



► Communication interfaces

PILZ
THE SPIRIT OF SAFETY

Operating Manual-1002971-EN-12

- Configurable, safe small controllers PNOZmulti 2



This document is the original document.

Where unavoidable, for reasons of readability, the masculine form has been selected when formulating this document. We do assure you that all persons are regarded without discrimination and on an equal basis.

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SD means Secure Digital

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1 Introduction

1.1 Definition of symbols

Information that is particularly important is identified as follows:



DANGER!

This warning must be heeded! It warns of a hazardous situation that poses an immediate threat of serious injury and death and indicates preventive measures that can be taken.



WARNING!

This warning must be heeded! It warns of a hazardous situation that could lead to serious injury and death and indicates preventive measures that can be taken.



CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



NOTICE

This describes a situation in which the product or devices could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.



INFORMATION

This gives advice on applications and provides information on special features.

1.2 Validity of documentation



This document describes the communication options for the configurable control systems PNOZmulti 2.

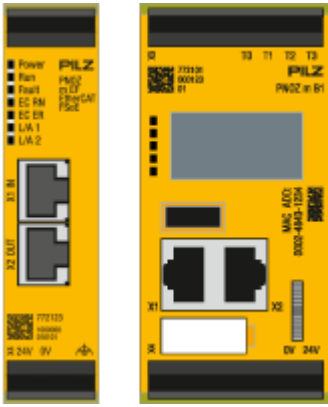
2 Overview - Communication options

2.1 Communication via the fieldbus modules

The fieldbus modules provide both cyclical and acyclical data. The chapter entitled [Fieldbus Modules \[17\]](#) describes the structure of the cyclical data. The chapter entitled [Service data \[86\]](#) describes the acyclical data, its structure and addressing.

The following device combinations are possible:

| Fieldbus modules | | Base units |
|--|--|------------|
| PNOZ m ES Profibus PNOZ m ES CANopen PNOZ m ES EtherCAT PNOZ m ES Powerlink PNOZ m ES Profinet PNOZ m ES Ethernet/IP PNOZ m ES CC-Link |  | PNOZ m B0 |
| PNOZ m ES Profibus PNOZ m ES CANopen PNOZ m ES EtherCAT PNOZ m ES Profinet PNOZ m ES Powerlink PNOZ m ES Ethernet/IP PNOZ m ES CC-Link |  | PNOZ m B1 |

| Fieldbus modules | | Base units |
|-------------------------|--|------------|
| PNOZ m EF EtherCAT FSoE |  | PNOZ m B1 |

The following versions are compatible:

| | PNOZ m B0 v1.1 | PNOZ m B0 v1.2 | PNOZ m B0 v1.4 | PNOZ m B0 v2.0 | PNOZ m B1 v1.0 | PNOZ m B1 v1.1 | from PNOZ m B1 v1.2 |
|--------------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| PNOZ m ES Profibus V1.x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| PNOZ m ES CAN-open V1.x | ✓ | ✓ | ✓ | ✓ | - | - | - |
| PNOZ m ES CAN-open V2.x | ✓ | ✓ | ✓ | ✓ | - | - | ✓ |
| PNOZ m ES CC-Link V1.0 | - | - | - | ✓ | - | ✓ | ✓ |
| PNOZ m ES EtherCAT V1.x | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| PNOZ m ES EtherCAT V2.x | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| PNOZ m ES Powerlink V1.x | - | - | ✓ | ✓ | - | - | - |

| | PNOZ m B0 v1.1 | PNOZ m B0 v1.2 | PNOZ m B0 v1.4 | PNOZ m B0 v2.0 | PNOZ m B1 v1.0 | PNOZ m B1 v1.1 | from PNOZ m B1 v1.2 |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------------|
| PNOZ m ES Power- link V2.x | - | - | ✓ | ✓ | - | - | ✓ |
| PNOZ m ES Ether- net/IP V1.x | - | - | ✓ | ✓ | - | - | - |
| PNOZ m ES Ether- net/IP V2.x | - | - | ✓ | ✓ | - | - | ✓ |
| PNOZ m ES Profinet V1.x | - | - | ✓ | ✓ | - | - | - |
| PNOZ m ES Profinet V2.x | - | - | ✓ | ✓ | - | ✓ | ✓ |
| PNOZ m EF Ether- CAT FSoE V1.x | - | - | ✓ | ✓ | - | ✓ | ✓ |


The [Service data \[86\]](#) can only be fully polled using fieldbus modules of Version 2.x. These are provided by a PNOZ m B1 from Version 1.1.




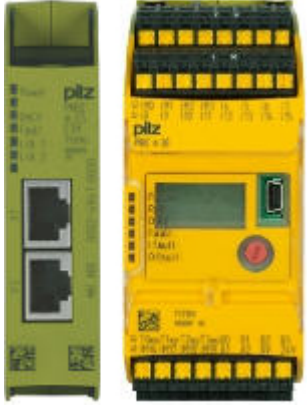
INFORMATION

A maximum of one fieldbus module can be connected to a base unit.

2.2 Communication via the communication modules

When communication takes place via a communication module, data exchange is defined via a Pilz-specific protocol. This protocol is described in more detail in the chapter entitled [ETH/RS232 interfaces](#) [ 53].

The following device combinations are possible:


| Communication Module | | Base units |
|--|---|------------|
| Communication Module PNOZ m ES RS232 |  | PNOZ m B0 |
| Communication Module PNOZ m ES ETH |  | |

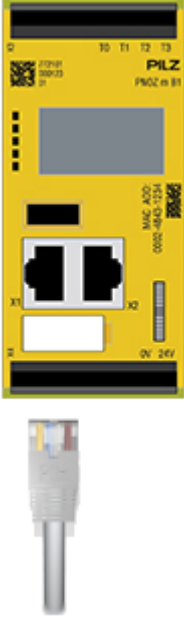


INFORMATION

If virtual inputs/outputs are to be downloaded via the communication module (without using a fieldbus module), the interface **Inputs/outputs that are downloaded via the integrated interface** must be configured in the hardware configuration in the PNOZmulti Configurator.

2.3 Communication via the integrated ETH interface

When communication takes place via an integrated ETH interface, data exchange is defined via a Pilz-specific protocol. This protocol is described in more detail in the chapter entitled [ETH/RS232 interfaces](#) [ 53].

| Communication | | Base units |
|---|--|------------|
| Integrated Ethernet interface |  | PNOZ m B1 |



INFORMATION


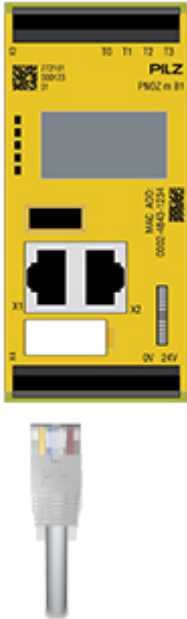
For communication via the integrated Ethernet interface, the interface ***Inputs/outputs that are downloaded via the integrated interface*** must be configured in the hardware configuration in the PNOZmulti Configurator.

2.4 Communication via Modbus/TCP

For data exchange with Modbus/TCP, the PNOZmulti 2 is the connection server. All the service data is defined in one data record, to which the client has direct access.

Communication with Modbus/TCP is described in detail in the chapter entitled [Modbus/TCP](#) [52].

The following device combinations are possible:

| Communication | | Base unit |
|---|--|----------------------------|
| Communication Module PNOZ m ES ETH [53] |  | PNOZ m B0 |
| Integrated Ethernet interface [54] |  | PNOZ m B1 from Version 1.1 |



INFORMATION

If virtual inputs/outputs are to be downloaded via the communication module (without using a fieldbus module), the interface "Inputs/outputs that are downloaded via the integrated interface" must be configured in the hardware configuration in the PNOZmulti Configurator.

3 Safety

3.1 Intended use

The communication interface on the configurable control system PNOZmulti 2 is used to transfer diagnostic data to an application program. This data may only be used for non-safety purposes, e.g. visualisation.



NOTICE

For details of the intended use and application of the configurable control system PNOZmulti 2 please refer to the operating instructions for the respective unit.

The following is deemed improper use in particular:

- ▶ Any component, technical or electrical modification to the product
- ▶ Use of the product outside the areas described in this manual
- ▶ Use of the product outside the technical details (see chapter entitled "Technical details").

3.2 Safety regulations

3.2.1 Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by persons who are competent to do so.

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with the state of the art and the applicable national, European and international laws, directives and standards.

It is the company's responsibility only to employ personnel who

- ▶ Are familiar with the basic regulations concerning health and safety / accident prevention,
- ▶ Have read and understood the information provided in the section entitled Safety
- ▶ Have a good knowledge of the generic and specialist standards applicable to the specific application.

3.2.2 Warranty and liability

All claims to warranty and liability will be rendered invalid if

- ▶ The product was used contrary to the purpose for which it is intended,
- ▶ Damage can be attributed to not having followed the guidelines in the manual,
- ▶ Operating personnel are not suitably qualified,
- ▶ Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering work etc.).

3.2.3

Disposal

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

4 Fieldbus Modules

4.1 Basics

The input and output range is each reserved an area of 32 Bytes for communication via fieldbuses; this is updated approx. every 15 ms. The Master (PC, PLC) can send 32 Bytes to the PNOZmulti 2 and receive 32 Bytes from the PNOZmulti 2. The Master can process the information in bytes, words or in double words.

4.1.1 Input data (to the PNOZmulti 2)

| Double word | Word | Byte | Contents |
|-------------|------|------|---|
| 0 | 0 | 0 | State of virtual inputs on the PNOZmulti 2 fieldbus module. The inputs are defined in the PNOZmulti Configurator. Each input that is used is given a number there, e.g. i0, i5... The state of input i0 is stored in bit 0 of byte 0; the state of input i5 is stored in bit 5 of byte 0 etc. |
| | | 1 | |
| | 1 | 2 | |
| | | 3 | |
| 1 | 2 | 4 | |
| | | 5 | |
| | 3 | 6 | |
| | | 7 | |
| 2 | 4 | 8 | |
| | | 9 | |
| | 5 | 10 | |
| | | 11 | |
| 3 | 6 | 12 | |
| | | 13 | |
| | 7 | 14 | |
| | | 15 | |
| 4 | 8 | 16 | Reserved |
| | | 17 | Table number |
| | 9 | 18 | Segment number |
| | | 19 | Reserved |
| 5 | 10 | 20 | Reserved |
| | | 21 | Reserved |
| | 11 | 22 | Reserved |
| | | 23 | Reserved |
| 6 | 12 | 24 | Reserved |
| | | 25 | Reserved |
| | 13 | 26 | Reserved |
| | | 27 | Reserved |

| Double word | Word | Byte | Contents |
|-------------|------|------|----------|
| 7 | 14 | 28 | Reserved |
| | | 29 | Reserved |
| | 15 | 30 | Reserved |
| | | 31 | Reserved |

4.1.2 Output data (from the PNOZmulti 2)


| Double Word | Word | Byte | Content |
|-------------|------|------|---|
| 0 | 0 | 0 | State of virtual outputs on the PNOZmulti 2 fieldbus module. The outputs are defined in the PNOZmulti Configurator. Each output that is used is given a number there, e.g. o0, o5... |
| | | 1 | |
| | 1 | 2 | |
| | | 3 | |
| 1 | 2 | 4 | The status of output o0 is stored in bit 0 of byte 0; the status of output o5 is stored in bit 5 of byte 0 etc. |
| | | 5 | |
| | 3 | 6 | |
| | | 7 | |
| 2 | 4 | 8 | |
| | | 9 | |
| | 5 | 10 | |
| | | 11 | |
| 3 | 6 | 12 | |
| | | 13 | |
| | 7 | 14 | |
| | | 15 | |
| 4 | 8 | 16 | LED status |
| | | 17 | Table number |
| | 9 | 18 | Segment number |
| | | 19 | Payload Byte 0 |
| 5 | 10 | 20 | Payload Byte 1 |
| | | 21 | Payload Byte 2 |
| | 11 | 22 | Payload Byte 3 |
| | | 23 | Payload Byte 4 |
| 6 | 12 | 24 | Payload Byte 5 |
| | | 25 | Payload Byte 6 |
| | 13 | 26 | Payload Byte 7 |
| | | 27 | Payload Byte 8 |

| Double Word | Word | Byte | Content |
|-------------|------|------|-----------------|
| 7 | 14 | 28 | Payload Byte 9 |
| | | 29 | Payload Byte 10 |
| | 15 | 30 | Payload Byte 11 |
| | | 31 | Payload Byte 12 |

4.1.3 Overview of tables

The following types are available:

- Table 20: Process data, base unit
- Table 21: Process data, right-hand expansion modules
- Table 22: Process data, left-hand expansion modules
- Table 23: Process data, fieldbus module / communication module
- Table 24: Process data, ST expansion module
- Table 70: Diagnostic words
- Table 71: Enable elements
- Table 80: Project Information
- Table 90: Device data, base unit
- Table 91: Device data, right-hand expansion modules
- Table 92: Device data, left-hand expansion modules
- Table 93: Device data, fieldbus module / communication module
- Table 94: Device data, ST expansion module
- Table 110: Connected devices
- Table 201: Advanced data

The content and the version and device-dependent validity of the tables are described in detail in the chapter [Service data](#) [ 86].

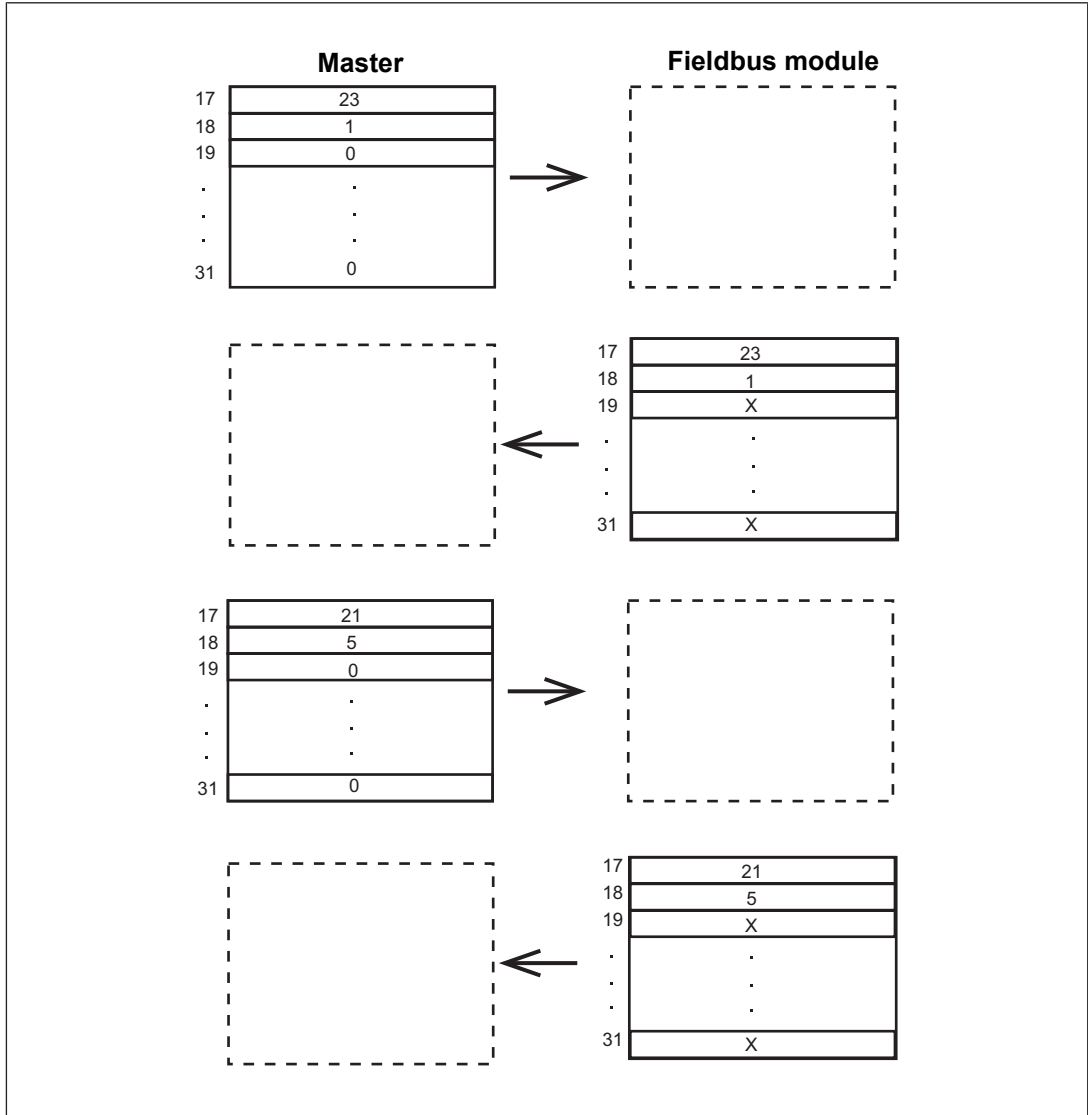
4.1.4 Access to table segments

Each table consists of one or more segments. Each segment is made up of 13 Bytes. The tables have a fixed assignment. The Master requests the required data using the table number and segment number. The Slave repeats the two numbers and sends the requested data. If data is requested that is not available, the Slave sends the error message FF (hex) or 255 (dec) instead of the segment number. The segments may be requested in any sequence.

4.1.4.1 Example 1 - Access successful

Access to existing segments

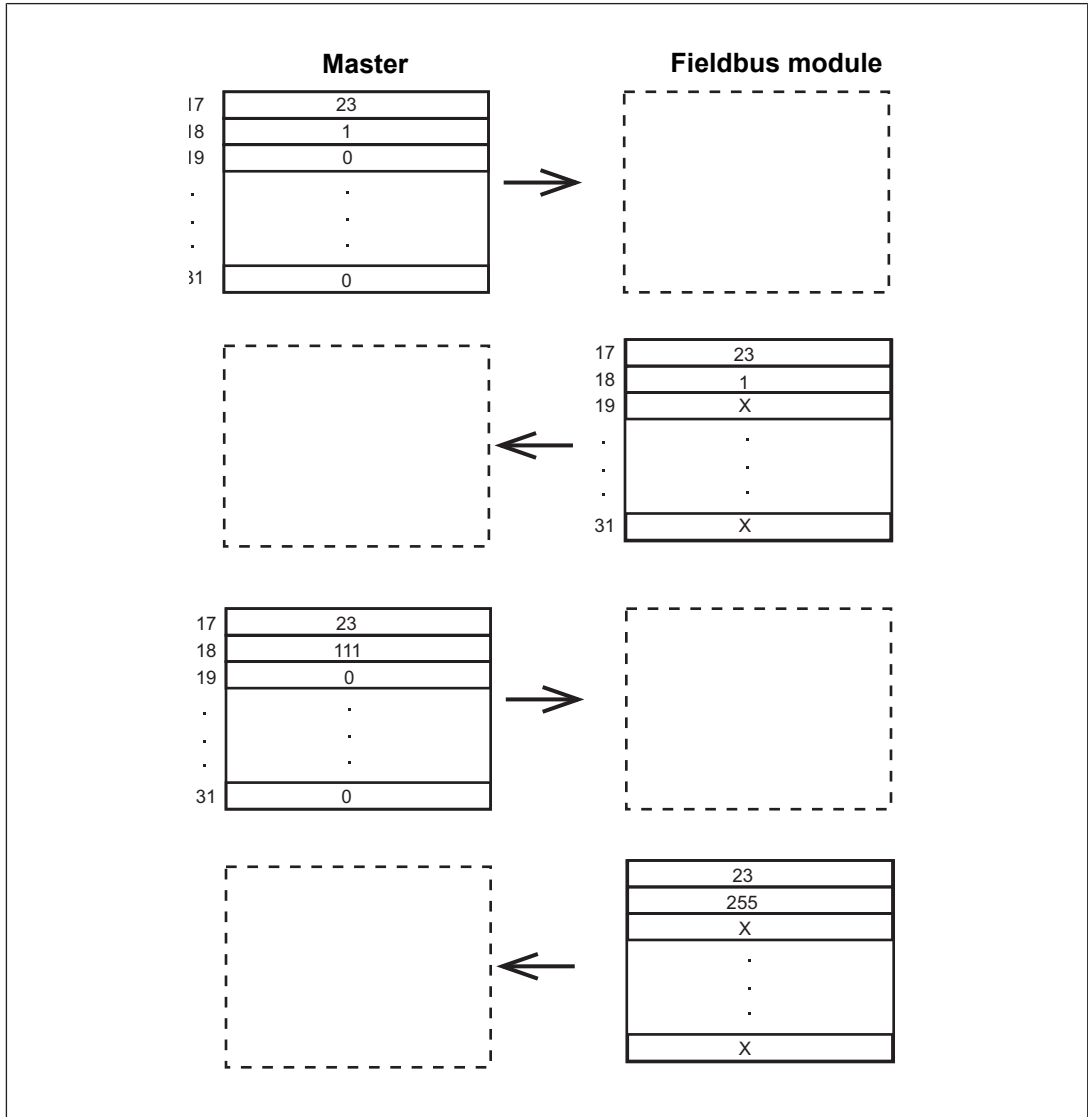
The Master requests segment 1 from table 23. The fieldbus module confirms both these details and sends segment 1. Then the data from segment 5 table 21 is requested.



4.1.4.2 Example 2 - Access failed

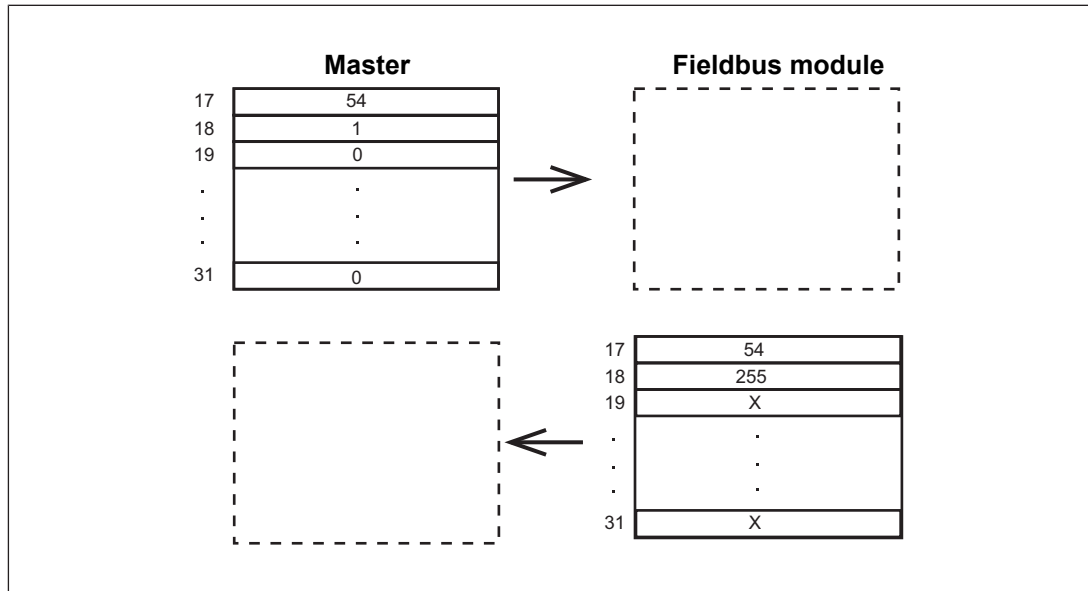
Access to non-existent segment

The Master requests segment 1 from table 23. The fieldbus module confirms both these details and sends segment 1. Then the Master requests segment 111 from table 23. As this table does not contain a segment 111, the Slave registers an error by sending back "255".



Access to non-existent table

The Master requests segment 1 from table 54. As there is no table 54, the Slave registers an error by sending back "255".



4.2 PNOZ m ES Profibus

4.2.1 Cyclical input and output data

Virtual inputs and outputs can be requested or set directly via the following modules. Each element can be selected individually in the master control system, e.g. virtual inputs i0-31. The data width is also established this way.

Input data

The Master writes to the virtual inputs of the PNOZmulti 2.

| Description | Input data from PNOZmulti 2 |
|---------------------------|-----------------------------|
| Virtual inputs i0 – i31 | 4 Input Bytes |
| Virtual inputs i32 – i63 | 4 Input Bytes |
| Virtual inputs i64 – i95 | 4 Input Bytes |
| Virtual inputs i96 – i127 | 4 Input Bytes |

Output data

The Master reads the virtual outputs of the PNOZmulti 2.

| Description | Output data from PNOZmulti 2 |
|----------------------------|------------------------------|
| Virtual outputs o0 – o31 | 4 Output Bytes |
| Virtual outputs o32 – o63 | 4 Output Bytes |
| Virtual outputs o64 – o95 | 4 Output Bytes |
| Virtual outputs o96 – o127 | 4 Output Bytes |

4.2.2 Access to table segments

The data in the tables (see [Service data \[86\]](#)) can be requested via the following modules.

Input data

The Master requests a table segment in the form:

| Description | Input data from PNOZmulti 2 |
|--------------------------|-----------------------------|
| Table and segment number | 2 Input Bytes |

Output data

The PNOZmulti 2 replies in the form:

| Description | Output data from PNOZmulti 2 |
|--|------------------------------|
| Table and segment number + 13 Byte payload | 15 Output Bytes |

A detailed description is available in the chapter entitled [Access to table segments \[19\]](#).

4.2.3 LED status

| Description | Output data from PNOZmulti 2 |
|-------------|------------------------------|
| LED status | 1 Output Byte |

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN is lit
- ▶ Bit 5-7: Reserved

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN FS is lit
- ▶ Bit 5: Reserved
- ▶ Bit 6 = 1: LED RUN ST is lit
- ▶ Bit 7: Reserved

4.2.4 Service data

The service data for PROFIBUS-DP is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module

- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content and the version and device-dependent validity of the service data and the addressing are described in detail in the chapter [Service data](#) [86].

4.2.5 Diagnostic data PNOZ m ES Profibus

These bits contain the diagnostic data of the PNOZ m B0 and PNOZ m B1

| Unit Diag_Bit | Content | PNOZ m B0 | PNOZ m B1 |
|------------------|---|-----------|-----------|
| 00 | RUN FS, base unit is in FS RUN state | x | x |
| 01 | STOP FS, base unit is in FS STOP state | x | x |
| 02 | Base unit was stopped by the Configurator | x | x |
| 03 | Reserved | | |
| 04 | External fault | x | x |
| 05 | Internal error | x | x |
| 06 | External error on the inputs | x | x |
| 07 | Internal error on the inputs | x | |
| 08 | External error on the outputs | x | x |
| 09 | Internal error on the outputs | x | |
| 10 | No connection to base unit | x | x |
| 11 | STOP ST, base unit is in ST STOP state | | x |
| 12 | Error on the 1st ST expansion module, right | | x |
| 13 | Error on the 2nd ST expansion module, right | | x |
| 14 | Error on the 3rd ST expansion module, right | | x |
| 15 | Error on the 4th ST expansion module, right | | x |
| 16 | Error on the 5th ST expansion module, right | | x |
| 17 | Error on the 6th ST expansion module, right | | x |
| 18 | Reserved | | |
| ... | | | |
| 21 | | | |
| 22 | Error on the base unit | x | x |
| 23 | Reserved | | |
| 24 | Error on the 1st FS expansion module, right | x | x |
| 25 | Error on the 2nd FS expansion module, right | x | x |

| Unit Diag_Bit | Content | PNOZ m B0 | PNOZ m B1 |
|------------------|--|-----------|-----------|
| 26 | Error on the 3rd FS expansion module, right | x | x |
| 27 | Error on the 4th FS expansion module, right | x | x |
| 28 | Error on the 5th FS expansion module, right | x | x |
| 29 | Error on the 6th FS expansion module, right | x | x |
| 30 | Error on the 7th FS expansion module, right | | x |
| 31 | Error on the 8th FS expansion module, right | | x |
| 32 | Error on the 9th FS expansion module, right | | x |
| 33 | Error on the 10th FS expansion module, right | | x |
| 34 | Error on the 11th FS expansion module, right | | x |
| 35 | Error on the 12th FS expansion module, right | | x |
| 36 ... 39 | Reserved | | |
| 40 | Error on the 1st FS expansion module, left | x | x |
| 41 | Error on the 2nd FS expansion module, left | x | x |
| 42 | Error on the 3rd FS expansion module, left | x | x |
| 43 | Error on the 4th FS expansion module, left | x | x |
| 44 ... 45 | Reserved | | |
| 46 | Error on the communication module | x | |
| 47 ... 55 | Reserved | | |
| 56 | Error in the configuration, F_81 | x | |
| 57 | Error in the user program, F_82 | x | |
| 58 | Error in the periphery, F_83 | x | |
| 59 | Error on the speed monitor, F_84 | x | |
| 60 | Error on the bus module, F_85 | x | |
| 61 | Error on the link module, F_86 | x | |
| 62 | Error on the analogue input module, F_87 | x | |
| 63 | Reserved | | |
| 64 | Error on the input/output module, F_89 | x | |
| 65 | Error on the Ethernet module, F_8A | x | |

| Unit Diag_Bit | Content | PNOZ m B0 | PNOZ m B1 |
|------------------|---|-----------|-----------|
| 66 | Internal error on the left-hand expansion module, F_90 | x | |
| 67 | Internal periphery error, F_93 | x | |
| 68 | Internal error on the right-hand expansion module, F_94 | x | |
| 69 | Internal error on the right-hand expansion module, F_95 | x | |
| 70 | Internal self test error, F_B0 | x | |
| 71 | Internal data error, F_B1 | x | |
| 72 | Internal parameter error, F_B2 | x | |
| 73 | Internal serial/I2C error, F_B3 | x | |
| 74 | Internal time error, F_B4 | x | |
| 75 | Internal processor error, F_B5 | x | |
| 76 | Internal parameter error, F_B6 | x | |
| 77 | Internal compare error, F_B7 | x | |
| 78 | Internal sequence error, F_B8 | x | |
| 79 | Internal periphery error, F_B9 | x | |
| 80 | Internal error on bus module, F_BA | x | |
| 81 | Internal error on link module, F_BB | x | |
| 82 | Internal error on speed monitor, F_BC | x | |
| 83 | Internal error on analogue input module, F_BD | x | |
| 84 | Internal error on link module, F_BE | x | |
| 85 | Internal error on link module, F_BF | x | |
| 86 | Internal error on the left-hand expansion module, F_C0 | x | |
| 87 | Internal error on the left-hand expansion module, F_C1 | x | |
| 88 | Internal error on the Ethernet module, F_C2 | x | |
| 89 | Internal compare error, F_C3 | x | |
| 90 | Internal error on the right-hand expansion module, F_C4 | x | |
| 91 | Internal error on the right-hand expansion module, F_C5 | x | |
| 92 | Reserved | x | |
| ... | | | |
| 95 | | | |

Explanation: Bits 56 to 91 display the last content of the error stack (corresponds to the error class). The bits are deleted as soon as PNOZmulti 2 returns to a RUN state.

4.3 PNOZ m ES CANopen

4.3.1 Service Data Objects (SDOs)

The object directory of the CANopen is where all the relevant device parameters and current process data of the PNOZmulti 2 are stored. These can be read and written via Service Data Objects (SDOs).

To enable the fieldbus module to be incorporated easily within a CANopen network, the object directory is available as an EDS file. The content is described in the chapter entitled [Service data](#) [86].

4.3.2 Service data

The service data for CANopen is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module
- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content and the version and device-dependent validity of the service data and the addressing are described in detail in the chapter [Service data](#) [86].

4.3.3 Process Data Objects (PDOs)

The output data is stored as follows:

| Byte | Object Index (hex) | Sub Index (hex) | PDO | COB-ID |
|------|--------------------|-----------------|--------|------------------------|
| 0 | 2000 | 1 | TPDO 1 | 180h + node address |
| 1 | 2000 | 2 | | |
| 2 | 2000 | 3 | | |
| 3 | 2000 | 4 | | |
| 4 | 2000 | 5 | | |
| 5 | 2000 | 6 | | |
| 6 | 2000 | 7 | | |
| 7 | 2000 | 8 | | |

| Byte | Object Index (hex) | Sub Index (hex) | PDO | COB-ID |
|------|-----------------------|--------------------|--------|------------------------|
| 8 | 2000 | 9 | TPDO 2 | 280h + node address |
| 9 | 2000 | A | | |
| 10 | 2000 | B | | |
| 11 | 2000 | C | | |
| 12 | 2000 | D | | |
| 13 | 2000 | E | | |
| 14 | 2000 | F | | |
| 15 | 2000 | 10 | | |
| 16 | 2000 | 11 | TPDO 3 | 380h + node address |
| 17 | 2000 | 12 | | |
| 18 | 2000 | 13 | | |
| 19 | 2000 | 14 | | |
| 20 | 2000 | 15 | | |
| 21 | 2000 | 16 | | |
| 22 | 2000 | 17 | | |
| 23 | 2000 | 18 | | |
| 24 | 2000 | 19 | TPDO 4 | 480h + node address |
| 25 | 2000 | 1A | | |
| 26 | 2000 | 1B | | |
| 27 | 2000 | 1C | | |
| 28 | 2000 | 1D | | |
| 29 | 2000 | 1E | | |
| 30 | 2000 | 1F | | |
| 31 | 2000 | 20 | | |

The input data is stored as follows:

| Byte | Object Index (hex) | Sub Index (hex) | PDO | COB-ID |
|------|-----------------------|--------------------|--------|------------------------|
| 0 | 2100 | 1 | RPDO 1 | 200h + node address |
| 1 | 2100 | 2 | | |
| 2 | 2100 | 3 | | |
| 3 | 2100 | 4 | | |
| 4 | 2100 | 5 | | |
| 5 | 2100 | 6 | | |
| 6 | 2100 | 7 | | |
| 7 | 2100 | 8 | | |
| 8 | 2100 | 9 | RPDO 2 | 300h + node address |
| 9 | 2100 | A | | |
| 10 | 2100 | B | | |
| 11 | 2100 | C | | |
| 12 | 2100 | D | | |
| 13 | 2100 | E | | |
| 14 | 2100 | F | | |
| 15 | 2100 | 10 | | |
| 16 | 2100 | 11 | RPDO 3 | 400h + node address |
| 17 | 2100 | 12 | | |
| 18 | 2100 | 13 | | |
| 19 | 2100 | 14 | | |
| 20 | 2100 | 15 | | |
| 21 | 2100 | 16 | | |
| 22 | 2100 | 17 | | |
| 23 | 2100 | 18 | | |
| 24 | 2100 | 19 | RPDO 4 | 500h + node address |
| 25 | 2100 | 1A | | |
| 26 | 2100 | 1B | | |
| 27 | 2100 | 1C | | |
| 28 | 2100 | 1D | | |
| 29 | 2100 | 1E | | |
| 30 | 2100 | 1F | | |
| 31 | 2100 | 20 | | |

Key to abbreviations:

TPDO: Transmit Process Data Object

RPDO: Receive Process Data Object

COB-ID: Communication Object Identifier

4.3.4 Formation of the object 0x2000 output data

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|-----------------------------|------|------|------|------|------|------|-------|
| | | Virtual outputs o0 ... o127 | | | | | | | |
| 0x2000:01 | 1 | Bit 7 | ... | | | | | | Bit 0 |
| | | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 |
| 0x2000:02 | 1 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 |
| 0x2000:03 | 1 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 |
| 0x2000:04 | 1 | o31 | o30 | o29 | o28 | o27 | o26 | o25 | o24 |
| 0x2000:05 | 1 | o39 | o38 | o37 | o36 | o35 | o34 | o33 | o32 |
| 0x2000:06 | 1 | o47 | o46 | o45 | o44 | o43 | o42 | o41 | o40 |
| 0x2000:07 | 1 | o55 | o54 | o53 | o52 | o51 | o50 | o49 | o48 |
| 0x2000:08 | 1 | o63 | o62 | o61 | o60 | o59 | o58 | o57 | o56 |
| 0x2000:09 | 1 | o71 | o70 | o69 | o68 | o67 | o66 | o65 | o64 |
| 0x2000:0A | 1 | o79 | o78 | o77 | o76 | o75 | o74 | o73 | o72 |
| 0x2000:0B | 1 | o87 | o86 | o85 | o84 | o83 | o82 | o81 | o80 |
| 0x2000:0C | 1 | o95 | o94 | o93 | o92 | o91 | o90 | o89 | o88 |
| 0x2000:0D | 1 | o103 | o102 | o101 | o100 | o99 | o98 | o97 | o96 |
| 0x2000:0E | 1 | o111 | o110 | o109 | o108 | o107 | o106 | o105 | o104 |
| 0x2000:0F | 1 | o119 | o118 | o117 | o116 | o115 | o114 | o113 | o112 |
| 0x2000:10 | 1 | o127 | o126 | o125 | o124 | o123 | o122 | o121 | o120 |
| 0x2000:11 | 1 | LED status | | | | | | | |
| 0x2000:12 | 1 | Table number | | | | | | | |
| 0x2000:13 | 1 | Segment number | | | | | | | |
| 0x2000:14 | 13 | Byte 0 to 12 of payload | | | | | | | |
| ... | | | | | | | | | |
| 0x2000:20 | | | | | | | | | |

4.3.5 Formation of the object 0x2100 input data

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|----------------------------|------|------|------|------|------|------|-------|
| | | Virtual inputs i0 ... i127 | | | | | | | |
| | | Bit 7 | ... | | | | | | Bit 0 |
| 0x2100:01 | 1 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 |
| 0x2100:02 | 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 |
| 0x2100:03 | 1 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 |
| 0x2100:04 | 1 | i31 | i30 | i29 | i28 | i27 | i26 | i25 | i24 |
| 0x2100:05 | 1 | i39 | i38 | i37 | i36 | i35 | i34 | i33 | i32 |
| 0x2100:06 | 1 | i47 | i46 | i45 | i44 | i43 | i42 | i41 | i40 |
| 0x2100:07 | 1 | i55 | i54 | i53 | i52 | i51 | i50 | i49 | i48 |
| 0x2100:08 | 1 | i63 | i62 | i61 | i60 | i59 | i58 | i57 | i56 |
| 0x2100:09 | 1 | i71 | i70 | i69 | i68 | i67 | i66 | i65 | i64 |
| 0x2100:0A | 1 | i79 | i78 | i77 | i76 | i75 | i74 | i73 | i72 |
| 0x2100:0B | 1 | i87 | i86 | i85 | i84 | i83 | i82 | i81 | i80 |
| 0x2100:0C | 1 | i95 | i94 | i93 | i92 | i91 | i90 | i89 | i88 |
| 0x2100:0D | 1 | i103 | i102 | i101 | i100 | i99 | i98 | i97 | i96 |
| 0x2100:0E | 1 | i111 | i110 | i109 | i108 | i107 | i106 | i105 | i104 |
| 0x2100:0F | 1 | i119 | i118 | i117 | i116 | i115 | i114 | i113 | i112 |
| 0x2100:10 | 1 | i127 | i126 | i125 | i124 | i123 | i122 | i121 | i120 |
| 0x2100:11 | 1 | Reserved | | | | | | | |
| 0x2100:12 | 1 | Table number | | | | | | | |
| 0x2100:13 | 1 | Segment number | | | | | | | |
| 0x2100:14 | 13 | Reserved | | | | | | | |
| ... | | | | | | | | | |
| 0x2100:20 | | | | | | | | | |

4.4 PNOZ m ES EtherCAT

4.4.1 Service Data Objects (SDOs)

The object directory of the EtherCAT is where all the relevant device parameters and current process data of the PNOZmulti 2 are stored. These can be read and written via Service Data Objects (SDOs).

To enable the fieldbus module to be incorporated easily within an EtherCAT network, the object directory is available as an XML file. The content is described in the chapter entitled [Service data \[86\]](#).

4.4.2 Service data

The service data for EtherCAT is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module
- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content and the version and device-dependent validity of the service data and the addressing are described in detail in the chapter [Service data](#) [86].

4.4.3 Setting the Communication Area (PDOs)

The PDO mapping of PNOZ m ES EtherCAT is available preselected if restarted, as in the table. The mapping of process data can be adapted. The PNOZmulti input and output data (objects 0x2100 and 0x2000) are updated every 10-15 ms.

| Mapping objects | Size | Name | Index (hex) | Sub-Index(hex) | Contents |
|-----------------|------|-------|-------------|----------------|--|
| 0x1A00 | 32 | TxPDO | 2000 | 01 - 20 | Output data (from the PNOZmulti) |
| 0x1A01 | 128 | TxPDO | 2000 | 01 - 11 | Default configuration (freely configurable) |
| | | | 2001 | 01 - 08 | |
| | | | 2001 | 49 - 50 | |
| | | | 2002 | 01 - 08 | |
| | | | 2002 | 25 – 2C | |
| | | | 2002 | 49–50 | |
| | | | 2007 | 01-08 | |
| | | | 2007 | 25–2C | |
| | | | 2007 | 49–50 | |
| | | | 200A | 01–2E | |
| 0x1600 | 19 | RxPDO | 2100 | 01-13 | Input data (to the PNOZmulti) |

Key to abbreviations:

TxPDO: Transmit Process Data Object

RxPDO: Receive Process Data Object

4.4.4 Formation of the object 0x2000 output data

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|-----------------------------|------|------|------|------|------|------|-------|
| | | Virtual outputs o0 ... o127 | | | | | | | |
| 0x2000:01 | 1 | Bit 7 | ... | | | | | | Bit 0 |
| | | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 |
| 0x2000:02 | 1 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 |
| 0x2000:03 | 1 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 |
| 0x2000:04 | 1 | o31 | o30 | o29 | o28 | o27 | o26 | o25 | o24 |
| 0x2000:05 | 1 | o39 | o38 | o37 | o36 | o35 | o34 | o33 | o32 |
| 0x2000:06 | 1 | o47 | o46 | o45 | o44 | o43 | o42 | o41 | o40 |
| 0x2000:07 | 1 | o55 | o54 | o53 | o52 | o51 | o50 | o49 | o48 |
| 0x2000:08 | 1 | o63 | o62 | o61 | o60 | o59 | o58 | o57 | o56 |
| 0x2000:09 | 1 | o71 | o70 | o69 | o68 | o67 | o66 | o65 | o64 |
| 0x2000:0A | 1 | o79 | o78 | o77 | o76 | o75 | o74 | o73 | o72 |
| 0x2000:0B | 1 | o87 | o86 | o85 | o84 | o83 | o82 | o81 | o80 |
| 0x2000:0C | 1 | o95 | o94 | o93 | o92 | o91 | o90 | o89 | o88 |
| 0x2000:0D | 1 | o103 | o102 | o101 | o100 | o99 | o98 | o97 | o96 |
| 0x2000:0E | 1 | o111 | o110 | o109 | o108 | o107 | o106 | o105 | o104 |
| 0x2000:0F | 1 | o119 | o118 | o117 | o116 | o115 | o114 | o113 | o112 |
| 0x2000:10 | 1 | o127 | o126 | o125 | o124 | o123 | o122 | o121 | o120 |
| 0x2000:11 | 1 | LED status | | | | | | | |
| 0x2000:12 | 1 | Table number | | | | | | | |
| 0x2000:13 | 1 | Segment number | | | | | | | |
| 0x2000:14 | 13 | Byte 0 to 12 of payload | | | | | | | |
| ... | | | | | | | | | |
| 0x2000:20 | | | | | | | | | |

4.4.5 Formation of the object 0x2100 input data

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|----------------------------|------|------|------|------|------|------|-------|
| | | Virtual inputs i0 ... i127 | | | | | | | |
| | | Bit 7 | ... | | | | | | Bit 0 |
| 0x2100:01 | 1 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 |
| 0x2100:02 | 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 |
| 0x2100:03 | 1 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 |
| 0x2100:04 | 1 | i31 | i30 | i29 | i28 | i27 | i26 | i25 | i24 |
| 0x2100:05 | 1 | i39 | i38 | i37 | i36 | i35 | i34 | i33 | i32 |
| 0x2100:06 | 1 | i47 | i46 | i45 | i44 | i43 | i42 | i41 | i40 |
| 0x2100:07 | 1 | i55 | i54 | i53 | i52 | i51 | i50 | i49 | i48 |
| 0x2100:08 | 1 | i63 | i62 | i61 | i60 | i59 | i58 | i57 | i56 |
| 0x2100:09 | 1 | i71 | i70 | i69 | i68 | i67 | i66 | i65 | i64 |
| 0x2100:0A | 1 | i79 | i78 | i77 | i76 | i75 | i74 | i73 | i72 |
| 0x2100:0B | 1 | i87 | i86 | i85 | i84 | i83 | i82 | i81 | i80 |
| 0x2100:0C | 1 | i95 | i94 | i93 | i92 | i91 | i90 | i89 | i88 |
| 0x2100:0D | 1 | i103 | i102 | i101 | i100 | i99 | i98 | i97 | i96 |
| 0x2100:0E | 1 | i111 | i110 | i109 | i108 | i107 | i106 | i105 | i104 |
| 0x2100:0F | 1 | i119 | i118 | i117 | i116 | i115 | i114 | i113 | i112 |
| 0x2100:10 | 1 | i127 | i126 | i125 | i124 | i123 | i122 | i121 | i120 |
| 0x2100:11 | 1 | Reserved | | | | | | | |
| 0x2100:12 | 1 | Table number | | | | | | | |
| 0x2100:13 | 1 | Segment number | | | | | | | |
| 0x2100:14 | 13 | Reserved | | | | | | | |
| ... | | | | | | | | | |
| 0x2100:20 | | | | | | | | | |

4.4.6 Diagnostic data

The following table includes emergency messages from PNOZ m ES EtherCAT Version 2.0


| Error code | Error register | Contents | Manufacturer Bytes |
|------------|----------------|---|--------------------------|
| 0xFF00 | 0x81 | No connection to base unit | 0xB0 0x00 0x00 0x00 0x00 |
| 0x0000 | 0x00 | Connection to the base unit has been restored | 0xB0 0x00 0x00 0x00 0x00 |

The EtherCAT Error register object 0x1001 is updated according to the Error register field of the last emergency message.

4.5 PNOZ m EF EtherCAT FSoE

4.5.1 Service Data Objects (SDOs)


The object directory of the EtherCAT FSoE is where all the relevant device parameters and current process data of the PNOZmulti 2 are stored. These can be read and written via Service Data Objects (SDOs).

To enable the fieldbus module to be incorporated easily within an EtherCAT FSoE network, the object directory is available as an XML file. The content is described in the chapter entitled [Service data](#) [ 86].

4.5.2 Service data

The service data for EtherCAT FSoE is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module
- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content and the version and device-dependent validity of the service data and the addressing are described in detail in the chapter [Service data](#) [ 86].

4.5.3 Setting the Communication Area (PDOs)

In the case of a restart, the PDO mapping of the PNOZ m EF EtherCAT FSoE is available preselected, as shown in the table. The mapping of process data can be adapted.

The virtual inputs and outputs are available to the base unit and the PNOZ m EF EtherCAT FSoE. The virtual inputs are OR-linked in both devices.



NOTICE

When using the FSoE interface, make sure that all FSoE subscribers have successfully completed a test in an official EtherCAT Test Centre.

The input and output data (objects 0x2100 and 0x2000) of the base unit is updated every 10-15 ms.

The inputs and outputs that are processed by the PNOZ m EF EtherCAT FSoE are available within 5-10 ms.

| Mapping objects | Size | Name | Index (hex) | Sub-Index(hex) | Content |
|-----------------|------|-------|-------------|----------------|--|
| 0x1B00 | 32 | TxPDO | 2000 | 01 - 20 | Output data (from the PNOZmulti) |
| 0x1B01 | 64 | TxPDO | 2001 | 49 - 50 | Default configuration (freely configurable) |
| | | | 2002 | 01 - 08 | |
| | | | 2002 | 25 - 2C | |
| | | | 2002 | 49 - 50 | |
| | | | 200A | 01 - 20 | |
| 0x1700 | 19 | RxPDO | 2100 | 01 - 13 | Input data (to the PNOZmulti) |

Key to abbreviations:

TxPDO: Transmit Process Data Object

RxPDO: Receive Process Data Object

4.5.4 Formation of the object 0x2000 output data

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|-----------------------------|------|------|------|------|------|------|-------|
| | | Virtual outputs o0 ... o127 | | | | | | | |
| 0x2000:01 | 1 | Bit 7 | ... | | | | | | Bit 0 |
| | | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 |
| 0x2000:02 | 1 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 |
| 0x2000:03 | 1 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 |
| 0x2000:04 | 1 | o31 | o30 | o29 | o28 | o27 | o26 | o25 | o24 |
| 0x2000:05 | 1 | o39 | o38 | o37 | o36 | o35 | o34 | o33 | o32 |
| 0x2000:06 | 1 | o47 | o46 | o45 | o44 | o43 | o42 | o41 | o40 |
| 0x2000:07 | 1 | o55 | o54 | o53 | o52 | o51 | o50 | o49 | o48 |
| 0x2000:08 | 1 | o63 | o62 | o61 | o60 | o59 | o58 | o57 | o56 |
| 0x2000:09 | 1 | o71 | o70 | o69 | o68 | o67 | o66 | o65 | o64 |
| 0x2000:0A | 1 | o79 | o78 | o77 | o76 | o75 | o74 | o73 | o72 |
| 0x2000:0B | 1 | o87 | o86 | o85 | o84 | o83 | o82 | o81 | o80 |
| 0x2000:0C | 1 | o95 | o94 | o93 | o92 | o91 | o90 | o89 | o88 |
| 0x2000:0D | 1 | o103 | o102 | o101 | o100 | o99 | o98 | o97 | o96 |
| 0x2000:0E | 1 | o111 | o110 | o109 | o108 | o107 | o106 | o105 | o104 |
| 0x2000:0F | 1 | o119 | o118 | o117 | o116 | o115 | o114 | o113 | o112 |
| 0x2000:10 | 1 | o127 | o126 | o125 | o124 | o123 | o122 | o121 | o120 |
| 0x2000:11 | 1 | LED status | | | | | | | |

| Index (hex) | Size (byte) | Contents |
|-------------|-------------|-------------------------|
| 0x2000:12 | 1 | Table number |
| 0x2000:13 | 1 | Segment number |
| 0x2000:14 | 13 | Byte 0 to 12 of payload |
| ... | | |
| 0x2000:20 | | |

4.5.5 Formation of the object 0x2100 input data

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|----------------------------|------|------|------|------|------|------|-------|
| | | Virtual inputs i0 ... i127 | | | | | | | |
| | | Bit 7 | ... | | | | | | Bit 0 |
| 0x2100:01 | 1 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 |
| 0x2100:02 | 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 |
| 0x2100:03 | 1 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 |
| 0x2100:04 | 1 | i31 | i30 | i29 | i28 | i27 | i26 | i25 | i24 |
| 0x2100:05 | 1 | i39 | i38 | i37 | i36 | i35 | i34 | i33 | i32 |
| 0x2100:06 | 1 | i47 | i46 | i45 | i44 | i43 | i42 | i41 | i40 |
| 0x2100:07 | 1 | i55 | i54 | i53 | i52 | i51 | i50 | i49 | i48 |
| 0x2100:08 | 1 | i63 | i62 | i61 | i60 | i59 | i58 | i57 | i56 |
| 0x2100:09 | 1 | i71 | i70 | i69 | i68 | i67 | i66 | i65 | i64 |
| 0x2100:0A | 1 | i79 | i78 | i77 | i76 | i75 | i74 | i73 | i72 |
| 0x2100:0B | 1 | i87 | i86 | i85 | i84 | i83 | i82 | i81 | i80 |
| 0x2100:0C | 1 | i95 | i94 | i93 | i92 | i91 | i90 | i89 | i88 |
| 0x2100:0D | 1 | i103 | i102 | i101 | i100 | i99 | i98 | i97 | i96 |
| 0x2100:0E | 1 | i111 | i110 | i109 | i108 | i107 | i106 | i105 | i104 |
| 0x2100:0F | 1 | i119 | i118 | i117 | i116 | i115 | i114 | i113 | i112 |
| 0x2100:10 | 1 | i127 | i126 | i125 | i124 | i123 | i122 | i121 | i120 |
| 0x2100:11 | 1 | Reserved | | | | | | | |
| 0x2100:12 | 1 | Table number | | | | | | | |
| 0x2100:13 | 1 | Segment number | | | | | | | |
| 0x2100:14 | 13 | Reserved | | | | | | | |
| ... | | | | | | | | | |
| 0x2100:20 | | | | | | | | | |

4.5.6 Formation of the object 0x6nn1 FSoE input data

The FSoE input data is stated in the object 0x6nn1.

The digits “nn” stand for the number of the FSoE connection.

The number of Input Bytes on an FSoE connection depends on the module that is used.

The maximum number is 16.

| Sub Index | 1. FSoE connection | 2. FSoE connection | 3. FSoE connection | ... | 64. FSoE connection |
|-----------|--------------------|--------------------|--------------------|-----|---------------------|
| | 0x6001 | 0x6011 | 0x6021 | ... | 0x63F1 |
| 1 | 1. Input Byte | 1. Input Byte | 1. Input Byte | ... | 1. Input Byte |
| 2 | 2. Input Byte | 2. Input Byte | 2. Input Byte | ... | 2. Input Byte |

| Sub Index | 1. FSoE connection | 2. FSoE connection | 3. FSoE connection | ... | 64. FSoE connection |
|-----------|--------------------|--------------------|--------------------|-----|---------------------|
| 3 | 3. Input Byte | 3. Input Byte | 3. Input Byte | ... | 3. Input Byte |
| ... | ... | ... | ... | ... | ... |
| n | n. Input Byte | n. Input Byte | n. Input Byte | ... | n. Input Byte |

4.5.7 Formation of the object 0x7nn1 FSoE output data

The FSoE output data is stated in the object 0x7nn1.

The digits “nn” stand for the number of the FSoE connection.

The number of Input Bytes on an FSoE connection depends on the module that is used.

The maximum number is 16.

| Sub Index | 1. FSoE connection | 2. FSoE connection | 3. FSoE connection | ... | 64. FSoE connection |
|-----------|--------------------|--------------------|--------------------|-----|---------------------|
| | 0x7001 | 0x7011 | 0x7021 | ... | 0x73F1 |
| 1 | 1. Output Byte | 1. Output Byte | 1. Output Byte | ... | 1. Output Byte |
| 2 | 2. Output Byte | 2. Output Byte | 2. Output Byte | ... | 2. Output Byte |
| 3 | 3. Output Byte | 3. Output Byte | 3. Output Byte | ... | 3. Output Byte |
| ... | ... | ... | ... | ... | ... |
| n | n. Output Byte | n. Output Byte | n. Output Byte | ... | n. Output Byte |

4.5.8 FSoE connection information

The FSoE connection information is stated in the object 0x7nn1.

The digits “nn” stand for the number of the FSoE connection.

| Sub Index | 1. FSoE connection | 2. FSoE connection | 3. FSoE connection | ... | 64. FSoE connection |
|-----------|------------------------|------------------------|------------------------|-----|------------------------|
| | 0x9001 | 0x9011 | 0x9021 | ... | 0x93F1 |
| 1 | Version | Version | Version | ... | Version |
| 2 | FSoE Slave Address | FSoE Slave Address | FSoE Slave Address | ... | FSoE Slave Address |
| 3 | Connection ID | Connection ID | Connection ID | ... | Connection ID |
| 4 | Watchdog Time | Watchdog Time | Watchdog Time | ... | Watchdog Time |
| 5 | Unique Device ID | Unique Device ID | Unique Device ID | ... | Unique Device ID |
| 6 | Connection Type | Connection Type | Connection Type | ... | Connection Type |
| 7 | ComParameterLength | ComParameterLength | ComParameterLength | ... | ComParameterLength |
| 8 | Appl. Parameter Length | Appl. Parameter Length | Appl. Parameter Length | ... | Appl. Parameter Length |
| 9 | SRA CRC | SRA CRC | SRA CRC | ... | SRA CRC |

4.5.9 FSoE connection diagnosis

The FSoE connection diagnosis is stated in the object 0xAnn0.
The digits “nn” stand for the number of the FSoE connection.

| Sub Index | 1. FSoE connection | 2. FSoE connection | 3. FSoE connection | ... | 64. FSoE connection |
|-----------|----------------------|----------------------|----------------------|-----|----------------------|
| | 0xA000 | 0x A010 | 0x A020 | ... | 0xA3B0 |
| 1 | Connection State | Connection State | Connection State | ... | Connection State |
| 2 | Connection Diagnosis | Connection Diagnosis | Connection Diagnosis | ... | Connection Diagnosis |

Connection State

indicates the state of the FSoE connection (e.g. **RESET + SESSION**)

Connection Diagnosis

The bits are divided as follows:

| Connection Diagnosis | Bit 7 ... 5 | Bit 4 ... 5 | Bit 0 ... 3 |
|----------------------|---|--|---|
| | 0:No Error 2:Establishing Connection FSoE Connection in Failsafe State 1:FSoE Slave 4:FSoE Master 5:Both | 0:No Error or 0:Error in Master Connection 1:Error in Slave Connection | 0:No Error 1:Wrong Command 2:Unknown Command 3:Wrong Connection ID 4:Wrong CRC 5:Watchdog Expired 6:Wrong FSoE Address 7:Wrong Data 8:Wrong Communication Parameter Length 9:Wrong Communication Parameter 10:Wrong Application Parameter Length 11: Wrong Application Parameter 12:Unexpected Session Command 13:Failsafe Data Received |

4.6 PNOZ m ES Powerlink

4.6.1 Service Data Objects (SDOs)

The object directory of the Ethernet POWERLINK is where all the relevant device parameters and current process data of the PNOZmulti 2 are stored. These can be read and written via Service Data Objects (SDOs).

To enable the fieldbus module to be incorporated easily within an Ethernet POWERLINK network, the object directory is available as an XDD file. The content is described in the chapter entitled [Service data](#) [86].

4.6.2 Service data

The service data for Ethernet POWERLINK is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module
- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content and the version and device-dependent validity of the service data and the addressing are described in detail in the chapter [Service data](#) [86].

4.6.3 Process Data Objects (PDOs)

A PDO can be assembled individually from the SDOs.

Maximum size for the PDOs:

- ▶ 254 Bytes input data
- ▶ 32 Bytes output data

The inputs and outputs are viewed from the Managing Node.

4.6.4 Formation of the object 0x2000 output data

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|-----------------------------|-----|-----|-----|-----|-----|-----|-------|
| | | Virtual outputs o0 ... o127 | | | | | | | |
| 0x2000:01 | 1 | Bit 7 | ... | | | | | | Bit 0 |
| | | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 |
| 0x2000:02 | 1 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 |
| 0x2000:03 | 1 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 |
| 0x2000:04 | 1 | o31 | o30 | o29 | o28 | o27 | o26 | o25 | o24 |
| 0x2000:05 | 1 | o39 | o38 | o37 | o36 | o35 | o34 | o33 | o32 |
| 0x2000:06 | 1 | o47 | o46 | o45 | o44 | o43 | o42 | o41 | o40 |
| 0x2000:07 | 1 | o55 | o54 | o53 | o52 | o51 | o50 | o49 | o48 |
| 0x2000:08 | 1 | o63 | o62 | o61 | o60 | o59 | o58 | o57 | o56 |
| 0x2000:09 | 1 | o71 | o70 | o69 | o68 | o67 | o66 | o65 | o64 |
| 0x2000:0A | 1 | o79 | o78 | o77 | o76 | o75 | o74 | o73 | o72 |
| 0x2000:0B | 1 | o87 | o86 | o85 | o84 | o83 | o82 | o81 | o80 |
| 0x2000:0C | 1 | o95 | o94 | o93 | o92 | o91 | o90 | o89 | o88 |

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|-------------------------|------|------|------|------|------|------|------|
| 0x2000:0D | 1 | o103 | o102 | o101 | o100 | o99 | o98 | o97 | o96 |
| 0x2000:0E | 1 | o111 | o110 | o109 | o108 | o107 | o106 | o105 | o104 |
| 0x2000:0F | 1 | o119 | o118 | o117 | o116 | o115 | o114 | o113 | o112 |
| 0x2000:10 | 1 | o127 | o126 | o125 | o124 | o123 | o122 | o121 | o120 |
| 0x2000:11 | 1 | LED status | | | | | | | |
| 0x2000:12 | 1 | Table number | | | | | | | |
| 0x2000:13 | 1 | Segment number | | | | | | | |
| 0x2000:14 | 13 | Byte 0 to 12 of payload | | | | | | | |
| ... | | | | | | | | | |
| 0x2000:20 | | | | | | | | | |

4.6.5 Formation of the object 0x2100 input data

| Index (hex) | Size (byte) | Contents | | | | | | | |
|-------------|-------------|----------------------------|------|------|------|------|------|------|-------|
| | | Virtual inputs i0 ... i127 | | | | | | | |
| | | Bit 7 | ... | | | | | | Bit 0 |
| 0x2100:01 | 1 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 |
| 0x2100:02 | 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 |
| 0x2100:03 | 1 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 |
| 0x2100:04 | 1 | i31 | i30 | i29 | i28 | i27 | i26 | i25 | i24 |
| 0x2100:05 | 1 | i39 | i38 | i37 | i36 | i35 | i34 | i33 | i32 |
| 0x2100:06 | 1 | i47 | i46 | i45 | i44 | i43 | i42 | i41 | i40 |
| 0x2100:07 | 1 | i55 | i54 | i53 | i52 | i51 | i50 | i49 | i48 |
| 0x2100:08 | 1 | i63 | i62 | i61 | i60 | i59 | i58 | i57 | i56 |
| 0x2100:09 | 1 | i71 | i70 | i69 | i68 | i67 | i66 | i65 | i64 |
| 0x2100:0A | 1 | i79 | i78 | i77 | i76 | i75 | i74 | i73 | i72 |
| 0x2100:0B | 1 | i87 | i86 | i85 | i84 | i83 | i82 | i81 | i80 |
| 0x2100:0C | 1 | i95 | i94 | i93 | i92 | i91 | i90 | i89 | i88 |
| 0x2100:0D | 1 | i103 | i102 | i101 | i100 | i99 | i98 | i97 | i96 |
| 0x2100:0E | 1 | i111 | i110 | i109 | i108 | i107 | i106 | i105 | i104 |
| 0x2100:0F | 1 | i119 | i118 | i117 | i116 | i115 | i114 | i113 | i112 |
| 0x2100:10 | 1 | i127 | i126 | i125 | i124 | i123 | i122 | i121 | i120 |
| 0x2100:11 | 1 | Reserved | | | | | | | |
| 0x2100:12 | 1 | Table number | | | | | | | |
| 0x2100:13 | 1 | Segment number | | | | | | | |

| Index (hex) | Size (byte) | Contents |
|-------------|-------------|----------|
| 0x2100:14 | 13 | Reserved |
| ... | | |
| 0x2100:20 | | |

4.7 PNOZ m ES Profinet

4.7.1 Cyclical input and output data

Virtual inputs and outputs can be requested or set directly via the following modules. Each element can be selected individually in the master control system, e.g. virtual inputs i0-31. The data width is also established this way.

Input data

The Master writes to the virtual inputs of the PNOZmulti 2.

| Description | Input data from PNOZmulti 2 |
|---------------------------|-----------------------------|
| Virtual inputs i0 – i31 | 4 Input Bytes |
| Virtual inputs i32 – i63 | 4 Input Bytes |
| Virtual inputs i64 – i95 | 4 Input Bytes |
| Virtual inputs i96 – i127 | 4 Input Bytes |

Output data

The Master reads the virtual outputs of the PNOZmulti 2.

| Description | Output data from PNOZmulti 2 |
|----------------------------|------------------------------|
| Virtual outputs o0 – o31 | 4 Output Bytes |
| Virtual outputs o32 – o63 | 4 Output Bytes |
| Virtual outputs o64 – o95 | 4 Output Bytes |
| Virtual outputs o96 – o127 | 4 Output Bytes |

4.7.2 Access to table segments

The data in the tables (see [Service data \[86\]](#)) can be requested via the following modules.

Input data

The Master requests a table segment in the form:

| Description | Input data from PNOZmulti 2 |
|--------------------------|-----------------------------|
| Table and segment number | 2 Input Bytes |

Output data

The PNOZmulti 2 replies in the form:

| Description | Output data from PNOZmulti 2 |
|--|------------------------------|
| Table and segment number + 13 Byte payload | 15 Output Bytes |

A detailed description is available in the chapter entitled [Access to table segments](#) [86] 19].

4.7.3

LED status

The LED status of the PNOZmulti 2 can be requested directly via the following module.

| Description | Output data from PNOZmulti 2 |
|-------------|------------------------------|
| LED status | 1 Output Byte |

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN is lit
- ▶ Bit 5-7: Reserved

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN FS is lit
- ▶ Bit 5: Reserved
- ▶ Bit 6 = 1: LED RUN ST is lit
- ▶ Bit 7: Reserved

4.7.4

Service data

The service data for PROFINET is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module
- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content and the version and device-dependent validity of the service data and the addressing are described in detail in the chapter [Service data](#) [86] 86].

4.7.5 Diagnostic data

These bits contain the diagnostic data of the PNOZ m B0 and PNOZ m B1

| Unit Diag_Bit | Content | PNOZ m B0 | PNOZ m B1 |
|------------------|---|-----------|-----------|
| 01 | STOP FS, base unit is in FS STOP state | x | x |
| 02 | Base unit was stopped by the Configurator | x | x |
| 03 | Reserved | | |
| 04 | External fault | x | x |
| 05 | Internal error | x | x |
| 06 | External error on the inputs | x | x |
| 07 | Internal error on the inputs | x | |
| 08 | External error on the outputs | x | x |
| 09 | Internal error on the outputs | x | |
| 10 | No connection to base unit | x | x |
| 11 | STOP ST, base unit is in ST STOP state | | x |
| 12 | Error on the 1st ST expansion module, left | | x |
| 13 | Error on the 2nd ST expansion module, left | | x |
| 14 | Error on the 3rd ST expansion module, left | | x |
| 15 | Error on the 4th ST expansion module, left | | x |
| 16 | Error on the 5th ST expansion module, left | | x |
| 17 | Error on the 6th ST expansion module, left | | x |
| 18 | Reserved | | |
| ... 21 | | | |
| 22 | Error on the base unit | x | x |
| 23 | Reserved | | |
| 24 | Error on the 1st FS expansion module, right | x | x |
| 25 | Error on the 2nd FS expansion module, right | x | x |
| 26 | Error on the 3rd FS expansion module, right | x | x |
| 27 | Error on the 4th FS expansion module, right | x | x |
| 28 | Error on the 5th FS expansion module, right | x | x |
| 29 | Error on the 6th FS expansion module, right | x | x |
| 30 | Error on the 7th FS expansion module, right | | x |
| 31 | Error on the 8th FS expansion module, right | | x |
| 32 | Error on the 9th FS expansion module, right | | x |

| Unit Diag_Bit | Content | PNOZ m B0 | PNOZ m B1 |
|------------------|---|-----------|-----------|
| 33 | Error on the 10th FS expansion module, right | | x |
| 34 | Error on the 11th FS expansion module, right | | x |
| 35 | Error on the 12th FS expansion module, right | | x |
| 36 ... 39 | Reserved | | |
| 40 | Error on the 1st FS expansion module, left | x | x |
| 41 | Error on the 2nd FS expansion module, left | x | x |
| 42 | Error on the 3rd FS expansion module, left | x | x |
| 43 | Error on the 4th FS expansion module, left | x | x |
| 44 ... 45 | Reserved | | |
| 46 | Error on the communication module | x | |
| 47 ... 55 | Reserved | | |
| 56 | Error in the configuration, F_81 | x | |
| 57 | Error in the user program, F_82 | x | |
| 58 | Error in the periphery, F_83 | x | |
| 59 | Error on the speed monitor, F_84 | x | |
| 60 | Error on the bus module, F_85 | x | |
| 61 | Error on the link module, F_86 | x | |
| 62 | Error on the analogue input module, F_87 | x | |
| 63 | Reserved | | |
| 64 | Error on the input/output module, F_89 | x | |
| 65 | Error on the Ethernet module, F_8A | x | |
| 66 | Internal error on the left-hand expansion module, F_90 | x | |
| 67 | Internal periphery error, F_93 | x | |
| 68 | Internal error on the right-hand expansion module, F_94 | x | |
| 69 | Internal error on the right-hand expansion module, F_95 | x | |
| 70 | Internal self test error, F_B0 | x | |
| 71 | Internal data error, F_B1 | x | |

| Unit Diag_Bit | Content | PNOZ m B0 | PNOZ m B1 |
|------------------|---|-----------|-----------|
| 72 | Internal parameter error, F_B2 | x | |
| 73 | Internal serial/I2C error, F_B3 | x | |
| 74 | Internal time error, F_B4 | x | |
| 75 | Internal processor error, F_B5 | x | |
| 76 | Internal parameter error, F_B6 | x | |
| 77 | Internal compare error, F_B7 | x | |
| 78 | Internal sequence error, F_B8 | x | |
| 79 | Internal periphery error, F_B9 | x | |
| 80 | Internal error on bus module, F_BA | x | |
| 81 | Internal error on link module, F_BB | x | |
| 82 | Internal error on speed monitor, F_BC | x | |
| 83 | Internal error on analogue input module, F_BD | x | |
| 84 | Internal error on link module, F_BE | x | |
| 85 | Internal error on link module, F_BF | x | |
| 86 | Internal error on the left-hand expansion module, F_C0 | x | |
| 87 | Internal error on the left-hand expansion module, F_C1 | x | |
| 88 | Internal error on the Ethernet module, F_C2 | x | |
| 89 | Internal compare error, F_C3 | x | |
| 90 | Internal error on the right-hand expansion module, F_C4 | x | |
| 91 | Internal error on the right-hand expansion module, F_C5 | x | |
| 92 | Reserved | | |
| ... | | | |
| 95 | | | |

Explanation: Bits 56 to 91 display the last content of the error stack (corresponds to the error class). The bits are deleted as soon as PNOZmulti 2 returns to a RUN state.

4.8 PNOZ m ES Ethernet/IP

4.8.1 Cyclical input and output data

17 or 32 bytes must always be sent and received for communication with the PNOZmulti.

Fixed parameters for the input/output assembly instances are set in the fieldbus module interfaces. The following data lengths can be selected:

| Assembly Instance Input | Data length | Description |
|---------------------------------|-------------|-----------------------|
| 100 | 32 Bytes | Inputs, tables |
| 101 | 17 Bytes | Inputs |
| Assembly Instance Output | Data length | Description |
| 150 | 32 Bytes | Outputs, LEDs, tables |
| 151 | 17 Bytes | Outputs, LEDs |
| Assembly Instance Configuration | Data length | Description |
| 4 | 0 Bytes | - |

4.8.2 LED status

The LED status of the PNOZmulti 2 can be read via Byte 16 of instance 100 or 101.

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN FS is lit
- ▶ Bit 5-7: Reserved

4.8.3 Service data

The service data for EtherNet/IP is instanced from class "0xB0" and is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module
- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content of the version and device-dependent service data and addressing are described in the chapter entitled [Service data \[86\]](#).

4.8.4 Diagnostic data

| Input | | | Output | | | | |
|-------|--------------------|----------------|-------------|------|--------------------|------------------------------|-------------|
| Byte | As-sembly Instance | | Input | Byte | As-sembly Instance | | Output |
| 0 | 101 | 100 | i7 - i0 | 0 | 151 | 150 | o7 - o0 |
| 1 | | | i15 - i8 | 1 | | | o15 - o8 |
| 2 | | | i23 - i16 | 2 | | | o23 - o16 |
| 3 | | | i31 - i24 | 3 | | | o31 - o24 |
| 4 | | | i39 - i32 | 4 | | | o39 - o32 |
| 5 | | | i47 - i40 | 5 | | | o47 - o40 |
| 6 | | | i55 - i48 | 6 | | | o55 - o48 |
| 7 | | | i63 - i56 | 7 | | | o63 - o56 |
| 8 | | | i71 - i64 | 8 | | | o71 - o64 |
| 9 | | | i79 - i72 | 9 | | | o79 - o72 |
| 10 | | | i87 - i80 | 10 | | | o87 - o80 |
| 11 | | | i95 - i88 | 11 | | | o95 - o88 |
| 12 | | | i103 - i96 | 12 | | | o103 - o96 |
| 13 | | | i111 - i104 | 13 | | | o111 - o104 |
| 14 | | | i119 - i112 | 14 | | | o119 - o112 |
| 15 | | | i127 - i120 | 15 | | | o127 - o120 |
| 16 | | Reserved | 16 | | | LEDs | |
| 17 | | Table number | 17 | | | Table number | |
| 18 | | Segment number | 18 | | | Segment number | |
| 19 | | Reserved | 19 | | | Byte 0 to Byte 12 of payload | |
| 20 | | Reserved | 20 | | | | |
| 21 | | Reserved | 21 | | | | |
| 22 | | Reserved | 22 | | | | |
| 23 | | Reserved | 23 | | | | |
| 24 | | Reserved | 24 | | | | |
| 25 | | Reserved | 25 | | | | |
| 26 | | Reserved | 26 | | | | |
| 27 | | Reserved | 27 | | | | |
| 28 | | Reserved | 28 | | | | |
| 29 | | Reserved | 29 | | | | |
| 30 | | Reserved | 30 | | | | |
| 31 | | Reserved | 31 | | | | |

4.9 PNOZ m ES CC-Link

4.9.1 Input and output data

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

The data is structured as follows:

► **Input area**

- Inputs on PNOZmulti Configurator: i00 .. i127
- Input data CC-Link: RYmn.. RY(m+50)n, RWw l .. RWw l+2
 with l = address can be set as required on the master side (word address)
 with m = address can be set as required on the master side (Bit address)
 with n = 0 .. F (Bit number)

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

Bit addressed input data i00 - i87

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

Word addressed input data i88 - i127

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

► **Output range**

- Outputs on PNOZmulti Configurator: o00 .. o127
- Output data CC-Link: RXmn .. RX(m+50)n, RWr l .. RWr l+2
 with l = address can be set as required on the master side (word address)
 with m = address can be set as required on the master side (Bit address)
 with n = 0 .. F (Bit number)

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

Bit addressed output data o00 - o87

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

Word addressed output data o88 - o127

| | High byte | | | | | | | | Low byte | | | | | | | |
|---------|-----------|----------|----------|------------------------------|-------------------------|------------------------------|-----------------------------------|-----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Bit No. | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| RWr I | o10 3 | o10 2 | o10 1 | o10 0 | o99 | o98 | o97 | o96 | o95 | o94 | o93 | o92 | o91 | o90 | o89 | o88 |
| RWr I+1 | o11 9 | o11 8 | o11 7 | o11 6 | o11 5 | o11 4 | o11 3 | o11 2 | o11 1 | o11 0 | o10 9 | o10 8 | o10 7 | o10 6 | o10 5 | o10 4 |
| RWr I+2 | - | - | - | LED R U N F S | LED D I A G | LED F A U L T | LED I F A U L T | LED O F A U L T | o12 7 | o12 6 | o12 5 | o12 4 | o12 3 | o12 2 | o12 1 | o12 0 |

4.9.2 Service data

The service data for CC-Link is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module
- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content and the version and device-dependent validity of the service data and the addressing are described in detail in the chapter [Service data \[86\]](#).

4.9.3 LED status

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

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

Bit 5-7: Reserved

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN is lit
- ▶ Bit 5-7: Reserved

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN FS is lit
- ▶ Bit 5: Reserved
- ▶ Bit 6 = 1: LED RUN ST is lit
- ▶ Bit 7: Reserved

4.9.4 Access to table segments

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

Input data

The Master requests a table segment:

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

Output data

PNOZmulti 2 answers as follows:

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

5 ETH/RS232 interfaces

5.1 Overview

The communication interface on the configurable control system PNOZmulti 2 is used to

- ▶ Download and upload the project,
- ▶ Read the diagnostic words,
- ▶ Read the error stack.

Base unit PNOZ m B1

The base unit PNOZ m B1 has an Ethernet interface integrated in the device.

Base unit PNOZ m B0

The base unit PNOZ m B0 does not contain an integrated interface. Communication modules with interface can be connected:

- ▶ **PNOZ m ES RS232**

The communication module provides a serial RS232 interface

- ▶ **PNOZ m ES ETH**

The communication module provides 2 Ethernet interfaces

5.2 Communication Module PNOZ m ES RS232

The connection to the RS 232 interface of the communication partner and the communication module PNOZ m ES RS232 is established via a null modem cable.


Transmission rate:

19.2 kBit with

- ▶ 8 bits of data
- ▶ 1 start bit
- ▶ 2 stop bits
- ▶ 1 parity bit
- ▶ Even parity

5.3 Communication Module PNOZ m ES ETH

5.3.1 Introduction

This chapter describes the special features of communication with the expansion module PNOZ m ES ETH via Ethernet and Modbus/TCP. Access to data from the PNOZmulti 2 via tables and segments is described in Chapter [Basics](#)  17].

5.3.2 Overview

The expansion module PNOZ m ES ETH provides an interface to Ethernet. Via this interface, the configurable control system PNOZmulti 2 can be connected via Ethernet to control systems that support Modbus/TCP. Modbus/TCP is designed for fast data exchange at field level. The expansion module PNOZ m ES ETH is a passive Modbus/TCP subscriber

(Server). The basic functions of communication with Ethernet or Modbus/TCP conform to IEEE 802.3. The central controller (Client) reads output information from the Servers and writes input information to the Servers as part of each cycle. In addition to the cyclical payload transmission, the PNOZ m ES ETH also has diagnostic functions.

The connections are established via two RJ45 sockets.

The Ethernet interface is configured in the PNOZmulti Configurator (for description see online help for the PNOZmulti Configurator).

The communication module PNOZ m ES ETH supports [Modbus/TCP](#)  [72].

The module can manage up to 8 Modbus/TCP connections and up to 4 PG port (Port 9000) connections.

5.3.3 Module features

- ▶ Can be configured in the PNOZmulti Configurator
- ▶ Network protocols: TCP/IP, Modbus/TCP
- ▶ Status indicators for communication and display of errors
- ▶ Transmission rate 10 MBit/s (10BaseT) and 100 MBit/s (100BaseTX), full and half duplex

5.3.4 Modbus/TCP

There is no need to configure a connection on the PNOZ m ES ETH. Port 502 is used in accordance with the Modbus/TCP specification.

For details see [Modbus/TCP](#)  [72]

5.4 Integrated Ethernet interface

5.4.1 Overview

The base unit PNOZ m B1 has an integrated Ethernet interface. Via this interface, the configurable control system PNOZmulti 2 can be connected via Ethernet to control systems that support Modbus/TCP. Modbus/TCP is designed for fast data exchange at field level. The PNOZmulti is a passive Modbus/TCP subscriber (Server).

The basic functions of communication with Ethernet or Modbus/TCP conform to IEEE 802.3. The central controller (Client) reads output information from the Servers and writes input information to the Servers as part of each cycle. In addition to the cyclical payload transmission, the PNOZ m B1 also has diagnostic functions.

The connections are established via two RJ45 sockets.

The Ethernet interface is configured in the PNOZmulti Configurator (for description see online help for the PNOZmulti Configurator).

The module can manage up to 8 Modbus/TCP connections and up to 4 PG port (Port 9000) connections.

5.4.2 Module features

- ▶ Can be configured in the PNOZmulti Configurator
- ▶ Network protocols: TCP/IP
- ▶ Status indicators for communication and display of errors
- ▶ Transmission rate 10 MBit/s (10BaseT) and 100 MBit/s (100BaseTX), full and half duplex

5.4.3 Modbus/TCP

No connection needs to be configured. Port 502 is used in accordance with the Modbus/TCP specification.

For details see [Modbus/TCP](#) [ 72]

5.5 Communication procedure

The PNOZmulti 2 is always the connection's Server in the communication; the communication partner (PC, SPS) is the Client. With both communication interfaces, the bytes are sent in the same sequence.



INFORMATION

For communication via Ethernet, the Ethernet interface must be set up in the PNOZmulti Configurator. The procedure is described in the PNOZmulti Configurator's online help.

Each communication is started by sending a request to the PNOZmulti 2. Requests are used to receive data from the PNOZmulti 2 or send data to the PNOZmulti 2:

1. Request:

The user sends a request to the PNOZmulti 2 via the communications partner.

2. Response:

The PNOZmulti 2 sends a response to the communications partner after approx. 20 to 30 ms, confirming that the request has been received without error. Data is sent in accordance with the request.

5.6 Telegram structure

The telegram used for communication consists of:

- ▶ a header,
- ▶ the payload,
- ▶ a footer.

| User → PNOZmulti | | | PNOZmulti → User | | | | |
|----------------------|--------|-----------------|----------------------|----------------|-----------------|---|--------------------|
| | Byte | Request | | Byte | Response | | |
| Header | 0 | 0x05 | Header | 0 | 0x05 | | |
| | 1 | 0x15 | | 1 | 0x15 | | |
| | 2 | 0x00 | | 2 | 0x00 | | |
| | 3 | Telegram length | | 3 | Telegram length | | |
| | (BCC)* | 4 | | Request No. | (BCC)* | 4 | Confirmation/error |
| | | 5 | | Segment No. HB | | 5 | Segment No. HB |
| | | 6 | | Segment No. LB | | 6 | Segment No. LB |
| 7 | | 0x00 | 7 | Reserved | | | |
| Payload (Payload) | 7+1 | Payload Byte 0 | Payload (Payload) | 8 | Payload Byte 0 | | |
| | 7+2 | Payload Byte 1 | | 9 | Payload Byte 1 | | |
| | ... | ... | | ... | ... | | |
| | 7+x | Payload Byte x | | 7+y | Payload Byte y | | |
| Footer | 7+x+1 | BCC | Footer | 7+y+1 | BCC | | |
| | 7+x+2 | 0x10 | | 7+y+2 | 0x10 | | |

x stands for the request's payload amount

y stands for the response's payload amount

*Check sum field

5.6.1 Header


Byte 0 ... Byte 7 form the data block's header

- ▶ Byte 0: Always 0x05
- ▶ Byte 1: Always 0x15
- ▶ Byte 2: Always 0x00
- ▶ Byte 3: Telegram length = Length of check sum area +1
- ▶ Byte 4

– Request: Request number

A request is defined via the request number

[Requests](#) [ 60]

- Response: Confirmation of request
The request is confirmed: Request number + 0x80 (Bit 7 set).
If the request cannot be processed, an error message is returned
[Troubleshooting](#) [ 70].

- ▶ Byte 5: High Byte of segment number
- ▶ Byte 6: Low Byte of segment number
- ▶ Byte 7
 - Request: Always 0x00
 - Response: Reserved

5.6.2 Payload

The telegram contains payload from Byte 8. The content and number of payload bytes depend on the request. 0 - 40 bytes of payload can be transmitted.

If there is no payload, then the footer directly follows the header, without any payload in between.

- ▶ Bytes 8 ... x + 7 (request): Application data, which is sent to the PNOZmulti
- ▶ Bytes 8 ... y + 7 (response): Application data, which is sent by the PNOZmulti

5.6.3 Footer

The Byte x + 8 contains a byte-size check sum (Block Check Character = BCC). The value at Byte x + 9 contains the fixed byte value 0x10.

The check sum is calculated as the sum total of the check sum field:

$$\text{BCC} = 0 - \left(\sum_{\text{Byte } 4}^{\text{Byte } x+7} \text{byte values} \right)$$

Sample of the check sum field:

$$0 = \text{BCC} + \left(\sum_{\text{Byte } 4}^{\text{Byte } x+7} \text{byte values} \right)$$

Example for 2 Bytes payload length

Table 91 Segment 40 is requested:

Telegram: 05 15 00 07 2F 00 00 00 5B 28 [BCC] 10

Calculation of check sum:

1. Total: 2F + 00 + 00 + 00 + 5B + 28 = B2
2. Invert (two's complement): -B2 = 4E
3. Result BCC = 4E

5.7 Description of payload

This section describes the payload that can be transmitted as the result of a corresponding request.

5.7.1 Virtual inputs (Input Byte 0 ... Input Byte 15)

The virtual inputs are defined by the communication partner and transferred to the PNOZmulti 2. Each input has a number, e.g. input bit 4 of input byte 1 has the number i12.

| Input Byte | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|
| 0 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 |
| 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 |
| 2 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 15 | i127 | i126 | i125 | i124 | i123 | i122 | i121 | i120 |

5.7.2 Watchdog

The watchdog is used to monitor the virtual inputs.

If no virtual inputs are sent by a communications partner within a defined watchdog time (watchdog timeout), the PNOZmulti sets the virtual inputs to "0".

The configuration and functionality of the watchdog varies and so is described in the respective requests.

5.7.3 Virtual outputs (Output Byte 0 ... Output Byte 15)

The virtual outputs are defined in the PNOZmulti Configurator. Each output that is used is given a number there, e.g. o0, o5 The state of output o0 is stored in bit 0 of output byte 0; the state of output o5 is stored in bit 5 of output byte 0 etc.

| Output Byte | | | | | | | | |
|-------------|------|------|------|------|------|------|------|------|
| 0 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 |
| 1 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 |
| 2 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 15 | o127 | o126 | o125 | o124 | o123 | o122 | o121 | o120 |

5.7.4 LED status

The statuses of the LEDs are stored in a byte.

Status of LEDs with PNOZ m B0:

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN is lit
- ▶ Bit 5-7: Reserved

Status of LEDs with PNOZ m B1:

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN FS is lit
- ▶ Bit 5: Reserved
- ▶ Bit 6 = 1: LED RUN ST is lit
- ▶ Bit 7: Reserved

5.7.5 Tables


Further information can be requested in table form.

A table consists of one or more PNOZmulti 2 segments. Each segment is made up of 13 Bytes.

The communications partner requests the required data using the table number and segment number. The PNOZmulti 2 repeats the two numbers and sends the requested data.

The following types are available:

| | |
|------------|--|
| Table 20: | Process data, base unit |
| Table 21: | Process data, right-hand expansion modules |
| Table 22: | Process data, left-hand expansion modules |
| Table 23: | Process data, fieldbus module / communication module |
| Table 24: | Process data, ST expansion module |
| Table 70: | Diagnostic words |
| Table 71: | Enable elements |
| Table 80: | Project Information |
| Table 90: | Device data, base unit |
| Table 91: | Device data, right-hand expansion modules |
| Table 92: | Device data, left-hand expansion modules |
| Table 93: | Device data, fieldbus module / communication module |
| Table 94: | Device data, ST expansion module |
| Table 110: | Connected devices |
| Table 201: | Advanced data |

The content and the version and device-dependent validity of the tables are described in detail in the chapter [Service data](#) [ 86].

5.8 Requests

A request is defined via the request number and segment number.

The following requests are available:

| Request No. | Segment No. | Meaning |
|-------------|-------------|---|
| 0x14 | 0x01 | Sending virtual inputs to the PNOZmulti 2 |
| 0x14 | 0x02 | Sending virtual inputs and requesting the LED statuses from the PNOZmulti 2 |
| 0x2C | 0x01 | Requesting virtual input and output data from the PNOZmulti 2 |
| 0x2C | 0x02 | Requesting virtual input and output data and the LED statuses from the PNOZmulti 2 Constraint: PNOZ m B1 from V1.10 |
| 0x2F | 0x00 | Requesting the diagnostic data in table form from the PNOZmulti 2 |
| 0x5C | 0x00 | Sending virtual inputs and requesting virtual output data from the PNOZmulti 2 (suitable for a cyclical exchange) |

5.8.1 Mask (Mask Byte 0 ... Mask Byte 15)

The mask is used to determine which of the virtual inputs sent in a Byte are to be set. For example, if only inputs i0 to i5 are to be set in Byte 8, 0x3F must be entered in the mask in Byte 24.

5.8.2 Sending virtual inputs to PNOZmulti 2

Request 0x14 Segment 0x01

The communication partner uses this request to send virtual inputs to the PNOZmulti 2.

The mask (Bytes 24 to 39) is used to determine which of the virtual inputs in a Byte are to be set.

Telegram

| Byte | Request | | Byte | Response |
|------|--|--|------|----------|
| 0 | 0x05 | | 0 | 0x05 |
| 1 | 0x15 | | 1 | 0x15 |
| 2 | 0x00 | | 2 | 0x00 |
| 3 | 0x25 | | 3 | 0x05 |
| 4 | 0x14 | | 4 | |
| 5 | 0x00 | | 5 | 0x00 |
| 6 | 0x01 | | 6 | 0x01 |
| 7 | 0x00 | | 7 | 0x00 |
| 8 | Virtual inputs Input Byte 0: i7 to i0 | | 8 | 0x6B |
| ... | ... | | 9 | 0x10 |
| 23 | Virtual inputs Input Byte 15: i127 to i120 | | | |
| 24 | Mask Mask Byte 0: i7 to i0 | | | |
| ... | ... | | | |
| 39 | Mask Mask Byte 15: i127 to i120 | | | |
| 40 | BCC | | | |
| 41 | 0x10 | | | |



INFORMATION

If a fieldbus module is configured, virtual inputs cannot be activated via the integrated interface. In this case the request will be rejected by the PNOZmulti 2 with error message 0x63 (request cannot be executed).

5.8.3

Sending virtual inputs and requesting the LED states from PNOZmulti 2

Request 0x14 Segment 0x02

The communication partner uses this request to send virtual inputs to the PNOZmulti 2 in exactly the same way as request 0x14 segment 0x01. It also requests the virtual outputs and the LED status from the PNOZmulti 2 .

The mask (Bytes 24 to 39) is used to determine which of the virtual inputs in a Byte are to be set. For example, if only inputs i0 to i5 are to be set in Byte 8, 0x3F must be entered in the mask in Byte 24.

Telegram

| Byte | Request | Byte | Response |
|------|--|------|--|
| 0 | 0x05 | 0 | 0x05 |
| 1 | 0x15 | 1 | 0x15 |
| 2 | 0x00 | 2 | 0x00 |
| 3 | 0x26 | 3 | 0x16 |
| 4 | 0x14 | 4 | 0x94 |
| 5 | 0x00 | 5 | 0x00 |
| 6 | 0x02 | 6 | 0x02 |
| 7 | 0x00 | 7 | 0x00 |
| 8 | Virtual inputs Input Byte 0: i7 to i0 | 8 | Virtual outputs Output Byte 0: o7 to o0 |
| ... | ... | ... | ... |
| 23 | Virtual inputs Input Byte 15: i127 to i120 | 23 | Virtual outputs Output Byte 15: o127 to o120 |
| 24 | Mask Mask Byte 0: i7 to i0 | 24 | LED status |
| ... | ... | 25 | BCC |
| 39 | Mask Mask Byte 15: i127 to i120 | 26 | 0x10 |
| 40 | Control Byte | | |
| 41 | BCC =0 - (Byte 4 + ... + Byte 40) | | |
| 42 | 0x10 | | |

For details of the LED status see chapter entitled LED status.



INFORMATION

If a fieldbus module is configured, virtual inputs cannot be activated via the communication module.

5.8.3.1 Control Byte (Byte 40)

Bit 0 ... 2 of the Control Byte contain a watchdog function.

If no virtual inputs are sent by a communications partner within the defined watchdog time (watchdog timeout), the PNOZmulti 2 sets the virtual inputs to "0".

Control Byte 40:

| | | | | | | | |
|----------|-------------------|---------------|----------|----------|--------------|--------------|--------------|
| Reserved | Delayed Re-sponse | Error Message | Reserved | Reserved | W-Timer Bit2 | W-Timer Bit1 | W-Timer Bit0 |
|----------|-------------------|---------------|----------|----------|--------------|--------------|--------------|

▶ Bit 0 - 2: Watchdog Timeout

| Watchdog Timer Bit 2 | Watchdog Timer Bit 1 | Watchdog Timer Bit 0 | Watchdog Timeout |
|----------------------|----------------------|----------------------|-------------------|
| 0 | 0 | 0 | Timer deactivated |
| 0 | 0 | 1 | 100 ms |
| 0 | 1 | 0 | 200 ms |
| 0 | 1 | 1 | 500 ms |
| 1 | 0 | 0 | 1 s |
| 1 | 0 | 1 | 3 s |
| 1 | 1 | 0 | 5 s |
| 1 | 1 | 1 | 10 s |

▶ Bit 3 and 4: Reserved

▶ Bit 5 Error Message: Error message

If the bit is set to "1", an error stack entry is generated when the watchdog is triggered.

▶ Bit 6 Delayed Response: Delayed response

If the bit is set to "1", the response (send virtual outputs) is sent after a delay of one cycle.

▶ Bit 7: Reserved



INFORMATION

To test if the watchdog is active, set a virtual input continuously to "1". If this input becomes "0" after the set watchdog timeout has elapsed, then the watchdog is active.



INFORMATION

The watchdog functions of the requests 0x14 segment 0x02 and 0x5C use the same watchdog timer. In other words, the watchdog timer is reset if either request is called.

5.8.4 Requesting virtual input and output data from PNOZmulti 2

Request 0x2C Segment 0x01

The communication partner uses this request to request the state of the virtual inputs and outputs from the PNOZmulti.

Telegram

| Byte | Request | Byte | Response |
|------|---------|------|--|
| 0 | 0x05 | 0 | 0x05 |
| 1 | 0x15 | 1 | 0x15 |
| 2 | 0x00 | 2 | 0x00 |
| 3 | 0x05 | 3 | 0x25 |
| 4 | 0x2C | 4 | 0xAC |
| 5 | 0x00 | 5 | 0x00 |
| 6 | 0x01 | 6 | 0x01 |
| 7 | 0x00 | 7 | 0x00 |
| 8 | 0xD3 | 8 | Virtual inputs Input Byte 0: i7 to i0 |
| 9 | 0x10 | ... | ... |
| | | 23 | Virtual inputs Input Byte 15: i127 to i120 |
| | | 24 | Virtual outputs Output Byte 0: o7 to o0 |
| | | ... | ... |
| | | 39 | Virtual outputs Output Byte 15: o127 to o120 |
| | | 40 | BCC |
| | | 41 | 0x10 |

5.8.5 Requesting virtual input and output data and the LED statuses from PNOZmulti 2

Request 0x2C Segment 0x02

The communication partner uses this request to request the status of the LEDs and the virtual inputs and outputs from the PNOZmulti.

Telegram

| Byte | Request | Byte | Response |
|------|---------|------|--|
| 0 | 0x05 | 0 | 0x05 |
| 1 | 0x15 | 1 | 0x15 |
| 2 | 0x00 | 2 | 0x00 |
| 3 | 0x05 | 3 | 0x26 |
| 4 | 0x2C | 4 | 0xAC |
| 5 | 0x00 | 5 | 0x00 |
| 6 | 0x02 | 6 | 0x02 |
| 7 | 0x00 | 7 | 0x00 |
| 8 | 0xD2 | 8 | Virtual inputs Input Byte 0: i7 to i0 |
| 9 | 0x10 | ... | ... |
| | | 23 | Virtual inputs Input Byte 15: i127 to i120 |
| | | 24 | Virtual outputs Output Byte 0: o7 to o0 |
| | | ... | ... |
| | | 39 | Virtual outputs Output Byte 15: o127 to o120 |
| | | 40 | LED status |
| | | 41 | BCC |
| | | 42 | 0x10 |

5.8.6 Requesting the diagnostic data in table form from PNOZmulti 2

Request 0x2F

The communication partner uses this request to request data from the PNOZmulti in table form.

The content of the tables and segments is described in detail in the Appendix.

Telegram

| Byte | Request | Byte | Response |
|------|-------------|------|----------------------------------|
| 0 | 0x05 | 0 | 0x05 |
| 1 | 0x15 | 1 | 0x15 |
| 2 | 0x00 | 2 | 0x00 |
| 3 | 0x07 | 3 | 0x14 |
| 4 | 0x2F | 4 | 0xAF |
| 5 | 0x00 | 5 | 0x00 |
| 6 | 0x00 | 6 | 0x00 |
| 7 | 0x00 | 7 | 0x00 |
| 8 | Table No. | 8 | Table No. |
| 9 | Segment No. | 9 | Segment No. |
| 10 | BCC | 10 | Byte 0 of Table x, Segment y |
| 11 | 0x10 | ... | ... |
| | | 22 | Byte 12 of Table x, Segment y |
| | | 23 | BCC |
| | | 24 | 0x10 |

► Byte 8: Table number

Example: 0x15 for Table 21: Process data, right-hand expansion modules

► Byte 9: Segment number

Example: 0x00 for Segment 0, in Byte 4 state of outputs o0 ... o7 of the right-hand expansion modules



INFORMATION

If the requested segment is unavailable, the Segment No. is set to 255.

Example:

Request: Table No. 20 Segment No. 45

Response: Table No. 20 Segment No. 255

Byte 10 ... 22 = 0

5.8.7 Sending virtual inputs and requesting the virtual output data from PNOZmulti 2 (see fieldbus communication)

Request 0x5C

The communication partner uses this request to send input data to the PNOZmulti and request output data from the PNOZmulti (see section entitled [Basics \[17\]](#)).

As with fieldbus communication, 32 Bytes each are reserved for input and output data (Byte 8 – 39); they are updated approx. every 15 ms.

| Byte | Request | Byte | Response |
|------|---------------|------|----------------|
| 0 | 0x05 | 0 | 0x05 |
| 1 | 0x15 | 1 | 0x15 |
| 2 | 0x00 | 2 | 0x00 |
| 3 | 0x26 | 3 | 0x26 |
| 4 | 0x5C | 4 | 0xDC |
| 5 | Control Byte | 5 | Control Byte |
| 6 | 0x00 | 6 | Reserved |
| 7 | 0x00 | 7 | 0x00 |
| 8 | Input Byte 0 | 8 | Output Byte 0 |
| 9 | Input Byte 1 | 9 | Output Byte 1 |
| 10 | Input Byte 2 | 10 | Output Byte 2 |
| ... | ... | ... | ... |
| 39 | Input Byte 31 | 39 | Output Byte 31 |
| 40 | 0x00 | 40 | Reserved |
| 41 | BCC | 41 | BCC |
| 42 | 0x10 | 42 | 0x10 |

5.8.7.1 Input data (to the PNOZmulti)

| Input Byte | Content |
|------------|------------|
| 0 | i7 to i0 |
| 1 | i15 to i8 |
| 2 | i23 to i16 |
| 3 | i31 to i24 |
| 4 | i39 to i32 |
| 5 | i47 to i40 |
| 6 | i55 to i48 |
| 7 | i63 to i56 |
| 8 | i71 to i64 |
| 9 | i79 to i72 |
| 10 | i87 to i80 |

| Input Byte | Content |
|------------|----------------|
| 11 | i95 to i88 |
| 12 | i103 to i96 |
| 13 | i111 to i104 |
| 14 | i119 to i112 |
| 15 | i127 to i120 |
| 16 | 0x00 |
| 17 | Table number |
| 18 | Segment number |
| 19 | 0x00 |
| 20 | 0x00 |
| 21 | 0x00 |
| 22 | 0x00 |
| 23 | 0x00 |
| 24 | 0x00 |
| 25 | 0x00 |
| 26 | 0x00 |
| 27 | 0x00 |
| 28 | 0x00 |
| 29 | 0x00 |
| 30 | 0x00 |
| 31 | 0x00 |

The virtual inputs are set and a specific table/segment is requested in the input data.



INFORMATION

If a fieldbus module is configured, virtual inputs cannot be activated via the communication module.

5.8.7.2

Output data (from the PNOZmulti)

| Output Byte | Content |
|-------------|------------|
| 0 | o7 to o0 |
| 1 | o15 to o8 |
| 2 | o23 to o16 |
| 3 | o31 to o24 |
| 4 | o39 to o32 |
| 5 | o47 to o40 |
| 6 | o55 to o48 |

| Output Byte | Content |
|-------------|-----------------|
| 7 | o63 to o56 |
| 8 | o71 to o64 |
| 9 | o79 to o72 |
| 10 | o87 to o80 |
| 11 | o95 to o88 |
| 12 | o103 to o96 |
| 13 | o111 to o104 |
| 14 | o119 to o112 |
| 15 | o127 to o120 |
| 16 | LED status |
| 17 | Table number |
| 18 | Segment number |
| 19 | Payload Byte 0 |
| 20 | Payload Byte 1 |
| 21 | Payload Byte 2 |
| 22 | Payload Byte 3 |
| 23 | Payload Byte 4 |
| 24 | Payload Byte 5 |
| 25 | Payload Byte 6 |
| 26 | Payload Byte 7 |
| 27 | Payload Byte 8 |
| 28 | Payload Byte 9 |
| 29 | Payload Byte 10 |
| 30 | Payload Byte 11 |
| 31 | Payload Byte 12 |

The content of the tables and segments is described in detail in the section entitled [Service data \[86\]](#).

5.8.7.3 Control Byte (Byte 5)

Bit 0 ... 2 of the Control Byte contain a watchdog function.

If no virtual inputs are sent by a communications partner within the defined watchdog time (watchdog timeout), the PNOZmulti sets the virtual inputs to "0".

Control Byte 5:

| | | | | | | | |
|------------|------------------|---------------|----------|----------|---------------|---------------|---------------|
| Read/Write | Delayed Response | Error Message | Reserved | Reserved | W-Timer Bit 2 | W-Timer Bit 1 | W-Timer Bit 0 |
|------------|------------------|---------------|----------|----------|---------------|---------------|---------------|

► Bit 0 - 2: Watchdog Timeout

| Watchdog Timer Bit 2 | Watchdog Timer Bit 1 | Watchdog Timer Bit 0 | Watchdog Timeout |
|-------------------------|-------------------------|-------------------------|-------------------|
| 0 | 0 | 0 | Timer deactivated |
| 0 | 0 | 1 | 100 ms |
| 0 | 1 | 0 | 200 ms |
| 0 | 1 | 1 | 500 ms |
| 1 | 0 | 0 | 1 s |
| 1 | 0 | 1 | 3 s |
| 1 | 1 | 0 | 5 s |
| 1 | 1 | 1 | 10 s |

- ▶ Bit 3 and 4: Reserved
- ▶ Bit 5 Error Message: Error message
If the bit is "1", an error stack entry is generated when the watchdog is triggered.
- ▶ Bit 6 Delayed Response: Delayed response
If the bit is "1", the response (send virtual outputs) is sent after a delay of one cycle.
- ▶ Bit 7: Read/Write: Read/write access
If the bit is "1", write protection is active; data cannot be overwritten. With read access, the watchdog timer is not reset, Bit 6 Delayed Response is deactivated.



INFORMATION

The watchdog functions of the requests 0x14 segment 0x02 and 0x5C use the same watchdog timer. In other words, the watchdog timer is reset if either request is called.



INFORMATION

To test if the watchdog is active, set a virtual input continuously to "1". If this input becomes "0" after the set watchdog timeout has elapsed, then the watchdog is active.

5.9 Troubleshooting

5.9.1 Request format does not meet specifications

If the request format does not meet the specifications, the PNOZmulti 2 sends the following response:

| Byte | Response |
|------|----------|
| 0 | 0x05 |
| 1 | 0x02 |
| 2 | 0x00 |

| Byte | Response |
|------|----------|
| 3 | 0x02 |
| 4 | 0x00 |
| 5 | 0x02 |
| 6 | 0x10 |

5.9.2 Error while executing a request

If an error occurs while executing a request, the PNOZmulti 2 sends the following response:

| Byte | Response |
|------|------------|
| 0 | 0x05 |
| 1 | 0x15 |
| 2 | 0x00 |
| 3 | 0x05 |
| 4 | Error Code |
| 5 | 0x00 |
| 6 | 0x00 |
| 7 | 0x00 |
| 8 | BCC |
| 9 | 0x10 |

Error Codes (Byte 4):

- ▶ 0x62: Request's BCC is incorrect
- ▶ 0x63: Request cannot be executed
- ▶ 0x64: Request unknown
- ▶ 0x67: Table or segment number unavailable
- ▶ 0x68: PNOZmulti 2 not ready

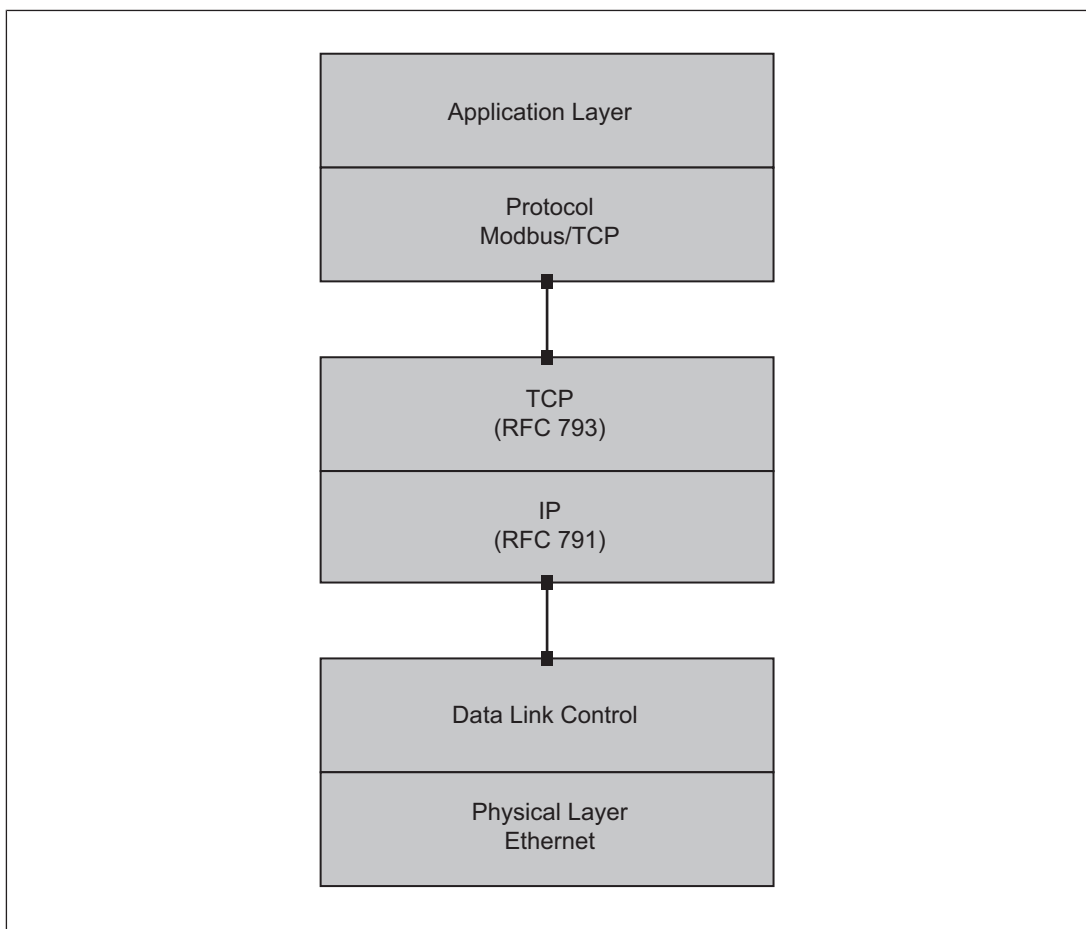
6 Modbus/TCP

6.1 System requirements

- ▶ PNOZmulti Configurator: From Version 9.0.0
- ▶ PNOZ m B0 + PNOZ m ES ETH
- ▶ PNOZ m B1

6.2 Modbus/TCP - Basics

Modbus/TCP is an open fieldbus standard published by the user organisation MODBUS-IDA.



Modbus/TCP is a protocol based on Industrial Ethernet (TCP/IP over Ethernet). It is one of the protocols with Client/Server communication. Data is transferred via a request/response mechanism using function codes (FC).

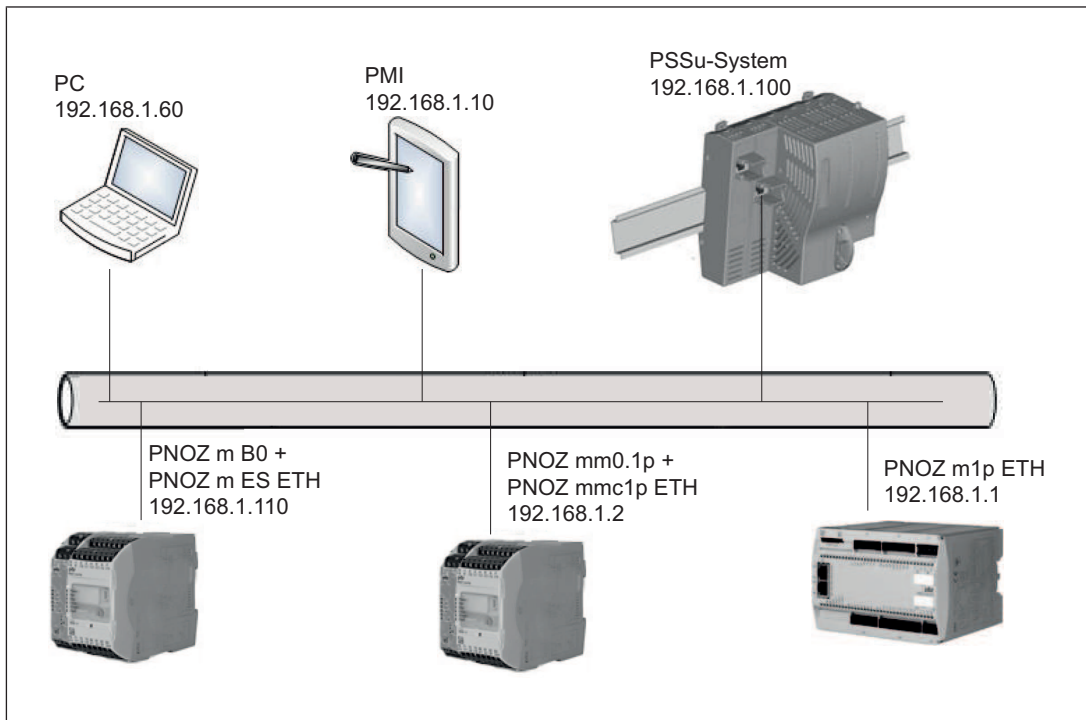
Modbus/TCP is connection-oriented, i.e. before the payload is transferred via Modbus/TCP, a connection must first be established between two Modbus/TCP interfaces. The initiator of the connection is called the Client. The communications partner with which the Client establishes the connection is called the Server. Whether a connection on a device assumes the role of Client or Server is defined when a connection is configured. As a result, the Server/Client role only applies for that specific connection.

6.3 Modbus/TCP with PNOZmulti 2

On PNOZmulti 2, an interface for communication via Modbus/TCP is provided via the communication module PNOZ m ES ETH or the integrated interface of the PNOZ m B1.

A PNOZ m ES ETH can manage a max. of 8 Modbus/TCP connections. The PNOZmulti 2 is always the connection Server. The connection Clients may be various devices, e.g. PC (PNOZmulti Configurator), control system, display unit. They can access the configurable control system PNOZmulti 2 simultaneously.

The virtual I/Os plus all the information that is requested during fieldbus communication are contained in data areas. The data is accessed directly. It's no longer necessary to switch via table/segment.



The configurations required for Modbus/TCP are fully pre-configured in the PNOZmulti 2 operating system. All that's necessary in the PNOZmulti Configurator is to activate the virtual inputs and outputs (see PNOZmulti Configurator's online help, under "Display and edit module selection").

On a configurable control system PNOZmulti 2, port number "502" is fixed as the default for data exchange via a Modbus/TCP connection. It is not displayed in the PNOZmulti Configurator and cannot be modified.

6.4 Data areas

6.4.1 Overview

A configurable control system PNOZmulti 2 supports the following Modbus/TCP data areas:

| Data area | Modbus syntax | Example |
|--|---------------|--|
| Coils (Bit) 0x00000 ... 0x65535 [read/write] | 0x[xxxxx] | 0x00031 (virtual input i31) |
| Discrete Inputs (Bit) 1x00000 ... 1x65535 [read only] | 1x[xxxxx] | 1x08193 (virtual output o1) |
| Input Register (Word/16 Bits) 3x00000 ... 3x65535 [read only] | 3x[xxxxx] | 3x00002 (virtual inputs 32 ... 47) |
| Holding Register (Word/16 Bits) 4x00000 ... 4x65535 [read/write] | 4x[xxxxx] | 4x04108 (project name, 1st character) |



INFORMATION

Addressing for PNOZmulti systems starts at "0". On devices from other manufacturers, addressing can start at "1". Please refer to the operating manual provided by the relevant manufacturer.

Data can be accessed via various Modbus/TCP data areas.

The tables below show the relationship between Modbus/TCP data areas and the content of the data areas.

6.4.2 Function codes

The following function codes (FC) are available for communication with the PNOZmulti 2 via Modbus/TCP:

| Function code | Function | |
|---------------|-----------------------|---|
| FC 01 | Read Coils | The connection Client reads bit data from the connection Server, data length ≥ 1 Bit, content: Input/output data (data received from 0x) |
| FC 02 | Read Discrete Input | The connection Client reads bit data from the connection Server, data length ≥ 1 Bit, content: Input/output data (data received from 1x) |
| FC 03 | Read Holding Register | The connection Client reads word data from the connection Server, data length ≥ 1 Word, content: Diagnostic word (data received from 4x) |

| Function code | Function | |
|---------------|-------------------------------|---|
| FC 04 | Read Input Register | The connection Client reads word data from the connection Server, data length ≥ 1 Word, content: Diagnostic word (data received from 3x) |
| FC 05 | Write Single Coil | The connection Client writes to one bit datum in the connection Server, data length = 1 Bit, content: Input data (send data to 0x) |
| FC 06 | Write Single Register | The connection Client writes to one word datum in the connection Server, data length = 1 Word, content: Input data (send data to 4x) |
| FC 15 | Write Multiple Coils | The connection Client writes to multiple bit data in the connection Server, data length ≥ 1 Bit, content: Input data (send data to 0x) |
| FC 16 | Write Multiple Registers | The connection Client writes to multiple word data in the connection Server, data length ≥ 1 Word, content: Input data (send data to 4x) |
| FC 23 | Read/Write Multiple Registers | The connection Client reads and writes multiple word data within a telegram (receive data from 3x and send data to 4x) |

Error codes on Modbus/TCP

| Code | Name | Description |
|------|----------------------|---|
| 01 | Invalid function | The function code in the enquiry is not supported. |
| 02 | Invalid data address | The data address received in the enquiry is outside the memory range. |
| 03 | Invalid data | Invalid data requested. |

6.4.3 Data transfer limits

The following table contains information on the data length per telegram that is supported:

| Data transfer | | Data length per telegram |
|-----------------|------------------------------|--------------------------|
| Read data (Bit) | FC 01 (Read Coils) | 1 ... 2000 |
| | FC 02 (Read Discrete Inputs) | |
| Read data (Bit) | FC 05 (Write Single Coil) | 1 Bit |
| | FC 15 (Write Multiple Coils) | 1 ... 1968 |

| Data transfer | | Data length per telegram |
|----------------------------|---------------------------------------|---|
| Read data (Word) | FC 03 (Read Holding Registers) | 1 ... 125 |
| | FC 04 (Read Input Register) | |
| Write data (Word) | FC 06 (Write Single Register) | 1 Word |
| | FC 16 (Write Multiple Registers) | 1 ... 123 Words |
| Read and write data (Word) | FC 23 (Read/Write Multiple Registers) | Read 1 ... 125 Words Write 1 ... 121 Words |



INFORMATION

There may be some restrictions in data length, depending on the device that is used. Please refer to the information stated in the operating manual of the device you are using.

6.4.4 Input and output data, watchdog

The table below describes the Modbus/TCP data areas that contain the current state of the virtual inputs of the PNOZmulti 2. These are the virtual inputs that can be set by the user.

Relevant areas for the data are defined in each Modbus/TCP data area (Coils (0x), Discrete Inputs (1x), Input Register (3x), Holding Register (4x)). Read/write access will depend on the Modbus/TCP data area.

| Register (3x, 4x) | Coil/ Discrete Input (0x, 1x) | Content | High Byte | Low Byte |
|-------------------|-------------------------------|-----------------------------------|-------------|-------------|
| 0 | 15... 0 | State of virtual inputs 0...15 | i15...i8 | i7...i0 |
| 1 | 31... 16 | State of virtual inputs 16...31 | i31...i24 | i23...i16 |
| 2 | 47...32 | State of virtual inputs 32...47 | i47...i40 | i39...i32 |
| 3 | 63...48 | State of virtual inputs 48...63 | i63...i56 | i55...i48 |
| 4 | 79... 64 | State of virtual inputs 64...79 | i79...i72 | i71...i64 |
| 5 | 95...80 | State of virtual inputs 80...95 | i95...i88 | i87...i80 |
| 6 | 111...96 | State of virtual inputs 96...111 | i111...i104 | i103...i96 |
| 7 | 127...112 | State of virtual inputs 112...127 | i127...i120 | i119...i112 |

The table below describes the Modbus/TCP data areas that contain the states of the virtual outputs of the PNOZmulti 2.

Relevant areas for the data are defined in the Modbus/TCP data areas Discrete Inputs (1x) and Input Register (3x). Read access is available to these data areas.

| Register (3x) | Discrete Input (1x) | Content | High Byte | Low Byte |
|---------------|---------------------|------------------------------------|-------------|-------------|
| 512 | 8207...8192 | State of virtual outputs 0...15 | o15...o8 | o7...o0 |
| 513 | 8223...8208 | State of virtual outputs 16...31 | o31...o24 | o23...o16 |
| 514 | 8239...8224 | State of virtual outputs 32...47 | o47...o40 | o39...o32 |
| 515 | 8255...8240 | State of virtual outputs 48...63 | o63...o56 | o55...o48 |
| 516 | 8271...8256 | State of virtual outputs 64...79 | o79...o72 | o71...o64 |
| 517 | 8287...8272 | State of virtual outputs 80...95 | o95...o88 | o87...o80 |
| 518 | 8303...8288 | State of virtual outputs 96...111 | o111...o104 | o103...o96 |
| 519 | 8319...8304 | State of virtual outputs 112...127 | o127...o120 | o119...o112 |

A watchdog can be activated in Control Register 255.

If no input bits are set by a Modbus/TCP subscriber within the preset time, the PNOZmulti 2 will set the input bits to "0".

The table below describes the Modbus/TCP data areas for the watchdog.

A relevant area for the watchdog is defined in each Modbus/TCP data area (Coils (0x), Discrete Inputs (1x), Input Register (3x), Holding Register (4x)). Read/write access will depend on the Modbus/TCP data area.

| Register (3x, 4x) | Coil/ Discrete Input (0x, 1x) | Content | High Byte | Low Byte |
|-------------------|-------------------------------|------------------|-----------------|----------|
| 255 | 4095...4080 | Control Register | See table below | |

| High Byte | WD-Trig-ger | Error Mes-sage | Reserved | Reserved | Reserved | W-Timer Bit 2 | W-Timer Bit 1 | W-Timer Bit 0 |
|-----------|-------------|----------------|----------|----------|----------|---------------|---------------|---------------|
| Low Byte | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved |

Bit 15 "Watchdog Trigger": The watchdog can be triggered by setting Bit 15 constantly to "1", or by a Client writing in the input area of the 128 inputs. The state of the bit when reading is undefined. A 1 or a 0 can be read.

Bit 14 "Error Message": If this bit is set, an error stack entry is generated when the watchdog is triggered.

Bit 10 ... 8 "WD Timer": If the set time for the watchdog is set, then Bit 15 must be set, or become set, at the same time.

| Watchdog Timer Bit 2 | Watchdog Timer Bit 1 | Watchdog Timer Bit 0 | Watchdog Time |
|-------------------------|-------------------------|-------------------------|-------------------|
| 0 | 0 | 0 | Timer deactivated |
| 0 | 0 | 1 | 100 ms |
| 0 | 1 | 0 | 200 ms |
| 0 | 1 | 1 | 500 ms |
| 1 | 0 | 0 | 1 s |
| 1 | 0 | 1 | 3 s |
| 1 | 1 | 0 | 5 s |
| 1 | 1 | 1 | 10 s |



INFORMATION

To check whether the watchdog has been triggered, set a virtual input permanently to "1".
If the corresponding input in the PNOZmulti 2 is "0", then the watchdog has been triggered.

6.4.5 Allocation table of the virtual inputs and outputs
Addressing the virtual inputs (coils) in Registers 0 to 7.

| | Virtual inputs | | | | | | | | | | | | | | | |
|---|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 1 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| 2 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| 3 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| 4 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| 5 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| 6 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| 7 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |

Allocation of virtual inputs i0, i1 ... i127 to the Bits in Registers 0 to 7

Addressing the virtual outputs (discrete inputs) in Registers 512 to 519.

| | Virtual outputs | | | | | | | | | | | | | | | |
|------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 512 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 513 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| 514 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| 515 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| 516 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| 517 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| 518 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| 519 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |

Allocation of virtual outputs o0, o1 ... o127 to the Bits in Registers 512 to 519.

6.4.6 Service data

The service data for Modbus/TCP is divided into the following data areas:

- ▶ Process data - Base unit and expansion modules
- ▶ Process data - Fieldbus module and communication module
- ▶ Diagnostic words
- ▶ Enable elements
- ▶ Project data
- ▶ Device data

The content of the version and device-dependent service data and addressing are described in the chapter entitled [Service data \[86\]](#).

6.4.7 LEDs

The table below describes the Modbus/TCP data areas that contain the LED statuses.

Relevant areas for the data are defined in the Modbus/TCP data areas Discrete Inputs (1x) and Input Register (3x). Read access is available to these data areas.

| Register (3x) | Discrete Input (1x) | Contents | High Byte | Low Byte |
|---------------|---------------------|----------------|-----------|------------------|
| 511 | 8176 | Status of LEDs | Reserved | PNOZmulti 2 LEDs |

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN is lit
- ▶ Bit 5-7: Reserved

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

- ▶ Bit 0 = 1: LED OFAULT is lit or flashes
- ▶ Bit 1 = 1: LED IFAULT is lit or flashes
- ▶ Bit 2 = 1: LED FAULT is lit or flashes
- ▶ Bit 3 = 1: LED DIAG is lit or flashes
- ▶ Bit 4 = 1: LED RUN FS is lit
- ▶ Bit 5: Reserved
- ▶ Bit 6 = 1: LED RUN ST is lit
- ▶ Bit 7: Reserved

6.4.8 Updating the data areas

Data is updated with varying priority.

The table below shows the typical update cycles for the various data.

| Content | Typ. update cycle |
|--|----------------------------|
| Virtual inputs/outputs | 20 ms |
| Project and device data | Once during initialisation |
| State of the inputs/outputs from the base unit and expansion modules | 320 ms |
| LED status | 1000 ms |
| Number of elements that can store a state | Once during initialisation |
| Element enable | 320 ms |
| Diagnostic words | 1000 ms |
| Current state of the virtual inputs | 1000 ms |



INFORMATION

The update time may increase if there are additional TCP/IP connections (e.g. PNOZmulti Configurator, PMI, control system) on the PG port (Port 9000).

6.5 Examples of Clients and Servers

The following subscribers communicate via Modbus/TCP or Ethernet:

▶ Devices with Server role:

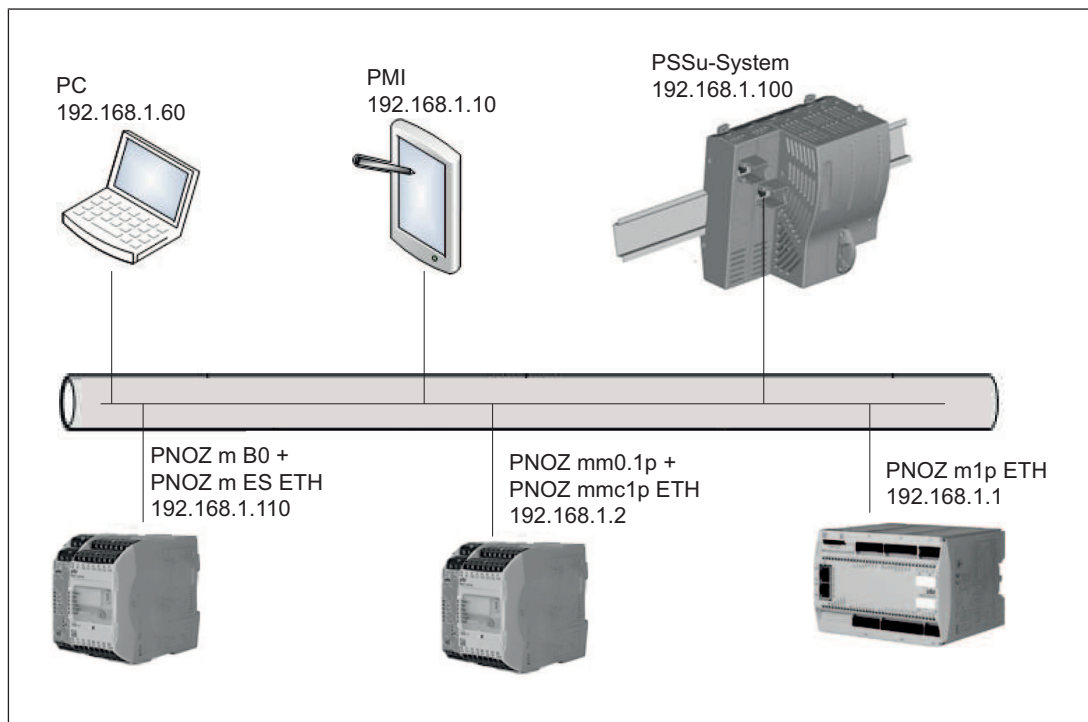
- PNOZ m ES ETH
- PNOZ m1p ETH
- PNOZ mmc1p ETH

▶ Devices with Client role:

- PSSu system in the automation system PSS 4000
- Operator terminal PMI

▶ PC as programming device for PNOZmulti 2, PSSu system and PMI

The PSSu system and the operator terminal PMI access the configurable control system PNOZmulti 2 (Server role) simultaneously.



7 Diagnostic word

7.1 Introduction

A diagnostic word can be read out for those elements in the PNOZmulti Configurator that can store a status. The diagnostic word contains information on a particular element, such as:

- ▶ Operating states (e.g. safety gate was opened)
- ▶ Error messages (e.g. N/C contact failed to switch or switched too late)

The content of the diagnostic words on the individual elements can be displayed and edited in the element in the PNOZmulti Configurator.

7.2 Elements with diagnostic word

The diagnostic word is accessed by activating an Element ID. The permitted value range for the Element ID is 1 ... 100. Elements with an element ID include:

- ▶ Function elements
 - E-STOP and safety gate
 - Safety gate with guard locking
 - Light curtain
 - Enabling switch
 - Foot switch
 - Two-hand buttons
 - Operating mode selector switch
- ▶ Analogue elements
 - Analogue input
 - Plausibility
 - Mathematical operations
 - Scaling
 - Threshold value monitoring
 - Range monitoring
- ▶ Logic Elements
 - RS flipflop
 - Start element
- ▶ Press elements
 - Light curtain
- ▶ Muting elements
 - Sequential muting
 - Parallel muting
 - Cross muting

- ▶ Output elements
 - Output elements with a feedback loop
 - Safety valve

7.3 Structure of the diagnostic word

The diagnostic word has 16 Bits:

| | | | | | |
|--------|--------|-----|-------|-------|-------|
| Bit 15 | Bit 14 | ... | Bit 2 | Bit 1 | Bit 0 |
|--------|--------|-----|-------|-------|-------|

If the diagnostic word = 0, the output of the respective element = 1. The element was enabled. (Exceptions: on various function elements, the states of the inputs are evaluated). Otherwise, at least one of the bits from 0 ... 15 of the diagnostic word is set and can be evaluated,

e.g.: Bit 1 on a safety gate element: 1:00000000 00000010

Key: Safety gate was opened

7.4 Evaluate diagnostic word

▶ Evaluation in the user program

One bit from the diagnostic word can be linked further within the PNOZmulti 2 user program. The user selects a bit within a diagnostic word and polls it. An LED can be driven in this way, for example.

▶ Evaluation using PVIS expanded diagnostics


The bits of a diagnostic word can be configured for PVIS expanded diagnostics in the PNOZmulti Configurator. A "Safety Device" diagnostic type is assigned to an element. It contains the diagnostic word as an event message. An event message including remedies (actions) is defined in the diagnostic type for each event, i.e. for every potential element state. The event messages and actions can also be supplemented through additional information, which is helpful during diagnostics (equipment identifier, location description). The event messages can be displayed on the PMImicro diag, for example.




INFORMATION

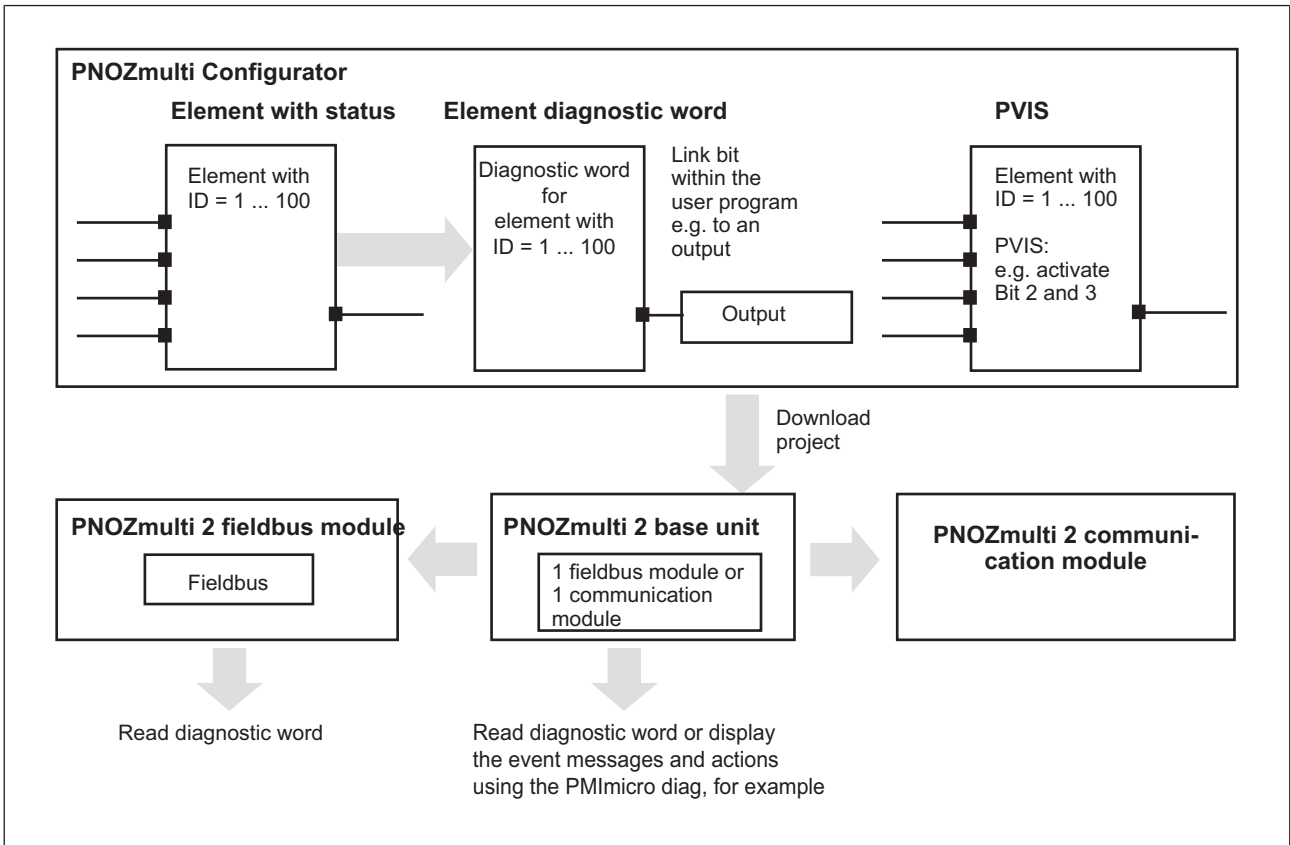
Detailed information on PVIS expanded diagnostics can be found in the PNOZmulti Configurator's online help.

▶ Evaluation via the RS232/Ethernet interfaces

The diagnostic word is requested via the communication module using the element's ID (see also [ETH/RS232 interfaces](#) [ 53]).

▶ Evaluation via a fieldbus

The diagnostic word is requested via a connected fieldbus module, via the element's ID (see also [Fieldbus Modules](#) [ 17]).



7.4.1 Example - Evaluate diagnostic word of a safety gate

Safety gate with Element ID = 5:

- ▶ Dual-channel
- ▶ Manual reset
- ▶ Start-up test

Evaluation of the following bits:

- ▶ Bit 2 = 1: Safety gate is ready for reset. The reset button for manual reset must be operated.
- ▶ Bit 8 = 1: Error in the test pulse wiring

| PNOZmulti Configurator | |
|------------------------|---|
| | 0000 0000 0000 0000 Enable issued |
| | 0000 0000 0000 0001 |
| | 0000 0000 0000 0010 Safety gate has been opened |
| Bit 2 | 0000 0000 0000 0100 Safety gate is ready for reset |
| | 0000 0000 0000 1000 Function test must be performed |
| | 0000 0000 0001 0000 |
| | 0000 0000 0010 0000 N/C contact failed to switch or switched too late |
| | 0000 0000 0100 0000 |
| | 0000 0000 1000 0000 |
| Bit 8 | 0000 0001 0000 0000 Error in the test pulse wiring |
| | 0000 0010 0000 0000 |
| | 0000 0100 0000 0000 |
| | 0000 1000 0000 0000 |
| | 0001 0000 0000 0000 There is a 1 signal at input 1. |
| | 0010 0000 0000 0000 There is a 1 signal at input 2. |
| | 0100 0000 0000 0000 There is a 1 signal at input 3. |
| | 1000 0000 0000 0000 There is a 1 signal at input 4. |


| |
|---|
| Evaluate Bit 2 of the diagnostic word logic element for ID = 5 within the user program |
| Poll diagnostic word for ID = 5 via interface |
| Poll diagnostic word for ID = 5 via fieldbus module |
| Display Bit 2 and 8 of the safety gate function element for ID = 5 (e.g. PMImicro diag) |


8 Service data

The service data of the configurable control system PNOZmulti 2 is divided into various data ranges. The service data is addressed differently, based on the fieldbus. They are fully available after the control system has been in "Run" state for three seconds.

The content of the service data is described generally in the sections below. This is followed by the fieldbus-specific addressing.

Data ranges:

| | PNOZ m B0 | PNOZ m B1 |
|---|--------------------------|--------------------------|
| Process data for base unit and expansion modules:  88] | | |
| Base unit | ✓ | ✓ |
| Expansion modules right 1 ... 6 | ✓ | ✓ |
| Expansion modules right 7 ... 12 | - | from V1.1 |
| Expansion modules left 1 ... 4 | ✓ | ✓ |
| ST expansion modules | - | from V1.1 ^[1] |
| ▶ State of safe inputs i0 ... i31 | ✓ | ✓ |
| ▶ State of safe outputs o0 ... o31 | ✓ | ✓ |
| ▶ Status of system LEDs | ✓ | ✓ |
| ▶ Status of IO LEDs | ✓ | ✓ |
| ▶ Status of the expanded inputs i32 ... i127 when using the module PNOZ m EF SafetyNET | from V2.3 | from V1.2 |
| ▶ Advanced data | from V2.3 ^[2] | from V1.1 ^[2] |
| Process data: Fieldbus and communication module | ✓ | ✓ |
| ▶ State of virtual standard inputs i0 ... i127 | ✓ | ✓ |
| ▶ State of virtual standard outputs o0 ... o127 | ✓ | ✓ |
| ▶ Status of system LEDs | ✓ | ✓ |
| Connected devices | | |
| ▶ 1st device connection | - | from V1.5 ^[3] |
| ▶ 2nd ... 8th device connection | - | from V1.6 ^[3] |
| Diagnostic words | ✓ | ✓ |
| ▶ Diagnostics | ✓ | ✓ |
| Enable elements | ✓ | - |
| ▶ Element IDs | ✓ | - |
| Project data | ✓ | ✓ |
| ▶ Check sums | ✓ | ✓ |
| ▶ Date | ✓ | ✓ |

| | PNOZ m B0 | PNOZ m B1 |
|--|-----------|-----------|
| ▶ Project name | ✓ | ✓ |
| Device data [ 149] | | |
| Base unit | ✓ | ✓ |
| Expansion modules right 1 ... 6 | ✓ | ✓ |
| Expansion modules right 7 ... 12 | - | from V1.1 |
| Expansion modules left 1 ... 4 | ✓ | ✓ |
| ST expansion modules | - | from V1.1 |
| ▶ Product | ✓ | ✓ |
| ▶ Firmware | ✓ | ✓ |
| ▶ Operating hours | ✓ | ✓ |

[1] Minimum requirements for addressing the process data: ST expansion modules

| Data | PNOZ m B1 V1.1 |
|-----------------------|----------------------------|
| Tables | ✓ |
| Modbus Register | ✓ |
| SDOs | Fieldbus modules from V2.0 |
| Profinet Records | |
| Ethernet IP instances | |

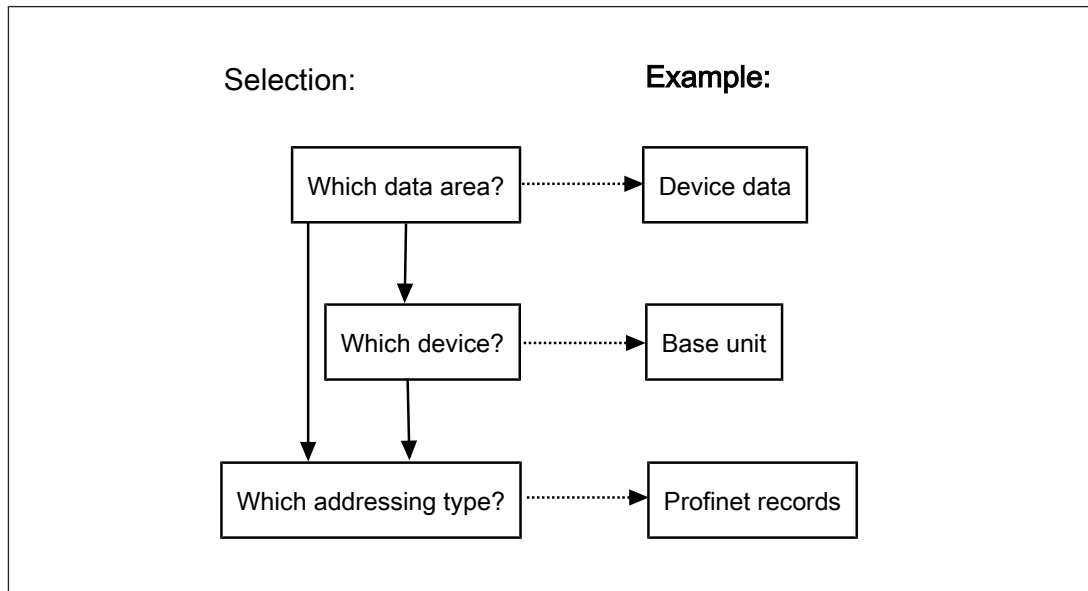
[2] Minimum requirements for addressing the process data: Advanced data

| Data | PNOZ m B0 V2.3 | PNOZ m B1 V1.1 |
|-----------------------|--------------------|----------------------------|
| Tables | ✓ | ✓ |
| Modbus Register | PNOZ m ES ETH V1.1 | ✓ |
| SDOs | Not supported | Fieldbus modules from V2.0 |
| Profinet Records | | |
| Ethernet IP instances | | |

[3] Minimum requirements for addressing the device connections

| Data | PNOZ m B1 from V1.5 |
|-----------------------|----------------------------|
| Tables | ✓ |
| Modbus Register | ✓ |
| SDOs | Fieldbus modules from V2.0 |
| Profinet Records | |
| Ethernet IP instances | |

The following example illustrates the procedure for selecting certain service data. In the example, the device data for the base unit is selected with the fieldbus module PROFINET.



Data area: [Device data](#)
 Device: [Device data addressing on base unit](#)
 Addressing type: PROFINET Records



INFORMATION

The service data is only updated piecemeal in each cycle by the PNOZmulti 2. Updating all of the data can take up to 500 ms. An exception is data requested in table form. This is updated fully in each cycle.

8.1 Process data: Base unit and expansion modules

The process data of the base unit and expansion modules consists of 36 Bytes and contains the following information:


- ▶ State of the inputs and outputs
- ▶ The status of the system LED for
 - supply voltage,
 - Diagnostics
- ▶ State of the inputs and outputs, which is displayed on the device.

8.1.1 State of inputs i0 ... i31

Please note:

Does not apply for the fieldbus module PNOZ m EF EtherCAT FSoE.

| Byte | Bit 7 | ... | | | | | | Bit 0 |
|------|-------|-----|-----|-----|-----|-----|-----|-------|
| 0 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 |
| 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 |
| 2 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 |
| 3 | i31 | i30 | i29 | i28 | i27 | i26 | i25 | i24 |

Fieldbus-specific addressing is described in the chapter entitled [Process data addressing](#) [ 98].

Status of the expanded inputs i32 ... i127 when using the module PNOZ m EF SafetyNET

| Byte | Bit 7 | ... | | | | | | Bit 0 |
|------|-------|------|------|------|------|------|------|-------|
| 12 | i39 | i38 | i37 | i36 | i35 | i34 | i33 | i32 |
| 13 | i47 | i46 | i45 | i44 | i43 | i42 | i41 | i40 |
| 14 | i55 | i54 | i53 | i52 | i51 | i50 | i49 | i48 |
| 15 | i63 | i62 | i61 | i60 | i59 | i58 | i57 | i56 |
| 16 | i71 | i70 | i69 | i68 | i67 | i66 | i65 | i64 |
| 17 | i79 | i78 | i77 | i76 | i75 | i74 | i73 | i72 |
| 18 | i87 | i86 | i85 | i84 | i83 | i82 | i81 | i80 |
| 19 | i95 | i94 | i93 | i92 | i91 | i90 | i89 | i88 |
| 20 | i103 | i102 | i101 | i100 | i99 | i98 | i97 | i96 |
| 21 | i111 | i110 | i109 | i108 | i107 | i106 | i105 | i104 |
| 22 | i119 | i118 | i117 | i116 | i115 | i114 | i113 | i112 |
| 23 | i127 | i126 | i125 | i124 | i123 | i122 | i121 | i120 |

8.1.2 State of outputs o0 ... o31

Please note:

Does not apply for the fieldbus module PNOZ m EF EtherCAT FSoE.

| Byte | Bit 7 | ... | | | | | | Bit 0 |
|------|-------|-----|-----|-----|-----|-----|-----|-------|
| 4 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 |
| 5 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 |
| 6 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 |
| 7 | o31 | o30 | o29 | o28 | o27 | o26 | o25 | o24 |

Fieldbus-specific addressing is described in the chapter entitled [Process data addressing](#) [98].

8.1.3 Status of system LEDs

Status of the system LEDs for supply voltage and base unit diagnostics (see also [Assignment of system and I/O-LEDs](#) [91])

| Byte | Bit 7 | ... | Bit 4 | Bit 3 | ... | Bit 0 |
|------|--------------|-----|-------|--------------|-----|-------|
| 8 | System LED 1 | | | System LED 0 | | |
| 9 | System LED 3 | | | System LED 2 | | |
| 10 | System LED 5 | | | System LED 4 | | |
| 11 | Reserved | | | | | |

| LED status | 4 Bit coding |
|------------|--------------|
| Off | 0x0 |
| On | 0xF |
| Flashes | 0x3 |

Fieldbus-specific addressing is described in the chapter entitled [Process data addressing](#) [98].

8.1.4 Status of IO LEDs

Status of the IO LEDs on the expansion modules to the right of the base unit (see also [Assignment of system and I/O-LEDs](#) [91])

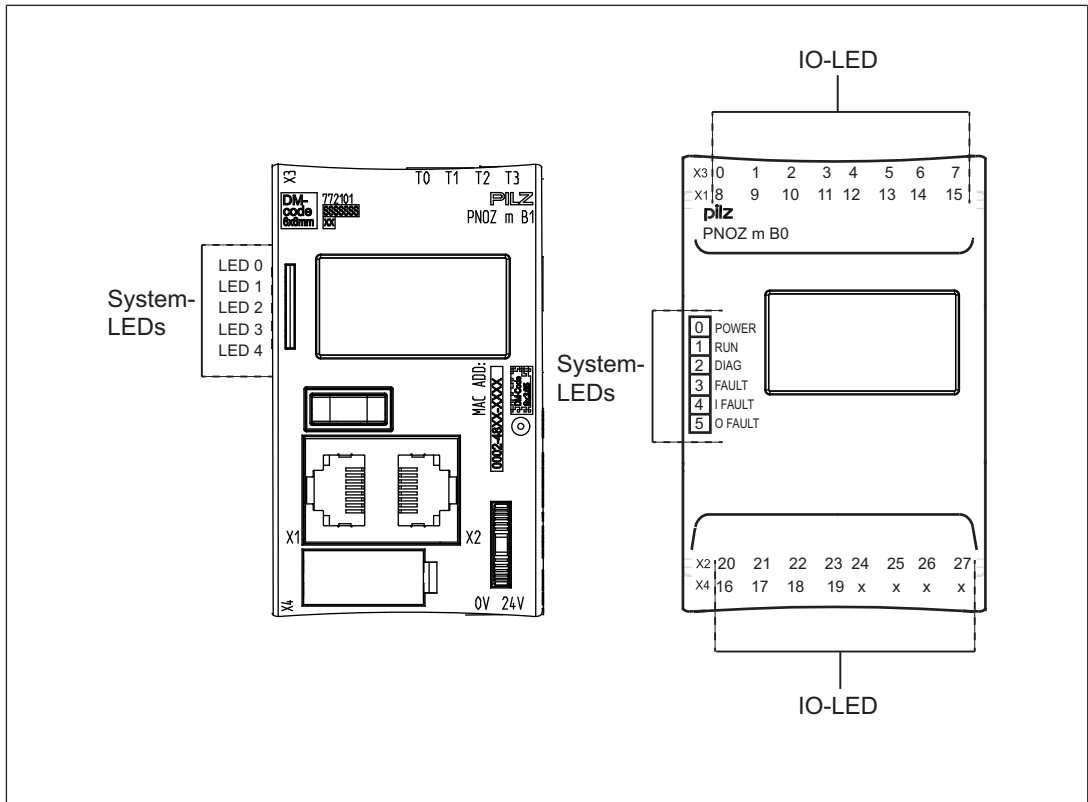
| Byte | Bit 7 | ... | Bit 4 | Bit 3 | ... | Bit 0 |
|------|------------|-----|-------|------------|-----|-------|
| 12 | I/O LED 1 | | | I/O LED 0 | | |
| 13 | I/O LED 3 | | | I/O LED 2 | | |
| 14 | I/O LED 5 | | | I/O LED 4 | | |
| 15 | I/O LED 7 | | | I/O LED 6 | | |
| 16 | I/O LED 9 | | | I/O LED 8 | | |
| 17 | I/O LED 11 | | | I/O LED 10 | | |
| 18 | I/O LED 13 | | | I/O LED 12 | | |
| 19 | I/O LED 15 | | | I/O LED 14 | | |
| 20 | I/O LED 17 | | | I/O LED 16 | | |
| 21 | I/O LED 19 | | | I/O LED 18 | | |
| 22 | I/O LED 21 | | | I/O LED 20 | | |
| 23 | I/O LED 23 | | | I/O LED 22 | | |
| 24 | I/O LED 25 | | | I/O LED 24 | | |

| Byte | Bit 7 | ... | Bit 4 | Bit 3 | ... | Bit 0 |
|------------|------------|-----|--------------|------------|-----|-------|
| 25 | I/O LED 27 | | | I/O LED 26 | | |
| 26 | I/O LED 29 | | | I/O LED 28 | | |
| 27 | I/O LED 31 | | | I/O LED 30 | | |
| 28 | Reserved | | | | | |
| ... | ... | | | | | |
| 35 | Reserved | | | | | |
| LED status | | | 4 Bit coding | | | |
| Off | | | 0x0 | | | |
| On | | | 0xF | | | |
| Flashes | | | 0x3 | | | |

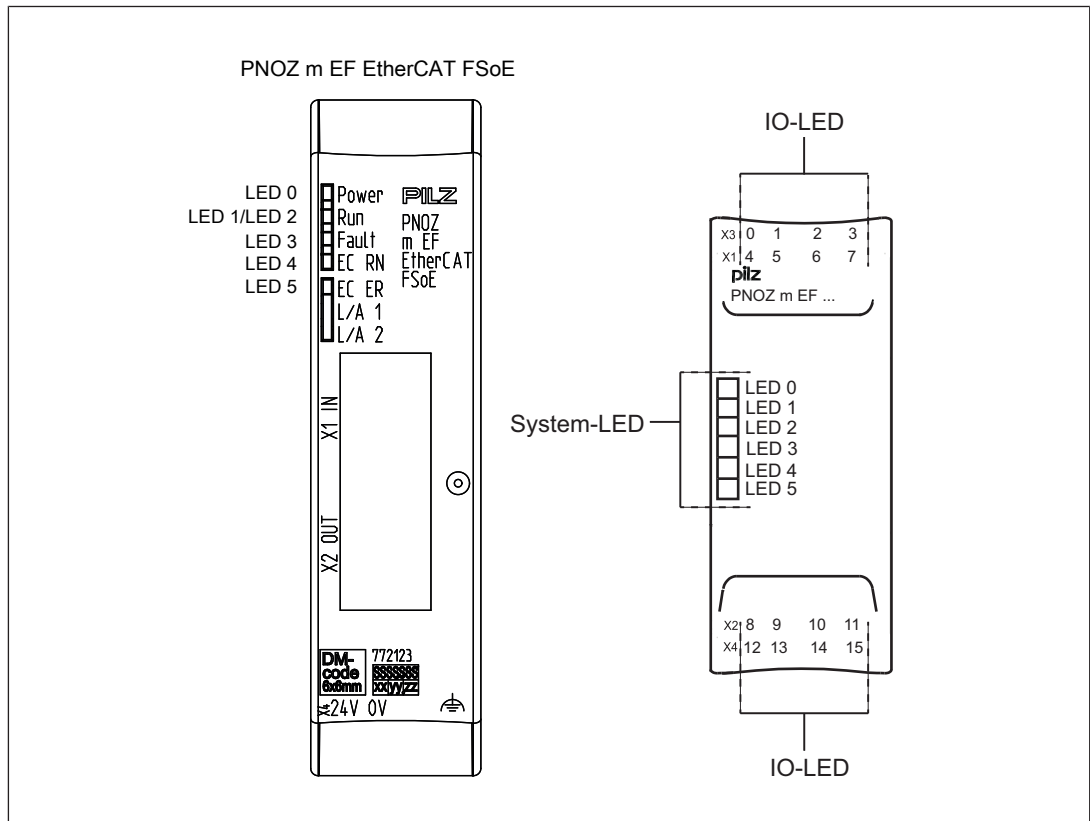
Fieldbus-specific addressing is described in the chapter entitled [Process data addressing](#) [98].

8.1.5 Assignment of system and I/O-LEDs

Assignment of the I/O LEDs and system LEDs to the LEDs on the base unit:



Assignment of the I/O LEDs and system LEDs to the LEDs on the expansion modules:



8.1.6 Advanced data

Up to six additional data values are available for the expansion modules. Depending on the type of expansion module, operating data such as the axis speed of a motion monitoring module can be requested, for example.

The different types of operating data are each identified by a unique data ID. A data word consists of 4 Bytes.

The Byte sequence is Big Endian, that is, the most significant Byte is transmitted first.

The following data can be requested:

| Data ID | Description | Unit | Data type |
|---------|--------------------------|------------|----------------|
| 0xFF | Invalid value | | |
| 0x05 | Encoder frequency Axis 1 | mHz | unsigned int |
| 0x06 | Position Axis 1 | Increments | unsigned int |
| 0x07 | Encoder frequency Axis 2 | mHz | unsigned int |
| 0x08 | Position Axis 2 | Increments | unsigned int |
| 0x40 | Analogue Input I0 | mA | float IEEE 754 |
| 0x41 | Analogue Input I1 | mA | float IEEE 754 |
| 0x42 | Analogue Input I2 | mA | float IEEE 754 |
| 0x43 | Analogue Input I3 | mA | float IEEE 754 |

| Data ID | Description | Unit | Data type |
|---------|--|------|----------------|
| 0x50 | 1st numerical value from analogue diagnostic element | | float IEEE 754 |
| 0x51 | 2nd numerical value from analogue diagnostic element | | float IEEE 754 |
| 0x52 | 3rd numerical value from analogue diagnostic element | | float IEEE 754 |
| 0x53 | 4th numerical value from analogue diagnostic element | | float IEEE 754 |
| 0x54 | 5th numerical value from analogue diagnostic element | | float IEEE 754 |
| 0x55 | 6th numerical value from analogue diagnostic element | | float IEEE 754 |

All other values are reserved.

| Operating data | | Segment |
|----------------|-----------|-------------|
| Information | Byte | |
| Data ID 1 | 0 ... 1 | 1st segment |
| Data value | 2 ... 5 | |
| Data ID 2 | 6 ... 7 | |
| Data value | 8 ... 11 | |
| Data ID 3 | 12 ... 13 | 2nd segment |
| Data value | 14 ... 17 | |
| Data ID 4 | 18 ... 19 | |
| Data value | 20 ... 23 | |
| Data ID 5 | 24 ... 25 | 3rd segment |
| Data value | 26 ... 29 | |
| Data ID 6 | 30 ... 31 | |
| Data value | 32 ... 35 | |

8.1.7 Process data, left-hand expansion modules

8.1.7.1 Process data PNOZ m EF PDP Link (from configured Version 1.x)

| Byte | Bit7 | ... | | | | | | Bit0 | Module no. | Table/ Segment (e.g. slot 1) |
|------|------|-----|----|----|----|----|----|------|-------------|------------------------------------|
| 0 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 | PDPModule 1 | 22/0 |
| 1 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 | PDPModule 2 | 22/0 |
| 2 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 | PDPModule 3 | 22/0 |

| Byte | Bit7 | ... | | | | | | Bit0 | Module no. | Table/ Segment (e.g. slot 1) |
|------|----------|-----|----|----|----|----|----|------|-------------|------------------------------------|
| 3 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 | PDPModule 4 | 22/0 |
| 4 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 | PDPModule 1 | 22/0 |
| 5 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 | PDPModule 2 | 22/0 |
| 6 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 | PDPModule 3 | 22/0 |
| 7 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 | PDPModule 4 | 22/0 |
| 8 | | | | | | | | | | 22/0 |
| 9 | | | | | | | | | | 22/0 |
| 10 | | | | | | | | | | 22/0 |
| 11 | | | | | | | | | | Reserved |
| 12 | Reserved | | | | | | | | | 22/1 |
| ... | ... | | | | | | | | | 22/1 |
| 24 | Reserved | | | | | | | | | 22/1 |
| 25 | Reserved | | | | | | | | | 22/2 |
| ... | ... | | | | | | | | | 22/2 |
| 35 | Reserved | | | | | | | | | 22/2 |

8.1.7.2 Process data PNOZ m EF PDP Link (from configured Version 2.x)

| Byte | Bit 7 | ... | Bit 4 | Bit 3 | ... | Bit 0 | Table/ Segment (e.g. slot 1) |
|------|--|-----|-------|--------------|-----|-------|------------------------------------|
| 0 | Inputs PDP Module 1: | | | | | | 22/0 |
| 1 | i0 ... i7 (Type 1/2) or i10 ... i42 (Type 4) | | | | | | 22/0 |
| 2 | Inputs PDP Module 2: | | | | | | 22/0 |
| 3 | | | | | | | 22/0 |
| 4 | Outputs PDP Module 1: | | | | | | 22/0 |
| 5 | o0 ... o7 (Type 1/2) or o10 ... o42 (Type 4) | | | | | | 22/0 |
| 6 | Outputs PDP Module 2 | | | | | | 22/0 |
| 7 | | | | | | | 22/0 |
| 8 | System LED 1 | | | System LED 0 | | | 22/0 |
| 9 | System LED 3 | | | System LED 2 | | | 22/0 |
| 10 | System LED 4 | | | System LED 3 | | | 22/0 |
| 11 | Reserved | | | | | | 22/0 |
| 12 | Inputs PDP Module 3 | | | | | | 22/1 |
| 13 | | | | | | | 22/1 |

| Byte | Bit 7 | ... | Bit 4 | Bit 3 | ... | Bit 0 | Table/ Segment (e.g. slot 1) |
|------|----------------------|-----|-------|-------|-----|-------|------------------------------------|
| 14 | Inputs PDP Module 4 | | | | | | 22/1 |
| 15 | | | | | | | 22/1 |
| 16 | Reserved | | | | | | 22/1 |
| ... | ... | | | | | | ... |
| 23 | Reserved | | | | | | 22/1 |
| 24 | Outputs PDP Module 3 | | | | | | 22/2 |
| 25 | | | | | | | 22/2 |
| 26 | Outputs PDP Module 4 | | | | | | 22/2 |
| 27 | | | | | | | 22/2 |
| 28 | Reserved | | | | | | 22/2 |
| ... | ... | | | | | | .. |
| 35 | Reserved | | | | | | 22/2 |

8.1.7.3 Process data PDP67 F 8DI ION (HP)

from configured Version 2.x of the PNOZ m EF PDP Link

| | Byte | Bit 7 | ... | | | | | | Bit 0 |
|---------|------|----------|-----|----|----|---|---|----|-------|
| Inputs | 0 | - | - | i3 | i2 | - | - | i1 | i0 |
| | 1 | - | - | i7 | i6 | - | - | i5 | i4 |
| Outputs | 2 | - | - | o3 | o2 | - | - | o1 | o0 |
| | 3 | - | - | o7 | o6 | - | - | o5 | o4 |

8.1.7.4 Process data PDP67 F 8DI4DO 5/5 ION (VA)

from configured Version 2.x of the PNOZ m EF PDP Link

| | Byte | Bit 7 | ... | | | | | | Bit 0 |
|---------|------|----------|-----|-----|-----|---|---|-----|-------|
| Inputs | 0 | - | - | i21 | i20 | - | - | i11 | i10 |
| | 1 | - | - | i41 | i40 | - | - | i31 | i30 |
| Outputs | 2 | - | - | o21 | o20 | - | - | o11 | o10 |
| | 3 | o-43 | - | o41 | o40 | - | - | o31 | o30 |

8.1.7.5 Process data PDP67 F 10DI4DO 5/8 ION (VA)

from configured Version 2.x of the PNOZ m EF PDP Link

| | Byte | Bit 7 | ... | | | | | | Bit 0 |
|---------|------|-------|-----|-----|-----|---|---|-----|-------|
| Inputs | 0 | - | i22 | i21 | i20 | - | - | i11 | i10 |
| | 1 | - | i42 | i41 | i40 | - | - | i31 | i30 |
| Outputs | 2 | o23 | o22 | o21 | o20 | - | - | o11 | o10 |
| | 3 | o43 | o42 | o41 | o40 | - | - | o31 | o30 |

8.1.7.6 Process data PNOZ m EF SafetyNet

| Byte | Bit 7 | ... | ... | Bit 4 | Bit 3 | ... | ... | Bit 0 | Table/ Segment (e.g. slot 1) |
|------|--------------|------|------|-------|--------------|------|------|-------|------------------------------------|
| 0 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 | 22/0 |
| 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 | 22/0 |
| 2 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 | 22/0 |
| 3 | i31 | i30 | i29 | i28 | i27 | i26 | i25 | i24 | 22/0 |
| 4 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 | 22/0 |
| 5 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 | 22/0 |
| 6 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 | 22/0 |
| 7 | o31 | o30 | o29 | o28 | o27 | o26 | o25 | o24 | 22/0 |
| 8 | System LED 1 | | | | System LED 0 | | | | 22/0 |
| 9 | System LED 3 | | | | System LED 2 | | | | 22/0 |
| 10 | System LED 4 | | | | System LED 3 | | | | 22/0 |
| 11 | Reserved | | | | | | | | 22/0 |
| 12 | i39 | 22/1 | i37 | i36 | i35 | i34 | i33 | i32 | 22/1 |
| 13 | i47 | 22/1 | i45 | i44 | i43 | i42 | i41 | i40 | 22/1 |
| 14 | i55 | 22/1 | i53 | i52 | i51 | i50 | i49 | i48 | 22/1 |
| 15 | i63 | 22/1 | i61 | i60 | i59 | i58 | i57 | i56 | 22/1 |
| 16 | i71 | 22/1 | i69 | i68 | i67 | i66 | i65 | i64 | 22/1 |
| 17 | i79 | 22/1 | i77 | i76 | i75 | i74 | i73 | i72 | 22/1 |
| 18 | i87 | 22/1 | i85 | i84 | i83 | i82 | i81 | i80 | 22/1 |
| 19 | i95 | 22/1 | i93 | i92 | i91 | i90 | i89 | i88 | 22/1 |
| 20 | i103 | 22/1 | i101 | i100 | i99 | i98 | i97 | i96 | 22/1 |
| 21 | i111 | 22/1 | i109 | i108 | i107 | i106 | i105 | i104 | 22/1 |
| 22 | i119 | 22/1 | i117 | i116 | i115 | i114 | i113 | i112 | 22/1 |
| 23 | i127 | 22/1 | i125 | i124 | i123 | i122 | i121 | i120 | 22/1 |
| 24 | Reserved | | | | | | | | 22/1 |

| Byte | Bit 7 | ... | Bit 4 | Bit 3 | ... | Bit 0 | Table/ Segment (e.g. slot 1) |
|------|----------|-----|-------|-------|-----|-------|------------------------------------|
| 25 | Reserved | | | | | | 22/2 |
| ... | ... | | | | | | 22/2 |
| 35 | Reserved | | | | | | 22/2 |

8.1.7.7 Process data PNOZ m EF MultiLink

| Byte | Bit 7 | ... | | | | | | Bit 0 | Table/ Segment (e.g. slot 1) |
|------|--------------|-----|-----|--------------|-----|-----|------|-------|------------------------------------|
| 0 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 | 22/0 |
| 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 | 22/0 |
| 2 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 | 22/0 |
| 3 | i31 | i30 | i29 | i28 | i27 | i26 | i25 | i24 | 22/0 |
| 4 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 | 22/0 |
| 5 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 | 22/0 |
| 6 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 | 22/0 |
| 7 | o31 | o30 | o29 | o28 | o27 | o26 | o25 | o24 | 22/0 |
| 8 | System LED 1 | | | System LED 0 | | | 22/0 | | |
| 9 | System LED 3 | | | System LED 2 | | | 22/0 | | |
| 10 | System LED 4 | | | System LED 3 | | | 22/0 | | |
| 11 | Reserved | | | | | | 22/0 | | |
| 12 | Reserved | | | | | | 22/0 | | |
| ... | ... | | | | | | | | |
| 24 | Reserved | | | | | | 22/1 | | |
| 25 | Reserved | | | | | | 22/2 | | |
| ... | ... | | | | | | ... | | |
| 35 | Reserved | | | | | | 22/2 | | |

8.1.7.8 Process data PNOZ m EF EtherCAT FSoE

| Byte | Bit 7 | ... | | | | | Bit 0 | Table/ Segment (e.g. slot 1) |
|------|-------|-----|--|--|--|--|-------|------------------------------------|
| 0 | | | | | | | 22/0 | |
| ... | | | | | | | 22/0 | |
| 7 | | | | | | | 22/0 | |

| Byte | Bit 7 | ... | Bit 0 | Table/ Segment (e.g. slot 1) |
|------|--------------|-----|--------------|------------------------------------|
| 8 | System LED 1 | | System LED 0 | 22/0 |
| 9 | System LED 3 | | System LED 2 | 22/0 |
| 10 | System LED 4 | | System LED 3 | 22/0 |
| 11 | Reserved | | | 22/0 |
| 12 | Reserved | | | 22/1 |
| ... | ... | | | ... |
| 24 | Reserved | | | 22/1 |
| 25 | Reserved | | | 22/2 |
| ... | ... | | | ... |
| 35 | Reserved | | | 22/2 |

8.1.8 Process data addressing

8.1.8.1 Process data addressing on base unit

Tables

| Process data | | Tables | | |
|--------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 20 | 0 | 0 ... 3 |
| Outputs | 4 ... 7 | 20 | 0 | 4 ... 7 |
| System LEDs | 8 ... 10 | 20 | 0 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 20 | 1 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 20 | 2 | 0 ... 3 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2001 | 1 ... 4 |
| Outputs | 4 ... 7 | 0x2001 | 5 ... 8 |
| System LEDs | 8 ... 10 | 0x2001 | 9 ... 11 |
| I/O LEDs | 12 ... 27 | 0x2001 | 13 ... 28 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1024 ... 1025 | 16384 ... 16415 |
| Outputs | 4 ... 7 | 1026 ... 1027 | 16416 ... 16447 |
| System LEDs | 8 ... 10 | 1028 ... 1029 | 16448 ... 16471 |
| I/O LEDs | 12 ... 27 | 1030 ... 1037 | 16480 ... 16607 |

Profinet records

| Process data | | Profinet | |
|--------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Inputs | 0 ... 3 | 1 | 0 ... 3 |
| Outputs | 4 ... 7 | 1 | 4 ... 7 |
| System LEDs | 8 ... 10 | 1 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 1 | 12 ... 27 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 1 | 1 | 0 ... 3 |
| Outputs | 4 ... 7 | 1 | 1 | 4 ... 7 |
| System LEDs | 8 ... 10 | 1 | 1 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 1 | 1 | 12 ... 27 |

8.1.8.2 Process data addressing, 1st right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 0 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 0 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 0 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 1 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 2 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 0 | 0...11 |
| Advanced data | 12...23 | 201 | 1 | 0...11 |

| Process data | | Tables | | |
|-------------------------------|---------|--------|---|--------|
| Advanced data | 24...35 | 201 | 2 | 0...11 |

SDOs

| Process data | | SDOs | |
|-------------------------------|-----------|--------|------------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2001 | 73 ... 76 |
| Outputs | 4 ... 7 | 0x2001 | 77 ... 80 |
| System LEDs | 8 ... 10 | 0x2001 | 81 ... 83 |
| I/O LEDs | 12 ... 27 | 0x2001 | 85 ... 100 |
| Advanced data | 0 ... 35 | 0x2029 | 1 ... 36 |

Modbus Register

| Process data | | Modbus Register | |
|-------------------------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1060 ... 1061 | 16960 ... 16991 |
| Outputs | 4 ... 7 | 1062 ... 1063 | 16992 ... 17023 |
| System LEDs | 8 ... 10 | 1064 ... 1065 | 17024 ... 17047 |
| I/O LEDs | 12 ... 27 | 1066 ... 1073 | 17056 ... 17183 |
| Advanced data | 0...35 | 16420 ... 16437 | - |

Profinet Records

| Process data | | Profinet | |
|-------------------------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 3 | 0 ... 3 |
| Outputs | 4 ... 7 | 3 | 4 ... 7 |
| System LEDs | 8 ... 10 | 3 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 3 | 12 ... 27 |
| Advanced data | 0 ... 35 | 151 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|-------------------------|---------|-------------|-----------|---------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 1 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 1 | 4 ... 7 |

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|---|-----------|
| System LEDs | 8 ... 10 | 2 | 1 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 1 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 3 | 0 ... 35 |

8.1.8.3 Process data addressing, 2nd right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 3 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 3 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 3 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 4 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 5 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 3 | 0...11 |
| Advanced data | 12...23 | 201 | 4 | 0...11 |
| Advanced data | 24...35 | 201 | 5 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2002 | 1 ... 4 |
| Outputs | 4 ... 7 | 0x2002 | 5 ... 8 |
| System LEDs | 8 ... 10 | 0x2002 | 9 ... 11 |
| I/O LEDs | 12 ... 27 | 0x2002 | 13 ... 28 |
| Advanced data | 0 ... 35 | 0x2029 | 37 ... 72 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1078 ... 1079 | 17248 ... 17279 |
| Outputs | 4 ... 7 | 1080 ... 1081 | 17280 ... 17311 |
| System LEDs | 8 ... 10 | 1082 ... 1083 | 17312 ... 17335 |
| I/O LEDs | 12 ... 27 | 1084 ... 1091 | 17344 ... 17471 |

| Process data | | Modbus Register | |
|---------------|--------|-----------------|---|
| Advanced data | 0...35 | 16438 ... 16455 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 4 | 0 ... 3 |
| Outputs | 4 ... 7 | 4 | 4 ... 7 |
| System LEDs | 8 ... 10 | 4 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 4 | 12 ... 27 |
| Advanced data | 0 ... 35 | 152 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 2 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 2 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 2 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 2 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 4 | 0 ... 35 |

8.1.8.4

Process data addressing, 3rd right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 6 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 6 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 6 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 7 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 8 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 6 | 0...11 |
| Advanced data | 12...23 | 201 | 7 | 0...11 |
| Advanced data | 24...35 | 201 | 8 | 0...11 |

SDOs

| Process data | | SDOs | |
|-------------------------------|-----------|--------|------------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2002 | 37 ... 40 |
| Outputs | 4 ... 7 | 0x2002 | 41 ... 44 |
| System LEDs | 8 ... 10 | 0x2002 | 45 ... 47 |
| I/O LEDs | 12 ... 27 | 0x2002 | 49 ... 64 |
| Advanced data | 0 ... 35 | 0x2029 | 73 ... 108 |

Modbus Register

| Process data | | Modbus Register | |
|-------------------------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1096 ... 1097 | 17536 ... 17567 |
| Outputs | 4 ... 7 | 1098 ... 1099 | 17568 ... 17599 |
| System LEDs | 8 ... 10 | 1100 ... 1101 | 17600 ... 17623 |
| I/O LEDs | 12 ... 27 | 1102 ... 1109 | 17632 ... 17759 |
| Advanced data | 0...35 | 16456 ... 16473 | - |

Profinet Records

| Process data | | Profinet | |
|-------------------------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 5 | 0 ... 3 |
| Outputs | 4 ... 7 | 5 | 4 ... 7 |
| System LEDs | 8 ... 10 | 5 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 5 | 12 ... 27 |
| Advanced data | 0 ... 35 | 153 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|-------------------------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 3 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 3 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 3 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 3 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 5 | 0 ... 35 |

8.1.8.5 Process data addressing, 4th right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 9 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 9 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 9 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 10 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 11 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 9 | 0...11 |
| Advanced data | 12...23 | 201 | 10 | 0...11 |
| Advanced data | 24...35 | 201 | 11 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|------------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2002 | 73 ... 76 |
| Outputs | 4 ... 7 | 0x2002 | 77 ... 80 |
| System LEDs | 8 ... 10 | 0x2002 | 81 ... 83 |
| I/O LEDs | 12 ... 27 | 0x2002 | 85 ... 100 |
| Advanced data | 0 ... 35 | 0x2030 | 1 ... 36 |

Modbus Register

| Process data | | Modbus Register | |
|---------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1114 ... 1115 | 17824 ... 17855 |
| Outputs | 4 ... 7 | 1116 ... 1117 | 17856 ... 17887 |
| System LEDs | 8 ... 10 | 1118 ... 1119 | 17888 ... 17911 |
| I/O LEDs | 12 ... 27 | 1120 ... 1127 | 17920 ... 18047 |
| Advanced data | 0...35 | 16474 ... 16491 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 6 | 0 ... 3 |
| Outputs | 4 ... 7 | 6 | 4 ... 7 |
| System LEDs | 8 ... 10 | 6 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 6 | 12 ... 27 |
| Advanced data | 0 ... 35 | 154 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 4 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 4 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 4 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 4 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 6 | 0 ... 35 |

8.1.8.6

Process data addressing, 5th right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 12 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 12 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 12 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 13 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 14 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 12 | 0...11 |
| Advanced data | 12...23 | 201 | 13 | 0...11 |
| Advanced data | 24...35 | 201 | 14 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2003 | 1 ... 4 |
| Outputs | 4 ... 7 | 0x2003 | 5 ... 8 |
| System LEDs | 8 ... 10 | 0x2003 | 9 ... 11 |
| I/O LEDs | 12 ... 27 | 0x2003 | 13 ... 28 |
| Advanced data | 0 ... 35 | 0x2030 | 37 ... 72 |

Modbus Register

| Process data | | Modbus Register | |
|---------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1132 ... 1133 | 18112 ... 18143 |
| Outputs | 4 ... 7 | 1134 ... 1135 | 18144 ... 18175 |
| System LEDs | 8 ... 10 | 1136 ... 1137 | 18176 ... 18199 |
| I/O LEDs | 12 ... 27 | 1138 ... 1145 | 18208 ... 18335 |
| Advanced data | 0...35 | 16492 ... 16509 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 7 | 0 ... 3 |
| Outputs | 4 ... 7 | 7 | 4 ... 7 |
| System LEDs | 8 ... 10 | 7 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 7 | 12 ... 27 |
| Advanced data | 0 ... 35 | 155 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 5 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 5 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 5 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 5 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 7 | 0 ... 35 |

8.1.8.7 Process data addressing, 6th right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 15 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 15 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 15 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 16 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 17 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 15 | 0...11 |
| Advanced data | 12...23 | 201 | 16 | 0...11 |
| Advanced data | 24...35 | 201 | 17 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|------------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2003 | 37 ... 40 |
| Outputs | 4 ... 7 | 0x2003 | 41 ... 44 |
| System LEDs | 8 ... 10 | 0x2003 | 45 ... 47 |
| I/O LEDs | 12 ... 27 | 0x2003 | 49 ... 64 |
| Advanced data | 0 ... 35 | 0x2030 | 73 ... 108 |

Modbus Register

| Process data | | Modbus Register | |
|---------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1150 ... 1151 | 18400 ... 18431 |
| Outputs | 4 ... 7 | 1152 ... 1153 | 18432 ... 18463 |
| System LEDs | 8 ... 10 | 1154 ... 1155 | 18464 ... 18487 |
| I/O LEDs | 12 ... 27 | 1156 ... 1163 | 18496 ... 18623 |
| Advanced data | 0...35 | 16510 ... 16527 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 8 | 0 ... 3 |
| Outputs | 4 ... 7 | 8 | 4 ... 7 |
| System LEDs | 8 ... 10 | 8 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 8 | 12 ... 27 |
| Advanced data | 0 ... 35 | 156 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 6 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 6 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 6 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 6 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 8 | 0 ... 35 |

8.1.8.8**Process data addressing, 7th right-hand expansion module****Tables**

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 18 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 18 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 18 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 19 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 20 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 18 | 0...11 |
| Advanced data | 12...23 | 201 | 19 | 0...11 |
| Advanced data | 24...35 | 201 | 20 | 0...11 |

SDOs

| Process data | | SDOs | |
|-------------------------------|-----------|--------|------------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2003 | 73 ... 76 |
| Outputs | 4 ... 7 | 0x2003 | 77 ... 80 |
| System LEDs | 8 ... 10 | 0x2003 | 81 ... 83 |
| I/O LEDs | 12 ... 27 | 0x2003 | 85 ... 100 |
| Advanced data | 0 ... 35 | 0x2031 | 1 ... 36 |

Modbus Register

| Process data | | Modbus Register | |
|-------------------------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1168...1169 | 18688...18719 |
| Outputs | 4 ... 7 | 1170...1171 | 18720...18751 |
| System LEDs | 8 ... 10 | 1172...1173 | 18752...18775 |
| I/O LEDs | 12 ... 27 | 1174...1181 | 18784...18911 |
| Advanced data | 0...35 | 16528 ... 16545 | - |

Profinet Records

| Process data | | Profinet | |
|-------------------------------|-----------|----------|----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 9 | 0...3 |
| Outputs | 4 ... 7 | 9 | 4...7 |
| System LEDs | 8 ... 10 | 9 | 8...10 |
| I/O LEDs | 12 ... 27 | 9 | 12...27 |
| Advanced data | 0 ... 35 | 157 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|-------------------------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 7 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 7 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 7 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 7 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 9 | 0 ... 35 |

8.1.8.9 Process data addressing, 8th right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 21 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 21 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 21 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 22 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 23 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 21 | 0...11 |
| Advanced data | 12...23 | 201 | 22 | 0...11 |
| Advanced data | 24...35 | 201 | 23 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2004 | 1 ... 4 |
| Outputs | 4 ... 7 | 0x2004 | 5 ... 8 |
| System LEDs | 8 ... 10 | 0x2004 | 9 ... 11 |
| I/O LEDs | 12 ... 27 | 0x2004 | 13 ... 28 |
| Advanced data | 0 ... 35 | 0x2031 | 37 ... 72 |

Modbus Register

| Process data | | Modbus Register | |
|---------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0 ... 3 | 1186...1187 | 18976...19007 |
| Outputs | 4 ... 7 | 1188...1189 | 19008...19039 |
| System LEDs | 8 ... 10 | 1190...1191 | 19040...19063 |
| I/O LEDs | 12 ... 27 | 1192...1199 | 19072...19199 |
| Advanced data | 0...35 | 16546 ... 16563 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 10 | 0...3 |
| Outputs | 4 ... 7 | 10 | 4...7 |
| System LEDs | 8 ... 10 | 10 | 8...10 |
| I/O LEDs | 12 ... 27 | 10 | 12...27 |
| Advanced data | 0 ... 35 | 158 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 8 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 8 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 8 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 8 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 10 | 0 ... 35 |

8.1.8.10

Process data addressing, 9th right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 24 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 24 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 24 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 25 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 26 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 24 | 0...11 |
| Advanced data | 12...23 | 201 | 25 | 0...11 |
| Advanced data | 24...35 | 201 | 26 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|------------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2004 | 37...40 |
| Outputs | 4 ... 7 | 0x2004 | 41...44 |
| System LEDs | 8 ... 10 | 0x2004 | 45...47 |
| I/O LEDs | 12 ... 27 | 0x2004 | 49...64 |
| Advanced data | 0 ... 35 | 0x2031 | 73 ... 108 |

Modbus Register

| Process data | | Modbus Register | |
|---------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1204...1205 | 19264...19295 |
| Outputs | 4...7 | 1206...1207 | 19296...19327 |
| System LEDs | 8...10 | 1208...1209 | 19328...19351 |
| I/O LEDs | 12...27 | 1210...1217 | 19360...19487 |
| Advanced data | 0...35 | 16564 ... 16581 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 11 | 0...3 |
| Outputs | 4 ... 7 | 11 | 4...7 |
| System LEDs | 8 ... 10 | 11 | 8...10 |
| I/O LEDs | 12 ... 27 | 11 | 12...27 |
| Advanced data | 0 ... 35 | 159 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 9 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 9 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 9 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 9 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 11 | 0 ... 35 |

8.1.8.11 Process data addressing, 10th right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 27 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 27 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 27 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 28 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 29 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 27 | 0...11 |
| Advanced data | 12...23 | 201 | 28 | 0...11 |
| Advanced data | 24...35 | 201 | 29 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2005 | 73...76 |
| Outputs | 4 ... 7 | 0x2005 | 77...80 |
| System LEDs | 8 ... 10 | 0x2005 | 81...83 |
| I/O LEDs | 12 ... 27 | 0x2005 | 85...100 |
| Advanced data | 0 ... 35 | 0x2032 | 1 ... 36 |

Modbus Register

| Process data | | Modbus Register | |
|---------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1222...1223 | 19552...19583 |
| Outputs | 4...7 | 1224...1225 | 19584...19615 |
| System LEDs | 8...10 | 1226...1227 | 19616...19639 |
| I/O LEDs | 12...27 | 1228...1235 | 19648...19775 |
| Advanced data | 0...35 | 16582 ... 16599 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 12 | 0...3 |
| Outputs | 4 ... 7 | 12 | 4...7 |
| System LEDs | 8 ... 10 | 12 | 8...10 |
| I/O LEDs | 12 ... 27 | 12 | 12...27 |
| Advanced data | 0 ... 35 | 160 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 10 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 10 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 10 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 10 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 12 | 0 ... 35 |

8.1.8.12

Process data addressing, 11th right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 30 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 30 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 30 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 31 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 32 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 30 | 0...11 |
| Advanced data | 12...23 | 201 | 31 | 0...11 |
| Advanced data | 24...35 | 201 | 32 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2005 | 1...4 |
| Outputs | 4 ... 7 | 0x2005 | 5...8 |
| System LEDs | 8 ... 10 | 0x2005 | 9...11 |
| I/O LEDs | 12 ... 27 | 0x2005 | 13...28 |
| Advanced data | 0 ... 35 | 0x2032 | 37 ... 72 |

Modbus Register

| Process data | | Modbus Register | |
|---------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1240...1241 | 19840...19871 |
| Outputs | 4...7 | 1242...1243 | 19872...19903 |
| System LEDs | 8...10 | 1244...1245 | 19904...19927 |
| I/O LEDs | 12...27 | 1246...1253 | 19936...20063 |
| Advanced data | 0...35 | 16600 ... 16617 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 13 | 0...3 |
| Outputs | 4 ... 7 | 13 | 4...7 |
| System LEDs | 8 ... 10 | 13 | 8...10 |
| I/O LEDs | 12 ... 27 | 13 | 12...27 |
| Advanced data | 0 ... 35 | 161 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 11 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 11 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 11 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 11 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 13 | 0 ... 35 |

8.1.8.13 Process data addressing, 12th right-hand expansion module

Tables

| Process data | | Tables | | |
|---------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 21 | 33 | 0 ... 3 |
| Outputs | 4 ... 7 | 21 | 33 | 4 ... 7 |
| System LEDs | 8 ... 10 | 21 | 33 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 21 | 34 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 21 | 35 | 0 ... 3 |
| Advanced data | 0...11 | 201 | 33 | 0...11 |
| Advanced data | 12...23 | 201 | 34 | 0...11 |
| Advanced data | 24...35 | 201 | 35 | 0...11 |

SDOs

| Process data | | SDOs | |
|---------------|-----------|--------|------------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2005 | 37...40 |
| Outputs | 4 ... 7 | 0x2005 | 41...44 |
| System LEDs | 8 ... 10 | 0x2005 | 45...47 |
| I/O LEDs | 12 ... 27 | 0x2005 | 49...64 |
| Advanced data | 0 ... 35 | 0x2032 | 73 ... 108 |

Modbus Register

| Process data | | Modbus Register | |
|---------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1258...1259 | 20128...20159 |
| Outputs | 4...7 | 1260...1261 | 20160...20191 |
| System LEDs | 8...10 | 1262...1263 | 20192...20215 |
| I/O LEDs | 12...27 | 1264...1271 | 20224...20351 |
| Advanced data | 0...35 | 16618 ... 16635 | - |

Profinet Records

| Process data | | Profinet | |
|---------------|-----------|----------|----------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 14 | 0...3 |
| Outputs | 4 ... 7 | 14 | 4...7 |
| System LEDs | 8 ... 10 | 14 | 8...10 |
| I/O LEDs | 12 ... 27 | 14 | 12...27 |
| Advanced data | 0 ... 35 | 162 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|---------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 2 | 12 | 0 ... 3 |
| Outputs | 4 ... 7 | 2 | 12 | 4 ... 7 |
| System LEDs | 8 ... 10 | 2 | 12 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 2 | 12 | 12 ... 27 |
| Advanced data | 0 ... 35 | 14 | 14 | 0 ... 35 |

8.1.8.14

Process data addressing, 1st ST right-hand expansion module

Tables

| Process data | | Tables | | |
|--------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 24 | 0 | 0 ... 3 |
| Outputs | 4 ... 7 | 24 | 0 | 4 ... 7 |
| System LEDs | 8 ... 10 | 24 | 0 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 24 | 1 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 24 | 2 | 0 ... 3 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2018 | 1 ... 4 |
| Outputs | 4 ... 7 | 0x2018 | 5 ... 8 |
| System LEDs | 8 ... 10 | 0x2018 | 9 ... 11 |
| I/O LEDs | 12 ... 27 | 0x2018 | 13 ... 28 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1760...1761 | 28160...28191 |
| Outputs | 4...7 | 1762...1763 | 28192...28223 |
| System LEDs | 8...10 | 1764...1765 | 28224...28247 |
| I/O LEDs | 12...27 | 1766...1773 | 28256...28383 |

Profinet Records

| Process data | | Profinet | |
|--------------|-----------|----------|---------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 66 | 0...3 |
| Outputs | 4 ... 7 | 66 | 4...7 |
| System LEDs | 8 ... 10 | 66 | 8...10 |
| I/O LEDs | 12 ... 27 | 66 | 12...27 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 12 | 1 | 0 ... 3 |
| Outputs | 4 ... 7 | 12 | 1 | 4 ... 7 |
| System LEDs | 8 ... 10 | 12 | 1 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 12 | 1 | 12 ... 27 |

8.1.8.15

Process data addressing 2nd ST expansion module, right

Tables

| Process data | | Tables | | |
|--------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 24 | 3 | 0 ... 3 |
| Outputs | 4 ... 7 | 24 | 3 | 4 ... 7 |
| System LEDs | 8 ... 10 | 24 | 3 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 24 | 4 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 24 | 5 | 0 ... 3 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2018 | 37 ... 40 |
| Outputs | 4 ... 7 | 0x2018 | 41 ... 44 |
| System LEDs | 8 ... 10 | 0x2018 | 45 ... 47 |
| I/O LEDs | 12 ... 27 | 0x2018 | 49 ... 64 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1778...1779 | 28448...28479 |
| Outputs | 4...7 | 1780...1781 | 28480...28511 |
| System LEDs | 8...10 | 1782...1783 | 28512...28535 |
| I/O LEDs | 12...27 | 1784...1791 | 28544...28671 |

Profinet Records

| Process data | | Profinet | |
|--------------|-----------|----------|---------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 67 | 0...3 |
| Outputs | 4 ... 7 | 67 | 4...7 |
| System LEDs | 8 ... 10 | 67 | 8...10 |
| I/O LEDs | 12 ... 27 | 67 | 12...27 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 12 | 2 | 0 ... 3 |
| Outputs | 4 ... 7 | 12 | 2 | 4 ... 7 |
| System LEDs | 8 ... 10 | 12 | 2 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 12 | 2 | 12 ... 27 |

8.1.8.16 Process data addressing 3rd ST expansion module, right

Tables

| Process data | | Tables | | |
|--------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 24 | 6 | 0 ... 3 |
| Outputs | 4 ... 7 | 24 | 6 | 4 ... 7 |
| System LEDs | 8 ... 10 | 24 | 6 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 24 | 7 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 24 | 8 | 0 ... 3 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2018 | 73...76 |
| Outputs | 4 ... 7 | 0x2018 | 77...80 |
| System LEDs | 8 ... 10 | 0x2018 | 81...83 |
| I/O LEDs | 12 ... 27 | 0x2018 | 85...100 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1796...1797 | 28736...28767 |
| Outputs | 4...7 | 1798...1799 | 28768...28799 |
| System LEDs | 8...10 | 1800...1801 | 28800...28823 |
| I/O LEDs | 12...27 | 1802...1809 | 28832...28959 |

Profinet Records

| Process data | | Profinet | |
|--------------|-----------|----------|---------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 68 | 0...3 |
| Outputs | 4 ... 7 | 68 | 4...7 |
| System LEDs | 8 ... 10 | 68 | 8...10 |
| I/O LEDs | 12 ... 27 | 68 | 12...27 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 12 | 3 | 0 ... 3 |
| Outputs | 4 ... 7 | 12 | 3 | 4 ... 7 |
| System LEDs | 8 ... 10 | 12 | 3 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 12 | 3 | 12 ... 27 |

8.1.8.17

Process data addressing 4th ST expansion module, right

Tables

| Process data | | Tables | | |
|--------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 24 | 9 | 0 ... 3 |
| Outputs | 4 ... 7 | 24 | 9 | 4 ... 7 |
| System LEDs | 8 ... 10 | 24 | 9 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 24 | 10 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 24 | 11 | 0 ... 3 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2019 | 1...4 |
| Outputs | 4 ... 7 | 0x2019 | 5...8 |
| System LEDs | 8 ... 10 | 0x2019 | 9...11 |
| I/O LEDs | 12 ... 27 | 0x2019 | 13...28 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1814...1815 | 29024...29055 |
| Outputs | 4...7 | 1816...1817 | 29056...29087 |
| System LEDs | 8...10 | 1818...1819 | 29088...29111 |
| I/O LEDs | 12...27 | 1820...1827 | 29120...29247 |

Profinet Records

| Process data | | Profinet | |
|--------------|-----------|----------|---------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 69 | 0...3 |
| Outputs | 4 ... 7 | 69 | 4...7 |
| System LEDs | 8 ... 10 | 69 | 8...10 |
| I/O LEDs | 12 ... 27 | 69 | 12...27 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 12 | 4 | 0 ... 3 |
| Outputs | 4 ... 7 | 12 | 4 | 4 ... 7 |
| System LEDs | 8 ... 10 | 12 | 4 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 12 | 4 | 12 ... 27 |

8.1.8.18 Process data addressing 5th ST expansion module, right

Tables

| Process data | | Tables | | |
|--------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 24 | 12 | 0 ... 3 |
| Outputs | 4 ... 7 | 24 | 12 | 4 ... 7 |
| System LEDs | 8 ... 10 | 24 | 12 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 24 | 13 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 24 | 14 | 0 ... 3 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2019 | 37...40 |
| Outputs | 4 ... 7 | 0x2019 | 41...44 |
| System LEDs | 8 ... 10 | 0x2019 | 45...47 |
| I/O LEDs | 12 ... 27 | 0x2019 | 49...64 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1832...1833 | 29312...29343 |
| Outputs | 4...7 | 1834...1835 | 29344...29375 |
| System LEDs | 8...10 | 1836...1837 | 29376...29399 |
| I/O LEDs | 12...27 | 1838...1845 | 29408...29535 |

Profinet Records

| Process data | | Profinet | |
|--------------|-----------|----------|---------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 70 | 0...3 |
| Outputs | 4 ... 7 | 70 | 4...7 |
| System LEDs | 8 ... 10 | 70 | 8...10 |
| I/O LEDs | 12 ... 27 | 70 | 12...27 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 12 | 5 | 0 ... 3 |
| Outputs | 4 ... 7 | 12 | 5 | 4 ... 7 |
| System LEDs | 8 ... 10 | 12 | 5 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 12 | 5 | 12 ... 27 |

8.1.8.19

Process data addressing 6th ST expansion module, right

Tables

| Process data | | Tables | | |
|--------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 3 | 24 | 15 | 0 ... 3 |
| Outputs | 4 ... 7 | 24 | 15 | 4 ... 7 |
| System LEDs | 8 ... 10 | 24 | 15 | 8 ... 10 |
| I/O LEDs | 12 ... 23 | 24 | 16 | 0 ... 11 |
| I/O LEDs | 24 ... 27 | 24 | 17 | 0 ... 3 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 3 | 0x2019 | 73...76 |
| Outputs | 4 ... 7 | 0x2019 | 77...80 |
| System LEDs | 8 ... 10 | 0x2019 | 81...83 |
| I/O LEDs | 12 ... 27 | 0x2019 | 85...100 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|---------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Inputs | 0...3 | 1850...1851 | 29600...29631 |
| Outputs | 4...7 | 1852...1853 | 29632...29663 |
| System LEDs | 8...10 | 1854...1855 | 29664...29687 |
| I/O LEDs | 12...27 | 1856...1863 | 29696...29823 |

Profinet Records

| Process data | | Profinet | |
|--------------|-----------|----------|---------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 3 | 71 | 0...3 |
| Outputs | 4 ... 7 | 71 | 4...7 |
| System LEDs | 8 ... 10 | 71 | 8...10 |
| I/O LEDs | 12 ... 27 | 71 | 12...27 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 3 | 12 | 6 | 0 ... 3 |
| Outputs | 4 ... 7 | 12 | 6 | 4 ... 7 |
| System LEDs | 8 ... 10 | 12 | 6 | 8 ... 10 |
| I/O LEDs | 12 ... 27 | 12 | 6 | 12 ... 27 |

8.1.8.20 Process data addressing, left-hand expansion devices

Process data addressing SDO

| Byte | Table/ Segment | SDO | Table/ Segment | SDO | Table/ Segment | SDO | Table/ Segment | SDO |
|------------------------------|-------------------|-----------|-------------------|-----------|-------------------|------------|-------------------|-----------|
| | Slot 1 | | Slot 2 | | Slot 3 | | Slot 4 | |
| 0 ... 3 Inputs | 22/0 | 0x2007:1 | 22/3 | 0x2007:37 | 22/6 | 0x2007:73 | 22/9 | 0x2008:1 |
| | 22/0 | 0x2007:2 | 22/3 | 0x2007:38 | 22/6 | 0x2007:74 | 22/9 | 0x2008:2 |
| | 22/0 | 0x2007:3 | 22/3 | 0x2007:39 | 22/6 | 0x2007:75 | 22/9 | 0x2008:3 |
| | 22/0 | 0x2007:4 | 22/3 | 0x2007:40 | 22/6 | 0x2007:76 | 22/9 | 0x2008:4 |
| 3 ... 7 Outputs | 22/0 | 0x2007:5 | 22/3 | 0x2007:41 | 22/6 | 0x2007:77 | 22/9 | 0x2008:5 |
| | 22/0 | 0x2007:6 | 22/3 | 0x2007:42 | 22/6 | 0x2007:78 | 22/9 | 0x2008:6 |
| | 22/0 | 0x2007:7 | 22/3 | 0x2007:43 | 22/6 | 0x2007:79 | 22/9 | 0x2008:7 |
| | 22/0 | 0x2007:8 | 22/3 | 0x2007:44 | 22/6 | 0x2007:80 | 22/9 | 0x2008:8 |
| 8 ... 10 LEDs | 22/0 | 0x2007:9 | 22/3 | 0x2007:45 | 22/6 | 0x2007:81 | 22/9 | 0x2008:9 |
| | 22/0 | 0x2007:10 | 22/3 | 0x2007:46 | 22/6 | 0x2007:82 | 22/9 | 0x2008:10 |
| | 22/0 | 0x2007:11 | 22/3 | 0x2007:47 | 22/6 | 0x2007:83 | 22/9 | 0x2008:11 |
| 11 | 22/0 | 0x2007:12 | 22/3 | 0x2007:48 | 22/6 | 0x2007:84 | 22/9 | 0x2008:12 |
| 12 ... 36 Device-specific | 22/1 | 0x2007:13 | 22/4 | 0x2007:49 | 22/7 | 0x2007:85 | 22/10 | 0x2008:13 |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| | 22/1 | 0x2007:24 | 22/4 | 0x2007:60 | 22/7 | 0x2007:96 | 22/10 | 0x2008:24 |
| | 22/2 | 0x2007:25 | 22/5 | 0x2007:61 | 22/8 | 0x2007:97 | 22/11 | 0x2008:25 |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| | 22/2 | 0x2007:36 | 22/5 | 0x2007:72 | 22/8 | 0x2007:108 | 22/11 | 0x2008:36 |

Process data addressing Modbus

| Byte | Re- gister | Coil/ Dis- crete Input | Re- gister | Coil/ Dis- crete Input | Re- gister | Coil/ Dis- crete Input | Re- gister | Coil/ Dis- crete Input |
|-------------------|---------------|---------------------------|---------------|---------------------------|---------------|---------------------------|---------------|---------------------------|
| | Slot 1 | | Slot 2 | | Slot 3 | | Slot 4 | |
| 0 ... 3 Inputs | 1348 | 21568 | 1366 | 21856 | 1384 | 22144 | 1402 | 22432 |
| | 1348 | 21576 | 1366 | 21864 | 1384 | 22152 | 1402 | 22440 |
| | 1349 | 21584 | 1367 | 21872 | 1385 | 22160 | 1403 | 22448 |
| | 1349 | 21592 | 1367 | 21880 | 1385 | 22168 | 1403 | 22456 |

| Byte | Re- gister | Coil/ Dis- crete Input | Re- gister | Coil/ Dis- crete Input | Re- gister | Coil/ Dis- crete Input | Re- gister | Coil/ Dis- crete Input |
|----------------------------------|---------------|---------------------------|---------------|---------------------------|---------------|---------------------------|---------------|---------------------------|
| | Slot 1 | | Slot 2 | | Slot 3 | | Slot 4 | |
| 3 ... 7 Outputs | 1350 | 21600 | 1368 | 21888 | 1386 | 22176 | 1404 | 22464 |
| | 1350 | 21608 | 1368 | 21896 | 1386 | 22184 | 1404 | 22472 |
| | 1351 | 21616 | 1369 | 21904 | 1387 | 22192 | 1405 | 22480 |
| | 1351 | 21624 | 1369 | 21912 | 1387 | 22200 | 1405 | 22488 |
| 8 ... 10 LEDs | 1352 | 21632 | 1370 | 21920 | 1388 | 22208 | 1406 | 22496 |
| | 1352 | 21640 | 1370 | 21928 | 1388 | 22216 | 1406 | 22504 |
| | 1353 | 21648 | 1371 | 21936 | 1389 | 22224 | 1407 | 22512 |
| 11 | 1353 | 21656 | 1371 | 21944 | 1389 | 22232 | 1407 | 22520 |
| 12 ... 36 Device- specific | 1354 | 21664 | 1372 | 21952 | 1390 | 22240 | 1408 | 22528 |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| | 1359 | 21752 | 1377 | 22040 | 1395 | 22328 | 1413 | 22616 |
| | 1360 | 21760 | 1378 | 22048 | 1396 | 22336 | 1414 | 22624 |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| | 1365 | 21848 | 1383 | 22136 | 1401 | 22424 | 1419 | 22712 |

Process data addressing PROFINET

| Byte | Table/ Seg- ment | Record | Table/ Seg- ment | Record | Table/ Seg- ment | Record | Table/ Seg- ment | Record |
|--------------------|------------------------|--------|------------------------|--------|------------------------|--------|------------------------|--------|
| | Slot 1 | | Slot 2 | | Slot 3 | | Slot 4 | |
| 0 ... 3 Inputs | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| 3 ... 7 Outputs | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| 8 ... 10 LEDs | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |
| 11 | 22/0 | 19 | 22/3 | 20 | 22/6 | 21 | 22/9 | 22 |

| Byte | Table/ Seg- ment | Record | Table/ Seg- ment | Record | Table/ Seg- ment | Record | Table/ Seg- ment | Record |
|----------------------------------|------------------------|--------|------------------------|--------|------------------------|--------|------------------------|--------|
| | Slot 1 | | Slot 2 | | Slot 3 | | Slot 4 | |
| 12 ... 36 Device- specific | 22/1 | 19 | 22/4 | 20 | 22/7 | 21 | 22/10 | 22 |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| | 22/1 | 19 | 22/4 | 20 | 22/7 | 21 | 22/10 | 22 |
| | 22/2 | 19 | 22/5 | 20 | 22/8 | 21 | 22/11 | 22 |
| | ... | ... | ... | ... | ... | ... | ... | ... |
| | 22/2 | 19 | 22/5 | 20 | 22/8 | 21 | 22/11 | 22 |

Process data addressing Ethernet/IP

| Byte | Table/ Seg- ment | In- stanc e | At- trib- ute | Table/ Seg- ment | In- stanc e | At- trib- ute | Table/ Seg- ment | In- stanc e | At- trib- ute | Table/ Seg- ment | In- stanc e | At- trib- ute |
|----------------------------------|------------------------|-------------------|---------------------|------------------------|-------------------|---------------------|------------------------|-------------------|---------------------|------------------------|-------------------|---------------------|
| | Slot 1 | | | Slot 2 | | | Slot 3 | | | Slot 4 | | |
| 0 ... 3 Inputs | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| 3 ... 7 Outputs | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| 8 ... 10 LEDs | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| 11 | 22/0 | 3 | 1 | 22/3 | 3 | 2 | 22/6 | 3 | 3 | 22/9 | 3 | 4 |
| 12 ... 36 Device- specific | 22/1 | 3 | 1 | 22/4 | 3 | 2 | 22/7 | 3 | 3 | 22/10 | 3 | 4 |
| | ... | 3 | 1 | ... | 3 | 2 | ... | 3 | 3 | ... | 3 | ... |
| | 22/1 | 3 | 1 | 22/4 | 3 | 2 | 22/7 | 3 | 3 | 22/10 | 3 | 4 |
| | 22/2 | 3 | 1 | 22/5 | 3 | 2 | 22/8 | 3 | 3 | 22/11 | 3 | 4 |
| | ... | .. | 1 | ... | .. | ... | ... | .. | .. | ... | .. | ... |
| | 22/2 | 3 | 1 | 22/5 | 3 | 2 | 22/8 | 3 | 3 | 22/11 | 3 | 4 |


8.2 Process data: Fieldbus and communication module

The process data of the fieldbus and communication modules consists of 60 Bytes and contains the following information:

- ▶ State of the virtual inputs and outputs
- ▶ The status of the system LED for
 - supply voltage,
 - Diagnostics


8.2.1 State of virtual inputs i0 ... i127

| Byte | Bit 7 | ... | | | | | | Bit 0 |
|------|----------|------|------|------|------|------|------|-------|
| 0 | i7 | i6 | i5 | i4 | i3 | i2 | i1 | i0 |
| 1 | i15 | i14 | i13 | i12 | i11 | i10 | i9 | i8 |
| 2 | i23 | i22 | i21 | i20 | i19 | i18 | i17 | i16 |
| 3 | i31 | i30 | i29 | i28 | i27 | i26 | i25 | i24 |
| 4 | i39 | i38 | i37 | i36 | i35 | i34 | i33 | i32 |
| 5 | i47 | i46 | i45 | i44 | i43 | i42 | i41 | i40 |
| 6 | i55 | i54 | i53 | i52 | i51 | i50 | i49 | i48 |
| 7 | i63 | i62 | i61 | i60 | i59 | i58 | i57 | i56 |
| 8 | i71 | i70 | i69 | i68 | i67 | i66 | i65 | i64 |
| 9 | i79 | i78 | i77 | i76 | i75 | i74 | i73 | i72 |
| 10 | i87 | i86 | i85 | i84 | i83 | i82 | i81 | i80 |
| 11 | i95 | i94 | i93 | i92 | i91 | i90 | i89 | i88 |
| 12 | i103 | i102 | i101 | i100 | i99 | i98 | i97 | i96 |
| 13 | i111 | i110 | i109 | i108 | i107 | i106 | i105 | i104 |
| 14 | i119 | i118 | i117 | i116 | i115 | i114 | i113 | i112 |
| 15 | i127 | i126 | i125 | i124 | i123 | i122 | i121 | i120 |
| 16 | Reserved | | | | | | | |
| ... | ... | | | | | | | |
| 23 | Reserved | | | | | | | |


Fieldbus-specific addressing is described in the chapter entitled [Process data addressing](#) [ 130].

8.2.2 State of virtual outputs o0 ... o127

| Byte | Bit 7 | ... | | | | | | Bit 0 |
|------|----------|------|------|------|------|------|------|-------|
| 24 | o7 | o6 | o5 | o4 | o3 | o2 | o1 | o0 |
| 25 | o15 | o14 | o13 | o12 | o11 | o10 | o9 | o8 |
| 26 | o23 | o22 | o21 | o20 | o19 | o18 | o17 | o16 |
| 27 | o31 | o30 | o29 | o28 | o27 | o26 | o25 | o24 |
| 28 | o39 | o38 | o37 | o36 | o35 | o34 | o33 | o32 |
| 29 | o47 | o46 | o45 | o44 | o43 | o42 | o41 | o40 |
| 30 | o55 | o54 | o53 | o52 | o51 | o50 | o49 | o48 |
| 31 | o63 | o62 | o61 | o60 | o59 | o58 | o57 | o56 |
| 32 | o71 | o70 | o69 | o68 | o67 | o66 | o65 | o64 |
| 33 | o79 | o78 | o77 | o76 | o75 | o74 | o73 | o72 |
| 34 | o87 | o86 | o85 | o84 | o83 | o82 | o81 | o80 |
| 35 | o95 | o94 | o93 | o92 | o91 | o90 | o89 | o88 |
| 36 | o103 | o102 | o101 | o100 | o99 | o98 | o97 | o96 |
| 37 | o111 | o110 | o109 | o108 | o107 | o106 | o105 | o104 |
| 38 | o119 | o118 | o117 | o116 | o115 | o114 | o113 | o112 |
| 39 | o127 | o126 | o125 | o124 | o123 | o122 | o121 | o120 |
| 40 | Reserved | | | | | | | |
| ... | ... | | | | | | | |
| 47 | Reserved | | | | | | | |

Fieldbus-specific addressing is described in the chapter entitled [Process data addressing](#) [ 130].

8.2.3 Status of system LEDs

Status of the system LEDs for the fieldbus module (see also [Assignment of system LEDs](#) [ 130])


| Byte | Bit 7 | ... | | Bit 4 | Bit 3 | ... | | Bit 0 |
|------|--------------|-----|--|-------|--------------|-----|--|-------|
| 48 | System LED 1 | | | | System LED 0 | | | |
| 49 | System LED 3 | | | | System LED 2 | | | |
| 50 | Reserved | | | | | | | |
| ... | ... | | | | | | | |
| 59 | Reserved | | | | | | | |

| LED status | 4 Bit coding |
|------------|--------------|
| Off | 0x0 |
| On | 0xF |
| Flashes | 0x3 |



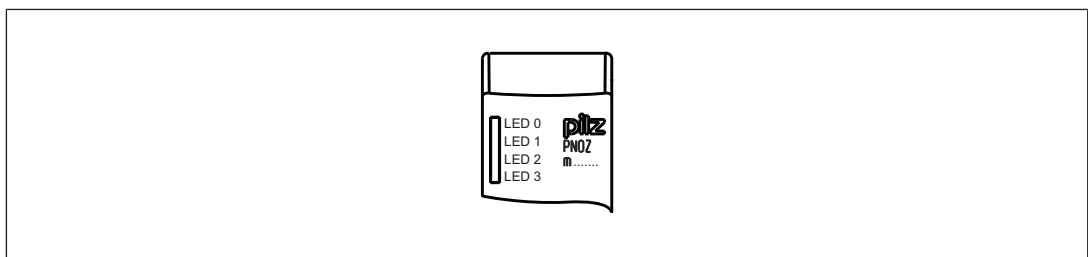
INFORMATION

The LED status "On" and "Flashes" cannot be determined exactly on some fieldbus modules.

Fieldbus-specific addressing is described in the chapter entitled [Process data addressing](#) [ 130].

8.2.3.1 Assignment of system LEDs

Assignment of system LEDs to LEDs on the fieldbus modules:



8.2.4 Process data addressing

8.2.4.1 Process data addressing, fieldbus module

Please note: For the module PNOZ m ES EtherCAT FSoE, the System LEDs can only be polled with the help of Table 22.

Tables

| Process data | | Tables | | |
|-----------------------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 11 | 23 | 0 | 0 ... 11 |
| Inputs | 12 ... 15 | 23 | 1 | 0 ... 3 |
| Outputs | 24 ... 35 | 23 | 2 | 0 ... 11 |
| Outputs | 36 ... 39 | 23 | 3 | 0 ... 3 |
| System LEDs | 48 ... 49 | 23 | 4 | 0 ... 1 |

SDOs

| Process data | | Tables | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 15 | 0x2100 | 0 ... 15 |
| Outputs | 24 ... 39 | 0x2000 | 0 ... 15 |
| System LEDs | 48 ... 49 | 0x2009 | 1 ... 2 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|-----------|-----------------|--------------------------|
| Info | Byte | Register | Coil/Discrete Input (1x) |
| Inputs | 0 ... 15 | 1456 ... 1463 | 23296 ... 23423 |
| Outputs | 24 ... 39 | 1468 ... 1475 | 23488 ... 23615 |
| System LEDs | 48 ... 49 | 1480 | 23680 ... 23695 |

PROFINET Records

| Process data | | Profinet | |
|--------------|-----------|----------|---------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 15 | --- | --- |
| Outputs | 24 ... 39 | --- | --- |
| System LEDs | 48 ... 49 | 25 | 0 ... 1 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|---------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 15 | --- | --- | --- |
| Outputs | 24 ... 39 | --- | --- | --- |
| System LEDs | 48 ... 49 | 4 | 1 | 0 ... 1 |

8.2.4.2

Process data addressing, communication module

Tables

| Process data | | Tables | | |
|--------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Inputs | 0 ... 11 | 23 | 5 | 0 ... 11 |
| Inputs | 12 ... 15 | 23 | 6 | 0 ... 3 |
| Outputs | 24 ... 35 | 23 | 7 | 0 ... 11 |

| Process data | | Tables | | |
|--------------|-----------|--------|-----|---------|
| Outputs | 36 ... 39 | 23 | 8 | 0 ... 3 |
| System LEDs | 48 ... 49 | --- | --- | --- |

SDOs

| Process data | | SDOs | |
|--------------|-----------|-------|----------|
| Info | Byte | Index | Subindex |
| Inputs | 0 ... 15 | --- | --- |
| Outputs | 24 ... 39 | --- | --- |
| System LEDs | 48 ... 49 | --- | --- |

Modbus Register

| Process data | | Modbus Register | |
|--------------|-----------|-----------------|--------------------------|
| Info | Byte | Register | Coil/Discrete Input (1x) |
| Inputs | 0 ... 15 | 1486 ... 1493 | 23776 ... 23903 |
| Outputs | 24 ... 39 | 1498 ... 1505 | 23968 ... 24095 |
| System LEDs | 48 ... 49 | --- | --- |

PROFINET Records

| Process data | | Profinet | |
|--------------|-----------|----------|------|
| Info | Byte | Record | Byte |
| Inputs | 0 ... 15 | --- | --- |
| Outputs | 24 ... 39 | --- | --- |
| System LEDs | 48 ... 49 | --- | --- |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|------|
| Info | Byte | Instance | Attribute | Byte |
| Inputs | 0 ... 15 | --- | --- | --- |
| Outputs | 24 ... 39 | --- | --- | --- |
| System LEDs | 48 ... 49 | --- | --- | --- |

8.3 Connected devices

Contains information about the connected devices and the device connection. The data consists of 36 Bytes.

8.3.1 Device connection data

8.3.1.1 General connection data

| Byte | About |
|-----------|---|
| 0 | Connection type <ul style="list-style-type: none"> ▶ 0: Unused ▶ 1: Modbus TCP Client |
| 1 | Connection status <ul style="list-style-type: none"> ▶ 1: Connected ▶ 2: Connecting ▶ 3: Connection has failed ▶ 4: Error in communication |
| 2... 5 | IP address |
| 6 ... 7 | Remote port |
| 8 ... 9 | Local port |
| 10 ... 11 | Reserved |
| 12 | Device type <ul style="list-style-type: none"> ▶ 1: PITreader ▶ 2: Visu Panel |
| 13 ... 35 | Device-specific data (1st device connection xth device connection) |

8.3.1.2 1st device connection

| Byte | Information |
|-----------|--|
| 12 | Device type > 1:PITreader |
| 13 | PITreader status <ul style="list-style-type: none"> ▶ 1: Transponder key authenticated PITreader recognised the transponder key. Permission exists ▶ 2: No transponder key present There is no transponder key inserted in the PITreader ▶ 3: No permission The transponder key does not have permission (permission = 0) ▶ 4: Authentication failed Invalid data from the PITreader ▶ 5: No connection to the PITreader |
| 14 ... 21 | Security ID: Safety identifier of the transponder key |

| Byte | Information |
|-----------|---|
| 22 | Permission 1... 64 of the transponder key |
| 23 | Reserved |
| 24 ... 27 | Order number of the transponder key |
| 28 ... 31 | Serial number of the transponder key |
| 32 ... 35 | Reserved |

8.3.1.3 2nd ... 8th device connection

| Byte | About |
|-----------|----------------------------|
| 12 | Device type > 2:Visu Panel |
| 13 ... 35 | Reserved |

8.3.2 1st device connection addressing

Tables

| Process data | | Tables | | |
|------------------------|----------|--------|---------|-----------|
| Information | Byte | Table | Segment | Byte |
| Device connection data | 0 ... 35 | 110 | 0 | 0 ... 11 |
| | | | 1 | 12 ... 23 |
| | | | 2 | 24 ... 35 |

SDOs

| Process data | | SDOs | |
|------------------------|----------|--------|----------|
| Information | Byte | Index | Subindex |
| Device connection data | 0 ... 35 | 0x201E | 1 ... 36 |

Modbus Register

| Process data | | Modbus Register | |
|------------------------|----------|-----------------|--------------------------|
| Information | Byte | Register | Coil/Discrete Input (1x) |
| Device connection data | 0 ... 35 | 14000 ... 14017 | - |

PROFINET Records

| Process data | | Profinet | |
|------------------------|----------|----------|----------|
| Information | Byte | Record | Byte |
| Device connection data | 0 ... 35 | 84 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|------------------------|----------|-------------|-----------|----------|
| Information | Byte | Instance | Attribute | Byte |
| Device connection data | 0 ... 35 | 12 | 19 | 0 ... 35 |

8.3.3 2nd device connection addressing

Tables

| Process data | | Tables | | |
|------------------------|----------|--------|---------|-----------|
| About | Byte | Table | Segment | Byte |
| Device connection data | 0 ... 35 | 110 | 3 | 0 ... 11 |
| | | | 4 | 12 ... 23 |
| | | | 5 | 24 ... 35 |

SDOs

| Process data | | SDOs | |
|------------------------|----------|--------|-----------|
| About | Byte | Index | Subindex |
| Device connection data | 0 ... 35 | 0x201E | 37 ... 72 |

Modbus Register

| Process data | | Modbus Register | |
|------------------------|----------|-----------------|--------------------------|
| About | Byte | Register | Coil/Discrete Input (1x) |
| Device connection data | 0 ... 35 | 14018 ... 14035 | - |

PROFINET Records

| Process data | | Profinet | |
|------------------------|----------|----------|----------|
| About | Byte | Record | Byte |
| Device connection data | 0 ... 35 | 85 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|------------------------|----------|-------------|-----------|----------|
| About | Byte | Instance | Attribute | Byte |
| Device connection data | 0 ... 35 | 12 | 20 | 0 ... 35 |

8.3.4 3rd device connection addressing

Tables

| Process data | | Tables | | |
|------------------------|----------|--------|---------|-----------|
| About | Byte | Table | Segment | Byte |
| Device connection data | 0 ... 35 | 110 | 6 | 0 ... 11 |
| | | | 7 | 12 ... 23 |
| | | | 8 | 24 ... 35 |

SDOs

| Process data | | SDOs | |
|------------------------|----------|--------|------------|
| About | Byte | Index | Subindex |
| Device connection data | 0 ... 35 | 0x201E | 73 ... 108 |

Modbus Register

| Process data | | Modbus Register | |
|------------------------|----------|-----------------|--------------------------|
| About | Byte | Register | Coil/Discrete Input (1x) |
| Device connection data | 0 ... 35 | 14036 ... 14053 | - |

PROFINET Records

| Process data | | Profinet | |
|------------------------|----------|----------|----------|
| About | Byte | Record | Byte |
| Device connection data | 0 ... 35 | 86 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|------------------------|----------|-------------|-----------|----------|
| About | Byte | Instance | Attribute | Byte |
| Device connection data | 0 ... 35 | 12 | 21 | 0 ... 35 |

8.3.5 4th device connection addressing

Tables

| Process data | | Tables | | |
|------------------------|----------|--------|---------|-----------|
| About | Byte | Table | Segment | Byte |
| Device connection data | 0 ... 35 | 110 | 9 | 0 ... 11 |
| | | | 10 | 12 ... 23 |
| | | | 11 | 24 ... 35 |

SDOs

| Process data | | SDOs | |
|--|----------|--------|----------|
| About | Byte | Index | Subindex |
| Device connection data | 0 ... 35 | 0x201F | 1 ... 36 |

Modbus Register

| Process data | | Modbus Register | |
|--|----------|-----------------|--------------------------|
| About | Byte | Register | Coil/Discrete Input (1x) |
| Device connection data | 0 ... 35 | 14054 ... 14071 | - |

PROFINET Records

| Process data | | Profinet | |
|--|----------|----------|----------|
| About | Byte | Record | Byte |
| Device connection data | 0 ... 35 | 87 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--|----------|-------------|-----------|----------|
| About | Byte | Instance | Attribute | Byte |
| Device connection data | 0 ... 35 | 12 | 22 | 0 ... 35 |

8.3.6

5th device connection addressing

Tables

| Process data | | Tables | | |
|--|----------|--------|---------|-----------|
| About | Byte | Table | Segment | Byte |
| Device connection data | 0 ... 35 | 110 | 12 | 0 ... 11 |
| | | | 13 | 12 ... 23 |
| | | | 14 | 24 ... 35 |

SDOs

| Process data | | SDOs | |
|--|----------|--------|-----------|
| About | Byte | Index | Subindex |
| Device connection data | 0 ... 35 | 0x201F | 37 ... 72 |

Modbus Register

| Process data | | Modbus Register | |
|--|----------|-----------------|--------------------------|
| About | Byte | Register | Coil/Discrete Input (1x) |
| Device connection data | 0 ... 35 | 14072 ... 14089 | - |

PROFINET Records

| Process data | | Profinet | |
|--|----------|----------|----------|
| About | Byte | Record | Byte |
| Device connection data | 0 ... 35 | 88 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--|----------|-------------|-----------|----------|
| About | Byte | Instance | Attribute | Byte |
| Device connection data | 0 ... 35 | 12 | 23 | 0 ... 35 |

8.3.7 6th device connection addressing**Tables**

| Process data | | Tables | | |
|--|----------|--------|---------|-----------|
| About | Byte | Table | Segment | Byte |
| Device connection data | 0 ... 35 | 110 | 15 | 0 ... 11 |
| | | | 16 | 12 ... 23 |
| | | | 17 | 24 ... 35 |

SDOs

| Process data | | SDOs | |
|--|----------|--------|------------|
| About | Byte | Index | Subindex |
| Device connection data | 0 ... 35 | 0x201F | 73 ... 108 |

Modbus Register

| Process data | | Modbus Register | |
|--|----------|-----------------|--------------------------|
| About | Byte | Register | Coil/Discrete Input (1x) |
| Device connection data | 0 ... 35 | 14090 ... 14107 | - |

PROFINET Records

| Process data | | Profinet | |
|------------------------|----------|----------|----------|
| About | Byte | Record | Byte |
| Device connection data | 0 ... 35 | 89 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|------------------------|----------|-------------|-----------|----------|
| About | Byte | Instance | Attribute | Byte |
| Device connection data | 0 ... 35 | 12 | 24 | 0 ... 35 |

8.3.8 7th device connection addressing

Tables

| Process data | | Tables | | |
|------------------------|----------|--------|---------|-----------|
| About | Byte | Table | Segment | Byte |
| Device connection data | 0 ... 35 | 110 | 18 | 0 ... 11 |
| | | | 19 | 12 ... 23 |
| | | | 20 | 24 ... 35 |

SDOs

| Process data | | SDOs | |
|------------------------|----------|--------|-----------|
| About | Byte | Index | Subindex |
| Device connection data | 0 ... 35 | 0x2036 | 37 ... 72 |

Modbus Register

| Process data | | Modbus Register | |
|------------------------|----------|-----------------|--------------------------|
| About | Byte | Register | Coil/Discrete Input (1x) |
| Device connection data | 0 ... 35 | 14108 ... 14125 | - |

PROFINET Records

| Process data | | Profinet | |
|------------------------|----------|----------|----------|
| About | Byte | Record | Byte |
| Device connection data | 0 ... 35 | 173 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--|----------|-------------|-----------|----------|
| About | Byte | Instance | Attribute | Byte |
| Device connection data | 0 ... 35 | 15 | 7 | 0 ... 35 |

8.3.9 8th device connection addressing**Tables**

| Process data | | Tables | | |
|--|----------|--------|---------|-----------|
| About | Byte | Table | Segment | Byte |
| Device connection data | 0 ... 35 | 110 | 21 | 0 ... 11 |
| | | | 22 | 12 ... 23 |
| | | | 23 | 24 ... 35 |

SDOs

| Process data | | SDOs | |
|--|----------|--------|------------|
| About | Byte | Index | Subindex |
| Device connection data | 0 ... 35 | 0x2036 | 73 ... 108 |

Modbus Register

| Process data | | Modbus Register | |
|--|----------|-----------------|--------------------------|
| About | Byte | Register | Coil/Discrete Input (1x) |
| Device connection data | 0 ... 35 | 14126 ... 14143 | - |

PROFINET Records

| Process data | | Profinet | |
|--|----------|----------|----------|
| About | Byte | Record | Byte |
| Device connection data | 0 ... 35 | 174 | 0 ... 35 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--|----------|-------------|-----------|----------|
| About | Byte | Instance | Attribute | Byte |
| Device connection data | 0 ... 35 | 15 | 8 | 0 ... 35 |

8.4 Diagnostic words

The diagnostic words contain information about the elements in the PNOZmulti Configurator. The diagnostic words consist of 200 Bytes.

8.4.1 Diagnostics

| Byte | About PNOZmulti Configurator |
|------|--|
| 0 | Diagnostic word, element ID1 |
| 1 | e.g. A0B1 (hex): ▶ Byte 0: A0 ▶ Byte 1: B1 |
| 2 | Diagnostic word, element ID2 |
| 3 | e.g. A2B3 (hex): ▶ Byte 2: A2 ▶ Byte 3: B3 |
| ... | ... |
| ... | ... |
| 198 | Diagnostic word, element ID100 |
| 199 | e.g. AEBF (hex): ▶ Byte 198: AE ▶ Byte 199: BF |

8.4.2 Diagnostic word addressing

Tables

| Process data | | Tables | | |
|--------------|-------------|--------|----------|----------|
| Information | Byte | Table | Segment | Byte |
| Diagnostics | 0 ... 11 | 70 | 0 | 0 ... 11 |
| Diagnostics | 12 ... 23 | 70 | 1 | 0 ... 11 |
| Diagnostics | 24 ... 179 | 70 | 2 ... 14 | 0 ... 11 |
| Diagnostics | 180 ... 191 | 70 | 15 | 0 ... 11 |
| Diagnostics | 192 ... 199 | 70 | 16 | 0 ... 7 |

SDOs

| Process data | | SDOs | |
|--------------|-------------|--------|-----------|
| Information | Byte | Index | Subindex |
| Diagnostics | 0 ... 119 | 0x200A | 1 ... 120 |
| Diagnostics | 120 ... 199 | 0x200B | 1 ... 80 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|-----------|-----------------|--------------------------|
| Information | Byte | Register | Coil/Discrete Input (1x) |
| Diagnostics | 0 ... 199 | 2048 ... 2147 | 32768 ... 34367 |

Profinet records

| Process data | | Profinet | |
|--------------|-------------|-----------|----------|
| Information | Byte | Record | Byte |
| Diagnostics | 0 ... 23 | 27 | 0 ... 23 |
| Diagnostics | 24 ... 47 | 28 | 0 ... 23 |
| Diagnostics | 48 ... 191 | 29 ... 35 | 0 ... 23 |
| Diagnostics | 192 ... 199 | 36 | 0 ... 7 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-------------|-------------|-----------|----------|
| Information | Byte | Instance | Attribute | Byte |
| Diagnostics | 0 ... 23 | 5 | 1 | 0 ... 23 |
| Diagnostics | 24 ... 47 | 5 | 2 | 0 ... 23 |
| Diagnostics | 48 ... 191 | 5 | 3 ... 8 | 0 ... 23 |
| Diagnostics | 192 ... 199 | 5 | 9 | 0 ... 7 |

8.5 Enable elements

Each element is assigned an ID in the PNOZmulti Configurator. If the element's output = 0 (no enable), the corresponding bit is set.

The enable elements consist of 13 Bytes.

8.5.1 Element IDs

| Byte | Bit 7 | ... | | | | | | Bit 0 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0 | ID 8 | ID 7 | ID 6 | ID 5 | ID 4 | ID 3 | ID 2 | ID 1 |
| 1 | ID 16 | ID 15 | ID 14 | ID 13 | ID 12 | ID 11 | ID 10 | ID 9 |
| 2 | ID 24 | ID 23 | ID 22 | ID 21 | ID 20 | ID 19 | ID 18 | ID 17 |
| 3 | ID 32 | ID 31 | ID 30 | ID 29 | ID 28 | ID 27 | ID 26 | ID 25 |
| 4 | ID 40 | ID 39 | ID 38 | ID 37 | ID 36 | ID 35 | ID 34 | ID 33 |
| 5 | ID 48 | ID 47 | ID 46 | ID 45 | ID 44 | ID 43 | ID 42 | ID 41 |
| 6 | ID 56 | ID 55 | ID 54 | ID 53 | ID 52 | ID 51 | ID 50 | ID 49 |

| Byte | Bit 7 | ... | | | | | | Bit 0 |
|------|----------|-------|-------|-------|--------|-------|-------|-------|
| 7 | ID 64 | ID 63 | ID 62 | ID 61 | ID 60 | ID 59 | ID 58 | ID 57 |
| 8 | ID 72 | ID 71 | ID 70 | ID 69 | ID 68 | ID 67 | ID 66 | ID 65 |
| 9 | ID 80 | ID 79 | ID 78 | ID 77 | ID 76 | ID 75 | ID 74 | ID 73 |
| 10 | ID 88 | ID 87 | ID 86 | ID 85 | ID 84 | ID 83 | ID 82 | ID 81 |
| 11 | ID 96 | ID 95 | ID 94 | ID 93 | ID 92 | ID 91 | ID 90 | ID 89 |
| 12 | Reserved | | | | ID 100 | ID 99 | ID 98 | ID 97 |

8.5.2 Enable element addressing

Tables

| Process data | | Tables | | |
|--------------|----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| ID | 0 ... 12 | 71 | 0 | 0 ... 12 |

SDOs

| Process data | | SDOs | |
|--------------|----------|--------|-----------|
| Information | Byte | Index | Subindex |
| ID | 0 ... 12 | 0x200B | 81 ... 93 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|----------|-----------------|--------------------------|
| Information | Byte | Register | Coil/Discrete Input (1x) |
| ID | 0 ... 12 | 2150 ... 2156 | 34400 ... 34503 |

Profinet records

| Process data | | Profinet | |
|--------------|----------|----------|----------|
| Information | Byte | Record | Byte |
| ID | 0 ... 12 | 36 | 0 ... 12 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|----------|-------------|-----------|----------|
| Information | Byte | Instance | Attribute | Byte |
| ID | 0 ... 12 | 5 | 10 | 0 ... 12 |

8.6 Maintenance safeguarding system Key-in-pocket

When the Key-in-pocket system is used, a person may only enter a plant/machine's danger zone if they have used their transponder outside at an access point to sign in to the sign in list on the Key-in-pocket system. The transponder must have a valid permission. The transponder's security ID and serial number are entered into the sign in list.

A maximum of 20 people at a time can be signed into a sign in list with their transponder. The Key-in-pocket system can monitor a maximum of 4 independent plant sections. A sign in list is assigned to each plant section.

The sign in lists can be polled via Modbus Register or tables and segments.

1. Sign in list

| Byte | | Table/ Segment | Modbus Register |
|-----------------|---|-------------------|-----------------|
| 1. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 220/0 | 18000 ... 18005 |
| 2. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 220/1 | 18006 ... 18011 |
| 3. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 220/2 | 18012 ... 18017 |
| ... | | | |
| 20. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 220/19 | 18114 ... 18119 |

2. Sign in list

| Byte | | Table/ Segment | Modbus Register |
|----------------|---|-------------------|-----------------|
| 1. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 221/0 | 18120 .. 18125 |
| 2. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 221/1 | 18126 .. 18131 |
| 3. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 221/2 | 18132 .. 18137 |
| ... | | | |

| Byte | | Table/ Segment | Modbus Register |
|-----------------|---|-------------------|-----------------|
| 20. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 221/19 | 18134 ... 18139 |

3. Sign in list

| Byte | | Table/ Segment | Modbus Register |
|-----------------|---|-------------------|-----------------|
| 1. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 222/0 | 18240 .. 18245 |
| 2. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 222/1 | 18246 .. 18252 |
| 3. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 222/2 | 18252 .. 18257 |
| ... | | | |
| 20. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 222/19 | 18354 .. 18359 |

4. Sign in list


| Byte | | Table/ Segment | Modbus Register |
|-----------------|---|-------------------|-----------------|
| 1. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 223/0 | 18360 .. 18365 |
| 2. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 223/1 | 18366 .. 18371 |
| 3. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 223/2 | 18372 .. 18377 |
| ... | | | |
| 20. Transponder | Secure ID Byte 0 ... 7 Serial Number Byte 8 ... 11 | 223/19 | 18474 .. 18479 |

8.7 Project data

The project data, which was also defined in the PNOZmulti Configurator, consists of 60 Bytes.


8.7.1 Check sums

| Byte | Information |
|------|--|
| 0 | Project check sum |
| 1 | e.g. check sum A1B2 (hex:) ‣ Byte 0: A1 ‣ Byte 1: B2 |
| 2 | ‣ Overall check sum |
| 3 | |
| 4 | Reserved |
| ... | ... |
| 11 | Reserved |

Fieldbus-specific addressing is described in the chapter entitled [Project data addressing](#) [ 147].

8.7.2 Date


| Byte | Info |
|------|--|
| 12 | Project creation date: Day and month (DDMM), year (YYYY) |
| 13 | e.g. creation date: 28.11.2003 |
| 14 | ‣ Byte 12: 1C ‣ Byte 13: 0B |
| 15 | ‣ Byte 14: 0x07 ‣ Byte 15: 0xD3 |
| 16 | Day and month (DDMM), e.g. 28.11. |
| 17 | ‣ Byte 16: 1C ‣ Byte 17: 0B |
| 18 | Year (YYYY), e.g. 2003 |
| 19 | ‣ Byte 18: 0x07 ‣ Byte 19: 0xD3 |
| 20 | Time (HH:MM), e.g. 14 hours, 25 minutes |
| 21 | ‣ Byte 20: 0E ‣ Byte 21: 19 |
| 22 | Time zone 1 |
| 23 | ‣ Byte 22: 0 ‣ Byte 23: 1 |

Fieldbus-specific addressing is described in the chapter entitled [Project data addressing](#) [ 147].

8.7.3 Project name

Project name defined in the PNOZmulti Configurator under "Enter project data". The name is stored in UNICODE format (2 Bytes contain the Hex code of one UNICODE character).

| Byte | Information |
|------|--|
| 24 | 1st character of project name |
| 25 | |
| 26 | 2nd character of project name |
| 27 | |
| ... | ... |
| ... | |
| 54 | 16th character of project name |
| 55 | |
| 56 | End of character string (identified by "FFFF") |
| 57 | |
| 58 | Reserved |
| 59 | Reserved |

Fieldbus-specific addressing is described in the chapter entitled [Project data addressing](#) [ 147].

8.7.4 Project data addressing

Tables

| Process data | | Tables | | |
|------------------------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Check sums | 0 ... 3 | 80 | 0 | 0 ... 3 |
| Date | 12 ... 23 | 80 | 1 | 0 ... 11 |
| Project name | 24 ... 35 | 80 | 2 | 0 ... 11 |
| Project name | 36 ... 47 | 80 | 3 | 0 ... 11 |
| Project name | 48 ... 57 | 80 | 4 | 0 ... 9 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Check sums | 0 ... 3 | 0x200D | 13 ... 16 |
| Date | 12 ... 23 | 0x200D | 25 ... 36 |
| Project name | 24 ... 57 | 0x200D | 37 ... 70 |

Modbus Register

| Process data | | Modbus Register | |
|--------------|-----------|-----------------|--------------------------|
| Information | Byte | Register | Coil/Discrete Input (1x) |
| Check sums | 0 ... 3 | 4096 ... 4097 | --- |
| Date | 12 ... 23 | 4102 ... 4107 | --- |
| Project name | 24 ... 57 | 4108 ... 4124 | --- |

Profinet records

| Process data | | Profinet | |
|--------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Check sums | 0 ... 3 | 37 | 0 ... 3 |
| Date | 12 ... 23 | 37 | 12 ... 23 |
| Project name | 24 ... 57 | 38 | 0 ... 33 |

Ethernet/IP instances


| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Check sums | 0 ... 3 | 6 | 1 | 0 ... 3 |
| Date | 12 ... 23 | 6 | 1 | 12 ... 23 |
| Project name | 24 ... 57 | 6 | 2 | 0 ... 33 |

8.8 Device data

The device data consists of 36 Bytes.

8.8.1 Product

| Byte | Info |
|------|---|
| 0 | Product number, e.g. 772 100: 000BC804 (hex) |
| 1 | ▶ Byte 0: 00, |
| 2 | ▶ Byte 1: 0B, |
| 3 | ▶ Byte 2: C8, ▶ Byte 3: 04 |
| 4 | Serial number, e.g. 123 456: 0001E240 (hex) |
| 5 | ▶ Byte 4: 00, |
| 6 | ▶ Byte 5: 01, |
| 7 | ▶ Byte 6: E2, ▶ Byte 7: 40 |
| 8 | Device type, e.g. PNOZ m B0: 0060 (hex) |
| 9 | ▶ Byte 8: 00, ▶ Byte 9: 60 ▶ Device type, e.g. PNOZ m B1: 0061 (hex) ▶ Byte 8: 00, ▶ Byte 9: 61 |
| 10 | Device version 20: 14 (hex) |
| 11 | ▶ Byte 10: 00, ▶ Byte 11: 14 |

Fieldbus-specific addressing is described in the chapter entitled [Device data addressing](#) [ 151].


Device types

- ▶ PNOZ m B0: 0x0060
- ▶ PNOZ m B1: 0x0061
- ▶ PNOZ m B1 Burner: 0x0062
- ▶ PNOZ m EF 8DI4DO: 0x00E0
- ▶ PNOZ m EF 4DI4DOR: 0x00E1
- ▶ PNOZ m EF 16DI: 0x00E2
- ▶ PNOZ m EF 1MM: 0x00E3
- ▶ PNOZ m EF 2MM: 0x00E4
- ▶ PNOZ m EF 8DI2DOT: 0x00E5
- ▶ PNOZ m EF EtherCAT FSoE: 0x00A0
- ▶ PNOZ m EF SafetyNet: 0x00A5
- ▶ PNOZ m EF 4AI 0x00E6

- ▶ PNOZ m EF 1MM2DO: 0x00E8
- ▶ PNOZ m EF 4DI4DORD: 0x00E9
- ▶ PNOZ m EF 2DOR: 0x00EA
- ▶ PNOZ m EF MultiLink: 0x00A7
- ▶ PNOZ m EF PDPLink: 0x00B7
- ▶ PNOZ m ES 14DO: 0x00F8
- ▶ PNOZ m ES PROFIBUS: 0x0001
- ▶ PNOZ m ES CANopen: 0x0020
- ▶ PNOZ m ES Ethernet/IP: 0x0083
- ▶ PNOZ m ES PROFINET: 0x0085
- ▶ PNOZ m ES EtherCAT: 0x0087
- ▶ PNOZ m ES Powerlink: 0x0098
- ▶ PNOZ m ES CC-Link: 0x0090

8.8.2 Firmware


| Byte | Information |
|------|-------------------------------|
| 12 | Firmware Version A |
| 13 | |
| 14 | Firmware Version B |
| 15 | |
| 16 | Check sum, Firmware Version A |
| 17 | |
| 18 | Check sum, Firmware Version B |
| 19 | |
| 20 | Reserved |
| ... | ... |
| 23 | Reserved |

Fieldbus-specific addressing is described in the chapter entitled [Device data addressing](#) [ 151].

8.8.3 Operating hours

The operating hours counter can only be requested for the base unit.

| Byte | Info |
|------|--------------------------------------|
| 24 | Operating hours counter, e.g. 106786 |
| 25 | ▸ Byte 24: Reserved |
| 26 | ▸ Byte 25: 01 x 10000 (hex) |
| 27 | ▸ Byte 26: A1 x 100 (hex) |
| 27 | ▸ Byte 27: 22 x 1 (hex) |
| 28 | Reserved |
| ... | ... |
| 35 | Reserved |

Fieldbus-specific addressing is described in the chapter entitled [Device data addressing](#) [ 151].

8.8.4 Device data addressing

8.8.4.1 Device data addressing on base unit

Tables

| Device data | | Tables | | |
|---------------------------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 90 | 0 | 0 ... 11 |
| Firmware | 12 ... 19 | 90 | 1 | 0 ... 7 |
| Operating hours | 24 ... 27 | 90 | 2 | 0 ... 3 |

SDOs

| Device data | | SDOs | |
|---------------------------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x200F | 1 ... 12 |
| Firmware | 12 ... 19 | 0x200F | 13 ... 20 |
| Operating hours | 24 ... 27 | 0x200F | 25 ... 28 |

Modbus Register

| Device data | | Modbus Register | |
|--------------------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8192 ... 8197 | --- |
| Firmware | 12 ... 19 | 8198 ... 8201 | --- |

| Device data | | Modbus Register | |
|-----------------|-----------|-----------------|-----|
| Operating hours | 24 ... 27 | 8204 ... 8205 | --- |

PROFINET Records

| Device data | | Profinet | |
|-----------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 40 | 0 ... 11 |
| Firmware | 12 ... 19 | 40 | 12 ... 19 |
| Operating hours | 24 ... 27 | 40 | 24 ... 27 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-----------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 7 | 1 | 0 ... 11 |
| Firmware | 12 ... 19 | 7 | 1 | 12 ... 19 |
| Operating hours | 24 ... 27 | 7 | 1 | 24 ... 27 |

8.8.4.2 Device data addressing, 1st right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 0 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 1 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x200F | 73 ... 84 |
| Firmware | 12 ... 19 | 0x200F | 85 ... 92 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8228 ... 8233 | ---- |
| Firmware | 12 ... 19 | 8234 ... 8237 | ---- |

Profinet Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 42 | 0 ... 11 |
| Firmware | 12 ... 19 | 42 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 1 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 1 | 12 ... 19 |

8.8.4.3**Device data addressing, 2nd right-hand expansion module****Tables**

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 3 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 4 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2010 | 1 ... 12 |
| Firmware | 12 ... 19 | 0x2010 | 13 ... 20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8246 ... 8251 | --- |
| Firmware | 12 ... 19 | 8252 ... 8255 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 43 | 0 ... 11 |
| Firmware | 12 ... 19 | 43 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 2 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 2 | 12 ... 19 |

8.8.4.4 Device data addressing, 3rd right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 6 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 7 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2010 | 37 ... 48 |
| Firmware | 12 ... 19 | 0x2010 | 49 ... 56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8264 ... 8269 | --- |
| Firmware | 12 ... 19 | 8270 ... 8273 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 44 | 0 ... 11 |
| Firmware | 12 ... 19 | 44 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 3 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 3 | 12 ... 19 |

8.8.4.5

Device data addressing, 4th right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 9 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 10 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2010 | 73 ... 84 |
| Firmware | 12 ... 19 | 0x2010 | 85 ... 92 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8282 ... 8287 | --- |
| Firmware | 12 ... 19 | 8288 ... 8291 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 45 | 0 ... 11 |
| Firmware | 12 ... 19 | 45 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 4 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 4 | 12 ... 19 |

8.8.4.6

Device data addressing, 5th right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 12 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 13 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2011 | 1 ... 12 |
| Firmware | 12 ... 19 | 0x2011 | 13 ... 20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8300 ... 8305 | --- |
| Firmware | 12 ... 19 | 8306 ... 8309 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 46 | 0 ... 11 |
| Firmware | 12 ... 19 | 46 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 5 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 5 | 12 ... 19 |

8.8.4.7

Device data addressing, 6th right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 15 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 16 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2011 | 37 ... 48 |
| Firmware | 12 ... 19 | 0x2011 | 49 ... 56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8318 ... 8323 | --- |
| Firmware | 12 ... 19 | 8324 ... 8327 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 47 | 0 ... 11 |
| Firmware | 12 ... 19 | 47 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 6 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 6 | 12 ... 19 |

8.8.4.8 Device data addressing, 7th right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 18 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 19 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2011 | 73 ... 84 |
| Firmware | 12 ... 19 | 0x2011 | 85 ... 92 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8336 ... 8341 | --- |
| Firmware | 12 ... 19 | 8342 ... 8345 | --- |

Profinet Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 48 | 0 ... 11 |
| Firmware | 12 ... 19 | 48 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 7 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 7 | 12 ... 19 |

8.8.4.9

Device data addressing, 8th right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 21 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 22 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2012 | 1 ... 12 |
| Firmware | 12 ... 19 | 0x2012 | 13 ... 20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8354 ... 8359 | --- |
| Firmware | 12 ... 19 | 8360 ... 8363 | --- |

Profinet Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 49 | 0 ... 11 |
| Firmware | 12 ... 19 | 49 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 8 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 8 | 12 ... 19 |

8.8.4.10

Device data addressing, 9th right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 24 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 25 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2012 | 37...48 |
| Firmware | 12 ... 19 | 0x2012 | 49...56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8372...8377 | --- |
| Firmware | 12 ... 19 | 8378...8381 | --- |

Profinet Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 50 | 0 ... 11 |
| Firmware | 12 ... 19 | 50 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 9 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 9 | 12 ... 19 |

8.8.4.11

Device data addressing, 10th right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 27 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 28 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2012 | 37...48 |
| Firmware | 12 ... 19 | 0x2012 | 49...56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8390...8395 | --- |
| Firmware | 12 ... 19 | 8391...8394 | --- |

PROFINET Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 51 | 0 ... 11 |
| Firmware | 12 ... 19 | 51 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 10 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 10 | 12 ... 19 |

8.8.4.12

Device data addressing, 11th right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 30 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 31 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2013 | 1...12 |
| Firmware | 12 ... 19 | 0x2013 | 13...20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8408...8413 | --- |
| Firmware | 12 ... 19 | 8414...8417 | --- |

Profinet Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 52 | 0 ... 11 |
| Firmware | 12 ... 19 | 52 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 11 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 11 | 12 ... 19 |

8.8.4.13**Device data addressing, 12th right-hand expansion module****Tables**

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 91 | 33 | 0 ... 11 |
| Firmware | 12 ... 19 | 91 | 34 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2013 | 37...48 |
| Firmware | 12 ... 19 | 0x2013 | 49...56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8426...8431 | --- |
| Firmware | 12 ... 19 | 8432...8435 | --- |

Profinet Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 53 | 0 ... 11 |
| Firmware | 12 ... 19 | 53 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 8 | 12 | 0 ... 11 |
| Firmware | 12 ... 19 | 8 | 12 | 12 ... 19 |

8.8.4.14

Device data addressing, 1st ST right-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 94 | 0 | 0 ... 11 |
| Firmware | 12 ... 19 | 94 | 1 | 0 ... 7 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2020 | 1 ... 12 |
| Firmware | 12 ... 19 | 0x2020 | 13 ... 20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8928...8933 | --- |
| Firmware | 12 ... 19 | 8934...8937 | --- |

Profinet Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 125 | 0 ... 11 |
| Firmware | 12 ... 19 | 125 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 13 | 1 | 0 ... 11 |
| Firmware | 12 ... 19 | 13 | 1 | 12 ... 19 |

8.8.4.15

Device data addressing 2nd ST expansion module, right

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 94 | 3 | 0 ... 11 |
| Firmware | 12 ... 19 | 94 | 4 | 0 ... 7 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2020 | 37...48 |
| Firmware | 12 ... 19 | 0x2020 | 49...56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8946...8951 | --- |
| Firmware | 12 ... 19 | 8952...8955 | --- |

PROFINET Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 126 | 0 ... 11 |
| Firmware | 12 ... 19 | 126 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 13 | 2 | 0 ... 11 |
| Firmware | 12 ... 19 | 13 | 2 | 12 ... 19 |

8.8.4.16

Device data addressing 3rd ST expansion module, right

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 94 | 6 | 0 ... 11 |
| Firmware | 12 ... 19 | 94 | 7 | 0 ... 7 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2021 | 73...84 |
| Firmware | 12 ... 19 | 0x2021 | 85...92 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8964...8969 | --- |
| Firmware | 12 ... 19 | 8970...8973 | --- |

PROFINET Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 127 | 0 ... 11 |
| Firmware | 12 ... 19 | 127 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 13 | 3 | 0 ... 11 |
| Firmware | 12 ... 19 | 13 | 3 | 12 ... 19 |

8.8.4.17

Device data addressing 4th ST expansion module, right

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 94 | 9 | 0 ... 11 |
| Firmware | 12 ... 19 | 94 | 10 | 0 ... 7 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2021 | 1...12 |
| Firmware | 12 ... 19 | 0x2021 | 13...20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8982...8987 | --- |
| Firmware | 12 ... 19 | 8988...8991 | --- |

PROFINET Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 128 | 0 ... 11 |
| Firmware | 12 ... 19 | 128 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 13 | 4 | 0 ... 11 |
| Firmware | 12 ... 19 | 13 | 4 | 12 ... 19 |

8.8.4.18

Device data addressing 5th ST expansion module, right

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 94 | 12 | 0 ... 11 |
| Firmware | 12 ... 19 | 94 | 13 | 0 ... 7 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2021 | 37...48 |
| Firmware | 12 ... 19 | 0x2021 | 49...56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 9000...9005 | --- |
| Firmware | 12 ... 19 | 9006...9009 | --- |

PROFINET Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 129 | 0 ... 11 |
| Firmware | 12 ... 19 | 129 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 13 | 5 | 0 ... 11 |
| Firmware | 12 ... 19 | 13 | 5 | 12 ... 19 |

8.8.4.19

Device data addressing 6th ST expansion module, right

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 94 | 15 | 0 ... 11 |
| Firmware | 12 ... 19 | 94 | 16 | 0 ... 7 |

SDOs

| Process data | | SDOs | |
|--------------|-----------|--------|----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2022 | 73...84 |
| Firmware | 12 ... 19 | 0x2022 | 85...92 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 9018...9023 | --- |
| Firmware | 12 ... 19 | 9024...9027 | --- |

PROFINET Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 130 | 0 ... 11 |
| Firmware | 12 ... 19 | 130 | 12 ... 19 |

Ethernet/IP instances

| Process data | | Ethernet/IP | | |
|--------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 13 | 6 | 0 ... 11 |
| Firmware | 12 ... 19 | 13 | 6 | 12 ... 19 |

8.8.4.20

Device data addressing, 1st left-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 92 | 0 | 0 ... 11 |
| Firmware | 12 ... 19 | 92 | 1 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2020 | 1 ... 12 |
| Firmware | 12 ... 19 | 0x2020 | 13 ... 20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8516 ... 8521 | --- |
| Firmware | 12 ... 19 | 8522 ... 8525 | --- |

Profinet Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 58 | 0 ... 11 |
| Firmware | 12 ... 19 | 58 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 13 | 1 | 0 ... 11 |
| Firmware | 12 ... 19 | 13 | 1 | 12 ... 19 |

8.8.4.21

Device data addressing, 2nd left-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 92 | 3 | 0 ... 11 |
| Firmware | 12 ... 19 | 92 | 4 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2015 | 37 ... 48 |
| Firmware | 12 ... 19 | 0x2015 | 49 ... 56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8534 ... 8539 | --- |
| Firmware | 12 ... 19 | 8540 ... 8543 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 59 | 0 ... 11 |
| Firmware | 12 ... 19 | 59 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 9 | 2 | 0 ... 11 |
| Firmware | 12 ... 19 | 9 | 2 | 12 ... 19 |

8.8.4.22

Device data addressing, 3rd left-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 92 | 6 | 0 ... 11 |
| Firmware | 12 ... 19 | 92 | 7 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2015 | 73 ... 84 |
| Firmware | 12 ... 19 | 0x2015 | 85 ... 92 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8552 ... 8557 | --- |
| Firmware | 12 ... 19 | 8558 ... 8561 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 60 | 0 ... 11 |
| Firmware | 12 ... 19 | 60 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 9 | 3 | 0 ... 11 |
| Firmware | 12 ... 19 | 9 | 3 | 12 ... 19 |

8.8.4.23

Device data addressing, 4th left-hand expansion module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 92 | 9 | 0 ... 11 |
| Firmware | 12 ... 19 | 92 | 10 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2016 | 1 ... 12 |
| Firmware | 12 ... 19 | 0x2016 | 13 ... 20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8570 ... 8575 | --- |
| Firmware | 12 ... 19 | 8576 ... 8579 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 61 | 0 ... 11 |
| Firmware | 12 ... 19 | 61 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 9 | 4 | 0 ... 11 |
| Firmware | 12 ... 19 | 9 | 4 | 12 ... 19 |

8.8.4.24

Device data addressing, fieldbus module

Please note:

For device data addressing of the module PNOZ m EF EtherCAT FSoE see **Device data addressing 1st ... 4th left-hand expansion module.**

**INFORMATION**

No serial number and no check sum are currently entered for the fieldbus modules.

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Info | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 93 | 0 | 0 ... 11 |
| Firmware | 12 ... 19 | 93 | 1 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Info | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2017 | 1 ... 12 |
| Firmware | 12 ... 19 | 0x2017 | 13 ... 20 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Info | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8624 ... 8629 | --- |
| Firmware | 12 ... 19 | 8630 ... 8633 | --- |

PROFINET Records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Info | Byte | Record | Byte |
| Product | 0 ... 11 | 64 | 0 ... 11 |
| Firmware | 12 ... 19 | 64 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Info | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 10 | 1 | 0 ... 11 |
| Firmware | 12 ... 19 | 10 | 1 | 12 ... 19 |

8.8.4.25 Device data addressing, communication module

Tables

| Device data | | Tables | | |
|-------------|-----------|--------|---------|----------|
| Information | Byte | Table | Segment | Byte |
| Product | 0 ... 11 | 93 | 3 | 0 ... 11 |
| Firmware | 12 ... 19 | 93 | 4 | 0 ... 7 |

SDOs

| Device data | | SDOs | |
|-------------|-----------|--------|-----------|
| Information | Byte | Index | Subindex |
| Product | 0 ... 11 | 0x2017 | 37 ... 48 |
| Firmware | 12 ... 19 | 0x2017 | 49 ... 56 |

Modbus Register

| Device data | | Modbus Register | |
|-------------|-----------|-----------------|---------------------|
| Information | Byte | Register | Coil/Discrete Input |
| Product | 0 ... 11 | 8642 ... 8647 | --- |
| Firmware | 12 ... 19 | 8648 ... 8651 | --- |

Profinet records

| Device data | | Profinet | |
|-------------|-----------|----------|-----------|
| Information | Byte | Record | Byte |
| Product | 0 ... 11 | 65 | 0 ... 11 |
| Firmware | 12 ... 19 | 65 | 12 ... 19 |

Ethernet/IP instances

| Device data | | Ethernet/IP | | |
|-------------|-----------|-------------|-----------|-----------|
| Information | Byte | Instance | Attribute | Byte |
| Product | 0 ... 11 | 10 | 2 | 0 ... 11 |
| Firmware | 12 ... 19 | 10 | 2 | 12 ... 19 |

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