
# Basic profile 10

**V2.0**

**03-27-2012**

**07**

| | |
|---|---|
| Profile: | Basic |
| Profile number: | 10 |
| Version: | V2.0 |
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## List of revisions

| Index | Date | Modifications, additions or explanations |
|---|---|---|
| 1.00 | 10/14/2002 | First version |
| 1.01 | 08/12/2004 | • Addition of channel number in diagnostic object 0018 and onwards<br>• Addition of priorities 81, 82, 83 "Error removed" in diagnostic object 0018 and onwards<br>• Revision/addition of error codes<br>• Extension of handling description for diagnostic messages<br>• Object 000F DeviceProfile Mandatory<br>• Introduction and appendix added<br>• Editorial revision<br>• Introduction of objects<br>- 002E – CheckSum<br>- 002F - PDOUT_Subst<br>- 0030 - PF_Code<br>- 0031 - PDIN_Subst<br>- 0032 - IBS_ID<br>• Definition of values for objects<br>- 0024 – IBSResetCode<br>- 0020 – PDTimeoutCode |
| 1.02 | 01/28/2005 | • Error resolution (Re/Gr/formats/etc.)<br>• Object 0019 "ResetDiag" name and meaning adapted<br>• Object 000F "DeviceProfile" type modified<br>• Error codes extended:<br>2344; 2345; 341X; 342X; 5230 |
| 1.10 | 06/20/2006 | • Object 0018 "DiagState.Kanal" changed to "DiagState.Channel/Group", meaning adapted<br>• Object 0018 "DiagState. MoreFollows" meaning adapted<br>• Object 001A "GetErrorRepMethod", name and description extended<br>• Object 0x001D "Password" adapted<br>• Object 0x0025 "PDIN" additional explanation<br>• Object 0x0026 "PDOUT" additional explanation<br>• Object 002E "CheckSum", type changed from UINT16 => UNIT32<br>• Object 0033 "DiagStateChannelNumber" added<br>• Object 0034 "DiagStateAddValue" added<br>• Object 0035 "NoOfModules" added<br>• Object 0036 "DeviceStructure" added<br>• Object 0037 "DeviceType" added<br>• Object 0038 "ObjDescrReq" added<br>• Object 0039 "ObjDescr" added<br>• Object 003A "VersionCount" added<br>• Object E805 "ObjDescrLong" added<br>• Object E800 "DiagStateLong" described in part as a link and duplicate descriptions to be avoided<br>• Modular devices described. The Invoke ID, now "Module number", is used for module addressing<br>• List of permitted communication error codes revised and extended<br>• "Bit string" data type added<br>• "PCP objects" section revised, restructured, and extended<br>• "Object description" section added<br>• Addition of profile-specific error class 8 error code 1 |

| | | |
|---|---|---|
| 1.11 | 10/06/2009 | • Additional error code revised<br>• Handling object 0x0038 "ObjDescrReq" object 0x0039 "ObjDescr" extended<br>• Error class "8" other, error code "1" profile-specific consistently corrected<br>• Visible string data type (always scheduled "0x00"!)<br>• Object 0037 "DeviceType" slightly revised<br>• Object 0008 "ProductID" re-named to "SerialNo" to avoid confusion<br>• Error codes 6800 and 6810 introduced. A000 et seq. extended and explained in more detail<br>• Explanation of the object area for modular devices<br>• Object 003B "PDIN_Descr" added<br>• Object 003C "PDOUT_Descr" added<br>• Object 0019 "ResetDiag" extended and made more specific |
| 1.12 | 11/19/2010 | • Device range supplemented by digital/analog IN/OUT<br>• Data type list completed<br>• LanguageCode corrected<br>• Length for visible string corrected<br>• Object 003B "PDIN_Descr" revised, new types added<br>• Object 003C "PDOUT_Descr" revised, new types added<br>• Object 000C "FirmwareVersion" and 000B "PChVersion" supplemented by entries if no FW/PChVersion is available<br>• Handling of priorities in diagnostics object 0x0018 DiagState explained<br>• Object 0019 "ResetDiag" extended and made more specific<br>• Object 0018.5 "ResetDiag.MoreFollows" made more specific<br>• Additional error codes added<br>• Object 0037 "DeviceType" error rectified R/W => R, could at no time have been R/W<br>• Subindices "Access-Rights", "DisplayFormat", "Resolution", and "Offset" inserted in object 0x0039 "ObjDescr", description added<br>• Value index for "force" and "el. resistance" added<br>• Object 0020, 0024, 0030 UINT16 => array of UINT16 modified and commented |
| 2.0 | 12/07/2011 | • Basic profile "neutralized", i.e., relationship with INTERBUS and PCP dissolved. However, this is still an<br>• Comments on the version counters added<br>• Object 003D "WakeUpTime" added<br>• ResetCode explained in more detail<br>• Object 002D ResetParam code "02" added<br>• **!!! Object 0x0039 "ObjDescr" incompatible, revised (minimum and maximum moved)**<br>• Translation table for the object names added to appendix<br>• Description of download services (download write, download read), extended and made more specific<br>• Object 0011 error in the string length (10+1) corrected<br>• Object 0x0005 "Capabilities" added<br>• Object 0038 “ObjDescrReq” length corrected |
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**Contents**

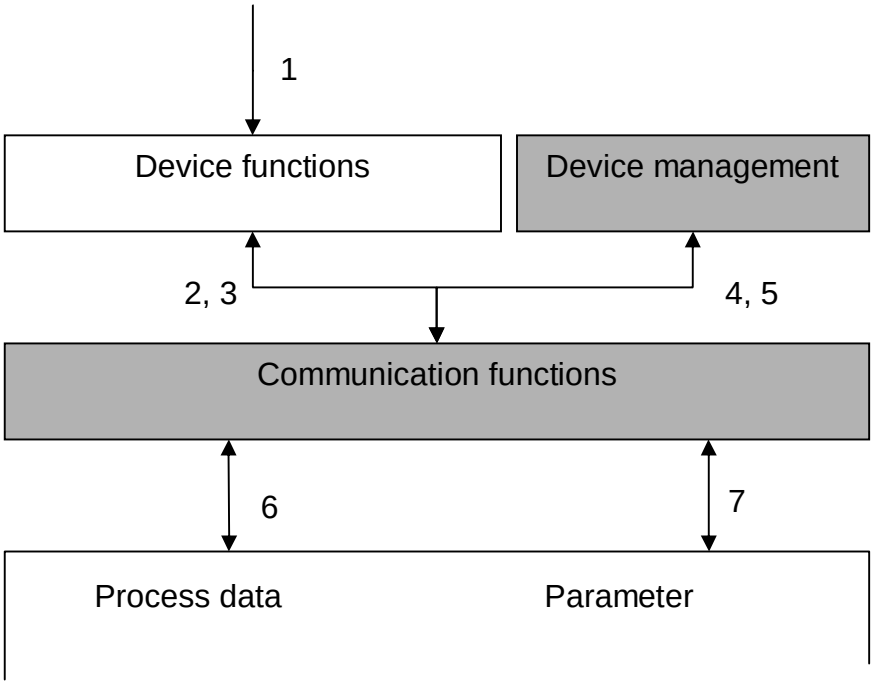
# 1 Foreword

More powerful and more flexible systems for industrial sensors and actuators are increasingly required for factory automation. Intelligent field devices can meet these requirements. However, they must support open and standardized connectivity in order to be fully integrated in complex production procedures.
The basic idea of an open system is to enable the exchange of information between application functions which are implemented in devices from different manufacturers. This involves specified application functions, a uniform user interface for communication, and a uniform transmission medium.

INTERBUS Club Deutschland e.V. has set itself the task of standardizing the most important field device functions and bringing them together in this profile. To enable field device functions to be defined regardless of the communication medium, an internationally recognized and standardized IEC 61158 user interface was used for communication. This provided continuity with MMS. No specific fieldbus system has been selected as a transmission medium. All the transmission medium has to do is meet the requirements for field communication in terms of realtime behavior and a standardized user interface.
The basic profile is aimed at all users and manufacturers of field devices that are designed for operation on a fieldbus. This profile definition provides the user with a logical means of enhancing standardized communication and it ensures universal agreement on data content and device behavior. These function definitions standardize the key field device parameters. This ensures that devices from different manufacturers behave in the same way in terms of the communication medium.
An independent specialist body will be set up for conformance testing and certification of products with the basic profile. As standardization work continues, further additions can be expected.

# 2 Application and device properties

This section describes the entire application in terms of communication. The application is divided into the following function blocks:




**Communication function**
The communication function executes all communication-specific functions.

**Device function**
The device function executes all device-specific functions.

**Device management**
The device information manages information about the device in a non-volatile memory.

**Interaction between function blocks**
1 Process variables
2 Process data from the higher-level control system to the device functions
3 Process data from the device functions to the higher-level control system
4 Storing device information for management, diagnostics, and identification
5 Reading device information for management, diagnostics, and identification
6 Mapping to the process data channel
7 Mapping to the parameter channel

# 3 General

In addition to information about the current state of the device, modern field device management and diagnostics also encompass information about the device itself, historical status information, error images, etc.
Previously only a small amount of the information available was provided as standard.
The aim of this document is to define a basic profile which will enable uniform management of devices that are equipped with a parameter channel.
This basic profile enables device manufacturers to provide end users (as well as tools) with considerably more information about their devices and associated features.
This "multitude" of information simplifies device startup, in particular, due to this standardization. As for service work, there is also now the option to access certain diagnostics data in a uniform and thus faster manner.

Understanding the profile:

> "Information and sequences that are similar in terms of content are also displayed in a standardized form, which aids manufacturers and users instead of restricting them."

In order to meet this requirement, the relevant information is stored consistently in standard objects. Mechanisms are specified that control the access to these objects and, in the event of errors, uniform error codes are established.

# 4 Overview

## 4.1 Index ranges of the PCP objects

The PCP objects in the basic profile are divided into the following index ranges:

| Index | Name | Object type |
|---|---|---|
| 0 | Object dictionary | OD |
| 0001 – 003D | General standard objects<br>These objects are further described in this document. | Variable |
| 003E – 007F | Reserved | |
| 0080 – 5FFF | Manufacturer-specific application objects<br>Manufacturers specify their device-specific variable objects in this area. | Variable |
| 6000 – CFFF | Profile-specific application objects<br>Additional specified application objects can be found in the relevant profiles (e.g., DRIVECOM, sensor/actuator, etc.). | Variable |
| D000 – DFFF | Reserved | |
| E000 – E3FF | Static VariablenListen | VariableList |
| E400 – E7FE | Dynamic variable list | VariableList |
| E7FF | Creating and reading variable list definitions | VariableListStructure |
| E800 – E805 | General domain variables<br>These objects are further described in this document. | DomainVariable |
| E805 – E820 | Reserved domain variable | DomainVariable |
| E820 – E8FF | Device-specific for domain variable<br>Manufacturers specify their device-specific variable objects in this area. | DomainVariable |
| F000 – FFFF | Reserved | |

## 4.2 List of standard objects

| Index | Object name | R/W | Length | Data type | M/O/D |
|---|---|---|---|---|---|
| 0001 | VendorName | R | 58 bytes, maximum | Visible string | **M** |
| 0002 | VendorID | R | 6+1 bytes | Visible string | O |
| 0003 | VendorText | R | 58 bytes, maximum | Visible string | O |
| 0004 | DeviceFamily | R | 58 bytes, maximum | Visible string | **M** |
| 0005600F | Capabilities | R | N x 8 bytes | Array of visible string | O |
| 0006 | ProductFamily | R | 58 bytes, maximum | Visible string | O |
| 0007 | ProductName | R | 58 bytes, maximum | Visible string | **M** |
| 0008 | SerialNo | R | 58 bytes, maximum | Visible string | O |
| 0009 | ProductText | R | 58 bytes, maximum | Visible string | O |
| 000A | OrderNumber | R | 58 bytes, maximum | Visible string | **M** |
| 000B | HardwareVersion | R | 2 entries | Record | **M** |
| 000C | FirmwareVersion | R | 2 entries | Record | **M** |
| 000D | PChVersion | R | 2 entries | Record | **M** |
| 000E | CommProfile | R | 3+1 bytes | Visible string | **M** |
| 000F | DeviceProfile | R | 4+1 bytes, maximum | Visible string | **M** |
| 0010 | Reserved | | | | |
| 0011 | ProfileVersion | R | 2 entries | Record | **M** |
| 0012 | VendorURL | R | 58 bytes, maximum | Visible string | O |
| 0013 | DeviceDescFile | R | 58 bytes, maximum | Visible string | O |
| 0014 | Location | R/W | 58 bytes, maximum | Visible string | O |
| 0015 | EquipmentIdent | R/W | 58 bytes, maximum | Visible string | O |
| 0016 | ApplDeviceAddr | R/W | 2 bytes | UINT16 | O |
| 0017 | Language | R/W | 2 entries | Record | **M** |
| 0018 | DiagState | R | 6 entries | Record | **M** |
| 0019 | ResetDiag | W | 1 byte | UINT8 | O |
| 001A | GetErrorRepMethod | R/W | 1 byte | UINT8 | O |
| 001B | TestMode | R/W | 2 bytes | UINT16 | O |
| 001C | ControlTrace | R/W | 1 byte | UINT8 | O |
| 001D | Password | W | 40 bytes, maximum | Octet string | O |
| 001E | SetPassword | W | 3 entries | Record | O |
| 001F | PDTimeout | R/W | 2 bytes | UINT16 | O |
| 0020 | PDTimeoutCode | R/W | N x 2 bytes | Array of UINT16 | O |
| 0021 | PChTimeout | R/W | 2 bytes | UINT16 | O |
| 0022 | PChTimeoutCode | R/W | 2 bytes | UINT16 | O |
| 0023 | AbortCode | R/W | 2 bytes | UINT16 | O |
| 0024 | ResetCode | R/W | N x 2 bytes | Array of UINT16 | O |
| 0025 | PDIN | R | PD length | Octet string | **M** |
| 0026 | PDOUT | R/W | PD length | Octet string | **M** |
| 0027 | GetExRight | R/W | 1 byte | UINT8 | O |
| 0028 | ChangePDSet | R/W | 2 bytes | UINT16 | O |
| 0029 | ParamSetWriteControl | R/W | 1 byte | UINT8 | O |
| 002A | ConflictDictionary | R | 2*N entries | Record | O |
| 002B | ParamSet | R/W | 2 bytes | UINT16 | O |
| 002C | ParameterMoment | R/W | 2 entries | Record | O |
| 002D | ResetParam | W | 1 byte | UINT8 | O |
| 002E | CheckSum | R | 4 bytes | UINT32 | O |
| 002F | PDOUT_Subst | R/W | PD length | Octet string | D |
| 0030 | PF_Code | R/W | N x 2 bytes | Array of UINT16 | O |
| 0031 | PDIN_Subst | R/W | PD length | Octet string | D |
| 0032 | FieldBus_ID | R | 2 entries | Record | **M** |
| 0033 | DiagStateChannelNo | R | 2 entries | Record | D |
| 0034 | DiagStateAddValue | R | 2 entries | Record | D |
| 0035 | NoOfModules | R | 1 byte | UINT8 | D |

| | | | | | |
|---|---|---|---|---|---|
| 0036 | DeviceStructure | R/W | 4 entries | Record | D |
| 0037 | DeviceType | R | 8 bytes | Octet string | O |
| 0038 | ObjDescrReq | R/W | 2 entries | Record | O |
| 0039 | ObjDescr | R | 16 entries | Record | O |
| 003A | VersionCount | R | 4 entries | Array | **M** |
| 003B | PDIN_Descr | R | 4 entries | Array | O |
| 003C | PDOUT_Descr | R | 4 entries | Array | O |
| 003D | WakeUpTime | R | 2 bytes | UINT16 | O |
| E800 | DiagStateLong | R | | Domain variable record | O |
| E801 | DiagHistory | R | | Domain variable record | O |
| E802 | DiagHistoryLong | R | | Domain variable record | O |
| E803 | TraceBuffer | R | | Domain variable | O |
| E804 | LanguageAvailable | R | | Domain variable record | O |
| E805 | ObjDescrLong | R | | Domain variable record | O |

R = Read only, this object is read only
W = Write only, this object can only be written
R/W = Read/Write, this object can be read and written

M = Mandatory (must be implemented)
O = Optional (does not have to be implemented)
D = Dependent (depends on other objects, must be implemented if the dependency is specified)

## 4.3 List of permitted communication error codes

**Error messages that occur during communication via parameter channel:**
The "Error type" service parameter consists of the following parameters:

- Error class
- Error code
- Additional code

### 4.3.1 Error class and error code

| Error class | Error code | Meaning |
|---|---|---|
| 2 Application reference | | This error class refers to the communication relationship which is used to process the service. |
| | 1 Application unreachable | Access to the object is not possible because the application is not implemented/available. This error message usually appears when an attempt is made to access a module that does not exist on a modular device via the module number. Module not available or module number incorrect. |
| | 0 Other | This error code is reported if the error cannot be assigned to any of the error codes previously specified. |
| 5 Service | | This error class is reported in the event of a faulty service. |
| | 1 Object state conflict | This error code is reported if the current state of the object prevents the service from being executed. |
| | 2 Service PDU size | This error code is reported in the event of a problem with the PDU size. |
| | 3 Object constrain conflict | This error code is reported if the service cannot be executed at present. |
| | 4 Parameter inconsistent | This error code is reported if the service contains inconsistent parameters. |
| | 5 Illegal parameter | This error code is reported if a parameter accepted an invalid value. |
| | 0 Other | This error code is reported if the error cannot be assigned to any of the error codes previously specified. |
| 6 Access | | This error class is reported in the event of faulty access. |
| | 1 Object invalidated | This error code is reported if access relates to a defined object, which has an undefined reference attribute. This represents a permanent error for access to this object. |
| | 2 Hardware fault | Access to the object failed due to a hardware fault. More detailed information about the cause can be found in the additional code (global = 8 and 9). |
| | 3 Object access denied | Client has insufficient access rights. |
| | 4 Invalid address | Access to an invalid internal address. |
| | 5 Object attribute inconsistent | A service parameter accepted an invalid value. More detailed information about the cause can be found in the additional code (global = 1). |
| | 6 Object access unsupported | The object is not a variable access object. |

| | | |
|---|---|---|
| | 7 Object non existent | No object exists for this index. |
| | 8 Type conflict | The data does not correspond to the object data type. |
| | 0 Other | This error code is reported if the error cannot be assigned to any of the error codes previously specified. |
| 8 Other (application) | 0 Other | The service was not executed. The cause is manufacturer-specific. More detailed information about the cause can be found in the additional code. |
| | 1 Profile-specific | The service was not executed. The cause is profile-specific. More detailed information about the cause can be found in the additional code.<br>All additional codes listed in this profile are profile-specific. |

### 4.3.2 Additional code:

The additional code consists of a global, specific, and device-specific part. Specifying a global or a specific code is optional. This means that if the application cannot provide more detailed information about the error cause, additional code = 0000hex is output. The specific code contains a detailed description of the error cause defined in the global code. If the error cause does not logically correspond to a specific code, then specific code = 0 must be specified.
The device-specific code (bits 8 to 15) is specified by the device manufacturer.

2 octets with the following structure:

| Bit 15 8 | 7 4 | 3 0 |
|---|---|---|
| Device-specific | Global code | Specific code |

The values for bits 8 to 15 are reserved and are currently set to 0.

All additional codes listed in this profile are profile-specific.

| Global code [hex] | Specif. code [hex] | Meaning |
|---|---|---|
| 0 | 0 | No detailed information about the error cause |
| 1 | 0 | Service parameter with invalid value |
| 1 | 1 | Subindex not available |
| 1 | 2 | Object access is not a request |
| 1 | 3 | Reserved service code |
| 1 | 4 | SubSlot not supported |
| 1 | 5 | Object access type not supported on this object |
| 1 | 6 | Object access request index for this access type must be 0x0000 |
| 1 | 7 | Object access request length for this access type must be 0 |
| 1 | 8 | Object length for this object does not match |
| 1 | 9 | Object is read only and may not be overwritten. |
| 2 | 0 | Service cannot be executed at present |
| 2 | 1 | Service cannot be executed at present due to local control |
| 2 | 2 | Service cannot be executed in current device state (device control) |
| 2 | 3 | Service cannot be executed at present as no object dictionary is available |
| 3 | 0 | Parameter value out of range (the server will not provide the value) |
| 3 | 1 | Parameter value too large |
| 3 | 2 | Parameter value too small |
| 4 | 0 | Collision with other values |
| 4 | 1 | PCP object cannot be mapped to the process data |
| 4 | 2 | Process data length exceeded |
| 8 | 0 | Hardware fault |
| 8 | 1 | Application failed |
| A | 0 | Invalid segment number<br>E.g, upload without initiation with subindex == 0xFF |
| A | 1 | Resource not available<br>No more resources (memory) are available for downloading |
| A | 2 | Incorrect CRC |
| A | 3 | Error opening the file (if file system is available) |
| A | 4 | Error writing the file (if file system is available) |
| A | 5 | Error closing the file (if file system is available) |
| A | 6 | Segment missing<br>Fewer data blocks were received than specified in the last segment |
| A | 7 | Too many segments<br>More data blocks were received than specified in the last segment |
| A | 8 | Error reading the file (if file system is available) |
| A | 9 | Error reading the file (if file system is available) |
| B | 1 | The password cannot be replaced (deleted). |
| B | 2 | The password cannot be added (too many passwords). |
| B | 3 | The password cannot be assigned for the desired type of access. |

Codes that are not listed are reserved.

If a manufacturer cannot assign an error message to any of the above, the INTERBUS Club should be notified.

# 5 PCP objects

Unlike standard parameter channel implementation, the PCP objects are not described in an object dictionary, but must instead be recognized implicitly by the user, e.g., from a description of the objects in the user manual for the relevant device.

## 5.1 Data types

| Index of type (dec.) | Symbol description | Number of bytes |
|---|---|---|
| 1 | Boolean | 1 |
| 2 | INT8 | 1 |
| 3 | INT16 | 2 |
| 4 | INT32 | 4 |
| 5 | UINT8 | 1 |
| 6 | UINT16 | 2 |
| 7 | UINT32 | 4 |
| 8 | Floating point | 4 |
| 9 | Visible string (always scheduled "0x00"!) | 1,2,3 … |
| 10 | Octet string | 1,2,3 … |
| 11 | Date | 7 |
| 12 | Time of day | 6 |
| 13 | Time difference | 6 |
| 14 | Bit string | 1,2,3 … |

## 5.2 Data objects

### 5.2.1 Domain variable object

The "Domain variable" object is used to transmit user-specific structured data of a moderately large to very large size (greater than (PDU size - 6) bytes). The object description must be recognized implicitly by the application program.

☞ The "Domain variable" object can only be addressed fully and only using the "Download-Write" and "Upload-Read" macro services.

The total size of the domain variable must not exceed the maximum user data volume of [PDU size – 8) * $FFF0_{hex}$] (approximately 3.5 MB).

#### 5.2.1.1 Domain variable - formal description

Object: domain variable
Object code: 0x02
Key attribute (m): index
Attribute (m): length (maximum PDU size – 8) * $FFF0_{hex}$ bytes)
Attribute (o): password

Services:
(o) Download-Write
(o) Upload-Read

### 5.2.2 Simple variable object

The "Simple variable" object represents a single, basic variable. The object description must be recognized implicitly by the application program. The size of a simple variable must not exceed the maximum user data volume of [PDU size – 6) bytes.

#### 5.2.2.1 Simple variable - formal description

| | |
|---|---|
| Object: | simple variable |
| Object code: | 0x07 |
| Key attribute (m): | index |
| Attribute (m): | length (maximum (PDU size - 6) bytes) |
| Attribute (o): | password |

Services:
- (o) Read
- (o) Write
- (o) Information report

### 5.2.3 Array object

The "Array" object consists of a string of simple variables of the same data type. The object description must be recognized implicitly by the application program.
If an element of the object is addressed, a subindex must also be specified in the service next to the index. Subindex 1 accesses the 1st element of the object. Subindex 0 addresses the object as a whole.
It is not mandatory for each element of an array to be addressed individually.
The total size of the array must not exceed the maximum user data volume of (PDU size - 6) bytes.

#### 5.2.3.1 Array variable - formal description

| | |
|---|---|
| Object: | array variable |
| Object code: | 0x08 |
| Key attribute (m): | index |
| Attribute (m): | length (maximum (PDU size - 6) bytes) |
| Attribute (m): | number of elements |
| Attribute (o): | password |

Services:
- (o) Read
- (o) Write
- (o) Information report

### 5.2.4 Record object

The "Record" object consists of a string of simple variables and, in certain cases, a string of variables at the end with different data types. The object description must be recognized implicitly by the application program. The record object may be addressed as a whole or element by element. If the object is to be addressed as a whole, the associated index is specified in the service.
If an element of the object is addressed, a subindex must also be specified in the service next to the index. Subindex 1 accesses the 1st element of the object.
It is not mandatory for each element of a record to be addressed individually.
The total size of the record must not exceed the maximum user data volume of (PDU size - 6) bytes.

#### 5.2.4.1 Record variable - formal description

| | |
|---|---|
| Object: | record variable |
| Object code: | 0x09 |
| Key attribute (m): | index |
| Attribute (m): | length (maximum (PDU size - 6) bytes) |
| Attribute (m): | list of elements |
| Attribute (o): | password |

Services:
- (o) Read
- (o) Write
- (o) Information report

### 5.2.5 Variable list object

A variable list contains a collection of individual variables. The structure must be recognized implicitly by the application program.

☞ As the values belonging to the variable list can quickly exceed the maximum size of a telegram, objects in the variable list data type are accessed using the "Download-Write" and "Upload-Read" macro services.

Compiling several individual variables into a variable list is only useful for variables with small data types (e.g., UINT8, Integer32, etc.). In theory, the length of an individual variable in a variable list can be a maximum of (PDU size - 8) bytes. However, this sort of variable can be accessed more effectively using a normal Read service.

#### 5.2.5.1 Variable list - formal description

| | |
|---|---|
| Object: | variable list |
| Object code: | 0x0A |
| Key attribute (m): | index |
| Attribute (m): | number of elements |
| Attribute (m): | list of elements index |
| → Attribute (m): | → index |
| Attribute (o): | password |

Services:
(o) Download-Write
(o) Upload-Read

#### 5.2.5.2 Static variable list

The device manufacturer may have created static variable lists. These variable lists are found in the "static variable lists" index range, see index areas for PCP objects.

The structure of the static variable list can be read using the "VariableListRecord" variable (index E7FF). First of all, the index of the variable list to be read is written to object E7FF. Download-Write should be used here, as object E7FF is a domain object. The "VariableListRecord" can then be read using Upload-Read access to object E7FF.

The "VariableListRecord" is transmitted according to the following structure:

| Index (2 bytes) | Meaning |
|---|---|
| 1st value | Index of the 1st variable in the list |
| 2nd value | Index of the 2nd variable in the list |
| ... | |
| ... | |
| ... | |
| nth value | Index of the nth variable in the list |

#### 5.2.5.3 Dynamic variable list

Dynamic variable lists are created using the "VariableListRecord" variable (index E7FF). These variable lists are found in the "dynamic variable lists" index range (see index ranges for PCP objects). The "VariableListRecord" is created using Download-Write access to object E7FF.

The "VariableListRecord" is transmitted according to the following structure:

| Index (2 bytes) | Meaning |
|---|---|
| 1st value | Index under which the "VariableListRecord" is to be created |
| 2nd value | Index of the 1st variable in the list |
| 3rd value | Index of the 2nd variable in the list |
| ... | |
| ... | |
| ... | |
| nth value | Index of the nth variable in the list |

#### 5.2.5.4 Transmission format for variable lists

To read and write a variable list, all the values of the individual variables are entered one after the other in the "Data" parameter of the Upload-Read or Download-Write.

| | Meaning |
|---|---|
| 1st value | Content of the 1st variable in the list |
| 2nd value | Content of the 2nd variable in the list |
| ... | |
| ... | |
| nth value | Content of the nth variable in the list |

### 5.2.6 String variable object

The "String variable" object represents a single, basic variable that is characterized by a specific data type (octet string, visible string or bit string).
The object description of the "variable access object" string variable is stored statically in the object dictionary (S-OD). A string variable is mapped to a real string variable that actually exists in the user system by means of the object description for the "String variable" object.
In the description of the "String variable" object, only one data type (octet string, visible string or bit string) is permitted.
A string variable has the same structure as a simple variable.
The difference is the variable length of the data types. The maximum length is configured in the object dictionary.

#### 5.2.6.1 String variable - formal description

| | |
|---|---|
| Object: | array variable |
| Object code: | 0x0B |
| Key attribute (m): | index |
| Attribute (m): | maximum length (maximum (PDU size - 6) bytes) |
| Attribute (o): | password |

Services:
- (o) Read
- (o) Write
- (o) Information report

# 6 Services

All basic variables, arrays, and records are accessed using the standard services, for example:

- Read
- Write
- Information report

As these services are functions of parameter channel implementation, they are not described here. For additional information, please refer to the relevant parameter channel documentation)*.

The domain variable and variable list objects, however, are accessed using the Download-Write and Upload-Read macro services. The use of these services is described below.

)* E.g., IBS PCP RE HB (5052b.pdf) and IBS PCP RR HB (5054b.pdf)

## 6.1 Download function with write service ("Download-Write")

Unlike standard parameter channel implementation (which contains download services), large volumes of data (e.g., application program, firmware update, variable lists, etc.) are transmitted using the write service. A download protocol is defined in the user data of the write service, which enables segmented transmission of larger volumes of data. Downloading can only be performed on domain variables and variable lists.

| Parameters | Req/Ind | Rsp/Cnf |
|---|---|---|
| Communication reference | M | M |
| Module number | M | M |
| Index | M | |
| Subindex | O | |
| Array | M | |
| Segment number | M | |
| Data | M | |
| Result(+) | | S |
| | | |
| Result(-) | | S |
| Error type | | M |

### Communication reference

The communication reference addresses the desired communication partner.
("Compact" implemented devices can only communicate with the master (not peer-to-peer), which means that the communication reference is always 2.)

**Module number (Invoke ID)**

The Invoke ID, which was previously not used and only available for reasons of compatibility, is used to address modules on a modular device. For this reason, the name of this parameter has also been changed to "Module number".
However, the handling of this parameter has not changed. The module number of the indication is still entered in the response.
For more detailed information, please refer to the "Modular devices" section.

**Index**

The parameter index addresses the object to be written.

**Subindex**

The value of the subindex for the download function is "0".

**Array**

The "Array" parameter contains the download protocol.

| Array | |
|---|---|
| Segment number<br>2-byte download control | User data<br>1 .. (PDU size – 8) bytes download data blocks<br>E.g. 1 .. 56 bytes for "Compact" implementation |

***Segment number***

This parameter contains the number of the data block to be written, whereby the following definition applies:

| | |
|---|---|
| Segment number = 1 | Initiation of a download sequence with the first data block. |
| Segment number = 2..0xFFF0hex | Data block number n |
| Segment number = 0xFFFDhex | The last data block only contains<br>• the number of transmitted data blocks (without this end data block) (2 bytes) and<br>• the CRC16 residual polynomial[1)] (2 bytes) |
| Segment number = 0xFFFEhex | The last data block only contains<br>• the number of transmitted data blocks (without this end data block) (2 bytes) and<br>• the CRC32 residual polynomial[1)] (4 bytes) |
| Segment number = 0xFFFFhex | The last data block only contains<br>• the number of the transmitted data blocks (without this end data block) (2 bytes) and no CRC residual |

[1)] The CRC is always generated using all the pure user data. The segment numbers are not part of the user data.

The download server must check that the segment number sequence is in ascending order without any gaps and, in the event of an error, send a negative response to the client (usually the fieldbus master). In the case of a negative response, the client can transmit the correct segment or terminate transmission with an end segment.
Only an end data block can terminate the download service.

***Data***

This parameter contains the data blocks. The length of these data blocks depends on the maximum PDU size. For a PDU size of 64 bytes, the maximum data block length is 56 bytes. The maximum data block length does not have to be used.

**Result(+)**

The "Result(+)" parameter indicates a positive result. The segment number may only be incremented if the result is positive.

**Result(-)**

The "Result(-)" parameter indicates a negative result.

***Error type***

The "Error type" parameter contains the error cause.

The content of the "Error type" parameter corresponds to that of the write service, with the following definition for the specific download sequence error:

Error class "8" - other
Error code "1" – profile-specific

| Additional code (hex) | Meaning |
|---|---|
| 0x00A0 Invalid segment number - segment missing | Invalid segment number (segment missing) |
| 0x00A1 Resource unavailable | No more resources (memory) are available for downloading |
| 0x00A2 Invalid CRC | Incorrect CRC |
| 0x00A3 File open error | Error opening the file (if file system is available) |
| 0x00A4 File write error | Error writing the file (if file system is available) |
| 0x00A5 File close error | Error closing the file (if file system is available) |
| 0x00A6 Segment missing | Fewer data blocks were received than specified in the last segment |
| 0x00A7 Segment overrun | More data blocks were received than specified in the last segment |
| 0x00A9 Invalid segment number – double segment | Invalid segment number (segment duplicated, segment ignored) |

## 6.2 Upload function with read service (Upload-Read)

Unlike standard parameter channel implementation (which contains upload services), large volumes of data (e.g., application program, backups, variable lists, etc.) are read using the read service. An upload protocol is defined in the subindex of the read service, which enables segmented transmission of fairly large volumes of data. Uploading can only be performed on domain variables and variable lists.

| Parameters | Req/Ind | Rsp/Cnf |
|---|---|---|
| Communication reference | M | M |
| Module number | M | M |
| Index | M | |
| Subindex | M | |
| | | |
| Result(+) | | S |
| Array | | M |
| Segment number | | M |
| Data | | M |
| | | |
| Result(-) | | S |
| Error type | | M |

**Communication reference**
Like download function with write service ("Download-Write")

**Module number**
Like download function with write service ("Download-Write")

**Index**
Like download function with write service ("Download-Write")

**Subindex**

An upload sequence is initiated using a special subindex, whereby the following definition applies:

Subindex = $0xFF_{hex}$ Initiation of an upload sequence with request for the first data block
Subindex = $0x00_{hex}$ Request for the next data block
Subindex = $0x01_{hex}$ Request for the relevant previous data block (e.g., after an error)

**Result(+)**

The "Result(+)" parameter indicates a positive result. The segment number may only be incremented if the result is positive.

### Array

The "Array" parameter contains the upload protocol.

| Array | |
|---|---|
| Segment number<br>2-byte upload controller | User data<br>1 .. (PDU size – 8) bytes download data blocks<br>1 .. 56 bytes for "Compact" implementation |

#### *Segment number*

This parameter contains the number of the data block to be read, whereby the following definition applies:

| | |
|---|---|
| Segment number = 1 | Initiation of an upload sequence with the first data block. |
| Segment number = 2..0xFFF0$_{hex}$ | Data block number n |
| Segment number = 0xFFFD$_{hex}$ | The last data block only contains<br>• the number of transmitted data blocks (without this end data block) (2 bytes) and<br>• the CRC16 residual polynomial[1)] (2 bytes) |
| Segment number = 0xFFFE$_{hex}$ | The last data block only contains<br>• the number of transmitted data blocks (without this end data block) (2 bytes) and<br>• the CRC32 residual polynomial[1)] (4 bytes) |
| Segment number = 0xFFFF$_{hex}$ | The last data block only contains<br>• the number of the transmitted data blocks (without this end data block) (2 bytes) and no CRC residual |

[1)] The CRC is always generated using all the pure user data. The segment numbers are not part of the user data.

The upload client must check that the segment number sequence is in ascending order without any gaps. In the event of an error, the client can request the last segment again with subindex 0xFE or restart the upload with subindex 0xFF.

#### *Data*

This parameter contains the data blocks. The length of these data blocks depends on the maximum PDU size. For a PDU size of 64 bytes, the maximum data block length is 56 bytes. The maximum data block length does not have to be used.

**Result(-)**

The "Result(-)" parameter indicates a negative result.

**Error type**

The "Error type" parameter contains the error cause.

The content of the "Error type" parameter corresponds to that of the read service, with the following definition for the specific upload sequence errors:

Error class "8" - other
Error code "1" - profile-specific

| Additional code (hex) | | Meaning |
|---|---|---|
| 0x00A0 | Invalid segment number - segment missing | Upload without initiation with subindex == 0xFF |
| 0x00A3 | File open error | Error opening the file (if file system is available) |
| 0x00A5 | File close error | Error closing the file (if file system is available) |
| 0x00A8 | File read error | Error reading the file (if file system is available) |

## 6.3 Example for variable list download

In this example, a "Compact" device uses the following objects, which are grouped into a variable list.

| Index | Subindex | Data type | Length | Example value (hex) |
|---|---|---|---|---|
| 0080 | 0 | UINT8 | 1 | FF |
| 0081 | 7 | UINT16 | 2 | 12 34 |
| 0090 | 3 | UINT8 | 1 | 00 |
| 0091 | 0 | Octet string | 16 | 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F |
| 0100 | 0 | Octet string | 16 | 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F |
| 0101 | 0 | Octet string | 16 | 20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F |
| 0105 | 0 | Octet string | 16 | 30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F |

### Download-Write

1. Download-Write request/indication

| Parameters | Content (hex) |
|---|---|
| Com. ref. | 02 |
| Module number | 00 |
| Index | E0 00 |
| Subindex | 00 |
| Segment number | 00 01 |
| Data | FF 12 34 00 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F |

2. Download-Write request/indication

| Parameters | Content (hex) |
|---|---|
| Com. ref. | 02 |
| Module number | 00 |
| Index | E0 00 |
| Subindex | 00 |
| Segment number | 00 02 |
| Data | 30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F |

3. Download-Write request/indication

| Parameters | Content (hex) |
|---|---|
| Com. ref. | 02 |
| Module number | 00 |
| Index | E0 00 |
| Subindex | 00 |
| Segment number | FF FF |
| Data | 00 02 |
| | |

# 7 Standard objects

The following objects are described as follows:

| | |
|---|---|
| Index (hex) | Unique ID for the object<br>The services use this index to access the object |
| Object name | Meaningful name for the object |
| R/W | Access type<br>R = Read only<br>W = Write only<br>R/W = Read and write access |
| Length | Length of object in bytes |
| Data type | Data type of the object, see above |
| Meaning | Explanation of the object contents |
| M/O | Implementation instruction<br>M = Mandatory<br>This object must be implemented.<br>O = Optional<br>This object can be implemented.<br>D = Dependent<br>This object must be implemented, if a specific optional function is implemented. |

To ensure standardized access using tools, the objects, if they exist, must usually be implemented in the precise form defined below. However, the device manufacturer can adapt the contents to meet requirements. For example, a hardware state that cannot be determined by the device firmware for technical reasons could be represented as follows:

| | | | | | | |
|---|---|---|---|---|---|---|
| 000B | HardwareVersion | R | 2 entries | Record | Hardware version (device or communication module) | **M** |
| .1 | • BuildDate | R | 10+1 bytes | Visible string | *0000-00-00* | **M** |
| .2 | • Version | R | Maximum 40 bytes | Visible string | *Not available* | **M** |

## 7.1 Identification

The information specified in the following objects describes the device itself, the manufacturer, and the device application. On dispatch, the data entered must match up with what is printed on the device.

| Index (hex) | Object name | R/W | Length | Data type | Meaning | M/O |
|---|---|---|---|---|---|---|
| 0001 | VendorName | R | Maximum 58 bytes | Visible string | Manufacturer name<br>e.g., Phoenix Contact GmbH & Co KG | **M** |
| 0002 | VendorID | R | 6+1 bytes | Visible string | Organizationally unique identifier Organizationally Unique Identifiers (OUI) according to:<br>http://standards.ieee.org/regauth/oui/index.shtml<br>e.g., "00A045" | O |
| 0003 | VendorText | R | Maximum 58 bytes | Visible string | Comments on the manufacturer<br>e.g., address, sector, etc. | O |
| 0012 | VendorURL | R | Maximum 58 bytes | Visible string | Manufacturer URL<br>e.g., http://www.phoenixcontact.com | O |
| 0007 | ProductName | R | Maximum 58 bytes | Visible string | Manufacturer-specific, unique product designation<br>e.g., IB IL 24 DO 8 | **M** |
| 0008 | SerialNo (ProductId) | R | Maximum 58 bytes | Visible string | Serial number<br>Manufacturer-specific, unique device code<br>e.g., 123456789 | O |
| 0009 | ProductText | R | Maximum 58 bytes | Visible string | Manufacturer-specific product text<br>e.g., digital output module | O |
| 000A | OrderNumber | R | Maximum 58 bytes | Visible string | Manufacturer-specific, unique product type ID,<br>e.g., Order No.<br>e.g., 2726269 | **M** |
| 0037 | DeviceType | R | 8 bytes | Octet string | Manufacturer-specific device/module identification not equal to "0"<br>The manufacturer-specific device/module identification can be used to replace and operate devices of the same type within a configuration. For example, a 16-channel output module with screw-on coupling may be replaced by one with spring-cage coupling even though it does not have the same order number. Different functionalities also require a different device type.<br>If this object is used in a modular device, it can also indicate a dummy. "0" if module is (still) not plugged in. Nevertheless, in this case, data can be mapped to the process data. | O |
| 0032 | FieldBus_ID | R | 2 entries | Record | Fieldbus identification information | **M** |
| .1 | • ID-Code | R | 1 byte | UINT8 | Fieldbus-specific ID code (8 bit, usually represented as a decimal number) | **M** |
| .2 | • PDLength | R | 2 bytes | UINT16 | Number of process data bits (unit bit) | **M** |
| 000B | HardwareVersion | R | 2 entries | Record | Hardware version<br>(device or communication module)<br>*On dispatch, the data entered must match up with what is printed on the device.* | **M** |

| | | | | | | |
|---|---|---|---|---|---|---|
| .1 | • BuildDate | R | 10+1 bytes | Visible string | Manufacturing date<br>Version date<br>Format YYYY-MM-DD<br>According to ISO 8601<br>e.g., 2002-11-29 | **M** |
| .2 | • Version | R | Maximum 40 bytes | Visible string | Version ID<br>e.g., 4.01 Beta customer | **M** |
| 000C | FirmwareVersion | R | 2 entries | Record | Firmware version<br>(device or communication module)<br>*On dispatch, the data entered must match up with what is printed on the device.* | **M** |
| .1 | • BuildDate | R | 10+1 bytes | Visible string | BuildDate<br>Version date<br>Format YYYY-MM-DD<br>According to ISO 8601<br>e.g., 2002-05-03<br>If no FW is available, "0000-00-00" is entered | **M** |
| .2 | • Version | R | Maximum 40 bytes | Visible string | Version ID<br>e.g., 1.03 customer<br>If no FW is available, "--" is entered | **M** |
| 000D | PChVersion | R | 2 entries | Record | Parameter channel version<br>Parameter channel implementation version | **M** |
| .1 | • BuildDate | R | 10+1 bytes | Visible string | BuildDate<br>Version date<br>Format YYYY-MM-DD<br>According to ISO 8601<br>e.g., 2002-05-03<br>If no parameter channel is available, "0000-00-00" is entered | **M** |
| .2 | • Version | R | Maximum 40 bytes | Visible string | Version ID<br>e.g., "PCP Compact V1.00"<br>If no parameter channel is available, "--" is entered | **M** |
| 0005 | Capabilities | R | Array of 8 bytes | Visible string | Properties/functionalities of the device in addition to the basic functions.<br>All current functionalities are listed below:<br>• "Nothing"<br>- This entry does not define any additional functions. The entry can also occur several times as a dummy.<br>• "SyncI_0"<br>- The slave supports synchronization of the inputs.<br>• "SyncO_0"<br>- The slave supports synchronization of the outputs.<br><br>The type is exactly 8 characters long. Characters not used to be completed with 0x00.<br>If the device does not have any properties/functionalities other than the basic functions, this object does not have to be implemented.<br>If the device has properties/functionalities other than the basic functions, this object must be implemented.<br><br>If the slave supports the "Capabilities" object but no other additional functions, the "Nothing" entry is included at least once. | D |
| 0006 | ProductFamily | R | Maximum 58 bytes | Visible string | Manufacturer-specific product range<br>e.g., Inline | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| 003D | WakeUpTime | R | 2 bytes | UINT16 | Wake-up time<br>The period of time that elapses between the point at which the supply voltage is switched on (if there are several supply voltages, the time when the last relevant one is switched on) and the time when the system is ready to operate.<br>It is used to support the various energy saving profiles.<br>The parameter only needs to be created if the wake-up time > 500 ms. If this parameter is not available, a default value of < 500 ms is assumed. | D |
| 0004 | DeviceFamily | R | Maximum 58 bytes | Visible string | Device range (e.g., I/O, drive) according to specifications, see below, e.g., motion control/frequency inverters | **M** |
| 000E | CommProfile | R | Maximum 4+1 bytes | Visible string | Communication profile<br>System-specific profile ID, see below.<br>e.g., 634 | **M** |
| 000F | DeviceProfile | R | Maximum 4+1 bytes | Visible string | Device profile, designation of the application profile (see below)<br>e.g., "10" for the basic profile or "22" for the DRIVECOM profile | **M** |
| 0011 | ProfileVersion | R | 2 entries | Record | Version designation of this profile | **M** |
| .1 | • BuildDate | R | 10+1 bytes | Visible string | "2012-03-27" | **M** |
| .2 | • Version | R | Maximum 40 bytes | Visible string | "Basic profile V2.0“ | **M** |
| 0013 | DeviceDescFile | R | Maximum 58 bytes | Visible string | File name of the FDCML device description file, e.g., XYZ.xml | O |
| 003A | VersionCount | R | 4 entries | Array | Version counter<br>Unique, consecutive numbering for the version of the corresponding components with the following indices:<br>• 0x0011<br>• 0x000D<br>• 0x000B<br>• 0x000C<br>If a given component is changed, the corresponding VersionCount must be increased by 1. | **M** |
| .1 | • ProfileVersion | R | 2 bytes | UINT16 | 07<br>For this profile. | **M** |
| .2 | • PChVersion | R | 2 bytes | UINT16 | e.g., 01 for "Compact" version implementation | **M** |
| .3 | • HardwareVersion | R | 2 bytes | UINT16 | e.g., 02 for the target hardware | **M** |
| .4 | • FirmwareVersion | R | 2 bytes | UINT16 | e.g., 05 for the target firmware | **M** |
| 0014 | Location | R/W | Maximum 58 bytes | Visible string | Installation location<br>Text that was stored in this parameter by the device user. This text indicates the installation location of the device and is stored in a non-volatile memory.<br>E.g., machine 1, back-left | O |
| 0015 | EquipmentIdent | R/W | Maximum 58 bytes | Visible string | Equipment identifier<br>Text that was stored in this parameter by the device user. The device description is stored in a non-volatile memory. Here, for example, the device user can store a description about device operation in the system.<br>E.g., M1H747h.l. | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| 0016 | ApplDeviceAddr | R/W | 2 bytes | UINT16 | Application device address (user-specified device number)<br>Any identification for this device in this specific application. This code number need not be unique. Management is left entirely to the end user.<br>E.g., 123 | O |

### 7.1.1 DeviceFamily

A unique designation for the device range.

| en | de |
|---|---|
| Actuator | Aktor |
| Bus coupler | Buskoppler |
| Closed loop controller | Regler |
| Dosing device | Dosiergerät |
| Drive | Antrieb |
| Drive - frequency inverter | Antrieb - Frequenzumrichter |
| Drive – motor starter | Antrieb - Motorschalter |
| Drive – servo amplifier | Antrieb - Servoverstärker |
| Drive – stepper motor controller | Antrieb - Schrittmotor-Steuerungcontroller |
| Encoder | Encoder |
| Gateway | Gateway |
| General | Allgemeines |
| HMI | HMI |
| HMI display | HMI-Anzeige |
| HMI operator panel | HMI-Bediengerät |
| Hydraulic device | Hydraulik-Gerät |
| I/O | E/A |
| I/O analog IN/OUT | E/A analog IN/OUT |
| I/O analog IN | E/A analog IN |
| I/O analog OUT | E/A analog OUT |
| I/O digital IN/OUT | E/A digital IN/OUT |
| I/O digital IN | E/A digital IN |
| I/O digital OUT | E/A digital OUT |
| I/O function module | E/A-Funktionsmodul |
| Identification system | Identifikationssystem |
| Media converter active | Medienkonverter aktiv |
| Media converter passive | Medienkonverter passiv |
| NC | NC |
| NC/RC | NC/RC |
| PC | PC |
| PC board | PC-Karte |
| PLC | PLC |
| PLC board | SPS-Karte |
| Pneumatic device | Pneumatik-Gerät |
| Positioning controller | Positionier-Steuerung |
| Power supply | Stromversorgung |
| Robot control | Roboter |
| Sensor | Sensor |
| Switching device | Schaltgerät |
| Technology controller | Technologie-Steuerung |
| Valve | Ventil |
| Weighing or batching system | Wiege- oder Dosiersystem |
| Welding controller | Schweißsteuerung |
| Wrenching controller | Schraubersteuerung |

If a manufacturer cannot assign a device to any of the above ranges, the INTERBUS Club should be notified.

### 7.1.2 CommunicationProfile

This parameter contains a system-specific communication profile code.
The following communication profiles apply for "Compact" implementation:

| 63 | Implementation | Channel type | Suitability |
|---|---|---|---|
| 632 | Compact | Fieldbus management, Compact parameter channel | No cyclic process data, no downloading/uploading of variable lists, programs, etc. |
| 633 | Compact Process data | Fieldbus management, cyclic process data, Compact parameter channel | Parameterizable devices, only parameters, no downloading/uploading of variable lists and programs, etc. |
| 634 | Compact Process data Upload/Download protocol | Fieldbus management, cyclic process data, Compact parameter channel, Download/upload | Complex devices, downloading/uploading of variable lists |
| 635 | Compact Upload/Download protocol | Fieldbus management, Compact parameter channel, Download/upload | Complex devices, downloading/uploading of variable lists, no cyclic process data |

### 7.1.3 DeviceProfile

This parameter contains information on the implemented device profile of the device.
Structure of the parameter:

| B15 .....b12 | b11 .....b8 | b7 .....b4 | b3 .....b0 |
|---|---|---|---|
| Profile group | | | Version |

| DeviceProfile | Meaning |
|---|---|
| 0000 | No profile |
| 0010 | Basic profile (basis for all other profiles) |
| 0012 | Sensor/actuator |
| 0020 | DRIVECOM only process data |
| 0021 | DRIVECOM frequency inverter |
| 0022 | DRIVECOM servo |
| 0030 | Reserved |
| 0040 | Controller boards |
| 0050 | Reserved |
| 0060 | Reserved |
| 0070 | Encoder |
| 0080 | Process controllers |
| 0090 | Robot controllers |
| 00A0 | Wrenching controllers |
| 00B0 | ISO valves |
| 00C0 | Welding controllers |
| 00D0 | Operating/display units |
| 00E0 | Hydraulic devices |
| | |
| FFFF | More than one application profile |
| | |

If a device supports more than one device profile, "$FFFF_{hex}$" is entered into the DeviceProfile parameter.

## 7.2 Device diagnostics

These objects are used to send diagnostic information about the state of the device and any connected I/O devices to the application. The current diagnostic information for the device is stored in the "DiagState" object. In addition, this information can be stored in long form in the domain variable (index E800).
A history of the diagnostic information can be found in the "DiagHistory" domain variable or the "DiagHistoryLong" domain variable for the long form.

### 7.2.1 Objects

| **Index** (hex) | **Object name** | **R/W** | **Length** | **Data type** | **Meaning** | **M/O** |
|---|---|---|---|---|---|---|
| 0018 | DiagState | R | 6 entries | **Record** | Current diagnostic status of the device | **M** |
| .1 | • Seq.no. | R | 2 bytes | UINT16 | Unique, consecutive error number since the last power up reset or history reset | **M** |
| .2 | • Priority | R | 1 byte | UINT8 | Priority of the message "1" is the highest priority | **M** |
| .3 | • Channel/Group/Module | R | 1 byte | UINT8 | Channel, group or module on which the error occurred. Channel/Group/Module "FF" refers to the entire device.<br><br>For additional information, see "MoreFollows" | **M** |
| .4 | • Code | R | 2 bytes | Octet string | Error code (see below) | **M** |

| | | | | | | |
|---|---|---|---|---|---|---|
| .5 | • MoreFollows | R | 1 byte | Bit string 8 | = "$00_{hex}$" For subindex 3 "Channel/Group/Module", this refers to a channel number.<br>= "$01_{hex}$" There is additional information about this error, which can be read via the "DiagStateLong" object.<br>= "$02_{hex}$" There is an additional value for diagnostics. This value can be read via the "DiagStateAddValue" object.<br>= "$04_{hex}$" For subindex 3 "Channel/Group/Module", this refers to a group number. So that a distinction can be made, the channel can be read in the "DiagStateChannelNumber" object as an option.<br>= "$08_{hex}$" This is a modular device. Subindex 3 "Channel/Group/Module" indicates the module concerned. By accessing this object (0x0018) again with the corresponding module number, the group and, if necessary, the channel can be read. | **M** |
| .6 | • Text | R | Maximum 51 bytes | Visible string | The first 51 characters, maximum, of the message sent. Default: "Status OK" | **M** |
| E800 | DiagStateLong | R | | **Domain variable** Record | Current diagnostic information for the device in long form | O |
| Seg.1-a | • Seq.no. | | | | – 0018.1 | D |
| -b | • Priority | | | | – 0018.2 | D |
| .c | • Channel/Group | | | | – 0018.3 | **D** |
| -d | • Code | | | | – 0018.4 | D |
| -e | • MoreFollows | | | | – 0018.5 | D |
| -f | • Date | R | 10+1 bytes | Visible string | Date on which the error occurred. YYYY-MM-DD 0000/00/00 = No date available | D |
| -g | • Time | R | 8+1 bytes | Visible string | Time at which the error occurred. hh:mm:ss 00:00:00 = No time | D |

| | | | | | | |
|---|---|---|---|---|---|---|
| -h | • TimeofOperation | R | 4 bytes | UINT32 | Absolute operating hours counter reading at which the error occurred.<br>0 .. 4294967295 seconds<br>About 136 years<br>= 0 no operating hours counter available | D |
| -i | • ParamSet | R | 2 bytes | UINT16 | Current valid parameter record number at which the error occurred.<br>0000 = No specific parameter record number available | D |
| -j | • TraceData | R | 2 bytes | UINT16 | Start index, used to indicate relevant trace data, if necessary.<br>= 0000 no trace data available | D |
| Seg.2 -a | • RecipientLength | R | 2 bytes | UINT16 | Length of the subsequent recipient of the message text in characters (bytes)<br>= "$00_{hex}$" no information | D |
| -b | • Recipient | R | Any | Visible string | Recipient of the message | D |
| Seg.N -a | • Senderlength | R | 2 bytes | UINT16 | Length of the subsequent sender of the message text in characters (bytes)<br>= "$00_{hex}$" no information | D |
| -b | • Sender | R | Any | Visible string | Sender of the message | D |
| Seg.M -a | • Textlength | R | 2 bytes | UINT16 | Length of the subsequent message text in characters (bytes) | D |
| -b | • Text – 0018.6 | R | Any | Visible string | The message sent. Default: "Status OK" | D |
| E801 | DiagHistory | R | | **Domain variable** Record | Diagnostic information for the device in short form with history (the oldest information/lowest error number is transmitted first). The structure is the same as that of "DiagState". | O |
| | • DiagStateM | | | | Oldest diagnostic status in short form | D |
| | • DiagStateM-1 | | | | | D |
| | … | | | | … | D |
| | • DiagStateN+1 | | | | | D |
| | • DiagStateN | | | | Latest diagnostic status in short form | D |
| E802 | DiagHistoryLong | R | | **Domain variable** Record | Diagnostic information for the device in long form with history (the oldest information/lowest error number is transmitted first). The structure is the same as that of "DiagStateLong". | O |
| | • DiagStateLongM | | | | Oldest diagnostic status in long form | D |
| | • DiagStateLongM-1 | | | | | D |
| | … | | | | | D |
| | • DiagStateLongN+1 | | | | | D |
| | • DiagStateLongN | | | | Latest diagnostic status in long form | D |

| | | | | | | |
|---|---|---|---|---|---|---|
| 0019 | ResetDiag | W | 1 byte | UINT8 | Deletes the corresponding diagnostic memory of the device and acknowledges the diagnostic message(s)<br>= "$00_{hex}$" no limitation for the diagnostic messages<br>= "$01_{hex}$" deletes the diagnostic history. This value is only supported if the "DiagHistory(Long)" object exists.<br>= "$02_{hex}$" deletes (and acknowledges) all unretrieved and pending DiagStates (errors).<br>= "$03_{hex}$" deletes (and acknowledges) the entire diagnostics<br>= "$04_{hex}$" deletes (and acknowledges) all DiagStates already reported via an information report<br>= "$05_{hex}$" deletes (and acknowledges) the most recently reported DiagState<br>= "$06_{hex}$" deletes (and acknowledges) the entire diagnostics (such as "$03_{hex}$") and does not permit any new diagnostic messages.<br>= "$80_{hex}$" acknowledges without deleting<br><br>Otherwise: reserved | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| 001A | GetErrorRepMethod | R/W | 1 byte | Bit string 8 | Specifies the method with which an error is to be reported to the higher-level system.<br><br>= "$01_{hex}$" switches the generation of an information report using the contents of the "DiagState" object in the event of an error on (= "1")/off (= "0").<br>= "$02_{hex}$" switches the generation of an I/O fault status message using the contents of the "DiagState" object in the event of an error on (= "1")/off (= "0").<br>= "$04_{hex}$" switches the generation of a process data status message (process data bit freely selected by the manufacturer) using the contents of the "DiagState" object in the event of an error on (= "1")/off (= "0").<br>= "$09_{hex}$" switches the generation of an information report using the contents of the "DiagState" object in the event of an error on (= "1")/off (= "0") and deletes the corresponding DiagState without explicit acknowledgement.<br><br>If several report methods are selected simultaneously, the diagnostic message (and the subsequent diagnostic messages) must be stored in object 0018 until they have been read, even if one or more other diagnostic messages have already been sent via the report mechanism. | O |
| 0033 | DiagStateChannelNo | R | 6 entries | **Record** | Current diagnostic status of the device | D |
| .1 | • Seq.no. | R | 2 bytes | UINT16 | Unique, consecutive error number since the last power up reset or history reset | D |

| | | | | | | |
|---|---|---|---|---|---|---|
| .2 | • ChannelNo | R | 1 byte | UINT8 | If the device has grouped channels, the affected channel of the corresponding group can be entered here.<br><br>If "DiagState" is read, this object must be kept consistent with "DiagState" until at least the end of the next read access.<br><br>If "DiagState" is reported as an information report and if this object is relevant for this purpose, this object is also reported via an information report (chronologically after the DiagState). | D |
| 0034 | DiagStateAddValue | R | 6 entries | **Record** | Current diagnostic status of the device | D |
| .1 | • Seq.no. | R | 2 bytes | UINT16 | Unique, consecutive error number since the last power up reset or history reset | D |
| .2 | • AddValue | R | 4 bytes | UINT32 | Here an accompanying value for channel diagnostics such as "Current temperature in the event limit value is exceeded" can be entered.<br>Details: see PROFINET I&M profile<br><br>If "DiagState" is polled, this object must be kept consistent with "DiagState" until at least the end of the next read access.<br><br>If "DiagState" is reported as an information report and if this object is relevant for this purpose, this object is also reported via an information report (chronologically after the DiagState). | D |
| 001B | TestMode | R/W | 2 bytes | UINT16 | A manufacturer-specific code is used to switch to a test mode. Other test parameters are thereby activated. The value "0" is used to switch back to the normal operating mode.<br>= "$0000_{hex}$" normal operating mode (Default) | O |

The depth of the diagnostic history, i.e., the number of entries, can be freely selected by the device developer according to requirements and resources.

#### 7.2.1.1 Notification by reading the DiagState object

Available diagnostic information is reported (for example, via status bit [e.g., bit 7 in byte 0 of the process data channel] in the process data channel or via the /StatErr module error input of the fieldbus slave protocol chip) according to its priority. Several items of diagnostic information may be available at the same time. The master or a software tool can retrieve the relevant information via the parameter channel.

The current diagnostic information in DiagState(Long) remains until:
- This information has been read at least once
  and
- The cause of this diagnostic information does not exist anymore.

Only then is the next item of information (e.g., "Error removed" or "Error no. 2") made available.

The status bit(s) in the process data channel or module error input remain(s) until:
- Each item of diagnostic information has been read at least once
  and
- No more diagnostic information is available.

Only then is the current information, e.g., "Status OK", made available.

#### 7.2.1.2 Notification via information report from the DiagState object

Alternatively, errors can be reported to the master using the "Information Report" service (only once using the "DiagState" object). This function is enabled or disabled using the "GetErrorRepMethod" object. When the "GetErrorRepMethod" function is activated, each new item of diagnostic information (contents: object 0018) is reported once automatically to the master (without a request from the master).
In this case, the evaluation of the information report must be present on the fieldbus master side, e.g., as a PLC function block or HLL program.

This does not affect normal diagnostic handling of object 0018 "DiagState" (see above) (see description for "DiagState" object). This means that the first item (and subsequent items) of diagnostic information remain pending here even if they were reported via the "Information Report".

Here, the diagnostic information in "DiagState(Long)" always refers to the first error that remains pending.

The status bit(s) in the process data channel or module error input remain(s) until:
- No more diagnostic information is available.

Only then is the current information, e.g., "Status OK", reported.

#### 7.2.1.3 Classification of messages

Prio 3 (green) message, information, notification
Example: general operating message indicating that 10,000 operating hours have elapsed

Prio 2 (yellow) warning
Meaning: risk of error
Example: limit value not reached or exceeded
A warning does not require action to be taken in the device

Prio 1 (red) error (alarm)
Meaning: an error has occurred and requires a response.
An error requires action to be taken in the drive, but does not necessarily require the system to be stopped with immediate effect.

Prio 81, 82, 83 removed
Meaning: the error reported with the same number has been removed.

Messages and information are defined by the user. Warnings and errors can be predefined or defined by the user.

An outgoing message (DiagnoseStatus) overwrites the corresponding incoming message (DiagnoseStatus), if this has not yet been retrieved by the master. This reduces the volume of communication traffic without losing any information.
This results in the following sequence of priorities:

| Encoding | Priority | Meaning |
|---|---|---|
| 0x81 – highest priority | Prio 1 (red) outgoing | Error (alarm) removed |
| 0x01 | Prio 1 (red) incoming | Error (alarm) |
| 0x82 | Prio 2 (yellow) outgoing | Warning removed |
| 0x02 | Prio 2 (yellow) incoming | Warning |
| 0x83 | Prio 3 (green) outgoing | Information, message removed |
| 0x03 – lowest priority | Prio 3 (green) incoming | Information, message |

#### 7.2.1.4 Error codes

The aim of standardizing the error codes is to provide the user with a quick and easy guide for remedying problems without requiring detailed knowledge of the device.
The error code is represented as an octet string with a length of 2 bytes. It is encoded hierarchically, beginning with a rough distinction that is gradually refined.

| Bit | Grouping |
|---|---|
| 15 ... 12 | Main groups |
| 11 ... 8 | Subgroups |
| 7 ... 0 | Details |

If the device is in the "Error" state, the parameter contains a value that is not equal to 0.
If the device is not in the "Error" state, the parameter contains the value "0".

### 7.2.1.4.1 Main groups and subgroups

| Code (hex) | Meaning |
|---|---|
| **0000** | **No error** |
| **1000** | **General error** |
| **2000** | **Current** |
| 2100 | Current on the device input side |
| 2200 | Current inside the device |
| 2300 | Current on the device output side |
| **3000** | **Voltage** |
| 3100 | Mains voltage |
| 3200 | Voltage inside the device |
| 3300 | Output voltage |
| 3400 | I/O supply voltage |
| **4000** | **Temperature** |
| 4100 | Ambient temperature |
| 4200 | Device temperature |
| 4300 | External temperature (e.g., drive) |
| 4400 | Supply temperature |
| **5000** | **Device hardware (only inside the device housing)** |
| 5100 | Supply, internally and through the device |
| 5200 | Controller (device application) |
| 5300 | Operating and display unit |
| 5400 | Power section |
| 5500 | Communication with add-on module |
| **6000** | **Device software** |
| 6100 | Internal software (firmware) |
| 6200 | Application software |
| 6300 | Data record not OK |
| **7000** | **Add-on module(s) (fixed to the device) faulty** |
| 7100 | Power |
| 7200 | Measuring circuit |
| 7300 | Sensor (on device) |
| 7400 | Computer circuit |
| 7500 | Communication |
| 7600 | Data memory |
| 7700 | Open circuit/Cable error |
| **8000** | **Monitoring** |
| 8100 | Communication |
| 8200 | Closed-loop control |
| 8300 | Torque controller |
| 8400 | Speed controller |
| 8500 | Position controller |
| 8600 | Positioning controller |
| 8700 | Synchro controller |
| 8800 | Winding controller |
| 8900 | Sensors (own device) measurement error |
| 8A00 | Actuators |
| 8B00 | Preventive maintenance required (condition monitoring) |
| **9000** | **External error** |
| **A000** | **Modular devices** |
| **F000** | **Additional functions** |

### 7.2.1.4.2 Main groups with subgroups and details

| Code$_{(hex)}$ | Meaning |
|---|---|
| **0000** | **No error** |
| **1000** | **>General error** |
| 1800 | General error (manufacturer-specific) |
| ... | General error (manufacturer-specific) |
| 1FFF | General error (manufacturer-specific) |
| **2000** | **Current** |

| | |
|---|---|
| **2100** | **Current on the device input side** |
| 2110 | Short circuit/ground fault |
| 2120 | Ground fault |
| 2121 | Ground fault, phase L1 |
| 2122 | Ground fault, phase L2 |
| 2123 | Ground fault, phase L3 |
| 2130 | Short circuit |
| 2131 | Short circuit, phases L1 - L2 |
| 2132 | Short circuit, phases L2 - L3 |
| 2133 | Short circuit, phases L3 - L1 |
| 2136 | Short circuit to VCC |
| 2137 | Short circuit to GND |
| **2200** | **Current inside the device** |
| 2211 | Current inside the device, no. 1 |
| 2212 | Current inside the device, no. 2 |
| 2213 | Overcurrent on startup |
| 2214 | Overcurrent during operation |
| 2220 | Continuous overcurrent |
| 2221 | Continuous overcurrent, no. 1 |
| 2222 | Continuous overcurrent, no. 2 |
| 2230 | Short circuit/ground fault |
| 2240 | Ground fault |
| 2250 | Short circuit |
| **2300** | **Current on the device output side** |
| 2310 | Continuous overcurrent |
| 2311 | Continuous overcurrent, no. 1 |
| 2312 | Continuous overcurrent, no. 2 |
| 2320 | Short circuit/ground fault |
| 2330 | Ground fault |
| 2331 | Ground fault, phase U |
| 2332 | Ground fault, phase V |
| 2333 | Ground fault, phase W |
| 2340 | Short circuit |
| 2141 | Short circuit, phases U - V |
| 2142 | Short circuit, phases V - W |
| 2343 | Short circuit, phases W - U |
| 2344 | Output overload |
| 2345 | Overload of initiator supply |
| 2346 | Short circuit to VCC |
| 2347 | Short circuit to GND |
| 2350 | Open cables |
| 2360 | Cable interrupt |
| **3000** | **Voltage** |
| **3100** | **Mains voltage** |
| 3110 | Mains surge voltage |
| 3111 | Mains surge voltage, phase L1 |
| 3112 | Mains surge voltage, phase L2 |
| 3113 | Mains surge voltage, phase L3 |
| 3120 | Mains undervoltage |
| 3121 | Mains undervoltage, phase L1 |
| 3122 | Mains undervoltage, phase L2 |
| 3123 | Mains undervoltage, phase L3 |
| 3130 | Phase failure |
| 3131 | Phase failure L1 |
| 3132 | Phase failure L2 |
| 3133 | Phase failure L3 |
| 3134 | Phase sequence |
| 3140 | Mains frequency |
| 3141 | Mains frequency too high |
| 3142 | Mains frequency too low |
| **3200** | **Voltage inside the device** |
| 3210 | Surge voltage inside the device |
| 3211 | Surge voltage, no. 1 |
| 3212 | Surge voltage, no 2 |
| 3220 | Undervoltage inside the device |
| 3221 | Undervoltage, no. 1 |
| 3222 | Undervoltage, no. 2 |
| 3230 | Charging error |
| **3300** | **Output voltage** |

| | |
|---|---|
| 3310 | Output surge voltage |
| 3311 | Output surge voltage, phase U |
| 3312 | Output surge voltage, phase V |
| 3313 | Output surge voltage, phase W |
| 3320 | Output undervoltage |
| 3320 | Armature circuit |
| 3321 | Armature circuit interrupted |
| 3330 | Field circuit |
| 3331 | Field circuit interrupted |
| **3400** | **I/O supply voltage** |
| 3410 | Initiator supply |
| 3411 | Initiator supply undervoltage |
| 3412 | Initiator supply not available |
| 3413 | Initiator supply surge voltage |
| 3420 | Actuator supply |
| 3421 | Actuator supply undervoltage |
| 3422 | Actuator supply not present |
| 3423 | Actuator supply surge voltage |
| **4000** | **Temperature** |
| **4100** | **Ambient temperature** |
| 4110 | Ambient overtemperature |
| 4120 | Ambient undertemperature |
| 4130 | Intake air temperature |
| 4140 | Exhaust air temperature |
| **4200** | **Device temperature** |
| 4210 | Device overtemperature |
| 4220 | Device undertemperature |
| **4300** | **External temperature (e.g., drive)** |
| 4310 | Drive overtemperature |
| 4320 | Drive undertemperature |
| **4400** | **Supply temperature** |
| 4410 | Supply overtemperature |
| 4420 | Supply undertemperature |
| **5000** | **Device hardware (only inside the device housing)** |
| 5010 | Component error |
| **5100** | **Supply, internally and through the device** |
| 5110 | Supply low voltage, general |
| 5111 | Supply +/- 15 V |
| 5112 | Supply + 24 V |
| 5113 | Supply + 5 V |
| 5114 | Supply + 3.3 V |
| 5115 | Supply + 2.5 V |
| 5116 | Supply + 1.2 V |
| 5118 | U8 = Manufacturer-specific |
| .... | ..... for U8 to U15 manufacturer-specific |
| 511F | U15 = Manufacturer-specific |
| 5120 | Supply for air |
| 5130 | Supply for paint |
| 5140 | Supply for intermediate circuit |
| 5150 | Supply for initiator |
| 5151 | Short circuit |
| 5160 | Supply of I/O devices supplied by the device |
| **5200** | **Controller (device application)** |
| 5210 | Measuring circuits |
| 5220 | Computer circuits |
| 5230 | Communication (inside the device) |
| **5300** | **Operating and display unit** |
| **5400** | **Power section** |
| 5410 | Output stages |
| 5420 | Choppers |
| 5430 | Input stages |
| 5440 | Contactors |
| 5441 | Channel 1 |
| … | … |
| 5448 | Channel 8 |
| 5450 | Fuses |
| 5451 | S1 = L1 |
| 5452 | S2 = L2 |
| 5453 | S3 = L3 |

| | |
|---|---|
| 5454 | S4 = Manufacturer-specific |
| .... | .... for S5, S6, S7, S8 |
| 5459 | S9 = Manufacturer-specific |
| **5500** | **Communication with add-on module** |
| 5510 | Interface no. 1 |
| 5520 | Interface no. 2 |
| **6000** | **Device software** |
| 6010 | Software reset (watchdog) |
| **6100** | **Internal software (firmware)** |
| **6200** | **Application software** |
| 6210 | PD index not available |
| 6211 | Variable no. not available |
| **6300** | **Data record not OK** |
| 6301 | Data record no. 1 |
| .. | And so on for 2 to 14 |
| 630F | Data record no. 15 |
| 6310 | Parameter missing |
| 6320 | Parameter errors |
| 6330 | Parameter not yet initialized |
| 6800 | Configuration |
| 6810 | Data configuration double mapped |
| **7000** | **Add-on module(s)** (fixed to the device) **faulty** |
| **7100** | **Power** |
| 7110 | Brake chopper |
| 7111 | Brake chopper failure |
| 7112 | Brake chopper overcurrent |
| 7113 | Brake chopper wiring |
| 7120 | Motor |
| 7121 | Motor blocked |
| 7122 | Motor missing or commutation error |
| 7123 | Motor tilted |
| **7200** | **Measuring circuit** |
| **7300** | **Sensor (on device)** |
| 7301 | Sensor 1 faulty |
| 730F | Sensor 15 faulty |
| 7301 | Tachometer faulty |
| 7302 | Tachometer polarity reversal |
| 7303 | Resolver 1 faulty |
| 7304 | Resolver 2 faulty |
| 7305 | Incremental encoder 1 faulty |
| 7306 | Incremental encoder 2 faulty |
| 7307 | Incremental encoder 3 faulty |
| 7310 | Speed |
| 7320 | Position |
| **7400** | **Computer circuit** |
| **7500** | **Communication** |
| 7510 | Serial interface no 1 |
| 7520 | Serial interface no 2 |
| **7600** | **Data memory** |
| 7610 | RAM |
| 7620 | EPROM |
| 7630 | EEPROM |
| **7700** | **Open circuit/Cable error** |
| 7701 | Cable 1 faulty |
| 770F | Cable 15 faulty |
| 7710 | Sensor cable open circuit |
| **8000** | **Monitoring** |
| **8100** | **Communication** |
| 8110 | Process data monitoring |
| 8120 | Host monitoring |
| 8121 | iPD channel handshake timeout |
| **8200** | **Closed-loop control** |
| 8210 | System deviation, desired > actual. Deviation present longer than a specified period of time (manufacturer-specific) |
| 8211 | Maximum manipulated variable reached |
| 8220 | System deviation, desired < actual. Deviation present longer than a specified period of time (manufacturer-specific) |
| 8221 | Minimum manipulated variable reached |
| ... | Reserved for profile-specific system errors |

| | |
|---|---|
| 827f | Reserved for profile-specific system errors |
| 8280 | Manufacturer-specific system errors |
| ... | Manufacturer-specific system errors |
| 82FF | Manufacturer-specific system errors |
| **8300** | **Torque controller** |
| 8311 | Excess torque |
| 8312 | High-inertia starting |
| 8313 | Static torque |
| 8321 | Insufficient torque |
| 8331 | Torque break |
| **8400** | **Speed controller** |
| **8500** | **Position controller** |
| **8600** | **Positioning controller** |
| 8611 | Following error |
| 8612 | Reference limit |
| **8700** | **Synchro controller** |
| **8800** | **Winding controller** |
| **8900** | **Sensors (own device) measurement error** |
| 8910 | Measuring range overshot |
| 8920 | Measuring range undershot |
| **8A00** | **Actuators** |
| **8B00** | **Preventive maintenance required (condition monitoring)** |
| **9000** | **External error** |
| **A000** | **Modular devices** |
| A001 | No module present |
| A002 | Incorrect module present |
| A003 | Replaced (the expected module was replaced by a compatible module) |
| A004 | Sub bus more devices than expected |
| A010 | Device error |
| A012 | Application on module not ready |
| A013 | Sub bus device reset |
| A020 | Sub bus communication error |
| A021 | Sub bus error - timeout |
| A022 | Multiple transmission errors in sub bus |
| A023 | Sub bus I/O data communication error |
| A024 | Sub bus management data communication error |
| A030 | Sub bus configuration error |
| A031 | I/O data configuration double mapped |
| A040 | Common errors |
| A041 | Hardware error |
| A042 | Firmware error |
| A043 | Sub bus asynchronous to higher-level system |
| B0XX | Reserved |
| **F000** | **Additional functions** |
| F001 | Delay |
| F002 | Subsynchronous operation |
| F003 | Lifting system |
| F004 | Controller |

Codes that are not listed are reserved.
NOTE: additional error codes are defined in the profiles.

If a manufacturer cannot assign an error to any of the above codes, the INTERBUS Club should be notified.

### 7.2.2 Trace data

Traces are consecutive recordings of specific device data. They can be used, for example, to recapitulate sequences in order to detect errors or problems, or to archive data.
Basically, there are many different types of traces. Contents, structure, scope, and handling are specified by the device manufacturer.

| **Index** (hex) | **Object name** | **R/W** | **Length** | **Data type** | **Meaning** | **M/O** |
|---|---|---|---|---|---|---|
| 001C | ControlTrace | R/W | 1 byte | UINT8 | Controls a recording process.<br>"$00_{hex}$" Resets the recording and the corresponding parameters<br>"$01_{hex}$" Starts a recording<br>"$02_{hex}$" Stops a recording<br>Additional details are specified by the manufacturer | O |
| E803 | TraceBuffer | R | | **Domain variable** | Contains the recorded trace data.<br>The structure is specified by the manufacturer | O |

Trace data is usually transmitted using the upload mechanism. When uploading trace data, the header should contain the basic information.

If an error occurs when writing/reading objects, e.g., invalid values are transmitted, access must be rejected using the appropriate error codes (see "List of permitted error codes" section).

## 7.3 User data management

### 7.3.1 Process data management

This section defines the behavior of process data. Behavior in the event of a timeout and fieldbus reset is defined as well as that for reading and writing process data via the parameter channel.

| **Index** (hex) | **Object name** | **R/W** | **Length** | **Data type** | **Meaning** | **M/O** |
|---|---|---|---|---|---|---|
| 001F | PDTimeout | R/W | 2 bytes | UINT16 | Process data monitoring time<br>Maximum permissible time in ms (e.g., 100 ms) by which the new data must have been transmitted via the process data channel.<br>The action that is then triggered is specified in object 0x0020 "PDTimeoutCode".<br>FFFFh = Disabled | O |
| 0020 | PDTimeoutCode | R/W | N x 2 bytes | Array of UINT16 | If the process data monitoring time elapses, the function assigned to the "process data timeout code" is carried out by the device.<br><br>This type of function can be, for example, the defined shutdown of a drive or the continuous transmission of error telegrams via a serial interface.<br><br>0000h "0" output to all output bits<br>0001h "1" output to all output bits<br>0002h Keep last valid value<br>0003h Accept substitute value from object 002F "PDOUT_Subst"<br>0004h to 7FFFh Reserved<br>8000h to FFFFh Manufacturer-specific<br><br>Since different behavior may be required for each channel/each group, this parameter is set up as an array. The number of array elements is defined by the number of elements of the corresponding PDOUT (0x0026) (PDIN 0x0025) object.<br>N = Number of elements<br>If only one entry is supported (written) even though the device has several elements (channels/groups), the parameter is valid for the device as a whole. | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| 0024 | ResetCode | R/W | N x 2 bytes | Array of UINT16 | Fieldbus reset code<br>In the event of a bus reset, the function assigned to the "bus reset code" is carried out by the device.<br><br>This type of function can be, for example, the defined shutdown of a drive or the continuous transmission of error telegrams via a serial interface.<br><br>0000h "0" output to all output bits<br>0001h "1" output to all output bits<br>0002h Keep last valid value<br>0003h Acceptance of the substitute value from object 002F "PDOUT_Subst"<br>0004h to 7FFFh Reserved<br>8000h to FFFFh Manufacturer-specific<br><br>Since different behavior may be required for each channel/each group, this parameter is set up as an array. The number of array elements is defined by the number of elements of the corresponding PDOUT (0x0026) (PDIN 0x0025) object.<br>N = Number of elements<br>If only one entry is supported (written) even though the device has several elements (channels/groups), the parameter is valid for the device as a whole. | O |
| 0030 | PF_Code | R/W | N x 2 bytes | Array of UINT16 | Peripheral fail code<br>In the event of an error on the I/O of the fieldbus protocol chip, which prevents the processing of IN process data, the function assigned to the "Peripheral fail code" is carried out by the device.<br><br>This type of function can be displayed, for example, via the /StatErr input or microprocessor WD on the protocol chips.<br><br>0000h "0" output to all input bits<br>0001h "1" output to all input bits<br>0002h Keep last valid value<br>0003h Acceptance of the substitute value from object 0031 "PDIN_Subst"<br>0004h to 7FFFh Reserved<br>8000h to FFFFh Manufacturer-specific<br><br>Since different behavior may be required for each channel/each group, this parameter is set up as an array. The number of array elements is defined by the number of elements of the corresponding PDOUT (0x0026) (PDIN 0x0025) object.<br>N = Number of elements<br>If only one entry is supported (written) even though the device has several elements (channels/groups), the parameter is valid for the device as a whole. | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| 0025 | PDIN | R | PD length | Record | IN process data<br>The IN process data (from the device to the master) is mapped to an object.<br>The PD bytes, like the bytes in the octet string, are counted in ascending order starting at the (top) left with 0.<br><br>If the process data is structured (e.g., several channels), this object should also be structured and individual structure elements are accessed via the subindex. | **M** |
| .1 | • Part 1 | R | | Dependent | First section of the process date | **O** |
| .2 | • Part 2 | R | | Dependent | Second section of the process date | **O** |
| ... | • | | | | | |
| .N | • Part N | R | | Dependent | Nth section of the process date | **O** |
| 0026 | PDOUT | $R/W_D$ | PD length | Record | OUT process data<br>The OUT process data (from the master to the device) is mapped to an object.<br>The PD bytes, like the bytes in the octet string, are counted in ascending order starting at the (top) left with 0.<br><br>If the process data is structured (e.g., several channels), this object should also be structured and individual structure elements are accessed via the subindex.<br><br>If the "GetExRight" object is not implemented, the status of the PDOUT object is "Read-only".<br>If the "GetExRight" object is implemented, the status of the PDOUT object is "Read and write".<br>If the value for the "GetExRight" object = 0, write access to the PDOUT object is rejected with<br>Error class "8" - other<br>Error code "1" - profile-specific<br>Additional code $0022_{hex}$<br>"Service cannot be executed in current device state". | **M** |
| .1 | • Part 1 | R | | Dependent | First section of the process date | **O** |
| .2 | • Part 2 | R | | Dependent | Second section of the process date | **O** |
| ... | • | | | | | |
| .N | • Part N | R | | Dependent | Nth section of the process date | **O** |
| 002F | PDOUT_Subst | R/W | PD length | Octet string | OUT process data substitute<br>Substitute value for the OUT process data (from the master to the device) in the event of an error.<br>The PD bytes, like the bytes in the octet string, are counted in ascending order starting at the (top) left with 0.<br>Must be implemented if the value 0003h is permitted for object 0020 "PDTimeoutCode" or object 0024 "ResetCode".<br>See relevant section. | D |

| | | | | | | |
|---|---|---|---|---|---|---|
| 0031 | PDIN_Subst | R/W | PD length | Octet string | IN process data substitute<br>Substitute value for the IN process data (from the device to the master) in the event of an error in the connected I/O devices.<br>The PD bytes, like the bytes in the octet string, are counted in ascending order starting at the (top) left with 0.<br>Must be implemented if the value 0003h is permitted for object 0030 "PF_Code".<br>See relevant section. | D |
| 0027 | GetExRight | R/W | 1 byte | UINT8 | Get exclusive process data write rights<br>This parameter can be used to request exclusive write access to the process data outputs via the parameter channel. Following positive confirmation, the data is no longer updated via the process data channel. Any modifications to the process data outputs are made via the "PDOUT" object, which can now be read from and written to. The exclusive rights are reset each time a connection is aborted or the bus is reset.<br><br>**Note:** this action may have serious consequences for the connected process. This is why this object should be password protected.<br><br>= "$00_{hex}$" Output data via the PD channel<br>= "$01_{hex}$" Output data via the parameter channel<br>Otherwise: reserved | O |
| 0028 | ChangePDSet | R/W | 2 bytes | UINT16 | Change process data settings<br>Selects one of the following possible process data assignments defined by the manufacturer and activates it:<br><br>0 Default<br>0001h to 7FFFh Reserved<br>8000h to FFFFh Manufacturer-specific<br><br>aus und aktiviert diese.<br>If the ID code and/or length code needs adapting in a new process data assignment, the changes only come into effect after the next bus reset.<br>If possible, this configuration should be stored in the non-volatile memory and the device should be started with this configuration. | O |
| 003B | PDIN_Descr | R | N x 3 entries | Array of records | Process data description<br>Description of the process data structure<br>The description must be continuous and arranged in ascending order, starting on the left.<br><br>The number of array elements is defined by the number of elements of the PDIN (0x0025) object.<br>N = Number of elements PDIN (0x0025) | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| .1 | • Type | R | 8 bytes | Visible string | Type of I/O data. The following are currently defined:<br>• "ACK" - Response to command<br>• "STATUS" - Status information<br>• "DIAG" - Diagnostic information<br>• "DI" - Digital IN<br>• "AI" - Analog IN<br>• "CNT" - Counter<br>• "CmpP" - Complex protocol<br>• "SubMa" - SubBus master<br>• "SubSl" - SubBus slave<br>• "SI" - Safety input<br>• "PLC" - PLC (intelligent module data)<br>• "MotSt" - Motor starter<br>• "PWM" - PWM data<br>• "POS" - Positioning data<br>• "NO" - Number<br>• "NC" - Not connected, not in use<br>• "DO_F" - DO feedback<br>• "AO_F" - AO feedback<br>• "SO_F" - SO feedback<br><br>The type is exactly 8 characters long. Characters not used to be completed with 0x00. | D |
| .2 | • ChNo | R | 2 bytes | UINT16 | Channel number<br>Number of channels of this type<br>Note:<br>A channel always refers to a number of bits (even when there is only 1) which collectively have a meaning.<br>Example:<br>4 analog inputs represent 4 channels<br>or<br>16 digital inputs represent 16 channels | D |
| .3 | • ChLength | R | 2 bytes | UINT16 | Channel length<br>Length of the channel | D |
| 003C | PDOUT_Descr | R | N x 3 entries | Array of records | Process data description<br>Description of the process data structure<br>The description must be arranged in ascending order without any gaps, starting on the left.<br><br>The number of array elements is defined by the number of elements of the PDOUT (0x0026) object.<br>N = Number of elements PDOUT (0x0026) | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| .1 | • Type | R | 8 bytes | Visible string | Type of I/O data. The following are currently defined:<br>• "CMD" - Commands<br>• "CTRL" - Control/Configuration<br>• "DO" - Digital OUT<br>• "AO" - Analog OUT<br>• "CNT" - Counter<br>• "CmpP" - Complex protocol<br>• "SubMa" - SubBus master<br>• "SubSl" - SubBus slave<br>• "SO" - Safety output<br>• "PLC" - PLC (intelligent module data)<br>• "MotSt" - Motor starter<br>• "PWM" - PWM data<br>• "POS" - Positioning data<br>• "NO" - Number<br>• "NC" - Not connected, not in use<br><br>The type is exactly 8 characters long. Characters not used to be completed with 0x00. | D |
| .2 | • ChNo | R | 2 bytes | UINT16 | Channel number<br>Number of channels of this type | D |
| .3 | • ChLength | R | 2 bytes | UINT16 | Channel length<br>Length of the channel | D |

If an error occurs when writing/reading objects, e.g., invalid values are transmitted, access must be rejected using the appropriate error codes (see "List of permitted error codes" section).

**Note about output behavior following power-on:**
Following power-on, the outputs must adopt a safe (defined) state within the meaning of the Machinery Directive (inactive, type "0"). This state must be maintained until a check has been performed to see if any parameter settings that may have been stored in the module for the substitute value behavior are suitable for the system configuration (installation location) or whether new valid values have been transmitted.

### 7.3.2 Parameter channel management

This section defines the behavior of the parameter channel in the case of a timeout and a communication abort.

| **Index** (hex) | **Object name** | **R/W** | **Length** | **Data type** | **Meaning** | **M/O** |
|---|---|---|---|---|---|---|
| 0021 | PChTimeout | R/W | 2 bytes | UINT16 | Communication monitoring time<br>Maximum permissible time in ms (e.g., 1000 ms) by which the new data must have been transmitted via the parameter channel.<br>The action that is then triggered is specified in object 0x0022 "PChTimeoutCode".<br>FFFFh = Disabled | O |
| 0022 | PChTimeoutCode | R/W | 2 bytes | UINT16 | If the communication monitoring time elapses, the function assigned to the PCP timeout code is carried out.<br><br>This type of function can be, for example, the defined shutdown of a drive or the continuous transmission of error telegrams via a serial interface.<br><br>0 No action<br>0001h to 7FFFh Reserved<br>8000h to FFFFh Manufacturer-specific | O |
| 0023 | AbortCode | R/W | 2 bytes | UINT16 | If a connection is aborted, the function that is assigned to the connection abort code is carried out.<br><br>This type of function can be, for example, the defined shutdown of a drive or the continuous transmission of error telegrams via a serial interface.<br><br>0 No action<br>0001h to 7FFFh Reserved<br>8000h to FFFFh Manufacturer-specific | O |

If an error occurs when writing/reading objects, e.g., invalid values are transmitted, access must be rejected using the appropriate error codes (see "List of permitted error codes" section).

## 7.4 Device management

Field devices use increasingly complex functions, which must be suitably parameterized by the application or software tools. The following establishes a basic structure that enables the usual principal handling procedures to be standardized.

| Index (hex) | Object name | R/W | Length | Data type | Meaning | M/O |
|---|---|---|---|---|---|---|
| 0029 | ParamSetWriteControl | R/W | 1 byte | UINT8 | Block parameterization control (see below) | O |
| 002A | ConflictDictionary | R | 2*N entries | **Record** | Block parameterization result (see below) | O |
| .1 | • Index1 | R | 2 bytes | UINT16 | Index of the 1st dependent parameter | D |
| .2 | • Add. Code1 | R | 2 bytes | UINT16 | Additional info on the 1st dependent parameter | D |
| .3 | • Index2 | R | 2 bytes | UINT16 | Index of the 2nd dependent parameter | D |
| .4 | • Add. Code2 | R | 2 bytes | UINT16 | Additional info on the 2nd dependent parameter | D |
| | • … | | | | | |
| .2*N-1 | • IndexN (maximum 14) | R | 2 bytes | UINT16 | Index of the Nth dependent parameter | D |
| .2*N | • Add. CodeN (maximum 14) | R | 2 bytes | UINT16 | Additional info on the Nth dependent parameter | D |
| 002B | ParamSet | R/W | 2 bytes | UINT16 | Parameter record identification<br>If the device has parameter records, the active one is set or displayed here.<br>0000h<br>Default<br>0001h – FFFEh<br>The parameter record of the device was initialized via the bus. For identification purposes, it has been assigned the freely selectable number 0001-FFFE.<br>FFFFh<br>The device was switched to "local mode"<br>or manual mode and there is no guarantee that the previously loaded parameter record remains unmodified. | O |
| 002C | ParameterMoment | R/W | 2 entries | **Record** | Time of the last modification to the parameterization | O |
| .1 | • Date | R/W | 10+1 bytes | Visible string | Date YYYY/MM/DD | D |
| .2 | • Time | R/W | 8+1 bytes | Visible string | Time hh:mm:ss | D |
| 002D | ResetParam | W | 1 byte | UINT8 | "$01_{hex}$" = Reset parameterization<br>This command is used to undo all settings and replace them with default values. This also applies to passwords and other user-defined settings.<br><br>"$02_{hex}$" = Reset application parameterization<br>This command is used to undo just the application parameters and replace them with default values. | O |

| | | | | | | |
|---|---|---|---|---|---|---|
| 002E | CheckSum | R | 4 bytes | UINT32 | Unique, device-specific generated checksum (e.g., CRC16), which ensures the integrity of the parameter data. The security mechanism used involves all the device parameter data. A "modification counter" is also possible.<br><br>The checksum is regenerated each time a parameter is modified and enables the user to check whether all parameter settings are still unchanged. To do this, the current checksum must be compared with the checksum provided during parameterization. | O |

If an error occurs when writing/reading objects, e.g., invalid values are transmitted, access must be rejected using the appropriate error codes (see "List of permitted error codes" section).

### 7.4.1 Block parameterization

Block parameterization serves to enable the joint transfer of interdependent parameters.
Block parameterization is initiated via the "Write control = 01" parameter and terminated with the "Write control = 00" parameter.
Any conflicts that occur are stored in the "Conflict dictionary" parameter.

If an attempt is made to parameterize dependent parameters individually, this may result in the following error:
"Dependency of other parameter not taken into consideration".
The dependent parameter(s) can be found in the conflict dictionary. The parameter which was the subject of the recent write attempt is located in the first position.

**Result(-) when an attempt is made to write to objects that may only be modified in conjunction with other objects due to dependency**

Error class "8" other, error code "1" profile-specific

| Additional code | | Meaning |
|---|---|---|
| 0x0040 | DependencyIgnored | Collision with other values<br>Dependency ignored |

#### 7.4.1.1 Write control

The transition between individual parameterization and block parameterization is initiated by this parameter.

Write control = "$00_{hex}$": individual parameterization
Write control = "$01_{hex}$": block parameterization

The following actions are carried out when the parameter content is modified:

**Write control = "$00_{hex}$" -> write control = "$01_{hex}$":**
- Block parameterization is initiated
- No individual parameterization
- "Conflict dictionary" parameter is reset

**Write control = "$01_{hex}$" -> write control = "$00_{hex}$":**
- Block parameterization is terminated
- Individual parameterization again from now on

- Compatibility is checked:
  - If compatible:
    - The parameter contents are accepted
    - Write access to the "Write control" parameter is acknowledged positively.

  - If incompatible:
    - The old contents of all the parameters required for block parameterization remain in effect
    - "Conflict dictionary" parameter is set
    - Write access to the "Write control" parameter is acknowledged negatively as follows.

Error class "8" other, error code "1" profile-specific

| Additional code | | Meaning |
|---|---|---|
| 0x0040 | DependencyIgnored | Collision with other values, dependency ignored<br>As a rule, dependent values were not taken into consideration. |

#### 7.4.1.2 Conflict dictionary

The parameter contains the indices and error messages (additional code) for the parameters involved in the conflict. The "Conflict dictionary" parameter must be updated in the case of:

- Negative acknowledgment of "Block write control" and
- Individual parameterization of dependent parameters, if the dependency of the other parameter is not taken into consideration.
- However, it can also be updated after each write access inside and/or outside the "Block parameterization" state.

### 7.4.2 Parameter record identification

This parameter is used to identify the device parameter record that currently applies. For example, this can be a welding program or a recipe.
Parameter records can be predefined by the manufacturer or loaded by the user depending on the device using individual or block parameterization or "Download-Write" services.
If the device cannot save the received device parameter values so that they are not lost in the event of a power failure, the device automatically sets the parameter record identification to "0000" when the mains voltage is switched on. The device user can evaluate this information and reinitialize accordingly.

| | |
|---|---|
| 0000h | The parameter record of the device has not yet been initialized via the bus. The default parameter record is valid. |
| 0001h - FFFEh | The parameter record of the device was initialized via the bus. It received a freely selectable ID number (1 - FFFEh) for identification purposes. |
| FFFFh | The device was or is switched to "local mode" and there is no guarantee that the previously loaded parameter record remains unmodified. |

The device user can enter any value between 0 and FFFFh.

### 7.4.3 Password protection

| Index (hex) | Object name | R/W | Length | Data type | Meaning | M/O |
|---|---|---|---|---|---|---|
| 001D | Password | W | Maximum 40 bytes | Octet string | This command is used to transmit a password (e.g., "Superuser") which is valid for subsequent actions. Where access is attempted without a password or with an incorrect password, this must be rejected with reference to the absent access rights.<br>The password is disabled if:<br>• Communication is aborted<br>• The bus is stopped (bus reset)<br>• No password is written (string length is "0")<br>• An incorrect password is written<br>No access protection can be provided for this object. | O |
| 001E | SetPassword | W | 3 entries | **Record** | One or more passwords are set for a specific index using this object. The password can only be deleted using the "ResetParam" command.<br>The manufacturer may have defined a default password for any object.<br>To prevent passwords from being modified, this object can itself be protected. For all intents and purposes, it is the "Superuser" which protects the "SetPassword" object.<br>Passwords may have been preset by the manufacturer. These are not necessarily deletable. | O |
| | • Index | W | 2 bytes | UINT16 | "FFFF" as an index sets the password for all objects. | D |
| | • Add/Replace | W | 1 byte | Bit string 8 | 0Xh = All existing passwords are replaced<br>1Xh = Add to existing passwords<br>X1h = Applies for read access<br>X2h = Applies for write access<br>X3h = Applies for read and write access | D |
| | • Password | W | Maximum 40 bytes | Visible string | Password for the "Index" object<br>"Replace" and no password overrides password protection. | D |

If an error occurs when writing/reading objects, e.g., invalid values are transmitted, access must be rejected using the appropriate error codes (see "List of permitted error codes" section).

| **Additional code** (hex) | **Meaning** |
|---|---|
| 00B1 | The password cannot be replaced (deleted). |
| 00B2 | The password cannot be added (too many passwords). |
| 00B3 | The password cannot be assigned for the desired type of access. |

## 7.5 Multilingual capacity

The "Language" object can be used to read the current language selected and select the language.
The "LanguageAvailable" domain variable indicates which languages are available. The first entry contains the default language.

| **Index** (hex) | **Object name** | **R/W** | **Length** | **Data type** | **Meaning** | **M/O** | **Example** |
|---|---|---|---|---|---|---|---|
| 0017 | Language | R/W | 2 entries | **Record** | Object for the device language selection<br>The currently valid language may be accessed and modified here. | **M** | |
| .1 | • LanguageCode | R/W | 5+1 bytes | Visible string | Language code according to ISO 639-1 and country code according to ISO 3166-1-Alpha-2 code, separated by a "-" if desired<br>e.g., en[-us]<br>If a country code is not being used, 0x00 will be entered.<br>The language code of the language to be selected is entered here.<br>Following a positive response, all text is output in the selected language. | **M** | en |
| .2 | • NameLanguage | R | Maximum 50 bytes | Visible string | The text string for the language that is currently valid can be read here. The name changes as soon as a new number is entered. | **M** | English |
| E804 | LanguageAvailable | R | | **Domain variable** Record | Object for device language selection – displays all available languages<br>Language name, already in the relevant language | O | |
| Seg.1 -a | • LanguageCode1 (default) | R | 5+1 | Visible string | Language code according to ISO 639-2 (default) | D | En |
| -b | • NameLanguage1 (default) | R | Maximum 50 | Visible string | Text string for the 1st language available (default) | D | English |
| Seg.2 -a | • LanguageCode2 | R | 5+1 | Visible string | Language code according to ISO 639-2 of the 2nd language available | O | De |
| -b | • NameLanguage2 | R | Maximum 50 | Visible string | Text string for the 2nd language available | O | Deutsch |
| Seg.3 -a | • LanguageCode3 | R | 5+1 | Visible string | Language code according to ISO 639-2 of the 3rd language available | O | Fr |
| -b | • NameLanguage3 | R | Maximum 50 | Visible string | Text string for the 3rd language available | O | Français |
| Seg.4 -a | • LanguageCode4 | R | 5+1 | Visible string | Language code according to ISO 639-2 of the 4th language available | O | Es |
| -b | • NameLanguage4 | R | Maximum 50 | Visible string | Text string for the 4th language available | O | Español |
| | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Seg.N-a | • LanguageCodeN | R | 5+1 | Visible string | Language code according to ISO 639-2 of the Nth language available | O | It |
| -b | • NameLanguageN | R | Maximum 50 | Visible string | Text string for the Nth language available | O | Italiano |

If an error occurs when writing/reading objects, e.g., invalid values are transmitted, access must be rejected using the appropriate error codes (see "List of permitted error codes" section).

The "LanguageCode" (subindex 1) subobject contains the language code according to ISO 639-1 and country code according to ISO 3166-1-Alpha-2 code, separated by a "-" if desired. If a country code is not being used, 0x00 is entered.
Writing this subobject selects the language. This language then appears in the "NameLanguage" subobject.
For write access to the entire "Language" object, the entry for the "NameLanguage" subobject is ignored, as the "NameLanguage" subobject has "Read-only" status.

Each segment in the "LanguageAvailable" domain variable contains both the "LanguageCode" and the "NameLanguage" subobjects of the available language. The individual read services of the "Upload-Read" macro service, therefore, (almost) always have different lengths, but each language entry is always transmitted in its entirety in one segment. This results in easy handling.

## 7.6 Modular devices

In addition to compact devices, there are also numerous modular devices. Their handling should also be taken into account in this profile. A modular device is defined as follows:

- It has exactly one communication access module (header).
- It has N modules, whereby 0 <= N <= 253.
- A module does not necessarily have to be active/present.
- Each module has its own independent set of objects.
  This object area does not need to be the object area described in this basic profile, but is determined instead by the subsystem.

The module structure of a modular device is described in the object 0x0036 "DeviceStructure".

The Invoke ID, which was previously not used and only available for reasons of compatibility, is used to address modules on a modular device. For this reason, the name of this parameter has also been changed to "Module number".
However, the handling of this parameter has not changed. The module number of the indication is still entered in the response.

The behavior for compact devices has not changed either. Any module number may be used here as usual. However, for reasons of consistency, we recommend selecting module number "00".
A modular device as a whole can always be addressed using the module number 0xFF. The individual modules can be addressed via the corresponding module number.
The module number should begin with 1. The head of a modular device does not necessarily have to have the module number "1".

| **Index** (hex) | **Object name** | **R/W** | **Length** | **Data type** | **Meaning** | **M/O** |
|---|---|---|---|---|---|---|
| 0035 | NoOfModules | R | 1 byte | UINT8 | Number of the last module that is currently present. (Number of modules including dummy.)<br>The "Module number" parameter is of no significance for this object.<br>• If this object does not exist, the device is a compact device and not a modular device.<br>• If "0" is returned, the device is a modular device in which no modules are installed (inserted) at present. | **D** |
| 0036 | DeviceStructure | R/W | 4 entries | Record | The structure of the modular device and the mapping of the module process data to the device process data is specified here. The start and length of process data mapping can be called for each module using its module number.<br><br>This object is also suitable for describing compact devices.<br>Mandatory object for modular devices. | **D** |
| .1 | • PDINOffset | R/W | 2 bytes | UINT16 | Bit offset in the IN process data channel | **D** |
| .2 | • PDINLength | R/W | 2 bytes | UINT16 | Bit length in bits in the IN process data channel | **D** |

| | | | | | | |
|---|---|---|---|---|---|---|
| .3 | • PDOUTOffset | R/W | 2 bytes | UINT16 | Bit offset in the OUT process data channel | **D** |
| .4 | • PDOUTLength | R/W | 2 bytes | UINT16 | Bit length in bits in the OUT process data channel | **D** |

## 7.7 Object description

During startup and servicing, not only is it important to have the requisite knowledge of the desired parameterization; the actual parameterization of the device must also be known. This requires knowledge of the existing user objects.
These objects and their meaning can be read using the two profile objects below.

| **Index** (hex) | **Object name** | **R/W** | **Length** | **Data type** | **Meaning** | **M/O** |
|---|---|---|---|---|---|---|
| 0038 | ObjDescrReq | R/W | 2 entries | **Record** | Object whose description is requested. | O |
| | • Index | R/W | 2 bytes | UINT16 | | D |
| | • SubIndex | R/W | 1 byte | UINT8 | | D |
| 0039 | ObjDescr | R | 16 entries | **Record** | Description of the object whose index was requested.<br>Automatically incremented to next valid index/subindex on next access attempt.<br>Empty objects and indices that are not present are skipped. | O |
| .1 | • Index | R | 2 bytes | UINT16 | Object number<br>e.g., 0x6051 | D |
| .2 | • SubIndex | R | 1 byte | UINT8 | Substructure number of an object<br>e.g., 0x00 | D |
| .3 | • ObjectCode | R | 1 byte | UINT8 | As specified under "Data objects"<br>e.g., 0x07 - simple variable | D |
| .4 | • IndexOfType | R | 1 byte | UINT8 | As specified under "Data types"<br>e.g., 0x0A – OctetString | D |
| .5 | • Length | R | 1 byte | UINT8 | Length of the (sub)object in bytes<br>e.g., 0x04 | D |
| .6 | • UnitText | R | 5+1 bytes | Visible string | Value unit – 0x00 scheduled<br>e.g., rpm | D |
| .7 | • UnitCode | R | 1 byte | UINT8 | Unit code of the value according to the "Indices of physical values" table<br><br>e.g., 0x11 | D |
| .8 | • UnitCodeExp | R | 1 byte | UINT8 | Unit exponent code of the value according to<br>"Indices of physical values" table<br>The unit exponent code specifies the decimal power of the unit value. The unit exponent code has the value range 127 to 128.<br>Example<br>• Unit index 0 for $10^0$<br>• Unit index 3 for $10^3$<br>• Unit index -3 for $10^{-3}$<br>etc.<br>The listed unit exponent codes for SI-compatible units (unit exponent code < 64) serve as examples<br>only. The unit indices for other SI compatible prefixes (Pico, etc.) are generated in a similar way.<br>Unit exponent codes greater than +64 have a special significance which must be determined from the table. | D |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | These units can, for example, take the form of the units day, hour or minute or be non-SI compatible units, such as Fahrenheit.<br><br>E.g., 0x73 | |
| .9 | • Offset | R | 2 bytes | INT16 | Offset of the corresponding value This must be added to the process data to calculate the measured value, taking the resolution into account.<br>Example: the process data value is 12345, the offset is -15000, this results, taking the above resolution into account, in a measured value of -1.77 V | D |
| .10 | • RDR | R | 2 bytes | UINT16 | **ResolutionDimensionRange**<br>Resolution = $= \frac{RDR}{RNR}$<br>Dimension range of the resolution related to the unit in which the size is displayed and within which the process data can fluctuate. Is used for calculating the resolution.<br>Example: 10 (V)<br>Resolution = 10 V/3000 = 3.333 mV | D |
| .11 | • RNR | R | 2 bytes | INT16 | **ResolutionNumberRange**<br>Resolution = $= \frac{RDR}{RNR}$<br>Number range of the resolution related to the dimension range in which the process data can fluctuate.<br>Is used for calculating the resolution.<br>Example: 3000<br>Resolution = 10 V/3000 = 3.333 mV | D |
| .12 | • Access Rights | R | 1 byte | Bit string 8 | Bit 0 = WriteProtected (1=active)<br>Bit 1 = ReadProtected (1=active)<br>Bit 2 = Write_OnlyWithPassword (1=active)<br>Bit 3 = Read_OnlyWithPassword (1=active)<br>Bit 4 - 7 Reserved | D |
| .13 | • DisplayFormat | R | 1 byte | UINT8 | 0x00 – undefined<br>0x01 - binary<br>0x02 - unsigned decimal<br>0x03 - signed decimal<br>0x04 - hexadecimal<br>0x05 - text<br>0x06 - float<br>0x07 - time<br>0x08 – 0xFF reserved | D |
| .14 | • Min. | R | "Length" byte | According to data type | Lower permitted limit of a value.<br>The length is based on ".5 length" of the object.<br>For all string variables, there is no minimum value. In this case, the length is 0.<br>E.g., -500 | D |
| .15 | • Max | R | "Length" byte | According to data type | Upper permitted limit of a value.<br>The length is based on ".5 length" of the object.<br>For all string variables, there is no minimum value. In this case, the length is 0.<br>E.g., 500 | D |
| .16 | • Symbol | R | M byte | Visible string | Name of the object. The length can be a maximum of 58 bytes.<br>maxM=58-2xLength-22<br>E.g., set speed – 0x00 scheduled | D |

| | | | | | | |
|---|---|---|---|---|---|---|
| E805 | ObjDescrLong | R | N segments | **Domain variable** | Description of all existing objects (index/subindex)<br>One description is transmitted per segment.<br>Strings are completed with 0x00. | O |
| Seg.1 | ObjDescr1 | R | 58 bytes | Record | See above | D |
| … | … | … | … | ... | ... | |
| Seg.N | ObjDescr1 | R | 58 bytes | Record | See above | D |

If an object has subindices, these are arranged after the index.

If the object 0x0038 "ObjDescrReq" is used to request an index/subindex that is not available, an error message is issued as follows: error class 8 (application), error code 1 (profile-specific), additional code 0x0030 (value range of parameter has been exited). The description of the next available index/subindex is then provided in object 0x0039 "ObjDescr".

After the last index/subindex, this process starts again from the beginning.

The auto-increment function of object 0x0039 can easily be used by an application to read all available indices/subindices and thereby obtain a complete overview of all available objects in a device. (After an initial read access, the description of the next available index/subindex is provided for the next read access).

No description has to be saved for basic profile objects, because this description (including subindices) is already known across the entire system as a result of the basic profile. Object 0x0039 is assigned the index only. The remaining entries are not available (user data length: 2 bytes). This means that the availability of optional objects can be indicated. A basic profile object must therefore not be ignored.

Process data objects 0x0025 and 0x0026 are an exception, since their availability and function are process-specific, but their structures are manufacturer-specific. As they can only be determined in this way, they must be described in full.

If object 0x0039 is not available, the process data objects 0x0025 and 0x0026 are specified by default as bit strings of corresponding length.

### "Indices of physical values" table

| Physical_value | Value index | Unit | Unit index (incomplete) |
|---|---|---|---|
| | 0 | Without dimension | 0 |
| Length | 1 | Meter | 0 |
| Area | 2 | Square meter | 0 |
| Volume | 3 | Cubic meter | 0 |
| Time | 4 | Second | 0 |
| | | Minute | 70 |
| | | Hour | 74 |
| | | Day | 77 |
| | | Half-waves | 78 |
| | | Millisecond | -3 |
| | | Microsecond | -6 |
| Force | 6 | Newton | 0 |
| Real power | 9 | Watt | 0 |
| Apparent power | 10 | Volt-ampere | 0 |
| Rotational speed | 11 | 1/second | 0 |
| | | 1/minute | 73 |
| | | 1/hour | 74 |
| Angle | 12 | Radiant | 0 |
| | | Second | 75 |
| | | Minute | 76 |
| | | (Old) degree | 77 |
| | | New degree | 78 |
| Speed | 13 | Meter/second | 0 |
| | | Millimeter/second | -3 |
| | | Millimeter/min. | 79 |
| | | Meter/min. | 80 |
| | | Kilometer/min. | 81 |
| | | Millimeter/hour | 82 |
| | | Meter/hour | 83 |
| | | Kilometer/hour | 84 |
| Torque | 16 | Newton meter | 0 |
| Temperature | 17 | Kelvin | 0 |
| | | Degrees_Celsius | 94 |
| | | Degrees_Fahrenheit | 95 |
| Electric_voltage | 21 | Volt | 0 |
| Electric_current | 22 | Amps | 0 |
| Electric_resistance | 23 | Ohm | 0 |
| Relation | 24 | Percent | 0 |
| Frequency | 28 | Hertz | 0 |
| Steps | 32 | Steps | 0 |
| Encoder resolution | 33 | Increments/rotation | 0 |
| Flow rate | 34 | Cubic meter/second | 0 |
| | | Liter/second | -3 |
| | | Milliliter/second | -6 |
| | | Cubic meter/minute | 85 |
| | | Liter/minute | 86 |
| | | Milliliter/minute | 87 |
| Acceleration | 35 | 1/second2 | 0 |

The unit index corresponds to the exponent (base 10) as standard

E.g.,
UnitCodeExp -6 for $10^3$ => kilo
UnitCodeExp -6 for $10^0$ => without
UnitCodeExp -6 for $10^{-3}$ => m
UnitCodeExp -6 for $10^{-6}$ => µ
UnitCodeExp -9 for $10^{-9}$ => n

# 8 Appendix A

## 8.1 Definition of terms

**Substitute values**
If the optional PCP objects are not implemented, the device behaves according to the substitute value defined for this parameter.

**Error message**
An error message is returned if a service cannot be executed.

**Function units, definition of**
The device function is described by a function unit. The function is controlled and parameterized via the inputs. In addition, internal signals or internal parameters can affect the function. The function output can be linked to the inputs of other functions or made accessible via the bus.

Function unit
Input:
Internal signals
Actions
External signals
Parameter (services, process data)
PCP objects
Function output:
Internal variable
PCP objects

**Device parameters**
Default values for all device parameters are defined in this profile.

**Device profile**
The device profile specifies the application functions that are to be made visible via communication. The application functions are mapped to the communication process by defining the following:

- The communication profile
- The interactions between application functions which are executed via the communication system
- The PCP services used and the PCP objects that are manipulated using them

Mapping makes the behavior of the application transparent. The application profile definitions ensure interoperability in an area of application, provided that the device properties used support this.
In addition, the profile defines device properties which are important for the user. A distinction is made between mandatory, optional, and manufacturer-specific device functions and parameters. If the user uses only mandatory functions or parameters, devices can be replaced, provided this is supported by the device properties and settings used. In terms of communication, the devices can always be replaced by others with the same parameters, regardless of their function.

**Index, subindex**
The index is used to address a parameter (PCP object). The subindex is used within a parameter, which is created as a structure, to address a subparameter (element of a PCP object).

**Communication interface**
The communication interface consists of a process data channel and a parameter channel.

**Communication profile**

The communication profile restricts or classifies the degree of freedom included in the specification of the transmission medium, according to the application or device group. The communication profile defines PCP services and parameters, which are marked as optional in the specification. All optional functions and parameters that are not specified in the communication profile remain optional. Mandatory services and parameters are binding even if they are not specified in the profile. Value ranges for attributes and parameters are also specified in the profile.

**Communication reference**
Every communication relationship between two devices is configured regardless of when it is used. The configuration is stored in every device in a communication relationship list (CRL). An application process identifies the communication relationship via a local communication reference. This is then used to address the communication partner.

**Parameter channel**
The parameter channel can be used to access all PCP objects. Parameter channel services provide acknowledged access to device parameters, i.e., access to a device parameter is confirmed by the device.

**Mandatory range**
The mandatory range is the value range in which a parameter can always be set, if it is implemented.

**Process data description**
If the device transmits or receives several items of process data in parallel, the structure and meaning of this process data must be described by the manufacturer.

**Process data channel**
The process data channel enables fast transmission of process data. Data is transmitted in an unacknowledged way and at regular intervals (equidistant) via the process data channel. Process data can be read and written.
The direction of the process data is regarded as from the bus; i.e.,

- OUT process data is data which is transmitted from the control system to the device. The device reads this data from the process data channel and transfers it to the process, depending on the function.
- IN process data is data which is transmitted from the device to the control system. The device writes this data to the process data channel and thereby transmits it to the control system.

**VFD object**
The virtual field device (VFD) is an abstract model for describing the data and the behavior of an automation device from the point of view of its communication partner. The VFD model is based on the VFD object. The VFD object contains all objects and object descriptions that can be used by a communication partner through a service. The object descriptions are stored in an object dictionary. Each VFD has one object dictionary.

**State machine**
In this profile, some functions are described using a state machine. A state refers to a specific internal and external response. It can only be exited by defined events. These events are assigned corresponding state transitions. Actions can be executed in a transition. This modifies the state response. When the transition is complete, the
current state changes to the next state.

## 8.2 Symbols and abbreviations

**Network-specific abbreviations**

| | |
|---|---|
| ALI | Application layer interface |
| CRL | Communication relationship list |

| | |
|---|---|
| CRL header | Header of the communication relationship list |
| CR | Communication reference |
| m | Mandatory |
| MAP | Manufacturing automation protocol |
| o | Optional |
| OD | Object dictionary |
| PCP | Peripherals communication protocol |
| PCh | Parameter channel |
| PD | Process data |
| PMS | Peripherals message specification |
| S-OD | Static object dictionary |
| ST-OD | Static type dictionary |
| VFD | Virtual field device |
| .con | Confirmation primitive |
| .ind | Indication primitive |
| .req | Request primitive |
| .res | Response primitive |

# 9 Appendix B

## 9.1 Translation table for the object names

| Index | Subindex | Object name (basic profile) | DE | EN-US | ES | FR | IT | ZH-CN |
|---|---|---|---|---|---|---|---|---|
| 0001 | | VendorName | Herstellername | Vendor name | Nombre del fabricante | Nom du fabricant | Nome del produttore | 厂商名称 |
| 0002 | | VendorID | Herstellerkennung | Vendor ID | Identificación del fabricante | Identificateur du fabricant | Identificativo produttore | 厂商标识 |
| 0003 | | VendorText | Herstellertext | Vendor text | Texto del fabricante | Texte du fabricant | Testo produttore | 厂商文本 |
| 0004 | | DeviceFamily | Gerätefamilie | Device family | Familia de dispositivos | Famille d'appareils | Famiglia di dispositivi | 设备系列 |
| 0005 | | Capabilities | Eigenschaften | Capabilities | | | | |
| 0006 | | ProductFamily | Produktfamilie | Product family | Familia de productos | Famille de produits | Famiglia di prodotti | 产品系列 |
| 0007 | | ProductName | Produktname | Product name | Nombre del producto | Nom du produit | Nome del prodotto | 产品名称 |
| 0008 | | SerialNo | Seriennummer | Serial number | Número de serie | Numéro de série | Numero di serie | 序列号 |
| 0009 | | ProductText | Produkttext | Product text | Texto de producto | Texte du produit | Testo prodotto | 产品文本 |
| 000A | | OrderNumber | Bestellnummer | Order number | Número de pedido | Numéro d'ordre | Numero d'ordinazione | 订货号 |
| 000B | | HardwareVersion | Hardware-Version | Hardware version | Versión del hardware | Version du matériel | Versione hardware | 硬件版本 |
| | .1 | BuildDate | Hardware-Version - Herstelldatum | Hardware version - build date | Versión del hardware - fecha de fabricación | Version du matériel - date de fabrication | Versione hardware - data di produzione | 硬件版本 - 创建日期 |
| | .2 | Version | Hardware-Version - Versionskennung | Hardware version - version | Versión del hardware - identificación de versión | Version du matériel - identificateur de version | Versione hardware/ID versione | 硬件版本 - 版本标识 |
| 000C | | FirmwareVersion | Firmware-Version | Firmware version | Versión del firmware | Version du microprogramme | Versione firmware | 固件版本 |
| | .1 | BuildDate | Firmware-Version - Datum | Firmware version - build date | Versión del firmware - fecha | Version du microprogramme - date | Versione firmaware - data | 固件版本 - 日期 |
| | .2 | Version | Firmware-Version - Versionskennung | Firmware version - version | Versión del firmware - identificación de | Version du microprogramme - identificateur de | Versione firmware/ID versione | 固件版本 - 版本标识 |

| Index | Subindex | Object name (basic profile) | DE | EN-US | ES | FR | IT | ZH-CN |
|---|---|---|---|---|---|---|---|---|
| | | | | | versión | version | | |
| 000D | | PChVersion | Parameterkanal-Version | Parameter channel version | Versión del canal de parámetros | Version du canal de paramètres | Versione PCh | 参数通道版本 |
| | .1 | BuildDate | Parameterkanal-Version - Datum | PCP version - build date | Versión de canal de parámetros - fecha | Version du canal de paramètres - date | Versione PCP - data | 参数通道版本 - 日期 |
| | .2 | Version | Parameterkanal-Version - Versionskennung | PCP version - version | Versión de canal de parámetros - identificación de versión | Version du canal de paramètres - identificateur de version | Versione PCP - ID versione | 参数通道版本 - 版本标识 |
| 000E | | CommProfile | Kommunikationsprofil | Communication profile | Perfil de comunicación | Profil de communication | Profilo di comunicazione | 通信概要 |
| 000F | | DeviceProfile | Geräteprofil | Device profile | Perfil del dispositivo | Profil | Profilo dispositivo | 设备概要 |
| 0010 | | Reserved | Reserviert | Reserved | Reservado | Réservé | Riservato | 保留 |
| 0011 | | ProfileVersion | Profil-Version | Profile version | Versión del perfil | Version du profil | Versione profilo | 概要版本 |
| | .1 | BuildDate | Profil-Version - Datum | Profile version - build date | Versión del perfil - fecha | Version du profil - date | Versione profilo - data | 概要版本 - 日期 |
| | .2 | Version | Profil-Version - Versionskennung | Profile version - version | Versión del perfil - identificación de versión | Version du profil - identificateur de version | Versione profilo - ID versione | 概要版本 - 版本标识 |
| 0012 | | VendorURL | Hersteller URL | Vendor URL | URL del fabricante | URL du fabricant | URL venditore | 厂商URL |
| 0013 | | DeviceDescFile | Gerätebeschreibungsdatei | Device description file | Archivo de descripción del dispositivo | Fichier de description d'appareil | File descrizione dispositivo | 设备描述文件 |
| 0014 | | Location | Einbauort | Location | Lugar de montaje | Emplacement de montage | Posizione di montaggio | 安装地点 |
| 0015 | | EquipmentIdent | Betriebsmittel-Kennzeichen | Equipment identifier | Identificación del equipo | Identificateur de matériel | Identificatore dispositivo (BMK) | 设备标识符 |
| 0016 | | ApplDeviceAddr | applikationsspezifische Geräteadresse | Application device address | Dirección del dispositivo específica de la aplicación | Adresse d'appareil spécifique à l'application | Indirizzo dispositivo per la specifica applicazione | 应用特定的设备地址 |
| 0017 | | Language | Sprache | Language | Idioma | Langue | Lingua | 语言 |
| | .1 | LanguageCode | Sprache - Ländercode | Language - language code | Idioma - código del país | Langue - code pays | Lingua - codice paese | 语言 - 国家代码 |
| | .2 | NameLanguage | Sprache - Name | Language - name | Idioma - nombre | Langue - nom | Lingua - nome | 语言 - 名称 |

| Index | Subindex | Object name (basic profile) | DE | EN-US | ES | FR | IT | ZH-CN |
|---|---|---|---|---|---|---|---|---|
| 0018 | | DiagState | Diagnosestatus | Diagnostic state | Estado de diagnóstico | État du diagnostic | Stato diagnostico | 诊断状态 |
| | .1 | Seq.no. | Diagnosestatus - Lfd. Nr. | Diagnostic state - cons. no. | Estado de diagnóstico - n° de orden | État du diagnostic - n° de série | Stato diagnostico - numero d'ordine | 诊断状态 - 连续编号 |
| | .2 | Priority | Diagnosestatus - Priorität | Diagnostic state - priority | Estado de diagnóstico - prioridad | État du diagnostic - priorité | Stato diagnostic - priorità | 诊断状态 - 优先级 |
| | .3 | Channel/Group/Module | Diagnosestatus - Kanal/Gruppe/Modul | Diagnostic state - channel/group/module | Estado de diagnóstico - canal/grupo/módulo | État du diagnostic - canal/groupe/module | Stato diagnostico - canale/gruppo/modulo | 诊断状态 - 通道/组/模块 |
| | .4 | Code | Diagnosestatus - Code | Diagnostic state - code | Estado de diagnóstico - código | État du diagnostic - code | Stato diagnostico - codice | 诊断状态 - 代码 |
| | .5 | MoreFollows | Diagnosestatus - Zusatzinformationen | Diagnostic state - more follows | Estado de diagnóstico - información adicional | État du diagnostic - informations supplémentaires | Stato diagnostico - informazioni aggiuntive | 诊断状态 - 附加信息 |
| | .6 | Text | Diagnosestatus - Text | Diagnostic state - text | Estado de diagnóstico - texto | État du diagnostic - texte | Stato diagnostico - testo | 诊断状态 - 文本 |
| 0019 | | ResetDiag | Diagnosemeldungen quittieren | Reset diagnostic messages | Confirmar mensajes de diagnóstico | Acquitter les messages de diagnostic | Consenso messaggi diagnostici | 应答诊断信息 |
| 001A | | GetErrorRepMethod | Meldemethode für Störung | Get error report method | Método de avisar un fallo | Méthode de signalisation des perturbations | Metodo avvertimento guasti | 故障提示方法 |
| 001B | | TestMode | Testbetrieb | Test mode | Servicio de prueba | Mode d'essai | Modalità di prova | 试运行 |
| 001C | | ControlTrace | Steuerung der Protokollierung | Control trace | Mando del registro | Commande de la journalisation | Controllo protocollo | 记录控制 |
| 001D | | Password | Passwort | Password | Contraseña | Mot de passe | Password | 密码 |
| 001E | | SetPassword | Passwort setzen | Set password | Establecer contraseña | Définir le mot de passe | Impostare password | 设置密码 |
| 001F | | PDTimeout | Prozessdaten-Überwachungszeit | Process data timeout | Tiempo de monitorización de los datos de proceso | Temps de surveillance des données de process | Tempo di monitoraggio dei dati di processo | 过程数据监视时间 |
| 0020 | | PDTimeoutCode | Prozessdaten-Überwachungs-Code | Process data timeout code | Código de monitorización de los datos de proceso | Code de surveillance des données de process | Codice di monitoraggio dei dati di processo | 过程数据监视代码 |

| Index | Subindex | Object name (basic profile) | DE | EN-US | ES | FR | IT | ZH-CN |
|---|---|---|---|---|---|---|---|---|
| 0021 | | PCPTimeout | Parameterkanal-Überwachungszeit | PCP timeout | Tiempo de monitorización del canal de parámetros | Temps de surveillance du canal de paramètres | Tempo di monitoraggio dei dati di processo | 参数通道监视时间 |
| 0022 | | PCPTimeoutCode | Parameterkanal-Überwachungs-Code | PCP timeout code | Código de monitorización del canal de parámetros | Code de surveillance du canal de paramètres | Codice di monitoraggio PCP | 参数通道监视代码 |
| 0023 | | AbortCode | Verbindungsabbruch-Code | Connection abort code | Código de interrupción de comunicación | Code d'interruption de la connexion | Codice per interruzione connessione | 连接中断代码 |
| 0024 | | IBSResetCode | Reset-Code | INTERBUS reset code | Código de restablecimiento | Code de réinitialisation | Codice di reset | 复位代码 |
| 0025 | | PDIN | Prozesseingangsdaten | Process input data | Datos de proceso de entrada | Données de process entrantes | Dati ingresso processo | 过程输入数据 |
| 0026 | | PDOUT | Prozessausgangsdaten | Process output data | Datos de proceso de salida | Données de process sortantes | Dati uscita processo | 过程输出数据 |
| 0027 | | GetExRight | Exklusive Schreibrechte anfordern | Get exclusive process data write rights | Solicitar derechos de escritura exclusivos | Demander les autorisations d'accès en écriture exclusives | Richiedere diritto di scrittura esclusivo | 请求独享写权限 |
| 0028 | | ChangePDSet | Prozessdatenzuordnungen einstellen | Change process data settings | Ajustar las asignaciones de datos de proceso | Régler les affectations des données de process | Impostare assegnazione dati di processo | 设置过程数据分配 |
| 0029 | | ParamSetWriteControl | Parametersatz-Schreibsteuerung | Parameter set write control | Control de escritura de juego de parámetros | Commande d'écriture du jeu de paramètres | Controllo scrittura set parametri | 参数组写控制 |
| 002A | | ConflictDictionary | Konflikt-Verzeichnis | Conflict dictionary | Directorio de conflicto | Répertoire des conflits | Elenco conflitti | 冲突目录 |
| 002B | | ParamSet | Parametersatzkennung | Parameter set identification | Identificación de juego de parámetros | Identificateur de jeu de paramètres | Identificatore set parametri | 参数组标识 |
| 002C | | ParameterMoment | Zeitpunkt der letzten Parametrierungsänderung | Moment of last parameterization modification | Hora y fecha del cambio de parametrización más reciente | Moment de la dernière modification du paramétrage | Ultima modifica parametro | 最后一次参数化更改的时间点 |
| 002D | | ResetParam | Parametrierung zurücksetzen | Reset parameterization | Restablecer parametrización | Réinitialiser le paramétrage | Reset parametrizzazione | 复位参数化 |
| 002E | | CheckSum | Prüfsumme | Checksum | Suma de comprobación | Somme de contrôle | Somma di controllo | 检查和 |
| 002F | | PDOUT_Subst | Ersatzwert Prozessausgangsdaten | Process output data | Valor de reserva | Valeur de | Valore sostitutivo per | 过程输出数据替换值 |

| Index | Subindex | Object name (basic profile) | DE | EN-US | ES | FR | IT | ZH-CN |
|---|---|---|---|---|---|---|---|---|
| | | | | substitute | para datos de proceso de salida | remplacement des données de process sortantes | dati di processo in uscita | |
| 0030 | | PF_Code | Peripherie-Fehler-Auswahlcode | Peripheral fail code | Código de selección de fallo en periferia | Code de sélection de l'erreur périphérique | Codice selezione errore periferia | 外设错误选择代码 |
| 0031 | | PDIN_Subst | Ersatzwert Prozesseingangsdaten | Process input data substitute | Valor de reserva para datos de proceso de entrada | Valeur de remplacement des données de process entrantes | Valore sostitutivo per dati di processo in ingresso | 过程输入数据替换值 |
| 0032 | | IBS_ID | INTERBUS Identifikation/ reserviert | INTERBUS identification/ reserved | Identificación de INTERBUS/ reservado | Identification INTERBUS/ réservé | Identificazione INTERBUS/ riservato | INTERBUS识别/ 保留 |
| | .1 | ID-Code | INTERBUS Identifikation - ID-Code | INTERBUS identification - ID code | Identificación de INTERBUS - código ID | Identification INTERBUS - code d'identification | Identificazione INTERBUS - codice ID | INTERBUS识别- ID代码 |
| | .2 | PDLength | INTERBUS Identifikation - Prozessdatenlänge | INTERBUS identification - process data length | Identificación de INTERBUS - longitud de datos de proceso | Identification INTERBUS - longueur des données de process | Identificazione INTERBUS - lunghezza dati di processo | INTERBUS识别 - 过程数据长度 |
| 0033 | | DiagStateChannelNo | Diagnosestatus-Kanal-Nr. | Diagnostic state channel no. | N° de canal de diagnóstico | N° de canal d'état du diagnostic | N. canale stato diagnostico | 诊断状态通道号 |
| 0034 | | DiagStateAddValue | Diagnosestatus-Zusatzwert | Diagnostic state additional value | Valor adicional del estado de diagnóstico | Valeur supplémentaire d'état du diagnostic | Valore aggiuntivo stato diagnostico | 诊断状态附加值 |
| 0035 | | NoOfModules | Anzahl der Submodule | Number of modules | Cantidad de submódulos | Nombre de sous-modules | Numero di moduli subordinati | 子模块数 |
| 0036 | | DeviceStructure | Gerätestruktur | Device structure | Estructura del dispositivo | Structure d'appareil | Struttura dispositivo | 设备结构 |
| 0037 | | DeviceType | Gerätetyp | Device type | Tipo de dispositivo | Type d'appareil | Tipo di dispositivo | 设备类型 |
| 0038 | | ObjDescrReq | Anfrage Objektbeschreibung | Object description request | Solicitud de descripción del objeto | Requête de description d'objet | Richiesta descrizione oggetto | 对象描述询问 |
| 0039 | | ObjDescr | Objektbeschreibung | Object description | Descripción del objeto | Description d'objet | Descrizione oggetto | 对象描述 |
| 003A | | VersionCount | Versionszähler | Version counter | Contador de versiones | Compteur de version | Conteggio versione | 版本计数器 |
| | .1 | ProfileVersion | Versionszähler - Profil-Version | Version counter - profile version | Contador de versiones - versión del perfil | Compteur de version - version du profil | Contatore versioni - versione profilo | 版本计数器 - 概要版本 |

| Index | Subindex | Object name (basic profile) | DE | EN-US | ES | FR | IT | ZH-CN |
|---|---|---|---|---|---|---|---|---|
| | .2 | PCPVersion | Versionszähler - Parameterkanal-Version | Version counter - PCP version | Contador de versiones - versión del canal de parámetros | Compteur de version - version du canal de paramètres | Contatore versioni - versione canale parametri | 版本计数器 - 参数通道版本 |
| | .3 | HardwareVersion | Versionszähler - Hardware-Version | Version counter - hardware version | Contador de versiones - versión del hardware | Compteur de version - version du matériel | Contatore versioni - versione hardware | 版本计数器 - 硬件版本 |
| | .4 | FirmwareVersion | Versionszähler - Firmware-Version | Version counter - firmware version | Contador de versiones - versión del firmware | Compteur de version - version du microprogramme | Contatore versioni - versione firmware | 版本计数器 - 固件版本 |
| 003B | | PDIN_Descr | Prozesseingangsdatenbeschreibung | Process input data description | Descripción de datos de proceso de entrada | Description des données de process entrantes | Descrizione dati in ingresso processo | 过程输入数据描述 |
| 003C | | PDOUT_Descr | Prozessausgangsdatenbeschreibung | Process output data description | Descripción de datos de proceso de salida | Description des données de process sortantes | Descrizione dati in uscita processo | 过程输出数据描述 |
| E800 | | DiagStateLong | Diagnosestatus (Langform) | Diagnostic state (long form) | Estado de diagnóstico (de forma detallada) | État du diagnostic (forme longue) | Stato diagnostico (forma estesa) | 诊断状态(长式) |
| E801 | | DiagHistory | Diagnoseinformationen | Diagnostic history | Datos de diagnóstico | Informations de diagnostic | Informazioni diagnostiche | 诊断信息 |
| E802 | | DiagHistoryLong | Diagnoseinformationen (Langform) | Diagnostic history (long form) | Datos de diagnóstico (de forma detallada) | Informations de diagnostic (forme longue) | Informazioni diagnostiche (forma estesa) | 诊断信息(长式) |
| E803 | | TraceBuffer | Puffer für Fehlerprotokollierung | Trace buffer | Búfer para registro de errores | Tampon pour le journal des erreurs | Buffer per protocollo errori | 错误记录缓冲区 |
| E804 | | LanguageAvailable | Landessprache | Language | Idioma nacional | Langue | Lingua nazionale | 语言 |
| E805 | | ObjDescrLong | Objektbeschreibung (Langform) | Object description (long form) | Descripción del objeto (de forma detallada) | Description d'objet (forme longue) | Descrizione oggetto (forma estesa) | 对象描述(长式) |

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