GESTRA Steam Systems

NRGS 11-1
NRGS 16-1
NRGS 16-1S

GB

Installation Instructions 810393-03

Level Electrode
NRGS 11-1, NRGS 16-1, NRGS 16-1S

spector compact

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Important Notes

Usage for the intended purpose

Use compact system for level monitoring type NRGS 11-1, NRGS 16-1, NRGS 16-1 S only for level indication in electrically conductive liquids.

Safety note

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.

The terminal strip of the NRGS 11-1, 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.

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 explosion-risk areas.

Explanatory Notes

Scope of supply

NRGS 11-1
1 Compact system type NRGS 11-1, PN 6
1 Joint ring (of stainless steel 1.4301) D 33 x 39 to DIN 7603
1 Installation manual

NRGS 16-1
1 Compact system type NRGS 16-1, PN 40
1 Joint ring (of stainless steel 1.4301) D 33 x 39 to DIN 7603
1 Installation manual

NRGS 16-1 S
1 Compact system type NRGS 16-1 S (flanged design for marine application)
1 Flange DN 50, PN 40, DIN 2635
1 Installation manual

System description

The compact system NRGS 11-1, NRGS 16-1, NRGS 16-1 S works according to the conductivity measurement principle.

With the NRGS 11-1, NRGS 16-1, NRGS 16-1 S a maximum of 4 levels can be signalled in conductive liquids:

- 4 levels with one switchpoint each
- High-level alarm, low-level alarm, pump ON, pump OFF with one switchpoint each

The NRGS 1...-1(S) has a switching controller integrated in the electrode case for the control of all functions. External switchgear is therefore **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 tip submerged or exposed, meaning switchpoint reached or not reached. Before installation, the length of the electrode tip must be cut to the required switching levels, e. g. for high-level/low-level alarm, controlling of a valve or pump.

Designs

NRGS 11-1, NRGS 16-1:
Screwed design 1" BSP, DIN ISO 228. **Fig. 1**

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

Technical Data

NRGS 11-1, NRGS 16-1, NRGS 16-1S

Type approval no.

NRGS 11-1:	TÜV · WBR · 06-388
NRGS 16-1:	TÜV · WRB · 06-388
NRGS 16-1 S:	GL 99250-96 HH
	LR 98/20075
	RINA No ELE/30298/1

Max. service pressure

NRGS 11-1:	6 bar g at 159 °C
NRGS 16-1:	32 bar g at 238 °C
NRGS 16-1 S:	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 (CrNiMoTi17-12-2)
Flange:	Forged steel 1.0460 (C 22.8)
Measuring electrodes:	S. S. 1.4571 (CrNiMoTi17-12-2)
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_{max} = 102 °C

Sensitivity

Range 1: 10 µS/cm
Range 2: 0.5 µS/cm

Electrode voltage

10 V_{ss}

Output

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

Technical Data – continued –

NRGS 11-1, NRGS 16-1, NRGS 16-1S – continued –

Energizing/deenergizing delay
3 sec., factory set

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

Cable entry
Cable gland with integral cable clamp
2 x PG 9 (M 16)
1 x PG 16 (M 20)

Protection
IP 65 to DIN EN 60529

Max. admissible ambient temperature
70 °C

Weight

NRGS 11-1:	approx. 1.4 kg
NRGS 16-1:	approx. 1.8 kg
NRGS 16-1 S:	approx. 2.5 kg

Corrosion resistance

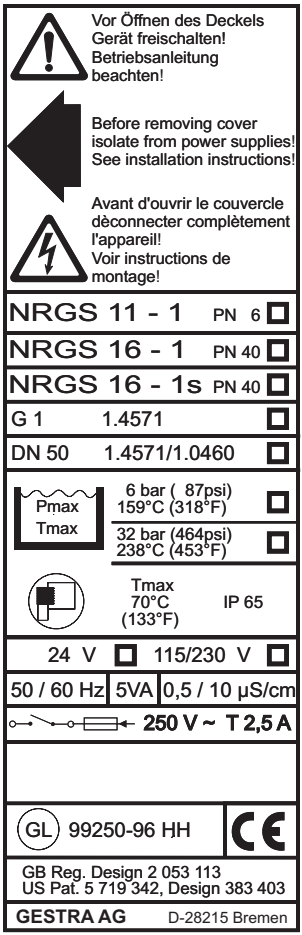
When used for its intended purpose, the safe functioning of the equipment will not be impaired by corrosion.

Sizing

The body must not be subjected to sharp increases in pressure. The sizing and dimensional allowances reflect the latest state of technology.

Technical Data – continued –

Name plate / marking



Dimensions

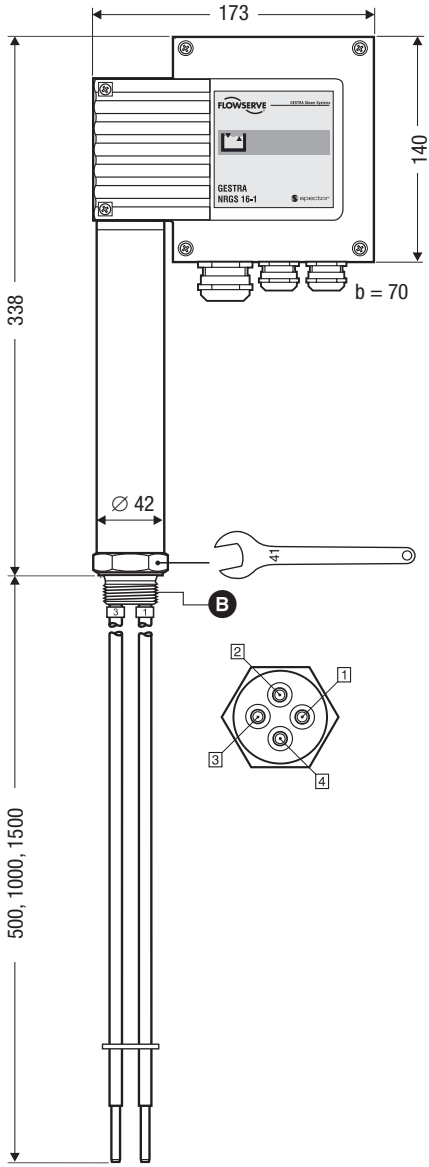


Fig. 1 *NRGS 11-1, NRGS 16-1*

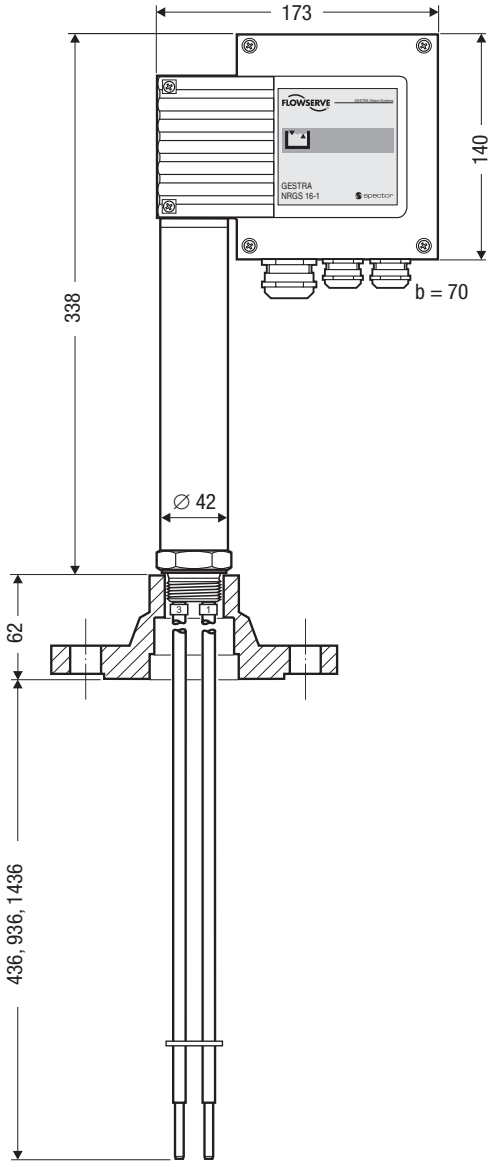


Fig. 2 *NRGS 16-1S*

Design

NRGS 11-1, NRGS 16-1, NRGS 16-1S

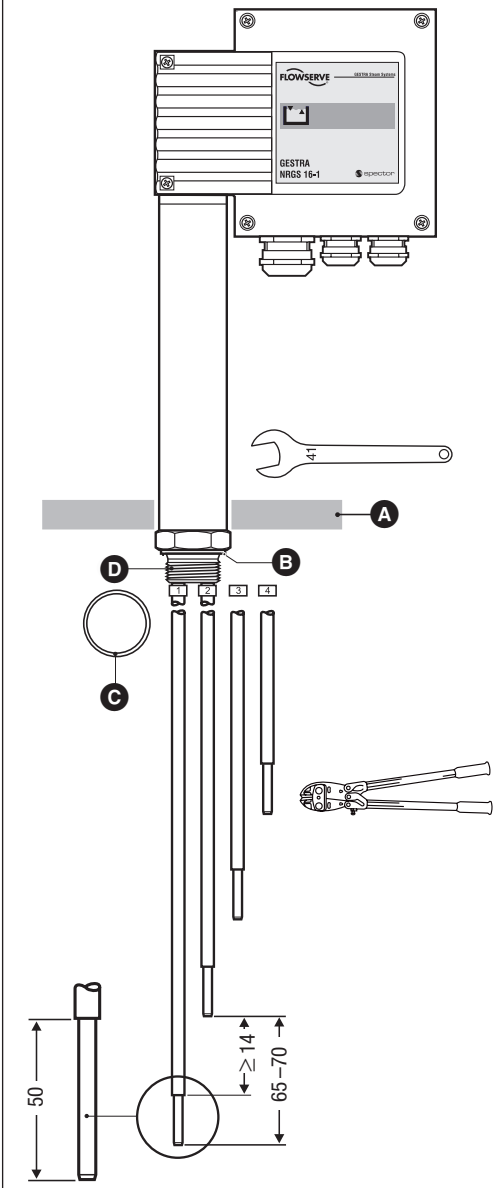


Fig. 3

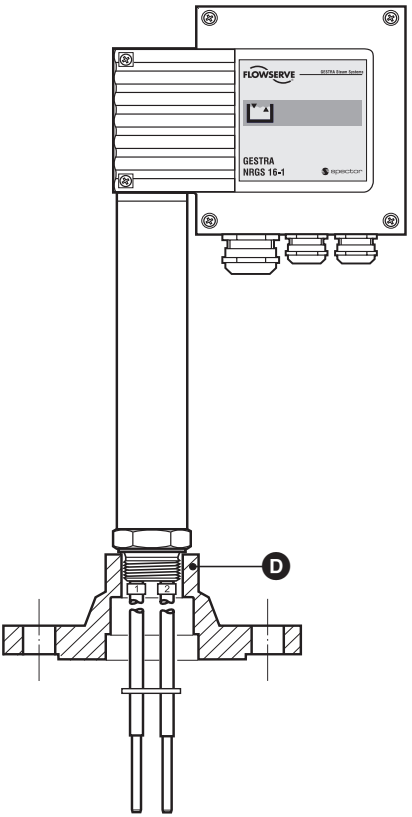


Fig. 4

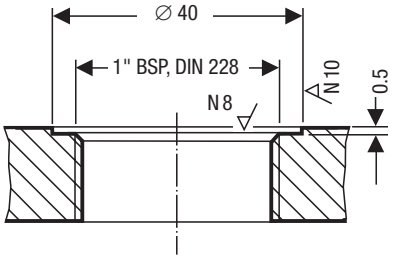


Fig. 5

Functional Elements

NRGS 11-1, NRGS 16-1, NRGS 16-1S

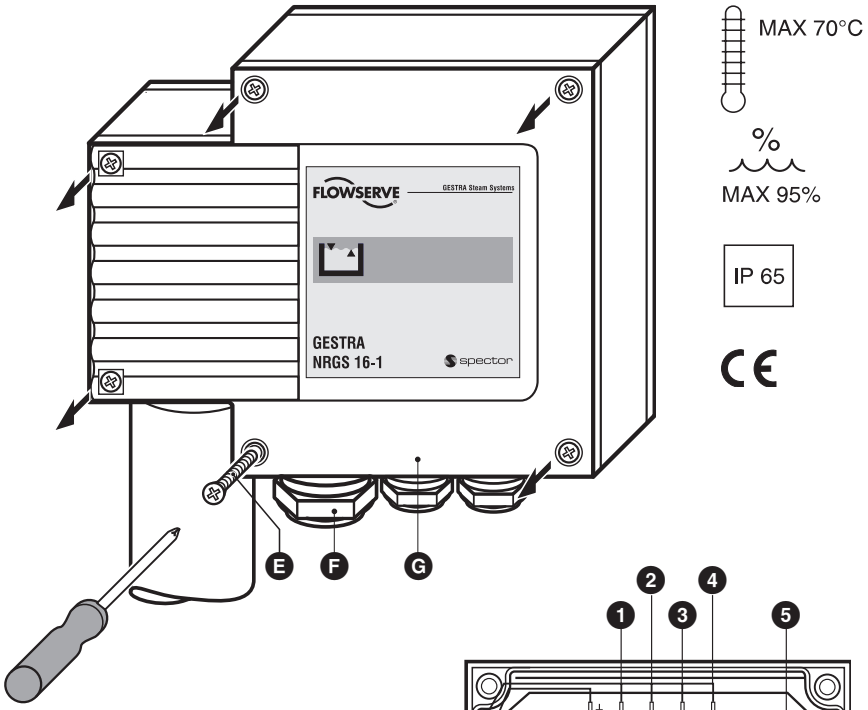


Fig. 6

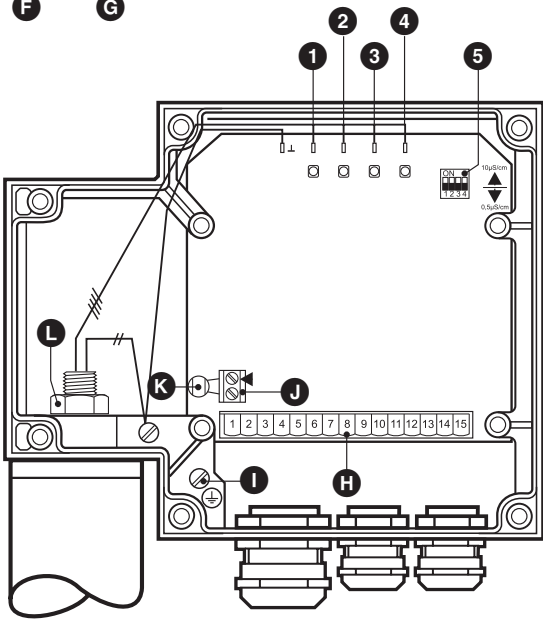


Fig. 7

Technical Data / Design / Functional Elements

Key

- **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, PN 40 to DIN 2635
- **E** Housing screws M4
- **F** Cable entry PG 9 / PG 16
- **G** Housing cover
- **H** Terminal strip
- **I** PE connection
- **J** Terminal strip “Test”
- **K** Thermal fuse T_{max} 102 °C
- **L** Plug

- **1** LED “Low-level alarm”
- **2** LED “Pump ON”
- **3** LED “Pump OFF”
- **4** LED “High-level alarm”
- **5** Code switch “Measuring range”

Installation

NRGS 11-1, NRGS 16-1, NRGS 16-1 S

1. Determine required measuring lengths of electrode tips and enter data in table **Fig. 3.**
2. Cut electrode tips [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 11-1, 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. Molykote® 111) 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 Functions

Function	Function	Electrode tip	Length [mm]
e. g. First low-level alarm		1	
e. g. Feed pump ON		2	
e. g. Fee pump OFF		3	
e. g. High level alarm		4	

Please enter function and length.

Molykote® 111 is a registered trademark of DOW Corning Corp., Midland Michigan, USA

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 tip 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 19.

Tools

- Open-end spanner 41 mm A. F. to DIN 894
- Bolt cutter
- Hacksaw
- Flat file, medium cut

Examples of installation

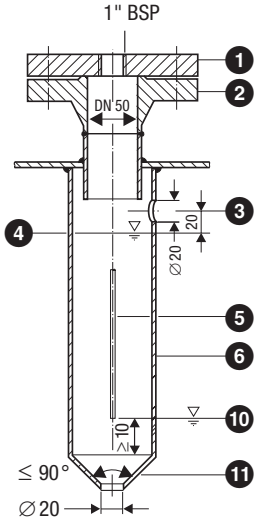


Fig. 8

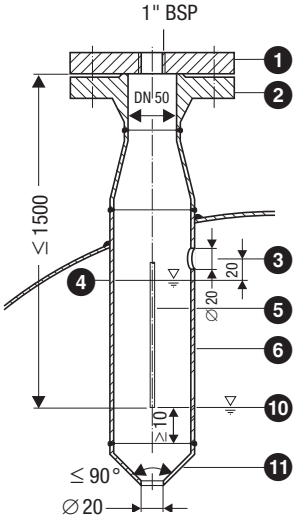


Fig. 9

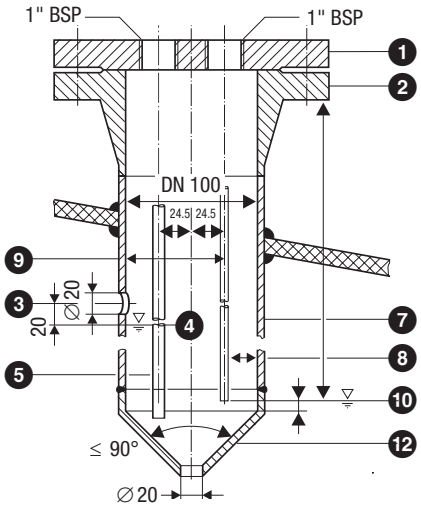


Fig. 10

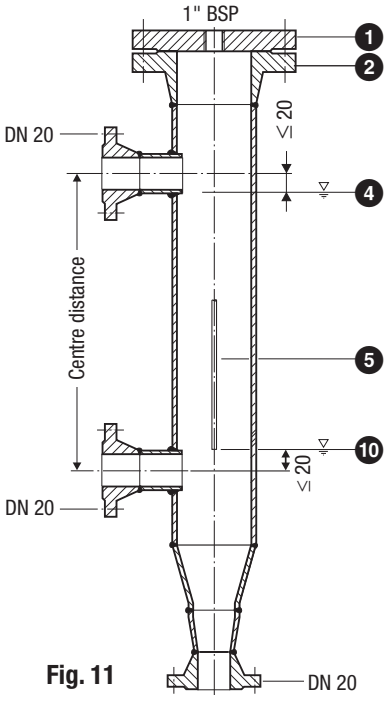


Fig. 11

Key

1. Flange PN 40, DN 150 (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 tip 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

Wiring

NRGS 11-1, NRGS 16-1, NRGS 16-1 S

Use multi-core flexible cable with min. conductor size 1.5 mm^2 for wiring.

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

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

3. Slacken plug Ⓛ with 17 mm open-end spanner but do not remove. **Fig. 7**
4. Turn electrode terminal into desired direction (+/- 180°).
5. Tighten plug Ⓛ slightly.
6. Remove terminal strip Ⓗ from board.
7. Connect terminal strip according to wiring diagram, connect PE connection Ⓘ.
8. Plug in terminal strip.
9. Install housing cover Ⓖ, fasten screws Ⓔ and install cable entry Ⓕ.

Wiring diagram

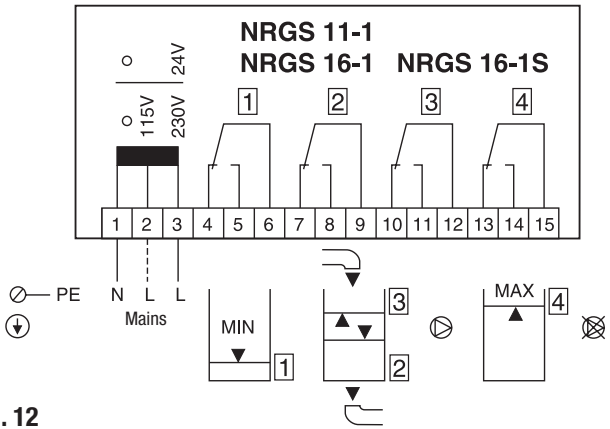


Fig. 12

Wiring – continued –

Fill control

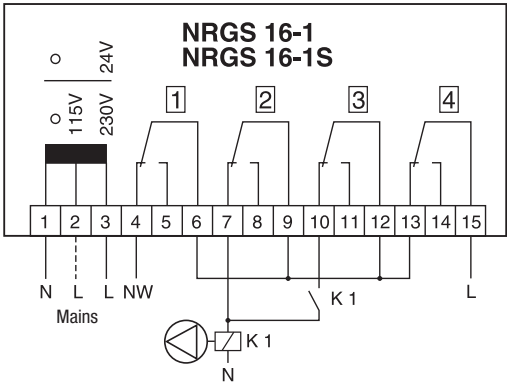


Fig. 13

Discharge control

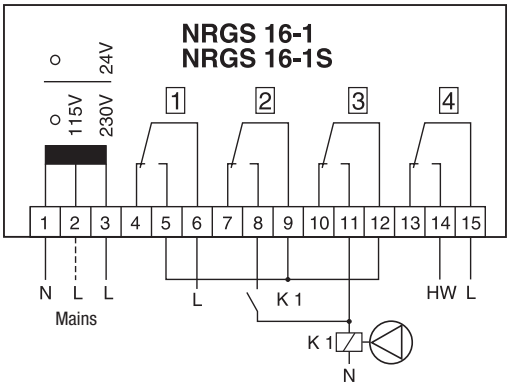


Fig. 14

Attention

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

Tools

- Screwdriver for cross head screws, size 1
- Screwdriver for slotted screws, size 2.5; completely insulated according to VDE 0680
- Open-end spanner 17 mm A. F. to DIN 894

Standard setting

Factory setting

The compact system is delivered with the following factory settings:

- Measuring range ≥ 10 µS/cm

Switch selection of measuring range

The measuring range can be switch selected between ≥ 0.5 µS/cm and ≥ 10 µS/cm by means of code switch ❺:

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

   DIP switch 1 – 4 OFF 

   Measuring range ≥ 0.5 µS/cm.

   DIP switch 1 – 4 ON 

   Measuring range ≥ 10 µS/cm.

2. Replace cover Ⓖ and fasten screws Ⓔ.

Attention

- Do not damage the electronic components when setting the code switch.

Tools

- Screwdriver for cross head screws, size 1
- Screwdriver for slotted screws, size 2.5; completely insulated according to VDE 0680

Commissioning

Warning

The terminal strip of the NRGS 11-1, 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.

Check wiring

1. Check whether the system has been wired according to wiring diagram **Fig. 12**.
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 "Functions"**, page 13.

Apply mains voltage

1. Switch on mains supply and check the correct functioning of the equipment at the corresponding switchpoints.
   LEDs ❶, ❷, ❸ and ❹ are provided for visual check of switchpoints. **Fig. 7**

Remove housing cover Ⓖ to check LEDs ❶, ❷, ❸ and ❹. **See "Wiring"**

Operation

NRGS 11-1, NRGS 16-1, NRGS 11-1S

For operation in steam and (pressurized) hot-water installations according to TRD 401, TRD 602, TRD 604, EN 12952, EN 12953 or other national rules or acc. to the rules and regulations of the classification societies.

Note

- Should malfunctions occur during the commissioning procedure refer to chapter "Troubleshooting" on page 21 in order to analyse and correct them.

Troubleshooting

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 been triggered.
Remedy:	In case of defective thermal fuse the mains voltage has not been connected to terminal ❶: Replace defective thermal fuse (stock code 051 629). The ambient temperature must not exceed 70 °C.

Fault:	The electric conductivity is too low.
Remedy:	Set code switch ❺ 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 (stock code 391 422).

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

Fault:	The electrode tips 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 tips have been cut to the wrong size.
Remedy:	Identify electrode supply wire and reconnect accordingly.

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

Risk of severe burns and scalds to the whole body.

Before removing the level electrode make sure that the vessel or the level pot is depressurised (0 bar) and cooled down to room temperature (0 °C).

Disposal

Dismantle the equipment and separate the waste materials.
For the disposal of the equipment observe the pertinent legal regulations concerning waste disposal.

Annex

Declaration of Conformity CE

We hereby declare that the equipment **NRGS 11-1, NRGS 16-1** and **NRGS 16-1 S** conform to the following Euopean guidelines:

- LVD 73/23/eec version 93/68/eec
- EMC guideline 89/336/eec version 93/68/eec

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, 4th September 2002
GESTRA AG

i. V. U. Bledschun

Head of the Design Dept.
Uwe Bledschun
(Academically qualified engineer)

i. V.

Quality Assurance Manager
Lars Bohl
(Academically qualified engineer)

FLOWSERVE GESTRA

Agencies all over the world:

www.gestra.de

España

GESTRA ESPAÑOLA S.A.
Luis Cabrera, 86-88
E-28002 Madrid
Tel. 00 34 91 / 5 15 20 32
Fax 00 34 91 / 4 13 67 47; 5 15 20 36
E-mail: aromero@flowserve.com

Great Britain

Flowserve Flow Control (UK) Ltd.
Abex Road
Newbury, Berkshire RG14 5EY
Tel. 00 44 16 35 / 4 69 99
Fax 00 44 16 35 / 3 60 34
E-mail: gestraukinfo@flowserve.com

Italia

Flowserve S.p.A.
Flow Control Division
Via Prealpi, 30
I-20032 Cormano (MI)
Tel. 00 39 02 / 66 32 51
Fax 00 39 02 / 66 32 55 60
E-mail: infoitaly@flowserve.com

Polska

GESTRA POLONIA Spolka z.o.o.
Ul. Schuberta 104
PL - 80-172 Gdansk
Tel. 00 48 58 / 3 06 10 -02 od 10
Fax 00 48 58 / 3 06 33 00
E-mail: gestra@gestra.pl

Portugal

Flowserve Portuguesa, Lda.
Av. Dr. Antunes Guimarães, 1159
Porto 4100-082
Tel. 0 03 51 22 / 6 19 87 70
Fax 0 03 51 22 / 6 10 75 75
E-mail: jtavares@flowserve.com

USA

Flowserve GESTRA U.S.
2341 Ampere Drive
Louisville, KY 40299
Tel.: 00 15 02 / 267 2205
Fax: 00 15 02 / 266 5397
E-mail: dgoodwin@flowserve.com

GESTRA AG

P. O. Box 10 54 60, D-28054 Bremen
Münchener Str. 77, D-28215 Bremen
Telephone +49 (0) 421 35 03 - 0
Fax +49 (0) 421 35 03 - 393
E-Mail gestra.ag@flowserve.com
Internet www.gestra.de

GESTRA

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