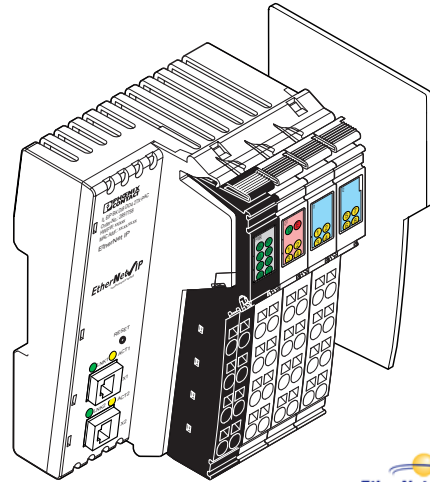# IL EIP BK DI8 DO4 2TX-PAC

Inline Bus Coupler for Ethernet/IP With Eight Digital Inputs and Four Digital Outputs

AUTOMATION

1 Description

The bus coupler is the interface between the Ethernet/IP network and the Inline installation system.

With the help of a bus coupler, 61 Inline terminals can be connected at any position within an existing Ethernet/IP system. The bus coupler and the Inline terminals form a station with 63 local bus devices. Here, the inputs and outputs of the bus coupler form the first and second local bus devices.

Up to eight PCP devices can be operated on the bus coupler.

1.1 Module Features

– 2 x Ethernet twisted pair according to 802.3 with auto negotiation and auto crossover connected via an integrated 3-port switch (2 external ports, 1 internal port)
– Ethernet connection via 8-pos. RJ45 female connector
– Ethernet TCP/IP, with 10/100 Base-T (X)
– Industrial Ethernet/IP, Version 1.2
– Process data access via XML
– Web-based management (WBM)
– IP parameter configuration:
  BootP, DHCP, WBM, Static IP
– Integrated web server
– Eight digital inputs
– Four digital outputs
– Diagnostic and status indicators

ℹ️ For additional information, please refer to the UM EN IL EIP BK DI8 DO4 2TX-PAC user manual (see "Documentation" on page 4).

ℹ️ This data sheet is only valid in association with the IL SYS INST UM E user manual (see "Documentation" on page 4).

ℹ️ Make sure you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

PHŒNIX CONTACT

INSPIRING INNOVATIONS

1.2 Inline Features

– Up to 61 other Inline modules can be connected (process data channel)
– Up to eight other PCP modules can be connected
– Can be installed in the field, software for automatic configuration of the station is not required
– Automatic baud rate detection on the local bus (500 kbaud or 2 Mbaud)

1.3 Ethernet and CIP Features

– Electrical isolation of Ethernet interface and logic
– Type of device profile: $0C_{hex}$ communication adapter
– Supported CIP connections in total: 128 (eight, typical)
– Explicit signaling: Max. number of connections 128 (eight, typical)
– I/O signaling: Max. number of connections 128 (eight, typical)
– Device configuration possibilities: EDS, individual software
– MAC parameter configuration: rate: 10 Mbps, 100 Mbps, automatic duplex: half, full, automatic

www.phoenixpowersupply.co.uk

Table of Contents

www.phoenixpowersupply.co.uk

2   Ordering Data

Bus Coupler

Description	Type	Order No.	Pcs./Pkt.
Inline bus coupler for Ethernet/IP with eight digital inputs and four digital outputs; including accessories (end plate, Inline connector and labeling fields)	IL EIP BK DI8 DO4 2TX-PAC	2897758	1

Accessories

Description	Type	Order No.	Pcs./Pkt.
Connector set for Inline bus coupler with connected I/Os	IL BKDIO-PLSET	2878599	1
Gray RJ45 connector set for linear cable	FL PLUG RJ45 GR/2	2744856	2
Green RJ45 connector set for crossed cable	FL PLUG RJ45 GN/2	2744571	2
Keying profile	CP-MSTB	1734634	100
Zack marker strip to label the terminals	ZB 6 ... see CLIPLINE catalog	1051003	10
Zack marker strip to label the terminals	ZB 12 ... see CLIPLINE catalog	0812120	10
Labeling field covering one connector	IB IL FIELD 2	2727501	10
Labeling field covering four connectors	IB IL FIELD 8	2727515	10
Insert strips for IB IL FIELD 2, perforated, can be labeled using a laser printer, marker pen or CMS system (72 sheets)	ESL 62X10	0809492	1
Insert strips for IB IL FIELD 8, perforated, can be labeled using a laser printer, marker pen or CMS system (15 sheets)	ESL 62X46	0809502	5
DIN EN 50022 DIN rail, 2 meters	NS 35/7,5 PERFORATED NS 35/7,5 UNPERFORATED	0801733 0801681	1 1
End clamp can be snapped on without tools	CLIPFIX 35-5	3022276	50
End clamp can be fixed using screws	E/UK	1201442	50

Additional System Components

Description	Type	Order No.	Pcs./Pkt.
Double sheathed Ethernet cable	FL CAT5 HEAVY	2744814	1 meter
Flexible Ethernet cable	FL CAT5 FLEX	2744830	1 meter
Media converter 660 nm	FL MC 10BASE-T/FO POF	2744513	1
Voltage supplies	QUINT-PS ... see INTERFACE catalog		

Tools

Description	Type	Order No.	Pcs./Pkt.
Assembly tool for RJ45 connector	FL CRIMPTOOL	2744869	1
Screwdriver according to DIN 5264, blade width 3.5 mm	SZF 1-0,6X3,5	1204517	10

Software

Description	Type	Order No.	Pcs./Pkt.
BootP IP Addressing Tool	IPAssign.exe	This software can be downloaded at www.download.phoenixcontact.com.	

Documentation

Description	Type	Order No.	Pcs./Pkt.
"Inline Bus Coupler for Ethernet/IP With Eight Digital Inputs and Four Digital Outputs" user manual	UM EN IL EIP BK DI8 DO4 2TX-PAC	–	
"I/O Modules at Bus Couplers" application note	AH IL BK IO LIST	9015358	1
"Automation Terminals of the Inline Product Range" user manual	IL SYS INST UM E	2698737	1

www.phoenixpowersupply.co.uk

3 Technical Data

General Data

Housing dimensions (width x height x depth)	80 mm x 121 mm x 70 mm
Weight	270 g with connectors
Ambient temperature (operation)	-25°C to +60°C
Ambient temperature (storage/transport)	-25°C to +85°C
Permissible humidity (storage/transport)	10% to 95%, according to EN 61131-2
Permissible air pressure (operation/storage/transport)	70 kPa to 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20 according to IEC 60529
Class of protection	Class 3, according to EN 61131-2, IEC 61131-2
Preferred mounting position	Perpendicular to a standard DIN rail
Connection to functional earth ground	The functional earth ground must be connected to the 24 V DC supply/ functional earth ground connection. The contacts are directly connected to the potential jumper and FE springs on the bottom of the housing. The terminal is grounded when it is snapped onto a grounded DIN rail. Functional earth ground is only used to discharge interference.
Ambient compatibility	Free of substances which would hinder coating with paint or varnish
Resistance to solvents	Resistant to standard solvents
Connection data for Inline connectors	
Connection type	Spring-cage terminals
Conductor cross-section	0.2 mm^2 to 1.5 mm^2 (solid or stranded), 24 -16 AWG

System Limits of the Bus Coupler

Number of devices per station	63, maximum (including two devices on the bus coupler)
Number of I/O data	512 bytes, maximum
Transmission rate on the local bus	500 kbps or 2 Mbps (automatic detection)
Power supply at U_L (7.5 V)	0.8 A, maximum
Power supply at U_{ANA}	0.5 A, maximum
Power supply at U_S	8 A, maximum
Power supply at U_M	8 A, maximum

Interfaces

Ethernet	
Type	Ethernet 10Base-T and 100Base-TX with auto negotiation and auto crossover
Number	Two
Connection format	8-pos. RJ45 female connector
Connection medium	CAT 5 twisted pair cable with a conductor cross section of 0.14 mm^2 to 0.22 mm^2
Cable impedance	100 Ω
Transmission speed	10 Mbps (10Base-T), 100 Mbps (100Base-TX) half duplex, full duplex (auto detection)
Maximum network segment extension	100 m
Local bus	Through data routing

Supply Voltage for U_L, U_S, U_M

Recommended cable lengths	30 m, maximum; routing cables through outdoor areas is not admissible
Continuation	Through potential routing
Special demands on the voltage supply	The supplies U_M/U_S and the bus coupler supply U_{BK} do not have the same ground potential because they are supplied by two separate power supply units.
Behavior in the event of voltage fluctuations	Voltages (main and segment supply) that are transferred from the bus coupler to the potential jumpers follow the supply voltages without delay.
Nominal value	24 V DC

www.phoenixpowersupply.co.uk

Supply Voltage for U_L, U_S, U_M (Continued)

Permissible range (according to EN 61131-2)	19.2 V to 30 V (ripple included)

NOTE: Module is damaged in the event of overload

This 24 V area must be externally protected. The power supply unit must be able to supply 4 times the nominal current of the external fuse, to ensure that it trips in the event of an error.

Observe the logic current consumption of each device when configuring an Inline station. This information is given in every module-specific data sheet. The current consumption can differ depending on the individual module. The permissible number of devices that can be connected therefore depends on the specific station structure.

Communications Power U_L (7.5 V) and Analog Supply U_{ANA}

The bus coupler supply U_L (24 V) generates the communications power U_L (7.5 V) and the analog supply U_{ANA} (24 V) for the Inline station.

- Communications Power (Potential Jumper)

Nominal value	7.5 V DC
Maximum output current	2 A DC (observe derating)
Safety equipment	Electronic short-circuit protection

- Analog Supply (Potential Jumper)

Nominal value	24 V DC
Maximum output current	0.5 A DC (observe derating)
Safety equipment	Electronic short-circuit protection

Current Consumption/Power Consumption

Current consumption from U_L (24 V)	
Current consumption of module electronics	0.08 A, maximum
Current consumption of local bus (800 mA load at 7.5 V)	0.4 A, maximum
Current consumption from U_{ANA} (24 V)	0.5 A, maximum
Total current consumption from U_L	0.98 A, maximum
Current consumption from U_S (24 V)	3 mA +4 mA for each output set + load, typical; 8 A, maximum
Current consumption from U_M (24 V)	3 mA +3 mA for each output set + load, typical; 8 A, maximum
Power dissipation of entire device	3 W, typical

Bus Interface of the Lower-Level System Bus

Interface	Inline local bus
Electrical isolation	No
Number of Inline terminals that can be connected	
Limitation by software	63, maximum
Limitation by power supply unit	Maximum logic current consumption of the connected local bus modules: $I_{max} \leq 2$ A DC

Observe the logic current consumption of each device when configuring an Inline station. This information is given in every module-specific data sheet. The current consumption can differ depending on the individual module. The permissible number of devices that can be connected therefore depends on the specific station structure.

Digital Outputs

Number	4
Connection method for actuators	2 and 3-wire technology
Nominal output voltage U_{OUT}	24 V DC
Differential voltage at I_{nom}	< 1 V
Nominal current I_{nom} per channel	0.5 A
Total current	2 A

Digital Outputs (Continued)

Protection	Short circuit; overload
Nominal load	
Ohmic	12 W
Lamp	12 W
Inductive	12 VA (1.2 H)
Switching frequency with nominal inductive load	0.5 Hz (1.2 H), maximum
Overload response	Auto restart
Response with inductive overload	Output may be damaged
Reverse voltage protection against short pulses	Protected against reverse voltages
Resistance to permanently applied reverse voltages	Protected against reverse voltages, permissible current 2 A, maximum
Response upon power down	The output follows the supply voltage without delay.
Limitation of the voltage induced on circuit interruption	-30.0 V, approximately
Safety equipment	Integrated free running circuit in the output chip
Overcurrent shutdown	0.7 A, minimum
Maximum output current when switched off	10 µA

> **i**   When not loaded, a voltage can be measured even at an output that is not set.

Digital Inputs

Number	8
Connection method for sensors	2 and 3-wire technology
Input design	According to EN 61131-2 Type 1
Definition of switching thresholds	
Maximum low-level voltage	$U_{Lmax} < 5$ V
Minimum high-level voltage	$U_{Hmin} > 15$ V
Common potentials	Sensor supply U_M, ground
Nominal input voltage U_{IN}	24 V DC
Permissible range	-30 V $< U_{IN} < +30$ V DC
Nominal input current for U_{IN}	3 mA, typical
Current flow	Limited to a 3 mA, maximum
Delay time	$<$ 500 ms
Permissible cable length to the sensor	100 m
Use of AC sensors	AC sensors in the voltage range $< U_{IN}$ are limited in application
Safety equipment	Surge voltage, polarity reversal
Error message to the higher-level control system	Sensor supply not present

Mechanical Requirements

Vibration test sinusoidal vibrations according to IEC 60068-2-6; EN 60068-2-6	5g load, 2 hours in each space direction
Shock test according to IEC 60068-2-27; EN 60068-2-27	25g load for 11 ms, half sinusoidal wave, three shocks in each space direction and orientation

Mechanical Tests

|	
Shock test according to EN 60068-2-27	Operation: 25g, 11 ms period, half-sine shock pulse Storage/transport: 50g, 11 ms period, half-sine shock pulse
Vibration resistance according to IEC 60068-2-6	Operation/storage/transport: 5g, 150 Hz, Criterion A
Free fall according to IEC 60068-2-32	1 m

Conformance With EMC Directives

Developed according to IEC 61000-6.2

IEC 61000-4-2 (ESD)	Criterion B 6 kV contact discharge 6 kV air discharge (without labeling field) 8 kV air discharge (with labeling field)
IEC 61000-4-3 (radiated noise immunity)	Criterion A
IEC 61000-4-4 (burst)	Criterion B
IEC 61000-4-5 (surge)	Criterion B
IEC 61000-4-6 (conducted noise immunity)	Criterion A
IEC 61000-4-8 (noise immunity against magnetic fields)	Criterion A
EN 55011 (noise emission)	Class A

Approvals

Information on current approvals can be found on the Internet at www.download.phoenixcontact.com or www.eshop.phoenixcontact.com.

www.phoenixpowersupply.co.uk
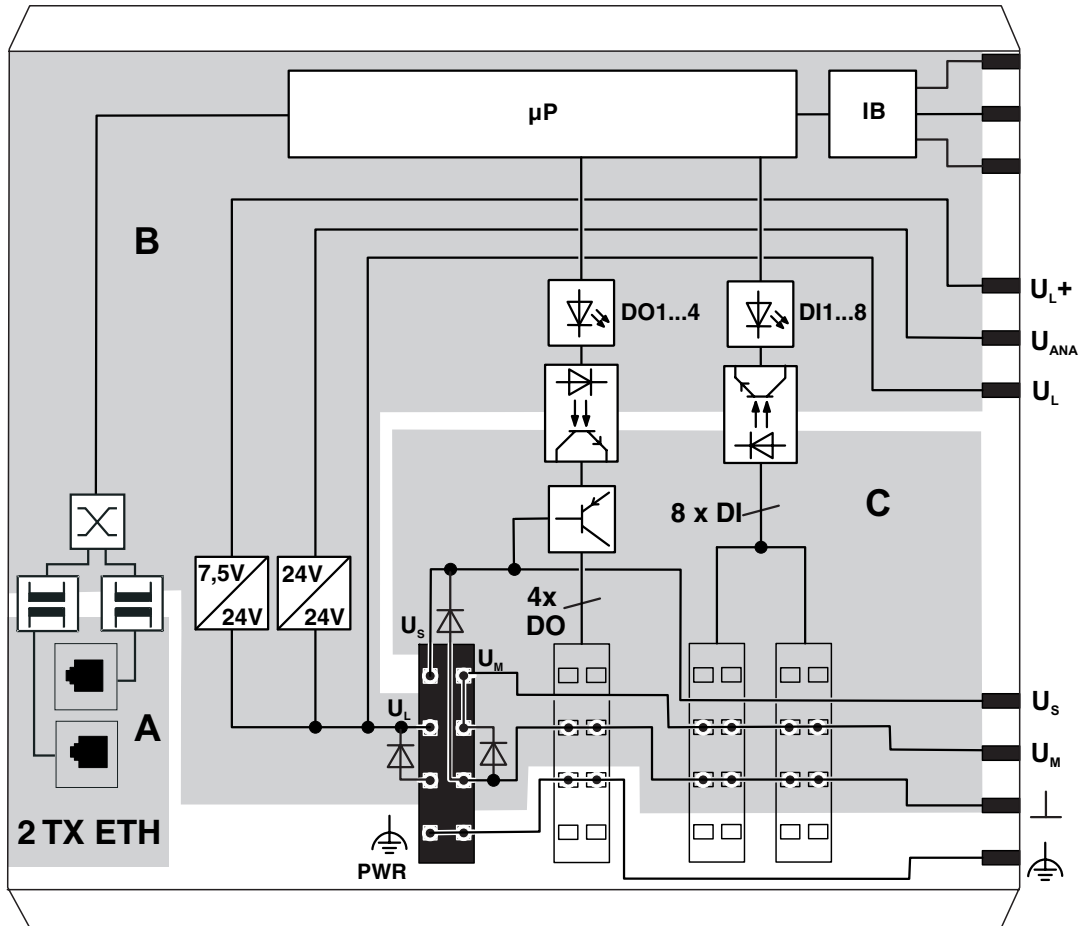
4 Circuit Diagram

Figure 1   Circuit diagram of the Ethernet Bus Coupler

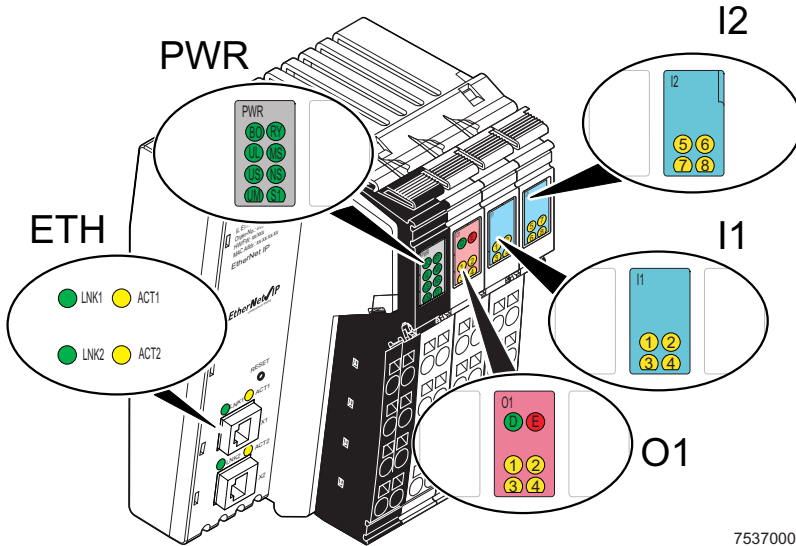Key:

μP	Microprocessor
IB	Protocol chip
(optocoupler symbol)	Optocoupler
(switch symbol)	Ethernet switch
(transistor symbol)	PNP transistor
(transmitter symbol)	Transmitter with electrical isolation

The gray areas in the circuit diagram represent the electrically isolated areas.

A: Ethernet interface
B: Logic
C: I/O

5   Local Diagnostic and Status Indicators

Figure 2   Indicators on the bus coupler

LED	Color	Meaning	State	Description of the LED States
ETH				
LNK1	Green	Link at port 1	ON	Link connection at port 1 present
			OFF	Link connection at port 1 not present
LNK2	Green	Link at port 2	ON	Link connection at port 2 present
			OFF	Link connection at port 2 not present
ACT1	Yellow	Activity on port 1	ON	Data transmission on port 1 active
			OFF	Data transmission on port 1 not active
ACT2	Yellow	Activity on port 2	ON	Data transmission on port 2 active
			OFF	Data transmission on port 2 not active
PWR				
BO	Green	**Bo**ot	ON	Boot loader active, firmware started
			Flashing	Waiting for BootP/DHCP reply
			OFF	Firmware started successfully
UL	Green	U_{Logic}	ON	24 V communications supply / 7.5 communications power present
			OFF	24 V communications supply / 7.5 communications power not present

www.phoenixpowersupply.co.uk

LED	Color	Meaning	State	Description of the LED States
US	Green	$U_{Segment}$	ON	24 V segment circuit supply present
			OFF	24 V segment circuit supply not present
UM	Green	U_{Main}	ON	24 V I/O supply present
			OFF	24 V I/O supply not present
RY	Green	**R**ead**y**		Ready
			ON	Connection to a process data client established
			Flashing	Firmware ready to operate
			OFF	Firmware not active
MS	Red/ green	**M**odule **s**tatus		Device status
			Green ON	Normal operation
			Red ON	Unrecoverable error
			Flashing green	– Device not configured, or device configuration not complete or faulty – Device in standby mode
			Flashing red	Recoverable error
			Flashing red-green	Selftest
			OFF	No supply voltage
NS	Green/ red	**N**etwork **s**tatus		Network status
			Green ON	Module is online and has established a connection
			Red ON	Error preventing communication with the network (e.g., bus offline or double MAC ID).
			Flashing green	Device online, connections not established Device has finished the "double MAC ID" test but has not established connections to other nodes.
			Flashing red	One or more connections in timeout state
			Flashing red-green	Selftest
			OFF	Device not online Device has not yet finished the "double MAC ID" test. Device has no IP address or is not supplied with voltage.
S1	Green	Boot source **s**tatus	ON	IP parameters received from BootP/DHCP server
			Flashing	BootP request/responses in process
			OFF	Stored IP parameters are used

LED	Color	Meaning	State	Description of the LED States
O1				
D	Green	**D**iagnostics	ON	Data transmission within the station active
			Flashing	Data transmission within the station not active
E	Red	**E**rror	ON	Short circuit/overload of outputs
			OFF	No short circuit/overload of outputs
1-4	Yellow	**O1**...**O4**	ON	Outputs active
			OFF	Outputs not active
I1, I2				
1-8	Yellow	**I1**...**I8**	ON	Inputs active
			OFF	Inputs not active

6 Reset Button

The reset button is on the front side of the bus coupler.

It has two functions:

– Restarting the bus coupler
– Restoring the default settings

For restoring the default settings (see "Startup" on page 15) the reset button must be pressed when the voltage is applied.
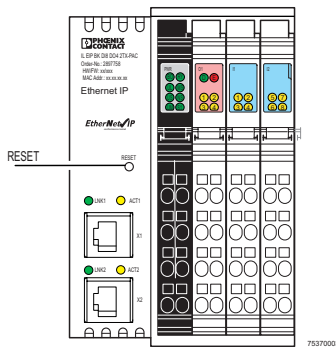
Figure 3   Reset button

7 Connecting Ethernet, the Supply, Actuators, and Sensors

7.1 Connecting Ethernet
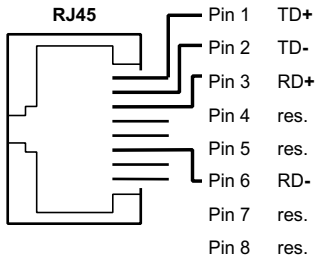
Figure 4   Pin assignment of the 8-pos. RJ45 female connector

Connect Ethernet to the bus coupler via an 8-pos. RJ45 connector. For the pin assignment, please refer to the following table:

Pin	Assignment
1	TxD + (transmit data +)
2	TxD - (transmit data -)
3	RxD + (receive data +)
4	Reserved
5	Reserved
6	RxD - (receive data -)
7	Reserved
8	Reserved

ℹ️	Both Ethernet interfaces have an auto crossover function.

7.2 Connecting the Supply, Actuators, and Sensors
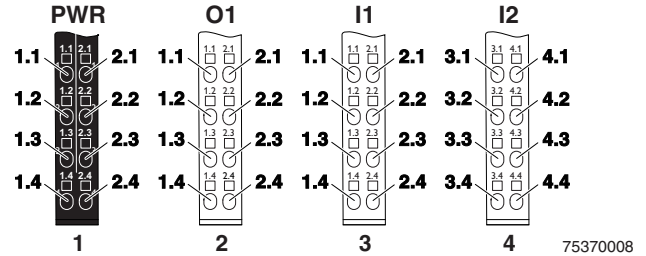
Figure 5   Terminal point assignment of the Inline connectors

Terminal Point Assignment of the Power Connector (1, PWR)

Terminal Points	Assignment	Terminal Points	Assignment
1.1	U_S	2.1	U_M
1.2	U_L	2.2	U_M
1.3	GND U_L	2.3	GND U_M, U_S
1.4	Functional earth ground (FE)	2.4	Functional earth ground (FE)

ⓘ	**NOTE: Module is damaged in the event of overload** The GND U_M, U_S potential jumper carries the total current of the main and segment circuits. The total current must not exceed the maximum current carrying capacity of the potential jumpers (8 A). If, in the course of configuring, it is found that the 8 A limit is reached at one of the potential jumpers U_S, U_M and GND, a new power terminal must be used.

ℹ️	The functional earth ground must be connected to the 24 V DC supply/functional earth ground connection.

www.phoenixpowersupply.co.uk

Terminal Point Assignment of the Output Connector (2, O1)

Terminal Points	Assignment	Terminal Points	Assignment
1.1	OUT1	2.1	OUT2
1.2	GND	2.2	GND
1.3	FE	2.3	FE
1.4	OUT3	2.4	OUT4

Terminal Point Assignment of the Input Connector (3, I1)

Terminal Points	Assignment	Terminal Points	Assignment
1.1	IN1	2.1	IN2
1.2	U_M	2.2	U_M
1.3	GND	2.3	GND
1.4	IN3	2.4	IN4

Terminal Point Assignment of the Input Connector (4, I2)

Terminal Points	Assignment	Terminal Points	Assignment
3.1	IN5	4.1	IN6
3.2	U_M	4.2	U_M
3.3	GND	4.3	GND
3.4	IN7	4.4	IN8

7.3 Connection Example

Connect the bus coupler according to Figure 6.
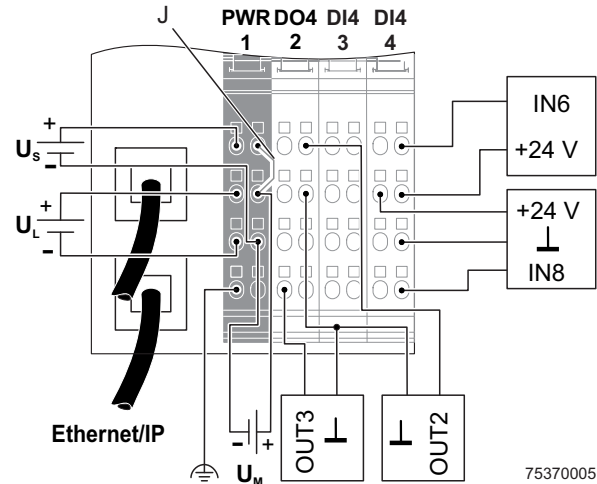
Figure 6   Connection example

J = internal jumper (in the module)

8 Mounting/Removing Modules and Connecting Cables

Installation Instructions

> **i** To ensure that installation is carried out correctly, please read the "Installation Instructions for the Electrical Engineer" supplied with the bus coupler. Please also observe the information given in the IL SYS INST UM E user manual.

> **(!)** **NOTE: Failure to observe this warning may damage the module**
>
> Before removing or mounting a module, disconnect the power to the entire station. Make sure the entire station is reassembled before switching the power back on.

9 Startup

9.1 Default Upon Delivery/Default Settings

By default upon delivery, the following functions and features are available:

- IP Configuration

IP Address:	0.0.0.0
Subnet Mask:	0.0.0.0
Default Gateway:	0.0.0.0
BootP Requests:	Enable

- Software Update

Software Update on Next Reboot:	Disable
TFTP-Server IP Address:	0.0.0.0
Downloadable File Name:	c2897758.fw

- System Identification

Name of Device:	IL EIP BK DI8 DO4 2TX-PAC
Description:	Ethernet/IP Bus Terminal
Physical Location:	Unknown
Contact:	Unknown

- Process Data Monitoring

Process Data Watchdog Timeout:	0 ms
Fault Response Mode:	Reset Fault Mode (Default)

- Plug and Play Mode   Enable

9.2 Starting the Firmware

> **i** By default upon delivery, the IL EIP BK DI8 DO4 2TX-PAC bus coupler has no valid IP parameters.

Once you have connected the power to the bus coupler, the firmware is started. The following sequence appears on the LEDs:

Display	Meaning
BO flashing	Starting Boot loader Transmitting BootP requests
BO on	Extracting firmware
BO off	Starting firmware
RY flashing	Firmware ready to operate

9.3 Sending BootP Requests

Initial Startup:

During initial startup, the device sends BootP requests without interruption until it receives a valid IP address. The requests are transmitted at varying intervals (2 s, 4 s, 8 s, 2 s, 4 s, etc.) so that the network is not loaded unnecessarily. If valid IP parameters are received, they are saved as configuration data by the device.

Restart:

By default, the device will send BootP requests indefinitely until it receives a valid reply. This action can be changed to limit three BootP requests on a restart which reverts to using the previous configuration parameters.
See the UM EN IL EIP BK DI8 DO4 2TX-PAC User Manual under the Configuration Object section for details.

10 Ethernet/IP Object Classes

The Inline bus coupler supports CIP by means of digital input points (DIP), digital output points (DOP), analog input points (AIP) and analog output points (AOP) according to the ODVA specification. Additional objects include User-Defined Configuration, Inline Interface, Inline Module, Inline Special Function, PCP Special Function and Serial Communications Objects.

CIP Class Services

The IL EIP BK DI8 DO4 2TX-PAC supports the following class services and instance services:

Service Code dec (hex)	Service Name
01 (01)	Get_Attribute_All
02 (02	Set_Attribute_All
05 (05)	Reset
14 (0E)	Get_Attribute_Single
16 (10)	Set_Attribute_Single

11 Operating Directives for the System

11.1 Repeat Packet Interval (RPI) Settings

– Configurations requiring RPI rates below 10 ms, should first be tested for correct operation.

– Configurations requiring PCP modules, should use RPI settings of at least 20 ms. Settings below 20 ms should first be tested.

11.2 Maximum Connection

The module firmware supports up to 128 connections in total (any mixture of implicit and explicit). Special features of the application such as CPU load, data update frequency (RPI parameter) and scanned I/O quantity have an effect on the maximum number of connections. A lower number of connections allows for faster scanned data update and therefore affects the maximum number of connections. A lower number of connections allows for faster data update (RPI value). To obtain the maximum I/O performance, the number of connections should be limited to eight, maximum.

12 CIP Object Classes

The IL EIP BK DI8 DO4 2TX-PAC supports the following CIP object classes:

Class Code		Object Type
dec	hex	
01	01	Identity Object
02	02	Router Object
04	04	Assembly Object
05	05	Connection Object
06	06	Connection Manager Object
08	08	Digital Input Point (DIP) Object
09	09	Digital Output Point (DOP) Object
10	0A	Analog Input Point (AIP) Object
11	0B	Analog Output Point (AOP) Object
43	2D	Acknowledge Handler Object
100	64	Configuration Object
101	65	Inline Interface Object
102	66	Inline Module Object
103	67	Inline Special Function Object
104	68	COS Mask Object
105	69	PCP Object
106	6A	Serial Object
244	F4	Port Object
245	F5	TCP/IP Interface Object
246	F6	Ethernet Link Object

13 Web-Based Management (WBM)

The IL EIP BK DI8 DO4 2TX-PAC has a web server, which generates the required pages for web-based management and, depending on the requirements of the user, sends them to the "Factory Manager" or a standard web browser.

Web-based management can be used to access static information (e.g., technical data, MAC address) or dynamic information (e.g., IP address, status information) or to change the configuration (password-protected).

13.1 Calling Web-Based Management

The IL EIP BK DI8 DO4 2TX-PAC web server can be addressed using the IP address if configured correspondingly. The bus coupler homepage is accessed by entering the URL "http://<IP address>".

Example: http://172.16.113.38

> **i** If you cannot access the WBM pages, check the connection settings in your browser and deactivate the proxy, if set.

Figure 7   WBM homepage

13.2 Structure of the Web Pages

The web pages for the Ethernet/IP bus coupler are divided into two sections. The left-hand side has the selection menu with the relevant submenus. The right-hand side displays the information related to the menu item. Static and dynamic information about the bus coupler can be found in the following menus.
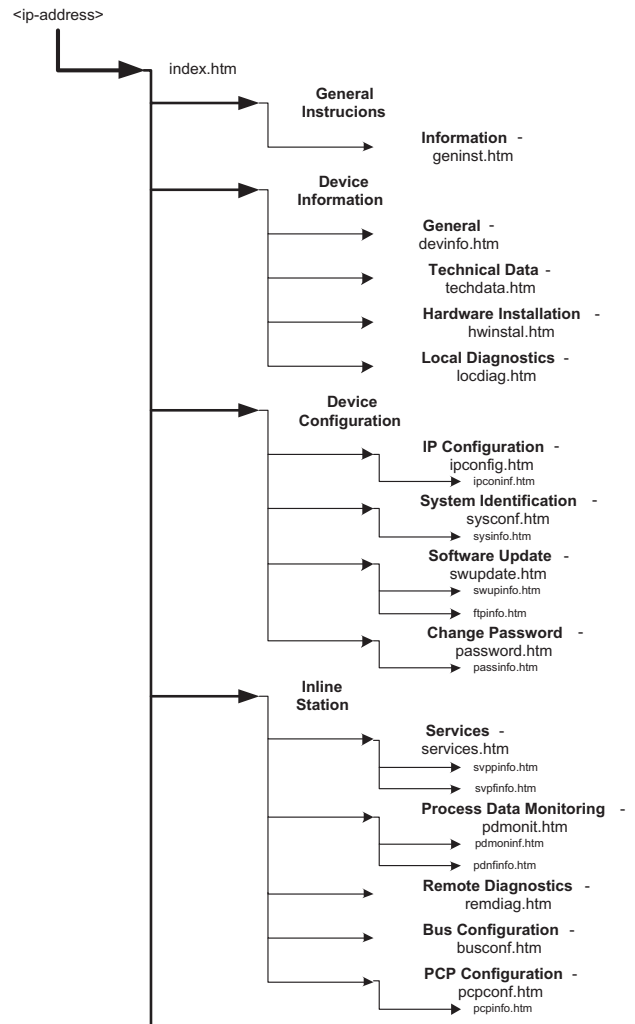
Figure 8   Structure of the web pages

13.3 "IP Configuration" Menu

Figure 9 illustrates the set IP parameters and addressing mechanism. To change the IP parameters via WBM, "BootP Requests" must be set to "Disable" or BootP requests to the bus coupler must not be answered (no BootP server can be active in the network).

Figure 9   "IP Configuration" menu

13.4 Password Protection

All status changes to the bus coupler require the entry of a password. The password can be changed at any time. Your unique password must be between four and twelve characters long (please note that it is case-sensitive). By default upon delivery, the password is "private".

> If you forget the password, the only way to access the bus coupler again is to reset the entire configuration using the reset button.

13.5 Firmware Update via WBM and TFTP

The following steps must be carried out when executing a firmware update using WBM:

– In WBM, click on "Device Configuration" and then "Software Update". Enter the IP address of the TFTP server in the "TFTP Server IP Address" field. Then enter the file name of the firmware and the path name, if necessary, in "Downloadable File Name". In the "Software Update on Next Reboot" field, click "Enable".

– Enter your password. To wait until later to apply the update with a restart, click "Apply". To start the update immediately, click "Apply and Reboot".

– Check the execution of the update by checking the firmware version under "Device Information/General". In the event of an error during the download, a restart repeats the download. To abort the update, set "Disable" in the "Software Update on Next Reboot" field.

Figure 10   "Software Update" menu

> If BootP is set to "Enable" and a reply with values for "TFTP Server IP Address" and "Downloadable File Name" is received on a restart, these values overwrite the entries made in WBM. The received values are displayed in WBM after the restart.

> In the event of an error during Flash programming (e.g., voltage interrupt), the bus coupler can only be restarted by repeating the update. The bus coupler starts the update automatically after a restart. Access to WBM is no longer possible.

13.6 Process Data Access via XML

The integrated web server of the
IL EIP BK DI8 DO4 2TX-PAC offers the option of accessing the process data of the connected Inline terminals via a web page in XML format.

You can access the web pages via a standard web browser. To access the XML pages with the process data in the address line of the browser, enter the address in the following format:

http://<IP address>/procdata.xml

13.7 XML File Structure

The XML file contains different data areas:

IL_STATION

Frames for the entire XML file. The mandatory elements of this frame are IL_BUS_TERMINAL and IL_BUS.

IL_BUS_TERMINAL

This data area contains information on the entire Inline station (bus coupler and all connected terminals). This data area includes:

TERMINAL_TYPE

This area contains the name of the bus coupler, which is always IL EIP BK DI8 DO4 2TX-PAC.

NAME

Contains the user-specific station name. The station name can be modified via WBM.

IP_ADDRESS

Contains the IP address of the station.

MODULE_NUMBER

Contains the number of connected Inline terminals, including local I/Os. In the event of a bus error, the number of the last known operable configuration is indicated.

DIAGNOSTIC_STATUS_REGISTER

Contains the INTERBUS status, represented by all bits of the diagnostic status register. A detailed description can be found in the diagnostic parameter register. Whenever an error bit is set, the diagnostic parameter register is rewritten.

IL_BUS

Frame for the connected Inline terminals.

IL_MODULE

Frame for the data of an individual Inline terminal. The terminals are numbered consecutively from one to a maximum of 63.

MODULE_TYPE

Contains the terminal type. Possible types are DI, DO, DIO, AI, AO, AIO, and PCP.

PD_CHANNELS

Number of process data channels in an Inline terminal. For digital terminals the number of channels is equal to the number of supported bits. For other terminals, the number of process data words is indicated.
Example: An IB IL AO 2 has two process data channels and an IB IL 24 DO 8 has eight bits and therefore eight process data channels.

PD_WORDS

Number of process data words in an Inline terminal. Please note that analog terminals always have the same number of output and input words. An IB IL AO 2 therefore also has two input words and an IB IL AI 2 also has two output words.

PD_IN

This area is used by all terminals that occupy input data. The number of process data words depends on the terminal type.

PD_OUT

This area is used by all terminals that occupy output data (see also "PD_OUT" on page 21).

Examples:

a) Inline terminal with two active inputs

```
<IL_MODULE number="1">
    <MODULE_TYPE>DI</MODULE_TYPE>
    <PD_CHANNELS>2</PD_CHANNELS>
    <PD_WORDS>1</PD_WORDS>
    <PD_IN word="1">3</PD_IN>
</IL_MODULE>
```

b) Inline terminal with two digital inputs and only the second input is active.

```
<IL_MODULE number="3">
    <MODULE_TYPE>DI</MODULE_TYPE>
    <PD_CHANNELS>2</PD_CHANNELS>
    <PD_WORDS>1</PD_WORDS>
    <PD_IN word="1">2</PD_IN>
</IL_MODULE>
```

c) Inline terminal with 16 digital inputs and the 13th and the 14th input are active.

```
<IL_MODULE number="7">
    <MODULE_TYPE>DI</MODULE_TYPE>
    <PD_CHANNELS>16</PD_CHANNELS>
    <PD_WORDS>1</PD_WORDS>
    <PD_IN word="1">12288</PD_IN>
</IL_MODULE>
```

The input word returns the value 12288 ($2^{12} + 2^{13}$).

d) Inline terminal with two analog inputs, only the first channel being active (14970).

```
<IL_MODULE number="10">
    <MODULE_TYPE>AI</MODULE_TYPE>
    <PD_CHANNELS>2</PD_CHANNELS>
    <PD_WORDS>2</PD_WORDS>
    <PD_IN word="1">14970</PD_IN>
    <PD_IN word="2">8</PD_IN>
    <PD_OUT word="1">0</PD_OUT>
    <PD_OUT word="2">0</PD_OUT>
</IL_MODULE>
```

PD_OUT

This area is used by all terminals with output data. The use of bits is identical to the use of "PD_IN".

In the event of an error in the Inline station, this is indicated in the diagnostic registers. The D LED flashes on the bus coupler. The process data is invalid because only internal values are indicated, not the values on INTERBUS.

In order to make sure that only valid data is displayed, the diagnostic register must also always be requested. The same is valid in the event of a faulty configuration. In this case, INTERBUS does not run and only internal values can be read in the XML file.

In the event of a peripheral fault, all data is valid, except for the data of the faulty terminal.
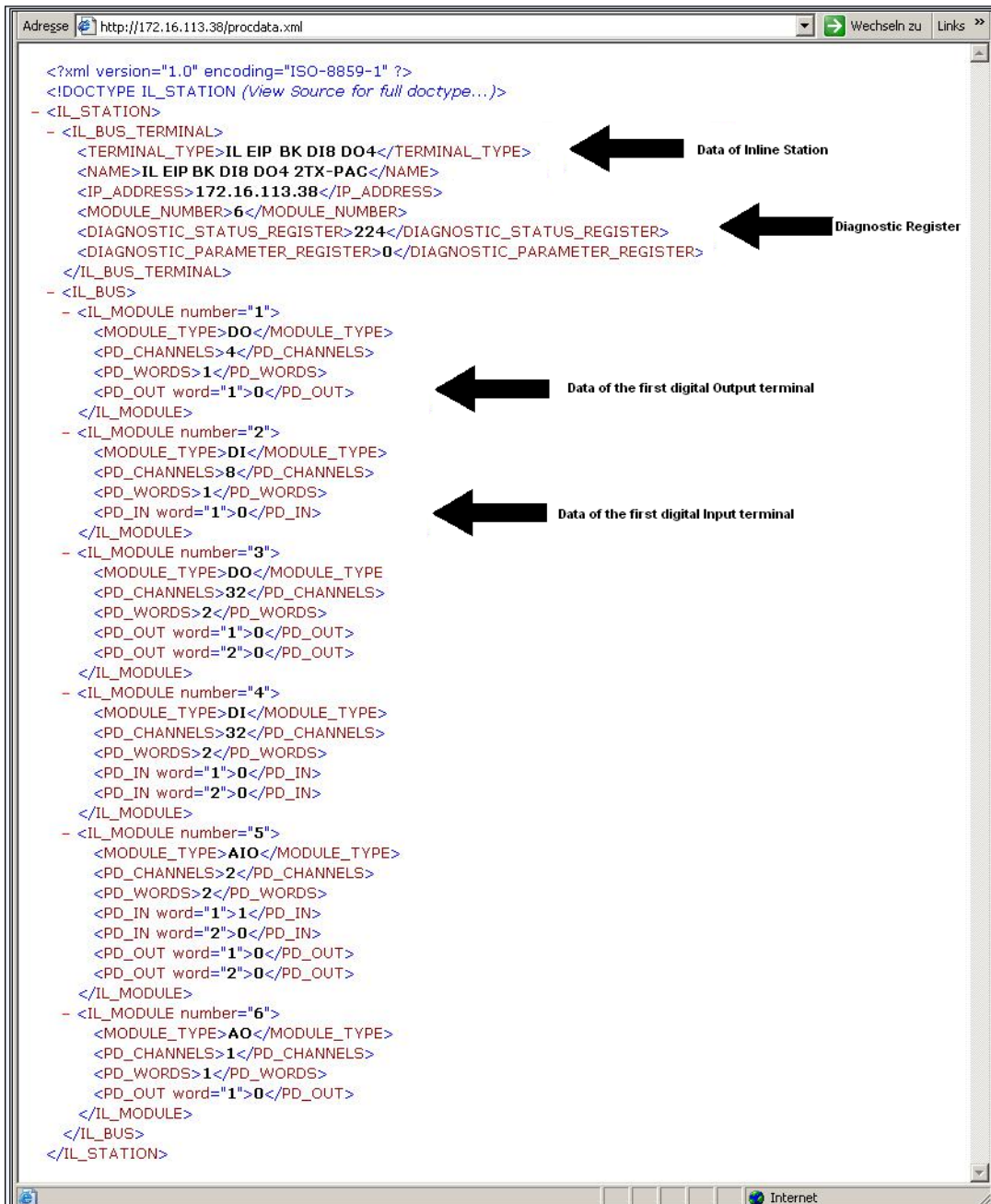
Figure 11   Screen for XML data

14 Startup Behavior of the Bus Coupler

The startup behavior of the bus coupler is specified via the system parameter "Plug&Play" (P&P). The P&P mode can be set to one of three states: Inputs Only, Inputs &Outputs, and Disabled. By default upon delivery, P&P mode is enabled to the "Inputs & Outputs" setting.

Plug&Play Mode - "Inputs Only" Active

The IL EIP BK DI8 DO4 2TX-PAC supports a P&P mode referred to as "Inputs Only". This mode enables Inline terminals connected in the field to be started up using the bus coupler without a higher-level configuration. The P&P mode status (Inputs Only, Inputs &Outputs, and Disabled) is stored retentively on the bus coupler. The current mode is accessible via the WBM interface or the CIP interface. In P&P mode, the connected Inline terminals are detected and their ability to operate is checked. If this physical configuration is ready to operate, it is started, however writing outputs is **not enabled**. To enable writing outputs, P&P mode must be either deactivated or set to "Inputs & Outputs". The deactivation of P&P mode is also the signal to save the active configuration as the reference configuration.

Plug&Play Mode - "Inputs & Outputs" Active

The IL EIP BK DI8 DO4 2TX-PAC supports a P&P mode referred to as "Inputs & Outputs". This mode allows the writing of outputs. Care should be taken when setting a device to this mode. A mismatched I/O system configuration which is connected to end devices such as drive controls or motion controls can cause unwanted actions when outputs are turned on! Users must ensure in this P&P mode that any connected end device will safely function if outputs are enabled.

Plug&Play Mode Disabled

When P&P mode is disabled or deactivated, the reference configuration is compared to the physical configuration. If they are the same, the bus coupler is set to the "RUN" state.

If the reference configuration and the physical configuration differ, the MS (Module Status) LED lights up and process data exchange is no longer possible for safety reasons.

In order to operate the bus you have the following two options:

1. Restore the original configuration so that the reference configuration and the physical configuration are the same again

2. Activate P&P mode and restart the bus coupler so that the active physical configuration is accepted as the reference configuration
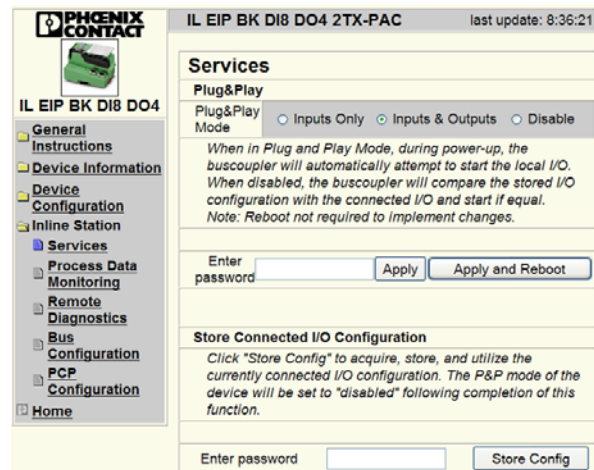

Figure 12   Plug & Play mode

| P&P Mode	Description/Effect	Diagram
Disabled	Normal case - the station sets valid configurations to the "RUN" state. Process data exchange is possible.	Figure 13 on page 23
Inputs Only	The connected configuration is stored as the reference configuration and the station is set to the "RUN" state. Process data cannot be written.	Figure 14 on page 23
Inputs & Outputs	The connected configuration is stored as the reference configuration and the station is set to the "RUN" state. Process data exchange is possible.	Figure 14 on page 23

Startup Diagrams for the Bus Coupler
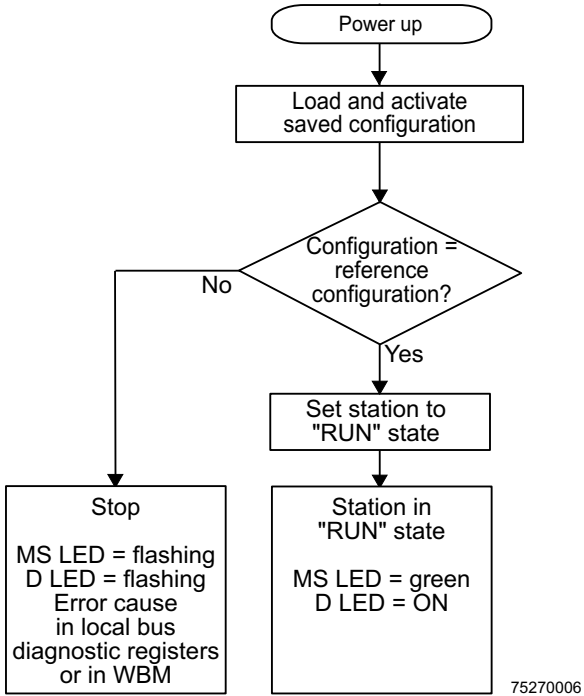
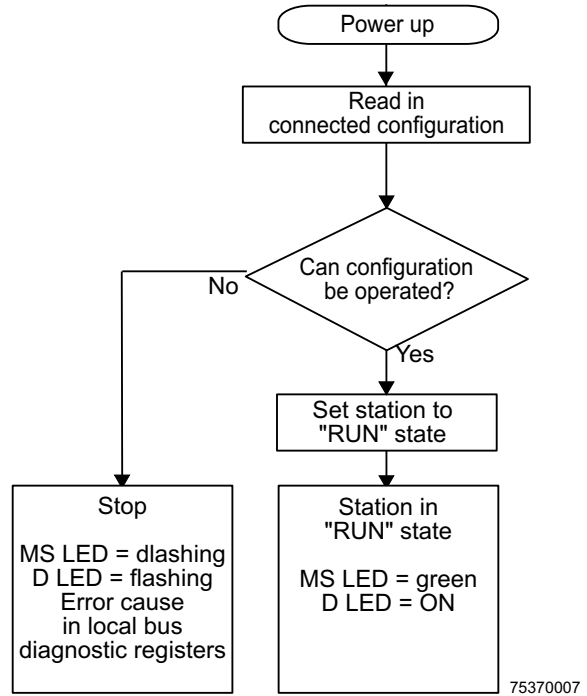Figure 13   "Standard" mode/P&P mode inactive

Figure 14   P&P mode active

www.phoenixpowersupply.co.uk

15   Configuration of the PCP PDU Size

The standard PDU size for communication with all Phoenix Contact Inline devices is 64 bytes in the transmit and receive direction.

System couplers such as the ILC 200 UNI have configurable PDU sizes. If another size is configured and an IL EIP BK DI8 DO4 2TX-PAC is used for communication,

the bus coupler must also be configured to the values already set on the ILC 200 UNI.

Figure 15   PCP configuration in web-based management