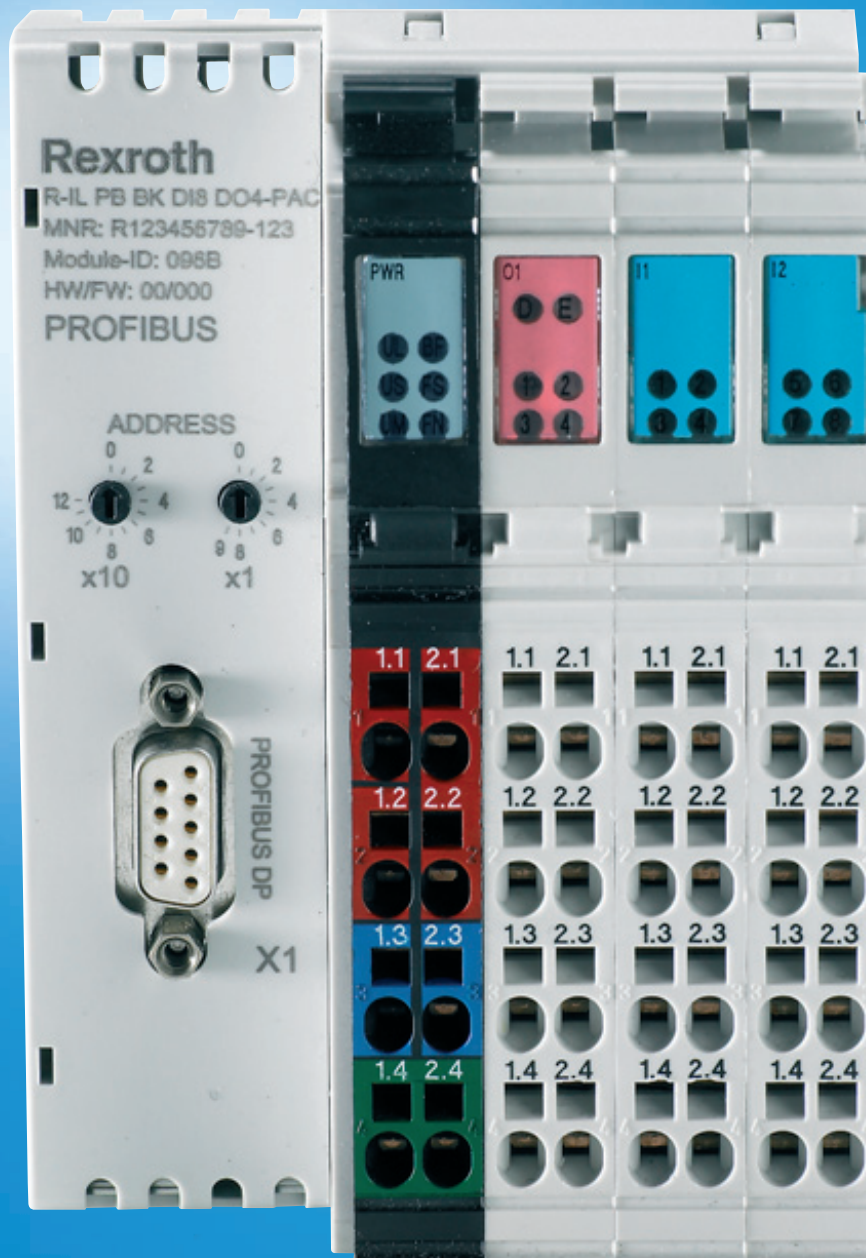


# Rexroth Inline Bus Coupler for PROFIBUS DP R-IL PB BK DI8 DO4-PAC

R911317926  
Edition 01

## Application Description



**Title** Rexroth Inline bus coupler  
for PROFIBUS-DP  
R-IL PB BK D18 DO4-PAC

**Type of documentation** Application Description

**Document typecode:** DOK-CONTRL-ILPBBKDI8DO-AW01-EN-P

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**Purpose of documentation** This document describes the diagnostic and firmware functions of the R-IL PB BK D18 DO4-PAC PROFIBUS bus coupler.

**Record of revisions**

Document designation of previous editions	Release date	Notes
120-0401-B332/EN -01	04/2011	First edition

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# 1 The PROFIBUS Bus Coupler

## 1.1 General Information

The PROFIBUS bus coupler configures the station and manages data exchange with a PROFIBUS master. It also provides the power supply for the connected In-line terminals.

The PROFIBUS bus coupler can be ordered under MNR R911170402. Connectors, labeling fields, and an end plate are supplied as standard.

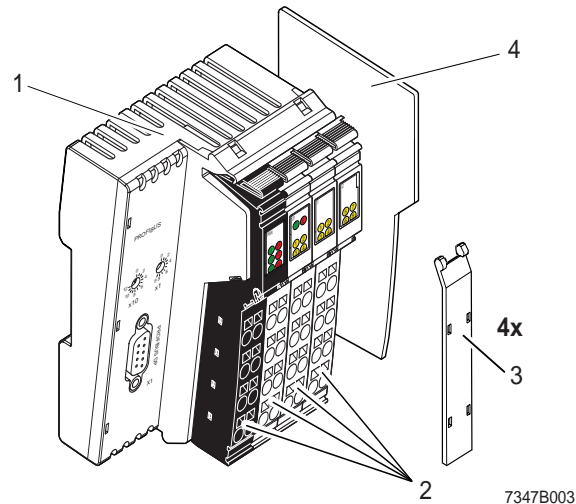


Fig. 1-1 The R-IL PB BK DI8 DO4-PAC PROFIBUS bus coupler

### Scope of supply

- PROFIBUS bus coupler (1)
- Connectors (2)
- Labeling field (3)
- End plate (4)

### Features

The key features of the PROFIBUS bus coupler are listed below:

- PROFIBUS connection via 9-pos. D-SUB female connector
- Interface physics RS-485 for PROFIBUS
- Electrical isolation of PROFIBUS interface and logic
- DP/V1 for Class 1 and Class 2 masters
- Data transmission speed of 9.6 kbps up to 12 Mbps (automatic detection)
- Rotary encoding switches for setting the PROFIBUS address
- Supported PROFIBUS addresses 1 to 126
- Terminal description using GSD file
- I & M functions
- Eight digital inputs
- Four digital outputs
- Diagnostic and status LEDs
- Automatic Baud rate detection on the local bus 500 kBaud or 2 MBaud)

## The PROFIBUS Bus Coupler



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For additional information about the bus coupler, please refer to the following documents:

Data sheet DOK-CONTRL-ILPBBKDI8DO-KB..-EN-P,  
MNR R911170476

Application description:  
DOK-CONTRL-ILSYSINS\*\*\*-AW..-EN-P,  
MNR R911317021

They can be downloaded at: [www.boschrexroth.com](http://www.boschrexroth.com).

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## 1.2 I & M Functions

I & M functions (Identification & Maintenance functions) are pieces of information stored in the bus coupler, which provide support when:

- Removing errors in a system
- Checking the system configuration
- Identifying hardware modifications in a system

**I data** provides information about the bus coupler, such as the manufacturer and MNR. This information is also marked on the housing. I data can only be read.

**M data** is system-dependent information such as installation location, installation date.

M data is created during configuration and is written onto the bus coupler.

The R-IL PB BK D18 DO4-PAC supports asset management functions IM0 to IM4.

IM0: Device identification data and ordering information (read only)

IM1: Project data (installation location), (read/write)

IM2: Project data (installation date), (read/write)

IM3: Project data (individual information), (read/write)

IM4: Signature (security code for integrity check), (read/write)

The data structure is based on the specifications of the PNO (PROFIBUS user organization) and is stored in the device firmware. The data is transmitted via the acyclic communication channel.

## 2 Important Directions for Use

### 2.1 Appropriate Use

#### 2.1.1 Introduction

Rexroth products represent state-of-the-art developments and manufacturing. They are tested prior to delivery to ensure operating safety and reliability.

The products may only be used in the manner that is defined as appropriate. If they are used in an inappropriate manner, then situations can develop that may lead to property damage or injury to personnel.



Bosch Rexroth, as manufacturer, is not liable for any damages resulting from inappropriate use. In such cases, the guarantee and the right to payment of damages resulting from inappropriate use are forfeited. The user alone carries all responsibility of the risks.

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Before using Rexroth products, make sure that all the pre-requisites for appropriate use of the products are satisfied:

- Personnel that in any way, shape or form uses our products must first read and understand the relevant safety instructions and be familiar with appropriate use.
- If the product takes the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software products or alter source codes.
- Do not mount damaged or faulty products or use them in operation.
- Make sure that the products have been installed in the manner described in the relevant documentation.

## Important Directions for Use

## 2.1.2 Areas of Use and Application

The Inline system of Rexroth is a modular and flexibly scalable input/output system in the degree of protection IP 20. It can be operated locally at the IndraControl L or peripherally via a field bus coupler.



The Rexroth Inline system may only be used with the accessories and parts specified in this document. If a component has not been specifically named, then it may not be either mounted or connected. The same applies to cables and lines.

Operation is only permitted in the specified configurations and combinations of components using the software and firmware as specified in the relevant function descriptions.

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Typical applications of the Rexroth Inline system are:

- Handling and assembly systems,
- Packaging and foodstuff machines,
- Printing and paper processing machines and
- Machine tools.

The Rexroth Inline system may only be operated under the assembly, installation and ambient conditions as described here (temperature, system of protection, humidity, EMC requirements, etc.) and in the position specified.

In residential areas as well as in business and commercial areas Class A devices may be used with the following note:



This is a Class A device. In a residential area, this device may cause radio interferences. In such a case, the user may be required to introduce suitable countermeasures at his own cost.

---

## 2.2 Inappropriate Use

Using the Rexroth Inline system outside of the above-referenced areas of application or under operating conditions other than described in the document and the technical data specified is defined as "inappropriate use".

The Rexroth Inline system may not be used if

- they are subject to operating conditions that do not meet the above specified ambient conditions. This includes, for example, operation under water, in the case of extreme temperature fluctuations or extremely high maximum temperatures or if
- Bosch Rexroth has not specifically released them for that intended purpose. Please note the specifications outlined in the general Safety Guidelines!

## 3 Safety Instructions for Electric Drives and Controls

### 3.1 Safety Instructions - General Information

#### 3.1.1 Using the Safety Instructions and Passing them on to Others

Do not attempt to install or commission this device without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with the device. If you do not have the user documentation for the device, contact your responsible Bosch Rexroth sales representative. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the device.

If the device is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the device in the official language of the user's country.



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**Improper use of these devices, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in material damage, bodily harm, electric shock or even death!**

Observe the safety instructions!

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#### 3.1.2 How to Employ the Safety Instructions

Read these instructions before initial commissioning of the equipment in order to eliminate the risk of bodily harm and/or material damage. Follow these safety instructions at all times.

- Bosch Rexroth AG is not liable for damages resulting from failure to observe the warnings provided in this documentation.
- Read the operating, maintenance and safety instructions in your language before commissioning the machine. If you find that you cannot completely understand the documentation for your product, please ask your supplier to clarify.
- Proper and correct transport, storage, assembly and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of this device.
- Only assign trained and qualified persons to work with electrical installations:
  - Only persons who are trained and qualified for the use and operation of the device may work on this device or within its proximity. The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the product, as well as an understanding of all warnings and precautionary measures noted in these instructions.
  - Furthermore, they must be trained, instructed and qualified to switch electrical circuits and devices on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid.
- Only use spare parts and accessories approved by the manufacturer.

## Safety Instructions for Electric Drives and Controls

- Follow all safety regulations and requirements for the specific application as practiced in the country of use.
- The devices have been designed for installation in industrial machinery.
- The ambient conditions given in the product documentation must be observed.
- Only use safety-relevant applications that are clearly and explicitly approved in the Project Planning Manual. If this is not the case, they are excluded. Safety-relevant are all such applications which can cause danger to persons and material damage.
- The information given in the documentation of the product with regard to the use of the delivered components contains only examples of applications and suggestions.
- The machine and installation manufacturer must
  - make sure that the delivered components are suited for his individual application and check the information given in this documentation with regard to the use of the components,
  - make sure that his application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Commissioning of the delivered components is only permitted once it is sure that the machine or installation in which they are installed complies with the national regulations, safety specifications and standards of the application.
- Operation is only permitted if the national EMC regulations for the application are met.
- The instructions for installation in accordance with EMC requirements can be found in the section on EMC in the respective documentation (Project Planning Manuals of components and system).  
The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.
- Technical data, connection and installation conditions are specified in the product documentation and must be followed at all times.

*National regulations which the user must take into account*

- European countries: according to European EN standards
- United States of America (USA):
  - National Electrical Code (NEC)
  - National Electrical Manufacturers Association (NEMA), as well as local engineering regulations
  - regulations of the National Fire Protection Association (NFPA)
- Canada: Canadian Standards Association (CSA)
- Other countries:
  - International Organization for Standardization (ISO)
  - International Electrotechnical Commission (IEC)

### 3.1.3 Warning Symbols and Degrees of Hazard Seriousness

The safety instructions describe the following degrees of hazard seriousness. The degree of hazard seriousness informs about the consequences resulting from non-compliance with the safety instructions:




Warning symbol	Signal word	Degree of hazard seriousness acc. to ANSI Z 535.4-2002
	Danger	Death or severe bodily harm will occur.
	Warning	Death or severe bodily harm may occur.
	Caution	Minor or moderate bodily harm or material damage may occur.

Fig. 3-1 Hazard classification (according to ANSI Z 535)

### 3.1.4 Hazards by Improper Use



**DANGER**

**High electric voltage and high working current! Risk of death or severe bodily injury by electric shock!**

Observe the safety instructions!



**DANGER**

**Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!**

Observe the safety instructions!



**WARNING**

**High electric voltage because of incorrect connection! Risk of death or bodily injury by electric shock!**

Observe the safety instructions!



**WARNING**

**Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!**

Observe the safety instructions!



**CAUTION**

**Hot surfaces on device housing! Danger of injury! Danger of burns!**

Observe the safety instructions!

## Safety Instructions for Electric Drives and Controls

**CAUTION**

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**Risk of injury by improper handling! Risk of bodily injury by bruising, shearing, cutting, hitting or improper handling of pressurized lines!**

Observe the safety instructions!

---

**CAUTION**

---

**Risk of injury by improper handling of batteries!**

Observe the safety instructions!

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## 3.2 Instructions with Regard to Specific Dangers

### 3.2.1 Protection Against Contact with Electrical Parts and Housings



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This section concerns devices and drive components with voltages of more than **50 volts**.

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Contact with parts conducting voltages above 50 volts can cause personal danger and electric shock. When operating electrical equipment, it is unavoidable that some parts of the units conduct dangerous voltage.

**DANGER****High electrical voltage! Danger to life, electric shock and severe bodily injury!**

- Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain and repair this equipment.
- Follow general construction and safety regulations when working on electrical power installations.
- Before switching on the device, the equipment grounding conductor must have been permanently connected to all electrical equipment in accordance with the connection diagram.
- Do not operate electrical equipment at any time, even for brief measurements or tests, if the equipment grounding conductor is not permanently connected to the mounting points of the components provided for this purpose.
- Before working with electrical parts with voltage potentials higher than 50 V, the device must be disconnected from the mains voltage or power supply unit. Provide a safeguard to prevent reconnection.
- For electrical drive and filter components, observe the following: Wait **30 minutes** after switching off power to **allow capacitors to discharge** before beginning to work. Measure the electrical voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.
- Never touch the electrical connection points of a component while power is turned on.
- Install the covers and guards provided with the equipment properly before switching the device on. Before switching the equipment on, cover and safeguard live parts safely to prevent contact with those parts.
- A residual-current-operated circuit-breaker or r.c.d. cannot be used for electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device according to the relevant standards.
- Secure built-in devices from direct touching of electrical parts by providing an external housing, for example a control cabinet.



For electrical drive and filter components with voltages of **more than 50 volts**, observe the following additional safety instructions.

**DANGER****High housing voltage and high leakage current! Risk of death or bodily injury by electric shock!**

- Before switching on, the housings of all electrical equipment and motors must be connected or grounded with the equipment grounding conductor to the grounding points. This is also applicable before short tests.
- The equipment grounding conductor of the electrical equipment and the devices must be non-detachably and permanently connected to the power supply unit at all times. The leakage current is greater than 3.5 mA.
- Over the total length, use copper wire of a cross section of a minimum of 10 mm<sup>2</sup> for this equipment grounding connection!
- Before commissioning, also in trial runs, always attach the equipment grounding conductor or connect to the ground wire. Otherwise, high voltages may occur at the housing causing electric

## 3.2.2 Protection Against Electric Shock by Protective Extra-Low Voltage

Protective extra-low voltage is used to allow connecting devices with basic insulation to extra-low voltage circuits.

All connections and terminals with voltages between 5 and 50 volts at Rexroth products are PELV systems<sup>1</sup>. It is therefore allowed to connect devices equipped with basic insulation (such as programming devices, PCs, notebooks, display units) to these connections and terminals.



**WARNING**

---

### **High electric voltage by incorrect connection! Risk of death or bodily injury by electric shock!**

If extra-low voltage circuits of devices containing voltages and circuits of more than 50 volts (e.g. the mains connection) are connected to Rexroth products, the connected extra-low voltage circuits must comply with the requirements for PELV<sup>1</sup>.

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## 3.2.3 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:

- improper or wrong wiring of cable connections
- incorrect operation of the equipment components
- wrong input of parameters before operation
- malfunction of sensors, encoders and monitoring devices
- defective components
- software or firmware errors

These errors can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring in the drive components will normally be sufficient to avoid faulty operation in the connected drives. Regarding personal safety, especially the danger of bodily harm and/or material damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

1) "Protective Extra-Low Voltage"



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### **Dangerous movements! Danger to life, risk of injury, severe bodily harm or material damage!**

- For the above reasons, ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation.

They have to be provided for by the user according to the specific conditions within the installation and a hazard and fault analysis. The safety regulations applicable for the installation have to be taken into consideration. Unintended machine motion or other malfunction is possible if safety devices are disabled, bypassed or not activated.

### **To avoid accidents, bodily harm and/or material damage**

- Keep free and clear of the machine's range of motion and moving parts. Possible measures to prevent people from accidentally entering the machine's range of motion:
    - use safety fences
    - use safety guards
    - use protective coverings
    - install light curtains or light barriers
  - Fences and coverings must be strong enough to resist maximum possible momentum.
  - Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before commissioning. Do not operate the device if the emergency stop switch is not working.
  - Isolate the drive power connection by means of an emergency stop circuit or use a safety related starting lockout to prevent unintentional start.
  - Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone.
  - Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example:
    - mechanically securing the vertical axes,
    - adding an external braking/arrester/clamping mechanism or
    - ensuring sufficient equilibration of the vertical axes.
  - The standard equipment motor brake or an external brake controlled by the drive controller are **not sufficient to guarantee personal safety!**
  - Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection for:
    - maintenance and repair work
    - cleaning of equipment
    - long periods of discontinued equipment use
  - Prevent the operation of high-frequency, remote control and radio equipment near electronics circuits and supply leads. If the use of such devices cannot be avoided, verify the system and the installation for possible malfunctions in all possible positions of normal use before initial commissioning. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.
-

### 3.2.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors and permanent magnets in motors represent a serious personal danger to those with heart pacemakers, metal implants and hearing aids.



**WARNING**

#### Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

- Persons with heart pacemakers and metal implants are not permitted to enter following areas:
  - Areas in which electrical equipment and parts are mounted, being operated or commissioned.
  - Areas in which parts of motors with permanent magnets are being stored, repaired or mounted.
- If it is necessary for somebody with a pacemaker to enter such an area, a doctor must be consulted prior to doing so. The noise immunity of present or future implanted heart pacemakers differs greatly so that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids, must consult a doctor before they enter the areas described above. Otherwise health hazards may occur.

### 3.2.5 Protection Against Contact with Hot Parts



**CAUTION**

Hot surfaces at motor housings, on drive controllers or chokes! Danger of injury!  
Danger of burns!

- Do not touch surfaces of device housings and chokes in the proximity of heat sources! Danger of burns!
- Do not touch housing surfaces of motors! Danger of burns!
- According to the operating conditions, temperatures can be **higher than 60 °C, 140 °F** during or after operation.
- Before accessing motors after having switched them off, let them cool down for a sufficiently long time. Cooling down can require **up to 140 minutes!** Roughly estimated, the time required for cooling down is five times the thermal time constant specified in the Technical Data.
- After switching drive controllers or chokes off, wait 15 minutes to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications, the manufacturer of the end product, machine or installation, according to the respective safety regulations, has to take measures to avoid injuries caused by burns in the end application. These measures can be, for example: warnings, guards (shielding or barrier), technical documentation.

### 3.2.6 Protection During Handling and Mounting

In unfavorable conditions, handling and mounting certain parts and components in an improper way can cause injuries.



---

**Risk of injury by improper handling! Bodily injury by bruising, shearing, cutting, hitting!**

- Observe the general construction and safety regulations on handling and mounting.
  - Use suitable devices for mounting and transport.
  - Avoid jamming and bruising by appropriate measures.
  - Always use suitable tools. Use special tools if specified.
  - Use lifting equipment and tools in the correct manner.
  - If necessary, use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).
  - Do not stand under hanging loads.
  - Immediately clean up any spilled liquids because of the danger of skidding.
- 

### 3.2.7 Battery Safety

Batteries consist of active chemicals enclosed in a solid housing. Therefore, improper handling can cause injury or material damage.



---

**Risk of injury by improper handling!**

- Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
  - Do not recharge the batteries as this may cause leakage or explosion.
  - Do not throw batteries into open flames.
  - Do not dismantle batteries.
  - When replacing the battery/batteries do not damage electrical parts installed in the devices.
  - Only use the battery types specified by the manufacturer.
- 



Environmental protection and disposal! The batteries contained in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separate from other waste. Observe the local regulations in the country of assembly.

---

### 3.2.8 Protection Against Pressurized Systems

According to the information given in the Project Planning Manuals, motors cooled with liquid and compressed air, as well as drive controllers, can be partially supplied with externally fed, pressurized media, such as compressed air, hydraulics oil, cooling liquids and cooling lubricating agents. Improper handling of the connected supply systems, supply lines or connections can cause injuries or material damage.



**CAUTION**

---

#### **Risk of injury by improper handling of pressurized lines!**

- Do not attempt to disconnect, open or cut pressurized lines (risk of explosion).
  - Observe the respective manufacturer's operating instructions.
  - Before dismounting lines, relieve pressure and empty medium.
  - Use suitable protective equipment (for example safety goggles, safety shoes, safety gloves).
  - Immediately clean up any spilled liquids from the floor.
- 



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Environmental protection and disposal! The agents used to operate the product might not be economically friendly. Dispose of ecologically harmful agents separately from other waste. Observe the local regulations in the country of assembly.

---

## 4 Diagnostics

The diagnostic concept for the bus coupler consists of two components. Firstly, diagnostic data is supplied to the control system via PROFIBUS in the form of diagnostic bytes. Secondly, local diagnostics are available, whereby the error type is indicated by the specific flashing codes of the LEDs on the bus coupler.

### 4.1 Diagnostic Data via PROFIBUS

PROFIBUS diagnostics consist of six blocks:

- 1 PROFIBUS standard diagnostics
- 2 ID-specific diagnostics
- 3 Status diagnostics (terminal status)
- 4 Channel-specific diagnostics
- 5 Revision diagnostics (manufacturer-specific)
- 6 Status-PDU (manufacturer-specific)

The header bytes are used to distinguish between all blocks.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Meaning
<b>Block 1</b>									
1	X	X	X	X	X	X	X	X	Station status 1
2	X	X	X	X	X	X	X	X	Station status 2
3	X	X	X	X	X	X	X	X	Station status 3
4	X	X	X	X	X	X	X	X	PROFIBUS master address
5	0	0	0	0	1	0	0	1	Manufacturer ID high byte (09 <sub>hex</sub> )
6	0	1	1	0	1	0	1	1	Manufacturer ID low byte (6B <sub>hex</sub> )
<b>Block 2</b>									
7	0	1	L = Block length						ID-specific diagnostics (header)
8	LD 8	LD 7	LD 6	LD 5	LD 4	LD 3	LD 2	LD 1	Local bus devices 1 to 8
9	LD 16	LD 15	LD 14	LD 13	LD 12	LD 11	LD 10	LD 9	Local bus devices 9 to 16
...	...	...	...	...	...	...	...	...	...
15	0	LD 63	LD 62	LD 61	LD 60	LD 59	LD 58	LD 57	Local bus devices 57 to 63
<b>Block 3</b>									
16	0	0	L = Block length						Status (header)
17	1	0	0	0	0	0	1	0	Status type = terminal status
18	0	0	0	0	0	0	0	0	Slot (= 0 = general status of the bus coupler)
19	0	0	0	0	0	0	SP	SP	Specifier
20	ST LD 4		ST LD 3		ST LD 2		ST LD 1		Status, local bus devices 1 to 4
21	ST LD 8		ST LD 7		ST LD 6		ST LD 5		Status, local bus devices 5 to 8
...	...	...	...	...	...	...	...	...	...
35	0		ST LD 63		ST LD 62		ST LD 61		Status, local bus devices 60 to 63

Fig. 4-1 R-IL PB BK DI8 DO4-PAC diagnostics

## Diagnostics

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Meaning	
<b>Block 4</b>										
36	1	0	Module no.						Channel-specific diagnostics (header) Channel error 1	
37	IO		Channel						IN/OUT and channel number Channel error 1	
38	CT			ET						Channel and error type Channel error 1
...	1	0	Module no.						Channel-specific diagnostics (header) Channel error 2	
...	IO		Channel						IN/OUT and channel number Channel error 2	
...	CT			ET						Channel and error type Channel error 1
...	...	...	...	...	...	...	...	...	...	
...	1	0	Module no.						Channel-specific diagnostics (header) Channel error 10	
...	IO		Channel						IN/OUT and channel number Channel error 10	
65	CT			ET						Channel and error type Channel error 10
<b>Block 5</b>										
66	1	1	X	X	X	X	X	X	Version (start with C1)	
<b>Block 6</b>										
67	0	0	0	0	1	1	0	0	Status (header)	
68	1	0	1	0	0	0	0	0	Reserved (header)	
69	0	0	0	0	0	0	0	0	Reserved (header)	
70	0	0	0	0	0	0	0	0	Reserved (header)	
71	0	0	0	0	0	0	B	B	Local bus baud rate 1 = 500 kbaud 2 = 2 Mbaud	
72	X	X	X	X	X	X	X	X	Diagnostic location (FF = OK)	
73	X	X	X	X	X	X	X	X	User ID code, 1st local bus device with error	
74	X	X	X	X	X	X	X	X	User length code, 1st local bus device with error	
75	X	X	X	X	X	X	X	X	HB state (high byte)	
76	X	X	X	X	X	X	X	X	LB state (low byte)	
77	0	0	0	0	0	0	0	X	System limit violated?	
78	X	X	X	X	X	X	X	X	Number of accessible local bus devices	

Fig. 4-1 R-IL PB BK D18 DO4-PAC diagnostics (continued)

**Block 1: PROFIBUS standard diagnostics**

X: Value 1 is activated. Value 0 is deactivated.

M: Slave transmits 0, master adds if necessary.

7	6	5	4	3	2	1	0	
							M	Station does not exist
						X		Slave is not ready for data exchange
					X			Error in configuration telegram
				X				Telegram includes extended diagnostics
			X					Requested function not supported by slave
		M						Invalid response from slave
	X							Error in parameter telegram
M								Slave assigned to another master

Fig. 4-2 Byte 1: Status 1

7	6	5	4	3	2	1	0	
							X	Slave must be reparameterized
						X		Static diagnostics
					1			Fixed to 1 for DP operation
				X				Watchdog activated
			X					Freeze command received
		X						Sync command received
	0							Reserved
M								Slave deactivated

Fig. 4-3 Byte 2: Status 2

7	6	5	4	3	2	1	0	
	0	0	0	0	0	0	0	Reserved
X								Slave has more diagnostic information than displayed in the telegram

Fig. 4-4 Byte 3: Status 3

7	6	5	4	3	2	1	0	
0 - 125 (0x00 - 0x7E)								Master address following parameterization, default address is 255 (0xFF)

Fig. 4-5 Byte: Master address

7	6	5	4	3	2	1	0	
0 - 225 (0x00 - 0xFF)								ID number high byte
0 - 225 (0x00 - 0xFF)								ID number low byte

Fig. 4-6 Byte 5 and 6: ID number

## Diagnostics

**Block 2: ID-specific diagnostics**

The table shows the faulty local bus devices. For every faulty terminal, a "1" is entered.

In the first byte of the block, the length L of the entire ID-specific diagnostic block including the header is specified in bits 0 to 5. The minimum length of this block is 2 bytes, the maximum length is 9 bytes. The size of the ID-specific diagnostic block therefore depends on the number of configured terminals.

**Block 3: Status PDU (terminal status)**

For every local bus device there are 2 bits for status encoding:

- ST LD x: 00 = Terminal data valid
- ST LD x: 01 = Terminal data invalid due to an error
- ST LD x: 10 = Terminal data invalid due to incorrect terminal being connected
- ST LD x: 11 = Terminal data invalid or no terminal connected  
(despite configuration)

The specifier (SP) equals 1 in the event of a faulty state. The specifier equals 2 if the terminal changes from a faulty state to an error-free state. If the specifier equals 0, the state has not changed.

- SP: 0 = No evaluation
- SP: 1 = Error occurs (number > 0)
- SP: 2 = Error disappears (number = 0)
- SP: 3 = Reserved

In the first byte of the block, the length L of the entire status PDU block including the header is specified in bits 0 to 5. The minimum length of this block is 5, the maximum length is 20. The size of the status PDU block also depends on the number of the configured terminals.

#### Block 4: Channel-specific diagnostics

Up to 10 channel errors are indicated here. There are 3 bytes per channel error, this block can be a maximum of 30 bytes in size. Each channel error is an individual and independent error. In order to display the channel errors, the I/O terminal must support PCP and channel-specific diagnostics must be activated on the bus coupler. Channel-specific diagnostics can be activated with Rexroth IndraWorks by changing the "Channel-wise diagnostics" parameter to "active" in the bus coupler settings.

IO: 00<sub>bin</sub> = Reserved  
IO: 01<sub>bin</sub> = Input  
IO: 10<sub>bin</sub> = Output  
IO: 11<sub>bin</sub> = Input and output

Channel: Channel number of the relevant channel (0 to 63)

CT: 000<sub>bin</sub> = Reserved  
CT: 001<sub>bin</sub> = 1 bit  
CT: 010<sub>bin</sub> = 2 bits  
CT: 011<sub>bin</sub> = 4 bits  
CT: 100<sub>bin</sub> = 1 byte  
CT: 101<sub>bin</sub> = 2 bytes  
CT: 110<sub>bin</sub> = 4 bytes  
CT: 111<sub>bin</sub> = Reserved

ET: 0 = Reserved  
ET: 1 = Short circuit  
ET: 2 = Undervoltage  
ET: 3 = Surge voltage  
ET: 4 = Overload  
ET: 5 = Overtemperature  
ET: 6 = Cable break  
ET: 7 = Upper limit value exceeded  
ET: 8 = Lower limit value exceeded  
ET: 9 = General error

## Diagnostics

**Block 5: Version Diagnostics**

Indicates the firmware version, e.g., 0xC3 = Version 3. Version diagnostics starts with C1 for version 1.

**Block 6: Status PDU**

The sixth block is also encoded as a status PDU block, but in manufacturer-specific format. The information stored here does not usually need to be evaluated.

Byte 5 indicates the baud rate at which the local bus is operated.  
(01hex = 500 kbaud, 02hex = 2 Mbaud).

Byte 7 and byte 8 indicate the ID and length code of the first faulty terminal. This can be used as additional information for blocks 2 and 3, if required.

Byte 9 and byte 10 indicate the HB state (high byte) and LB state (low byte).

The value of byte 11 is 1 if a system limit was violated.

Byte 12 indicates the number of available terminals.

**CAUTION**

The bus coupler is always counted as a local bus device (LD). In the event of an error on the bus coupler, the corresponding bits for local bus device 1 are set in the diagnostics.

---

## 4.2 Local Diagnostics for the Bus Coupler (FS/FN Flashing Codes)

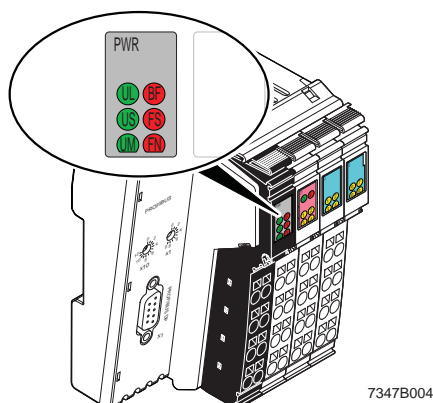


Fig. 4-7 Local diagnostic indicators on the bus coupler

On the bus coupler local diagnostics is indicated with the FS and FN LEDs. Diagnostics can be evaluated with the following table and evaluating the flashing codes of these two LEDs.

First, determine the number of flashes of FN while FS is ON. This number indicates the error type which can be found in column 1. Error numbers are distinguished in column 2 within this error block. The error number results from the number of flashes fo FN while FS is OFF. After this number in column 2 you will find a detailed error description in the line.

### Local diagnostics for the bus coupler (FS/FN flashing codes)

Error type (FS ON, FN flashing)	Error no. (FS OFF, FN flashing)	Error cause	Error remedy
<b>1</b>		<b>Parameter errors on PROFIBUS</b>	
	1	A parameter block is faulty.	The number of terminals does not correspond to the number of parameter blocks or the header byte of the module parameter is incorrect or the parameter block is incomplete.
	2	Too many data blocks for the terminal.	The number of terminals does not correspond to the number of parameter blocks.
	3	The data length of the parameter block is too short	Check the number of parameters.
	4	The PD PCP module appears several times in the configuration.	Check the configuration with regard to the number of PD PCP modules. There must only be one PD PCP module.
	5	The data block length was exceeded.	Check the number of terminals.

## Diagnostics

Error type (FS ON, FN flashing)	Error no. (FS OFF, FN flashing)	Error cause	Error remedy
<b>2</b>		<b>Configuration errors on PROFIBUS</b>	
	1	Fewer terminals have been configured than are available in the station.	Add these terminals to the configuration.
	2	More terminals have been configured than are available in the station.	Delete the extra terminals from your configuration.
	3	Configuration block is faulty.	Determine the exact error location using the terminal-specific diagnostics in your control system.
	4	The ID code in the configuration does not correspond to the terminal.	Determine the exact error location using the terminal-specific diagnostics in your control system. Check the configuration in the hardware configurator.
	5	The length code of the configured terminal does not correspond to the length code of the terminal.	Determine the exact error location using the terminal-specific diagnostics in your control system. Check the configuration in the hardware configurator.
	6	The data length of the parameter block is faulty.	Check the number of parameters.
	7	PROFIBUS address of the R-IL PB BK D18 DO4-PAC is greater than 126.	Check the PROFIBUS address of the R-IL PB BK D18 DO4-PAC. After the address is set, the R-IL PB BK D18 DO4-PAC must be restarted.
	8	More than 244 bytes are required for the configuration.	Reduce the number of terminals in the station or group several Inline terminals in the configuration, so that the configuration data is compressed.
		This additional display is only available under firmware version FW 1.01.	
Error type (FS ON, FN flashing)	Error no. (FS OFF, FN flashing)	Error cause	Error remedy
<b>3</b>		<b>Parameter error on the local bus</b>	
	1	General PCP parameterization failed.	Check the station configuration and the PCP devices.
	2	PCP communication was aborted.	Check the PCP PDU size of the PCP devices.
	3	Module error occurred during initialization.	Try to restart the station.
	4	An error occurred in the I/O circuit (e.g., short circuit or overload at the actuator).	Remove the error from your I/O devices.
Error type (FS ON, FN flashing)	Error no. (FS OFF, FN flashing)	Error cause	Error remedy
<b>4</b>		<b>Local bus error within the station</b>	
	1	Local bus was stopped.	Check the configuration of the station.

## 5 Object Dictionaries

Due to the complexity of the station, the station is divided into slots 0 to 63. The slots represent the individual slots of the station. Slot 0 represents the bus coupler, slot 1 the integrated inputs and outputs on the bus coupler, and slots 2 to 63 the additional bus devices.

To parameterize the station, each slot offers one or more object references, which can be used to acyclically parameterize the bus coupler and the bus devices. In the following section, these objects are explained in more detail in reference to the slots.

### 5.1 Slot 0

The following station-specific indices are implemented on slot 0:

**Index 3: PDU length**

**Function:** Data width of the virtual C1 module (process data interface for acyclic communication) in bytes

**Access:** Read

**Length:** 1 byte

**Note:** For DP/V0 access only

**Index 4: Master control**

**Function:** Control bits for station

**Access:** Write

**Length:** 1 byte

**Structure:**

- Bit 0: Restart local bus
- Bit 1: Acknowledge PF
- Bit 2: Update diagnostics (evaluation of index 18 on PCP terminals)
- Bit 3: Unlock dynamic configuration
- Bit 4: Reserved (set to 0)
- Bit 5: Reserved (set to 0)
- Bit 6: Reserved (set to 0)
- Bit 7: Reserved (set to 0)

Bit 0 can be used to restart the local bus at any time. If a new activation status has been specified via index 6, it is used for this restart. Please note that during a restart the terminal output data is reset to its terminal-specific reset values.

Bit 1 can be used to reset peripheral faults that have to be acknowledged. This function has been prepared for future terminals.

Set bit 2 if the diagnostics of all connected terminals are to be read in again. This is only useful if terminals are connected for which object 18<sub>hex</sub> (diag state) is implemented. Usually this includes all devices that use PCP. Therefore check in the relevant data sheet whether the terminal supports PCP.

Bit 3 can be used in the context of dynamic configuration. If a new activation status is specified via object 6 or 7, it is mandatory.

If the connection to the PROFIBUS master is then interrupted and if the original parameterization is transmitted by the master during restart, the activation status is maintained. The dynamic configuration does not have to be executed again.

Object Dictionaries

However, if the activation status is reset during a restart, simply set bit 3 once following dynamic configuration via index 6 or 7.

In this way, both options are available:

- Restart with original configuration
- Restart with last dynamic configuration

**Index 5: PCP status**  
**Function:** Position and communication status of PCP terminal  
**Access:** Read  
**Length:** 3 bytes per PCP terminal -> 48 bytes, maximum  
**Structure:** Byte 1: Position in the station (slot number)  
 Byte 2: Status of PCP connection  
 • 00<sub>hex</sub> No connection  
 • 01<sub>hex</sub> Connection OK  
 • FF<sub>hex</sub> Error during connection establishment  
 Byte 3: Reserved

**Index 6: Terminal activation**  
**Function:** Activation/deactivation of I/O terminals  
**Access:** Read and write  
**Length:** 8 bytes  
**Structure:**

	Byte 0									Byte 1								Bytes 2 ... 6		Byte 7														
Bit	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0										7	6	5	4	3	2	1	0
TN	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16	...		57	58	59	60	61	62	63	x							

Numbers 1 to 63 correspond to local bus devices (1 = integrated I/O, 2 = first plugged-in module, 3 = second plugged-in module, etc.).

TN = Device

Bit = 0: Terminal and slot inactive

Bit = 1: Terminal and slot active

However, local bus device 1 (integrated I/Os) cannot be deactivated for the bus coupler.

**Index 7: Terminal activation/restart**

**Function:** Activation/deactivation of I/O terminals,  
bus restart (write), number of terminals, and status (read)

**Access:** Simultaneous read and write access via DP/V0 with command 08

**Length:** 3-byte header, 1-byte length,  
up to n = 8 bytes for up to 63 terminals

**Structure**  
:

**Write:**

Byte 1	08 <sub>hex</sub>							
Byte 2	00 <sub>hex</sub>							
Byte 3	07 <sub>hex</sub>							
Byte 4	Length of the following data n							
Byte 5	1	2	3	4	5	6	7	8
...								
Byte 4+n	x	x	x	x	x	x	x	x

Bit = 0: Terminal and slot inactive

Bit = 1: Terminal and slot active

**Read (write response):**

Byte 1	88 <sub>hex</sub>							
Byte 2	Status							
Byte 3	Length of the following data m							
Byte 4	Number of available terminals (k)							
Byte 5	1	2	3	4	5	6	7	8
...								
Byte 3+m	x	x	x	x	x	x	x	x

Bit = 0: Terminal and slot inactive

Bit = 1: Terminal and slot active

This object is specifically intended for use under DP/V0. The data length for write access always depends on the number of configured terminals. The number of activated/deactivated terminals is completely irrelevant. If, for example, 15 terminals were configured, 4 of which are to be deactivated and 11 of which are to be activated, only the number of configured terminals is relevant. In this case, 2 bytes are required in order to display 15 terminals. If 25 terminals were configured, 4 bytes would be required. In the case of write access, at least as many bytes must be used as are necessary for the activation status for each device to be transmitted. More bytes can also be transmitted, however only up to 8 bytes, as the station can only manage a maximum of 63 terminals.

In the case of read access, the amount of data is based on the number of configured and available devices. If, for example, k = 18 devices are configured, you will receive the response m = 3+1 bytes.

## Object Dictionaries

The following is valid for bytes in position 5 and up:

Status and specification are the same:

Activated and connected: Write: "1"; Read: „1“

Not activated and not connected: Write: "0"; Read: "0"

Status and specification inconsistent:

Activated but not connected: Write: "1"; Read: "0"

Not activated but connected: Write "0"; Read: "1"

As the specification must match the connected terminals, by comparing the desired state in the output data and the real status in the input data in addition to simply specifying the activation, you can easily determine which terminals are present or not.

An example for access to index 7 is illustrated in Chapter [7.3.3 "Specification of the Active Configuration via DP/V0"](#).

**Index 12: Terminal diagnostics**

**Function:** Station diagnostics byte 7 and up (without standard diagnostics)

**Access:** Read

**Length:** 72 bytes, maximum

**Structure:** As described in Chapter ["Diagnostics" on page 15](#)

**Index 20: Cycle count**

**Function:** Cycle counter (all cycles)

**Access:** Read and write

**Length:** 8 bytes

**Note:** For write access, all counters (index 20 to 25) are set to 0

**Index 21: Cycle error count**

**Function:** Cycle counter (all faulty cycles)

**Access:** Read and write

**Length:** 8 bytes

**Note:** For write access, all counters (index 20 to 25) are set to 0

**Index 22: ID cycle count**

**Function:** Cycle counter (all ID cycles)

**Access:** Read and write

**Length:** 8 bytes

**Note:** For write access, all counters (index 20 to 25) are set to 0

**Index 23: ID cycle error count**

**Function:** Cycle counter (all faulty ID cycles)

**Access:** Read and write  
**Length:** 8 bytes  
**Note:** For write access, all counters (index 20 to 25) are set to 0

**Index 24:** **Data cycle count**  
**Function:** Cycle counter (all data cycles)  
**Access:** Read and write  
**Length:** 8 bytes  
**Note:** For write access, all counters (index 20 to 25) are set to 0

**Index 25:** **Data cycle error count**  
**Function:** Cycle counter (all faulty data cycles)  
**Access:** Read and write  
**Length:** 8 bytes  
**Note:** For write access, all counters (index 20 to 25) are set to 0

The objects on slot 0 can be read and written with a single access attempt via DP/V1.

**Index 255:** **Identification & Maintenance functions**  
**Function:** Read and write I & M functions  
**Access:** Read and write  
**Length:** 64 bytes  
**Note:** Only possible via DP/V1

For this object, each access attempt - read or write - should be implemented in two stages (in accordance with specification IEC 61158-6, Section 6.1).

## Object Dictionaries

**Example:****Read I & M1**

1. a) Send the request as a DP/V1 write request (I & M read call) to slot 0  
b) Receive DP/V1 write response
  
2. a) Send a DP/V1 read to slot 0  
b) Receive DP/V1 read response

**Write I & M**

1. a) Send the request as a DP/V1 write request (I & M write call) to slot 0  
b) Receive DP/V1 write response
  
2. a) Send a DP/V1 read to slot 0  
b) Receive DP/V1 read response



---

Please note that the internal non-volatile memory of the device is accessed when writing to I&M functions I&M 1 to I&M 4. A maximum of 100,000 write access operations is permitted.

---

## 5.2 Slot 1

On slot 1, indices are implemented with regard to the integrated DI 8:

<b>Index 13:</b>	<b>PD IN</b>
<b>Function:</b>	Input data of the integrated DI 8
<b>Access:</b>	Read
<b>Length:</b>	1 byte

## 5.3 Slots 2 to 63

On slots 2-63, indices are implemented with regard to the I/O terminals that can be connected:

<b>Index 13:</b>	<b>PD IN</b>
<b>Function:</b>	Input data on the slot of connected terminals
<b>Access:</b>	Read
<b>Length:</b>	0 to 128 bytes

<b>Index 47:</b>	<b>PCP access</b>
<b>Function:</b>	Read and write PCP data on connected terminals via DP/V1
<b>Access:</b>	Read and write
<b>Length:</b>	Depends on the command and the PCP object
<b>Structure:</b>	See Chapter 6.4 on <a href="#">page 32</a> and onwards.
<b>Note:</b>	During access via DP/V0, the PCP objects can be accessed directly, i.e., without being diverted via index 47.

## 6 Acyclic Communication (DP/V1 and PCP)

**DP/V1** DP/V1 extends the cyclic data exchange function according to IEC 61158 to include acyclic services. This makes it easy to operate even complex terminals.

**PCP** PCP is used in the local bus to exchange data acyclically. This is usually the parameterization data of complex terminals (e.g., IB IL RS 232-PAC) or variable length data.

DP/V1 is a mechanism which corresponds to PCP at PROFIBUS level. The R-IL PB BK DI8 DO4-PAC coupler prepares the data records, which are sent via DP/V1 from the Class 1 or Class 2 master, for the PCP mechanism in the local bus. PCP data from the local bus is in turn converted into DP/V1 telegrams by the bus coupler.



Before programming the application, check whether your control system or configuration tool supports DP/V1. If not, the functions can be used via the cyclic process data channel (DP/V0), see Chapter 6.5 on page 40 and onwards.

The following distinctions must be observed regarding communication:

### 6.1 Acyclic Communication via the Class 1 Master (C1 Master)

**C1 master** The C1 master carries out parameterization during slave startup and is also the master for cyclic data traffic. It may also be necessary to read a parameter acyclically from the terminal as an option using this C1 master.

Corresponding read and write access rights are therefore defined for the C1 master. As it already has a connection to the slave during cyclic data traffic, the C1 master does not have to establish an explicit connection (using "Initiate"), but can communicate with the slave directly via "Read" and "Write".

### 6.2 Acyclic Communication via the Class 2 Master (C2 Master)

**C2 master** For communication in the C2 master, the data fields are identical to those for C1 communication, and it is only the SAPs (Service Access Points) which differ. The additional effort required is the use of "Initiate" and "Abort" to establish and release the connection via SAP49 and 50. If DP/V1 terminals are already in use, the routines for connection management can be adapted easily. The C2 master can be implemented in various forms, e.g., in the form of a display device or operator interface. In a display device, the data is retrieved from the slave on request if, for example, a specific parameter is to be read. Access to the operator interface is usually acyclic.



Up to 16 terminals capable of PCP can be connected to the R-IL PB BK DI8 DO4-PAC bus coupler.

Acyclic Communication (DP/V1 and PCP)

## 6.3 PCP Communication Basics

PCP (Peripherals Communication Protocol) controls the transmission of parameter data in the local bus. Special PCP services are available for this purpose.

### *Example*

To explain the basics of PCP communication, the following concrete PCP application is used as an example: A frequency inverter (FI), together with other field devices, is connected to a PLC via a bus interface. The device versions are standardized according to the Drives profile.

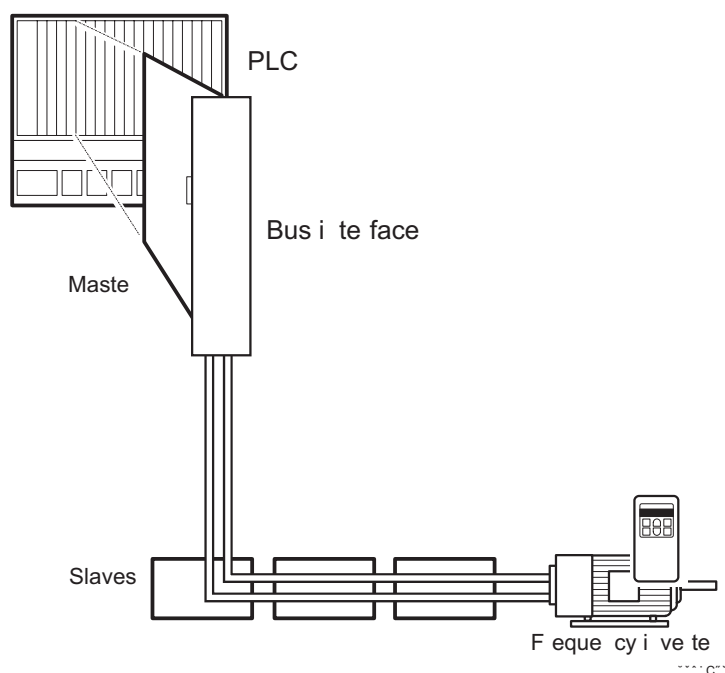


Fig. 6-1 Application example

### **Device parameters**

Device parameters are data from intelligent field devices (PCP devices), which is required for the startup phase of machines and systems. Once it has been entered, this data only has to be modified upon a change in the parameterization or in the event of an error. The parameters are preconfigured and can be taken from the device documentation provided by the manufacturer.

### **Parameters of a frequency inverter**

As an electrical drive controller, a key feature of a frequency inverter is that changes can be made to process variables (e.g., speed, position, and torque) using analog or digital signals. Additional information is required to optimize the adaptation of the drive controller and motor to the process. As well as setpoint information, the frequency inverter also requires information about the motor type point, the minimum and maximum permissible speed of the system, the maximum speed variation during acceleration and deceleration, starting ramp, starting current, etc.

These types of additional information are device-specific parameters, which can be modified via the parameter data channel.

The parameter values for all PCP devices are the subject of communication via the parameter data channel. To enable the individual parameters to be distinguished during communication, each parameter has a number, the index.

## Acyclic Communication (DP/V1 and PCP)

**Index** The index is the address of the communication object. It is required to identify the object.

	Object description (OD)		
Index	Type	Object	Name
...	...	...	...
60 4A <sub>hex</sub>	Ramp	Record	Speed quick stop
60 4B <sub>hex</sub>	Integer16	Array	Setpoint factor
...	...	...	...

Fig. 6-2 Object description (example)

### Object description

The object description includes all the properties of the object, such as data type, object type, name, etc.

**Object types** There are various different object types:

- Simple variable**
  - Simple variable type objects.  
Examples include measured values, the time or status of a terminal.
- Array**
  - Array type objects, i.e., several "simple variable" objects of the same type, which are grouped to form one object. Each element can be accessed individually.  
An example of an array is a range of the same type of measured values.
- Record**
  - Record type objects, i.e., several "simple variable" objects of different types, which are grouped to form one object. As for the array type, each element of a record can be accessed individually. An example of a record is the group of data in a test report, which contains not only the actual measured value, but also additional information, e.g., the time of the measurement.
- Program invocation**
  - Program invocation type objects, i.e., program sequences that can be run.

Acyclic Communication (DP/V1 and PCP)

## 6.4 Acyclic Communication in DP/V1 Mode

### 6.4.1 The Communication Mechanism

Whenever data is accessed, a distinction must be made between accessing data from local bus devices and data from the R-IL PB BK DI8 DO4-PAC bus coupler:

Data type	Access to I/O terminal	Access to R-IL PB BK DI8 DO4-PAC	Slot	Index/dec
PDU length	–	x	0	3
Master control	–	x	0	4
PCP status	–	x	0	5
Terminal activation	–	x	0	6
Terminal activation/restart	–	x	0	7
Terminal diagnostics	–	x	0	12
Cycle count	–	x	0	20
Cycle error count	–	x	0	21
ID cycle count	–	x	0	22
ID cycle error count	–	x	0	23
Data cycle count	–	x	0	24
Data cycle error count	–	x	0	25
I & M functions	–	x	0	255
PD IN	–	x	1 to 63	13
PCP access	x	–	2 to 63	47

Fig. 6-3 Objects on the R-IL PB BK DI8 DO4-PAC bus coupler

When accessing the R-IL PB BK DI8 DO4-PAC bus coupler, use the usual DP/V1 format. Read and write access can be executed in one step (request -> response).

The PCP data from I/O terminals is addressed via 16-bit object indices. DP/V1 only has fields for 8-bit indices. Additional parameters have therefore been added to the data block for use when accessing the local bus, as for PROFIDrive. A sequence involving 2 steps is used, which follows the PROFIDrive profile:

Read:

1.
  - a) Send the request as a DP/V1 write request (PCP read) to slot x
  - b) Receive the DP/V1 write response - often automatically via the master
2.
  - a) Send a DP/V1 read to slot x
  - b) Receive the DP/V1 read response - usually automatically via the master

Acyclic Communication (DP/V1 and PCP)

Write:

1. a) Send the request as a DP/V1 write request (PCP write) to slot x  
b) Receive the DP/V1 write response - often automatically via the master
2. a) Send a DP/V1 read to slot x  
b) Receive the DP/V1 read response - usually automatically via the master

Note that when communicating with objects on local bus devices, the response should be fetched using "Read". Otherwise the result will be overwritten during the next communication. Communication is always carried out via DP/V1 index 47, and the object index and assigned subindex of the I/O devices are transmitted as part of the data field.

**Request and response**

The section below provides additional information about the format of write and read access (request and response).

The format for all types of access (request and response (positive), read and write) in DP/V1 is:

<DP/V1 header> <Data (PCP/DP/V1)>

The DP/V1 header for a positive DP/V1 response always has the following format:

<DP/V1 service (positive)> <Slot> <DP/V1 index> <DP/V1 length>

In the event of a faulty response, the format is as follows:

- For a DP/V1 error:  
<DP/V1 service (negative)> <Error decode> <Error code 1> <Error code 2>
- For an I/O device error:  
<DP/V1 service (positive)> <Slot> <DP/V1 index> <DP/V1 length>  
<Error data (PCP/DP/V1)>

The <Data (PCP/DP/V1)> is optional depending on the service and has the following structure:

Access	Service	Data
Write objects (R-IL PB BK DI8 DO4-PAC)	DP/V1 write request	Object data
	DP/V1 write response	None
Read objects (R-IL PB BK DI8 DO4-PAC)	DP/V1 read request	None
	DP/V1 read response	Object data
Write objects (I/O device)	DP/V1 write request (PCP write)	Write PCP request/Invoke ID/Index high/Index low/Subindex/Length of PCP data/x bytes of PCP object data
	DP/V1 write response	None
	DP/V1 read request	None
	DP/V1 read response	Write PCP ack/Invoke ID/Status
Read objects (I/O device)	DP/V1 write request (PCP read)	Read PCP req/Invoke ID/Index high/Index low/Subindex
	DP/V1 write response	None
	DP/V1 read request	None
	DP/V1 read response	Read PCP ack/Invoke ID/Status/ Length of PCP data/x bytes of PCP object data

Fig. 6-4 Structure of the data depending on the service

## Acyclic Communication (DP/V1 and PCP)

The meaning of the individual parameters is as follows:

- **<DP/V1 service>:**  
In the request there is a distinction between DP/V1 read ( $5E_{\text{hex}}$ ) and DP/V1 write ( $5F_{\text{hex}}$ ); in the error response there is a distinction between  $DE_{\text{hex}}$  (read error) and  $DF_{\text{hex}}$  (write error).
- **<Slot>:**  
The slot of the device to be addressed in the station. The bus coupler is addressed with slot = 0, the integrated DI8/DO4 terminals are addressed with slot = 1. Starting with the first connected device, the devices are addressed with slots 2 to 63.
- **<DP/V1 index>:**  
For access to the PCP objects of the local bus devices, PROFIBUS index  $47_{\text{dec}}$  ( $= 2F_{\text{hex}}$ ) is to be used. The PCP index is transmitted as part of the data field. For access to the bus coupler, the object index can be used directly.
- **<DP/V1 length>:**  
For write access, the length of the subsequent data is specified here, and for read access, the length of the expected data is specified. On a response, this parameter contains the actual length of the DP/V1 data.
- **<Error decode>:**  
 $80_{\text{hex}}$  indicates an error in DP/V1.
- **<Error code 1> and <Error code 2>:**  
Error codes from DP/V1 access (see ["Error Codes for DP/V1 and VC1 Communication" on page 65](#)).
- **<Write PCP/read PCP>:**  
This specifies whether the following object indices should be written or read. Read PCP =  $06_{\text{hex}}$ ; Write PCP =  $07_{\text{hex}}$ .
- **<Object data>:**  
This is only the contents of an object. The length and scope of the data has already been described by <DP/V1 length>.
- **<Invoke ID>:**  
The Invoke ID is used for some I/O devices. Check this in the relevant data sheet.
- **<Index high and Index low>:**  
This specifies the object index of the addressed PCP object in two bytes. For example, for index  $2300_{\text{hex}}$  the value  $23_{\text{hex}}$  should be entered for Index high and the value  $00_{\text{hex}}$  should be entered for Index low.
- **<Subindex>:**  
When working with a PCP object, the subindex can be used to select a specific element from an array or record.
- **<PCP data length>:**  
This value specifies how many bytes of PCP object data (object contents) follow.
- **<PCP object data>:**  
This is the actual contents of a PCP object.
- **<Status>:**  
For a positive PCP response, the status is  $00_{\text{hex}}$ , in the event of an error it is  $44_{\text{hex}}$ .
- **-<Error data (PCP/DP/V1)>:**  
The structure of error data is as follows, <PCP confirmation code> <Invoke ID>  
<Status =  $44_{\text{hex}}$ > <PCP error code (4 bytes)>.  
(PCP error code, see ["Error Codes for DP/V1 and VC1 Communication" on page 65](#)).



## Acyclic Communication (DP/V1 and PCP)

Objects 4 and 4 on the bus coupler are also used in these examples. For an explanation regarding these objects, please refer to Chapter ["Object Dictionaries" on page 23](#).

**Example 1:  
Reading the connected local PCP devices and their status (Slot 0, Index 5 on the bus coupler)**

Data	Data structure
5E 00 05 20	DP/V1 read/Slot/Index/Maximum length

Read request (master -> slave)

Data	Data structure
5E 00 05 06 03 01 00 04 01 00	DP/V1 read/Slot/Index/Actual length/ 6 bytes of object data

Read request (slave -> master)

The data shows that there is one PCP device each on slots 3 and 4, and its connection status is OK, see Chapter ["Object Dictionaries" on page 23](#).

**Example 2:  
Writing the bus restart bit (slot 0, index 4, bit 0 on the bus coupler)**

Data	Data structure
5F 00 04 01 01	DP/V1 write/Slot/Index/Length/1 byte of data

Write request (master -> slave)

Data	Data structure
5F 00 04 01	DP/V1 write/Slot/Index/Length

Write response (slave -> master)

The data block is only important in the request. The response indicates that the command has been received. As can be seen in Chapter ["Object Dictionaries" on page 23](#), the local bus is restarted with bit 0 (01<sub>hex</sub>) at index 4, slot 0.

Acyclic Communication (DP/V1 and PCP)

**Example 3:  
Reading the Config Table on the connected R-IB IL AI4/EF (slot 3,  
index 0080)**

Data	Data structure
5F 03 2F 05 06 00 00 80 00	DP/V1 write/Slot/Index/Length/Read PCP request/Invoke ID/PCP index high/PCP index low/PCP subindex

Write request (master -&gt; slave)

Data	Data structure
5F 03 2F 05	DP/V1 write/Slot/Index/Length

Write response (slave -&gt; master)

Data	Data structure
5E 03 2F 20	DP/V1 read/Slot/Index/Maximum length

Read request (master -&gt; slave)

Data	Data structure
5E 03 2F 10 86 00 00 0C 03 01 03 00 03 01 03 00 00 00 00 00	DP/V1 read/Slot/Index/Actual length/PCP read response/Invoke ID/Status/Length of PCP data/12 bytes of PCP object data

Read response (slave -&gt; master)

In the read response, the user receives the 12 bytes of object 80<sub>hex</sub> on the R-IB IL AI4 EF as described above. The settings for channel 1 and 3 are the same as well as for channel 2 and 4. Bytes 9 to 12 are reserved and are indicated as 0. The Invoke ID was mirrored and the status indicates that communication was error-free.

Acyclic Communication (DP/V1 and PCP)

**Example 4:  
Writing the Config Table for channel 3 on the connected  
R-IB IL AI4/EF (slot 3, index 0080, subindex 3)**

Data	Data structure
5F 03 2F 08 07 00 00 80 03 02 03 01	DP/V1 write/Slot/Index/Length/Write PCP request/Invoke ID/PCP index high/PCP index low/PCP subindex/Length of PCP object data/PCP object data

Write request (master -> slave)

Data	Data structure
5F 03 2F 08	DP/V1 write/Slot/Index/Length

Write response (slave -> master)

Data	Data structure
5E 03 2F 20	DP/V1 read/Slot/Index/Maximum length

Read request (master -> slave)

Data	Data structure
5E 03 2F 03 87 00 00	DP/V1 read/Slot/Index/Actual length/Write PCP response/Invoke ID/Status

Read response (slave -> master)

In the read response, the mirrored Invoke ID is the result and the status is 00.

**Example 5:  
In the event of an error: Reading a faulty object index on the  
connected R-IB IL AI4/EF (slot 3, index 0180)**

Data	Data structure
5F 03 2F 05 06 00 01 80 00	DP/V1 write/Slot/Index/Length/Read PCP request/Invoke ID/PCP index high/PCP index low/PCP subindex

Write request (master -> slave)

Data	Data structure
5F 03 2F 05	DP/V1 write/Slot/Index/Length

Write response (slave -> master)

Data	Data structure
5E 03 2F 20	DP/V1 read/Slot/Index/Maximum length

Read request (master -> slave)

Data	Data structure
5E 03 2F 07 86 00 44 06 07 00 00	DP/V1 read/Slot/Index/Actual length/PCP read response/Invoke ID/Status/Error data PCP

Read response (slave -> master)

## Acyclic Communication (DP/V1 and PCP)

Status byte 44<sub>hex</sub> indicates an error during execution. In this case, the PCP read request is sent to the I/O terminal first. However, the I/O terminal does not recognize this index and acknowledges it using error code 06 07. According to Chapter "[Error Codes for PCP Communication](#)" on page 63, this means that the object does not exist. The last 2 bytes are also part of the PCP error data, however, they are not used in this example. If they do not equal zero, refer to the relevant I/O device data sheet for more detailed information.

**Example 6:****In the event of an error: Reading an Object on a Device Without PCP (Slot 2, Index 0080)**

Data	Data structure
5F 02 2F 05 06 00 00 80 00	DP/V1 write/Slot/Index/Length/Read PCP request/Invoke ID/PCP index high/PCP index low/PCP subindex

Write request (master -> slave)

Data	Data structure
DF 80 D2 00	DP/V1 write error/Error decode/Error code 1/Error code 2

Write response (slave -> master)

Since the addressed device does not support PCP, the request is rejected immediately. A message is sent by DP/V1, whereby error code D2 stands for "Terminal does not have PCP". See also Chapter "[Error Codes for DP/V1 and VC1 Communication](#)" on page 65.

Acyclic Communication (DP/V1 and PCP)

## 6.5 Acyclic Communication in DP/V0 Mode via Process Data

DP/V1 communication is relatively new compared to cyclic DP/V0 communication. However, the service life of control systems and plants is so long that extensions and modifications are made. In many cases, the control system is not DP/V1-compatible, but is expected to operate complex devices.

**Acyclic services** For this purpose, acyclic services can also be operated within the process data, i.e., even a control system that does not have DP/V1 can operate more complex terminals.

For additional information about PCP communication, please refer to Chapters "[PCP Communication Basics](#)" on page 30 and "[Acyclic Communication in DP/V1 Mode](#)" on page 32.

### 6.5.1 Mechanism for Transmission in the Process Data

**VC1 module** Transmission is via a virtual C1 module (VC1 module). A C1 module should be selected in the hardware configurator in the same way as "normal" I/O devices and therefore specified in the configuration and parameter telegram.

The VC1 module is only a virtual device because the process data can be used to transmit communication data (PCP) and is not linked to a specific module. During active process data exchange, it is possible to assign the VC1 module sequentially to different modules with communication objects and to exchange parameter data parallel to the process data.

**Process data width** The process data width occupied by the VC1 module in the process data channel can be selected from 8 to 32 bytes in increments of 4 bytes. This means that communication objects can be used even if resources are limited. If there are sufficient free resources, a data width of up to 32 bytes can be used, providing the same ease of operation as for DP/V1 communication.

As the data width of the VC1 module is between 8 and 32 bytes (even number), but the user data can be up to 72 bytes per communication, it may be necessary to split the data and transmit it in several steps.

This leads to:

- **Start fragment**
- **Continue fragment**
- **End fragment**
- **Error or abort fragment**

Each fragment contains a service byte, which is used for the precise assignment of the fragment. The individual fragments and the service byte are explained in detail in the following.



The VC1 module (listed in the GSD as "PD PCP x words") may be configured at any position after the R-IL PB BK DI8 DO4-PAC bus coupler. We recommend configuring the VC1 device in the last position. In this way the configured slot and the actual slot occupied by the I/O device will always be the same. It is not linked to any hardware, so a module is not actually inserted.

---

## Acyclic Communication (DP/V1 and PCP)

**Start fragment:**

- Byte 1:** Service  
**Byte 2:** Terminal number  
**Byte 3:** Invoke ID  
**Byte 4:** Index high  
**Byte 5:** Index low  
**Byte 6:** Subindex  
**Byte 7:** Length, if required  
**Byte 8:** Data block, if required  
 ...  
**Byte n:** Data block, if required

Byte 1							
7	6	5	4	3	2	1	0
Request/ response	0	0	Fragment ation	Action			

Fig. 6-7 Byte 1 - Service in start fragment:

- Bit 7: Request/Response**  
 0 = Request  
 1 = Response
- Bits 6 to 5: Fragment type**  
 00 = Start fragment
- Bit 4: Fragmentation**  
 0 = Not fragmented  
 1 = Fragmented
- Bits 3 to 0: Action**
- |  |  |
|--|--|
| 00 <sub>hex</sub>                      | No action (clear)                                    |
| 01 <sub>hex</sub> to 02 <sub>hex</sub> | Reserved   |
| 03 <sub>hex</sub>                      | Read (R-IL PB BK DI8 DO4)                            |
| 04 <sub>hex</sub>                      | Write (R-IL PB BK DI8 DO4)                           |
| 05 <sub>hex</sub>                      | Reserved   |
| 06 <sub>hex</sub>                      | Read PCP (I/O device)                                |
| 07 <sub>hex</sub>                      | Write PCP (I/O device)                               |
| 08 <sub>hex</sub>                      | Read and write simultaneously (special objects only) |
| 09 <sub>hex</sub> to 0F <sub>hex</sub> | Reserved   |

## Acyclic Communication (DP/V1 and PCP)

**Continue fragment:**

- Byte 1:** Service  
**Byte 2:** Data block, if required  
 ...  
**Byte n:** Data block, if required

Byte 1							
7	6	5	4	3	2	1	0
Request/ response	0	1	Fragment number (01 <sub>hex</sub> - 1F <sub>hex</sub> )				

Fig. 6-8 Byte 1 - Service in continue fragment

**Bit 7: Request/Response**

- 0 = Request  
 1 = Response

**Bits 6 to 5: Fragment type**

- 01 = Continue fragment

**Bits 4 to 0: Counter**

- 01<sub>hex</sub> to 1F<sub>hex</sub> fragment number

**End fragment:**

- Byte 1:** Service  
**Byte 2:** Data block, if required  
 ...  
**Byte n:** Data block, if required

Byte 1							
7	6	5	4	3	2	1	0
Request/ response	1	0	Reserved				

Fig. 6-9 Byte 1 - Service in end fragment:

**Bit 7: Request/Response**

- 0 = Request  
 1 = Response

**Bits 6 to 5: Fragment type**

- 10 = Last fragment (end fragment)

**Bits 4 to 0: Reserved**

## Acyclic Communication (DP/V1 and PCP)

**Abort/error fragment:**

- Byte 1:** Service  
**Byte 2:** Error code, if required  
 ...  
**Byte n:** Error code, if required

Byte 1								
7	6	5	4	3	2	1	0	
Request/ response	1	1	Reserved					

Fig. 6-10 Byte 1 - Service in abort/error fragment

- Bit 7:** **Request/Response**  
 0 = Request  
 1 = Response
- Bits 6 to 5:** **Fragment type**  
 11 = Abort/error fragment
- Bits 4 to 0:** **Reserved**



Communication can be reset at any time using 00<sub>hex</sub> and 60<sub>hex</sub>.

A response is sent after every request. This response indicates that the request has been received and shows its current status:

**Response structure:**

- Byte 1:** Service (mirrored request with set response bit)  
**Byte 2:** Status, if required  
**Byte 3:** Length, only on first read response  
 ...  
**Byte n:** Data block, if required

The status is indicated when local PCP transmission is complete and in the event of an error. In the event of an error, the data block can provide details. An error has occurred if the value of the status byte does not equal 00<sub>hex</sub>.

- |                   |   |
|-------------------|---|
| 00 <sub>hex</sub> | No error  |
| 44 <sub>hex</sub> | Error during communication  |
| Other errors      | See " <a href="#">Error Codes for DP/V1 and VC1 Communication</a> " on page 65. |

## Acyclic Communication (DP/V1 and PCP)

For VC1, the parameters have the following meaning:

- <Terminal number>:

The R-IL PB BK DI8 DO4-PAC bus coupler is counted as device 0, the integrated DI8/DO4 terminals as 1, and the first connected device and onwards as terminal = 2 ... 63.

- <Invoke ID>:

The invoke ID has a length of one byte and is only used for a few I/O devices. Check this in the relevant data sheet.

- <Index high and Index low>:

This specifies the object index of the addressed object in two bytes. This also applies for objects on the R-IL PB BK DI8 DO4-PAC bus coupler. For example, for index  $5FE0_{hex}$  the value  $5F_{hex}$  should be entered for Index high and the value  $E0_{hex}$  should be entered for Index low. For index  $4_{hex}$  on the bus coupler,  $00_{hex}$  is Index high and  $04_{hex}$  is Index low.

- <Subindex:>

When working with a PCP object, the subindex can be used to select a specific element from an array or record. Therefore the subindex should be specified when accessing I/O devices. The bus coupler has no arrays or records, so subindex 0 should be specified.

- <Length>:

This value specifies how many bytes of object data (object contents) follow. Depending on the addressed slot, this may be bus coupler object data or I/O device object data.

- <Data block>:

This is only the contents of an object. The length and scope of the data has already been described by the <Length> parameter.

To aid understanding, the same examples as for DP/V1 services are used in the following chapter. This means that the description of the examples for DP/V1 communication is valid again here, see Chapter "[Examples](#)" on page 35. See also "[Error Codes for DP/V1 and VC1 Communication](#)" on page 65.

## 6.5.2 Examples for VC1 Services

### Example 1:

**Reading the connected local PCP devices and their status (Slot 0, Index 5 on the bus coupler)**

Data (16 bytes VC1)	Data structure
03 00 00 00 05 00 01 00 00 00 00 00 00 00 00 00	Read request (bus coupler)/Slot/Invoke ID/ Index high/Index low/Subindex/ 10 bytes unused

Read request (master -> slave)

Data (16 bytes VC1)	Data structure
83 00 06 03 01 00 04 01 00 00 00 00 00 00 00 00	Read response (bus coupler)/Status/Actual length/6 bytes of object data/7 bytes unused

Read response (slave -> master)

Data (16 bytes VC1)	Data structure
00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Clear request/15 bytes unused

Clear request (master -> slave)

Data (16 bytes VC1)	Data structure
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Clear response

Clear response (slave -> master)

The status byte equals zero. This means that communication was error-free. The data shows that there is one PCP device each on slot 3 and 4, and its connection status is OK, see Chapter "[Object Dictionaries](#)" on page 23.

The communication data can be reset to the initial state via "Clear".

Acyclic Communication (DP/V1 and PCP)

**Example 2:  
Writing the bus restart bit (slot 0, index 4, bit 0 on the bus coupler)**

Data (12 bytes VC1)	Data structure
04 00 00 00 04 00 01 01 00 00 00 00	Write request (bus coupler)/Slot/Invoke ID/Index high/Index low/Subindex/Length/ 1 byte of data/4 bytes unused

Write request (master -&gt; slave) - Start fragment

Data (12 bytes VC1)	Data structure
84 00 00 00 00 00 00 00 00 00 00 00	Write response (bus coupler)/Status/ 10 bytes unused

Write response (slave -&gt; master)

Data (12 bytes VC1)	Data structure
00 00 00 00 00 00 00 00 00 00 00 00	Clear request/11 bytes unused

Clear request (master -&gt; slave)

Data (12 bytes VC1)	Data structure
00 00 00 00 00 00 00 00 00 00 00 00	Clear response

Clear response (slave -&gt; master)

The response indicates that the command has been received. Here, the status is positive (=0). The communication data can be reset to the initial state via "Clear".

**Example 3:  
Reading the Config Table on the connected R-IB IL AI4/EF (slot 3, index 0080)**

Data (8 bytes VC1)	Data structure
06 03 00 00 80 00 00 00	Read request (I/O)/Slot/Invoke ID/ Index high/Index low/Subindex/ 2 bytes unused

Read request (master -&gt; slave) - Start fragment

Data (8 bytes VC1)	Data structure
96 00 0C 03 01 03 00 03	Read response/Status/Length/ 5 bytes of object data

Read response (slave -&gt; master)

Data (8 bytes VC1)	Data structure
96 00 00 00 00 00 00 00	Start fragment acknowledgment/7 bytes unused

Read request (master -&gt; slave) - Start fragment acknowledgment

Data (8 bytes VC1)	Data structure
C0 01 03 00 00 00 00 00	End fragment/7 bytes of object data

Read response (slave -&gt; master)

## Acyclic Communication (DP/V1 and PCP)

In the read response, the user receives the 12 bytes of object 80<sub>hex</sub> on the R-IB IL A14/EF as described above. The first 5 object data bytes are transmitted in the start fragment. The missing 7 bytes follow in the second fragment which is already the last. The status byte indicates that communication was error-free.

For the bus coupler the service is finished as soon as the last fragment has been transmitted. If the next service byte differs from the previous one, the next read/write access can be started immediately. Alternatively, the last fragment can be acknowledged or "Clear" can be sent.

**Acknowledgment of the last fragment:**

Data (8 bytes VC1)	Data structure
C0 1 00 00 00 00 00 00 00	End fragment acknowledgment/7 bytes unused

Read request (master -> slave) - End fragment acknowledgment

Data (8 bytes VC1)	Data structure
00 00 00 00 00 00 00 00	Clear

Read response (slave -> master)

or

**Clear:**

Data (8 bytes VC1)	Data structure
00 1 00 00 00 00 00 00 00	Clear request/7 bytes unused

Clear request (master -> slave)

Data (8 bytes VC1)	Data structure
00 00 00 00 00 00 00 00	Clear response

Clear response (slave -> master)

Acyclic Communication (DP/V1 and PCP)

**Example 4:  
Writing the Config Table on the connected R-IB IL AI4/EF  
(slot 3, index 0080, subindex 0)**

Data (8 bytes VC1)	Data structure
17 03 00 00 80 00 0C 03	Write request (I/O)/Slot/Invoke ID/PCP index high/PCP index low/PCP subindex/Length of PCP object data/1 byte of PCP object data

Write request (master -> slave) - Start fragment

Data (8 bytes VC1)	Data structure
17 1 00 00 00 00 00 00	Write response/7 bytes unused

Write response (slave -> master)

Data (8 bytes VC1)	Data structure
21 00 03 01 03 00 03 01	1. Continue fragment / 7 bytes PCP object data

Write request (master -> slave) - 1st continue fragment

Data (8 bytes VC1)	Data structure
21 1 00 00 00 00 00 00	Response/7 bytes unused

Write response (slave -> master)

Data (8 bytes VC1)	Data structure
40 00 00 00 00 1 00 00 00	End fragment/4 bytes of PCP object data/ 3 bytes unused

Write request (master -> slave) - End fragment

Data (8 bytes VC1)	Data structure
87 00 1 00 00 00 00 00	Response/Status/6 bytes unused

Write response (slave -> master)

Data (8 bytes VC1)	Data structure
00 1 00 00 00 00 00 00	Clear request/7 bytes unused

Clear request (master -> slave)

Data (8 bytes VC1)	Data structure
00 00 00 00 00 00 00 00	Clear response

Clear response (slave -> master)

Here, the write specification is done in 3 fragments. The bus coupler only accepts the request once the last fragment has been received. The response "87" indicates that command "07" was executed. The status "0" indicates that transmission was successful.

The communication data can be reset to the initial state via "Clear".

Acyclic Communication (DP/V1 and PCP)

**Example 5:****In the event of an error: Reading a faulty object index on the connected R-IB IL AI4/EF (slot 3, index 0180)**

Data (8 bytes VC1)	Data structure
06 03 00 01 80 00 00 00	Read request (I/O)/Slot/Invoke ID/ Index high/Index low/Subindex/ 2 bytes unused

Read request (master -&gt; slave) - Start fragment

Data (8 bytes VC1)	Data structure
86 44 06 07 00 00 00 00	Read response/Status/4 bytes of error code/ 2 bytes unused

Write response (slave -&gt; master)

Data (8 bytes VC1)	Data structure
00 00 00 00 00 00 00 00	Clear request/7 bytes unused

Clear request (master -&gt; slave)

Data (8 bytes VC1)	Data structure
00 00 00 00 00 00 00 00	Clear response

Clear response (slave -&gt; master)

Status byte 44<sub>hex</sub> indicates an error during execution. In this case, the PCP read request is sent to the I/O terminal first. However, the I/O terminal does not recognize index 0180<sub>hex</sub> and acknowledges it using error code 06 07. According to "[Error Codes for PCP Communication](#)" on page 63, this means that the object does not exist. The last 2 bytes are also part of the PCP error data, however, they are not used in this example. If they do not equal zero, refer to the relevant device data sheet for more detailed information.

The communication data can be reset to the initial state via "Clear".

Acyclic Communication (DP/V1 and PCP)

**Example 6:**  
**In the event of an error: Reading an object on a device without PCP function (slot 2, index 0080)**

Data (8 bytes VC1)	Data structure
06 02 00 00 80 00 01 00 00	Read request/Slot/Invoke ID/Index high/Index low/Subindex/2 bytes unused

Read request (master -> slave)

Data (8 bytes VC1)	Data structure
86 D2 00 00 00 00 00 00	Read response/Status/6 bytes unused

Write response (slave -> master)

Data (8 bytes VC1)	Data structure
00 01 00 00 00 00 00 00	Clear request/7 bytes unused

Clear request (master -> slave)

Data (8 bytes VC1)	Data structure
00 00 00 00 00 00 00 00	Clear response

Clear response (slave -> master)

Since the addressed device does not support PCP, the request is rejected immediately. A message is sent by the bus coupler, which manages the PCP devices, whereby error code D2 stands for "Terminal does not have PCP". See also ["Error Codes for DP/V1 and VC1 Communication" on page 65](#). The communication data can be reset to the initial state via "Clear".

## 7 Dynamic Configuration

Dynamic configuration is the specification and configuration of a maximum configuration. Any subgroup of this maximum configuration can be operated.

In addition to dynamic configuration, empty spaces can be reserved for future extensions.

### 7.1 Empty Spaces

It can be helpful to reserve empty spaces for a station, which may be used at different configuration levels. You can configure the maximum configuration level and thus also reserve memory in the PLC. However, optional terminals do not have to be connected. They can be deactivated in the configuration.

If the station is subsequently extended to include previously deactivated terminals, the new terminals can be connected and activated in the hardware configurator.

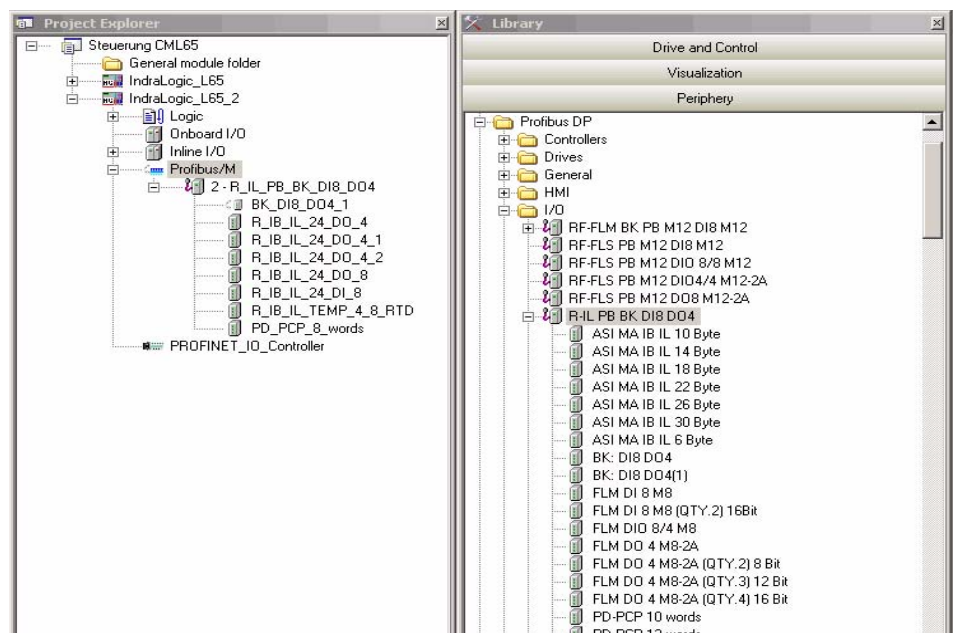


Fig. 7-1 Configuration in the IndraWorks project explorer

Configuration of the station e.g., under Rexroth IndraWorks, is carried out in the same way as for other modular slaves. The configuration can be created from the periphery library using drag & drop, see Fig. 7-1.

Dynamic Configuration

Open the tab with information on the module by double-clicking on a terminal.

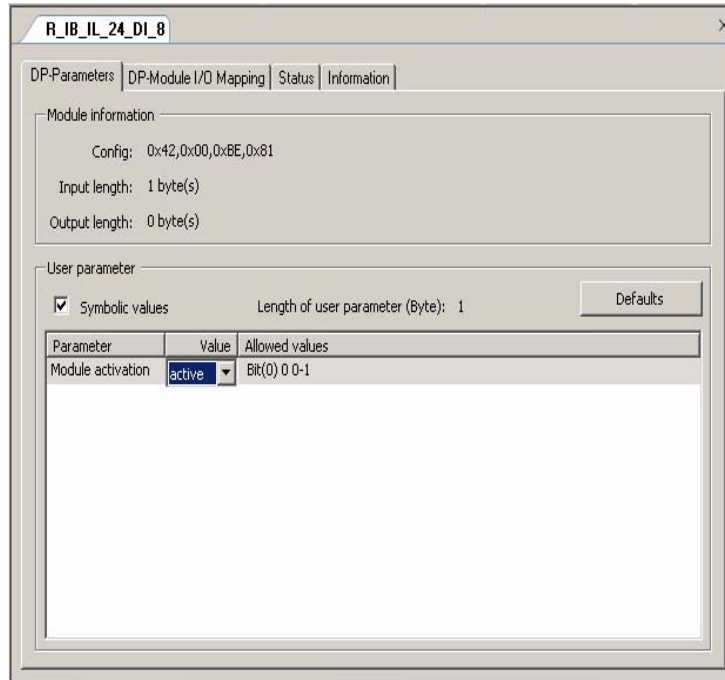


Fig. 7-2 DP-Parameters for the R-IB IL 24 DI 8 terminal

In the "DP-Parameter" tab you can select for every Inline module whether it should be active or inactive, see Fig. 7-2.



Please note that adjustments to the configuration and actual structure are also carried out for inactive terminals. A message is displayed if deactivated terminals are connected.

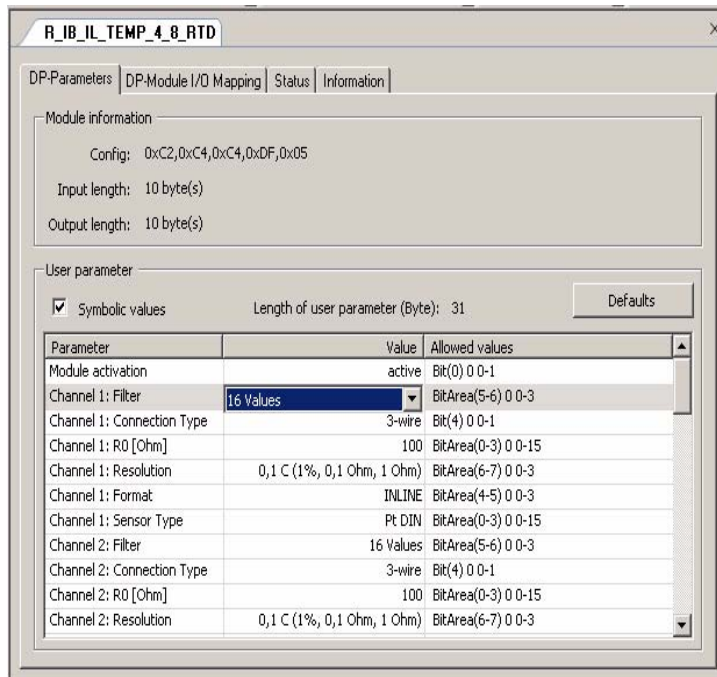


Fig. 7-3 DP-Parameters for the R-IB IL TEMP4/8 RTD terminal

## Dynamic Configuration

Following activation/deactivation, the configuration can be saved, translated, and downloaded as usual.

Depending on the terminal type, substitute values (DO and AO) to be output in the event of an error can also be set at this point, for example. Furthermore, inputs (AI) can be parameterized. This is also carried out via the dialog box shown in [Fig. 7-3](#).

Dynamic Configuration

## 7.2 Principle of Dynamic Configuration

In dynamic configuration, a maximum configuration is specified during configuration. The addresses are thus reserved in the PLC. Any subgroup of this maximum configuration can be operated. This type of subgroup can be selected and activated during configuration and runtime. The advantage is that the application can divide an identical hardware configuration into active and inactive terminals.

Optional terminals that are only required for additional functions do not have to be connected. They can simply be deactivated by the application.

If a subsequent extension is planned, the application can activate the new devices. The only requirement is that they are part of the maximum configuration.

All settings are stored in the volatile memory. Thus easy replacement is ensured. The terminal does not have to be parameterized in advance.

Three indices on the bus coupler are used for handling:

### Index 4: General control bits

Access: Write

Function: Details under "Slot 0" on page 23. Please observe bit 0 and bit 3 during dynamic configuration.

Structure Length of 1 bytes  
:

Bit 0: Restart local bus

Bit 3: Unlock dynamic configuration

### Index 6: Activation/deactivation of devices and slots

Access: Read and write

Function: Indicates which devices are active/inactive. Deactivation via the parameter telegram (reservation of empty spaces) is also indicated here.

Structure Length of 8 bytes  
:

	Byte 0									Byte 1								Bytes 2 ... 6	Byte 7															
Bit	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0									7	6	5	4	3	2	1	0	
TN	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16	...									57	58	59	60	61	62	63	x

Numbers 1 to 63 correspond to local bus devices (1 = integrated I/O, 2 = first plugged-in module, 3 = second plugged-in module, etc.).

TN = Device

Bit = 0: Terminal and slot inactive

Bit = 1: Terminal and slot active

## Dynamic Configuration

**Index 7:** Activation/deactivation of devices and slots and bus reset

Access: Only via DP/V0, command 8

Function: Indicates which devices are active/inactive. Deactivation via the parameter telegram (reservation of empty spaces) is also indicated here. In addition, the bus is reset.

Structure Length of 5 to 12 bytes, maximum  
:

Byte 1: 08<sub>hex</sub>

Byte 2: 00<sub>hex</sub>

Byte 3: 07<sub>hex</sub>

Byte 4: Length of data n

Byte 5: 1 2 3 4 5 6 7 8

...

Byte 4+n: x x x x x x x x

Bit = 0: Terminal and slot inactive

Bit = 1: Terminal and slot active

## Dynamic Configuration

## 7.3 Startup

## 7.3.1 Planning Configuration

Fig. 7-4 shows an example of the maximum configuration, as provided. All terminals are activated by default.

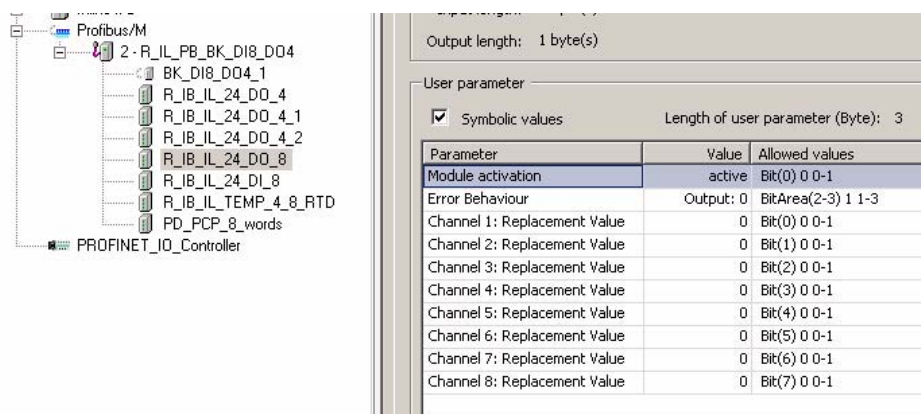


Fig. 7-4 Configuration of the coupler could look like this

Access to indices 4 and 6 described in the introduction is either via PROFIBUS DP/V1 or via the process data interface. Index 7 is intended to be used if no DP/V1 master exists or if both the specification and the bus restart are to be implemented using a single service in the process data interface. If the process data interface is used, the effort required is minimized.

For access via process data, configure the VC1 process data interface. This is the "PD PCP x words" ( $x = 4, 6, \dots, 16$ ) module. It can be specified as the first or last module in the station and the data width and address can be selected according to the options in the CPU.

The remaining terminals can be configured as usual.

## 7.3.2 Options for Specifying the Active Configuration

In the following example, the 8-channel digital terminals are not part of the station, i.e., these devices are part of the maximum configuration, but are to be deactivated at this station.

There are two options for startup:

- 1 Deactivating terminals in the hardware configuration by default
  - This option can be implemented easily. After setting the "Module activation" parameter to "inactive", the configuration can be downloaded to the control system as usual, see ["DP-Parameters for the R-IB IL TEMP4/8 RTD terminal" on page 52](#).
  
- 2 Via DP/V1 or DP/V0 with maximum configuration and final specification in the application
  - Specify the maximum configuration in the hardware configuration and download it.
  - Switch to cyclic data exchange.
  - On the I/O terminals, no data is exchanged as long as the connected configuration does not correspond to the available, activated terminals.
  - Specify the configuration connected to the station in a non-volatile memory via index 6 or index 7.
  - Data exchange is started.

For the second option, the example from the figure on [page 56](#) is used and the DI 8 as well as the DO 8 are deactivated via DP/V0 and DP/V1. In each case, the data to be written is indicated. For additional information about the protocol, please refer to Chapter ["Acyclic Communication in DP/V1 Mode" on page 32](#) and Chapter ["Acyclic Communication in DP/V0 Mode via Process Data" on page 40](#). Here, you will find further examples for communication via DP/V0 and DP/V1. The individual indices are explained in Chapter ["Slot 0" on page 23](#).

Which option will be used in the end depends on the support of DP/V1 in the master. If DP/V1 is not (or inadequately) supported by the master, DP/V0 should be used.

## Dynamic Configuration

### 7.3.3 Specification of the Active Configuration via DP/V0

For DP/V0, the activation status can be accessed via Index 6 or 7. The structure of the objects differs slightly, therefore typical access is illustrated for both objects.

#### Access via Index 6

Please observe the structure of index 6 when accessing it:

	Byte 0								Byte 1								Bytes 2 ... 6								Byte 7														
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0																7	6	5	4	3	2	1	0
TN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	...	57	58	59	60	61	62	63	x														

Numbers 1 to 63 correspond to local bus devices (1 = integrated I/O, 2 = first plugged-in module, 3 = second plugged-in module, etc.).

TN = Device

Bit = 0: Terminals and slot inactive

Bit = 1: Terminals and slot active

In this example there are 7 connected terminals. Terminals 1, 2, 3, 4, and 7 should be active. Terminals 5 and 6 are inactive.

The resulting data for object 6 is as follows:

F2<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>

These 8 data bytes are described below as an example for two possible data widths of the VC1 device.



If a new activation status is described via index 6 or index 7, it only becomes valid when the bus is restarted.

Two corresponding examples:

If, as described in this example, the configuration and the available terminals differ, because, e.g., two terminals are not connected, the bus is read in continuously until it matches the configuration. The activation status on index 6 is evaluated automatically.

If the active bus configuration is extended and if previously inactive terminals are attached at the end, these terminals are first activated via index 6. Next time the bus is started, the new terminals are integrated into the data traffic. The bus can be started via index 4, bit 0. Please note that during a restart the terminal output data is reset to its terminal-specific reset values.

If the active bus configuration is extended and previously inactive terminals are attached at the end, terminal activation and bus restart can be implemented simultaneously via index 7. The new terminals are integrated into data traffic. Please note that during a restart the terminal output data is reset to its terminal-specific reset values.

## Dynamic Configuration

**8 bytes VC1**

Data (8 bytes VC1)	Data structure
14 00 00 00 06 00 08 F2	Write/Slot/Invoke ID/Index high/Index low/Subindex/Length/1 byte of data

Write request (master -&gt; slave) - Start fragment

Data (8 bytes VC1)	Data structure
14 1 00 00 00 00 00 00	Write response/7 bytes unused

Write response (slave -&gt; master)

Data (8 bytes VC1)	Data structure
40 00 00 00 00 00 00 00	Write/7 bytes of data

Write request (master -&gt; slave) - End fragment

Data (8 bytes VC1)	Data structure
84 1 00 00 00 00 00 00	Write response/Status/6 bytes unused

Write response (slave -&gt; master)

**16 bytes VC1**

Data (16 bytes VC1)	Data structure
14 00 00 00 06 00 08 F2 00 00 00 00 00 00 00 1 00	Write/Slot/Invoke ID/Index high/Index low/Subindex/Length/8 bytes of data/1 byte unused

Write request (master -&gt; slave) - Start fragment

Data (16 bytes VC1)	Data structure
14 1 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Write response/15 bytes unused

Write response (slave -&gt; master)

## Dynamic Configuration

**Access via index 7**

Please observe the structure of index 7 when accessing it:

```

Byte 1    08hex
Byte 2    00hex
Byte 3    07hex
Byte 4    Length of data n
Byte 5    1  2  3  4  5  6  7  8
...
Byte 4+n  x  x  x  x  x  x  x  x

```

Bit = 0: Terminal and slot inactive

Bit = 1: Terminal and slot active

In this example there are 7 connected terminals. Terminals 1, 2, 3, 4, and 7 should be active. Terminals 5 and 6 are inactive.

The resulting data for object 7 is as follows:

08<sub>hex</sub>, 00<sub>hex</sub>, 07<sub>hex</sub>, 01<sub>hex</sub>, F2<sub>hex</sub>

As the fourth byte for index 7 contains the length, the number of bytes to be transmitted is only as many as required for the terminals to be activated/deactivated.

These 5 data bytes are described below as an example:

**8 bytes VC1**

Data (8 bytes VC1)	Data structure
08 00 07 01 F2   00 00 00	Read/write/Index high/Index low/Length/ 1 byte of data/3 bytes unused

Write request (master -> slave) - Start fragment

Data (8 bytes VC1)	Data structure
88 00 02 05 F2   00 00 00	Read/write response/Status/Length/ Number of available terminals/Status of the terminals/3 bytes unused

Write response (slave -> master)

### 7.3.4 Specifying the Active Configuration via DP/V1

For DP/V1 the activation status can be accessed via index 6. Index 7 is not supported here because it was specifically optimized for access via the process data interface.

#### Access via index 6

Please observe the structure of index 6 when accessing it:

	Byte 0									Byte 1								Bytes 2 ... 6								Byte 7																				
Bit	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0																						7	6	5	4	3	2	1	0
TN	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16		...																								x			

Numbers 1 to 63 correspond to local bus devices (1 = integrated I/O, 2 = first plugged-in module, 3 = second plugged-in module, etc.).

TN = Device

Bit = 0: Terminal and slot inactive

Bit = 1: Terminal and slot active

In this example there are 7 connected terminals. Terminals 1, 2, 3, 4, and 7 should be active. Terminals 5 and 6 are inactive.

The resulting data for object 6 is as follows:

F2<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>, 00<sub>hex</sub>

These 8 data bytes are transmitted via DP/V1 in the following.



If a new activation status is described via index 6, it only becomes valid when the bus is restarted.

#### Two corresponding examples:

If, as described in this example, the configuration and the available terminals differ, because, e.g., two terminals are not connected, the bus is read in continuously until it matches the configuration. The activation status on index 6 is evaluated automatically.

If the active bus configuration is extended and if previously inactive terminals are attached at the end, these terminals are first activated via index 6. Next time the bus is started, the new terminals are integrated into the data traffic. The bus can be started via index 4, bit 0. Please note that during a restart the terminal output data is reset to its terminal-specific reset values.

Data (16 bytes VC1)	Data structure
5F 00 06 08 F2 00 00 00 00 00 00 00	Write/Slot/Index/Total length of data/ Length/8 bytes of object data

Write request (master -> slave)

Data (16 bytes VC1)	Data structure
5F 00 06 08	Write/Slot/Index/Length

Write response (slave -> master)

### 7.3.5 Summary

Depending on the task and requirements in the control system, the illustrated services (process data interface DP/V0 or DP/V1) can be used to specify the configuration actually used by the application. In this example, the R-IB IL 24 DI 8 and R-IB IL 24 DO 8 terminals are deactivated with the illustrated services and therefore must not be connected. For additional information and examples regarding communication via the process data interface as well as DP/V1, please refer to Chapter "[Acyclic Communication \(DP/V1 and PCP\)](#)" on page 29.



The "PD PCP x words" process data interface module does not have to be configured for normal operation. It is only required if you wish to access objects such as index 6 via the process data.

---



If you wish to use the "PD PCP x words" process data interface module (VC1), it can be configured in any position. However, it is recommended that the last position be used so that the configured slot and the actual slot will always be the same.

---

## 8 Error Codes for PCP Communication

<b>Meaning</b>	Access to the object failed due to a hardware fault.
<b>Cause</b>	E.g., I/O voltage not present.
<b>Remedy</b>	Remove the hardware fault.

Fig. 8-1  $06_{hex}/02_{hex}$  (hardware fault)

<b>Meaning</b>	The object has limited access rights.
<b>Cause</b>	It may be a read-only object or it may be password-protected.
<b>Remedy</b>	Check the access rights in the object description.

Fig. 8-2  $06_{hex}/03_{hex}$  (object access denied)

<b>Meaning</b>	A service parameter was specified with an impermissible value.
<b>Cause</b>	E.g., an incorrect length specification or an impermissible subindex.
<b>Remedy</b>	Check the parameters in the object description and send the service again with the corrected values.

Fig. 8-3  $06_{hex}/05_{hex}$  (object attribute inconsistent)

### Communication error messages

<b>Meaning</b>	The service used cannot be applied to this object.
<b>Cause</b>	E.g., a program sequence can be started or stopped, but not read.
<b>Remedy</b>	Check the object description to determine which services are supported for this object.

Fig. 8-4  $06_{hex}/06_{hex}$  (object access unsupported)

<b>Meaning</b>	The object does not exist.
<b>Cause</b>	The "Index" parameter probably contains an invalid value.
<b>Remedy</b>	Check the object index in the object description and send the service again.

Fig. 8-5  $06_{hex}/07_{hex}$  (object non-existent)

## Error Codes for PCP Communication

**Other error messages**

<b>Meaning</b>	Terminal-specific error message; not a communication error
<b>Cause</b>	-
<b>Remedy</b>	Refer to your terminal description.

Fig. 8-6  $08_{hex}/00_{hex}$  (application error)



Depending on the I/O terminal, other specific error codes may also be used. These codes are listed in the relevant data sheet.

## 8.1 Error Codes for DP/V1 and VC1 Communication



**CAUTION**

Always observe the individual displays in your working environment.

### DP/V1 errors:

Function code (response) = DE<sub>hex</sub> (error read)

Or function code (response) = DF<sub>hex</sub> (error write)

Error decode = 80<sub>hex</sub> (DP/V1 communication)

### Errors with reference to I/O terminal:

Status 44<sub>hex</sub> indicates an error

- For DP/V1 on byte 3 of the data block
- For VC1 byte 2 in the response

Error_Code_1	Error_Code_2	Meaning
B0 <sub>hex</sub>	0	Index invalid
B1 <sub>hex</sub>	0	Invalid data length when writing
B2 <sub>hex</sub>	0	Invalid device number
B5 <sub>hex</sub>	0	Status conflict, last read/write not finished yet
B6 <sub>hex</sub>	0	Access to device or index not permitted
B7 <sub>hex</sub>	0	Invalid parameter
C3 <sub>hex</sub>	0	(Internal) resource not available

D1 <sub>hex</sub>	0	PCP connection not established
D2 <sub>hex</sub>	0	PCP not supported
D4 <sub>hex</sub>	0	Incorrect service code
D5 <sub>hex</sub>	0	Incorrect sequence of fragments
D6 <sub>hex</sub>	0	Incorrect data length during access
D7 <sub>hex</sub>	0	PCP PDU size of 64 bytes (58 bytes of user data) per communication exceeded
DC <sub>hex</sub>	0	(Internal) timeout while reading
DD <sub>hex</sub>	0	(Internal) error while sending a request
DE <sub>hex</sub>	0	(Internal) error while receiving a service

Fig. 8-7 Error codes for DP/V1 and VC1 communication

## Error Codes for PCP Communication

## 8.2 Format of the Parameter Telegram

This section provides a detailed description of the format of the parameters for the bus coupler and the I/O terminals. This may be useful when setting parameters using acyclic services or if there is no user interface for the simple selection of parameters.

Bytes 1 to 7	DP standard	
Bytes 8 to 10	DP/V1 standard	
Byte 11	Control byte	
	Bit 7	0: Hide channel-specific diagnostics 1: Show channel-specific diagnostics
	Bit 6	0: Do not rotate DI32 and DO32 data 1: Rotate DI32 and DO32 data
	Bit 5	0: SET_PRM does not overwrite dynamic configuration 1: SET_PRM overwrites dynamic configuration
	Bit 4	0: Do not rotate DI16 and DO16 data 1: Rotate DI16 and DO16 data
	Bit 3	Reserved (set to 0)
	Bit 2	Reserved (set to 0)
	Bit 1	0: Automatically acknowledge peripheral faults 1: Manually acknowledge peripheral faults
	Bit 0	0: Stop local bus in the event of terminal failure 1: Operate local bus with available terminals

Fig. 8-8 Parameters for the bus coupler



The data for the configuration and the failsafe value can be found in the terminal-specific data sheets.

## Error Codes for PCP Communication

1

Byte 1	Bit 7 to bit 6	00: Start block ID for device
		Bit 5 to bit 4
		00: No configuration (e.g., DO)
		01: Permanent configuration
		10: Temporary configuration
	Bit 3 to bit 2	Failsafe value
		00: No failsafe value (e.g., DI)
		01: Output zero
		10: Maintain value
		11: Apply value from data field
	Bit 1	Extended functions
		0: No function block
		1: Function block (also several)
	Bit 0	Activation
		0: Activated
1: Disabled		

Fig. 8-9 Parameters for the I/O devices byte

Following a configuration block:

Byte x	Bit 7 to bit 6	01: Configuration block ID
	Bit 5 to bit 0	Length of the data block
Byte x+1 to n		n data bytes

Following a failsafe block:

Byte x	Bit 7 to bit 6	10: Failsafe value block ID
	Bit 5 to bit 0	Length of the data block
Byte x+1 to n		n data bytes

## Error Codes for PCP Communication

If one or more function blocks are present, a header byte for the function block follows:

Byte x	Bit 7 to bit 6	11: Function block ID
	Bit 5 to bit 0	Entire function block length

After that the function blocks are decoded:

**a) PCP function block**

Byte x+1	Bit 7 to bit 6	01: PCP function block
	Bit 5 to bit 0	PCP function block length
Byte x+2		Invoke ID
Byte x+3		Index high byte
Byte x+4		Index low byte
Byte x+5		Subindex
Byte x+6 to x+6+n		n data bytes

**b) Additional function block**

Byte x+1	Bit 7 to bit 6	10: Additional function block
	Bit 5 to bit 0	Length of the additional function block
Byte x+2	Bit 0	1: Rotate I/O data permitted 0: Rotate I/O data not permitted
	Bit 7 to bit 1	Reserved

**c) ID function block (n <= 16)**

Byte x+1	Bit 7 to bit 6	11: ID function block
	Bit 5 to bit 0	Length of the ID function block
Byte x+2	Bit 7 to bit 0	MNR (last - n sign), ASCII
Byte x+2+n	Bit 7 to bit 0	MNR (last sign), ASCII

## 9 Disposal and Environmental Protection

### 9.1 Disposal

#### 9.1.1 Products

Our products can be returned to us free of charge for disposal. However, it is a pre-condition that the products are free of oil, grease or other dirt.

Furthermore, the products returned for disposal must not contain any undue foreign matter or foreign component.

Please send the products free domicile to the following address:

Bosch Rexroth AG

Electric Drives and Controls

Bürgermeister-Dr.-Nebel-Straße 2

D-97816 Lohr am Main

#### 9.1.2 Packaging Materials

The packaging materials consist of cardboard, wood and polystyrene. These materials can be easily recycled in any municipal recycling system. For ecological reasons, please refrain from returning the empty packages to us.

### 9.2 Environmental Protection

#### 9.2.1 No Release of Hazardous Substances

Our products do not contain any hazardous substances which may be released in the case of appropriate use. Accordingly, our products will normally not have any negative effect on the environment.

#### 9.2.2 Materials Contained in the Products

##### Electronic Devices

Electronic devices mainly contain:

- steel
- aluminium
- copper
- synthetic materials
- electronic components and modules

##### Motors

Motors mainly contain:

- steel
- aluminium
- copper
- brass
- magnetic materials
- electronic components and modules

Disposal and Environmental Protection

### **9.2.3 Recycling**

Due to their high content of metal most of the product components can be recycled. In order to recycle the metal in the best possible way, the products must be disassembled into individual modules.

Metals contained in electric and electronic modules can also be recycled by means of special separation processes. The synthetic materials remaining after these processes can be thermally recycled.

If the products contain batteries or rechargeable batteries, these batteries are to be removed and disposed before they are recycled.

## 10 Service & Support

### 10.1 Helpdesk

Our service helpdesk at our headquarters in Lohr, Germany, will assist you with all kinds of enquiries.

Contact us:

- By phone through the Service Call Entry Center,  
Mo - Fr 7:00 am - 6:00 pm CET  
+49 (0) 9352 40 50 60
- By Fax  
+49 (0) 9352 40 49 41
- By email: [service.svc@boschrexroth.de](mailto:service.svc@boschrexroth.de)

### 10.2 Service Hotline

Out of helpdesk hours please contact our German service department directly:

+49 (0) 171 333 88 26

or

+49 (0) 172 660 04 06

Hotline numbers for other countries can be found in the addresses of each region (see below).

### 10.3 Internet

Additional notes regarding service, maintenance and training, as well as the current addresses of our sales and service offices can be found on

<http://www.boschrexroth.com>

Outwith Germany please contact our sales/service office in your area first.

### 10.4 Helpful Information

For quick and efficient help please have the following information ready:

- detailed description of the fault and the circumstances
- information on the type plate of the affected products, especially type codes and serial numbers
- your phone / fax numbers and e-mail address so we can contact you in case of questions

Service & Support

Notes

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