GESTRA®

Level Electrode

NRG 16-11S

EN
English

Original Installation Instructions

818790-00

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Important Notes

Usage for the intended purpose

Use level electrode NRG 16-11S only in conjunction with level switch NRS 1-7 for low-level limiting (low level alarm) on board of seagoing vessels, mobile offshore platforms or river boats. The equipment must **not** be used in explosion risk areas.

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.
It is essential not to mount or dismantle the electrode unless the boiler pressure is verified to be 0 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.

Explanatory Notes

Scope of supply

NRG 16-11S
1 Level electrode NRG 16-11S, PN 40
1 Disk with set screw (measuring surface extension) – optional
1 Retaining ring – optional
1 Installation manual

Description NRG 16-11S

The level electrode NRG 16-11S is exclusively designed for seagoing vessels, mobile offshore platforms and river boats. The level electrode NRG 16-11S detects the min. liquid level (low level alarm) in a steam boiler. The operation of the electrode is based on the conductivity measuring principle using the electrical conductivity of water for signaling one liquid level:

- Low level alarm

The NRG 16-11S is designed for use in conjunction with level switch NRS 1-7 (15 sec.) as a self-monitoring low level limiter with periodic self-checking (SMART) feature.

Application in steam and pressurised hot-water plants in accordance with TRD 604, sheet 1 and sheet 2 (24 h/72 h operation) as well as EN 12952 and EN 12953.

The electrical equipment meets the requirements of the Regulations on Protection Circuits EN 50156-1.

Function

The water level limiter comprises a level electrode type NRG 16-11S and a level switch type NRS 1-7. The level electrode NRG 16-11S consists of two concentrically arranged electrodes (measuring electrode and compensating electrode) which are isolated from each other by special insulating seals.

The level limiter operation is based on the conductive measuring principle using the electrical conductivity of water for signaling water level. During normal, trouble-free operation the level electrode tip is immersed in boiler water and no low level alarm is given. A low level alarm will only be raised if the electrode tip is exposed for more than 15 (25) seconds. A low level alarm will also be activated if the insulating seals placed between the electrodes and the body are no longer pressure tight, allowing water to penetrate into the body. However confirmation should always be done by checking if there is water in the gauge glass. The equipment combination NRG 16-11S and NRG 1-7 provides fail safe protection against a first fault in accordance with TRD 604.

System components

NRS 1-7
Level switch **NRS 1-7**. Two channel level limiter (redundancy) with periodic self-checking routine to EN 50156-1.

Design

NRG 16-11S
End connection: Flanged PN 40, DN 50
Electrical connection: Four-pole connector

Technical Data

NRG 16-11S

Type approval
SEE-BG GL-WB-93-349001
GL 88091 HH
RINA N° ELE/96695/1
LR 98/20076
BV 10618/Bo
KR HMB06190-MS001
NKK 02A 012

Service pressure
NRG 16-11S: 32 bar at 238 °C

Connection
Flange, PN 40, DN 50

Materials
Flange: 1.0460 C22.8
Measuring electrode: 1.4401, X5CrNiMo17-12-2
Electrode insulation: Gylon®
Four pole connector: Polyamid (PA)

Lengths available
500 mm, 1000 mm, 1500 mm, 2000 mm

Cell constant C
0.13 cm^{-1} **with** measuring surface extension
0.3 cm^{-1} **without** measuring surface extension

Response sensitivity
10 µS/cm at 25 °C, cell constant 0.3 cm^{-1}
0.5 µS/cm at 25 °C, cell constant 0.13 cm^{-1}

Electrical connection
Four-pole connector, cable gland M 16

Protection
IP 65 to EN 60529

Max. admissible ambient temperature
70 °C

Weight
Approx. 6.0 kg

Technical Data – continued –

Corrosion resistance

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

Sizing

The body must not be subjected to sharp increases in pressure. 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.

Name plate / marking

Equipment designation

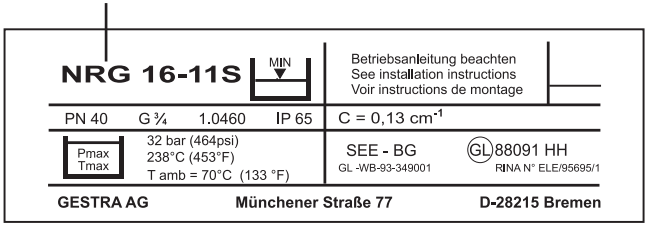

Fig. 1

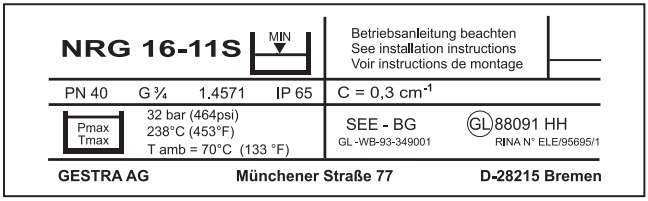

Fig. 2

Technical Data – continued –

Dimensions NRG 16-11S

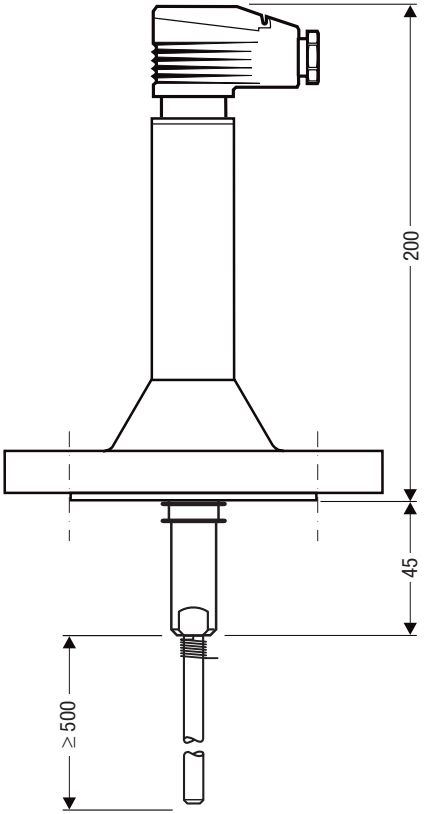

Fig. 3
NRG 16-11S for marine applications

Design

NRG 16-11S

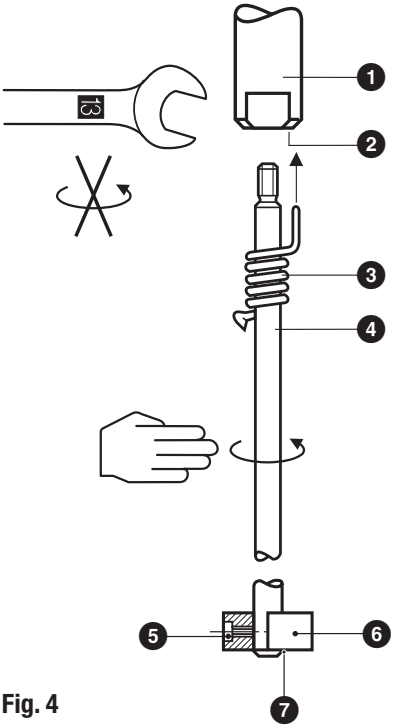

Fig. 4

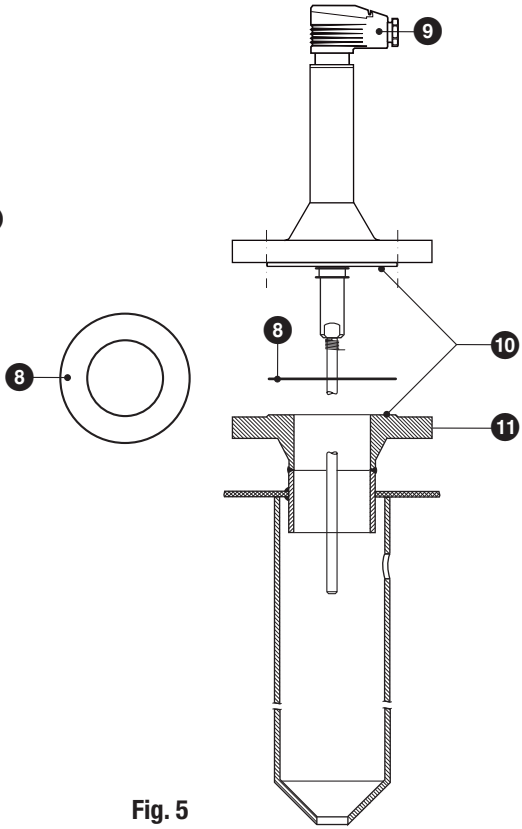

Fig. 5

Functional Elements

NRG 16-11S

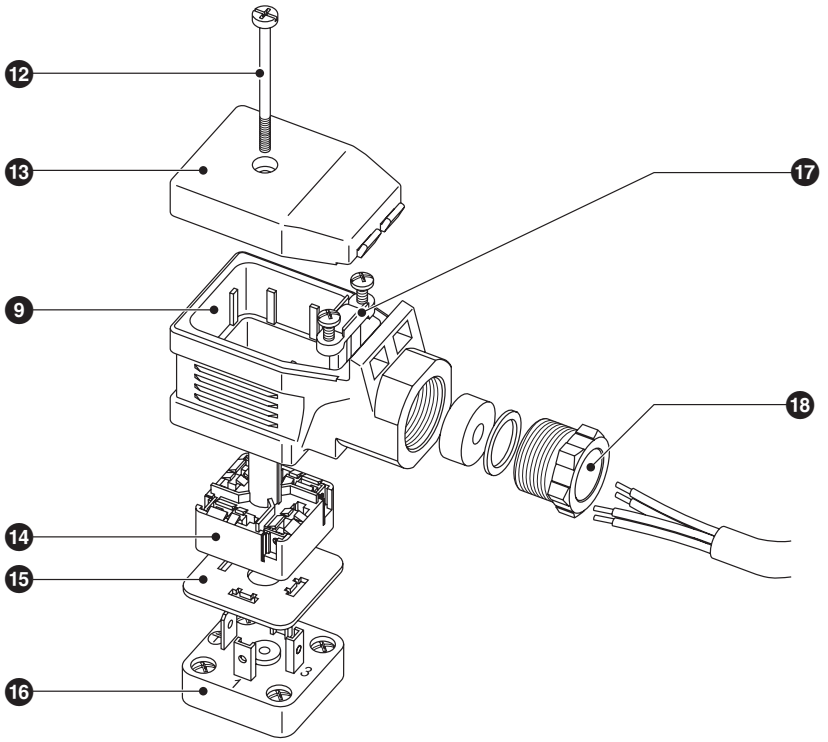

Fig. 6

Design / Functional Elements – continued –

Key

1. Electrode rod
2. Bore
3. Spring
4. Electrode tip
5. Grub screw
6. Disk (Measuring surface extension)
7. Retaining ring
8. Flange seal
9. Upper part of terminal box
10. Seating surface
11. Connecting standpipe
12. Screw M 4
13. Cover
14. Connection plate
15. Sealing element
16. Contact plate for level electrode
17. Cable clamp
18. Cable gland M 16 (PG 9)

Installation

NRG 16-11S, step 1

1. Screw electrode tip ❹ into measuring electrode ❶, **Fig. 4**
2. Carefully determine required measuring length, taking minimum length into account.
3. Mark length of electrode tip ❹.
4. Unscrew electrode tip ❹ from measuring electrode ❶ and cut tip.
5. Screw electrode tip ❹ into measuring electrode ❶ and tighten. Slide spring ❸ along electrode tip ❹, so that its bent end completely enters into small bore ❷.
6. Slip disk ❻ onto electrode tip ❹ ensuring that the electrode tip protrudes 2 mm from disk. Fasten disk with grub screw ❺. Push retaining ring ❼ from below over electrode tip against disk ❻.

NRG 16-11S, step 2

1. Check seating surfaces of flange provided on boiler standpipe.
2. Place flange seal ❽ onto the connecting standpipe ⓫, **Fig. 5**
3. Mount level electrode onto the connecting standpipe and fasten with bolts.
4. Tighten bolts uniformly in diagonally opposite pairs.

Attention

- Do not bend the electrode tip when mounting.
- Do not lag the electrode body.
- Provide a min. spacing of 14 mm between electrode and earth (flange, boiler wall), **Fig. 7, Fig. 8**
- Observe the minimum distances for the installation of the electrode.

Important notes

- For the approval of the boiler standpipe observe the relevant regulations.
- For typical installation examples refer to page 13 and 14.

Tools

- Scriber
- Hacksaw
- Flat file, cut 2, DIN 7261, form A

Examples of Installation

NRG 16-11S

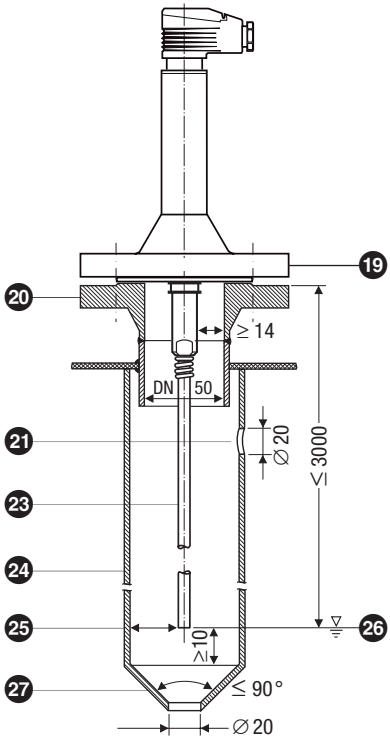

Fig. 7

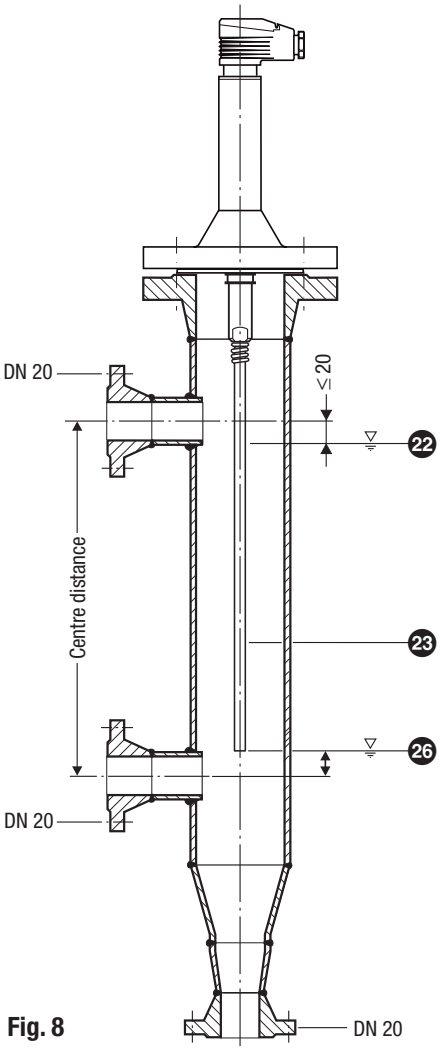

Fig. 8

Examples of Installation – continued –

Key

⑲ Flange PN 40, DIN 2501-1

⑳ For the approval of the boiler standpipe the relevant regulations must be considered.

㉑ Vent hole Provide bore as close as possible to the boiler wall!

㉒ High water HW

㉓ Electrode rod d = 8 mm

㉔ Protection tube DN 80

㉕ Electrode distance ≥ 14 mm (creepage distances and clearances)

㉖ Low water LW

㉗ Reducer DIN 2616-2, K-88.9 x 3.2 – 42.4 x 2.6 W

Electrical Connection

NRG 16-11S

Electrical connection via four pole connector.
Note that screened four-core cable, e. g. I-Y(St)Y 2 x 2 x 0.8 or LIYCY 4 x 0.5 mm² is required for wiring the electrode.
Max. length 100 m with conductivites from 10 µS/cm.
Max. length 30 m with conductivites from 0.5 µS/cm.
Max. length 15 m with conductivites from 0.5 µS/cm and application of the ancillary unit URN 1 (24 V DC).

1. Unscrew screw ⑫, **Fig. 6**
2. Take the terminal box off the level electrode, leaving the sealing element ⑮ on the contact plate ⑯.
3. Remove cover ⑬.
4. Press connecting plate ⑭ out of the upper part of the terminal box ⑨.

   The upper part of the terminal box can be turned in steps of 90°.
5. Detach cable gland ⑱ and cable clamp ⑰ from the upper part of the terminal box ⑨.
6. Run cable through cable gland ⑱ and upper terminal box ⑨ and connect the terminals of the connecting plate ⑭ according to the wiring diagram.
7. Press connecting plate ⑭ into the upper part of the terminal box and align the cable.
8. Hold cable with cable clamp ⑰ and cable gland ⑱ in position.
9. Mount cover ⑬ and insert screw ⑫.
10. Put upper part of the terminal box onto the level electrode and fix it firmly with screw ⑫.

Electrical Connection – continued –

Wiring diagram

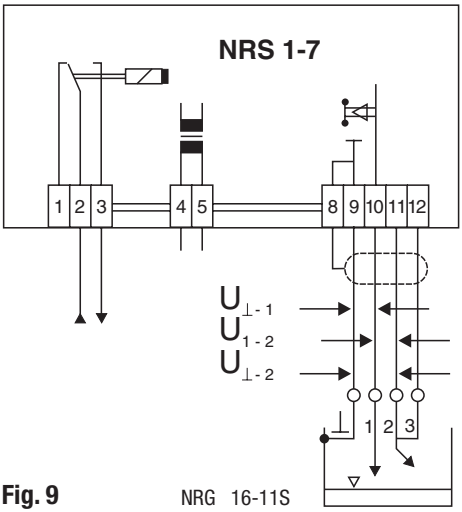

Fig. 9 NRG 16-11S

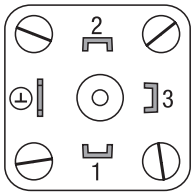

Fig. 11 NRG 16-11S

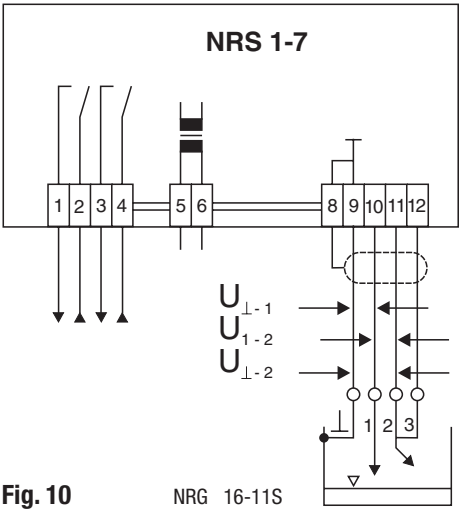

Fig. 10 NRG 16-11S

This wiring diagram is only valid for **France.**

Electrical Connection – continued –

Voltage table

Use this voltage table as a reference when checking whether the level electrode is submerged or if there is a malfunction. Please take the wiring diagram of the electrode NRS 1-7 into account.
Fig. 9, Fig. 10

U_{1-2}	$U_{1-\perp}$		$U_{2-\perp}$
	submerged	exposed	malfunction (submerged/alarm)
10 V_{eff} 0.5 µS/cm, C = 0.13 cm^{-1} 2 V_{eff} 10 µS/cm, C = 0.3 cm^{-1}	$< \frac{U_{1-2}}{2}$	$\geq \frac{U_{1-2}}{2}$	$\leq U_{1-\perp}$

Note

- The self-checking routine of the amplifier NRS 1-7 reduces U_{1-2} every 40 seconds to 0 volt!

Tools

- Screwdriver for cross-recess head screws, size 1
- Screwdriver for slotted screws, size 2.5, completely insulated according to DIN VDE 0680-1
- Open-end spanner A. F. 18 (19)

Commissioning

Check wiring

Check whether the NRG 16-11S and the associated controller NRS 1-7 are wired in accordance with the wiring diagram. **Fig. 9, Fig. 10**

Apply mains voltage

Apply mains voltage to level switch NRS 1-7.

Operation

Low-level limiter

Operation in combination with controller NRS 1-7 in steam and pressurised hot water plants to TRD 401, TRD 602, TRD 604, EN 12952, EN 12953 or other national regulations.

Note

- Should malfunctions occur during the commissioning procedure refer to chapter “Operational Malfunctions” on page 17 in order to analyse and correct them.

Operational Malfunctions

Fault-finding list for troubleshooting

Level electrode submerged – low-level alarm

Fault: Mains voltage is not applied to level switch.
Remedy: Apply mains voltage. Wire electrode according to wiring diagram.

Fault: The electrode housing does not have earth connection to the boiler.
Remedy: Clean seating surfaces and insert suitable metal joint ring.
Do **not** insulate level electrode with hemp of PTFE tape.

Fault: The internal insulation of the electrode rod is damaged.
Remedy: Replace level electrode.

Water level below low level limit – no function

Fault: The electrode rods have earth contact.
Remedy: Check and change position of installation.

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 (optional extra) are closed.
Remedy: Open isolating valves.

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

Decommissioning

Danger

Risk of severe burns and scalds to the whole body!
Before removing the level electrode make sure that the vessel or measuring pot are depressurised (0 bar) and cooled down to room temperature (20 °C).

Disposal

Remove the level electrode and separate the waste materials in accordance with the material specification.
For the disposal of the level electrode observe the pertinent legal regulations concerning waste disposal.

For your notes

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