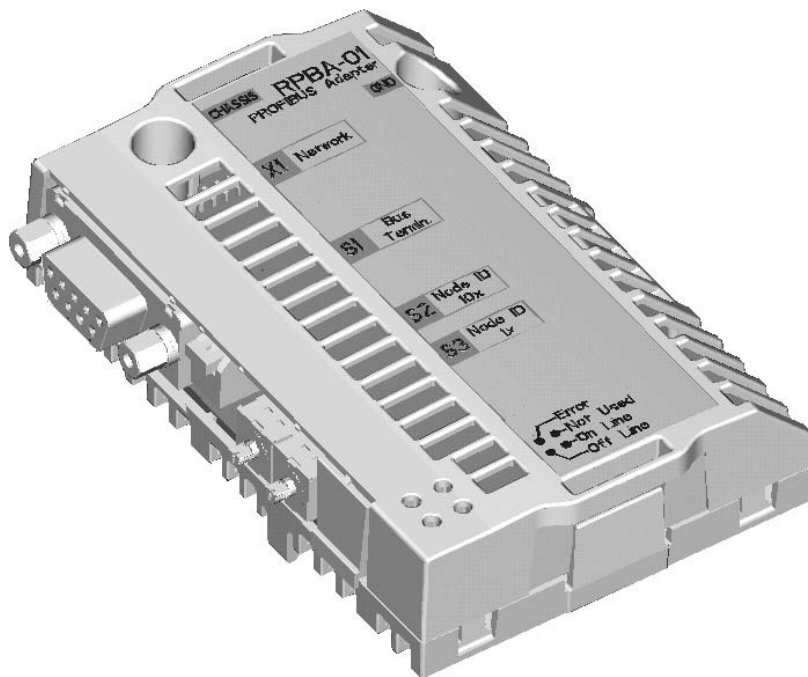


# ABB Drives

## User's Manual PROFIBUS-DP Adapter Module RPBA-01





PROFIBUS-DP Adapter Module  
RPBA-01

**User's Manual**

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# Safety instructions

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## Overview

This chapter states the general safety instructions that must be followed when installing and operating the RPBA-01 PROFIBUS-DP Adapter module.

The material in this chapter must be studied before attempting any work on, or with, the unit.

In addition to the safety instructions given below, read the complete safety instructions of the specific drive you are working on.

## General safety instructions



**WARNING!** All electrical installation and maintenance work on the drive should be carried out by qualified electricians.

The drive and adjoining equipment must be properly earthed.

Do not attempt any work on a powered drive. After switching off the mains, always allow the intermediate circuit capacitors 5 minutes to discharge before working on the frequency converter, the motor or the motor cable. It is good practice to check (with a voltage indicating instrument) that the drive is in fact discharged before beginning work.

The motor cable terminals of the drive are at a dangerously high voltage when mains power is applied, regardless of motor operation.

There can be dangerous voltages inside the drive from external control circuits even when the drive mains power is shut off. Exercise appropriate care when working on the unit. Neglecting these instructions can cause physical injury or death.



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# Introduction

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## Intended audience

The manual is intended for the people who are responsible for commissioning and using an RPBA-01 PROFIBUS-DP Adapter module. The reader is expected to have a basic knowledge of electrical fundamentals, electrical wiring practices and how to operate the drive.

## Before you start

It is assumed that the drive is installed and ready to operate before starting the installation of the extension module.

In addition to conventional installation tools, have the drive manuals available during the installation as they contain important information not included in this manual. The drive manuals are referred to at various points of this document.

## What this manual contains

This manual contains information on the wiring, configuration and use of the RPBA-01 PROFIBUS-DP Adapter module.

**Safety instructions** are featured in the first few pages of this manual.

**Overview** contains a short description of the PROFIBUS protocol and the RPBA-01 PROFIBUS-DP Adapter module, a delivery checklist, and information on the manufacturer's warranty.

**Mechanical installation** contains placing and mounting instructions for the module.

**Electrical installation** contains wiring, bus termination and earthing instructions.

**Programming** explains how to program the master station and the drive before the communication through the adapter module can be started.

**Communication** contains a description of how data is transmitted through the RPBA-01 module.

**Fault tracing** explains how to trace faults with the status LEDs on the RPBA-01 module.

**PROFIBUS parameters** presents the PROFIBUS Profile-specific parameters.

**Definitions and abbreviations** explains definitions and abbreviations concerning the PROFIBUS protocol family.

**Technical data** contains information on physical dimensions, configurable settings and connectors of the module and the specification of the PROFIBUS link.

## Terms used in this manual

### *Communication Module*

Communication Module is a name for a device (e.g. a fieldbus adapter) through which the drive is connected to an external communication network (e.g. a fieldbus). The communication with the module is activated with a drive parameter.

### *Data Sets and Data Words*

Each data set consists of three 16-bit words, ie. data words. The Control Word (sometimes called the Command Word) and the Status Word, References and Actual Values (see chapter Communication) are types of data words; the contents of some data words are user-definable.

### *RPBA-01 PROFIBUS-DP Adapter module*

The RPBA-01 PROFIBUS-DP Adapter module is one of the optional fieldbus adapter modules available for ABB drives. The RPBA-01 is a device through which an ABB drive is connected to a PROFIBUS network.

### *Parameter*

A parameter is an operating instruction for the drive. Parameters can be read and programmed with the drive control panel, or through the RPBA-01 module.

## Further information

Further information is available on the World Wide Web from **[www.profibus.com](http://www.profibus.com)**.



# Overview

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## Overview

This chapter contains a short description of the PROFIBUS standard and the RPBA-01 Adapter module, a delivery checklist and warranty information.

## PROFIBUS standard

PROFIBUS is an open serial communication standard that enables data exchange between all kinds of automation components. There are three main variations of PROFIBUS: PROFIBUS-FMS (Fieldbus Message Specification), PROFIBUS-DP (Decentralised Periphery) and PROFIBUS-PA (Process Automation). The RPBA-01 PROFIBUS-DP Adapter module supports the PROFIBUS-DP protocol only.

The physical transmission medium of the bus is a twisted pair cable (according to the RS-485 standard). The maximum length of the bus cable is 100 to 1200 metres, depending on the selected transmission rate (see Technical data chapter). Up to 31 nodes can be connected to the same PROFIBUS network segment without the use of repeaters. With repeaters, it is possible to connect 127 nodes (including repeaters and master station) to the network.

In PROFIBUS communication, the master station – usually a programmable logic controller (PLC) – polls the nodes which respond and take the actions requested by the master. It is also possible to send a command to several nodes at the same broadcast; in this case the nodes do not send a response message to the master. Communication between nodes is not possible on a PROFIBUS network.

The PROFIBUS protocol family is specified in the EN 50170 standard. The communication with a drive is defined in the PROFIDRIVE-PROFILE – The PROFIBUS Profile for Adjustable

Speed Drives. For further information on PROFIBUS, refer to the above-mentioned standards.

## The RPBA-01 PROFIBUS-DP Adapter module

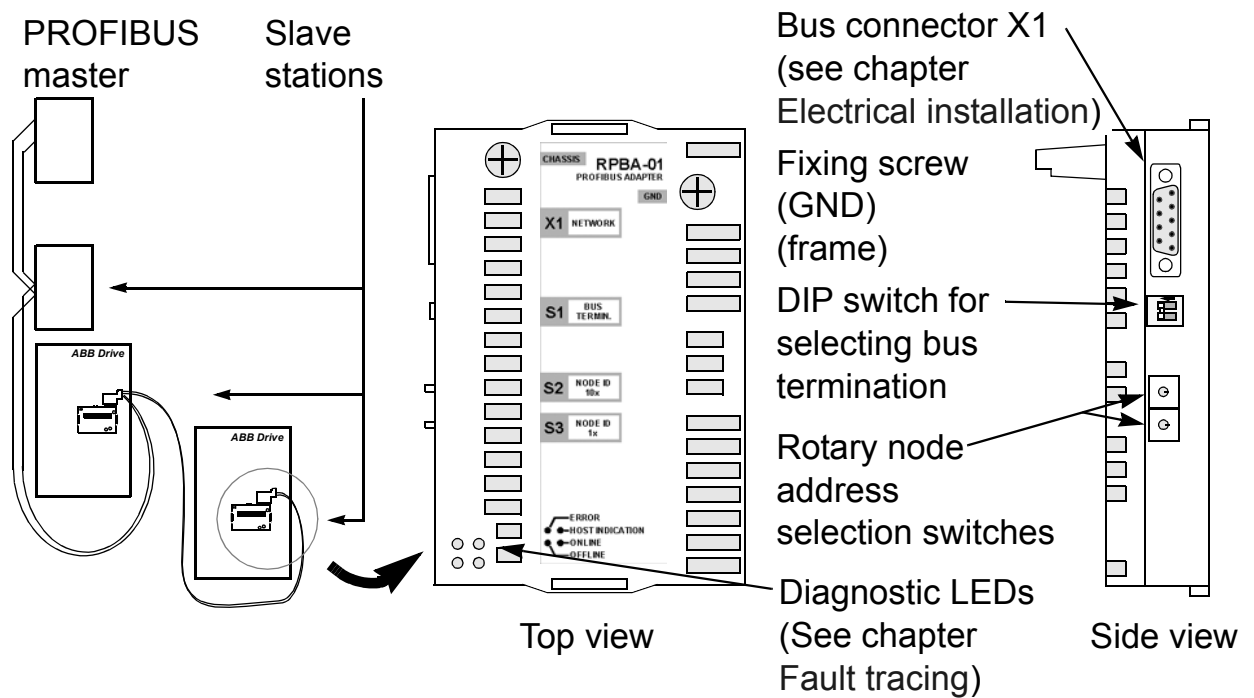
The RPBA-01 PROFIBUS-DP Adapter module is an optional device for ABB drives which enables the connection of the drive to a PROFIBUS network. The drive is considered as a slave on the PROFIBUS network. Through the RPBA-01 PROFIBUS-DP Adapter module, it is possible to:

- give control commands to the drive (Start, Stop, Run enable, etc.)
- feed a motor speed or torque reference to the drive
- give a process actual value or a process reference to the PID controller of the drive
- read status information and actual values from the drive
- change drive parameter values
- reset a drive fault.

The PROFIBUS commands and services supported by the RPBA-01 PROFIBUS-DP Adapter module are discussed in chapter *Communication*. Please refer to the user documentation of the drive as to which commands are supported by the drive.

The adapter module is mounted into an option slot on the motor control board of the drive. See the Hardware Manual of the drive for module placement options.

The type definition (GSD) file required for configuration of the master station is available from [www.profibus.com](http://www.profibus.com) or your local ABB representative. The filename is **ABB\_0812.GSD**.



*Figure 1. The construction of the PROFIBUS link and the RPBA-01 Adapter module.*

## Compatibility

The RPBA-01 is compatible with all master stations that support the PROFIBUS-DP protocol.

## Delivery check

The option package for the RPBA-01 PROFIBUS-DP Adapter module contains:

- PROFIBUS-DP Adapter module, type RPBA-01
- two screws (M3x10)
- this manual.

## Warranty and liability information

The manufacturer warrants the equipment supplied against defects in design, materials and workmanship for a period of twelve (12) months after installation or twenty-four (24) months from date of manufacturing, whichever first occurs. The local ABB office or distributor may grant a warranty period different to the above and refer to local terms of liability as defined in the supply contract.

The manufacturer is not responsible for

- any costs resulting from a failure if the installation, commissioning, repair, alternation, or ambient conditions of the drive do not fulfil the requirements specified in the documentation delivered with the unit and other relevant documentation
- units subjected to misuse, negligence or accident
- units comprised of materials provided or designs stipulated by the purchaser.

In no event shall the manufacturer, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties.

If you have any questions concerning your ABB drive, please contact the local distributor or ABB office. The technical data, information and specifications are valid at the time of printing. The manufacturer reserves the right to modifications without prior notice.



# Mechanical installation

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**WARNING!** Follow the safety instructions given in this manual and in the Hardware Manual.

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## Mounting

The RPBA-01 is to be inserted into its specific position in the drive. The module is held in place with plastic retaining clips and two screws. The screws also provide the earthing of the I/O cable shield connected to the module, and interconnect the GND signals of the module and the control board of the drive.

On installation of the module, the signal and power connection to the drive is automatically made through a 34-pin connector.

Mounting procedure:

- Insert the module carefully into its position inside the drive until the retaining clips lock the module into position.
- Fasten the two screws (included) to the stand-offs.
- Set the bus termination switch of the module to the required position.

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**Note:** Correct installation of the screws is essential for fulfilling the EMC requirements and for proper operation of the module.

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# Electrical installation

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## Overview

This chapter contains:

- general cabling instructions
- instructions for setting module node address number and bus termination
- instructions for connecting the module to the PROFIBUS-DP network.



**WARNING!** Before installation, switch off the drive power supply. Wait five minutes to ensure that the capacitor bank of the drive is discharged. Switch off all dangerous voltages connected from external control circuits to the inputs and outputs of the drive.

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## General cabling instructions

Arrange the bus cables as far away from the motor cables as possible. Avoid parallel runs. Use bushings at cable entries.

## Bus termination

The DIP switch on the front of the RPBA-01 module is used to switch on bus termination. Bus termination prevents signal reflections from the cable ends. Bus termination must be set to ON if the module is the last or first module on the network. When using PROFIBUS specific D-sub connectors with built-in termination, the RPBA-01 termination must be switched off.

---

**Note:** The built-in termination circuitry of the RPBA-01 is of the active type, so the module has to be powered for the termination to work. If the module needs to be switched off during operation of the network, the bus can be terminated by connecting a 220 ohm, 1/4 W resistor between the A and B lines.

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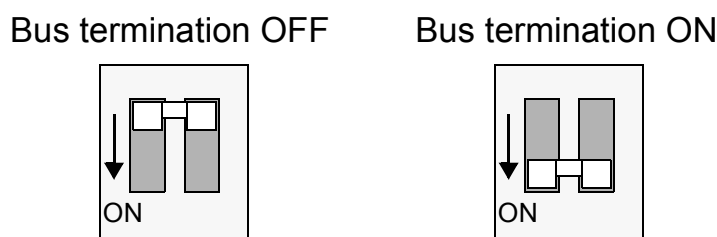


Figure 2. Bus termination switch

## Node selection

Use the rotary node address selectors on the module to select the node address number. The node address number is a decimal number ranging from 01 to 99. The left selector represents the first digit and the right selector the second digit. The node address can be changed during operation, but the module must be re-initialised for changes to take effect.

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**Note:** When 00 is selected, the node number is defined by a parameter in the fieldbus parameter group of the drive.

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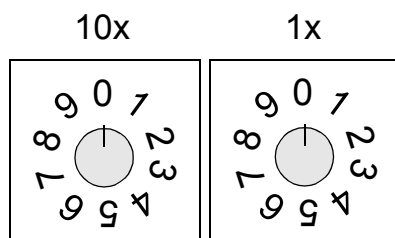
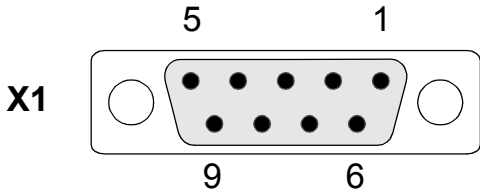


Figure 3. Node selectors

**PROFIBUS connection**

The bus cable is connected to connector X1 on the RPBA-01.

The connector pin allocation described below follows the PROFIBUS standard.



X1		Description
1		Not used
2		Not used
3	B	Data positive (Conductor 1 in twisted pair).
4	RTS	Request To Send
5	GND BUS	Isolated ground
6	+5V	Isolated 5V DC voltage supply
7		Not used
8	A	Data negative (Conductor 2 in twisted pair).
9		Not used
Housing	SHLD	PROFIBUS cable shield. Internally connected to GND BUS via an RC filter and directly to CHGND.

+5V and GND BUS are used for bus termination. Some devices, like optical transceivers (RS485 to fibre optics) might require external power supply from these pins.

RTS is used in some equipment to determine the direction of transmission. In normal applications only the line A, line B and shield are used.

### PROFIBUS wiring example

The PROFIBUS cable shields are directly earthed at all nodes.

In the example below a recommended Siemens 6ES7 972-0BA12-0XA0 connector (not included in the delivery) is connected to the RPBA-01 module. The cable is a standard PROFIBUS cable consisting of a twisted pair and screen.

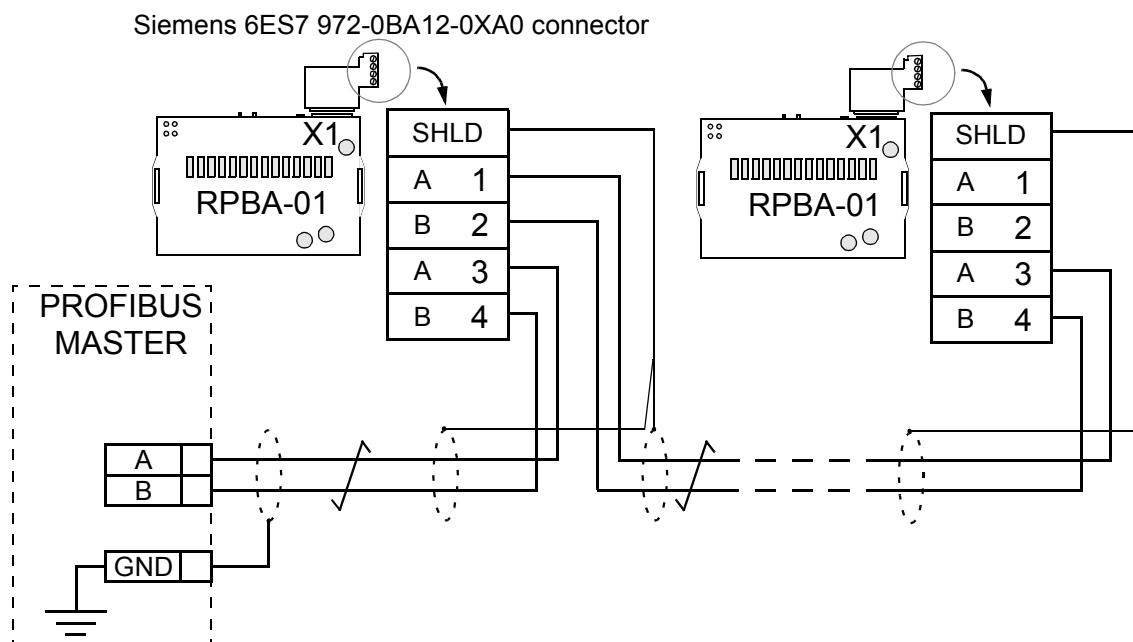


Figure 4. Connection diagram for the standard PROFIBUS cable

# Programming

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## Overview

This chapter gives information on configuring the PROFIBUS master station and the drive for communication through the RPBA-01 PROFIBUS-DP Adapter module.

## Configuring the system

After the RPBA-01 PROFIBUS-DP Adapter module has been mechanically and electrically installed according to the instructions in previous chapters, the master station and the drive must be prepared for communication with the module.

The type definition (GSD) file required for configuration of the master station is available from [www.profibus.com](http://www.profibus.com) or your local ABB representative. The filename is **ABB\_0812.GSD**.

Please refer to the master station documentation for more information.

## PROFIBUS connection configuration

The detailed procedure of activating the module for communication with the drive is dependent on the drive type. (Normally, a parameter must be adjusted to activate the communication. See the drive documentation.)

As communication between the drive and the RPBA-01 is established, several configuration parameters are copied to the drive. These parameters – shown below in Table 5 – must be checked first and adjusted if necessary. The alternative selections for these parameters are discussed in more detail below the table.

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**Note:** The new settings take effect only when the module is powered up the next time or when the module receives a 'Fieldbus Adapter parameter refresh' command from the drive.

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### *Data transfer rates supported*

The RPBA-01 supports the following PROFIBUS communication speeds: 9.6 kbit/s, 19.2 kbit/s, 45.45 kbit/s, 93.75 kbit/s, 187.5 kbit/s, 500 kbit/s, 1.5 Mbit/s, 3 Mbit/s, 6 Mbit/s, 12 Mbit/s.

The RPBA-01 automatically detects the communication speed and PPO-type used.

*Table 5. The RPBA-01 configuration parameters.*

<b>Par. no.</b>	<b>Parameter name</b>	<b>Alternative settings</b>	<b>Default setting</b>
1	MODULE TYPE	(Read-only)	PROFIBUS-DP
2	Node address	0 to 126	3
3	Baud rate	<b>(12000)</b> 12 Mbit/s; <b>(6000)</b> 6 Mbit/s; <b>(3000)</b> 3 Mbit/s; <b>(1500)</b> 1.5 Mbit/s; <b>(500)</b> 500 kbit/s; <b>(187)</b> 187.5 kbit/s; <b>(93)</b> 93.75 kbit/s; <b>(45)</b> 45.45 kbit/s; <b>(19)</b> 19.2 kbit/s; <b>(9)</b> 9.6 kbit/s <sup>1)</sup>	1500
4	PPO-type	<b>(1)</b> PPO 1; <b>(2)</b> PPO 2; <b>(3)</b> PPO 3; <b>(4)</b> PPO 4; <b>(5)</b> PPO 5; (Read-only) <sup>1)</sup>	<b>(1)</b> PPO 1
5	PZD3 OUT	0 to 32767 with format xxyy, where xx = Parameter Group and yy = Parameter Index. See description below.	0
6	PZD3 IN	See PZD3 OUT above	0
7	PZD4 OUT	See PZD3 OUT above	0
8	PZD4 IN	See PZD3 OUT above	0
...	...		
19	PZD10 OUT	See PZD3 OUT above	0
20	PZD10 IN	See PZD3 OUT above	0

<sup>1)</sup> The value is automatically updated (Read-only).



---

**Note:** Set also the extended Parameter Data (see page 31) to ensure proper operation of the RPBA-01 with the drive.

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### 1 MODULE TYPE

This parameter shows the module type as detected by the drive. The value cannot be adjusted by the user.

If this parameter is undefined, the communication between the drive and the module has not been established.

### 2 Node address

Each device on the PROFIBUS network must have a unique node number. This parameter is used to define a node number for the drive it is connected to, if the node address selection switches are set to the zero position. When the node address selector switches are used to define the node address (node address selectors not in zero position) this parameter indicates the set node address.

### 3 Baud rate

The speed of communication. The value is given in kbit/s:

12000	=	12	Mbit/s
6000	=	6	Mbit/s
3000	=	3	Mbit/s
1500	=	1.5	Mbit/s
500	=	500	kbit/s
187	=	187.5	kbit/s
93	=	93.75	kbit/s
45	=	45.45	kbit/s
19	=	19.2	kbit/s
9	=	9.6	kbit/s

### 4 PPO-type

This parameter indicates the selected PPO message type for the PROFIBUS communication. See Figure 6 in chapter Communication for the supported PPO message types.

### 5 PZD3 OUT

This parameter represents process data word 3 of the PPO type received by the drive over the PROFIBUS network. The content is defined by a decimal number in the range of 0 to 32767 as follows:

0	not used
1 - 99	data set area of the drive
101 - 9999	parameter area of the drive
10000 - 32767	not supported by the drive

The data set area is allocated as follows:	
1	data set 1 word 1
2	data set 1 word 2
3	data set 1 word 3
4	data set 2 word 1
5	data set 2 word 2
6	data set 2 word 3
7	data set 3 word 1
...	
99	data set 33 word 3

The parameter area is allocated as follows:

Parameter number with format xxyy, where xx is the parameter group number (1 to 99) and yy is the parameter number index inside the group (01 to 99).

### *6 PZD3 IN*

Process data word 3 of the PPO type sent from the drive to the PROFIBUS network.

The content is defined by a decimal number in the range of 0 to 32767. See parameter PZD3 OUT for description of decimal number allocation.

### *7 to 20 PZD4 OUT to PZD10 IN*

See parameters PZD3 OUT and PZD3 IN.

## **Control locations**

ABB drives can receive control information from multiple sources including digital inputs, analogue inputs, the drive control panel and a communication module (e.g. RPBA-01). ABB drives allow the user to separately determine the source for each type of control information (Start, Stop, Direction, Reference, Fault Reset, etc.). In order to give the fieldbus master station the most complete control over the drive, the communication module must be selected as source for this information. See the user documentation of the drive for information on the selection parameters.



# Communication

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## Overview

This chapter describes the PROFIBUS messaging used in the communication with the drive.

## PROFIBUS-DP

The RPBA-01 module supports the PROFIBUS-DP protocol according to EN 50170 standard. PROFIBUS-DP is a distributed I/O system which enables the master to use a large number of peripheral modules and field devices. The data transfer is mainly cyclic: the master reads the input information from the slaves and sends the output information back to the slaves.

The PROFIBUS-DP protocol uses so-called PPOs (*Parameter/Process Data Objects*) in cyclic communication. See Figure 6 for the different PPO types and their composition.

## Service Access Points

The services of the PROFIBUS Data Link Layer (Layer 2) are used by PROFIBUS-DP through Service Access Points (SAPs). Precisely defined functions are assigned to individual SAPs.

For further information on Service Access Points, refer to the manual of the PROFIBUS master, *PROFIDRIVE – The PROFIBUS Profile for Adjustable Speed Drives*, or the EN 50170 standard.



<b>Prm_Data (Parameter Data Extended)</b> Type: Octet String - Length: 23										
8	10h (default)	<p>Header byte</p> <table style="margin-left: 20px;"> <tr> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">1</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">0</td> <td style="border: 1px solid black; padding: 2px;">0</td> </tr> </table> <p style="margin-left: 20px;"> <span style="display: inline-block; width: 100px; border-bottom: 1px solid black;"></span> Fail-safe mode. Defines the action taken when the PLC is switched from 'RUN' to 'STOP' mode.            00 = STOP (default)            01 = LAST SPEED            02 = USE FAIL-SAFE. The values of the PZDs are defined by bytes 11-30 in the Prm_Data telegram.         </p> <p style="margin-left: 20px;"> <span style="display: inline-block; width: 100px; border-bottom: 1px solid black;"></span> Control zero mode. Defines the action taken if a PROFIBUS telegram containing only zeros is received.            00 = USE FRAME (default). Note that, with this setting, the drive might not be stopped (if it is running) since also bit 10 (Remote Command) in the control word is zero. However, the other PZD's may still be updated, but have the value zero.            01 = IGNORE         </p> <p style="margin-left: 20px;"> <span style="display: inline-block; width: 100px; border-bottom: 1px solid black;"></span> Operation mode. Determines which control/status word and reference/actual values are used.            00 = PROFIDRIVE (i.e. Generic drive profile)            01 = VENDOR SPECIFIC (i.e. ABB Drives profile) (default). With this setting,           <ul style="list-style-type: none"> <li>• Fail-safe mode 'STOP' equals 'LAST SPEED'</li> <li>• the control word is forwarded unchanged to the drive</li> <li>• if the drive has a parameter for selection of operation mode (i.e. communication profile), make sure that the operation modes of the RPBA-01 and the drive match.</li> </ul> </p> <p style="margin-left: 20px;"> <span style="display: inline-block; width: 100px; border-bottom: 1px solid black;"></span> Reserved         </p>	0	0	0	1	0	0	0	0
0	0	0	1	0	0	0	0			
9 - 10	0-65536	Cut off time out in milliseconds.								
11 - 12	0-65536	Fail-safe, PZD1 (CW)								
13 - 14	0-65536	Fail-safe, PZD2 (REF)								
15 - 16	0-65536	Fail-safe, PZD3								
17 - 18	0-65536	Fail-safe, PZD4								
19 - 20	0-65536	Fail-safe, PZD5								
21 - 22	0-65536	Fail-safe, PZD6								
23 - 24	0-65536	Fail-safe, PZD7								
25 - 26	0-65536	Fail-safe, PZD8								

27 - 28	0-65536	Fail-safe, PZD9
29 - 30	0-65536	Fail-safe, PZD10

The extended Parameter Data bytes are configured via the PROFIBUS network configuration tool. The functions are defined in the GSD file.

### *SAP 62 (Chk\_Cfg)*

SAP 62 selects the PPO type to be used. The table below gives the Hex frame that must be sent to the drive to select the PPO type.

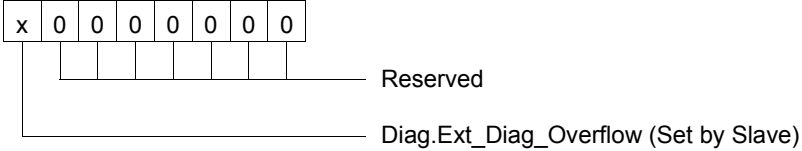
<b>Cfg_Data</b> (Configuration Data)	
Type: Octet String - Length: 1 to 32	
PPO Type	Hex Frame
1	F3 F1
2	F3 F5
3	F1
4	F5
5	F3 F9



SAP 60 (Slave\_Diag)

This SAP gives diagnostic information on the slave station.

<b>Diag_Data</b> (Diagnostic Data)	
Type: Octet String - Length: 6 (Standard) + 2 (Extended Diagnosis)	
<b>Byte</b>	<b>Description</b>
1	<p><b>Station_Status_1</b></p> <ul style="list-style-type: none"> <li>Diag.Station_Non_Existent (Set by Master, reset by Slave) Slave not found</li> <li>Diag.Stagion_Not_Ready (Set by Slave) Slave not ready for data exchange</li> <li>Diag.Cfg_Fault (Set by Slave) Received configuration data does not match original configuration data</li> <li>Diag.Ext_Diag (Set by Slave) Diagnostic entry present in slave-specific diagnostic area</li> <li>Diag.Not_Supported (Set by Slave) Service not supported by slave</li> <li>Diag.Invalid_Slave_Response (Set by Master, reset by Slave) Invalid response by slave</li> <li>Diag.Prm_Fault (Set by Slave) Invalid parameter or parameter value</li> <li>Diag.Master_Lock (Set by Master, reset by Slave) Slave is parameterised by another master</li> </ul>
2	<p><b>Station_Status_2</b></p> <ul style="list-style-type: none"> <li>Diag.Prm_Req (Set by Slave) Slave requires re-configuration and re-parameterisation</li> <li>Diag.Stat_Diag (Set by Slave) Static diagnosis. Slave (temporarily) unable to provide valid data</li> <li>Always set to 1 by slave</li> <li>Diag.WD_On (Set by Slave) Watchdog on</li> <li>Diag.Freeze_Mode (Set by Slave) Freeze command received by slave</li> <li>Diag.Sync_Mode (Set by Slave) Sync command received by slave</li> <li>Reserved</li> <li>Diag.Deactivated (Set by Master, reset by Slave) Slave is inactive</li> </ul>

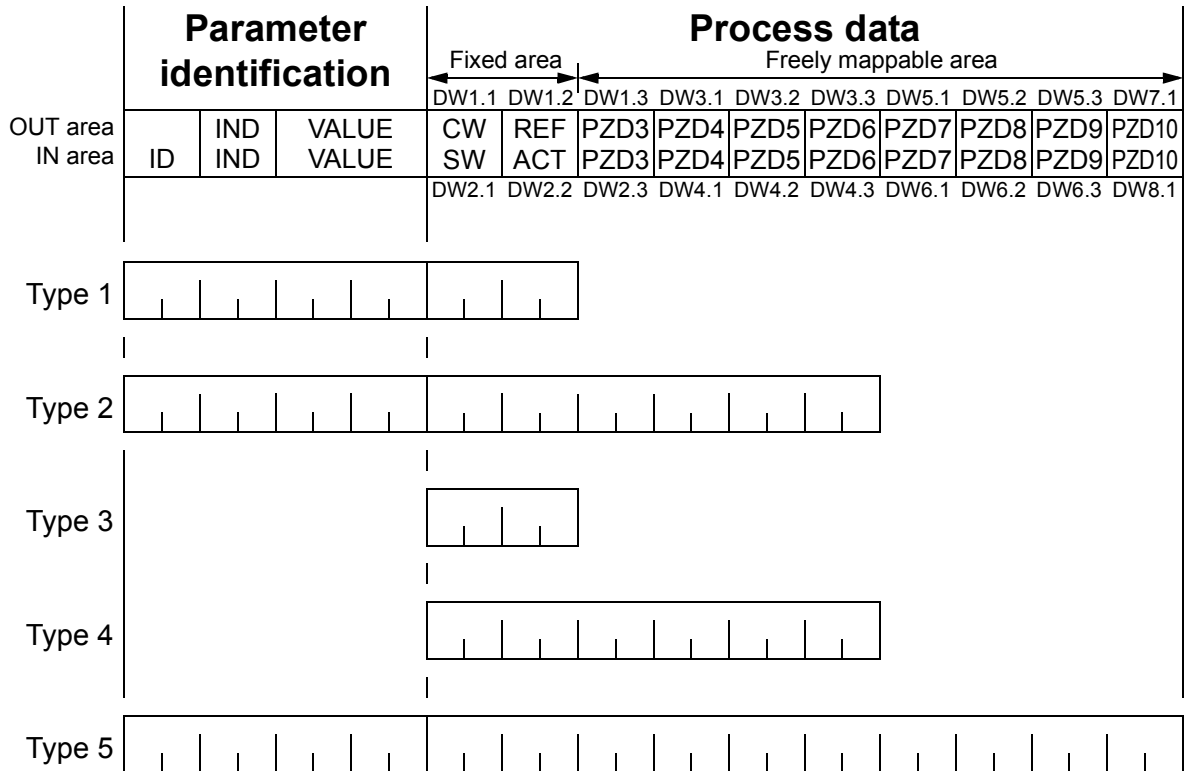
<b>Diag_Data</b> (Diagnostic Data) Type: Octet String - Length: 6 (Standard) + 2 (Extended Diagnosis)	
<b>Byte</b>	<b>Description</b>
3	<b>Station_Status_3</b> 
4	<b>Diag.Master_Add</b> The address of the master that parameterised this slave
5 - 6	<b>Ident_Number</b> (for RPBA-01: <b>0812h</b> )
7	<b>Ext_Diag_Data</b> The number of bytes reserved for Extended Diagnosis (including this byte) Fixed to 2
8	<b>Ext_Diag_Data</b> Bit 0 = Communication temporarily lost Bit 1 = Communication permanently lost Bit 2 - 7 = Not used

### *SAP 128 (Data\_Exchange)*

Allows the master to send output data to a slave station and to simultaneously request input data from the same station.

<b>Outp_Data</b> (Output Data) Type: Octet String - Length: 0 to 32 (depending on the selected PPO Type)
<b>Inp_Data</b> (Input Data) Type: Octet String - Length: 0 to 32 (depending on the selected PPO Type)

# PPO message types



**OUT area** – Data sent from Master to Slave (control data)

**IN area** – Data sent from Slave to Master (actual data)

**Parameter Identification:**

ID – Parameter Identification

IND – Index for Arrays

VALUE – Parameter Value (Max. 4 bytes)

**Process Data:**

CW – Control Word (see Table 7.)

SW – Status Word (see Table 8.)

REF – Reference

ACT – Actual Value

PZD – Process Data (application-specific)

DS – Data Set

DW – Data Word

Figure 6. PPO message types

## The Control Word and the Status Word

The Control Word (PROFIBUS Parameter 967) is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station to the drive, the adapter module acting as a gateway. The drive switches between its states according to the bit-coded instructions on the Control Word, and returns status information to the master in the Status Word (PROFIBUS Parameter 968).

The contents of the Control Word and the Status Word are detailed in Tables 7 and 8 respectively; see the drive documentation for information on the drive-specific bits. The drive states are presented in the PROFIBUS State Machine (Figure 9).

## References

References are 16-bit words containing a sign bit and a 15-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

ABB drives can receive control information from multiple sources including analogue and digital inputs, the drive control panel and a communication module (e.g. RPBA-01). In order to have the drive controlled through PROFIBUS, the communication module must be defined as the source for control information, e.g. Reference.

In the Vendor Specific mode, the scaling of the integer received from the master as Reference is drive-specific. See its programming manual for available control source selections and Reference scaling factors.

In PROFIdrive mode, the speed reference (REF) in hexadecimal (0...4000h) corresponds to 0...'motor nominal speed'.

## Actual Values

Actual Values are 16-bit words containing information on the operation of the drive. The functions to be monitored are selected by a drive parameter. The scaling of the integers sent to the

master as Actual Values depends on the selected function, refer to the drive documentation.

In PROFIdrive mode, the actual speed (ACT) in hexadecimal (0...4000h) corresponds to 0...'motor nominal speed'.

*Table 7. The Control Word (PROFIBUS Parameter 967). The upper case boldface text refers to the states shown in Figure 9.*

Bit	Name	Value	Proceed to STATE/Description
0	ON	1	Proceed to <b>READY TO OPERATE</b>
	OFF1	0	Emergency OFF, stop by the selected deceleration ramp. Proceed to <b>OFF1 ACTIVE</b> ; proceed further to <b>READY TO SWITCH ON</b> unless other interlocks (OFF2, OFF3) are active
1	OFF2	1	Continue operation (OFF2 inactive)
		0	Emergency OFF, coast to stop. Proceed to <b>OFF2 ACTIVE</b> ; proceed further to <b>SWITCH-ON INHIBIT</b>
2	OFF3	1	Continue operation (OFF3 inactive)
		0	Emergency stop, stop according to fastest possible deceleration mode. Proceed to <b>OFF3 ACTIVE</b> ; proceed further to <b>SWITCH-ON INHIBIT</b> . <b>Warning:</b> Ensure motor and driven machine can be stopped using this stop mode.
3	OPERATION_ENABLE	1	Proceed to <b>ENABLE OPERATION</b>
		0	Inhibit operation. Proceed to <b>OPERATION INHIBIT</b>
4	RAMP_OUT_ZERO	1	Normal operation. Proceed to <b>RAMP FUNCTION GENERATOR: ENABLE OUTPUT</b>
		0	Stop according to selected stop type
5	RAMP_HOLD	1	Normal operation. Proceed to <b>RAMP FUNCTION GENERATOR: ENABLE ACCELERATOR</b>
		0	Halt ramping (Ramp Function Generator output held)

Bit	Name	Value	Proceed to <b>STATE/Description</b>
6	RAMP_IN_ZERO	1	Normal operation. Proceed to <b>OPERATING</b>
		0	Force Ramp Function Generator input to zero
7	RESET	0 ⇒ 1	Fault reset if an active fault exists. Proceed to <b>SWITCH-ON INHIBIT.</b>
		0	(Continue normal operation)
8	INCHING_1		Inching 1. (See the drive documentation for information)
9	INCHING_2		Inching 2. (See the drive documentation for information)
10	REMOTE_CMD	1	Fieldbus control enabled
		0	Control Word <> 0 or Reference <> 0: Retain last Control Word and Reference Control Word = 0 and Reference = 0: Fieldbus control enabled
11 to 15			Drive-specific. (See the drive documentation for information)

*Table 8. The Status Word (PROFIBUS Parameter 968). The upper case boldface text refers to the states shown in Figure 9.*

Bit	Name	Value	<b>STATE/Description</b>
0	RDY_ON	1	<b>READY TO SWITCH ON</b>
		0	<b>NOT READY TO SWITCH ON</b>
1	RDY_RUN	1	<b>READY TO OPERATE</b>
		0	<b>OFF1 ACTIVE</b>
2	RDY_REF	1	<b>ENABLE OPERATION</b>
		0	<b>DISABLE OPERATION</b>
3	TRIPPED	1	<b>FAULT</b>
		0	No fault
4	OFF_2_STA	1	OFF2 inactive
		0	<b>OFF2 ACTIVE</b>

Bit	Name	Value	STATE/Description
5	OFF_3_STA	1	OFF3 inactive
		0	<b>OFF3 ACTIVE</b>
6	SWC_ON_INHIB	1	<b>SWITCH-ON INHIBIT ACTIVE</b>
		0	<b>SWITCH-ON INHIBIT NOT ACTIVE</b>
7	ALARM	1	Warning/Alarm
		0	No Warning/Alarm
8	AT_SETPOINT	1	<b>OPERATING.</b> Actual value equals reference value (i.e. is within tolerance limits)
		0	Actual value differs from reference value (= is outside tolerance limits)
9	REMOTE	1	Drive control location: REMOTE
		0	Drive control location: LOCAL
10	ABOVE_LIMIT	1	Actual frequency or speed value equals or is greater than supervision limit.
		0	Actual frequency or speed value is within supervision limit.
11 to 15			Drive-specific

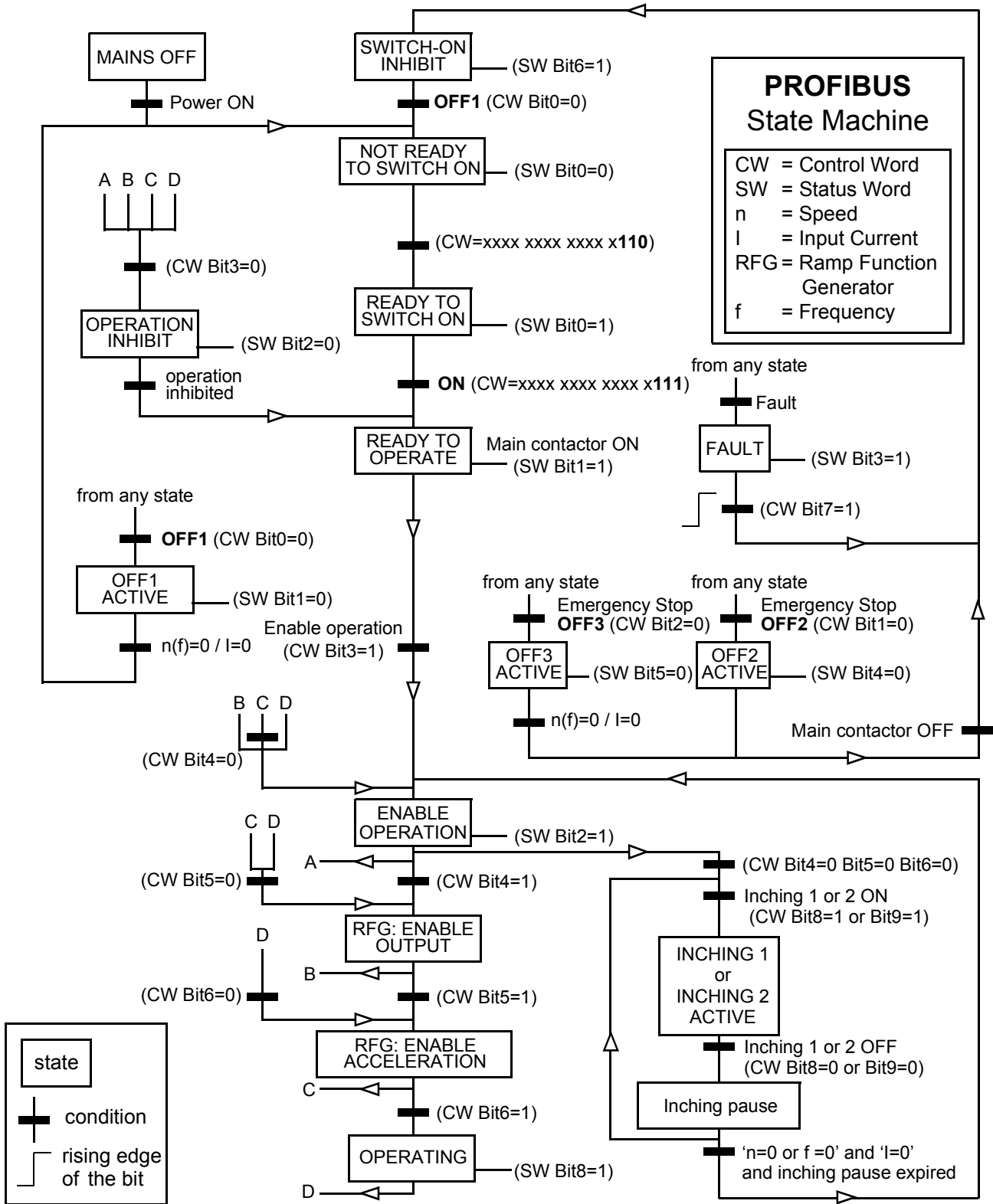
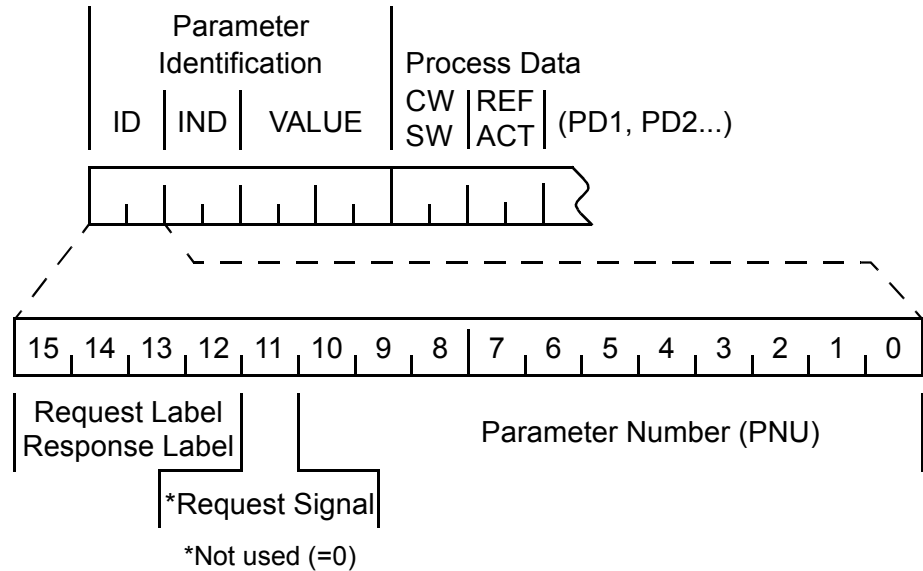


Figure 9. The PROFIBUS state machine



## Parameter handling in cyclic communication (DP)

In cyclic PROFIBUS-DP communication, parameter data is transferred in PPO message types 1, 2 and 5 (see Figure 6.). The Parameter Identification part consists of eight bytes (see below).



The Request Label is used by the master when transmitting data to the slave, while the Response Label is used by the slave as a positive or negative acknowledgement. The tables below show the Request/Response functions.

Request labels (from Master to Slave)		Response labels	
Request	Function	Ackn. (+)	Ackn. (-)
0	No task	0	–
1	Request parameter value	1, 2	7
2	Change parameter value (word)	1	7, 8
3	Change parameter value (double word)	2	7, 8
4	Request description element	3	7
5	Change description element	3	7, 8
6	Request parameter value (array)	4, 5	7, 8
7	Change parameter value (array word)	4	7, 8
8	Change parameter value (array double word)	5	7, 8
9	Request number of array elements	6	7

<b>Response label (Acknowledgement from Slave to Master)</b>	
<b>Ackn.</b>	<b>Function</b>
0	No response
1	Transfer parameter value (word)
2	Transfer parameter value (double word)
3	Transfer description element
4	Transfer parameter value (array word)
5	Transfer parameter value (array double word)
6	Transfer number of array elements
7	<p>Task cannot be executed, followed by error number</p> <p>0 = Illegal parameter number</p> <p>1 = Parameter value cannot be changed</p> <p>2 = Lower or upper limit violated</p> <p>3 = Erroneous subindex</p> <p>4 = No array</p> <p>5 = Incorrect data type</p> <p>6 = Setting not allowed (can only be reset)</p> <p>7 = Descriptive element cannot be changed</p> <p>9 = Descriptive data not available</p> <p>11 = No parameter change rights</p> <p>15 = Text array not available</p> <p>17 = Task cannot be executed due to operating status (e.g. parameter is currently read-only)</p> <p>18 = Other error</p> <p>101 = Vendor specific error</p> <p>102 = Request not supported</p> <p>103 = Request cannot be completed due to communication error</p> <p>110 = Failure during write to non-volatile memory</p> <p>111 = Request aborted due to time-out</p> <p>120 = Parameter cannot be mapped to PZD (size mismatch or non-existent)</p> <p>121 = Parameter cannot be mapped to PZD.</p> <p>123 = Parameter cannot be mapped to PZD.</p> <p>130 = Cannot map Control Word bit (parameter 933 - 937, e.g. double mapping of bits)</p> <p>140 = Cannot change mode to TORQUE (frequency is used)</p>
8	No parameter change rights for PKW interface
9	Parameter data signal (word)
10	Parameter data signal (double word)

The allocation of data sets, drive parameters and PROFIdrive parameters to the Parameter Identification part of the PPO type is shown below. The **Index** column corresponds to the parameter number (PNU) in the ID part of Parameter Identification. The **Sub-index** column corresponds to the IND part of Parameter Identification. The **Example No.** column refers to the examples on the following pages.

<b>Data set area</b>					
<b>Index</b>	<b>Sub-index</b>	<b>Range (Decimal)</b>	<b>Request Label</b>		<b>Example No.</b>
0h	1h	1	R/W	6/7	1, 2
0h	2h	2			
...					
0h	63h	99			

<b>Drive parameters</b>					
<b>Index</b>	<b>Sub-index</b>	<b>Range (Decimal)</b>	<b>Request Label</b>		<b>Example No.</b>
0h	65h	101	R/W	6/7	1, 2
0h	66h	102			
...					
27h	0Fh	9999			

PROFIdrive parameters						
Index	Sub-index	Range (Decimal)		Request Label		Example No.
393h	2h	915	2	R/W	6/7	6
	3h		3			
	...		...			
	9h		9			
394h	2h	916	2	R/W	6/7	7
	3h		3			
	...		...			
	9h		9			
396h	0h	918		R/W	1/2	3, 4
...						
3B3h	0h	947	1	R	6	5
	9h		9			
	11h		17			
	19h		25			
	21h		33			
	29h		41			
...						
3CCh	0h	972		R/W	1/2	3,4

The complete PROFIdrive parameter list for the RPBA-01 can be found as a separate chapter elsewhere in this manual.

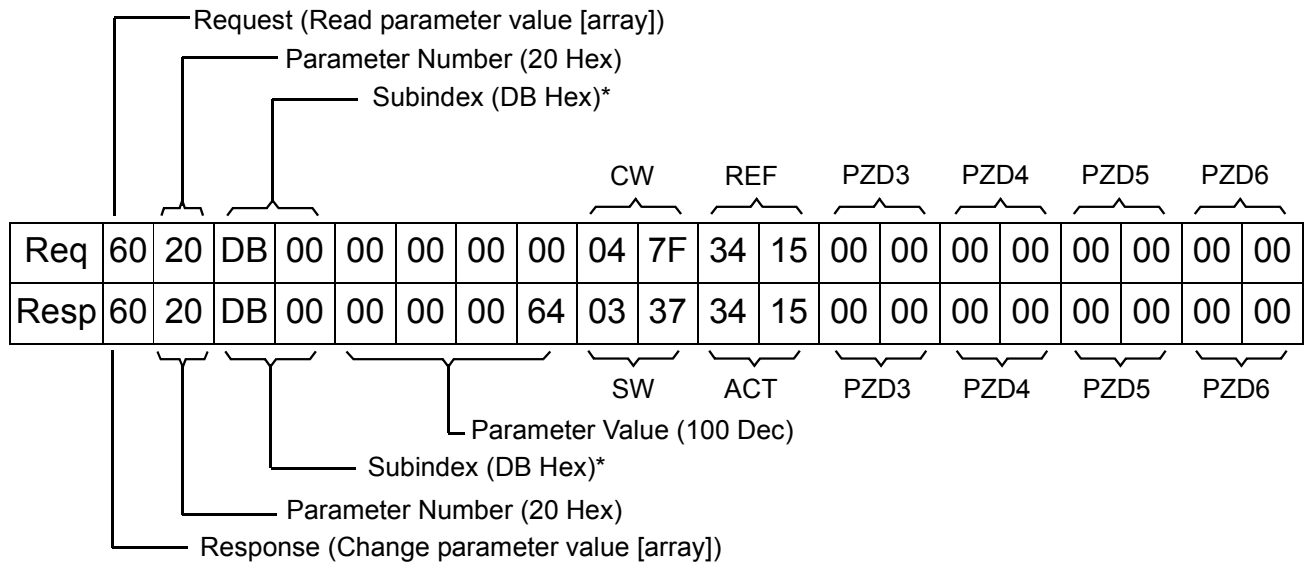
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**Note:** Continuous (cyclic) writing of PROFIdrive parameters should be avoided as the values of these parameters are stored in the flash memory of the RPBA-01. The estimated lifetime of the flash memory is 1,000,000 program/erase cycles, and continuous writing will cause the memory to fail prematurely.

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*Example 1: Reading a drive parameter (or data set)*

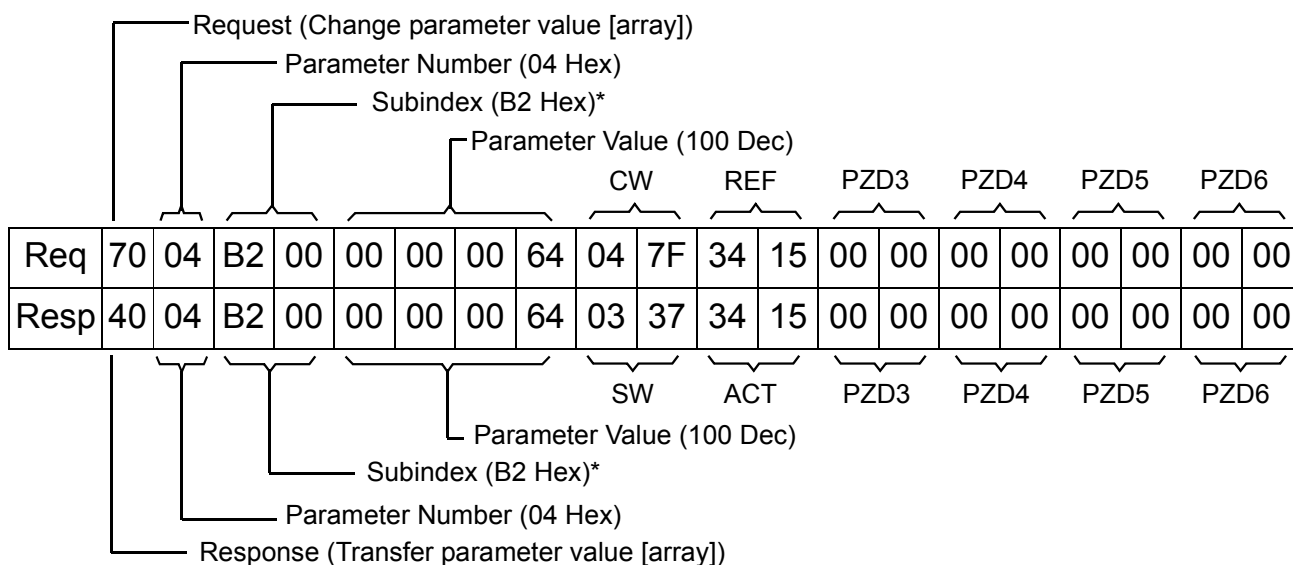
To determine the parameter number and subindex for drive parameter reading, multiply the parameter number by one hundred and then convert it to hexadecimal. The low byte is the subindex (IND), and the high byte is the parameter number (PNU). For example reading parameter 84.11 INPUT 1 from the drive:  
 $84.11 \times 100 = 8411 = 20DB \text{ Hex}$ .  
 Parameter number is 20 and subindex is DB.



\*2nd byte reserved

**Example 2: Writing a drive parameter (or data set)**

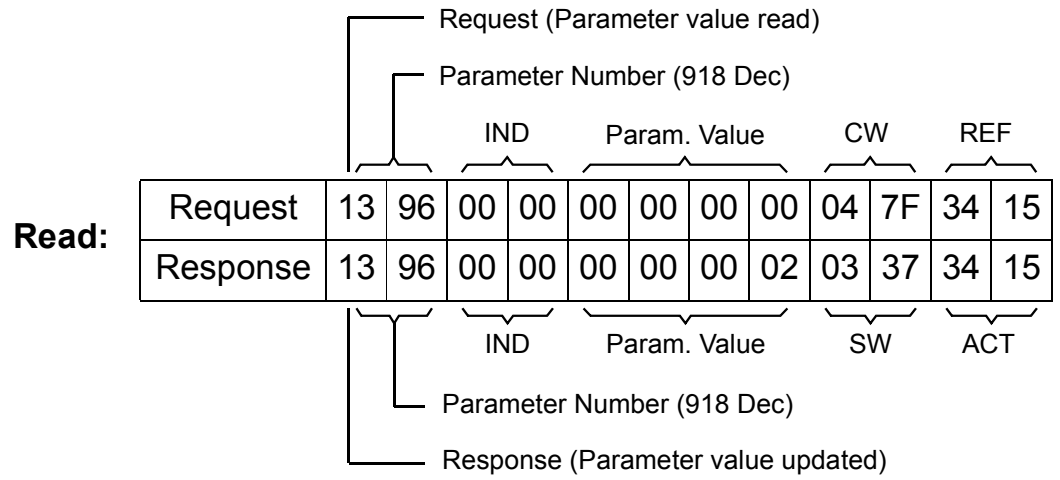
To determine the parameter number and subindex for drive parameter writing, multiply the parameter number by one hundred and then convert it to hexadecimal. The low byte is the subindex (IND), and the high byte is the parameter number (PNU). For example write parameter 12.02 CONSTANT SPEED.1:  
 $12.02 \times 100 = 1202 = 04B2$  Hex.  
 Parameter is 04 and subindex is 2B.



\*2nd byte reserved

*Example 3: Reading a PROFIdrive parameter (word)*

In this example, PROFIBUS Parameter No. 918 is used to read the station number of the slave.

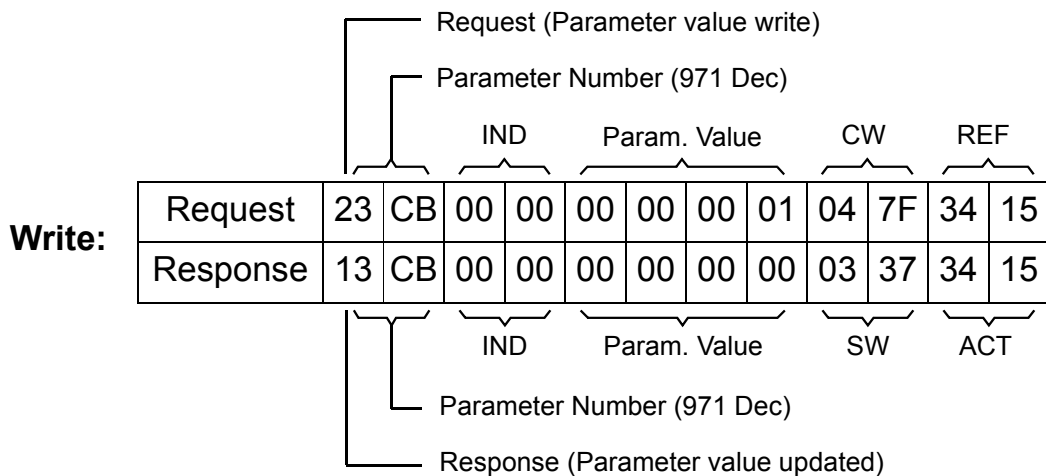


The slave returns its station number (2).

*Example 4: Writing a PROFIdrive parameter (word)*

In this example, current parameter settings are saved to the FLASH memory of the drive. This is done by setting the value of PROFIBUS Parameter No. 971 (3CBh) to 1.

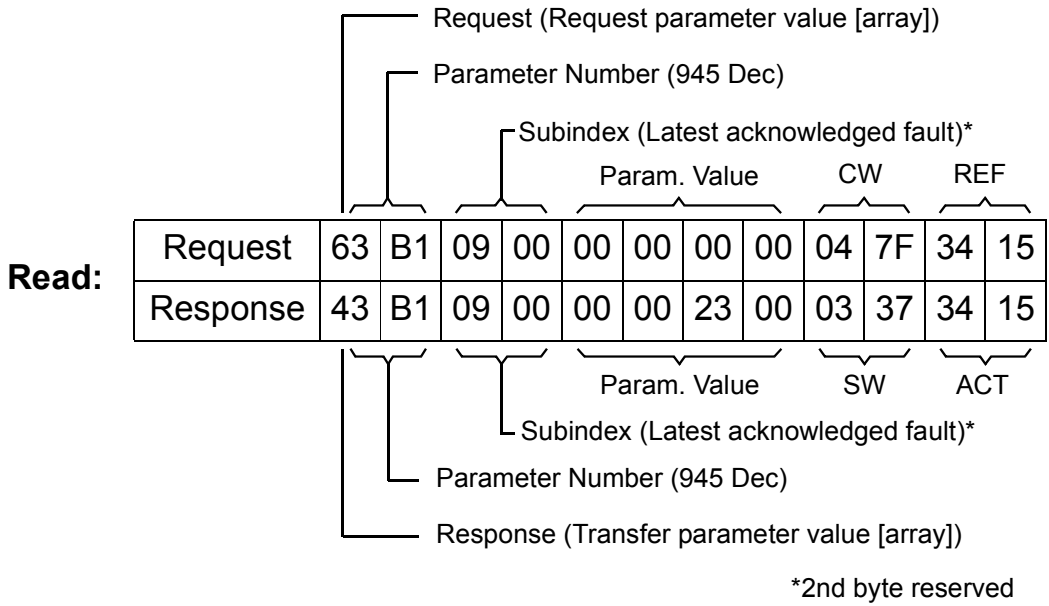
**Note that the drive always observes the Control Word (CW) and Reference (REF) bytes.** The values shown below are examples.





**Example 5: Reading a PROFIdrive parameter (array)**

In this example, PROFIBUS Parameter No. 947 is used to read the code of the latest acknowledged fault. As shown in Table 10 on page 57, parameter 945 is of the array type with subindexes 1, 9, 17 and 25.



The slave returns the code of the latest acknowledged fault (2300h). The fault codes are according to the DRIVECOM standard. See also the User’s Manual of the drive for drive specific fault codes.

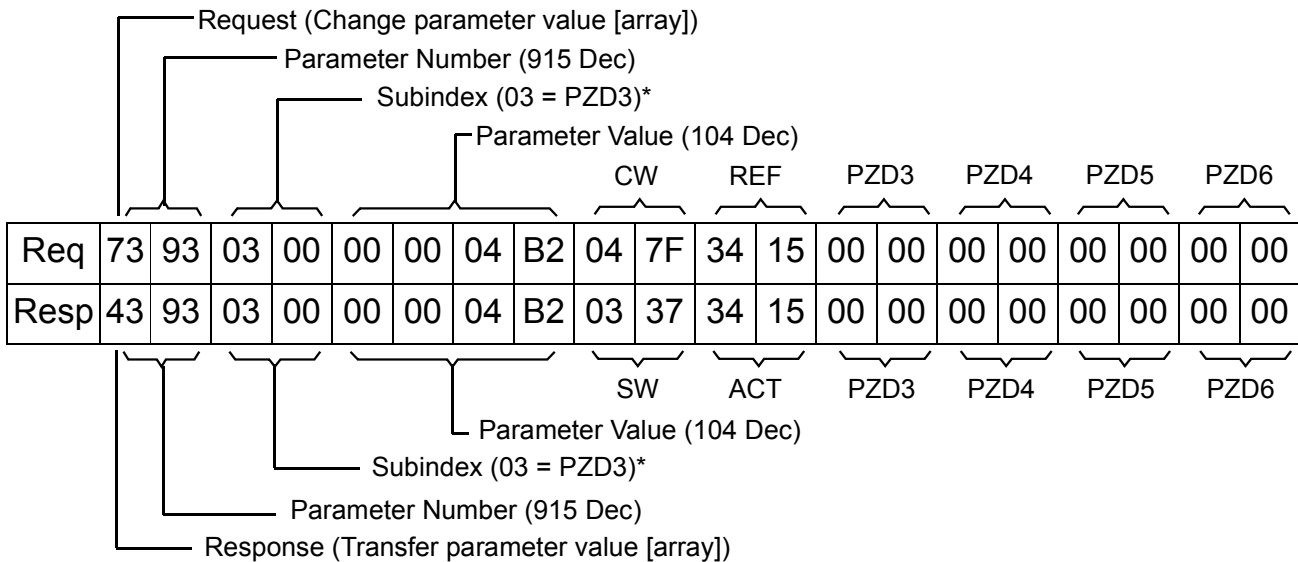
The implementation of the PROFIdrive profile in the RPBA-01 supports the storage of the active and the five latest occurred different faults in the fault buffer. The fault codes can be accessed by PROFIdrive parameters 945, 947 and 948 (see Table 10 on page 55). The value zero indicates no fault. The subindexes of these parameters are related to each other, i.e. parameter 945 with subindex 1 relates to subindex of parameter 947 and 948. For an explanation on the subindexes, refer to Table 10 on page 55.

**Example 6: Configuring the process data written to the drive**

PROFIBUS parameter 915 can be used to define which data is written cyclically to a drive parameter as application-specific process data.

In the example below, the value of drive parameter 12.02 CONSTANT SPEED 1 (4B2h) is selected to be taken from PZD3. The parameter will continue to be updated with the contents of PZD3 in each Request frame until a different selection is made.

*Subindex* (IND) defines which process data word the required data is taken from. *Parameter Value* selects the drive parameter to which that word is mapped.



\*2nd byte reserved

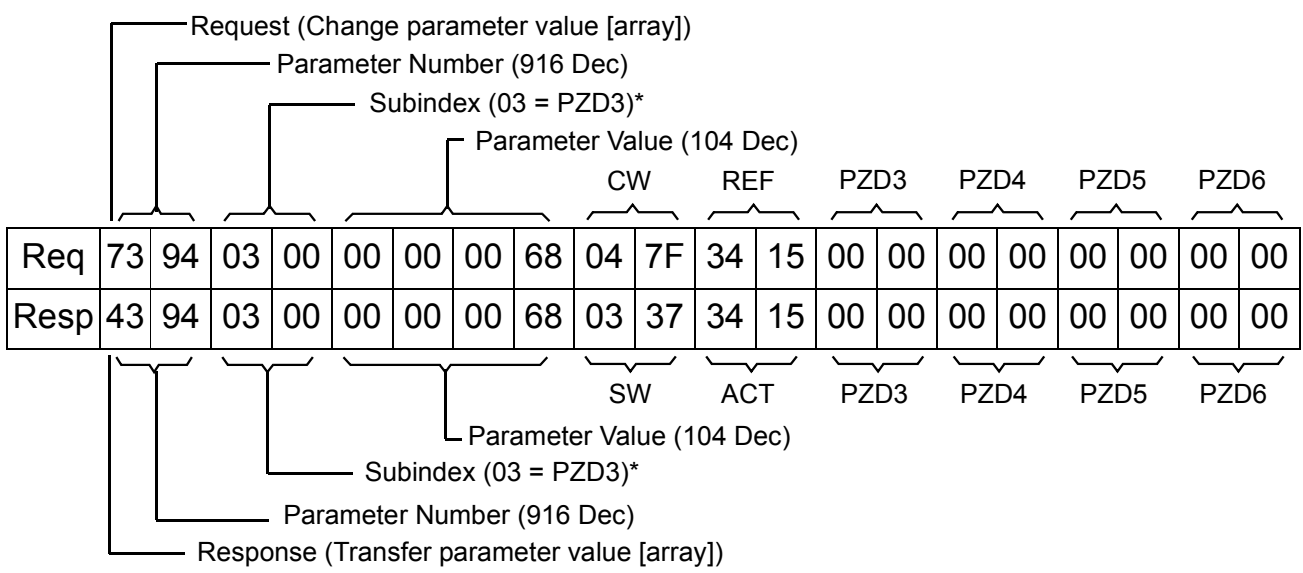
Subsequently, the contents of PZD3 in each Request frame are written to drive parameter 12.02 CONSTANT SPEED 1 until a different selection is made.

**Example 7: Configuring the process data read from the drive**

PROFIBUS Parameter No. 916 can be used to define which data is read cyclically from the drive as application-specific process data.

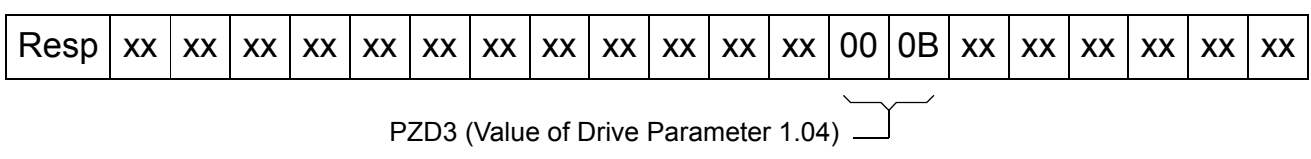
In the example below, drive parameter 1.04 CURRENT (68h) is selected to be transmitted by the drive as PZD3. The selection is in force until it is superseded by another selection.

*Subindex* (IND) defines which process data word the required data is transmitted in, and *Parameter Value* defines which drive parameter is mapped to that word.



\*2nd byte reserved

**Subsequent response frames:**



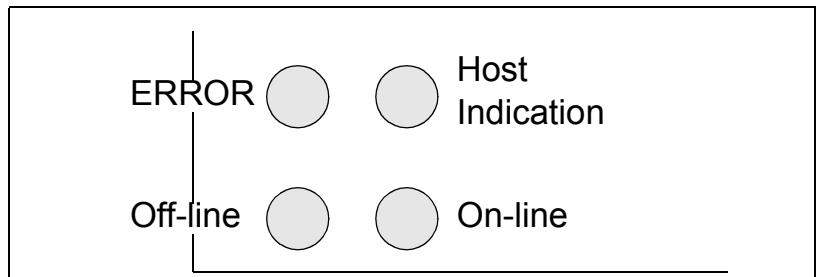


# Fault tracing

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## LED indications

The RPBA-01 module is equipped with three diagnostic LEDs. The description of the LEDs is below.



Name	Colour	Function
ERROR	Red	<p><b>Flashing 1 Hz</b> - Error in configuration: Internal configuration mismatch.</p> <p><b>Flashing 2 Hz</b> - Error in User Parameter data: The length/contents of the User Parameter data set during initialisation of the module is not equal to the length/contents set during configuration of the network.</p> <p><b>Flashing 4 Hz</b> - Error in initialisation of the PROFIBUS communication ASIC.</p> <p><b>Off</b> - No diagnostics present</p>
On-Line	Green	<p><b>Lit</b> - Module is On-Line and data exchange is possible.</p> <p><b>Off</b> - Module is not On-Line</p>
Off-Line	Red	<p><b>Lit</b> - Module is Off-Line and no data exchange is possible.</p> <p><b>Off</b> - Module is not Off-Line</p>

Name	Colour	Function
Host Indication	Green	<b>Lit</b> - Link functional
	Red	<b>Lit</b> - Link lost permanently <b>Flashing</b> - Link lost temporarily

# PROFdrive parameters

Table 10. PROFdrive profile-specific parameters.

Parameter	R/W*	Data type	Description																		
915	R/W	Array [10] Unsigned16	Assignment PZD1 to PZD10 in PPO-write																		
916	R/W	Array [10] Unsigned16	Assignment PZD1 to PZD10 in PPO-read																		
918	R/W	Unsigned16	Node address. Writing this parameter will change the node address if the rotary switches have the setting 0. Module restart required.																		
919	R	Octet String4	Device system number.																		
927	R/W	Unsigned16	Operator control rights (parameter identification, PKW). <table border="0"> <thead> <tr> <th>Value</th> <th>Mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Parameters cannot be written, only read (927 can be written)</td> </tr> <tr> <td>1</td> <td>Parameters can be written and read (default).</td> </tr> </tbody> </table>	Value	Mode	0	Parameters cannot be written, only read (927 can be written)	1	Parameters can be written and read (default).												
Value	Mode																				
0	Parameters cannot be written, only read (927 can be written)																				
1	Parameters can be written and read (default).																				
928	R/W	Unsigned16	Control rights (process data, PZD). <table border="0"> <thead> <tr> <th>Value</th> <th>Mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>PZD part is disabled, i.e. Receipt of new PZD data is ignored</td> </tr> <tr> <td>1</td> <td>PZD part is enabled (default).</td> </tr> </tbody> </table>	Value	Mode	0	PZD part is disabled, i.e. Receipt of new PZD data is ignored	1	PZD part is enabled (default).												
Value	Mode																				
0	PZD part is disabled, i.e. Receipt of new PZD data is ignored																				
1	PZD part is enabled (default).																				
929	R	Unsigned16	Selected PPO-type <table border="0"> <thead> <tr> <th>Value</th> <th>PPO-type</th> <th>Configuration</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>PPO1</td> <td>F3h, F1h</td> </tr> <tr> <td>2</td> <td>PPO2</td> <td>F3h, F5h</td> </tr> <tr> <td>3</td> <td>PPO3</td> <td>F1h</td> </tr> <tr> <td>4</td> <td>PPO4</td> <td>F5h</td> </tr> <tr> <td>5</td> <td>PPO5</td> <td>F3h, F9h</td> </tr> </tbody> </table>	Value	PPO-type	Configuration	1	PPO1	F3h, F1h	2	PPO2	F3h, F5h	3	PPO3	F1h	4	PPO4	F5h	5	PPO5	F3h, F9h
Value	PPO-type	Configuration																			
1	PPO1	F3h, F1h																			
2	PPO2	F3h, F5h																			
3	PPO3	F1h																			
4	PPO4	F5h																			
5	PPO5	F3h, F9h																			

Parameter	R/W*	Data type	Description
930	R/W	Unsigned16	Selection switch for operation mode. <b>Value</b> <b>Mode</b> 1                      Speed control mode: Control word and status word for frequency/speed used. 8001h                Speed control mode: Control word and status word for torque used.
933	R/W	Unsigned16	Selection switch for Control word, bit 11. <b>Value</b> <b>Inverter Control word bit</b> 0                      Not in use 1 to 5                Vendor specific 1 to 5* * function defined by drive application software
934	R/W	Unsigned16	Selection switch for Control word, bit 12. (See parameter 933 for coding)
935	R/W	Unsigned16	Selection switch for Control word, bit 13. (See parameter 933 for coding)
936	R/W	Unsigned16	Selection switch for Control word, bit 14. (See parameter 933 for coding)
937	R/W	Unsigned16	Selection switch for Control word, bit 15. (See parameter 933 for coding)
939	R/W	Unsigned16	Selection switch for Status word, bit 11. <b>Value</b> <b>Inverter Control word bit</b> 0                      Not in use 1 to 3                Vendor specific 1 to 3* * function defined by drive application software
940	R/W	Unsigned16	Selection switch for Status word, bit 12. (See parameter 939 for coding)
941	R/W	Unsigned16	Selection switch for Status word, bit 13. (See parameter 939 for coding)
942	R/W	Unsigned16	Selection switch for Status word, bit 14. (See parameter 939 for coding)



Parameter	R/W*	Data type	Description
943	R/W	Unsigned16	Selection switch for Status word, bit 15. (See parameter 939 for coding)
945	R	Array[64] Unsigned16	Fault code (coded according to DRIVECOM profile). <b>Subindex    Contents</b> 1            Active fault 9            **Last ackn. fault 17          **Second last ackn. fault 25          **Third last ackn. fault 33          **Fourth last ackn. fault 41          **Fifth last ackn. fault
947	R	Array [64] Unsigned16	Fault number. <b>Subindex    Contents</b> See parameter 945.
948	R	Array [64] Unsigned16	Time difference. Seconds since the last fault occurred. <b>Subindex    Contents</b> See parameter 945.
952	R/W	Unsigned16	Number of faults occurred. Writing a zero clears the value.
953	R	Unsigned16	**Last alarm
954	R	Unsigned16	**Second last alarm
955	R	Unsigned16	**Third last alarm
956	R	Unsigned16	**Fourth last alarm
957	R	Unsigned16	**Fifth last alarm
958	R	Unsigned16	Sixth last alarm (not supported)
959	R	Unsigned16	Seventh last alarm (not supported)
960	R	Unsigned16	Eighth last alarm (not supported)
961	R	Octet String4	Hardware configuration (manufacturer specific ID of the drive)

Parameter	R/W*	Data type	Description						
963	R	Unsigned16	Detected baud rate: <b>0</b> = 12 Mbit/s <b>1</b> = 6 Mbit/s <b>2</b> = 3 Mbit/s <b>3</b> = 1.5 Mbit/s <b>4</b> = 500 kbit/s <b>5</b> = 187.5 kbit/s <b>6</b> = 93.75 kbit/s <b>7</b> = 45.45 kbit/s <b>8</b> = 19.2 kbit/s <b>9</b> = 9.6 kbit/s <b>255</b> = Invalid baud rate						
964	R	Unsigned16	Identification number of this device <b>(0812h)</b>						
965	R	Octet String2	Profile number of this device <b>(0302h)</b> Profile 3, Version 2						
967	R	Unsigned16	Control word (CW)						
968	R	Unsigned16	Status word (SW)						
970	R/W	Unsigned16	Load parameter record <table> <thead> <tr> <th>Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No action</td> </tr> <tr> <td>1</td> <td>Restore factory settings</td> </tr> </tbody> </table> The parameter must do a zero-to-one transition and the motor must be stopped.	Value	Description	0	No action	1	Restore factory settings
Value	Description								
0	No action								
1	Restore factory settings								
971	R/W	Unsigned16	Save parameter record <table> <thead> <tr> <th>Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No action</td> </tr> <tr> <td>1</td> <td>Save the drive parameters to non-volatile memory</td> </tr> </tbody> </table> The parameter must do a zero-to-one transition and the motor must be stopped.	Value	Description	0	No action	1	Save the drive parameters to non-volatile memory
Value	Description								
0	No action								
1	Save the drive parameters to non-volatile memory								

<b>Para- meter</b>	<b>R/W*</b>	<b>Data type</b>	<b>Description</b>						
972	R/W	Unsigned16	Software reset <table border="0"> <thead> <tr> <th><b>Value</b></th> <th><b>Description</b></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No action</td> </tr> <tr> <td>1</td> <td>Re-boot PROFIBUS module</td> </tr> </tbody> </table> The parameter must do a zero-to-one transition and the motor must be stopped.	<b>Value</b>	<b>Description</b>	0	No action	1	Re-boot PROFIBUS module
<b>Value</b>	<b>Description</b>								
0	No action								
1	Re-boot PROFIBUS module								

\* Read and/or Write

\*\* Support depends on drive type



# Definitions and abbreviations

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## PROFIBUS definitions

<i>Acyclic Communication</i>	Communication in which messages are sent only once on request
<i>Array</i>	Parameter consisting of data fields of equal data type
<i>Broadcast</i>	Non-acknowledged message from master to all bus participants (compare Multicast)
<i>Command Word</i>	See Control Word
<i>Communication Object</i>	Any object of a real device that can be communicated with (variable, program, data range, etc.). Stored locally in the Object Dictionary.
<i>Control Word</i>	16-bit word from master to slave with bit-coded control signals (sometimes called the Command Word).
<i>Cyclic Communication</i>	Communication in which Parameter-/Process Data-Objects are sent cyclically at pre-defined intervals
<i>Device Class</i>	Classification according to the number of profile functions included in the device
<i>Drivecast</i>	Broad- and Multicast, a special message frame for drives
<i>Fault</i>	Event that leads to tripping of the device
<i>GSD File</i>	ASCII-format device description file in a specified form. Each device (active & passive stations) on PROFIBUS has to have its own GSD File.
<i>Index</i>	Access reference for Objects in PROFIBUS
<i>Information Report</i>	Non-acknowledged message from master to one or all groups of bus participants

<i>Master</i>	Control system with bus initiative. In PROFIBUS terminology, master stations are also called active stations.
<i>Multicast</i>	Non-acknowledged message from master to one group of bus participants (compare Broadcast)
<i>Name</i>	Symbolic name of a parameter
<i>Nibble</i>	Set of 4 bits
<i>Object Dictionary</i>	Local storage of all Communication Objects recognised by a device
<i>Object List</i>	List of all accessible objects
<i>Parameter</i>	Value that can be accessed as Object, e.g. variable, constant, signal
<i>Parameter Number</i>	Parameter address
<i>Parameter/Process Data Object</i>	Special object that contains Parameter and Process Data
<i>Process Data</i>	Data that contains Control Word and Reference value or Status Word and Actual value. May also contain other (user-definable) control information.
<i>Profile</i>	Adaptation of the protocol for certain application field, e.g. drives
<i>Request Label</i>	Coded information specifying the required service for the parameter part sent from master to slave
<i>Response Label</i>	Coded information specifying the required service for the parameter part sent from slave to master
<i>Slave</i>	Passive bus participant. In PROFIBUS terminology, slave stations (or slaves) are also called passive stations. Also referred to as node.
<i>Status Word</i>	16-bit word from slave to master with bit-coded status messages

*Warning* Signal caused by an existing alarm which does not lead to tripping of the device

## PROFIBUS abbreviations

The text in *italics* is the original German term.

<i>.con</i>	Confirmation
<i>.ind</i>	Indication
<i>.req</i>	Request
<i>.res</i>	Response
<i>ACT</i>	Actual Value <i>Istwert</i>
<i>AK</i>	Request Label/Response Label <i>Auftragskennung/Antwortkennung</i>
<i>ALI</i>	Application Layer Interface
<i>CR</i>	Communication Reference <i>Kommunikationsreferenz (Kommunikationsbeziehung)</i>
<i>DP</i>	Decentralised Periphery <i>Dezentrale Peripherie</i>
<i>DP-ALI</i>	Application Layer Interface for DP
<i>DPV1</i>	PROFIBUS-DP Extensions to the EN 50170 standard, including e.g. acyclic data exchange
<i>FDL</i>	Fieldbus Data Link
<i>FMS</i>	Fieldbus Message Specification
<i>FSU</i>	Manufacturer Specific Interface <i>Firmenspezifischer Umsetzer</i>
<i>HIW</i>	Main Actual Value <i>Hauptistwert</i>
<i>HSW</i>	Main Reference <i>Hauptsollwert</i>

<i>ISW</i>	see ACT
<i>KR (KB)</i>	see CR
<i>PA</i>	Process Automation <i>Prozessautomatisierung</i>
<i>PD</i>	Process Data <i>Prozessdaten</i>
<i>PKE</i>	Parameter Identification <i>Parameter-Kennung</i>
<i>PKW</i>	Parameter Identification Value <i>Parameter-Kennung-Wert</i>
<i>PNU</i>	Parameter Number <i>Parameternummer</i>
<i>PPO</i>	Parameter/Process Data Object <i>Parameter-/Prozessdaten-Objekt</i>
<i>PWE</i>	Parameter Value <i>Parameter-Wert</i>
<i>PZD</i>	see PD
<i>PZDO</i>	Process Data Object <i>Prozessdatenobjekt</i>
<i>SAP</i>	Service Access Point
<i>SOW</i>	Reference <i>Sollwert</i>
<i>SPM</i>	Request Signal <i>Spontanmeldung</i>
<i>STW</i>	Control Word <i>Steuerwort</i>
<i>ZSW</i>	Status Word <i>Zustandswort</i>

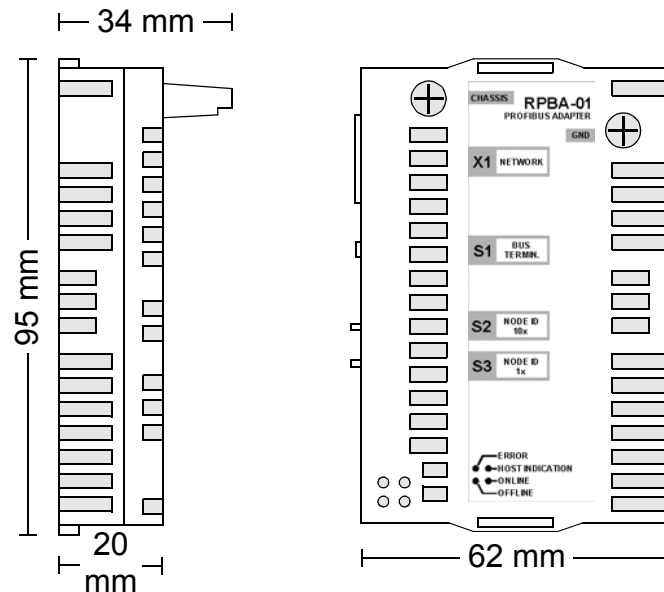


# Technical data

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## RPBA-01

### Enclosure:



**Mounting:** Into the option slot on the control board of the drive.

**Degree of protection:** IP 20

**Ambient conditions:** The applicable ambient conditions specified for the drive in its *Hardware Manual* are in effect.

### Hardware settings:

- Rotary switches for node address selection (address range 00 to 99)
- DIP switch for bus termination selection

### Software settings:

- Input/Output/User Parameter data/Diagnostics format
- Maximum cyclic I/O data size: 244 bytes in, max 244 bytes out, max. 416 bytes total
- Maximum User Parameter data/Diagnostics length: 237 bytes

**Connectors:**

- 34-pin parallel bus connector
- 9-pin female DSUB connector

**Current consumption:**

- 350 mA max. (5 V), supplied by the control board of the drive

**General:**

- Estimated min. lifetime: 100 000 h
- All materials UL/CSA-approved
- Complies with EMC standards EN 50081-2 and EN 50082-2

## PROFIBUS link

**Compatible devices:** All devices compatible with the PROFIBUS-DP protocol

**Size of the link:** 127 stations including repeaters (31 stations and 1 repeater per segment)

**Medium:** Shielded, twisted pair RS-485 cable

- Termination: built in the module
- Specifications:

Parameter	Line A PROFIBUS-DP	Line B DIN 19245 Part 1	Unit
Impedance	135 to 165 (3 to 20 MHz)	100 to 130 (f > 100 kHz)	Ω
Capacitance	< 30	< 60	pF/m
Resistance	< 110	–	Ω/km
Wire gauge	> 0.64	> 0.53	mm
Conductor area	> 0.34	> 0.22	mm <sup>2</sup>

- Maximum bus length:

<b>Transfer rate (kbit/s)</b>	≤ 93.75	187.5	500	1500	3000	6000	12000
<b>Line A (m)</b>	1200	1000	400	200	100	100	100
<b>Line B (m)</b>	1200	600	200	–	–	–	–

**Topology:** Multi-drop

**Serial communication type:** Asynchronous, half Duplex

**Transfer rate:** 9.6 kbit/s, 19.2 kbit/s, 45.45 kbit/s, 93.75 kbit/s, 187.5 kbit/s, 500 kbit/s, 1.5 Mbit/s, 3 Mbit/s, 6 Mbit/s, or 12 Mbit/s (automatically detected by RPBA-01)

**Protocol:** PROFIBUS-DP







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