GESTRA Steam Systems

NRGT 26-1
NRGT 26-1S

GB

Installation Instructions 810213-04

Level electrode

NRGT 26-1, NRGT 26-1 S

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Important Notes

Usage for the intended purpose

Use level electrodes NRGT 26-1 and NRGT 26-1S only for indicating liquid levels.

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.

The terminal strip of the NRGT 26-1 / NRGT 26-1S is live during operation.
This presents the danger of electric shock.
Cut off power supply before fixing or removing the housing cover.

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.

ATEX (Atmosphère Explosible)

According to the European Directive 94/9/EC the equipment must not be used in potentially explosive areas.

Explanatory Notes

Scope of supply

NRGT 26-1
1 Compact system type NRGT 26-1
with joint ring (of stainless steel 1.4301) D 27 x 32 to DIN 7603, bright annealed
1 Installation manual

NRGT 26-1S (for marine applications)
1 Compact system type NRGT 26-1S with flange DN 50 (2"), PN 40 to DIN 2635
1 Installation manual

System description

The compact system NRGT 26-1 works according to the capacitance measurement principle.
The NRGT 26-1 is used for signalling different levels in electrically conductive and non-conductive liquids:

■ Level maintained within the control band defined by two preset limits

The NRGT 26-1 has a level transmitter integrated in the electrode body which produces a standard signal of 4 - 20 mA. External switchgear is not required.

Function

The principle of capacitance measurement is applied to determine the level. The electrode rod and the vessel wall form a capacitor. If the level of the dielectric located between the two capacitor plates changes, the current which flows through the plates changes proportionally to the level. A dielectric is defined as an insulating substance, which excludes many liquids such as water. In order to receive a useful measuring result the measuring rod, which is submerged to varying depths in the liquid, must be completely insulated. After the calibration of the zero point/measuring range (0 %/100 %) the level can be read off from a remote display unit. The level measuring range can be changed during operation.

Designs

NRGT 26-1:
Screwed design ¾" BSP, DIN ISO 228-1. **Fig. 2**

NRGT 26-1S:
Flanged design for marine application DN 50, PN 40, DIN 2635. **Fig. 3**

Technical Data

NRGT 26-1, NRGT 26-1S

Type Approval N°

NRGT 26-1:	TÜV · WRS · 02-391	
NRGT 26-1 S:	LR 98/20075	RINA ELE/30298/2
	GL 99249-96HH	BV 10617/A0 BV
	NKK A-556	DNV A-8394
		KR HMB 06190-MS002

Max. service pressure
32 bar g at 238 °C

Connections

NRGT 26-1:	Screwed ¾" BSP, DIN ISO 228-1
NRGT 26-1 S:	Flanged DN 50, PN 40, DIN 2635

Materials

Case:	Die cast aluminium 3.2161 (G AlSi8Cu3)
Stem:	S. S. 1.4571 CrNiMoTi17-12-2
Flange:	Forged steel 1.0460 P250GH
Measuring electrodes:	S. S. 1.4571 CrNiMoTi17-12-2
Electrode insulation:	PTFE
Spacer disc:	PTFE (design for marine applications)

Mains supply
230 V +/- 10 %, 50/60 Hz
115 V +/- 10 %, 50/60 Hz (option)
24 V +/- 10 %, 50/60 Hz (option)
24 V DC

Length supplied / measuring range

NRGT 26-1

❶ Max. installation length at 238 °C
❷ Measuring range

❶	❷
373	300
477	400
583	500
688	600
794	700
899	800
1004	900
1110	1000
1214	1100
1319	1200
1423	1300
1528	1400
1636	1500
2156	2000

See Fig. 2

NRGT 26-1 S

❸ Max. installation length at 238 °C
❹ Measuring range

❸	❹
316	275
420	375
526	475
631	575
737	675
842	775
947	875
1053	975
1157	1075
1262	1175
1366	1275
1471	1375
1579	1475
2099	1975

See Fig. 3

Technical Data – continued –

NRGT 26-1, NRGT 26-1S – continued –

Power consumption
5 VA, 3 VA at 24 V DC

Fuse
Thermal fuse T_{max} = 102 °C

Sensitivity
Range 1: Water ≥ 0,5 µS/cm
Range 2: Water ≥ 20 µS/cm
Range 3: Fuel oil EL ε_r 2,3

Output
4 – 20 mA level-proportional; electrically insulated, max. load 500 Ω

Indicators and adjustors
2 red LEDs for “level 0 %” or “level 100 %” within the measuring range,
1 green LED for “level between 0 % and 100 %” of measuring range,
1 code switch for selecting the measuring range,
2 trimmer potentiometers for small-percentage adjustment of the measuring range,
2 terminal lugs for voltage measurement.

Cable entry
Cable gland with integral cable clamp
2 x M20 x 1.5

Protection
IP 65 nach DIN EN 60529

Max. admissible ambient temperature
70 °C (158 °F)

Weight
NRGT 26-1: approx. 1.8 kg
NRGT 26-1S: approx. 8.0 kg

Corrosion resistance

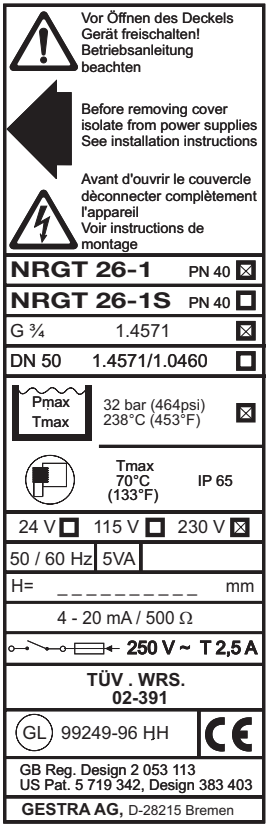
Provided that the equipment is used for its intended purpose, its safety is not impaired by corrosion.

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 reflect the latest state of technology.

Technical Data – continued –

Name plate / marking



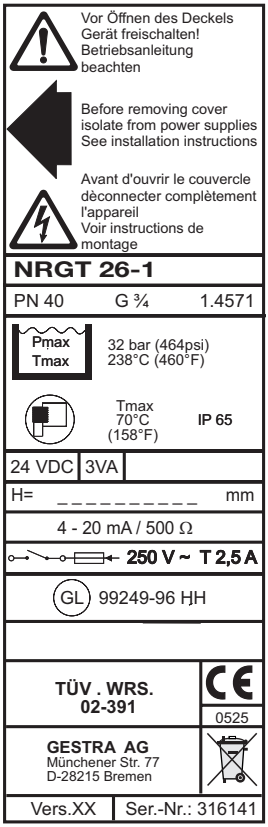


Fig. 1

Dimensions

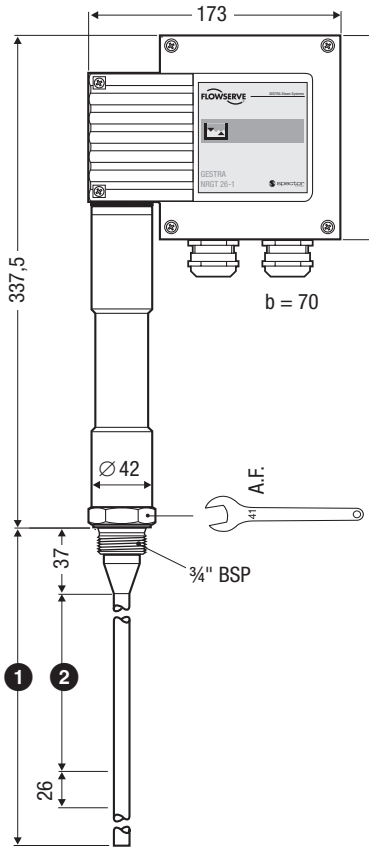


Fig. 2

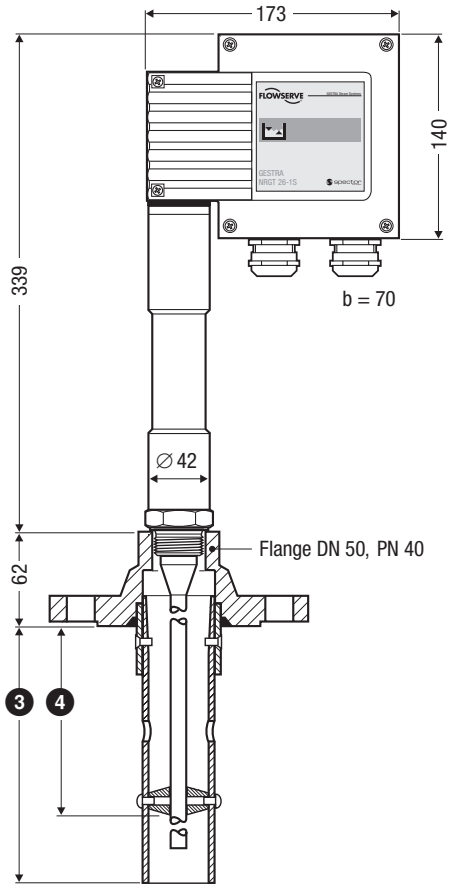


Fig. 3

2, 4 constant length (no elongation)

Design

NRGT 26-1, NRGT 26-1S

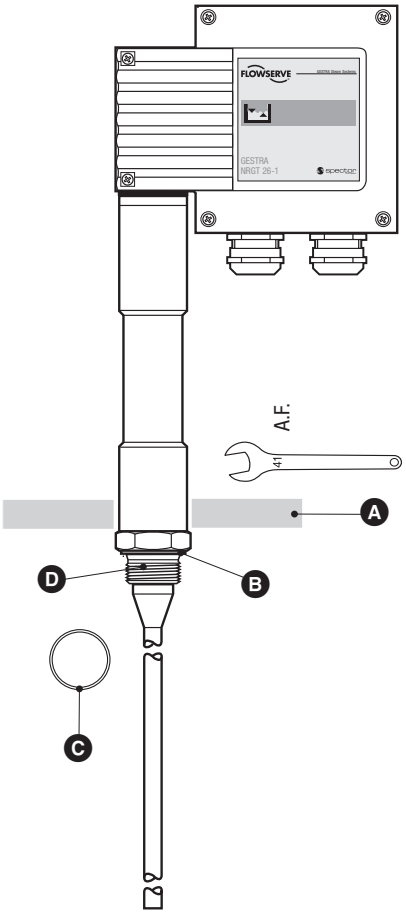


Fig. 4

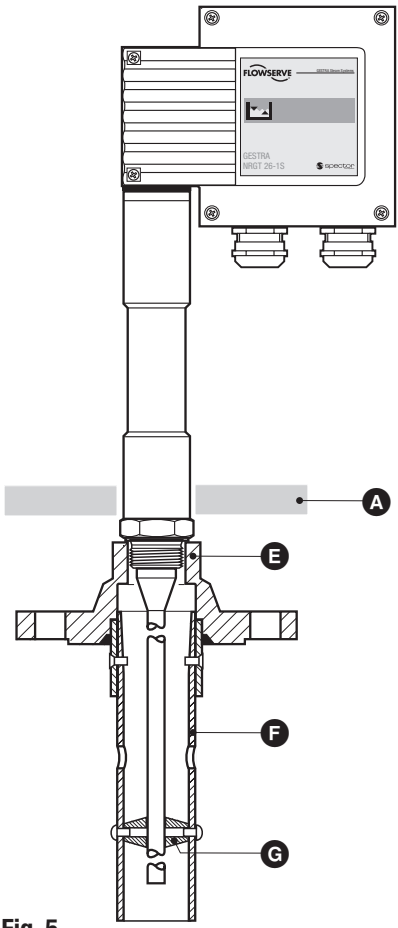


Fig. 5

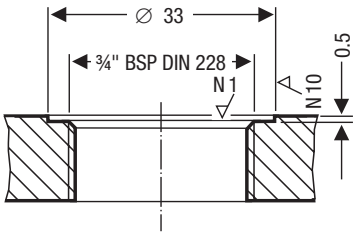
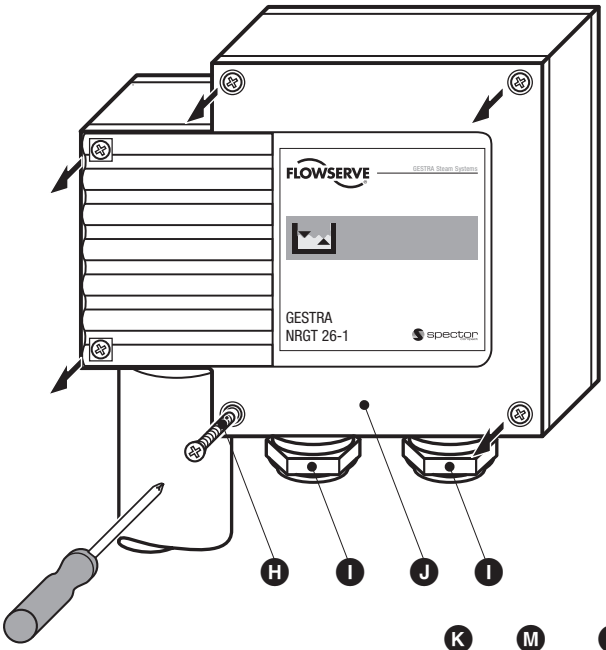


Fig. 6

NRGT 26-1, NRGT 26-1S



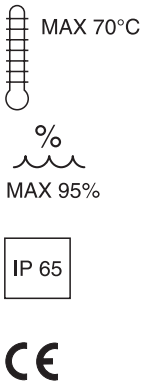


Fig. 7

Shown:
24, 115, 230 V AC version

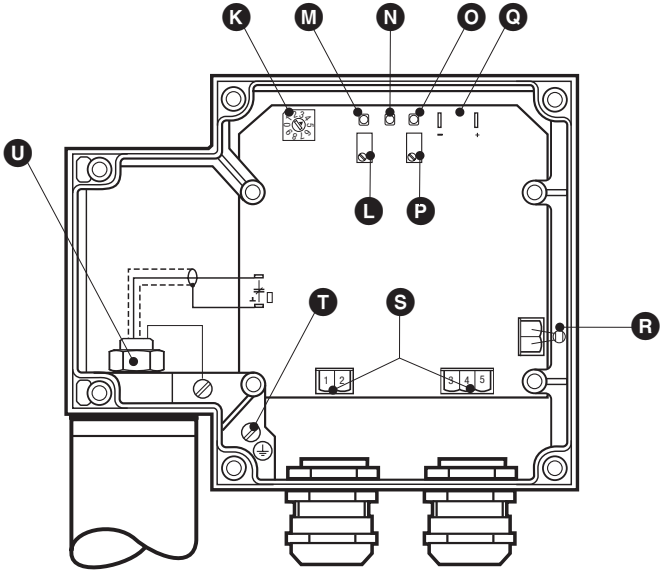


Fig. 8

Design / Functional Elements

Key

- **A** Thermal insulation provided on site, d = 20 mm (without thermal insulation of steam boiler)
- **B** Seating surface
- **C** Joint ring (of stainless steel 1.4301) D 27 x 32 to DIN 7603
- **D** Electrode thread ¾" BSP, DIN ISO 228-1
- **E** Flange DN 50 (2"), PN 40 to DIN 2635
- **F** Protection tube
- **G** Spacer disc
- **H** Housing screws M4
- **I** Cable entry M20 x 1.5
- **J** Housing cover
- **K** Measuring range switch
- **L** Potentiometer for lower measuring point (4 mA)
- **M** LED “Level 0 %”
- **N** LED “Level > 0 %, < 100 %”
- **O** LED “Level 100 %”
- **P** Potentiometer for upper measuring point (20 mA)
- **Q** Terminal lugs for voltage measurement (between 0-7 V DC, level proportional)
- **R** Thermal fuse T_{max} 102 °C
- **S** Terminal strip
- **T** PE connection
- **U** Plug

- **1** NRGT 26-1: Max. length of installation at 238 °C
- **2** NRGT 26-1: Measuring range
- **3** NRGT 26-1S: Max. length of installation at 238 °C
- **4** NRGT 26-1S: Measuring range

Installation

NRGT 26-1

1. Check seating surfaces of threads or flange provided on vessel or boiler standpipe. **Fig. 6**
2. Place joint ring Ⓒ onto seating surface Ⓑ of the electrode **Fig. 7.**
   Use only joint ring (of stainless steel 1.4301) D 27 x 32 to DIN 7603 supplied with electrode.
3. Apply a light smear of silicone grease (e. g. DOW Corning 111 Compound) to electrode thread Ⓐ.
4. Screw level electrode into threads or flange provided on vessel or boiler standpipe and tighten with a 41 mm open-end spanner. The torque required is **160 Nm** when cold.

NRGT 26-1S

1. Check seating surfaces and place flat gasket on connection standpipe.
2. Place flange Ⓔ together with level electrode onto connection standpipe and secure with bolts. Tighten bolts in diagonally opposite pairs. **Fig. 5**

Attention

- The seating surfaces of the threads or flange provided on the vessel or boiler standpipe must be accurately machined. **Fig. 6**
- Do not bend electrode rod when mounting.
- Do not lag electrode body.
- Do not insulate electrode thread with hemp or PTFE tape.

Note

- For the approval of the boiler standpipe with connecting flange the relevant local or national regulations must be considered.
- See four examples of installation on page 14.

Tools

- Open-end spanner 17 mm A. F.
- Open-end spanner 41 mm A. F.

Examples of installation

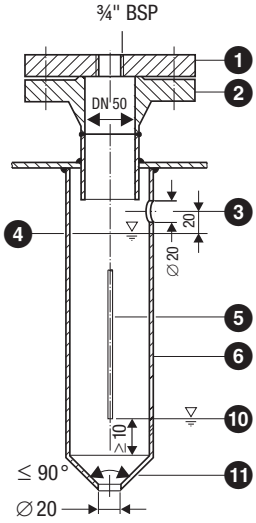


Fig. 9

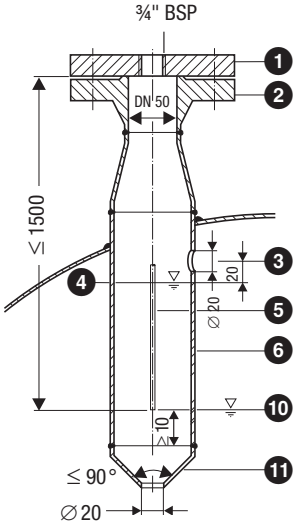


Fig. 10

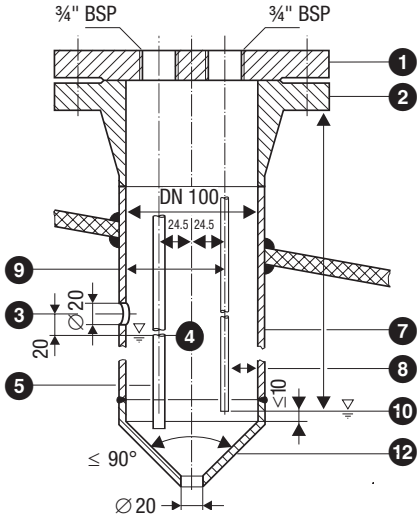


Fig. 11

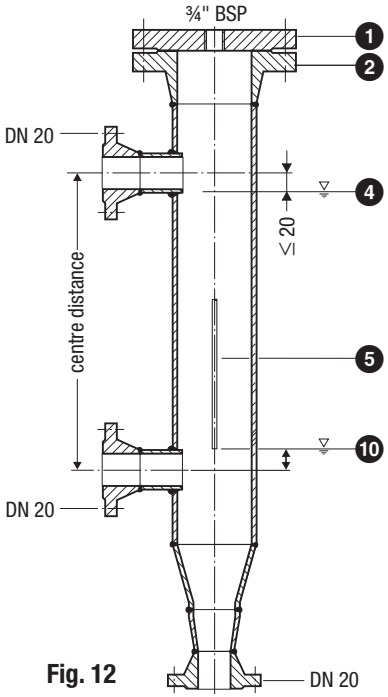


Fig. 12

Key

1. Flange PN 40, DN 50 (2"), DIN 2527
   Flange PN 40, DN 100 (4"), DIN 2527
2. For the approval of the boiler standpipe with connecting flange the relevant regulations must be considered.
3. Vent hole
4. High water (HW)
5. Electrode rod d = 15 mm
6. Protection tube DN 80
7. Protection tube DN 100
8. Electrode distance ≥ 14 mm (LW)
9. Electrode distance ≥ 40 mm (LW)
10. Low water (LW)
11. Reducer K-88.9 x 3.2-42.4 x 2.6 W to DIN 2616, part 2
12. Reducer K-114.3 x 3.6-48.3 x 2.9 W to DIN 2616, part 2

Wiring

NRGT 26-1, NRGT 26-1S

Use multi-core flexible control cable with min. conductor size 1.5 mm² for wiring.

1. Undo screws Ⓗ, remove housing cover Ⓙ. **Fig. 7**
2. Unscrew union nuts of cable entry Ⓘ.

The electrode terminal can be turned through +/– 180 °.

3. Loosen plug Ⓤ with 17 mm spanner but do not remove. **Fig. 8**
4. Turn electrode terminal into desired direction (+/– 180 °).
5. Tighten plug Ⓤ slightly.
6. Remove terminal strips Ⓢ from board.
7. Connect terminal strip according to wiring diagram, connect PE connection Ⓣ.
8. Plug in terminal strips Ⓢ.
9. Install cable entry Ⓘ.
10. Replace housing cover Ⓙ, insert screws Ⓗ and fasten.

Wiring diagram

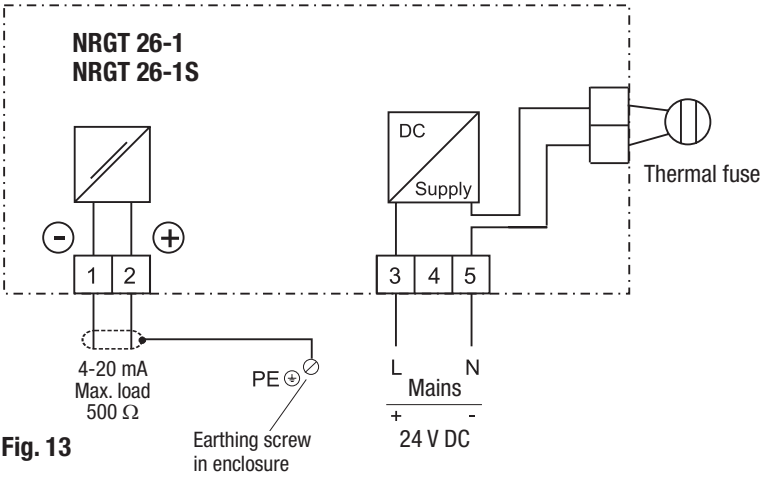


Fig. 13

Attention

- Fuse supply cables with 250 mA (slow blow).

Tools

- Screwdriver for cross head screws, size 1
- Screwdriver for slotted screws, size 2.5; completely insulated according to DIN VDE 0680-1
- Open-end spanner 17 mm A. F.

Basic Setting

Factory setting NRGT 26-1

The compact system is delivered with the following factory set default values:

- Measuring range 300 mm: Switch Ⓚ position 4, water ≥ 20 µS/cm
- Measuring range 400 mm up to 700 mm: Switch Ⓚ position 4, water ≥ 20 µS/cm
- Measuring range 800 mm up to 1500 mm: Switch Ⓚ position 4, water ≥ 20 µS/cm
- Measuring range 1600 mm up to 2000 mm: Switch Ⓚ position 5, water ≥ 20 µS/cm

Factory setting NRGT 26-1S

The compact system is delivered with the following factory set default values:

- Measuring range 275 mm: Switch Ⓚ position 4, water ≥ 20 µS/cm
- Measuring range 375 mm up to 675 mm: Switch Ⓚ position 4, water ≥ 20 µS/cm
- Measuring range 775 mm up to 1475 mm: Switch Ⓚ position 4, water ≥ 20 µS/cm
- Measuring range 1575 mm up to 1975 mm: Switch Ⓚ position 5, water ≥ 20 µS/cm

Establish active measuring range (control range)

A control range may be established within the measuring range of the electrode. Establish the length of the control range using switch Ⓚ, see **Fig. 8**

Ⓧ Control range [mm] (active measuring range)
❷ Max. measuring range at 25 °C
❺ Water, conductivity ≥ 20 µS/cm
❻ Water, conductivity ≥ 5 µS/cm
❼ Fuel oil EL, dielectric constant ε_r 2.3

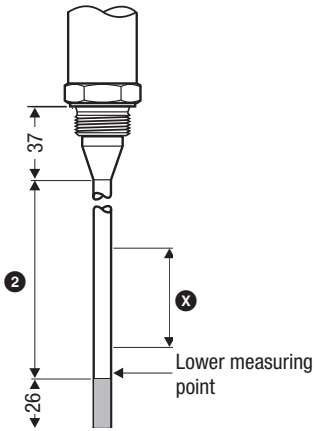


Fig. 14

Ⓧ	❺	❻	❼
100	4	3	3
200	4	3	3
300	4	3	3
400	4	4	3
500	4	4	3
600	4	4	3
700	4	4	3
800	4	4	3
900	4	5	3
1000	4	5	3
1100	4	5	3
1200	4	5	3
1300	4	5	3
1400	4	5	3
1500	4	5	3
1600	5	5	3
1700	5	6	3
1800	5	6	4
1900	5	6	4
2000	5	6	4

Attention

- If Ⓧ is clearly smaller than ❷ set switch Ⓚ one step back.

Commissioning

Danger

The terminal strip and the electronic components of the NRGT 26-1/NRGT 26-1S are live during operation.
This presents the danger of electric shock.
Use only completely insulated screwdriver according to VDE 0680 for adjusting the measuring points.

Check wiring

1. Check whether the system NRGT 26-1, NRGT 26-1S has been wired according to wiring diagram **Fig. 13.**
2. Check whether mains supply corresponds to the wiring carried out on the equipment.

Apply mains voltage

1. Turn on power to the equipment. The LED Ⓜ of the electrode NRGT 26-1 will light up (if the electrode is exposed). **Fig. 6**

Adjust lower measuring range

1. Fill boiler or vessel with liquid until the lower measuring point is reached.
2. Wait until boiler or vessel has reached its service pressure.
3. Turn potentiometer Ⓛ to the left until the red LED Ⓜ lights up.
4. Turn potentiometer Ⓛ to the right until **only** the green LED Ⓝ lights up.
   You have now established the lower measuring point.

Adjust upper measuring range

1. Fill boiler or vessel with liquid until the upper measuring point is reached and wait for 30 secs. (internal attenuation).
2. Turn potentiometer Ⓟ to the right until **only** the red LED Ⓞ lights up.
3. Turn potentiometer Ⓟ to the left until the green LED Ⓝ lights up.
4. Turn potentiometer Ⓟ to the right until the green LED Ⓝ goes out.
   You have now established the upper measuring point.
5. Fix housing cover Ⓙ.

Note

- When adjusting the measuring points of the electrode in a **cold** liquid, the measuring points will shift with rising temperature as a result of the longitudinal expansion of the electrode rod. Be sure to correct the settings accordingly.
- If a higher accuracy (for 0 % = 4 mA and 100 % = 20 mA) than ± 0.5 mA is required, measure the level-proportional current at terminals 1 ⊖ and 2 ⊕ in order to establish more accurate settings.

Operation

NRGT 26-1, NRGT 26-1S

Operation in steam and (pressurised) hot water plants in accordance with TRD 401, TRD 602, TRD 604, EN 12952, EN 12953 or other national regulations or according to the guidelines of classification societies.

Note

- Should malfunctions occur during the commissioning procedure refer to chapter “Operational Malfunctions” on page 20 in order to analyse and correct them.

Operational Malfunctions

Fault finding list for troubleshooting

Equipment fails to work

Fault: Mains voltage has not been applied.
Remedy: Apply mains voltage. Wire equipment according to the wiring diagram.

Fault: The thermal fuse has been activated.
Remedy: In case of a defective thermal fuse the mains voltage has not been applied to terminal ⓡ.
Replace defective thermal fuse (ref. no. 051629).
The ambient temperature must not exceed 70 °C.

Fault: The electrode housing does not have earth connection to the vessel.
Remedy: Clean seating surfaces and insert metal joint ring (of stainless steel 1.4301) D 27 x 32 to DIN 7603.
Do **not** insulate compact system with hemp or PTFE tape!

Fault: Electronic board is defective.
Remedy: Replace board (ref. no. 391360).

Equipment does not work accurately

Fault: Electrode has been installed without protection tube.
The protection tube serves as reference electrode.
Remedy: Install protection tube.

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) are closed.
Remedy: Open isolating valves.

Fault: The desired zero point does not lie within the measuring range of the electrode.
The electrode is too short.
Remedy: Replace the compact system. Choose adequate electrode length.

Fault: The adjustment of the measuring range is wrong.
Remedy: Adjust switch ⓚ correctly. See **"Basic Adjustments".**

Fault: Dirt deposits have accumulated on the electrode rod.
Remedy: Remove compact system and clean electrode rod with a wet cloth.

Fault: The gasket of the electrode rod is damaged.
Measuring current at terminal 1 and 2 $\geq$ 20 mA. **Fig. 13**
Remedy: Replace compact system.

If faults occur that are not listed above, please contact our subsidiary or 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. Electronic components (boards) must be disposed of separately.

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

Annex

Declaration of conformity CE

We hereby declare that the equipment **NRGT 26-1** and **NRGT 26-1S** conforms to the following European guidelines:

- Low Voltage Directive (LVD) 73/23/EEC version 93/68/EEC
- Directive of Electromagnetic Compatibility (EMC) 89/336/EEC version 93/68/EEC
- LVD standard EN 50178
- EMC standard EN 50 081-2, EN 50082-2

This declaration is no longer valid if modifications are made to the equipment without consultation with us.

Bremen, 19th March 2004
GESTRA AG

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