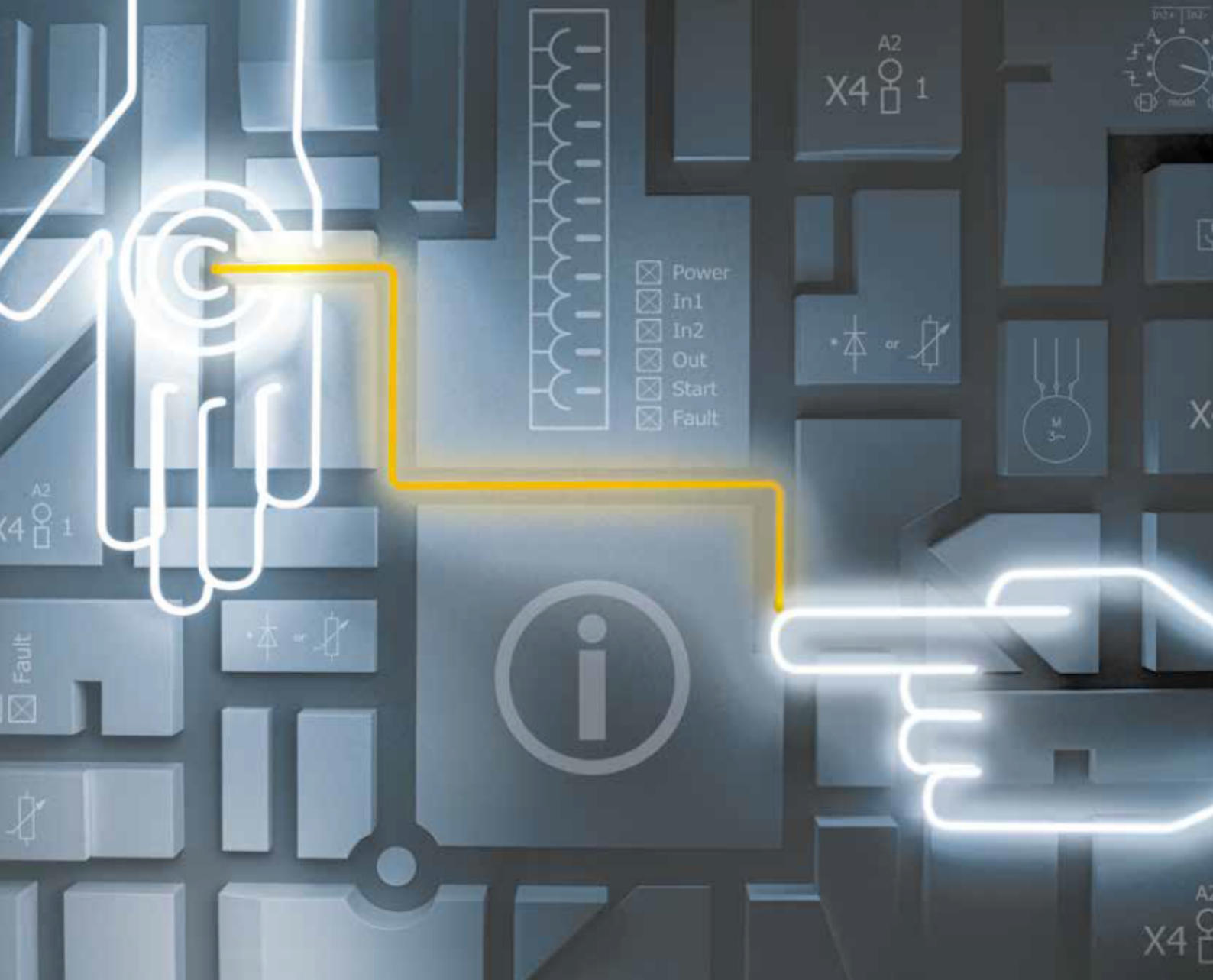




► PDP67 F 8DI ION

PILZ
THE SPIRIT OF SAFETY

Operating Manual-1001643-EN-11
- Decentralised periphery



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SD means Secure Digital

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1 Introduction

1.1 Validity of documentation

This documentation is valid for the products PDP67 F 8DI ION, PDP67 F 8DI ION VA. It is valid until new documentation is published.

This operating manual explains the function and operation, describes the installation and provides guidelines on how to connect the product.

1.1.1 Retaining the documentation

This documentation is intended for instruction and should be retained for future reference.

1.2 Definition of symbols

Information that is particularly important is identified as follows:



DANGER!

This warning must be heeded! It warns of a hazardous situation that poses an immediate threat of serious injury and death and indicates preventive measures that can be taken.



WARNING!

This warning must be heeded! It warns of a hazardous situation that could lead to serious injury and death and indicates preventive measures that can be taken.



CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



NOTICE

This describes a situation in which the product or devices could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.



INFORMATION

This gives advice on applications and provides information on special features.

2 Overview

2.1 Scope of supply

- ▶ Decentralised input module PDP67 F 8DI ION/PDP67 F 8DI ION VA
- ▶ 4 blind plugs

2.2 Unit features

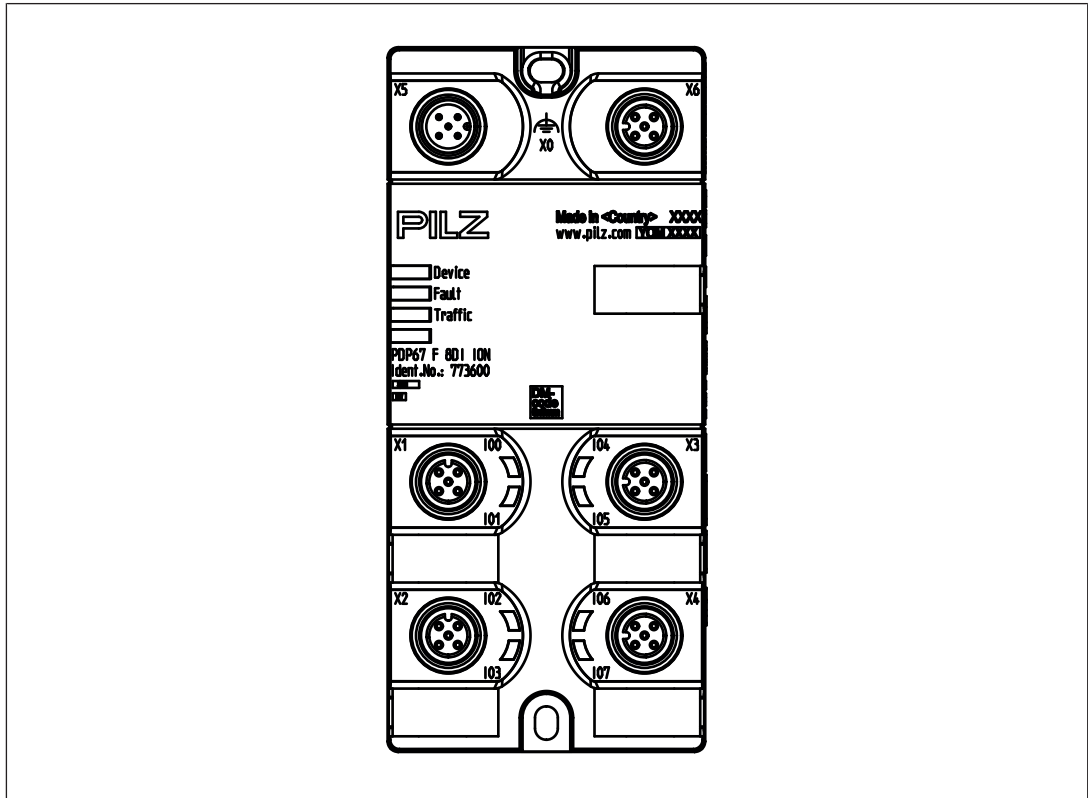
Application of the products PDP67 F 8DI ION, PDP67 F 8DI ION VA:

Decentralised input module for connection to a Pilz control system, for use in a rugged industrial environment up to protection type IP67.

The product has the following features:

- ▶ Protection type IP67
- ▶ 8 inputs for connecting 8 single-channel or 4 dual-channel sensors
- ▶ 8 outputs, which can be configured as
 - Standard outputs
 - Test pulse outputs
 - 24 V outputs
- ▶ LED for:
 - Operating status
 - Connection status
 - Fault
 - Input status at each input

2.3 Front view



Legend

X0:	Functional earth
X1 ... X4:	Inputs
X5:	Interface to the control system (Supply) or to X6 on the upstream module
X6:	Interface to X5 on the downstream module or unused
LEDs	Device
	Fault
	Traffic
	I0 ... I7

3 Safety

3.1 Intended use

The products PDP67 F 8DI ION, PDP67 F 8DI ION VA are decentralised input modules designed for use in a rugged industrial environment up to protection type IP67.

The module can be connected to a link module PNOZ m EF PDP Link, PNOZ ml2p or PNOZ mml2p from the configurable control system PNOZmulti.

Improper use

The following is deemed improper use in particular:

- ▶ Any component, technical or electrical modification to the product,
- ▶ Use of the product outside the areas described in this operating manual,
- ▶ Use of the product outside the technical details (see chapter entitled [Technical Details](#) [20]).



NOTICE

EMC-compliant electrical installation

The product is designed for use in an industrial environment. The product may cause interference if installed in other environments. If installed in other environments, measures should be taken to comply with the applicable standards and directives for the respective installation site with regard to interference.

3.1.1 Third-party manufacturer licence information

The product contains open source software, whose terms of use could further limit the product's application area. It is essential that you observe the third-party manufacturer licence information.

Further information is available in the document "Third-party manufacturer licence information PDP67 F 8DI ION (HP)" (document number 1007254) at www.pilz.com.

3.2 Safety regulations

3.2.1 Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, de-commissioned and maintained by persons who are competent to do so.

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with the state of the art and the applicable national, European and international laws, directives and standards.

It is the company's responsibility only to employ personnel who

- ▶ Are familiar with the basic regulations concerning health and safety / accident prevention,

- ▶ Have read and understood the information provided in the section entitled Safety
- ▶ Have a good knowledge of the generic and specialist standards applicable to the specific application.

3.2.2 Warranty and liability

All claims to warranty and liability will be rendered invalid if:

- ▶ The product was used contrary to the purpose for which it is intended
- ▶ Damage can be attributed to not having followed the guidelines in the manual or
- ▶ Operating personnel are not suitably trained.

3.2.3 Disposal

- ▶ In safety-related applications, please comply with the mission time T_M stated in the safety-related characteristic data.
- ▶ When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

4 Function description

4.1 Operation

The functions of the inputs and outputs are configured in the system software.

4.1.1 Inputs

Single and dual-channel sensors can be connected to the inputs, with or without test pulses.

The input signals must show a "High" ("1"-signal) of 24 VDC (+15 ... +30 VDC) and a "Low" ("0"-signal) of 0 VDC (-3 ... +5 VDC).

The input status is signalled to the control system via the bus.

Green LEDs indicate the status of the inputs.

Test pulses can be used to check the inputs for shorts across contacts and correct functionality.

4.1.2 Outputs

The outputs can be used as standard outputs, as test pulse outputs or as 24 VDC outputs.

The test pulse outputs are suitable for testing the sensor wiring. All safety-related inputs must operate in accordance with the failsafe principle (on switching off).

Two test pulses are available on each plug-in connector; these test pulses are permanently assigned to the inputs. The assignment of the test pulses to the inputs cannot be changed in the system software's configurator.

If the test pulse outputs are not being used, they can be configured as standard outputs or 24 VDC outputs in the system software's configurator.

4.2 Data download

Communication with the control system is via a safe data link. Data is exchanged cyclically.

4.3 Diagnostics

The status and error messages shown by the LEDs are saved in an error stack. The system software can read this error stack.

5 Installation

5.1 General installation guidelines

The product must be fastened to a flat mounting surface, so that there is no strain on the housing when the module is screwed down. The mounting distances will depend on which plug-in connectors are used and on the bending radius of the cables. Unused connectors should be sealed using end caps.

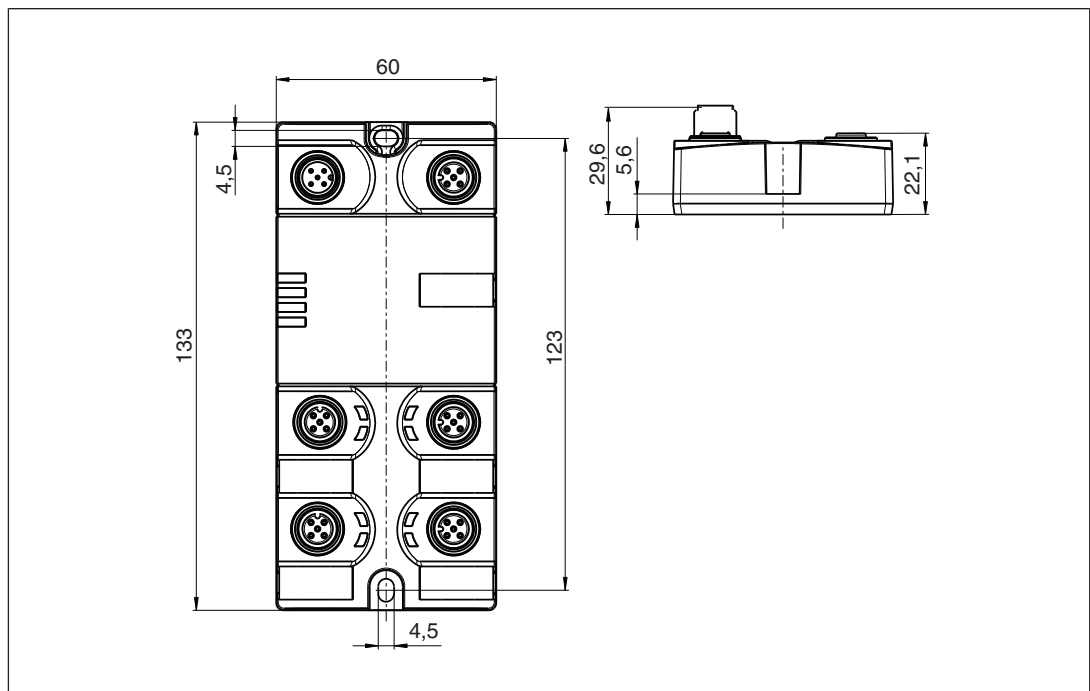
To install the system, proceed as follows:

- ▶ Fit 2 x M4 internal threads on the mounting surface.
- ▶ Use two fixing screws to attach the product to the mounting plate.
- ▶ With shielded cables, connect the functional earth to the fixing screw X0.
- ▶ Use internal hexagonal fixing screws with a strength class of 8.8 or comparable fixing screws with a torque setting of 1 Nm.
- ▶ Protect the device from:
 - Water or fluids with more stringent conditions than IP67,
 - Chemicals
 - Harmful substances
 - Intentional damage.

To meet the requirements of protection type IP67, ensure that:

- ▶ All used M12 connections must be connected with a torque setting of 0.6 Nm.
- ▶ All end caps must be fastened with a torque setting of 0.6 Nm. We recommend you use a torque screwdriver with PH3 bit.

5.2 Dimensions



6 Preparing for operation

6.1 Supply voltage

Supply

The supply voltage "Supply" is the internal bus voltage and is used to supply the device. It is fed via the link module PNOZ m EF PDP Link / PNOZ ml2p

Connection

The supply voltage "Supply" is fed via the link module PNOZ m EF PDP Link / PNOZ ml2p or PNOZ mml2p. Connect the module PDP67 F 8DI ION to the link module via the male connector X5. To forward the supply voltage to other modules, connect the socket X6 to X5 on the downstream module



INFORMATION

Connect the functional earth to the fixing screw X0.

6.2 General wiring guidelines

Note:

- ▶ Information given in the "Technical details" must be followed.
- ▶ Where safety-related applications are concerned, it is essential that short circuits and open circuits are unable to cause a hazardous condition within a plant. The way in which this is done will depend on the degree of hazard from the plant section, the switching frequency of the sensors and the level of safety of the sensors and actuators.
- ▶ Please refer to the link module's operating manual for details of the maximum cable length.
- ▶ Use copper wiring with a temperature stability of 85 °C.
- ▶ Pilz pre-assembled cable can be used to connect the inputs and outputs (see order reference).
- ▶ We recommend you use pre-assembled plug-in connectors to connect the inputs and test pulse outputs (see order reference).



CAUTION!

The power supply must meet the regulations for extra low voltages with protective electrical separation (SELV, PELV).



CAUTION!

In order to guarantee protection type IP67, unused plug-in connectors should be sealed using the end caps provided.



CAUTION!

Make sure that the plug-in connectors are connected to the sensors and actuators correctly. Once you have run a function test to check that the plug-in connectors are connected to the sensors and actuators correctly, the connections should be labelled. If the connections to the sensors and actuators are incorrect, life-threatening situations may arise on the plant.

6.3 Connector pin assignment

Inputs/outputs X1 to X4	Assignment	
5-pin M12 female connector A-coded	1: Test pulse x / 24 VDC / ST output. 2: Input X 3: 0 V 4: Input X + 1 5: Test pulse X + 1 / 24 VDC / ST output	
Interface to the link module: X5	Assignment	
5 pin M12 male connector A-coded	1: VCC 2: CAN- 3: GND 4: CAN+ 5: Shield	
Interface to the next decentralised module: X6	Assignment	
5-pin M12 female connector A-coded	1: VCC 2: CAN- 3: GND 4: CAN+ 5: Shield	

6.4 Wiring examples

6.4.1 Example: Single-channel, failsafe input device, without test pulse

Features:

- ▶ Depending on the application area and its respective regulations, this connection diagram is suitable for **input devices with frequent and infrequent operation up to PL d** of EN ISO 13849-1 and up to **SIL 2** of EN IEC 62061.
- ▶ The input device must be approved for failsafe applications.
- ▶ Please read the instructions provided with the input device.

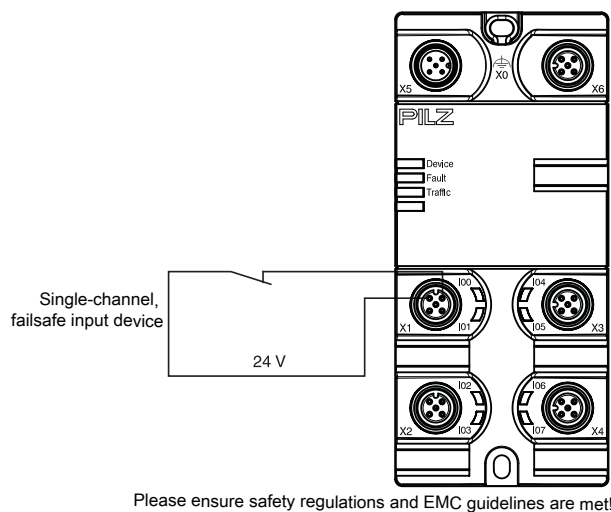


WARNING!

Short circuits between the cable to the input device and the 24 V line or between cables to various input devices will not be detected. Depending on the application, serious injury or death may result.

Avoid short circuits by

- Appropriate wiring
- Wiring in accordance with the requirements of IEC 61076-2-101 and IEC 60204-1, clause 14.1.1 and 14.1.2



6.4.2 Example: Dual-channel input devices, without test pulses

Features:

- ▶ This type of connection is mainly used for signal inputs with frequent operation.
- ▶ Depending on the application area and its respective regulations, this connection diagram is suitable for **input devices with frequent operation** with diverse channels **up to PL e** of EN ISO 13849-1 and **up to SIL 3** of EN IEC 62061, provided the functionality of both input device channels is monitored in the user program via a **plausibility check**.

- ▶ The input device must be approved for failsafe applications.
- ▶ If you are using input devices with different (diverse) channels, adjacent inputs may be used. Short circuits will be detected in the user program via the plausibility check.

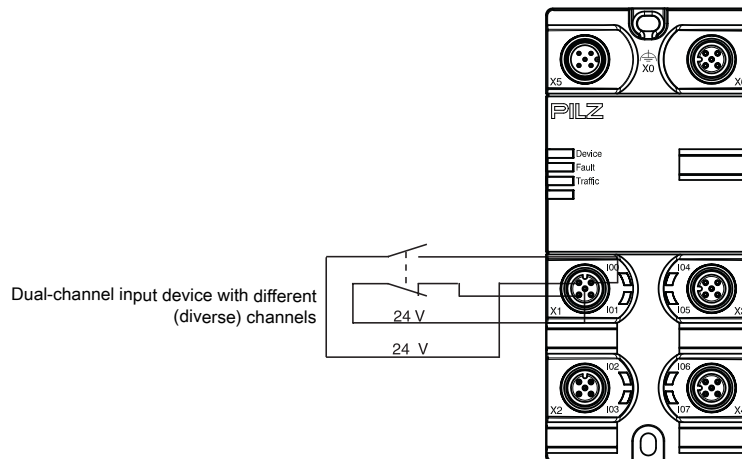


WARNING!

Short circuits between the cable to the input device and the 24 V line or between cables to various input devices will not be detected. Depending on the application, serious injury or death may result.

Avoid short circuits by

- Appropriate wiring
- Wiring in accordance with the requirements of IEC 61076-2-101 and IEC 60204-1, clause 14.1.1 and 14.1.2



Please ensure safety regulations and EMC guidelines are met!

6.4.3 Example: Single-channel, failsafe input device, with test pulse

Features:

- ▶ Depending on the application area and its respective regulations, this connection diagram is suitable **up to PL d** of EN ISO 13849-1 and **up to SIL 2** of EN IEC 62061.
- ▶ The input device must be approved for failsafe applications.
- ▶ Test pulses can be used to check the inputs for short circuit to 24 V and correct functionality. Short circuits that short out the input device (cable from the test pulse to the input device and cable from the input device to the input) will not be detected.
- ▶ Please read the instructions provided with the input device.
- ▶ Only input devices with N/C contacts can be tested.

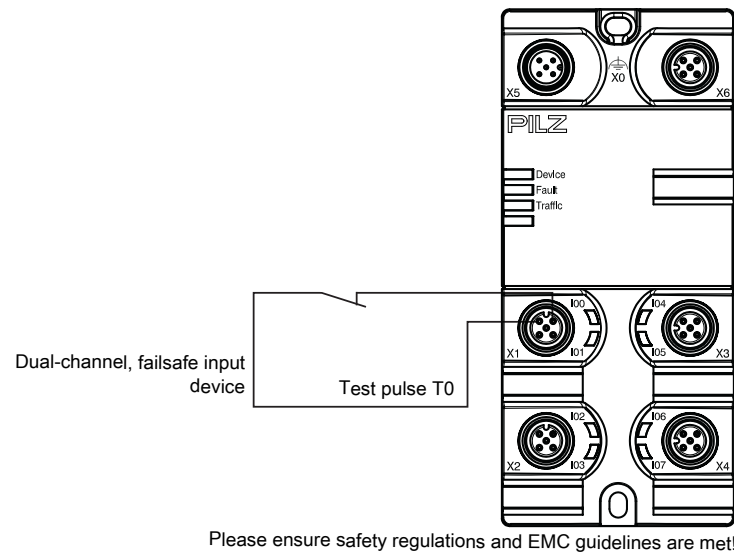


CAUTION!

Short circuits between the cable to the input device and the 24 V line or between cables to various input devices will not be detected.

Avoid short circuits by

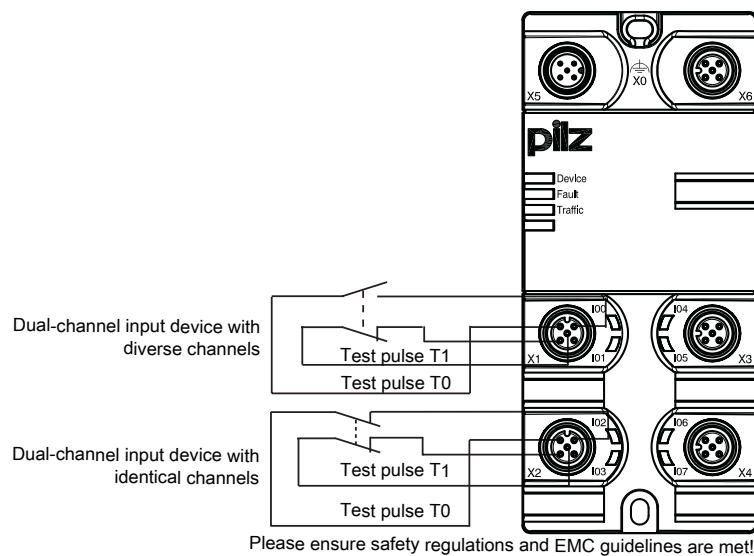
- Appropriate wiring
- Wiring in accordance with the requirements of IEC 61076-2-101 and IEC 60204-1, clause 14.1.1 and 14.1.2



6.4.4 Example: Dual-channel, failsafe input device, with test pulse

Features:

- ▶ Depending on the application area and its respective regulations, this connection diagram is suitable **up to PL e** of EN ISO 13849-1 and **up to SIL 3** of EN IEC 62061.
- ▶ The input device must be approved for failsafe applications.
- ▶ This type of connection is mainly used for signal inputs with infrequent operation.
- ▶ As the test pulses are permanently assigned to the inputs, all short circuits will be detected, with the exception of short circuits that short out the input device (cable from the test pulse to the input device and cable from the input device to the input).



7 Operation

7.1 Messages

The module is ready for operation when the "Ready" LED on the link module is lit continuously.

Legend

-  LED on
-  LED flashes
-  LED off

LED	LED status		Meaning
Device		Green	The unit is ready for operation
		Green	The supply voltage is/was too low. Once the fault has been rectified, the LED will not stop flashing until the system has been switched off and then on again.
			The unit is not ready for operation
FAULT		Red	Internal error
			No error
Traffic		Yellow	Connection to control system established
		Yellow	Error in the connection to the control system. Flashing stops a max. of 1 min. after the fault has been rectified.
			No connection to control system established
Input LEDs		Green	1 signal is present
		Green	Link module has detected a pulse error. Once the fault has been rectified, the decentralised input module will continue to work normally after a waiting period of just a few seconds.
			0 signal is present

8 Technical details

Where standards are undated, the 2020-09 valid editions apply.

General	773600	773614
Certifications	CE, KOSHA, TÜV, UKCA, cULus Listed	CE, KOSHA, TÜV, UKCA, cULus Listed
Application range	Standard/failsafe	Standard/failsafe
Electrical data	773600	773614
Supply voltage		
for	Supply	Supply
Voltage	24 V	24 V
Kind	DC	DC
Voltage tolerance	-30 %/+25 %	-30 %/+25 %
Current load capacity at UB	4 A	4 A
Output of external power supply (DC)	1,2 W	1,2 W
Permitted loads	inductive, capacitive, resistive	inductive, capacitive, resistive
Inputs	773600	773614
Quantity	8	8
Voltage at inputs	24 V	24 V
Input type in accordance with EN 61131-2	1, 3	1, 3
Input current range	2,4 - 4,6 mA	2,4 - 4,6 mA
Max. processing time of input when signal changes from "1" to "0"	1 ms	1 ms
Max. processing time of input when signal changes from "0" to "1"	1,2 ms	1,2 ms
Min. processing time of input when signal changes from "1" to "0"	0,5 ms	0,5 ms
Min. processing time of input when signal changes from "0" to "1"	0,7 ms	0,7 ms
Potential isolation	No	No
Semiconductor outputs	773600	773614
Output	O0 ... O7	O0 ... O7
Number of positive-switching single-pole semiconductor outputs	8	8
Function	24 VDC output, standard output, test pulse output	24 VDC output, standard output, test pulse output
Rated voltage	24 V DC	24 V DC
Typ. output current at "1" signal and rated voltage of semiconductor output	0,5 A	0,5 A
Permitted current range	0,000 - 0,600 A	0,000 - 0,600 A
Residual current at "0" signal	< 0,500 mA	< 0,500 mA
Max. internal voltage drop	< 3,0 V	< 3,0 V
Potential isolation	No	No

Semiconductor outputs	773600	773614
Short circuit-proof	Yes	Yes
Test pulse outputs	773600	773614
Max. cable length between test pulse output and input	20 m	20 m
Environmental data	773600	773614
Climatic suitability	EN 60068-2-78	EN 60068-2-78
Ambient temperature		
in accordance with the standard	EN 60068-2-14	EN 60068-2-14
Temperature range	-30 - 60 °C	-30 - 60 °C
Storage temperature		
in accordance with the standard	EN 60068-2-1/-2	EN 60068-2-1/-2
Temperature range	-40 - 70 °C	-40 - 70 °C
Climatic suitability		
in accordance with the standard	EN 60068-2-78	EN 60068-2-78
Humidity	93 % r. h. at 40 °C	93 % r. h. at 40 °C
Max. operating height above SL	2000 m	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN IEC 61000-6-4	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN IEC 61000-6-4
Vibration		
in accordance with the standard	EN 60068-2-6	EN 60068-2-6
Frequency	10 - 55 Hz	10 - 55 Hz
Amplitude	0,35 mm	0,35 mm
Acceleration	1g	1g
Shock stress		
in accordance with the standard	EN 60068-2-27	EN 60068-2-27
Number of shocks	3	3
Acceleration	15g	15g
Duration	11 ms	11 ms
in accordance with the standard	EN 60068-2-27	EN 60068-2-27
Number of shocks	500	500
Acceleration	10g	10g
Duration	16 ms	16 ms
Airgap creepage		
in accordance with the standard	IEC 60664-1	IEC 60664-1
Overvoltage category	III	III
Pollution degree	2	2
Protection type		
in accordance with the standard	EN 60529	EN 60529
Housing	IP67	IP67
Terminals	IP67	IP67

Mechanical data	773600	773614
Material		
Housing	PBT, PET, Valox 855	PBT, PET, Valox 855
Labelling bracket (accessories)	PC	PC
Connection type	M12	Stainless steel 1.4305
Mounting type	screw interlocked	screw interlocked
Dimensions		
Height	133 mm	133 mm
Width	60 mm	60 mm
Depth	30 mm	30 mm
Weight	250 g	250 g

8.1 Safety characteristic data



NOTICE

You must comply with the safety characteristic data in order to achieve the required safety level for your plant/machine.

Unit	Operating mode	EN ISO 13849-1: 2023	EN ISO 13849-1: 2023	EN IEC 62061 SIL CL/ max. SIL	EN IEC 62061 PFH _D [1/h]	EN/IEC 61511 SIL	EN/IEC 61511 SIL	EN ISO 13849-1: 2023 T _M [year]
		PL	Category				PFD	

Input								
Inputs	1-channel	PL d	Cat. 2	SIL 2	9,06E-09	SIL 2	7,89E-04	20
Inputs	2-channel	PL e	Cat. 4	SIL 3	1,24E-09	SIL 3	1,68E-05	20
Bus interface								
Bus interface	–	PL e	Cat. 4	SIL 3	1,94E-09	SIL 3	2,87E-05	20

Explanatory notes for the safety-related characteristic data:

- T_M is the maximum mission time in accordance with EN ISO 13849-1. The value also applies as the retest interval in accordance with EN IEC 61508-6 and EN IEC 61511 and as the proof test interval and mission time in accordance with EN IEC 62061.

All the units used within a safety function must be considered when calculating the safety characteristic data.



INFORMATION

A safety function's SIL/PL values are **not** identical to the SIL/PL values of the units that are used and may differ from these.

9 Order reference

9.1 Order reference for module

Product type	Features	Order no.
PDP67 F 8DI ION	Decentralised input module	773600
PDP67 F 8DI ION VA	Decentralised input module, V2A ring nut	773614

9.2 Order reference for accessories

9.2.1 Plug

Product type	Features	Order no.
Caps for IP67 modules	Blind plug	380324

9.2.2 Cable (by the metre)

Product type	Features	Order no.
PSS SB BUS-CABLE LC	By the metre	311074
PSS67 I/O Cable	By the metre	380320

9.2.3 Cable, M12 to M8

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSS67 Cable M8sf M12sm, 3m	3 m	M 4, 8-pin female connector, straight	M12, 4-pin male connector, straight		380200
PSS67 Cable M8sf M12sm, 5m	5 m	M 4, 8-pin female connector, straight	M12, 4-pin male connector, straight		380201
PSS67 Cable M8sf M12sm, 10m	10 m	M 4, 8-pin female connector, straight	M12, 4-pin male connector, straight		380202
PSS67 Cable M8sf M12sm, 30m	30 m	M 4, 8-pin female connector, straight	M12, 4-pin male connector, straight		380203
PSS67 Cable M8af M12sm, 3m	3 m	M 4, 8-pin female connector, angled	M12, 4-pin male connector, straight		380204
PSS67 Cable M8af M12sm, 5m	5 m	M 4, 8-pin female connector, angled	M12, 4-pin male connector, straight		380205

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSS67 Cable M8af M12sm, 10m	10 m	M 4, 8-pin female connector, angled	M12, 4-pin male connector, straight		380206
PSS67 Cable M8af M12sm, 30m	30 m	M 4, 8-pin female connector, angled	M12, 4-pin male connector, straight		380207

9.2.4 Cable, M12 to M12

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PDP67 Cable M12-5sf M12-5sm, 0.5m	0.5 m	M12, 5-pin female connector, straight	M12, 5-pin male connector, straight		380710
PDP67 Cable M12-5sf M12-5sm, 1m	1 m	M12, 5-pin female connector, straight	M12, 5-pin male connector, straight		380711
PDP67 Cable M12-5sf M12-5sm, 1.5m	1.5 m	M12, 5-pin female connector, straight	M12, 5-pin male connector, straight		380712
PDP67 Cable M12-5sf M12-5sm, 2m	2 m	M12, 5-pin female connector, straight	M12, 5-pin male connector, straight		380713
PSS67 Cable M12sf M12sm, 3m	3 m	M12, 5-pin female connector, straight	M12, 5-pin male connector, straight		380208
PSS67 Cable M12sf M12sm, 5m	5 m	M12, 5-pin female connector, straight	M12, 5-pin male connector, straight		380209
PSS67 Cable M12sf M12sm, 10m	10 m	M12, 5-pin female connector, straight	M12, 5-pin male connector, straight		380210
PSS67 Cable M12sf M12sm, 30m	30 m	M12, 5-pin female connector, straight	M12, 5-pin male connector, straight		380211
PSS67 Cable M12af M12am, 3m	3 m	M12, 5-pin female connector, angled	M12, 5-pin male connector, angled		380212
PSS67 Cable M12af M12am, 5m	5 m	M12, 5-pin female connector, angled	M12, 5-pin male connector, angled		380213
PSS67 Cable M12af M12am, 10m	10 m	M12, 5-pin female connector, angled	M12, 5-pin male connector, angled		380214
PSS67 Cable M12af M12am, 30m	30 m	M12, 5-pin female connector, angled	M12, 5-pin male connector, angled		380215

9.2.5 Adapter

Product type	Features	Connector X1	Connector X2	Connector X3	Order no.
PSEN ma adapter	Adapter for PSENmag/PIT en1.0	4-pin M12 female connector	5-pin M12 male connector		380300
PSEN cs adapter	Adapter for PSENcode	8-pin M12 female connector	5-pin M12 male connector		380301
PSEN sl adapter	Adapter for PSENSlock	8-pin M12 female connector	5-pin M12 male connector		380325
PSEN op SL adapter	Set of 2 adapter cables for transmitter and receiver	M12, 5-pin male connector	M12, 5-pin female connector		631187

10 EU/EC declaration of conformity

These products meet the requirements of the directive 2006/42/EC on machinery up to and including 19 January 2027, and the EU regulation 2023/1230 of the European Parliament and of the Council from 20 January 2027. The full EU and EC declaration of conformity is available to download at www.pilz.com/manuals.

Authorised representative: Pilz GmbH & Co. KG, Felix-Wankel-Str. 2, 73760 Ostfildern, Germany

11 UKCA-Declaration of Conformity

This product(s) complies with following UK legislation: Supply of Machinery (Safety) Regulation 2008.

The complete UKCA Declaration of Conformity is available on the Internet at www.pilz.com/manuals.

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► Support

Technical support is available from Pilz round the clock.

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We are represented internationally. Please refer to our homepage www.pilz.com for further details or contact our headquarters.

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