



Backward Compatibility

SPECTORbus

EN
English

Installation & Operating Manual

850609-01

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Usage for the intended purpose

Applicable directives and standards

NRG 1.-6. level electrodes, LRG 1.-60, LRG 1.-61 and NRG 26-60 conductivity electrodes and the URB 60 have 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
- 61000-6-2 Immunity for industrial environments
- 61000-6-3 Emission standard for residential, commercial and
light-industrial environments
- 61000-6-4 Emission standard for industrial environments

Standards documents:

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

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 rating plate.

The rating 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 level electrodes that have 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 faulty NRG 111-60 level electrodes due to the sudden escape of hot steam or hot water.

Mistakes during transport or installation can cause the ceramic in the NRG 111-60 level electrode to break, so that hot steam or hot water escapes through the pressure relief hole.

- 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.

- NRG 1.-60 level electrodes may only be repaired by the manufacturer, GESTRA AG.
- Only replace faulty equipment with identical equipment from GESTRA AG.

If a SPECTORconnect component is used in an existing SPECTORbus system, a SELV power supply unit with an adequate rating must be used for the 24VDC power supply.

In this case, the 24V supply voltage (18-36V) to the SPECTORbus control units must be disconnected.

Guide to backward compatibility in the SPECTORbus system

NRS1-40.1 control unit			
Function 1	Function 2	Function 3	Function 4
Low-level limiter (LW) level electrode NRG 1.-.0			
Low-level limiter (LW) level electrode NRG 1.-.0	Low-level limiter (LW) 2 level electrodes NRG 1.-.0		
Low-level limiter (LW) level electrode NRG 1.-.0	Low-level limiter (LW) 2 level electrodes NRG 1.-.0	Safety temperature monitor/ limiter temperature transmitter TRV 5-40	
Low-level limiter (LW) level electrode NRG 1.-.0	Low-level limiter (LW) 2 level electrodes NRG 1.-.0	High-level alarm (HW) level electrode NRG 1.-41.1 and NRG 1.-61	Safety temperature monitor/limiter temperature transmitter TRV 5-40
Low-level limiter (LW) level electrode NRG 1.-.0	Safety temperature monitor/limiter temperature transmitter TRV 5-40	Safety temperature monitor/ limiter temperature transmitter TRV 5-40	
Low-level limiter (LW) level electrode NRG 1.-.0	Low-level limiter (LW) 2 level electrodes NRG 1.-.0	Safety temperature monitor/ limiter temperature transmitter TRV 5-40	Safety temperature monitor/limiter temperature transmitter TRV 5-40
Safety temperature monitor/limiter temperature transmitter TRV 5-40			
Safety temperature monitor/limiter temperature transmitter TRV 5-40	Safety temperature monitor/limiter temperature transmitter TRV 5-40		

The following electrodes can be used as low-level limiters (LW1 or LW2) with the NRS 1.40.1:

SPECTORbus	SPECTOR <i>connect</i>
NRG 16-40	NRG 16-60
NRG 17-40	NRG 17-60
NRG 19-40	NRG 19-60
NRG 111-40	NRG 111-60

The following electrodes can be used as high-level alarms with the NRS1-40.1:

SPECTORbus	SPECTOR <i>connect</i>
NRG 16-41.1	NRG 16-61
NRG 17-41.1	NRG 17-61
NRG 19-41.1	NRG 19-61
	NRG 111-61

Guide to backward compatibility in the SPECTORbus system

NRS 1-40.2 control unit			
Function 1	Function 2	Function 3	Function 4
High-level alarm (HW) level electrode NRG 1.-.1			
High-level alarm (HW) level electrode NRG 1.-.1	Safety temperature monitor/limiter temperature transmitter TRV 5-40		
High-level alarm (HW) level electrode NRG 1.-.1	Safety temperature monitor/limiter temperature transmitter TRV 5-40	Safety temperature monitor/limiter temperature transmitter TRV 5-40	
Safety temperature monitor/limiter temperature transmitter TRV 5-40			
Safety temperature monitor/limiter temperature transmitter TRV 5-40	Safety temperature monitor/limiter temperature transmitter TRV 5-40		

The following electrodes can be used as high-level alarms with the NRS1.40.2:

SPECTORbus	SPECTOR <i>connect</i>
NRG 16-41	NRG 16-61
NRG 17-41	NRG 17-61
NRG 19-41	NRG 19-61
	NRG 111-61

The NRS1-40 level limiter can be used with the following electrodes.

SPECTORbus	SPECTOR <i>connect</i>
NRG 16-40	NRG 16-60
NRG 17-40	NRG 17-60
NRG 19-40	NRG 19-60
NRG 111-40	NRG 111-60

The NRS1-41 level limiter can be used with the following electrodes.

SPECTORbus	SPECTOR <i>connect</i>
NRG 16-41	NRG 16-61
NRG 17-41	NRG 17-61
NRG 19-41	NRG 19-61
	NRG 111-61

The NRR2-40 level controller can be used with the following electrodes.

SPECTORbus	SPECTOR <i>connect</i>
NRG 26-40	NRG 26-60

The NRG 26-60 must be operated in compatibility mode (see NRG 26-60 manual) if a URB2 is connected.

The NRS2-40 level switch can be used with the following electrodes.

SPECTORbus	SPECTOR <i>connect</i>
NRG 26-40	NRG 26-60

The NRG 26-60 must be operated in compatibility mode (see NRG 26-60 manual) if a URB2 is connected.

Guide to backward compatibility in the SPECTORbus system

The LRR 1-40 conductivity controller can be used with the following electrodes.

SPECTORbus	SPECTOR <i>connect</i>
LRG 16-40	LRG1 6-60
LRG 16-41	LRG 16-61
LRG 17-40	LRG 17-60

Important information on backward compatibility:

The scale of the measuring range has changed.

In two-rod measurement (LRG 1.-60), there is no more measuring range 8 (up to 12000 uS/cm).

In four-rod measurement (LRG 1.-61), the lower measuring range limit has been moved to 50 uS/cm.

	[uS/cm]	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8
LRG 1.-40	Min	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Max	20	100	200	500	1000	2000	6000	12000
LRG 1.-60	Min	0.5	0.5	0.5	0.5	0.5	0.5	0.5	---
	Max	20	100	200	500	1000	2000	6000	---
LRG 1.-41	Min	100	100	100	100	---	---	---	---
	Max	3000	5000	7000	10000	---	---	---	---
LRG 1.-61	Min	50	50	50	50	---	---	---	---
	Max	3000	5000	7000	10000	---	---	---	---

These changes affect the display on the URB 1/URB 2, the output via the 4-20 mA interface of the LRR 1-40 / LRR 1-60, and the 20 mA output of the SPECTOR*compact* system LRG(T).

Temperature compensation

The “Auto curve” and “Standard curve” options are no longer available with temperature compensation. Now the only options are “Linear compensation with TK” and “Compensation OFF (TK=0.0)”.

Setting parameters

The LRG 1.-6. can be used as a conductivity limiter in the SPECTOR*connect* system.

Therefore, the cell constant (CF, CAL), temperature coefficient (TK/TC), vapour bubble filter (FILT) and measuring range (Sout) parameters have been changed from simple setting via the CAN bus to a process secured on several levels (safe parameters).

The limiter function of the LRG 1.-6 must not be activated if it is being used in the SPECTORbus system.

Effects on operation together with the URB 1

Display:

The URB 1 can still display the measured conductivity and all parameters, but with the following restriction:

The URB 1 basically only supports a correct display for two-rod measurement using the LRG 1.-40.

Since only the uppermost measuring range 8 is missing with the LRG 1.-60, the display is still correct in this respect.

The measuring ranges were already not being displayed correctly on the URB 1 when the LRG 1.-41 (SPECTOR I) four-rod conductivity electrode was used.

This point continues to apply to the LRG 1.-61. The value that was set on the LRG 1.-61 is the deciding factor.

URB 1 configuration:

As the URB 1 does not support the safe parameters of the SPECTOR*connect*, all parameters must be set on the LRG 1.-60 or LRG 1.-61 itself. This affects the cell constant (CF, CAL), temperature coefficient (TK/TC), vapour bubble filter (FILT) and measuring range (Sout) parameters.

Effects on operation together with the URB 2

Display:

The URB 2 can still display the measured conductivity and all parameters, but with the following restriction:

The URB 2 only supports the correct display of measuring ranges for measurement with the LRG 1.-40 and LRG 1.-41.

Since only the uppermost measuring range is missing with the LRG 1.-60, the display is still correct in this respect.

With the LRG 1.-61, the lower limit of the selected measuring range is not displayed correctly. The value that was set on the LRG 1.-61 is the deciding factor.

URB 2 configuration:

As the URB 2 does not support the safe parameters of the SPECTOR*connect*, all parameters must be set on the LRG 1.-60 or LRG 1.-61 itself. This affects the cell constant (CF, CAL), temperature coefficient (TK/TC), vapour bubble filter (FILT) and measuring range (Sout) parameters.

Effects on operation together with the LRR 1-40

Transmission of measured conductivity via the 4-20 mA output:

The correct scale of the 4-20 mA output is only supported with controller software 311106-14 from 21.05.2008 or later. With these later software versions, the correct scale of the LRG1x-4x and also the LRG 1.-6. is used.

It is important to ensure that the scale of the 4-20 mA output is correctly set in downstream equipment (e.g. PLC).

URB 1 / URB 2 / URB 60

The following can be used as a visual display and operating unit in the combinations listed below:

URB 1 / URB 2 / URB 60				
NRS 1.40				
NRS 1.40	NRS 1.41			
NRS 1.40.1				
NRS 1.40.1	NRS 1.40.2			
NRS 1.40	NRS 1.41	NRR 2-40		
NRS 1.40.1	NRS 1.40.2	NRR 2-40		
NRS 1.40	NRS 1.41	NRR 2-40	LRR 1-40	
NRS 1.40.1	NRS 1.40.2	NRR 2-40	LRR 1-40	
NRS 1.40	NRS 1.41	NRS 2-40		
NRS 1.40.1	NRS 1.40.2	NRS 2-40		
NRS 1.40	NRS 1.41	NRS 2-40	LRR 1-40	
NRS 1.40.1	NRS 1.40.2	NRS 2-40	LRR 1-40	
NRS 1.40	NRS 1.41	NRS 1-42		
NRS 1.40.1	NRS 1.40.2	NRS 1-42		
NRS 1.40	NRS 1.41	NRS 1-42	LRR 1-40	
NRS 1.40.1	NRS 1.40.2	NRS 1-42	LRR 1-40	
NRS 1.40	NRS 1.41	NRR 2-40	LRR 1-40	TRS 5-40
NRS 1.40.1	NRS 1.40.2	NRR 2-40	LRR 1-40	TRS 5-40
NRS 1.40	NRS 1.41	NRS 2-40	TRS 5-40	
NRS 1.40.1	NRS 1.40.2	NRS 2-40	TRS 5-40	
NRS 1.40	NRS 1.41	NRS 2-40	LRR 1-40	TRS 5-40
NRS 1.40.1	NRS 1.40.2	NRS 2-40	LRR 1-40	TRS 5-40
NRS 1.40	NRS 1.41	NRS 1-42	TRS 5-40	
NRS 1.40.1	NRS 1.40.2	NRS 1-42	TRS 5-40	
NRS 1.40	NRS 1.41	NRS 1-42	LRR 1-40	TRS 5-40
NRS 1.40.1	NRS 1.40.2	NRS 1-42	LRR 1-40	TRS 5-40

Only the baud rates 50 kBd and 250 kBd are now supported in the CANbus.

50 kBd is the standard for the SPECTOR*connect*, 250 kBd for the SPECTORbus I.

The assignment of node IDs has been changed from relatively free to fixed slots. However, these fixed slots conform to the default settings of the SPECTORbus I.

The cutout for the URB 60 differs from the cutouts required for the URB 1 and URB 2.

The operating temperature of the URB 60 is between 0°C and 50°C.

URB 1 / URB 2 / URB 60

Fist Node Id	Second Node Id	Equipment	Function	Remarks
00	--	n.a.	n.a.	
01	--	URS 60	Safety limiter for firing	
02	--	LW1,LW2,HW,Cond. Temp. Level (incl. SK LW1)	Limiter 1	Each sensor type can be used
03	--	LW1,LW2,HW,Cond. Temp. Level (incl. SK LW2)	Limiter 2	Each sensor type can be used
04	--	LW1,LW2,HW,Cond. Temp. Level (incl. SK HW)	Limiter 3	Each sensor type can be used
05	--	LW1,LW2,HW, Cond. Temp. Level	Limiter 4	Each sensor type can be used
06	--	URS 61	Safety limiter for pumps	
07	--	LW1,LW2,HW,Cond. Temp. Level	Limiter 5	Each sensor type can be used
08	--	LW1,LW2,HW,Cond. Temp. Level	Limiter 6	Each sensor type can be used
09	--	LW1,LW2,HW,Cond. Temp. Level	Limiter 7	Each sensor type can be used
10	--	LW1,LW2,HW,Cond. Temp. Level	Limiter 8	Each sensor type can be used
11	2-5,7-10	Standard Boiler (SB) NRG 26-60	Capacitance level electrode for SB	OEM variant
13	2-5,7-10	Standard Boiler (SB) LRG 16-60	Conductivity electrode for SB	OEM variant
2-5,7-10	--	NRG 1x-6x	TDS level electrode	LW1, LW2, HW for limiting
2-5,7-10	--	TRGV 5-6x	Pt100 temperature sensor	Temp. for limiting and control
19	--	n.a.	n.a.	
20	--	n.a. VKK KS98-1	n.a. Regler (MFE)	Former: NRS1-42 (not available) OEM-Variante
21	--	n.a.	n.a.	Former: NRG16-42 (not available)
38	--	1. URZ 40	Feedwater valve (no.1)	
39	--	1. NRR 2-61	Level controller, continuous (no. 1)	Also for contact multiplication
40	--	1. NRR 2-60	Level controller, 3-position (no. 1)	
41	2-5,7-10	1. NRG 26-60	Capacitance level electrode (no. 1)	Level (for limiting and control)
43	--	2. URZ 40	Feedwater valve (no.2)	
44	--	2. NRR 2-xx	Level controller, continuous (no. 2)	Also for contact multiplication
45	--	2. NRR 2-xx	Level controller 3-position (no.2)	
46	2-5,7-10	2. NRG 26-xx	Capacitance level electrode (no. 2)	Level (for limiting and control)
48	--	1. BAE xx-40	Continuous blowdown valve (no. 1)	
49	--	1. n.a.	n.a. (no. 1)	n.a.
50	--	1. LRR 1-60	Conductivity controller (no.1)	
51	2-5,7-10	1. LRG 1x-6x	Conductivity electrode (no.1)	Conductivity for limiting and control
53	--	2. BAE xx-40	Continuous blowdown valve (no. 2)	
54	--	2. n.a.	n.a. (no. 2)	n.a.
55	--	2. LRR 1-60	Conductivity controller (no. 2)	
56	2-5,7-10	2. LRG 1x-6x	Conductivity electrode (no. 2)	Conductivity for limiting and control
58	--	3. URZ 40	Feedwater valve (no. 3)	
59	--	3. NRR 2-61	Level controller, continuous. (no. 3)	Also for contact multiplication
60	--	3. NRR 2-60	Level controller, 3-position (no. 3)	
61	2-5,7-10	3. NRG 26-60	Capacitance level electrode (no. 3)	Level for limiting and control
63	--	4. URZ 40	Feedwater valve (no. 4)	
64	--	4. NRR 2-61	Level controller, continuous. (no. 4)	Also for contact multiplication
65	--	4. NRR 2-60	Level controller, 3-position (no. 4)	
66	2-5,7-10	4. NRG 26-60	Capacitance level electrode (no. 4)	Level for limiting and control
68	--	3. BAE xx-40	Continuous blowdown valve (no. 3)	
69	--	3. n.a.	n.a. (no. 3)	n.a.
70	--	3. LRR 1-60	Conductivity controller (no. 3)	
71	2-5,7-10	3. LRG 1x-6x	Conductivity electrode (no. 3)	Conductivity for limiting and control
73	--	4. BAE xx-40	Continuous blowdown valve (no. 4)	
74	--	4. n.a.	n.a. (no. 4)	n.a.
75	--	4. LRR 1-60	Conductivity controller (no. 4)	
76	2-5,7-10	4. LRG 1x-6x	Conductivity electrode (no. 4)	Conductivity for limiting and control
98	--	ORT6,7 + NRA1-3	Condensate monitoring	
120	--	URB 60	Touch panel	
120-127	--	SPECTORcontrol	Touch panel / IPC	

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No SIL review has been performed for cases where a SPECTORbus electrode is replaced with a new SPECTORconnect electrode. As SPECTORconnect components have considerably better SIL3 characteristics in conformity with IEC 61508 than SPECTORbus components, the existing characteristics remain unchanged.

The SPECTORbus system with a SPECTORconnect electrode satisfies the requirements of the European boiler standards EN 12952/12953 and has EC type test approval and a VdTÜV certificate.

URB 1 / URB 2 / URB 60

Device	URS 60	Sensor 1	Sensor 2	Sensor 3	Sensor 4
Limiter ID	–	1	2	3	4
CAN node ID	1	2	3	4	5

Device	URS 61	Sensor 1	Sensor 2	Sensor 3	Sensor 4
Limiter ID	–	5	6	7	8
CAN node ID	6	7	8	9	10



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