



Level Electrode

NRG 26-61

EN
English

Original Installation &
Operating Manual

819874-00

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Content of this Manual

Product:

Level Electrode NRG 26-61

First edition:

BAN 819874-00/08-2019cm

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Scope of delivery/Product package

- 1 x level electrode NRG 26-61
- 1 x sealing ring D 27 x 32, form D, DIN 7603-2.4068, bright annealed
- 1 x Installation & Operating Manual

How to use this Manual

This Installation & Operating Manual describes the correct use of the NRG 26-61 level electrode. It applies to persons who integrate this equipment in 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

Hazard symbols in this Manual



Danger zone/Dangerous situation

Types of warning

DANGER

Warning of a dangerous situation that results 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 results in damage to property or the environment.

Specialist terms/Abbreviations

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

IEC 61508

International standard IEC 61508 describes both the type of risk assessment and actions taken to provide appropriate safety functions.

SIL (safety integrity level)

Safety integrity levels SIL 1 to 4 are used to quantify risk reduction. SIL 4 is the highest level of risk reduction. International standard IEC 61508 forms the basis for establishing, testing and operating technical safety systems.

CAN (Controller Area Network) bus

Data transmission standard and interface for connecting electronic equipment, sensors and control systems. Data can be sent and received.

NRG .. / URS .. / URB .. / SRL .. / etc.

Equipment and type designations of GESTRA AG, see page 10.

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 pressurised steam plant, for example, these parameters would be output, pressure and temperature.

The design data may be a lot more stringent, however.

A boiler that is operated at 10 bar and 180°C may be designed for a pressure of 60 bar and a temperature of 275 °C, for example, which is not necessarily its operating point.

Usage for the intended purpose

Use as a safety high-level (HW) limiter and low-level (LW) limiter

The NRG 26-61 level electrode is used in conjunction with the URS 60 / URS 61 safety control unit as a safety high-level limiter and low-level limiter for pressurised steam and hot-water plants.

- Safety high-level limiters prevent the defined maximum high water (HW) level from being exceeded, e.g. by switching off the feedwater supply.
- Low-level limiters react when the water drops below the set minimum level (LW), e.g. by switching off the heating.



Safety notes for use as an LW limiter

- Since the electrode measures continuously using capacitance, the low-level limiter function of the NRG 26-61 may only be used in combination with a conductive NRG 16-60 level electrode.
 - Always use the NRG 16-60 level electrode as the first low-level electrode.
-

Additional use as a level control system

In addition, the NRG 26-61 level electrode can be used with an NRR 2-60 / NRR 2-61 level controller for continuously measuring the water level in pressurised steam and hot-water plants or in condensate and feedwater tanks.

- In combination with the NRR 2-60 / NRR 2-61 level controller, the electrode can be used as a level control system with MIN/MAX alarm, for example.
- The limiter functions can be disabled independently and by an infinitely variable measurement signal.

Influences of the test fluid

- The NRG 26-61 level electrode can be used in fluids with different conductivity. However, a conductivity of less than 100 $\mu\text{S}/\text{cm}$ has a major influence on the measured capacitance, which is why recalibration of the measuring range (see page 43) at the operating point* and after a cold start is extremely important.

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

- To achieve the best possible reproducibility and maintain high-quality measurements (see “Technical data” on page 19), the sensor must be installed in a protective tube (see “Installation examples with dimensions” on page 29 ff.).
- This is the only way to ensure safe use as a level limiter with a SIL 2 rating at the stated values.
- If the dielectric constant of the test fluid differs considerably from that of the usual water used ($\epsilon_r = 80$), it may be necessary to adjust the measuring frequency. For this, please contact the GESTRA AG Service department.

Visual display and operation

- Viewing and operation take place using the URB 60 or SPECTOR*control* operating terminal.

Usage for the intended purpose

Applicable directives and standards

The NRG 26-61 level electrode has been tested and approved for use in the scope governed by the following directives and standards:

Directives:

- Directive 2014/68/EU EU Pressure Equipment Directive
- Directive 2014/35/EU Low Voltage Directive
- Directive 2014/30/EU EMC Directive
- Directive 2011/65/EU RoHS II Directive

Standards:

- EN 12953-09 Shell boilers, requirements for limiting devices
- EN 12952-11 Water-tube boilers, requirements for limiting devices
- EN 60730-1 Automatic electrical controls – Part 1:
General requirements
- EN 61508 Functional safety of electronic systems

Standards documents:

- VdTÜV Bulletin BP WASS 0100-RL
Requirements for water level control and limiting equipment

Usage for the intended purpose

Admissible system components, dependent on the required safety level

In accordance with EU Pressure Equipment Directive 2014/68/EU and standards EN 12952, EN 12953 and EN 61508, and the technical rules of VdTÜV Bulletin BP WASS 0100-RL, the level electrode can be operated with the following system components, as suitable for the required safety integrity level.

	Level control and limiter electrode	Safety control unit for limiters	Control unit as level controller and limit indicator	Operating unit
SIL 2 to EN 61508	NRG 26-61	URS 60 URS 61	–	URB 60, SPECTOR <i>control</i>
Without SIL as per EN 61508	NRG 26-61	–	NRR 2-60 NRR 2-61	URB 60, SPECTOR <i>control</i>

Fig. 1

Key to Fig. 1:

NRG = level electrode

URS = SPECTOR*connect* safety control unit

URB = visual display and operating unit

SRL = monitoring unit

NRR = level controller, continuous



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 will find the latest Installation & Operating Manuals for the system components named in Fig. 1 on our website:

<http://www.gestra.com/documents/brochures.html>

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. The level electrode becomes very hot during operation.

- Always allow the level electrode to cool.
- Perform all installation and maintenance work only on a level electrode that has been allowed to cool.



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 NRG 26-61 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 NRG 26-61 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.
- Check that the level electrode is tight when bringing into service.



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

- The NRG 26-61 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 conversions may only be performed by authorised staff who have undergone specific training.
Retrofit	Specialist staff	Persons trained by the plant operator to work with pressure and temperature.

Fig. 2

Notes on product liability

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

Functional safety, safety integrity level (SIL)

In combination with the URS 60 / URS 61 safety control unit, the NRG 26-61 level electrode is suitable for safety functions up to SIL 2.

It is an element of a safety circuit up to SIL 2 as per EN 61508 in the SPECTOR*connect* system, and can transmit alarm notifications.

When combined with the accessories, you will have a type B subsystem. The technical and safety characteristics in Fig. 4 are based solely on the NRG 26-61 level electrode.

Breakdown of safety function failure rates (safety shutoff)

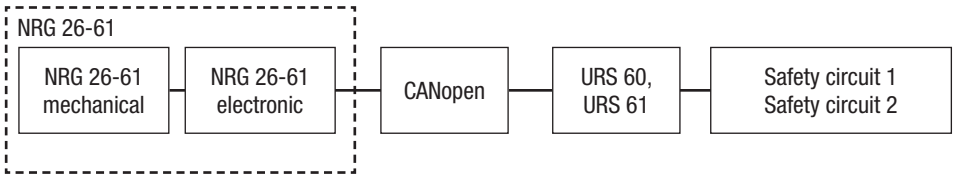


Fig. 3

The CANopen interface is a “Black Channel” type, and can be ignored during calculation due to the low failure rate of < 1FIT.

Check the safety function regularly

Check the limiter function of the level electrode at least once a year by bringing the system to the minimum and/or maximum water level ($T1 = 1$ year), see page 46.

The test function is initiated on site using the rotary knob integrated in the terminal box, see page 50.

In addition, the test function can be initiated remotely on the URS 60 / URS 61 or the external URB 60 or SPECTOR*control* operating units.

Reliability data to EN 61508

Description	Characteristic values
Safety integrity level	SIL 2
Architecture	1oo1
Type of equipment	Type B
Hardware error tolerance	HFT = 0
Overall failure rate for dangerous undetected failures	$\lambda_{DU} = < 20 * 10^{-9} \text{ 1/h}$
Overall failure rate for dangerous detected failures	$\lambda_{DD} = < 2000 * 10^{-9} \text{ 1/h}$
Safe failure fraction	SFF > 99.0 %
Test interval	T1 = 1 year
Probability of failure on demand	PFDD < $100 * 10^{-6}$
Diagnostic coverage. Percentage of dangerous failures detected by a test.	DC > 98.0 %
Mean time to failure	MTTF _D > 30 a
Diagnostic interval	T2 = 1 hour
Performance level (to ISO 13849)	PL = d
Probability of failure per hour	PFH < $20 * 10^{-9} \text{ 1/h}$
Ambient temperature as a basis for calculation	Tu = 60 °C
Mean time to repair	MTTR = 0 (no repair)
Fraction of undetected dangerous failures that have a common cause	beta = 2 %
Fraction of detected dangerous failures that have a common cause	beta d = 1 %

Fig. 4

Function

The NRG 26-61 level electrode works using the capacitance measurement principle and converts the water level information into a data telegram. The 0 - 100 % measuring range can be scaled based on the effective length of the electrode rod.

Automatic self-test

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

The data are transferred to the URS 60 / URS 61 safety control unit in the form of a Black Channel data telegram in the CANopen protocol via an ISO 11898 CAN bus.

These data telegrams contain the following information:

- Measured level value as raw data
- Measured level value scaled between 0 – 100 %, as a 16-bit data word in high resolution
- Measure level value scaled in 1 % stages without decimal places
- Limiter LW/HW alarm limits
- Status or error information
 - ◆ Fault indications in the event of faults in electronic or mechanical parts
 - ◆ Temperature in the level electrode terminal box
- LW/HW limiter test command

Limiter functions

If the water exceeds the set high-level point, the URS 60 or URS 61 safety control unit initiates a safety shutoff. This “High Water (HW)” switchpoint can be adjusted solely using the rotary knob on the NRG 26-61 level electrode.

If the water falls below the set low-level point, the URS 60 or URS 61 safety control unit initiates a safety shutoff. This “Low Water (LW)” switchpoint can be adjusted solely using the rotary knob on the NRG 26-61 level electrode.

The level electrode works using the capacitance measurement principle and is equipped with numerous self-monitoring mechanisms. Faults in the electrical connection or electronic measuring equipment trigger fault indications and safety shutoffs.

The level electrode is installed inside pressurised steam plants, tanks or feed lines in pressurised hot-water plants. A protective tube provided on site keeps it functioning reliably (see page 29 “Installation examples”).

A capacitance NRG 26-61 level electrode and a conductive NRG 1x-60 or NRG 1x-61 level electrode can be installed in the same protective tube or level pot.



Safety notes for use as an LW limiter

- Since the electrode measures continuously using capacitance, the low-level limiter function of the NRG 26-61 may only be used in combination with a conductive NRG 16-60 level electrode.
 - Always use the NRG 16-60 level electrode as the first low-level electrode.
-

Function

Use as a limiter in external mounted level pots

If a level electrode is installed in a lockable level pot outside the boiler, the connecting pipes must be flushed regularly. An SRL 6-60 monitoring unit is additionally required to monitor the flushing times and flushing process.

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.

Display and signals, see page 47 / 51 *

The NRG 26-61 level electrode has a green 4-digit, 7-segment display for showing readings, status information and fault codes. A red and green LED indicate the operating status.

Behaviour when switched on *

“**LO.LE**” and “**HI.LE**” (low and high-level alarm, LW and HW) are shown alternately on the display.



This is due to the factory-set alarm limits “AL.Lo” and “AL.Hi”.

When bringing into service for the first time, you will therefore be asked to change the alarm limits to suitable values for your specific plant.

To set the “**AL.Lo**” and “**AL.Hi**” alarm limits, see page 42.

Behaviour in normal operation (no alarm, no faults) *

The display shows the scaled level reading (3 digits + 1 decimal place), e.g. 050.3



The scale of the 0 – 100 % measuring range is factory-set at a maximum for the electrode length used. This way, meaningful measurements results of the level can be obtained immediately after installation.

Adjusting the measuring range when bringing into service (CAL.L, CAL.P or CAL.H)

When bringing into service, however, the measuring range should be adapted in line with your sight glass. Do this using the parameters CAL.L, CAL.P or CAL.H, see page 43 - 44. This is the only way to gain all the benefits of a high measurement resolution in the sight glass range.



When the equipment is brought into service for the first time, the “**AL.Lo**” and “**AL.Hi**” alarm limits are set to Max/Min values, which is why the warning messages “**LO.LE**” and “**HI.LE**” are shown alternately on the display.

First, set the “**AL.Lo**” and “**AL.Hi**” alarm limits to suitable values for your specific plant, see page 42.

Function

Behaviour in the event of an alarm (the level has strayed beyond a limit value) *

“**LO.LE**” (for LW) or “**HI.LE**” (for HW) are shown on the display, alternating with the actual level value.

The alarm state is transferred to the URS 60 or URS 61 safety control unit via CAN data telegram. There, once the time delay has elapsed, the alarm signal triggers the safety shutoff in the safety control unit. The URS 60 / URS 61 safety control unit does **not** automatically lock the safety contacts.

Behaviour in the event of malfunctions *

A fault code, e.g. E.005, appears permanently in the display. Fault codes, see page 52.

The faulty state is transferred to the URS 60 or URS 61 safety control unit via CAN data telegram. The fault indication causes the unit to executed an undelayed safety shutoff. The URS 60 / URS 61 safety control unit does **not** automatically lock the safety contacts.



Electrode alarms and faults cannot be acknowledged.

When the alarm or fault is cancelled the display also goes blank, and the URS 60 / URS 61 safety control unit closes the safety contacts once more.

Simulating the alarm state *

The triggering of an alarm can be simulated by pressing the rotary knob of the NRG 26-61, pressing the appropriate button on the URS 60 / URS 61, or using the URB 60. The equipment will then behave as if a normal alarm had been triggered.



* The tables on pages 48 - 50 clearly show the relationship between the equipment status, the display and the alarm LEDS.

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 38 ff.

Level control functions

In addition, the NRG 26-61 level electrode can be used in conjunction with an NRR 2-60 / NRR 2-61 level controller to form a level control system. The controller parameters are set solely on the URB 60 visual display and operating unit.

Technical data

Model and mechanical connection

- Thread G $\frac{3}{4}$ A, EN ISO 228-1, see Fig. 8

Nominal pressure rating, admissible service pressure and temperature

- PN 40 32 bar (g) at 238 °C

Materials

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

pH value

- Maximum admissible = 10

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

Max electrode length:	373	477	583	688	794	899	1004
Measuring range:	300	400	500	600	700	800	900
Max electrode length:	1110	1214	1319	1423	1528	1636	2156
Measuring range:	1000	1100	1200	1300	1400	1500	2000



Do not shorten the electrode rod.

Measurement quality

The information below applies to a compensated fluid conductivity range from 100 – 10000 μ S/cm based on 25 °C.

- Reading error: +/- 1 % from the set measuring range at the operating point
- Limit error: + 1 % from MAX (AL.Hi)
- 1 % from MIN (AL.Lo)
- MAX hysteresis: - 3 % from limit value
- MIN hysteresis: + 3 % from limit value
- Resolution of reading on display: 0.1 %
- Resolution for internal processing: 15 bits with sign (16 bits)

Supply voltage

- 24 V DC +/-20 %

Power consumption

- Max. 7 VA

Technical data

Current input

- Max. 0.3 A

Internal fuse

- T2A

Safety cutout at excessive ambient temperature

- The cutout at excessive ambient temperature takes place at $T_{amb} = 75\text{ °C}$

Input/output

- Interface for CAN bus to ISO 11898, CANOpen, insulated
- M12 CAN bus connector, 5-pole, A-coded
- M12 CAN bus socket, 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 alarm
- 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

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

- Approx. 2.1 kg

Admissible installation positions

- Vertical
- Oblique to a maximum inclination of 45°. In this case, the length of the electrode rod is limited to 688 mm maximum.

Name plate/Identification






Safety note →	 Betriebsanleitung beachten See installation instructions Voir instructions de montage		
Equipment designation →	NRG 26 - 61		
Equipment function →	Niveauelektrode Level electrode Électrode de niveau		
Nominal pressure rating, connection thread, material of screw-in body →	PN40 G3/4 1.4571 IP65		← IP rating
Admissible service pressure, admissible temperature →	 32 bar (464psi) 238°C (460°F)		
Admissible ambient temperature →	T 70°C (158 °F)		
Measuring range →	H= _____ mm		
Power consumption →	7 VA	24 V \pm 20%	← Supply voltage
Data interface →	IN/OUT: CAN-Bus		
Safety integrity level →	IEC 61508 SIL 2		
Current approval →	TÜV. xx . xx-xxx		← CE marking
Manufacturer →	GESTRA AG Münchener Str. 77 28215 Bremen GERMANY	 	← Appointed authority ← Protection class ← Disposal information
Serial number →			

Fig. 5



The date of production is stamped on the screw-in body of every level electrode.

Factory settings

The NRG 26-61 level electrode is delivered ex-works with the following settings:

Parameter	Display in menu	Parameter values	Unit	
		NRG 26-61		
Limiter ID	Id.Lo	0002	---	
Limiter ID	Id.Hi	0005	---	
Controller group	GrP	0001	---	
Baud rate	bd.rt	0050	KBit/s	
Alarm limit	AL.Lo	100	%	
Alarm limit	AL.Hi	0	%	
Lower bound calibration	CAL.L	variable	0 %	Raw value (hex) approx. 50 mV on ADC
Measuring range section calibration	CAL.P	variable	25 %	Raw value (hex)
Upper bound calibration	CAL.H	variable	100 %	Raw value (hex) approx. 2.0 V on ADC
Filter constant	FiLt	0005	seconds	
Compatibility mode	ConP	oFF	---	

Fig. 6

Overall view of the NRG 26-61

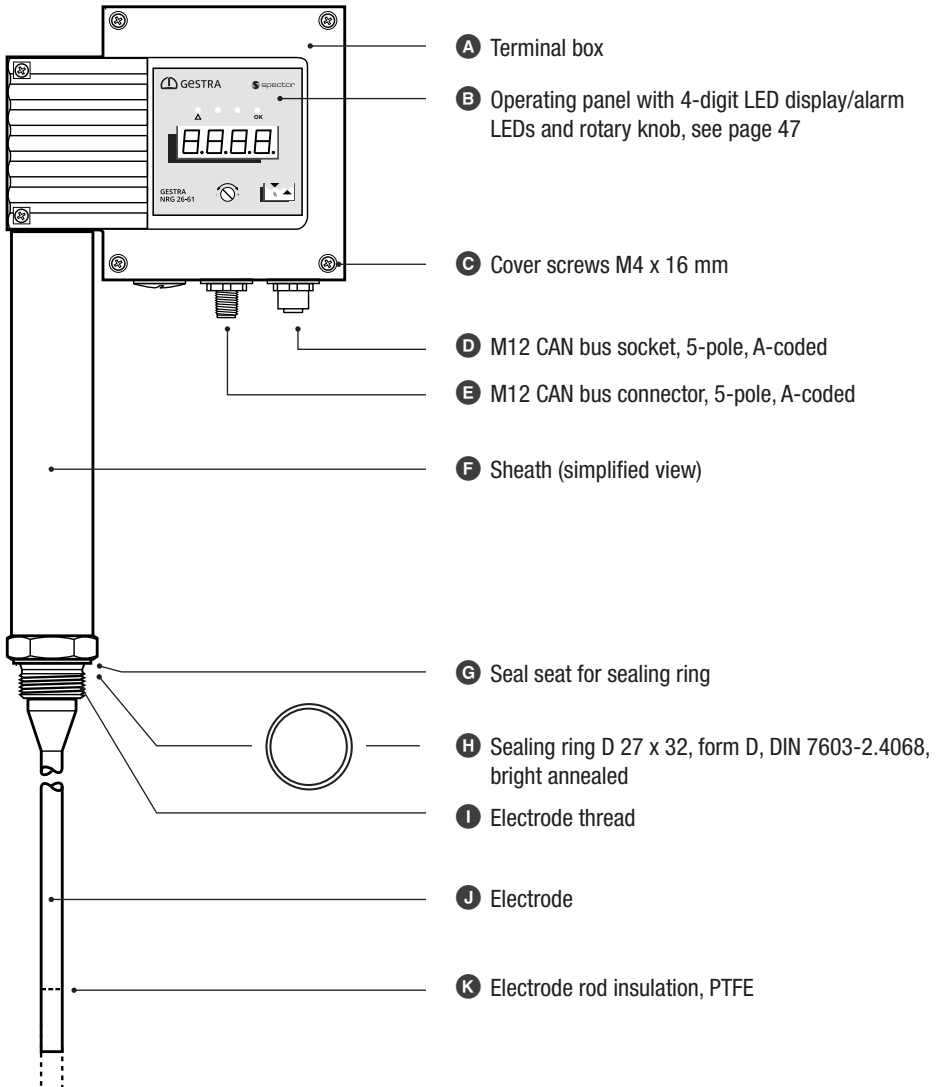


Fig. 7

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 20.
 - 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.
 - 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 the equipment from lightning, insects and animals, and salty air.
-

You will need the following tools:

- Torque wrench (with size 41 open-ended spanner attachment), see page 24:

Installation

DANGER



Danger to life from scalding caused by escaping hot steam.

Hot steam or water can escape suddenly if the level electrode is 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 the level electrode after it has 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. 9.
- Take care not to bend the level electrode during installation!
- Do not subject the electrode rod to hard impacts.
- The level electrode may be inclined at 45° only when being used in a two-hole flange, with the length of the electrode rod limited to 688 mm maximum, see Fig. 15.
- Do **not** install the body **A** or upper part of the cover tube **F** of the level electrode in the boiler thermal insulation!
- Do not install in the screwed socket.
- Pay attention to the minimum clearances when installing the level electrode, see installation examples Fig. 11 to Fig. 15.
- To prevent current leaks, maintain a minimum distance of 14 mm between the electrode and earth (flange or tank wall).
- Check the boiler coupling and flange during the preliminary boiler inspection.

Installation

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

Sealing surfaces must be perfectly machined, as shown in Fig. 9.

Sealing surface dimensions for NRG 26-61

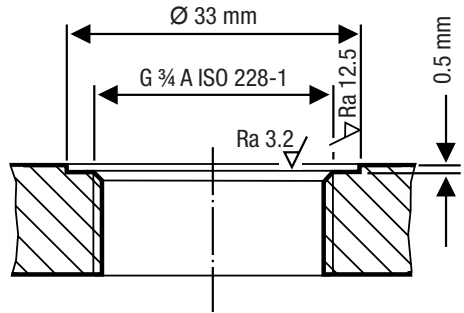


Fig. 9

2. Push the supplied sealing ring **H** onto the seal seat **G** 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 **I**.
- ◆ **Sealing ring D 27 x 32**
DIN 7603-2.4068, bright annealed

Prohibited seal materials:

- Hemp, PTFE tape
- Conductive paste or grease

Example

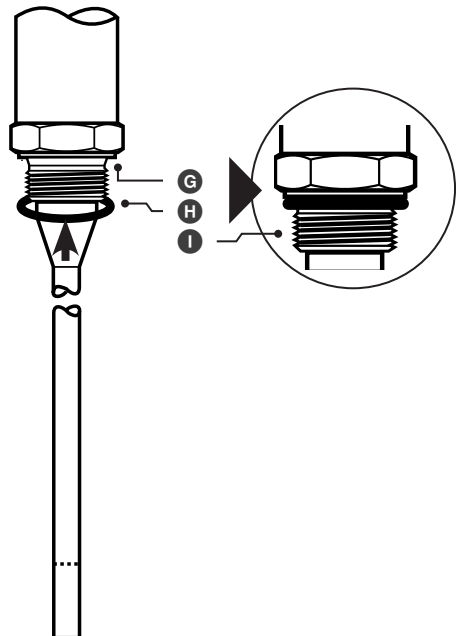


Fig. 10

Installation

3. If necessary, apply a small quantity of silicone grease (e.g. Molykote® III) to the electrode thread ❶.
4. Screw the level electrode into the threaded standpipe of the tank 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:

- NRG 26-61 = 160 Nm

Installation example with dimensions, see Fig. 11, page 29

Installing two level electrodes in a flange

1. Fit the first electrode as described above.
2. Slacken and remove the rear body panel of the second electrode opposite the operating unit.
3. Unfasten the electrode wiring from the PCB.
4. Slacken the nut in the body of the second electrode using a size 19 open-ended spanner.
5. Screw in the second electrode and tighten the nut in the body to a torque of 25 Nm.
6. Reconnect the electrode wiring to the PCB.
7. Close the rear body panel of the second electrode and screw back on.

Installation example with dimensions, see Fig. 13, page 31

Installation examples with dimensions

Protective tube (provided at the site) for internal installation.

Illustration not to scale.

Key, see page 34

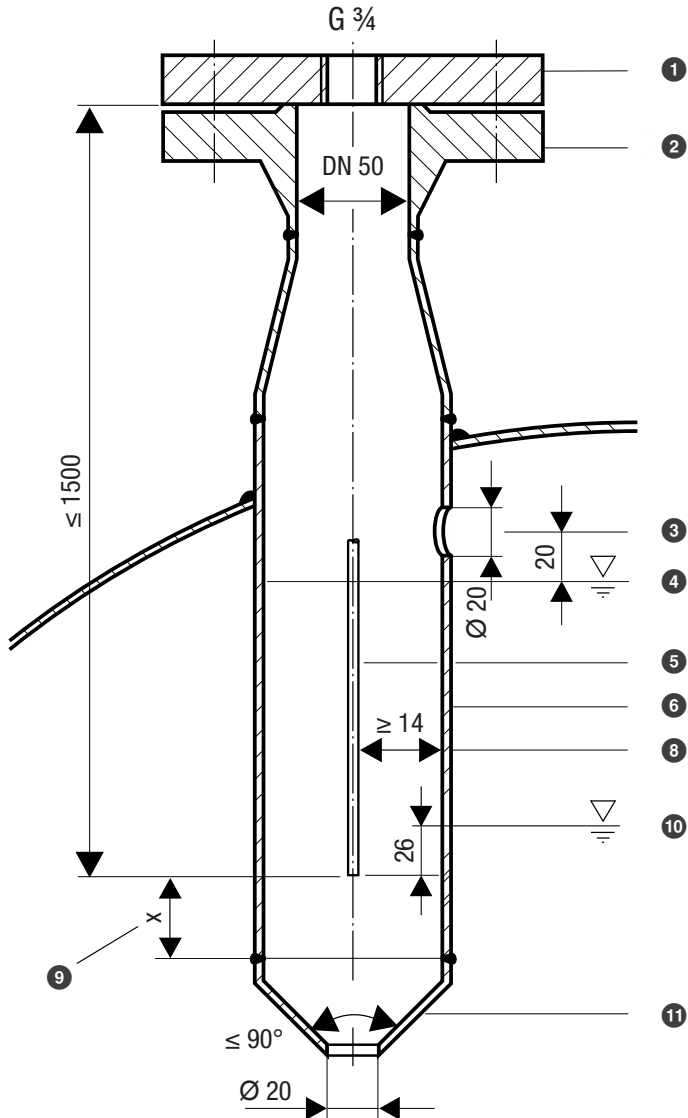


Fig. 12

All lengths and diameters in mm

Installation examples with dimensions

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

Illustration not to scale.

Key, see page 34

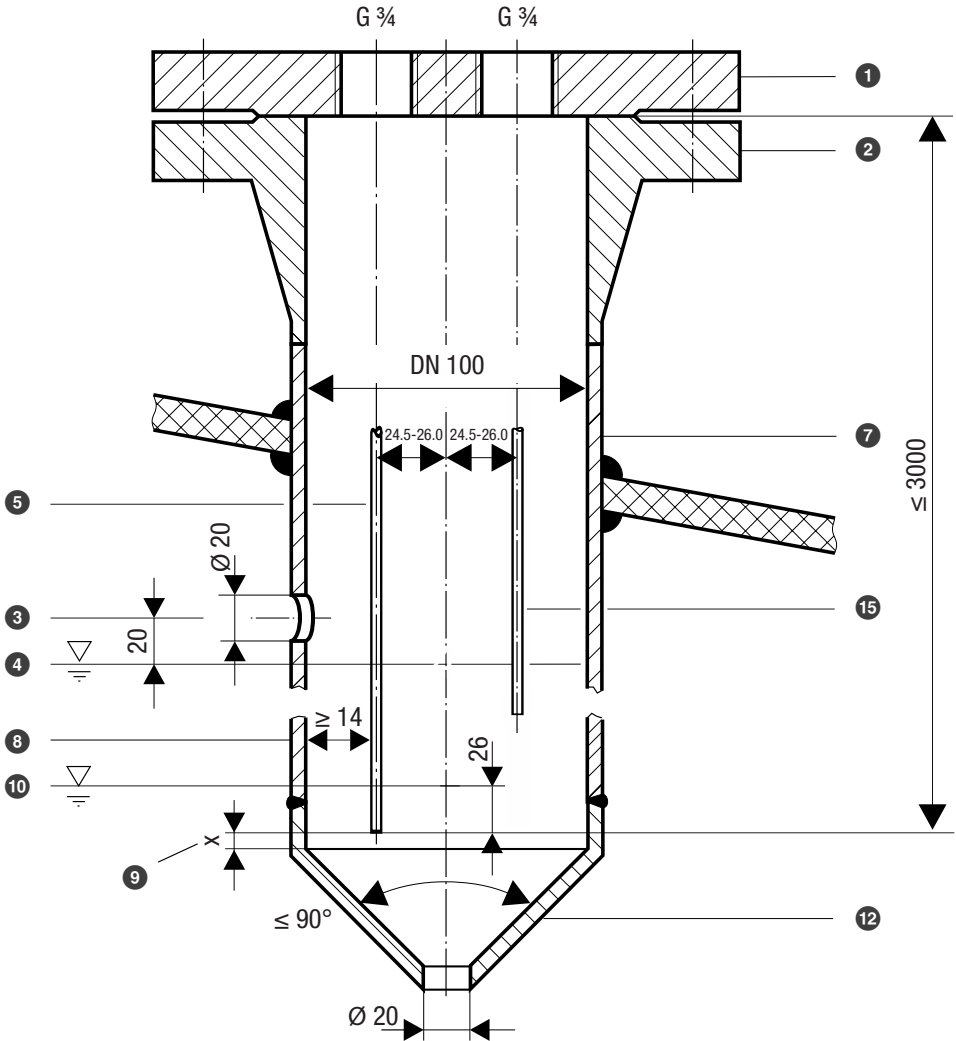


Fig. 13 All lengths and diameters in mm

Installation examples with dimensions

Level pot (\geq DN 80) for mounting externally.

Illustration not to scale.

Key, see page 34

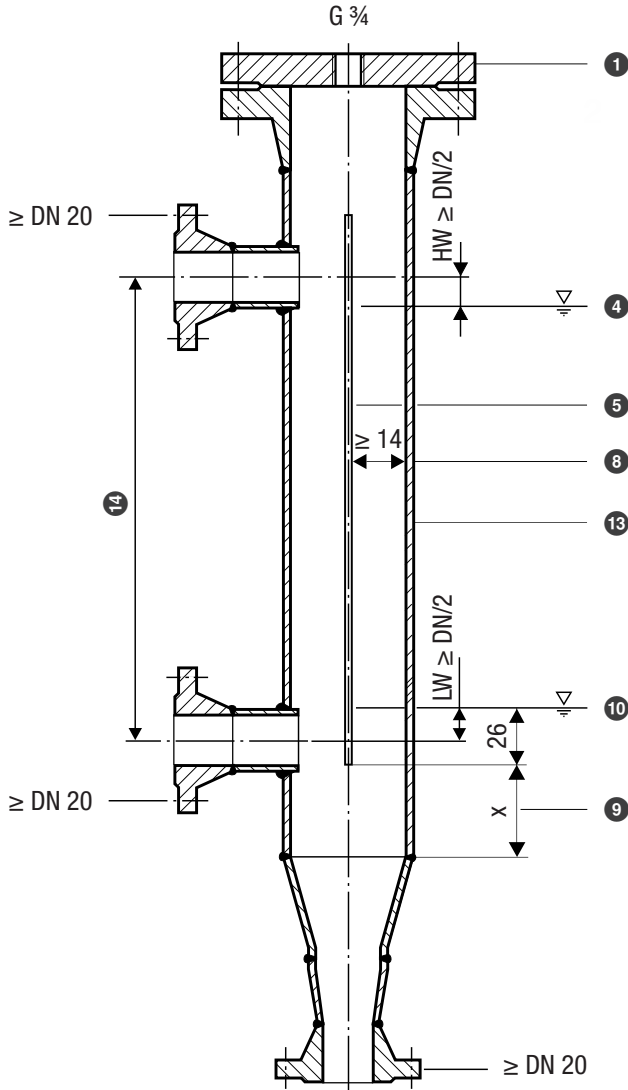


Fig. 14

All lengths and diameters in mm

Installation examples with dimensions

Oblique installation, e.g. in pressurised steam plants.

The level electrode must not be at an incline of more than 45°, and the length of the electrode rod is limited to 688 mm maximum.

Illustration not to scale.

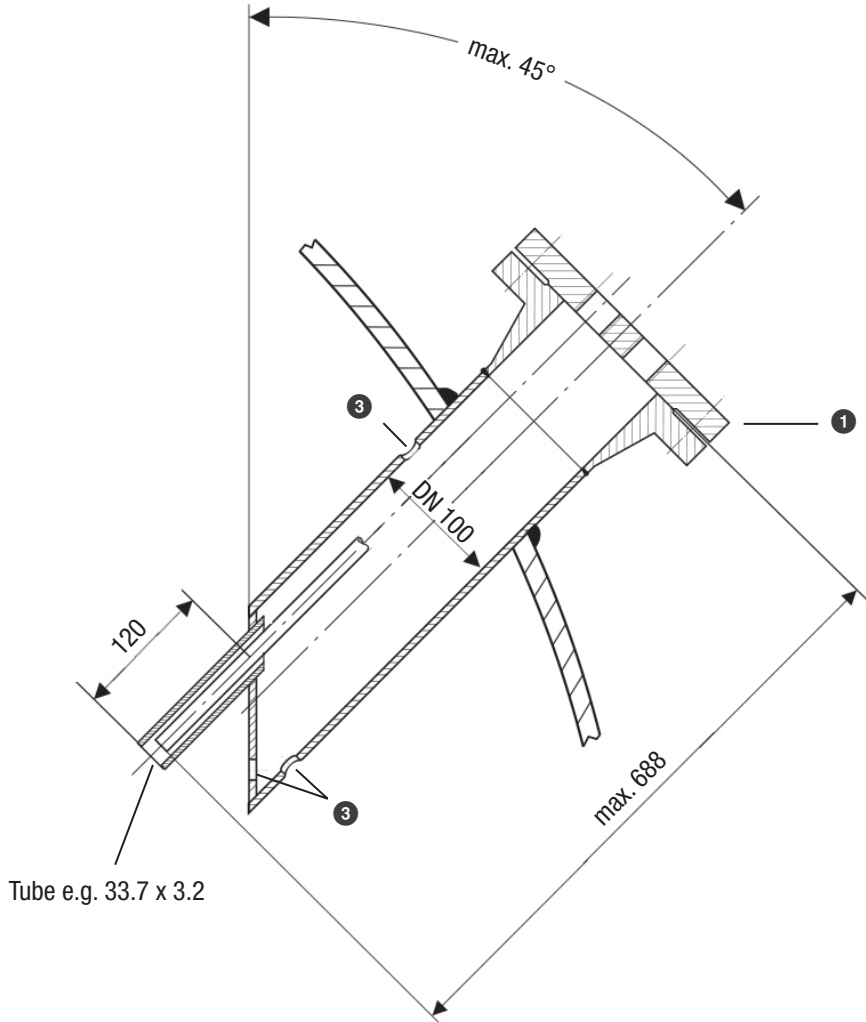


Fig. 15

All lengths and diameters in mm

Installation examples with dimensions

Key Fig. 11 to Fig. 15

- ① Fig. 11, 12: Flange (PN 40, DN 50) DIN EN 1029-01 (single electrode)
Fig. 14: Flange (PN 40, \geq DN 80) DIN EN 1029-01 (single electrode)
Fig. 13, 15: Flange (PN 40, DN 100) DIN EN 1029-01 (electrode combination)
- ② Standpipe in connecting flange (perform preliminary inspection of standpipe during boiler inspection)
- ③ Pressure relief hole \varnothing 20 mm
- ④ Highest possible HW mark
- ⑤ Electrode rod
- ⑥ Protective tube DN 80 (in France as per AFAQ \geq DN 100)
- ⑦ Protective tube DN 100
- ⑧ Distance between electrode rod and protective tube \geq 14 mm
- ⑨ Minimum dimension (x) = 10 mm below the electrode length (electrode length, see page 19)
- ⑩ Lowest possible LW mark (upper bound)
- ⑪ Reducer DIN 2616-2, K-88.9 x 3.2 - 42.4 x 2.6 W
- ⑫ Reducer DIN 2616-2, K-114.3 x 3.6 - 48.3 x 2.9 W
- ⑬ Level pot \geq DN 80
- ⑭ Centre distance of standpipe
- ⑮ Additional electrode

Aligning 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° will damage the level electrode's internal wiring.

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

Functional elements

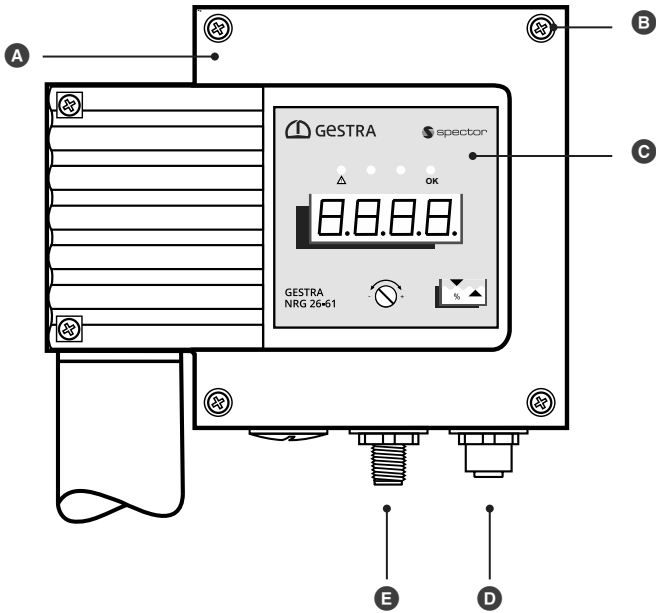


Fig. 16

- A** Terminal box
- B** Cover screws M4 x 16 mm
- C** Operating panel with 4-digit LED display/alarm and status LEDs and rotary knob, see page 47
- D** M12 CAN bus socket, 5-pole, A-coded
- E** M12 CAN bus connector, 5-pole, A-coded

Connecting the CAN bus system

Bus line, cable length and cross-section

- Use a shielded, multi-core, twisted-pair control cable, e.g. UNITRONIC® BUS CAN 2 x 2 x .. mm² or RE-2YCYV-fl 2 x 2 x .. mm² as the bus line.
- Pre-wired control cables (with plug and coupling) are available as accessories in various lengths.
- The baud rate (transfer rate) is determined by the cable length between the bus terminal devices, and the wire cross-section is determined by the overall power input of the measuring sensors.
- 0.2 A at 24 V is required per sensor. With five sensors, there is therefore a voltage drop of approx. 8 V per 100 m when using cables of 0.5 mm². In this case, the system is operating at its limits.
- With five or more sensors and a cable length of ≥ 100 m, the wire cross-section needs to be doubled to 1.0 mm².
- At larger distances of > 100 m, the 24 V DC supply can also be connected on site.

Example

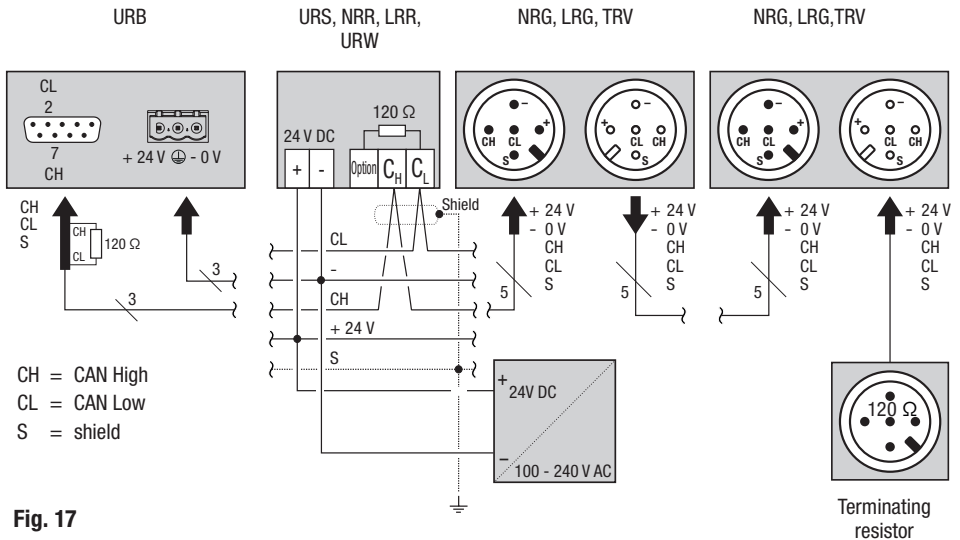


Fig. 17

Connecting the CAN bus system

Important notes on connecting the CAN bus system

- A dedicated 24 V DC SELV power supply unit that is isolated from connected loads must be used to supply the SPECTORconnect system.
- Make sure wiring is in line, not in a star!
- Use a central earth to prevent differences in potential between plant parts.
 - ◆ Connect the bus line shields to one another all the way along, and connect them to the central earthing point (CEP).
- If two or more system components are connected in a CAN bus network, a 120 Ω terminating resistor must be connected to the **first** and **last** units between terminals C_L / C_H.
- Use the CAN bus connector with terminating resistor if you are using the level electrode as the first or last unit.
- Only **one** URS 60 and **one** URS 61 safety control unit may be used in the CAN bus network.
- The CAN bus network must not be interrupted during operation!
If it is, an alarm is triggered.

Pin assignment of the CAN bus connector and coupling for non pre-wired control cables

If non pre-wired control cables are used, you must wire the CAN bus connector and couplings as shown in the wiring **Fig. 18** diagram.

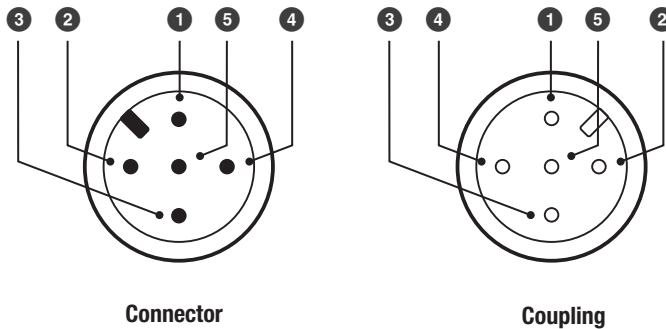


Fig. 18

- | | |
|----------|--------------------|
| ① S | Shield (screen) |
| ② + 24 V | Power supply |
| ③ - 0 V | Power supply |
| ④ CH | CAN High data line |
| ⑤ CL | CAN Low data line |

Bringing into service

Before bringing into service, check that all equipment is correctly connected:

- Is the polarity of the CAN bus control line correct throughout?
- Is a 120 Ω terminating resistor connected to the terminal devices of the CAN bus line?

Next, switch on the supply voltage.

Changing the factory settings if necessary

You will need the following tools

- Slotted screwdriver, size 2.5

Notes for bringing into service for the first time



When the equipment is brought into service for the first time, the “**AL.Lo**” and “**AL.Hi**” alarm limits are set to Max/Min values, which is why the warning messages “**LO.LE**” and “**HI.LE**” are shown alternately on the display.


First, set the “**AL.Lo**” and “**AL.Hi**” alarm limits to suitable values for your specific plant, see page 42.



Measuring range calibration and the setting of alarm limits are mutually independent.

Bringing into service

Selecting and setting a parameter:

1.  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. bd.rt → "value" → bd.rt.


The following parameters are shown one after the other when you turn the knob clockwise:


"Actual value" → Id.Lo → Id.Hi → GrP → bd.rt → °C.in → AL.Lo → AL.Hi → CAL.L → CAL.P → CAL.H → Filt → diSP → ConP → "Actual value"

Key to parameters, see page 40.



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

2.  Once you have selected a parameter, press and hold the rotary knob until the current value of this parameter flashes on the display.


3.  Set the desired value.
- / + Reducing/increasing the value

Each parameter has an individual, admissible value range.

By pressing the knob briefly, you can jump 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.

4.  Save your set value by pressing the rotary knob for approx. 1 second.
The message "donE" is shown and the parameter appears on the display once more.

Bringing into service

Key to parameters:

- 099.9 = actual value display, the current measured level based on the 0 - 100 % calibration
- Id.Lo = limiter ID; for the LW limiter function *
- Id.Hi = limiter ID; for the HW limiter function *
* Effect on the URS 6x safety control unit
- GrP = controller group (effect on URB 60 / SPECTOR*control*)
- bd.rt = baud rate
- °C.in = display ambient temperature of housing
- AL.Lo = sets the LW alarm limit for the limiter function
- AL.Hi = sets the HW alarm limit for the limiter function
- CAL.L = lower bound calibration to 0 %
- CAL.P = calibrates measuring range to an intermediate value above 25 % (alternative to CAL.H)
- CAL.H = upper bound calibration to 100 %
- Filt = filter constant
- diSP = initiate a display test
- ConP = activation of compatibility mode; for operation with SPECTORconnect, do not change setting (ConP = oFF)

Notes on changing communication parameters “bd.rt, Id.Lo; Id.Hi or GrP”



All CAN bus equipment from GESTRA AG has default ex works parameter settings, which enable a standard system to be brought into operation without making any changes.

Please follow the steps below if you need to make changes to communication parameters:

- Set the same baud rate for all bus nodes.
- To apply changed communication parameters, perform the steps below on the URB 60 visual display and operating unit or the SPECTOR*control*.

◆ **Device list - Reimport**



To do this, please read the instructions in the Installation & Operating Manual of the URB 60 visual display and operating unit or the SPECTOR*control*.

Bringing into service

Changing the “Id.Lo / Id.Hi” limiter ID



To set the limiter ID, please also read the instructions in the Installation & Operating Manual of the URS 60 / URS 61 safety control unit.

Pay attention to the setting instructions on page 39 and proceed as follows:

1. Select the parameter **“Id.Lo or Id.Hi”**.
Id.Lo = limiter ID for the 2nd low water electrode
Id.Hi = limiter ID for the 1st high water electrode
2. Press and hold the rotary knob until the current limiter ID flashes on the display.
3. Set the desired ID (off/0001 to 0008).
off = the NRG 26-61 level electrode has no effect on the URS 60 / URS 61 safety control unit.
4. Save your setting by pressing the rotary knob for approx. 1 second.

Changing the controller group “GrP”



For setting the controller group, please also pay attention to the information in the Installation & Operating Manual of the NRR 2-60 or NRR 2-61 level controller.

Pay attention to the setting instructions on page 39 and proceed as follows:

1. Select the parameter **“GrP”**.
2. Press and hold the rotary knob until the current controller group ID flashes on the display.
3. Set the desired controller group (1 to 4).
4. Save your setting by pressing the rotary knob for approx. 1 second.

Changing the baud rate “bd.rt”



You must set the same baud rate for all bus nodes.

Pay attention to the setting instructions on page 39 and proceed as follows:

1. Select the parameter **“bd.rt”**.
2. Press and hold the rotary knob until the current baud rate flashes on the display.
3. Set the desired baud rate (50 kBit/s or 250 kBit/s).
4. Save your setting by pressing the rotary knob for approx. 1 second.

Bringing into service

Notes for setting the “AL.Lo” and “AL.Hi” alarm limits



These settings only apply to the limit value for the safety shutoff by the URS 60 / URS 61 safety control unit.

They do not affect the limit signal contacts of the NRR 2-60 or NRR 2-61 level controller.



Please also see the information in the relevant Installation & Operating Manual.

Always set the alarm limits with the plant at its operating point.

If the alarm limits were previously set with a cold plant, you must repeat them at the operating point.

Setting the “AL.Lo” (low-level alarm = LW) limit

Pay attention to the setting instructions on page 39 and proceed as follows:

1. Select the parameter “AL.Lo”.
2. Bring the boiler water to the desired low water level.
3. Save your setting by pressing the rotary knob for approx. 1 second.

Checking the set “AL.Lo” limit or switchpoint



Check the switchpoint by allowing the level to drop below the set “AL.Lo” limit. In this case, the equipment must behave as if there were an alarm.

Always check the switchpoint when bringing into service, after changing a limit, and each time the NRG 26-61 level electrode is changed, and do this at the plant's operating point.

Setting the “AL.Hi” (high-level alarm = HW) limit

Pay attention to the setting instructions on page 39 and proceed as follows:

1. Select the parameter “AL.Hi”.
2. Bring the boiler water to the desired high water level.
3. Save your setting by pressing the rotary knob for approx. 1 second.

Checking the set “AL.Hi” limit or switchpoint



Check the switchpoint by allowing the level to rise above the set “AL.Hi” limit. In this case, the equipment must behave as if there were an alarm.

Always check the switchpoint when bringing into service, after changing a limit, and each time the NRG 26-61 level electrode is changed, and do this at the plant's operating point.

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 when subject to heat and will then need to be corrected at the operating point.

Calibration to the lower bound 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 39 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 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 39 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 > 25 % to match the set level.
5. Save your setting by pressing the rotary knob for approx. 1 second.

Bringing into service

Calibration to the upper bound 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 39 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 the rotary knob for approx. 1 second.

Setting the filter constant “Filt”



Here, you can set a time constant to smooth the output signal for the level controller and the display. The filter constant only affects the display and control, and is set at a fixed value for the limiter.

Pay attention to the setting instructions on page 39 and proceed as follows:

1. Select the parameter “**Filt**”.
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 the rotary knob for approx. 1 second.

Bringing into service

Manually initiating a display test

Pay attention to the setting instructions on page 39 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 electrode with an identical one from GESTRA AG.

Activating URB 2 compatibility “ConP”



For operation with SPECTORconnect, do not change setting (ConP = oFF).

1. Select the parameter “**ConP**”.
2. Press and hold the rotary knob until the current status flashes on the display.
3. Set the required status (off / on).
ConP = on: This enables the higher-resolution NRG 26-61 readings to be displayed on the URB 2 operating terminal. (by converting from 16 bit to 10 bit)
ConP = oFF: 16-bit resolution of the NRG 26-61 readings.
4. Save your setting by pressing the rotary knob for approx. 1 second.

Bringing into service

Checking the level display by raising or reducing the level



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 the NRG 26-61 level electrode:

- Check the LW and HW limiter switchpoints by exceeding the upper or lower level at the plant's operating point.
- Never start up any plant without first checking that switchpoints are correct.
- The NRG 26-61 level electrode may only be repaired by the manufacturer, GESTRA AG.
- Only replace a faulty device with an identical device from GESTRA AG.

Checking the limiter switchpoints by initiating a test function

Check the AL.Lo and AL.Hi alarm limits of the limiter function by initiating the test function with the rotary knob, see page 50, Test table.

In this case, the equipment must behave as if there were an alarm.

Lockout function



If the installation requires a lockout function, this must be implemented in the downstream (safety) circuit. This circuit must conform to the requirements of EN 50156.

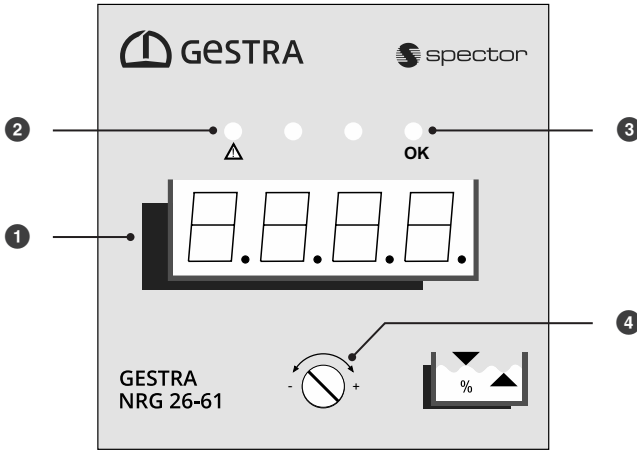


Fig. 19

The operating panel:

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

Notes on the priority of the various indications



Fault indications and alarms 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 1 = fault indications as per fault code table, see page 52 ff.

Priority 2 = low-level (LW) alarm

Priority 3 = high-level (HW) alarm

Priority of fault code display

Higher priority fault codes overwrite lower ones on the display!

Starting, operation and testing

Relationship between display and LEDs and the operating state of the level electrode:

Start		
Switch on supply voltage	All LEDs light up - Test Display: S-xx = software version t-07 = equipment type NRG 26-61	The system is started and tested. The LEDs and display are tested.

Bringing into service for the first time		
Switch on supply voltage	Display: LO.LE + HI.LE alternating	Low and high-level alarm (LW and HW) based on factory-set alarm limits "AL.Lo" and "AL.Hi".
	LED 1: Alarm LED lights up red LED 2: Operating LED is off	First, set the alarm limits to suitable values for your specific plant, see page 42.

Normal operation		
The level electrode is immersed within the set measuring range	Display: 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.

Starting, operation and testing

Behaviour in the event of a low-level alarm (LW)		
<p>The level electrode is immersed only to below the low-level mark (LW)</p> <p>The level is below the AL.Lo alarm limit</p>	Display: LO.LE and e.g. 009.5 alternating	The alarm message (Low Level) and the current reading are shown alternately on the display
	LED 1: Alarm LED lights up red	The MIN alarm is active
	LED 2: Operating LED is OFF	Alarm
Behaviour in the event of a high-level alarm (HW)		
<p>The level electrode is immersed to above the high-level mark (LW)</p> <p>The level is above the AL.Hi alarm limit</p>	Display: HI.LE and e.g. 092.5 alternating	The alarm message (High Level) and the current reading are shown alternately on the display
	LED 1: Alarm LED lights up red	The MAX alarm is active
	LED 2: Operating LED is OFF	Alarm
<ul style="list-style-type: none"> ■ The alarm state is transferred to the URS 60 / URS 61 safety control unit via CAN data telegram. ■ There, once the time delay has elapsed, the alarm message triggers the safety shutoff. ■ The affected signal output is activated. ■ The URS 60 / URS 61 safety control unit does not automatically lock the safety contacts. 		

Behaviour in the event of a malfunction (fault code display)		
<p>On the occurrence of a fault</p>	Display: e.g. E.005	A fault code is permanently displayed, fault codes see page 52
	LED 1: Alarm LED lights up red	There is an active fault
	LED 2: Operating LED is OFF	A fault is present
<ul style="list-style-type: none"> ■ The fault or error state is transferred to the URS 60 / URS 61 safety control unit via CAN data telegram. ■ The fault causes this unit to execute an undelayed safety shutoff. ■ The affected signal output is activated. ■ The URS 60 / URS 61 safety control unit does not automatically lock the safety contacts. 		



Electrode alarms and faults cannot be acknowledged.

When the alarm or fault is cancelled the display also goes blank, and the URS 60 / URS 61 safety control unit closes the safety contacts and deactivates the relevant signal outputs once more.

Starting, operation and testing

Test		
Checking the safety function by simulating the alarm state		
<p>In operating mode: Press the rotary knob on the NRG 26-61 and hold until the end of the test: 1 x press and hold = low-level (LW) alarm 2 x press and hold = high-level (HW) alarm</p> <p>or</p> <p>press button 1, 2, 3 or 4 of the URS 60 / URS 61 safety control unit and hold until the end of the test</p> <p>or</p> <p>initiate the limiter test for the NRG 26-61 level electrode on the URB 60.</p>	<p>Display: e.g. LO.LE and 000.0 alternating</p>	<p>The test simulates water falling below the LW mark or rising above the HW mark.</p>
	<p>e.g. HI.LE and 100.0 alternating</p>	<p>The respective alarm message and the current reading are shown alternately on the display</p>
	<p>LED 1: Alarm LED lights up red</p>	<p>MIN or MAX alarm</p>
	<p>LED 2: Operating LED is OFF</p>	<p>Alarm</p>
<ul style="list-style-type: none"> ■ The safety control unit URS 60 / URS 61 or equipment behaves as if there were a real alarm. ■ Once the delay time has elapsed, the output contacts of the URS 60 / URS 61 are opened and the corresponding signal outputs are activated. ■ The test has now finished 		



Faulty equipment jeopardises plant safety.

- If the level electrode does not behave as described above, it may be faulty.
- Perform failure analysis.
- The NRG 26-61 level electrode 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 if CAN bus components have been incorrectly installed or configured, if the equipment has overheated, if there is interference in the supply network or if electronic components are faulty.

Check the installation and configuration before 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?
- Is the bus line polarity correct throughout?
- Is a 120 Ω terminating resistor connected to the terminal devices of the CAN bus line?

Configuration of the level electrode:

- Is the level electrode set to the correct limiter ID 1,2,3,4,5,6,7,8?
- Limiter IDs must not be assigned in duplicate.

Baud rate:

- Is the cable length correct for the set baud rate?
- Is the baud rate identical for all units?

ATTENTION



Interrupting the CAN bus causes a plant shutdown and triggers an alarm.

- Bring the plant into a safe operating state before commencing work on the 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 fault codes

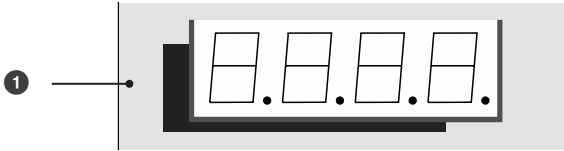


Fig. 20 ① Actual value display/fault code/limit value, green, 4 digits

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

System malfunctions

Fault code display			
Fault code	Internal designation	Possible faults	Remedy
E.012	FreqErr	Measurement signal frequency	Replace the level electrode
E.014	ADSReadErr	16-bit AD converter is not responding	Replace the level electrode
E.015	UnCalibErr	Factory calibration invalid (not measuring range calibration)	Replace the level electrode
E.016	PlausErr	Measuring range plausibility error	Check measuring range calibration, repeat if necessary
E.019	V6Err	System voltage 6 V outside tolerance	Replace the level electrode
E.020	V5Err	System voltage 5 V outside tolerance	Replace the level electrode
E.021	V3Err	System voltage 3 V outside tolerance	Replace the level electrode
E.022	V1Err	System voltage 1 V outside tolerance	Replace the level electrode
E.023	V12Err	System voltage 12 V outside tolerance	Replace the level electrode
E.024	CANErr	Communication failure	Check the baud rate, wiring and terminating resistors
E.025	ESMG1Err	µC error	Replace the level electrode
E.026	BISTErr	µC periphery self-test error	Replace the level electrode
E.027	OvertempErr	PCB temperature, ambient temperature > 75 °C	Check installation location. Lower the ambient temperature of the terminal box (cool if necessary)

All E.013, E.017 and E.018 fault codes not listed here are available as reserves



Virtually all of the aforementioned fault codes can be caused by EMC interference. This is less likely to be the case in the event of permanent faults, but should be considered for sporadic fault messages.

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 messages 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 messages 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 appears implausible compared with the tendency of the level in the sight glass.

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

A control unit, e.g. NRR2-60, indicates a MIN or MAX alarm even though the level visible in the sight glass remains within the admissible measuring range limits.

Possible causes if no error messages appear	Remedy
<ul style="list-style-type: none"> ■ The measuring range is incorrectly set. ■ The electrode or protective tube is soiled. 	<ul style="list-style-type: none"> ■ Calibrate the measuring range at the operating point. ■ Inspect the electrode and protective tube for soiling 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 messages 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 messages 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 messages appear	Remedy
The earth connection to the tank is interrupted.	<ul style="list-style-type: none"> ■ Clean the sealing surfaces and ■ screw in the level electrode with a metal sealing ring, see page 27.

Flashing values from t-71 to t-75 appear on the display

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 °, the fault code E.027 (Overtemp Err) appears and a plant shutoff occurs.</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 limiter functions by bringing the level below the set low water (LW) and above the set high water (HW) limits. In this case, the equipment must behave as if there were an alarm.
- Check the switchpoint when bringing into service and every time the NRG 26-61 level electrode is replaced.



System malfunctions in the NRG 26-61 level electrode also trigger a system malfunction in the URS 60 / URS 61 safety control unit. The output contacts open without a delay and the relevant signal output is activated.

If you require assistance, please tell us the indicated fault 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

DANGER



Danger to life from scalding caused by escaping hot steam.

Hot steam or water can escape suddenly if the level electrode is 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 is very hot during operation.

- Always let the level electrode cool down before performing installation and maintenance work.
- Only remove the level electrode after it has 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. Unplug the connections of the CAN bus control lines and plug them into one another.
5. Next, remove the level electrode.



An alarm is triggered when the CAN bus line is interrupted.

Cleaning the level electrode

Cleaning interval

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



Before cleaning the electrode rod, take the level electrode out of operation and remove it, see page 57.

Disposal

Dispose of level electrodes in accordance with statutory waste disposal provisions.

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.

The term media can refer to solid, liquid or gaseous substances or mixtures, as well as 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 outside of the return package, as processing will otherwise be impossible and the products will be returned to the sender at their expense.

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.

EU Declaration of Conformity

We hereby declare that the NRG 26-61 level electrode conforms to the following European Directives:

- Directive 2014/68/EU EU Pressure Equipment Directive
- Directive 2014/35/EU Low Voltage Directive
- Directive 2014/30/EU EMC Directive
- Directive 2011/65/EU RoHS Directive

Please see our Declaration of Conformity for details on the conformity of our equipment with European Directives.

The current Declaration of Conformity can be found on the internet at www.gestra.com or requested from us.



You can find our authorised agents around the world at:

www.gestra.com

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