



Level Transmitter

NRGT 26-2 **in Non-Standard** **Lengths**

EN
English

Original Installation &
Operating Manual

850973-00

Contents

Content of this Manual	4
Scope of delivery/Product package	4
How to use this Manual	5
Illustrations and symbols used	5
Hazard symbols in this Manual	5
Types of warning	6
Specialist terms/Abbreviations	7
Usage for the intended purpose	8
Improper use	9
Basic safety notes	9
Required personnel qualifications	10
Notes on product liability	10
Function	11
Technical data	13
Example name plate/Identification	16
Factory settings	17
Overall view of the NRGT 26-2	18
Dimensions of the NRGT 26-2	19
Preparing for installation	20
Installation	21
Installing the NRGT 26-2.....	22
Sealing surface dimensions of the NRGT 26-2	22
Example	22
Installing two level electrodes in a flange by detaching a terminal box	23
Installing two level electrodes in a flange by detaching a terminal box	24
Installing two level electrodes in a flange by detaching a terminal box	25
Installation example with dimensions for the NRGT 26-2	26
Positioning the terminal box	30
Functional elements of the NRGT 26-2	31
Electrical connection	32
Notes on electrical connection	32
Connecting the 24V DC power supply	32
Connecting the actual value output (4 – 20 mA).....	32
Pin assignment of the M12 connector for non pre-wired control cables	32

Contents

Bringing into service	33
Changing the factory settings if necessary	33
Changing parameters when password protection is enabled	33
Calibration at the lower limit of the active measuring range "CAL.L" (0% calibration value)	36
Independent rapid calibration at a water level of > 25% of the active measuring range "CAL.P"	36
Calibration at the upper limit of the active measuring range "CAL.H" (100% calibration value)	37
Setting the filter constant "Filt"	37
Manually initiating a display test	37
Viewing the software version and equipment type "InFo"	38
Enabling/disabling password protection	38
Checking the level display by raising or reducing the level	39
Checking the safety function by initiating a test function	39
Starting, operation and testing	40
System malfunctions	43
Causes	43
Indication of system malfunctions using error codes	44
Common application and usage errors	46
Checking installation and function	48
Taking out of service/Disassembly	49
Cleaning the measuring electrode of the level transmitter	50
Cleaning interval	50
Disposal	50
Returning decontaminated equipment	50
Declaration of Conformity; Standards and Directives	51

Content of this Manual

Product:

- Level transmitter NRGT 26-2 in non-standard lengths

First edition:

BAN 850973-00/07-2023cm

© Copyright

All rights reserved. Any misuse, particularly reproduction and dissemination to third parties, is not permitted. The General Terms & Conditions of GESTRA AG apply.

Scope of delivery/Product package

- 1 x level transmitter NRGT 26-2 in non-standard lengths
- 1 x sealing ring D 27 x 32, form D, DIN 7603-2.4068, bright annealed
- 1 x Installation & Operating Manual

Required accessories for NRGT 26-2 when installing for the first time

- Connecting cable, M12 A-coded, 5m, mat. no. 1508392
- Connecting cable, M12 A-coded, 10m, mat. no. 1508394
- Connecting cable, M12 A-coded, 30m, mat. no. 1508395

Optional accessories or refit

- Cable jack M12 A-coded, mat. no. 52820

How to use this Manual

This Installation & Operating Manual describes the correct use of the NRGT 26-2 level transmitter. It applies to persons who integrate this equipment into control systems, install, bring into service, operate, maintain and dispose of this equipment. Anyone carrying out the above-mentioned activities must have read this Installation & Operating Manual and understood its contents.

- Read this Manual in full and follow all instructions.
- Please also read the instructions for use of any accessories.
- The Installation & Operating Manual is part of the product package. Keep it in an easily accessible location.

Availability of this Installation & Operating Manual

- Make sure this Installation & Operating Manual is always available to the operator.
- If you pass on or sell the equipment to a third party, please also hand over the Installation & Operating Manual.

Illustrations and symbols used

1. Action to be taken

2.

- Lists
 - ◆ Bullet points in lists

A Keys to illustrations



Additional information



Read the relevant Installation & Operating Manual



Press the rotary knob

Hazard symbols in this Manual



Danger zone/Dangerous situation



Danger of death from electric shock

Types of warning

DANGER

Warning of a dangerous situation that will result in death or serious injury.

WARNING

Warning of a dangerous situation that may possibly result in death or serious injury.

CAUTION

Warning of a situation that may result in minor or moderate injury.

ATTENTION

Warning of a situation that will result in damage to property or the environment.

Specialist terms/Abbreviations

Here, we explain some abbreviations, specialist terms, etc., which are used in this Manual.

NRGT .. / NRR.. / NRS.. / URS .. / URB .. / SRL .. / etc.

Equipment and type designations of GESTRA AG.

SELV

Safety Extra Low Voltage

Operating point (of the plant)

The operating point describes the operating parameters within which a plant or boiler is operated in its nominal range. In a steam boiler, for example, these parameters would be output, pressure and temperature.

The pressure at the operating point does not have to match the design pressure, but is the same or lower.

Usage for the intended purpose

Use as a water level controller

The NRG 26-2 level transmitter can be used to continually measure the water level in steam boiler and hot-water installations, or in condensate and feedwater tanks. In the calibrated measuring range from 0% to 100%, the level transmitter makes up the linear profile of the 4 – 20 mA current output.

Influence of the monitored fluid

- The NRG 26-2 level transmitter can be used in fluids with different conductivity and in insulating fluids. However, a conductivity of less than 100 $\mu\text{S}/\text{cm}$ has a major influence on the measured capacitance, which is why it is extremely important to recalibrate the measuring range at the operating point* when bringing into service, see page 36.

* *Operating point of the plant, see page 7.*

- To achieve the best possible reproducibility and maintain high-quality measurements (see “Technical data” on page 13), the sensor must be installed in a protective tube (see “Installation example with dimensions for the NRG 26-2” on page 26 ff.).
- The dielectric constant of the monitored fluid may require an adjustment to the measurement frequency, if it deviates significantly from that of the usual water ($\epsilon_r = 80$). To do this, please contact GESTRA AG Service.

Systems without SIL rating

In systems without a SIL rating, any controller, display unit or diagnostic tester with an input for a standard 4 – 20 mA signal can be connected.



To ensure the proper use of equipment during all types of use, please also read the Installation & Operating Manuals for the system components used.

- You can find the latest Installation & Operating Manuals for other system components on our website:
www.gestra.com
-

Improper use



There is a danger of death due to explosion if the equipment is used in potentially explosive atmospheres.

Do not use the equipment in potentially explosive atmospheres.



Do not bring any equipment into service that does not have its own specific name plate.

The name plate indicates the technical features of the equipment.

Basic safety notes



Danger to life from scalding if the level electrode is removed under pressure. Steam or hot water can spurt forcefully out of the equipment.

- Only remove the level electrode at **0 bar boiler pressure**.



Risk of severe burns if work is performed on a level electrode that has not been allowed to cool down. The level electrode becomes very hot during operation.

- Always allow the level electrode to cool.
- Perform all installation and maintenance work only when the level electrode has been allowed to cool down.



There is a risk of electric shock during work on electrical systems.

- Always switch off the voltage to the plant before performing connection work.
- Check that the plant is not carrying live voltage before commencing work.



Danger to life from a faulty NRGT 26-2 level electrode due to the sudden escape of hot steam or hot water.

Shocks and impacts during transport or installation can result in damage to or leaks in the level electrode, causing pressurised hot steam or hot water to escape through the pressure relief hole.

- To prevent damage during transport and installation, do not expose the electrode rod to major shocks or impacts.
- Before and after installation, check that the level electrode is completely undamaged and do not install any damaged components.
- Check that the level electrode is not leaking when bringing into service.



Attempts to repair the equipment will cause the plant to become unsafe.

- The NRGT 26-2 level electrode may only be repaired by the manufacturer, GESTRA AG.
- Only replace faulty equipment with identical equipment from GESTRA AG.

Required personnel qualifications

Activity	Personnel	
Integration in control system	Specialist staff	Plant designer
Installation/electrical connection/ bringing into service	Specialist staff	The unit is an item of equipment with a safety function (EU Pressure Equipment Directive) and may only be installed, electrically connected and brought into service by suitable, trained staff.
Operation	Boiler service technician	Staff trained by the plant operator.
Maintenance work	Specialist staff	Maintenance and refits may only be performed by authorised staff who have undergone specific training.
Refits	Specialist staff	Persons trained by the plant operator to work with pressure and temperature.

Fig. 1

Notes on product liability

We the manufacturer cannot accept any liability for damages resulting from improper use of the equipment.

Function

Measuring process

The NRG2 26-2 level transmitter uses the capacitance measurement principle and converts level data into a level-dependent 4 – 20 mA current signal. The 0 – 100% measuring range can be scaled by modifying the effective length of the electrode rod.

Transmitter function

The transmitter function is the ability of the electrode to provide a scalable measuring range on the 4 – 20 mA current output interface and to make this available to one or more recipients for analysis.

Level transmitters do not have any controlling or limiting functions.

The level transmitters are installed on the inside of steam boilers, tanks or feed lines of hot-water installations. A protective tube provided on site keeps them functioning reliably (see page 26 “Installation examples”).

Automatic self-test

An automatic self-test periodically monitors the safety and function of the level transmitters and measured value acquisition.

Faults in the electrical connection or electronic measuring equipment trigger an error message on the display, and the current output is set to 0 mA.

Operation in external level pots

If a level transmitter is installed outside the boiler in a level pot that can be shut off, the connecting pipes must be flushed regularly.

If the steam pipe is ≥ 40 mm and the water pipe is ≥ 100 mm, installation is regarded as internal. In this case, upstream monitoring of flushing processes is not required.

Indications and signals, see page 40 / 43 *

The NRG2 26-2 level transmitter features a green 4-digit, 7-segment display for showing readings, status information and error codes. The operating status is indicated by a red and green LED.

Function

Behaviour when switched on *

The display alternately shows the software version, the type and then the scaled level reading.

Behaviour in normal operation (no faults) *

The display shows the scaled level reading (3 digits + 1 decimal place), e.g. 050.3, and converts the level data into a level-dependent current signal from 4 – 20 mA.



The scale of the 0 – 100% measuring range is factory-set to maximum for the electrode length used. Adjustment under operating conditions is essential and must be performed when bringing into service.

Adjusting the measuring range when bringing into service

When bringing into service, the measuring range must be adapted to the sight glass level (on the steam boiler), see page 36 - 37.

Behaviour in the event of faults *

The error state or malfunction is shown continuously on the display by an error code, e.g. E.005 (for error codes, see pages 44 - 45).

Every time there is a fault, 0 mA is output via the current output.



Faults are displayed based on their priority. Indications with higher priority are shown continuously before those with low priority. If several indications need attention, the display does not alternate between them.



Electrode faults cannot be acknowledged.

When the fault is corrected, the message disappears from the display and the NRGT 26-2 level transmitter returns to normal operation.



* The tables on pages 41 - 42 clearly show the relationship between the equipment status, the display and the status LE DS.

Setting parameters and changing factory settings

If necessary, you can adapt the electrode parameters to suit conditions at the plant. You can set parameters and change factory settings using a rotary knob on the terminal box, see page 34 ff.

Technical data

Model and mechanical connection

- NRGT 26-2 Thread G $\frac{3}{4}$ A, EN ISO 228-1, see Fig. 5

Nominal pressure rating, admissible service pressure and temperature

- NRGT 26-2 PN 40 32 bar (abs) at 238 °C

Materials

- Terminal box 3.2581 G AISi12, powder-coated
- Cover tube 1.4301 X5 CrNi 18-10
- Electrode rod insulation PTFE
- Screw-in body 1.4571, X6CrNiMoTi17-12-2

Max. installed length at 238 °C, all measurements in mm

- NRGT 26-2

Max. installed length:	2260	2365	2470	2575	2680
Measuring range:	2100	2200	2300	2400	2500



Do **not shorten** the electrode rod.

Technical data

Measurement quality

The information below applies to a compensated fluid conductivity range from 0.5 – 10000 $\mu\text{S}/\text{cm}$ based on 25 °C.

- | | |
|---------------------------------------|--|
| ■ Reading error: | $\pm 1\%$ of set measuring range at the operating point |
| ■ Resolution of reading on display: | 0.1% |
| ■ Resolution for internal processing: | 15 bit |
| ■ Resolution of 4 – 20 mA output: | 15 bit |
| ■ Sensitivity (minimum conductivity) | |
| ◆ Water | $\geq 0.5 \mu\text{S}/\text{cm}$ (see page 8 “Influence of the fluid to be monitored”) |

Supply voltage

- 24 V DC $\pm 20\%$

Power consumption

- Max. 7 W

Current input

- Max. 0.3 A

Internal fuse

- T2A

Safety cutout at excessive temperature

- Cutout occurs when an excessive temperature of 75 °C is measured in the electrode tip

Analogue output

- 1 x actual value output 4 – 20 mA, proportional to level, galvanically isolated
- Maximum output load 500 Ω
- M12 connector, 5-pole, A-coded

Indicators and controls

- 1 x green 4-digit, 7-segment display for showing status information
- 1 x red LED for indicating an error state
- 1 x green LED for indicating OK
- 1 x rotary knob IP65 with button for menu navigation and test function

Protection class

- III Safety Extra Low Voltage (SELV)

IP rating to EN 60529

- IP 65

Technical data

Admissible ambient conditions

- Service temperature: 0 °C – 70 °C
- Storage temperature: -40 °C – 80 °C
- Transport temperature: -40 °C – 80 °C
- Air humidity: 10% – 95% non-condensing

Weight (dependent on length of electrode)

- NRG T 26-2 approx. 2.9 kg (with 2100 mm measuring range)

Admissible installation positions

- Vertical

Example name plate/Identification











 Betriebsanleitung beachten! See installation instruction!	
 Vor dem Öffnen des Deckels Gerät freischalten! Before removing cover isolate from power supplies!	
1	
2	
3	
4	5 6 7
	bar (psi) 8 °C (°F)  Tamb = T °C (°F)
9	10
L/H= 11	
ppm	µS/cm
12	
15	    16
17	GESTRA AG Münchener Str. 77 28215 Bremen Made in Germany 
18	
19	 12345678-12345678

Fig. 2

- 1 Safety note
- 2 Equipment designation
- 3 Equipment function
- 4 Nominal pressure rating
- 5 Connection thread
- 6 Screw-in body material
- 7 IP rating
- 8 Maximum pressure and temperature ratings
- 9 Supply voltage
- 10 Power consumption
- 11 Measuring range
- 12 Actual value output
- 15 Mark of conformity
- 16 Disposal information
- 17 Manufacturer
- 18 Protection class
- 19 Material number + serial number



The date of production (quarter and year) is stamped on the screw-in body of the level transmitter.

Factory settings

The NRGT 26-2 level transmitter has the following factory settings:

Menu display	Parameter values	Unit	
CAL.L	variable	0%	Raw value (hex) approx. 50 mV
CAL.P	variable	25%	Raw value (hex)
CAL.H	variable	100%	Raw value (hex) approx. 2.0 V
FiLt	0005	Seconds	
PW	oFF	- - -	

Fig. 3

Overall view of the NRG2 26-2

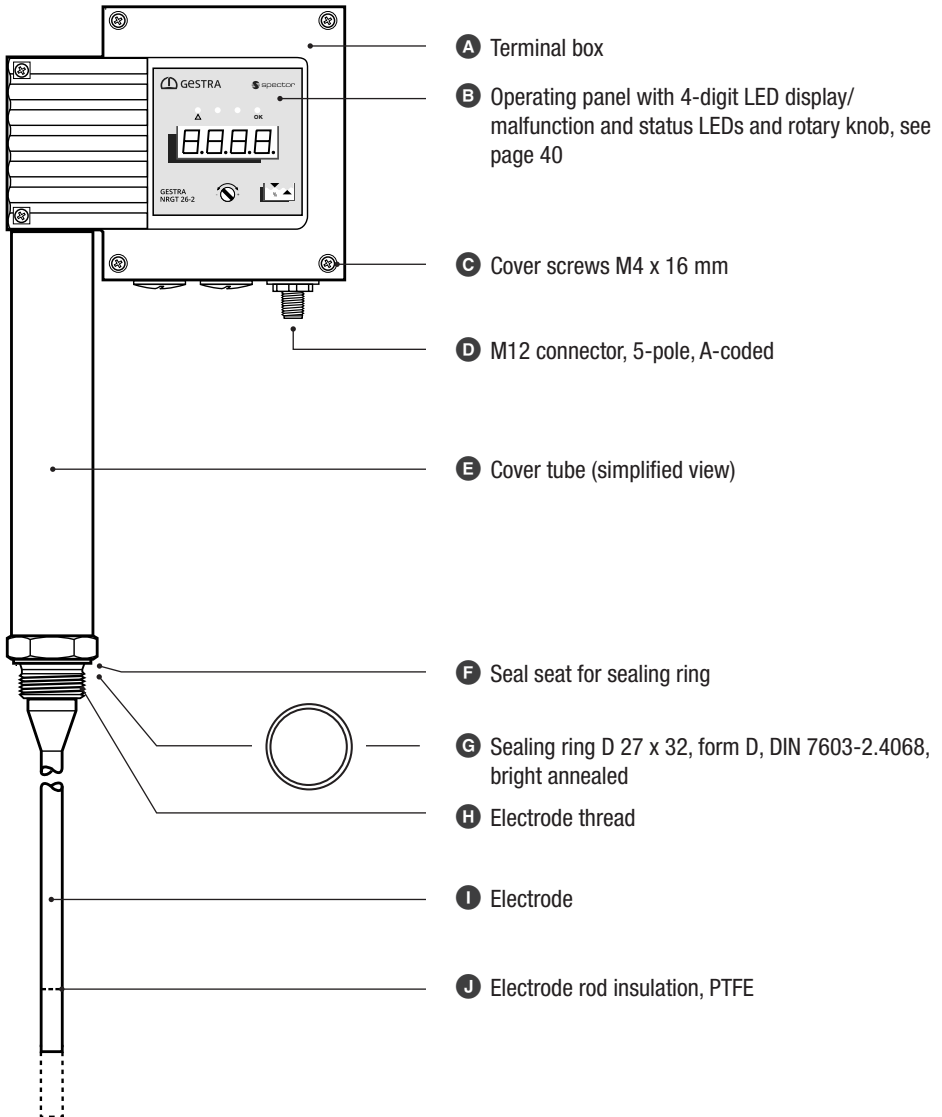


Fig. 4

Dimensions of the NRG2 26-2

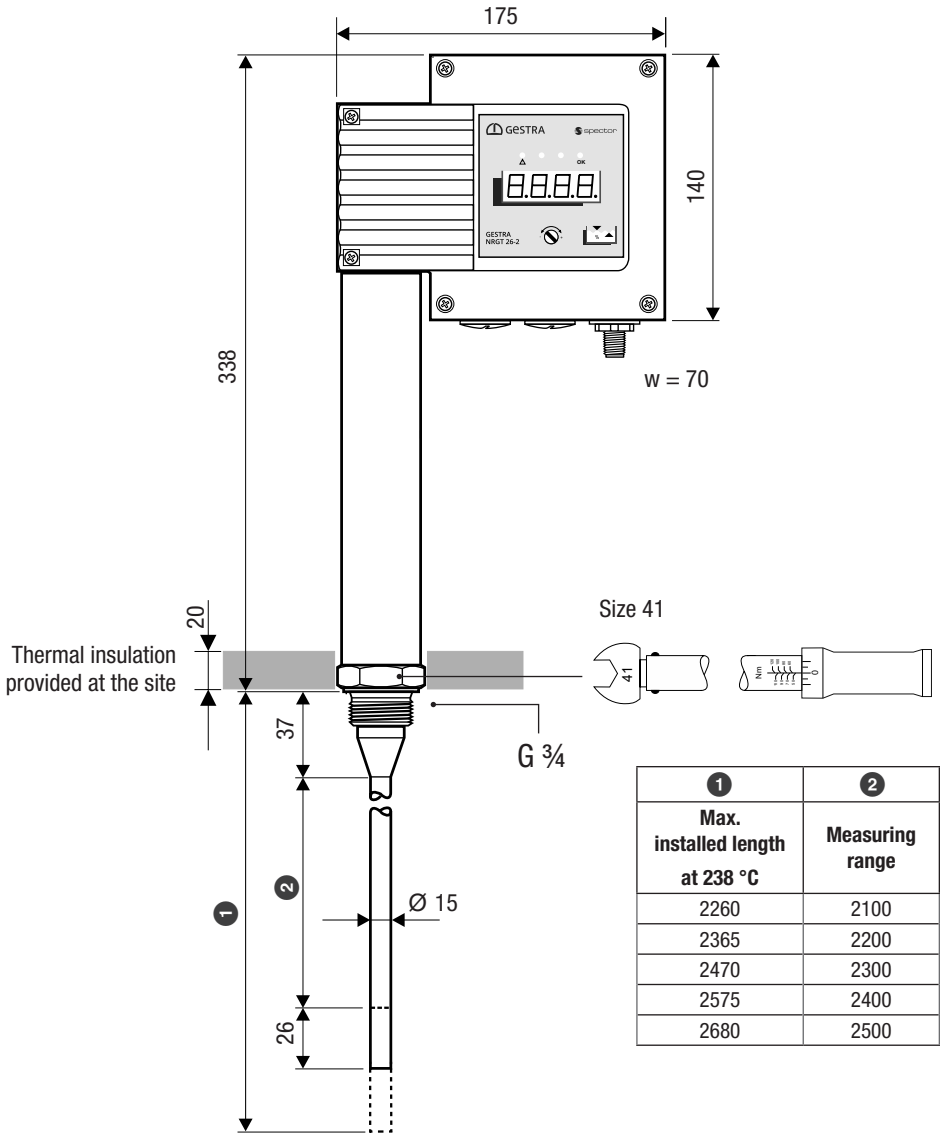


Fig. 5 All lengths and diameters in mm

Preparing for installation



If the equipment is to be installed outdoors, outside the protection of a building, environmental influences may adversely affect function.

- Pay attention to the admissible ambient conditions in the technical data, see page 15.
 - Do not operate the equipment if the temperature is below freezing.
 - ◆ At temperatures below freezing, use a suitable heat source (e.g. control cabinet heater, etc.).
 - Connect all plant parts to a central earthing point to prevent equalisation currents in the shielding.
 - Use a cover to protect the equipment from direct sunlight, condensation and heavy rain.
 - Use UV-resistant cable ducts for routing the connecting cable.
 - Take further measures to protect from harmful environmental influences such as lightning, insects and animals, and salty air.
-

You will need the following tools:

NRGT 26-2

- Torque wrench (with size 41 open-ended spanner attachment), see page 19.

Installation

DANGER



Danger to life from scalding caused by escaping hot steam.

Hot steam or water can escape suddenly if level electrodes are when unscrewed under pressure.

- Reduce the boiler pressure to 0 bar and check the boiler pressure before you unscrew the level electrode.
- Only remove the level electrode at a boiler pressure of 0 bar.

WARNING



The hot level electrode can cause severe burns.

The level electrode becomes very hot during operation.

- Always let the level electrode cool down before performing installation and maintenance work.
- Only remove level electrodes that have cooled down.

ATTENTION



Incorrect installation can lead to malfunctions in the plant or the level electrode.

- Inspect the sealing surfaces of the tank threaded standpipe or flange cover to ensure they are perfectly machined, see Fig. 6.
- Do not shorten the electrode rod or protective tube*.
- Take care not to bend the level electrode during installation!
- Do not expose the electrode rod to hard impacts.
- Do **not** install the terminal box **A** / **A1** or the upper part of the cover tube **E** / **E1** of the measuring electrode in the thermal insulation of the boiler!
- Pay attention to the minimum clearances when installing the level electrode, see installation examples Fig. 9 to Fig. 12.
- To prevent current leaks, maintain a minimum distance of 14 mm between the electrode and earth (flange or tank wall).
- Check the boiler standpipe and flange during the preliminary boiler inspection.

Installation

Installing the NRG T 26-2

1. Inspect the sealing surfaces of the tank threaded standpipe or flange cover.

Sealing surfaces must be perfectly machined, as shown in Fig. 6.

Sealing surface dimensions of the NRG T 26-2

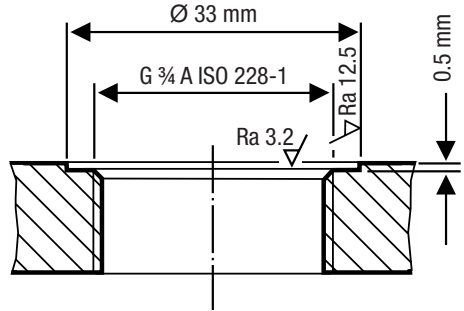


Fig. 6

2. Push the supplied sealing ring **G** onto the seal seat **F** of the electrode, or lay it on the sealing surface of the flange.

DANGER



Danger to life from escaping hot steam if incorrect or defective seals are used.

- Only use the supplied sealing ring for sealing the electrode thread **H**.
- ◆ **Sealing ring D 27 x 32**
DIN 7603-2.4068, bright annealed

Prohibited seal materials:

- Hemp, PTFE tape
- Conductive pastes

Example

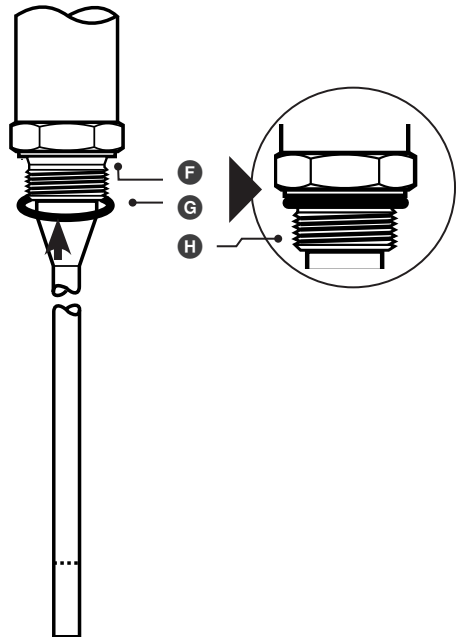



Fig. 7

Installation

3. If necessary, apply a small quantity of silicone grease (e.g. Molykote® P40) to the electrode thread .
4. Screw the NRGT 26-2 level electrode into the tank standpipe or flange cover, and tighten securely using a torque wrench (with size 41 open-ended spanner attachment).
Tighten to the torques stated below.

Tightening torque when cold:

- NRGT 26-2 = 160 Nm

Installation example with dimensions, see Fig. 9, page 26

Installing two level electrodes in a flange by detaching a terminal box

When installing or removing the level electrode (e.g. when installing for the first time, during annual cleaning/maintenance or when taking out of service), you may need to completely detach the terminal box from the electrode because of space issues.



A self-locking nut connects the terminal box to the electrode. Therefore, before establishing the electrical connection, you can rotate the terminal box max. $\pm 180^\circ$ (a half turn) in the desired direction. This is often sufficient for alignment.

If, and only if, this option is not sufficient, completely detach the terminal box from the electrode and fit it again later on (see steps below).

ATTENTION



Incorrect installation can lead to malfunctions in the plant or the level electrode.

The steps below must be carried out exclusively by the manufacturer's service personnel or a specialist expressly authorised by the manufacturer to perform this work.



Avoid open circuits or damaging terminals and a subsequent short circuit

- When screwing the level electrode into or out of the standpipe, take care not to twist or trap the connecting cables from the electrode to the terminal box!
- Therefore, detach all connecting cables from the electrode to the terminal box before unscrewing the level electrode from the standpipe.

Installation

Installing two level electrodes in a flange by detaching a terminal box

1. Fit the **first** electrode as described above.
2. Detach and remove the rear body panel of the **second electrode** opposite the operating unit.

Interior view of terminal box:

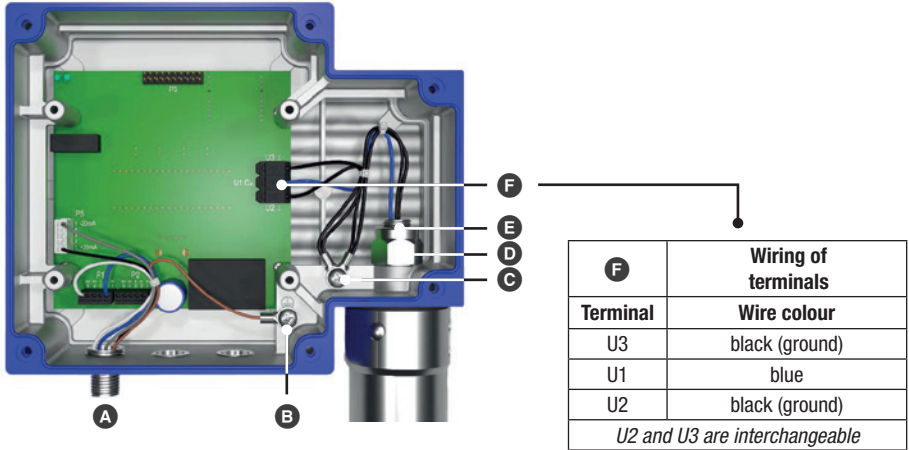


Fig. 8

Key:

- Ⓐ M12 connector
- Ⓑ Ring cable lug no. 2
- Ⓒ Ring cable lug no. 1
- Ⓓ Self-locking nut (size 19)
- Ⓔ Feed-through of connecting cable to electrode
- Ⓕ Terminals
U1 (middle) / U2 (bottom) / U3 (top)

3. Detach the electrode connecting cables from the PCB:
 - Detach the ring cable lug Ⓒ from the terminal box
 - Detach the connecting cables from the terminals Ⓕ
4. Slacken the fixing nut Ⓓ in the terminal box of the **second electrode** using a size 19 open-ended spanner.
5. You can now remove the terminal box or screw it onto the electrode.
When fully removing the terminal box, feed all detached connecting cables through the unscrewed nut and the hole in the terminal box.
6. Install the **second electrode** in the flange.
7. Next, route all connecting cables through the hole in the terminal box and the nut once again.

Installation

Installing two level electrodes in a flange by detaching a terminal box

8. Place the terminal box back on the electrode with the correct orientation.



Ensure the terminal box is correctly orientated/aligned – position it correctly in advance.

9. Tighten the nut in the terminal box to a torque of 25 Nm.

10. Reconnect the electrode wiring to the PCB, see table in **Fig. 8**.

Tie connecting cables together in the terminal box with cable ties, if necessary.

11. Finally, check the wiring one more time.

12. Close the rear panel of the terminal box of the second electrode and screw back on.

Installation example with dimensions, see Fig. 11, page 28

Installation example with dimensions for the NRG 26-2

Protective tube (provided by the customer) for internal installation

Illustration not to scale.

Key, see page 30

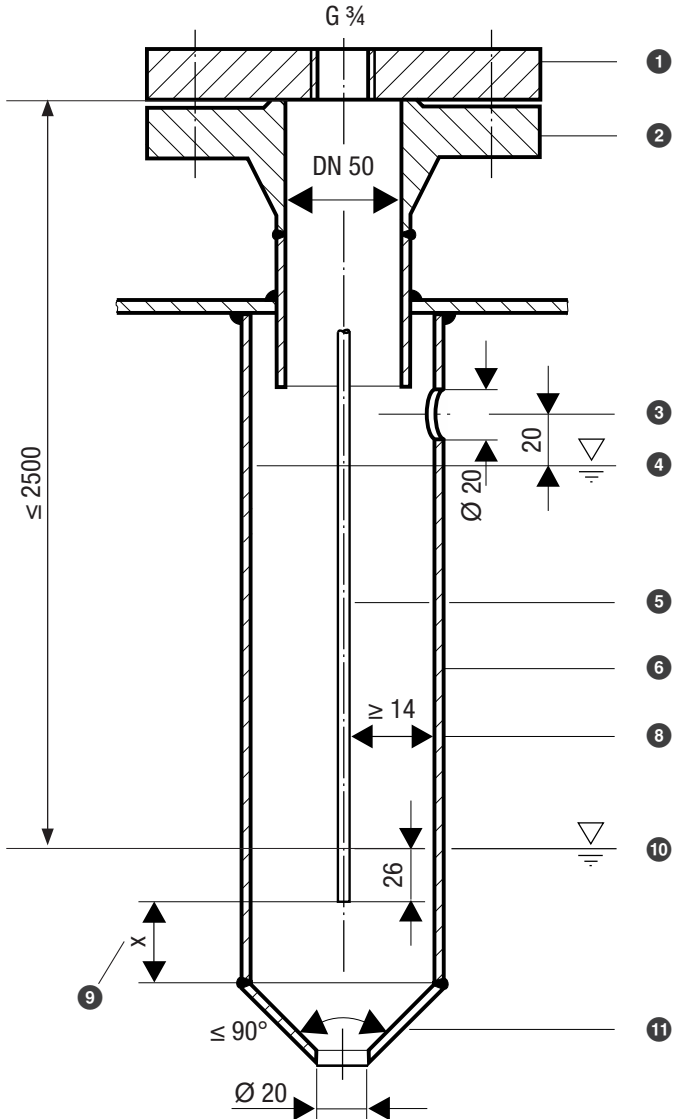


Fig. 9

All lengths and diameters in mm

Installation example with dimensions for the NRG 26-2

Protective tube (provided by the customer) for internal installation, combined with other equipment from GESTRA AG.

Illustration not to scale.

Key, see page 30

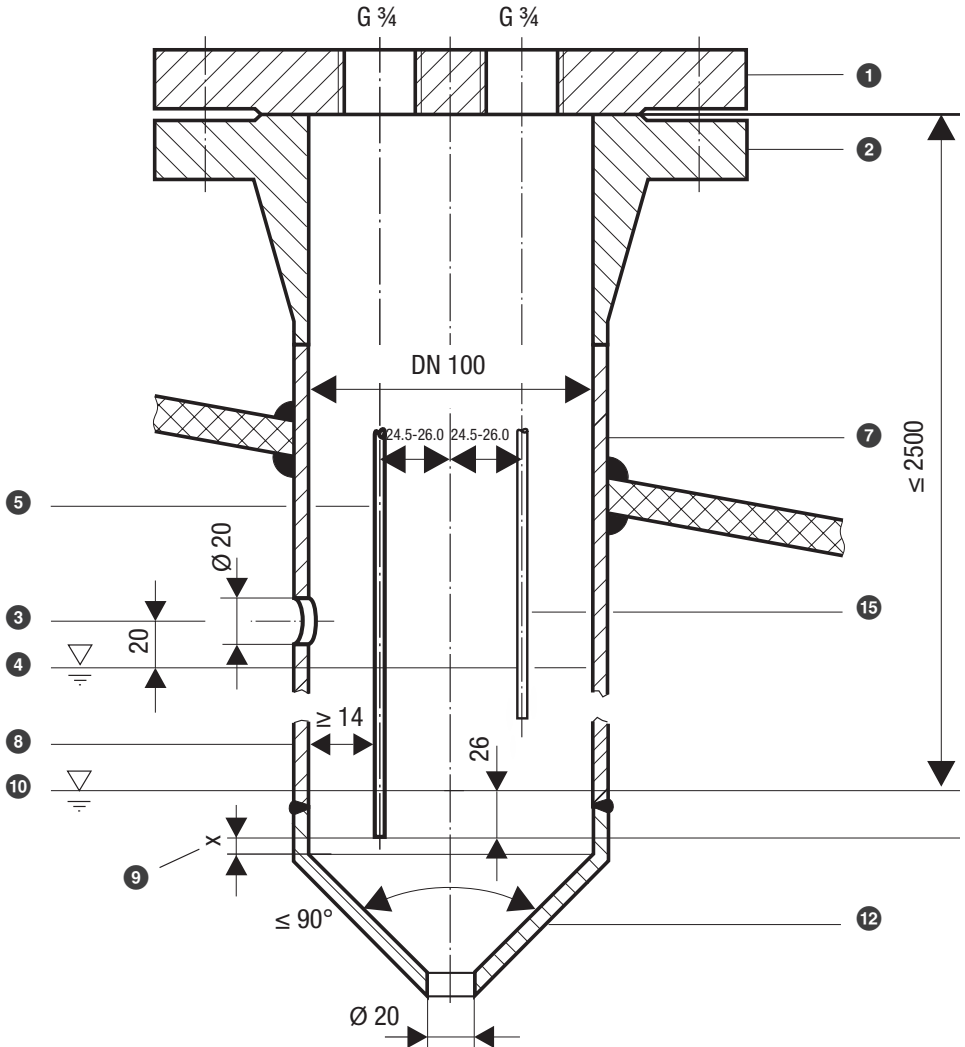


Fig. 11

All lengths and diameters in mm

Installation example with dimensions for the NRG2 26-2

Level pot (\geq DN 80) for external use.

Illustration not to scale.

Key, see page 30

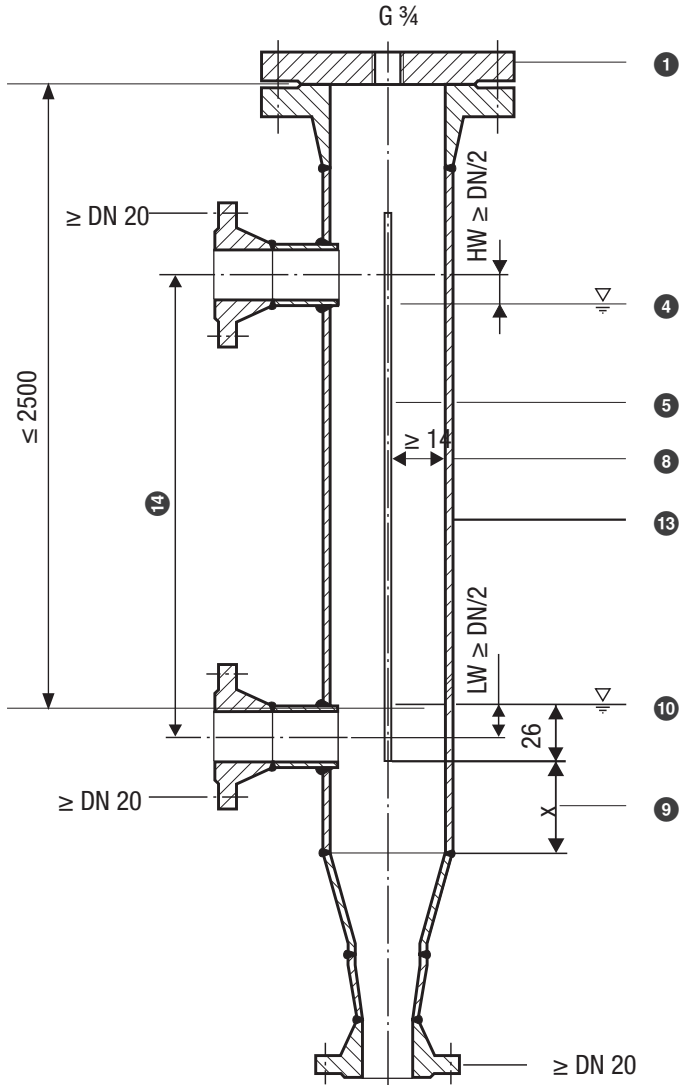


Fig. 12

All lengths and diameters in mm

Installation example with dimensions for the NRGT 26-2

Key Fig. 9 to Fig. 12

- 1 Fig. 9, 13: Flange (PN 40, DN 50) EN 1092-1 (single electrode)
Fig. 12: Flange (PN 40, \geq DN 80) EN 1092-1 (single electrode)
Fig. 11: Flange (PN 40, DN 100) EN 1092-1 (two electrodes installed in one flange)
- 2 Coupling in connecting flange (perform preliminary inspection of coupling during boiler inspection)
- 3 Pressure relief hole \varnothing 20 mm
- 4 Highest possible HW mark
- 5 Electrode rod (NRGT 26-2 maximum measuring range 2500 mm)
- 6 Protective tube DN 80 (\geq DN 100 in France as per AFAQ)
- 7 Protective tube DN 100
- 8 Distance between electrode rod and protective tube \geq 14 mm
- 9 Minimum dimension (x) = 10 mm below maximum installed length
(for installed length, see page 19)
- 10 Lowest possible LW mark (end of measuring range)
- 11 Reducer EN 10253-2, K-88.9 x 3.2 – 42.4 x 2.6 W
- 12 Reducer EN 10253-2, K-114.3 x 3.6 – 48.3 x 2.9 W
- 13 Level pot \geq DN 80
- 14 Centre distance of coupling
- 15 Additional electrode

Positioning the terminal box

If necessary, you can orientate the display in the desired direction by rotating the terminal box.

ATTENTION



Rotating the terminal box $\geq 180^\circ$ will damage the internal wiring of the NRGT 26-2 level transmitter.

- Never rotate the terminal box more than 180 degrees in either direction.



If the terminal box needs to be rotated by $>180^\circ$ or fully removed, proceed as described on pages 23 to 25.

Functional elements of the NRG2 26-2

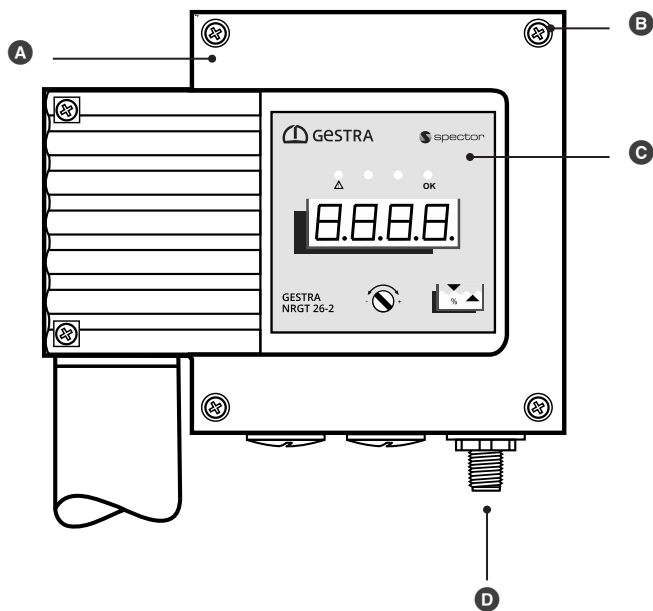


Fig. 13

Example
NRG2 26-2

- A** Terminal box
- B** Cover screws M4 x 16 mm
- C** Operating panel with 4-digit LED display/malfunction and status LEDs and rotary knob, see page 40
- D** M12 connector, 5-pole, A-coded

Electrical connection

Notes on electrical connection

- Use a shielded, multi-core control cable with a minimum conductor size of 0.5 mm², e.g. LiYCY 5 x 0.5 mm².
- Pre-wired control cables (with plug and coupling) are available as accessories in various lengths.

Connecting the 24V DC power supply

- The NRG 26-2 level transmitter is supplied with 24 V DC.
- A safety power supply unit that delivers a Safety Extra Low Voltage (SELV) and is isolated from connected loads must be used to supply the equipment with 24 V DC.

Connecting the actual value output (4 – 20 mA)

- Please note the maximum output load of 500 Ω.
- Maximum cable length = 100 m.

Pin assignment of the M12 connector for non pre-wired control cables

If non pre-wired control cables are used, you must wire the cable to match the pin assignment of the M12 connector.

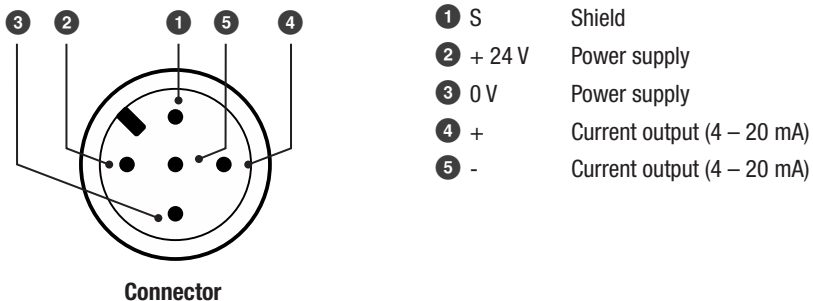


Fig. 14

Bringing into service

- Before bringing into service, check that the level transmitter is correctly connected.
- Next, switch on the supply voltage.

Changing the factory settings if necessary

You will need the following tools

- Size 2.5 slotted screwdriver

Notes for bringing into service for the first time



When the equipment is brought into service for the first time, the scale of the 0 – 100% measuring range is factory-set to maximum for the electrode length used.

After installation, set the measuring range to suitable values for your specific plant.

Changing parameters when password protection is enabled



When password protection is enabled, you must enter the password before you can change parameters, see page 34. Password protection applies only to the menu items with parameters that the user can actually change.



Menu items that can only display values (i.e. not parameters) are not covered by password protection. You can always request this information if necessary.

Password protection after restarting the equipment




Parameters are also password-protected when the equipment has been restarted, if password protection was previously enabled, see page 38.

Default ex-works password

The default password is “**1902**” and cannot be changed. Password protection is available from software version S-16 onwards.

Bringing into service

Selecting and setting a parameter:

-  Using the screwdriver, turn the rotary knob clockwise or anti-clockwise until the desired parameter appears on the display. The set value is displayed after approx. 3 seconds.

The display alternates between the set parameter and its actual value, e.g. FilT → “value” → FilT.


When you turn the knob clockwise, the following parameters are shown in turn:

“Actual value” → °C.in → CAL.L → CAL.P → CAL.H → FilT → diSP
→
InFo → PW → “Actual value”





Key to parameters, see page 35.



If you do not enter anything for 30 seconds, the display automatically returns to the actual value.


-  Once you have selected a parameter, press and hold the rotary knob until:
 - “PASS” appears on the display, prompting you to enter a password; move on to step 3.**or (if password protection is disabled)**
 - the current parameter value flashes on the display; move on to step 8.

With password entry:

3. Release the rotary knob.
4.  Next, press and hold the rotary knob until “0000” appears on the display and the right-hand digit flashes.
5.  Enter the password “1902”. By pressing the rotary knob briefly, you can skip to the next flashing digit.
- / + reduce/increase the value.
6.  After the final digit, press and hold the rotary knob until “donE” is displayed. The display then alternates between the selected parameter and its current value.
7.  Keep pressing the rotary knob until the current parameter value flashes on the display. Move on to step 8.

Bringing into service

Without password entry:


8.  Set the desired value.
- / + reduce/increase the value

Each parameter has an individual, admissible value range.

By pressing the knob briefly, you can skip to the next digit. This is a more convenient way of making large changes to values.



If you do not set a parameter within 10 seconds, the process is aborted (“quit”) and the old parameter value is retained.

9.  Save your settings by pressing and holding the rotary knob for approx. 1 second.
The message “done” is shown and the parameter appears on the display once more.

Pay attention to the time limit for password entry



Disabled password protection is re-enabled after 30 minutes without any activity (rotary knob) and the password must then be entered again.

Key to parameters:

- 099.9 = actual value display, the current measured level based on 0 – 100% calibration
- °C.in = display ambient temperature of terminal box
- CAL.L = calibrate start of measuring range to 0%
- CAL.P = calibrate measuring range to an intermediate value above 25% (alternative to CAL.H)
- CAL.H = calibrate end of measuring range to 100%
- Filt = filter constant
- diSP = initiate a display test
- InFo = show software version and equipment type
- PW = enable/disable password protection

Bringing into service

Notes on calibration



Always perform calibration with the boiler fluid at the operating point

If you set the measuring range while the fluid is cold, the settings will change on exposure to heat and the set measuring range then need to be corrected at the operating point.

Calibration at the lower limit of the active measuring range “CAL.L” (0% calibration value)



Bring the level to 0% and perform calibration.

Pay attention to the setting instructions on page 34 and proceed as follows:

1. Reduce the level of water in the boiler to the 0% limit of the desired measuring range.
2. Select the parameter “**CAL.L**”. After approx. 3 seconds, the old value is shown as a hexadecimal display.
3. Press and hold the rotary knob until the new value is displayed.
4. Save your setting by pressing and holding the rotary knob for approx. 1 second.
5. Continue with calibration “**CAL.P**” or “**CAL.H**”.

Independent rapid calibration at a water level of > 25% of the active measuring range “CAL.P”



This parameter enables partial filling of the boiler, as an alternative to complete filling. The value set for partial filling is extrapolated to 100% of the boiler level.

Pay attention to the setting instructions on page 34 and proceed as follows:

1. Increase the level of water in the boiler to > 25% of the desired measuring range.
2. Select the parameter “**CAL.P**”. After approx. 3 seconds, the old value is shown as a hexadecimal display.
3. Press and hold the rotary knob until the value (e.g. 0025) appears. The last digit flashes.
4. Set the desired reading to > 25% to match the set level.
5. Save your setting by pressing and holding the rotary knob for approx. 1 second.

Bringing into service

Calibration at the upper limit of the active measuring range "CAL.H" (100% calibration value)



Calibration with "CAL.H" ensures the best possible accuracy for setting the measuring range.

Pay attention to the setting instructions on page 34 and proceed as follows:

1. Increase the level of water in the boiler to the 100% limit of the desired measuring range.
2. Select the parameter "**CAL.H**". After approx. 3 seconds, the old value is shown as a hexadecimal display.
3. Press and hold the rotary knob until the new value is displayed.
4. Save your setting by pressing and holding the rotary knob for approx. 1 second.

Setting the filter constant "Filt"



Here, you can set a damping time constant to smooth the output signal for the level controller and the display.

Pay attention to the setting instructions on page 34 and proceed as follows:

1. Select the parameter "**Filt**". First of all, the current filter constant is displayed.
2. Press and hold the rotary knob until the current time constant flashes on the display.
3. Set the desired time constant (1 to 30 seconds).
4. Save your setting by pressing and holding the rotary knob for approx. 1 second.

Manually initiating a display test

Pay attention to the setting instructions on page 34 and proceed as follows:

1. Select the parameter "**diSP**".
2. Press and hold the rotary knob until the display test starts and shows "....".
3. The following numbers and decimal points run across the display from right to left: "...., 1, 2, 3, 4, 5, 6, 7, 8, 9,"
4. Check that all numbers and decimal points are displayed correctly.
The display test runs automatically until it has finished, and cannot be interrupted.
5. The display test ends with "**donE**".

Replacing faulty equipment



Faulty equipment jeopardises plant safety.

- If numbers or decimal points are displayed incorrectly or not at all, you must replace the level transmitter with an identical one from GESTRA AG.

Bringing into service

Viewing the software version and equipment type "InFo"

Pay attention to the setting instructions on page 34 and proceed as follows:

1. Select the parameter "**InFo**".
2. The display shows the software version "**S-xx**" alternating with "**InFo**".

Then view the equipment type (see 3. and 4.) or exit the menu (see 5.):

3. Press and hold the rotary knob until the software version is continuously displayed.
4. Turn the rotary knob clockwise or anti-clockwise to view the equipment type.
5. You can exit the menu by pressing and holding (message "**donE**") or by waiting (message "**quit**").

Enabling/disabling password protection

The default ex-works password cannot be changed

- The default password is "**1902**".
- Password protection is available from software version S-16 onwards.

Pay attention to the setting instructions on page 34 and proceed as follows:

1. Select the parameter "**PW**".
"**PW**" alternates with the current status, e.g. "**oFF** or **on**" on the display.
2. Press and hold the rotary knob until "**PASS**" is displayed.
3. Release the rotary knob.
4. Next, press the rotary knob until "**0000**" appears and the right-hand digit flashes.
5. Enter the password "**1902**". By pressing the rotary knob briefly, you can skip to the next flashing digit.
6. After the final digit, press and hold the rotary knob until "**donE**" is displayed.

The following may appear on the display:

- **donE** the correct password was entered
 - **FAiL** the wrong password was entered
 - **quit** timeout. Password entry was aborted.
7. Release the rotary knob.
"**PW**" alternates with the current status, e.g. "**oFF** or **on**" on the display.
 8. Press the rotary knob again until "**oFF** or **on**" flashes on the display.
 9. Turn the rotary knob and set the desired status.
 - **on** = password protection is enabled
 - **oFF** = password protection is disabled
 10. Press and hold the rotary knob until "**donE**" is displayed.

Bringing into service

11. Release the rotary knob.

“PW” alternates with the set status, e.g. “**off** or **on**” on the display.

12. You can exit the menu by waiting (message “**quit**”) or by turning the rotary knob to the actual value.

Checking the level display by raising or reducing the level

ATTENTION



Incorrectly installed or bent level electrodes result in a loss of function that can jeopardise plant safety.

Therefore, proceed as follows when bringing into service and when replacing level electrodes:

- Check the level display by raising and lowering the fluid to different levels within the measuring range of the level electrode. Always perform this check with the plant at its operating point.
- Never start up any plant that has not passed the above tests.
- NRGT 26-2 level transmitters may only be repaired by the manufacturer, GESTRA AG.
- Only replace faulty equipment with identical equipment from GESTRA AG.

Checking the safety function by initiating a test function

Check the safety function by initiating the test function with the rotary knob, see page 42, Test table.

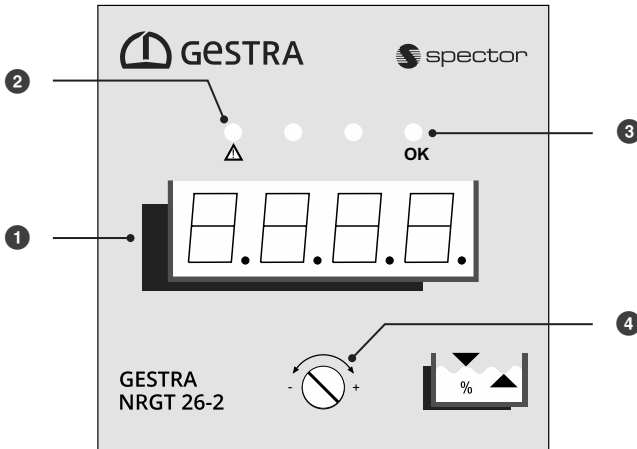


Fig. 15

Example NRGT 26-2

The operating panel:

- ① Actual value display/error code/limit value, green, 4 digits
- ② LED 1, fault, red
- ③ LED 2, function OK, green
- ④ Rotary knob for operation and settings

Notes on the priority of the various indications



Fault indications are displayed based on their priority. Indications with higher priority are shown continuously before those with low priority. If several indications need attention, the display does not alternate between them.

Priority of error code display

Higher priority error codes overwrite lower priority ones on the display! See page 44 ff. for fault indications and the error code table.

Starting, operation and testing

Relationship between the display and LEDs showing the operating state of the level transmitter:

Starting		
Switch on supply voltage	All LEDs light up - Test Indication: S-xx = software version t-08 = equipment type NRG T 26-2	The system is started and tested. The LEDs and display are tested.

Normal operation		
The electrode rod is immersed within the set measuring range	Indication: e.g. 047.3 LED 2: Operating LED lights up green	Displays the current level as % of the calibrated measuring range.

See the following pages for more information and tables.

Behaviour in the event of a malfunction (error code display)		
On the occurrence of a fault	Indication: e.g. E005	An error code is displayed continuously, error codes see page 44
	LED 1: Fault LED lights up red	A fault indication is active
	LED 2: Operating LED is OFF	A fault is present
<ul style="list-style-type: none"> ■ In the event of a fault or error state, an analogue value of 0 mA is displayed. 		



Electrode faults cannot be acknowledged.

When a fault is corrected, the message disappears from the display, and the level transmitter returns to normal operation.

Starting, operation and testing



When password protection is enabled, you must enter the password before you can change parameters.

Testing		
Checking the safety function via simulation in operating mode		
<p>In operating mode: Press the rotary knob on the NRGT 26-2 and hold until the end of the test: The test function of the equipment toggles the output between levels 0% and 100% and the actual value output delivers the corresponding signal, 4 mA or 20 mA.</p>	<p>Indication: 0000 (%) or 0100 (%)</p>	<p>The test simulates water falling below the LW mark or rising above the HW mark. The simulated reading is displayed for each test.</p>
	<p>LED 2: Operating LED lights up green</p>	<p>Test function is active</p>
	<p>LED 1: Fault LED is OFF</p>	<p>No fault</p>
	<ul style="list-style-type: none"> ■ The secure current output can be simulated and tested ■ When the rotary knob is released, the test ends ■ A test cycle (bringing the system to 100%, actual value and 0%) takes approx. 3 s. This cycle time may be longer if internal test functions are running at the same time. 	



Faulty equipment jeopardises plant safety.

- If the level transmitter does not behave as described above, the equipment may be faulty.
- Perform failure analysis.
- The NRGT 26-2 level transmitter may only be repaired by the manufacturer, GESTRA AG.
- Only replace faulty equipment with identical equipment from GESTRA AG.

System malfunctions

Causes

System malfunctions occur as the result of incorrect installation, overheating of equipment, radiated interference to the supply network, or faulty electronic components.

Check the installation and configuration before beginning systematic troubleshooting!

Installation:

- Check that the installation location complies with the admissible ambient conditions in terms of temperature, vibration, interference sources, minimum distances, etc.

Wiring:

- Does the wiring conform to the wiring diagrams?
- Does the 4 – 20 mA current loop have the correct polarity and is it closed?
- Is the 4 – 20 mA current loop below the overall output load of 500 Ω ?

ATTENTION



An open circuit in the 4 – 20 mA current loop can cause a plant shutdown and a malfunction is indicated.

- Bring the plant into a safe operating state before commencing work on the plant installation.
 - Switch off the voltage to the plant and secure so that it cannot be switched back on.
 - Check that the plant is not carrying live voltage before commencing work.
-

System malfunctions

Indication of system malfunctions using error codes

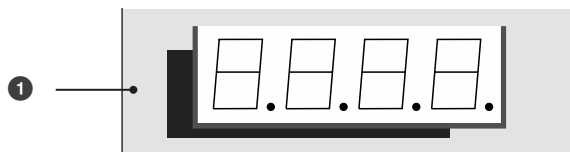


Fig. 16 ① Actual value display/error code/limit value, green, 4 digits

Error code display			
Error code	Internal designation	Possible errors	Remedy
E.001	MinCh1Err	Channel 1 reading below minimum, possible internal open circuit	Is the level electrode no longer immersed? Check the installation location. Broken electrode rod? If necessary, replace the level transmitter
E.002	MinCh2Err	Channel 2 reading below minimum, possible internal open circuit	Is the level electrode no longer immersed? Check the installation location. Broken electrode rod? If necessary, replace the level transmitter
E.003	MaxCh2Err	Channel 2 reading above maximum, possible internal short circuit	Damage to electrode rod PTFE (e.g. crack)? Replace the level transmitter
E.004	Ch1Ch2DiffErr	Difference between channels 1 and 2 exceeds 10% error tolerance, internal short circuit	Damage to electrode rod PTFE (e.g. crack)? Replace the level transmitter
E.005	MaxCh1Err	Channel 1 reading above maximum, possible internal short circuit	Damage to electrode rod PTFE (e.g. crack)? Replace the level transmitter
E.006	MinTSTCh1Err	Channel 1 reading internal capacitance (47pF)	Replace the level transmitter
E.007	MaxTSTCh1Err	Channel 1 reading reference capacitance (1nF 47pF)	Replace the level transmitter
E.008	MinTSTCh2Err	Channel 2 reading internal capacitance (47pF)	Replace the level transmitter
E.009	MaxTSTCh2Err	Channel 2 reading reference capacitance (1nF 47pF)	Replace the level transmitter
E.010	PWMTSTCh1Err	Channel 1 reading with disabled measurement signal	Replace the level transmitter
E.011	PWMTSTCh2Err	Channel 2 reading with disabled measurement signal	Replace the level transmitter
E.012	FreqErr	Measurement signal frequency	Replace the level transmitter.

System malfunctions

Error code display			
Error code	Internal designation	Possible errors	Remedy
E.013	VMessErr	4 – 20 mA analogue output error	Check wiring and output load. Is the connection OK or is the polarity reversed? Connect tester to the M12 connector. If the error code disappears when a tester is connected, check the on-site wiring.
E.014	ADSReadErr	16-bit AD converter is not responding	Replace the level transmitter
E.015	UnCalibErr	Factory calibration invalid (not measuring range calibration)	Replace the level transmitter
E.016	PlausErr	Measuring range plausibility error	Check measuring range calibration, repeat if necessary
E.017	ENDRVErr	Second shutdown path of 4 – 20 mA analogue output faulty	Replace the level transmitter
E.019	V6Err	System voltage 6 V outside limits	Replace the level transmitter
E.020	V5Err	System voltage 5 V outside limits	Replace the level transmitter
E.021	V3Err	System voltage 3 V outside limits	Replace the level transmitter
E.022	V1Err	System voltage 1 V outside limits	Replace the level transmitter
E.023	V12Err	System voltage 12 V outside limits	Replace the level transmitter
E.025	ESMG1Err	µC error	Replace the level transmitter
E.026	BISTErr	µC periphery self-test error	Replace the level transmitter
E.027	OvertempErr	PCB temperature, ambient temperature > 75 °C	Check the installation location. Lower the ambient temperature of the terminal box (cool if necessary)

All error codes E 018 to E 024 not listed here are available as reserves



Generally speaking, electromagnetic interference can be the cause of virtually all of the error codes mentioned above. This is less likely to be the case for permanent errors, but should be considered for sporadic error codes.

System malfunctions

Common application and usage errors

The 0% and 100% measuring range limits are obviously outside the sight glass level.

Possible causes if no error codes appear	Remedy
The measuring range is incorrectly set.	<ul style="list-style-type: none"> ■ Check the measuring range calibration. ■ Repeat calibration if necessary.

The characteristic of the measurement signal in the measuring range is reproducible, but not linear.

Possible causes if no error codes appear	Remedy
<p>The level electrode was installed without a protective tube.</p> <p>The protective tube is required as a counter electrode.</p>	<ul style="list-style-type: none"> ■ Install a protective tube.

The characteristic of the displayed reading does not seem plausible in relation to the fill level trend in the sight glass.

Possible causes if no error codes appear	Remedy
The pressure relief hole is clogged or flooded, or may even be missing completely.	<ul style="list-style-type: none"> ■ Check the protective tube. ■ If necessary, add a pressure relief hole.
The shut-off valves of an externally mounted measuring cylinder (option) are closed.	<ul style="list-style-type: none"> ■ Inspect shut-off valves, open if necessary.

A correctly set electrode that has been in operation for a long period delivers increasingly imprecise readings.

Possible causes if no error codes appear	Remedy
Increasing fouling and build-up on the electrode rod.	<ul style="list-style-type: none"> ■ Remove the level electrode and clean the electrode rod with a damp cloth.

A connected diagnostic tester indicates alarms, e.g. MIN or MAX, even though the level visible in the sight glass remains within the admissible measuring range limits.

Possible causes if no error codes appear	Remedy
<ul style="list-style-type: none"> ■ The measuring range is incorrectly set. ■ Fouling on the electrode or protective tube. 	<ul style="list-style-type: none"> ■ Calibrate the measuring range at the operating point. ■ Inspect the electrode and protective tube for fouling and clean if necessary.

System malfunctions

The display or control unit reacts to changes of level too slowly or too quickly.	
Possible causes if no error codes appear	Remedy
The damping coefficient "FILT" is incorrectly set.	Correct the damping coefficient "FILT".

The equipment fails to work. No display and the LEDs do not light up.	
Possible causes if no error codes appear	Remedy
Supply voltage failure.	<ul style="list-style-type: none"> ■ Switch on the supply voltage. ■ Check all electrical connections.

The equipment fails to work. The display is on and the LEDs light up.	
Possible causes if no error codes appear	Remedy
The earth connection to the tank is interrupted.	<ul style="list-style-type: none"> ■ Clean the sealing surfaces. ■ Screw in the NRG26-2 level electrode with a metal sealing ring, see page 22.

The display shows flashing values from t-71 to t-75	
Possible causes	Remedy
<p>The ambient temperature of the electrode terminal box is high, between 71 °C and 75 °C.</p> <p>If the temperature rises above 75 °C, the error code E.027 (Overtemp Err) appears and the 0 mA current output causes a lockout.</p>	<ul style="list-style-type: none"> ■ Reduce the ambient temperature around the terminal box, e.g. by cooling.

System malfunctions

Checking installation and function

When you have remedied system malfunctions, perform a function test as follows.

- Check the level display by raising and lowering the fluid to different levels within the measuring range of the level electrode. Always perform this check with the plant at its operating point.
- Also check that the level remains within the MIN and MAX limits when limit indicators are connected.
- Check the switchpoints when bringing into service and every time the NRGT 26-2 level transmitter is replaced.



System malfunctions of the NRGT 26-2 level transmitter result in an output of 0 mA at the analogue output.

If you require assistance, please tell us the indicated error code.



In the event of malfunctions or faults that cannot be remedied with the aid of this Installation & Operating Manual, please contact our service centre or authorised agent in your country.

Taking out of service/Disassembly

DANGER



Danger to life from scalding caused by escaping hot steam.

Hot steam or water can escape suddenly if level electrodes are when unscrewed under pressure.

- Reduce the boiler pressure to 0 bar and check the pressure before unscrewing the level electrode.
- Only remove the level electrode at a boiler pressure of 0 bar.

WARNING



The hot level electrode can cause severe burns.

The level electrode becomes very hot during operation.

- Always let the level electrode cool down before performing installation and maintenance work.
- Only remove level electrodes that have cooled down.

Proceed as follows:

1. Reduce the boiler pressure to 0 bar.
2. Allow the level electrode to cool to room temperature.
3. Switch off the supply voltage.
4. Detach the plug-in connection (M12 connector).
5. Next, remove the level electrode.



If the terminal box needs to be rotated by **>180°** in relation to the electrode or needs to be fully removed, proceed as described on pages 23 to 25.

Cleaning the measuring electrode of the level transmitter

Cleaning interval

We recommend cleaning the electrode at least once a year, e.g. during maintenance work, depending on operating conditions.



Before cleaning the electrode rod, take the level transmitter out of service and remove it, see page 49.

Cleaning

- Clean the PTFE protective sleeve by wiping it with a clean, damp cloth.
- When cleaning the electrode rod, take care not to bend it and avoid hard knocks.

Disposal

Dispose of the level transmitter in accordance with statutory waste disposal regulations.

Returning decontaminated equipment



If products have come into contact with media that are hazardous to health, they must be drained and decontaminated before being returned to GESTRA AG.

Such media include solid, liquid or gaseous substances, mixtures of these, or radiation.

GESTRA AG can accept returned products only if accompanied by a completed and signed return note and also a completed and signed declaration of decontamination.



The return confirmation and declaration of decontamination must be attached to the returned goods and be accessible from the outside. Otherwise, the goods cannot be dealt with and will be returned, carriage unpaid.

Please proceed as follows:

1. Let GESTRA AG know about the return beforehand by e-mail or phone.
2. Wait until you have received the return confirmation from GESTRA.
3. Fill out the return confirmation (and declaration of decontamination) and send it with the products to GESTRA AG.

Declaration of Conformity; Standards and Directives

You can find details on the conformity of the equipment and the applicable standards and directives in the Declaration of Conformity and associated certificates.

You can download the Declaration of Conformity from www.gestra.com and request relevant certificates by writing to the following address:

GESTRA AG

Münchener Straße 77

28215 Bremen

Germany

Phone +49 421 3503-0

Fax +49 421 3503-393

e-mail info@de.gestra.com

Website www.gestra.com

Modifications to the equipment not approved by us will invalidate the Declarations of Conformity and certificates.



You can find our authorised agents around the world at:

www.gestra.com

GESTRA AG

Münchener Straße 77

28215 Bremen

Germany

Phone +49 421 3503-0

Fax +49 421 3503-393

e-mail info@de.gestra.com

Website www.gestra.com

UK Importer:

GESTRA UK Ltd

Unit 1 Sopwith Park, Royce Close,
West Portway Business Park, Andover,
Hampshire SP10 3TS
United Kingdom