Legend

A. Electrode thread 1" BSP, DIN 228
B. Seating surface
C. Joint ring (of stainless steel 1.4301) D 33 x 39 to DIN 7603
D. Flange DN 50 (2"), PN 40 to DIN 2635
E. Housing screws M4
F. Cable entry PG 9/PG 16
G. Housing cover
H. LED “MIN”
I. LED “Pump ON”
J. LED “Pump OFF”
K. LED “MAX”
L. DIP switch “Measuring range”
M. Terminal strip
N. PE connection
O. Terminal strip ‘Test’
P. Thermal fuse $T_{\text{max}}$ 102 °C
Q. Screw
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Important Notes

Safety Note

Use compact system for level monitoring type NRGS 16-1 and NRGS 16-1 S only for level indication. Installation must only be performed by qualified staff. Qualified staff are those persons who – through adequate training in electrical engineering, the use and application of safety equipment in accordance with regulations concerning electrical safety systems, and first aid & accident prevention – have achieved a recognised level of competence appropriate to the installation and commissioning of this device.

Danger

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

Warning

The terminal strip of the NRGS 16-1 / NRGS 16-1 S is live during operation. This presents the danger of electric shock. Cut off power supply before fixing or removing the housing cover.
Explanatory Notes

Scope of Supply

**NRGS 16-1**
1 Compact system type NRGS 16-1
1 Joint ring (of stainless steel 1.4301) D 33 x 39 to DIN 7603
1 Installation Instruction

**NRGS 16-1 S**
1 Compact system type NRGS 16-1 S (for marine application)
1 Flange DN 50 (2"), PN 40 to DIN 2635
1 Installation Instruction

System Description

The compact system NRGS 16-1 / NRGS 16-1 S works according to the conductivity measurement principle.

With the NRGS 16-1 / NRGS 16-1 S a maximum of 4 levels can be signalled in conductive liquids:

- 4 Levels with one switchpoint each
- MAX alarm, MIN alarm, pump ON, pump OFF with one switchpoint each.

The NRGS 16-1 / NRGS 16-1 S has a level switch integrated in the electrode case for the controlling of all functions. An external switching device is not required.

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 be measured is required.

The conductivity measurement method can detect two conditions: electrode rod submerged/exposed or switchpoint reached/not reached. Before installation, the length of the electrode rod must be adapted to the switching levels, e. g. for max./min. alarm, controlling of a valve or pump.

Designs

**NRGS 16-1**:
Screwed design 1" BSP, DIN ISO 228. Fig. 1

**NRGS 16-1 S**:
Flanged design for marine application DN 50, PN 40, DIN 2635. Fig. 2
Technical Data

Type Approval N°
NRGS 16-1: TÜV · WRB · 96-388
NRGS 16-1 S: GL 99250-96 HH

Max. service pressure
32 bar g at 238 °C

Connections
Screwed 1" BSP, DIN ISO 228
Flanged DN 50, PN 40, DIN 2635

Materials
Case: Die cast aluminium 3.2161 (G AlSi8Cu3)
Stem: S. S. 1.4571 (CrNiMoTi 17 12 2)
Flange: Forged steel 1.0460 (C 22.8)
Measuring electrodes: S. S. 1.4571 (CrNiMoTi 17 12 2)
Electrode insulation: PTFE
Spacer disc: PTFE

Lengths supplied
500 mm
1000 mm
1500 mm

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

Power consumption
5 VA

Fuse
Thermal fuse T\text{max} = 102 °C

Sensitivity
Range 1: 10 $\mu$S/cm
Range 2: 0.5 $\mu$S/cm

Electrode voltage
10 Vss

Output
4 volt-free relay contacts.
Max. contact rating with a switching voltage of 24 V, 115 V and 230 V a. c.: ohmic 4 A, inductive 0.75 A at cos $\phi$ 0.5. Max. contact rating with a switching voltage of 24 V d. c.: 4 A
Contact material: silver, hard-gold plated

Energizing/deenergizing delay
3 sec., factory set
Technical Data – continued

**Indicators and adjustors**
4 red LEDs for signalling “electrode submerged”, “output relay energized”
1 four-pole DIP switch for changing sensitivity

**Cable entry**
Cable gland with integral cable clamp
2 x PG 9
1 x PG 16

**Protection**
IP 65 to DIN 40050

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

**Weight**
approx. 1.8 kg

**Installation**

**NRGS 16-1, NRGS 16-1 S**

1. Determine required measuring lengths of electrode rods and enter data in table 1  
   **Fig. 3, Fig. 4**

2. Cut electrode rods 1, 2, 3 and 4 accordingly.

3. Deburr faces of electrode tips.

4. Strip off 50 mm of PTFE insulation from the ends of electrode tips.

**NRGS 16-1**

5. Check seating surfaces of threads or flange provided on vessel or boiler standpipe.  
   **Fig. 5**

6. Place joint ring  onto seating surface  of electrode **Fig. 3**. Use only joint ring  
   (of stainless steel 1.4301) D 33 x 39 to DIN 7603 supplied with electrode.

7. Apply a light smear of silicone grease (e.g. DOW Corning 111 Compound)  
   to electrode thread  .

8. 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 140 Nm when  
   cold.

**NRGS 16-1 S**

9. Check seating surfaces and place flat gasket on connection standpipe.

10. Place blind flange with bore  together with level electrode onto connection  
    standpipe and fix with bolts. Tighten bolts in diagonally opposite pairs. **Fig. 4**
Table 1

<table>
<thead>
<tr>
<th>Function</th>
<th>Electrode rod</th>
<th>Length [mm]</th>
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<tbody>
<tr>
<td>e. g. First low-level alarm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>e. g. Feed pump ON</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>e. g. Feed pump OFF</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>e. g. High level alarm</td>
<td>4</td>
<td></td>
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Attention

- The seating surfaces of the threads or flange provided on the vessel or boiler standpipe must be accurately machined. Fig. 5
- Do not bend electrode rod when mounting.
- Do not lag electrode body.

Note

- For the approval of the boiler standpipe with connecting flange the relevant local and national regulations must be considered.
- See four examples of installation on page 17.

Tools

- Open-end spanner 41 mm A. F.
- Bolt cutter
- Hacksaw
- Flat file, medium cut
Wiring

NRGS 16-1, NRGS 16-1S
Use multi-core flexible cable with min. conductor size 1.5 mm² for wiring.

1. Unscrew screws Fig. 6, remove housing cover Fig. 6.
2. Unscrew union nuts of cable entry.

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

3. Loosen screw Fig. 7 with 17 mm spanner but do not remove.
4. Turn electrode terminal into desired direction (+/- 180°).
5. Tighten screw slightly.
6. Remove terminal strip from board.
7. Connect terminal strip according to wiring diagram, connect PE connection.
8. Insert terminal strip.
9. Replace housing cover, fasten screws and install cable entry.

Wiring diagram

Fig. 8

Attention

- Fuse supply cables with T 250 mA.
- The connection of the switchpoints 2 and 3 must be effected on site (pump contactor, auxiliary relay)!

Tools

- Screwdriver for cross head (“Phillips”) screws, size 1
- Screwdriver for slotted screws, size 2.5; completely insulated according to VDE 0680
- Open-end spanner 17 mm A. F.
### Standard setting

#### Factory setting NRGS 16-1

The compact system is delivered with the following factory settings:

- Measuring range $\geq 10 \mu S/cm$

#### Switch selection of measuring range

The measuring range can be switch selected between $\geq 0.5 \mu S/cm$ and $\geq 10 \mu S/cm$ by means of DIP switch:

1. Unscrew screws at the electrode terminal, remove cover, Fig. 6

   - DIP switch 1–4 OFF: Measuring range $\geq 0.5 \mu S/cm$
   - DIP switch 1–4 ON: Measuring range $\geq 10 \mu S/cm$

2. Replace cover and fasten screws

### Attention

- Do not damage the electronic components when operating DIP switch.

### Tools

- Screwdriver for cross head (“Phillips”) screws, size 1
- Screwdriver for slotted screws, size 2.5; completely insulated according to VDE 0680
Commissioning

Warning

The terminal strip of the NRGS 16-1/NRGS 16-1 S is live during operation. This presents the danger of electric shock. Cut off power supply before removing or replacing housing cover.

Wiring check

1. Check whether the system NRGS 16-1, NRGS 16-1 S has been wired according to wiring diagram Fig. 8.
2. Check whether mains supply corresponds to the wiring carried out on the equipment.

Check correlation of switching functions

1. Check whether the designated switchpoints – i.e. switch functions – have been correlated with the individual electrode rods. See table 1.

Application of mains voltage

1. Switch on mains supply and check the correct functioning of the equipment at the corresponding switchpoints. LEDs H, I, J and K are provided for visual check of switchpoints. Fig. 7

Remove housing cover O to check LEDs H, I, J and K. See “Wiring”
Annex

Warning

The terminal strip of the NRGS 16-1/NRGS 16-1 S is live during operation. This presents the danger of electric shock. Cut off power supply before removing or replacing housing cover.

Fault finding list

Level has exceeded switchpoint “High water” – no function

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

Fault: The thermal fuse has failed.
Remedy: In case of defective thermal fuse the mains voltage has not been connected to terminal : Replace defective thermal fuse (Order No. 051629).
The ambient temperature must not exceed 70 °C.

Fault: The electric conductivity is too low.
Remedy: Switch DIP switch to ≥ 0.5 µS/cm.

Fault: The electrode housing does not have earth connection to the boiler.
Remedy: Clean seating surfaces and insert metal joint ring (of stainless steel 1.4301) 33 x 39 to DIN 7603.
Do not insulate compact system with hemp or PTFE tape!

Fault: Electronic board is defective.
Remedy: Replace board (Order No. 391321).

Level has fallen below switchpoint “Low water” – no function

Fault: The electrode rods have earth contact.
Remedy: Change installation position.

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.

Switchpoint has been reached – incorrect function

Fault: The switching function has not been correctly allocated. Electrode rods have been cut to the wrong size.
Remedy: Identify electrode supply wire and reconnect accordingly.
Annex – continued

Declaration of conformity

We hereby declare that the equipment NRGS 16-1 and NRGS 16-1S conform to the following European guidelines:

- LV guideline 73/23/EWG version 93/68/EWG
- EMC guideline 89/336/EWG version 93/68/EWG

which are based on the following harmonised standards:

- LV standard EN 60947-5-1: 1991
- EMC standard EN 50 081-2, EN 50 082-2

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

Bremen, 28th April 1997
GESTRA GmbH

Dr. Anno Krautwald

Legend

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 = 5 mm

6. Protection tube DN 80

7. Protection tube DN 100

8. Electrode distance ≥ 14 mm

9. Electrode distance ≥ 40 mm

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
Examples of installation

Fig. 9

Fig. 10

Fig. 11

Fig. 12
España

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