Operating Manual

PT-IL

Content

1 General

Information

- The level probe, as described in this operating manual, is carefully designed and manufactered using state-of-the-art technology. All components are subject to strict quality and environmental criteria during production. Our management system is certified to ISO 9001.
- This operating manual includes important information on handling the level probe. Basis for safe workings is the compliance with all given safety and work instructions.
- Observe the relevant local accident prevention regulations and general safety regulations for the instrument‘s range of use.
- The operating instructions are part of the product and must be kept in the immediate vicinity of the instrument and readily accessible to skilled personnel at any time.
- Skilled personnel must have carefully read and understood the operating instructions prior to beginning any work.
- The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compliance with these operating instructions, assignment of insufficiently qualified skilled personnel or unauthorised modifications to the instrument.
- The general terms and conditions contained in the sales documentation shall apply.
- The level probe is subject to technical modifications.
- Further information: Internet: www. mueller-ie.com
  Data sheet: PT-IL
  Consulting: +49-05032-9672-0

Signs

Warning!
Non-compliance can cause injuries to persons and/or can be a danger to life.

Attention!
Non-compliance can cause faulty device operation or lead to device demolition.

Information!
Non-compliance can influence device operation or cause unintentional device reactions.

CE marking
Level probes bearing this mark comply with the relevant European directives.

ATEX explosion protection
The product complies with the requirements of the European directive 2014/34/EU (ATEX) on explosion protection.

Abbreviations

2-wire:	The two connection lines are used for the voltage supply. The measurement signal also provides the supply current.
U+:	Positive supply connection
U-:	Negative supply connection
MIE:	Müller Industrie-Elektronik

2 Safety Instructions

Warning

Before installation, commissioning and operation, ensure that the appropriate pressure transmitter has been selected in terms of measuring range, design and specific measuring conditions.

Non-compliance can result in serious injury and/or damage to the equipment.

Further important safety instructions can be found in the individual chapters of this operating manual.

Intended Use

Use the intrinsically safe level probe to convert a hydrostatic pressure into an electrical signal in hazardous locations.

ATEX approval: Level probe for the intended use in hazardous locations (EC-Type Examination Certificate BVS 12 ATEX E 076 X for download at www.mueller-ie.com).

ATEX features of approval: for gases and vapour: Installation on Zone 0 (EPL Ga/Gb), installation in Zone 0 (EPL Ga), Zone 1(EPL Gb) and Zone 2 (EPL Gc).

The level probe has been designed and built solely for the intended use as described here, and may only be used accordingly.

The technical specifications contained in this operating manual must be observed. Improper handling or operation of the pressure transmitter outside of its technical specifications requires the instrument to be shutdown immediately and inspected by an authorised MIE service engineer.

Personnel Qualification

Warning

Risk of injury if qualification is insufficient!

- Improper handling can result in considerable injury and damage to equipment.
- The activities described in this operating manual may only be carried out by skilled personnel with qualifications as described below.

Keep unqualified personnel away from hazardous areas!

Qualified Personnel

Qualified personnel are understood to have, based on their technical training, knowledge of measurement and control technology and experience and knowledge of country-specific regulations, current standards and directives, are capable of carrying out the work as described and independently recognizing potential hazards.

Special operating conditions require further appropriate knowledge, e.g. of corrosive media.

Special Hazards

Warning

Non-compliance of these instructions and their contents may result in the loss of explosion protection.

Warning

Observe the information given in the applicable type examination certificate and the relevant country-specific regulations for installation and use in hazardous areas (e.g. IEC 60079-14, NEC, CEC). Non-compliance can result in serious injury and/or damage to the equipment.

Warning

For hazardous media, flammable or toxic substances or liquids, follow the appropriate existing codes or regulations in addition to standard regulations.

Warning

Rest media in dismounted instruments can can be hazardous to persons, the environment and the installation.

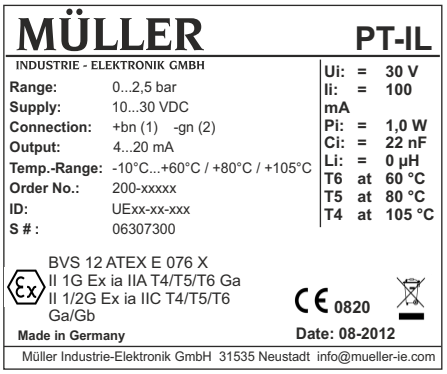
Use sufficient safety measures!

2 Safety Instructions (Continued)

Product Label / Safety Marking

PT-IL	Type of instrument
Range:	Nominal pressure range
Supply:	Voltage supply
Connection:	Wire identification
Output:	Output signal
Temp.-Range:	Maximum temperature range
Order No.:	Order number
ID:	Product code
S # :	Serial number
Date:	Month/Year of manufacture

Example of a product label



Safety-related maximum values

Specification of ignition protection types

3 Design and Function

Description:
By means of a sensor element and by applying power, the prevailing pressure is converted into an amplified standardised electrical signal via the deformation of a diaphragm. This electrical signal varies in proportion to the pressure and can be evaluated accordingly.

Scope of delivery
Complete assembled level probe, operating manual
Cross-check the scope of delivery with the delivery note.

4 Transport, Packaging and Storage

Transport
Check the pressure transmitter for any damage that may have been caused during transportation.
Obvious damage must be reported immediately.

Packaging
Do not remove packaging until just before mounting.
Keep the packaging as it will provide optimum protection during transport (e.g. change in installation site, returns).

Storage
Mount the protection cap when storing the pressure transmitter in order to prevent any damage to the diaphragm.
Permissible conditions at the place of storage: Storage temperature: -10 ... +60 °C

Warning

Before storing the pressure transmitter (following operation), remove any residual media.
This is of particular importance if the medium is hazardous to health, e.g. caustic, toxic, carcinogenic, radioactive, etc.

Diaphragm Test For Your Safety

It is necessary to conduct an optical test of the level probe before start-up, as this is a safety-relevant component.

- 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 in terms of safety technology.

Mounting Mechanical Connection

Protection cap model CrNi steel

- 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.
- Protect the diaphragm against any contact with abrasive substances and shocks. If you damage the diaphragm, no intrinsic safety can be guaranteed (ATEX).

Electrical Connection

Installation in / mounting to zone 0, Group II, application with gas

Warning

- When mounting the level probe in walls of areas where EPL Ga equipment is required, ensure a protection class of IP67 is guaranteed as per EN 60529.
- When using the level probe in areas where EPL Ga equipment is required, include the shield of the connection cable and the metallic part of the anchor clamp in the potential equalization of the vessel.
- When mounting the line entrance of the device in the wall separating areas requiring EPL Ga equipment from less hazardous areas, ensure a protection class of IP67 is guaranteed, as per EN 60529.
- To avoid mechanical hazards, comply with technical information related to usage of the level probe when in contact with aggressive / corrosive media.

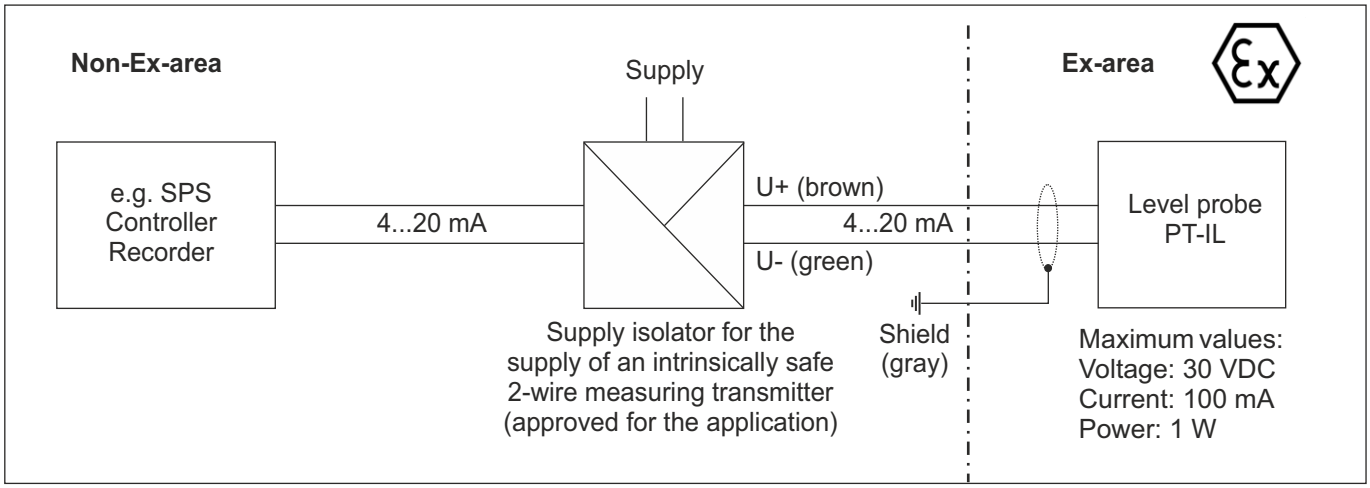
Warning

- Supply the level probe out of a certified intrinsically safe electric circuit.
- Cover fine-wire wire ends with wire end ferrules (cable assembly).
- Applications requiring EPL Gb equipment will allow the use of a supply and signal current circuit with a protection level of „ib“. In this case, this interconnection and also the level probe will have the protection level II 2G ib IIC T4/T5/T6 Gb, even when marked differently (see EN 60079-14, chapter 5.4).
- Comply with the safety parameters from chapter 6 (Technical Data, page 8).
- The cable shield and the casing should not be conductively connected.

- If the cables are longer than 30 m (2-wire) or leave the building, connect the cable shield with a potential equalization.
- Please ensure that no moisture can seep in at the cable ends.

Installation Example

Cable		FEP	
4...20 mA (2-wire)		U+ = brown (1) U- = green (2)	
Cable shield	put on on casing	gray	
Wire cross section	with wire end ferrules	0,25 mm² (AWG 24)	
Cable diameter		7,5 mm	
Cable length		variable	
Maximum immersion depth		100 m	
Maximum tensile strength		500 N	
Protection class	as per IEC 60529	IP68	
Level probe mechanical mounting is done without an additional strain relief via the connection cable.			



Functional Test

The output signal must be proportional to the pressure. If it is not, this might point to a damaged diaphragm. In this case, refer to chapter „Fault Recovery“ (page 8).

Warning

- Observe the ambient and working conditions outlined in section „Technical Data“ (pages 7 and 8).
- Please ensure the level probe is only used within the overload limit range!
- Surfaces of device components can become hot during operation. Please take care when touching the device.

6 Technical Data

Input

Relative pressure:	0...0,1 up to 0...10 bar	
Ranges:	see table page 2	
Overload limit:	see table page 2	
Bursting pressure:	see table page 2	

Output

Analog:	4...20 mA:	2-wire
	Load:	maximum (U+ - 10 V) / 0,02 A - (Cable length in m x 0,14 Ω)

Performance Parameters

Accuracy:	<0,5% of range
Option:	<0,25% of range (For pressure ranges >0,25 bar) Including non-linearity, hysteresis, zero point and full scale error (corresponds to error of measurement as per IEC 61298-2)
Calibration:	in vertical mounting position with lower pressure connection
Non-linearity:	<0,2% of range (BFSL as per IEC 61298-2)
Non repeatability:	<0,1% of range
1-year stability:	<0,2% of range (at reference conditions)

Supply

Voltage:	10...30 VDC	
Electrical protection:	Reverse polarity:	U+ towards U-

Approvals

Ex-approval:	according ATEX directive: 2014/34/EU (EPL according DIN EN 60079-14)	
	EC-type examination certificate:	BVS 12 ATEX E 076 X

Environmental Conditions

Temperature medium:	-10...+85 °C (also environmental temperature)	
More details regarding environmental and medium temperature see below (ATEX and EPL)		
Storage temperature:	-10...+60 °C	
Rated temperature range:	0...+50 °C (compensated range)	
Temperature coefficient:	mean temperature coefficient (TC) within rated temperature range	
TC zero:	<0,2% of range / 10 K <0,4% of range / 10 K for ranges <250 mbar	
TC span:	<0,2% of range / 10 K	
CE-conformity:	EMC directive:	2014/30/EU
	EN 61326:	Emission (Group 1, Class B) and immunity for industrial locations

Mechanics

Material	Cable:	FEP
	Case:	CrNi steel Option: Hastelloy
	Diaphragm:	CrNi steel or Hastelloy
	Protection cap:	Plastics with CrNi steel
Transmission fluid:	synthetic oil (internally)	
Pressure connection:	CrNi steel:	G1/2 B (male thread)
	Hastelloy:	G1/4 (female thread)
Electrical connection:	see page 5-6	
Protection class:	IP68 (as per IEC 60529)	
Weight:	Level probe:	approx. 200 g
	Cable:	80 g per meter

Pressure Table

Measurement range	0,1	0,16	0,25	0,4	0,6	1	1,6	2,5
Overpressure limit	1	1,5	2	2	4	5	10	10
Bursting pressure	2	2	2,4	2,4	4,8	6	12	12
Measurement range	4	6	10					
Overpressure limit	17	35	35					
Bursting pressure	20,5	42	42					

6 Technical Data (Continued)

ATEX and EPL

Ex-protection ATEX, ignition protection type and EPL: II 1G Ex ia IIA T4/T5/T6 Ga
II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb
II 2G Ex ia IIC T4/T5/T6 Gb

Safety parameters, maximum values

Voltage:	30 VDC
Current:	100 mA
Power:	1 W
Effective internal capacitance C:	16,5 nF + 0,1 nF/m (Value see level probe product label)
Effective internal inductance L:	0 µH + 1 µH/m (Value see level probe product label)

Insulation voltage: Insulation complies with EN 60079-11, 6.4, 12

Valid temperature ranges

Category according ATEX 2014/34/EU	EPL according DIN EN 60079-14	Temperature class	Ambient and medium temperature range
1G, 1/2G, 2G	Ga, Ga/Gb, Gb	T6	-30...+60°C
1G, 1/2G, 2G	Ga, Ga/Gb, Gb	T5	-30...+80 °C
1G, 1/2G, 2G	Ga, Ga/Gb, Gb	T4	-30...+105 °C

7 Fault Recovery

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.

Fault	Possible cause	Procedure
Signal span dropping off Signal span too small	Diaphragm is damaged, eg through impact, abrasive/corrosive media; corrosion of diaphagm/pressure connector; transmission fluid missing	Contact the manufacturer and replace the instrument
Signal span drops off	Moisture present (eg at cable end)	Install the cable correctly
Signal span erratic Signal span incorrect	Operating temperature too high/low	Ensure valid temperatures as per the operating manual
Abnormal zero point signal	Medium or ambient temperature too high/low	Control if internal temperature of instrument is within the valid range; comply with the valid temperature range (see operating manual)
	Diaphragm is damaged, eg through impact, abrasive / corrosive media corrosion of diaphragm or pressure connector	Replace instrument
	Working temperature too high / low	Ensure valid temperatures as per the operating manual
Zero point signal unstable Zero point signal too high/low	Moisture present (eg at cable end)	Install the cable correctly, insert filter element
Hot casing surface	Valid ambient or medium temperature exceeded	Ensure valid ambient/medium temperature limits are observed (see operating manual)
No output signal	No/wrong voltage supply or surge voltage	Correct the voltage supply as per operating manual

Ensure the unit is working properly after changes to the system. In case the fault persists, return the instrument for repair (or replacement).

! If faults cannot be rectified using the measures listed here, immediately shut down the pressure transmitter and ensure the device is depressurized or without a signal.
Protect the device against accidental start-up and contact the manufacturer.
If a return becomes necessary, please observe the instructions in chapter „Other“ (page 9).

Note: In case of unjustified reclamation we may charge reclamation handling expenses.

8 Other

Maintenance

- The PT-IL level probes are maintenance-free.
- Only the manufacturer should conduct repairs.

Accessories

For details about necessary accessories (e.g. cable anchor clamp) please contact your supplier.

Cleaning

Attention

- Clean the instrument with a moist cloth.
- Wash or clean the dismounted instrument before returning it in order to protect personnel and the environment from exposure to rest media.
- Rest media in dismounted instruments can be hazardous to personnel, the environment and equipment. Take sufficient safety measures!
- Do not use pointed, sharp or hard objects for cleaning. The diaphragm of the process connection may be damaged.

Shutdown

Warning

Rest media in dismounted instruments can be hazardous to personnel, the environment and equipment. Take sufficient safety measures!

Return

Warning

Please pay attention when shipping the pressure transmitter:
All pressure transmitters delivered to supplier/manufacterer must be free from any kind of hazardous substances (acids, bases, solutions, etc.).

When returning the PT-IL level probe, use the original or a suitable transport packaging. Be sure to include detailed information about the problem.

Disposal

Dispose of device components and packaging materials in an environmentally safe manner in accordance with country-specific waste treatment and disposal regulations.

Collect electrical and electronic parts separately. Separate metals and plastics. Dispose of printed circuit board assemblies professionally.

We MÜLLER INDUSTRIE-ELEKTRONIK GMBH

(supplier's name)

Justus-von-Liebig-Straße 24
31535 Neustadt
GERMANY

(*address*)

declare that the product

HART level sensor type PT-IL

(*name, type or model, batch or serial number, possibly sources and number of items*)

is (are) in conformity with the following European CE-directives:

2014/30/EU (EMC)

by the application with the following standard(s)

DIN EN 61326-1:2018, DIN EN 61326-2-3:2019

and is in conformity with the following EC Type Examination Certificate:

BVS 12 ATEX E 076 X

according the following European CE-directive:

2014/34/EU (ATEX)

by the application with the following standard(s)

EN 60079-0:2014, EN 60079-11:2012 and EN60079-26:2015

by the notified body number 0158

DEKRA EXAM GmbH
BVS
44809 Bochum
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Müller Industrie-Elektronik GmbH
Matthias Müller

Neustadt, 05.08.2019

(*Place and date of issue*) (*name and signature or equivalent marking of authorized person*)

Annex (Notes)