

**PDP67 F 8DI ION**

**pilz**

Decentralised periphery

This document is a translation of the original document.

All rights to this documentation are reserved by Pilz GmbH & Co. KG. Copies may be made for internal purposes.

Suggestions and comments for improving this documentation will be gratefully received.

Pilz<sup>®</sup>, PIT<sup>®</sup>, PMI<sup>®</sup>, PNOZ<sup>®</sup>, Primo<sup>®</sup>, PSEN<sup>®</sup>, PSS<sup>®</sup>, PVIS<sup>®</sup>, SafetyBUS p<sup>®</sup>, SafetyEYE<sup>®</sup>, SafetyNET p<sup>®</sup>, the spirit of safety<sup>®</sup> are registered and protected trademarks of Pilz GmbH & Co. KG in some countries.



SD means Secure Digital.

Contents		Page
<b>Chapter 1 Introduction</b>		
1.1	Validity of documentation	1-1
1.1.1	Retaining the documentation	1-1
1.2	Overview of documentation	1-2
1.3	Definition of symbols	1-3
<b>Chapter 2 Overview</b>		
2.1	Unit structure	2-1
2.1.1	Scope of supply	2-1
2.1.2	Unit features	2-1
2.2	Front view	2-2
<b>Chapter 3 Safety</b>		
3.1	Intended use	3-1
3.2	Safety regulations	3-2
3.2.1	Use of qualified personnel	3-2
3.2.2	Warranty and liability	3-2
3.2.3	Disposal	3-2
<b>Chapter 4 Function description</b>		
4.1	Unit properties	4-1
4.1.1	Operation	4-1
4.1.1.1	Inputs	4-1
4.1.1.2	Outputs	4-1
4.1.2	Data download	4-1
4.1.3	Diagnostics	4-2
<b>Chapter 5 Installation</b>		
5.1	General installation guidelines	5-1
5.1.1	Dimensions	5-1
<b>Chapter 6 Wiring</b>		
6.1	General wiring guidelines	6-1
6.2	Connector pin assignment	6-2
6.3	Wiring examples	6-3
6.3.1	Example: Single-channel, failsafe input device, without test pulse	6-3
6.3.2	Example: Dual-channel input devices, without test pulses	6-4
6.3.3	Example: Single-channel, failsafe input device, with test pulse	6-5
6.3.4	Example: Dual-channel, failsafe input device, with test pulse	6-7

---

---

<b>Chapter 7 Operation</b>		
----------------------------	--	--

7.1	Messages	7-1
-----	----------	-----

7.1.1	Display elements for device diagnostics	7-1
-------	---	-----

<b>Chapter 8 Technical details</b>		
------------------------------------	--	--

8.1	Technical details	8-1
-----	-------------------	-----

8.2	Order reference	8-3
-----	-----------------	-----

# 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 Overview of documentation

---

### **1 Introduction**

The introduction is designed to familiarise you with the contents, structure and specific order of this manual.

### **2 Overview**

This chapter provides information on the product's most important features.

### **3 Safety**

This chapter must be read as it contains important information on intended use.

### **4 Function Description**

This chapter describes the product's mode of operation.

### **5 Installation**

This chapter explains how to install the product.

### **6 Commissioning**

This chapter describes the product's commissioning and wiring.

### **7 Operation**

This chapter describes how to operate the product and gives tips in the case of a fault.

### **8 Technical Details**

This chapter contains the product's technical details and order reference.

## 1.3 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 unit(s) 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.

# 1 Introduction

---

---



### 2.1 Unit structure

---

#### 2.1.1 Scope of supply

- ▶ Decentralised input module **PDP67 F 8DI ION/PDP67 F 8DI ION VA**
- ▶ 4 blind plugs 380 324

#### 2.1.2 Unit features

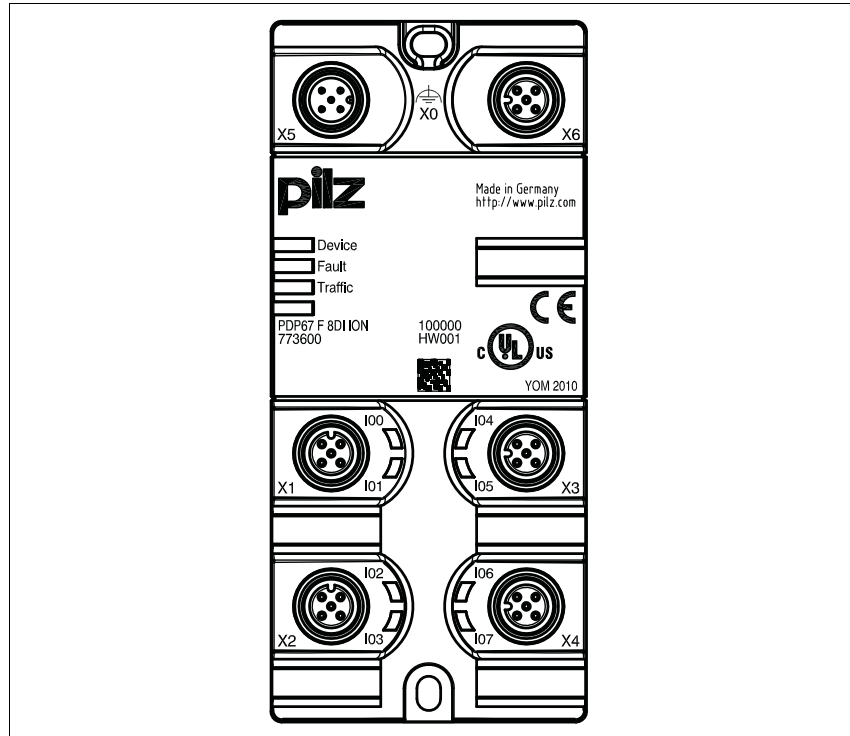
Application of the products **PDP67 F 8DI ION, PDP67 F 8DI ION VA:**

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

## 2.2 Front view



**Key:**

- ▶ X1 ... X4:
  - Inputs
- ▶ X5:
  - Interface to the control system or to X6 on the upstream module
- ▶ X6:
  - Interface to X5 on the downstream module
- ▶ LEDs:
  - Device
  - Fault
  - Traffic
  - IO0 ... IO7

## 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 ml2p or PNOZ mml2p from the configurable control system PNOZmulti.

Intended use includes making the electrical installation EMC-compliant. The product is designed for use in an industrial environment. It is not suitable for use in a domestic environment, as this can lead to interference.

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 manual
- ▶ Use of the product outside the technical details (see chapter entitled “Technical Details”)

## 3.2 Safety regulations

---

### 3.2.1 Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by competent persons.

A competent person is someone who, because of their training, experience and current professional activity, has the specialist knowledge required to test, assess and operate the work equipment, devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology.

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 safety guidelines given in this description
- ▶ 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  $t_M$  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).

### 4.1 Unit properties

---

#### 4.1.1 Operation

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

##### 4.1.1.1 Inputs

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

Input signals must show a “High” (“1” signal) of 15 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.

##### 4.1.1.2 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 Function description

---

### 4.1 Unit properties

---

#### 4.1.2 Data download

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

#### 4.1.3 Diagnostics

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

## 5.1 General installation guidelines

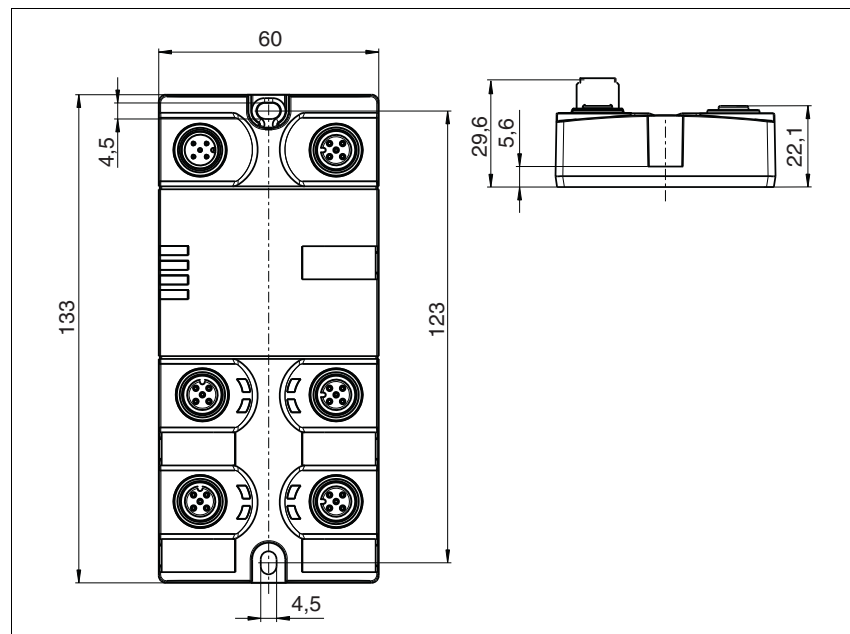
The product must be fastened to a flat mounting surface, so that there is no strain on the housing when the module is screwed down. The mounting distances will depend on which plug-in connectors are used and on the bending radius of the cables.

Unused connectors should be sealed using blind plugs.

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 upper fixing screw X0.

### 5.1.1 Dimensions







## 6.1 General wiring guidelines

---

Please note:

- ▶ Information given in the “Technical details” must be followed.
- ▶ In safety-related applications, 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 instructions for details of the maximum cable length.
- ▶ Pilz pre-assembled cable can be used to connect the inputs and outputs (see order reference).
- ▶ We recommend you use pre-assembled Pilz connectors to connect the inputs and test pulse outputs (see order reference).



### **CAUTION!**

The supply voltages for an external device must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410.



### **CAUTION!**

In order to guarantee protection type IP67, unused connectors should be sealed using the blind plugs supplied.



### **CAUTION!**

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

## 6.2 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	
<b>Interface to the link module: X5</b>	<b>Assignment</b>	
5 pin M12 male connector A-coded	1: VCC 2: CAN- 3: GND 4: CAN+ 5: Shield	
<b>Interface to the next decentralised module: X6</b>	<b>Assignment</b>	
5-pin M12 female connector A-coded	1: VCC 2: CAN- 3: GND 4: CAN+ 5: Shield	

## 6.3 Wiring examples

### 6.3.1 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** in accordance with EN ISO 13849-1 **up to PL d** and EN IEC 62061 **up to SIL CL 2**.
- ▶ The input device must be approved for failsafe applications.
- ▶ Please read the instructions provided with the input device.



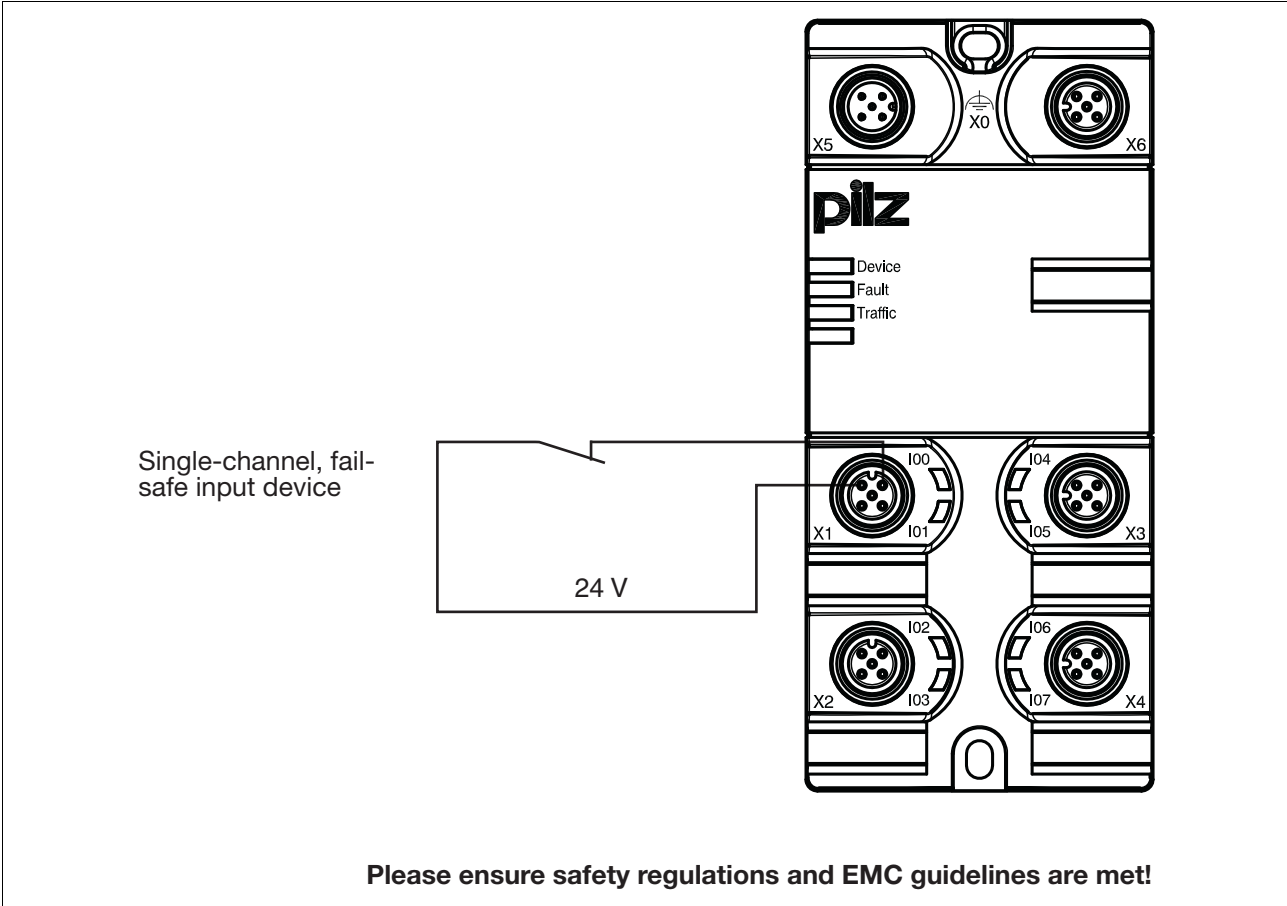
#### **WARNING!**

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

### 6.3 Wiring examples



## 6.3 Wiring examples

### 6.3.2 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** and diverse channels in accordance with EN ISO 13849-1 **up to PL e** and EN IEC 62061 **up to SIL CL 3**, provided the functionality of both input device channels is monitored in the user program via a **feasibility 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. The user program will detect short circuits via the feasibility check.



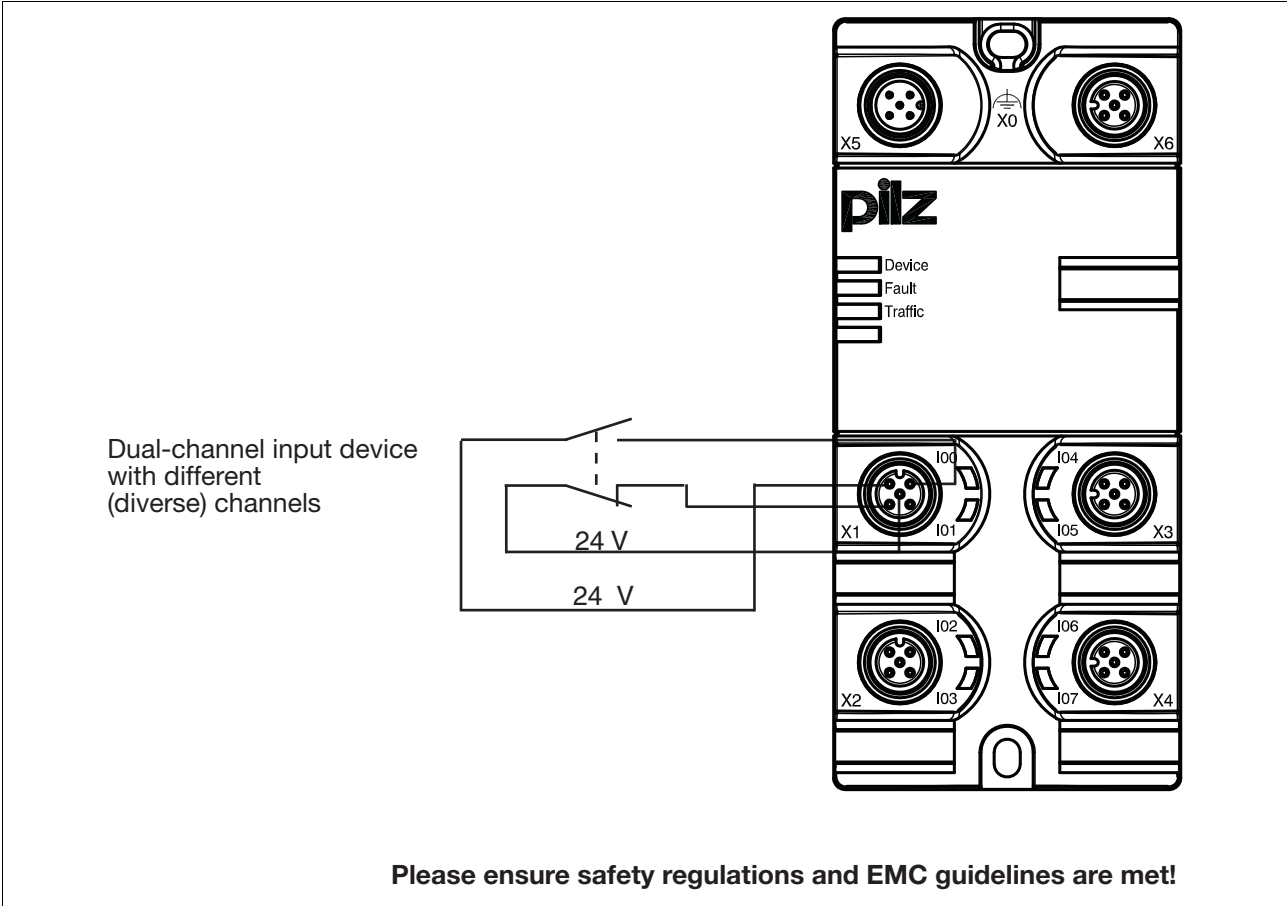
#### **WARNING!**

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

### 6.3 Wiring examples



## 6.3 Wiring examples

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

Features:

- ▶ Depending on the application area and its respective regulations, this connection diagram is suitable in accordance with EN ISO 13849-1 **up to PL d** and EN IEC 62061 **up to SIL CL 2**.
- ▶ 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.



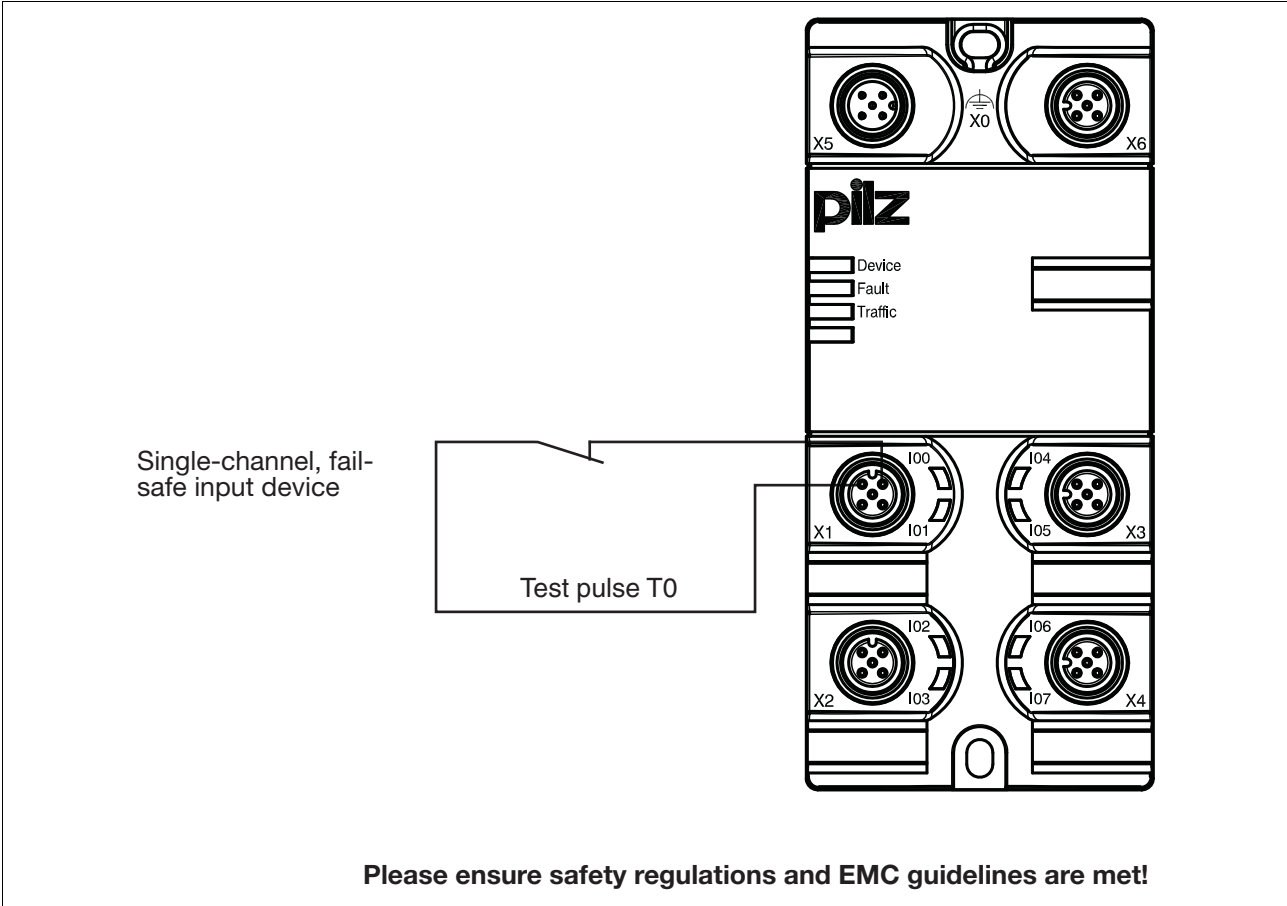
#### **CAUTION!**

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

### 6.3 Wiring examples



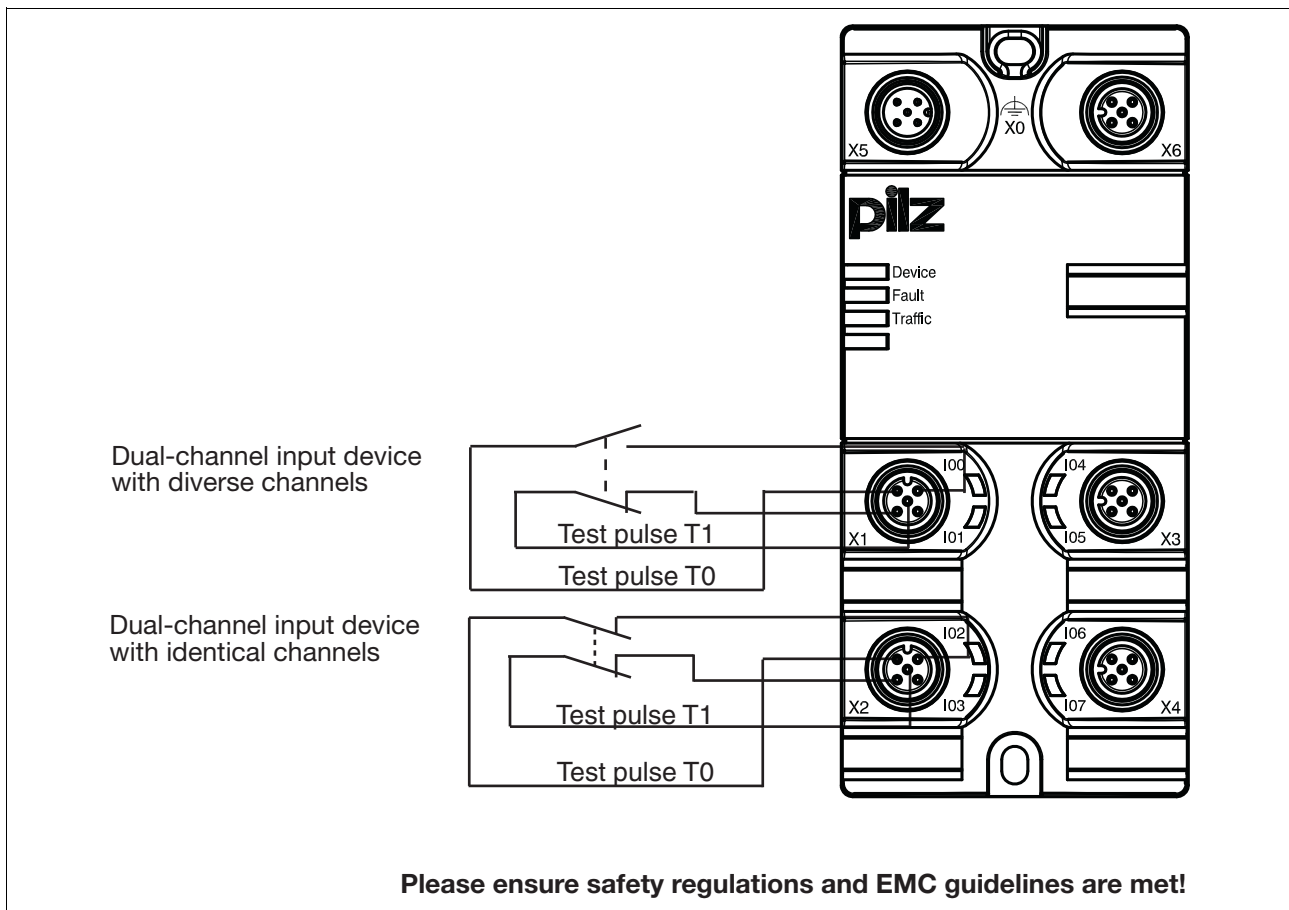


## 6.3 Wiring examples

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

Features:

- ▶ Depending on the application area and its respective regulations, this connection diagram is suitable in accordance with EN ISO 13849-1 **up to PL e** and EN IEC 62061 **up to SIL CL 3**.
- ▶ 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).



## 7.1 Messages

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

### 7.1.1 Display elements for device diagnostics

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 wait of just a few seconds.
			0 signal is present



## 8.1 Technical details

Technical details	
Application range	Standard/Failsafe
<b>Electrical data</b>	
Internal supply voltage	Supply
Supply voltage $U_B$ DC	24 V
Voltage tolerance	-30 %/+25 %
Power consumption at $U_B$	1.2 W
<b>Inputs</b>	
Number	8
Input voltage	24 V DC
Input current	3.0 mA
Potential isolation between input and internal bus voltage	no
<b>Outputs (configurable as semiconductor outputs or test pulse outputs)</b>	
Voltage	24 V DC
Number of positive-switching single-pole semiconductor outputs	8
Short circuit-proof	yes
Potential isolation between semiconductor output and internal bus voltage	no
Potential isolation between semiconductor output and input	no
Typ. output current at "1" signal and rated voltage of semiconductor output	0.50 A
Permitted current range	0.00 - 0.60 A
Residual current at "0" signal	0.02 mA
Permitted loads	inductive, capacitive, resistive
Max. internal voltage drop	200 mV
Terminal voltage when switching off inductive loads	-45 V
Number of test pulse outputs	8
Number of outputs that can be configured as test pulses	8
Max. output current at "1" signal	0.50 A
Short circuit-proof	yes
Max. cable runs between test pulse output and input	20 m
<b>Hardware processing times</b>	
Max. processing time for input when signal changes from "1" to "0"	1.000 ms
Max. processing time for input when signal changes from "0" to "1"	1.200 ms
Min. processing time for input when signal changes from "1" to "0"	0.50 ms
Min. processing time for input when signal changes from "0" to "1"	0.70 ms
<b>Environmental data</b>	
Climatic suitability	EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	-30 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	temporary No. 773600
EMC	EN 55011: class A, EN 61000-4-11, 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 61000-4-9

## 8.1 Technical details

Environmental data	
Vibration to <b>EN 60068-2-6</b>	
Frequency	<b>10 - 55 Hz</b>
Max. acceleration	<b>1g</b>
Shock stress	
<b>EN 60068-2-27</b>	<b>15g</b>
	<b>11 ms</b>
<b>EN 60068-2-29</b>	<b>10g</b>
	<b>16 ms</b>
Protection type in accordance with <b>EN 60529</b>	
Housing	<b>IP67</b>
Terminals	<b>IP67</b>
Airgap creepage in accordance with <b>IEC 60664-1</b>	
Overvoltage category	<b>III</b>
Pollution degree	<b>2</b>
Mechanical data	
Connection type	<b>M12 No. 773600</b> <b>Stainless steel 1.4305 No. 773614</b>
Housing material	
Top	<b>Valox 855</b>
Labelling bracket (accessories)	<b>PC</b>
Dimensions	
Height	<b>133.0 mm</b>
Width	<b>60.0 mm</b>
Depth	<b>30.0 mm</b>
Weight	<b>250 g</b>

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1: 2006 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	EN ISO 13849-1: 2006 T <sub>M</sub> [year]
<b>Input</b>						
SC inputs	single-channel	PL d (Cat. 2)	Cat. 2	SIL CL 2	9.06E-09	20
SC inputs	dual-channel	PL e (Cat. 4)	Cat. 4	SIL CL 3	1.24E-09	20
<b>Bus interface</b>						
Bus interface		PL e (Cat. 4)	Cat. 4	SIL CL 3	1.94E-09	20

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

The standards current on **2010-03** apply.

## 8.2 Order reference

Order reference		
Product type	Features	Order no.
PDP67 F 8DI ION	Decentralised input module	773 600
PDP67 F 8DI ION VA	Decentralised input module, V2A ring nut	773 614

Order reference: accessories for PDP67 F 8DI ION		
Product type	Features	Order no.
Caps for IP67 modules	Blind plugs	380 324

Order reference: Cable			
Product type	Features		Order no.
PSS SB BUSCABLE LC	Cable, shielded	1 - 100 m	311 074
PSS67 I/O Cable	Cable	1 - 30 m	380 320
PSS67 Cable M8sf M12sm	Cable, straight M12 connector, straight M8 socket, 4-pin	3 m	380 200
PSS67 Cable M8sf M12sm	Cable, straight M12 connector, straight M8 socket, 4-pin	5 m	380 201
PSS67 Cable M8sf M12sm	Cable, straight M12 connector, straight M8 socket, 4-pin	10 m	380 202
PSS67 Cable M8sf M12sm	Cable, straight M12 connector, straight M8 socket, 4-pin	30 m	380 203
PSS67 Cable M8sf M12sm	Cable, straight M12 connector, angled M8 socket, 4-pin	3 m	380 204
PSS67 Cable M8sf M12sm	Cable, straight M12 connector, angled M8 socket, 4-pin	5 m	380 205
PSS67 Cable M8sf M12sm	Cable, straight M12 connector, angled M8 socket, 4-pin	10 m	380 206
PSS67 Cable M8sf M12sm	Cable, straight M12 connector, angled M8 socket, 4-pin	30 m	380 207
PSS67 Cable M12sf M12sm	Cable, straight M12 connector, straight M12 socket, 5-pin	3 m	380 208
PSS67 Cable M12sf M12sm	Cable, straight M12 connector, straight M12 socket, 5-pin	5 m	380 209
PSS67 Cable M12sf M12sm	Cable, straight M12 connector, straight M12 socket, 5-pin	10 m	380 210
PSS67 Cable M12sf M12sm	Cable, straight M12 connector, straight M12 socket, 5-pin	30 m	380 211
PSS67 Cable M12sf M12sm	Cable, angled M12 connector, angled M12 socket, 5-pin	3 m	380 212
PSS67 Cable M12sf M12sm	Cable, angled M12 connector, angled M12 socket, 5-pin	5 m	380 213
PSS67 Cable M12sf M12sm	Cable, angled M12 connector, angled M12 socket, 5-pin	10 m	380 214
PSS67 Cable M12sf M12sm	Cable, angled M12 connector, angled M12 socket, 5-pin	30 m	380 215

## 8.2 Order reference

### Order reference: Adapters

Product type	Features	Order no.
PSEN ma adapter	Adapter for connection to safety switch PSENmag	380 300
PSEN cs adapter	Adapter for connection to safety switch PSENcode	380 301

### Order reference: Connectors

Product type	Features	Order no.
PSS67 M12 connector	Connector, M12, straight, 5-pin, A-coded	380 308
PSS67 M12 connector	Socket, M12, straight, 5-pin, A-coded	380 309
PSS67 M12 connector	Connector, M12, angled, 5-pin, A-coded	380 310
PSS67 M12 connector	Socket, M12, angled, 5-pin, A-coded	380 311
PSS67 M8 connector	Connector, M8, straight, 4-pin	380 316
PSS67 M8 connector	Socket, M8, straight, 4-pin	380 317
PSS67 M8 connector	Connector, M8, angled, 4-pin	380 318
PSS67 M8 connector	Socket, M8, angled, 4-pin	380 319



► ...  
In many countries we are represented by our subsidiaries and sales partners.

Please refer to our homepage for further details or contact our headquarters.

Pilz GmbH & Co. KG  
Felix-Wankel-Straße 2  
73760 Ostfildern, Germany  
Telephone: +49 711 3409-0  
Telefax: +49 711 3409-133  
E-Mail: [pilz.gmbh@pilz.de](mailto:pilz.gmbh@pilz.de)  
Internet: [www.pilz.com](http://www.pilz.com)

## ► Technical support

+49 711 3409-444  
[support@pilz.com](mailto:support@pilz.com)

# pilz

IndurNET p<sup>®</sup>, Pilz<sup>®</sup>, PIT<sup>®</sup>, PMCprotego<sup>®</sup>, PMI<sup>®</sup>, PNOZ<sup>®</sup>, Primo<sup>®</sup>, PSEN<sup>®</sup>, PSS<sup>®</sup>, PVIS<sup>®</sup>, SafetyBUS P<sup>®</sup>, SafetyEYE<sup>®</sup>, SafetyNET p<sup>®</sup>, the spirit of safety<sup>®</sup> are registered and protected trademarks of Pilz GmbH & Co. KG in some countries. We would point out that product features may vary from the details stated in this document, depending on the status at the time of publication and the scope of the equipment. We accept no responsibility for the validity, accuracy and entirety of the text and graphics presented in this information. Please contact our Technical Support if you have any questions.