GESTRA®

alnab

Level Electrodes

NRG 16-50
NRG 17-50
NRG 19-50
NRG 111-50

EN
English

Original Installation Instructions

818954-08

Contents

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Important Notes

Usage for the intended purpose

The level electrodes NRG 1...-50 are used in conjunction with level switch NRS 1-50 as water level limiters for steam boilers and (pressurised) hot water installations.

Water level limiters switch off the heating when the water level falls below the set minimum level (low water).

Function

When the water level falls below the low level, the level electrode is exposed and a low level alarm is triggered in the level switch NRS 1-50. This switchpoint "Low water level (LW)" is determined by the length of the electrode tip.

The electrode operation is based on the conductive measuring principle using the electrical conductivity of the water for signalling water level. The self-monitoring function ensures that an alarm will also be triggered if the electrode insulation is contaminated or has developed a leak or if there is a malfunction in the electrical connection.

The level electrode is installed inside steam boilers, vessels or inlet lines of hot-water systems. The protective tube mounted on site (see section **Examples of Installation** - pages 16, 17) ensures correct functioning.

One level electrode NRG 1...-50 can be installed together with one GESTRA level electrode, one level switch or transmitter for water level control and low level alarm in one single protection tube or level pot.

If the level electrode is installed in an isolatable level pot outside the boiler, make sure that the connecting lines are rinsed regularly. In addition, the logic unit SRL is required to monitor the purging times and the purging sequence.

If the connecting lines for steam ≥ 40 mm and water ≥ 100mm, the installation is considered to be internal. In this case the rinsing processes do not have to be monitored.

Safety note

This equipment is a safety accessory and 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 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 electrode becomes hot during operation.
Risk of severe burns to hands and arms.
Before carrying out installation and maintenance work make sure that the steam trap 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.

Important Notes - continued -

Potentially explosive atmospheres

Do not use the equipment in potentially explosive atmospheres.

Note

The level electrodes NRG 1...-50 are simple items of electrical equipment as specified in EN 60079-11 section 5.7. The equipment must be equipped with approved Zener barriers if used in potentially explosive areas (zones 1 and 2). The equipment does not bear an Ex marking.

Note that the requirements of the IEC 61508 are not met if the NRG 1...-50 + Zener barriers + NRS 1-50 are interconnected!

Technical data

NRG 16-50, NRG 17-50, NRG 19-50

Service pressure
NRG 16-50: PN 40, 32 bar at 238 °C
NRG 17-50: PN 63, 60 bar at 275 °C
NRG 19-50: PN 160, 100 bar at 311 °C
NRG 111-50: PN 320, 183 bar at 357 °C

Mechanical connection
Screwed G ¾ A to ISO 228-1 (NRG 16-50, NRG 17-50, NRG 19-50)
Screwed G 1 A to ISO 228-1 (NRG 111-50)

Materials
Screw-in body: 1.4571, X6CrNiMoTi17-12-2 (NRG 16-50, NRG 17-50, NRG 19-50)
Screw-in body: 1.4529, X1NiCrMoCuN25-20-7 (NRG 111-50)
Measuring electrode: 1.4571, X6CrNiMoTi17-12-2 (NRG 16-50, NRG 17-50, NRG 19-50)
Measuring electrode: 1.4122, X39CrMo17-1 (NRG 111-50)
Electrode tip: 1.4401, X5CrNiMo17-12-2
Electrode insulation: Gylon® (NRG 16-50, NRG 17-50, NRG 19-50)
Electrode insulation: special ceramic (NRG 111-50)
NRG 1...-50: Four-pole connector: polyamide (PA)
NRG 1...-50F: Terminal box 3.2161 G AlSi8Cu3

Lengths supplied
500 mm, 1000 mm, 1500 mm, 2000 mm, 2500 mm, 3000 mm

ph value
Max. admissible: 10 (NRG 111-50)

Electrical connection
NRG 1...-50: Four-pole connector, cable glands M 16
NRG 1...-50F: Terminal box made from aluminium, cable gland M 20

Protection
IP 65 to EN 60529

Admissible ambient temperature
Max. 70 °C

Weight
Approx. 1.2 kg (without extension) (NRG 16-50, NRG 17-50, NRG 19-50)
Approx. 2.1 kg (without extension) (NRG 16-50F, NRG 17-50F, NRG 19-50F)
Approx. 1.8 kg (without extension) (NRG 111-50)
Approx. 2.7 kg (without extension) (NRG 111-50F)

Technical data - continued -

Scope of supply

NRG 16-5
1 Level electrode NRG 16-50, PN 40
1 Joint ring 27 x 32, form D, DIN 7603, 2.4068, bright annealed
1 Washer with set screw (measuring surface extension) (optional)
1 Retaining ring (optional)
1 Installation manual

NRG 17-50
1 Level electrode NRG 17-50, PN 63
1 Joint ring 27 x 32, form D, DIN 7603, 2.4068, bright annealed
1 Washer with set screw (measuring surface extension) (optional)
1 Retaining ring (optional)
1 Installation manual

NRG 19-50
1 Level electrode NRG 19-50, PN 160
1 Joint ring 27 x 32, form D, DIN 7603, 2.4068, bright annealed
1 Washer with set screw (measuring surface extension) (optional)
1 Retaining ring (optional)
1 Installation manual

NRG 111-50
1 Level electrode NRG 111-50, PN 320
1 Joint ring 33 x 39, form D, DIN 7603, 2.4068, bright annealed
1 Washer with set screw (measuring surface extension) (optional)
1 Retaining ring (optional)
1 Installation manual

Example name plate/marking

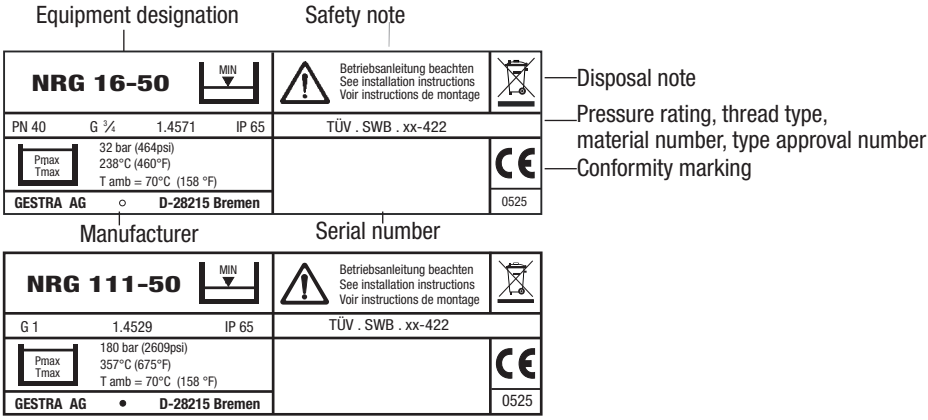

Fig. 1

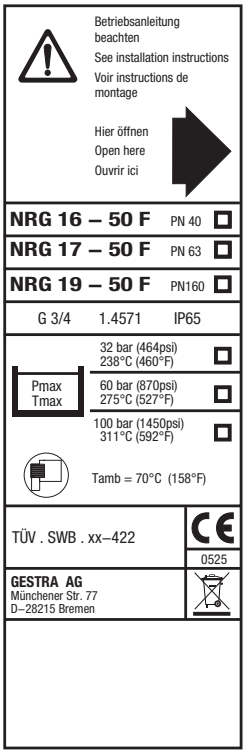

Fig. 2

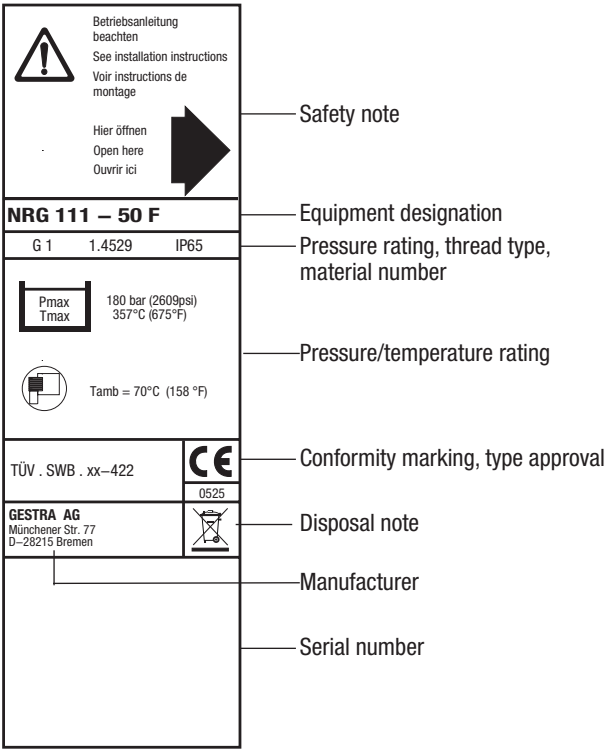

Fig. 3

Dimensions NRG 16-50, NRG 17-50, NRG 19-50

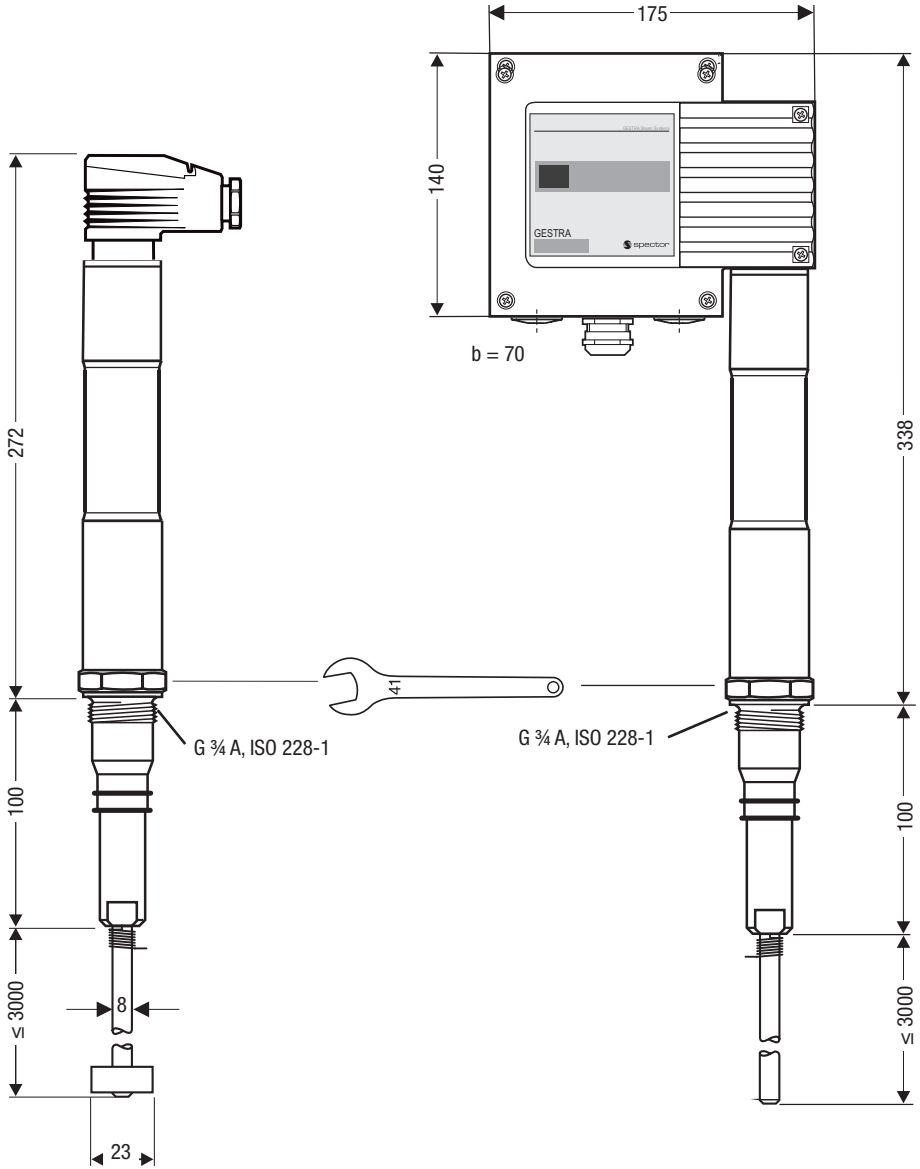

Fig. 4

NRG 16-50, NRG 17-50, NRG 19-50
with four-pole connector and measuring surface extension

Fig. 5

NRG 16-50F, NRG 17-50F, NRG 19-50F
with aluminium terminal box

Dimensions NRG 111-50

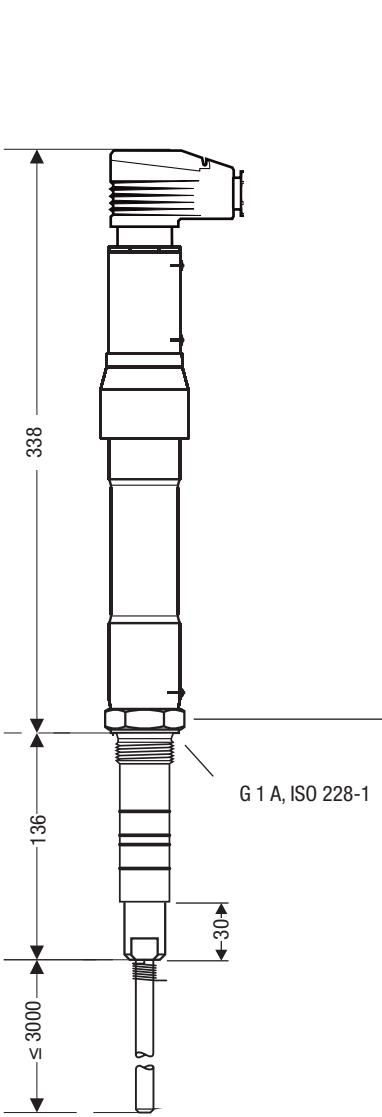

Fig. 6
NRG 111-50

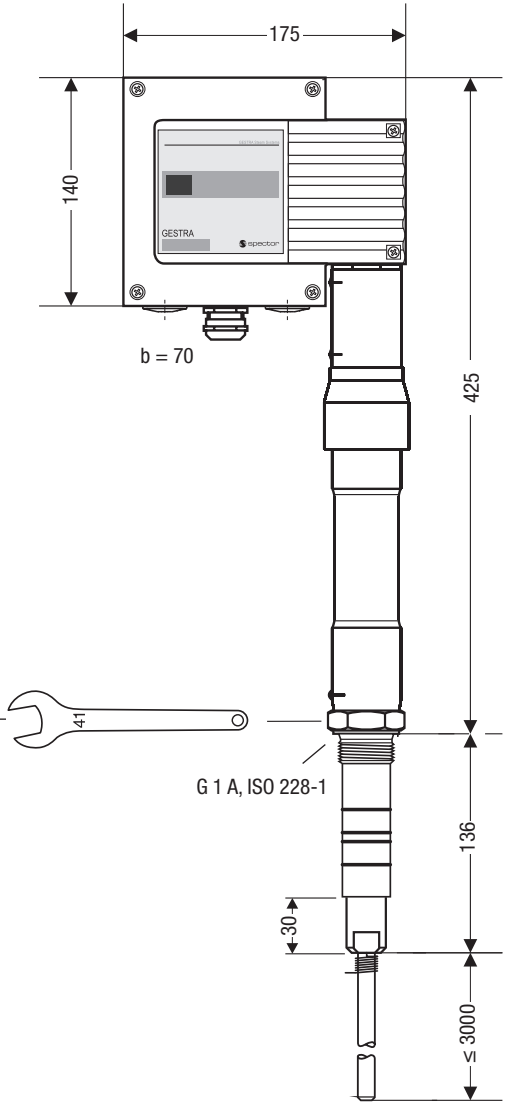

Fig. 7
NRG 111-50F

Note

- **One** level electrode NRG 1...-50 can be installed together with one GESTRA level electrode, one level switch or transmitter for water level control or low level alarm in one single protection tube or level pot (inside diameter 100 mm). **Fig. 17.** If the electrode NRG 1...-50 is installed inside the vessel, it must be at least 40 mm away from the upper vent hole.
- The installation of two water-level limiting electrodes NRG 1...-50 in one single standpipe is not allowed.
- For the approval of the boiler standpipe the relevant regulations must be considered.
- Refer to pages 16 – 17 for typical installation examples.
- The angle of inclination of the electrode must not exceed 45°, with the length of the electrode rod being limited to 1000 mm. **Fig. 16, 20**
- If used in combination with level switch NRS 1-50 with a response sensitivity of 0.5 µS/cm please us a measuring surface extension.
- For outdoor installations please use level electrode NRG 1...-50 F.
  Level electrodes with this suffix (F) feature a terminal box made from aluminium.

Attention

- The seating surfaces of the standpipe or the flange provided on the vessel must be accurately machined, see **Fig. 12.**
- If the level electrode NRG 111-50 is to be installed in a flanged standpipe DN 50 use only the GESTRA hat flange. **Fig. 11**
- Do not bend electrode tip when mounting.
- Use only the joint rings supplied with the electrode.
  NRG 16-50, NRG 17-50, NRG 19-50: 27 x 32, form D, DIN 7603, 2.4068
  NRG 111-50: 33 x 39, form D, DIN 7603, 2.4068
- 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!
- Make sure that the air distance between the electrode rod and earth (flange, vessel wall) is not less than 14 mm. **Fig. 11, Fig. 15-21**
- Observe the minimum distances for the installation of the electrode!

Tools

- Open-end spanner A. F. 13, DIN 3110, ISO 3318
- Open-end spanner A. F. 19, DIN 3110, ISO 3318
- Open-end spanner A. F. 41, DIN 3110, ISO 3318
- Scriber
- Hacksaw
- Flat file, medium cut, DIN 7261, form A

NRG 16-50, NRG 17-50, NRG 19-50, NRG 111-50

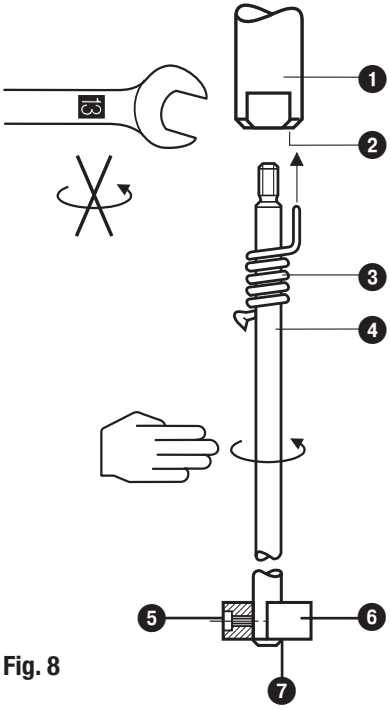

Fig. 8

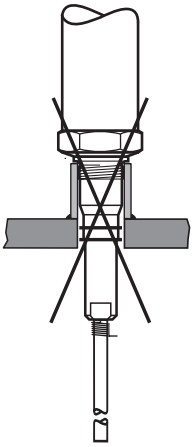

Fig. 10

NRG 16-50
NRG 17-50
NRG 19-50

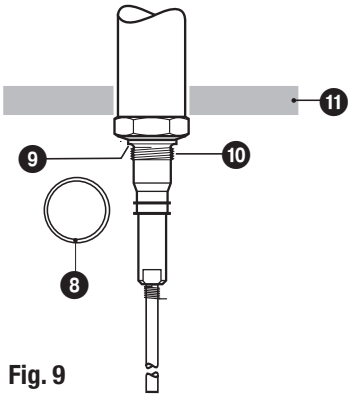

Fig. 9

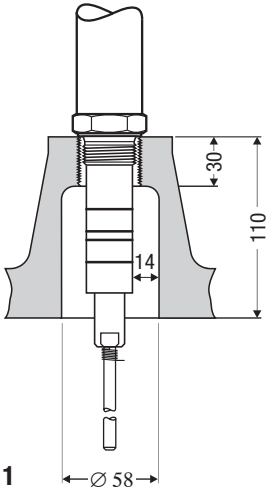

Fig. 11

NRG 111-50

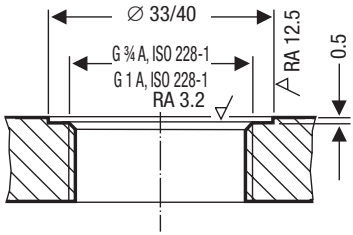

Fig. 12

Installation - continued -

NRG 16-50, NRG 17-50, NRG 19-50, NRG 111-50, step 1

1. Screw electrode tip ❹ into measuring electrode ❶. **Fig. 8**
2. Carefully determine required measuring length of electrode.
3. Mark length of electrode tip ❹.
4. Unscrew electrode tip ❹ from measuring electrode ❶ and cut tip.
5. After visual inspection screw electrode tip ❹ into measuring electrode ❶. Slide spring ❸ along electrode tip 4 so that its end completely enters the small hole ❷.
6. Mounting the measuring surface extension: Fit disk ❻ to electrode tip, making sure that the electrode tip protrudes 2 mm beyond the bottom of the surface extension disk. Fix the disk in this position with the set screw ❺. Push supplied lock washer ❼ from below over electrode tip and against surface extension disk ❻.

NRG 16-50, NRG 17-50, NRG 19-50, NRG 111-50, step 2

7. Check seating surfaces. **Fig. 12**
8. Place supplied joint ring ❽ onto seating surface of the threaded standpipe or flange. **Fig. 9**
9. Apply a light smear of heat resistant silicone grease (e.g. WINIX® 2150) to electrode thread ❼.
10. Screw level electrode into threads or flange provided on vessel and tighten with a 41 mm open-end spanner. The torque required when **cold is 160 Nm** (NRG 16-50, NRG 17-50, NRG 19-50) or **475 Nm** (NRG 111-50).

Key

❶ Measuring electrode

❷ Bore

❸ Spring

❹ Electrode tip

❺ Set screw

❻ Disk (measuring surface extension)

❼ Retaining ring

❽ NRG 1...-50: Joint ring 27 x 32, form D, DIN 7603, 2.4068, bright annealed

NRG 111-50: Joint ring 33 x 39, form D, DIN 7603, 2.4068, bright annealed

❾ Seating surface

❿ Electrode thread

⓫ Thermal insulation, provided on site, d = 20 mm (outside of thermal insulation of steam boiler)

NRG 16-50 F, NRG 17-50 F, NRG 19-50 F, NRG 111-50 F, with aluminium terminal box

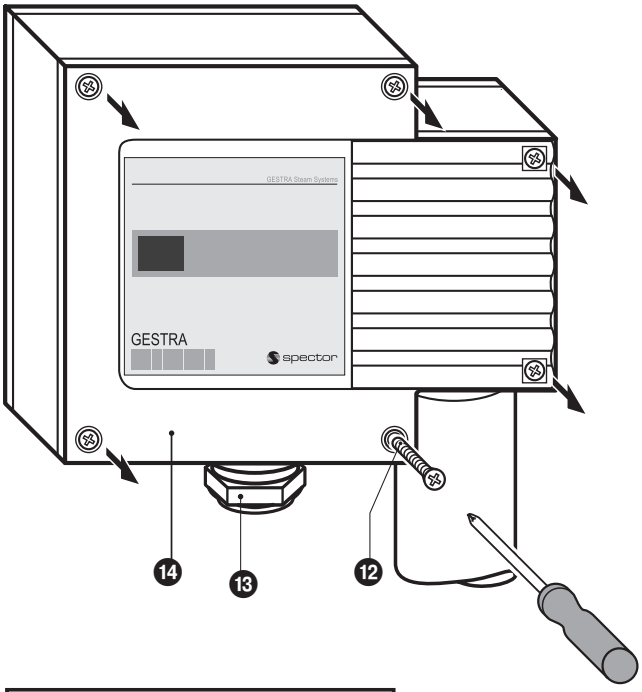

Fig. 13

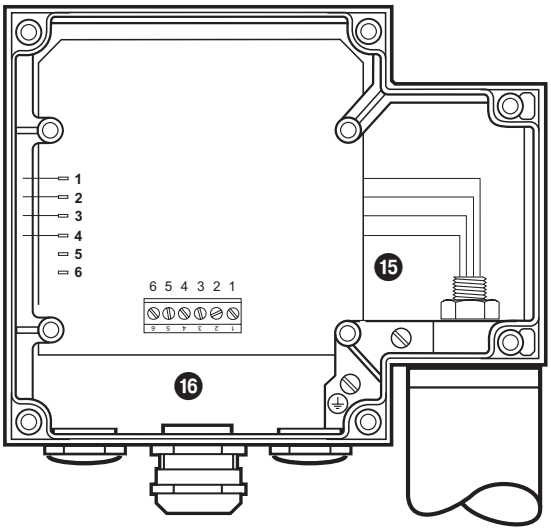

Fig. 14

Installation - continued -

NRG 16-50 F, NRG 17-50 F, NRG 19-50 F, additional information

If one level electrode NRG 1...-50 F is installed together with one level electrode, one level switch or transmitter (with aluminium terminal box) in a single protection tube or level pot, please observe the following:

1. Mount the first equipment as specified in the pertinent installation manual.

When installing level electrode NRG 1...-50 F, please observe the following instructions:

1. Loosen screws ⓬ and remove housing cover ⓮. **Fig. 13.** The arrow on the name plate points towards this cover.
2. Remove cable lugs from terminal lugs. **Fig. 14**
3. Loosen nut ⓯ with 19 mm open-end spanner but do not remove! **Fig. 14**
4. Screw in level electrode as described in step 2, items 7 – 10.
5. Turn electrode terminal box into desired direction (+/-180°).

The terminal box can be turned through +/-180°.

6. Tighten nut ⓯ with a torque of **25 Nm.**
7. Plug cable lugs onto terminal lugs.
5. Mount housing cover ⓮ and tighten screws ⓬.

Key

⓬ Housing screws M 4

⓭ Cable gland M 20 x 1.5

⓮ Housing cover

⓯ Nut

⓰ Terminal strip

Examples of installation

NRG 16-50, NRG 17-50, NRG 19-50

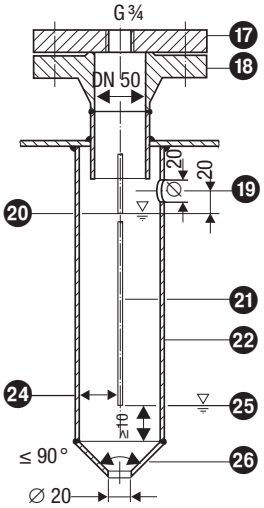

Fig. 15 Protection tube (provided on site) if electrode is used as internal water-level limiter

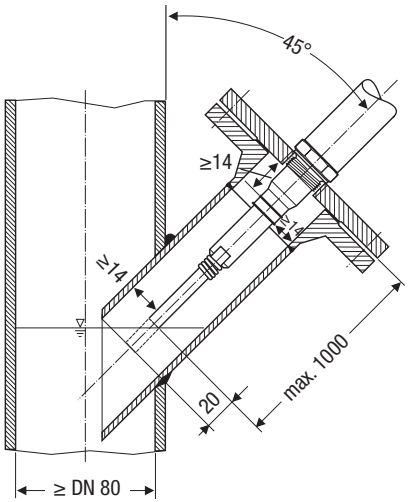

Fig. 16 Inclined installation, e. g. in ascending inlet lines of hot-water installations or vessels

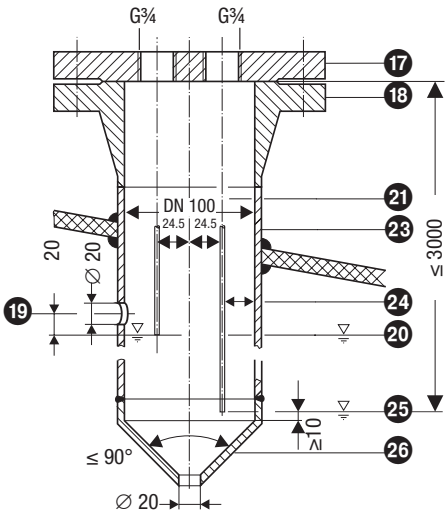

Fig. 17 Protection tube (provided on site) if electrode is used as internal water level-limiter combined with water level control or low water level alarm

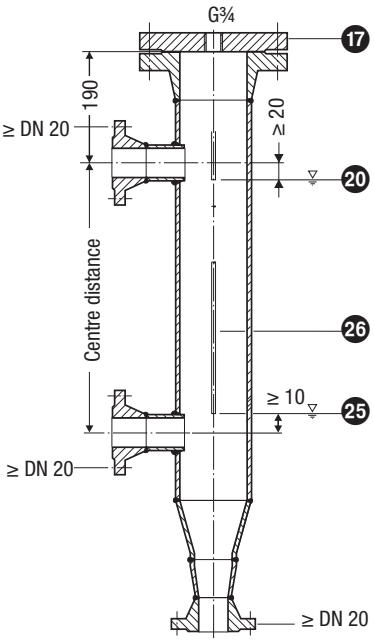

Fig. 18 Level pot ≥ DN 80 if electrode is used as external water level limiter

Examples of Installation - continued -

NRG 111-50

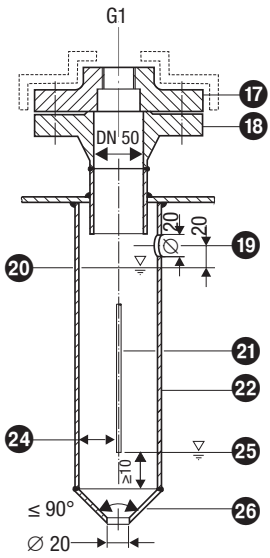

Fig. 19 Protection tube (provided on site) if electrode is used as internal water-level limiter

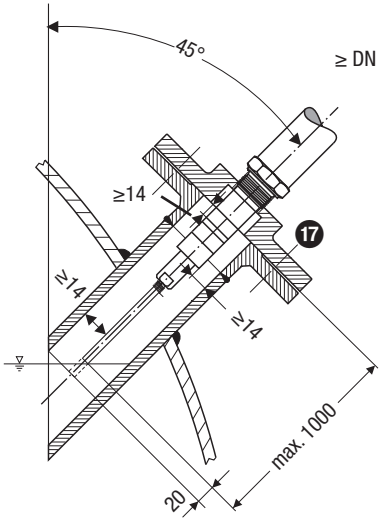

Fig. 20 Inclined installation, e. g. in steam boilers

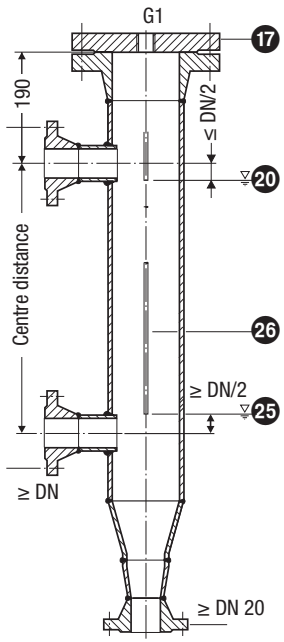

Fig. 21 Level pot ≥ DN 80 if electrode is used as external water level limiter

Key

17 Flange PN 40, PN 63, PN 160, DN 50, EN 1092-01 (for one electrode)
Flange PN 40, PN 63, PN 160, DN 100, EN 1092-01 (for two electrodes)
GESTRA hat flange PN 320, DN 50, EN 1092-01 (NRG 111-50)

18 For the approval of the boiler standpipe with connecting flange the relevant regulations must be considered.

22 Vent hole Provide vent hole as close to the boiler wall as possible!

20 High water HW

21 Electrode tip d = 8 mm

22 Protection tube DN 80 (in France according to AFAQ ≥ DN 100)

23 Protection tube DN 100

24 Electrode distance ≥ 14 mm (air gap and creepage distance)

25 Low water LW

26 Reducer DIN 2616-2, K-88.9 x 3.2-42.4 x 2.6 W / DIN 2616-2, K-114.3 x 3.6-48.3 x 2.9 W

Electrical connection

NRG 16-50, NRG 17-50, NRG 19-50, NRG 111-50, four-pole connector

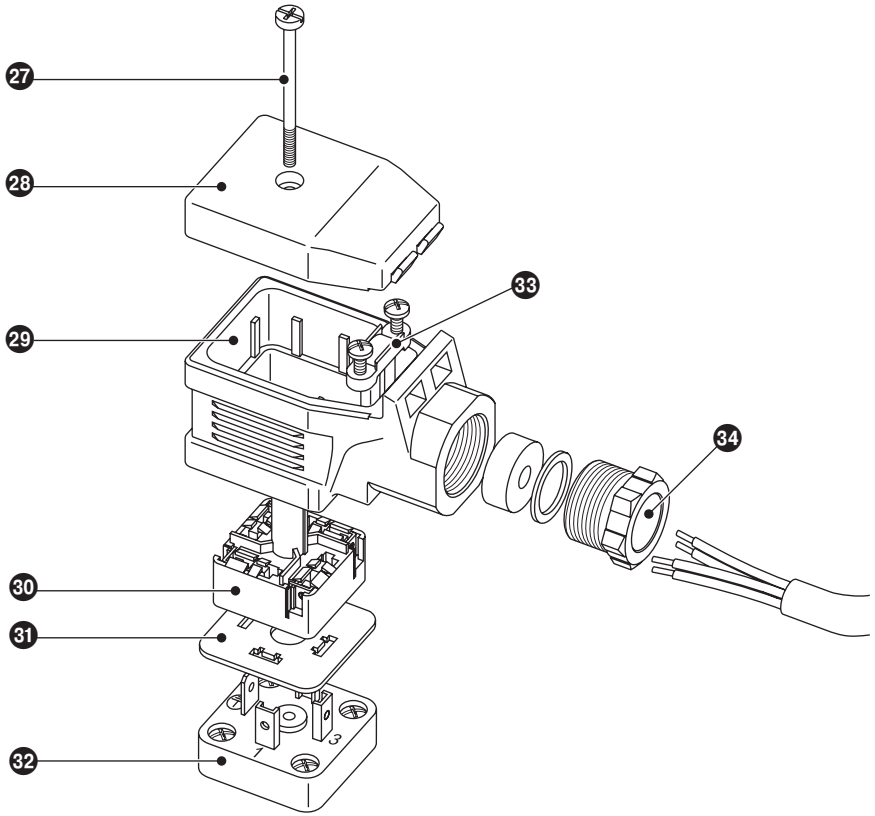

Fig. 22

Key

- 27 Screw M 4
- 28 Cover
- 29 Upper part of terminal box
- 30 Connecting plate
- 31 Insulating plate
- 32 Contact plate of level electrode
- 33 Cable strain relief
- 34 Cable gland M 16 (PG 9)

Electrical connection - continued -

Connection of level electrode

To connect the level electrode(s) please use:

- For the level switch NRS 1-50 with a response sensitivity of 10 µS:
  Multi-core screened control cable, min. conductor size 0.5 mm², e. g. LiYCY 4 x 0.5 mm²,
  max. length 100 m.
- For the level switch NRS 1-50 with a response sensitivity of 0.5 µS:
  Multi-core double-screened low-capacitance data cable, min. conductor size 0.5 mm²,
  Li2YCY PiMF 2 x 2 x 0.5 mm², max. length 30 m.

Wire terminal strip in accordance with the wiring diagram. **Fig. 23.** Wire the screens to terminals 5 and 13 and to the central earthing point **(CEP)** in the control cabinet.

NRG 16-50, NRG 17-50, NRG 19-50, NRG 111-50, with four-pole connector

1. Loosen screw ㉗. **Fig. 22**
2. Remove upper part ㉙ of the terminal box from the level electrode but leave insulating plate ㉛ on contact plate ㉜.
3. Remove cover ㉘.
4. Press connecting plate ㉚ out of the upper part of the terminal box ㉙.

   The upper part of the terminal box can be turned in steps of 90°.
5. Detach cable gland ㉞ and cable clamp ㉝ from the upper part of the terminal box ㉙.
6. Run cable through cable gland ㉞ and upper part of the terminal box ㉙ and wire terminals of the connecting plate ㉚ in accordance with wiring diagram.
7. Press connecting plate ㉚ into the upper part of the terminal box and align cable.
8. Fix cable with cable strain relief ㉝ and cable gland ㉞ firmly into position.
9. Replace cover ㉘ and insert screw ㉗.
10. Put upper part of the terminal box onto the level electrode and fix it with screw ㉗.

NRG 16-50 F, NRG 17-50 F, NRG 19-50 F, NRG 111-50 F, with aluminium terminal box

1. Loosen screws ⑫ and remove housing cover ⑭. **Fig. 13, 14**
2. Loosen cable gland ⑬. Pull cable through cable entry.
3. Remove terminal strip ⑯ from board.
4. Connect terminal strip according to the wiring diagram.
5. Attach terminal strip.
6. Tighten the cable gland in order to seal the cable entry. Use the supplied sealing plug to seal off the unused cable entry and tighten the cable gland.
7. Mount housing cover ⑭ and tighten screws ⑫.

Tools

- Screwdriver, size 1
- Screwdriver, size 2.5, completely insulated according to DIN VDE 0680-1
- Open-end spanner A.F. 18 (19) mm

Electrical Connection - continued -

Wiring diagram

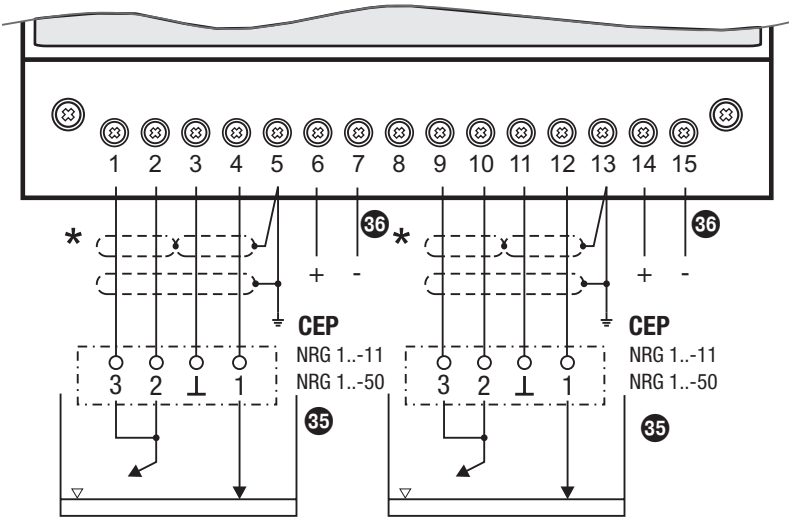

Fig. 23

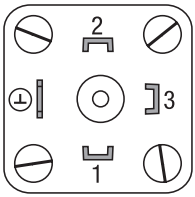

Fig. 24 Wiring of level electrode with four-pole connector

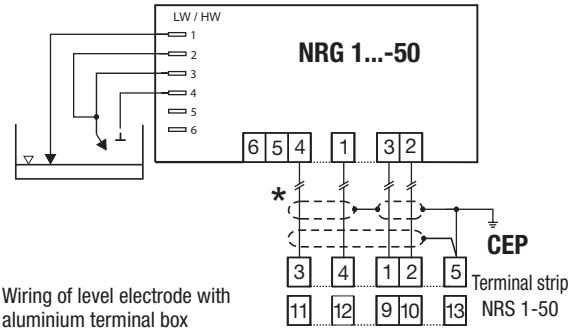

Fig. 25 Wiring of level electrode with aluminium terminal box

* NRS 1-50 with response sensitivity 0.5 µS/cm: Connect the two internal screens to terminals 5 and 13 and the **CEP.**

Key

35 Level electrode NRG 1..-50, NRG 1..-11

36 Stand-by input 1 / 2, 24 VDC, for connecting logic unit SRL

CEP Central earthing point in control cabinet

Commissioning, fault indication and troubleshooting

For additional information on commissioning procedures and troubleshooting refer to the installation manual of the level switch NRS 1-50.

Removing and disposing of the level electrode

Danger

When loosening the 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 electrode becomes hot during operation.
Risk of severe burns to hands and arms.
Before carrying out installation and maintenance work make sure that the steam trap is cold.

Removing and disposing of level electrode NRG 1..-50

1. Loosen screw ㉗. **Fig. 22**
2. Detach upper part of the terminal box ㉙ from the level electrode.
3. Before removing the equipment make sure that is is neither hot nor under pressure.

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

Removing and disposing of level electrode NRG 1..-50F

1. Loosen screws ⑫ and remove housing cover ⑭. **Fig. 13, 14**
2. Unplug connecting cables from terminal strip and pull cables out of the cable gland.
3. Before removing the equipment make sure that is 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.

Declaration of Conformity
Directives and Standards

For more information on the conformity of the equipment as well as applied Directives and Standards please refer to our Declaration of Conformity and associated certificates and/or approvals.

The Declaration of Conformity can be found online at www.gestra.com and associated certificates can be requested from:

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Note that Declarations of Conformity and associated certificates lose their validity if equipment is modified without prior consultation with us.

For your Notes

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

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