GESTRA Steam Systems

NRS 2-3

GB

Installation Instructions 810414-02

Level Switch Type
NRS 2-3

Contents

Contents – continued –

Page

Important Notes

Usage for the intended purpose

Use level switch NRS 2-3 only in conjunction with GESTRA level transmitter NRGT 26-1 for pump control.

Safety note

The equipment must only be installed and commissioned by qualified and adequately trained personnel.

Maintenance and retrofitting must only be performed by entrusted personnel who – through adequate training – have achieved a recognised level of competence.

Danger

The terminal strip of the NRS 2-3 is live during operation. This presents the danger of electric shock.

Cut off power supply before inserting or removing the 19" slide-in unit and before carrying out any installation or maintenance work.

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)

The equipment constitutes a simple item of electrical equipment as defined in DIN EN 50020 section 5.4. According to the European Directive ATEX 94/9/EC the equipment may only be used in potentially explosive atmospheres if it is provided with approved Zener barriers.
Application in Ex zones 1, 2 (1999/92/EC). The equipment does not bear an Ex marking.
The suitability of the Zener barrier is certified in a separate document.

Explanatory Notes

Scope of supply

NRS 2-3, design “b”
1 Level switch NRS 2-3
1 Mounting panel for installation in control cabinets
1 Installation manual

NRS 2-3, design “c”
1 Level switch NRS 2-3
2 Guide rails
1 32 pole screw-type connector
1 Installation manual

NRS 2-3, design “d”
1 Level switch NRS 2-3
1 Installation manual

System description

The level switch type NRS 2-3 is an analogue electronic control instrument (pump control) for the capacitance level transmitter type NRGT 26-1S.

In combination with this transmitter the equipment can signal the following levels:
High level, low level, level control unit ON/OFF

and can be used as level controller for steam boilers and pressurized hot-water plants.

Function

The standardized input current signal is transformed by the resistor into a level-proportional voltage and then preamplified. This voltage is fed to three voltage comparators V1, V2, V3 and compared with adjustable reference voltages. Depending on the comparison result the relays will be (de)energized as follows:

- If the level voltage across V1 is higher than the reference voltage, relay 1 is de-energized and the red LED Ⓓ illuminated.
- If the level voltage across V3 is lower than the reference voltage, relay 3 is de-energized and the red LED Ⓐ illuminated.
- If the level voltage across V3 is higher than the reference voltage, relay 3 is energized and the red LED Ⓐ extinguishes.

V2 works as switching controller, e. g. for the boiler feed pump.

- If the level voltage across V2 is lower than the reference voltage, relay 2 will switch on the pump. The yellow LED Ⓑ is illuminated.

The pump switches off in accordance with the adjusted hysteresis, which is adjustable over 1 % to 50 % of the level transmitter measuring range. Once the adjusted value is reached the relay 2 switches off the pump and the green LED Ⓒ is illuminated.

Designs

Design “b”
19" slide-in unit to DIN 41494 part 5, installed on a mounting panel for installation in control cabinets with screw-type terminals at the top and bottom.

Design “c”
19" slide-in unit with guide rails and 32 pole screw-type connector for the installation in 19" mounting panels acc. to DIN 41494 part 5.

Design “d”
19" spare slide-in unit

Technical Data

NRS 2-3

Type approval no.
GL 99249-96HH
LR 98/20074
BV 10617/Bo
RINA No ELE/30298/2
KR HMB06190-MS002
DNV A-8394

Mains voltage
230 V ± 10 %, 50/60 Hz
115 V ± 10 %, 50/60 Hz (option)
24 V ± 10 %, 50/60 Hz (option)

Power consumption
5 VA

Input
4 – 20 mA (coming from level transmitter)

Output
3 volt-free relay contacts
Max. contact rating with switching voltages of 24 V, 115 V and 230 V AC: 4 A resistive,
0.75 A inductive at cos $\varphi = 0.5$.
Max. contact rating with a switching voltage of 24 V DC: 4 A
Service life of relay: 30×10^6 switching cycles.

Limit value HIGH LEVEL / LOW LEVEL
Continuously adjustable within measuring range of level transmitter

Switchpoints PUMP ON/OFF
Continuously adjustable within 1 – 50 % of the measuring range of level transmitter

Indicators and adjustors
1 red LED "HIGH LEVEL", 1 red LED "LOW LEVEL", 1 yellow LED "PUMP ON", 1 green LED "PUMP OFF".
4 adjustors for HIGH LEVEL/LOW LEVEL and PUMP ON/OFF.

Protection
IP 10 to DIN EN 60529

Max. admissible ambient temperature
0 °C to +70 °C

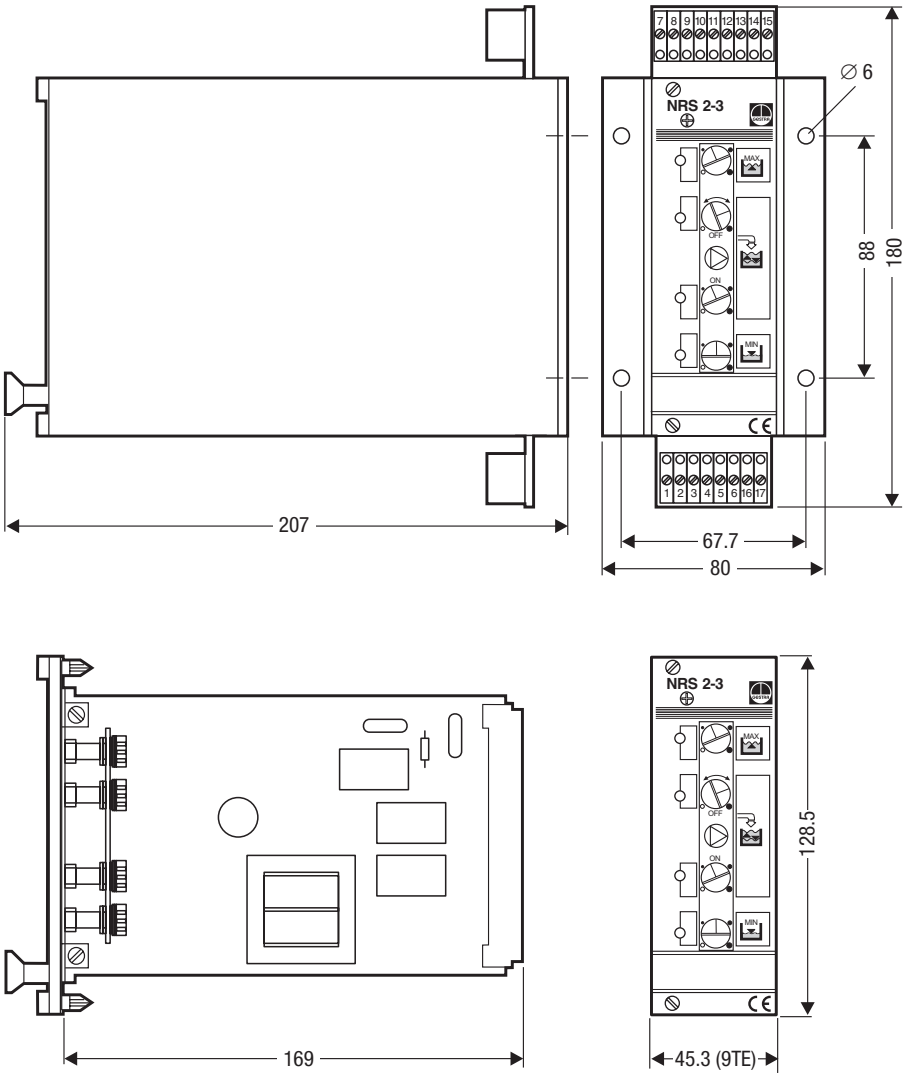
Case
19" slide-in unit with front panel to DIN 41494 part 5 and rear 32 way Euro card connector to
DIN 41612 installed in a mounting panel or for installation in 19" mounting panel.
Front panel, mounting panel: aluminium

Wiring
Design "b": screw-type terminal strips at the back of the mounting panel, max. conductor size 1.5 mm^2
Design "c": 32 pole screw-type connector at the back of the 19" mounting panel,
max. conductor size 1.5 mm^2
Supply line to level transmitter: screened two-core cable, conductor size 0.5 mm^2, max. cable length 150 m

Internal fuse
Glass cartridge fine-wire fuse M 0.05 A, 5 x 20, replaceable

Weight
approx. 0.8 kg

Dimensions



(TE = division units)
(1 TE = 5.08 mm)

Fig. 1

Functional Elements

NRS 2-3

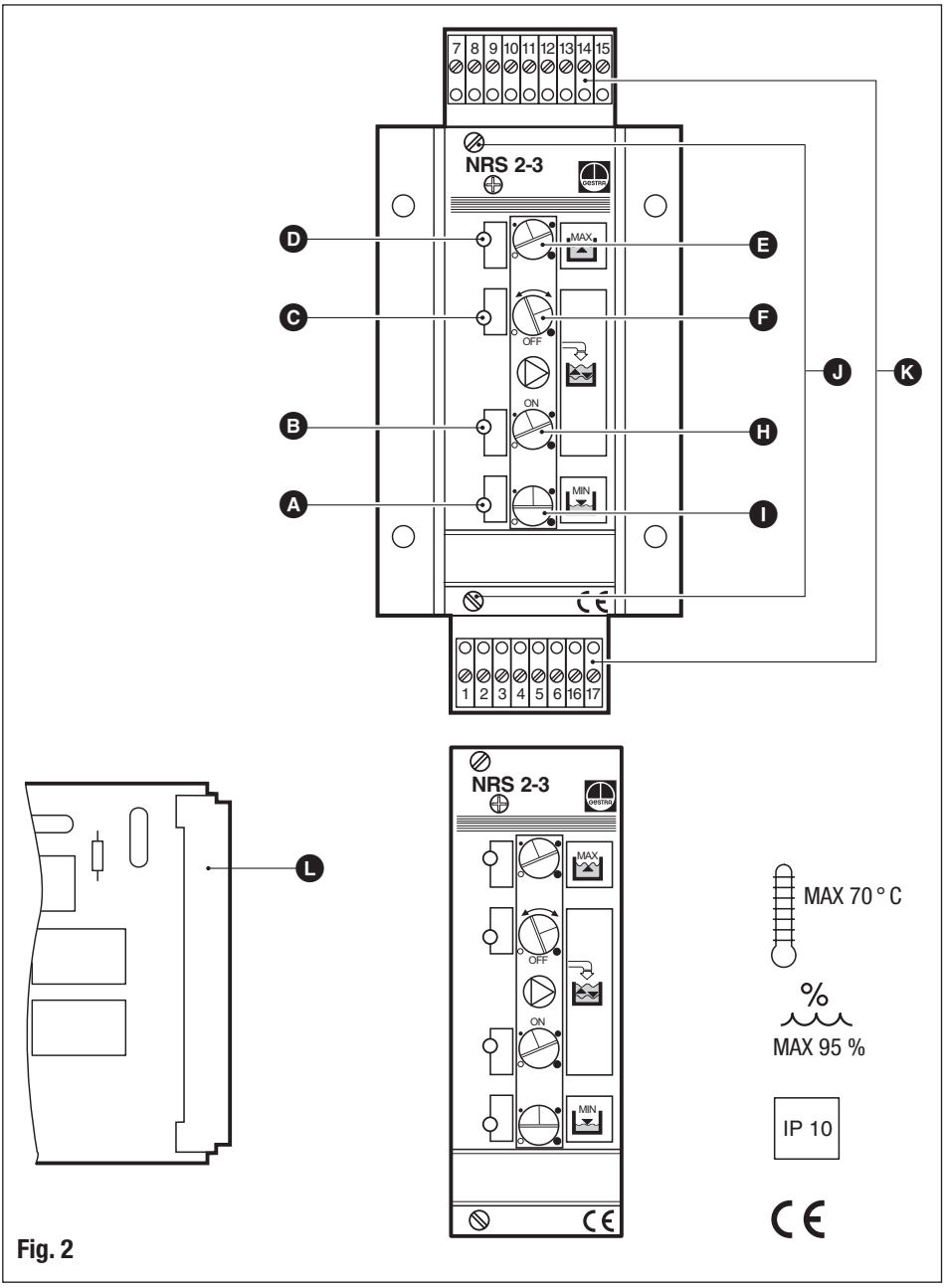


Fig. 2

Functional Elements – continued –

Key

- **A** LED “Low Level”
- **B** LED “Pump ON”
- **C** LED “Pump OFF”
- **D** LED “High Level”
- **E** Adjustor for high level
- **F** Adjustor for pump OFF
- **H** Adjustor for pump ON
- **I** Adjustor for low level
- **J** Fixing screws
- **K** Screw-type terminal strip
- **L** 32way Euro card connector

Installation

Design “b”

1. Drill four holes into the mounting panel of the control cabinet.
2. Put level switch onto the mounting panel and align.
3. Insert matching screws and fasten.

Design “c”/“d”

1. Install guide rails and screw-type connector into 19" mounting panel.
2. Insert 19" slide-in unit into the guide rails until it hits the stop.
3. Fasten the fixing screws ❶.

Tools

- Screwdriver for slotted screws, size 2 mm, 5 mm, completely insulated to VDE 0680

Electrical Connection

Design “b”

Wiring is effected via the two screw-type terminal strips.
Use screened two-core cable, conductor size 0.5 mm², max. cable length 150 m for the supply of the level transmitter.

Wiring diagram for design “b”

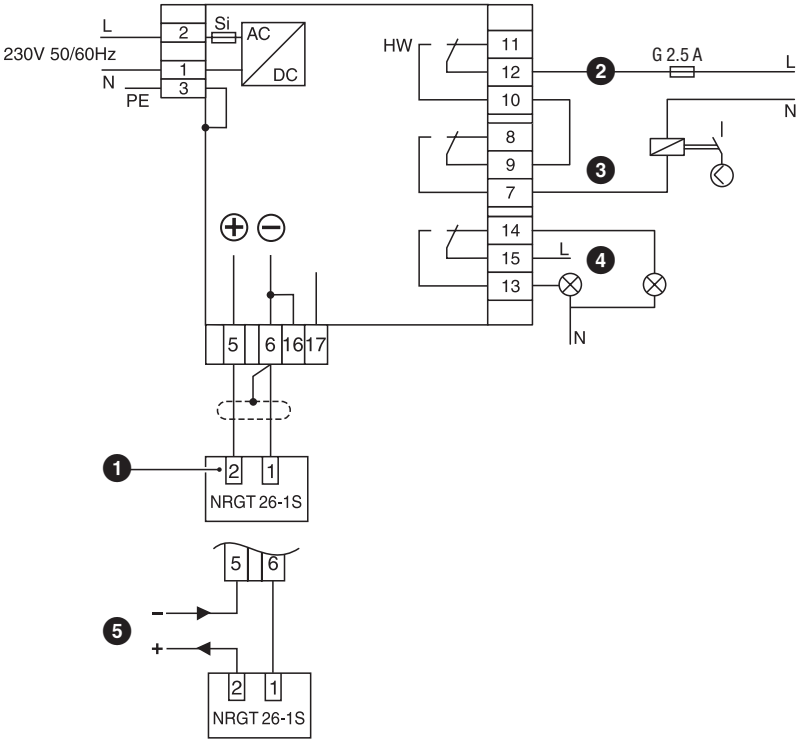


Fig. 3 *Example of fill control with second level indicator*

Electrical Connection – continued –

Design “c”/“d”

Wiring is effected via the 32 pole screw-type connector.
Use screened two-core cable, conductor size 0.5 mm², max. cable length 150 m for the supply of the level transmitter.

Wiring diagram for design “c”/“d”

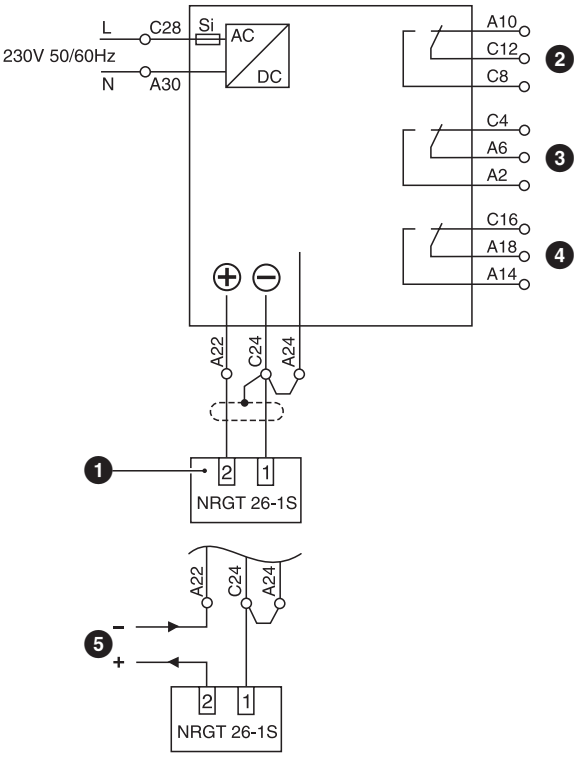


Fig. 4

Attention

- Protect the control circuit with a 2.5 A (slow blow) fuse.
- Connect screen only to the assigned terminal of the switch.
- The screen must not make any other electrical contact.
- When switching off inductive loads, voltage spikes are produced that may impair the operation of control and measuring systems. Inductive loads should therefore be provided with commercial arc suppressor RC combinations, e. g. 0.1 µF/ 100 Ω.

Electrical Connection – continued –

Key to wiring diagram

1. Level transmitter, output 4 – 20 mA
2. High level
3. Water level controller (fill control)
4. Low level (LED red/green)
5. Connection for another device, e. g. NRR 2-3

Commissioning

Danger

The terminal strip of the NRS 2-3 is live during operation. This presents the danger of electric shock.
Cut off power supply before removing or inserting the 19" slide-in unit or undertaking any kind of installation or maintenance work.

Note

The level switch NRS 2-3 can only be operated and checked in combination with the level transmitter NRGT 26-1S.

Checking wiring

1. Make sure that the 19" slide-in unit has been properly installed in the mounting panel.
2. Make sure that the mains supply corresponds to the wiring carried out on the equipment.

Applying mains voltage

1. Switch on the mains supply and verify that the NRS 2-3 is receiving power. The LED Ⓑ or Ⓒ will illuminate to verify this.

Adjusting switchpoint “Low Level”

1. Fill the tank and observe the level indicator until the water has reached the desired level.
2. Turn the adjustor Ⓘ from the left stop slowly to the right just until the red LED Ⓐ lights up.

Adjusting switchpoint “Pump ON”

1. Raise the water level in the tank until the desired switchpoint for the feedpump is reached.
2. Turn the adjustors Ⓕ and Ⓗ to the left stop.
3. Turn the adjustor Ⓗ from the left stop to the right until the yellow LED Ⓑ lights up.
4. Turn the adjustor Ⓕ to the right stop. The green LED Ⓒ is not illuminated.

Adjusting switchpoint “Pump OFF”

1. Raise the water level in the tank until the desired switchpoint for the pump is reached.
2. Turn the adjustor Ⓕ to the left until the green LED Ⓒ PUMP OFF lights up.
3. Carry out a final adjustment during operation: Adjust Ⓕ such that the exact switchpoint is achieved. Turning to the right increases the distance between the pump on and pump off positions.

Commissioning – continued –

Adjusting switchpoint “High Level”

1. Fill the tank until the max. admissible water level is reached.
2. Turn the adjustor Ⓔ from the right stop slowly to the left until the red LED Ⓓ lights up.

Note

You can directly change the switchpoints over the whole measuring range of the level transmitter by using the adjustors Ⓘ for LOW LEVEL, Ⓗ for PUMP ON and Ⓔ for HIGH LEVEL. To avoid confusion of the switchpoints during commissioning, we recommend that the above-mentioned sequence is carefully followed.

The adjustor Ⓕ for PUMP OFF is for changing the distance to the switchpoint PUMP ON only.

Table switchpoints

Mark the adjusted switchpoints either on the water level indicator and/or enter the data into the following table:

Switchpoint	(above the lowest water level)
Low level	..... mm
Pump ON	..... mm
Pump OFF	..... mm
High level	..... mm

Operation

Danger

The terminal strip of the NRS 2-3 is live during operation. This presents the danger of electric shock.
Cut off power supply before removing or inserting the 19" slide-in unit or undertaking any kind of installation or maintenance work.

Note

The level switch NRS 2-3 can only be operated and checked in combination with the level transmitter NRGT 26-1S.

Correct switchpoints

During operation you have to correct the switchpoints if the following malfunctions occur:

- Pump is switched on and off too frequently
  Increase the distance between the switchpoints PUMP ON and PUMP OFF. Turn the adjustor ⓕ to the right.
- Signal LOW LEVEL too frequently
  Raise the switchpoint PUMP ON or lower the switchpoint LOW LEVEL.
  Turn the adjustor ⓗ to the right or the adjustor ⓘ for LOW LEVEL to the left.
- Signal HIGH LEVEL too frequently
  Raise the switchpoint HIGH LEVEL or lower the switchpoint PUMP OFF.
  Turn the adjustor ⓔ to the right or the adjustor ⓕ to the left.
  If it is not possible to make this rectification install a time relay to delay the signal LOW LEVEL by 2 to 20 sec.

Check power

1. Check the measuring current coming from the level transmitter across the terminals 5(+) and 6(–) in the case of design “b” and A22/C24 in the case of design “c” and “d”.
   Measuring current: 4 to 20 mA

Operational Malfunctions

Danger

The terminal strip of the NRS 2-3 is live during operation. This presents the danger of electric shock.
Cut off power supply before inserting or removing the 19" slide-in unit and before carrying out any installation or maintenance work.

Fault finding list for troubleshooting

After applying mains voltage LEDs Ⓑ and Ⓒ do not light up

Fault: The mains voltage is not applied across the equipment.
Remedy: Apply mains voltage. Check installation of the 19" slide-in unit.

Fault: The internal fuse is defective.
Remedy: Remove the 19" slide-in unit and replace the internal fuse.

Incorrect measuring current between electrode terminal 2 and NRS terminal 5 or A22 defective

Fault: The level transmitter NRGT 26-1S is defective.
Remedy: Check level transmitter (see installation instructions NRGT 26-1S).

Level switch does not work properly despite correct measuring current

Fault: The level switch NRS 2-3 is defective.
Remedy: Replace level switch.

Annex

Declaration of conformity CE

We hereby declare that the equipment **NRS 2-3** conforms to the following European guidelines:

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

which are based on the following harmonised standards:

- LV standard EN 60947-5-1: 1991 73/23/EC version 93/68/EC
- 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 AG

i. V. U. Bledschun

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

ppa. W. Meyer

Quality Assurance Representative
Walter Meyer

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

810414-02/807cm · 1997 GESTRA AG · Bremen · Printed in Germany