OPERATING MANUAL

Hydrocont® B4 | Hydrostatic fill level sensor

ø40 mm
with capacitive ceramic pressure cell
with temperature sensor

umn_fam_b4_vs1.01_en
07/2026

senseca

Contents

1 Notes on the Document

1.1 Document Purpose

This manual describes the product's design, functions, and use, and helps ensure that the product is operated as intended.

Read the manual carefully before using the product. This will help you avoid potential injury, property damage, and damage to the device.

The operating manual is an integral part of the device and must be kept accessible at all times in the immediate vicinity of the operating site.

The information in this document reflects the knowledge available at the time of printing. Subject to change without notice.

1.2 Terms

NOTE

Information on how to prevent malfunctions, operational failures, and damage to the device or system.

WARNING

Failure to follow these instructions may result in serious or fatal injury.

[04-5]

Reference to a variant >> Product Code section

1.3 Additional Documentation

In addition to this document, you can find additional documentation online.

2 Safety Instructions

2.1 Authorized Personnel

Installation, electrical connection, commissioning, operation, maintenance, disassembly, and disposal of the device must be performed by a qualified and authorized specialist in accordance with the instructions in the operating manual and applicable standards.

This specialist must have read and understood the operating instructions, particularly the safety instructions. The required personal protective equipment must always be worn when working on or with the device.

If the device is intended for use in potentially explosive atmospheres, the safety instructions for electrical equipment intended for use in potentially explosive atmospheres must be observed in particular.

2.2 Intended Use

The device is an electronic hydrostatic level transmitter for monitoring, controlling, and continuously measuring liquid levels and temperatures.

The device's operational safety is guaranteed only when used as intended. Improper or unintended use of this product may result in application-specific hazards, such as a tank overflow due to incorrect installation or adjustment. This can result in property damage, personal injury, or environmental damage. Furthermore, this may impair the device's performance.

Improper use, failure to follow the operating instructions and technical regulations, the use of inadequately qualified personnel, unauthorized modifications, and damage to the device exclude the manufacturer's liability for any resulting damages. The manufacturer's warranty is void.

2.3 Operational Safety

The device is designed and tested in accordance with the state of the art to ensure operational safety. It may only be operated when it is in technically sound and safe operating condition. The operator is responsible for ensuring the trouble-free operation of the device.

The device may only be used within the permissible operating limits. Any use outside these intended limits may result in significant hazards.

The materials must be checked for compatibility with the application requirements prior to use. An unsuitable material can lead to damage, malfunction, or destruction of the device and the resulting hazards.

The device must not be used as the sole means of preventing hazardous conditions on machines and systems.

For safety and warranty reasons, any modifications beyond the described operating procedures may only be performed by personnel authorized by the manufacturer. Unauthorized modifications or alterations are expressly prohibited. For safety reasons, only accessories specified by the manufacturer may be used.

The device complies with the requirements of all relevant EU directives. This is confirmed by the CE marking affixed to the device. The corresponding EU Declaration of Conformity can be requested or downloaded from the website.

2.4 Equipment for Potentially Explosive Atmospheres

If a device is installed and operated in potentially explosive atmospheres, the general Ex installation regulations (EN/IEC 60079-14, VDE 0165), these operating instructions, the EU type examination certificate, or the IECEx certificate of conformity, including any supplements, must be observed.
The installation of equipment in potentially explosive atmospheres must be performed by qualified personnel.

The devices are designed to measure levels in potentially explosive atmospheres. The measured media may include flammable liquids, gases, mists, vapors, or dusts.

Maximum permissible values for intrinsically safe circuits:

		B4_C _ _ _ _ _ _X...	**B4_C _ _ _ _ _ _A...**
Voltage	Ui	30 V	30 V
Current	Ii	300 mA	300 mA
Power	Pi	900 mW	900 mW
Effective internal capacitance	Ci	1.3 nF + (0.2 nF/m * Lc)	1.3 nF + (0.2 nF/m * Lc)
Effective internal inductance	Li	5 µH + (2.5 µH/m * Lc)	5 µH + (6.5 µH/m * Lc)
Maximum cable length	Lc	150 m	60 m

The intrinsically safe signal and power supply circuit is safely galvanically isolated from parts that can be grounded.

The device with overvoltage protection Hydrocont B4_ C _ _ _ _ _ _ _A... is considered grounded for safety purposes. Sufficient equipotential bonding must be ensured along the entire length of the cable run. The cable shield must be connected to the equipotential bonding system of the potentially explosive area. The intrinsically safe circuit must be installed without grounding.

For device models with chargeable plastic parts, a warning label indicates the safety measures that must be followed regarding the risk of electrostatic charging during operation and, in particular, during maintenance work:

- Avoid friction
- Do not dry clean
- Do not install in a pneumatic conveying system

If there is a risk of swinging or oscillation, the device must be effectively secured against these hazards.

CATEGORY 1

The device in the electronic output version [09-X] may be installed in potentially explosive atmospheres where Category 1 equipment is required.

Category 1 equipment may be operated in potentially explosive atmospheres where Category 1 equipment is required only if atmospheric conditions are met (temperature—see the following tables; pressure from 0.8 bar to 1.1 bar).

Category 1 equipment must be connected to intrinsically safe circuits with protection level ia.

CATEGORY 2

The device in the electronic output versions [09-A] or [09-X] may be installed in potentially explosive atmospheres where Category 2 equipment is required.

Category 2 equipment may be connected to intrinsically safe circuits with protection level ib.

For applications requiring EPL Ga or Gb devices, the following values apply:

Ex Marking	Ambient/Media Temperature Range
II 1 G Ex ia IIC T6 Ga II 2 G Ex ib IIC T6 Gb	-20°C…+42°C
II 1 G Ex ia IIC T5 Ga II 2 G Ex ib IIC T5 Gb	-20°C…+57°C
II 1 G Ex ia IIC T4...T1 Ga II 2 G Ex ib IIC T4...T1 Gb	-20°C…+70°C

For applications requiring EPL Da or Db devices, the following values apply:

Ex Marking	Ambient / Medium Temperature Range
II 1 D Ex ia IIIC T_{200} 100°C Da	-20 °C ... +35 °C
II 1 D Ex ia IIIC T_{200} 120°C Da	-20 °C ... +55 °C
II 2 D Ex ib IIIC T80°C Db	-20 °C ... +42 °C
II 2 D Ex ib IIIC T95°C Db	-20 °C ... +57 °C
II 2 D Ex ib IIIC T108°C Db	-20 °C ... +70 °C

3 Product Description

3.1 Function

The device is an electronic hydrostatic level transmitter for monitoring, controlling, and continuously measuring liquid levels and temperatures.

The device is suitable for level measurement applications in virtually all industrial sectors, particularly for fresh water, wastewater, and saltwater.

The highly accurate, long-term stable, and robust ceramic measuring cell, the heavy-duty stainless steel housing, and the double-walled, double-sealed, dimensionally stable support cable ensure reliably precise measurements and enable operation even under demanding environmental conditions, such as low temperatures or high shock and vibration loads.

The hydrostatic fluid pressure acts directly (dry system) via the process membrane on the capacitor mounted on the rear side, causing a change in capacitance there, which is then processed.

An integrated, long-term stable platinum temperature sensor is used for optional temperature measurement.
In the RS485 Modbus-RTU version, the measured temperature value can be read via the digital interface; in the 4...20 mA FSK current version, the resistance signal can be evaluated in parallel with the pressure-related analog current signal using 3-wire technology.

Parameterization and operation can be performed via the integrated wired interface.

3.2 Design

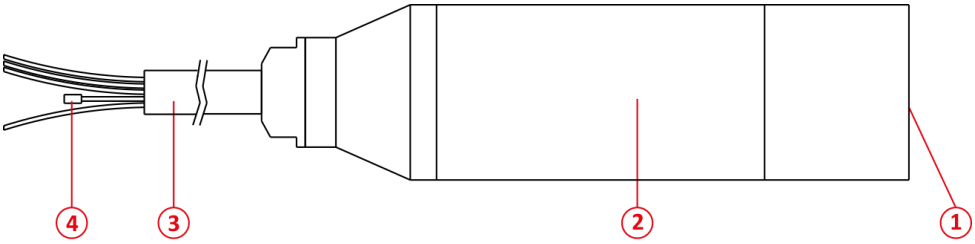

Figure 3.1: grf00001_cmp_b4s

1 Pressure transducer, optionally with temperature sensor
2 Electronics housing
3 Support cable with capillary tube

4 Ventilation/Pressure Compensation

Ceramic pressure diaphragm (1) for measuring hydrostatic fluid pressure.
A platinum temperature sensor, thermally coupled to the metal housing wall, is optionally integrated.

Fully encapsulated signal processing electronics inside the housing tube (2).

Length-stable support cable (3) with steel shielding braid. The reference air supply required for relative pressure measurement is provided via a capillary tube with a filter attachment (4) integrated into the support cable.

Laser-etched labeling on the nameplate affixed to the housing tube (2) ensures the device's identifiability throughout its entire service life.

3.3 Nameplate

The nameplate contains the most important data for identifying and using the device.

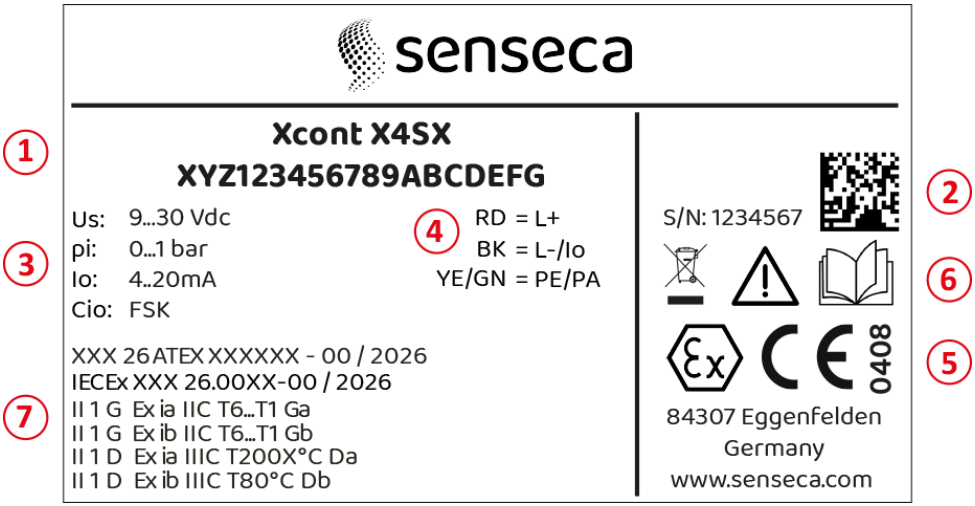

Figure 3.2: grf00002_lab001

1 Product code
2 Serial number
3 Technical Specifications
4 Electrical Connection
5 Approvals

6 Safety Instructions
7 Type of ignition protection

3.4 Product Code

B4 [01][02][03][04][05][06][07][08][09][10][11][12][13][14][15][80][94/95/96/97/98/99]

	Device	**B4**	**Level sensor D40 mm**
01	Model	S	Standard
02	Sensor	C	capacitive – flush-mounted / 99.9% Al_2O_3 ceramic
03	Approval	S	Standard
03		X	ATEX: II 1 G Ex ia IIC T6...T1 Ga / II 1 D Ex ia IIIC T_{200}X°C Da
03		Z	ATEX: II 2 G Ex ib IIC T6...T1 Gb / II 2 D Ex ib IIIC TX°C Db
04	Process connection	0	without
05	Process Seals	1	FKM/FPM
05		3	EPDM (FDA)
05		4	FFKM
05		6	FFKM, high-density
06	Process connection	V	CrNi steel
06		D	CrNi steel, duplex, seawater-resistant
06		6	PEEK
07	Connection housing	0	without
08	Measurement Range (PV)	26	0...50 mbar
08		01	0...100 mbar
08		02	0...200 mbar
08		03	0...400 mbar
08		04	0...600 mbar

08		05	0…1 bar
08		07	0…2 bar
08		08	0…4 bar
08		09	0…6 bar
08		10	0…10 bar
08		12	0…20 bar
08		0A	0…1 mH_2O
08		0B	0…2 mH_2O
08		0C	0…4 mH_2O
08		0M	0…5 mH_2O
08		0D	0…6 mH_2O
08		0E	0…10 mH_2O
08		0F	0…20 mH_2O
08		0L	0…25 mH_2O
08		0G	0…40 mH_2O
08		0J	0…50 mH_2O
08		0K	0…60 mH_2O
08		0H	0…100 mH_2O
09	Electronics – Output	A	Current 4…20 mA, FSK, 2-wire, overvoltage protection - [03-S/03-Z]
09		X	Current 4…20 mA, FSK, 2-wire
09		V	RS485 Modbus-RTU, 4-wire, surge protection - [03-S]
10	Electronics – Function	0	without
10		1	Temperature Pt100-B, 3-wire – IEC 60751 - [03-S]/[09-A/09-X]
10		3	Temperature -20...+70 °C (-4…+158 °F) - [09-V]

11	Process temperature	0	-20...+70°C (-4...+158 °F)
12	Pressure variant (PV)	R	Relative pressure
13	Measurement Accuracy (PV)	1	0.2%
13		3	0.1%, linearity certificate
13		6	Xcellence – 0.05% [08 ≥ 200 mbar/2 mH_2O], linearity report
14	Electrical Connection	K	Cable, stranded wire assembly
14		0	Cable, unterminated
15	Support cables	A	PE cable jacket
15		E	FEP cable jacket
80	Length L1	/##### #	mm (≤ 300,000 mm / Ex ≤ 150,000 mm / Ex ≤ 60,000 mm)
94	Additional option	+SF	LABS-free, silicone-free / Paint-compatible formulation
95	Optional add-on	+ML	Measurement point designation / TAG - Laser marking
96	Additional option	+MZ	Material Test Certificate – EN 10204 3.1
97	Additional Option	+WT	Factory Certificate – Suitability for Drinking Water
98	Additional Option	+KF	Configuration / Default Settings
99	Additional Option	+WK	Factory Calibration – Calibration Certificate

Variants are generally identified by the letter Y in the product code.

3.5 Dimensions

Dimensions in mm

[06-6] = Specifications for process connection – PEEK

3.5.1 Electrical Connection – Cable, Stranded Wire Assembly – [14-K]

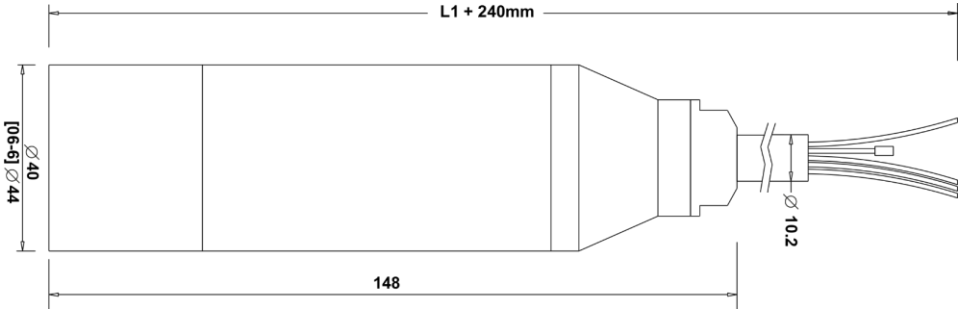

Figure 3.3: grf00004_dim_b4sc_k

3.5.2 Electrical connection – cable, without termination – [14-0]

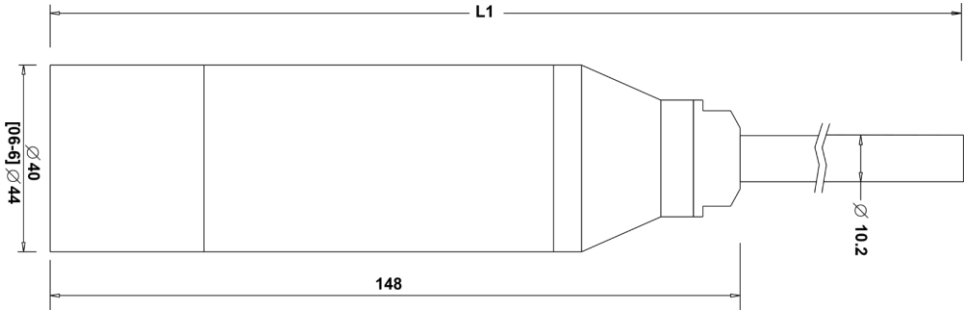

Figure 3.4: grf00003_dim_b4sc_0

3.6 Packaging, Transport, Storage

The device is protected by packaging designed to withstand normal transport stresses. Transport must be carried out in accordance with the instructions on the shipping packaging. Failure to do so may result in damage to the device.

Upon receipt, the shipment must be inspected immediately for correctness, completeness, and any transport damage. Any transport damage or hidden defects found must be handled accordingly.

The packages must be kept sealed until installation and, unless otherwise specified, stored only under the following conditions:

- Do not store outdoors
- Store in a dry, dust-free location
- Do not expose to corrosive substances

- Protect from direct sunlight
- Avoid mechanical shocks
- Storage and transport temperature: -20…+85 °C
- Relative humidity 20…85 %

3.7 Accessories

A comprehensive range of accessories, optimally tailored to the device, is available for installation and electrical connection.

4 Installation

4.1 Ambient and Process Conditions

Correct operation of the device within the specified technical data can only be guaranteed if the permissible ambient and process conditions at the installation site (see the Technical Data section) are not exceeded. Therefore, before installation, ensure that all parts of the device in contact with the process (e.g., measuring diaphragm, process seal, housing, connection cable) are suitable for the prevailing process conditions (e.g., process pressure, process temperature, chemical properties of the media, abrasion, mechanical stresses).

4.2 Installation Location

Install the device in a location free of flow and turbulence, or use a guide tube. The inner diameter of the guide tube should be at least 1 mm larger than the outer diameter of the device.

Install the device below the lowest measurement point.

Do not install the device in the flow stream, in the suction zone of a pump, or at a location in the tank where it may be subjected to pressure pulses from an agitator.

The device should be installed in a location with a stable temperature whenever possible. Significant fluctuations in process temperature can cause temporary increases in measurement signal deviations.

If the temperature falls below the dew point—e.g., cold process medium at high ambient temperature—condensation may form in the pressure sensor, which can lead to temporary increased measurement deviations or malfunctions. These deviations are completely reversible once the condensation dries out.

The cable end must terminate in a dry room or in a suitable junction box.

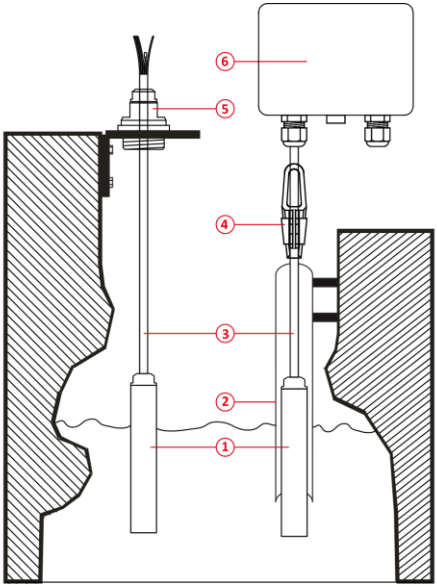

Figure 4.1: grf00005_ins_hp4s

1 Level Sensor
2 Guide tube
3 Support cable (bending radius > 100 mm)
4 Tension clamp – see accessories
5 Mounting screw – see accessories
6 Field housing – see accessories

4.3 Installation Instructions

Do not remove the packaging until immediately before installation, and inspect the device for any damage.

The transport protection cap attached to the process connection or the diaphragm must not be removed until immediately before installation. The transport protection cap must be removed. The diaphragm must not be damaged.

Contamination or damage to the pressure-compensating capillary can lead to incorrect measurement results.

If the cable is shortened, the filter must be reattached to the pressure-compensating hose.

WARNING

Install the device only when the system is depressurized. There is a risk of rapidly escaping measured media or a pressure surge.

WARNING

Allow the system to cool sufficiently before installation. There is a risk from escaping, hazardous, and hot measured media.

5 Electrical Connection

5.1 Electronics Output – Current 4...20 mA, FSK – [09-A]/[09-X]

5.1.1 Function

The digital communication protocol uses Frequency Shift Keying (FSK) technology and is superimposed on the 4…20 mA analog sensor signal. This enables two-way communication with the field and thus the transmission of additional information—beyond the normal process variables—to or from a smart field device.

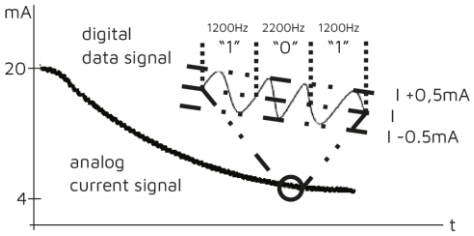

Figure 5.1: grf00006_eac_fsk

The communication protocol operates at 1,200 bits/s without interrupting the 4…20 mA signal and enables the host application (master) to receive two or more digital updates per second from a smart field device. The digital signal does not interfere with the 4…20 mA signal.

The communication protocol provides two simultaneous communication channels: the analog 4–20 mA signal and a digital signal. The 4–20 mA signal transmits the primary measured value via the 4–20 mA current loop, the fastest and most reliable industry standard. The digital signal provides additional information from the device, including device status, diagnostic data, additional measured values, or calculated values, etc. The combination of these two principles in a single installation enables a cost-effective, exceptionally robust, and comprehensive field communication solution that is easy to use and conFigure .

5.1.2 Pin Assignment

Current 4...20 mA, FSK, non-hazardous area – [10-0]

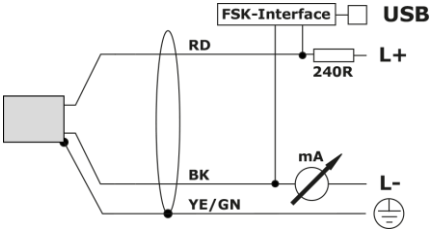

Figure 5.2: grf00007_eac_cab_2p_2w_ma_fsk

Current 4...20 mA, FSK, Pt100–3W, non-hazardous area – [10-1]

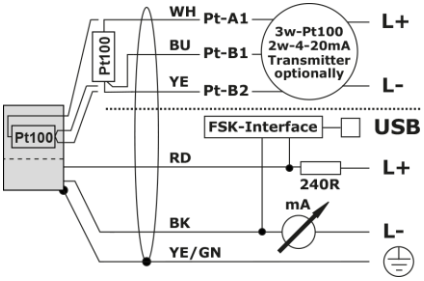

Figure 5.3: grf00018_eac_cab_5p_2w_ma_fsk_3w_pt_b4

Current 4–20 mA, FSK, hazardous area

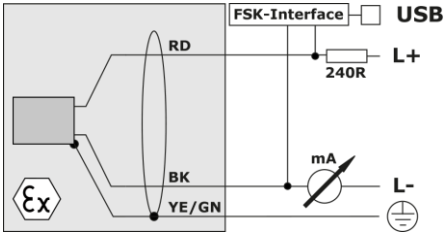

Figure 5.4: grf00009_eac_cab_2p_2w_ma_fsk_ex

Current 4...20 mA, hazardous area

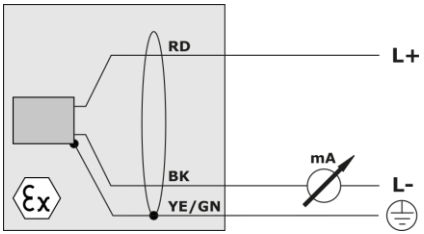

Figure 5.5: grf00010_eac_cab_2p_2w_ma_ex

NOTE
Include a 240 Ω resistor in the +L line for connecting an FSK communication device.

5.1.3 Connection cable

Use a 2- or 5-wire, twisted-pair, shielded cable.
Cable colors: RD = red / BK = black / WH = white / BU = blue / YE = yellow / YE/GN = yellow/green

5.1.4 Connection Instructions

WARNING
Install the device only when it is de-energized.

NOTE
Switch off all connected control devices before commissioning.

Observe the maximum permissible supply voltage Us at the L+/L- terminals:

- Us = 9...35 Vdc
- Example: Us = 9...30 Vdc

Observe the maximum permissible load resistance RL of the analog output:

- RL ≤ (Us – 9 V) / 22.2 mA

Ground the device, preferably via the metal housing, or alternatively via the cable shield.
Route the cable separately from power-carrying lines.

5.1.5 Analog Output Io

An analog current signal is output, which corresponds to the device's nominal measurement range:

- 4 – 20 mA Output signal range 3.9...20.5 mA

Behavior of the output current value when the output signal range is exceeded:
Holds the end value of 3.9 mA / 20.5 mA

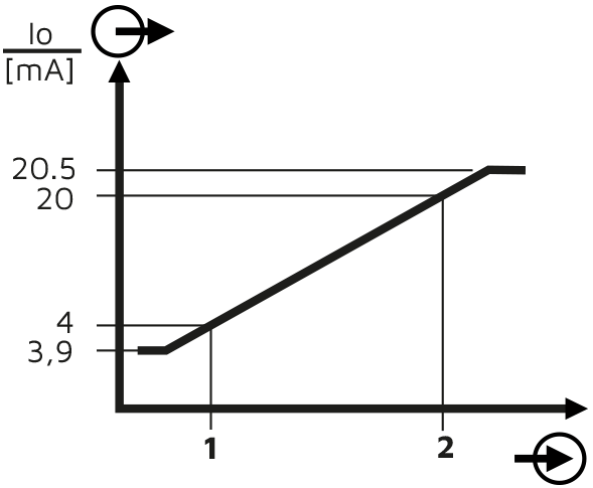

Figure 5.6: grf00181_fun_iout_4_20_hold_39_205

5.2 Electronics Output – RS485 Modbus-RTU – [09-V]

5.2.1 Function

The Modbus protocol is a communication protocol based on a master/slave architecture.
All devices are connected via two data lines (A+ / B-) and a COMMON line (C/L-).

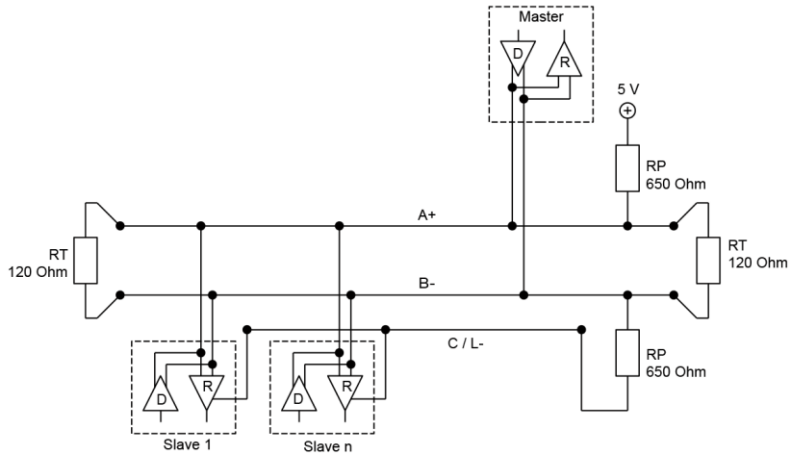

Figure 5.7: grf00011_eac_modbus_line_termination

A standard RS485 allows for the connection of 32 slaves in a single segment. The device has a load of only 1/8 of the standard load (Rin ≥ 96 kΩ), meaning that, theoretically, up to 256 of these devices can be operated in a single network segment. However, the number is limited to 247 by the Modbus address space.

The two terminating resistors RT prevent reflections on the data lines. The optimal resistance value depends on the characteristic impedance of the cable used; however, a value of 120 ohms is a common choice.

The polarization network is required to ensure appropriate potentials when none of the devices are transmitting and the A+ and B- lines are therefore undefined (high-impedance). The value of RP depends, for example, on the bus load or the terminating resistors. Recommended values range from 450 ohms to 650 ohms.
The use of a bias network is recommended to maintain a stable network. Typically, the bias resistors are built into the master device or can be enabled as needed.

Arrange the devices in a bus topology (line). Avoid branch lines.

5.2.2 Pin Assignment

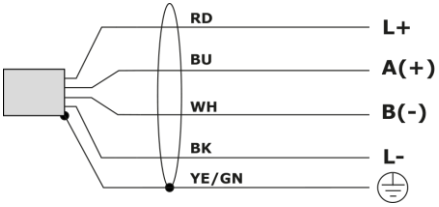

Figure 5.8: grf00012_eac_cab_4p_4w_rs485_b4.ai

5.2.3 Connection Cable

Use a 4-wire cable in accordance with the EIA485 recommendation:

Impedance	135…165 Ω @ 3…20 MHz
Cable capacitance	< 30 pF/m
Cable diameter	> 0.64 mm
Cable cross-section	0.34 mm² / AWG 22
Loop resistance	< 110 Ω/km
Shielding	Braided shield / shielding foil
Cable length	38,400 baud ≤ 1,200 m

Cable colors RD = red / BU = blue / WH = white / BK = black / YE/GN = yellow/green

5.2.4 Connection Instructions

WARNING

Install the device only when it is de-energized.

NOTE

Switch off all connected control devices before commissioning.

Observe the maximum permissible supply voltage Us at the L+/L- terminals:

- Us = 6…35 Vdc

Ground the device, preferably via the metallic process connection, or alternatively via the cable shield.

Route the cable separately from power-carrying lines; ground the cable shield.

6 Operation

6.1 Electronics Output – Current 4...20 mA, FSK – [09-A]/[09-X]

Configuration and data transmission are performed via a standard FSK interface, e.g., isHRT USB and configuration software.

Use of the isHRT CommDTM or ICS Generic HART DTM is recommended.

Instructions for installing and using the FSK interface and operating software are not included in this manual.

NOTE

If the damping is set to 0 s...<1 s, communication is active for only 20 s after the supply voltage is turned on. Once a communication connection is established, it remains active.

During this time, the damping is set to 1 s. After 4 minutes of inactivity, the connection is terminated and the damping is reset to the set value. When the damping is set to ≥ 1 s, a communication connection can be established at any time.

Factory Settings [Setting Range]

	Factory Setting	Description
Address	0 [0...15]	
Damping	1 s [0...60 s]	Time interval, dout = 100% din
Initial LRV value	Nominal lower setpoint = 4 mA	LRV < URV, din ≥ 25%
Final value URV	Nominal upper setpoint = 20 mA	LRV < URV, din ≥ 25%

6.2 Electronics Output – RS485 Modbus-RTU – [09-V]

Operation is performed via the wired interface.

Information regarding installation and use of the interface and operating software is not included in this manual.

Parameters

The parameter file and description can be downloaded from the manufacturer's website. Setting ranges and default values are specified for all parameters.

7 Troubleshooting and Fault Resolution

The system operator is responsible for taking appropriate measures to resolve any malfunctions that occur.

In the event of a malfunction, check:

Component / Area	Check	Remedy
Housing	Damage	Replace or return the device
Pressure diaphragm	Contamination	Clean the device or send it in
	Damage	Replace or return the device
Process seals	Damage	Replace the process seal
		Use a different sealing material if necessary
Pressure-compensating capillary	Contamination	Send the device in for repair
Supply voltage	Operating voltage present	Turn on operating voltage
		Check or repair the connection contacts
	Operating voltage polarity reversed	Reverse the polarity of the operating voltage
	Operating voltage too low	Adjust or repair
	Operating voltage too high	Send the device in for repair
	Load resistance too high	Increase operating voltage
	Connection cable is damaged	Send the unit in for repair

If the malfunction cannot be resolved, please contact the manufacturer.

8 Maintenance

The device is maintenance-free when used as intended.

Deposits adhering to the diaphragm can cause incorrect readings. In this case, clean the diaphragm regularly. Do not use sharp or hard tools, compressed air, or corrosive chemicals.
Device disassembly: See the “Disassembly” section.

9 Repair

The device is not intended for repair by the user. Repairs may only be performed by the manufacturer.

9.1 Disassembly

Wear appropriate protective clothing, e.g., safety goggles and gloves.

WARNING

Allow the device and system to cool sufficiently before disassembly. There is a risk from hot surfaces as well as leaking, hazardous, and hot measured media.

WARNING

Disassemble the device only when it is de-energized.

WARNING

Switch off all connected control units before disassembly.

After disassembly, the diaphragm must be fitted with a protective cap.

9.2 Returns

Returns can only be accepted if the device is accompanied by a decontamination declaration. The declaration is available for download on the website and must be fully completed and affixed to the outside of the packaging in a manner that protects it from the elements and ensures safe transport.

9.3 Disposal

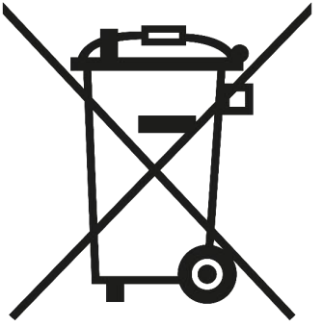

Figure 9.1: sym00001_weee_can

In accordance with EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), the product is marked with the symbol shown to minimize the disposal of WEEE as unsorted household waste. These products must not be disposed of as unsorted household waste and can be returned to the manufacturer for disposal. Returns are subject to the manufacturer's general terms and conditions or individually agreed terms.

10 Technical Specifications

Reference Conditions	Ta = +15...+25 °C (+59...+77 °F) / Pa = 860...1060 kPa / r.F. = 45...75 % Us = 24 Vdc ±0.1 V / ton = 240 s / vertical, sensor at the bottom
Measurement Deviation	EN/IEC 60770-1: Characteristic curve deviation – Setpoint adjustment
Response time	IEC 60751: Water / 0.4 m/s / temperature step 10 K

10.1 Inputs

10.1.1 Pressure/Level Input – [08-##]

Sensor Type	Capacitive cell					
Type code	[08-26]	[08-01]	[08-02]	[08-03]	[08-04]	[08-05]
Measuring range PN, rel. – FSI	0..0.05 bar	0..0.1 bar	0..0.2 bar	0..0.4 bar	0..0.6 bar	0..1 bar
Overload/burst pressure, rel	4 bar	4 bar	5 bar	8 bar	10 bar	10 bar
Vacuum, abs	0.7 bar	0.7 bar	0.5 bar	0 bar	0 bar	0 bar
Type code	[08-07]	[08-08]	[08-09]	[08-10]	[08-12]	
Measuring range PN, rel. – FSI	0..2 bar	0..4 bar	0..6 bar	0..10 bar	0…20 bar	
Overload/burst pressure, rel	18 bar	25 bar	40 bar	40 bar	60 bar	
Type code	[08-0A]	[08-0B]	[08-0C]	[08-0M]	[08-0D]	[08-0E]
Measurement Range PN, rel. – FSI	0..1 mH_2O	0..2 mH_2O	0..4 mH_2O	0..5 mH_2O	0..6 mH_2O	0..10 mH_2O
Overload/burst pressure, rel	4 bar	5 bar	8 bar	10 bar	10 bar	10 bar

Vacuum, abs	0.7 bar	0.5 bar	0 bar	0 bar	0 bar	0 bar
Type code	[08-0F]	[08-0L]	[08-0G]	[08-0J]	[08-0K]	[08-0H]
Measuring Range PN, rel. – FSI	0..20 mH_2O	0..25 mH_2O	0..40 mH_2O	0..50 mH_2O	0..60 mH_2O	0..100 mH_2O
Overload/burst pressure, rel	18 bar	25 bar	25 bar	40 bar	40 bar	40 bar

Resolution	FSI ≥ 16 bits
Characteristic curve deviation	≤ ±0.05% FSI / ±0.1% FSI / ±0.2% FSI
Hysteresis	negligible
Repeatability	negligible
Effect of auxiliary power	≤ ±0.002% FSI/V
Temperature influence	Tk zero point ≤ ±0.028 %FSI/K (≤ 0.4 bar/4 mH_2O)
	Zero point at Tk ≤ ±0.013 %FSI/K (> 0.6 bar/5 mH_2O)
	Temperature range ≤ ±0.028 %FSI/K (≤ 0.4 bar/4 mH_2O)
	Tk Span ≤ ±0.013 %FSI/K (> 0.6 bar/5 mH_2O)
Effect of Mounting Orientation	Measuring range ≤ 1 bar: ≤ +0.6 mbar (orientation: vertical, sensor at the top)
	Measuring range > 1 bar: ≤ +6 mbar (position: vertical, sensor at the top)
Long-term zero drift	≤ ±0.18 %FSI/year

10.1.2 Temperature Input – Pt100, 3-wire – [10-1]

Sensor type	Pt100 resistance / Class B / 3-wire – IEC 60751
Measuring range – FSI	-20…+70 °C (-4…. +158 °F)
Time Response	t90 ≤ 60 s
Measurement error	≤ ±0.3 K + 0.005 * [Tp]

10.1.3 Input Temperature – Pt1000 – [10-3]

Sensor Type	Resistance Pt1000 – IEC 60751
Measuring range – FSI	-20…+70 °C (-4…+158 °F)
Resolution	≤ ±0.01 K / FSI ≥ 16 bits
Characteristic Curve Deviation	≤ ±0.2 K + 0.005 * [Tp]
Long-term drift	≤ ±0.1 K/year

10.2 Outputs

10.2.1 Electronic output – current 4...20 mA, FSK – [09-A]/[09-X]

Interface – Cio	
Specifications	FSK / 1200 bits/s
Coupling resistance	≥ 240 Ω, external
Analog Output – Io	
Signal range	4…20 mA = Measurement range PV >> [08-##], limit value/error = 3.9…20.5 mA
Resolution	≤ 1 µA
Permissible load RL	≤ (Us – 9 V) / 20.5 mA
Effect of auxiliary power	≤ ±0.5 µA/V
Temperature effect Ta	≤ ±1 µA/K
Auxiliary power	
Supply voltage Us	[09-A/X]/[03-S]: 4…20 mA: 9…35 Vdc, reverse-polarity protected / ≤ 2 Vpp
	[09-A/X]/[03-X/Z]: 4…20 mA Ex: 9…30 Vdc, reverse-polarity protected / ≤ 2 Vpp
Input current Is	≤ 20.5 mA
Turn-on delay time	≤ 0.1 s (td = 0 s)

10.2.2 Electronics Output – RS485 Modbus-RTU – [09-V]

Interface - Cio	
Specifications	RS485, bidirectional / Modbus-RTU / 9600 baud (4800…38400 baud)
Input resistance	112 Ω
Time Response	Pressure/level signal: t90 ≤ 2 ms (td = 0 s)
	Temperature signal: t90 ≤ 60 s (td = 0 s)
Auxiliary power	
Supply voltage Us	6…35 Vdc, reverse-polarity protected / residual ripple ≤ 2 Vpp
Input current Is	≤ 10 mA (no load)
Turn-on delay time	≤ 0.1 s (td = 0 s)

10.3 Environmental conditions

Process temperature Tp	-20…+70° C (-4… +158 °F) [03-X/Z]: ATEX/IECEx: see certificate
Pressure cycles	≥ 100 million (1.2xPN)
Ambient temperature Ta	-20…+70 °C (-4… +158 °F) [03-X/Z]: ATEX/IECEx: see certificate
Protection class	IP68 [≤ 100 m/≤ 20 bar] (EN/IEC 60529)
Climate class	4K4H (EN/IEC 60721-3-4)
Impact resistance	50 g [11 ms] (EN/IEC 60068-2-27)
Vibration resistance	20 g [10…2000 Hz] (EN/IEC 60068-2-6)
EMC	Class B equipment / industrial environment (EN/IEC 61326)
Surge protection	Integrated surge protection (EN/IEC 61000-4-5)
[09-A]/[09-V]	Insulation voltage ≥ 50 Vdc / Rated discharge current 10 kA (8/20 µs)
Protection class	III

Pollution degree	4
Operating altitude	2,000 m above sea level
MTTF	463.4 years
Weight	[06-V/D]: 0.9 kg + (L1 × 0.068 kg/m) [06-6]: 0.6 kg + (L1 × 0.068 kg/m)

10.4 Materials

In contact with the process	Ceramic Al_2O_3 99.9% Steel 1.4404/316L, Steel 1.4462/318LN (duplex), PEEK FKM/FPM, EPDM, FFKM, PE, FEP
Support cable	Breaking strength of steel shield: ≥ 920 N Bending radius: ≥ 100 mm Strand cross-sectional area: 0.22 mm² Resistance: 90 ohms/km

11 Revision

Version	Changes
UMN07.26	Initial release

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