



Operating instructions
Pulse stretcher (IP 69K)
DP4402

GB

Contents

1	Preliminary note	3
1.1	Symbols used	3
1.2	Warnings	3
1.3	Safety symbol on the device	3
2	Safety instructions	4
3	Intended use	5
4	Function	6
4.1	Application as an IO-Link device	6
4.1.1	General information	6
4.1.2	Application	6
4.1.3	IO Device Description (IODD)	6
4.2	Function diagrams	6
4.2.1	Input configuration: pulse-controlled	6
4.2.2	Input configuration: edge-controlled	7
5	Installation	8
6	Electrical connection	9
6.1	Input side	9
6.2	Connecting the device	9
6.2.1	Mounting the connector	10
6.2.1.1	Maximum cable length	10
7	Operating and display elements	11
7.1	LEDs	11
7.2	Indication	11
8	Menu	12
8.1	General	12
8.2	Parameters adjustable via IO-Link	12
8.2.1	ou1 — output configuration	12
8.2.2	dIn1 — input configuration	12
8.2.3	dS1 — switch-on delay	12
8.2.4	dr1 — switch-off delay	12
8.2.5	h.t1 — hold time	12
8.2.6	ou2 — output configuration	12
8.2.7	dIn2 — input configuration	13
8.2.8	dS2 — switch-on delay	13
8.2.9	dr2 — switch-off delay	13
8.2.10	h.t2 — hold time	13
8.2.11	FLASH_ON — activate flashing of the display	13
8.2.12	FLASH_OFF — deactivate flashing of the display	13
8.2.13	internal_temperature — operating temperature microcontroller	13
8.2.14	operation_hours — operating hours	13
8.2.15	Application-specific tag	13
8.2.16	Location tag	14
8.2.17	Function tag	14
9	Operation	15
10	Troubleshooting	16
11	Maintenance, repair and disposal	17

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.

1.3 Safety symbol on the device



Safety symbol on the device:

- Adhere to the operating instructions for the safe operation of the unit.

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).
- 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, programming, configuration, operation and maintenance of the product must be carried out by personnel qualified and authorised for the respective activity.
- Protect units and cables against damage.
- Replace damaged units, otherwise the technical data and safety will be impaired.
- Observe applicable documents.

3 Intended use

The device can output incoming pulses stretched at the output. The device is designed as a standard IO device. IO-Link only serves as a configuration interface.

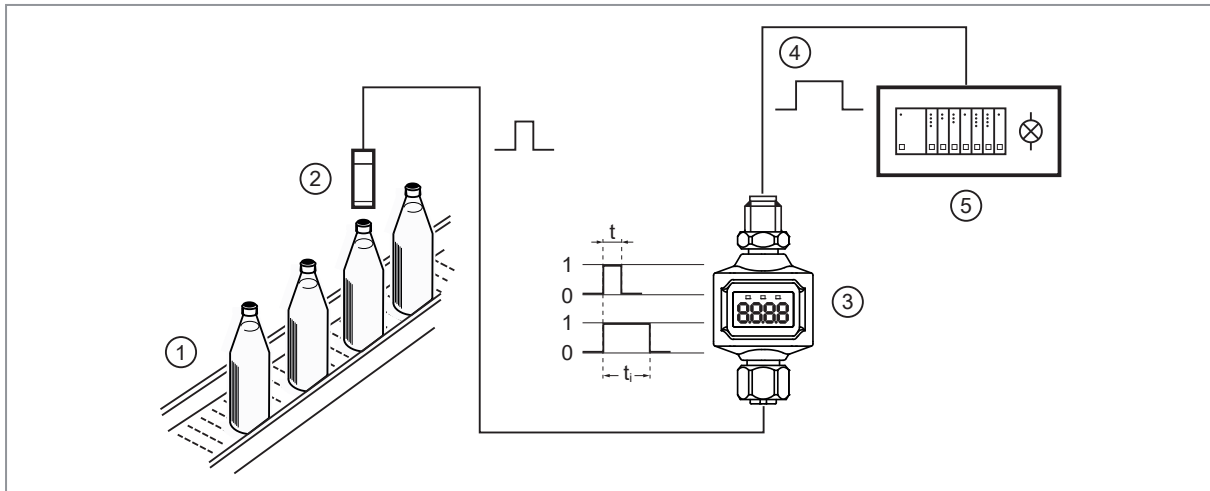


Fig. 1: Example: Pulse stretching between sensor and evaluation unit

- | | |
|-------------------------------|---------------------------------------|
| 1: Conveyor belt | 2: Pulse pick-up on the conveyor belt |
| 3: DP4402 | 4: Transistor output |
| 5: PLC, evaluation units, ... | |

The device is suited for wet environments. Observe instructions in chapters "Installation" and "Electrical connection".



The unit is not suited for environments with particular requirements on mechanical stability (e.g. shock/vibration).

The unit is intended for indoor use only.

► Observe the operating conditions (→ Technical data at www.ifm.com).



The accuracy and functionality of the unit can only be guaranteed within the specification. If necessary, the user must provide appropriate digital input filters for the input signals.

4 Function

The device supports two different output behaviours:

1. It can output an input pulse stretched, shortened or delayed at the output.
2. The edge of the input signal can serve as a trigger to initiate a pulse at the output. The pulse duration is set via a parameter.

For parameter setting and diagnostic purposes there is an IO-Link interface available. The following options are available:

- Remote parameter setting: reading and changing the current parameter setting
- IO-Link parameter setting: [IO Device Description \(IODD\)](#) (→ [6](#))

For diagnostic purposes, the input states and output states are available via the process data.



Due to the cycle time, the correctness of the process data displayed via IO-Link cannot be guaranteed.

4.1 Application as an IO-Link device

4.1.1 General information

The unit has an IO-Link communication interface which requires an IO-Link capable module (IO-Link master).

The IO-Link interface allows direct access to the process and diagnostic data and enables setting of the parameters of the unit during operation.

You will find further information about IO-Link and all the necessary information about the required IO-Link hardware and software at:

www.io-link.ifm

4.1.2 Application

The use of the IO-Link interface in the application is not intended. It is mainly used for convenient setting of the device.

4.1.3 IO Device Description (IODD)

You will find the IODDs required for configuration of the IO-Link device as well as detailed information about the process data structure, diagnostic information and parameter addresses at

documentation.ifm.com

4.2 Function diagrams

The output is defined as normally open (no) or normally closed (nc) via the parameter [ou1] or [ou2].

4.2.1 Input configuration: pulse-controlled

The application of the switch-on and switch-off delay makes it possible to output input pulses stretched, shortened or delayed at the output. The duration of the output pulse depends on the pulse duration at the input.

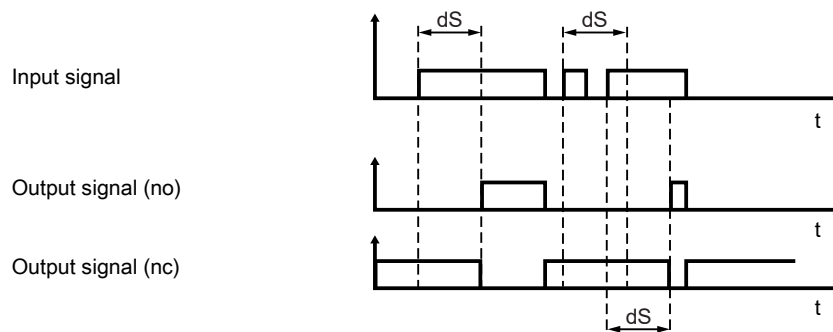


Fig. 2: Switch-on delay

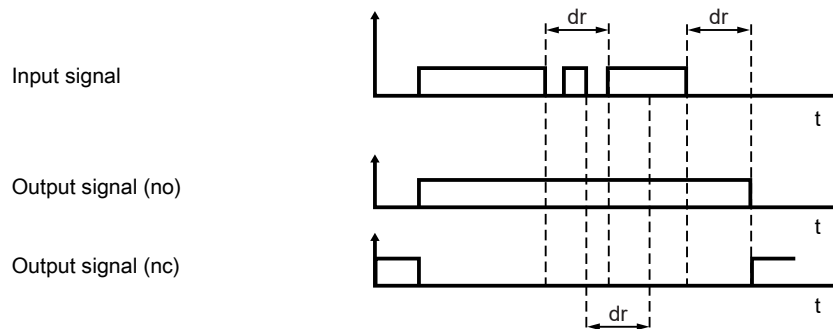


Fig. 3: Switch-off delay



After switching on, the device will not function properly until there is at least one rising edge at the input.

4.2.2 Input configuration: edge-controlled

The edge of the input signal is the trigger for the output of pulses at the output. The duration of the output pulse is always constant and is determined by the parameter [h.t1] or [h.t2]. The trigger can be set to either the positive or negative edge.

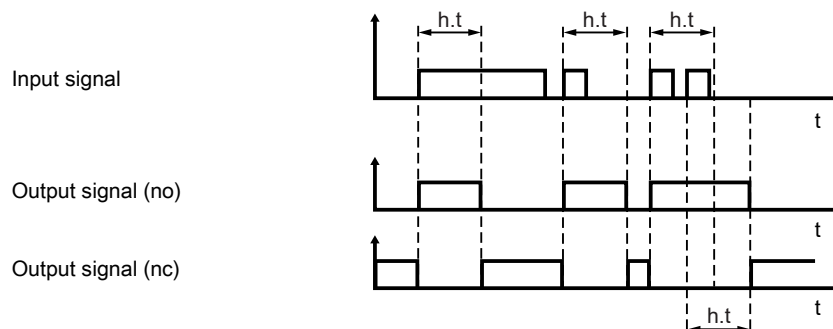


Fig. 4: Hold time

5 Installation

ATTENTION

Higher shock $\geq$ IK06

- ▷ Damage possible
- ▷ Protection rating and, in wet environments, electrical protection might be impaired
- ▶ If necessary, the system creator must take external measures to protect the device depending on the requirements of the corresponding application.
- ▶ Replace damaged devices, otherwise the technical data and safety will be impaired.

The IP rating of the overall system depends on the protection ratings of the individual devices, the applied connection elements and the corresponding protective caps.

ATTENTION

No protection rating / no protection of the contacts without mounted connectors / protective caps.

- ▷ Inadmissible soiling / moisture possible.
- ▷ Disconnection of circuits / safety possibly impaired.
- ▷ Before installation / when replacing the device, maintain pollution degree 2.
- ▶ Disconnection / safety guaranteed.

- ▶ Connect the M12 connectors of the device (→ Electrical connection).
- ▶ Install the device so that the M12 connection parts and the device are protected from mechanical stress such as shock and vibration.
- ▶ If necessary, fix the device with cable ties.



The following applies to all types of mounting:

The responsibility for the compliance with the requirements concerning mounting of the device in the application with regard to shock, vibration, acceleration and weight lies with the system architect.

6 Electrical connection



The unit must be connected by a qualified electrician.

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



CAUTION

Use in wet environments

- ▷ Electric shock possible.
- ▶ Voltage derating required (→ Technical data).

The input and output circuits are insulated from each other and from device surfaces that could be touched with basic insulation according to IEC 61010-1 (secondary circuit with max. 32 V DC, supplied from the mains circuit up to 300 V of overvoltage category II).

The external wiring has to be carried out in a way that ensures the required separation from other circuits.

6.1 Input side

Operating voltage (SELV/PELV)



CAUTION

The input current of the operating voltage is not limited.

- ▷ No fire protection.
- ▶ Protect the circuit.
- ▶ Protect the sensor supply via the same fuse.

Potential	M12 connector ①	Fuse
L+ / supply voltage	Pin 1	≤ 2 A

Required tripping characteristic of the fuse:

$T_{\text{fuse}} \leq 120 \text{ s}$ at max. 6.25 A (fire protection)

- ▶ Alternatively supply the device via a limited energy circuit according to IEC 61010-1 or class 2 according to UL1310.



Output reaction to overload or short circuit:

For self-protection of the output in case of excessive thermal load (due to short circuit or overload), the output driver starts clocking. If a short circuit / overload continues for several hours, the driver may be damaged!

6.2 Connecting the device

- ▶ Disconnect power.
- ▶ Connect the unit as follows:

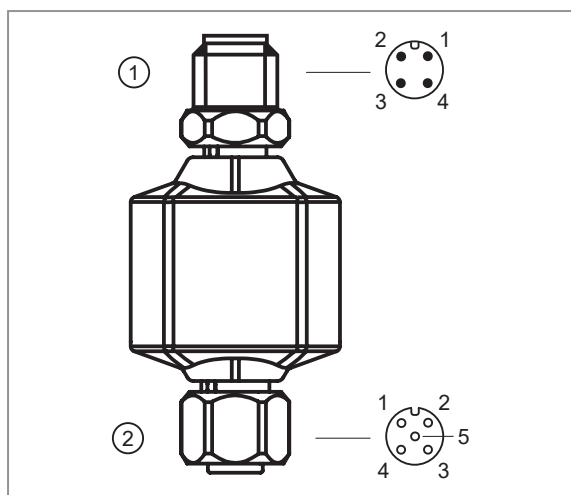


Fig. 5: Electrical connection

- 1: 4-pole M12 connector**
- Pin 1: L+ / supply voltage
 - Pin 2: OUT2 / digital output 2
 - Pin 3: L- / supply voltage
 - Pin 4: OUT1 / digital output 1 / IO-Link (C/Q)
- 2: 5-pole M12 socket**
- Pin 1: L+
 - Pin 2: IN2 / digital input 2
 - Pin 3: L-
 - Pin 4: IN1 / digital input 1
 - Pin 5: not connected



The device must not be externally supplied via the 5-pole M12 socket ②.



Always use the provided connection cables to connect other devices.

See also application examples (→ Intended use)

6.2.1 Mounting the connector

The threaded connections in the device correspond to the M12 standard. To ensure compliance with the specified protection rating, only cables that comply with this standard may be used. In the case of self-assembled cables, the system manufacturer is responsible for the protection rating.

- ▶ Use connectors with gold-plated contacts.
- ▶ During installation, place the connectors vertically so that the coupling nut will not damage the thread.
- ▶ Observe the coding of the connectors during installation.

If connector in the device:

- ▶ Tighten the cable sockets according to the torque specifications indicated by the cable vendor. Maximum permissible tightening torque: 1.8 Nm

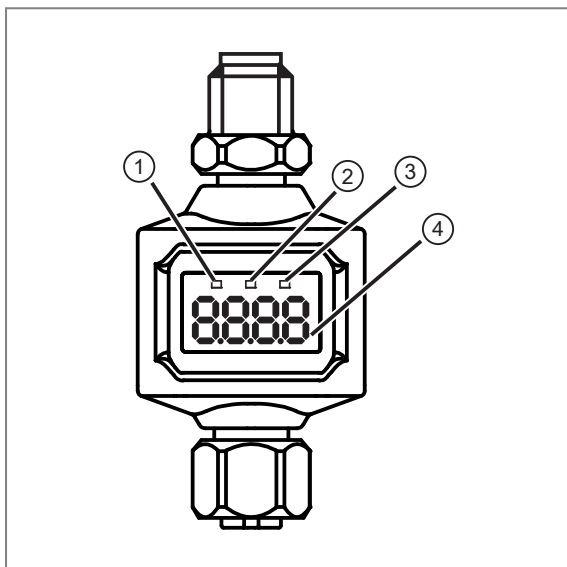
If sockets in the device:

- ▶ Tighten the cable plug using 1.3 ± 0.1 Nm.
- ▶ Provide all outgoing cables with suitable strain relief after a maximum of 200 mm. Observe the minimum bending radius of the cables (→ information from the cable manufacturer).

6.2.1.1 Maximum cable length

- Without IO-Link communication: 30 m on each side
- With IO-Link communication: 20 m on the master side

7 Operating and display elements



- 1: LED I
- 2: LED Power
- 3: LED II
- 4: Display

7.1 LEDs

LED		Colour	Status	Designation
I	OUT1	yellow	on	Output 1 switched.
Power		green	on	Voltage supply OK. Device in operating mode.
			off	No voltage supply. Device switched off.
II	OUT2	yellow	on	Output 2 switched.

Error signals and diagnostics: Troubleshooting

7.2 Indication

Colour	Designation
Red	7-segment LED display, 4 digits

Error signals and diagnostics: Troubleshooting

In operating mode, no value is shown on the display.

8 Menu

8.1 General

Irrespective of the operating mode (standard IO mode or IO-Link device), the device can be configured via an IO-Link tool.



Parameter cloning and parameter setting backup is possible with an IO-Link tool.

8.2 Parameters adjustable via IO-Link

The following functions or parameters are only available via IO-Link tools.

8.2.1 ou1 — output configuration

Definition of the output logic at output OUT1.

[OFF] = output is switched off.

[no] = switch is closed when activated.

[nc] = switch is opened when activated.

8.2.2 dIn1 — input configuration

Configuration of the evaluation of signals at input IN1.

[PULS] = stretched, shortened and delayed output of an input pulse at the output

[EdG] = output of a pulse with defined duration for a rising edge at the input

[-EdG] = output of a pulse with defined duration for a falling edge at the input

8.2.3 dS1 — switch-on delay

Delay when the output OUT1 changes to the active switching status.



This function is only available if [PULS] is selected as input configuration.

8.2.4 dr1 — switch-off delay

Delay when the output OUT1 changes to the idle state.



This function is only available if [PULS] is selected as input configuration.

8.2.5 h.t1 — hold time

Definition of the hold time of output OUT1 in the active switching status.



This function is only available if [EdG] or [-EdG] is selected as input configuration.

8.2.6 ou2 — output configuration

Definition of the output logic at output OUT2.

[OFF] = output is switched off.

[no] = switch is closed when activated.

[nc] = switch is opened when activated.

8.2.7 dIn2 – input configuration

Configuration of the evaluation of signals at input IN2.

[PULS] = stretched, shortened and delayed output of an input pulse at the output

[EdG] = output of a pulse with defined duration for a rising edge at the input

[-EdG] = output of a pulse with defined duration for a falling edge at the input

8.2.8 dS2 – switch-on delay

Delay when the output OUT2 changes to the active switching status.



This function is only available if [PULS] is selected as input configuration.

8.2.9 dr2 – switch-off delay

Delay when the output OUT2 changes to the idle state.



This function is only available if [PULS] is selected as input configuration.

8.2.10 h.t2 – hold time

Definition of the hold time of output OUT2 in the active switching status.



This function is only available if [EdG] or [-EdG] is selected as input configuration.

8.2.11 FLASH_ON – activate flashing of the display

Used to identify a unit. Display flashes and shows [dEVC].

8.2.12 FLASH_OFF – deactivate flashing of the display

Deactivates the flashing of the display.

8.2.13 internal_temperature – operating temperature microcontroller

Reads the data from the internal temperature sensor of the microcontroller.

8.2.14 operation_hours – operating hours

Only counts full operating hours. Operating times of less than one full hour are not saved. Counter readings are saved permanently.

8.2.15 Application-specific tag

Customer-specific application description, max. 32 characters long.

Default value: " *** " / can be freely defined by the customer

8.2.16 Location tag

Customer-specific location tag of the unit, max. 32 characters long.

Default value: " *** " / can be freely defined by the customer

8.2.17 Function tag

Customer-specific function tag of the unit, max. 32 characters long.

Default value: " *** " / can be freely defined by the customer

9 Operation

After power on, the device is in the operating mode (SIO). It carries out its measurement and evaluation functions and provides output signals according to the set parameters.



The normal operating mode is SIO mode, as real-time transmission of data cannot be ensured due to the IO-Link cycle time.

10 Troubleshooting

Display	LED			Error	Troubleshooting
	I	Power	II		
OFF	off	off	off	Supply voltage too low.	Check/correct the supply voltage: Electrical connection.
SC	flashes	can differ	flashes	Excessive current at the switching output OUTx (see LED I/II).	Check switching output for short circuit or excessive current. Remove the fault.
Rotating segment	can differ	can differ	can differ	Temperature in housing exceeds limit value.	Check the device temperature
DEUC	can differ	on	can differ	Device identification activated (system command: FLASH_ON)	Deactivate device identification (system command: FLASH_OFF)

11 Maintenance, repair and disposal

The unit is maintenance-free.

- ▶ Carry out cleaning considering the technical data (protection rating) and the connection technology used.
- ▶ Cleaning agents must be checked by the system manufacturer / operator for their suitability for the device materials (→ Technical data) and the connection technology used.
- ▶ The cleaning agents must not damage the device materials.
- ▶ It is not possible to repair the unit.
- ▶ After use, dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.