



Operating instructions
Electronic pressure sensor
for industrial applications

GB

PV78

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1 Preliminary note

You will find instructions, technical data, approvals and further information using the QR code on the unit / packaging or at documentation.ifm.com.

1.1 Symbols used

- ✓ Requirement
- Instructions
- ▷ Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference
-  Important note
Non-compliance may result in malfunction or interference.
-  Information
Supplementary note

1.2 Warnings

Warnings indicate the possibility of personal injury and damage to property. This enables safe product handling. Warnings are graded as follows:



WARNING

Warning of serious personal injury

▷ If the warning is not observed, fatal and serious injuries are possible.



CAUTION

Warning of minor to moderate personal injury

▷ If the warning is not observed, minor to moderate injuries are possible.

ATTENTION

Warning of damage to property

▷ If the warning is not observed, damage to property is possible.

2 Safety instructions

- The unit described is a subcomponent for integration into a system.
 - The system architect is responsible for the safety of the system.
 - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- Only use the product for permissible media (→ Technical data).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.
- Store the device in its original packaging.



CAUTION

With high medium temperatures, parts of the unit may heat up.

- ▷ Risk of burns
- ▶ Do not touch the unit.
- ▶ Protect the housing against contact with flammable substances and unintentional contact.

2.1 Cybersecurity

Installation

The device is suitable for operation in a secure environment according to IEC 62443-1-1.

The device was designed for operation behind a firewall.

- ▶ Carry out a risk assessment of the system according to IEC 62443-1-1.
- ▶ Take measures to ensure physical security.

Operation

- ▶ Observe the security functions described in the product documentation and the recommendations for their use.

Maintenance

- ▶ Back up system configuration and system data in accordance with your company's change management processes.

Decommissioning

- ▶ Ensure that no sensitive information can fall into unauthorised hands.

- ▶ Always reset the system settings to the factory settings before decommissioning the device.

3 Intended use

The unit measures and monitors the system pressure of machines and installations.

3.1 Application area

Type of pressure: relative pressure



The device is vacuum resistant. Adhere to the specifications in the data sheet!



Information on pressure rating and bursting pressure → Data sheet



Avoid static and dynamic overpressure exceeding the indicated pressure rating by taking appropriate measures. The indicated bursting pressure must not be exceeded. Even if the bursting pressure is exceeded only for a short time, the unit may be destroyed. ATTENTION: Risk of injury!



If the cable length exceeds 30 m or if used outside buildings, there is a risk of overvoltage pulses from external sources. We recommend to use the unit in protected operating environments and to limit overvoltage pulses to max. 500 V.



Pressure Equipment Directive (PED)

The devices comply with the Pressure Equipment Directive. They are designed for group 2 fluids and manufactured in accordance with sound engineering practice. Use of media from group 1 fluids on request.

4 Function

- The device generates output signals according to the operating mode and the parameter setting.
- It also provides the process data, output signals and diagnostic messages via IO-Link.

4.1 IO-Link

IO-Link is a communication system for connecting intelligent sensors and actuators to automation systems. IO-Link is standardised in the IEC 61131-9 standard.



General information on IO-Link at [io-link.ifm](https://io-link.ifm.com)



Input Output Device Description (IODD) with all parameters, process data and detailed descriptions of the device at documentation.ifm.com

IO-Link offers the following advantages:

- Interference-free transmission of all data and process values
- Parameter setting in the running process or presetting outside the application
- Parameters for identifying the connected devices in the system
- Additional parameters and diagnostic functions
- Automatic backup and restore of parameter sets in case of device replacement (data storage)
- Logging of parameter sets, process values and events
- Device description file (IODD - Input Output Device Description) for easy project planning
- Standardised electrical connection
- Remote maintenance

4.2 Zero point behaviour output and IO-Link



Due to permissible device tolerances and temperature changes, the sensor can show a deviation from the zero point when no pressure is applied. To prevent this, the device is equipped with functions that keep the measured signal more stable at the process value 0.

Zero point behaviour switching output:

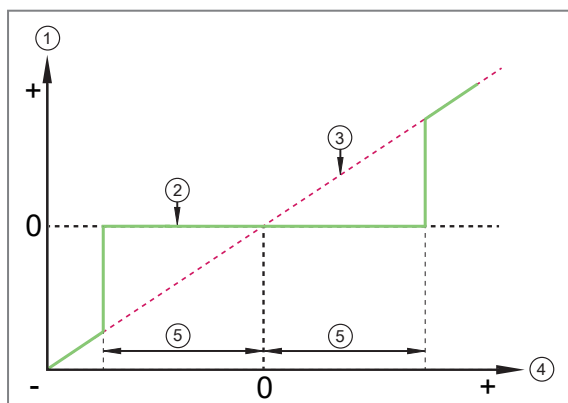


Fig. 1: Switching output

- 1: Process value
- 2: Sensor output signal with hysteresis (green)
- 3: Ideal measurement signal (red)
- 4: System pressure
- 5: Zero point stabilisation → Data sheet

Zero point behaviour IO-Link communication:

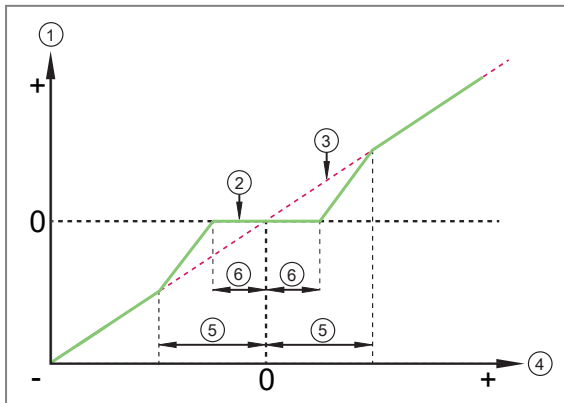


Fig. 2: IO-Link communication

- 1: Process value
- 2: Sensor output signal (green)
- 3: Ideal measurement signal (red)
- 4: System pressure
- 5: Zero point stabilisation → Data sheet
- 6: 0.5 x zero point stabilisation → Data sheet

The first process value that can be evaluated via the IO-Link communication is indicated by the half zero point stabilisation (6).

In the further range of the zero point stabilisation (5), the output signal of the sensor runs at a larger gradient angle.



The zero point stabilisation is specified in % of the span → Data sheet.

4.3 Communication, parameter setting, evaluation

OUT1 (pin 4)	- Switching signal for system pressure limit - Communication via IO-Link
OUT2 (pin 2)	Switching signal for system pressure limit

4.4 Switching function

OUTx changes its switching status if it is above or below the set switching limits (SPx, rPx). The following switching functions can be selected:

- Hysteresis function / normally open: $[ou1/ou2] = [Hno]$ (→ Figure hysteresis function).
- Hysteresis function / normally closed: $[ou1/ou2] = [Hnc]$ (→ Figure hysteresis function).

First the set point (SPx) is set, then the reset point (rPx).

The hysteresis defined remains even if SPx is changed again.

- Window function / normally open: $[ou1/ou2] = [Fno]$ (→ Figure window function).
- Window function / normally closed: $[ou1/ou2] = [Fnc]$ (→ Figure window function).
- The width of the window can be set by means of the difference between $[FHx]$ and $[FLx]$. $[FHx]$ = upper value, $[FLx]$ = lower value.

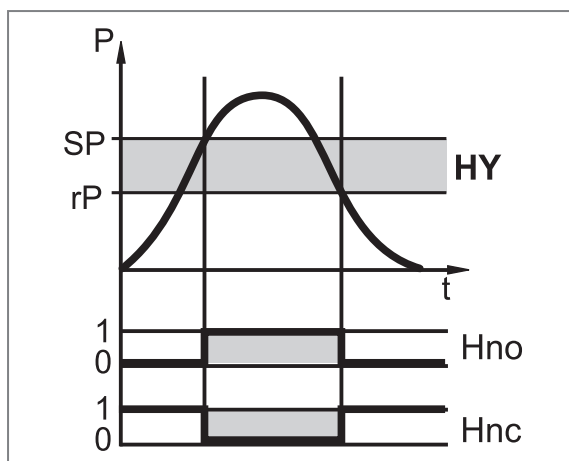


Fig. 3: Hysteresis function

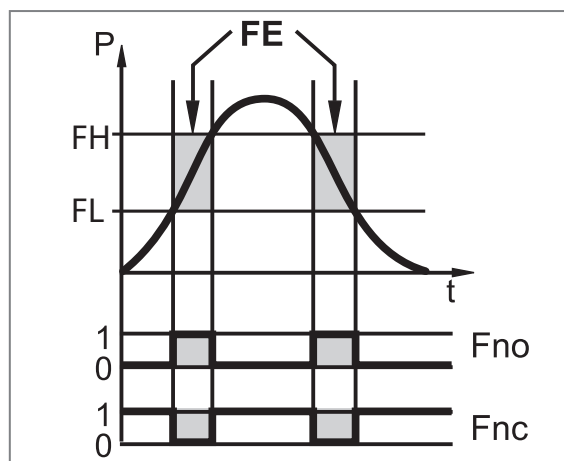


Fig. 4: Window function

P =	System pressure
HY =	Hysteresis
FE =	Window



When set to the window function the set point and reset point have a fixed hysteresis of % of the measuring span.

PV7804 = 0.25 %, PV7809 = 0.4 %, PV7829 = 0.8 %.

5 Installation



Before installing and removing the device: make sure that no pressure is applied to the system.

- ▶ Insert the device in a process connection G1/8.
- ▶ Tighten firmly. Recommended tightening torque: 20...25 Nm.
Depends on the sealing type, the pressure load and the lubrication.

6 Electrical connection



The unit must be connected by a qualified electrician.

Observe the national and international regulations for the installation of electrical equipment.

Voltage supply according to SELV, PELV.

► Disconnect power.

► Connect the unit as follows:

Connector: 1 x M12; : A

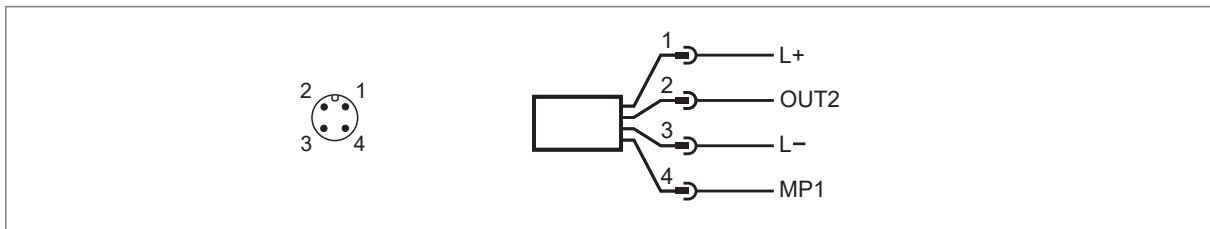


Fig. 5: Wiring diagram; MP: Multi-functional (OUT, Data)

3-wire

Pin	Assignment
1	L+
2	OUT2: DO2 (NO/NC)
3	L-
4	MP1: DO1 (NO/NC), IO-Link

Parameter setting

Pin	Assignment
1	L+
3	L-
4	MP1: IO-Link

7 Parameter setting

Parameters can be set before installation or during operation.



If you change parameters during operation, this will influence the function of the plant.

- ▶ Ensure that there will be no malfunctions in your plant.

During parameter setting the unit remains in the operating mode. It continues to monitor with the existing parameter until the parameter setting has been completed.

The device parameters can be set via the IO-Link interface in the following ways, for example:

- Parameter setting via a suitable parameter setting software, e.g. ifm moneo|configure
- Parameter setting via a PLC
- Parameter setting via an IIoT application

Requirements for parameter setting via the IO-Link interface:

- ✓ The Input Output Device Description (IODD) for the device in case of parameter setting via a parameter setting software, see documentation.ifm.com
- ✓ The IO-Link interface description (PDF) for the device in case of parameter setting via a PLC or IIoT application, see documentation.ifm.com
- ✓ An IO-Link master
 - ▶ Connect the IO-Link master to the parameter setting software, the PLC or the IIoT application.
 - ▶ Connect the device to a suitable free port of the IO-Link master.
 - ▶ Set the port of the IO-Link master to the IO-Link operating mode.
- ▷ The device changes to the IO-Link mode.
 - ▶ Change the parameter settings in the software.
 - ▶ Write the parameter settings to the device.



Support for system integration and parameter setting via IO-Link:

- Manual of the parameter setting software (e.g. moneo)
- Explanations and startup packages at ifm.com/cnt/io-link-system-integration.

7.1 Parameter setting via the memory plug

A parameter set can be written to the device / can be recorded by the device via a memory plug (ifm storage module): www.ifm.com.



In order to allow for data to be written from the memory plug to the sensor, the sensor must have the factory setting.



If the sensor has been configured, the memory plug records the parameter set which can then be transferred to other sensors of the same type.

- ▶ Load a suitable parameter set (e.g. from a PC or from a sensor of the same type) to the memory plug.
- ▶ Connect the memory plug between sensor and socket.
- ▷ Sensor with factory setting:
When voltage is supplied, the parameter set is transferred from the memory plug to the sensor.
- ▷ Sensor with changed settings:
When voltage is supplied, the memory plug records the sensor's parameter set.
- ▶ Remove the memory plug.
- ▶ Put the unit into operation.

More information on the memory plug: → Documentation www.ifm.com.

7.2 List of the parameters

Parameter	Function
SPx/rPx	Upper / lower limit value for system pressure at which OUTx switches with hysteresis setting. Requirement: OUTx setting is [Hno] or [Hnc].
FHx/FLx	Upper / lower limit value for system pressure at which OUTx switches with window setting. Requirement: OUTx setting is [Fno] or [Fnc].
ou1	Output function for OUT1: Switching signal for the pressure limits: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc].
ou2	Output function for OUT2: Switching signal for the pressure limits: hysteresis function [H ..] or window function [F ..] as normally open [. no] or normally closed [. nc] each.
dS1 / dS2	Switch-on delay for OUT1 / OUT2.
dr1 / dr2	Switch-off delay for OUT1 / OUT2.
uni	Standard unit of measurement for system pressure: [bAr] / [MPa] / [PSI].
P-n	Output logic: pnp / npn.
Lo	Minimum value memory for system pressure.
Hi	Maximum value memory for system pressure.
dAP	Damping of the switch point.
coF	Zero-point calibration
HIPS	Setting of the threshold for the overload counter
HIPC	Number of overload processes

8 Factory setting

	PV7809	PV7829	PV7804	User settings
SP1	-0.5 bar	-0.23 bar	25 % MEW*	
rP1	-0.54 bar	-0.25 bar	23 % MEW*	
SP2	0.5 bar	-0.73 bar	75 % MEW*	
rP2	0.46 bar	-0.75 bar	73 % MEW*	
uni	mbar	mbar	bar	
ou1	Hno			
ou2	Hno			
dS1	0.0			
dr1	0.0			
dS2	0.0			
dr2	0.0			
P-n	PnP			
dAP	0.06			
coF	0			
HIPS	MEW			
HIPC	0 bar			

* = The indicated percentage of the final value of the measuring range (MEW) of the sensor is set in bar.

9 Disposal, repair and return

- ▶ After use, dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.
- ▶ In case of return shipment, ensure that the unit is free from soiling, especially from dangerous and toxic substances.
- ▶ For transport only use appropriate packaging to avoid damage of the unit.