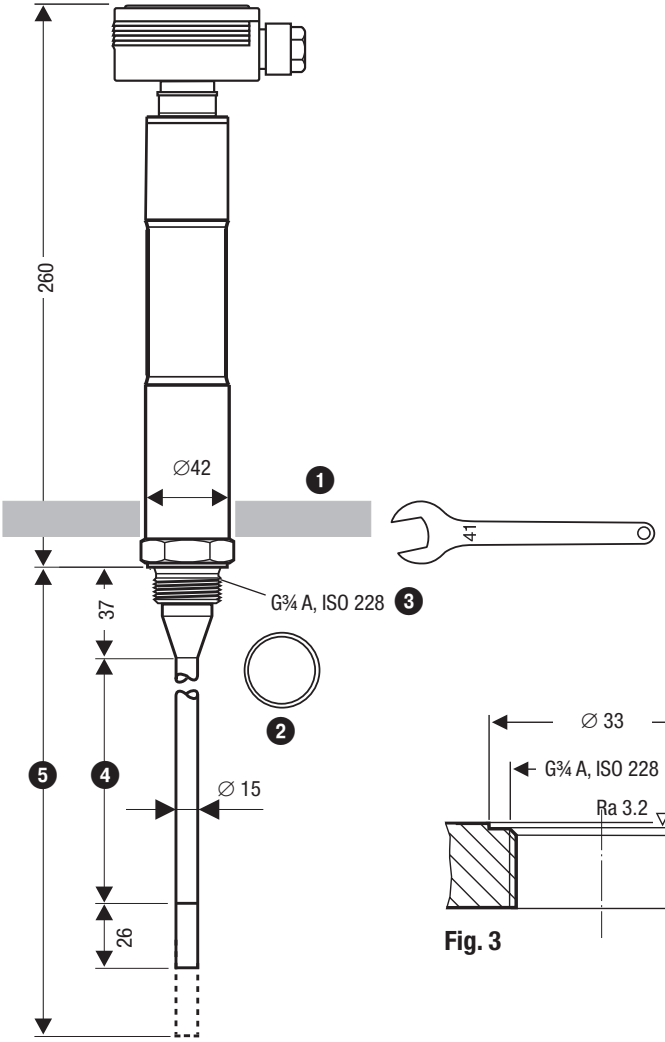

Fig. 2
NRG 26-21

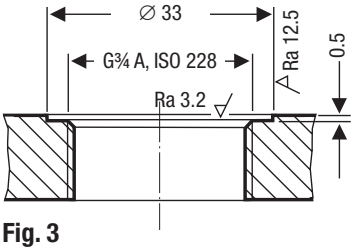

Fig. 3

Key

1. Thermal insulation, provided on site, d = 20 mm (outside of thermal insulation of steam boiler)
2. Joint ring 27 x 32 form D to DIN 7603, made from 2.4068, bright annealed
3. Electrode thread
4. Measuring range (mm) = xxx %
5. Max. length of installation at 238 °C

Installation - continued -

Note

- One level electrode NRG 26-21 can be installed together with one GESTRA level electrode, one level switch or transmitter in a single protection tube or an external level pot (inside diameter DN80/DN100). **Fig. 4 - 7.** If the level limiting electrode is installed inside the vessel, it must be at least 40 mm away from the upper vent hole.
- For the approval of the boiler standpipe the relevant regulations must be considered.
- Refer to pages 10 and 11 for typical installation examples.
- The angle of inclination of the electrode must not exceed 45°, with the length of the electrode being limited to 688 mm. **Fig. 8**
- If installed outdoors the level electrode **must** be equipped with a GESTRA weather protection cover.

Attention

- The seating surfaces of the standpipe or the flange provided on the vessel must be accurately machined, **Fig. 3**!
- Do not bend electrode tip when mounting.
- Do not subject electrode to physical shocks.
- Use only the supplied joint ring.
  Joint ring 27 x 32, form D, DIN 7603, 2.4068, bright annealed
- Do not lag electrode body above the hexagonal section.
- Do not insulate electrode thread with hemp or PTFE tape!
- Do not apply conductive paste or grease to the electrode thread!
- Observe the minimum withdrawal distance when installing the electrode!
- Observe the specified tightening torque.
- Do not cut the electrode rod.

NRG 26-21

1. Check seating surfaces. **Fig. 3**
2. Place supplied joint ring ❷ onto seating surface of the threaded standpipe or flange. **Fig. 3**
3. Apply a light smear of heat resistant silicone grease(e.g. WINIX® 2150) to electrode thread ❸.
4. Screw level electrode into threaded standpipe or flange and tighten with an open-end spanner A. F. 41 mm. The torque required **when cold is 160 Nm.**

Tools

- Open-end spanner A. F. 41, DIN 3110, ISO 3318

Examples of installation

NRG 26-21

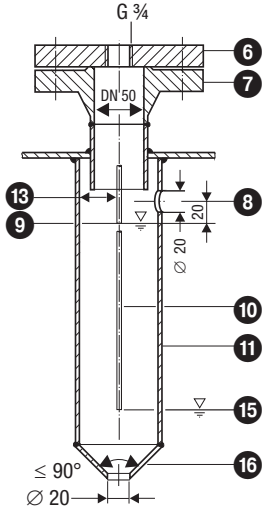

Fig. 4 Protection tube (provided on site) for installation inside the boiler

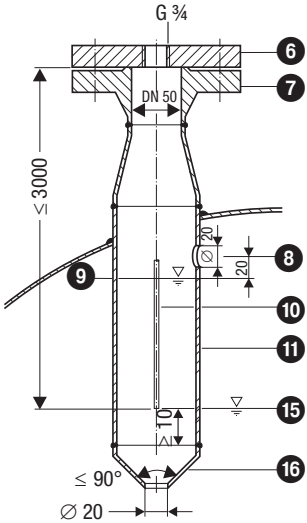

Fig. 5 Protection tube (provided on site) for installation inside the boiler

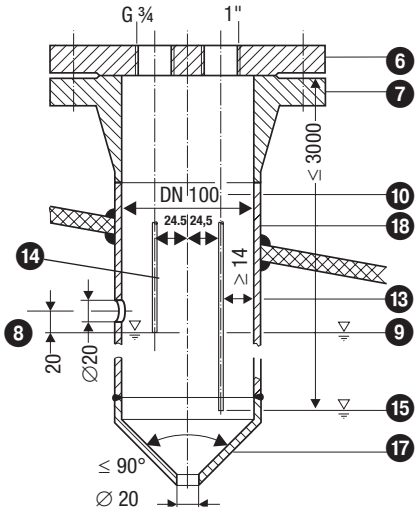

Fig. 6 Protection tube (provided on site) for installation inside the boiler and in combination with other GESTRA equipment

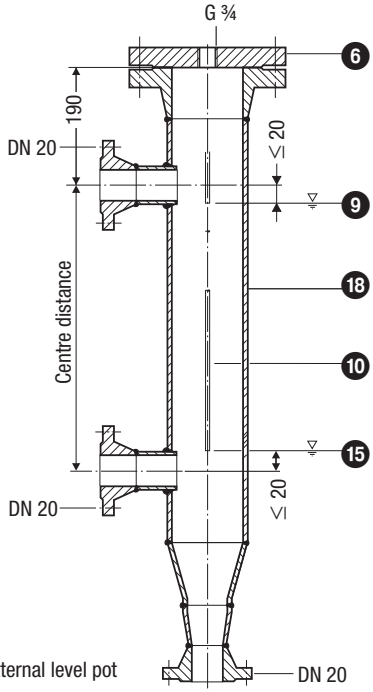

Fig. 7 External level pot

Examples of installation - continued -

NRG 26-21 - continued -

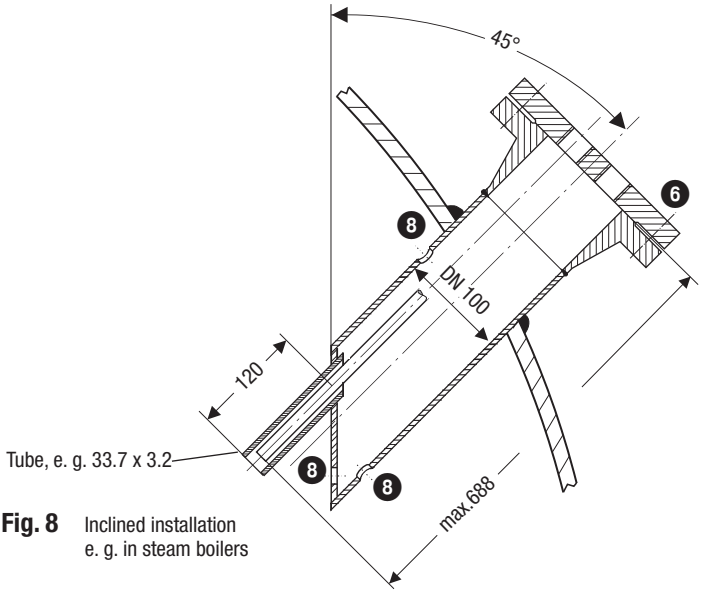

Fig. 8 Inclined installation
e. g. in steam boilers

Key

- ❻ Flange PN 40, DN 50, DIN EN 1092-01 (single electrode)
  Flange PN 40, DN 100, DIN EN 1092-01 (combination of electrodes)
- ❼ For the approval of the boiler standpipe with connecting flange the relevant regulations must be considered.
- ❽ Vent hole ∅ 20 mm
- ❾ High water (HW)
- ❿ Electrode tip
- ⓫ Protection tube DN 80 (in France according to AFAQ ≥ DN 100)
- ⓬ Protection tube DN 100
- ⓭ Distance between electrode rod and protection tube ≥ 14 mm
- ⓮ Distance between electrode tip (NRG 1..-50 or NRG 1...-51) ≥ 14 mm
  (creepage distances and clearances)
- ⓯ Low water LW
- ⓰ Reducer DIN 2616-2, K-88.9 x 3.2-42.4 x 2.6 W
- ⓰ Reducer DIN 2616-2, K-114.3 x 3.6-48.3 x 2.9 W
- ⓲ Level pot ≥ DN 80

Electrical connection

NRV 2-29

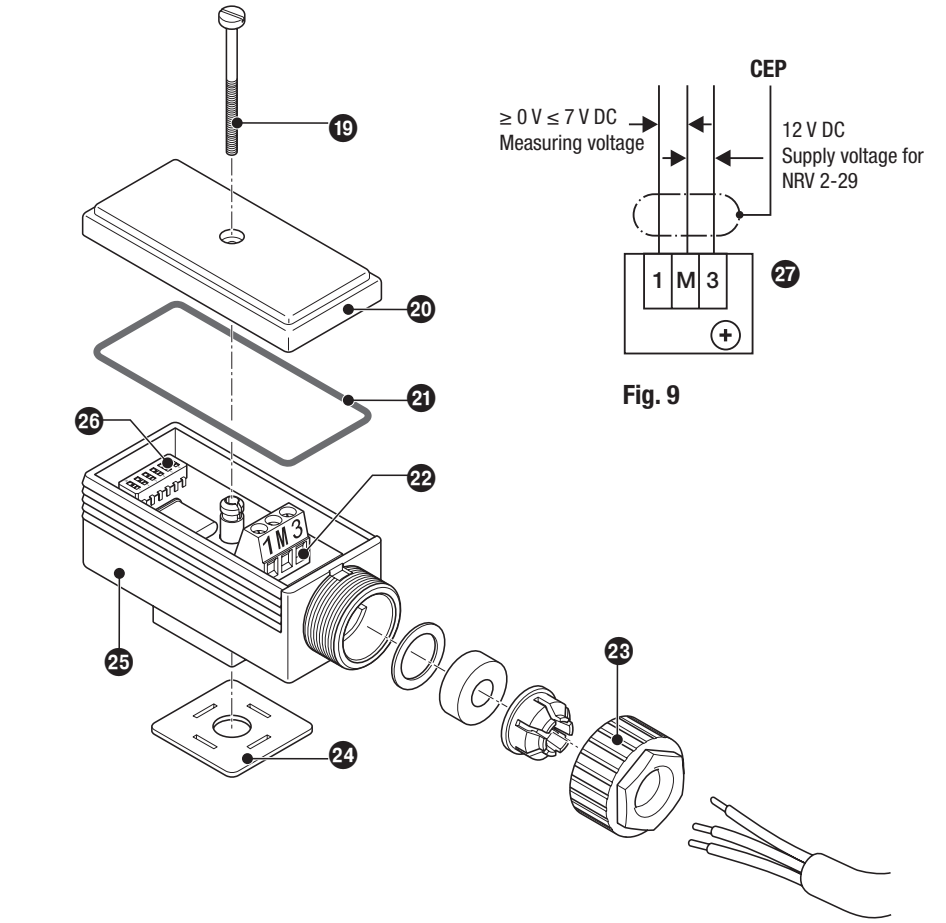

Fig. 9

Fig. 9 Electronic module NRV 2-29 integrated in terminal box

Key

19 Screw M4

20 Cover

21 Seal

22 Terminals

23 Cable gland M 16 (PG 9)

24 Sealing plate

25 Terminal box (electronic module NRV 2-29)

26 Code switch

27 Wiring of terminals

Electrical connection - continued -

Connection of level electrode

To connect the equipment use screened multi-core control cable with a min. conductor size 0.5 mm², e. g. LiYCY 4 x 0.5 mm², max. length 100 m.

A maximum of 3 switches / controllers NRS /NRR 2-5.. can be connected to one level electrode.

Connect the screen only once to the central earthing point **(CEP) in the control cabinet**. Wire terminal strip in accordance with the wiring diagram. **Fig. 9**

NRV 2-29, connecting the terminal strip

1. Loosen screw ⑲. **Fig. 9**
2. Detach terminal box (electronic module NRV 2-29) ㉕ from level electrode. Leave sealing plate ㉔ on contact plate.
3. Remove cover ⑳ and seal ㉑.
4. Unscrew cable gland ㉓.
5. Pull cable through cable gland ㉓ in terminal box ㉕ and wire terminals ㉒ in accordance with wiring diagram **Fig. 9**.
6. Replace cover ⑳ and insert screw ⑲.
7. Put terminal box ㉕ onto level electrode and fix it with screw ⑲.

Wiring diagram

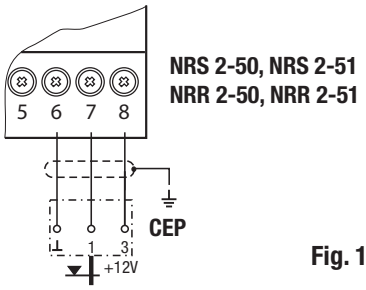

Fig. 10

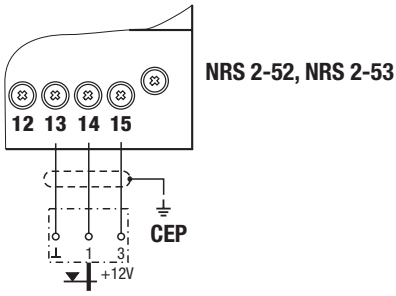

Fig. 11

Attention

- Please observe the instructions given in the installation & operating manual for the level switches / controllers NRS 2-50, NRS 2-51, NRR 2-50, NRR 2-51, NRR 2-52 and NRR 2-53 or NRS 2-1, NRR 2-1, NRR 2-2 and NRT 2-1!
- Make sure that connecting cables leading to the level electrode are segregated and run separately from power cables .

Tools

- Screwdriver, size 1
- Screwdriver, size 2.5, completely insulated according to DIN VDE 0680-1

Basic settings

Factory setting

The code switch ㉘ is set at our factory so that the max. measuring range for water (conductivity ≥ 20 µS/cm) is activated. The max. measuring range is the range between the lower and the upper end of the measuring range. **Fig. 11**

The level electrode features the following factory set default values:

- Measuring range up to 350 mm: Code switch ㉘ position 4, 5 ON, 1, 2, 3, 6 OFF
- Measuring range 350 mm up to 750 mm: Code switch ㉘ position 4 ON, 1, 2, 3, 5, 6 OFF
- Measuring range 750 mm up to 1500 mm: Code switch ㉘ position 3 ON, 1, 2, 4, 5, 6 OFF
- Measuring range 1500 mm up to 2500 mm: Code switch ㉘ position 2 ON, 1, 3, 4, 5, 6 OFF

Establishing active measuring range (control range)

Within the measuring range of the electrode you can establish the active measuring range. Use code switch ㉘ **Fig. 9** to establish the length of the active measuring range.

Ⓧ Selected (active) measuring range [mm]

❹ Measuring range (mm) = xxx % **see Fig. 2**

㉙ Lower end of measuring range, adjustable

㉚ Upper end of measuring range, adjustable

㉛ Diagram for water, conductivity ≥ 20 µS/cm

㉜ Diagram for water, conductivity ≥ 0.5 µS/cm

㉝ Diagram for fuel oil EL, dielectric constant ε_r 2.3

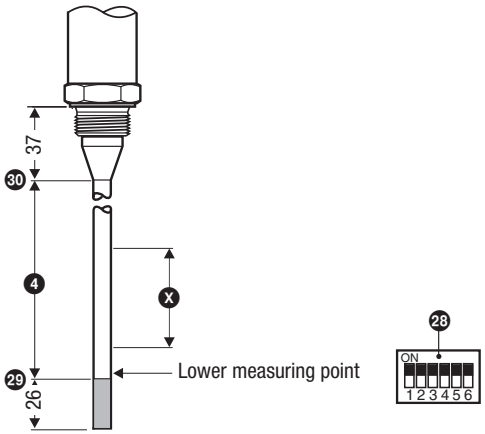

Fig. 12

Attention

- If Ⓧ is clearly below ❹ change the code switch settings according to the diagrams ㉛, ㉜ ㉝ for the fluid to be measured.

Establishing active measuring range (control range) - continued -

Ascertain the type of fluid that will be measured. Determine the active measuring range (control range) in mm. Refer to diagrams ㉛, ㉜ or ㉜ for the required code switch settings for water and fuel oil EL.

Example: Max. measuring range at 25°C: 1500 mm, selected active measuring range: 1000 mm, toggle switch 3 of the code switch must be set to ON, all other toggle switches to OFF.

If a fluid other than water or fuel oil EL is to be measured, the position of the code switches must be determined by measuring the voltage. For this purpose apply supply voltage to the connected level switch / level controller.

1. Unscrew screw ⑲ land remove cover ⑳.
2. Fill vessel to required maximum level and connect a voltmeter between terminals "1" (+) and "M" (–). Before starting the measurement set all toggle switches of the code switch to OFF.
3. Now operate each individual switch in turn: only switch 1 to ON, only 2 to ON, only 3 to ON, only 4 to ON, only 4 + 5 to ON and only 4 + 5 + 6 to ON. As soon as with one of the switch positions the value measured by the voltmeter exceeds 7 V, stop operating switches, and select the preceding switch position.
4. After having set the code switch, place cover ⑳ onto the terminal box ㉕ and fasten with screw ⑲.

㉛ Diagram for water, conductivity ≥ 20 µS/cm

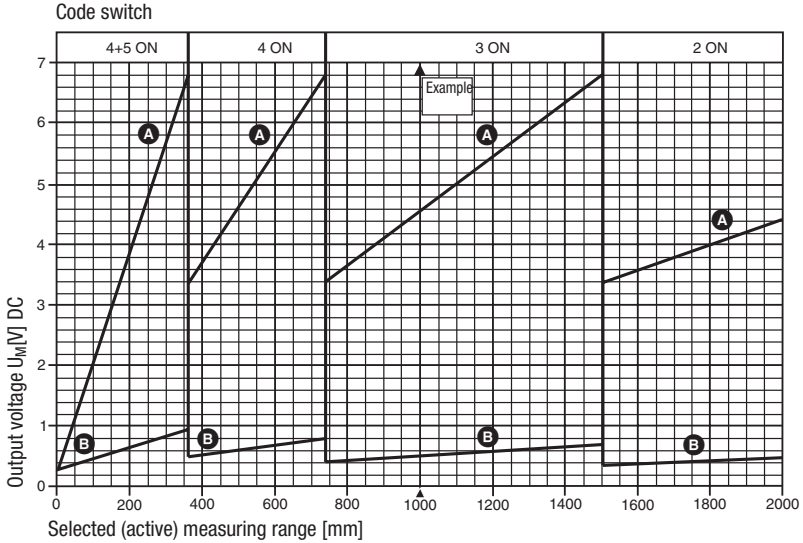

Fig. 13

Ⓐ = completely submerged Ⓑ = completely exposed

Establishing active measuring range (control range) - continued -

32 Diagram for water, conductivity ≥ 0.5 µS/cm

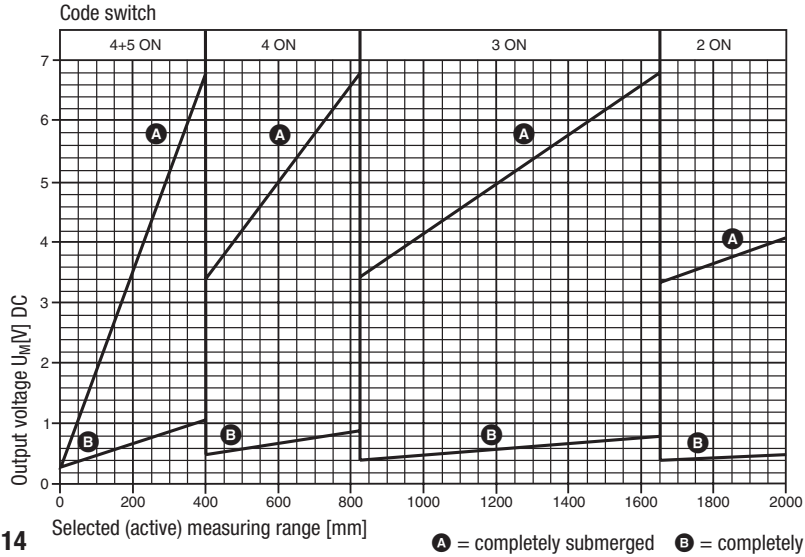

Fig. 14 Ⓐ = completely submerged Ⓑ = completely exposed

33 Diagram for fuel oil EL, dielectric constant εr 2.3

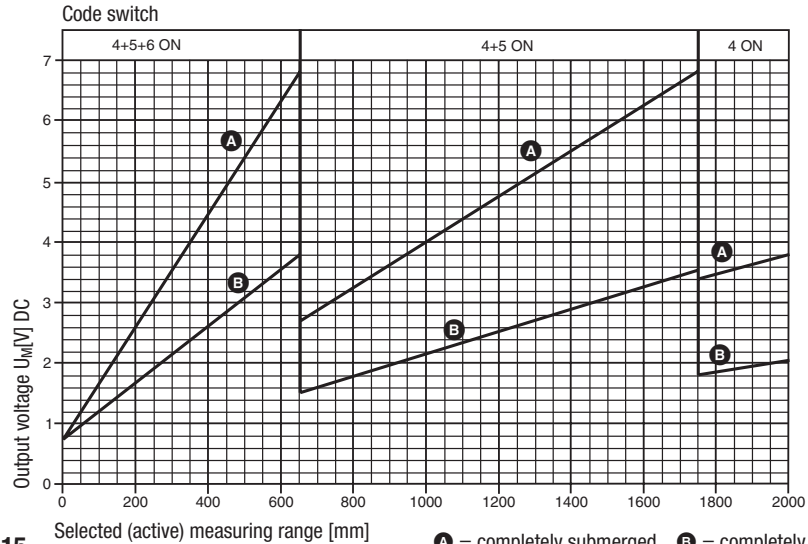

Fig. 15 Ⓐ = completely submerged Ⓑ = completely exposed

Commissioning procedure

Applying supply voltage

Please check that the level electrode is wired in accordance with the wiring diagram (**Fig. 10, 11)** and switch on supply voltage of the connected level switch / controller.

Checking measuring range

Before commissioning the level electrode make sure that the active measuring range (= control range) agrees with the service conditions of your installation.

Checking measuring voltages

The supply voltage can be measured between terminals "3" and "M" in the terminal box ㉕. The voltage should be 12 V DC. If this voltage is not present, check the connected level switch / level controller.

The level-proportional voltage UM can be measured between terminals "1" (+) and "M" (–).
Raise level in vessel to the highest point (completely submerged) of the selected (active) measuring range (e. g. 1000 mm) and measure the voltage.

Compare the value measured with the value of the corresponding chart (in diagram ㉛ UM for 1000 mm is 4.6 V). The following values must be obtained in any case:
Level electrode completely exposed: UM ≥ 0 V, level electrode completely submerged: UM ≤ 7 V DC

If the electrode is submerged and you measure UM = 0 V or UM > 7 V DC, replace the level electrode.

Note

- When adjusting the measuring range when the system is **cold**, the adjusted measuring points will shift with rising temperature as a result of the longitudinal expansion of the electrode rod. Correct the settings accordingly.

Troubleshooting

Indication, diagnosis and remedy

Attention

Before carrying out the fault diagnosis please check:

Supply voltage:
Is the level electrode supplied with the voltage specified on the name plate?

Wiring:
Is the wiring in accordance with the wiring diagram?

Malfunctions	
Equipment does not work accurately	
Error	**Remedy**
The level electrode was installed without a protection tube. The protection tube is required because it serves as reference electrode.	Install a protection tube.
The vent hole in the protection tube does not exist, is obstructed or flooded.	Check protection tube and, if necessary, provide vent hole.
The isolating valves of the external level pot (optional) are closed.	Open isolating valve.
The desired lower measuring point is outside the measuring range of the level electrode. The level electrode is too short.	Install a sufficiently long level electrode.
The adjustment of the measuring range is wrong.	Correct code switch ㉘ settings. See **Basic Settings**
The electrode rod is covered with dirt deposits.	Remove level electrode and clean the electrode tip with a wet cloth.
The level electrode is submerged and UM = 0 V or > 7 V DC.	Replace level electrode.

Equipment fails to work	
Error	**Remedy**
Power failure.	Switch on supply voltage. Check all electrical connections.
The earth connection to the vessel is interrupted.	Clean seating surfaces and screw in the level electrode together with the joint ring 27 x 32, form D, DIN 7603 (made from 2.4068), bright annealed. Do **not** insulate the electrode with hemp or PTFE tape!

Maintenance

Safety note

The equipment must only be installed, wired 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 level electrode steam or hot water might escape!
This presents the risk of severe scalding all over the body!
It is therefore essential not to dismantle the electrode unless the boiler pressure is verified to be 0 bar.

The level electrode becomes hot during operation.
Risk of severe burns to hands and arms.
Before carrying out installation and maintenance work make sure that the equipment is cold.

Cleaning the electrode rod

The equipment may only be installed and removed by qualified personnel. Observe note in chapter "Installation" on page 9.

Before cleaning the electrode rod decommission and remove the level electrode.

Clean the electrode rod with a wet cloth.

Removing and disposing of the level electrode

Removing and disposing of level electrode NRG 26-21

1. Switch off supply voltage.
2. Unscrew screw ㉕ and remove cover ⑳.
3. Disconnect the connecting wires from the terminals ㉒ and pull wires out of the cable gland.
4. Before removing the equipment make sure that it is neither hot nor under pressure.

For the disposal of the equipment observe the pertinent legal regulations concerning waste disposal.

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

Agencies all over the world: **www.gestra.de**

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818774-05/07-2017cm (808388-11)· GESTRA AG · Bremen · Printed in Germany