



Level Electrode

# **NRG 16-36**

**EN**  
English

Original Installation Instructions  
**819257-01**

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## Important notes

### Usage for the intended purpose

The level electrode NRG 16-36 is used in conjunction with level switch NRS 1-50 as water level limiter for steam boilers and (pressurized) hot-water installations and in conjunction with level switches NRS 1-52 / NRS 1-54 or NRS 1-2 / NRS 1-5 as water level controller.

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

### Function

The **NRG 16-36** is a combination level electrode consisting of 1 level-limiting electrode tip for low level alarm (LW) and 3 electrode tips for water level control with high level alarm (MAX).

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

The length of the individual electrode rods determines the switchpoints for the respective water levels. 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 11).

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  $\geq 40$  mm and water  $\geq 100$ mm, the installation is considered to be internal. In this case the rinsing processes do not have to be monitored.

### Safety note

This device is an item of equipment with safety function (PED) 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.

## Directives and standards

### Pressure Equipment Directive (PED) 2014/68/EU

Water level limiters are safety accessories as defined in the Pressure Equipment Directive (PED). The level electrode NRG 16-36 in conjunction with level switch NRS 1-50 is EC type approved according to EN 12952/EN 12953. These Directives state, among other things, the requirements made on limiting systems and equipment for steam boiler plants and (pressurised) hot-water installations.

### Functional Safety acc. to IEC 61508

The level electrodes NRG 1...-50 / NRG 16-36 are certified acc. to IEC 61508 only if used in combination with level switch NRS 1-50. This standard describes the functional safety of safety-related electrical/electronic/programmable electronic systems.

The equipment combination NRG 1...-50 or NRG 16-36 + NRS 1-50 corresponds to a type B sub-system with Safety Integrity Level (SIL) 3.

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

The level electrodes NRG 1-50, NRG 1...-11 and NRG 16-36 in conjunction with the level switch NRS 1-50 are type approved according to the VdTÜV Bulletin "Water Level 100".

The level electrode NRG 16-36 is also type approved in conjunction with level switches NRS 1-52 / NRS 1-55 or NRS 1-2 / NRS 1-5.

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

### ATEX (Atmosphère Explosible)

The level electrodes NRG 1...-50, NRG 1...-11 and NRG 16-36 are simple items of electrical equipment as specified in EN 60079-11 section 5.7. According to the European Directive 2014/34/EU the equipment must be equipped with approved Zener barriers if used in potentially explosive areas. Applicable in Ex zones 1, 2 (1999/92/EC). The equipment does not bear an Ex marking.

Note that the requirements of the IEC 61508 are not met if the NRG 1...-50, NRG 1...-11, NRG 16-36 + Zener barriers + NRS 1-50 are interconnected!

### 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 / Declaration of Manufacturer are available in the Internet under [www.gestra.com/documents](http://www.gestra.com/documents) or can be requested from us.

# Technical data

## NRG 16-36

### Operating pressure

PN 40, 32 bar at 238 °C

### Mechanical connection

Screwed BSP 1 1/2 A, ISO 228

### Materials

Screw-in body 1.4571, X6CrNiMoTi17-12-2

Electrode tips 1.4571, X6CrNiMoTi17-12-2

Electrode insulation Gylon®, PTFE

Spacer disks PTFE

Terminal box 3.2161 G AISi8Cu3

### Lengths available

400mm, 1000 mm, 1500 mm

### Electrical connection

Terminal box made from aluminium, 2 cable glands Pg 11

### Protection

IP 65 to EN 60529

### Max. admissible ambient temperature

Max. 70 °C

### Weight

Approx. 4.5 kg (L=1000 mm)

### Approvals:

TÜV certificate

VdTÜV Bulletin "Water Level 100"

Requirements made on water level limiting & control equipment.

Type approval no. TÜV · WR / WB · XX-370; XX-424; SWB · XX-422

(see name plate)

Gylon® is a registered trademark of Garlock Sealing Technologies, Palmyra NY, USA

## Scope of supply






### NRG 16-36

1 Level electrode NRG 16-36, PN 40

1 Joint ring 48 x 55, form D to DIN 7603, made from 2.4068, bright annealed

1 Installation manual

## Name plate/markings

Equipment designation			Safety note		
<b>NRG 16-36</b>			 Betriebsanleitung beachten See installation instructions Voir instructions de montage		 Disposal note
PN 40	G1 1/2	1.4571	IP 65	TÜV · WR / WB · xx-424	 Type approval no.
 CE	32 bar (464psi)		238°C (460°F)	TÜV · SWB · xx-422	0525
	T max		T amb = 70°C (158°F)	Mat-Nr.:	
GESTRA AG		Münchener Straße 77		D-28215 Bremen	

Manufacturer Application range Pressure rating, thread type, material number, protection

Fig. 1

## Installation



### Note

- For the approval of the boiler standpipe the relevant regulations must be considered.
- Refer to pages 11 for typical installation examples.
- If installed outdoors the level electrode **must** be equipped with a GESTRA weather protection cover.



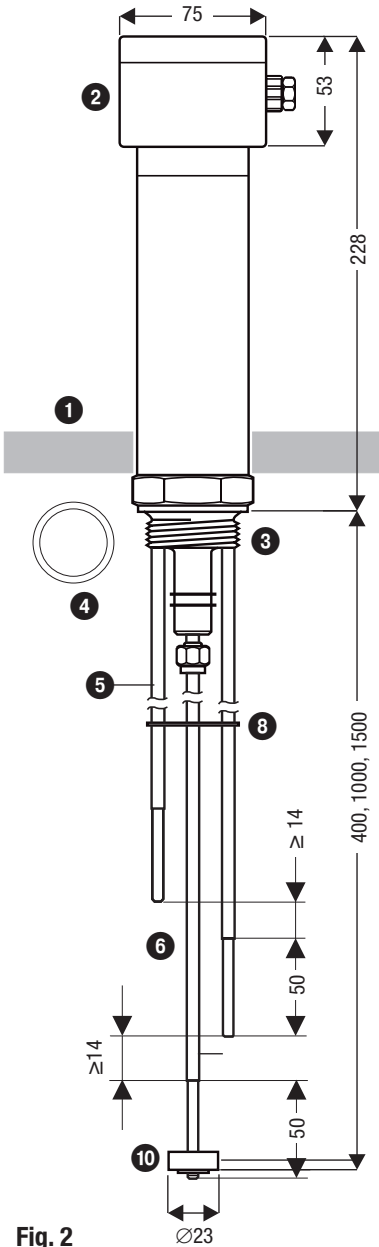
### Attention

- The level electrode shall be installed vertically.
- The seating surfaces of the standpipe or the flange provided on the vessel must be accurately machined, see **Fig. 3**.
- Do not bend electrode tips when mounting.
- Do not subject electrode tips to physical shocks.
- Use only the supplied joint ring 48 x 55, form D, DIN 7603, made from 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!
- Make sure that the air distance between the electrode tips and earth (flange, vessel wall) is not less than 14 mm. **Fig. 6 - 7**.
- Observe the minimum withdrawal distance when installing the electrode!
- The specified torques must be strictly observed.

### Tools

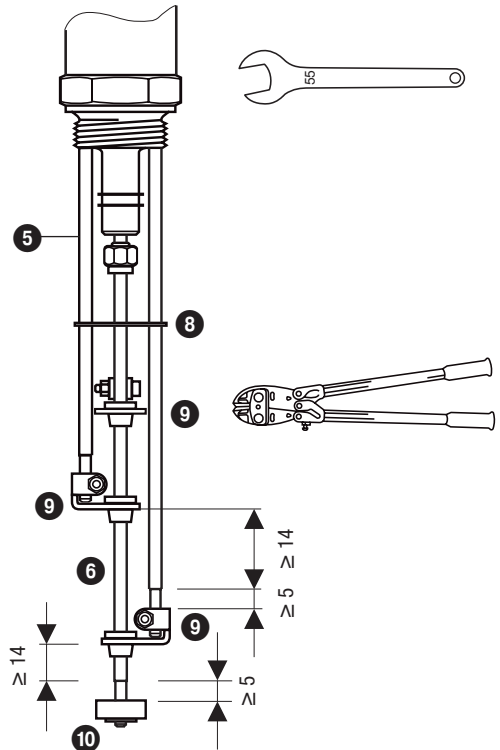
- Open-end spanner A. F. 55, DIN 3110, ISO 3318
- Scriber
- Bolt cutter
- Flat file, medium cut, DIN 7261, form A

**Dimensions NRG 16-36**



**Fig. 2**

NRG 16-36 (dimensions are applicable for conductivity > 10 µS/cm / measuring length < 1000 mm)



**Fig. 3**

NRG 16-36 (dimensions are applicable for conductivity < 10 µS/cm / measuring length > 1000 mm)



## Dimensions NRG 16-36 - continued -

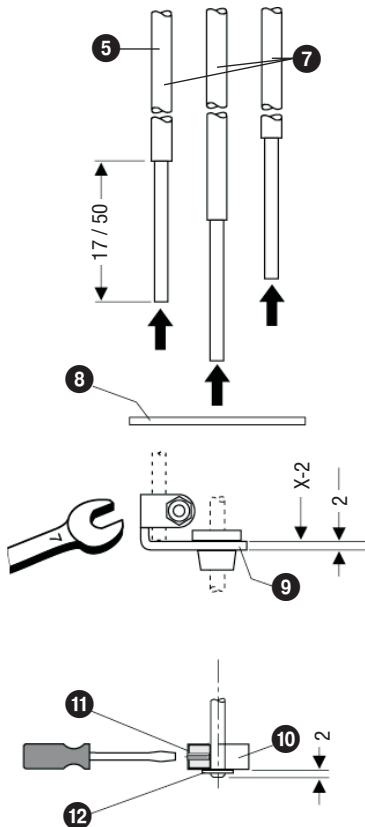


Fig. 4

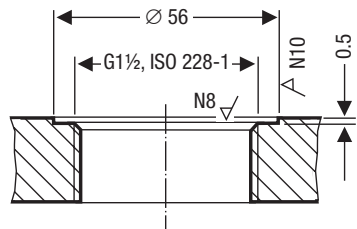


Fig. 5

### Key

- |   |   |
|---|---|
| <p>1 Thermal insulation, provided on site, d = 20 mm (outside of thermal insulation of steam boiler)</p> <p>2 Terminal box</p> <p>3 Screwed BSP 1 1/2 A, ISO 228</p> <p>4 Joint ring 48 x 55 form D to DIN 7603, made from 2.4068, bright annealed</p> <p>5 Electrode tips 6, 7 and 8</p> <p>6 Electrode tip for low water (LW)</p> | <p>7 Insulation of electrode tips</p> <p>8 Spacer disc</p> <p>9 Measuring surface extension for electrode tips 6, 7 and 8</p> <p>10 Measuring surface extension for low water (LW)</p> <p>11 Set screw</p> <p>12 Retaining ring</p> |
|---|---|

## NRG 16-36, step 1

1. Determine required measuring lengths of electrode tips and enter data in **table "Functions"**.  
**Fig. 2:** Dimensions are applicable for installation in water with a conductivity > 10 µS/cm / measuring length < 1000 mm. Measuring surface extension ⑨ not required  
**Fig. 3:** Dimensions are applicable for installation in water with a conductivity < 10 µS/cm / measuring length > 1000 mm.
2. Use a bolt cutter to cut the three radial electrode tips ⑥ ⑦ ⑧ and the central electrode tip for low water LW.
3. Only for **Fig. 3:** Reduce the length of the electrode tips ⑥ ⑦ ⑧ by 2 mm to compensate for the measuring surface extension ⑨.
4. Deburr faces of electrode tips.
5. Strip off 50 mm **Fig. 2** or 17 mm **Fig. 3** of the PTFE insulation from the ends of the electrode tips.  
**Fig. 4**
6. A plastic bag with screws, spacer discs and measuring surface extensions is included in the terminal box ②.
7. Slip spacer disc ⑧ onto electrode tips at equal distances. **Fig. 4**
9. Attach a measuring surface extension ⑨ (only required in **Fig. 3**) to each of the electrode tips arranged radially around the central electrode tip. **Fig. 4**
10. Attach measuring surface extension ⑩ onto the central electrode tip (LW) and fasten it with the set screw ⑪.
11. Put the retaining ring ⑫ onto the central electrode tip.

## NRG 16-36, step 2

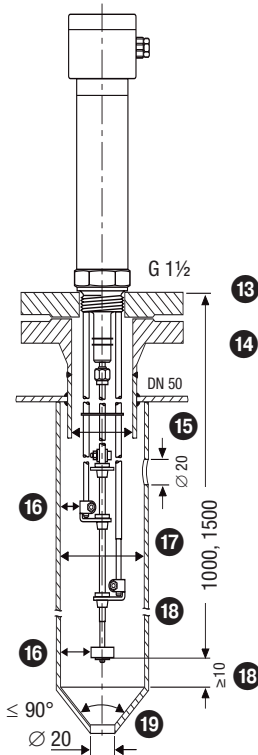
12. Check seating surfaces. **Fig. 5**
13. Place supplied joint ring ④ onto seating surface of the threaded standpipe or flange. **Fig. 5**
14. Apply a light smear of heat resistant silicone grease (e.g. WINIX® 2150) to electrode thread ③.
15. Screw level electrode into threaded standpipe or flange and tighten with an open-end spanner A. F. 55 mm. The torque required **when cold is 490 Nm**.

**Table "Functions"**

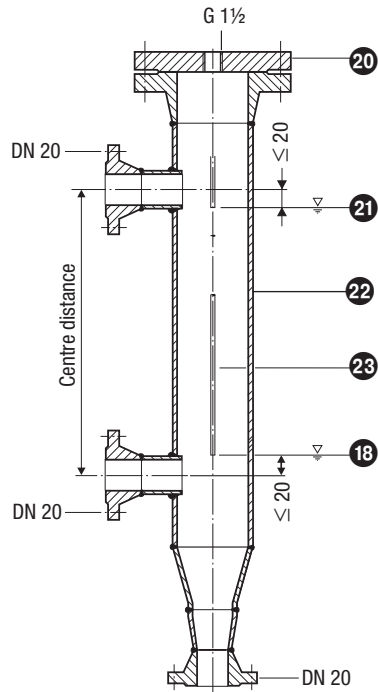
Function of electrode tip	Connecting terminal	Length [mm] Please enter length
Low water LW	1+2+3+4	
Pump ON	6	
Pump OFF	7	
MAX alarm	8	

# Examples of installation

NRG 16-36



**Fig. 6** Protection tube (provided on site) if electrode is used as internal water-level limiter



**Fig. 7** Level pot if electrode is used as external water level limiter

## Key

- 13 Flange PN 40, DN 50, DIN EN 1092-01
- 14 For the approval of the boiler standpipe with connecting flange the relevant regulations must be considered.
- 15 Vent hole Provide vent hole as close to the boiler wall as possible!
- 16 Distance between electrode tips and protection tube  $\geq 14$  mm
- 17 Protection tube DN 100
- 18 Low water LW
- 19 Reducer DIN 2616-2, K-114,3 x 3,6 – 48,3 x 2,9 W
- 20 Flange PN 40, DN 100, DIN EN 1092-01
- 21 High water (HW)
- 22 Level pot  $\geq$  DN 100
- 23 Electrode tips

## Electrical connection

### Connection of level electrode

To connect the level electrode use two multi-core overall screened control cables in separated conduits.

To connect the **level tip for low water level (LW) alarm** please use:

- For the level switch NRS 1-50 with a response sensitivity of 10  $\mu$ S:  
Multi-core screened control cable, min. conductor size 0.5 mm<sup>2</sup>, e. g. LiYCY 4 x 0.5 mm<sup>2</sup>, max. length 100 m.
- For the level switch NRS 1-50 with a response sensitivity of 0.5  $\mu$ S:  
Multi-core double-screened low-capacitance data cable, min. conductor size 0.5 mm<sup>2</sup>,  
**Li2YCY PiMF 2 x 2 x 0.5 mm<sup>2</sup>, max. length 30 m.**

Wire terminal strip in accordance with the wiring diagram. **Fig. 8.** Wire the screens to terminal 5 and the central earthing point (**CEP**) in the control cabinet.

To connect the **electrode tips 6, 7 and 8** use multi-core overall screened control cable, min. conductor size 0.5 mm<sup>2</sup>, e. g. LiYCY 5 x 0.5 mm<sup>2</sup>, max. length 100 m.

Connect the screens **only once** to the central earthing point (**CEP**) in the control cabinet.

### NRG 16-36, connecting terminals

1. Unscrew the fixing screws and remove the terminal box.  
Loosen cable gland.
2. Pull the cables for connecting the electrode tip for low water LW and the three radial electrode tips 6, 7 and 8 through the associated cable glands. **Fig. 9**
3. Connect terminals according to the wiring diagram **Fig. 8** and **table "Functions" on page 10.**
4. Tighten the cable gland.
5. Put back the cover of the terminal box and fasten the fixing screws.  
Make sure that the cover is properly seated.



#### Attention

- Please observe the instructions given in the installation & operating manual for the NRS 1-50, NRS 1-52, NRS 1-54 or NRS 1-1, NRS 1-2 and NRS 1-5.
- Make sure that connecting cables leading to the level electrode are segregated and run separately from power cables.
- Check the connection of the screen to the central earthing point (CEP) in the control cabinet.

### Tools

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

## Wiring diagram

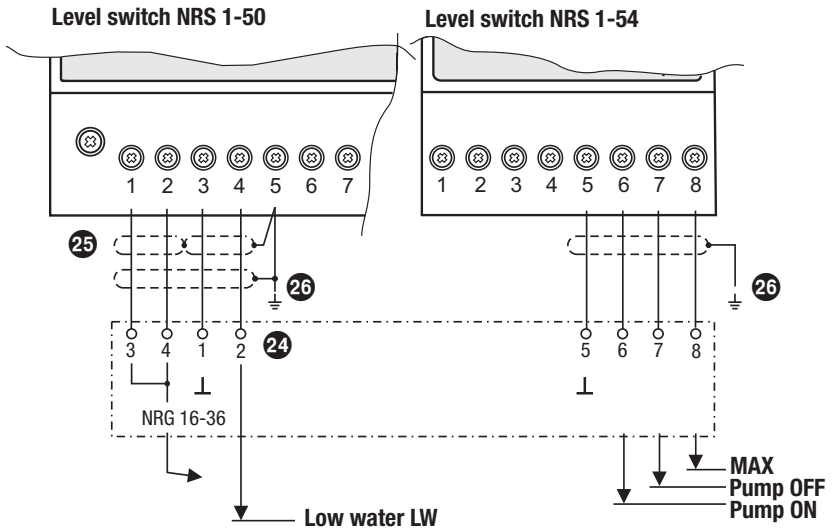


Fig. 8

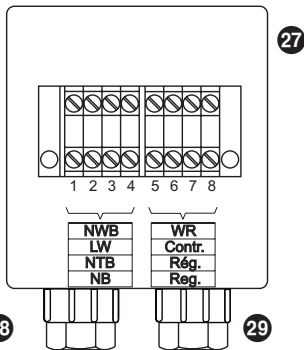


Fig. 9

## Key

- 24 Level electrode NRG 16-36
- 25 NRS 1-50 with response sensitivity  $0.5 \mu\text{S}/\text{cm}$ :  
Connect the two internal screens to terminal 5 and the CEP.
- 26 Central earthing point (CEP) in control cabinet
- 27 Terminal box
- 28 Cable gland for low water LW
- 29 Cable gland for water level controller (electrode tips 6, 7 and 8)

## Commissioning, fault indication and troubleshooting

For additional information on commissioning procedures and troubleshooting refer to the installation & operating manuals for level switch NRS 1-50, NRS 1-52, NRS 1-54 or NRS 1-1, NRS 1-2 and NRS 1-5!

## 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 equipment is cold.

## Removing and disposing of level electrode NRG 16-36

1. Unscrew the fixing screws and remove the terminal box. Loosen cable gland.
  2. Detach all cables and pull the cable glands.
  3. 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](http://www.gestra.de)

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