

Level Electrode

NRG 16-40

NRG 17-40

NRG 19-40

NRG 111-40



CANopen

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Important Notes

Usage for the intended purpose

Use level electrodes type NRG 16-40, NRG 17-40, NRG 19-40 and NRG 111-40 in conjunction with level switch NRS 1-40 or NRS 1-40.1 only as low-water level limiters (low-level alarms).

Safety note

The equipment must only be installed and commissioned by qualified staff.

Maintenance and service work must only be performed by adequately trained persons who have a recognized level of competence.



Danger

When loosening the electrode steam or hot water might escape.

This presents the danger of severe scalding. It is therefore essential not to remove the electrode unless the boiler pressure is verified to be zero.

The electrode is hot during operation. This presents the danger of severe burns to hands and arms. Installation and maintenance work should only be carried out when the system is cold.

If the internal ceramic insulation breaks, hot steam can escape through the lateral vent hole on the electrode body. This presents the risk of severe scalding. Do not stay near the electrode during operation.



Attention

The name plate indicates the technical specification of the equipment.

Do not commission or operate equipment without its specific name plate.

PED (Pressure Equipment Directive)

The equipment fulfills the requirements of the Pressure Equipment Directive (PED) 2014/68/EU. Applicable in fluids of group 1 and 2. With CE marking (apart from equipment according to section 3.3).

ATEX (Atmosphère Explosible)

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

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

For details on the conformity assessment 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.de/document or can be requested from us.

Explanatory Notes

Scope of supply

NRG 16-40

- 1 Level electrode type NRG 16-40
- 1 S. S. joint ring D 27 x 32 mm to DIN 7603 (made of 1.4301), bright annealed
- 1 Terminating resistor 120 Ω
- 1 Installation manual

NRG 17-40

- 1 Level electrode type NRG 17-40
- 1 S. S. joint ring D 27 x 32 mm to DIN 7603 (made of 1.4301), bright annealed
- 1 Terminating resistor 120 Ω
- 1 Installation manual

NRG 19-40

- 1 Level electrode type NRG 19-40
- 1 S. S. joint ring D 27 x 32 mm to DIN 7603 (made of 1.4301), bright annealed
- 1 Terminating resistor 120 Ω
- 1 Installation manual

NRG 111-40

- 1 Level electrode type NRG 111-40
- 1 S. S. joint ring D 33 x 39 mm to DIN 7603 (made of 1.4301), bright annealed
- 1 Terminating resistor 120 Ω
- 1 Installation manual

Description

The level electrode NRG 1...-40 works according to the conductivity measurement principle. The NRG 1...-40 is designed for use in conductive liquids to detect the minimum liquid level:

- One level with **one** switchpoint.

The NRG 1...-40 is used in combination with switching controller NRS 1-40 or NRS 1-40.1 or further system components. NRG 1...-40 in conjunction with the associated control equipment constitutes a water level limiter with periodic self-testing routine (SMART function) in accordance with TRD 604, sheet 1 and 2 and EN regulations. The level data are transferred from the electrode NRG 1...-40 to the control unit via a CAN bus using the CANopen protocol.

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 the 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. cut-out of the burner circuit or interruption of the burner-protection circuit.

The system incorporates an additional electrode that provides automatic monitoring of the electrical resistance path between the measuring electrode and the earth. When the measured value falls below the admissible resistance value the burner shutdown is endorsed by interruption of the burner protection circuit.

At regular intervals, the level electrode NRG 1...-40 sends a data telegram to the switching controller NRS 1-40. The data transfer is effected by means of a CAN bus according to DIN ISO 11898 using the CANopen protocol.

One switching controller type NRS 1-40 or NRS 1-40.1 can be used for **two** level electrodes NRG 1...-40 (**low-level limiting system**).

System components

NRS 1-40

Digital switching controller for low-level limiter NRG 1...-40 (low water)

Functions: Low-level alarm (MIN)

Data exchange: CAN bus to DIN ISO 11898 using CANopen protocol.

NRS 1-40.1

Digital control equipment for level electrodes NRG 1...-40 (low water), one level electrode NRG 1...-41 (high level) and a safety temperature limiter TRG 5-6... / TRV 5-40.

Functions: MIN alarm, MAX alarm, MAX temperature (freely configurable combinations)

Data exchange: CAN bus to DIN ISO 11898 using CANopen protocol.

URB 1, URB 2

Control terminal and display unit

Functions: Parameterization and visual display (LCD)

Data exchange: CAN bus to DIN ISO 11898 using CANopen protocol

Design

NRG 16-40, NRG 17-40, NRG 19-40:

Screwed $\frac{3}{4}$ " , EN ISO 228-1. **Fig. 2**

NRG 111-40:

Screwed 1" , EN ISO 228-1. **Fig. 3**

Technical Data

NRG 16-40, NRG 17-40, NRG 19-40, NRG 111-40

Type Approval N°

TÜV · SWB / SHWS · xx-403

EG BAF-MUC 02 02 103881 002

Service pressure

NRG 16-40, PN 40

32 bar g (464 psig)
at 238 °C

NRG 17-40, PN 63

60 bar g (870 psig)
at 275 °C

NRG 19-40, PN 160

100 bar g (1450 psig)
at 311 °C

NRG 111-40, PN 320

183 bar g (2652 psig)
at 357 °C

Connection

Screwed ¾" BSP, EN ISO 228-1 (NRG 16-40, NRG 17-40, NRG 19-40)

Screwed 1" BSP, EN ISO 228-1 (NRG 111-40)

Materials

Terminal box: Die cast aluminium 3.2161 (G AlSi8Cu3)

Sheath: S. S. 1.4301 X5 CrNi18-10

Measuring electrode: S. S. 1.4401 (X5CrNiMo17 12 2)

Electrode insulation: Gylon® (NRG 16-40, NRG 17-40, NRG 19-40)

Electrode insulation: PEEK (NRG 111-40)

Lengths supplied

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

Sensitivity of response

> 0.5 µS/cm at 25°C.

Supply voltage

18 – 36 V DC (coming from NRS 1-40 / NRS 1-40.1)

Current consumption

35 mA

Fuse

Electronic thermal fuse $T_{max} = 85\text{ °C}$, hysteresis 2K

Hysteresis

-2 K

Electrode voltage

$2 V_{ss}$

Data exchange

CAN bus to DIN ISO 11898, CANopen protocol

Indicators and adjustors

One 10-pole code switch for node ID and baud rate settings

One wire link (for switching between electrode 1 and electrode 2)

Electric connection

M 12 sensor connector, 5 poles, A-coded,

M 12 sensor jack, 5 poles, A-coded

Protection

IP 65 to DIN EN 60529

Max. admissible ambient temperature













70 °C

Weight

approx. 2.5 kg

Gylon® is a registered trademark of the company Garlock GmbH, Neuss

Name plate / marking

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
|  <p>Betriebsanleitung beachten See installation instructions Voir instructions de montage</p> <p>Hier öffnen Open here Ouvrir ici</p>  | |
| NRG 16 - 40 | PN 40  |
| NRG 17 - 40 | PN 63  |
| NRG 19 - 40 | PN 160  |
| G 3/4"NPT | 1.4571 IP65 |
|  <p>32 bar (464psi) 238°C (460°F) </p> <p>60 bar (870psi) 275°C (527°F) </p> <p>100 bar (1450psi) 311°C (592°F) </p> <p>Tamb = 70°C (158°F)</p> | |
|  | Tamb = 70°C (158°F) |
| | 18-36 V DC |
| IN/OUT: CAN-Bus | |
| Node ID: _____ | |
| TÜV. SWB / SHWS . xx - 403 TÜV. SWB/SHWS STW(STB) . xx - 413 |  0525 |
| GESTRA AG Münchener Str. 77 D-28215 Bremen |  |







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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
|  <p>Betriebsanleitung beachten See installation instructions Voir instructions de montage</p> <p>Hier öffnen Open here Ouvrir ici</p>  | |
| NRG 111 - 40 | |
| G 1 | 1.4529 IP65 |
|  <p>180 bar (2611psi) 357°C (675°F)</p> | |
|  | Tamb = 70°C (158°F) |
| ≥ 0,5 µS/cm | 18-36 V DC |
| IN/OUT: CAN-Bus | |
| Node ID: _____ | |
| TÜV. SWB / SHWS . xx - 403 TÜV. SWB/SHWS STW(STB) . xx - 413 |  0525 |
| GESTRA AG Münchener Str. 77 D-28215 Bremen |  |

Fig. 1

Dimensions NRG 16-40, NRG 17-40, NRG 19-40

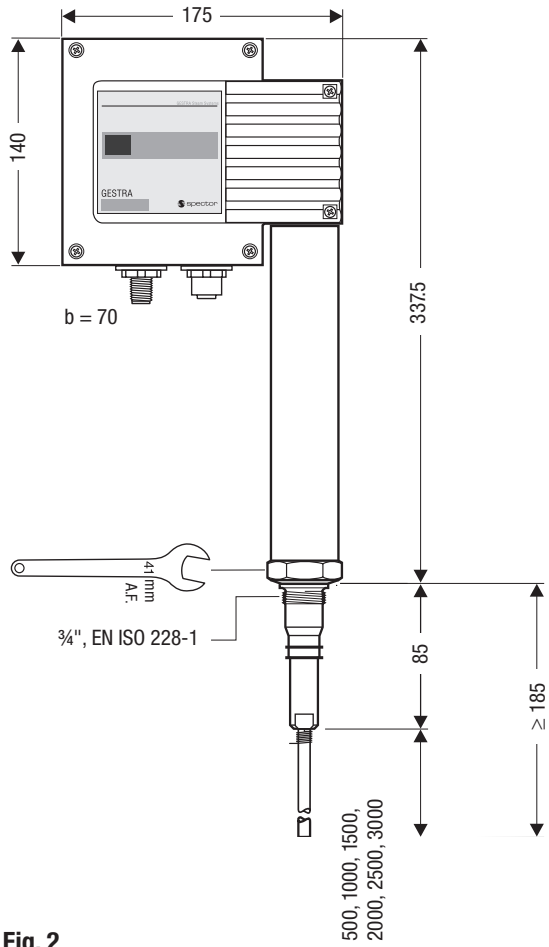


Fig. 2

Dimensions NRG 111-40

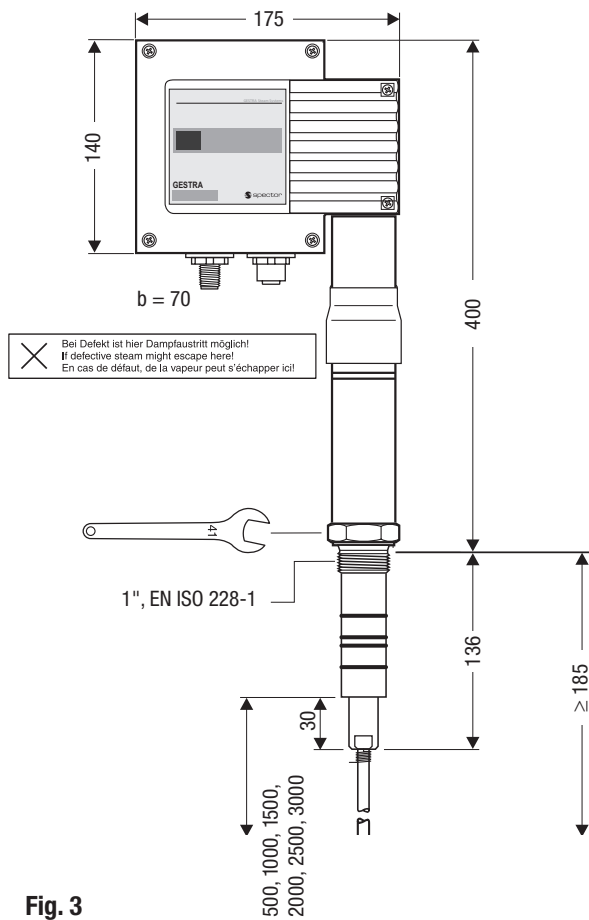
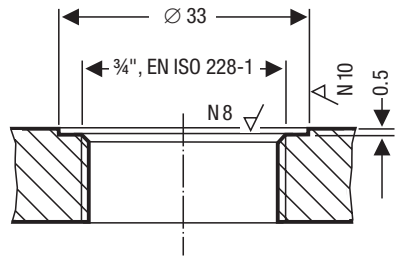
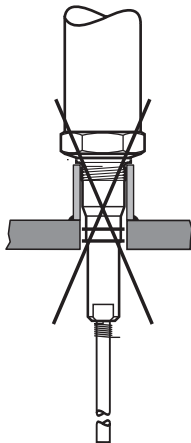
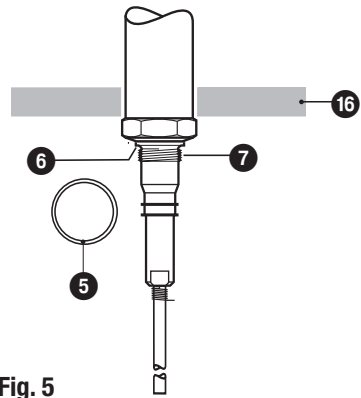
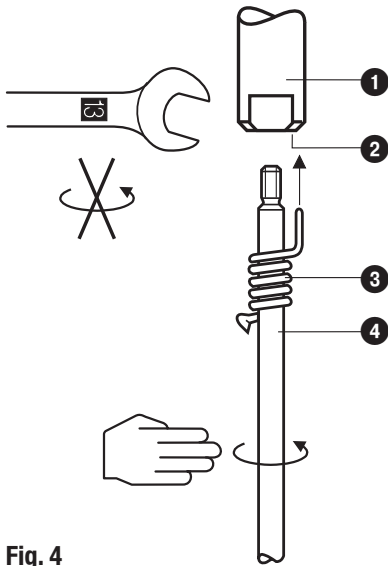


Fig. 3

Design

NRG 16-40, NRG 17-40, NRG 19-40



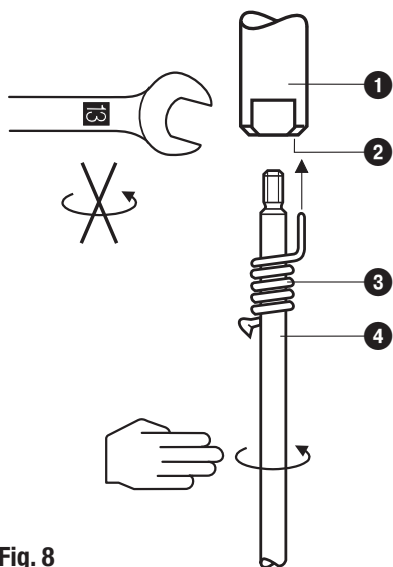


Fig. 8

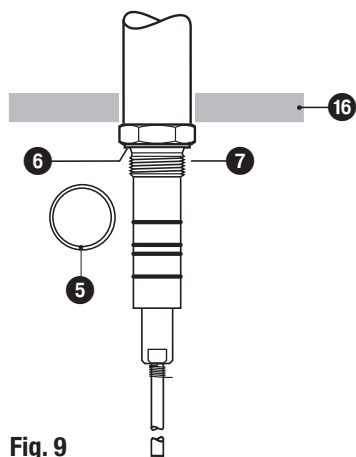


Fig. 9

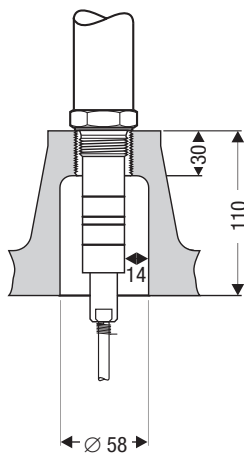


Fig. 10

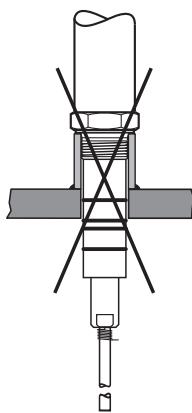


Fig. 11

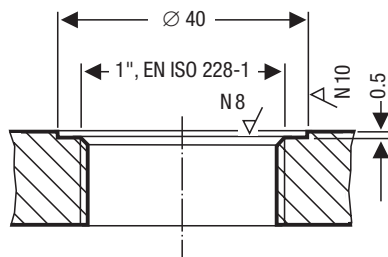


Fig. 12

Functional Elements

NRG 16-40, NRG 17-40, NRG 19-40, NRG 111-40

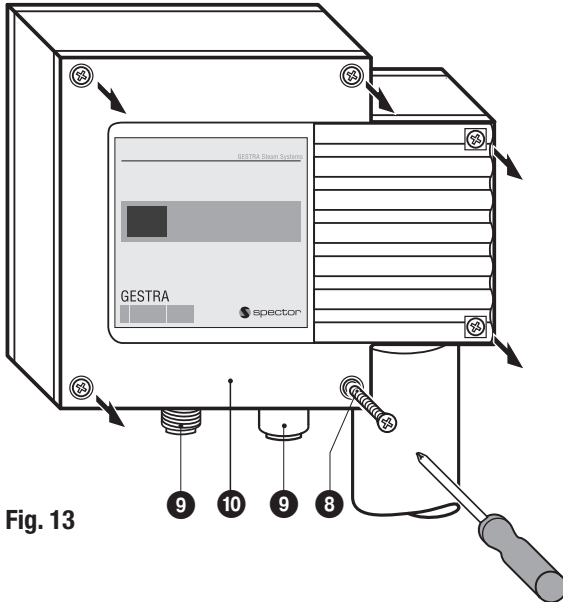


Fig. 13

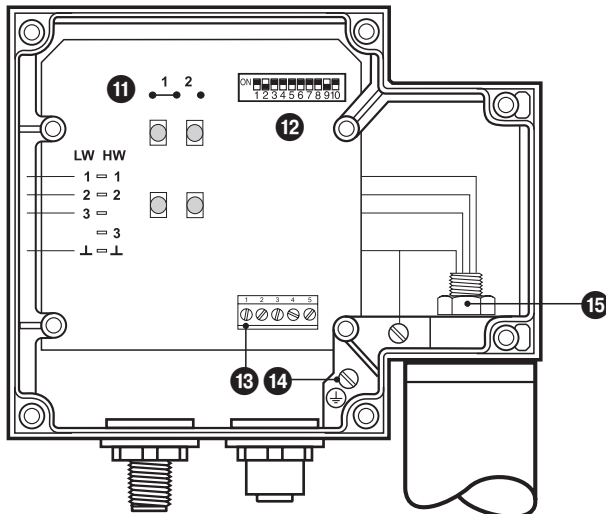


Fig. 14

Key

- 1 Electrode rod
- 2 Bore
- 3 Spring
- 4 Electrode tip
- 5 S. S. joint ring D 27 x 32 mm to DIN 7603 (made of 1.4301), bright annealed (NRG 1...-40)
S. S. joint ring D 33 x 39 mm to DIN 7603 (made of 1.4301), bright annealed (NRG 111-40)
- 6 Seating surface
- 7 Electrode thread
- 8 Screws M 4
- 9 M 12 sensor connector, 5 poles, A-coded, M 12 sensor jack, 5 poles, A-coded
- 10 Cover
- 11 Wire link (for selecting “Electrode 1” or “Electrode 2”)
- 12 10-pole code switch for setting node ID and baud rate
- 13 Terminal strip
- 14 PE connection
- 15 Nut
- 16 Thermal insulation (provided on site), $d = 20$ mm (outside of thermal insulation of steam generating unit)

Installation

NRG 16-40, NRG 17-40, NRG 19-40, NRG 111-40, step 1

1. Screw electrode tip ④ into measuring electrode ① , Fig. 4, Fig. 8.
2. Carefully determine required measuring length of electrode. Observe min. length, Fig. 2, Fig. 3.
3. Mark length of electrode tip ④.
4. Unscrew electrode tip ④ from measuring electrode ① and cut tip.
5. After visual inspection screw electrode tip ④ into measuring electrode ①. Slide spring ③ along electrode tip ④, so that its bent end completely enters into small bore ②.

NRG 16-40, NRG 17-40, NRG 19-40, NRG 111-40, step 2

1. Check seating surfaces, Fig. 7, Fig. 12
2. Place ring joint ⑤ onto seating surface ⑥ of electrode, Fig. 5, Fig. 9
3. Apply a light smear of silicone grease (e.g. Molykote® 111) to electrode thread ⑦.
4. Screw level electrode into threads of flange provided on vessel and tighten with a 41 mm open-end spanner. The torque required is **160 Nm when cold**, for NRG 111-40 **475 Nm**.
5. When installing two electrodes together in one flange install the first electrode as described in 4. Before mounting the second electrode undo nut ⑮, remove PE connection ⑭ and strip cable lugs from the board. Screw in electrode. Slightly tighten nut ⑮. Install PE connection ⑭ and insert cable lugs.



Attention

- The seating surfaces of the standpipe or the flange provided on the vessel must be accurately machined, see Fig. 7, Fig. 12.
- Do not bend electrode tip when mounting.
- Use only ring joint (of stainless steel 1.4301) D 27 x 32 (D 33 x 39 for NRG 111-40) to DIN 7603 supplied with the electrode.
- Do not lag electrode body above the hexagonal section, Fig. 5, Fig. 9.
- Do not insulate electrode thread with hemp or PTFE tape.
- Do not screw electrode directly into a screwed socket, Fig. 6, Fig. 11.
- Observe min. spacing when installing the electrode, Fig. 15 – Fig. 21



Note

- For the approval of the boiler standpipe the relevant regulations must be considered.
- Refer to pages 16 and 17 for typical installation examples.

Tools

- Open-end spanner A. F. 17 mm
- Hacksaw
- Open-end spanner A. F. 41 mm
- Flat file, medium cut

Examples of installation NRG 16-40, NRG 17-40, NRG 19-40

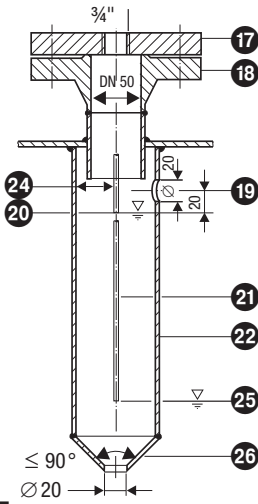


Fig. 15

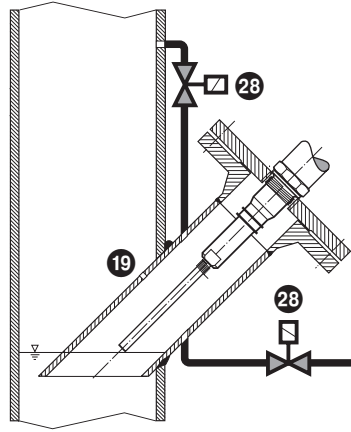


Fig. 16

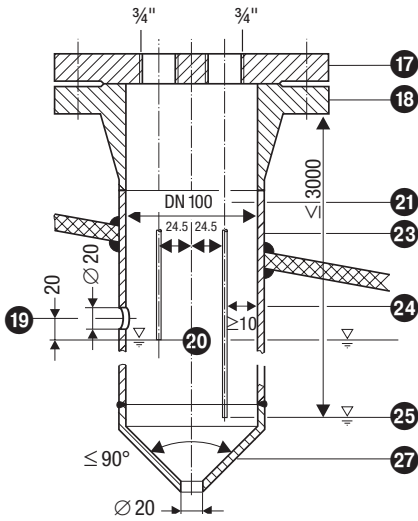


Fig. 17

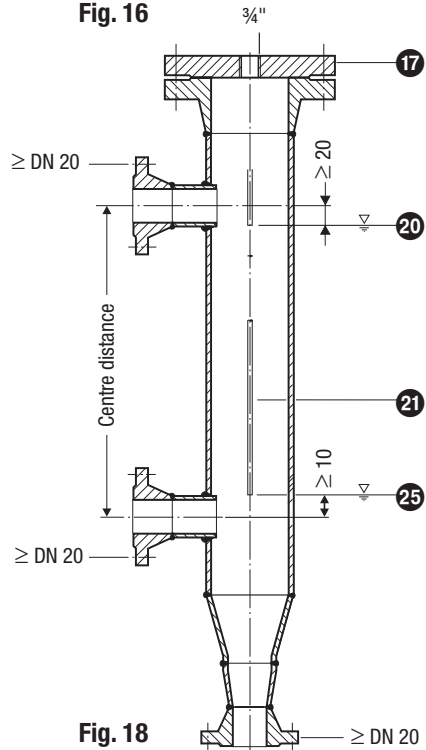


Fig. 18

Examples of installation NRG 111-40

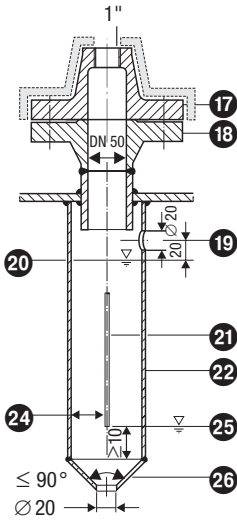


Fig. 19

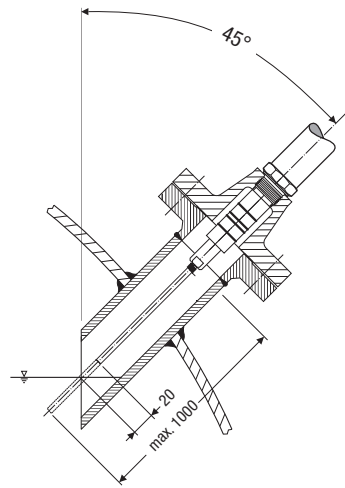


Fig. 20

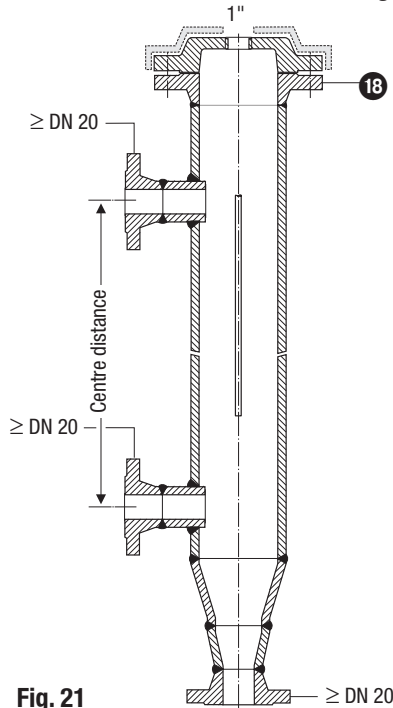


Fig. 21

Key

- 17 Flange PN 40, DN 50
Flange PN 40, DN 100
Flange PN 160, DN 80
Flange PN 250, DN 80
Flange PN 320, DN 80
- 18 For the approval of the boiler standpipe with connecting flange the relevant regulations must be considered.
- 19 Vent hole (Provide vent hole as close to the boiler wall as possible)
- 20 High water (HW)
- 21 Electrode rod $d = 8 \text{ mm}$
- 22 Protection tube DN 80
- 23 Protection tube DN 100
- 24 Electrode distance $\geq 14 \text{ mm}$
- 25 Low water (LW)
- 26 Reducer DIN 2616-2, K-88.9 x 3.2 - 42.4 x 2.6 W
- 27 Reducer DIN 2616-2, K-114.3 x 3.6 - 48.3 x 2.9 W
- 28 Solenoid valve

Electrical Connection

Aligning terminal box

1. Unscrew screws **8** and remove cover **10**. **Fig. 13**
2. Loosen nut **15** with 19 mm spanner. Do not remove it! **Fig. 14**
The electrode terminal box can now be turned through +/- 180°.
3. Turn electrode terminal box into desired position (+/- 180°).
4. Tighten nut **15** with a torque of **25 Nm**.
5. Set node ID (see **"Basic Settings"**, **"Configuring level electrode"**).
6. Re-attach cover **10** and fix it with screws **8**.



Note

- Wire the control cable according to the wiring diagram with connector and coupler.

Control cable

NRS, NRR, LRR, TRS, URB 1

To wire the equipment screened multi-core twisted-pair control cable **must** be used for the bus line, e. g. UNITRONIC® BUS CAN 2 x 2 x ... mm² or RE-2YCYV-fl 2 x 2 x ... mm².

Control cable assemblies (2 x 2 x 0.32 mm² cable with plug and connector) of various lengths are available as add-on equipment.

NRG, LRG, EF, URZ, TRV, URB 2

The equipment is fitted with sensor plug-in connectors (5 poles, A-coded). For connecting the bus devices control cable assemblies (with plug and connector) of various lengths are available as add-on equipment.

Note that the recommended control cables are not UV-resistant and must be protected by a UV-resistant plastic tube or cable duct if the equipment is installed outdoors (except for URB 2). The baud rate (data transfer rate) dictates the cable length and size between the bus nodes. The total power consumption must also be taken into consideration when selecting the conductor size. The total power consumption is obtained from the number of bus nodes. If the cable length between the steam boiler and the control cabinet exceeds 15 m, we recommend that you fit a branching box that is resistant to electromagnetic interference (stock code 1501214) and use a control cable with a larger conductor size for the distance to the control cabinet.

| S 8 | S 9 | S 10 | Baud rate | Cable length | Number of pairs and conductor size [mm ²] |
|------------------------|-----|------|------------|--------------|-------------------------------------------------------|
| OFF | ON | OFF | 250 kBit/s | 125 m | 2 x 2 x 0.34 |
| Factory setting | | | | | |
| ON | ON | OFF | 125 kBit/s | 250 m | 2 x 2 x 0.5 |
| OFF | OFF | ON | 100 kBit/s | 335 m | 2 x 2 x 0.75 |
| ON | OFF | ON | 50 kBit/s | 500 m | on request, depending on bus configuration |
| OFF | ON | ON | 20 kBit/s | 1000 m | |
| ON | ON | ON | 10 kBit/s | 1000 m | |

Set baud rate via code switch **12**. Make sure that all bus nodes feature the same settings.



Note

- The max. baud rates and cable lengths indicated above are based on empirical values obtained by GESTRA. In certain cases it may be necessary to reduce the baud rate in order to ensure operational safety.
- The type and design of the data cable has a strong influence on the electromagnetic compatibility (EMC) of the equipment. Take special care when connecting the equipment.
- If you do not use the control cable assemblies connect the connectors and jacks for the control cables as indicated in the assignment diagram for sensor plug-in unions.

CAN bus voltage supply

To ensure the troublefree operation of the CAN bus system make sure that the voltage supply for all bus devices is sufficient.

Please use the following table to check the voltage supply of your bus system.

| | | | | | |
|--------------------------------------------------------------------|--------------------|---|----------------------------|-------|-----|
| Control units with voltage supply | Qty. | X | Power output per item | = | Sum |
| | | X | 6 W | = | W |
| Please enter data. | | | Sum 1 | = | W |
| Sensor, transmitter, control units, operating & display unit URB 1 | Qty. | X | Power consumption per item | = | Sum |
| | | X | 3 W | = | W |
| Operating & display unit URB 2 | | X | 5 W | = | W |
| | Please enter data. | | | Sum 2 | = |

If sum 2 exceeds sum 1 supply the CAN bus with 24 V DC coming from a separate and stabilized safety power supply unit (e. g. SITOP Smart 24 V 2.5 A).

The power supply unit must be electrically isolated from dangerous contact voltages and must meet at least the requirements on double or reinforced isolation acc. to DIN EN 50178 or DIN 61010-1 or DIN EN 60730-1 or DIN EN 60950 (safe isolation).

The power supply unit must be provided with an overcurrent protective device in accordance with EN 61010-1.



Attention

If a safety power supply unit (e. g. SITOP smart, 24 V, 2.5 A) is used for the voltage supply of the CAN bus do not tap the supply voltage from the terminals 1 and 5 of the GESTRA control devices.

Wiring diagram

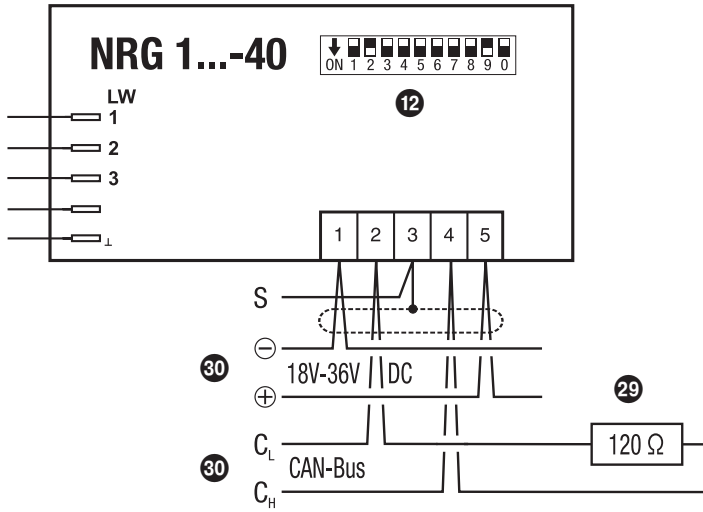


Fig. 22

Wiring diagram for the sensor plug-in connections

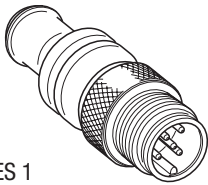
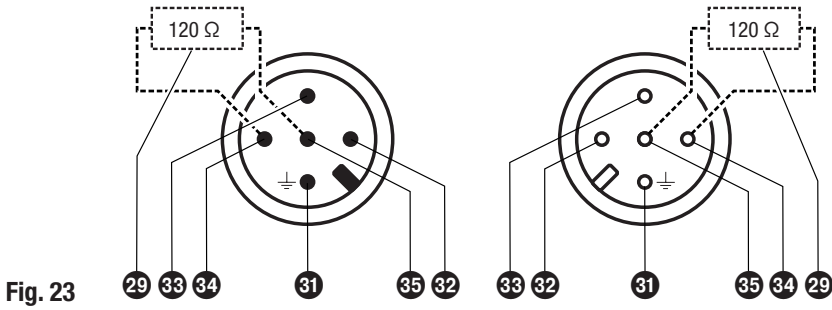


Fig. 24 RES 1

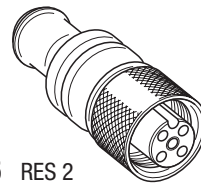


Fig. 25 RES 2

Key

- 29** Terminating resistor 120 Ω, RES 1 or RES 2
- 30** CAN bus line, twisted pair control cable
- 31** Pin 1: Screen
- 32** Pin 2: Power supply 24 V DC+ (red)
- 33** Pin 3: Power supply 24 V DC- (black)
- 34** Pin 4: CAN data line C_H (white)
- 35** Pin 5: CAN data line C_L (blue)

CAN bus wiring diagram

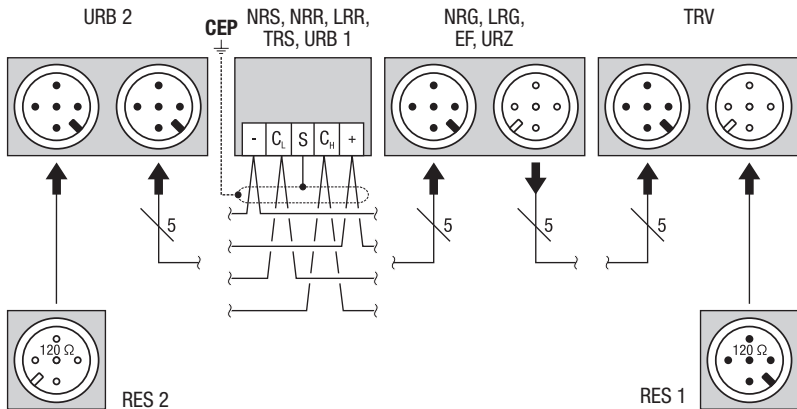


Fig. 26



Attention

- Wire equipment in series. Star-type wiring is not permitted!
- Link screens of control cables such that electrical continuity is ensured and connect them **once** to the central earthing point (CEP). If equipotential bonding currents are to be expected, for instance in outdoor installations, make sure that the screen is separated from the central earthing point (CEP).
- To protect the switching contacts fuse circuit with T 2.5 A or according to TRD regulations (1.0 A for 72 h operation).
- If two or more system components are connected in a CAN bus system, provide the first and the last device with a terminating resistor of 120 Ω, **Fig. 24, Fig. 25**
- Note that in a CAN bus network only **one** water-level limiting system may be used.
- Do **not** interrupt the CAN bus network during operation with one or more system components!

If the CAN bus network is interrupted the safety circuit will be opened.

Before taking the CAN bus line from the terminal strip, make sure that all connected system components are out of service.



Note

- The loop resistance must be below 10 Ω .
- The rated voltage is indicated on the name plate.
- When switching off inductive loads, voltage spikes are produced that may impair the operation of control and measuring systems. Provide connected contactors with RC combinations, e. g. 0.1 $\mu\text{F}/100 \Omega$.
- Even in correctly wired systems high frequency interference caused by the installation can lead to system outages and malfunction alarms. For more information please refer to the fault-finding list in the section **Troubleshooting**.

Tools

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

Basic Settings

Bus cable

All devices (level, conductivity) are interconnected via CAN bus. The CANopen protocol is used for the data exchange between the equipment groups. All devices have an electronic address – the node ID. The four-core bus cable serves as power supply and data highway for high-speed data exchange.

The CAN address (node ID) can be set between **1 - 123**.

The control unit NRS 1-40 has already been configured at our works for operation with other GESTRA components and can be used straight away without having to set the node ID.

If several identical systems are to communicate in a CAN bus network, set a different node ID for each system (e. g. limiter, controller, etc).

If the length of the CAN bus cable exceeds 125 m change the settings of the code switch ⑫.

For more information on switch positions see **Basic Settings / Switch positions**.

Basic Settings continued

Node ID

Water level limiter

| | | | | | |
|----------|---------------|---------------|----------|----------|-----------------|
| NRS 1-40 | NRG 16-40 (1) | NRG 16-40 (2) | Reserved | Reserved | |
| X | X + 1 | X + 2 | X + 3 | X + 4 | |
| 1 | 2 | 3 | | | Factory setting |

Safety system for steam boilers with superheater

| | | | | | |
|------------|---------------|---------------|----------|-----------|-----------------|
| NRS 1-40.1 | NRG 16-40 (1) | NRG 16-40 (2) | TRV 5-40 | Limiter 4 | |
| X | X + 1 | X + 2 | X + 3 | X + 4 | |
| 1 | 2 | 3 | 4 | | Factory setting |

Safety system (e. g. hot-water generating units)

| | | | | | |
|------------|---------------|---------------|-----------|-----------|-----------------|
| NRS 1-40.1 | NRG 16-40 (1) | NRG 16-40 (2) | Limiter 3 | Limiter 4 | |
| X | X + 1 | X + 2 | X + 3 | X + 4 | |
| 1 | 2 | | | | Factory setting |

Safety system (e. g. hot-water generating units)

| | | | | | |
|------------|--------------|--------------|-----------|-----------|-----------------|
| NRS 1-40.2 | TRV 5-40 (1) | TRV 5-40 (2) | Limiter 3 | Limiter 4 | |
| X | X + 1 | X + 2 | X + 3 | X + 4 | |
| 6 | 7 | 8 | 9 | 10 | Factory setting |
| | TRS 5-40 (1) | TRS 5-40 (2) | | | |
| | X + 1 + 90 | X + 2 + 90 | | | |
| | 97 | 98 | | | |

High level alarm

| | | | | | |
|----------|-----------|----------|----------|----------|-----------------|
| NRS 1-41 | NRG 16-41 | Reserved | Reserved | Reserved | |
| X | X + 1 | X + 2 | X + 3 | X + 4 | |
| 6 | 7 | 8 | 9 | 10 | Factory setting |

Further components

| | | |
|---------------------------------------------|--|-----------------|
| SRL 40 | | |
| X = (sensor: level limiter // hi alarm) + 2 | | Factory setting |
| ORT 6 | | |
| 98 | | Factory setting |

On-off level control

| | | | |
|----------|----------|-----------|-----------------|
| Reserved | NRS 1-42 | NRG 16-42 | |
| X - 1 | X | X + 1 | |
| 19 | 20 | 21 | Factory setting |

Modulating level control

| | | | | | |
|--------|----------|----------|-----------|----------|-----------------|
| URZ 40 | NRS 2-40 | NRR 2-40 | NRG 26-40 | Reserved | |
| X - 2 | X - 1 | X | X + 1 | X + 2 | |
| 38 | 39 | 40 | 41 | 42 | Factory setting |

Automatic continous blowdown control

| | | | | | |
|---------|----------|----------|------------|----------|-----------------|
| EF 1-40 | Reserved | LRR 1-40 | LRG 1-4... | Reserved | |
| X - 2 | X - 1 | X | X + 1 | X + 2 | |
| 48 | 49 | 50 | 51 | 52 | Factory setting |

Control unit

| | | |
|--------------|--|-----------------|
| URB 1, URB 2 | | |
| 60 | | Factory setting |

Factory setting

The level electrode features the following factory set default values:

- Baud rate: **250 kB/s**
- Measuring sensitivity: **0.5 $\mu\text{S/cm}$**
- Node ID: **002**
- Configuration: **Level electrode 1**, wire link **11** set to the left

Establishing / changing node ID

If several identical systems are to communicate in a CAN bus network, set a different node ID for each system (e. g. limiter, controller, etc).

1. Unscrew screws **8** and take off cover **10**.
2. Set code switch **12** as requested. Please observe the table "Code switch settings" on page 27.
3. Re-attach cover **10** and fix it with screws **8**.



Attention

- We recommend that you commission the CAN bus devices with the default factory setting.
- Do not use a node ID for more than one piece of equipment in the CAN bus system.

Code switch settings



| | | Node ID | 2 |
|----|-----------|---------|---|
| S1 | OFF | 1 | |
| S2 | ON | 2 | |
| S3 | OFF | 4 | |
| S4 | OFF | 8 | |
| S5 | OFF | 16 | |
| S6 | OFF | 32 | |
| S7 | OFF | 64 | |

Fig. 27 (Factory setting)



| | | Node ID | 3 |
|----|-----------|---------|---|
| S1 | ON | 1 | |
| S2 | ON | 2 | |
| S3 | OFF | 4 | |
| S4 | OFF | 8 | |
| S5 | OFF | 16 | |
| S6 | OFF | 32 | |
| S7 | OFF | 64 | |

Fig. 28 (Example 1)

| S 8 | S 9 | S 0 | Baud rate | Cable length |
|-----------|-----------|-----------|------------|--------------|
| OFF | ON | OFF | 250 kBit/s | 125 m |
| ON | ON | OFF | 125 kBit/s | 250 m |
| OFF | ON | ON | 100 kBit/s | 335 m |
| ON | ON | ON | 50 kBit/s | 500 m |
| OFF | ON | ON | 20 kBit/s | 1000 m |
| ON | ON | ON | 10 kBit/s | 1000 m |

Fig. 29 (Factory setting 250 kBit/s)

Commissioning

Checking electrical connection

Make sure that the electrode NRG 1...-40 is connected to the level switch NRS 1-40 or NRS 1-40.1 according to the wiring diagram. **Fig. 26**

Applying mains voltage

Apply mains voltage to the control unit NRS 1-40 or NRS 1-40.1.

Operation

Water-level limiter, water-level limiting system

Use in conjunction with level switch NRS 1-40 or NRS 1-40.1 in steam and pressurised hot water plants in accordance with TRD 401, TRD 602, TRD 604, EN 12952, EN 12953 or according to other national regulations.



Note

- To analyse and eliminate malfunctions refer to section “Fault finding list for troubleshooting” on page 29.

Emergency Operation

Emergency operation of water-level limiting system

If one level electrode fails to operate the installation can continue to operate in emergency mode under constant supervision according to TRD 401 with **one** level electrode.

1. Undo screws **8** and remove cover **10**, **Fig. 13**
2. Set wire link **11** of the working electrode to the **left (electrode 1)**, **Fig. 14**
3. Set node ID of the working electrode to “**002**”, **Fig. 14, Fig. 27**
4. Attach cover **10** and tighten screws **8**.



Attention

- Enter beginning of emergency operation in the boiler log.
- An installation operating in emergency mode has to be constantly supervised.
- Immediately replace faulty level electrode.
- Enter end of emergency operation in the boiler log.

Troubleshooting

Fault finding list for troubleshooting

Equipment fails to work – Indication of a malfunction

- Fault:** In spite of correct wiring and commissioning of the equipment an interference signal is indicated.
- Remedy:** The interference signal is caused by H. F. interferences coming from the installation. For interference suppression of the voltage supply we supply ferrite rings, stock code 147253. The 230 V supply lines should be looped through the ferrite ring five to ten times. If several controllers are used in the system, they can be fed from the interference suppressed supply lines. For the interference suppression of the bus line we supply hinged-shell ferrite rings, stock code 147254. The hinged-shell ferrite rings are clamped onto the bus line close to the terminal strip of the controller.

Level electrode submerged – Low-level alarm

- Fault:** The electrode housing does not have earth connection to the boiler.
- Remedy:** Clean seating surfaces and insert metal joint ring D 27 x 32 (D 33 x 39) DIN 7603-1.4301. Do **not** insulate level electrode with hemp or PTFE tape.
- Fault:** The internal insulation of the electrode rod is damaged.
- Remedy:** Replace level electrode.
- Fault:** Mains voltage not applied.
- Remedy:** Apply mains voltage. Connect electrode according to wiring diagram.
- Fault:** Thermal fuse has been triggered.
- Remedy:** The ambient temperature must not exceed 70 °C.

Level below “Low water level” – 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 (optional item) are closed.
- Remedy:** Open isolating valves.
- Fault:** The electrode rods have earth contact.
- Remedy:** Change installation position.

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

Decommissioning



Danger

When loosening the electrode steam or hot water might escape. This presents the danger of severe scalding. It is therefore essential not to remove the electrode unless the boiler pressure is verified to be zero.

Disposal

Remove the level electrode and separate the waste materials in accordance with the material specification.

Electronic components (boards) must be disposed of separately.

For the disposal of the level electrode observe the pertinent legal regulations concerning waste disposal.

For your notes



Agencies all over the world: www.gestra.de

GESTRA AG

Münchener Straße 77

28215 Bremen

Germany

Telefon +49 421 3503-0

Telefax +49 421 3503-393

E-mail info@de.gestra.com

Web www.gestra.de