OCTOGON

MANUAL

FPMB

INTRINSICALLY SAFE HART LEVEL PROBE

Operating manual



Document	Version	Date	Applies to
Operating manual	V00x	10/2026	FPMB, all input ranges, CrNi steel and Hastelloy

Intrinsically safe level probe with HART communication for applications in hazardous environments.

octogon GmbH · Roseggerstrasse 16 · 8700 Leoben · Austria · office@octogon.org

www.octogon.org

Contents

1 Important details for your information ... 2
1.1 Device ... 2
1.2 Use according to regulations ... 2
1.3 Knowledge required ... 3
2 A quick overview for you ... 3
3 Signs, symbols, abbreviations ... 3
4 Function ... 3
5 For your safety ... 4
6 Packaging ... 4
7 Starting, operation ... 5
7.1 Diaphragm test for your safety ... 5
7.2 Mechanical connection ... 5
7.3 Installation in / mounting to Zone 0 ... 5
7.4 Warning with regard to heat sources near the place of installation ... 5
7.5 Mounting, electrical connection ... 5
7.6 HART communication ... 6
7.7 Functional test ... 6
8 Maintenance, accessories ... 6
9 Trouble shooting ... 7
10 Storage, disposal ... 7
11 Technical data ... 8
11.1 Input ranges (in bar) ... 8
11.2 Electrical and measuring data ... 8
11.3 Mechanics and dimensions ... 8
11.4 Data of the EC-type examination certificate BVS 12 ATEX E 066 X ... 9
12 Conformity ... 9

1 Important details for your information

1.1 Device

Feature	Version
Device	intrinsically safe level probe (hydrostatic) with HART communication, 4 ... 20 mA, 2-wire
Input ranges	0.1 ... 10 bar (section 11)
Material	CrNi steel, option Hastelloy (HC4)
Explosion protection	ATEX II 1G Ex ia IIA T4 Ga, BVS 12 ATEX E 066 X
Manufacturer type	PT-HL

Read this operating manual before installing and starting the level probe. Keep the operating manual in a place that is accessible to all users at any time. The following installation and operating instructions have been compiled with great care but it is not feasible to take all possible applications into consideration. These installation and operation instructions should meet the needs of most pressure measurement applications. If questions remain regarding a specific application, you can obtain further information from the FPMB data sheet or from octogon.

If the serial number on the product label gets illegible (e.g. by mechanical damage or repainting), the retraceability of the instrument is not possible any more.

The level probes, described in this operating instructions, are carefully designed and manufactured using state-of-the-art technology. Every component undergoes strict quality and environmental inspection before assembly.

1.2 Use according to regulations

Use the intrinsically safe level probe to transform the hydrostatic pressure into an electrical signal in hazardous areas.

Certificate ATEX: Level probe for operation in hazardous areas in compliance with the respective certificate (see attached EC-type examination certificate BVS 12 ATEX E 066 X).

ATEX approval ratings: for gases and mist: Mounting to Zone 0; installation in Zone 0, Zone 1 and Zone 2.

1.3 Knowledge required

Install and start the level probe only if you are familiar with the relevant regulations and directives of your country and if you have the qualification required. You have to be acquainted with the rules and regulations on hazardous areas, measurement and control technology and electric circuits, since this level probe is defined as „electrical equipment“. Depending on the operating conditions of your application you have to have the corresponding knowledge, e.g. of corrosive media.

2 A quick overview for you

If you want to get a quick overview, read chapters 3, 5, 7 and 10. There you will get some short safety instructions and important information on your product and its starting. Read these chapters in any case.

3 Signs, symbols, abbreviations

Sign	Meaning
Warning	Potential danger of life or of severe injuries.
Warning	Potential danger of life or of severe injuries due to catapulting parts.
Warning (Ex)	Instructions for hazardous areas: Potential danger of life or of severe injuries.
Caution	Potential danger of burns due to hot surfaces.
Notice	Notice, important information, malfunction.
CE	The product complies with the applicable European directives.
ATEX	European guideline for explosion protection (Atmosphäre = AT, Explosion = EX). The product complies with the requirements of the European directive 2014/34/EU (ATEX) on explosion protection.
2-wire	Two connection lines are intended for the voltage supply. The supply current is the measurement signal.

4 Function

The hydrostatic pressure prevailing within the application is transformed into a standardised electrical signal through the deflection of the diaphragm, which acts on the sensor element with the power supply fed to the level probe. This electric signal changes in proportion to the hydrostatic pressure and can be evaluated correspondingly.

5 For your safety

Warning Select the appropriate level probe with regard to scale range, performance and specific measurement conditions prior to installing and starting the instrument.
– Observe the relevant national regulations and observe the applicable standards and directives for special applications. If you do not observe the appropriate regulations, serious injuries and/or damage can occur!
– Please make sure that the level probe is only used within the overload threshold limit all the time!
– Observe the ambient and working conditions outlined in section 11 „Technical data".
– Ensure that the level probe is only operated in accordance with the provisions i.e. as described in the following instructions.
– Do not interfere with or change the level probe in any other way than described in these operating instructions.
– Remove the level probe from service and mark it to prevent it from being used again accidentally, if it becomes damaged or unsafe for operation.
– Take precautions with regard to remaining media in removed level probes. Remaining media in the pressure port may be hazardous or toxic!
– Have repairs performed by the manufacturer only.

Information about material consistency against corrosion and diffusion can be found in the materials data sheet according your application:

Material	Designation	Material no.
1. Stainless steel		1.4571
2. Hastelloy	HC4	2.4610

Ex instruction Consider the details given in the EC-type examination certificate as well as the respective country specific regulations for installation and operation in hazardous areas. If you do not observe these stipulations, serious injuries and/or damage can occur.

6 Packaging

Has everything been supplied?

Notice Check the scope of supply: completely assembled level probes, EC-type examination certificate.
– Inspect the level probe for possible damage during transportation. Should there be any obvious damage, inform the transport company and octogon without delay.
– Keep the packaging, as it offers optimal protection during transportation (e.g. changing installation location, shipment for repair).
– Ensure that the connection contacts will not be damaged.

7 Starting, operation

7.1 Diaphragm test for your safety

It is necessary that before starting the level probe you test the diaphragm, as this is a safety-relevant component.

Warning – Pay attention to any liquid leaking out, for this points to a diaphragm damage.
– Use the pressure transmitter only if the diaphragm is undamaged.
– Use the pressure transmitter only if it is in a faultless condition as far as the safety-relevant features are concerned.

7.2 Mechanical connection

Notice – An additional strain relief is not necessary because the cable has a max. tensile strength of 500 N.
– The protection cap (A) protects the secluded diaphragm (B) from damaging the level probe during transport and immersion. Remove the protection cap if used with viscous or contaminated media.

Ex instruction – Protect the diaphragm against any contact with abrasive substances and pressure peaks and do not touch it with tools. If you damage the diaphragm, no intrinsic safety can be guaranteed (ATEX)!
– Observe the technical data for the use of the pressure transmitter in connection with aggressive or corrosive media and for the avoidance of mechanical hazards.

7.3 Installation in / mounting to Zone 0

(In general Zone 0 is given when the pressure transmitter is surrounded by a mixture of explosive gases more than 1,000 hours per year = continuous hazard.)

Ex instruction – Include the screen/sheath of the connection line used as a suspension rope in the equipotential bonding of the container.
– For separation of the zones the bulkhead cable gland in the wall must have the ingress protection according to IEC 60529 namely for zone 0: IP67.
– Integrate an overvoltage protection, if the mounting position is less than 1 m away from the transition into Zone 0.

7.4 Warning with regard to heat sources near the place of installation

Warning When fixing the place of installation take into consideration the influence of heat sources near the place of installation, e.g. heating coils on the tank bottom. The place of installation has to be chosen in a way which prevents external heat sources to exceed the allowed working temperature.
– When exceeding the maximum allowed working temperature the ATEX approval expires and damage of the device is possible (loss of warranty).

7.5 Mounting, electrical connection

Notice – Operate the level probe with a shielded cable and earth the shield at least on one side of the cable, if the cable is longer than 30 m (2-wire), or if it is run outside of the building.
– There must be no difference in potential between medium/tank and the grounding of the junction box and the control cabinet when the shield of the cable is applied.
– Please make sure that the ends of cables with flying leads do not allow any ingress of moisture.

Ex instruction Ground the cable screen at one end, preferably in the safe, thus non-Ex, area (EN 60079-14).
– For devices with flying leads, the screen is connected to the housing. The simultaneous connection of housing and cable screen to ground is only permitted if ground loop problems between the screen connection (e.g. at the power supply) and housing can be excluded (see EN 60079-14).
– If the housing of the transmitter is not grounded and is likely to be subjected to any electrostatic charging (EN 60079-14, 6.3 paragraph 4) or if the level probe is to be operated in Zone 0, the cable screen should be connected to the equipotential bonding.
– See also BVS 12 ATEX E 066 X.
– Supply the level probe from an intrinsically safe current circuit (Ex ia).
– Consider both the internal capacitance and inductance.
– Cover flying leads with fine wires by an end splice (cable preparation).

– Consider that cables for use in zones 1 and 2 must be checked with a test voltage between conductor/earth, conductor/screen of more than 500 V (AC).

Notice With a line transformer, which has to be suitable for HART communication, you realise the mandatory galvanic isolation of the voltage and current supply between hazardous and non-hazardous areas and ensure the safety connection data.

Connection lead	Function
red	+ supply / + signal
black	– supply / – signal

Examples of connection

Example	Non-Ex area	Supply isolator	Ex area
1	e.g. SPC, controller, recorder	power supply at the supply isolator	level sensor (HART), shielded cable; shield earthed on the side of the supply isolator
2	e.g. SPC, controller, recorder, power supply in the circuit to the supply isolator	without separate power supply	as example 1

Supply isolator for the supply of intrinsically safe 2-wire transmitter (suitable for HART). Maximum values: voltage 30 V DC, current 100 mA, power 1 W.

7.6 HART communication

Notice – In the intrinsically safe circuit (to and within Ex-area) the device for the HART communication has to be intrinsically safe.
– For the HART communication a load resistance of minimum 250 Ω is necessary; when needed it has to be connected in addition.
– When the HART communication will be used in the non Ex-area the supply isolator has to be suitable for HART communication.

7.7 Functional test

Notice The output signal must be proportional to the pressure. If not, this might point to a damage of the diaphragm. In that case refer to chapter 9 „Trouble shooting“.

Warning – Observe the ambient and working conditions outlined in section 11 „Technical data“.
– Please make sure that the level probe is only used within the overload threshold limit at all times!

Caution When touching the level probe, keep in mind that the surfaces of the instrument components might get hot during operation.

8 Maintenance, accessories

Notice – The level probes require no maintenance.
– Have repairs performed by the manufacturer only.

Accessories: For details about the accessories, please contact octogon.

9 Trouble shooting

Warning – Take precautions with regard to remaining media in removed level probes. Remaining media in the pressure port may be hazardous or toxic!
– Remove the level probe from service and mark it to prevent it from being used again accidentally, if it becomes damaged or unsafe for operation.
– Have repairs performed by the manufacturer only.

Notice Do not insert any pointed or hard objects into the pressure port for cleaning to prevent damage to the diaphragm.

Please verify in advance if pressure is being applied (valves/ball valve etc. open) and if the right voltage supply and the right type of wiring (2-wire) has been chosen.

Failure	Possible cause	Procedure
Signal span dropping off; signal span too small	Diaphragm is damaged, e.g. through impact, abrasive/aggressive media; corrosion of diaphragm/pressure connector; transmission fluid missing	Contact octogon and replace the instrument
Signal span drops off	Moisture present (e.g. at the cable tail)	Install the cable correctly
Signal span erratic; signal span incorrect	Working temperature too high/low	Ensure permissible temperatures as per operating manual
Abnormal zero point signal	Medium or ambient temperature too high/low	Control internal instrument temp. within permissible range; observe allowable temperature error (see operating instructions)
Abnormal zero point signal	Diaphragm is damaged, e.g. through impact, abrasive / aggressive media, corrosion of diaphragm or pressure connector	Replace instrument
Abnormal zero point signal	Working temperature too high / low	Ensure permissible temperatures as per the operating instructions
Zero point signal unstable; zero point signal too high/low	Moisture present (e.g. at the cable tail)	Install the cable correctly, filter element insertion
Hot instrument case surface	Permissible ambient or medium temperature exceeded	Ensure permissible ambient/medium temperature limits are observed (see operating instructions)
No output signal	No/wrong voltage supply or line transient	Correct the voltage supply according operation instructions

Make sure that after the assembly the unit is working properly. In case the error continues to exist send in the instrument for reparation (or replace the unit). If the problem persists, contact octogon.

Providing service

Purge / clean dismounted instruments before returning them in order to protect employees and the environment from any hazard caused by adherent remaining media. An examination of faulty devices is only possible with a detailed description of the error.

10 Storage, disposal

Warning When storing or disposing of the level probe, take precautions with regard to remaining media in removed level probes. Cleaning the level probe properly and carefully is recommended. Remaining media in the pressure port may be hazardous or toxic!

Storage

Mount the protection cap when storing the pressure transmitter in order to prevent any damage to the diaphragm.

Disposal

Dispose of instrument components and packaging materials in accordance with the respective waste treatment and disposal regulations of the region or country to which the instrument is supplied.

11 Technical data

11.1 Input ranges (in bar)

Pressure range	Over pressure safety	Burst pressure	preferred
0.1	1	2	
0.16	1.5	2	
0.25	2	2.4	
0.4	2	2.4	preferred
0.6	4	4.8	
1	5	6	preferred
1.6	10	12	
2.5	10	12	preferred
4	17	20.5	
6	35	42	
10	35	42	

Preferred ranges are marked with ** in the source (here column „preferred“).

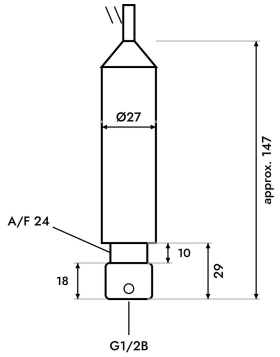
11.2 Electrical and measuring data

Item	Value
Power supply	UB = 16 ... 30 V DC (maximum current consumption: < 25 mA)
Output signal	4 ... 20 mA, 2-wire, with superimposed communication signal (HART protocol)
Load	R = (UB – 16 V) / 0.02 A – (length of cable in m × 0.14 Ω) (HART communication: a communication resistance of 250 Ω has to be taken into account)
Accuracy (according to BFSL)	up to 0.25 bar: 0.25 % of span, above 0.25 bar: 0.125 % of span
Accuracy*	up to 0.25 bar: 0.5 % of span, above 0.25 bar: 0.25 % of span
Non-linearity	0.2 % of span (according BFSL)
Non-repeatability	0.1 % of span
1-year stability	0.2 % of span (at reference conditions)
Adjustment	adjusted in vertical mounting position with lower pressure connection
Temperature ranges	operation range HART transmitter and FEP cable: –10 ... +85 °C; more details about temperature ranges are included in the EC-type examination certificate; storage range: –10 ... +60 °C
Compensated temperature range	0 ... +50 °C
Temperature coefficient	mean TC of zero: 0.2 % of span / 10 K; mean TC of zero: 0.4 % of span / 10 K (ranges up to 0.25 bar); mean TC of range: 0.2 % of span / 10 K
CE conformity	pressure equipment directive: 2014/68/EU; EMC directive: 2014/30/EU; ATEX directive: 2014/34/EU
Ex protection	according ATEX (category: II 1G)
Ignition protection type	Ex ia IIA T4; EPL level: Ga – for this take into account the data of the belonging EC-type examination certificate (section 11.4)
Wiring protection	short-circuit protection: permanent; reverse polarity protection: no damage, but no function, too

* including non-linearity, hysteresis, zero point and full scale error

11.3 Mechanics and dimensions

Item	Value
Materials	case, covering cap: CrNi steel (1.4571), option: Hastelloy (HC4); cable: FEP; internal transmission fluid: synthetic oil
Weight	approx. 200 g; cable: approx. 80 g per m cable
Covering cap	for transport and storage; if the sensor is used as an immersion probe: can be removed when medium is dirty or viscous



Dimensions in mm, process connection G1/2B, width across flats 24.

11.4 Data of the EC-type examination certificate BVS 12 ATEX E 066 X

Parameter	Value
Marking	II 1G Ex ia IIA T4 Ga
Maximum input voltage Ui	DC 30 V
Maximum input current Ii	100 mA
Maximum input power Pi	1 W
Effective internal capacitance Ci	„vernachlässigbar“ (negligible)
Effective internal inductance Li	„vernachlässigbar“ (negligible)
Ambient temperature range Ta	–10 °C ... +85 °C
Special condition for safe use	„Die Tauchsonde muss mit in den Potentialausgleich einbezogen werden.“ (certificate wording: the immersion probe must be included in the equipotential bonding)

Data as stated in the certificate (annex, parameters and special conditions); the certificate is issued in German.

12 Conformity

The manufacturer's EU declaration of conformity states for this device:

Directive	Applied standards / certificate
2014/30/EU	DIN EN 61000-6-2, DIN EN 61000-6-4, DIN EN 61000-4-2 and DIN EN 55011
2014/34/EU	EC type examination certificate BVS 12 ATEX E 066 X; EN 60079-0:2009, EN 60079-11:2007 and EN 60079-26:2007; notified body number 0158

The declaration of conformity and the type examination certificate are available from octogon on request.