▶ PNOZ m ES CC-Link

PILZ

THE SPIRIT OF SAFETY

Contents

1 Introduction

1.1 Validity of documentation

This documentation is valid for the product PNOZ m ES CC-Link. 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.

1.2 Using the documentation

This document is intended for instruction. Only install and commission the product if you have read and understood this document. The document should be retained for future 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 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

▸ Expansion module PNOZ m ES CC-Link

▸ Jumper

2.2 Unit features

Application of the product PNOZ m ES CC-Link:

Expansion module for connection to a base unit from the PNOZmulti 2 system.

The product has the following features:

▸ Can be configured in the PNOZmulti Configurator

▸ Connection for CC-Link

▸ Station addresses from 1 ... 63, selected via rotary switch

▸ Station type: Remote Device

▸ Occupied stations: 3

▸ 128 virtual inputs and outputs on the control system PNOZmulti can be defined in the PNOZmulti Configurator for communication with the fieldbus CC-Link.

▸ Max. 1 PNOZ m ES CC-Link can be connected to the base unit

▸ Plug-in connection terminals:
Either spring-loaded terminal or screw terminal available as an accessory (see Order references for accessories).

▸ Please refer to the document "PNOZmulti System Expansion" for the PNOZmulti base units that can be connected.

2.3 Front view
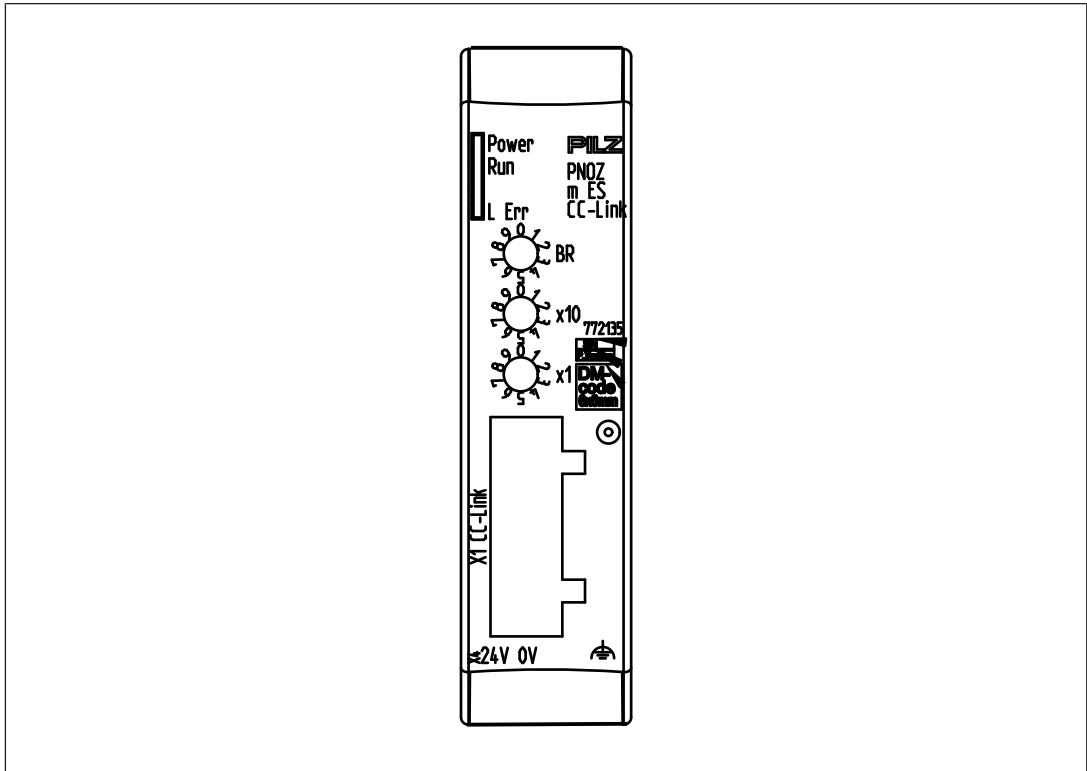
Legend:

X1:	CC-Link interface
X4: 0 V, 24 V:	Supply connections
⏚:	Functional earth
Rotary switch	For setting the station addresses
LEDs:	Power, Run, L Err

3 Safety

3.1 Intended use

The fieldbus module PNOZ m ES CC-Link is an expansion module of the configurable control system PNOZmulti. It is used for communication between the configurable control system PNOZmulti and the CC-Link .

CC-Link is designed for fast data exchange at field level. The expansion module CC-Link is a passive subscriber (Slave) in CC-Link. The basic communication functions with CC-Link conform to CC-Link V1.10. The central controller (master) reads input information from the slaves and writes output information to the slaves as part of each cycle. As well as the cyclical transfer of usable data, the expansion module PNOZ m ES CC-Link also has diagnostic and commissioning functions. Data traffic is monitored on the Master/Slave side.

The expansion module may only be connected to a base unit from the PNOZmulti system (please refer to the document "PNOZmulti System Expansion" for details of the base units that can be connected).

The configurable small control systems PNOZmulti are used for the safety-related interruption of safety circuits and are designed for use in:

▸ E-STOP equipment

▸ Safety circuits in accordance with VDE 0113 Part 1 and EN 60204-1

The expansion module may not be used for safety-related functions.

The module PNOZ m ES CC-Link can be used as a non-safety-related component in accordance with the Lifts Directive 2014/33/EU.
It meets the environmental requirements for passenger and goods lifts in accordance with EN 81-1/2, EN 81-20, EN 81-22 and EN 81-50, as well as the requirements for escalators and moving walks in accordance with EN 115-1.

The safety controller should be installed in a protected environment that meets at least the requirements of pollution degree 2.
Example: Protected inside space or control cabinet with protection type IP54 and appropriate air conditioning.

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 Technical details [📖 22]).

> **!** **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.

3.2 System requirements

Please refer to the "Product Modifications PNOZmulti" document in the "Version overview" section for details of which versions of the base unit and PNOZmulti Configurator can be used for this product.

3.3 Safety regulations

3.3.1 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 information provided in this description under "Safety",

▸ And have a good knowledge of the generic and specialist standards applicable to the specific application.

3.3.2 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,

▸ Operating personnel are not suitably qualified,

▸ Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering work etc.).

3.3.3 Disposal

▸ When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

3.3.4 For your safety

The unit meets all the necessary conditions for safe operation. However, you should always ensure that the following safety requirements are met:

▸ This operating manual only describes the basic functions of the unit. The expanded functions are described in the PNOZmulti Configurator's online help. Only use these functions once you have read and understood the documentations.

▸ Do not open the housing or make any unauthorised modifications.

▸ Please make sure you shut down the supply voltage when performing maintenance work (e.g. exchanging contactors).

4 Function description

4.1 Functions

The virtual inputs and outputs that are to be transferred via the fieldbus CC-Link are selected and configured in the PNOZmulti Configurator. The base unit and the fieldbus module PNOZ m ES CC-Link are connected via a jumper. After the supply voltage is switched on or the PNOZmulti control system is reset, the fieldbus module PNOZ m ES CC-Link is configured and started automatically.

LEDs indicate the status of the fieldbus module CC-Link.

The configuration is described in detail in the PNOZmulti Configurator's online help.

To send and receive data three stations have to be created in CC-Link master.

4.2 Input and output data

Virtual inputs and outputs can be requested or set directly via the following addresses. The implementation to the names of the inputs and outputs in PNOZmulti 2 is performed as in the table listed below.

The data is structured as follows:

▸ **Input area**

    – Inputs on PNOZmulti Configurator: i00 .. i127

    – Input data CC-Link: RYmn.. RY(m+50)n, RWw l .. RWw l+2

       with l = address can be set as required on the master side (word address)

       with m = address can be set as required on the master side (Bit address)

       with n = 0 .. F (Bit number)

       Example: (with m=100) i23 -> n = 7 -> RY117

Bit addressed input data i00 - i87

n	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
RY m n	i15	i14	i13	i12	i11	i10	i09	i08	i07	i06	i05	i04	i03	i02	i01	i00
RY(m+10)n	i31	i30	i29	i28	i27	i26	i25	i24	i23	i22	i21	i20	i19	i18	i17	i16
RY(m+20)n	i47	i46	i45	i44	i43	i42	i41	i40	i39	i38	i37	i36	i35	i34	i33	i32
RY(m+30)n	i63	i62	i61	i60	i59	i58	i57	i56	i55	i54	i53	i52	i51	i50	i49	i48
RY(m+40)n	i79	i78	i77	i76	i75	i74	i73	i72	i71	i70	i69	i68	i67	i66	i65	i64
RY(m+50)n									i87	i86	i85	i84	i83	i82	i81	i80

Word addressed input data i88 - i127

Bit no	High byte								Low byte							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
RWw l	i103	i102	i101	i100	i99	i98	i97	i96	i95	i94	i93	i92	i91	i90	i89	i88
RWw l+1	i119	i118	i117	i116	i115	i114	i113	i112	i111	i110	i109	i108	i107	i106	i105	i104
RWw l+2	-	-	-	-	-	-	-	-	i127	i126	i125	i124	i123	i122	i121	i120

▶ **Output range**

– Outputs on PNOZmulti Configurator: o00 .. o127

– Output data CC-Link: RXmn .. RX(m+50)n, RWr l .. RWr l+2

  with l = address can be set as required on the master side (word address)

  with m = address can be set as required on the master side (Bit address)

  with n = 0 .. F (Bit number)

  Example: (with m=100) o22 -> n = 6 -> RX116

Bit addressed output data o00 - o87

n	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
RX m n	o15	o14	o13	o12	o11	o10	o09	o08	o07	o06	o05	o04	o03	o02	o01	o00
RX(m+10)n	o31	o30	o29	o28	o27	o26	o25	o24	o23	o22	o21	o20	o19	o18	o17	o16
RX(m+20)n	o47	o46	o45	o44	o43	o42	o41	o40	o39	o38	o37	o36	o35	o34	o33	o32
RX(m+30)n	o63	o62	o61	o60	o59	o58	o57	o56	o55	o54	o53	o52	o51	o50	o49	o48
RX(m+40)n	o79	o78	o77	o76	o75	o74	o73	o72	o71	o70	o69	o68	o67	o66	o65	o64
RX(m+50)n									o87	o86	o85	o84	o83	o82	o81	o80

Word addressed output data o88 - o127

Bit No.	High byte								Low byte							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
RWr l	o103	o102	o101	o100	o99	o98	o97	o96	o95	o94	o93	o92	o91	o90	o89	o88
RWr l+1	o119	o118	o117	o116	o115	o114	o113	o112	o111	o110	o109	o108	o107	o106	o105	o104
RWr l+2	-	-	-	LED RUN FS	LED DIAG	LED FAULT	LED IFAULT	LED OFAULT	o127	o126	o125	o124	o123	o122	o121	o120

4.3 LED status

The LED status of PNOZmulti 2 can be read out via the following High Byte.

	High Byte								Low Byte							
Bit no	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
RWr (I+2)	LED Byte								Output data o120 - o127							

Bit 5-7: Reserved

The LED status of the base unit PNOZ m B0 can be requested directly as follows

▸ Bit 0 = 1: LED OFAULT is lit or flashes

▸ Bit 1 = 1: LED IFAULT is lit or flashes

▸ Bit 2 = 1: LED FAULT is lit or flashes

▸ Bit 3 = 1: LED DIAG is lit or flashes

▸ Bit 4 = 1: LED RUN is lit

▸ Bit 5-7: Reserved

The LED status of the base unit PNOZ m B1 can be requested directly as follows

▸ Bit 0 = 1: LED OFAULT is lit or flashes

▸ Bit 1 = 1: LED IFAULT is lit or flashes

▸ Bit 2 = 1: LED FAULT is lit or flashes

▸ Bit 3 = 1: LED DIAG is lit or flashes

▸ Bit 4 = 1: LED RUN FS is lit

▸ Bit 5: Reserved

▸ Bit 6 = 1: LED RUN ST is lit

▸ Bit 7: Reserved

4.4 Access to table segments

The data in the tables can be requested via the following addresses.

**Input data**

The Master requests a table segment:

	High Byte	Low Byte
RWw (I+3)	Segment number	Table number

Output data

PNOZmulti 2 answers as follows:

	High Byte	**Low Byte**
RWr (I+3)	Segment number	Table number
RWr(I+4)	Segment Byte 1	Segment Byte 0
RWr(I+5)	Segment Byte 3	Segment Byte 2
RWr(I+6)	Segment Byte 5	Segment Byte 4
RWr(I+7)	Segment Byte 7	Segment Byte 6
RWr(I+8)	Segment Byte 9	Segment Byte 8
RWr(I+9)	Segment Byte 11	Segment Byte 10
RWr(I+A)	Reserved	Segment Byte 12
RWr(I+B)	Reserved	Reserved

4.5 Block diagram
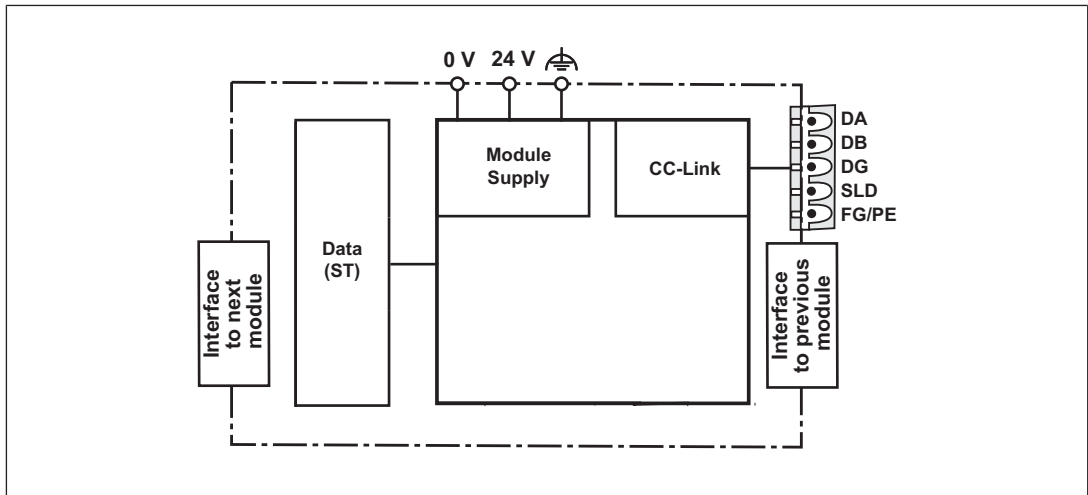
5 Installation

5.1 General installation guidelines

▸ The unit should be installed in a control cabinet with a protection type of at least IP54.

▸ Fit the safety system to a horizontal mounting rail. The venting slots must face upward and downward. Other mounting positions could damage the safety system.

▸ Use the locking elements on the rear of the unit to attach it to a mounting rail.

▸ In environments exposed to heavy vibration, the unit should be secured using a fixing element (e.g. retaining bracket or end angle).

▸ Open the locking slide before lifting the unit from the mounting rail.

▸ To comply with EMC requirements, the mounting rail must have a low impedance connection to the control cabinet housing.

▸ The ambient temperature of the PNOZmulti units in the control cabinet must not exceed the figure stated in the technical details. Air conditioning may otherwise be required.
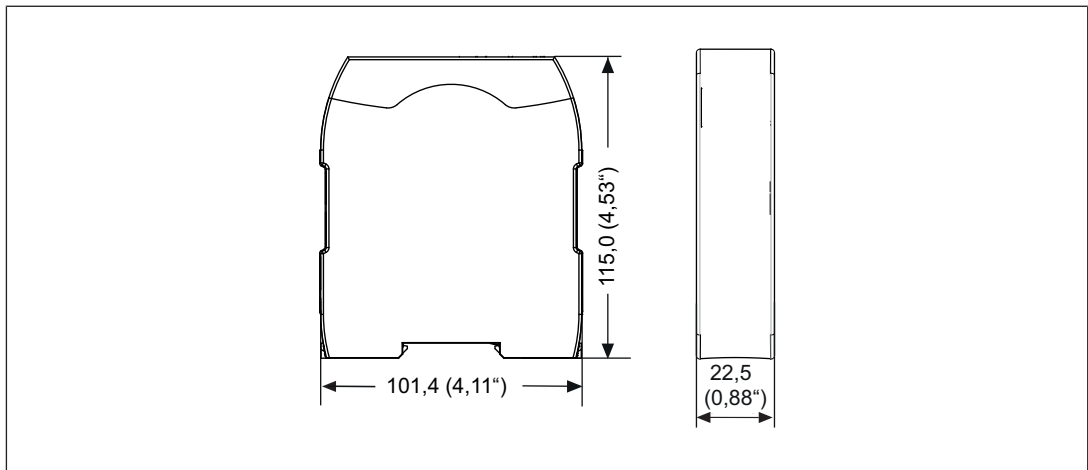
> **NOTICE**
>
> Damage due to electrostatic discharge!
>
> Electrostatic discharge can damage components. Ensure against discharge before touching the product, e.g. by touching an earthed, conductive surface or by wearing an earthed armband.

5.2 Dimensions in mm

5.3 Connect the base unit and expansion modules

Connect the base unit and the expansion module as described in the operating instructions for the base units.

▸ Connect the black/yellow terminator to the expansion module.

▸ Install the expansion module in the position in which it is configured in the PNOZmulti Configurator.

The position of the expansion modules is defined in the PNOZmulti Configurator. The expansion modules are connected to the left or right of the base unit, depending on the type.

Please refer to the document "PNOZmulti System Expansion" for details of the number of modules that can be connected to the base unit and the module types.

6 Commissioning

6.1 General wiring guidelines

The wiring is defined in the circuit diagram of the PNOZmulti Configurator.

Please note:

▸ Information given in the Technical details [📖 22] must be followed.

▸ The position of the expansion module is specified in the Hardware configuration of the PNOZmulti Configurator.

▸ Use copper wiring with a temperature stability of 75 °C.

▸ External measures must be used to connect the terminal ⏚ to the functional earth, when the mounting rail is **not** connected to the functional earth.

▸ Always connect the mounting rail to the protective earth via an earthing terminal. This will be used to dissipate hazardous voltages in the case of a fault.

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

> ⚠️ **CAUTION!**
>
> Only connect and disconnect the expansion module when the supply voltage is switched off.

> 🛈 **NOTICE**
>
> When installing, you must refer to the guidelines of the CC-LinkUser Group.

## 6.2 Connecting the supply voltage

Connect the supply voltage to the fieldbus module:

▸ **24 V** terminal: + 24 VDC

▸ **0 V** terminal: 0 V

▸ Protect the supply voltage as follows:

– Circuit breaker, characteristic C - 6 A

or

– Blow-out fuse, slow, 6A

6.3 Interface assignment

It is possible to define which outputs on the safety system will communicate with CC-Link. The connection to CC-Link is made via a 5-pin screw connector.
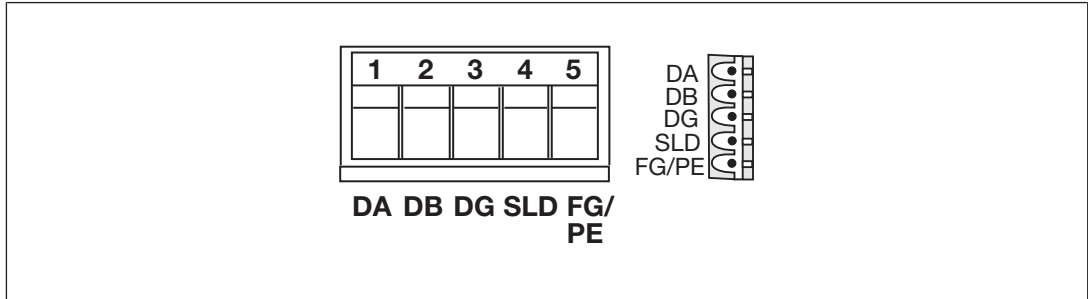
1: DA (Channel A)

2: DB (Channel B)

3: DG (Earth)

4: SLD (Cable shield)

5: FG/PE (Functional earth)

6.4 Setting the transmission rate

▸ On the upper rotary switch DR, use a small screwdriver to set the transmission rate (in the example, "3" corresponds to 5 MBit/s).

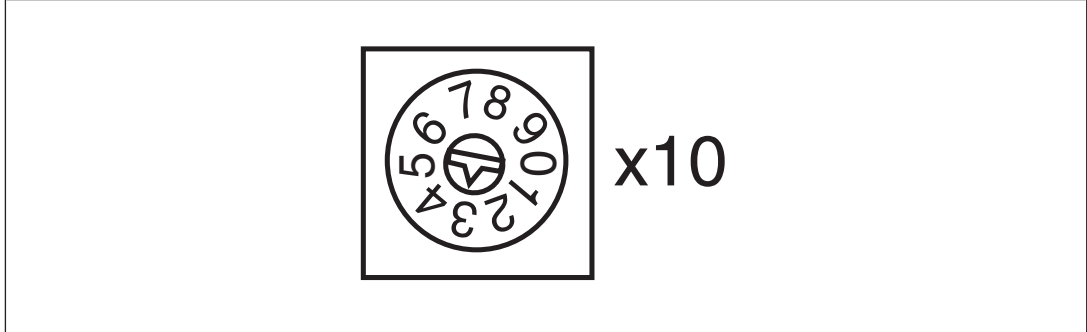| Switch setting	0	1	2	3	4
Transmission rate	156 kBit/s	625 kBit/s	2.5 MBit/s	5 MBit/s	10 MBit/s

INFORMATION

The transmission rate cannot be changed during operation.

6.5 Setting the station address

The station address of the expansion module PNOZ m ES CC-Link is set between 1 ... 63 (decimal) via two rotary switches x1 and x10.
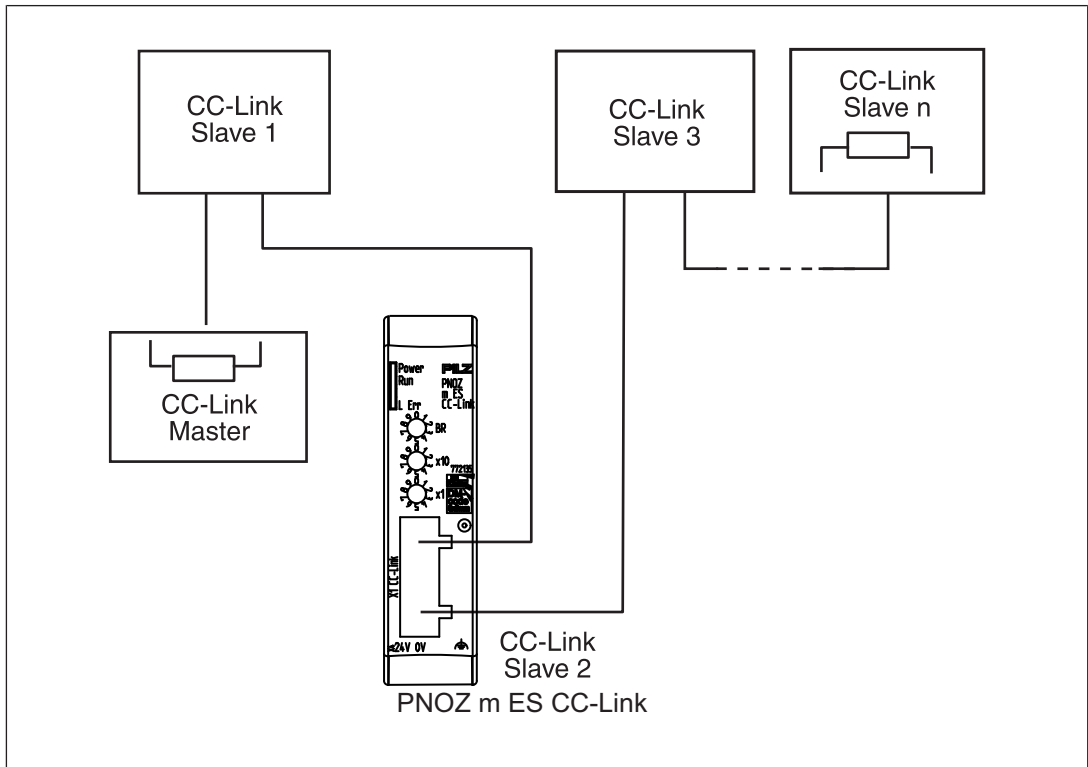

▸ On the middle rotary switch x10, use a small screwdriver to set the tens digit for the address ("3" in the example).
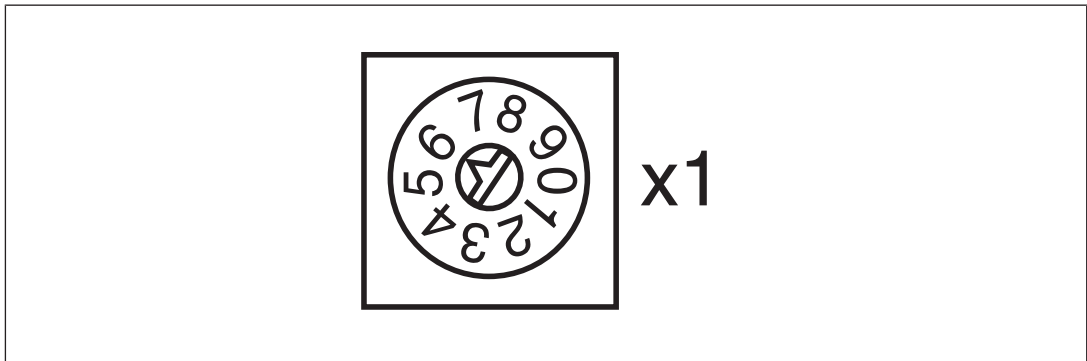
▸ On the lower rotary switch x1, set the ones digit for the address ("6" in the example).

Station address 36 is set in the diagrams as an example.

6.6 Connection example

6.7 Download modified project to the PNOZmulti system

As soon as an additional expansion module has been connected to the system, the project must be amended in the PNOZmulti Configurator and downloaded back into the base unit. Proceed as described in the operating manual for the base unit.

> **NOTICE**
>
> For the commissioning and after every user program change, you must check whether the safety devices are functioning correctly.

7 Operation

When the supply voltage is switched on, the PNOZmulti copies the configuration from the chip card.

The expansion module PNOZ m ES CC-Link is configured and started automatically.

7.1 Messages

Legend

☼ LED on

◐ LED flashes

● LED off

LED			Meaning
Power	☼	green	Supply voltage is present
	●		Supply voltage is not present
RUN	☼	green	Bus connection available
	●		▸ Bus connection is not available ▸ Status: timeout ▸ No supply voltage at the fieldbus module PNOZ m ES CC-Link
L Err	☼	red	Fault detected: wrong station address or transmission rate
	◐	red	▸ Flashes evenly: setting has been changed during operation and PNOZ m ES CC-Link has not been restarted ▸ Flashes unevenly: faulty connection, e.g. terminating resistor is missing
	●		▸ Bus connection available ▸ No supply voltage at the fieldbus module PNOZ m ES CC-Link

8   Technical Details

General	
Certifications	**CE, EAC, UKCA, cULus Listed**
Application range	**Standard**
Electrical data	
Supply voltage	
for	**Module supply**
Voltage	**24 V**
Kind	**DC**
Voltage tolerance	**-20 %/+25 %**
Max. continuous current that the external power supply must provide	**45 mA**
Output of external power supply (DC)	**1,1 W**
Potential isolation	**Yes**
Supply voltage	
for	**Module supply**
internal	**Via base unit**
Voltage	**3,3 V**
Kind	**DC**
Current consumption	**60 mA**
Power consumption	**0,2 W**
Max. power dissipation of module	**1,5 W**
Status indicator	**LED**
Fieldbus interface	
Fieldbus interface	**CC-Link V1.10**
Device type	**Slave**
Station address	**1 ... 63d**
Transmission rates	**10 MBit/s, 156 kbit/s, 2,5 MBit/s, 5 MBit/s, 625 kbit/s**
Connection	**5-pin Combicon plug-in connector**
Assigned stations	**3**
Galvanic isolation	**Yes**
Environmental data	
Ambient temperature	
in accordance with the standard	**EN 60068-2-14**
Temperature range	**0 - 60 °C**
Forced convection in control cabinet off	**55 °C**
Storage temperature	
in accordance with the standard	**EN 60068-2-1/-2**
Temperature range	**-25 - 70 °C**
Climatic suitability	
in accordance with the standard	**EN 60068-2-30, EN 60068-2-78**
Condensation during operation	**Not permitted**
Max. operating height above SL	**2000 m**

Environmental data	
EMC	**EN 61131-2**
Vibration	
in accordance with the standard	**EN 60068-2-6**
Frequency	**10 - 150 Hz**
Acceleration	**1g**
Shock stress	
in accordance with the standard	**EN 60068-2-27**
Acceleration	**15g**
Duration	**11 ms**
Airgap creepage	
in accordance with the standard	**EN 61131-2**
Overvoltage category	**II**
Pollution degree	**2**
Rated insulation voltage	**30 V**
Protection type	
in accordance with the standard	**EN 60529**
Housing	**IP20**
Terminals	**IP20**
Mounting area (e.g. control cabinet)	**IP54**
Potential isolation	
Potential isolation between	**Fieldbus and module voltage**
Type of potential isolation	**Functional insulation**
Rated surge voltage	**500 V**
Mechanical data	
Mounting position	**horizontally on mounting rail**
DIN rail	
Top hat rail	**35 x 7,5 EN 50022**
Recess width	**27 mm**
Material	
Bottom	**PC**
Front	**PC**
Top	**PC**
Connection type	**Spring-loaded terminal, screw terminal**
Conductor cross section with screw terminals	
1 core flexible	**0,25 - 2,5 mm², 24 - 12 AWG**
2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors	**0,2 - 1,5 mm², 24 - 16 AWG**
Torque setting with screw terminals	**0,5 Nm**
Conductor cross section with spring-loaded terminals: Flexible with/without crimp connector	**0,2 - 2,5 mm², 24 - 12 AWG**
Spring-loaded terminals: Terminal points per connection	**2**
Stripping length with spring-loaded terminals	**9 mm**

Mechanical data	
Dimensions	
Height	**101,4 mm**
Width	**22,5 mm**
Depth	**110,4 mm**
Weight	**90 g**

Where standards are undated, the 2015-08 latest editions shall apply.

9 Order reference

9.1 Product

Product type	Features	Order no.
PNOZ m ES CC-Link	Configurable safe small controllers PNOZmulti 2, fieldbus module, CC-Link.	772135

9.2 Accessories

9.2.1 Terminals

Product type	Features	Order no.
Spring terminals PNOZ, 1 pc.	Spring-loaded terminals, for fieldbus modules on PNOZ mm0.xp, 1 set.	783542
Screw terminals PNOZ mmcxp, 1 pc.	Plug-in screw terminal, fieldbus modules on PNOZ mm0.xp, 1 set.	793542
Spring terminals PNOZ mmcxp, 10 pcs.	Spring-loaded terminals, for fieldbus modules on PNOZ mm0.xp, 10 sets.	783543
Screw terminals PNOZ mmcxp, 10 pcs.	Plug-in screw terminal, fieldbus modules on PNOZ mm0.xp, 10 sets.	793543

9.2.2 Connector plug

Product type	Features	Order no.
PNOZ mm0.xp connector left (10 pcs)	Connector plug to connect the modules to the left-hand side of the PNOZmulti base unit, yellow/black (10 pieces).	779260

▶ Support

Technical support is available from Pilz round the clock.

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