EtherCAT® Slave Information

Specification

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ABBREVIATIONS

C	Conditional
CMD	Command
CoE	CAN Application Protocol over EtherCAT
DC	Distributed Clock
DPRAM	Dual-Ported RAM
ENI	EtherCAT Network Information (EtherCAT XML Master Configuration)
EoE	Ethernet over EtherCAT
ESC	EtherCAT Slave Controller
ESI	EtherCAT Slave Information (EtherCAT Devices Description)
ESM	EtherCAT State Machine
ETG	EtherCAT Technology Group
FMMU	Fieldbus Memory Management Unit
FoE	File Access over EtherCAT
FPRW	Configured Address Physical ReadWrite
I/O	Input/Output
IDN	Identification Number (Servo Profile Identifier)
IEC	International Electrotechnical Commission
LRD	Logical Read
LRW	Logical ReadWrite
LSB	Least Significant Bit
LWR	Logical Write
M	Mandatory
MAC	Media Access Controller
MI	(PHY) Management Interface
MII	Media Independent Interface
MSB	Most Significant Bit
ns	nanoseconds (10^{-9} seconds)
O	Optional
OD	Object Dictionary
PDO	Process Data Object
PreOp	Pre-Operational
SDO	Service Data Object
SII	Slave Information Interface
SM	SyncManager
SoE	Servo Drive Profile over EtherCAT
SOF	Start of Frame
SPI	Serial Peripheral Interface
WD	Watchdog
WKC	Working Counter
XML	eXtensible Markup Language

REFERENCES

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ETG Standards

[1] ETG.1000.2: Physical Layer service definition and protocol specification

[2] ETG.1000.3: Data Link Layer service definition

[3] ETG.1000.4: Data Link Layer protocol specification

[4] ETG.1000.5: Application Layer service definition

[5] ETG.1000.6: Application Layer protocol specification

[6] ETG.1004: EtherCAT Unit Specification

[7] ETG.1020: EtherCAT Guidelines and Protocol Enhancements

[8] ETG.5001: EtherCAT Modular Device Profile

Other References

[9] XML Schema Part 2: Datatypes Second Edition, 28 October 2004
http://www.w3.org/TR/2004/REC-xmlschema-2-20041028/

1 Terms, Definitions and Word Usage

1.1 Terms and Definitions

The terms and definitions of ETG.1000 series shall be fully valid, unless otherwise stated.

1.2 Word usage: obsolete

Element/attributes which are described with “obsolete” shall not be used any more. A configuration tool shall use those elements as described behind the word “Configtool”.

1.3 Word usage: for future use

Elements/attributes which are described with “For future use” shall not be used. A configuration tool shall skip those elements/attributes.

1.4 Word usage: shall, should, may, can

The word *shall* is used to indicate mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).

The word *should* is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain course of action is deprecated but not prohibited (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

2 Preface

For each EtherCAT Slave a device description, the so-called EtherCAT Slave Information (ESI) has to be delivered. This is done in form of an XML file (eXtensible Markup Language). It describes EtherCAT specific as well as application specific features of the slave.

There is always one unique ESI for a device. Revision changes on the device's hardware and/or software may have to be reflected in the ESI of this device (usually by the Revision Number).

Within one XML file (ESI file) one or more devices descriptions (ESI) can be saved.

The ESI file is used by an EtherCAT configuration tool (Configtool) to gain all information of the device(s). The Configtool then can setup the complete EtherCAT network and generate the EtherCAT Network EtherCAT Network Information (ENI), which then can be stored in a file (ENI file); also XML based.

This document specifies the structure and usage of the ESI file. The structure is represented by the schema files for generation and validation of the particular ESI file.

3 General

3.1 ESI

Every EtherCAT Slave shall be delivered with a device description, called “EtherCAT Slave Information” (ESI).

3.1.1 ESI File

The (“main”) ESI file contains information about the vendor (*EtherCATInfo/Vendor*) and at least one description of an EtherCAT slave device (*EtherCATInfo/Descriptions/Devices/Device*).

References to other XML files are possible. This allows describing specific parts in separate files that can be referenced from more than one ESI file. That allows avoiding redundant descriptions and reduces file size(s).

An ESI file has the extension .xml and is written in XML language. The structure of the ESI file is described in clause 5.

Following additional files exist: Module file, Dictionary file, and Diagnosis Message file.

3.1.2 Module file

Module files allow describing Modules only. This file then can be referenced from several ESI files containing devices that allow the use module(s) of this file. Allowed modules of a device are merged from ESI file and referenced Module file.

A Module file has the extension .xml and is written in XML language. The structure of the Module file is described in clause 6.

3.1.3 Dictionary file

Dictionary files allow describing an offline object dictionary only. This file then can be referenced from several ESIs or modules as an alternative of describing the objects in the device/module description itself.

A Dictionary file has the extension .xml and is written in XML language. The structure of the Dictionary file is described in clause 7.

3.1.4 Diagnosis Message file

Diagnosis Message files allow to describe diagnosis messages for diagnosis history functionality only. This file then can be referenced from several ESIs or modules as an alternative of describing the diagnosis messages in the device/module description itself.

A Diagnosis Message file has the extension .xml and is written in XML language. The structure of the Diagnosis Message file is described in clause 8.

3.2 XML (informative)

XML is a text based, human and machine-readable markup language, defined by the World Wide Web Consortium (W3C).

XML uses *elements* (sometimes called “nodes”) to describe specific content. *Elements* can have additional *attributes* that define specific properties of the corresponding *element*.

Table 1 explains terms used in context with XML.

Table 1: XML terms

Term	Description	Example
Attribute	Additional information in a *start tag* of an *element*.	`<entry number=”6”>Content</entry>`
CDATA	Construct that marks anything between *CDATA* start <![CDATA[and end]]> as character data. Content is not interpreted as markup.	`<![CDATA[any text here, even <this> is interpreted as text instead of an start tag]]>`

Term	Description	Example

Child element	*Element* within an *element*.	`<address>`
		`  <name>Florian</name>`
		`</address>`

Element	Logical construct within the XML document. Begins with (including) *start tag* and ends (including) with *end tag*. It includes text, and/or *attributes*, and/or other elements (*child elements*). It also may not have content (*empty element*).	`<entry>Content of the element</entry>`
Empty-element tag	Short version of an empty element. NOTE: short tags may not be allowed: refer to clause 0	`<tag />` short version of `<tag></tag>`
End tag	See *tag*	
Schema	File (*.xsd) that defines an allowed structure/content of XML files. XML editors can check a XML file against an XML *schema* for verification of the XML structure/content.	
Start tag	See *tag*	
Tag	Starts with < and ends with >. The *start tag* defines the beginning of an *element*. The *end tag* closes the *element*.	`<tag>` *start tag* `</tag>` *end tag*
XPath	The complete path of an element including all parents, based on the root element	`Root/Child/Subchild` *describes the path of the element „Subchild“* `Root/Child/Subchild/@Prop` *describes the path of the attribute Prop (the @ indicates that prop is an attribute is subchild, not an element)*

3.3 XML Schema

XML allows so-called schemas. A schema describes rules for the structure and/or the content of XML files. An XML schema allows, as a very basic example, to define of which data type the content of an element/attribute has to be (e.g. string, int, ..). It also allows to specify if an element/attribute has to be present in the XML file or not (mandatory, optional).

XML editors are able to proof a XML file against a XML schema (validate) and show errors in both, structure and content.

ETG provides the following XML schemas.

3.3.1 EtherCATInfo.xsd

The schema file “EtherCATInfo.xsd” for (“main”) ESI files.

3.3.2 EtherCATModule.xsd

The schema file “EtherCATModule.xsd” for Module files.

3.3.3 EtherCATDict.xsd

The schema file “EtherCATDict.xsd” for Dictionary files.

3.3.4 EtherCATDiag.xsd

The schema file “EtherCATDiag.xsd” for Diagnosis Message files.

3.3.5 EtherCATBase.xsd

The schema file “EtherCATBase.xsd” defines common complex XML data type descriptions, internally used in the above listed schema files.

Table 2 shows a list of the complex data types defined in EtherCATBase.xsd.

Table 2: EtherCATBase Types

Type
AccessType
ArrayInfoType
DataTypeType
DiagnosticsType
EntryType
EnumInfoType
HexDecValue
ModuleType
NameType
ObjectInfoType
ObjectType
PdoType
ProfileType
PropertyType
SubItemType
UnitTypeType
VendorSpecificType
VendorType

3.3.6 Unspecified elements (Informative)

The following schema elements are not specified and shall not be used.

- EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/SubItem
- EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/SubItem
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/@SRA_Parameter
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/@SRA_Parameter
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/@SafetyPdoType
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/@SafetyPdoType
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/@SafetyConnNumber
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/@SafetyConnNumber
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/@SafetyConnNumber
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/@SafetyConnNumber
- EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/SafetyMapping
- EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/SafetyMapping
- EtherCATInfo/Descriptions/Modules/Module/RxPdo/@SRA_Parameter
- EtherCATInfo/Descriptions/Modules/Module/TxPdo/@SRA_Parameter
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@Virtual
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@Sm
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@Su
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@PdoOrder
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@OSFac
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@OSMin
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@OSMax
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@OSIndexInc
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Index/@DependOnSlot

- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Index/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Exclude
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/Index/@DependOnSlot
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/Index/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/DataType/@Dscale
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/ExcludedSm
- EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/@SdoInfo
- EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/@PdoAssign
- EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/@PdoConfig
- EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/@PdoUpload
- EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/@CompleteAccess
- EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/@SegmentedSdo
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/Index/@DependOnSlot
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/Index/@DependOnSlot
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/Index/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/Index/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/Exclude/@DependOnSlot
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/Exclude/@DependOnSlot
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/Exclude/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/Exclude/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/Index/@DependOnSlot
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/Index/@DependOnSlot
- EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/Index/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/Index/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Index/@DependOnSlot
- EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Index/@DependOnSlotGroup
- EtherCATInfo/Descriptions/Modules/Module/RxPdo/@OverwrittenByModule
- EtherCATInfo/Descriptions/Modules/Module/TxPdo/@OverwrittenByModule
- EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@OverwrittenByModule
- EtherCATInfo/Descriptions/Modules/Module/Profile/ChannelInfo/@OverwrittenByModule
- EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Index/@OverwrittenByModule

3.4 Data types

3.4.1 General

In this document, "Data type" can be used in two different contexts.

XML data types define values in the context of the XML document itself. An element “Name” for example might be of data type “string”, i.e. the elements content is interpreted as text.

Base Data Types (EtherCAT data types) define values in the context of the EtherCAT environment. A parameter “Offset” of the EtherCAT device (that is described in the ESI) might be of data type “REAL”, for example. In the ESI the “base data type” of the parameters is specified in an own element, and an EtherCAT master/configuration tool would interpret the value as “REAL”.

3.4.2 XML Data Types

Each element/attribute of the ESI file is of a specific data type. There are two different types of data type. “Simple” data types are defined by the W3C, “complex” data types are defined in the schema (similar to classes, structs).

XML Schema Data Types shown in Table 3 and Table 4 are based on *XML Schema: Datatypes*, which is part 2 of the specification of the XML Schema language [9].

Table 3: XML Schema - Simple Data Types

Data Type	Description
string	ASCII string “not a character” symbols (e.g. TAB, LineFeed) shall not be used NOTE: They may be used in XML specific comments.

Data Type	Description
boolean	Boolean value ‘0’: FALSE ‘1’: TRUE
hexBinary	012345 → 0x01 LSB, 0x45 MSB

Table 4: XML Schema - Derivative Data Types

Data Type	Description
NMTOKEN	An Nmtoken (name token) is any mixture of name characters. A name is an Nmtoken with a restricted set of initial characters. Disallowed initial characters for names include digits, diacritics, the full stop and the hyphen.
int	String of bits (signed 32-bit integer), based on an integral number Range: -2147483648…0…+2147489647
integer	String of bits (unbounded integer), based on an integral number Range: -∞…0…+∞

Table 5: Complex Data Types

Data Type	Description
HexDecValue	Represents a hexadecimal value either in hexadecimal or decimal format, e.g. 12345 → 12345 (dec) #x12345 → 0x12345 (hex), whereas 0x45 is LSB and 0x01 MSB Only positive values are allowed. Possible exceptions are mentioned in the corresponding element definition.

3.4.3 Base Data Types (EtherCAT data types)

Base Data Types are defined in [7] (clause “Base Data Types”).

Column “Base Data Type” in the tables in in [7] defines the allowed terms that can be used in the ESI description as base data type.

3.5 Formatting rules

The following rules for formatting the text of the XML file are recommended for all ESI files. They are mandatory for elements with attribute Crc32 (refer to clause 3.6).

1. Indents shall be “Horizontal Tab” [HT].
2. New line shall be “Carriage Return” [CR] plus “Line Feed” [LF].
3. No blanks shall be used between a start tag and the end tag of the previous element.
4. Each child element shall start in a new line indented by one additional tab. Elements containing no child elements (empty or content-only) shall have start-tag and end-tag in the same line.
5. Empty-element tags are not allowed. Each element, also empty ones, shall use start tag and end tag.
   e.g. Not ~~`<Name lcId=123 />`~~ but `<Name lcId=123></Name>`

NOTE: XML 1.0 specification only allows [HT] (U+0009), [CR] (U+000D), and [LF] (U+000A) C0 controls.

Figure 1 shows a section of a well-formatted ESI file meeting the requirements specified above. The arrows represent tab controls [HT].

Figure 1: Well-formatted ESI file (section)

3.6 State Transitions

Table 6 describes all defined EtherCAT State Transitions which are selectable via the xs:NMTOKEN data type.

Table 6: Allowed State Transitions

Data Type	Description
xs:NMTOKEN	Allowed values in high commas: ‘IP’: Init → Pre-Operational ‘PS’: Pre-Operational → Safe-Operational ‘PI’: Pre-Operational → Init ‘SP’: Safe-Operational → Pre-Operational ‘SO’: Safe-Operational → Operational ‘SI’: Safe-Operational → Init ‘OS’: Operational → Safe-Operational ‘OP’: Operational → Pre-Operational ‘OI’: Operational → Init ‘IB’: Init → Bootstrap ‘BI’: Bootstrap → Init

3.7 Cyclic Redundancy Check (CRC)

3.7.1 About

CRC is a method to detect changes of content covered by a checksum. CRC can be used for each ESI element allowing the attribute *Crc32*. Therefor the binary content (“input”) of the covered elements is used with a CRC polynomial to calculate a checksum. The checksum is then used as value for the attribute *Crc32*. A master/configuration tool compares the own calculated checksum against the value of the attribute.

3.7.2 Input

The “input” for the checksum calculation is the binary stream of all characters that are covered by the checksum. For the *Crc32* attribute, this content is from start tag to end tag. Excluding the start tag with the *Crc32,* attribute itself, including the end tag.

In the following example of a module with checksum, the grey shaded characters are used as input for the calculation. The not shaded characters are not covered and not used as input.

```
...
[HT][HT][HT]<Module Crc32="12334567">[CR][LF]
[HT][HT][HT][HT]<Content>ABC</Content>[CR][LF]
[HT][HT][HT]</Module>[CR][LF]
...
```

Input stream:

```
[CR][LF][HT][HT][HT][HT]<Content>ABC</Content>[CR][LF][HT][HT][HT]</Module>
```

3.7.3 CRC Polynomial

Polynomial for the checksum calculation:

$$x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$$
$$= 104C11DB7h$$

The data type is unsigned integer 32.

NOTE: The polynomial is described in ISO 3309.

3.7.4 XML rules

The following rules shall be met for elements using the *Crc32* attribute:

1. The element with *Crc32* attribute shall comply with the XML formatting rule described in clause 0
2. CDATA sections are not allowed

3.7.5 Modules in external files

For module elements using the *Crc32* attribute and described in external module files the following rules shall be met in addition to clause 3.7.4:

1. The amount of indents (indent-level) before the start- and end-tag of the module shall be 3. A tool/algorithm needs to add indents [HT] at the beginning of each line of the covered data if indent-level is 2.

This rule guarantees that the input stream used for the calculation is identical – independent, if the module is described in an ESI file directly (indent-level = 3) or in an external module file (indent-level = 2). This leads to an identical checksum.

Figure 2 and Figure 3 show an example. Both figures show the same module using the *Crc32* attribute.

Figure 2 shows a section from a module described in an ESI file directly. The arrows represent tab controls [HT].

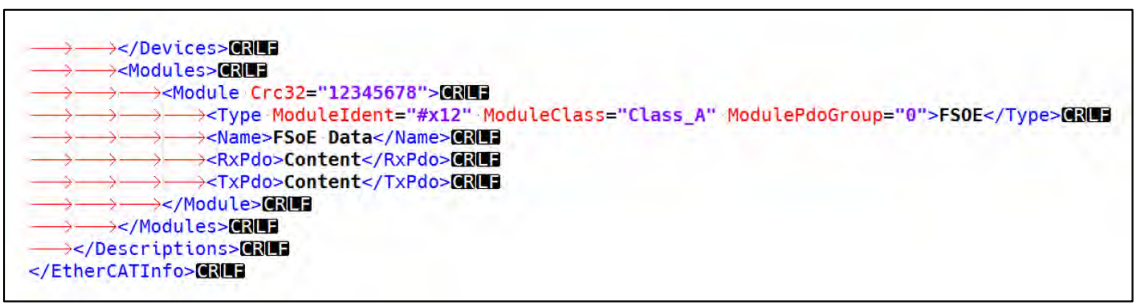


Figure 2: Module described in ESI file (section)

Figure 3 shows the module described in an external file. The calculation logic adds the tab controls [HT] marked with the dashed box. This results in the same input for the CRC calculation and the same checksum.

Figure 3: Module described in external file (section)

3.8 Element VendorSpecific

Information provided in a *VendorSpecific* element does not have to be supported, and usually is not, by the broad range of EtherCAT configuration tools. For this reason, all relevant information for proper usage of the slave device shall be provided by the elements/attributes specified by this standard.

3.9 Hints

3.9.1 Path Description

Other files may be referenced within the ESI file. The path description to the reference file follows the rules described in Table 7.

No absolute file paths shall be used.

Table 7: Reference to files

Reference	File Path
Reference file within the same folder	ReferencedFile.xml
Reference file in folder above	..\ReferencedFile.xml
Reference file in extra folder	ExtraFolder\ReferencedFile.xml

No special characters shall be used for file names and file paths. This includes language specific letters or special characters which may not be properly shown by operating systems or programs with different language settings or properly interpreted by file systems including servers.

3.9.2 Not Character Symbols

“Not a character” symbols (e.g. TAB, LineFeed) shall not be used in elements/attributes. Exceptions are allowed for Comment and Descriptions elements.

4 Document

4.1 Document structure

In clause 5 the structure and content of the ESI file is specified. Starting with the root element “EtherCATInfo” each element/attribute is described by a clause (with the name of the element/attribute) including Xpath, a table showing element/attribute details a description text.

The sub clauses allow jumping to a specific part of the ESI directly.

Figure 4 shows how an element/attribute is described in clause 5. The example shows the element “Vendor”.

Vendor [1]

EtherCATInfo / Vendor [2]

Occurrence:	mandatory (1..1)	[3]
Datatype:	--	[4]
Attributes:	@FileVersion @UniqueName	[5]
Child elements:	Id Name Comment URL DescriptionURL *Choice:* Image16x14 ImageFile16x14 ImageData16x14 VendorSpecific	[6] *[7]*

[8] Describes the identity of the device vendor with its name and EtherCAT Vendor ID assigned by the EtherCAT Technology Group

Figure 4: Example of element description

The description of an each element/attribute contains the following parts:

[1]: The name of the element that is specified. In case of the paragraph describes an attribute it starts with “@”.

[2]: The complete Xpath of the element/attribute. The first element of the Xpath is “EtherCATInfo” as this is the root element of an ESI file. “Vendor” is a direct child of “EtherCATInfo”.

Each element (separated by “/” and underlined) is linked to the paragraph that describes the element, i.e. by clicking on any parent in the path, the PDF reader jumps to the definition.

[3] Occurrence (refer clause 4.1.2) specifies in word (mandatory, optional) and numbers if and how often an element/attribute needs to be specified in the ESI file. In this case the element “Vendor” needs to be available (minimum = 1, maximum = 1), the element is mandatory.

[4] Datatype (refer clause 3.4.2) specifies the data type of the content of the element/attribute. In this case, (“--") the element “Vendor” does not contain data (no data type needed) but only child elements and attributes.

[5] In case an element allows/needs attributes they are listed after the data type. If not, it is indicated by the term “- -“.In case of an attribute is described, the attributes paragraph is omitted completely, as attributes cannot have attributes.

Each attribute that is listed (each line) is linked to the paragraph that describes the attribute, i.e. by clicking on any attribute in the list, the PDF reader jumps to the definition.

[6] In case of an element allows/needs child elements they are listed after the attributes. If not, it is indicated by the term “- -“. In case of an attribute is described, the child elements paragraph is omitted completely, as attributes cannot have child elements.

Each child element that is listed (each line) is linked to the paragraph that describes the child element, i.e. by clicking on any attribute in the list, the PDF reader jumps to the definition.

[7] In case of child elements can be used exclusively, this is indicated by the “Choice” keyword in the child element list. This means that one of the (in this example) three elements can be used. It is also possible that the choice contains a group of child elements. In this case, a “Sequence” keyword indicates the group. Figure 5 shows an example, where the described parent element can either have the child “DefaultString”, “DefaultData” or the group of child elements “MinValue”, “MaxValue” and “DefaultValue”.

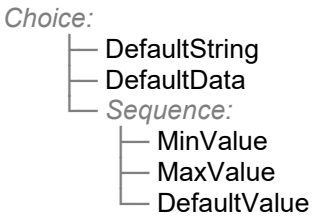


Figure 5: Choice and sequence

[8] The description text contains further information about usage of the described element/attribute.

4.1.1 Order of elements

The order of *elements* and *attributes* is given by the list of child elements and attributes in the description. The topmost element/attribute in the list shall be described first within the ESI file. It is important to use the elements in the right order. Top elements in the list have to be used first, bottom elements last.

4.1.2 Occurrence

Table 8 describes the terms of occurrence of the elements/attributes. The first value specifies minimum occurrence, second value maximum occurrence.

Table 8: Description of the terms of occurrence

Occurrence	Description
0..1	Optional Minimum: zero Maximum: one
1..1	Mandatory exact one element allowed
0..Unbounded	Optional Minimum: zero Maximum: infinite
1..Unbounded	Mandatory Minimum: one Maximum: infinite
0..n	Optional Minimum: zero Maximum: n

5 ESI File Structure

EtherCATInfo

/EtherCATInfo

Occurrence: mandatory (1..1)
Datatype: --
Attributes: @Version
Child elements: InfoReference
Vendor
Descriptions

The EtherCATInfo element is the root element of the EtherCAT Slave Device description. Figure 6 shows the structure of the EtherCAT slave information.

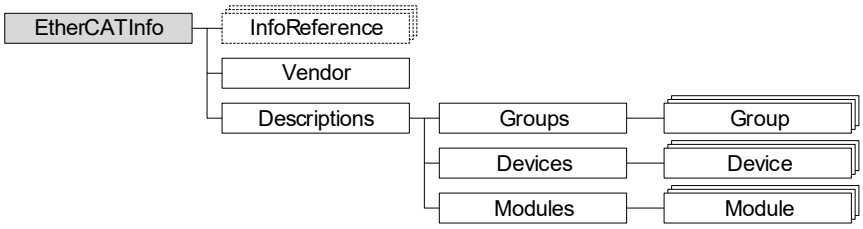


Figure 6: EtherCAT Slave Information diagram

EtherCATInfo/@Version

/EtherCATInfo/@Version

Occurrence: optional (0..1)
Datatype: String

EtherCAT device description schema version used as schema for this device description file.fix

InfoReference

/EtherCATInfo/InfoReference

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: --
Child elements: --

File name of an external file based on EtherCATModule.xsd which describes Modules

NOTE: paths may contain subfolders. Root folder is the folder of the ESI file itself.

5.1 Vendor

Vendor

/EtherCATInfo/Vendor

Occurrence: mandatory (1..1)
Datatype: VendorType
Attributes: @FileVersion
@UniqueName
Child elements: Id
Name
Comment
URL
DescriptionURL
Choice:
- Image16x14
- ImageFile16x14
- ImageData16x14

VendorSpecific

Describes the identity of the device vendor with its name and EtherCAT Vendor ID assigned by the EtherCAT Technology Group.

Vendor/@FileVersion

/EtherCATInfo/Vendor/@FileVersion

Occurrence: optional (0..1)
Datatype: Int

Version of the EtherCAT Slave Information (ESI) file. This version is vendor specific and is not evaluated by the configuration tool.

NOTE: *@FileVersion* and the schema version are not to be confused.

Vendor/@UniqueName

/EtherCATInfo/Vendor/@UniqueName

Occurrence: optional (0..1)
Datatype: String

Obsolete (Configtool: skip element)

Id

/EtherCATInfo/Vendor/Id

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

EtherCAT vendor ID (OD 0x1018.01).

Name

/EtherCATInfo/Vendor/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Expedient vendor name

Name/@LcId

/EtherCATInfo/Vendor/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Vendor/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Comment

Comment/@LcId

/EtherCATInfo/Vendor/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

URL

/EtherCATInfo/Vendor/URL

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Company URL

URL/@LcId

/EtherCATInfo/Vendor/URL/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DescriptionURL

/EtherCATInfo/Vendor/DescriptionURL

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

URL to all ESI files

Image16x14

/EtherCATInfo/Vendor/Image16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: skip element)

ImageFile16x14

/EtherCATInfo/Vendor/ImageFile16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

File path to a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool.

0xFF00FF is used for transparent color

ImageData16x14

/EtherCATInfo/Vendor/ImageData16x14

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Hex binary data of a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool

0xFF00FF is used for transparent color

NOTE: it is recommended to use DIB header version 3 as this guaranties maximum compatibility. Check: Byte 0x0E of the hex value is “0x28” when DIB header is V3

VendorSpecific

/EtherCATInfo/Vendor/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of Vendor

Descriptions

/EtherCATInfo/Descriptions

Occurrence: mandatory (1..1)

Datatype: --
Attributes: --
Child elements: Groups
Devices
Modules

Describes the EtherCAT device(s) using the elements *Groups*, *Devices* and *Modules*.

5.2 Groups

Groups

/EtherCATInfo/Descriptions/Groups

Occurrence: mandatory (1..1)
Datatype: --
Attributes: --
Child elements: Group

Similar devices can be assigned to one group. The structuring of devices to groups is used by a configuration tool.

The element *Groups* may define one or several groups with e.g. name and a bitmap symbol. The assignment of a device to a group is made within the element *…/Device/GroupType.*

The structuring of devices in groups is used by the configuration tool to group devices together. There is no slave functionality connected to the Groups element.

Group

/EtherCATInfo/Descriptions/Groups/Group

Occurrence: optional (0..Unbounded)
Datatype: GroupType
Attributes: @SortOrder
@ParentGroup
Child elements: Type
Name
Comment
Choice:
├─ Image16x14
├─ ImageFile16x14
└─ ImageData16x14
VendorSpecific

One Group groups similar devices with slightly different features.

Devices can be grouped together. This may be useful for configuration tools to display devices of one vendor or device type structured under the GroupType name in a tree view.

Group/@SortOrder

/EtherCATInfo/Descriptions/Groups/Group/@SortOrder

Occurrence: optional (0..1)
Datatype: Int

Helps to display multiple groups in the order intended by the vendor.

Groups are sorted in ascending order of this value.

Group/@ParentGroup

/EtherCATInfo/Descriptions/Groups/Group/@ParentGroup

Occurrence: optional (0..1)
Datatype: String

Contains string of any */Group/Type* this entry is subordinated. Can improves clearness when list of devices is shown in a configuration tool.

Parent group shall be defined in the same ESI file as child group.

Type

/EtherCATInfo/Descriptions/Groups/Group/Type

Occurrence: mandatory (1..1)
Datatype: String

Attributes: --
Child elements: --

A reference handle corresponding to the *GroupType* value in *…/Device/GroupType.*

Name

/EtherCATInfo/Descriptions/Groups/Group/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name for this group shown by a configuration tool

Name/@LcId

/EtherCATInfo/Descriptions/Groups/Group/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Groups/Group/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Optional Comment

Comment/@LcId

/EtherCATInfo/Descriptions/Groups/Group/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Image16x14

/EtherCATInfo/Descriptions/Groups/Group/Image16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: skip element)

ImageFile16x14

/EtherCATInfo/Descriptions/Groups/Group/ImageFile16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

File path to a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool.

0xFF00FF is used for transparent color

ImageData16x14

/EtherCATInfo/Descriptions/Groups/Group/ImageData16x14

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --

Child elements: --

This element is part of a choice. See parent's child element list for more information.

Hex binary data of a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool

0xFF00FF is used for transparent color

NOTE: it is recommended to use DIB header version 3 as this guaranties maximum compatibility. Check: Byte 0x0E of the hex value is “0x28” when DIB header is V3

VendorSpecific

/EtherCATInfo/Descriptions/Groups/Group/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of Vendor

5.3 Devices

Devices

/EtherCATInfo/Descriptions/Devices

Occurrence: mandatory (1..1)
Datatype: --
Attributes: --
Child elements: Device

Element Devices may describe one or several devices with their EtherCAT features such as SyncManagers, FMMUs, and Dictionary.

It describes all settings and features necessary to run the device.

Device

/EtherCATInfo/Descriptions/Devices/Device

Occurrence: optional (0..Unbounded)
Datatype: DeviceType
Attributes: @Invisible
@Physics
@Crc32
Child elements: Type
HideType
AlternativeType
SubDevice
Name
Comment
URL
Info
GroupType
Profile
Fmmu
Sm
Su
RxPdo
TxPdo
Mailbox
Dc
Slots
ESC
Eeprom
Choice:
- Image16x14
- ImageFile16x14
- ImageData16x14

VendorSpecific

Holds all information about the device like SyncManager and FMMU, object dictionary, data types and the PDO mapping and assign description.

Device is used to describe an EtherCAT slave device

Device/@Invisible

/EtherCATInfo/Descriptions/Devices/Device/@Invisible

Occurrence: optional (0..1)
Datatype: Boolean

Mandatory for devices, which have no EtherCAT functionality (no ESC), e.g. power supply device.

Allowed values:

0: EtherCAT slave (has EtherCAT Slave Controller (ESC))

1: No EtherCAT slave (i.e. not ESC). The device is shown by hardware configuration tools, but is not represented with data within the master configuration file.

Device/@Physics

/EtherCATInfo/Descriptions/Devices/Device/@Physics

Occurrence: mandatory (1..1)
Datatype: PhysicsType (String)

String with four characters that describes the physical type of each EtherCAT port of the device. Figure 7 shows the order of the logical ports on an ESC

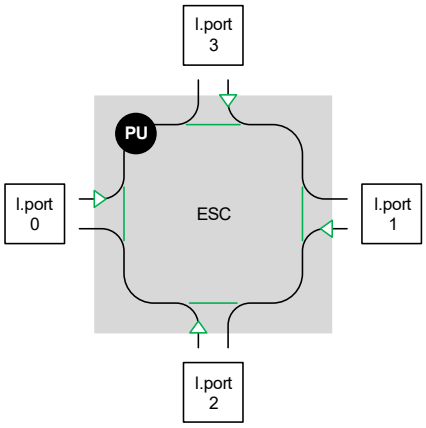


Figure 7: ESC port order

1st character: Physics of logical port 0
2nd character: Physics of logical port 1
3rd character: Physics of logical port 2
4th character: Physics of logical port 3

Allowed values for each port:

Y: MII

H: MII - Fast Hot Connect

K: LVDS

(blank character): Port not used

NOTE: Following blanks may be omitted, i.e. 'YY ' is equal to 'YY'.

Device/@Crc32

/EtherCATInfo/Descriptions/Devices/Device/@Crc32

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

CRC Checksum used to check device description against alteration. Refer to clause 0.

5.3.1 Type

Type

/EtherCATInfo/Descriptions/Devices/Device/Type

Occurrence: mandatory (1..1)
Datatype: String
Attributes: @ProductCode
@RevisionNo
@SerialNo
@CheckProductCode
@CheckRevisionNo
@CheckSerialNo
@TcSmClass
@TcCfgModeSafeOp
@UseLrdLwr
@ModulePdoGroup
@DownloadModuleList
Child elements: --

Device identity incl. name, product code, revision no.

Type/@ProductCode

/EtherCATInfo/Descriptions/Devices/Device/Type/@ProductCode

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Vendor specific product code. Used for identification in conjunction with Vendor ID. (CoE object 0x1018.2)

NOTE: The combination of product code and revision number should be unique for one device description and has to match the product code and revision number stored in the EEPROM.

Type/@RevisionNo

/EtherCATInfo/Descriptions/Devices/Device/Type/@RevisionNo

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Vendor specific revision number (CoE object 0x1018.3)

Type/@SerialNo

/EtherCATInfo/Descriptions/Devices/Device/Type/@SerialNo

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Vendor specific serial number (CoE object 0x1018.4)

Devices with same combination of product code and revision number have different serial number: *@SerialNo* shall not be used. In this case a serial number shall be written to the SII

NOTE: All device with same combination of product code and revision number have same serial number: write serial number to attribute *@SerialNo*.

Type/@CheckProductCode

/EtherCATInfo/Descriptions/Devices/Device/Type/@CheckProductCode

Occurrence: optional (0..1)
Datatype: NmToken

This element is used to specify how the product code read from the device's EEPROM is compared against the one of the network configuration (ENI).

Allowed values:

NONE: Product code is not checked

EQ: Product code read from found device shall be equal to the one of the configured device (default value)

Type/@CheckRevisionNo

/EtherCATInfo/Descriptions/Devices/Device/Type/@CheckRevisionNo

Occurrence: optional (0..1)
Datatype: NmToken

This element is used to specify how the Revision Number read from the connected device's EEPROM is compared against the one of the network configuration.

Allowed values:

NONE: revision number is not checked (default value)

EQ: revision number read from found device shall be equal to the one of the configured device

EQ_OR_G: revision number read from found device shall be equal or greater than the one of the configured device without distinguishing HW and LW.

LW_EQ: low word of revision number read from found device shall be equal with the one of the configured device

LW_EQ_HW_EQ_OR_G: low word of revision number read from found device shall be equal with the one of the configured device and the high word shall be equal or greater.

HW_EQ: high word of revision number read from found device shall be equal with the one of the configured device

HW_EQ_LW_EQ_OR_G: high word of revision number read from found device shall be equal with the one of the configured device and the low word shall be equal or greater.

Type/@CheckSerialNo

/EtherCATInfo/Descriptions/Devices/Device/Type/@CheckSerialNo

Occurrence: optional (0..1)
Datatype: NmToken

This element is used to specify how the serial number read from the connected device's EEPROM is compared against the one of the network configuration.

Allowed values:

NONE: Serial number is not checked (default value)

EQ: Serial number read from found device shall be equal to the one of the configured device

Type/@TcSmClass

/EtherCATInfo/Descriptions/Devices/Device/Type/@TcSmClass

Occurrence: optional (0..1)
Datatype: String

Vendor specific (Configtool: skip element)

Type/@TcCfgModeSafeOp

/EtherCATInfo/Descriptions/Devices/Device/Type/@TcCfgModeSafeOp

Occurrence: optional (0..1)
Datatype: Boolean

Obsolete (Configtool: use like *../Device/Info/StateMachine/Behavior/@StartToSafeopNoSync*)

Type/@UseLrdLwr

/EtherCATInfo/Descriptions/Devices/Device/Type/@UseLrdLwr

Occurrence: optional (0..1)
Datatype: Boolean

Shall only be used when ESC does not support the LRW command type.

Allowed values:

0: LRW command supported by ESC (default)

1: Indicates the configuration tool to use LRD and LWR commands instead of LRW commands.

Type/@ModulePdoGroup

/EtherCATInfo/Descriptions/Devices/Device/Type/@ModulePdoGroup

Occurrence: optional (0..1)
Datatype: Int

When using elements *Modules/Slots*: Defines the group number to which the PDOs of the this device (described by *../Device/RxPdo* and *../Device/TxPdo*) are assigned to.

Counting starts with '0'.

In addition to the PDOs of this device, the module PDOs can be assigned to the same group *(EtherCATInfo/Descriptions/Modules/Module/Type/@ModulePdoGroup*), too.

NOTE: The PDOs of a device incl. the PDOs of the modules are listed in the PDO assignment object according to the *@ModulePdoGroup* value.

Type/@DownloadModuleList

/EtherCATInfo/Descriptions/Devices/Device/Type/@DownloadModuleList

Occurrence: optional (0..1)
Datatype: Boolean

Obsolete (Configtool: use like *../Device/Slots/@DownloadModuleIdentList*)

5.3.2 HideType

HideType

/EtherCATInfo/Descriptions/Devices/Device/HideType

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @ProductCode
@RevisionNo
@ProductRevision
Child elements: --

Contains product code and may contain revision number of device(s) which should not be displayed by a configuration tool any more (e.g. older version of a device) when this (new) device is displayed.

NOTE: A configuration tool may support to show also the devices listed by the element *HideType*.

HideType/@ProductCode

/EtherCATInfo/Descriptions/Devices/Device/HideType/@ProductCode

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Use is mandatory for devices with ESC

Product code of the device that will be hidden

NOTE: if the product code of the description and product code of the device that should be hidden is the same, the element can be omitted (default value: same as Device/ProductCode).

HideType/@RevisionNo

/EtherCATInfo/Descriptions/Devices/Device/HideType/@RevisionNo

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Use is mandatory for devices with ESC

Revision number of the device that will be hidden

HideType/@ProductRevision

/EtherCATInfo/Descriptions/Devices/Device/HideType/@ProductRevision

Occurrence: optional (0..1)
Datatype: String

Obsolete (Configtool: skip element)

5.3.3 AlternativeType

AlternativeType

/EtherCATInfo/Descriptions/Devices/Device/AlternativeType

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @ProductCode
@RevisionNo

Child elements: --

Vendor specific

Config tool: skip element

AlternativeType/@ProductCode

/EtherCATInfo/Descriptions/Devices/Device/AlternativeType/@ProductCode

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

For future use

AlternativeType/@RevisionNo

/EtherCATInfo/Descriptions/Devices/Device/AlternativeType/@RevisionNo

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

For future use

5.3.4 SubDevice

SubDevice

/EtherCATInfo/Descriptions/Devices/Device/SubDevice

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @ProductCode
@RevisionNo
@PreviousDevice
@PreviousPortNo
Child elements: --

Used to display EtherCAT slaves, which are built with more than one ESC clearly arranged by a configuration tool.

Contains product code and revision number of ESIs describing additional *SubDevices*.

SubDevice/@ProductCode

/EtherCATInfo/Descriptions/Devices/Device/SubDevice/@ProductCode

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Product code of the device(s) that are part of this slave.

SubDevice/@RevisionNo

/EtherCATInfo/Descriptions/Devices/Device/SubDevice/@RevisionNo

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Revision number of the device(s) that are part of this slave.

SubDevice/@PreviousDevice

/EtherCATInfo/Descriptions/Devices/Device/SubDevice/@PreviousDevice

Occurrence: optional (0..1)
Datatype: Int

Refers to the sub devices as listed in the elements *SubDevice* of the main device with same order:

Main device = „0“,
first sub device=“1“ …

NOTE: This element is not used in a main device.

SubDevice/@PreviousPortNo

/EtherCATInfo/Descriptions/Devices/Device/SubDevice/@PreviousPortNo

Occurrence: optional (0..1)
Datatype: Int

Number of logical port of *PreviousDevice* (1, 2, 3; 0 is always IN port)

NOTE: This element is not used in a main device.

5.3.5 Name, Comment, URL

Name

/EtherCATInfo/Descriptions/Devices/Device/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Detailed name of device shown by a configuration tool (not used for identification)

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Devices/Device/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Optional comment to describe the device within ESI file (usually not evaluated by tools)

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

URL

/EtherCATInfo/Descriptions/Devices/Device/URL

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

URL for further information on the device.

Usually pointing to the vendor's homepage where up to date ESI files can be downloaded

URL/@LcId

/EtherCATInfo/Descriptions/Devices/Device/URL/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

5.3.6 Info

Info

/EtherCATInfo/Descriptions/Devices/Device/Info

Occurrence: optional (0..1)
Datatype: InfoType
Attributes: --
Child elements: Electrical
StateMachine
Mailbox

EtherCATController
Port
ExecutionUnit
VendorSpecific
StationAliasSupported
IdentificationAdo
IdentificationReg134
DeviceFeature

Additional information about the device (hardware features of ESC, timeouts)

Electrical

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: EBusCurrent
EtherCATp

Description of electrical properties of device

EBusCurrent

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EBusCurrent

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Power consumption on E-Bus in [mA].

Negative values are power suppliers.

NOTE: As this element is mandatory, set value to 0 in case of element *../Electrical/EtherCATp* element is used and *EBusCurrent* is not needed.

5.3.6.1 EtherCAT P

EtherCATp

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Device
PowerSupply

Description of EtherCAT P. Refer to ETG.1030 for more information about EtherCAT P.

Device

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device

Occurrence: mandatory (1..1)
Datatype: --
Attributes: --
Child elements: Us
Up

Description of EtherCAT P properties of the device

Us

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us

Occurrence: mandatory (1..1)
Datatype: --
Attributes: --
Child elements: PowerSupply
MinVoltage
Current
External

Description of EtherCAT P supply voltage U_S in the device.

PowerSupply

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/PowerSupply

Occurrence: optional (0..1)
Datatype: Boolean
Attributes: --
Child elements: --

Specifies if U_S of the device is powered by an external power supply.

Allowed values:

0: device is not powered by external power supply (default)

1: device is powered by external power supply

NOTE: *.../Device/Us/PowerSupply* and *.../Device/Up/PowerSupply* always show the same value: "true" if the device is a PSD (power sourcing device), "false" if it is a PD (powered device)

MinVoltage

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/MinVoltage

Occurrence: optional (0..1)
Datatype: Float
Attributes: --
Child elements: --

Minimal U_S voltage, the device needs to run properly in Volt

Default: 20.4

NOTE: In case the device is a PSD (supplied from external power supply) this value may be used for external voltage drop calculation, so the value is needed for both, PDs and PSDs

Current

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/Current

Occurrence: optional (0..1)
Datatype: Float
Attributes: @Type
Child elements: --

Current in amps, the devices consumes at nominal voltage (24.0 volts)

NOTE: In case the device is a PSD (supplied from external power supply) this value may be used for external voltage drop calculation, so the value is needed for both, PDs and PSDs

Current/@Type

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/Current/@Type

Occurrence: optional (0..1)
Datatype: EtherCATPLoadType (Token)

Load characteristic of the device. Configuration tool calculates actual power consumption depending on the actual supply voltage (may differ to nominal voltage of 24.0V)

Allowed values:

SwitchingRegulator: Device behaves like a switching regulator (SR). Configuration tool considers power P (= U x I) as constant (default)

LowDropoutRegulator: Device behaves like a low dropout regulator (LDO). Configuration tools considers current (I) as constant

Resistor: Device behaves like an electric resistance (R). Configuration considers the electric resistance as constant.

NOTE: refer to ETG.1030 for description and example of the allowed load types

External

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/External

Occurrence: optional (0..1)
Datatype: --
Attributes: --

Child elements: Channel

Description of voltages provided to externally connected devices, derived from U_S. Not present if the device does not provide any.

Element *External* indicates that the device provides power for devices that can be externally connected (e.g. sensors or actors). Child element *../External/Voltage* is used if the voltage level is transformed before providing it to external components.

Channel

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/External/Channel

Occurrence: mandatory (1..Unbounded)
Datatype: --
Attributes: --
Child elements: Name
Voltage

Description of one specific type of voltage, externally provided to other components by the device.

Name

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/External/Channel/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name of the connector where the voltage is supplied to (e.g. “Port X12” or “Sensor port 6”)

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/External/Channel/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Voltage

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/External/Channel/Voltage

Occurrence: optional (0..1)
Datatype: Float
Attributes: @Type
Child elements: --

Level of voltage, provided to this channel (e.g. “5.0” for 5V)

If Us/Up is provided externally without any transformation, this element is omitted

Voltage/@Type

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Us/External/Channel/Voltage/@Type

Occurrence: optional (0..1)
Datatype: EtherCATPLoadType (Token)

Characteristic of the power supply unit providing external voltage for this channel. Configuration tool calculates Us/Up power consumption accordingly.

Allowed values:

SwitchingRegulator: Device behaves like a switching regulator (SR). Configuration tool considers power P (= U x I) as constant (default)

LowDropoutRegulator: Device behaves like a low dropout regulator (LDO). Configuration tools considers current (I) as constant

Resistor: Device behaves like an electric resistance (R). Configuration considers the electric resistance as constant.

NOTE: refer to ETG.1030 for description and example of allowed values

Up

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: PowerSupply
MinVoltage
Current
External

Description of EtherCAT P peripheral voltage U_P in device

NOTE: element can be omitted in case of U_P is not used in an PD.

PowerSupply

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/PowerSupply

Occurrence: optional (0..1)
Datatype: Boolean
Attributes: --
Child elements: --

Allowed values:

0: device is not powered by external power supply (default)

1: device is powered by external power supply

NOTE: *.../Device/Us/PowerSupply* and *.../Device/Up/PowerSupply* always show the same value: “true” if it is a PSD (power sourcing device), “false” if it is a PD (powered device)

MinVoltage

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/MinVoltage

Occurrence: optional (0..1)
Datatype: Float
Attributes: --
Child elements: --

Minimal U_P voltage the device needs to run properly in Volt

Default: 20.4

NOTE: In case the device is a PSD (supplied from external power supply) this value may be used for external voltage drop calculation, so the value is needed for both, PDs and PSDs

Current

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/Current

Occurrence: optional (0..1)
Datatype: Float
Attributes: @Type
Child elements: --

Current in Amperes the devices consumes at nominal voltage (24.0 volts)

NOTE: In case the device is a PSD (supplied from external power supply) this value may be used for external voltage drop calculation, so the value is needed for both, PDs and PSDs

Current/@Type

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/Current/@Type

Occurrence: optional (0..1)
Datatype: EtherCATPLoadType (Token)

Load characteristic of the device. Configuration tool calculates actual power consumption depending on the actual supply voltage (may differ to nominal voltage of 24.0V)

Allowed Values:

SwitchingRegulator: Device behaves like a switching regulator (SR). Configuration tool considers power P (= U x I) as constant (default)

LowDropoutRegulator: Device behaves like a low dropout regulator (LDO). Configuration tools considers current (I) as constant

Resistor: Device behaves like an electric resistance (R). Configuration considers the electric resistance as constant.

NOTE: refer to ETG.1030 for description and example of the allowed load types

External

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/External

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Channel

Element *External* indicates that the device provides power for devices that can be externally connected (e.g. sensors or actors). Child element *Voltage* is used if the voltage level is transformed before providing it to external components.

Channel

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/External/Channel

Occurrence: mandatory (1..Unbounded)
Datatype: --
Attributes: --
Child elements: Name
Voltage

Description of one specific type of voltage externally provided to other components by the device.

Name

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/External/Channel/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name of the connector where the voltage is supplied to (e.g. “Port X12” or “Sensor port 6”)

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/External/Channel/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Voltage

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/External/Channel/Voltage

Occurrence: optional (0..1)
Datatype: Float
Attributes: @Type
Child elements: --

Level of voltage, provided to this channel (e.g. “5.0” for 5V)

If Us/Up is provided externally without any transformation, this element is omitted

Voltage/@Type

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/Device/Up/External/Channel/Voltage/@Type

Occurrence: optional (0..1)
Datatype: EtherCATPLoadType (Token)

Characteristic of the power supply unit providing external voltage for this channel. Configuration tool calculates Us/Up power consumption accordingly.

Allowed values:

SwitchingRegulator: Device behaves like a switching regulator (SR). Configuration tool considers power P (= U x I) as constant (default)

LowDropoutRegulator: Device behaves like a low dropout regulator (LDO). Configuration tools considers current (I) as constant

Resistor: Device behaves like an electric resistance (R). Configuration considers the electric resistance as constant.

NOTE: refer to ETG.1030 for description and example of allowed values

PowerSupply

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/PowerSupply

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Us
Up

Description of PSE properties of the device

Us

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/PowerSupply/Us

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: MaxCurrent

Description of U_S power supply

MaxCurrent

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/PowerSupply/Us/MaxCurrent

Occurrence: mandatory (1..1)
Datatype: Float
Attributes: --
Child elements: --

Maximal current of U_S in Amperes the device can supply, in sum, on all EtherCAT P OUT ports

Up

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/PowerSupply/Up

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: MaxCurrent

Description of U_P power supply

MaxCurrent

/EtherCATInfo/Descriptions/Devices/Device/Info/Electrical/EtherCATp/PowerSupply/Up/MaxCurrent

Occurrence: mandatory (1..1)
Datatype: Float
Attributes: --
Child elements: --

Maximal current of U_P in Amperes the device can supply, in sum, on all EtherCAT P OUT ports

5.3.6.2 State Machine

StateMachine

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Timeout
Behavior

Describes implemented behavior and attributes of the device's EtherCAT state machine.

Timeout

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Timeout

Occurrence: optional (0..1)
Datatype: --
Attributes: --

Child elements: PreopTimeout
SafeopOpTimeout
BackToInitTimeout
BackToSafeopTimeout

Timeout values describe in milliseconds how long the master waits for the confirmation of a requested state change. The value measures from the time of sending the state change request until the state change is confirmed the latest.

PreopTimeout

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Timeout/PreopTimeout

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Timeout time for state transition from INIT → PREOP/BOOT

Default value: 3000ms

SafeopOpTimeout

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Timeout/SafeopOpTimeout

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Timeout time for state transition from SAFEOP → OP and PREOP → SAFEOP

Default value: 10000ms

BackToInitTimeout

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Timeout/BackToInitTimeout

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Timeout time for state transition from OP/SAFEOP/PREOP/BOOT → INIT and OP/SAFEOP → PREOP

Default value: 5000ms

BackToSafeopTimeout

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Timeout/BackToSafeopTimeout

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Timeout time for state transition from OP → SAFEOP

Default value: 200ms

Behavior

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Behavior

Occurrence: optional (0..1)
Datatype: --
Attributes: @StartToInit
@StartToPreop
@StartToSafeop
@StartToSafeopNoSync
Child elements: --

State to which the master sets the slave at start up. Lower states exclude upper states. If no attribute is available, no state restrictions are set.

Behavior/@StartToInit

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Behavior/@StartToInit

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Master sets device to OP at start up

1: Master sets slave to INIT at start up

Behavior/@StartToPreop

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Behavior/@StartToPreop

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Master sets device to OP at start up

1: Master sets slave to PREOP at start up

Behavior/@StartToSafeop

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Behavior/@StartToSafeop

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Master sets device to Op at start up

1: Master sets slave to SAFEOP at start up

Behavior/@StartToSafeopNoSync

/EtherCATInfo/Descriptions/Devices/Device/Info/StateMachine/Behavior/@StartToSafeopNoSync

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Master sets device to Op at start up

1: Master sets slave only to SAFEOP (not to OP) if the master does not support DC synchronized operation

5.3.6.3 Mailbox

Mailbox

/EtherCATInfo/Descriptions/Devices/Device/Info/Mailbox

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Timeout

Details for mailbox communication

Timeout

/EtherCATInfo/Descriptions/Devices/Device/Info/Mailbox/Timeout

Occurrence: mandatory (1..1)
Datatype: --
Attributes: --
Child elements: RequestTimeout
ResponseTimeout

Timeout values in milliseconds for mailbox communication

RequestTimeout

/EtherCATInfo/Descriptions/Devices/Device/Info/Mailbox/Timeout/RequestTimeout

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --

Child elements: --

Time the master re-tries to initiate a successful mailbox request (= sending the mailbox request datagram for this time until the WKC becomes valid or the timeout expires)

Default value: 100ms

ResponseTimeout

/EtherCATInfo/Descriptions/Devices/Device/Info/Mailbox/Timeout/ResponseTimeout

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Time the master re-tries to successfully read a mailbox response (= sending the mailbox read command for this time until the WKC becomes valid or the timeout expires)

Default value: 1000ms

NOTE: This time should be longer than the maximum time the slave needs to produce the mailbox response.

5.3.6.4 ESC

EtherCATController

/EtherCATInfo/Descriptions/Devices/Device/Info/EtherCATController

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: DpramSize
SmCount
FmmuCount

Description of ESC features

NOTE: May be used when device supports flexible usage of hardware entities

DpramSize

/EtherCATInfo/Descriptions/Devices/Device/Info/EtherCATController/DpramSize

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

DPRAM (i.e. above address 0x1000) size of ESC in Byte

Default: size not specified

SmCount

/EtherCATInfo/Descriptions/Devices/Device/Info/EtherCATController/SmCount

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Number of SyncManagers supported by ESC

FmmuCount

/EtherCATInfo/Descriptions/Devices/Device/Info/EtherCATController/FmmuCount

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Number of FMMUs supported by ESC

5.3.6.5 Port

Port

/EtherCATInfo/Descriptions/Devices/Device/Info/Port

Occurrence: optional (0..4)
Datatype: --
Attributes: --
Child elements: Type
Connector
Label
RxDelay
TxDelay
PhysicalPhyAddr
EtherCATp

Description of configured available ports

Type

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/Type

Occurrence: mandatory (1..1)
Datatype: NmToken
Attributes: --
Child elements: --

Allowed values:

MII

EBUS

NONE

Connector

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/Connector

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @VendorId
Child elements: --

Connector the slave provides for this port. May be shown by a configuration tool.

Specified connectors by ETG (@VendorId = 1):

M8P: EtherCAT P M8 P-coded female

M12D: M12 D-coded female

RJ45: RJ45 female

All other connectors shall use the corresponding vendor id of the company.

NOTE: As passive adaptor cables allow the connection between different connectors (e.g. M8 and RJ45), the Connector element is not suitable to filter devices in a configuration tool when the user adds a device to a port.

Connector/@VendorId

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/Connector/@VendorId

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Vendor id of the company that defined the connector. Vendor id “1” is used for connectors specified by the ETG (M8P, M12D, RJ45).

Label

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/Label

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Contains the text of the label printed on the corresponding port on the device, e.g. “IN” or “EtherCAT IN”

RxDelay

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/RxDelay

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

For future use

TxDelay

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/TxDelay

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

For future use

PhysicalPhyAddr

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/PhysicalPhyAddr

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Logical PHY address used for accessing PHY via MII management interface (value for register 0x0512).

Allowed values:

-1: PHY of this port cannot be accessed via MII

≥0: hardware configured PHY address of PHY

Default:

LogicalPhyAddr = logical port number (0-3)

NOTE: PHY address offset of ESC is added to logical PHY address (e.g. element *Port:LogicalPhyAddr* = 10 and PHY offset of ESC = 16. Logical PHY address is 26. This value shall be equal to the hardware configured address of the PHY).

5.3.6.5.1 EtherCAT P

EtherCATp

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Us
Up

Mandatory for ports with PI using an M8 P-coded connector

Description of EtherCAT P port of the device.

Us

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp/Us

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: PowerSupply
MaxCurrent
Resistance

Description of U_S (supply voltage) this port supplies.

This element shall be used for all EtherCAT P ports except EtherCAT P tolerant ports (i.e. IN port of a “Refreshing Device”), where U_S is blocked and not used.

PowerSupply

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp/Us/PowerSupply

Occurrence: optional (0..1)

Datatype: Boolean
Attributes: --
Child elements: --

Specifies if the power supply sourcing this port is an external one

Shall be 0 or omitted for EtherCAT P IN ports

Allowed values:

0: U_S is not supplied by an external supply (default)

1: U_S is supplied by an external supply

NOTE: *../Us/PowerSupply* and *../Up/PowerSupply* always show the same value: "true" if it is an OUT port of a PSD (power sourcing device), "false" if it is an OUT port of a PD (powered device) or a EtherCAT P IN port

MaxCurrent

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp/Us/MaxCurrent

Occurrence: optional (0..1)
Datatype: Float
Attributes: --
Child elements: --

Current in Amperes this port can deliver to following devices

Default: 3

NOTE: according ETG.1030 the maximum current only can be unequal to '3' for an IN port of an End Device or a Decoupler.

Resistance

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp/Us/Resistance

Occurrence: mandatory (1..1)
Datatype: Float
Attributes: --
Child elements: --

Resistance of the path between U_S+ and U_SGND of the port (mainly coils and PCB)

Up

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp/Up

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: PowerSupply
MaxCurrent
Resistance

Description of EtherCATp Up (peripheral voltage) of the port

This element shall be used for all EtherCAT P ports except EtherCAT P tolerant ports (i.e. IN port of a "Refreshing Device"), where U_P is blocked and not used and ports of "End Devices/Decoupler" not using U_P.

PowerSupply

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp/Up/PowerSupply

Occurrence: optional (0..1)
Datatype: Boolean
Attributes: --
Child elements: --

Specifies if the power supply sourcing this port is an external one

Shall be 0 or omitted for EtherCAT P IN port

Allowed values:

0: U_P is not supplied by an external supply (default)

1: U_P is supplied by an external supply

NOTE: *../Up/PowerSupply* and *../Us/PowerSupply* always show the same value: “true” if it is an OUT port of a PSD (power sourcing device), “false” if it is an OUT port of a PD (powered device) or a EtherCAT P IN port

MaxCurrent

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp/Up/MaxCurrent

Occurrence: optional (0..1)
Datatype: Float
Attributes: --
Child elements: --

Current in Amperes this port can deliver to following devices

Default: 3

NOTE: according ETG.1030 the maximum current only can be unequal to ‘3’ on an IN port if the device is an End Device or a Decoupler.

Resistance

/EtherCATInfo/Descriptions/Devices/Device/Info/Port/EtherCATp/Up/Resistance

Occurrence: mandatory (1..1)
Datatype: Float
Attributes: --
Child elements: --

Resistance of the path between U_P+ and U_PGND of the port (mainly coils and PCB)

5.3.6.6 ESC, Execution Unit

ExecutionUnit

/EtherCATInfo/Descriptions/Devices/Device/Info/ExecutionUnit

Occurrence: optional (0..2)
Datatype: --
Attributes: --
Child elements: Type
RxDelay
TxDelay

Description of available execution unit

Type

/EtherCATInfo/Descriptions/Devices/Device/Info/ExecutionUnit/Type

Occurrence: mandatory (1..1)
Datatype: NmToken
Attributes: --
Child elements: --

Allowed values:

NONE:

PRIMARY: Execution unit after Port 0

SECONDARY: for future use

RxDelay

/EtherCATInfo/Descriptions/Devices/Device/Info/ExecutionUnit/RxDelay

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

For future use

TxDelay

/EtherCATInfo/Descriptions/Devices/Device/Info/ExecutionUnit/TxDelay

Occurrence: optional (0..1)
Datatype: Int

Attributes: --
Child elements: --

For future use

VendorSpecific

/EtherCATInfo/Descriptions/Devices/Device/Info/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of Info.

5.3.6.7 Identification

StationAliasSupported

/EtherCATInfo/Descriptions/Devices/Device/Info/StationAliasSupported

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Obsolete (Configtool: skip element)

IdentificationAdo

/EtherCATInfo/Descriptions/Devices/Device/Info/IdentificationAdo

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Identification information of the device. Element defines the ESC memory address where the Identification ID is saved.

Length: 2 Byte

Example: If IdenficationAdo is 0x0012 the register "Configured Station Alias" is used
If IdentificationAdo is 0x1000 Input Data is used

IdentificationReg134

/EtherCATInfo/Descriptions/Devices/Device/Info/IdentificationReg134

Occurrence: optional (0..1)
Datatype: Boolean
Attributes: --
Child elements: --

Device supports Explicit Device Identification according ETG.1020/ETG.1000

NOTE: This is the recommended way for identifying a slave with application microcontroller and ID selector.

5.3.6.8 Device Features

DeviceFeature

/EtherCATInfo/Descriptions/Devices/Device/Info/DeviceFeature

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: Name
Value
Description
Register

For future use

Name

/EtherCATInfo/Descriptions/Devices/Device/Info/DeviceFeature/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

For future use

Value

/EtherCATInfo/Descriptions/Devices/Device/Info/DeviceFeature/Value

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

For future use

Description

/EtherCATInfo/Descriptions/Devices/Device/Info/DeviceFeature/Description

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

For future use

Register

/EtherCATInfo/Descriptions/Devices/Device/Info/DeviceFeature/Register

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: StartAddress
Length
BitMask

For future use

StartAddress

/EtherCATInfo/Descriptions/Devices/Device/Info/DeviceFeature/Register/StartAddress

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

For future use

Length

/EtherCATInfo/Descriptions/Devices/Device/Info/DeviceFeature/Register/Length

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

For future use

BitMask

/EtherCATInfo/Descriptions/Devices/Device/Info/DeviceFeature/Register/BitMask

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

For future use

5.3.7 GroupType

GroupType

/EtherCATInfo/Descriptions/Devices/Device/GroupType

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Reference to a group (described in element *Groups*) to which this device should be assigned to.

Name of the handle used in element *EtherCATInfo/Descriptions/Groups/Group/Type*

5.3.8 Profile

Table 9 describes the elements ProfileNo, AddInfo, ChannelCount, and ChannelInfo.

Table 9: Description of Profiles

Profile usage	used elements
Slave does not have distinct channels	*ProfileNo*, *AddInfo*
Slave supports several channels with identical profile and sub-profile number	*ProfileNo*, *AddInfo*, *ChannelCount*
Slave supports several channels with different profile and/or sub-profile number	*ChannelInfo* NOTE: one *ChannelInfo* element per channel

Profile

/EtherCATInfo/Descriptions/Devices/Device/Profile

Occurrence: optional (0..Unbounded)
Datatype: ProfileType
Attributes: @Channel
Child elements: ProfileNo
AddInfo
Choice:
├─ ChannelCount
└─ ChannelInfo
Choice:
├─ DictionaryFile
└─ Dictionary
Choice:
├─ DiagFile
└─ DiagMessages
VendorSpecific

Description of the used profile and object dictionary including data type definition.

This element describes an offline object dictionary of the device and, if supported, the profile type. It shall be consistent with the description in element *RxPdo* and *TxPdo*, and the online object dictionary of the slave.

The Object Dictionary can either be described within the element *Profile* or a reference can be given to an external Object Dictionary File (refer to *../Profile/DictionaryFile*).

5.3.8.1 Profile Number, Channel information

Profile/@Channel

/EtherCATInfo/Descriptions/Devices/Device/Profile/@Channel

Occurrence: optional (0..1)
Datatype: Int

Obsolete (Configtool: skip element)

ProfileNo

/EtherCATInfo/Descriptions/Devices/Device/Profile/ProfileNo

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Use according Table 9

Number of device profile (low word of CoE object 0x1000) used by this device (e.g. 5001 for MDP or 402 for CiA402).

NOTE: Only profiles specified by ETG may be used.

AddInfo

/EtherCATInfo/Descriptions/Devices/Device/Profile/AddInfo

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Use according Table 9

Sub-Profile number (high word of CoE object 0x1000; e.g. according to ETG.5001 MDP sub-profile types.

If *ProfileNo* = 402, Default Value = 2 (Servo drives).

ChannelCount

/EtherCATInfo/Descriptions/Devices/Device/Profile/ChannelCount

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Use according Table 9

Number of channels of this device (e.g. an analog device with 4 analog inputs can be described as device with 4 channels)

ChannelInfo

/EtherCATInfo/Descriptions/Devices/Device/Profile/ChannelInfo

Occurrence: mandatory (1..Unbounded)
Datatype: --
Attributes: @OverwrittenByModule
@ChannelGroup
Child elements: ProfileNo
AddInfo
DisplayName

This element is part of a choice. See parent's child element list for more information.

Use according Table 9

Describes each channel of a device with its profile and sub-profile number. Used when a device supports several channels and those channels support different profiles.

ChannelInfo/@OverwrittenByModule

/EtherCATInfo/Descriptions/Devices/Device/Profile/ChannelInfo/@OverwrittenByModule

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Profile description is fixed

1: Profile number and sub-profile number is not considered (i.e. when configuration tool supports the elements *Modules* and *Slots* this object is defined in the element *Modules* of the ESI)

ChannelInfo/@ChannelGroup

/EtherCATInfo/Descriptions/Devices/Device/Profile/ChannelInfo/@ChannelGroup

Occurrence: optional (0..1)
Datatype: Integer

A configuration tool may group all entries containing the same number to improve clearness of relation between device channel and physical port/channel of the device.

Example: A device can support two different profiles on one external interface and needs two entries of element ChannelInfo. If both support the attribute ChannelInfo = 1 they are clearly grouped to one interface (physical I/O-port).

ProfileNo

/EtherCATInfo/Descriptions/Devices/Device/Profile/ChannelInfo/ProfileNo

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Profile number (low word of CoE object 0x1000) of this channel

AddInfo

/EtherCATInfo/Descriptions/Devices/Device/Profile/ChannelInfo/AddInfo

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Sub-profile number (high word of CoE object 0x1000) of this channel

If *../ChannelInfo/ProfileNo* = 402, default value = 2 (servo drives).

DisplayName

/EtherCATInfo/Descriptions/Devices/Device/Profile/ChannelInfo/DisplayName

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

If a drive supports more than one channel then a name can be assigned to each of them. A configuration tool may show the single channels with the */ChannelInfo/DisplayName* to link them to a drive manager tool

NOTE: May be used to assign several channels to one axis; in this case *DisplayName* describes the channel name.

DisplayName/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/ChannelInfo/DisplayName/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

5.3.8.2 Offline Dictionary

DictionaryFile

/EtherCATInfo/Descriptions/Devices/Device/Profile/DictionaryFile

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Path to Dictionary file.

NOTE: the root folder on which the path is based on is the same as the root folder of the ESI file.

Dictionary

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary

Occurrence:	optional (0..1)
Datatype:	DictionaryType
Attributes:	--
Child elements:	UnitTypes DataTypes Objects

This element is part of a choice. See parent's child element list for more information.

The Dictionary describes data types used to describe entries in the object dictionary (element *DataType*) and the object dictionary itself (element *Object*) of the device.

The element is used by the configuration tool to display the object dictionary offline. This gives the end user the possibility to adopt device specific parameters (easier). If the element *Dictionary* is supported at least mandatory objects shall be described herewith.

Figure 8 shows how the Dictionary element is composed.

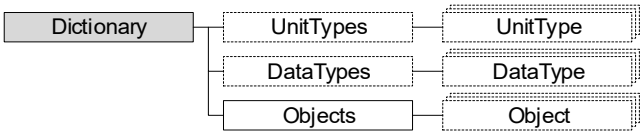


Figure 8: Content of Dictionary/Object

NOTE: Mandatory objects shall be defined. Optional objects may be defined.

5.3.8.2.1 Units

UnitTypes

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/UnitTypes

Occurrence:	optional (0..1)
Datatype:	--
Attributes:	--
Child elements:	UnitType

List of following element *UnitType.*

UnitType describes the data type for unit descriptions according ETG.1020.

NOTE: It is recommended to define specified units (refer ETG.1004) as well, so it can be guaranteed that the master/configuration tool knows the unit.

UnitType

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/UnitTypes/UnitType

Occurrence:	optional (0..Unbounded)
Datatype:	UnitTypeType
Attributes:	--
Child elements:	NotationIndex Index Name Symbol

Definition of one unit type that can be used in element *../Dictionary/Objects/Object/Info/Unit*

NotationIndex

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/UnitTypes/UnitType/NotationIndex

Occurrence:	mandatory (1..1)
Datatype:	HexDecValue (String)
Attributes:	--
Child elements:	--

Notation index (UINT8) of unit type according to ETG.1004

NOTE: if supported, CoE object 0x400 + "notation index" shall hold the same information as this element

Index

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/UnitTypes/UnitType/Index

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Object Index of the unit definition as defined in ETG.1004 Unit Specification.

NOTE: Index = NotationIndex + 0x400

Name

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/UnitTypes/UnitType/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of unit according to ETG.1004

Symbol

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/UnitTypes/UnitType/Symbol

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Symbol of unit according to ETG.1004

5.3.8.2.2 Data types

Table 10: Data Type Composition

CoE (Object) Data Type	Help Data Type construction	Mandatory Elements	Description	Name format
Base Data Type (excluding "ARRAY [0..n] OF *XYZ*")		Name BitSize	For allowed base data types refer to clause 3.4.3	As defined in clause 3.4.3
ARRAY		Name BitSize SubItem	Describes an object of data type ARRAY, i.e.: First element *SubItem* (SI0): *SubItem*/*SubIdx* = 0 Type shall be USINT Second element *SubItem* (SI1-n by using ARRAY Information) **no** *SubItem/SubIdx*, Type = DTyyyyARR	Recommended: DTyyyy* yyyy = index of object
	ARRAY Information	Name BaseType BitSize ArrayInfo	Describes an object of data type ARRAY, i.e.: SI1-n. *ArrayInfo/LBound* = 1 NOTE: The object data type does not include SI0	Recommended: DTyyyyARR* yyyy = index of object
RECORD		Name BitSize SubItem	Describes an object of data type RECORD First Element SubItem (SI0): *SubItem/SubIdx* = 0 Type shall be USINT Following SubItems: *SubItem/SubIdx* > 0	Recommended: DTyyyy* yyyy = index of object

CoE (Object) Data Type	Help Data Type construction	Mandatory Elements	Description	Name format
ENUM		Name BaseType BitSize EnumInfo	Describes data type for an enumerated object entry. *BaseType* can be any base data types according to clause 3.4.3 with length of 32 bits or less. The enumerated value is allways UDINT online. Any different datatype used in the ESI allows a Configtool to interpret values different from UDINT. It also allows a configuration tool to read/write reduced amount of bits (e.g. BIT3 instead of UDINT). BitSize shall match the used base data type.	Recommended: DTyyyyENxx yyyy = index of object in the index range from 0x800-0xFFF xx = Bitlength of Enum
ARRAY [0..n] OF *XYZ*		Name BaseType BitSize ArrayInfo	Describes data type for an ARRAY [0..n] OF *XYZ* object entry *ArrayInfo/LBound* = 0 *ArrayInfo/Elements* = n+1. NOTE: Despite ARRAY [0..n] OF *XYZ* are base data types, they shall be defined for usage in the offline object dictionary.	ARRAY [0..n] OF *XYZ* *XYZ* = Base data type according ETG.1020

*) NOTE: If a data type should be used for more than one object, it is recommended to use the first occurrence for naming. E.g.: 'DT6000' can be used for Object 0x6000, 0x6010, and 0x6050.

DataTypes

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: DataType

Mandatory if objects are defined in element Objects

List of following element *DataTypes*.

DataType

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType

Occurrence: optional (0..Unbounded)
Datatype: DataTypeType
Attributes: --
Child elements: Index
Name
BaseType
Comment
BitSize
Choice:
- ArrayInfo
- SubItem
- EnumInfo

Properties
Xml

The *DataType* describes a data type used in the element *../Dictionary/Objects/Object.*

All data types, which are used in the Object element, shall be defined, including base data types as defined in clause 3.4.3

Depending on the data type to be defined elements according Table 10 are required:

Index

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Index

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --

Child elements: --

Reserved for future use.

Name

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of data type.

NOTE: For allowed/recommended names, refer to Table 10.

BaseType

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/BaseType

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Usage according to Table 10.Specifies the base data type of a complex data type or an object data type

For allowed values, refer to 3.4.3.

Comment

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Optional comment on the data type

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

BitSize

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/BitSize

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Length of data type in bit.

BitSize is calculated according to the data type

BaseType:
BitSize is the length of the base data type

ENUM information:
BitSize is the length of bits used for the enumerated values. BitSize is used to adopt the Enum length to the object entry length.

ARRAY Information:
BitSize is the length of the used BaseType multiplied by the Number of Elements.

ARRAY:
BitSize is size of Subindex 0 (data type shall be USINT = 8 Bit) plus alignment information plus BitSize of ARRAY Information DataType.

NOTE: Subindex 0 plus alignment information is equal to the BitOffset of Subindex 1.

RECORD:
BitSize is the sum of Bit of all elements including alignment information, i.e. Subindex 0 (data type shall be USINT = 8 Bit) to last subindex including alignment.

NOTE: For objects of type array or record only supporting subindex 0 (e.g. “empty” PDO) the bitsize of the complete object is 16, i.e. the padding is included after SI 0.

NOTE: Information for Complete Access:
The information *BitSize* is needed to know the complete size of the object including alignment information. SubItem:BitSize is needed to know the size of each element. *../DataType/SubItem/BitOffset* is needed to know the offset of each element, including alignment information.

ArrayInfo

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/ArrayInfo

Occurrence:	optional (0..3)
Datatype:	ArrayInfoType
Attributes:	--
Child elements:	LBound Elements

This element is part of a choice. See parent's child element list for more information.

Used to describe data type “ARRAY Information” and “OCTET_STRING”.

Refer to Table 10

LBound

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/ArrayInfo/LBound

Occurrence:	mandatory (1..1)
Datatype:	Integer
Attributes:	--
Child elements:	--

Index of first array element.

For usage Table 10

Data range: 0 … 255

Elements

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/ArrayInfo/Elements

Occurrence:	mandatory (1..1)
Datatype:	Integer
Attributes:	--
Child elements:	--

Number of array elements

Data range:

1 … 255 (when used as ARRAY Information)

n+1 (when used for ARRAY [0..n] of XYZ)

See Table 10 for details.

SubItem

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem

Occurrence:	optional (0..Unbounded)
Datatype:	SubItemType
Attributes:	--
Child elements:	SubIdx Name DisplayName Type Comment BitSize BitOffs *Choice:* ├─ DefaultString

- DefaultData
- *Sequence:*
  - MinValue
  - MaxValue
  - DefaultValue
- Flags
- Property
- Xml

This element is part of a choice. See parent's child element list for more information.

Describes the elements of a “RECORD” or “ARRAY” data type.

The order of the SubItem elements reflects the order of the subindices in the device’s object dictionary.

SubIdx

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/SubIdx

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Mandatory for every SubItem when object data type is RECORD

Mandatory exclusively for SubItem 0 (= subindex 0) when object data type is ARRAY.

Usage according to Table 10.

Name

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of *SubItem*

Name of first *SubItem* (subindex 0) shall be “SubIndex 000”, “number of entries”, or “Number of entries”.

If data type ARRAY: Not relevant for second SubItem.

If data Type RECORD: This name is the identifier to the corresponding entry in the Object definition (*../Object/Name*), i.e. spelling must be identical.

DisplayName

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/DisplayName

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Contains an alternative name for this subindex that might be shown additionally to or instead of value of *Name* by a configuration tool.

NOTE: element Name holds the name that is used for SDO info and might be defined by specifications (e.g. “Hardware Version”). Element *DisplayName* can be used for an individual term also in different languages.

DisplayName/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/DisplayName/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Type

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Type

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --

Child elements: --

Data type of this SubItem

Usage according to Table 10.

Comment

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of the SubIndex content

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

BitSize

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/BitSize

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Length of SubIndex value in bit

BitOffs

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/BitOffs

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Bit address of the SubItem value starting at 0.

NOTE: The bit offset of SubItem 0 shall be 0x00. For SubItems >0 the bit offset can be chosen without any restriction. Padding bits for alignment do not have to be described explicitly.

DefaultString

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/DefaultString

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/DefaultString*)

DefaultData

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/DefaultData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/DefaultData*)

MinValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/MinValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/MinValue*)

MaxValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/MaxValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/MaxValue*)

DefaultValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/DefaultValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/DefaultValue*)

Flags

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Access
Category
PdoMapping
Attribute
Backup
Setting

Permissions for object handling

For ARRAY and RECORD

If *SubItem* is defined the flags in *../Subitem/Flags* shall be used for the entries (overwrite values given in *../Object/Flags*)

Access

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Access

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: @ReadRestrictions
@WriteRestrictions
Child elements: --

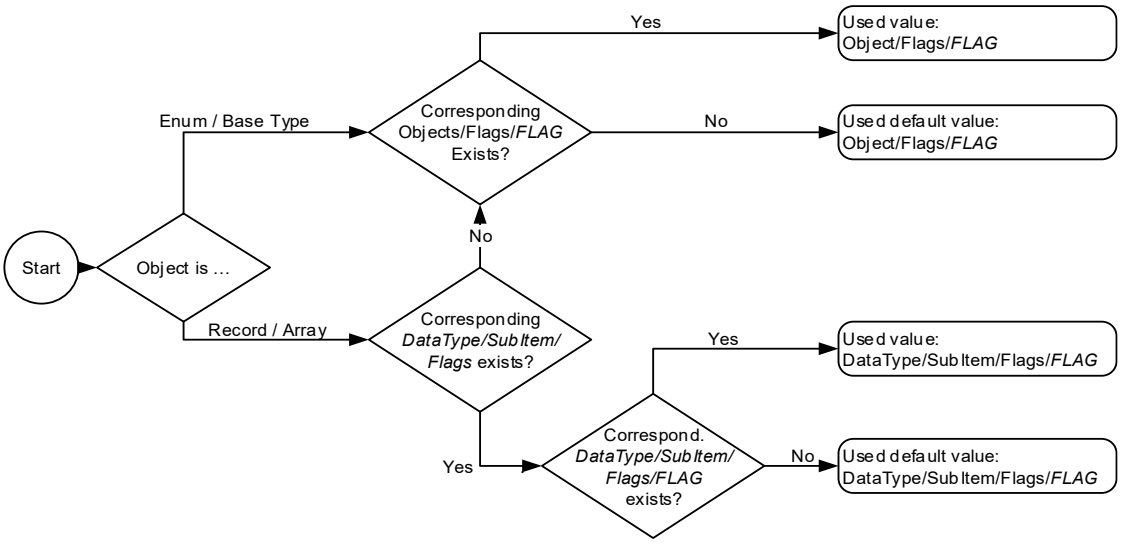
Access Type

Allowed values:

ro: readonly (default)
rw: readwrite
wo: writeonly

NOTE: The access right can be restricted by the attributes *ReadRestrictions* and *WriteRestrictions*

Usage



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

Access/@ReadRestrictions

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Access/@ReadRestrictions

Occurrence: optional (0..1)
Datatype: NmToken

Read access only available in the selected ESM state(s). Access Type shall be rw or ro.

Allowed values:

PreOP: Read access only in PreOP
PreOP_SafeOP: Read access only in PreOP and SafeOP
PreOP_OP: Read access only in PreOP and OP
SafeOP: Read access only in SafeOP
SafeOP_OP: Read access only in SafeOP and OP
OP: Read access only in OP

Configtool: for compatibility reasons also "PreO**p**" should be accepted and handled the same way as "PreOP". This allows configuration tools to handle legacy ESI files

Access/@WriteRestrictions

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Access/@WriteRestrictions

Occurrence: optional (0..1)
Datatype: NmToken

Write access only available in the selected ESM state(s). Access Type shall be rw or wo.

Allowed values:

PreOP: Write access only in PreOP
PreOP_SafeOP: Write access only in PreOP and SafeOP
PreOP_OP: Write access only in PreOP and OP
SafeOP: Write access only in SafeOP
SafeOP_OP: Write access only in SafeOP and OP
OP: Write access only in OP

Configtool: for compatibility reasons also "PreO**p**" should be accepted and handled the same way as "PreOP". This allows configuration tools to handle legacy ESI files

Category

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Category

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

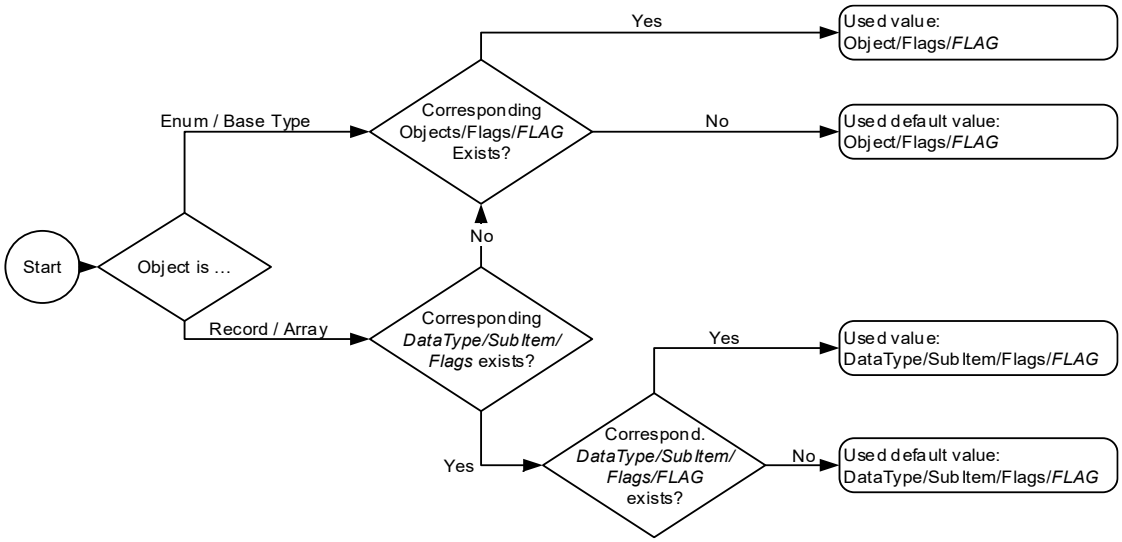
Use of object

Allowed values:

m: mandatory
o: optional (default)
c: conditional

NOTE: Values according to CoE object specification

Usage:



NOTE: “FLAG” is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

PdoMapping

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/PdoMapping

Occurrence:	optional (0..1)
Datatype:	NmToken
Attributes:	--
Child elements:	--

Object can be mapped as TxPDO, RxPDO or both

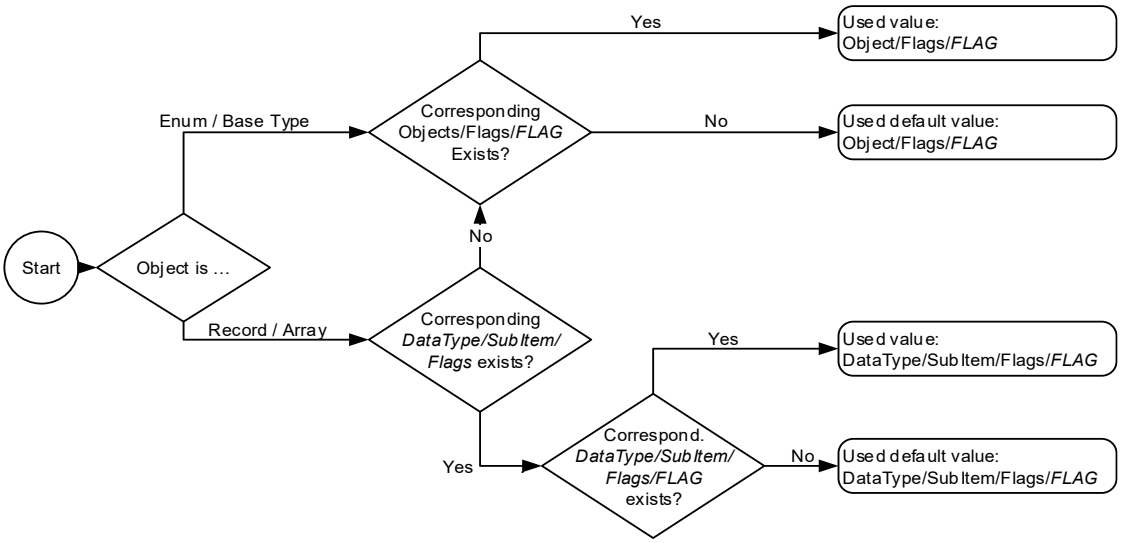
Usage according Figure 37.

Allowed values:

t, T: Transmit PDO (Inputs)
r, R: Receive PDO (Outputs)
tr, TR, rt, RT: Transmit or Receive PDO

Default value: cannot be mapped

Usage:



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

Attribute

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Attribute

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

For future use

Backup

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Backup

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Backup entries are used for Device Replacement (refer to ETG.1020)

Allowed values:

0: This SubItem is no Backup entry
1: This SubItem is a Backup entry

NOTE: If true default value for this SubItem should be provided in Object:SubItem:Info

Setting

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Setting

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Setting entries are downloaded during start-up by the master (refer to ETG.1020)

Allowed values:

0: This SubItem is no Setting entry
1: This SubItem is a Setting entry

NOTE: If true default value for this SubItem should be provided in Object:SubItem:Info

Property

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Property

Occurrence: optional (0..Unbounded)
Datatype: PropertyType
Attributes: --

Child elements: Name
Value
Desc

General description of additional properties.Can be used for example to define function groups.

Name

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Property/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of the property

Value

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Property/Value

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Value of the property

Desc

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Property/Desc

Occurrence: optional (0..1)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of the property

Desc/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Property/Desc/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Xml

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/SubItem/Xml

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: ##any --

Obsolete (Configtool: skip element)

EnumInfo

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/EnumInfo

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

This element is part of a choice. See parent's child element list for more information.

Used for data types with exclusive values only

Text

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/EnumInfo/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)

Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/EnumInfo/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/EnumInfo/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

NOTE: Enum number shall be unique within one *EnumInfo* element

Comment

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/EnumInfo/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/EnumInfo/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Properties

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Properties

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Property

List of following element *Property*.

Property

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Properties/Property

Occurrence: optional (0..Unbounded)
Datatype: PropertyType
Attributes: --
Child elements: Name
Value
Desc

General description of additional properties. Can be used for example to define function groups.

Name

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Properties/Property/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of the property

Value

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Properties/Property/Value

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Value of the property

Desc

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Properties/Property/Desc

Occurrence: optional (0..1)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of the property

Desc/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Properties/Property/Desc/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Xml

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/DataTypes/DataType/Xml

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: ##any --

General XML description for further information possible (similar to properties description above, but more generous)

5.3.8.2.3 Objects

Objects

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects

Occurrence: mandatory (1..1)
Datatype: --
Attributes: --
Child elements: Object

List of the following element *Object*.

Used by configuration tool to display Object Dictionary offline.

NOTE: If element Dictionary:Objects is supported at least the mandatory objects are available. Optional objects may not be available in the offline object dictionary.

Object

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object

Occurrence: optional (0..Unbounded)
Datatype: ObjectType
Attributes: --
Child elements: Index
Name
Comment
Type
BitSize
Info
Flags
Properties
Xml

Describes one object of the device's object dictionary

Index

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: @OverwrittenByModule
Child elements: --

Object index

Index/@OverwrittenByModule

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Index/@OverwrittenByModule

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Object is part of object dictionary
1: Object is ignored (e.g. when configuration tool supports the elements Modules and Slots the objects of the objects dictionary are defined in the element Modules/Profile)

Name

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name of this object

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Comment on this object

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Type

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Type

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Type of this object (BaseType or Complex type according to element DataTypes)

NOTE: All data types used in element Objects shall be defined in element DataType

BitSize

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/BitSize

Occurrence: mandatory (1..1)

Datatype: Int
Attributes: --
Child elements: --

Object size in bit including alignment bits

Info

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info

Occurrence: optional (0..1)
Datatype: ObjectInfoType
Attributes: --
Child elements:

- *Choice:*
  - DefaultString
  - *Sequence:*
    - MinData
    - MaxData
    - DefaultData
  - *Sequence:*
    - MinValue
    - MaxValue
    - DefaultValue
  - SubItem
- DisplayName
- Unit

Object information (e.g. default, minimum/ maximum values and SubItems).

DefaultString

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/DefaultString

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default string if data type STRING is used

MinData

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/MinData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Minimum value for elements of arbitrary data type

MaxData

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/MaxData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Maximum value for elements of arbitrary data type

DefaultData

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/DefaultData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default value for elements of arbitrary data type

MinValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/MinValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Minimum value for elements using base data types (excluding base data type with variable length)

MaxValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/MaxValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Maximum value for elements using base data types (excluding base data type with variable length)

DefaultValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/DefaultValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default value for elements using base data types (excluding base data type with variable length)

SubItem

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: Name
Info

This element is part of a choice. See parent's child element list for more information.

SubItem of this object

Name

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of this object entry.

The name corresponds to *../DataType/SubItem/Name*.

When object entry is of data type ARRAY (i.e. no *../DataType/SubItem/Name* specified):
../SubItem/Name shall be 'SubIndex xxx'

xxx is decimal SubIndex of SubItem

Info

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info

Occurrence: mandatory (1..1)
Datatype: ObjectInfoType
Attributes: --
Child elements: *Choice:*

- DefaultString
- *Sequence:*
  - MinData
  - MaxData
  - DefaultData
- *Sequence:*
  - MinValue
  - MaxValue
  - DefaultValue
- DisplayName
- Unit

For description of an object entry

Object information for each individual SubItem.

NOTE: Default values of ../ObjectInfo/SubItem/Info overwrites ../DataType/SubItem/Info

DefaultString

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/DefaultString

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default string if data type STRING is used

MinData

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/MinData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Minimum value for elements of arbitrary data type

MaxData

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/MaxData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Maximum value for elements of arbitrary data type

DefaultData

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/DefaultData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default value for elements of arbitrary data type

MinValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/MinValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Minimum value for elements using base data types (excluding base data type with variable length)

MaxValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/MaxValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Maximum value for elements using base data types (excluding base data type with variable length)

DefaultValue

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/DefaultValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default value for elements using base data types (excluding base data type with variable length)

DisplayName

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/DisplayName

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Allowed when object entry is of data type ARRAY in element *../SubItem/Info*

Defines a name that a Configtool/master can show instead of *../Subitem/Name* (Subitem XXX).

Unit

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/SubItem/Info/Unit

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Allowed when elements *MinValue*, *MaxValue*, *DefaultValue* or *MinData*, *MaxData*, *DefaultData* are used.

Unit of the object.

32-Bit Value as defined in ETG.1004 with
Bit 0…7: reserved
Bit 8…15: Denominator
Bit 16…23: Numerator

DisplayName

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/DisplayName

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Allowed when object entry is of data type ARRAY in element *../SubItem/Info*

Defines a name that a Configtool/master can show instead of *../SubItem/Name* (Subitem XXX).

Unit

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/Unit

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Allowed when elements *MinValue*, *MaxValue*, *DefaultValue* or *MinData*, *MaxData*, *DefaultData* are used.

Unit of the object.

32-Bit Value as defined in ETG.1004 with
Bit 0…7: reserved
Bit 8…15: Denominator
Bit 16…23: Numerator
Bit 24…31: Prefix

Flags

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags

Occurrence:	optional (0..1)
Datatype:	--
Attributes:	--
Child elements:	Access Category PdoMapping Attribute Transition SdoAccess Backup Setting

Permissions for object handling

Flag information applies to the whole object.

If object is of data type ARRAY or RECORD:

If Flags are defined in *../DataType/Subitem/Flags* those flags are used for the entries (overwrite values given here in *../Object/Flags*)

Access

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/Access

Occurrence:	optional (0..1)
Datatype:	NmToken
Attributes:	@ReadRestrictions @WriteRestrictions
Child elements:	--

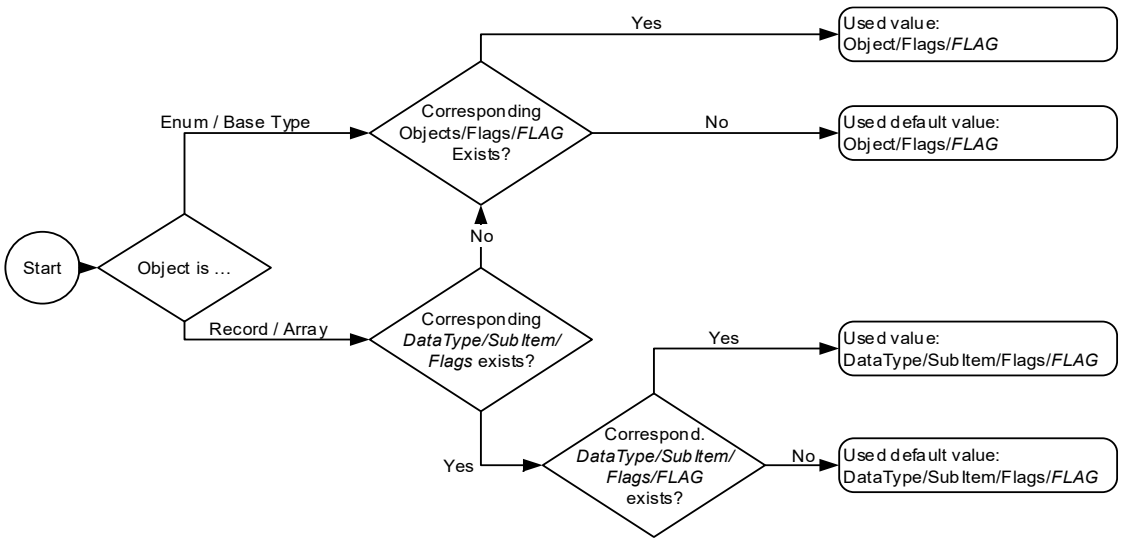
Access Type

Allowed values:

ro: readonly (default)
rw: readwrite
wo: writeonly

NOTE: The access right can be restricted by the attributes *ReadRestrictions* and *WriteRestrictions*

Usage



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

Access/@ReadRestrictions

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/Access/@ReadRestrictions

Occurrence: optional (0..1)
Datatype: NmToken

Read access only available in the selected ESM state(s). Access Type shall be rw or ro.

Allowed values:

PreOP: Read access only in PreOP
PreOP_SafeOP: Read access only in PreOP and SafeOP
PreOP_OP: Read access only in PreOP and OP
SafeOP: Read access only in SafeOP
SafeOP_OP: Read access only in SafeOP and OP
OP: Read access only in OP

Configtool: for compatibility reasons also "PreO**p**" should be accepted and handled the same way as "PreOP". This allows configuration tools to handle legacy ESI files

Access/@WriteRestrictions

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/Access/@WriteRestrictions

Occurrence: optional (0..1)
Datatype: NmToken

Write access only available in the selected ESM state(s). Access Type shall be rw or wo.

Allowed values:

PreOP: Write access only in PreOP
PreOP_SafeOP: Write access only in PreOP and SafeOP
PreOP_OP: Write access only in PreOP and OP
SafeOP: Write access only in SafeOP
SafeOP_OP: Write access only in SafeOP and OP
OP: Write access only in OP

Configtool: for compatibility reasons also "PreO**p**" should be accepted and handled the same way as "PreOP". This allows configuration tools to handle legacy ESI files

Category

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/Category

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

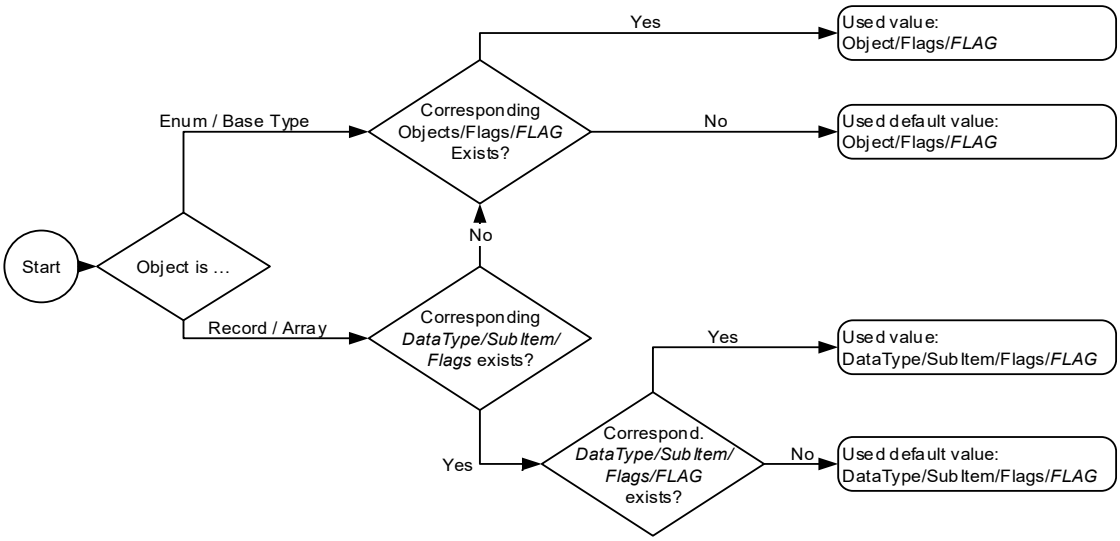
Use of object

Allowed values:

m: mandatory
o: optional (default)
c: conditional

NOTE: Values according to CoE object specification

Usage:



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

PdoMapping

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/PdoMapping

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Object can be mapped as TxPDO, RxPDO or both

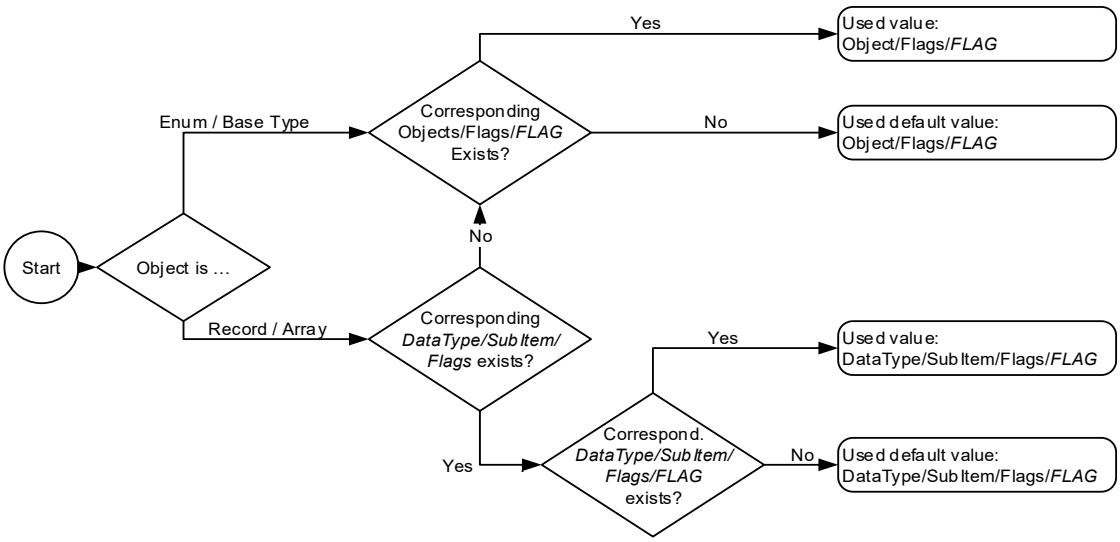
Usage according Figure 37.

Allowed values:

t, T: Transmit PDO (Inputs)
r, R: Receive PDO (Outputs)
tr, TR, rt, RT: Transmit or Receive PDO

Default value: cannot be mapped

Usage:



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

Attribute

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/Attribute

Occurrence: optional (0..1)

Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Attribute of a SoE IDN.

32 Bit value corresponding to attribute definition in IEC 61158-4-16

Transition

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/Transition

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Obsolete

SdoAccess

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/SdoAccess

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Allowed values

CompleteAccess: object can be accessed sub-index wise or by SDO complete access

SubIndexAccess: object can only be accessed subindex wise

Default value depends on *../CoE/@CompleteAccess*.

../CoE/@CompleteAccess = 1:

Default value : CompleteAccess

../CoE/@CompleteAccess = 0:

Default value = SubIndexAccess

Backup

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/Backup

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Backup entries are used for Device Replacement

Allowed values

0: This object is no Backup entry

1: This object is a Backup entry

NOTE: If true default value for this object should be provided in *../Object/Info*

Setting

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Flags/Setting

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Setting entries are downloaded during start-up by the master

Allowed values

0: This object is no Setting entry

1: This object is a Setting entry

NOTE: If true default value for this object should be provided in Object:Info

Properties

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Properties

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Property

General description of additional properties.

NOTE: Can be used for example to define function groups

Property

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Properties/Property

Occurrence: optional (0..Unbounded)
Datatype: PropertyType
Attributes: --
Child elements: Name
Value
Desc

Property information

Name

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Properties/Property/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of the property

Value

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Properties/Property/Value

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Value of the property

Desc

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Properties/Property/Desc

Occurrence: optional (0..1)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of the property

Desc/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Properties/Property/Desc/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Xml

/EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Xml

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: ##any --

General XML description for further information possible (similar to properties description above, but more generous)

5.3.8.3 Diagnosis messages

DiagFile

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagFile

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Path to DiagHistory file according to schema EtherCATDiag.xsd

DiagMessages

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages

Occurrence: optional (0..1)
Datatype: DiagnosticsType
Attributes: --
Child elements: DiagReset
DiagReaction
DiagType
DiagMessage

This element is part of a choice. See parent's child element list for more information.

Definition of diagnosis messages

DiagReset

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReset

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

Definition of a reset instruction. A diagnosis message can refer to this *DiagReset*.

Text

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReset/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReset/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReset/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

Allowed values

0: Reset not possible, fatal hardware error

1: Cold start required

2: Trigger device reset

10: State change to Init required

11: State change to PreOp required

12: State change to SafeOp required

>100: Vendor Specific

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReset/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReset/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagReaction

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReaction

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

Definition of the reaction in the device if this message is shown, e.g. TorqueOff, ClosedLoopRamp, …

A diagnosis message can refer to this DiagReaction.

Text

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReaction/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReaction/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReaction/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReaction/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagReaction/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagType

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagType

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

Definition of different diagnosis types, e.g. runtime error, parameter error, …

A diagnosis message can refer to this DiagType.

Text

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagType/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagType/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagType/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagType/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagType/Comment/@LcId

Occurrence: optional (0..1)

Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagMessage

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage

Occurrence: mandatory (1..Unbounded)
Datatype: --
Attributes: --
Child elements: TextId
MessageText
Description
Flags
CauseRemedy
Info
Hint
URL

Definition of one specific diagnosis message

TextId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/TextId

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Identifier for the diagnosis message

MessageText

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/MessageText

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Short diagnosis message

For using parameters as described in ETG.1020 the following specifiers are allowed: %c, %d, %u, and %s.

If the order of the parameters is not the order of the parameters within the message the position can be changed by adding ":n" to the specifier. Counting starts with 0.

Example: %u:2 shows the third parameter as unsigned value in defined message.

MessageText/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/MessageText/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Description

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Description

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Detailed description of the message

Description/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Description/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Flags

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Flags

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: DiagClass
DiagReset
DiagReaction
DiagType

DiagClass

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Flags/DiagClass

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Allowed values

error

warning

information

DiagReset

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Flags/DiagReset

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagReset instruction

DiagReaction

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Flags/DiagReaction

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagReaction

DiagType

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Flags/DiagType

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagType

CauseRemedy

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/CauseRemedy

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: @Idx
Child elements: Cause
Remedy

Pairs of cause and remedy in conjunction to this diagnosis message.

CauseRemedy/@Idx

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/CauseRemedy/@Idx

Occurrence: mandatory (1..1)
Datatype: AnyAtomicType

Assigns cause description to remedy description

Cause

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/CauseRemedy/Cause

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @LcId
Child elements: --

Cause of

Cause/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/CauseRemedy/Cause/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Remedy

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/CauseRemedy/Remedy

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @LcId
Child elements: --

Way to resolve this error

Remedy/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/CauseRemedy/Remedy/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Info

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Info

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

More information about the error/message, e.g. reference to chapter in documentation, …

Info/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Info/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Hint

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Hint

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Hints about the error / message. In case of no clear cause or remedy is known this might help the end user to find reasons for the error / message. Also what happens if an error is ignored might be described here.

Hint/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/Hint/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

URL

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/URL

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

URL that containins further information

URL/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages/DiagMessage/URL/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

VendorSpecific

/EtherCATInfo/Descriptions/Devices/Device/Profile/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of *Profile*

5.3.9 Fmmu

Fmmu

/EtherCATInfo/Descriptions/Devices/Device/Fmmu

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @OpOnly
@Sm
@Su
Child elements: --

Definition of FMMU usage

Allowed values

Outputs: FMMU is used for RxPDO

Inputs: FMMU is used for TxPDO

MBoxState: FMMU is used to map the Write Event Flag of the Input Mailbox (register 0x080D.0) to the process data. The Input Mailbox does not have to be polled by the Master when waiting for a Mailbox Response. The usage is highly recommended to reduce traffic.

DynamicOutputs: for future use

DynamicInputs: for future use

NOTE: FMMU is always assigned to one process data SyncManager. If there are n consecutive output SyncManagers with a physical start address of below 0x1000 and BitSize = 8, they are all covered by one FMMU with size n*8 bit.E.g. digital I/O devices without uC.

Fmmu/@OpOnly

/EtherCATInfo/Descriptions/Devices/Device/Fmmu/@OpOnly

Occurrence: optional (0..1)
Datatype: Boolean

Obsolete (Configtool: handle like *../Device/Sm/@OpOnly*)

Fmmu/@Sm

/EtherCATInfo/Descriptions/Devices/Device/Fmmu/@Sm

Occurrence: optional (0..1)
Datatype: Int

Mandatory if more than one FMMU for the same direction is used to map data to non-consecutive memory areas

Assigns this FMMU to a SyncManager

NOTE: SyncManager counting starts with 0

NOTE: If SM assigned for the FMMU it shall match with the SM setting in the PDO (refer to *../Device/RxPdo@Sm* and *../Device/TxPdo@Sm*)

Fmmu/@Su

/EtherCATInfo/Descriptions/Devices/Device/Fmmu/@Su

Occurrence: optional (0..1)
Datatype: Int

Assigns this FMMU to the related PDO (*../Device/RxPdo@Su* and *../Device/TxPdo@Su*) and therefore to a SyncManager.

5.3.10 Sm - SyncManager

Sm

/EtherCATInfo/Descriptions/Devices/Device/Sm

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @MinSize
@MaxSize
@DefaultSize
@StartAddress
@ControlByte
@Enable
@OneByteMode
@Virtual
@Watchdog
@OpOnly
@FixedAssignment
Child elements: --

Description of SyncManager including start address and direction.

Allowed values

MBoxOut: Mailbox Data Master → Slave

MBoxIn: Mailbox Data Slave → Master

Outputs: Process Data Master → Slave

Inputs: Process Data Slave → Master

DynamicOutputs: for future use

DynamicInputs: for future use

The first listed SyncManager describes SyncManager0, the following SyncManager describes SyncManager1, etc.

If more than one SyncManager of same direction and buffer mode is used attribute *../Device/RxPdo@Su* and *../Device/TxPdo@Su* is recommended to make clear to which Sm a PDO is assigned. If a PDO can be assigned to different SyncManagers, the attribute should be omitted.

NOTE: Standard SyncManager assignment as specified in ETG.1000, part 4 applies.

Sm/@MinSize

/EtherCATInfo/Descriptions/Devices/Device/Sm/@MinSize

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Minimum SyncManager length in bytes supported by the slave

NOTE: May be used to describe the minimum length of the mailbox SyncManagers. This may be checked by a configuration tool.

Sm/@MaxSize

/EtherCATInfo/Descriptions/Devices/Device/Sm/@MaxSize

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Maximum SyncManager length in bytes supported by the slave

NOTE: May be used to describe the maximum length of the mailbox SyncManagers and/or process data SyncManagers. This may be checked by a configuration tool.

Sm/@DefaultSize

/EtherCATInfo/Descriptions/Devices/Device/Sm/@DefaultSize

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory for Mailbox SyncManager

Process Data SyncManager: For process data length the default SyncManager length is calculated based on the default PDO assignment in element RxPDO (for Output SyncManager) and TxPDO (for Input SyncManager).

Default size in bytes of SyncManager

NOTE: The configuration tool has to recalculate the SM length if a manual configuration is done.

Sm/@StartAddress

/EtherCATInfo/Descriptions/Devices/Device/Sm/@StartAddress

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory. Physical start address of SyncManager

NOTE: If a SyncManager is configured for 3-buffer mode the occupied memory is calculated by 3 times of its length. This has to be considered for the calculation of the start address of the following SyncManager.

Sm/@ControlByte

/EtherCATInfo/Descriptions/Devices/Device/Sm/@ControlByte

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if ../Sm/@Virtual = false

SyncManager Control Byte (register 0x0804 + y*8; y= number of SyncManager) incl. SyncManager mode and direction

Sm/@Enable

/EtherCATInfo/Descriptions/Devices/Device/Sm/@Enable

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Use is mandatory for mailbox SyncManager.

SyncManager Enable Bit (0x0806.0 + y*8)

y= number of SyncManager

Allowed values

1: Enabled: SyncManager active controlling memory

0: Disabled: No memory protection by SyncManager

For Mailbox SyncManagers:

Mailbox Length != 0: Enable = TRUE

Mailbox Length == 0: Enable = FALSE

For process data SyncManagers:

Do not care

NOTE: The configuration tool calculates the process data length and adapts the Enable bit according to the SyncManager length.

Sm/@OneByteMode

/EtherCATInfo/Descriptions/Devices/Device/Sm/@OneByteMode

Occurrence: optional (0..1)
Datatype: Boolean

Obsolete (Configtool: skip element)

Sm/@Virtual

/EtherCATInfo/Descriptions/Devices/Device/Sm/@Virtual

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: SyncManager is not virtual

1: SyncManager used for configuration only – no use of hardware entity (i.e. no SyncManager registers are used) to ensure data consistency.

NOTE: It is used for register access via process data. Register access is always consistence, hence no SM is necessary. In this case ../Pdo/@Virtual shall be “true”, too.

Sm/@Watchdog

/EtherCATInfo/Descriptions/Devices/Device/Sm/@Watchdog

Occurrence: optional (0..1)
Datatype: Boolean

Obsolete (Configtool: skip element)

Sm/@OpOnly

/EtherCATInfo/Descriptions/Devices/Device/Sm/@OpOnly

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: EtherCAT State Machine has to be handled by host controller

1: Master enables SyncManager only in Op state. For all other states, the SyncManager is disabled.

According to the EtherCAT state machine the outputs shall only be activated in Op state. This is controlled by the host controller application. I/O interface devices do not handle a state machine.

NOTE: TRUE for devices with digital I/O interface.

Sm/@FixedAssignment

/EtherCATInfo/Descriptions/Devices/Device/Sm/@FixedAssignment

Occurrence: optional (0..1)
Datatype: Boolean

Obsolete (Configtool: skip element)

5.3.11 Su - SyncUnits

Su

/EtherCATInfo/Descriptions/Devices/Device/Su

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @SeparateSu
@SeparateFrame
@DependOnInputState
@FrameRepeatSupport
Child elements: --

Defines a timing context by defining different datagrams (possibly different frames) which are identified by this string.

Su/@SeparateSu

/EtherCATInfo/Descriptions/Devices/Device/Su/@SeparateSu

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: data of this SyncManager of this device may be sent within a datagram transporting also process data of other slaves

1: Separate SyncUnit for this device, i.e. an extra datagram for this slave is sent.

By using a separate SyncUnit the data of all other slaves remain valid.

NOTE: For devices which work in 1 Buffer Mode and have a slower cycle time than EtherCAT the SyncManager area might not be updated by the slave for one or more cycles. As result, the WKC might not be incremented and therefore the data of all other slaves addressed by this datagram would also become invalid.

Su/@SeparateFrame

/EtherCATInfo/Descriptions/Devices/Device/Su/@SeparateFrame

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Data of this device may not be sent with an extra Ethernet frame

1: Data of this device is sent with an extra Ethernet frame

Su/@DependOnInputState

/EtherCATInfo/Descriptions/Devices/Device/Su/@DependOnInputState

Occurrence: optional (0..1)
Datatype: Boolean

For future use

Su/@FrameRepeatSupport

/EtherCATInfo/Descriptions/Devices/Device/Su/@FrameRepeatSupport

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Device does not support processing of repeated frames within one cycle

1: Device supports processing of repeated frames within one cycle, i.e. SyncManager is read or written multiple times within one cycle.

NOTE: A device has to take special care of synchronization behavior when this mode is supported.

5.3.12 Pdo - Process Data

5.3.12.1 RxPdo - Output Process Data

RxPdo

/EtherCATInfo/Descriptions/Devices/Device/RxPdo

Occurrence: optional (0..Unbounded)
Datatype: PdoType
Attributes: @Fixed
@Mandatory
@Virtual
@Sm
@Su
@PdoOrder
@OSFac

@OSMin
@OSMax
@OSIndexInc
@OverwrittenByModule

Child elements: Index
Name
Exclude
Entry
ExcludedSm

Description of RxPDOs (output process data)

RxPdo/@Fixed

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: PDO mapping can be changed, i.e. PDO entries can be deleted or added

1: PDO content is not configurable i.e. complete PDO content is fixed; attribute Fixed of the PDO entries (*../Device/RxPdo/Entry/@Fixed*) is overwritten

NOTE: If attribute *../Mailbox/CoE/@PdoUpload* = true, the fixed content of the PDO shall be uploaded as defined in the ESI description from the slave.

RxPdo/@Mandatory

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@Mandatory

Occurrence: optional (0..1)
Datatype: Boolean

PDO is configured (= assigned to) in a SyncManager

Allowed values:

0: PDO assignment is changeable (e.g. content of object 0x1C12 can be changed)

1: PDO must be assigned to the default SyncManager

NOTE: If attribute *../Mailbox/CoE/@PdoUpload* = true, the mandatory PDO shall be uploaded from the slave.

NOTE: If there are no default PDOs assigned to a SyncManager (refer to attribute *../@Sm*) the Mandatory bit shall not be set.

RxPdo/@Virtual

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@Virtual

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Standard PDO description

1: Two cases:

Process data value is read from a register value (ESC memory address 0x0000:0x0EFF). In this case element *../Sm/@Virtual* shall be “true”.

Content (=PDO entries) of PDO can be configured manually via the configuration tool. In this case no element *../Rx/TxPdo/Entry* is described.

NOTE: Configuration tools shall sort process data byte aligned by default by adding padding PDO entries with Index=0 and BitLen = [bit size of padding bits].

RxPdo/@Sm

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@Sm

Occurrence: optional (0..1)
Datatype: Int

Default SyncManager for this PDO i.e. this PDO is included in the process data image by default

TxPDOs shall only be assigned to Input SyncManager. RxPDOs shall only be assigned to Output SyncManager (refer also to element *../Device/Sm*).

NOTE: PDOs which are not assigned to any SyncManager by default may be assigned manually via the configuration tool. In this case the PDO must not be configured as mandatory (Pdo@Mandatory = FALSE).

RxPdo/@Su

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@Su

Occurrence: optional (0..1)
Datatype: Int

Groups PDOs and defines to which FMMU (and with this SyncManager) they can be assigned to, i.e. *Pdo@Su* and *Fmmu@Su* have the same value.

RxPdo/@PdoOrder

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@PdoOrder

Occurrence: optional (0..1)
Datatype: Int

Obsolete (Configtool: skip element)

RxPdo/@OSFac

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@OSFac

Occurrence: optional (0..1)
Datatype: Int

Default oversampling factor

RxPdo/@OSMin

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@OSMin

Occurrence: optional (0..1)
Datatype: Int

Minimum oversampling factor

RxPdo/@OSMax

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@OSMax

Occurrence: optional (0..1)
Datatype: Int

Maximum oversampling factor

RxPdo/@OSIndexInc

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@OSIndexInc

Occurrence: optional (0..1)
Datatype: Int

Oversampling increment for entry indexes

RxPdo/@OverwrittenByModule

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/@OverwrittenByModule

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Object is part of process data configuration

1: Object is ignored (e.g. when configuration tool supports the elements Modules and Slots the process data are defined in the element Modules)

Index

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --

Child elements: --

PDO index

NOTE: RxPDOs: Index area 0x1600 to 0x17FF

Name

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

PDO name

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Exclude

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Exclude

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: --
Child elements: --

List of PDO indices that are excluded if this PDO is assigned to a SyncManager

PDOs are “mutually exclusive” i.e. if a PDO (PDO_A) is excluded by another PDO (PDO_B) than PDO_B also has to be excluded by PDO_A.

Entry

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry

Occurrence: optional (0..Unbounded)
Datatype: EntryType
Attributes: @Fixed
Child elements: Index
SubIndex
BitLen
Name
Comment
DataType

Description of all entries.

Entry/@Fixed

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Entries of this PDO can be edited, added, or deleted (overwritten by attribute *../Rx/TxPdo@Fixed*)

1**: Entries of this PDO are fixed**

Index

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

PDO index of mapped object

When no Modular Device Profile (ETG.5001) is used:

RxPDO entries: Index area 0x2000 to 0x5FFF for vendor specific objects or 0x6000 to 0x9FFF according to Device profile (e.g. CiA402).

When Modular Device Profile used:

RxPDO entries: Index area 0x7000 to 0x7FFF

NOTE: For padding PDO entries use Index = 0.

SubIndex

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/SubIndex

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Use is mandatory if Index != 0

PDO subindex of mapped object

Value Range: 0…255

NOTE: For padding PDOs use index = 0. If Index is a variable Type, enter SubIndex=0

BitLen

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/BitLen

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Bit length of mapped object

Value (n) might be smaller than the actual bit size of the mapped object/entry. In that case bit 0-n shall be mapped as process data.

Name

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Mandatory if Index != 0

Name of the mapped object

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Interpretation of process data value which may be shown by configuration tool (e.g. Diagnosis Message Object 0x1f03:4: “1: New Diag messages available, 0: No new Diag Messages available”)

DataType

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/DataType

Occurrence: optional (0..1)
Datatype: String

Attributes: @DScale
@SwapData
Child elements: --

Use is mandatory if Index != 0

Data type of the mapped object

Only Base data types (no data type STRING(n)) are allowed, refer to clause 3.4.3.

DataType/@DScale

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/DataType/@DScale

Occurrence: optional (0..1)
Datatype: String

Only if Entry:DataType is INT: This attribute is used to specify the range of the input data.

Allowed values:

+/-10: scale value from -10 to +10
+/-20: scale value from -20 to +20
0-10: scale value from 0 to +10
0-20: scale value from 0 to +20
4-20: scale value from +4 to +20
0.1°: multiply value with 0.1
0-10(16): scale value from 0 to +10
0-20(16): scale value from 0 to +20
0,01°: scale value in 0,01°
0-5: scale value from 0 to +5
0-15: scale value from 0 to +15
0-30: scale value from 0 to +30
0-50: scale value from 0 to +50
+/-5: scale value from -5 to +5
+/-2,5: scale value from -2,5 to +2,5
+/-100: scale value from -100 to +100
0-5(16): scale value from 0 to +5
0-30(16): scale value from 0 to +30
0-50(16): scale value from 0 to +50
+/-75mV: scale value from -75mV to+75mV

DataType/@SwapData

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/Entry/DataType/@SwapData

Occurrence: optional (0..1)
Datatype: NmToken

Defines swapping of PDO entry value for displaying.

Allowed values:

Swap_HB_LB: swap hi and lo bytes

Swap_HW_LW: swap hi and lo words

Swap_HB_LB_HW_LW: swap hi and lo words as well as hi and lo bytes

ExcludedSm

/EtherCATInfo/Descriptions/Devices/Device/RxPdo/ExcludedSm

Occurrence: optional (0..Unbounded)
Datatype: Int
Attributes: --
Child elements: --

SyncManager to which this PDO may not be assigned to.

Default: PDO can be assigned to all SyncManager with matching type/direction

NOTE: When PDO can be assigned to any SM with matching direction and type (1/3-buffer mode) this element is not needed.

5.3.12.2 TxPdo - Input Process Data

TxPdo

/EtherCATInfo/Descriptions/Devices/Device/TxPdo

Occurrence: optional (0..Unbounded)
Datatype: PdoType
Attributes: @Fixed
@Mandatory
@Virtual
@Sm
@Su
@PdoOrder
@OSFac
@OSMin
@OSMax
@OSIndexInc
@OverwrittenByModule
Child elements: Index
Name
Exclude
Entry
ExcludedSm

Description of TxPDOs (input process data)

TxPdo/@Fixed

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: PDO mapping can be changed, i.e. PDO entries can be deleted or added

1: PDO content is not configurable i.e. complete PDO content is fixed; attribute Fixed of the PDO entries (*../Device/RxPdo/Entry/@Fixed*) is overwritten

NOTE: If attribute *../Mailbox/CoE/@PdoUpload* = true, the fixed content of the PDO shall be uploaded as defined in the ESI description from the slave.

TxPdo/@Mandatory

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@Mandatory

Occurrence: optional (0..1)
Datatype: Boolean

PDO is configured (= assigned to) in a SyncManager

Allowed values:

0: PDO assignment is changeable (e.g. content of object 0x1C12 can be changed)

1: PDO must be assigned to the default SyncManager

NOTE: If attribute *../Mailbox/CoE/@PdoUpload* = true, the mandatory PDO shall be uploaded from the slave.

NOTE: If there are no default PDOs assigned to a SyncManager (refer to attribute *../@Sm*) the Mandatory bit shall not be set.

TxPdo/@Virtual

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@Virtual

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Standard PDO description

1: Two cases:

Process data value is read from a register value (ESC memory address 0x0000:0x0EFF). In this case element *../Sm/@Virtual* shall be “true”.

Content (=PDO entries) of PDO can be configured manually via the configuration tool. In this case no element *../Rx/TxPdo/Entry* is described.

NOTE: Configuration tools shall sort process data byte aligned by default by adding padding PDO entries with Index=0 and BitLen = [bit size of padding bits].

TxPdo/@Sm

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@Sm

Occurrence: optional (0..1)
Datatype: Int

Default SyncManager for this PDO i.e. this PDO is included in the process data image by default

TxPDOs shall only be assigned to Input SyncManager. RxPDOs shall only be assigned to Output SyncManager (refer also to element *../Device/Sm*).

NOTE: PDOs which are not assigned to any SyncManager by default may be assigned manually via the configuration tool. In this case the PDO must not be configured as mandatory (Pdo@Mandatory = FALSE).

TxPdo/@Su

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@Su

Occurrence: optional (0..1)
Datatype: Int

Groups PDOs and defines to which FMMU (and with this SyncManager) they can be assigned to, i.e. *Pdo@Su* and *Fmmu@Su* have the same value.

TxPdo/@PdoOrder

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@PdoOrder

Occurrence: optional (0..1)
Datatype: Int

Obsolete (Configtool: skip element)

TxPdo/@OSFac

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@OSFac

Occurrence: optional (0..1)
Datatype: Int

Default oversampling factor

TxPdo/@OSMin

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@OSMin

Occurrence: optional (0..1)
Datatype: Int

Minimum oversampling factor

TxPdo/@OSMax

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@OSMax

Occurrence: optional (0..1)
Datatype: Int

Maximum oversampling factor

TxPdo/@OSIndexInc

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@OSIndexInc

Occurrence: optional (0..1)
Datatype: Int

Oversampling increment for entry indexes

TxPdo/@OverwrittenByModule

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/@OverwrittenByModule

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Object is part of process data configuration

1: Object is ignored (e.g. when configuration tool supports the elements Modules and Slots the process data are defined in the element Modules)

Index

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

PDO index

NOTE: TxPDOs: Index area 0x1A00 to 0x1BFF

Name

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

PDO name

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Exclude

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Exclude

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: --
Child elements: --

List of PDO indices that are excluded if this PDO is assigned to a SyncManager

PDOs are “mutually exclusive” i.e. if a PDO (PDO_A) is excluded by another PDO (PDO_B) than PDO_B also has to be excluded by PDO_A.

Entry

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry

Occurrence: optional (0..Unbounded)
Datatype: EntryType
Attributes: @Fixed
Child elements: Index
SubIndex
BitLen
Name
Comment
DataType

Description of all entries.

Entry/@Fixed

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Entries of this PDO can be edited, added, or deleted (overwritten by attribute *../Rx/TxPdo@Fixed*)

1**: Entries of this PDO are fixed**

Index

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

PDO index of mapped object

When no Modular Device Profile (ETG.5001) is used:

TxPDO entries: Index area 0x2000 to 0x5FFF for vendor specific objects or 0x6000 to 0x9FFF according to Device profile (e.g. CiA402).

When Modular Device Profile used:

TxPDO entries: Index area 0x6000 to 0x6FFF

NOTE: For padding PDO entries use Index = 0.

SubIndex

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/SubIndex

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Use is mandatory if Index != 0

PDO subindex of mapped object

Value Range: 0…255

NOTE: For padding PDOs use index = 0. If Index is a variable Type, enter SubIndex=0

BitLen

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/BitLen

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Bit length of mapped object

Value (n) might be smaller than the actual bit size of the mapped object/entry. In that case bit 0-n shall be mapped as process data.

Name

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Mandatory if Index != 0

Name of the mapped object

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --

Child elements: --

Interpretation of process data value which may be shown by configuration tool (e.g. Diagnosis Message Object 0x1f03:4: “1: New Diag messages available, 0: No new Diag Messages available”)

DataType

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/DataType

Occurrence: optional (0..1)
Datatype: String
Attributes: @DScale
@SwapData
Child elements: --

Use is mandatory if Index != 0

Data type of the mapped object

Only Base data types (no data type STRING(n)) are allowed, refer to clause 3.4.3.

DataType/@DScale

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/DataType/@DScale

Occurrence: optional (0..1)
Datatype: String

Only if Entry:DataType is INT: This attribute is used to specify the range of the input data.

Allowed values:

+/-10: scale value from -10 to +10
+/-20: scale value from -20 to +20
0-10: scale value from 0 to +10
0-20: scale value from 0 to +20
4-20: scale value from +4 to +20
0.1°: multiply value with 0.1
0-10(16): scale value from 0 to +10
0-20(16): scale value from 0 to +20
0,01°: scale value in 0,01°
0-5: scale value from 0 to +5
0-15: scale value from 0 to +15
0-30: scale value from 0 to +30
0-50: scale value from 0 to +50
+/-5: scale value from -5 to +5
+/-2,5: scale value from -2,5 to +2,5
+/-100: scale value from -100 to +100
0-5(16): scale value from 0 to +5
0-30(16): scale value from 0 to +30
0-50(16): scale value from 0 to +50
+/-75mV: scale value from -75mV to+75mV

DataType/@SwapData

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/Entry/DataType/@SwapData

Occurrence: optional (0..1)
Datatype: NmToken

Defines swapping of PDO entry value for displaying.

Allowed values:

Swap_HB_LB: swap hi and lo bytes

Swap_HW_LW: swap hi and lo words

Swap_HB_LB_HW_LW: swap hi and lo words as well as hi and lo bytes

ExcludedSm

/EtherCATInfo/Descriptions/Devices/Device/TxPdo/ExcludedSm

Occurrence: optional (0..Unbounded)
Datatype: Int
Attributes: --
Child elements: --

SyncManager to which this PDO may not be assigned to.

Default: PDO can be assigned to all SyncManager with matching type/direction

NOTE: When PDO can be assigned to any SM with matching direction and type (1/3-buffer mode) this element is not needed.

5.3.13 Mailbox Services

Mailbox

/EtherCATInfo/Descriptions/Devices/Device/Mailbox

Occurrence: optional (0..1)
Datatype: --
Attributes: @DataLinkLayer
@RealTimeMode
Child elements: AoE
EoE
CoE
FoE
SoE
VoE
VendorSpecific

Description of available mailbox protocols (refer to clause 5.3.13)

Mailbox/@DataLinkLayer

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/@DataLinkLayer

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Mailbox Data Link Layer not supported (no Mailbox repeat service)

1: Mailbox Data Link Layer supported (Mailbox repeat service);

NOTE: Support of Mailbox Data Link Layer (=recovery from lost mailbox frame) is mandatory according to ETG.1000.4 for devices supporting the mailbox service.

Mailbox/@RealTimeMode

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/@RealTimeMode

Occurrence: optional (0..1)
Datatype: Boolean

5.3.13.1 for future useAoE (ADS over EtherCAT)

AoE

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/AoE

Occurrence: optional (0..1)
Datatype: --
Attributes: @AdsRouter
@GenerateOwnNetId
@InitializeOwnNetId
Child elements: InitCmd

not present: Device does not support AoE

present: Device supports AoE (ADS over EtherCAT)

AoE/@AdsRouter

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/AoE/@AdsRouter

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Device does not support ADS router services

1: Device supports ADS router services

AoE/@GenerateOwnNetId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/AoE/@GenerateOwnNetId

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: No AoE Net ID is generated

1: The configuration tool generates a AoE Net ID for the device

NOTE: This attribute should be set if AoE is supported because the device generally needs a AoE Net ID

AoE/@InitializeOwnNetId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/AoE/@InitializeOwnNetId

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: The AoE Net ID is not downloaded in the startup commands

1: The AoE Net ID is downloaded with the start-up commands

The attribute GenerateOwnNetId shall be set, too.

InitCmd

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/AoE/InitCmd

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: Transition
Data
Comment

Definition of AoE init command.

Transition

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/AoE/InitCmd/Transition

Occurrence: mandatory (1..Unbounded)
Datatype: NmToken
Attributes: --
Child elements: --

State transitions during which the mailbox protocol specific init command is sent.

For allowed state transitions refer to clause 3.6, excluding transitions from/to Boot

NOTE: If transition is 'IP' the command is send directly after the slave reached PreOp state.

Data

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/AoE/InitCmd/Data

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: --
Child elements: --

Data sent with the ADS init command (excluding Mailbox and AoE Header)

Comment

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/AoE/InitCmd/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Description of the AoE init command

5.3.13.2 EoE (Ethernet over EtherCAT)

EoE

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE

Occurrence: optional (0..1)
Datatype: --
Attributes: @IP
@MAC
@TimeStamp
Child elements: InitCmd

not present: Device does not support EoE

present: Device supports EoE (Ethernet over EtherCAT)

EoE/@IP

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE/@IP

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: no IP address is assigned

1: IP address and virtual MAC address is assigned

EoE/@MAC

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE/@MAC

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: No virtual MAC address is assigned

1: Virtual MAC address is assigned via EoE “Set IP Parameter” service

EoE/@TimeStamp

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE/@TimeStamp

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Device does not support time stamping using the DC time stamp

1: Device supports time stamping using the DC time stamp

InitCmd

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE/InitCmd

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: Transition
Type
Data
Comment

Definition of EoE init command

Transition

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE/InitCmd/Transition

Occurrence: mandatory (1..Unbounded)
Datatype: NmToken
Attributes: --
Child elements: --

State transitions during which the mailbox protocol specific init command is sent.

For allowed state transitions refer to clause 3.6, excluding transitions from/to Boot

NOTE: If transition ‘IP’ the command is send directly after the slave reached PreOp state.

Type

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE/InitCmd/Type

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

EoE frame type

Allowed values:

0x00: EoE Fragment Request

0x01: Timestamp Response

0x02: IP Parameter Request

0x04: Set MAC Address Filter Request

Data

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE/InitCmd/Data

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: --
Child elements: --

Data sent with the EoE command

(Excluding mailbox and EoE header)

Comment

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/EoE/InitCmd/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Description of init command

5.3.13.3 CoE (CAN application profile over EtherCAT)

CoE

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE

Occurrence: optional (0..1)
Datatype: --
Attributes: @SdoInfo
@PdoAssign
@PdoConfig
@PdoUpload
@CompleteAccess
@EdsFile
@DS402Channels
@SegmentedSdo
@DiagHistory
@SdoUploadWithMaxLength
@TimeDistribution
Child elements: Object
InitCmd

not present: Device does not support CoE

present: Device supports CoE (CAN application protocol over EtherCAT)

CoE/@SdoInfo

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@SdoInfo

Occurrence: optional (0..1)

Datatype: Boolean

Allowed values:

0: SDO Information Service not supported (default)

1: SDO Information Service supported

CoE/@PdoAssign

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@PdoAssign

Occurrence: optional (0..1)
Datatype: Boolean

Download of PDO assignment (e.g. 0x1C12, 0x1C13, etc) during start up

Allowed values:

0: PDO assignment is not downloaded (default)

1: PDO assignment is downloaded (e.g. set when PDO assignment can be changed)

NOTE: Access rights of assign objects shall not be “read only” when PdoAssign = true.

Padding PDOs that are configured in the PDO assignment are included in the downloaded PDO list.

CoE/@PdoConfig

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@PdoConfig

Occurrence: optional (0..1)
Datatype: Boolean

Download of PDO Configuration during start up

Allowed values:

0: PDO Configuration is not downloaded (default)

1: PDO Configuration is downloaded (set when PDO mapping can be changed)

NOTE: Access rights of mapping objects shall not be “read only” when PdoConfig = true.

Padding PDO entries that are configured in the PDO configuration are included in the downloaded PDO entry list.

CoE/@PdoUpload

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@PdoUpload

Occurrence: optional (0..1)
Datatype: Boolean

Device has dynamic process data, i.e. PDO configuration, PDO assignment is uploaded from the device, and SyncManager lengths are set according to the calculated PDO length.

Allowed values:

0: PDO description taken from ESI and SyncManager length calculated based on the same (default)

1: PDO description uploaded from the slave’s object dictionary and SyncManager length calculated based on the same

NOTE: If this element is set in addition to PdoAssign and/or PdoConfig the upload of the objects is made in the state transition IP (i.e. when PreOp is reached) and downloaded in state transition PS.

CoE/@CompleteAccess

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@CompleteAccess

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: SDO complete access not supported by default for all objects (default)

1: SDO complete access supported by default for all objects

NOTE: The default value is used for all objects. If any object differs from the default value the attribute Flags@SdoAccess overwrites this value.

NOTE: If CompleteAccess is supported, at least the mandatory objects (Pdo, PdoConfig, PdoAssign, ModuleAddressList, ModuleIdentList, …) shall support Complete Access. If a Configuration Tool reads “true” all automatically generated init commands (for objects listed above) are generated using Complete Access.

CoE/@EdsFile

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@EdsFile

Occurrence: optional (0..1)
Datatype: String

File path of EDS file with Object Dictionary. If available, the EDS file dictionary is used instead of the element Profile/Dictionary

CoE/@DS402Channels

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@DS402Channels

Occurrence: optional (0..1)
Datatype: Int

Obsolete

CoE/@SegmentedSdo

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@SegmentedSdo

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Segmented SDO service not supported (default)

1: Segmented SDO service supported

CoE/@DiagHistory

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@DiagHistory

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Diagnosis history object 0x10F3 is not supported (default)

1: Diagnosis history object 0x10F3 is supported

NOTE: Refer to ETG.1020, clause Diagnosis

CoE/@SdoUploadWithMaxLength

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@SdoUploadWithMaxLength

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: SDO Upload with max response size is not supported (default)

1: SDO Upload with max response size is supported

NOTE: Refer to ETG.1020, clause SDO Upload with max response size

CoE/@TimeDistribution

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/@TimeDistribution

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Time distribution objects 0x0F9 is not supported (default)

1: Time distribution objects 0x0F9 is supported

NOTE: Refer to ETG.1020, clause Time Distribution Object

Object

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/Object

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: Index
SubIndex
Data
Comment

Obsolete (Configtool: skip element)

Index

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/Object/Index

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Obsolete (Configtool: skip element)

SubIndex

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/Object/SubIndex

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Obsolete (Configtool: skip element)

Data

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/Object/Data

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: --
Child elements: --

Obsolete (Configtool: skip element)

Comment

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/Object/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Obsolete (Configtool: skip element)

InitCmd

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: @Fixed
@CompleteAccess
@OverwrittenByModule
Child elements: Transition
Index
SubIndex
Data
Comment

Definition of CoE init command

(SDO download service used)

InitCmd/@Fixed

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/@Fixed

Occurrence: optional (0..1)

Datatype: Boolean

Obsolete (Configtool: skip element)

InitCmd/@CompleteAccess

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/@CompleteAccess

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Init command shall be sent sub index wise

1: Init command may be sent sub-index wise or via complete access

InitCmd/@OverwrittenByModule

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/@OverwrittenByModule

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Always send this init command

1**: This init command is not sent when an init command with the same index and subindex is defined in element Module/Mailbox/CoE/InitCmd**

Transition

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/Transition

Occurrence: mandatory (1..Unbounded)
Datatype: NmToken
Attributes: --
Child elements: --

State transitions during which the mailbox protocol specific init command is sent.

For allowed state transitions refer to clause 3.6, excluding transitions from/to Boot

NOTE: If transition is 'IP' the command is send directly after the slave reached PreOp state.

Index

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/Index

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

CoE object index

SubIndex

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/SubIndex

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

CoE object subindex

Data

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/Data

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: @AdaptAutomatically
Child elements: --

CoE object data (excluding mailbox header and CoE header)

Data/@AdaptAutomatically

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/Data/@AdaptAutomatically

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Default values defined in CoE/InitCmd/Data are sent

1: Default values defined in CoE/InitCmd/Data are overwritten by real values, e.g. 0x1C32.02 will be adapted to the cycle time of the EtherCAT master

Comment

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/CoE/InitCmd/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Comment for this init command

5.3.13.4 File transfer over EtherCAT (FoE)

FoE

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/FoE

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: --

not present: Device does not support foE

present: Device supports FoE (File Transfer Protocol over EtherCAT)

5.3.13.5 Servo drive Profile over EtherCAT (SoE)

SoE

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE

Occurrence: optional (0..1)
Datatype: --
Attributes: @ChannelCount
@DriveFollowsBit3Support
Child elements: InitCmd
Choice:
├─ DiagFile
└─ DiagMessages

not present: Device does not support SoE

present: Device supports SoE (Servo Drive Profile over EtherCAT)

SoE/@ChannelCount

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/@ChannelCount

Occurrence: optional (0..1)
Datatype: Int

Number of supported axis.

NOTE: A SoE device can have up to 8 channels.

SoE/@DriveFollowsBit3Support

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/@DriveFollowsBit3Support

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: SoE Drive does not support the function of Bit 3 of the status word

1: SoE Drive supports the function of Bit 3 of the status word (refer to IEC 61800-7-204)

InitCmd

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/InitCmd

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: @Chn
Child elements: Transition
IDN
Data
Comment

Definition of SoE init command

InitCmd/@Chn

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/InitCmd/@Chn

Occurrence: optional (0..1)
Datatype: Int

Channel to which the init command is sent. Counting starts with 0 (corresponds to first axis).

Transition

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/InitCmd/Transition

Occurrence: mandatory (1..Unbounded)
Datatype: NmToken
Attributes: --
Child elements: --

State transitions during which the mailbox protocol specific init command is sent.

For allowed state transitions refer to clause 3.6, excluding transitions from/to Boot

NOTE: If transition is 'IP' the command is send directly after the slave reached PreOp state.

IDN

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/InitCmd/IDN

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

IDN (Ident Number)

Data

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/InitCmd/Data

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: --
Child elements: --

Data of the IDN

(excluding mailbox header and SoE header)

Comment

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/InitCmd/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Comment for this init command

DiagFile

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagFile

Occurrence: optional (0..Unbounded)
Datatype: String

Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Path to DiagHistory file according to EtherCATDiag.xsd

NOTE: not the same file than the one for ../Profile/DiagFile. This reference is used for SoE error codes as described at SoE/DiagMessages

DiagMessages

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages

Occurrence: optional (0..1)
Datatype: DiagnosticsType
Attributes: --
Child elements: DiagReset
DiagReaction
DiagType
DiagMessage

This element is part of a choice. See parent's child element list for more information.

Definition of diagnosis messages

NOTE: in the element *SoE* the DiagMessages are used to replace SoE error codes by readable text messages. Therefore *../SoE/DiagMessages/DiagMessage/TextId* is used as error code and *../SoE/DiagMessages/DiagMessage/TextMessage* is used for the message related to this error code.

DiagReset

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReset

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

Definition of a reset instruction. A diagnosis message can refer to this DiagReset.

Text

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReset/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReset/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReset/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

Allowed values:

0: Reset not possible, fatal hardware error

1: Cold start required

2: Trigger device reset

10: State change to Init required

11: State change to PreOp required

12: State change to SafeOp required

>100: Vendor Specific

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReset/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReset/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagReaction

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReaction

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

Definition of the reaction in the device if this message is shown, e.g. TorqueOff, ClosedLoopRamp, …

A diagnosis message can refer to this DiagReaction.

Text

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReaction/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReaction/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReaction/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReaction/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagReaction/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagType

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagType

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

Definition of different diagnosis types, e.g. runtime error, parameter error, …

A diagnosis message can refer to this DiagType.

Text

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagType/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagType/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagType/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagType/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagType/Comment/@LcId

Occurrence: optional (0..1)

Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagMessage

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage

Occurrence: mandatory (1..Unbounded)
Datatype: --
Attributes: --
Child elements: TextId
MessageText
Description
Flags
CauseRemedy
Info
Hint
URL

Definition of one specific diagnosis message

TextId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/TextId

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Identifier for the diagnosis message

MessageText

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/MessageText

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Short diagnosis message

For using parameters as described in ETG.1020 the following specifiers are allowed: %c, %d, %u, and %s.

If the order of the parameters is not the order of the parameters within the message the position can be changed by adding ":n" to the specifier. Counting starts with 0.

Example %u:2 shows the third parameter as unsigned value in defined message.

MessageText/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/MessageText/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Description

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Description

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Detailed description of the message

Description/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Description/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Flags

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Flags

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: DiagClass
DiagReset
DiagReaction
DiagType

DiagClass

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Flags/DiagClass

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Allowed values:

error

warning

information

DiagReset

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Flags/DiagReset

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagReset instruction

DiagReaction

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Flags/DiagReaction

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagReaction

DiagType

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Flags/DiagType

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagType

CauseRemedy

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/CauseRemedy

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: @Idx
Child elements: Cause
Remedy

Pairs of cause and remedy in conjunction to this diagnosis message.

CauseRemedy/@Idx

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/CauseRemedy/@Idx

Occurrence: mandatory (1..1)
Datatype: AnyAtomicType

Assigns cause description to remedy description

Cause

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/CauseRemedy/Cause

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @LcId
Child elements: --

Cause of

Cause/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/CauseRemedy/Cause/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Remedy

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/CauseRemedy/Remedy

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @LcId
Child elements: --

Way to resolve this error

Remedy/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/CauseRemedy/Remedy/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Info

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Info

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

More information about the error / message, e.g. reference to chapter in documentation, …

Info/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Info/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Hint

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Hint

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Hints about the error / message. In case of no clear cause or remedy is known this might help the end user to find reasons for the error / message. Also what happens if an error is ignored might be described here.

Hint/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/Hint/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

URL

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/URL

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

URL that containing further information

URL/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/SoE/DiagMessages/DiagMessage/URL/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

5.3.13.6 VendorSpecific over EtherCAT (VoE) and Vendor specific

VoE

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/VoE

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: ##any --

Not present: Device does not support VoE

Present: Device supports VoE (Vendor Specific Protocol over EtherCAT)

VendorSpecific

/EtherCATInfo/Descriptions/Devices/Device/Mailbox/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of Device/Mailbox

5.3.14 Distributed Clocks

Dc

/EtherCATInfo/Descriptions/Devices/Device/Dc

Occurrence: optional (0..1)
Datatype: --
Attributes: @UnknownFRMW
@Unknown64Bit
@ExternalRefClock
@PotentialReferenceClock
@TimeLoopControlOnly
Child elements: OpMode
VendorSpecific

Description of synchronization mode. This may be Freerun, synchronous with SyncManager event or Distributed Clocks.

Figure 9 shows the SYNC1 signal generation behavior if *CycleTimeSync1* = n * *CycleTimeSync0* with n > 1. The first SYNC1 signal always occurs with the n^{th} SYNC0 signal and never with the first SYNC0 signal.

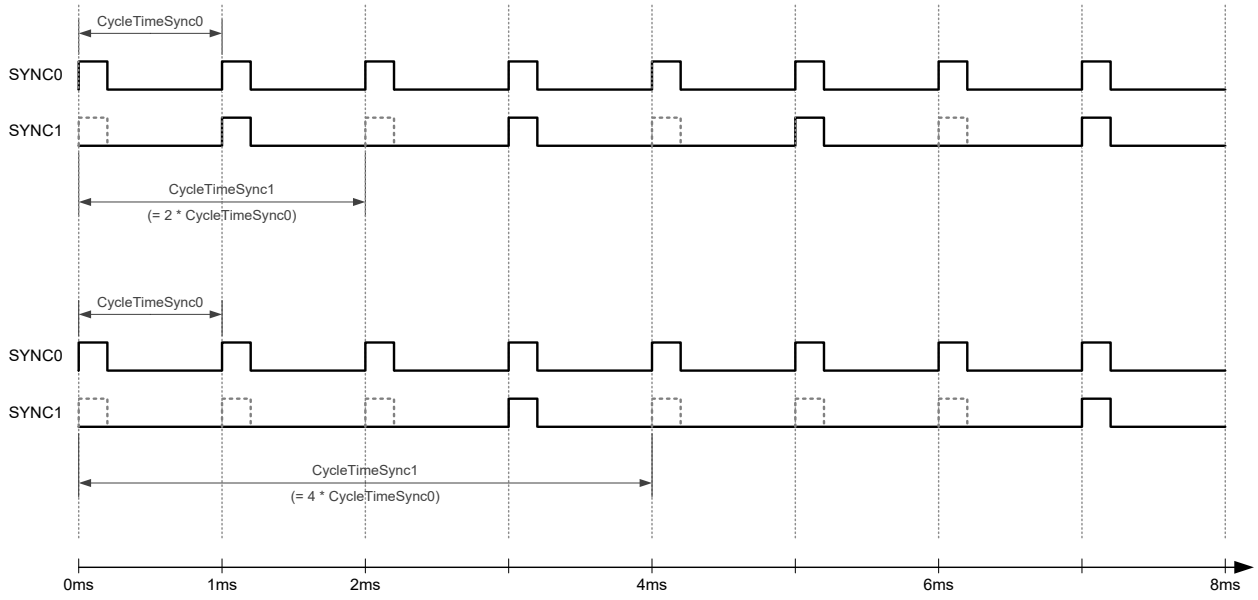


Figure 9: SYNC1 signal generation starts with first omitted signal (example)

Dc/@UnknownFRMW

/EtherCATInfo/Descriptions/Devices/Device/Dc/@UnknownFRMW

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Slave processes FRMW commands

1: Slave does not process FRMW commands

Shall only be TRUE when ESC does not support this command type.

Dc/@Unknown64Bit

/EtherCATInfo/Descriptions/Devices/Device/Dc/@Unknown64Bit

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: 64 bit time values supported

1: 64 bit time values not supported

Dc/@ExternalRefClock

/EtherCATInfo/Descriptions/Devices/Device/Dc/@ExternalRefClock

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: DC time of device is not triggered by an external source

1: Device synchronizes to an external clock source (e.g. IEEE1588 clock)

Dc/@PotentialReferenceClock

/EtherCATInfo/Descriptions/Devices/Device/Dc/@PotentialReferenceClock

Occurrence: optional (0..1)
Datatype: Boolean

0: device cannot be used as reference clock

1: device can be used a reference clock (all necessary registers available)

NOTE: For devices supporting the necessary DC registers this attribute should be set to 1. Devices supporting any DC mode automatically can be used as reference clock and this attribute may be omitted.

Dc/@TimeLoopControlOnly

/EtherCATInfo/Descriptions/Devices/Device/Dc/@TimeLoopControlOnly

Occurrence: optional (0..1)
Datatype: Boolean

Devices that need the DC SystemTime but not for SYNC/LATCH signals (e.g. bridges), may not support certain registers.

The EtherCAT master configures DC (calculate and download Offset value, …) but does not write registers from 0x0940 to 0x09FF (e.g. no Assign/Activate is downloaded)

Allowed values:

0: device supports DC with LATCH and/or SYNC unit (default)

1: device uses DC SystemTime but does not support SYNC or LATCH unit.

OpMode

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: Name
Desc
AssignActivate
CycleTimeSync0
ShiftTimeSync0
CycleTimeSync1
ShiftTimeSync1
Sm
VendorSpecific

Definition of supported operation modes (usually operation modes of synchronization)

The first operation mode listed is the default one.

NOTE: For definition of operation modes with mailbox init commands the elements Device:Slots and Modules are used

Name

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Internal handle of operation mode for configuration tool.

Every name shall only appear once within one description of a device.

Desc

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Desc

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Use is mandatory

Vendor specific description of operation mode displayed by configuration tool

Recommended values:

Free Run: no synchronization

SM Synchronous: synchronized on SyncManager event when process data is written (read)

DC-Synchronous: synchronized on DC sync event

AssignActivate

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/AssignActivate

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Value of Latch and Sync Control registers (ESC register 0x0981:0x0980)

CycleTimeSync0

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/CycleTimeSync0

Occurrence: optional (0..1)
Datatype: Int
Attributes: @Factor
Child elements: --

Cycle time of SYNC0 signal (= ESC register 0x09A3:0x09A0)

Allowed values:

>0: fixed cycle time in nanoseconds

0: cycle time is defined by using the attribute CycleTimeSync0@Factor based on SyncUnit cycle time (= EtherCAT cycle time = cycle time in which the process data of this device is updated)

NOTE: A fixed cycle time might be of disadvantage when the SyncUnit cycle time (i.e. EtherCAT cycle time = cycle time in which the process data of this device is updated) is not a multiple of the fixed time.

If CycleTimeSync0 and CycleTimeSync0@Factor are “0” this results in a total cycle time = 0. This may activate special features (single shot).

CycleTimeSync0/@Factor

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/CycleTimeSync0/@Factor

Occurrence: optional (0..1)
Datatype: Int

Used to define SYNC0 signal cycle based on the SyncUnit cycle time (= EtherCAT bus cycle time = cycle time in which the process data of this device is updated).

Sign of value indicates mathematical operation:

Positive value:

SYNC0 cycle time = SyncUnit cycle time * |Factor|

Negative value:

SYNC0 cycle time = SyncUnit cycle time / |Factor|

NOTE: If CycleTimeSync0 and CycleTimeSync0@Factor are “0” this results in a total cycle time = 0. This may activate special features (single shot).

ShiftTimeSync0

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync0

Occurrence: optional (0..1)
Datatype: Int
Attributes: @Factor
@Input
@OutputDelayTime
@InputDelayTime
Child elements: --

Shift (offset) of start time of SYNC0 and SYNC1 signal (as SYNC1 is based on SYNC0) relating to global DC reference in nanoseconds.

NOTE: Additionally attribute ShiftTimeSync0@Factor may be used to add a value that depends on the SyncUnit cycle time.

ShiftTimeSync0/@Factor

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync0/@Factor

Occurrence: optional (0..1)
Datatype: Int

Additional value to the element ShiftTimeSync0 depending on the SyncUnit cycle time (= EtherCAT bus cycle time = cycle time in which the process data of this device is updated). Both values are summed up to the total shift time by the configuration tool.

Sign of value indicates mathematical operation:

Positive value:

ShiftTimeSync0 = SyncUnit cycle time * |Factor|

Negative value:

ShiftTimeSync0 = SyncUnit cycle time / |Factor|

ShiftTimeSync0/@Input

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync0/@Input

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: SyncSignal of ESC is shifted in positive direction in relation to the global/master SyncSignal. Used when slave is synchronized for a synchronous output event

1: DC timing used for inputs - consider input DC timing. Used when input latch event shall be as shortly before the frame collects input data.

ShiftTimeSync0/@OutputDelayTime

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync0/@OutputDelayTime

Occurrence: optional (0..1)
Datatype: Int

Defines the delay between SYNC0 signal and the actualization of the outputs on the hardware

Corresponds to CoE Object 0x1C32.09

ShiftTimeSync0/@InputDelayTime

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync0/@InputDelayTime

Occurrence: optional (0..1)
Datatype: Int

Defines the delay between the SYNC0 signal and the actualization of the inputs on the hardware

Corresponds to CoE Object 0x1C33.09

CycleTimeSync1

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/CycleTimeSync1

Occurrence: optional (0..1)
Datatype: Int
Attributes: @Factor
Child elements: --

Cycle time of SYNC1 signal. CycleTimeSync1 shall be an integer multiple of CycleTimeSync0.

Allowed values:

>0: fixed cycle time in nanoseconds

0: cycle time is defined by using the attribute CycleTimeSync1@Factor based on either CycleTimeSync0 or SyncUnit cycle time (= EtherCAT cycle time = cycle time in which the process data of this device is updated)

Element “CycleTime1” of the ENI file (= ESC register 0x09a4:0x09a7) is calculated as follows:

CycleTimeSync1 - CycleTimeSync0 + ShiftTimeSync1

If CycleTimeSync1 and CycleTimeSync1@Factor are “0” this results in a total cycle time = 0. This may activate special features (single shot).

NOTE: If CycleTimeSync1 is n * CycleTimeSync0 with n>1, the SYNC1 signal generation always starts with the omitted signals (refer Figure 9).

CycleTimeSync1/@Factor

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/CycleTimeSync1/@Factor

Occurrence: optional (0..1)
Datatype: Int

Used to define cycle time of SYNC1 signal as a multiple of either the cycle time of SYNC0 signal or the SyncUnit cycle time (= EtherCAT bus cycle time = cycle time in which the process data of this device is updated).

Sign of value indicates mathematical operation:

Positive value:

CycleTimeSync1 = |Factor| * SyncCycleTime0

Negative value:

CycleTimeSync1 = |Factor| * SyncUnit cycle time

The cycle time of SYNC1 signal shall be an integer multiple of the cycle time of SYNC0 signal. This also applies if cycle time of SYNC1 is defined based on SyncUnit cycle time.

NOTE: If CycleTimeSync1 and CycleTimeSync1@Factor are "0" this results in a total cycle time = 0. This may activate special features (single shot).

ShiftTimeSync1

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync1

Occurrence: optional (0..1)
Datatype: Int
Attributes: @Factor
@Input
@OutputDelayTime
@InputDelayTime
Child elements: --

Shift (offset) of start time of SYNC1 signal relating to start time of SYNC0 signal in nanoseconds. ShiftTimeSync1 shall be smaller than CycleTimeSync0.

ShiftTimeSync1/@Factor

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync1/@Factor

Occurrence: optional (0..1)
Datatype: Int

For future use

ShiftTimeSync1/@Input

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync1/@Input

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: SyncSignal of ESC is shifted in positive direction in relation to the global/master SyncSignal. Used when slave is synchronized on a synchronous output event

1: DC timing used for inputs - consider input DC timing. Used when input latch event shall be as shortly before the frame collects input data.

ShiftTimeSync1/@OutputDelayTime

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync1/@OutputDelayTime

Occurrence: optional (0..1)
Datatype: Int

Defines the delay between SYNC1 signal and the actualization of the outputs on the hardware

ShiftTimeSync1/@InputDelayTime

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/ShiftTimeSync1/@InputDelayTime

Occurrence: optional (0..1)
Datatype: Int

Defines the delay between the SYNC1 signal and the actualization of the inputs on the hardware

Sm

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: @No
Child elements: SyncType
CycleTime
ShiftTime
Pdo

Sm/@No

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/@No

Occurrence: mandatory (1..1)
Datatype: Int

Number of SyncManager described by this element starting with 0 for first SyncManager. Counting starts with 0.

SyncType

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/SyncType

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Obsolete (Configtool: skip element)

CycleTime

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/CycleTime

Occurrence: optional (0..1)
Datatype: Int
Attributes: @Factor
Child elements: --

Obsolete (Configtool: skip element)

CycleTime/@Factor

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/CycleTime/@Factor

Occurrence: optional (0..1)
Datatype: Int

Obsolete (Configtool: skip element)

ShiftTime

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/ShiftTime

Occurrence: optional (0..1)
Datatype: Int
Attributes: @MinAfterSync
@MinBeforeFrame
Child elements: --

Obsolete (Configtool: skip element)

ShiftTime/@MinAfterSync

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/ShiftTime/@MinAfterSync

Occurrence: optional (0..1)
Datatype: Int

Obsolete (Configtool: skip element)

ShiftTime/@MinBeforeFrame

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/ShiftTime/@MinBeforeFrame

Occurrence: optional (0..1)

Datatype: Int

Obsolete (Configtool: skip element)

Pdo

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/Pdo

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @OSFac
Child elements: --

PDOs assigned to the named SyncManager (OpMode/Sm/Pdo/@Sm) when this operation mode is selected.

NOTE: PDOs assigned by this element have to be defined in the elements RxPdo/TxPdo

Pdo/@OSFac

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/Sm/Pdo/@OSFac

Occurrence: optional (0..1)
Datatype: Int

t.b.d.

VendorSpecific

/EtherCATInfo/Descriptions/Devices/Device/Dc/OpMode/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of OpMode

VendorSpecific

/EtherCATInfo/Descriptions/Devices/Device/Dc/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of Device/Dc

5.3.15 Slots

Slots

/EtherCATInfo/Descriptions/Devices/Device/Slots

Occurrence: optional (0..1)
Datatype: --
Attributes: @DownloadModuleIdentList
@DownloadModuleAddressList
@DownloadModuleListTransition
@MaxSlotCount
@MaxSlotGroupCount
@SlotPdoIncrement
@SlotGroupPdoIncrement
@SlotIndexIncrement
@SlotGroupIndexIncrement
@IdentifyModuleBy
Child elements: Slot
SlotGroupData
ModulePdoGroup
SlotSelections

Defines the combination possibilities of modules (described in element Modules). This may be used when the device supports the Modular Device Profile (ETG.5001).

Refer to clause 0.

A slot is used as a placeholder for a module. The element Slots describes the allowed combinations of modules as they are described in the element ../Description/Modules. Several Slots can be grouped together to one SlotGroup.

For further information on how to use Slots and Modules, refer to the Modular Devices Profile (ETG.5001).

Slots/@DownloadModuleIdentList

/EtherCATInfo/Descriptions/Devices/Device/Slots/@DownloadModuleIdentList

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: module ident list is not downloaded to the device

1: module ident list 0xF030 is downloaded to the device during PreOp to SafeOp state change

Slots/@DownloadModuleAddressList

/EtherCATInfo/Descriptions/Devices/Device/Slots/@DownloadModuleAddressList

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: module address list is not downloaded to the device

1: module address list 0xF020 is downloaded to the device during PreOp to SafeOp state change

Slots/@DownloadModuleListTransition

/EtherCATInfo/Descriptions/Devices/Device/Slots/@DownloadModuleListTransition

Occurrence: optional (0..1)
Datatype: NmToken

State transition for downloading the module ident list (if @DownloadModuleIdentList = 1) and the module address list (if @DownloadModuleAddressList = 1)

Allowed values (for element Enum):

IP

PS (default)

SO

For state transitions, refer to clause 3.6

NOTE: If transition is 'IP' the command is send directly after the slave reached PreOp state.

Slots/@MaxSlotCount

/EtherCATInfo/Descriptions/Devices/Device/Slots/@MaxSlotCount

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Maximum number of slots for this device

Slots/@MaxSlotGroupCount

/EtherCATInfo/Descriptions/Devices/Device/Slots/@MaxSlotGroupCount

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Maximum number of SlotGroups possible (e.g. for a DS402 drive there might be 8 SlotGroups at the maximum with 0x800 indexes per SlotGroup).

Slots/@SlotPdoIncrement

/EtherCATInfo/Descriptions/Devices/Device/Slots/@SlotPdoIncrement

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if SlotGroupPdoIncrement is not used

PDO Index increment, i.e. distance between the PDO start indexes, of two consecutive slots

NOTE: The EtherCAT configuration tool increments the PDO number of the module's PDOs with the SlotPdoIncrement multiplied with the module's position.

Slots/@SlotGroupPdoIncrement

/EtherCATInfo/Descriptions/Devices/Device/Slots/@SlotGroupPdoIncrement

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if SlotPdoIncrement ist not used

Distance between the PDO start indexes of two consecutive SlotGroups

The EtherCAT configuration tool increments the PDO number of the module's PDOs with the SlotGroupPdoIncrement multiplied with the module's position.

Slots/@SlotIndexIncrement

/EtherCATInfo/Descriptions/Devices/Device/Slots/@SlotIndexIncrement

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if SlotGroupIndexIncrement ist not used

Object Index increment, i.e. distance between the object (=PDO entry) indexes of two consecutive slots.

The index of the objects of the module's objects in the dictionary and entries in the PDO definition is incremented by the SlotIndexIncrement multiplied with the module's position

Slots/@SlotGroupIndexIncrement

/EtherCATInfo/Descriptions/Devices/Device/Slots/@SlotGroupIndexIncrement

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if SlotIndexIncrement is not used

Distance between the start index of two consecutive SlotGroups (e.g. with DS402 the SlotGroupPdoIncrement might be 0x800)

Slots/@IdentifyModuleBy

/EtherCATInfo/Descriptions/Devices/Device/Slots/@IdentifyModuleBy

Occurrence: optional (0..1)
Datatype: NmToken

Obsolete (Configtool: skip element)

Slot

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot

Occurrence: optional (0..Unbounded)
Datatype: SlotType
Attributes: @SlotGroup
@MinInstances
@MaxInstances
@SlotPdoIncrement
@SlotGroupPdoIncrement
@SlotIndexIncrement
@SlotGroupIndexIncrement
@TreeView
Child elements: Name
Choice:
- ModuleIdent
- ModuleClass

Choice:
- Image16x14
- ImageFile16x14
- ImageData16x14

Slot description

Elements *Slots* and *Modules* are used to describe the following device types:

- gateway device: device to subordinated fieldbuses

- modular devices : device has physical modules

- module device: process data of this device is structured as modules

Slot/@SlotGroup

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@SlotGroup

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Number of SlotGroup this slot belongs to.

NOTE: Use for complex Slot/Module description when several SlotGroups are required.

Slot/@MinInstances

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@MinInstances

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)

Minimum number of how many instances of this slot type shall be configured

Slot/@MaxInstances

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@MaxInstances

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)

Maximum number of how many instances of this slot type can be configured

Slot/@SlotPdoIncrement

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@SlotPdoIncrement

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if *SlotGroupPdoIncrement* is not used.

Index distance between two consecutive PDO mapping objects.

Overwrites value of *../Slots/@SlotPdoIncrement*

NOTE: *SlotIndexIncrement* may have to be referenced by attributes *../Rx/TxPdo/Index/@DependOnSlot and*, *../Rx/TxPdo/Exclude/Index/@DependOnSlot*

Slot/@SlotGroupPdoIncrement

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@SlotGroupPdoIncrement

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if *SlotPdoIncrement* is not used.

Index distance between the first PDO mapping object of two consecutive Slot Groups

Overwrites value of ../Device/Slots/@SlotGroupPdoIncrement

NOTE: *SlotGroupIndexIncrement* may have to be referenced by attributes *../Rx/TxPdo/Index@DependOnSlotGroup* and ../Rx/TxPdo/Exclude/Index/*@DependOnSlotGroup.*

Slot/@SlotIndexIncrement

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@SlotIndexIncrement

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if *SlotGroupIndexIncrement* is not used.

Index distance between object indexes (especially Rx/TxPdo entries objects) of two consecutive slots

Overwrites value of Slots@SlotIndexIncrement

NOTE: *SlotIndexIncrement* may have to be referenced by attributes *../Profile/Dictionary/Objects/Object/Index/@DependOnSlot*,

../Mailbox/Coe/InitCmd/Index/@DependOnSlot, *../SafetyParaMapping/Index/@DependOnSlot*, and *../Rx/TxPdo/Entry/Index/@DependOnSlot*

Slot/@SlotGroupIndexIncrement

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@SlotGroupIndexIncrement

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory if *SlotIndexIncrement* is not used

Index distance between the first object of two consecutive SlotGroups

Overwrites value of *../Slots/@SlotGroupIndexIncrement*

NOTE: *SlotGroupIndexIncrement* may have to be referenced by attributes *../Profile/Dictionary/Objects/Object/Index/@DependOnSlotGroup*, *../Mailbox/Coe/InitCmd/Index/@DependOnSlotGroup*, *../SafetyParaMapping/Index/@DependOnSlotGroup*, *../Rx/TxPdo/Entry/Index/@DependOnSlotGroup*

Slot/@TreeView

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@TreeView

Occurrence: optional (0..1)
Datatype: NmToken

Depending on the chosen NMTOKEN value, the configuration tool shows variables of the device grouped by SlotGroup, Slot, or Pdo.

Allowed values:

SLOTGROUP

SLOT

PDO

Name

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name of slot(s)

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

ModuleIdent

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleIdent

Occurrence: mandatory (1..Unbounded)
Datatype: String
Attributes: @Default
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either ModuleIdent or ModuleClass

List of modules (identified by ModuleIdent) which can be assigned to this slot

ModuleIdent/@Default

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleIdent/@Default

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

A configuration tool may use this information to add modules (represented by ModuleIdent) to the slot by default.

Allowed values:

0: this module is not used by default for the slot

1: this module is used by default for the slot

NOTE: for each slot only one instance of ModuleIdent@Default = 1 allowed.

ModuleClass

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleClass

Occurrence: mandatory (1..Unbounded)
Datatype: --
Attributes: --
Child elements: Class
VendorId
Name
Choice:
- Image16x14
- ImageFile16x14
- ImageData16x14

This element is part of a choice. See parent's child element list for more information.

Either ModuleIdent or ModuleClass

List of ModulClasses: Modules of the listed ModuleClass can be assigned to this slot.

Class

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleClass/Class

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Identifier of one ModuleClass that can be assigned to this slot

VendorId

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleClass/VendorId

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Modules of this vendor may be assigned to this slot.

Default value: value from element *EtherCATInfo/Vendor/Id*

Name

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleClass/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name of the ModuleClass that may be assigned to this slot.

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleClass/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Image16x14

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleClass/Image16x14

Occurrence: optional (0..1)

Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: skip element)

ImageFile16x14

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleClass/ImageFile16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

File path to a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool.

0xFF00FF is used for transparent color

ImageData16x14

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ModuleClass/ImageData16x14

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Hex binary data of a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool

0xFF00FF is used for transparent color

NOTE: it is recommended to use DIB header version 3 as this guaranties maximum compatibility. Check: Byte 0x0E of the hex value is “0x28” when DIB header is V3

Image16x14

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/Image16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: skip element)

ImageFile16x14

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ImageFile16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

File path to a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool.

0xFF00FF is used for transparent color

ImageData16x14

/EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/ImageData16x14

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Hex binary data of a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool

0xFF00FF is used for transparent color

NOTE: it is recommended to use DIB header version 3 as this guaranties maximum compatibility. Check: Byte 0x0E of the hex value is “0x28” when DIB header is V3

SlotGroupData

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotGroupData

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: @SlotGroup
Child elements: Name
Choice:
├─ ImageFile16x14
└─ ImageData16x14

Group description that might be shown by a configuration tool for user-friendly names/icons.

SlotGroupData/@SlotGroup

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotGroupData/@SlotGroup

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)

Refers to the SlotGroup (*EtherCATInfo/Descriptions/Devices/Device/Slots/Slot/@SlotGroup*) this description is related to.

Name

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotGroupData/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name of the group.

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotGroupData/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

ImageFile16x14

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotGroupData/ImageFile16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

File path to a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool.

0xFF00FF is used for transparent color

ImageData16x14

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotGroupData/ImageData16x14

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Hex binary data of a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool

0xFF00FF is used for transparent color

NOTE: it is recommended to use DIB header version 3 as this guaranties maximum compatibility. Check: Byte 0x0E of the hex value is “0x28” when DIB header is V3

ModulePdoGroup

/EtherCATInfo/Descriptions/Devices/Device/Slots/ModulePdoGroup

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @Alignment
@RxPdo
@TxPdo
Child elements: --

Not in current version of Spec

ModulePdoGroup/@Alignment

/EtherCATInfo/Descriptions/Devices/Device/Slots/ModulePdoGroup/@Alignment

Occurrence: optional (0..1)
Datatype: Int

Mandatory for every group value used in element *../Module/Type/ModulePdoGroup*

Alignment for ModulePdoGroup in bytes (e.g. 2 for word alignment)

Counting starts with ‘0’: First entry describes alignment for ModulePdoGroup 0, second for ModulePdoGroup 1, etc.)

NOTE: Alignment only applies on the PDO, not the entries. Alignment within the PDO is made by padding bit entries (index = 0)

ModulePdoGroup/@RxPdo

/EtherCATInfo/Descriptions/Devices/Device/Slots/ModulePdoGroup/@RxPdo

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory for every group value used in element *../Module/Type/ModulePdoGroup*

Used index for alignment PDO defined by attribute RxPdo, i.e. 0x1600 – 0x17FF

NOTE: Indices of alignment PDOs shall be used unique i.e. shall not be defined more than once.

ModulePdoGroup/@TxPdo

/EtherCATInfo/Descriptions/Devices/Device/Slots/ModulePdoGroup/@TxPdo

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

Mandatory for every group value used in element *../Module/Type/ModulePdoGroup*

Used index for alignment PDO defined by attribute TxPdo, i.e. 0x1A00 – 0x1BFF

NOTE: Indices of alignment PDOs shall be used unique i.e. shall not be defined more than once.

SlotSelections

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotSelections

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: Name
ModuleIdent

Contains a predefined set of modules. These sets can be displayed by a Configuration tool. When one set is selected, the defined modules are automatically plugged to the slots in the given order

One element SlotSelections is used for one predefined set.

Name

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotSelections/Name

Occurrence: mandatory (1..1)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name of the module set

Name/@LcId

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotSelections/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

ModuleIdent

/EtherCATInfo/Descriptions/Devices/Device/Slots/SlotSelections/ModuleIdent

Occurrence: mandatory (1..Unbounded)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

1 to n ModuleIdent elements to be connected to the slots of the device in case this set is selected. Order of ModuleIdent elements is used.

5.3.16 ESC

ESC

/EtherCATInfo/Descriptions/Devices/Device/ESC

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Reg0108
Reg0400
Reg0410
Reg0420
VendorSpecific

Init values of ESC watchdog registers.

Reg0108

/EtherCATInfo/Descriptions/Devices/Device/ESC/Reg0108

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Init value of register Physical Read/ Write Offset 0x0108

Offset of R/W Commands (FPRW/ APRW) between Read address and Write address.

RD_ADR = ADR and WR_ADR = ADR + R/W-Offset.

Shall be used when the Physical Read/Write Offset should be unequal 0.

NOTE: Command is sent before process data communication starts (IP)

Reg0400

/EtherCATInfo/Descriptions/Devices/Device/ESC/Reg0400

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Init value of register Watchdog Divider 0x0401:0x400:

Number of 25 MHz tics (minus 2) that represents the basic watchdog increment (Default value of this register is 100µs = 2498)

Might be used when Watchdog Divider should be different from the default value.

Default value: If element is not present no value is written to register 0x400. In that case, the default value of the ESC is not overwritten.

NOTE: Command is sent before process data communication starts (IP)

Reg0410

/EtherCATInfo/Descriptions/Devices/Device/ESC/Reg0410

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Init value of register Watchdog Time PDI 0410:

Number of basic watchdog increments (Default value with Watchdog divider 100µs means 100ms Watchdog).

Might be used when Watchdog Time PDI should be different from the default value.

Default value: If element is not present no value is written to register 0x410. In that case, the default value of the ESC is not overwritten.

NOTE: Command is sent before process data communication starts (IP)

Reg0420

/EtherCATInfo/Descriptions/Devices/Device/ESC/Reg0420

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Init value of register Watchdog Time Process Data 0x0421:0x420:

Number of basic watchdog increments. (Default value with Watchdog divider 100µs means 100ms Watchdog)

Might be used when Watchdog Time Process Data should be different from the default value.

Default value: If element is not present no value is written to register 0x420. In that case, the default value of the ESC is not overwritten.

NOTE: Command is sent before process data communication starts (IP)

VendorSpecific

/EtherCATInfo/Descriptions/Devices/Device/ESC/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of *../DeviceType/ESC*

5.3.17 EEPROM

Eeprom

/EtherCATInfo/Descriptions/Devices/Device/Eeprom

Occurrence: optional (0..1)
Datatype: EepromType
Attributes: @AssignToPdi
Child elements: *Choice:*
- Data
- *Sequence:*
  - ByteSize
  - ConfigData
  - BootStrap

└ Category
VendorSpecific

Use is mandatory

Description of SII, e.g. PDI configuration (loaded from ESC during start-up), EEPROM size

Eeprom/@AssignToPdi

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/@AssignToPdi

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: EEPROM access rights are assigned to PDI during state change from Init to PreOp, Init to Boot and while in Boot

1: EEPROM access rights are assigned to PDI in all states except Init

Data

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/Data

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either Data or (ByteSize and ConfigData and BootStrap and Category)

Complete EEPROM data. Length is implicit.

ByteSize

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/ByteSize

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either Data or (ByteSize and ConfigData and BootStrap and Category)

Byte size of connected EEPROM device

ConfigData

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/ConfigData

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either Data or (ByteSize and ConfigData and BootStrap and Category)

Data of first 7 words of EEPROM (Configuration Area).

Following “0” may be omitted

NOTE: the value for Configured Station Alias in the element *../Eeprom/ConfigData* should be 0x0000 as the Configured Station Alias value normally is changed by the user using a master/configuration tool if necessary.

BootStrap

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/BootStrap

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either Data or (ByteSize and ConfigData and BootStrap and Category)

Start address and length of mailbox SyncManagers (EEPROM data 0x0017:0x0014).

Indicates that device supports bootstrap.

NOTE: Settings shall be consistent with corresponding EEPROM values.

Category

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/Category

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: @PreserveOnlineData
Child elements: CatNo
Choice:
- Data
- DataString
- DataUINT
- DataUDINT

This element is part of a choice. See parent's child element list for more information.

Either Data or (ByteSize and ConfigData and BootStrap and Category)

Describes SII category information according to ETG.1000, part 6.

NOTE: A configuration tool that is able to write EEPROM data shall write the additional categories based on the information in the ESI file, i.e. element *../Device/Sm*, *../Device/Fmmu*, *../Device/Dc*, etc.

Category/@PreserveOnlineData

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/Category/@PreserveOnlineData

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Data of this category may be overwritten by configuration tool when downloading EEPROM data

1: Data of this category shall not be changed in EEPROM

NOTE: This can be used e.g. for devices with calibration information within a category that should not be overwritten by default data.

CatNo

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/Category/CatNo

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Available categories described by the Category type number (ETG.1000, part 6 and ETG.1020)

NOTE: A configuration tool that supports EEPROM download shall download the CatNo and corresponding data when SII content is generated.

This shall be done even if the CatNo is unknown.

CatNo 0x0001...0x0009: device specific categories that must not be overwritten

CatNo 0x0800...0x0FFF: vendor specific

All other CatNo reserved

Data

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/Category/Data

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either Data or DataString or DataUINT or DataUDINT is mandatory

Category data represented in binary format

DataString

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/Category/DataString

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either Data or DataString or DataUINT or DataUDINT is mandatory

Category data represented in STRING format

DataUINT

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/Category/DataUINT

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either Data or DataString or DataUINT or DataUDINT is mandatory

Category data represented in UINT format

DataUDINT

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/Category/DataUDINT

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Either Data or DataString or DataUINT or DataUDINT is mandatory

Category data represented in UDINT format

VendorSpecific

/EtherCATInfo/Descriptions/Devices/Device/Eeprom/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific EEPROM data that is only evaluated by a vendor specific configuration tool.

5.3.18 Image (Icons)

Image16x14

/EtherCATInfo/Descriptions/Devices/Device/Image16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: skip element)

ImageFile16x14

/EtherCATInfo/Descriptions/Devices/Device/ImageFile16x14

Occurrence: optional (0..1)
Datatype: String

Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

File path to a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool.

0xFF00FF is used for transparent color

ImageData16x14

/EtherCATInfo/Descriptions/Devices/Device/ImageData16x14

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Hex binary data of a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool

0xFF00FF is used for transparent color

NOTE: it is recommended to use DIB header version 3 as this guaranties maximum compatibility. Check: Byte 0x0E of the hex value is “0x28” when DIB header is V3

VendorSpecific

/EtherCATInfo/Descriptions/Devices/Device/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of DeviceType

5.4 Modules

Modules

/EtherCATInfo/Descriptions/Modules

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Module

Element Modules describes all possible modules that can be configured for a modular or complex device. This is typically, but not exclusively, used for devices supporting the Modular Device Profile (ETG.5001)

It is typically, but not exclusively, used when the EtherCAT slave device is structured according to the Modular Device Profile (ETG.5001). It describes physical modules (e.g. modular I/O terminals) as well as functional modules with different operation modes (e.g. different synchronization modes).

NOTE: The Modules description can be integrated into the EtherCAT Slave Information (ESI) file or described in a separate file (based on EtherCATModule.xsd). In the latter case, a reference to this file has to be listed in the element *EtherCATInfo/InfoReference*.

Module

/EtherCATInfo/Descriptions/Modules/Module

Occurrence: optional (0..Unbounded)
Datatype: ModuleType
Attributes: @Crc32
Child elements: Type
Name
RxPdo
TxPdo
SafetyParaMapping
Mailbox
Profile
DcOpModeName

Choice:
- Image16x14
- ImageFile16x14
- ImageData16x14

VendorSpecific

Description of a single module

Module/@Crc32

/EtherCATInfo/Descriptions/Modules/Module/@Crc32

Occurrence: optional (0..1)
Datatype: HexDecValue (String)

CRC Checksum used to check module description against alteration. Refer to clause 0.

5.4.1 Type

Type

/EtherCATInfo/Descriptions/Modules/Module/Type

Occurrence: mandatory (1..1)
Datatype: String
Attributes: @ModuleIdent
@ModuleClass
@ModulePdoGroup
@SRA_ParameterSupported
Child elements: --

Short name of this module

Type/@ModuleIdent

/EtherCATInfo/Descriptions/Modules/Module/Type/@ModuleIdent

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)

Identifies the module. The ModuleIdent is vendor specific and identifies a module.

ModuleIdent shall be unique within one ESI file including all referenced external module files. It may be re-used for modules in different ESI files or independent external module files.

Exception: ModuleIdent value shall be unique within all FSoE modules of one VendorID.

0x0 means no module is connected. i.e. “empty slot”.

NOTE: ModuleIdent can be downloaded in the Configured Module Ident List (objects 0xF03y) so that the slave can compare the configured with the detected Modules.

NOTE: ModuleIdent can be uploaded in the Detected Module Ident List Object (objects 0xF05y) to find out the actually available modules.

Type/@ModuleClass

/EtherCATInfo/Descriptions/Modules/Module/Type/@ModuleClass

Occurrence: optional (0..1)
Datatype: String

Name of module class (i.e. module group) to which this module is assigned to.

NOTE: Vendor specific unique class name that can be used if the number of allowed modules for one slot is too long to describe them by the ModuleIdent. ModuleClass is unique within one ESI file including all referenced external module classes. The name may be re-used for module classes in different ESI files or independent external module files.

Type/@ModulePdoGroup

/EtherCATInfo/Descriptions/Modules/Module/Type/@ModulePdoGroup

Occurrence: optional (0..1)
Datatype: Int

Specifies the PDO mapping order of the modules in the process data image. Modules of the first ModulePdoGroup are mapped to the beginning of the process image. Counting starts with ‘0’

Type/@SRA_ParameterSupported

/EtherCATInfo/Descriptions/Modules/Module/Type/@SRA_ParameterSupported

Occurrence: optional (0..1)
Datatype: Boolean

Mandatory for Safety over EtherCAT Devices supporting SRA Parameter

Allowed values:

0: SRA Parameter are not supported

1: SRA Parameter supported

Name

/EtherCATInfo/Descriptions/Modules/Module/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

More detailed description of this Module

Name/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

5.4.2 Pdo - Process Data

5.4.2.1 RxPdo - Output Process Data

RxPdo

/EtherCATInfo/Descriptions/Modules/Module/RxPdo

Occurrence: optional (0..Unbounded)
Datatype: PdoType
Attributes: @Fixed
@Mandatory
@Virtual
@Sm
@Su
@PdoOrder
@OSFac
@OSMin
@OSMax
@OSIndexInc
@SafetyPdoType
@SafetyConnNumber
Child elements: Index
Name
Exclude
Entry
ExcludedSm

RxPDOs of this Module.

RxPDOs are added automatically to the RxPDO assignment when this Module is configured. The Index of the RxPDO depends on the position of the Module. The PDO Number of the PDO and the Index of the PDO entries might be adapted.

RxPdo/@Fixed

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: PDO mapping can be changed, i.e. PDO entries can be deleted or added

1: PDO content is not configurable i.e. complete PDO content is fixed; attribute Fixed of the PDO entries (*../Device/RxPdo/Entry/@Fixed*) is overwritten

NOTE: If attribute *../Mailbox/CoE/@PdoUpload* = true, the fixed content of the PDO shall be uploaded as defined in the ESI description from the slave.

NOTE: highly recommended to use fixed PDO content in modules.

RxPdo/@Mandatory

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@Mandatory

Occurrence: optional (0..1)
Datatype: Boolean

PDO is configured (= assigned to) in a SyncManager

Allowed values:

0: PDO assignment is changeable (e.g. content of object 0x1C12 can be changed)

1: PDO must be assigned to the default SyncManager

NOTE: If attribute *../Mailbox/CoE/@PdoUpload* = true, the mandatory PDO shall be uploaded from the slave.

NOTE: If there are no default PDOs assigned to a SyncManager (refer to attribute *../@Sm*) the Mandatory bit shall not be set.

RxPdo/@Virtual

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@Virtual

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Standard PDO description

1: Two cases:

Process data value is read from a register value (ESC memory address 0x0000:0x0EFF). In this case element *../Sm/@Virtual* shall be “true”.

Content (=PDO entries) of PDO can be configured manually via the configuration tool. In this case no element *../Rx/TxPdo/Entry* is described.

NOTE: Configuration tools shall sort process data byte aligned by default by adding padding PDO entries with Index=0 and BitLen = [bit size of padding bits].

RxPdo/@Sm

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@Sm

Occurrence: optional (0..1)
Datatype: Int

Default SyncManager for this PDO i.e. this PDO is included in the process data image by default

TxPDOs shall only be assigned to Input SyncManager. RxPDOs shall only be assigned to Output SyncManager (refer also to element *../Device/Sm*).

NOTE: PDOs which are not assigned to any SyncManager by default may be assigned manually via the configuration tool. In this case the PDO must not be configured as mandatory (Pdo@Mandatory = FALSE).

RxPdo/@Su

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@Su

Occurrence: optional (0..1)
Datatype: Int

Groups PDOs and defines to which FMMU (and with this SyncManager) they can be assigned to, i.e. *Pdo@Su* and *Fmmu@Su* have the same value.

RxPdo/@PdoOrder

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@PdoOrder

Occurrence: optional (0..1)

Datatype: Int

Obsolete (Configtool: skip element)

RxPdo/@OSFac

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@OSFac

Occurrence: optional (0..1)
Datatype: Int

Default oversampling factor

RxPdo/@OSMin

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@OSMin

Occurrence: optional (0..1)
Datatype: Int

Minimum oversampling factor

RxPdo/@OSMax

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@OSMax

Occurrence: optional (0..1)
Datatype: Int

Maximum oversampling factor

RxPdo/@OSIndexInc

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@OSIndexInc

Occurrence: optional (0..1)
Datatype: Int

Oversampling increment for entry indexes

RxPdo/@SafetyPdoType

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@SafetyPdoType

Occurrence: optional (0..1)
Datatype: String

Allowed values:

FSoESlave: PDO defines one single FSoE Slave connection

FSoEMultipleSlave: two or more FSoE Slave connections mapped into one PDO (each PDO entry contains one FSoE Slave connection)

FSoEMaster: PDO defines one single FSoE Master connection

FSoEMultipleMaster: two or more FSoE Master connections mapped into one PDO (each PDO entry contains one FSoE Master connection)

FSoESlave and FSoEMultipleSlave types shall not be used within one module.

Two or more FSoEMultipleSlave type PDOs are allowed (to allow more than 256 connections)

FSoEMaster and FSoEMultipleMaster types shall not be used within one module.

Two or more FSoEMultipleMaster type PDOs are allowed (to allow more than 256 connections)

Rx-/Tx-PDOs belonging to one FSoE Connection (with a defined SafetyPdoType) shall have the same SafetyConnNumber

RxPdo/@SafetyConnNumber

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/@SafetyConnNumber

Occurrence: optional (0..1)
Datatype: Int

Mandatory if */RxPdo/@SafetyPdoType* is used and */RxPdo/Entry@SafetyConnNumber* is not used.

RxPdo, TxPdo, and SafetyParaMapping belonging to the same FSoE Connection shall have the same value in element SafetyConnNumber. Each connection shall use a unique number, independent of other connection properties.

Index

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: @DependOnSlot
@DependOnSlotGroup
Child elements: --

PDO index

NOTE: RxPDOs: Index area 0x1600 to 0x17FF

Index/@DependOnSlot

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Index/@DependOnSlot

Occurrence: optional (0..1)
Datatype: Boolean

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Allowed values:

0: Object Index is fixed

1: Object Index depends on the Slot number to which the module is assigned to.

Index/@DependOnSlotGroup

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Index/@DependOnSlotGroup

Occurrence: optional (0..1)
Datatype: Boolean

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Allowed values:

0: Object Index is fixed

1: Object Index depends on the SlotGroup number to which the module is assigned to.

Name

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

PDO name

Name/@LcId

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Exclude

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Exclude

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @DependOnSlot
@DependOnSlotGroup
Child elements: --

List of PDO indices that are excluded if this PDO is assigned to a SyncManager

PDOs are “mutually exclusive” i.e. if a PDO (PDO_A) is excluded by another PDO (PDO_B) than PDO_B also has to be excluded by PDO_A.

Exclude/@DependOnSlot

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Exclude/@DependOnSlot

Occurrence: optional (0..1)
Datatype: Boolean

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Allowed values:

0: Object Index is fixed

1: Object Index depends on the Slot number to which the module is assigned to.

Exclude/@DependOnSlotGroup

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Exclude/@DependOnSlotGroup

Occurrence: optional (0..1)
Datatype: Boolean

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Allowed values:

0: Object Index is fixed

1: Object Index depends on the SlotGroup number to which the module is assigned to.

Entry

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry

Occurrence: optional (0..Unbounded)
Datatype: EntryType
Attributes: @Fixed
@SafetyConnNumber
Child elements: Index
SubIndex
BitLen
Name
Comment
DataType

Description of all entries.

Entry/@Fixed

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Entries of this PDO can be edited, added, or deleted (overwritten by attribute *../Rx/TxPdo@Fixed*)

1**: Entries of this PDO are fixed**

Entry/@SafetyConnNumber

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/@SafetyConnNumber

Occurrence: optional (0..1)
Datatype: Int

Mandatory for entry of if */RxPdo/@SafetyPdoType* is used and */RxPdo/@SafetyConnNumber* is not used.

Shall only be used in case of SafetyPdoType = “FSoEMultipleSlave” or “FSoEMultipleMaster”

RxPdo/Entry, TxPdo/Entry, and *SafetyParaMapping* belonging to the same FSoE Connection shall have the same value in SafetyConnNumber. Each connection shall use a unique number, independent of other connection properties.

Index

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: @DependOnSlot
@DependOnSlotGroup
Child elements: --

PDO index of mapped object

NOTE: For padding PDO entries use Index = 0.

When no Modular Device Profile (ETG.5001) is used:

RxPDO/TxPDO entries: Index area 0x2000 to 0x5FFF for vendor specific objects or 0x6000 to 0x9FFF according to Device profile (e.g. CiA402).

When Modular Device Profile used:

RxPDO entries: Index area 0x7000 to 0x7FFF

TxPDO entries: Index area 0x6000 to 0x6FFF

Index/@DependOnSlot

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/Index/@DependOnSlot

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: The index is not adapted

1: The index is adapted depending on the slot number and the SlotIndexIncrement value in the element Slots of the device description.

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Index/@DependOnSlotGroup

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/Index/@DependOnSlotGroup

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: The index is not adapted

1: The index is adapted depending on the slot group number and the SlotGroupIndexIncrement value in the element Slots of the device description.

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

SubIndex

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/SubIndex

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Use is mandatory if Index != 0

PDO subindex of mapped object

Value Range: 0…255

NOTE: For padding PDOs use index = 0. If Index is a variable Type, enter SubIndex=0

BitLen

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/BitLen

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Bit length of mapped object

Value (n) might be smaller than the actual bit size of the mapped object/entry. In that case, bit 0-n shall be mapped as process data.

Name

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/Name

Occurrence: optional (0..Unbounded)

Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Mandatory if Index != 0

Name of the mapped object

Name/@LcId

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Interpretation of process data value which may be shown by configuration tool (e.g. Diagnosis Message Object 0x1f03:4: “1: New Diag messages available, 0: No new Diag Messages available”)

DataType

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/DataType

Occurrence: optional (0..1)
Datatype: String
Attributes: @DScale
@SwapData
Child elements: --

Use is mandatory if Index != 0

Data type of the mapped object

Only Base data types (no data type STRING(n)) are allowed, refer to clause 3.4.3.

DataType/@DScale

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/DataType/@DScale

Occurrence: optional (0..1)
Datatype: String

Only if Entry:DataType is INT: This attribute is used to specify the range of the input data.

Allowed values:

+/-10: scale value from -10 to +10
+/-20: scale value from -20 to +20
0-10: scale value from 0 to +10
0-20: scale value from 0 to +20
4-20: scale value from +4 to +20
0.1°: multiply value with 0.1
0-10(16): scale value from 0 to +10
0-20(16): scale value from 0 to +20
0,01°: scale value in 0,01°
0-5: scale value from 0 to +5
0-15: scale value from 0 to +15
0-30: scale value from 0 to +30
0-50: scale value from 0 to +50
+/-5: scale value from -5 to +5
+/-2,5: scale value from -2,5 to +2,5
+/-100: scale value from -100 to +100
0-5(16): scale value from 0 to +5
0-30(16): scale value from 0 to +30
0-50(16): scale value from 0 to +50
+/-75mV: scale value from -75mV to+75mV

DataType/@SwapData

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/Entry/DataType/@SwapData

Occurrence: optional (0..1)
Datatype: NmToken

Defines swapping of PDO entry value for displaying.

Allowed values:

Swap_HB_LB: swap hi and lo bytes

Swap_HW_LW: swap hi and lo words

Swap_HB_LB_HW_LW: swap hi and lo words as well as hi and lo bytes

ExcludedSm

/EtherCATInfo/Descriptions/Modules/Module/RxPdo/ExcludedSm

Occurrence: optional (0..Unbounded)
Datatype: Int
Attributes: --
Child elements: --

SyncManager to which this PDO may not be assigned to.

Default: PDO can be assigned to all SyncManager with matching type/direction

NOTE: When PDO can be assigned to any SM with matching direction and type (1/3-buffer mode) this element is not needed.

5.4.2.2 TxPdo - Input Process Data

TxPdo

/EtherCATInfo/Descriptions/Modules/Module/TxPdo

Occurrence: optional (0..Unbounded)
Datatype: PdoType
Attributes: @Fixed
@Mandatory
@Virtual
@Sm
@Su
@PdoOrder
@OSFac
@OSMin
@OSMax
@OSIndexInc
@SafetyPdoType
@SafetyConnNumber
Child elements: Index
Name
Exclude
Entry
ExcludedSm

TxPDOs of this Module.

TxPDOs are added automatically to the TxPDO assignment when this Module is configured. The Index of the TxPDO depends on the position of the Module. The PDO Number of the PDO and the Index of the PDO entries might be adapted.

TxPdo/@Fixed

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: PDO mapping can be changed, i.e. PDO entries can be deleted or added

1: PDO content is not configurable i.e. complete PDO content is fixed; attribute Fixed of the PDO entries (*../Device/RxPdo/Entry/@Fixed*) is overwritten

NOTE: If attribute *../Mailbox/CoE/@PdoUpload* = true, the fixed content of the PDO shall be uploaded as defined in the ESI description from the slave.

NOTE: highly recommended to use fixed PDO content in modules.

TxPdo/@Mandatory

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@Mandatory

Occurrence: optional (0..1)
Datatype: Boolean

PDO is configured (= assigned to) in a SyncManager

Allowed values:

0: PDO assignment is changeable (e.g. content of object 0x1C12 can be changed)

1: PDO must be assigned to the default SyncManager

NOTE: If attribute *../Mailbox/CoE/@PdoUpload* = true, the mandatory PDO shall be uploaded from the slave.

NOTE: If there are no default PDOs assigned to a SyncManager (refer to attribute *../@Sm*) the Mandatory bit shall not be set.

TxPdo/@Virtual

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@Virtual

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Standard PDO description

1: Two cases:

Process data value is read from a register value (ESC memory address 0x0000:0x0EFF). In this case element *../Sm/@Virtual* shall be “true”.

Content (=PDO entries) of PDO can be configured manually via the configuration tool. In this case no element *../Rx/TxPdo/Entry* is described.

NOTE: Configuration tools shall sort process data byte aligned by default by adding padding PDO entries with Index=0 and BitLen = [bit size of padding bits].

TxPdo/@Sm

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@Sm

Occurrence: optional (0..1)
Datatype: Int

Default SyncManager for this PDO i.e. this PDO is included in the process data image by default

TxPDOs shall only be assigned to Input SyncManager. RxPDOs shall only be assigned to Output SyncManager (refer also to element *../Device/Sm*).

NOTE: PDOs which are not assigned to any SyncManager by default may be assigned manually via the configuration tool. In this case the PDO must not be configured as mandatory (Pdo@Mandatory = FALSE).

TxPdo/@Su

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@Su

Occurrence: optional (0..1)
Datatype: Int

Groups PDOs and defines to which FMMU (and with this SyncManager) they can be assigned to, i.e. *Pdo@Su* and *Fmmu@Su* have the same value.

TxPdo/@PdoOrder

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@PdoOrder

Occurrence: optional (0..1)
Datatype: Int

Obsolete (Configtool: skip element)

TxPdo/@OSFac

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@OSFac

Occurrence: optional (0..1)
Datatype: Int

Default oversampling factor

TxPdo/@OSMin

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@OSMin

Occurrence: optional (0..1)
Datatype: Int

Minimum oversampling factor

TxPdo/@OSMax

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@OSMax

Occurrence: optional (0..1)
Datatype: Int

Maximum oversampling factor

TxPdo/@OSIndexInc

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@OSIndexInc

Occurrence: optional (0..1)
Datatype: Int

Oversampling increment for entry indexes

TxPdo/@SafetyPdoType

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@SafetyPdoType

Occurrence: optional (0..1)
Datatype: String

Allowed values:

FSoESlave: PDO defines one single FSoE Slave connection

FSoEMultipleSlave: two or more FSoE Slave connections mapped into one PDO (each PDO entry contains one FSoE Slave connection)

FSoEMaster: PDO defines one single FSoE Master connection

FSoEMultipleMaster: two or more FSoE Master connections mapped into one PDO (each PDO entry contains one FSoE Master connection)

FSoESlave and FSoEMultipleSlave types shall not be used within one module.

Two or more FSoEMultipleSlave type PDOs are allowed (to allow more than 256 connections)

FSoEMaster and FSoEMultipleMaster types shall not be used within one module.

Two or more FSoEMultipleMaster type PDOs are allowed (to allow more than 256 connections)

Rx-/Tx-PDOs belonging to one FSoE Connection (with a defined SafetyPdoType) shall have the same SafetyConnNumber

TxPdo/@SafetyConnNumber

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/@SafetyConnNumber

Occurrence: optional (0..1)
Datatype: Int

Mandatory if *../TxPdo/@SafetyPdoType* is used and *../TxPdo/Entry@SafetyConnNumber* is not used.

RxPdo, TxPdo, and SafetyParaMapping belonging to the same FSoE Connection shall have the same value in element SafetyConnNumber. Each connection shall use a unique number, independent of other connection properties.

Index

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Index

Occurrence: mandatory (1..1)
Datatype: String

Attributes: @DependOnSlot
@DependOnSlotGroup
Child elements: --

PDO index

NOTE: TxPDOs: Index area 0x1A00 to 0x1BFF

Index/@DependOnSlot

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Index/@DependOnSlot

Occurrence: optional (0..1)
Datatype: Boolean

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Allowed values:

0: Object Index is fixed

1: Object Index depends on the Slot number to which the module is assigned to.

Index/@DependOnSlotGroup

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Index/@DependOnSlotGroup

Occurrence: optional (0..1)
Datatype: Boolean

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Allowed values:

0: Object Index is fixed

1: Object Index depends on the SlotGroup number to which the module is assigned to.

Name

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

PDO name

Name/@LcId

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Exclude

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Exclude

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @DependOnSlot
@DependOnSlotGroup
Child elements: --

List of PDO indices that are excluded if this PDO is assigned to a SyncManager

PDOs are “mutually exclusive” i.e. if a PDO (PDO_A) is excluded by another PDO (PDO_B) than PDO_B also has to be excluded by PDO_A.

Exclude/@DependOnSlot

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Exclude/@DependOnSlot

Occurrence: optional (0..1)
Datatype: Boolean

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Allowed values:

0: Object Index is fixed

1: Object Index depends on the Slot number to which the module is assigned to.

Exclude/@DependOnSlotGroup

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Exclude/@DependOnSlotGroup

Occurrence: optional (0..1)
Datatype: Boolean

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Allowed values:

0: Object Index is fixed

1: Object Index depends on the SlotGroup number to which the module is assigned to.

Entry

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry

Occurrence: optional (0..Unbounded)
Datatype: EntryType
Attributes: @Fixed
@SafetyConnNumber
Child elements: Index
SubIndex
BitLen
Name
Comment
DataType

Description of all entries.

Entry/@Fixed

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Entries of this PDO can be edited, added, or deleted (overwritten by attribute *../Rx/TxPdo@Fixed*)

1**: Entries of this PDO are fixed**

Entry/@SafetyConnNumber

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/@SafetyConnNumber

Occurrence: optional (0..1)
Datatype: Int

Mandatory for entry of if *../TxPdo/@SafetyPdoType* is used and *../TxPdo/@SafetyConnNumber* is not used.

Shall only be used in case of SafetyPdoType = “FSoEMultipleSlave” or “FSoEMultipleMaster”

RxPdo/Entry, TxPdo/Entry, and *SafetyParaMapping* belonging to the same FSoE Connection shall have the same value in SafetyConnNumber. Each connection shall use a unique number, independent of other connection properties.

Index

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: @DependOnSlot
@DependOnSlotGroup
Child elements: --

PDO index of mapped object

NOTE: For padding PDO entries use Index = 0.

When no Modular Device Profile (ETG.5001) is used:

RxPDO/TxPDO entries: Index area 0x2000 to 0x5FFF for vendor specific objects or 0x6000 to 0x9FFF according to Device profile (e.g. CiA402).

When Modular Device Profile used:

RxPDO entries: Index area 0x7000 to 0x7FFF

TxPDO entries: Index area 0x6000 to 0x6FFF

Index/@DependOnSlot

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/Index/@DependOnSlot

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: The index is not adapted

1: The index is adapted depending on the slot number and the SlotIndexIncrement value in the element Slots of the device description.

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Index/@DependOnSlotGroup

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/Index/@DependOnSlotGroup

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: The index is not adapted

1: The index is adapted depending on the slot group number and the SlotGroupIndexIncrement value in the element Slots of the device description.

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

SubIndex

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/SubIndex

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Use is mandatory if Index != 0

PDO subindex of mapped object

Value Range: 0…255

NOTE: For padding PDOs use index = 0. If Index is a variable Type, enter SubIndex=0

BitLen

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/BitLen

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Bit length of mapped object

Value (n) might be smaller than the actual bit size of the mapped object/entry. In that case bit 0-n shall be mapped as process data.

Name

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Mandatory if Index != 0

Name of the mapped object

Name/@LcId

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Interpretation of process data value which may be shown by configuration tool (e.g. Diagnosis Message Object 0x1f03:4: “1: New Diag messages available, 0: No new Diag Messages available”)

DataType

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/DataType

Occurrence: optional (0..1)
Datatype: String
Attributes: @DScale
@SwapData
Child elements: --

Use is mandatory if Index != 0

Data type of the mapped object

Only Base data types (no data type STRING(n)) are allowed, refer to clause 3.4.3.

DataType/@DScale

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/DataType/@DScale

Occurrence: optional (0..1)
Datatype: String

Only if Entry:DataType is INT: This attribute is used to specify the range of the input data.

Allowed values:

+/-10: scale value from -10 to +10
+/-20: scale value from -20 to +20
0-10: scale value from 0 to +10
0-20: scale value from 0 to +20
4-20: scale value from +4 to +20
0.1°: multiply value with 0.1
0-10(16): scale value from 0 to +10
0-20(16): scale value from 0 to +20
0,01°: scale value in 0,01°
0-5: scale value from 0 to +5
0-15: scale value from 0 to +15
0-30: scale value from 0 to +30
0-50: scale value from 0 to +50
+/-5: scale value from -5 to +5
+/-2,5: scale value from -2,5 to +2,5
+/-100: scale value from -100 to +100
0-5(16): scale value from 0 to +5
0-30(16): scale value from 0 to +30
0-50(16): scale value from 0 to +50
+/-75mV: scale value from -75mV to+75mV

DataType/@SwapData

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/Entry/DataType/@SwapData

Occurrence: optional (0..1)
Datatype: NmToken

Defines swapping of PDO entry value for displaying.

Allowed values:

Swap_HB_LB: swap hi and lo bytes

Swap_HW_LW: swap hi and lo words

Swap_HB_LB_HW_LW: swap hi and lo words as well as hi and lo bytes

ExcludedSm

/EtherCATInfo/Descriptions/Modules/Module/TxPdo/ExcludedSm

Occurrence: optional (0..Unbounded)
Datatype: Int
Attributes: --
Child elements: --

SyncManager to which this PDO may not be assigned to.

Default: PDO can be assigned to all SyncManager with matching type/direction

NOTE: When PDO can be assigned to any SM with matching direction and type (1/3-buffer mode) this element is not needed.

5.4.3 SafetyParameterMapping

SafetyParaMapping

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping

Occurrence: optional (0..Unbounded)
Datatype: PdoType
Attributes: @Fixed
@Mandatory
@SRA_Parameter
@SafetyPdoType
@SafetyConnNumber
Child elements: Index
Name
Entry

Mapping of the Safety Parameter Set (used for FSoE modules).

Mandatory for Safety-over-EtherCAT devices. The existence of this object indicates that it is a safety-relevant module description.

Rx/Tx-PDOs (with a defined SafetyPdoType) belonging to the same FSoE Connection shall have the same SafetyConnNumber. Subsequent SafetyParaMapping element(s) with @SRA_Parameter set(s) can optionally follow for this FSoE Connection with the same SafetyConnNumber.

SafetyParaMapping/@Fixed

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Shall be 1, i.e. the content of the parameter set cannot be changed

SafetyParaMapping/@Mandatory

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@Mandatory

Occurrence: optional (0..1)
Datatype: Boolean

Shall be 1 (here: default), i.e. the parameter set cannot be deleted

SafetyParaMapping/@SRA_Parameter

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@SRA_Parameter

Occurrence: optional (0..1)
Datatype: Boolean

Allowed Values:

0: this mapping parameter is written by a safety master in the FSoE connection and shall not be used for the SRA CRC calculation

1: this mapping parameter is part of the SRA parameter set and the values shall be used for calculation of the SRA CRC

NOTE: see ETG.5120 for SRA parameter definition

SafetyParaMapping/@SafetyPdoType

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@SafetyPdoType

Occurrence: optional (0..1)
Datatype: String

Allowed values:

FSoESlave: PDO defines one single FSoE Slave connection

FSoEMultipleSlave: two or more FSoE Slave connections mapped into one PDO (each PDO entry contains one FSoE Slave connection)

FSoEMaster: PDO defines one single FSoE Master connection

FSoEMultipleMaster: two or more FSoE Master connections mapped into one PDO (each PDO entry contains one FSoE Master connection)

FSoESlave and FSoEMultipleSlave types shall not be used within one module.

Two or more FSoEMultipleSlave type PDOs are allowed (to allow more than 256 connections)

FSoEMaster and FSoEMultipleMaster types shall not be used within one module.

Two or more FSoEMultipleMaster type PDOs are allowed (to allow more than 256 connections)

Rx-/Tx-PDOs belonging to one FSoE Connection (with a defined SafetyPdoType) shall have the same SafetyConnNumber

SafetyParaMapping/@SafetyConnNumber

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/@SafetyConnNumber

Occurrence: optional (0..1)
Datatype: Int

Mandatory if */*SafetyParaMapping*/@SafetyPdoType* is used and */*SafetyParaMapping*/Entry@SafetyConnNumber* is not used.

RxPdo, TxPdo, and SafetyParaMapping belonging to the same FSoE Connection shall have the same value in element SafetyConnNumber. Each connection shall use a unique number, independent of other connection properties.

Index

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Index: should be 0x1Exx, shall be unique. Configtools: don't care

Name

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Safety parameter set name

Name/@LcId

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Entry

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry

Occurrence: optional (0..Unbounded)
Datatype: EntryType
Attributes: @Fixed
@SafetyConnNumber
Child elements: Index
SubIndex
BitLen
Name
Comment
DataType

Entry describes the elements that are mapped in the safety parameter set. Number of entries not restricted to 255, in case of the description is only available offline

Entry/@Fixed

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Should be omitted, as the overwriting flag */SafetyParaMapping/Index/@Fixed* is always 1

Entry/@SafetyConnNumber

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/@SafetyConnNumber

Occurrence: optional (0..1)
Datatype: Int

Mandatory for entry if *../SafetyParaMapping/@SafetyPdoType* is used and *../TxPdo/@SafetyConnNumber* is not used.

Shall only be used in case of SafetyPdoType = “FSoEMultipleSlave” or “FSoEMultipleMaster”

RxPdo/Entry, TxPdo/Entry, and *SafetyParaMapping* belonging to the same FSoE Connection shall have the same value in SafetyConnNumber. Each connection shall use a unique number, independent of other connection properties.

Index

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Index of the safety parameter set entry

SubIndex

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/SubIndex

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Use is mandatory if Index != 0

PDO subindex of mapped object

Value Range: 0…255

NOTE: For padding PDOs use index = 0. If Index is a variable Type, enter SubIndex=0

BitLen

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/BitLen

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --

Child elements: --

Bit length of mapped object

Value (n) might be smaller than the actual bit size of the mapped object/entry. In that case bit 0-n shall be mapped as process data.

Name

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/Name

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Use is mandatory if Index != 0

Name of the mapped parameter

Name/@LcId

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Interpretation of process data value which may be shown by configuration tool (e.g. Diagnosis Message Object 0x1f03:4: “1: New Diag messages available, 0: No new Diag Messages available”)

DataType

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/DataType

Occurrence: optional (0..1)
Datatype: String
Attributes: @DScale
@SwapData
Child elements: --

Use is mandatory if Index != 0

Data type of the mapped parameter

Only Base data types (no data type STRING(n)) are allowed, refer to clause 3.4.3.

DataType/@DScale

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/DataType/@DScale

Occurrence: optional (0..1)
Datatype: String

Only if Entry:DataType is INT: This attribute is used to specify the range of the input data.

Allowed values:

+/-10: scale value from -10 to +10
+/-20: scale value from -20 to +20
0-10: scale value from 0 to +10
0-20: scale value from 0 to +20
4-20: scale value from +4 to +20
0.1°: multiply value with 0.1
0-10(16): scale value from 0 to +10
0-20(16): scale value from 0 to +20
0,01°: scale value in 0,01°
0-5: scale value from 0 to +5
0-15: scale value from 0 to +15
0-30: scale value from 0 to +30

0-50: scale value from 0 to +50
+/-5: scale value from -5 to +5
+/-2,5: scale value from -2,5 to +2,5
+/-100: scale value from -100 to +100
0-5(16): scale value from 0 to +5
0-30(16): scale value from 0 to +30
0-50(16): scale value from 0 to +50
+/-75mV: scale value from -75mV to+75mV

DataType/@SwapData

/EtherCATInfo/Descriptions/Modules/Module/SafetyParaMapping/Entry/DataType/@SwapData

Occurrence: optional (0..1)
Datatype: NmToken

Defines swapping of PDO entry value for displaying.

Allowed values:

Swap_HB_LB: swap hi and lo bytes

Swap_HW_LW: swap hi and lo words

Swap_HB_LB_HW_LW: swap hi and lo words as well as hi and lo bytes

5.4.4 Mailbox

Mailbox

/EtherCATInfo/Descriptions/Modules/Module/Mailbox

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: CoE

Description of mailbox features

CoE

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE

Occurrence: optional (0..1)
Datatype: --
Attributes: @EdsFile
@ModuleOD
Child elements: InitCmd

If this element is present the module supports CoE

CoE/@EdsFile

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/@EdsFile

Occurrence: optional (0..1)
Datatype: String

File path of EDS file with Object Dictionary. If available, the EDS file dictionary is used instead of the element */Profile/Dictionary*

CoE/@ModuleOD

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/@ModuleOD

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: (default) Module does not have an own object dictionary.

1: Module has an own CoE object dictionary that can be accessed via AoE.

InitCmd

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd

Occurrence: optional (0..Unbounded)
Datatype: --

Attributes: @Fixed
@CompleteAccess
Child elements: Transition
Index
SubIndex
Data
Comment

List of CoE initialization commands which are sent during the specified state transition

InitCmd/@Fixed

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/@Fixed

Occurrence: optional (0..1)
Datatype: Boolean

Obsolete (Configtool: skip element)

InitCmd/@CompleteAccess

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/@CompleteAccess

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Init command shall be sent subindex wise

1: Init command may be sent sub-index wise or via complete access

Transition

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/Transition

Occurrence: mandatory (1..Unbounded)
Datatype: NmToken
Attributes: --
Child elements: --

State transitions during which the mailbox protocol specific init command is sent.

For allowed state transitions refer to clause 3.6, excluding transitions from/to Boot

NOTE: If transition is 'IP' the command is send directly after the slave reached PreOp state.

Index

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: @DependOnSlot
@DependOnSlotGroup
Child elements: --

CoE object index

Index/@DependOnSlot

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/Index/@DependOnSlot

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: The index is not adapted

1: The index is adapted depending on the slot number and *../Slots/Slot/@SlotIndexIncrement*

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Index/@DependOnSlotGroup

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/Index/@DependOnSlotGroup

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: The index is not adapted

1: The index is adapted depending on the slot group number and *../Slots/Slot/@SlotGroupIndexIncrement*

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

SubIndex

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/SubIndex

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

CoE object subindex

Data

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/Data

Occurrence: mandatory (1..1)
Datatype: HexBinary
Attributes: @AdaptAutomatically
Child elements: --

CoE object data

(Excluding mailbox header and CoE header)

Data/@AdaptAutomatically

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/Data/@AdaptAutomatically

Occurrence: optional (0..1)
Datatype: Boolean

Allowed values:

0: Default values defined in *../CoE/InitCmd/Data* are sent

1: Default values defined in *../CoE/InitCmd/Data* are overwritten by real values, e.g. 0x1C32.02 will be adapted to the cycle time of the EtherCAT master

Comment

/EtherCATInfo/Descriptions/Modules/Module/Mailbox/CoE/InitCmd/Comment

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Comment of this init command

5.4.5 Profile

Table 11 describes the elements ProfileNo, AddInfo, ChannelCount, and ChannelInfo.

Table 11: Description of Profiles

Profile usage	used elements
Slave does not have distinct channels	*ProfileNo*, *AddInfo*
Slave supports several channels with identical profile and sub-profile number	*ProfileNo*, *AddInfo*, *ChannelCount*
Slave supports several channels with different profile and/or sub-profile number	*ChannelInfo* NOTE: one *ChannelInfo* element per channel

Profile

/EtherCATInfo/Descriptions/Modules/Module/Profile

Occurrence: optional (0..1)
Datatype: ProfileType
Attributes: --
Child elements: ProfileNo
AddInfo
Choice:
├─ ChannelCount
└─ ChannelInfo
Choice:
├─ DictionaryFile
└─ Dictionary
Choice:
├─ DiagFile
└─ DiagMessages
VendorSpecific

Description of the used profile and object dictionary including data type definition.

This element describes an offline object dictionary of the device and, if supported, the profile type. It shall be consistent with the description in element RxPdo and TxPdo, and the online object dictionary of the slave.

The Object Dictionary can either be described within the element *Profile* or a reference can be given to an external Object Dictionary File (refer to *../Profile/DictionaryFile*).

5.4.5.1 Profile Number, Channel information

ProfileNo

/EtherCATInfo/Descriptions/Modules/Module/Profile/ProfileNo

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Use according Table 11

Number of device profile (low word of CoE object 0x1000) used by this device (e.g. 5001 for MDP or 402 for CiA402).

NOTE: Only profiles specified by ETG may be used.

AddInfo

/EtherCATInfo/Descriptions/Modules/Module/Profile/AddInfo

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Use according Table 11

Sub-Profile number (high word of CoE object 0x1000; e.g. according to ETG.5001 MDP sub-profile types.

If ProfileNo = 402, Default Value = 2 (Servo drives).

ChannelCount

/EtherCATInfo/Descriptions/Modules/Module/Profile/ChannelCount

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Use according Table 11

Number of channels of this device (e.g. an analog device with 4 analog inputs can be described as device with 4 channels)

ChannelInfo

/EtherCATInfo/Descriptions/Modules/Module/Profile/ChannelInfo

Occurrence: mandatory (1..Unbounded)
Datatype: --
Attributes: @ChannelGroup
Child elements: ProfileNo
AddInfo
DisplayName

This element is part of a choice. See parent's child element list for more information.

Use according Table 11

Describes each channel of a device with its profile and sub-profile number. Used when a device supports several channels and those channels support different profiles.

ChannelInfo/@ChannelGroup

/EtherCATInfo/Descriptions/Modules/Module/Profile/ChannelInfo/@ChannelGroup

Occurrence: optional (0..1)
Datatype: Integer

A configuration tool may group all entries containing the same number to improve clearness of relation between device channel and physical port/channel of the device.

Example: A device can support two different profiles on one external interface and needs two entries of element ChannelInfo. If both support the attribute ChannelInfo = 1 they are clearly grouped to one interface (physical I/O-port).

ProfileNo

/EtherCATInfo/Descriptions/Modules/Module/Profile/ChannelInfo/ProfileNo

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Profile number (low word of CoE object 0x1000) of this channel

AddInfo

/EtherCATInfo/Descriptions/Modules/Module/Profile/ChannelInfo/AddInfo

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Sub-profile number (high word of CoE object 0x1000) of this channel

If *../ChannelInfo/ProfileNo* = 402, default value = 2 (servo drives).

DisplayName

/EtherCATInfo/Descriptions/Modules/Module/Profile/ChannelInfo/DisplayName

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

If a drive supports more than one channel then a name can be assigned to each of them. A configuration tool may show the single channels with the *../ChannelInfo/DisplayName* to link them to a drive manager tool

NOTE: May be used to assign several channels to one axis; in this case *DisplayName* describes the channel name.

DisplayName/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/ChannelInfo/DisplayName/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

5.4.5.2 Offline Dictionary

DictionaryType describes data types used to describe entries in the object dictionary (element *DataType*) and the object dictionary itself (element *Object*).

The element *../Module/Profile/Dictionary* is only used by the configuration tool to display the object dictionary offline. This gives the end user the possibility to adopt device specific parameters (easier). If the elemenet *Profile:Dictionary* is supported at least all mandatory objects shall be described herewith.

DictionaryFile

/EtherCATInfo/Descriptions/Modules/Module/Profile/DictionaryFile

Occurrence:	optional (0..1)
Datatype:	String
Attributes:	--
Child elements:	--

This element is part of a choice. See parent's child element list for more information.

Path to Dictionary file. A fallback mechanism may be needed that tries to load a reference from the folder of the module file folder in case of a reference from the main ESI file folder fails.

NOTE: the root folder on which the path is based on is the same as the root folder of the ESI file.

Dictionary

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary

Occurrence:	optional (0..1)
Datatype:	DictionaryType
Attributes:	--
Child elements:	UnitTypes DataTypes Objects

This element is part of a choice. See parent's child element list for more information.

The Dictionary describes data types used to describe entries in the object dictionary (element *DataType*) and the object dictionary itself (element *Object*) of the device.

The element is used by the configuration tool to display the object dictionary offline. This gives the end user the possibility to adopt device specific parameters (easier). If the element *Dictionary* is supported at least mandatory objects shall be described herewith.

Figure 10 shows how the Dictionary element is composed.

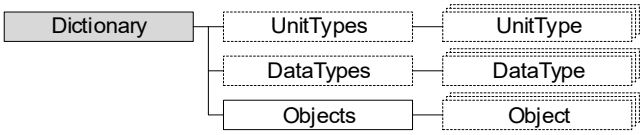


Figure 10: Content of Dictionary/Object

NOTE: Mandatory objects shall be defined, optional objects may be defined.

5.4.5.2.1 Units

UnitTypes

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/UnitTypes

Occurrence:	optional (0..1)
Datatype:	--
Attributes:	--
Child elements:	UnitType

List of following element *UnitType*.

UnitType describes the data type for unit descriptions according ETG.1020.

NOTE: It is recommended to define specified units (refer ETG.1004) as well, so it can be guaranteed that the master/configuration tool knows the unit.

UnitType

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/UnitTypes/UnitType

Occurrence: optional (0..Unbounded)
Datatype: UnitTypeType
Attributes: --
Child elements: NotationIndex
Index
Name
Symbol

Definition of one unit type that can be used in element *../Dictionary/Objects/Object/Info/Unit*

NotationIndex

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/UnitTypes/UnitType/NotationIndex

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Notation index (UINT8) of unit type according to ETG.1004

NOTE: if supported, CoE object 0x400 + "notation index" shall hold the same information as this element

Index

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/UnitTypes/UnitType/Index

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Object Index of the unit definition as defined in ETG.1004 Unit Specification.

Note: Index = NotationIndex + 0x400

Name

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/UnitTypes/UnitType/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of unit according to ETG.1004

Symbol

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/UnitTypes/UnitType/Symbol

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Symbol of unit according to ETG.1004

5.4.5.2.2 Data Types

Table 12: Data Type Composition

CoE (Object) Data Type	Help Data Type construction	Mandatory Elements	Description	Name format
Base Data Type (excluding “ARRAY [0..n] OF *XYZ*”)		Name BitSize	For allowed base data types refer to clause 3.4.3	As defined in clause 3.4.3

CoE (Object) Data Type	Help Data Type construction	Mandatory Elements	Description	Name format
ARRAY		Name BitSize SubItem	Describes an object of data type ARRAY, i.e.: First element *SubItem* (SI0): *SubItem*/*SubIdx* = 0 Type shall be USINT Second element *SubItem* (SI1-n by using ARRAY Information) **no** *SubItem/SubIdx*, Type = DTyyyyARR	Recommended: DTyyyy* yyyy = index of object
	ARRAY Information	Name BaseType BitSize ArrayInfo	Describes an object of data type ARRAY, i.e.: SI1-n. *ArrayInfo/LBound* = 1 NOTE: The object data type does not include SI0	Recommended: DTyyyyARR* yyyy = index of object
RECORD		Name BitSize SubItem	Describes an object of data type RECORD First Element SubItem (SI0): *SubItem/SubIdx* = 0 Type shall be USINT Following SubItems: *SubItem/SubIdx* > 0	Recommended: DTyyyy* yyyy = index of object
ENUM		Name BaseType BitSize EnumInfo	Describes data type for an enumerated object entry. *BaseType* can be any base data types according to clause 3.4.3 with length of 32 bits or less. The enumerated value is allways UDINT online. Any different datatype used in the ESI allows a Configtool to interpret values different from UDINT. It also allows a configuration tool to read/write reduced amount of bits (e.g. BIT3 instead of UDINT). BitSize shall match the used base data type.	Recommended: DTyyyyENxx yyyy = index of object in the index range from 0x800-0xFFF xx = Bitlength of Enum
ARRAY [0..n] OF *XYZ*		Name BaseType BitSize ArrayInfo	Describes data type for an ARRAY [0..n] OF *XYZ* object entry *ArrayInfo/LBound* = 0 *ArrayInfo/Elements* = n+1. NOTE: Despite ARRAY [0..n] OF *XYZ* are base data types, they shall be defined for usage in the offline object dictionary.	ARRAY [0..n] OF *XYZ* *XYZ* = Base data type according ETG.1020

*) NOTE: If a data type should be used for more than one object, it is recommended to use the first occurrence for naming. E.g.: 'DT6000' can be used for Object 0x6000, 0x6010, and 0x6050.

DataTypes

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: DataType

Mandatory if objects are defined in element Objects

List of following element *DataTypes*.

DataType

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType

Occurrence: optional (0..Unbounded)
Datatype: DataTypeType
Attributes: --

Child elements: Index
Name
BaseType
Comment
BitSize
Choice:
├─ ArrayInfo
├─ SubItem
└─ EnumInfo
Properties
Xml

The *DataType* describes a data type, used in the elements *../Dictionary/Objects/Object*.

All data types, which are used in the Object element, shall be defined, including base data types as defined in clause 3.4.3

Depending on the data type to be defined, elements according Table 12 are required:

Index

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Index

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Reserved for future use

Name

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of data type

NOTE: For allowed/recommended names, refer to Table 12.

BaseType

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/BaseType

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Usage according to Table 12.Specifies the base data type of a complex data type or an object data type

For allowed values, refer to clause 3.4.3.

Comment

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Optional comment on the data type

Comment/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

BitSize

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/BitSize

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Length of data type in bit.

BitSize is calculated according to the data type

BaseType:
BitSize is the length of the base data type

ENUM information:
BitSize is the length of bits used for the enumerated values. BitSize is used to adopt the Enum length to the object entry length.

ARRAY Information:
BitSize is the length of the used BaseType multiplied by the Number of Elements.

ARRAY:
BitSize is size of Subindex 0 (data type shall be USINT = 8 Bit) plus alignment information plus BitSize of ARRAY Information DataType.

NOTE: Subindex 0 plus alignment information is equal to the BitOffset of Subindex 1.

RECORD:
BitSize is the sum of Bit of all elements including alignment information, i.e. Subindex 0 (data type shall be USINT = 8 Bit) to last subindex including alignment.

NOTE: For objects of type array or record only supporting subindex 0 (e.g. “empty” PDO) the bitsize of the complete object is 16, i.e. the padding is included after SI 0.

NOTE: Information for Complete Access:
The information DataType:BitSize is needed to know the complete size of the object including alignment information. SubItem:BitSize is needed to know the size of each element. SubItem:BitOffset is needed to know the offset of each element, including alignment information.

ArrayInfo

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/ArrayInfo

Occurrence: optional (0..3)
Datatype: ArrayInfoType
Attributes: --
Child elements: LBound
Elements

This element is part of a choice. See parent's child element list for more information.

Used to describe data type ARRAY Information and OCTET_STRING.

Refer to Table 12.

LBound

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/ArrayInfo/LBound

Occurrence: mandatory (1..1)
Datatype: Integer
Attributes: --
Child elements: --

Index of first array element.

For usage, see Table 12.

Data range: 0 … 255

Elements

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/ArrayInfo/Elements

Occurrence: mandatory (1..1)
Datatype: Integer
Attributes: --
Child elements: --

Number of array elements

Data range:

1 … 255 (when used as ARRAY Information)

n+1 (when used for ARRAY [0..n] of XYZ)

See Table 12for details.

SubItem

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem

Occurrence: optional (0..Unbounded)
Datatype: SubItemType
Attributes: --
Child elements: SubIdx
Name
DisplayName
Type
Comment
BitSize
BitOffs
Choice:
- DefaultString
- DefaultData
- *Sequence:*
  - MinValue
  - MaxValue
  - DefaultValue

Flags
Property
Xml

This element is part of a choice. See parent's child element list for more information.

Describes the elements of a “RECORD” or “ARRAY” data type.

The order of the SubItem elements reflects the order of the subindices in the device’s object dictionary.

SubIdx

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/SubIdx

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

D: Mandatory for every SubItem when object data type is RECORD

Mandatory exclusively for SubItem 0 (= subindex 0) when object data type is ARRAY.

Usage according to Table 12.

Name

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of SubItem

Name of first SubItem (=subindex0) shall be “SubIndex 000”, “number of entries”, or “Number of entries”.

If data type ARRAY: Not relevant for second SubItem.

If data Type RECORD: This name is the identifier to the corresponding entry in the Object definition ((*../Object/Name*), i.e. spelling must be identical.

DisplayName

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/DisplayName

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId

Child elements: --

Contains an alternative name for this subindex that might be shown additionally to or instead of value of Name by a configuration tool.

NOTE: element Name holds the name that is used for SDO info and might be defined by specifications (e.g. “Hardware Version”). Element DisplayName can be used for an individual term also in different languages.

DisplayName/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/DisplayName/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Type

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Type

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Data type of this SubItem

Usage according to Table 12.

Comment

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of the SubIndex content

Comment/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

BitSize

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/BitSize

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Length of SubIndex value in bit

BitOffs

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/BitOffs

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Bit address of the SubItem value starting at 0.

NOTE: The bit offset of SubItem 0 shall be 0x00. For SubItems >0 the bit offset can be chosen without any restriction. Padding bits for alignment do not have to be described explicitly.

DefaultString

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/DefaultString

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/DefaultString*)

DefaultData

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/DefaultData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/DefaultData*)

MinValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/MinValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/MinValue*)

MaxValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/MaxValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/MaxValue*)

DefaultValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/DefaultValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: handle like *../Dictionary/Objects/Object/Info/SubItem/Info/DefaultValue*)

Flags

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Access
Category
PdoMapping
SafetyMapping
Attribute
Backup
Setting

Permissions for object handling

For ARRAY and RECORD

If Subitems are defined the flags in *../Subitem/Flags* shall be used for the entries (overwrite values given in *../Dictionary/Objects/Object/Flags*)

Access

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Access

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: @ReadRestrictions
@WriteRestrictions
Child elements: --

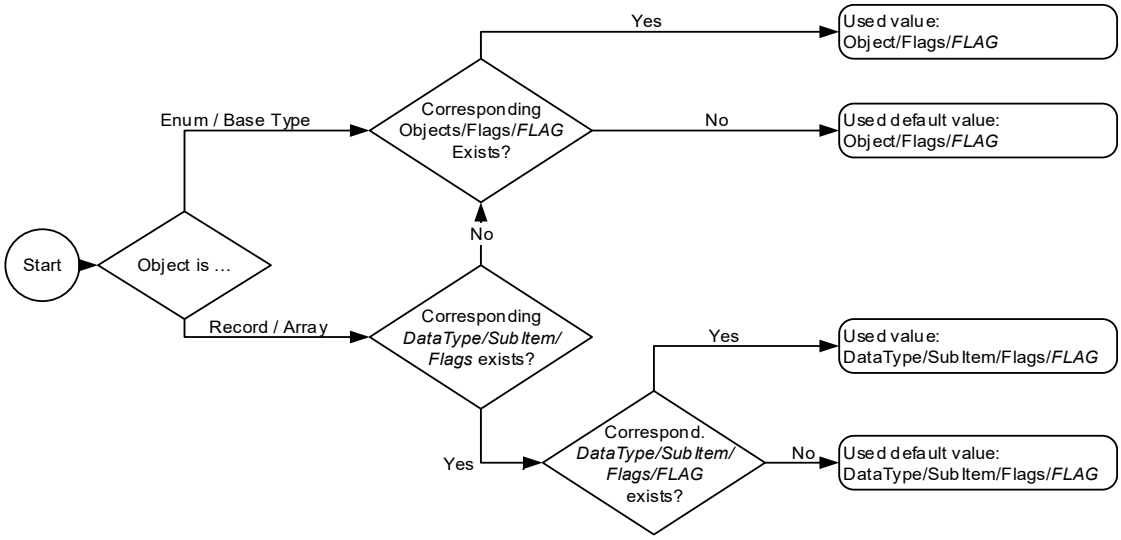
Access Type

Allowed values:

ro: readonly (default)
rw: readwrite
wo: writeonly

NOTE: The access right can be restricted by the attributes *ReadRestrictions* and *WriteRestrictions*

Usage



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

Access/@ReadRestrictions

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Access/@ReadRestrictions

Occurrence: optional (0..1)
Datatype: NmToken

Read access only available in the selected ESM state(s). Access Type shall be rw or ro.

Allowed values:

PreOP: Read access only in PreOP
PreOP_SafeOP: Read access only in PreOP and SafeOP
PreOP_OP: Read access only in PreOP and OP
SafeOP: Read access only in SafeOP
SafeOP_OP: Read access only in SafeOP and OP
OP: Read access only in OP

Configtool: for compatibility reasons also "PreO**p**" should be accepted and handled the same way as "PreOP". This allows configuration tools to handle legacy ESI files

Access/@WriteRestrictions

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Access/@WriteRestrictions

Occurrence: optional (0..1)
Datatype: NmToken

Write access only available in the selected ESM state(s). Access Type shall be rw or wo.

Allowed values:

PreOP: Write access only in PreOP
PreOP_SafeOP: Write access only in PreOP and SafeOP
PreOP_OP: Write access only in PreOP and OP
SafeOP: Write access only in SafeOP
SafeOP_OP: Write access only in SafeOP and OP
OP: Write access only in OP

Configtool: for compatibility reasons also “PreO**p**” should be accepted and handled the same way as “PreOP”. This allows configuration tools to handle legacy ESI files

Category

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Category

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

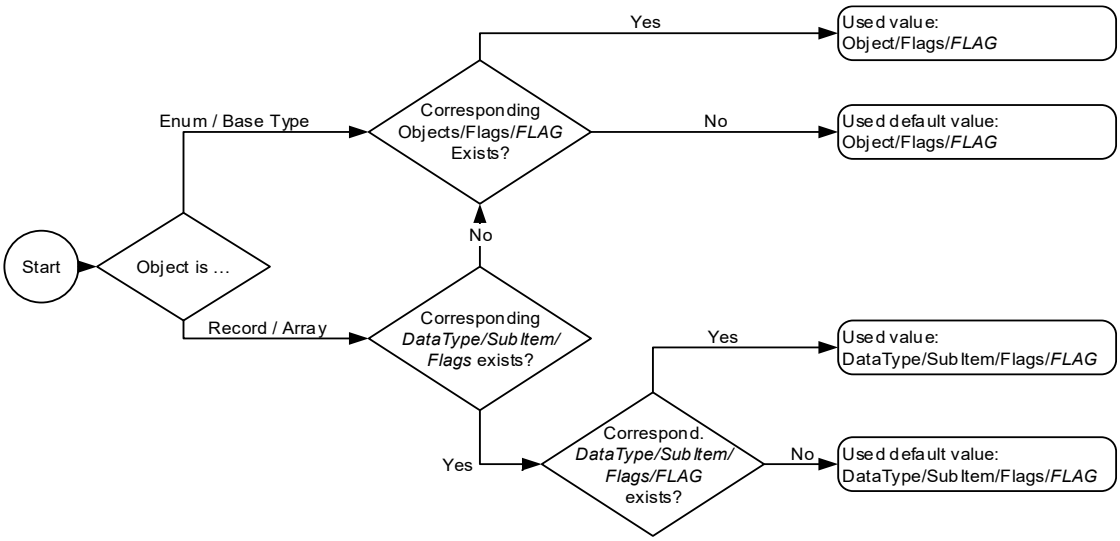
Use of object

Allowed values:

m: mandatory
o: optional (default)
c: conditional

NOTE: Values according to CoE object specification

Usage:



NOTE: “FLAG” is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

PdoMapping

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/PdoMapping

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Object can be mapped as TxPDO, RxPDO or both

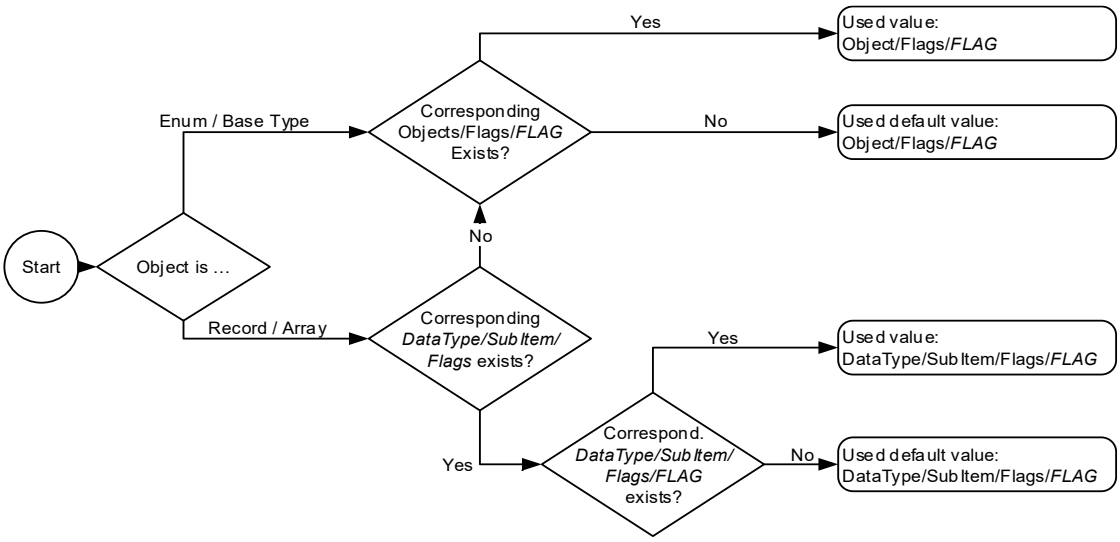
Usage according Figure 37.

Allowed values:

t, T: Transmit PDO (Inputs)
r, R: Receive PDO (Outputs)
tr, TR, rt, RT: Transmit or Receive PDO

Default value: cannot be mapped

Usage:



NOTE: “FLAG” is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

SafetyMapping

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/SafetyMapping

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Object can be mapped in the Safety Data (Input / Outputs) or the Safety Parameter Set:

Allowed values:

si, SI: Safe Inputs

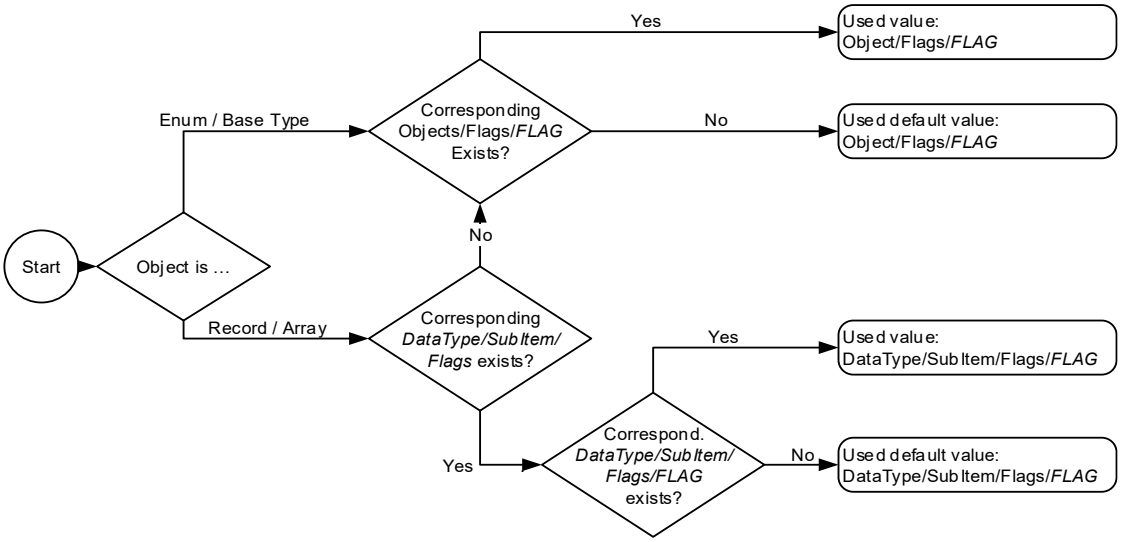
so, SO: Safe Outputs

sio, SIO: Safe Input or Output

sp, SP: Safety Parameter Set

Default value: cannot be mapped

Usage:



NOTE: “FLAG” is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

Attribute

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Attribute

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

For future use

Backup

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Backup

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Allowed values:

0: This SubItem is no Backup entry

1: This SubItem is a Backup entry

Backup entries are used for Device Replacement (refer to ETG.1020)

NOTE: If true, default value for this SubItem should be provided in *../Object/SubItem/Info*

Setting

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Flags/Setting

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Allowed values:

0: This SubItem is no Setting entry

1: This SubItem is a Setting entry

Setting entries are downloaded during start-up by the master (refer to ETG.1020)

NOTE: If true, default value for this SubItem should be provided in *../Object/SubItem/Info*

Property

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Property

Occurrence: optional (0..Unbounded)
Datatype: PropertyType
Attributes: --
Child elements: Name
Value
Desc

General description of additional properties. Can be used for example to define function groups.

Name

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Property/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of the property.

Value

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Property/Value

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Value of the property.

Desc

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Property/Desc

Occurrence: optional (0..1)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of the property.

Desc/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Property/Desc/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Xml

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/SubItem/Xml

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: ##any --

Obsolete (Configtool: skip element)

EnumInfo

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/EnumInfo

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

This element is part of a choice. See parent's child element list for more information.

Used for data types with exclusive values only

Text

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/EnumInfo/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/EnumInfo/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/EnumInfo/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

NOTE: Enum number shall be unique within one *EnumInfo* element

Comment

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/EnumInfo/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/EnumInfo/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Properties

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Properties

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Property

List of following element *Property*.

Property

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Properties/Property

Occurrence: optional (0..Unbounded)
Datatype: PropertyType
Attributes: --
Child elements: Name
Value
Desc

General description of additional properties. Can be used for example to define function groups.

Name

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Properties/Property/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of the property.

Value

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Properties/Property/Value

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Value of the property.

Desc

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Properties/Property/Desc

Occurrence: optional (0..1)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of the property.

Desc/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Properties/Property/Desc/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Xml

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/DataTypes/DataType/Xml

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: ##any --

General XML description for further information possible (similar to properties description above, but more generous).

5.4.5.2.3 Objects

Objects

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects

Occurrence: mandatory (1..1)
Datatype: --
Attributes: --
Child elements: Object

List of the following element *Object*.

Used by configuration tool to display Object Dictionary offline.

NOTE: If element *../Dictionary/Objects* is supported at least the mandatory objects are available. Optional objects may not be available in the offline object dictionary.

Object

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object

Occurrence: optional (0..Unbounded)
Datatype: ObjectType
Attributes: --
Child elements: Index
Name
Comment
Type
BitSize
Info
Flags
Properties
Xml

Describes one object of the modules object dictionary

Index

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Index

Occurrence: mandatory (1..1)
Datatype: String
Attributes: @DependOnSlot
@DependOnSlotGroup
Child elements: --

Object index

Index/@DependOnSlot

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Index/@DependOnSlot

Occurrence: optional (0..1)
Datatype: Boolean

Allows adapting the index of the objects defined in the module depending on the slot where the module is plugged.

Allowed values:

0: The index is not adapted depending on the slot number and the SlotIndexIncrement value in the element Slots

1: The index is adapted depending on the slot number and the SlotIndexIncrement value in the element Slots

Example: a module contains the object 0x7000 and DependOnSlot = true. If this module is plugged into the 3rd slot (of a SlotGroup), the object index automatically is changed to 0x7020 by the configuration tool (default slot index increment = 0x10).

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Index/@DependOnSlotGroup

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Index/@DependOnSlotGroup

Occurrence: optional (0..1)
Datatype: Boolean

Allows adapting the index of the objects defined in the module depending on the slot group where the module is plugged.

Allowed values:

0: The index is not adapted depending on the SlotGroup and the SlotGroupIndexIncrement value in the element Slots

1: The index is adapted depending on the SlotGroup and the SlotGroupIndexIncrement value in the element Slots

Example: a module contains the object 0x7000 and DependOnSlotGroup = true. If this module is plugged into second slot group, the object index automatically is changed to 0x7100 by the configuration tool (if slot group index increment = 0x100). In case of also DepentOnSlot = true, the configuration tool considers both increments. If the above usend module is pluged into the 3rd slot of the second slot group, the object index calculation results in 0x7120 (0x7000 + 1*0x100 + 2*0x10).

Shall not be used for padding entries (index = 0x0000 and subindex = 0).

Name

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Name

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Name of this object

Name/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Name/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Comment

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Comment on this object

Comment/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Type

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Type

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Type of this object (BaseType or Complex type according to element DataTypes)

NOTE: All data types used in element Objects shall be defined in element DataType

BitSize

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/BitSize

Occurrence: mandatory (1..1)
Datatype: Int
Attributes: --
Child elements: --

Object size in bit including alignment bits

Info

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info

Occurrence: optional (0..1)
Datatype: ObjectInfoType
Attributes: --
Child elements:

- *Choice:*
  - DefaultString
  - *Sequence:*
    - MinData
    - MaxData
    - DefaultData
  - *Sequence:*
    - MinValue
    - MaxValue
    - DefaultValue
  - SubItem
- DisplayName
- Unit

Object information (e.g. default, minimum/ maximum values and SubItems)

DefaultString

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/DefaultString

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default string if data type STRING is used

MinData

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/MinData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Minimum value for elements of arbitrary data type

MaxData

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/MaxData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary/Objects/Object/Info/MaxData

Maximum value for elements of arbitrary data type

DefaultData

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/DefaultData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default value for elements of arbitrary data type

MinValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/MinValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Minimum value for elements using base data types (excluding base data type with variable length)

MaxValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/MaxValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Maximum value for elements using base data types (excluding base data type with variable length)

DefaultValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/DefaultValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default value for elements using base data types (excluding base data type with variable length)

SubItem

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: --
Child elements: Name
Info

This element is part of a choice. See parent's child element list for more information.

SubItem of this object

Name

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of this object entry.

The name corresponds to *../DataType/SubItem/Name*.

When object entry is of data type ARRAY (i.e. no *../DataType/SubItem/Name* specified):
../SubItem/Name shall be 'SubIndex xxx'

xxx is decimal SubIndex of SubItem

Info

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info

Occurrence: mandatory (1..1)
Datatype: ObjectInfoType
Attributes: --
Child elements: *Choice:*
- DefaultString
- *Sequence:*
  - MinData
  - MaxData
  - DefaultData
- *Sequence:*
  - MinValue
  - MaxValue
  - DefaultValue
- DisplayName
- Unit

For description of an object entry. Object information for each individual SubItem.

NOTE: Default values of ../ObjectInfo/SubItem/Info overwrites ../DataType/SubItem/Info

DefaultString

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/DefaultString

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default string if data type STRING is used

MinData

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/MinData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Minimum value for elements of arbitrary data type

MaxData

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/MaxData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Maximum value for elements of arbitrary data type

DefaultData

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/DefaultData

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --

Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default value for elements of arbitrary data type

MinValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/MinValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Minimum value for elements using base data types (excluding base data type with variable length)

MaxValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/MaxValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Maximum value for elements using base data types (excluding base data type with variable length)

DefaultValue

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/DefaultValue

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Default value for elements using base data types (excluding base data type with variable length)

DisplayName

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/DisplayName

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Allowed when object entry is of data type ARRAY in element *../SubItem/Info*

Defines a name that a Configtool/master can show instead of *../Subitem/Name* (Subitem XXX).

Unit

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/SubItem/Info/Unit

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Allowed when elements *MinValue*, *MaxValue*, *DefaultValue* or *MinData*, *MaxData*, *DefaultData* are used.

Unit of the object.

32-Bit Value as defined in ETG.1004 with
Bit 0…7: reserved
Bit 8…15: Denominator
Bit 16…23: Numerator

DisplayName

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/DisplayName

Occurrence: optional (0..1)

Datatype: String
Attributes: --
Child elements: --

Allowed when object entry is of data type ARRAY in element *../SubItem/Info*

Defines a name that a Configtool/master can show instead of *../SubItem/Name* (Subitem XXX).

Unit

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Info/Unit

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Allowed when elements *MinValue*, *MaxValue*, *DefaultValue* or *MinData*, *MaxData*, *DefaultData* are used.

Unit of the object.

32-Bit Value as defined in ETG.1004 with
Bit 0…7: reserved
Bit 8…15: Denominator
Bit 16…23: Numerator
Bit 24…31: Prefix

Flags

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Access
Category
PdoMapping
SafetyMapping
Attribute
Transition
SdoAccess
Backup
Setting

Permissions for object handling

Flag information applies to the whole object.

If object is of data type ARRAY or RECORD:

If Flags are defined in *../DataType/SubItem/Flags* those flags are used for the entries (overwrite values given here in *../Object/Flags*)

Access

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/Access

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: @ReadRestrictions
@WriteRestrictions
Child elements: --

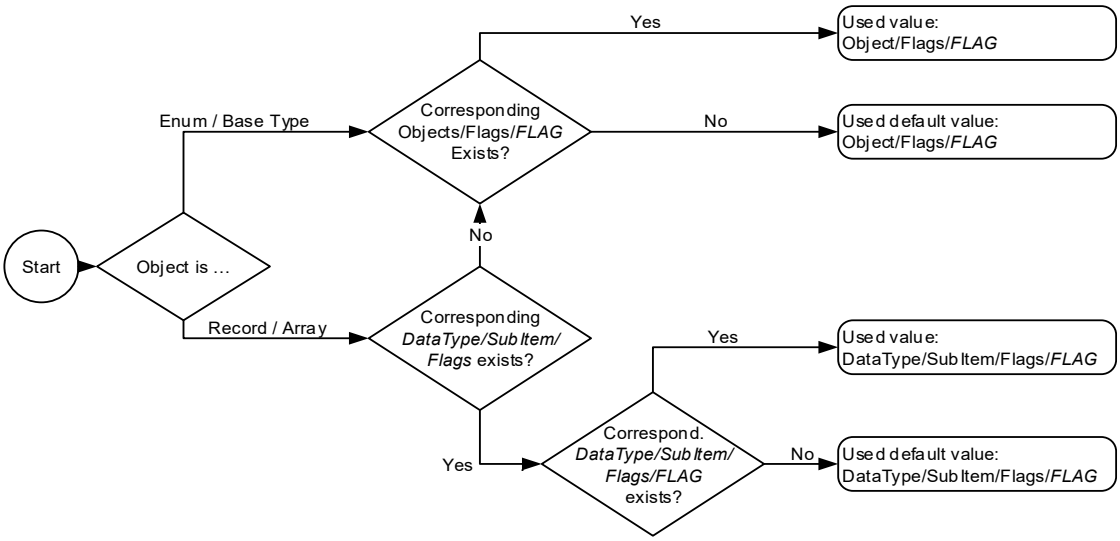
Access Type

Allowed values:

ro: readonly (default)
rw: readwrite
wo: writeonly

NOTE: The access right can be restricted by the attributes *ReadRestrictions* and *WriteRestrictions*

Usage



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

Access/@ReadRestrictions

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/Access/@ReadRestrictions

Occurrence: optional (0..1)
Datatype: NmToken

Read access only available in the selected ESM state(s). Access Type shall be rw or ro.

Allowed values:

PreOP: Read access only in PreOP
PreOP_SafeOP: Read access only in PreOP and SafeOP
PreOP_OP: Read access only in PreOP and OP
SafeOP: Read access only in SafeOP
SafeOP_OP: Read access only in SafeOP and OP
OP: Read access only in OP

Configtool: for compatibility reasons also "PreO**p**" should be accepted and handled the same way as "PreOP". This allows configuration tools to handle legacy ESI files

Access/@WriteRestrictions

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/Access/@WriteRestrictions

Occurrence: optional (0..1)
Datatype: NmToken

Write access only available in the selected ESM state(s). Access Type shall be rw or wo.

Allowed values:

PreOP: Write access only in PreOP
PreOP_SafeOP: Write access only in PreOP and SafeOP
PreOP_OP: Write access only in PreOP and OP
SafeOP: Write access only in SafeOP
SafeOP_OP: Write access only in SafeOP and OP
OP: Write access only in OP

Configtool: for compatibility reasons also "PreO**p**" should be accepted and handled the same way as "PreOP". This allows configuration tools to handle legacy ESI files

Category

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/Category

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

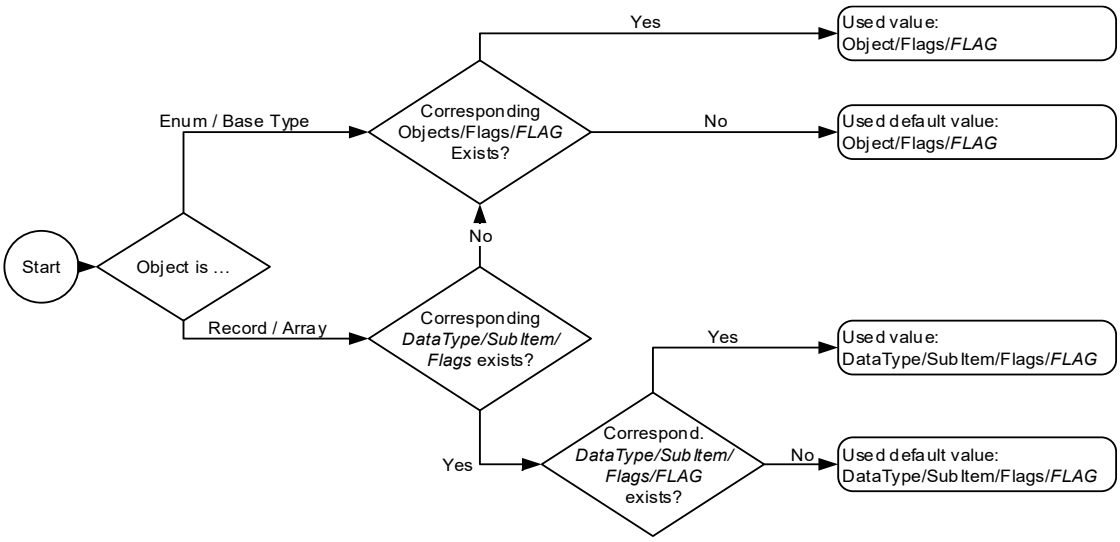
Use of object

Allowed values:

m: mandatory
o: optional (default)
c: conditional

NOTE: Values according to CoE object specification

Usage:



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

PdoMapping

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/PdoMapping

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Object can be mapped as TxPDO, RxPDO or both

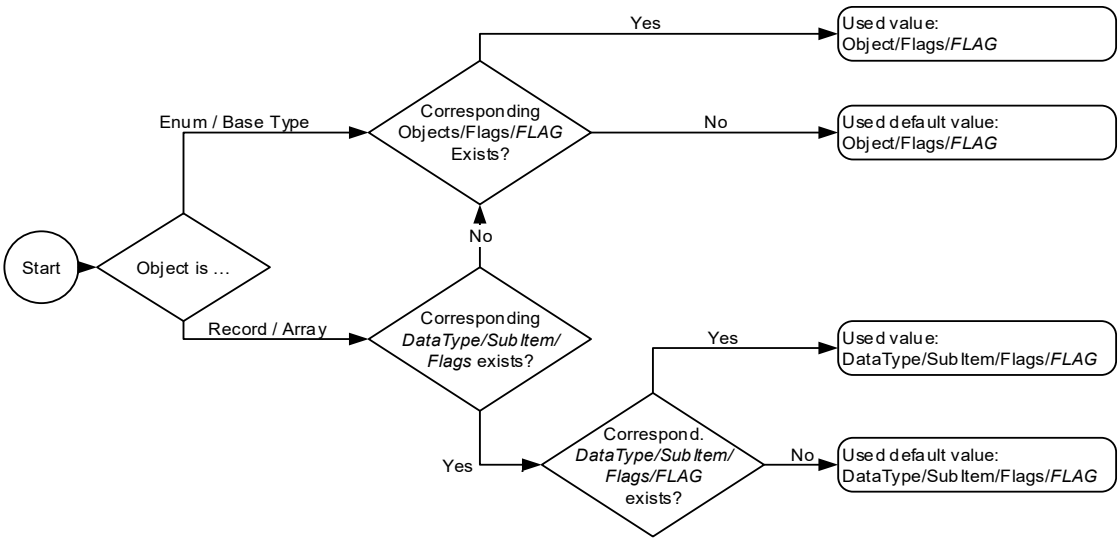
Usage according Figure 37.

Allowed values:

t, T: Transmit PDO (Inputs)
r, R: Receive PDO (Outputs)
tr, TR, rt, RT: Transmit or Receive PDO

Default value: cannot be mapped

Usage:



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

SafetyMapping

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/SafetyMapping

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Object can be mapped in the Safety Data (Input / Outputs) or the Safety Parameter Set:

Allowed values:

si, SI: Safe Inputs

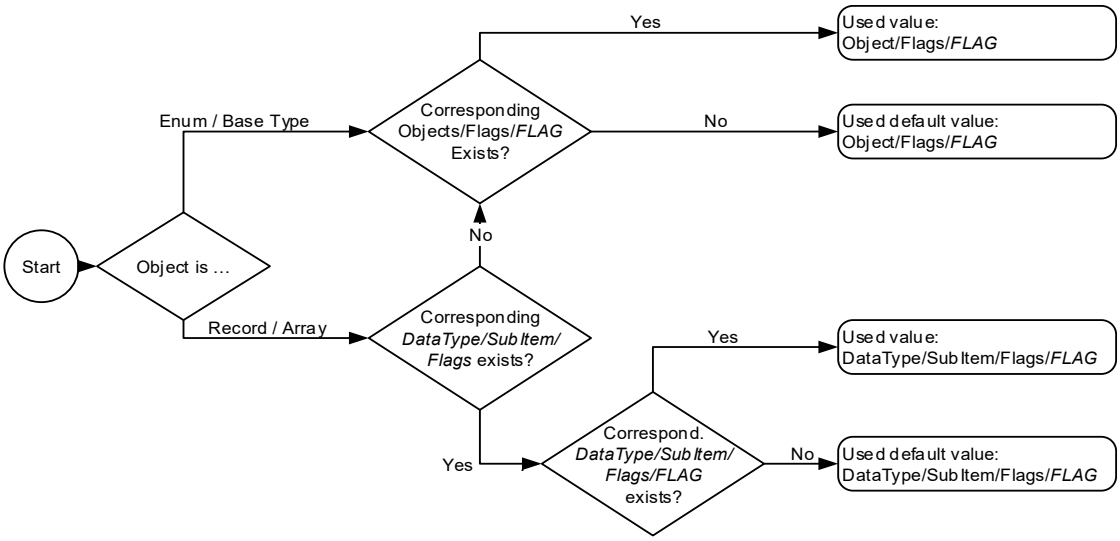
so, SO: Safe Outputs

sio, SIO: Safe Input or Output

sp, SP: Safety Parameter Set

Default value: cannot be mapped

Usage:



NOTE: "FLAG" is a placeholder for Flags: *Access*, *Category*, *PdoMapping*, *SafetyMapping*, *Backup*, and *Setting*

Attribute

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/Attribute

Occurrence: optional (0..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Attribute of a SoE IDN.

32 Bit value corresponding to attribute definition in IEC 61158-4-16

Transition

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/Transition

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Obsolete

SdoAccess

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/SdoAccess

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Allowed values

CompleteAccess: object can be accessed sub-index wise or by SDO complete access

SubIndexAccess: object can only be accessed subindex wise

Default value depends on *../CoE/@CompleteAccess*.

../CoE/@CompleteAccess = 1:

Default value : CompleteAccess

../CoE/@CompleteAccess = 0:

Default value = SubIndexAccess

Backup

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/Backup

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Backup entries are used for Device Replacement

Allowed values

0: This object is no Backup entry

1: This object is a Backup entry

NOTE: If true default value for this object should be provided in *../Object/Info*

Setting

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Flags/Setting

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Setting entries are downloaded during start-up by the master

Allowed values

0: This object is no Setting entry

1: This object is a Setting entry

NOTE: If true default value for this object should be provided in Object:Info

Properties

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Properties

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: Property

List of following element *Property*

Property

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Properties/Property

Occurrence: optional (0..Unbounded)
Datatype: PropertyType
Attributes: --
Child elements: Name
Value
Desc

Property information

Name

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Properties/Property/Name

Occurrence: mandatory (1..1)
Datatype: String
Attributes: --
Child elements: --

Name of the property

Value

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Properties/Property/Value

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Value of the property

Desc

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Properties/Property/Desc

Occurrence: optional (0..1)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of the property

Desc/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Properties/Property/Desc/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Xml

/EtherCATInfo/Descriptions/Modules/Module/Profile/Dictionary/Objects/Object/Xml

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: ##any --

General XML description for further information possible (similar to properties description above, but more generous)

5.4.5.3 Diagnosis messages

DiagFile

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagFile

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Path to DiagHistory file according to schema EtherCATDiag.xsd

DiagMessages

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages

Occurrence: optional (0..1)
Datatype: DiagnosticsType
Attributes: --
Child elements: DiagReset
DiagReaction

DiagType
DiagMessage

This element is part of a choice. See parent's child element list for more information.

Definition of diagnosis messages

DiagReset

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReset

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

Definition of a reset instruction. A diagnosis message can refer to this *DiagReset*.

Text

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReset/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReset/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReset/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

Allowed values

0: Reset not possible, fatal hardware error

1: Cold start required

2: Trigger device reset

10: State change to Init required

11: State change to PreOp required

12: State change to SafeOp required

>100: Vendor Specific

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReset/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReset/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagReaction

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReaction

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --
Child elements: Text
Enum
Comment

Definition of the reaction in the device if this message is shown, e.g. TorqueOff, ClosedLoopRamp, …

A diagnosis message can refer to this DiagReaction.

Text

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReaction/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReaction/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReaction/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReaction/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagReaction/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagType

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagType

Occurrence: optional (0..Unbounded)
Datatype: EnumInfoType
Attributes: --

Child elements: Text
Enum
Comment

Definition of different diagnosis types, e.g. runtime error, parameter error, …

A diagnosis message can refer to this DiagType.

Text

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagType/Text

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Enum Entry Text

Text/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagType/Text/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Enum

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagType/Enum

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Enum Entry Number

NOTE: Enum number shall be unique within one ENUM element

Comment

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagType/Comment

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Description of Enum entry

Comment/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagType/Comment/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

DiagMessage

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage

Occurrence: mandatory (1..Unbounded)
Datatype: --
Attributes: --
Child elements: TextId
MessageText
Description
Flags
CauseRemedy
Info
Hint
URL

Definition of one specific diagnosis message

TextId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/TextId

Occurrence: mandatory (1..1)
Datatype: HexDecValue (String)
Attributes: --
Child elements: --

Identifier for the diagnosis message

MessageText

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/MessageText

Occurrence: mandatory (1..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Short diagnosis message

For using parameters as described in ETG.1020 the following specifiers are allowed: %c, %d, %u, and %s.

If the order of the parameters is not the order of the parameters within the message the position can be changed by adding ":n" to the specifier. Counting starts with 0.

Example: %u:2 shows the third parameter as unsigned value in defined message.

MessageText/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/MessageText/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Description

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Description

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Detailed description of the message

Description/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Description/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Flags

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Flags

Occurrence: optional (0..1)
Datatype: --
Attributes: --
Child elements: DiagClass
DiagReset
DiagReaction
DiagType

DiagClass

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Flags/DiagClass

Occurrence: optional (0..1)
Datatype: NmToken
Attributes: --
Child elements: --

Allowed values:

error

warning

information

DiagReset

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Flags/DiagReset

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagReset instruction

DiagReaction

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Flags/DiagReaction

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagReaction

DiagType

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Flags/DiagType

Occurrence: optional (0..1)
Datatype: Int
Attributes: --
Child elements: --

Enum value (referrer) of the pre-defined DiagType

CauseRemedy

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/CauseRemedy

Occurrence: optional (0..Unbounded)
Datatype: --
Attributes: @Idx
Child elements: Cause
Remedy

Pairs of cause and remedy in conjunction to this diagnosis message.

CauseRemedy/@Idx

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/CauseRemedy/@Idx

Occurrence: mandatory (1..1)
Datatype: AnyAtomicType

assigns cause description to remedy description

Cause

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/CauseRemedy/Cause

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @LcId
Child elements: --

Cause of

Cause/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/CauseRemedy/Cause/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Remedy

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/CauseRemedy/Remedy

Occurrence: optional (0..Unbounded)
Datatype: String
Attributes: @LcId
Child elements: --

way to resolve this error

Remedy/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/CauseRemedy/Remedy/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Info

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Info

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

More information about the error / message, e.g. reference to chapter in documentation, …

Info/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Info/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

Hint

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Hint

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

Hints about the error / message. In case of no clear cause or remedy is known this might help the end user to find reasons for the error / message. Also what happens if an error is ignored might be described here.

Hint/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/Hint/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

URL

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/URL

Occurrence: optional (0..Unbounded)
Datatype: NameType (String)
Attributes: @LcId
Child elements: --

URL that containing further information

URL/@LcId

/EtherCATInfo/Descriptions/Modules/Module/Profile/DiagMessages/DiagMessage/URL/@LcId

Occurrence: optional (0..1)
Datatype: Integer

Language Code Identifier (Microsoft based) defines the language of the element. Details see Appendix A

VendorSpecific

/EtherCATInfo/Descriptions/Modules/Module/Profile/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType
Attributes: --
Child elements: ##any --

Vendor specific element of *Profile*

5.4.6 DcOpModeName (Dc Mode)

DcOpModeName

/EtherCATInfo/Descriptions/Modules/Module/DcOpModeName

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

Defines the default operation mode for this module. It is a reference to one operation mode as they are defined in the element *EtherCAT/Descriptions/Devices/Device/Dc/OpMode/Name*

5.4.7 Image (Icons)

Image16x14

/EtherCATInfo/Descriptions/Modules/Module/Image16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Obsolete (Configtool: skip element)

ImageFile16x14

/EtherCATInfo/Descriptions/Modules/Module/ImageFile16x14

Occurrence: optional (0..1)
Datatype: String
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

File path to a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool.

0xFF00FF is used for transparent color

ImageData16x14

/EtherCATInfo/Descriptions/Modules/Module/ImageData16x14

Occurrence: optional (0..1)
Datatype: HexBinary
Attributes: --
Child elements: --

This element is part of a choice. See parent's child element list for more information.

Hex binary data of a BMP file (dimension should be 16x14 with 16 colors) which might be shown by a configuration tool

0xFF00FF is used for transparent color

NOTE: it is recommended to use DIB header version 3 as this guaranties maximum compatibility. Check: Byte 0x0E of the hex value is “0x28” when DIB header is V3

VendorSpecific

/EtherCATInfo/Descriptions/Modules/Module/VendorSpecific

Occurrence: optional (0..1)
Datatype: VendorSpecificType

Attributes: --
Child elements: ##any --

Possible vendor specific elements can be added to the module description

6 Modules File Structure

EtherCATModule

EtherCATModule

Occurance:	mandatory (1..1)
DataType:	--
Attributes:	@Version
Child elements:	Vendor Modules

Root element.

@Version

EtherCATModule / @Version

Occurance:	optional (0..1)
DataType:	string

Version of this Module file.

Vendor

EtherCATModule / Vendor

Occurance:	mandatory (1..1)
DataType:	--
Attributes:	refer to clause 5.1
Child elements:	refer to clause 5.1

This element has exact the same description and underlying structure (children, sub-children, …) as the ESI element *EtherCATInfo/Vendor* described in clause 5.1.

Modules

EtherCATModule / Modules

Occurance:	mandatory (1..1)
DataType:	--
Attributes:	refer to clause 5.4
Child elements:	refer to clause 5.4

This element has exact the same description and underlying structure (children, sub-children, …) as the ESI element EtherCATModule/Modules described in clause 5.4.

7 Dictionary File Structure

EtherCATDict

EtherCATDict

Occurance: mandatory (1..1)
DataType: --
Attributes: @Version
Child elements: Dictionary

Root element

@Version

EtherCATDict / @Version

Occurance: optional (0..1)
DataType: string

Version of this Dictionary file

Dictionary

EtherCATDict / Dictionary

Occurance: mandatory (1..1)
DataType: --
Attributes: --
Child elements: refer to clause 5.3.8.2

This element has exact the same description and underlying structure (children, sub-children, …). As the ESI element EtherCATInfo/Descriptions/Devices/Device/Profile/Dictionary described in clause 5.3.8.2.

8 Diagnosis Message File

EtherCATDiag

EtherCATDiag

Occurance: mandatory (1..1)
DataType: --
Attributes: @Version
Child elements: DiagMessages

Root element

@Version

EtherCATDiag / @Version

Occurance: optional (0..1)
DataType: string

Version of this Diagnosis Message file

DiagMessages

EtherCATDiag / DiagMessages

Occurance: mandatory (1..1)
DataType: --
Attributes: --
Child elements: refer to clause 5.3.8.3

This element has exact the same description and underlying structure (children, sub-children, …). As the ESI element *EtherCATInfo/Descriptions/Devices/Device/Profile/DiagMessages* described in clause 5.3.8.3.

Appendix A: Additional information

Attribute @LcId

Decimal number of the Windows Language Code identifier. Refer to

https://docs.microsoft.com/en-us/openspecs/windows_protocols/ms-lcid/70feba9f-294e-491e-b6eb-56532684c37f (21.04.2020)

Appendix B: Changelog (informative)

Available in release again (including existing entries with updated links)

Version 1.0.7 → 1.0.8

XML terms (new):

Clause 3.2 explains common terms related to XML.

XML formatting (new):

Clause 3.5 defines rules how an ESI file is formatted.

Base Data Types (update):

Base data types refer to a global description in ETG.1020.

…/Device/Dc/@TimeLoopControlOnly (new):

Attribute indicates the need of DC synchronization even if not DC OpMode is defined.

…/Device/Slots/SlotGroupData (new):

Elements allows to define user friendly names for slot groups.

…/Device/Slots/@DownloadModuleListTransition (new):

Element to define in which state transition the module ident list and the module address list shall be downloaded.

…/Device/Profile/Dictionary/Objects/Object/Info/DisplayName (new):

Element allows to define a user friendly name for array entries in the object dictionary.

General:

Several notes and descriptions updated/added for clearer understanding.

- Element ImageData16x14
- Element Fmmu
- Table “Data Type Composition” (footnote)
- Element HideType:ProductCode
- Element InitCmd/Transition
- Attribute PdoUpload
- Attribute CompleteAccess
- Element Flags/SdoAccess
- Element SubItemType/DefaultString, DefaultData, MinValue, MaxValue, DefaultValue

Version 1.0.8 → 1.0.9

…/Group/@ParentGroup (update):

Device groups can be combined in a parent group. This adds one additional layer to sort devices in a configuration tool.

…/Device/Sm (update):

Allow to omit the Su attribute in case of a PDO can be assigned to more than one SyncManager.

…/DataType/DScale (update):

Term “+/-20” added

…/EnumInfo/Enum (update):

Xml data type changed to “xs:integer” to be able to use the full range in the ESI file. This has no technical impact on the ENUM itself or its data type.

…/Device/Info/Electrical/EBusCurrent (update):
…/Device/Info/Electrical/EtherCATp (new):
…/Device/Info/Port:EtherCATp (new):

New elements and attributes to add information of EtherCAT P devices.

…/Device/Profile/ChannelInfo/@ChannelGroup (new):
Allows to group channels logically. Can be used by configuration tools to display assignments of channels more clear.

Version 1.0.9 → 1.0.10

Clause 3.5 (update):
Chapter about ESI formatting fully revised. Usage of Characters and coding described in more detail.

Clause 3.7 (update):
Clause about calculating the CRC checksum fully revised: details and background information added. Specified usage if Crc32 attribute in external module files.

…/Module/SafetyParaMapping (update):
Description of usage together with the new SafetyConnNumber attribute.

…/Module/RxPdo/@SafetyPdoType (new):
…/Module/TxPdo/@SafetyPdoType (new):
Allows specifying the type of safety PDOs within an FSoE device.

…/Module/RxPdo/@SafetyConnNumber (new):
…/Module/TxPdo/Entry/@SafetyConnNumber (new):
…/Module/RxPdo/@SafetyConnNumber (new):
…/Module/TxPdo/Entry/@SafetyConnNumber (new):
The safety connection number is a numeric value. Same values indicate that the PDO, PDO entry or FSoE parameter belongs to the same FSoE connection.

…/Module/Type/@ModuleIdent (update):
…/Module/Type/@ModuleClass (update):
Clarification: value of module ident and module class shall be unique in one ESI file and referenced files, only values for FSoE modules shall be unique within a Vendor ID.

EtherCATModule/Modules/Module/@Crc32 (new):
Ability to add CRC checksum to modules defined in an external file.

Version 1.0.10 → 1.0.11

Clause 3.2 (update):
Note added to Empty-element tag description.

EtherCATInfo/InfoReference (update):
Note added.

…/Group/@ParentGroup (update):
Description added instead of “for future use”.

…/BitSize (update):
Note added: “empty objects” (only SI0 exists) still have the 8bit padding so that the object has a size of 16 bit.

…/DataType/BaseType (update):
Enums can use any base data type as enum “BaseType”. This allows to use enums in the object dictionary that have a data type like SINT, REAL, … with values like “-5” or “2.4”.See ETG.2001 for example and demonstration ESI files.

…/Device/Fmmu (update):
…/Device/Sm (update):
Added ‘DynamicOutputs’ and ‘DynamicInputs’ to the allowed values. The elements are for future use and are needed for coming extensions of ET.1020 and ETG.1000

(ESM). The dynamic sync managers can be configured and en-/disabled in Op state then.

…/Device/Mailbox/CoE/@SdoUploadWithMaxLength (new):
Attribute added that indicates that the device supports the max length feature. In that case, the master can define how many bytes a mailbox message (CoE upload response with complete access) may have at a maximum. Refer to ETG.1020.

…/Device/Mailbox/CoE/@TimeDistribution (update):
Attribute added that indicates that a device needs the system time even if it does not support DC. This is needed for timestamps in the diagnosis history objects. Refer to ETG.1020.

…/Device/Slots@DownloadModuleListTransition (update):
Default value corrected to “PS”

…/Index/@DependOnSlot (update):
…/Entry/Index/@DependOnSlotGroup (update):
Description added that defines that the offset calculation shall not be made for padding entries (0x0000) when one of the attributes is set.

…/Device/Info/StateMachine/Timeout/BackToInitTimeout (update):
Changed from “SAFEOP -> PREOP” to “OP/SAFEOP -> PREOP”.
The OP -> SAFEOP timeout was missing before.

…/Device/Info/Port/Connector (update):
…/Device/Info/Port/Connector/@VendorId (new):
Added description instead of “for future use”. Attribute VendorId added.

…/Module/Mailbox/CoE/InitCmd/Index/@DependOnSlot (update):
…/Module/Mailbox/CoE/InitCmd/Index/@DependOnSlotGroup (update):
…/Object/Index/@DependOnSlot (update):
…/Object/Index/@DependOnSlotGroup (update):
…/Index/@DependOnSlot (update):
…/TxPdo/Index/@DependOnSlot (update):
…/RxPdo/Index/@DependOnSlotGroup (update):
…/TxPdo/Index/@DependOnSlotGroup (update):
…/RxPdo/Exclude/@DependOnSlot (update):
…/TxPdo/Exclude/@DependOnSlot (update):
…/RxPdo/Exclude/@DependOnSlotGroup (update):
…/TxPdo/Exclude/@DependOnSlotGroup (update):
Handling for padding entries added.

Object/Index/@DependOnSlot (update):
Object/Index/@DependOnSlotGroup (update):
Description and example added.

…/RxPdo/@Fixed (update):
…/TxPdo/@Fixed (update):
…/RxPdoType/@Mandatory (update):
…/TxPdoType/@Mandatory (update):
Notes added that explain how to handle a PDO in relation of both attributes.

…/Profile/DictionaryFile (update):
Root for the defined path specified.

Document:
Some editorial fixes (typos, …).

Version 1.0.11 → 1.0.12

Document:

Structure changed from data-type-based to node-based (Xpath-based).
Clause 3 and 4 revised and adapted to the new layout of the document.
(No technical changes)