CiA Draft Standard 401

CANopen

Device Profile for Generic I/O Modules

Version 2.1

Date: 17 May 2002

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History

This document is based on version 2.0 and includes the corrections already published in the errata sheet. Additional type error corrections and other editorial changes (mostly clarifications and rewordings) are not listed in detail, only changes with technical content are recorded in the following table:

Chapter	Comment
Joystick appendix	Internal freeze function is optionally allowed.

General information on licensing and patents

CAN in AUTOMATION (CiA) calls attention to the possibility that some of the elements of this CiA specification may be subject of patent rights. CiA shall not be responsible for identifying any or all such patent rights.

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1 Scope

This document represents the CANopen device profiles for generic digital and analogue input and output modules. All these devices use communication techniques, which conform to those described in the CiA DS-301CANopen Communication Profile. In addition, programmable I/O devices may use communication techniques, which conform to those described in the CiA DSP-302 Framework for programmable CANopen Devices or in the CiA DSP Layer Setting Services (LSS) specification. These specifications should be consulted in parallel to this device profile specification.

In the appendices, some specific I/O devices are defined.

2 Normative references

/1/: IS 11898, Road vehicles – Interchange of digital information – Controller area network (CAN), November 1993.

/2/: CiA DS-301 V4.01, CANopen application layer and communication profile, June 2000.

/3/ CiA DRP-303-2 V1.1, Representation of SI Units and Prefixes, January 2000.

/4/ CiA DSP-302 V3.0, Framework for programmable CANopen devices, June 2000

/5/ CiA DSP-305 V1.1, Layer Setting Specification (LSS), January 2001

3 Definitions, acronyms and abbreviations

CAN

Controller Area Network. Data link layer protocol for serial communication as specified in ISO 11898-1 (1999).

CiA

CAN in Automation international users and manufacturers group e.V. Non-profit association promoting Controller Area Network (CAN).

COB

Communication Object, which is made of one or more CAN frames. Any information transmitted via CANopen has to be mapped into COBs.

COB-ID

COB-Identifier. Identifies a COB uniquely in a CAN network. The identifier determines the priority of that COB in the data link layer, too.

I/O

Input and output

RPDO

Receive Process Data Object. Communication object of a device, which contains output data.

SDO

Service Data Object. Peer-to-peer communication with access to the Object Dictionary of a CANopen device.

TPDO

Transmit Process Data Object. Communication object of a device, which contains input data.

4 Operating principle

4.1 Introduction

The purpose of I/O modules is to connect sensors and actuators to CANopen networks. In operational mode, input data can be transmitted from the inputs via TPDOs. By default, the PDO transmission is triggered by an interrupt (event). Optionally PDOs may be transmitted synchronously or remotely requested. In addition, it is possible to read input data via SDO communication from another module, or to write data via SDO to the network, if the module provides SDO client functionality.

Output data can be received via RPDO by those I/O modules that have output capabilities. Output data also can be received via SDO communication services.

However, the main purpose of SDO communication is to configure an I/O module. The module can receive via SDO I/O configuration data, parameters for converting data into meaningful measurements and so on. I/O modules compliant with this device profile use pre-defined PDOs. The default mapping of application objects into TPDO respectively RPDO may be changed via SDO, if variable PDO mapping is supported. An I/O module may provide optionally Sync producer/consumer, Time-Stamp producer/consumer and Emergency producer/consumer functionality. For new designs, it is highly recommended to support Heartbeat functionality.

5 Error handling

5.1 Principle

Emergency messages shall be triggered by internal errors in the device and they are assigned the highest possible priority to ensure that they get access to the bus without latency. By default, the Emergency messages shall contain the error field with pre-defined error numbers and additional information.

5.2 Error behaviour

If a serious device failure is detected the module shall enter by default autonomously the Pre-operational state. If 1029_h object is implemented, the device may be configured to enter alternatively the Stopped state or remain in the current state in case of a device failure. Device failures should include the following communication errors:

- Bus-off conditions of the CAN interface
- Life guarding event with the state ‘occurred’
- Heartbeat event with state ‘occurred’

Severe device errors also may be caused by device internal failures.

5.3 Additional error code meanings

Error Code	Meaning
2310_h	Current at outputs too high (overload)
2320_h	Short circuit at outputs
2330_h	Load dump at outputs
3110_h	Input voltage too high
3120_h	Input voltage too low
3210_h	Internal voltage too high
3220_h	Internal voltage too low
3310_h	Output voltage too high
3320_h	Output voltage too low

6 Pre-definitions

6.1 Introduction

If a device supports a specific type of I/O functionality (analogue/digital I/O) it shall support the related default PDOs. However, the module may support additional manufacturer-specific PDOs. If variable PDO mapping is supported the PDO default settings may be changed by means of configuration.

There shall be up to 4 enabled TPDOs and up to 4 enabled RPDOs with default mappings. If a module does not support a specific I/O function, the related default PDOs shall remain unused. If a device supports more than the default digital input or output channels, the related analogue default PDOs shall remain unused and the additional digital I/Os may use additional PDOs. This shall be the same for additional analogue channels.

All TPDOs with transmission type 255 shall be transmitted when entering the Operational state.

6.2 Pre-defined communication objects

Modules compliant with this device profile shall come with default values for some communication objects (1000_h to $1FFF_h$), which are not specified in all details in /2/.

6.2.1 Device type (1000_h)

The object at index 1000_h describes the type of device and its functionality. For multiple device modules the Additional information parameter shall contain $FFFF_h$. In this case, the $67FF_h$ object shall be implemented.

Additional information		General information
Specific functionality	I/O functionality	Device profile number

31 24 23 16 15 0

MSB LSB

General information
Device profile number: 401d

Additional information
1 = function is implemented
0 = function is not implemented

I/O functionality:
- 16^{th} Bit: Digital input
- 17^{th} Bit: Digital output
- 18^{th} Bit: Analogue input
- 19^{th} Bit: Analogue output
- Rest: Reserved

Any combination of digital/analogue, inputs and outputs is allowed.

Specific functionality:

Code	Function	Reference
0_h	No specific function	-
1_h	Joystick	Appendix A
$2_h..FF_h$	Reserved	-

6.2.2 Error Register (1001_h)

The device-specific bit in the status byte is reserved for future use.

6.2.3 Error Behaviour (1029_h)

The object specifies to which state an I/O module shall be set, when a communication error, output error or input error is detected.

0 = Pre-operational (only if the current state is Operational)

1 = no state change

2 = Stopped

In addition to the specification in /2/ the following sub-indices may be implemented.

Sub-Index	2_h
Description	Output Error
Access	rw
Entry Category	Optional
PDO Mapping	No
Value Range	0_h to 2_h
Default Value	0_h

Sub-Index	3_h
Description	Input Error
Access	rw
Entry Category	Optional
PDO Mapping	No
Value Range	0_h to 2_h
Default Value	0_h

Note: If the 1029_h object is not implemented the device shall be set into the Pre-operational state in the case a communication error is detected.

6.2.4 1st RPDO mapping (digital outputs)

This RPDO receives asynchronously the values of maximum 64 digital outputs to I/O module. The default transmission type shall be 255. *Note:* After power-on and application reset the values of the mapped outputs are as the default values or the stored values after configuration (stored values overwrites default values).

Receive PDO Communication Parameter

Index	Sub-Index	Comment	Default Value
1400_h	0_h	Largest sub-index supported	No
	1_h	COB-ID used by PDO	See /1/
	2_h	Transmission type	255
	3_h	Inhibit time	No
	4_h	reserved	See /1/
	5_h	Event timer	No

Receive PDO Mapping Parameter

Index	Sub-Index	Comment	Default Value
1600_h	0_h	number of mapped objects	No
	1_h	Write Output 1_h to 8_h	6200 01 08_h
	2_h	Write Output 9_h to 10_h	6200 02 08_h
	3_h	Write Output 11_h to 18_h	6200 03 08_h
	4_h	Write Output 19_h to 20_h	6200 04 08_h
	5_h	Write Output 21_h to 28_h	6200 05 08_h
	6_h	Write Output 29_h to 30_h	6200 06 08_h
	7_h	Write Output 31_h to 38_h	6200 07 08_h
	8_h	Write Output 39_h to 40_h	6200 08 08_h

The number of mapped objects into the PDO depends on the hardware.

6.2.5 1st TPDO mapping (digital inputs)

This TPDO transmits event-driven the values of maximum 64 digital inputs. The default transmission type shall be 255; the default values for inhibit and event timer shall be 0. If one digital input changes its value, this PDO shall be transmitted immediately. If an interrupt mask is enabled, the PDO shall be transmitted only if the interrupt condition is fulfilled.

Transmit PDO Communication Parameter

Index	Sub-Index	Comment	Default Value
1800_h	0_h	Largest sub-index supported	No
	1_h	COB-ID used by PDO	See /1/
	2_h	Transmission type	255
	3_h	Inhibit time	0
	4_h	reserved	See /1/
	5_h	Event timer	0

Transmit PDO Mapping Parameter

Index	Sub-Index	Comment	Default Value
$1A00_h$	0_h	number of mapped objects	No
	1_h	Read Input 1_h to 8_h	6000 01 08_h
	2_h	Read Input 9_h to 10_h	6000 02 08_h
	3_h	Read Input 11_h to 18_h	6000 03 08_h
	4_h	Read Input 19_h to 20_h	6000 04 08_h
	5_h	Read Input 21_h to 28_h	6000 05 08_h
	6_h	Read Input 29_h to 30_h	6000 06 08_h
	7_h	Read Input 31_h to 38_h	6000 07 08_h
	8_h	Read Input 39_h to 40_h	6000 08 08_h

The number of mapped objects into the PDO depends on the hardware.

6.2.6 2nd RPDO mapping (analogue outputs)

This RPDO receives asynchronously the 16-bit values of maximum 4 analogue outputs to the module. The default transmission type shall be 255. *Note:* After power-on and application reset the values of the mapped outputs are as the default values or the stored values after configuration (stored values overwrites default values).

Receive PDO Communication Parameter

Index	Sub-Index	Comment	Default Value
1401_h	0_h	Largest sub-index supported	No
	1_h	COB-ID used by PDO	See /1/
	2_h	Transmission type	255
	3_h	Inhibit time	No
	4_h	reserved	See /1/
	5_h	Event timer	No

Receive PDO Mapping Parameter

Index	Sub-Index	Comment	Default Value
1601_h	0_h	number of mapped objects	No
	1_h	Write Analogue Output 1_h	6411 01 10_h
	2_h	Write Analogue Output 2_h	6411 02 10_h
	3_h	Write Analogue Output 3_h	6411 03 10_h
	4_h	Write Analogue Output 4_h	6411 04 10_h

The number of mapped objects into the PDO depends on the hardware.

6.2.7 2nd TPDO mapping (analogue inputs)

This TPDO transmits event-driven the 16-bit values of maximum 4 analogue inputs. The default transmission type shall be 255; the default values for inhibit and event timer shall be 0. By default the interrupt source (6423_h object) shall be disabled. If one analogue input changes its value and 6423_h object is enabled, the PDO shall be transmitted immediately. If an analogue interrupt condition is enabled, the PDO shall be transmitted only if this interrupt condition is fulfilled. If more than one interrupt condition is enabled; the PDO shall be transmitted if one of these conditions is fulfilled.

Transmit PDO Communication Parameter

Index	Sub-Index	Comment	Default Value
1801_h	0_h	Largest sub-index supported	No
	1_h	COB-ID used by PDO	See /1/
	2_h	Transmission type	255
	3_h	Inhibit time	0
	4_h	reserved	See /1/
	5_h	Event timer	0

Transmit PDO Mapping Parameter

Index	Sub-Index	Comment	Default Value
$1A01_h$	0_h	number of mapped objects	No
	1_h	Read Analogue Output 1_h	6401 01 10_h
	2_h	Read Analogue Output 2_h	6401 02 10_h
	3_h	Read Analogue Output 3_h	6401 03 10_h
	4_h	Read Analogue Output 4_h	6401 04 10_h

The number of mapped objects into the PDO depends on the hardware.

6.2.8 3rd RPDO mapping (analogue outputs)

This RPDO receives asynchronously the 16-bit values of maximum 4 analogue outputs to the module. The default transmission type shall be 255. *Note:* After power-on and application reset the values of the mapped outputs are as the default values or the stored values after configuration (stored values overwrites default values).

Receive PDO Communication Parameter

Index	Sub-Index	Comment	Default Value
1402_h	0_h	Largest sub-index supported	No
	1_h	COB-ID used by PDO	See /1/
	2_h	Transmission type	255
	3_h	Inhibit time	No
	4_h	reserved	See /1/
	5_h	Event timer	No

Receive PDO Mapping Parameter

Index	Sub-Index	Comment	Default Value
1602_h	0_h	number of mapped objects	No
	1_h	Write Analogue Output 5_h	6411 05 10_h
	2_h	Write Analogue Output 6_h	6411 06 10_h
	3_h	Write Analogue Output 7_h	6411 07 10_h
	4_h	Write Analogue Output 8_h	6411 08 10_h

The number of mapped objects into the PDO depends on the hardware.

6.2.9 3rd TPDO mapping (analogue inputs)

This TPDO transmits event-driven the 16-bit values of maximum 4 analogue inputs. The default transmission type shall be 255; the default values for inhibit and event timer shall be 0. By default the interrupt source (6423_h object) shall be disabled. If one analogue input changes its value and 6423_h object is enabled, the PDO shall be transmitted immediately. If an analogue interrupt condition is enabled; the PDO shall be transmitted only if this interrupt condition is fulfilled. If more than one interrupt condition is enabled; the PDO shall be transmitted if one of these conditions is fulfilled.

Transmit PDO Communication Parameter

Index	Sub-Index	Comment	Default Value
1802_h	0_h	Largest sub-index supported	No
	1_h	COB-ID used by PDO	See /1/
	2_h	Transmission type	255
	3_h	Inhibit time	0
	4_h	reserved	See /1/
	5_h	Event timer	0

Transmit PDO Mapping Parameter

Index	Sub-Index	Comment	Default Value
$1A02_h$	0_h	number of mapped objects	No
	1_h	Read Analogue Output 5_h	6401 05 10_h
	2_h	Read Analogue Output 6_h	6401 06 10_h
	3_h	Read Analogue Output 7_h	6401 07 10_h
	4_h	Read Analogue Output 8_h	6401 08 10_h

The number of mapped objects into the PDO depends on the hardware.

6.2.10 4th RPDO mapping (analogue outputs)

This RPDO receives asynchronously the 16-bit values of maximum 4 analogue outputs to the module. The default transmission type shall be 255. *Note:* After power-on and application reset the values of the mapped outputs are as the default values or the stored values after configuration (stored values overwrites default values).

Receive PDO Communication Parameter

Index	Sub-Index	Comment	Default Value
1403_h	0_h	Largest sub-index supported	No
	1_h	COB-ID used by PDO	See /1/
	2_h	Transmission type	255
	3_h	Inhibit time	No
	4_h	reserved	See /1/
	5_h	Event timer	No

Receive PDO Mapping Parameter

Index	Sub-Index	Comment	Default Value
1603_h	0_h	number of mapped objects	No
	1_h	Read Analogue Output 9_h	6411 09 10_h
	2_h	Read Analogue Output A_h	6411 0A 10_h
	3_h	Read Analogue Output B_h	6411 0B 10_h
	4_h	Read Analogue Output C_h	6411 0C 10_h

The number of mapped objects into the PDO depends on the hardware.

6.2.11 4th TPDO mapping (analogue inputs)

This TPDO transmits event-driven the 16-bit values of maximum 4 analogue inputs. The default transmission type shall be 255; the default values for inhibit and event timer shall be 0. By default the interrupt source (6423_h object) shall be disabled. If one analogue input changes its value and 6423_h object is enabled, the PDO shall be transmitted immediately. If an analogue interrupt condition is enabled; the PDO shall be transmitted only if this interrupt condition is fulfilled. If more than one interrupt condition is enabled; the PDO shall be transmitted if one of these conditions is fulfilled.

Receive PDO Communication Parameter

Index	Sub-Index	Comment	Default Value
1803_h	0_h	Largest sub-index supported	No
	1_h	COB-ID used by PDO	See /1/
	2_h	Transmission type	255
	3_h	Inhibit time	0
	4_h	reserved	See /1/
	5_h	Event timer	0

Receive PDO Mapping Parameter

Index	Sub-Index	Comment	Default Value
$1A03_h$	0_h	number of mapped objects	No
	1_h	Write Analogue Output 9_h	6401 09 10_h
	2_h	Write Analogue Output A_h	6401 0A 10_h
	3_h	Write Analogue Output B_h	6401 0B 10_h
	4_h	Write Analogue Output C_h	6401 0C 10_h

The number of mapped objects into the PDO depends on the hardware.

7 Object dictionary

Each I/O module compliant with this device profile shall share the CANopen Object Dictionary entries from 6000_h to $67FF_h$. These entries are common to all I/O modules and each module only implements those objects relevant to its functions. Object Description and Entry Description are specified in /2/.

7.1 Input and output function principles

7.1.1 Object dictionary for the digital input and output modules

Command sequence

It is possible to switch the modules output or input polarity. This feature is the one which is nearest to the sensors and actuators, e.g. if the polarity of an output is enabled and the output is set to high, then the output level is '0'.

The following table shows the profile command sequence.

Commands	Polarity switch	Process
Read input	enabled: 0 change to 1	Sensor or actuator
Write output	1 change to 0	
Interrupt mask	disabled: 0 remains 0	
Error mode	1 remains 1	

Example of the polarity with a digital output:

Access to 1-, 8-, 16- and 32-points

There are different objects to allow 1-bit, 8-bit, 16-bit or 32-bit access to digital inputs or outputs (e.g. definition of polarity). If these objects define the same function, they access single database. Example: If the 6002_h object (Change Polarity Input 8-bit) Sub-index 1_h has the value AA_h and Sub-index 2_h the value $0F_h$, 6102_h object (Change Polarity Input 16-bit) Sub-index 1_h shall have the value $0FAA_h$.

I/O channel to Sub-index relation

The bit position is defined by the following formula:

Bit position = (I/O channel no. -1) MOD (length of data type)

The sub-index, where a bit is located, is calculated by the following formula:

Sub-index = (I/O channel no. - 1) DIV (length of data type) + 1

Example 8-bit access:

Sub-index 1

#8	#7	#6	#5	#4	#3	#2	#1
7							0

Sub-index 2

#16	#15	#14	#13	#12	#11	#10	#9
7							0

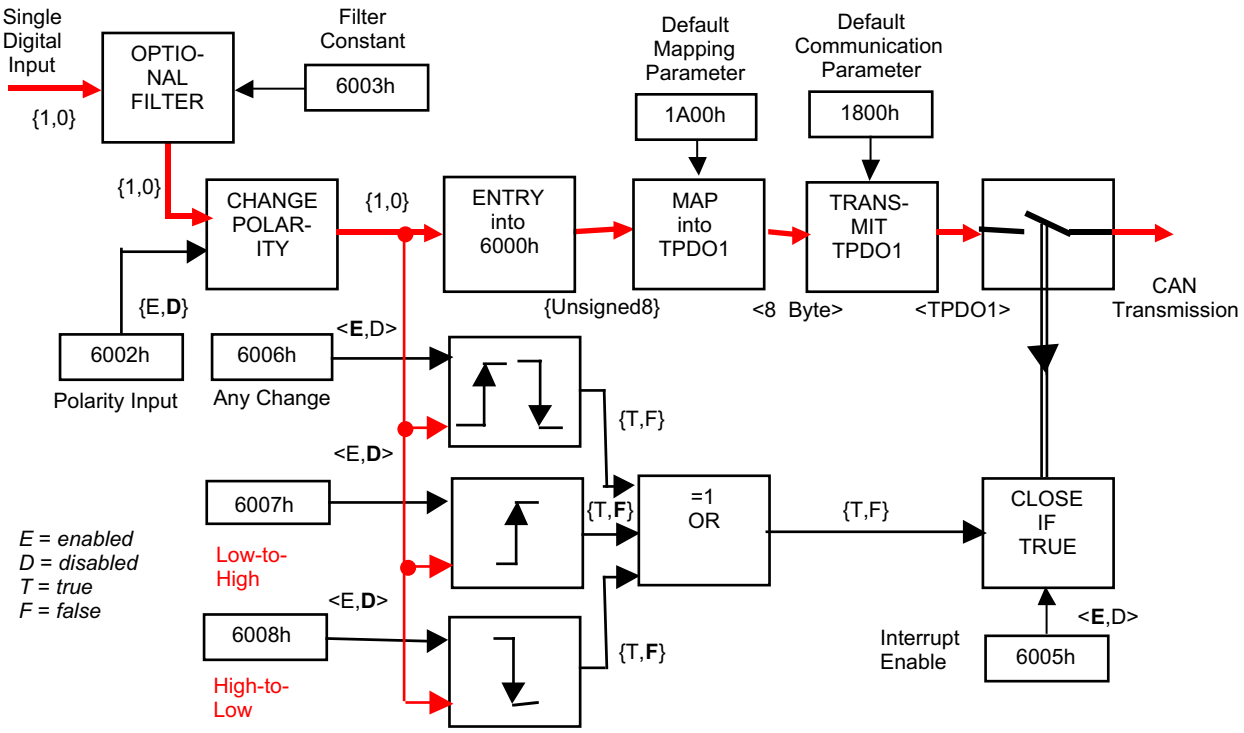
7.1.2 Digital input module

There are different access methods defined. By default, 8-bit access shall be supported; the other access methods are optional. The tables list the digital input objects.

The following table lists the objects for 8-bit access.

Index	Object Code (OC)	Name	Data Type	Category
6000_h	Array	Read Input 8-bit	Unsigned8	C: DI
6001_h	-	Reserved	-	-
6002_h	Array	Polarity Input 8-bit	Unsigned8	O
6003_h	Array	Filter Constant Input 8-bit	Unsigned8	O
6004_h	-	Reserved	-	-
6005_h	Var	Global Interrupt Enable Digital	Boolean	O
6006_h	Array	Interrupt Mask Any Change 8-bit	Unsigned8	O
6007_h	Array	Interrupt Mask Low-to-High 8-bit	Unsigned8	O
6008_h	Array	Interrupt Mask High-to-Low 8-bit	Unsigned8	O
6009_h	-	Reserved	-	-
to				
$601E_h$	-	Reserved	-	-

The figure shows the relationship between the digital input objects for an 8-bit access.



The following table lists the objects for 1-bit, 16-bit and 32-bit access.

Index	OC	Name	Data Type	Category
$601F_h$	-	Reserved	-	-
6020_h	Array	Read Input Bit 1 to 128	Boolean	O
		to		
6027_h	Array	Read Input Bit 897 to 1024	Boolean	O
6028_h	-	Reserved	-	-
		to		
$602F_h$	-	Reserved	-	-
6030_h	Array	Polarity Input Bit 1 to 128	Boolean	O
		to		
6037_h	Array	Polarity Input Bit 897 to 1024	Boolean	O
6038_h	Array	Filter Constant Input Bit 1 to 128	Boolean	O
		to		
$603F_h$	Array	Filter Constant Input Bit 897 to 1024	Boolean	O
$604F_h$	-	Reserved	-	-
6050_h	Array	Interrupt Mask Input Bit 1 to 128 Any Change	Boolean	O
		to		
6057_h	Array	Interrupt Mask Input Bit 897 to 1024 Any Change	Boolean	O
6058_h	-	Reserved	-	-
		to		
$605F_h$	-	Reserved	-	-
6060_h	Array	Interrupt Mask Input Bit 1 to 128 Low-to-High	Boolean	O
		to		
6067_h	Array	Interrupt Mask Input Bit 897 to 1024 Low-to-High	Boolean	O
6068_h	-	Reserved	-	-
		to		
$606F_h$	-	Reserved	-	-
6070_h	Array	Interrupt Mask Input Bit 1 to 128 High-to-Low	Boolean	O
		to		
6077_h	Array	Interrupt Mask Input Bit 897 to 1024 High-to-Low	Boolean	O
6078_h	-	Reserved	-	-
		to		
$60FF_h$	-	Reserved	-	-
6100_h	Array	Read Input 16-Bit	Unsigned16	O
6101_h	-	Reserved	-	-
6102_h	Array	Polarity Input 16-Bit	Unsigned16	O
6103_h	Array	Filter Constant Input 16-Bit	Unsigned16	O
6104_h	-	Reserved	-	-
6105_h	-	Reserved	-	-
6106_h	Array	Interrupt Mask Input 16-Bit Any Change	Unsigned16	O
6107_h	Array	Interrupt Mask Input 16-Bit Low-to-High	Unsigned16	O
6108_h	Array	Interrupt Mask Input 16-Bit High-to–Low	Unsigned16	O
6109_h	-	Reserved	-	-
		to		
$611F_h$	-	Reserved	-	-
6120_h	Array	Read Input 32-Bit	Unsigned32	O
6121_h	-	Reserved	-	-
6122_h	Array	Polarity Input 32-Bit	Unsigned32	O
6123_h	Array	Filter Constant Input 32-Bit	Unsigned32	-
6124_h	-	Reserved	-	-
6125_h	-	Reserved	-	-
6126_h	Array	Interrupt Mask Input 32-Bit Any Change	Unsigned32	O
6127_h	Array	Interrupt Mask Input 32-Bit Low-to-High	Unsigned32	O
6128_h	Array	Interrupt Mask Input 32-Bit High-to-Low	Unsigned32	O
6129h	-	Reserved	-	-
		to		
$61FF_h$	-	Reserved	-	-

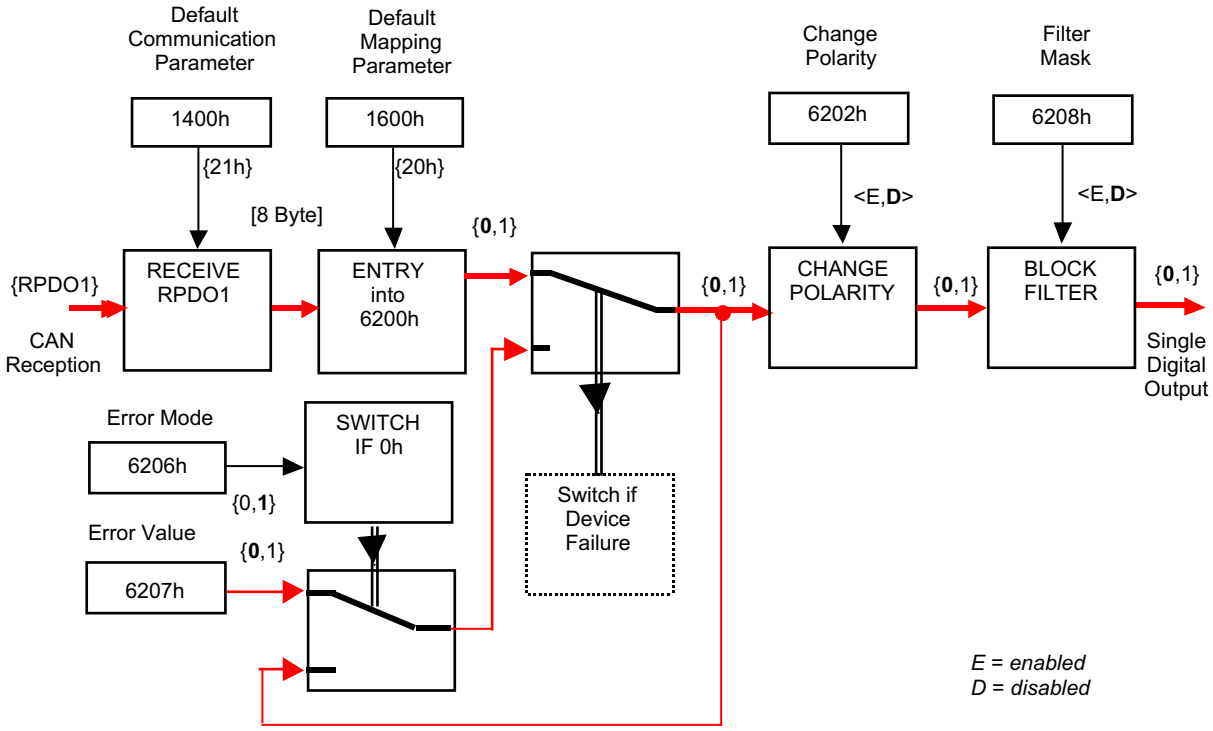
7.1.3 Digital output module

There are different access methods defined. By default, 8-bit access shall be supported; the other access methods are optional. The tables list the digital output objects.

The following table lists the objects for 8-bit access.

Index	Object Code (OC)	Name	Data Type	Category
6200_h	Array	Write Output 8-Bit	Unsigned8	C: DO
6201_h	-	Reserved	-	-
6202_h	Array	Change Polarity Output 8-Bit	Unsigned8	O
6203_h		Reserved	-	-
to				
6205_h	-	Reserved	-	-
6206_h	Array	Error Mode Output 8-Bit	Unsigned8	O
6207_h	Array	Error Value Output 8-Bit	Unsigned8	O
6208_h	Array	Filter Constant Output 8-Bit	Unsigned8	O
6209_h	-	Reserved	-	-
to				
$621E_h$	-	Reserved	-	-

The figure shows the relationship between the digital output objects for an 8-bit access.



The following table lists the objects for 1-, 16- and 32-Bit access.

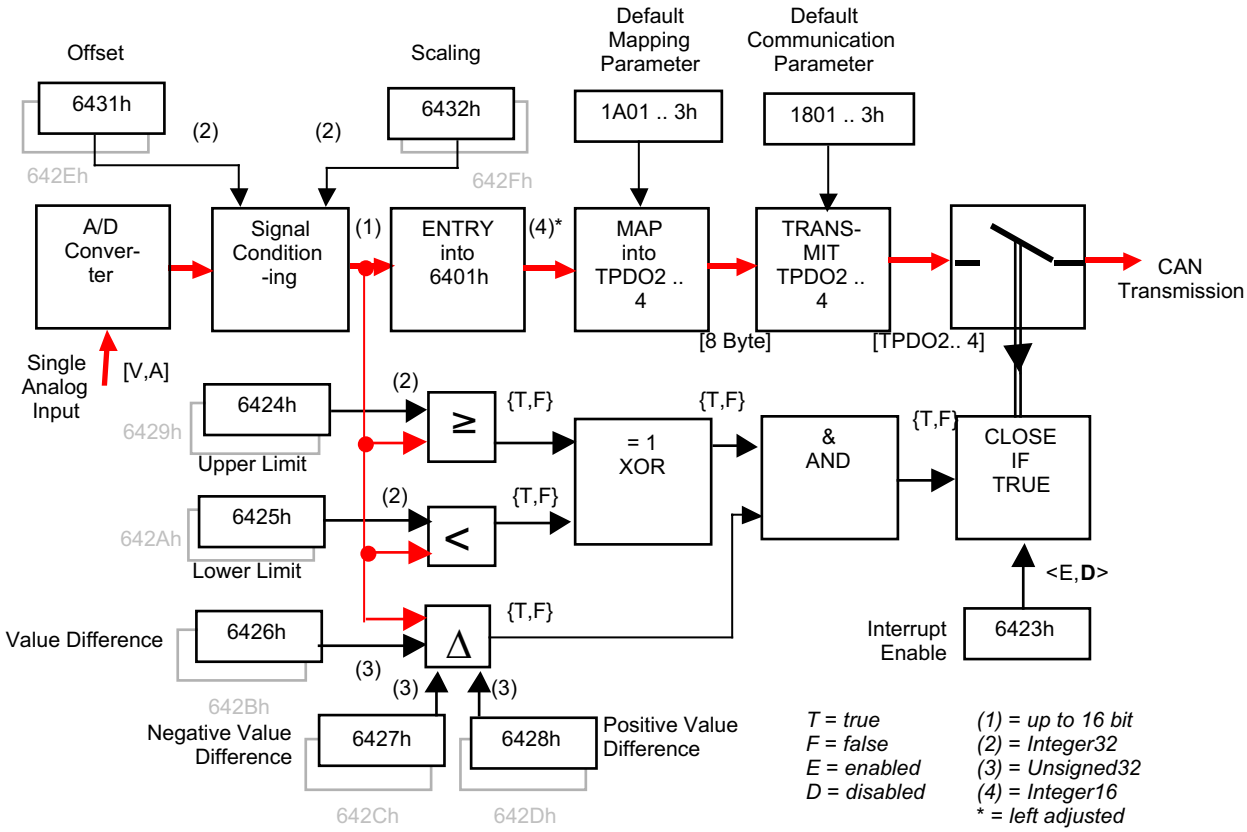
Index	OC	Name	Data Type	Category
$621F_h$	-	Reserved	-	
6220_h	Array	Write Output Bit 1 to 128	Boolean	O
to				
6227_h	Array	Write Output Bit 897 to 1024	Boolean	O
6228_h	-	Reserved	-	-
to				
$623F_h$	-	Reserved	-	-
6240_h	Array	Change Polarity Output Bit 1 to 128	Boolean	O
to				
6247_h	Array	Change Polarity Output Bit 897 to 1024	Boolean	O
6248_h	-	Reserved	-	-
to				
$624F_h$	-	Reserved	-	-
6250_h	Array	Error Mode Output Bit 1 to 128	Boolean	O
to				
6257_h	Array	Error Mode Output Bit 897 to 1024	Boolean	O
6258_h	-	reserved	-	-
to				
$625F_h$	-	reserved	-	-
6260_h	Array	Error Value Output Bit 1 to 128	Boolean	O
to				
6267_h	Array	Error Value Output Bit 897 to 1024	Boolean	O
6268_h	-	Reserved	-	-
to				
$626F_h$	-	Reserved	-	-
6270_h	Array	Filter Constant Output Bit 1 to 128	Boolean	O
to				
6277_h	Array	Filter Constant Output Bit 897 to 1024	Boolean	O
6278_h	-	Reserved	-	-
to				
$62FF_h$	-	Reserved	-	-
6300_h	Array	Write Output 16-Bit	Unsigned16	O
6301_h	-	Reserved	-	-
6302_h	Array	Change Polarity Output 16-Bit	Unsigned16	O
6303_h	-	Reserved	-	-
to				
6305_h	-	Reserved	-	-
6306_h	Array	Error Mode Output 16-Bit	Unsigned16	O
6307_h	Array	Error Value Output 16-Bit	Unsigned16	O
6308_h	Array	Filter Constant Output 16-Bit	Unsigned16	O
6309_h	-	Reserved	-	-
to				
$631F_h$	-	Reserved	-	-
6320_h	Array	Write Output 32-Bit	Unsigned32	O
6321_h	-	Reserved	-	-
6322_h	Array	Change Polarity Output 32-Bit	Unsigned32	O
6323_h	-	Reserved	-	-
to				
6325_h	-	Reserved	-	-
6326_h	Array	Error Mode Output 32-Bit	Unsigned32	O
6327_h	Array	Error Value Output 32-Bit	Unsigned32	O
6328_h	Array	Filter Constant Output 32-Bit	Unsigned32	O
6329_h	-	Reserved	-	-
to				
$63FF_h$	-	Reserved	-	-

7.1.4 Analogue input module

There are different access methods defined. By default, 16-bit access shall be supported; the other access methods are optional.

Index	Object Code	Name	Data Type	Category
6400_h	Array	Read Analogue Input 8-Bit	Integer8	O
6401_h	Array	Read Analogue Input 16-Bit	Integer16	C: AI
6402_h	Array	Read Analogue Input 32-Bit	Integer32	O
6403_h	Array	Read Analogue Input Float	Float	O
6404_h	Array	Read Manufacturer-specific Analogue Input	specific	O

The figure shows the relationship between the analogue input objects for an Integer16 access.

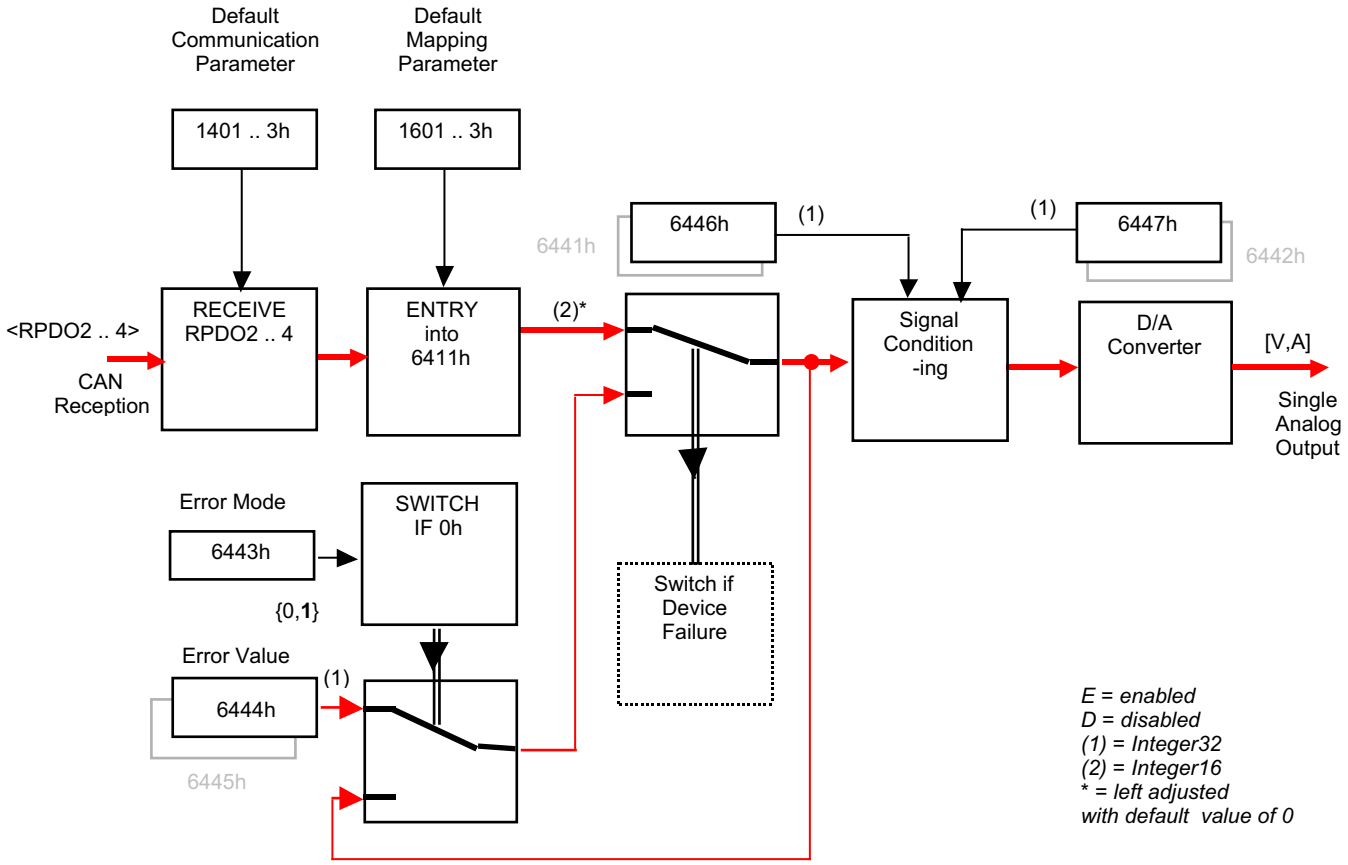


7.1.5. Analogue output module

There are different access methods defined. By default, 16-bit access shall be supported; the other access methods are optional.

Index	Object Code	Name	Data Type	Category
6410_h	Array	Write Analogue Output 8-Bit	Integer8	O
6411_h	Array	Write Analogue Output 16-Bit	Integer16	C:AO
6412_h	Array	Write Analogue Output 32-Bit	Integer32	O
6413_h	Array	Write Analogue Output Float	Float	O
6414_h	Array	Write Manufacturer-specific Analogue Output	specific	O

The figure shows the relationship between the analogue output objects for an Integer16 access.



7.1.6 Analogue input set-ups

Index	Object Code	Name	Data Type	Category
6420_h	-	Reserved for compatibility reason	-	-
6421_h	Array	Analogue Input Interrupt Trigger Selection	Unsigned8	O
6422_h	Array	Analogue Input Interrupt Source	Unsigned32	O
6423_h	Var	Analogue Input Global Interrupt Enable	Boolean	C: AI
6424_h	Array	Analogue Input Interrupt Upper Limit Integer	Integer32	O
6425_h	Array	Analogue Input Interrupt Lower Limit Integer	Integer32	O
6426_h	Array	Analogue Input Interrupt Delta Unsigned	Unsigned32	O
6427_h	Array	Analogue Input Interrupt Negative Delta Unsigned	Unsigned32	O
6428_h	Array	Analogue Input Interrupt Positive Delta Unsigned	Unsigned32	O
6429_h	Array	Analogue Input Interrupt Upper Limit Float	Float	O
$642A_h$	Array	Analogue Input Interrupt Lower Limit Float	Float	O
$642B_h$	Array	Analogue Input Interrupt Delta Float	Float	O
$642C_h$	Array	Analogue Input Interrupt Negative Delta Float	Float	O
$642D_h$	Array	Analogue Input Interrupt Positive Delta Float	Float	O
$642E_h$	Array	Analogue Input Offset Float	Float	O
$642F_h$	Array	Analogue Input Scaling Float	Float	O
6430_h	Array	Analogue Input SI Unit	Unsigned32	O
6431_h	Array	Analogue Input Offset Integer	Integer32	O
6432_h	Array	Analogue Input Scaling Integer	Integer32	O
6433_h	-	Reserved	-	-
to				
$673F_h$	-	Reserved	-	-

7.1.7 Analogue output set-ups

Index	Object Code	Name	Data Type	Category
6440_h	-	Reserved for compatibility reason	-	-
6441_h	Array	Analogue Output Offset Float	Float	O
6442_h	Array	Analogue Output Scaling Float	Float	O
6443_h	Array	Analogue Output Error Mode	Unsigned8	O
6444_h	Array	Analogue Output Error Value Integer	Integer32	O
6445_h	Array	Analogue Output Error Value Float	Float	O
6446_h	Array	Analogue Output Offset Integer	Integer32	O
6447_h	Array	Analogue Output Scaling Integer	Integer32	O
6448_h	-	Reserved	-	-
to				
$644F_h$	-	Reserved	-	-
6450_h	Array	Analogue Output SI Unit	Unsigned32	O
6451_h	-	Reserved	-	-
to				
$67FD_h$	-	Reserved	-	-

7.1.8 General device profile objects

Index	Object Code	Name	Data Type	Category
$67FF_h$	Var	Device Type (see /2/)	Unsigned32	O

8 Object descriptions

8. 1 Digital input module

8.1.1 Read Input 8-Bit (6000h)

This object shall read groups of 8 input lines as 8-bit information. A maximum of 254 x 8-Bit inputs is addressable (2032 inputs). This object is mandatory for digital input modules and shall support all implemented input lines.

Object Description

INDEX	6000_h
Name	Read Input 8 Bit
Object Code	Array
Data Type	Unsigned8
Category	Conditional: Device with digital inputs

Entry Description

Sub-Index	0_h
Description	Number of Inputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FEh
Default Value	No

Sub-Index	1_h
Description	Read Input 1_h to 8_h
Access	ro
Entry Category	Mandatory
PDO Mapping	Default
Value Range	Unsigned8
Default Value	No

Sub-Index	2_h
Description	Read Input 9_h to 10_h
Access	ro
Entry Category	Optional
PDO Mapping	Default
Value Range	Unsigned8
Default Value	No

to

Sub-Index	8_h
Description	Read Input 39_h to 40_h
Access	ro
Entry Category	Optional
PDO Mapping	Default
Value Range	Unsigned8
Default Value	No

Sub-Index	9_h
Description	Read Input 41_h to 48_h
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default value	No

to

Sub-Index	Fe_h
Description	Read Input $7E8_h$ to $7F0_h$
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default value	No

8.1.2 Polarity Input 8-Bit (6002_h)

This object shall define the polarity of a group of 8 input lines. Input polarity can be inverted individually.

1 = input inverted

0 = input not inverted

If the object is not supported the device shall behave accordingly to the default value.

Object Description

INDEX	6002_h
Name	Polarity Input 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Polarity Input 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Possible
Value Range	Unsigned8
Default Value	0_h

Sub-Index	2_h
Description	Polarity Input 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Possible
Value Range	Unsigned8
Default Value	0_h

to

Sub-Index	FE_h
Description	Polarity Input $7E8_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

8.1.3 Filter Constant Input 8-Bit (6003_h)

This object shall enable and disable an additional configurable filter constant. If the object is not supported, the device shall behave accordingly to the default value. The type of the filter constant and the configuration of the filter constant are manufacturer-specific.

1 = enabled

0 = disabled

Object Description

INDEX	6003_h
Name	Filter Constant Input 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Filter Constant Input 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0h

Sub-Index	2_h
Description	Filter Constant Input 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

to

Sub-Index	FE_h
Description	Filter Constant Input $7E8_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

8.1.4 Global Interrupt Enable Digital 8-Bit (6005_h)

This object shall enable and disable globally the interrupt behaviour without changing the interrupt masks. In event-driven mode the device transmits the input values depending on the interrupt masks in objects 6006_h, 6007_h, and 6008 (resp. 6050_h .. 6057_h, 6060_h .. 6067_h, 6070_h .. 6077_h, or 6106_h, 6107_h, 6108_h, or 6126_h, 6127_h, 6127_h) and the PDO transmission type. If the object is not supported, the device shall behave accordingly to the default value.

TRUE = global interrupt enabled

FALSE = global interrupt disabled

Object Description

INDEX	6005_h
Name	Global Interrupt Enable Digital 8-Bit
Object Code	Variable
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Access	rw
PDO Mapping	No
Value Range	Boolean
Default Value	TRUE

8.1.5 Interrupt Mask Any Change 8-Bit (6006_h)

This object determines, which input port lines shall activate an interrupt by positive or/and negative edge detection.

1 = interrupt enabled

0 = interrupt disabled

If the object is not supported the device shall behave accordingly to the default value.

Object Description

INDEX	6006_g
Name	Interrupt Mask Any Change 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Any Change 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

Sub-Index	2_h
Description	Interrupt Any Change 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

to

Sub-Index	FE_h
Description	Interrupt Any Change $7E8_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

8.1.6 Interrupt Mask Low-to-High 8-Bit (6007_h)

This object determines, which input port lines shall activate an interrupt by positive edge detection (logical 0 to 1). Done for groups of 8 lines. The values shall be in an ”OR” connection to the values of 6006_h object (Interrupt Mask Any Change 8-Bit). If inputs are inverted by 6002_h object (Polarity Input 8-Bit), the positive logical edge shall correspond to negative physical edge.

1 = interrupt enabled

0 = interrupt disabled

Object Description

INDEX	6007_h
Name	Interrupt Mask Low to High 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Low to High 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

Sub-Index	2_h
Description	Interrupt Low to High 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

to

Sub-Index	FE_h
Description	Interrupt Low to High $7E8_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

8.1.7 Interrupt Mask High-to-Low 8-Bit (6008_h)

This object determines, which input port lines shall activate an interrupt by negative edge detection (logical 1 to 0). Done for groups of 8 lines. The values shall be in an ”OR” connection to the values of 6006_h object (Interrupt Mask Any Change 8-Bit). If inputs are inverted by 6002_h object (Polarity Input 8-Bit), the negative logical edge shall correspond to positive physical edge.

1 = interrupt enabled

0 = interrupt disabled

Object Description

INDEX	6008_h
Name	Interrupt Mask High to Low 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt High to Low 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

Sub-Index	2_h
Description	Interrupt High to Low 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

to

Sub-Index	FE_h
Description	Interrupt High to Low $7F1_h$ to $7F8_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

8.1.8 Read Input Bit 1 to 128 .. Read Input Bit 897 to 1024 (6020_h .. 6027_h)

These objects shall read single input lines information. A maximum of 128 input lines is addressable at one index. The 6020_h object shall address the input lines 1 to 128, the 6021_h object shall address the input lines 129 to 256, etc.

Object Description

INDEX	6020_h
Name	Read Input Bit 1_h to 80_h
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Read Single Input 1_h
Access	ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	No

Sub-Index	2_h
Description	Read Single Input 2_h
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	No

to

Sub-Index	80_h
Description	Read Single Input 80_h
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	No

8.1.9 Polarity Input Bit 1 to 128 .. Polarity Input Bit 897 to 1024 (6030_h .. 6037_h)

These objects shall define the polarity of single input lines. A maximum of 128 input lines is addressable at one index. The 6030_h object shall address the input lines 1 to 128, the 6031_h object shall address the input lines 129 to 256, etc.

TRUE = input inverted FALSE = input not inverted

If these objects are not supported the device shall behave accordingly to the default value.

Object Description

INDEX	6030_h
Name	Polarity Input Bit 1_h to 80_h
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Polarity Input Bit 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

Sub-Index	2_h
Description	Polarity Input Bit 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

to

Sub-Index	80_h
Description	Polarity Input Bit 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

8.1.10 Filter Constant Input Bit 1 to 128 .. Filter Constant Input Bit 897 to 1024 (6038_h .. $603F_h$)

These objects shall enable and disable an additional configurable filter constant. If these objects are not supported, the device shall behave accordingly to the default value. The type of the filter constant and the configuration of the filter constant are manufacturer-specific. The 6038_h object shall address the input lines 1 to 128, the 6039h object shall address the input lines 129 to 256, etc.

TRUE = enabled FALSE = disabled

Object Description

INDEX	6038_h
Name	Filter Constant Input Bit 1_h to 80_h
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Filter Constant Input Bit 1h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

Sub-Index	2_h
Description	Filter Constant Input Bit 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

to

Sub-Index	80_h
Description	Filter Constant Input Bit 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

8.1.11 Interrupt Mask Input Any Change Bit 1 to 128 .. Interrupt Mask Input Any Change Bit 897 to 1024 (6050_h .. 6057_h)

These objects shall set interrupt masks for single input lines. A maximum of 128 Bit inputs is addressable at one index. The 6050_h object shall address the input lines 1 to 128, the 6051_h object shall address the input lines 129 to 256, etc.

TRUE = interrupt enabled FALSE = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6050_h
Name	Interrupt Mask Input Bit Any Change 1h to 80h
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Mask Any Change Input Bit 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

Sub-Index	2_h
Description	Interrupt Mask Any Change Input Bit 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

to

Sub-Index	80_h
Description	Interrupt Mask Any Change Input 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

8.1.12 Interrupt Mask Input Low-to-High Bit 1 to 128 .. Interrupt Mask Input Low-to-High Bit 897 to 1024 (6060_h .. 6067_h)

These objects shall set interrupt masks for a single input line. A maximum of 128 Bit inputs is addressable at one index. The 6060_h object shall address the input lines 1 to 128, the 6061_h object shall address the input lines 129 to 256, etc. The values shall be in an ”OR” connection to the values of 6050_h to 6057_h objects (Interrupt Mask Any Change). If inputs are inverted by 6030_h to 6037_h objects (Polarity Input), the positive logical edge shall correspond to negative physical edge.

TRUE = interrupt enabled FALSE = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6060_h
Name	Interrupt Mask Input Low to High Bit 1_h to 80_h
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 1-Bit
Access	rw
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Mask Low to High Input 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

Sub-Index	2_h
Description	Interrupt Mask Low to High Input 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

to

Sub-Index	80_h
Description	Interrupt Mask Low to High Input 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

8.1.13 Interrupt Mask Input High-to-Low Bit 1 to 128 .. Interrupt Mask Input High-to-Low Bit 897 to 1024 (6070_h .. 6077_h)

These objects shall set interrupt masks for single input lines. A maximum of 128 Bit inputs is addressable at one index. The 6070_h object shall address the input lines 1 to 128, the 6071_h object shall address the input lines 129 to 256, etc. The values shall be in an ”OR” connection to the values of 6050_h to 6057_h objects (Interrupt Mask Any Change). If inputs are inverted by 6030_h to 6037_h objects (Polarity Input), the negative logical edge shall correspond to positive physical edge.

TRUE = interrupt enabled FALSE = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6070_h
Name	Interrupt Mask Input High to Low Bit 1_h to 80_h
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 1-Bit
Access	rw
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Mask High to Low Input 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

Sub-Index	2_h
Description	Interrupt Mask High to Low Input 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

to

Sub-Index	80_h
Description	Interrupt Mask High to Low Input 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE
Default Value	FALSE

8.1.14 Read Input 16-bit (6100_h)

The object shall read a group of 16 input lines as a 16-bit information. A maximum of 254 x 16-Bit words is addressable (4064 inputs).

1 = input inverted 0 = input not inverted

Object Description

INDEX	6100_h
Name	Read Input 16-bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Read Input 1_h to 10_h
Access	ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	No

Sub-Index	2_h
Description	Read Input 11_h to 20_h
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	No

to

Sub-Index	FE_h
Description	Read Input $FD0_h$ to $FE0_h$
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	No

8.1.15 Polarity Input 16-bit (6102_h)

This object shall define the polarity for a group of 16 input lines. Inputs can be inverted individually.

1 = input inverted 0 = input not inverted

If the object is not supported the device shall behave accordingly to the default value.

Object Description

INDEX	6102_h
Name	Polarity Input 16-bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Polarity Input 1_h to 10_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

Sub-Index	2_h
Description	Polarity Input 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

to

Sub-Index	FE_h
Description	Polarity Input $FD1_h$ to $FF0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

8.1.16 Filter Constant Input 16-bit (6103_h)

This object shall enable and disable an additional configurable filter constant. If the object is not supported, the device shall behave accordingly to the default value. The type of the filter constant and the configuration of the filter constant are manufacturer-specific.

1 = enabled 0 = disabled

Object Description

INDEX	6103_h
Name	Filter Constant Input 16-bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Filter Constant Input 1_h to 10_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

Sub-Index	2_h
Description	Filter Constant Input 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

to

Sub-Index	FE_h
Description	Filter Constant Input $FD1_h$ to $FE0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

8.1.17 Interrupt Mask Input Any Change 16-bit (6106_h)

This object determines, which input port lines shall activate an interrupt. Done for groups of 16 lines and for any change of a digital input line.

1 = interrupt enabled 0 = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6106_h
Name	Interrupt Mask Input Any Change 16-bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Any Change Inputs 1_h to 10_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	$FFFF_h$

Sub-Index	2_h
Description	Interrupt Any Change Inputs 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	$FFFF_h$

to

Sub-Index	FE_h
Description	Interrupt Any Change Inputs $FD1_h$ to $FE0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	$FFFF_h$

8.1.18 Interrupt Mask Input Low-to-High 16-bit (6107_h)

This object determines, which input port lines shall activate an interrupt. Done for groups of 16 lines and for a change from low-to-high of a digital input line. The values shall be in an ”OR” connection to the values of 6106_h object (Interrupt Mask Any Change 16-Bit). If inputs are inverted by 6102_h object (Polarity Input 16-Bit), the positive logical edge shall correspond to negative physical edge.

1 = interrupt enabled 0 = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6107_h
Name	Interrupt Mask Input Low to High 16-bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Low to High Inputs 1_h to 10_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

Sub-Index	2_h
Description	Interrupt Low to High Inputs 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

to

Sub-Index	FE_h
Description	Interrupt Low to High Inputs $FD1_h$ to $FE0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

8.1.19 Interrupt Mask Input High-to-Low 16-bit (6108_h)

This object determines, which input port lines shall activate an interrupt. Done for groups of 16 lines and for a change from high-to-low of a digital input line. The values shall be in an ”OR” connection to the values of 6106_h object (Interrupt Mask Any Change 16-Bit). If inputs are inverted by 6102_h object (Polarity Input 16-Bit), the negative logical edge shall correspond to positive physical edge.

1 = interrupt enabled 0 = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6108_h
Name	Interrupt Mask Input High to Low 16-bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt High to Low Inputs 1_h to 10_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

Sub-Index	2_h
Description	Interrupt High to Low Inputs 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

to

Sub-Index	FE_h
Description	Interrupt High to Low Inputs $FD1_h$ to $FE0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

8.1.20 Read Input 32-bit (6120_h)

This object shall read a group of 32 input lines as 32-bit information. A maximum of 254 x 32-Bit words is addressable (8128 inputs).

Object Description

INDEX	6120_h
Name	Read Input 4 Byte
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Read Inputs 1_h to 20_h
Access	ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

Sub-Index	2_h
Description	Read Inputs 21_h to 40_h
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

to

Sub-Index	FE_h
Description	Read Inputs $1FA0_h$ to $1FC0_h$
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

8.1.21 Polarity Input 32-bit (6122_h)

This object shall define the polarity for a group of 32 input lines. Inputs can be inverted individually.

1 = input inverted 0 = input not inverted

If the object is not supported the device shall behave accordingly to the default value.

Object Description

INDEX	6122_h
Name	Polarity Input 32-bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 32-Bit
Access	ro
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	0_h

Sub-Index	1_h
Description	Polarity Inputs 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	No
Value Range	Unsigned32
Default Value	0h

Sub-Index	2_h
Description	Polarity Inputs 21_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	No
Value Range	Unsigned32
Default Value	0h

to

Sub-Index	FE_h
Description	Polarity Inputs $1FA0_h$ to $1FC0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.1.22 Filter Constant Input 32-bit (6123_h)

This object shall enable and disable an additional configurable filter constant. If the object is not supported, the device shall behave accordingly to the default value. The type of the filter constant and the configuration of the filter constant are manufacturer-specific.

1 = enabled 0 = disabled

Object Description

INDEX	6123_h
Name	Filter Constant Input 32-bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Filter Constant Inputs 1_h to 20
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Filter Constant Inputs 21_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Filter Constant Inputs $1FA1_h$ to $1FC0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.1.23 Interrupt Mask Input Any Change 32-bit (6126_h)

This object determines which input port lines shall activate an interrupt. Done for groups of 32 lines and for any change of a digital input line.

1 = interrupt enabled 0 = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6126_h
Name	Interrupt Mask Input Any Change 32-bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Any Change Input 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

Sub-Index	2_h
Description	Interrupt Any Change Input 21_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

to

Sub-Index	FE_h
Description	Interrupt Any Change Input $1FA1_h$ to $1FC0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

8.1.24 Interrupt Mask Input Low-to-High 32-bit (6127_h)

This object determines, which input port lines shall activate an interrupt. Done for groups of 32 lines and for a change from low-to-high of a digital input line. The values shall be in an ”OR” connection to the values of 6126_h object (Interrupt Mask Any Change 32-Bit). If inputs are inverted by 6122_h object (Polarity Input 32-Bit), the positive logical edge shall correspond to negative physical edge.

1 = interrupt enabled 0 = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6127_h
Name	Interrupt Mask Input Low to High 32-bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Low to High Input 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Interrupt Low to High Input 21_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Interrupt Low to High Input $1FA1_h$ to $1FC0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.1.25 Interrupt Mask Input High-to-Low 32-bit (6128_h)

This object determines, which input port lines shall activate an interrupt. Done for groups of 32 lines and for a change from high-to-low of a digital input line. The values shall be in an ”OR” connection to the values of 6126_h object (Interrupt Mask Any Change 32-Bit). If inputs are inverted by 6122_h object (Polarity Input 32-Bit), the negative logical edge shall correspond to positive physical edge.

1 = interrupt enabled 0 = interrupt disabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6128_h
Name	Interrupt Mask Input High to Low 32-bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Inputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Interrupt High to Low Input 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Interrupt High to Low Input 21_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Interrupt High to Low Input $1FA1_h$ to $1FC0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unisgned32
Default Vlaue	0_h

8.2 Digital output module

8.2.1 Write Output 8-Bit (6200_h)

This object shall set a group of 8 output lines as a Byte of information. A maximum of 254 x 8 Bit output blocks is addressable.

Object Description

INDEX	6200_h
Name	Write Output 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Conditional: Device with digital outputs

Entry Description

Sub-Index	0_h
Description	Number of Outputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Write Output 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	Unsigned8
Default Value	0_h

Sub-Index	2_h
Description	Write Output 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Default
Value Range	Unsigned8
Default Value	0_h

to

Sub-Index	8_h
Description	Write Output 39_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	Default
Value Range	Unsigned8
Default Value	0_h

Sub-Index	9_h
Description	Write Output 41_h to 48_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

to

Sub-Index	FE_h
Description	Write Output $7E9_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

8.2.3 Change Polarity Output 8-Bit (6202_h)

This object shall define the polarity of a group of 8 output lines. Output polarity can be inverted individually.

1 = output inverted 0 = output not inverted

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6202_h
Name	Change Polarity Output 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Change Polarity Output 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

Sub-Index	2_h
Description	Change Polarity Output 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

to

Sub-Index	FE_h
Description	Change Polarity Output $7E9_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

8.2.4 Error Mode Output 8-Bit (6206_h)

This object indicates, whether an output is set to a pre-defined error value (see 6207_h object) in case of an internal device failure or a 'Stop Remote Node' indication.

1 = output value shall take the pre-defined condition specified in 6207_h object

0 = output value shall be kept if an error occurs

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6206_h
Name	Error Mode Output 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Error Mode Output 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

Sub-Index	2_h
Description	Error Mode Output 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

to

Sub-Index	FE_h
Description	Error Mode Output $7E9_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

8.2.5 Error Value Output 8-Bit (6207_h)

On condition that the corresponding Error Mode is active, device failures (see chapter 5.2) shall set the outputs to the value configured by this object.

0 = Output shall be set to '0' in case of fault, if 6206_h object is enabled

1 = Output shall be set to '1' in case of fault, if 6206_h object is enabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6207_h
Name	Error Value Output 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Error Value Output 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

Sub-Index	2_h
Description	Error Value Output 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

to

Sub-Index	FE_h
Description	Error Value Output $7E9_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	0_h

8.2.6 Filter Mask Output 8-Bit (6208_h)

This object defines an additional configurable output filter mask for a group of 8 outputs.

1 = output shall be set to the received output value

0 = don't care, the received output value is neglected for the appropriated output channel, the old output value shall be kept.

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6208_h
Name	Filter Mask Output 8-Bit
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Filter Mask Output 1_h to 8_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

Sub-Index	2_h
Description	Filter Mask Output 9_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

to

Sub-Index	FE_h
Description	Filter Mask Output $7E9_h$ to $7F0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	FF_h

8.2.7 Write Output Bit 1 to 128 .. Write Output Bit 897 to 1024 (6220_h .. 6227_h)

These objects shall set single output lines information. A maximum of 128 outputs is addressable at one index. The 6220_h object shall address output lines 1 to 128, the 6221_h object shall address output lines 129 to 256, etc.

Object Description

INDEX	6220_h
Name	Write Output Bit 1 to 128
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Write Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

Sub-Index	2_h
Description	Write Output 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

to

Sub-Index	80_h
Description	Write Output 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

8.2.8 Change Polarity Output Bit 1 to 128 .. Change Polarity Output Bit 897 to 1024 (6240_h .. 6247_h)

These objects shall set the polarity of single output lines. A maximum of 128 outputs is addressable at one index. The 6240_h object shall address output lines 1 to 128, the 6241_h object shall address output lines 129 to 256, etc.

TRUE = output inverted FALSE = output not inverted

If these objects are not supported the device shall behave accordingly to the default value.

Object Description

INDEX	6240_h
Name	Change Polarity Output Bit 1 to 128
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Change Polarity Output 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

Sub-Index	2_h
Description	Change Polarity Output 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

to

Sub-Index	80_h
Description	Change Polarity Output 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

8.2.9 Error Mode Output Bit 1 to 128 .. Error Mode Output Bit 897 to 1024 (6250_h .. 6257_h)

These objects indicate, whether an output is set to a pre-defined error value (see 6260_h .. 6267_h objects) in case of an internal device failure a 'Stop Remote Node' indication. A maximum of 128 outputs is addressable at one index. The 6250_h object shall address output lines 1 to 128, the 6251_h object shall address output lines 129 to 256, etc.

TRUE = output value shall take the pre-defined condition as specified in 6260_h .. 6267_h objects

FALSE = output value shall be kept if an error occurs

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6250
Name	Error Mode Output Lines 1 to 128
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Error Mode Output 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

Sub-Index	2_h
Description	Error Mode Output 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

to

Sub-Index	80_h
Description	Error Mode Output 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

8.2.10 Error Value Output Bit 1 to 128 .. Error Value Output Bit 897 to 1024 (6260_h .. 6267_h)

On condition that the corresponding Error Mode is active, device failures (see chapter 5.2) shall set the outputs to the value configured by this object. A maximum of 128 outputs is addressable at one index. The 6260_h object shall address output lines 1 to 128, the 6261_h object shall address output lines 129 to 256, etc.

FALSE = Output shall be set to '0' in case of fault, if the corresponding object (6250_h .. 6257_h) is enabled

TRUE = Output shall be set to '1' in case of fault, if the corresponding object (6250_h .. 6257_h) is enabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6260_h
Name	Error Value Output Bit 1 to 128
Object Code	Array
Data Type	Boolean
Categrory	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No
Default Value	No

Sub-Index	1_h
Description	Error Value Output 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

Sub-Index	2_h
Description	Error Value Output 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

to

Sub-Index	80_h
Description	Error Value Output 80_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

8.2.11 Filter Mask Output Bit 1 to 128 .. Filter Mask Bit 897 to 1024 (6270_h ..6277_h)

This object defines an additional configurable output filter mask for a single output.

TRUE = output shall set to the received output value

FALSE = don't care the received output value is neglected for the appropriated output channel, the old output value shall be kept

A maximum of 128 outputs is addressable at one index. The 6270_h object shall address output lines 1 to 128, the 6271h object shall address output lines 129 to 256, etc.

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6270_h
Name	Filter Constant Output Bit 1 to 128
Object Code	Array
Data Type	Boolean
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 1-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 80_h
Default Value	No

Sub-Index	1_h
Description	Filter Constant Output 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

Sub-Index	2_h
Description	Filter Constant Output 2_h
Data Type	Boolean
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

to

Sub-Index	80_h
Description	Filter Constant Output 80_h
Data Type	Boolean
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Boolean
Default Value	TRUE

8.2.12 Write Output 16-bit (6300_h)

This object shall set a group of 16 output lines as 2-Byte information. A maximum of 255 x 16-Bit words is addressable (4080 outputs).

Object Description

INDEX	6300_h
Name	Write Output 16-Bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Write Output 1_h to 10_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

Sub-Index	2_h
Description	Write Output 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

to

Sub-Index	FE_h
Description	Write Output $FE0_h$ to $FF0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

8.2.13 Change Polarity Output 16-Bit (6302_h)

This object shall define the polarity for a group of 16 output lines. Output polarity can be inverted individually.

1 = enabled 0 = disabled

If the object is not supported the device shall behave accordingly to the default value.

Object Description

INDEX	6302_h
Name	Change Polarity Output 16-Bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Polarity Output 1_h to 10_h
Data Type	Unsigned16
Access	rw
Entry Category	Mandatory
PDO Mapping	No
Value Range	Unsigned16
Default Value	0_h

Sub-Index	2_h
Description	Polarity Output 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

to

Sub-Index	FE_h
Description	Polarity Output $FE0_h$ to $FF0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

8.2.14 Error Mode Output 16-Bit (6306_h)

These objects indicate, whether an output is set to a pre-defined error value (see 6307_h object) in case of an internal device failure a 'Stop Remote Node' indication.

1 = output value shall take the pre-defined condition as specified in 6307_h object
0 = output value shall be kept if an error occurs

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6306_h
Name	Error Mode Output 16-Bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Error Mode Output 1_h to 10_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	$FFFF_h$

Sub-Index	2_h
Description	Error Mode Output 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	$FFFF_h$

to

Sub-Index	FE_h
Description	Error Mode Output $FE0_h$ to $FF0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	$FFFF_h$

8.2.15 Error Value Output 16-Bit (6307_h)

On condition that the corresponding Error Mode is active, device failures (see chapter 5.2) shall set the outputs to the value configured by this object.

0 = Output shall be set to '0' in case of fault, if 6306_h object is enabled

1 = Output shall be set to '1' in case of fault, if 6306_h object is enabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6307_h
Name	Error Value Output 16-Bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Error Value Output 1_h to 10_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

Sub-Index	2_h
Description	Error Value Output 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

to

Sub-Index	FE_h
Description	Error Value Output $FE0_h$ to $FF0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	0_h

8.2.16 Filter Mask Output 16-Bit (6308_h)

This object defines an additional configurable output filter mask for a group of 16 outputs.

1 = output is shall set to the received output value

0 = don't care, the received output value is neglected for the appropriated output channel, the old output value shall be kept.

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6308_h
Name	Filter Mask Output 16-Bit
Object Code	Array
Data Type	Unsigned16
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Filter Mask Output 1_h to 10_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	$FFFF_h$

Sub-Index	2_h
Description	Filter Mask Output 11_h to 20_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	FFFF

to

Sub-Index	FE_h
Description	Filter Mask Output $FE0_h$ to $FF0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned16
Default Value	$FFFF_h$

8.2.17 Write Output 32-Bit (6320_h)

This object shall set a group of 32 output lines as 4-Byte information. A maximum of 255 x 32-Bit words is addressable (8160 outputs).

Object Description

INDEX	6320_h
Name	Write Output 32-Bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Write Output 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Write Output 21_h to 40_h
Data Type	Unsigned32
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Write Output $1FC0_h$ to $1FE0_h$
Data Type	Unsigned32
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.2.21 Change Polarity Output 32-Bit (6322_h)

This object shall define the polarity for a group of 32 output lines. Output polarity can be inverted individually.

1 = enabled 0 = disabled

If the object is not supported the device shall behave accordingly to the default value.

Object Description

INDEX	6322_h
Name	Change Polarity Output 32-Bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Polarity Output 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	No
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Polarity Output 21_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Polarity Output $1FC0_h$ to $1FE0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.2.22 Error Mode Output 32-Bit (6326_h)

These objects indicate, whether an output is set to a pre-defined error value (see also 6327_h object) in case of an internal device failure a 'Stop Remote Node' indication.

1 = output value shall take the pre-defined condition as specified in 6327_h object

0 = output value shall be kept if an error occurs

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6326_h
Name	Error Mode Output 32-Bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Error Mode Output 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

Sub-Index	2_h
Description	Error Mode Output 21_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

to

Sub-Index	FE_h
Description	Error Mode Output $1FC0_h$ to $1FE0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

8.2.23 Error Value Output 32-Bit (6327_h)

On condition that the corresponding Error Mode is active, device failures (see chapter 5.2) shall set the outputs to the value configured by this object.

0 = Output shall be set to '0' in case of fault, if 6326_h object is enabled

1 = Output shall be set to '1' in case of fault, if 6326_h object is enabled

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6327_h
Name	Error Value Output 32-Bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Error Value Output 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Error Value Output 21_h to 40_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Error Value Output $1FC0_h$ to $1FE0_h$
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.2.24 Filter Mask Output 32-Bit (6328_h)

This object defines an additional configurable output filter mask for a group of 32 outputs.

1 = output shall be set to the received output value

0 = don't care the received output value is neglected for the appropriated output channel, the old output value shall be kept.

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6328_h
Name	Filter Mask Output 32-Bit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Outputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Filter Mask Output 1_h to 20_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

Sub-Index	2_h
Description	Filter Mask Output 21_h to 40_h
Data Type	Unsigned32
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

to

Sub-Index	Fe_h
Description	Filter Mask Output $1FC0_h$ to $1FE0_h$
Data Type	Unsigned32
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	FFFF $FFFF_h$

8.3 Analogue input module

8.3.1 Read Analogue Input 8-Bit (6400_h)

This object shall read the value of the input channel 'n'. Value is 8-Bit or less in size. The value shall be always left adjusted. The remaining bits at the right side of the LSB shall be set to zero.

Object Description

INDEX	6400_h
Name	Read Analogue Input 8-Bit
Object Code	Array
Data Type	Integer8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer8
Default Value	No

Sub-Index	2_h
Description	Analogue Input 2
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer8
Default Value	No

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer8
Default Value	No

8.3.2 Read Analogue Input 16-Bit (6401_h)

This object shall read the value of the input channel 'n'. Value is 16-Bit wide or less. The value shall be always left adjusted. The remaining bits at the right side of the LSB shall be set to zero.

Object Description

INDEX	6401_h
Name	Read Analogue Input 16-Bit
Object Code	Array
Data Type	Integer16
Category	Conditional: Device with analog input

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	ro
Entry Category	Mandatory
PDO Mapping	Default
Value Range	Integer16
Default Value	No

Sub-Index	2_h
Description	Analogue Input 2
Access	ro
Entry Category	Optional
PDO Mapping	Default
Value Range	Integer16
Default Value	No

to

Sub-Index	$0C_h$
Description	Analogue Input 12
Access	ro
Entry Category	Optional
PDO Mapping	Default
Value Range	Integer
Default Value	No

Sub-Index	$0D_h$
Description	Analogue Input 13
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer16
Default Value	No

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer16
Default Value	No

8.3.3 Read Analogue Input 32-Bit (6402_h)

This object shall read the value of the input channel 'n'. Value is 32-Bit wide or less. The value shall be always left adjusted. The remaining bits at the right side of the LSB shall be set to zero.

Object Description

INDEX	6402_h
Name	Read Analogue Input 32-Bit
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer32
Default Value	No

Sub-Index	2_h
Description	Analogue Input 2
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	No

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	No

8.3.4 Read Analogue Input Float (6403_h)

This object shall read the Float value of the input channel 'n'.

Float value = Integer value x Input scale + Offset value

Object Description

INDEX	6403_h
Name	Read Analogue Input Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs Float
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	No

Sub-Index	2_h
Description	Analogue Input 2
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	No

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	No

8.3.5 Read Manufacturer-specific Analogue Input (6404_h)

This object shall read the manufacturer-specific value of the input channel 'n'.

Object Description

INDEX	6404_h
Name	Read Manufacturer Specific Analogue Input
Object Code	Array
Data Type	Manufacturer-specific
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Manufacturer-specific
Default Value	No

Sub-Index	2_h
Description	Analogue Input 2
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Manufacturer-specific
Default Value	No

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Manufacturer-specific
Default Value	No

8.4 Analogue output module

8.4.1 Write Analogue Output 8-Bit (6410_h)

This object shall write an Integer8 value to the output channel 'n'. The value shall be always left adjusted.

Object Description

INDEX	6410_h
Name	Write Analogue Output 8-Bit
Object Code	Array
Data Type	Integer8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs 8-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer8
Default Value	0_h

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer8
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer8
Default Value	0_h

8.4.2 Write Analogue Output 16-Bit (6411_h)

This object shall write an Integer16 value to the output channel 'n'. The value shall be always left adjusted.

Object Description

INDEX	6411_h
Name	Write Analogue Output 16-Bit
Object Code	Array
Data Type	Integer16
Category	Conditional: Device with analogue output

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs 16-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Default
Value Range	Integer16
Default Value	0_h

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Default
Value Range	Integer
Default Value	0_h

to

Sub-Index	$0C_h$
Description	Analogue Output 12
Access	rw
Entry Category	Optional
PDO Mapping	Default
Value Range	Integer16
Default Value	0_h

Sub-Index	$0D_h$
Description	Analogue Output 13
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer16
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer16
Default Value	0_h

8.4.3 Write Analogue Output 32-Bit (6412_h)

This object shall write an Integer32 value to the output channel 'n'. The value shall be always left adjusted.

Object Description

INDEX	6412_h
Name	Write Analogue Output 32-Bit
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs 32-Bit
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

8.4.4 Write Analogue Output Float (6413_h)

This object shall write the Float value to the output channel 'n'.

$$\text{Integer value} = \frac{\text{Float value} - \text{Output offset}}{\text{Output scale}}$$

Object Description

INDEX	6413_h
Name	Write Analogue Output Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs Float
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.4.5 Write Manufacturer-specific Analogue Output (6414_h)

Writes the manufacturer-specific value to the output channel 'n'.

Object Description

INDEX	6414_h
Name	Write Manufacturer Specific Analogue Output
Object Code	Record or Array
Data Type	Manufacturer-specific
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Manufacturer-specific
Default Value	Manufacturer-specific

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Manufacturer-specific
Default Value	Manufacturer-specific

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Manufacturer-specific
Default Value	Manufacturer-specific

8.5 Analogue input set-ups

8.5.1 (6420_h)

Reserved for compatibility reason.

8.5.2 Analogue Input Interrupt Trigger Selection (6421_h)

This object determines, which events shall cause an interrupt for a specific channel. Bits set in the list below shall refer to ways in which interrupts may be triggered. If the object is not supported, the device shall behave accordingly to the default value.

Bit no.	Interrupt trigger
0	Upper limit exceeded
1	Input below lower limit
2	Input changed by more than delta
3	Input reduced by more than negative delta
4	Input increased by more than positive delta
5 to 7	reserved for future use.

Object Description

INDEX	6421_h
Name	Interrupt Trigger Selection
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1_h
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	See above
Default Value	7_h

Sub-Index	2_h
Description	Analogue Input 2_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	See above
Default Value	7_h

to

Sub-Index	FE_h
Description	Analogue Input FE_h
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	See above
Default Value	7_h

8.5.3 Analogue Input Interrupt Source (6422_h)

This object shall determine, which channel has produced an interrupt. Bits set shall relate to the number of any channels that have produced interrupts. The bits shall be reset automatically after read by SDO or transmitted by means of a PDO.

1 = interrupt produced

0 = no interrupt produced

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6422_h
Name	Analogue Input Interrupt Source
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Interrupt Source Banks
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 8_h
Default Value	No

Sub-Index	1_h
Description	Interrupt Source Bank 1
Access	ro
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Interrupt Source Bank 2
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	8_h
Description	Interrupt Source Bank 8
Access	ro
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.5.4 Analogue Input Global Interrupt Enable (6423_h)

This object shall enable and disable globally the interrupt behaviour without changing the interrupt mask. By default, no analogue input activates an interrupt.

TRUE = global interrupt enabled

FALSE = global interrupt disabled

Object Description

INDEX	6423_h
Name	Analogue Input Global Interrupt Enable
Object Code	Var
Data Type	Boolean
Category	Conditional: Device with analogue input

Entry Description

Sub-Index	0_h
Access	rw
PDO Mapping	Optional
Value Range	Boolean
Default Value	FALSE

8.5.5 Analogue Input Interrupt Upper Limit Integer (6424_h)

If enabled (see 6423_h object), an interrupt is triggered when the analogue input is equal or rises above the given value. The value shall be always left adjusted. As long as the trigger condition is met, every change of the analogue input data generates a new interrupt, if there is no additional trigger condition, e.g. an input interrupt delta (6426_h).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Upper Limit Float object (6429_h) shall cause also value change in 6424_h object and vice versa.

Object Description

INDEX	6424_h
Name	Analogue Input Interrupt Upper Limit Integer
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Manadatory
PDO Mapping	No
Value Range	1_h to FE_h
Default	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

8.5.6 Analogue Input Interrupt Lower Limit Integer (6425_h)

If enabled (see 6423_h object), an interrupt is triggered when the analogue input falls below the given value. The value shall be always left adjusted. As long as the trigger condition is met, every change of the analogue input data generates a new interrupt, if there is no additional trigger condition, e.g. an input interrupt delta (6426_h).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Lower Limit Float object ($642A_h$) shall cause also value change in 6425_h object and vice versa.

Object Description

INDEX	6425_h
Name	Analogue Input Interrupt Lower Limit Integer
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

8.5.7 Analogue Input Interrupt Delta Unsigned (6426_h)

This object shall set the delta value (rising or falling above or below the last communicated value) for interrupt-enabled analogue inputs (see 6423_h object).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Delta Float object ($642B_h$) shall cause also value change in 6426_h object and vice versa.

Object Description

INDEX	6426_h
Name	Analogue Input Interrupt Delta Unsigned
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.5.8 Analogue Input Interrupt Negative Delta Unsigned (6427_h)

This object shall set the negative delta value (falling below the last communicated value) for interrupt-enabled analogue inputs (see 6423_h object).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Negative Delta Float object ($642C_h$) shall cause also value change in 6427_h object and vice versa.

Object Description

INDEX	6427_h
Name	Analogue Input Interrupt Negative Delta Unsigned
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Manadatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.5.9 Analogue Input Interrupt Positive Delta Unsigned (6428_h)

This object shall set the positive delta value (rising above the last communicated value) for interrupt-enabled analogue inputs (see 6423_h object).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Positive Delta Float object ($642D_h$) shall cause also value change in 6428_h object and vice versa.

Object Description

INDEX	6428_h
Name	Analogue Input Interrupt Positive Delta Unsigned
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	0_h

8.5.10 Analogue Input Interrupt Upper Limit Float (6429_h)

This object shall set the converted upper limits for interrupt-enabled analogue inputs (see 6423_h object). As long as the trigger condition is met, every change of the analogue input data generates a new interrupt, if there is no additional trigger condition, e.g. an input interrupt delta ($642B_h$).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Upper Limit Integer object (6424_h) shall cause also value change in 6429_h object and vice versa.

Object Description

INDEX	6429_h
Name	Analogue Input Interrupt Upper Limit Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.5.11 Analogue Input Interrupt Lower Limit Float ($642A_h$)

This object shall set the lower limits for interrupt-enabled analogue inputs (see 6423_h object). As long as the trigger condition is met, every change of the analogue input data generates a new interrupt, if there is no additional trigger condition, e.g. an input interrupt delta ($642B_h$).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Lower Limit Integer object (6425_h) shall cause also value change in $642A_h$ object and vice versa.

Object Description

INDEX	$642A_h$
Name	Analogue Input Interrupt Lower Limit Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.5.12 Analogue Input Interrupt Delta Float ($642B_h$)

This object shall set the delta value (rising or falling above or below the last sample) in Float format for interrupt-enabled analogue inputs (see 6423_h object).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Delta Unsigned object (6426_h) shall cause also value change in $642B_h$ object and vice versa.

Object Description

INDEX	$642B_h$
Name	Analogue Input Interrupt Delta Float
Object Code	Array
Data Type	Float
Catagory	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.5.13 Analogue Input Interrupt Negative Delta Float ($642C_h$)

This object shall set the negative delta value (falling below the last sample) in Float format for interrupt-enabled analogue inputs (see 6423_h object).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Negative Delta Unsigned object (6427_h) shall cause also value change in $642C_h$ object and vice versa.

Object Description

INDEX	$642C_h$
Name	Analogue Input Interrupt Negative Delta Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.5.14 Analogue Input Interrupt Positive Delta Float ($642D_h$)

This object shall set the positive delta value (rising above the last sample) in Float format for interrupt-enabled analogue inputs (see 6423_h object).

If the object is not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Interrupt Positive Delta Unsigned object (6428_h) shall cause also value change in $642D_h$ object and vice versa.

Object Description

INDEX	$642D_h$
Name	Analogue Input Interrupt Positive Delta Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.5.15 Analogue Input Offset Float ($642E_h$)

This object shall set the offsets in Float format for input data (6403_h object) for channel 'n'.

If the object is not supported, the device shall behave accordingly to 6431_h object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Offset Integer object (6431_h) shall cause also value change in $642E_h$ object and vice versa.

Object Description

INDEX	$642E_h$
Name	Analogue Input Offset Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.5.16 Analogue Input Scaling Float ($642F_h$)

This object shall set the scaling in Float format for input data (6403_h object).

If the object is not supported, the device shall behave accordingly to 6432_h object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Scaling Integer object (6432_h) shall cause also value change in $642F_h$ object and vice versa.

Object Description

INDEX	$642F_h$
Name	Analogue Input Scaling Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	1.0

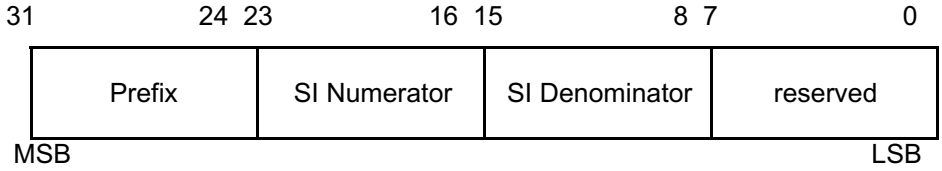
Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	1.0

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	1.0

8.5.17 Analogue Input SI Unit (6430_h)

This object shall assign SI units and prefixes for analogue inputs. The structure of the SI unit entry shall be as followed:



The values for prefix, SI numerator, and SI denominator are specified in /3/.

Object Description

INDEX	6430_h
Name	Analogue Input SI Unit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

8.5.18 Analogue Input Offset Integer (6431_h)

This object shall set the offset in Integer format for input data (6403_h object).

If the object is not supported, the device shall behave accordingly to $642E_h$ object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Offset Float object ($642E_h$) shall cause also value change in 6431_h object and vice versa.

Object Description

INDEX	6431_h
Name	Analogue Input Offset Integer
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

8.5.19 Analogue Input Scaling Integer (6432_h)

This object shall set the scaling in Integer format or input data (6403_h object).

If the object is not supported, the device shall behave accordingly to $642F_h$ object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Input Scaling Float object ($642F_h$) shall cause also value change in 6432_h object and vice versa.

Object Description

INDEX	6432_h
Name	Analogue Input Scaling Integer
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Inputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Input 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer32
Default Value	1_h

Sub-Index	2_h
Description	Analogue Input 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	1_h

to

Sub-Index	FE_h
Description	Analogue Input 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	1_h

8.6 Analogue output set-ups

8.6.1 (6440_h)

Reserved for compatibility reason.

8.6.2 Analogue Output Offset Float (6441_h)

This object shall set the offset in Float format for output data (6413_h object).

If the object is not supported, the device shall behave accordingly to 6446_h object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Output Offset Integer object (6446_h) shall cause also value change in 6441_h object and vice versa.

Object Description

INDEX	6441_h
Name	Analogue Output Offset Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.6.3 Analogue Output Scaling Float (6442_h)

This object shall set the scaling in Float format for output data (6413_h object).

If the object is not supported, the device shall behave accordingly to 6447_h object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Output Scaling Integer object (6447_h) shall cause also value change in 6442_h object and vice versa.

Object Description

INDEX	6442_h
Name	Analogue Output Scaling Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	1.0

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default	1.0

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default	1.0

8.6.4 Analogue Output Error Mode (6443_h)

This object defines, whether an output is set to a pre-defined error value (see 6444_h object) in case of an internal device failure or a 'Stop remote node' indication.

0h = actual value rest 1h = reverts to error value integer (6444_h)

others = reserved

If the object is not supported, the device shall behave accordingly to the default value.

Object Description

INDEX	6443_h
Name	Analogue Output Error Mode
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Error Mode Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	1_h

Sub-Index	2_h
Description	Error Mode Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	1_h

to

Sub-Index	FE_h
Description	Error Mode Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned8
Default Value	1_h

8.6.5 Analogue Output Error Value Integer (6444_h)

On condition that the corresponding Error Mode is active, device failures (see chapter 5.2) shall set the outputs to the value configured by this object.

If the object is not supported, the device shall behave accordingly to 6445_h object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Output Error Value Float object (6445_h) shall cause also value change in 6444_h object and vice versa.

Object Description

INDEX	6444_h
Name	Analogue Output Error Value Integer
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

8.6.8 Analogue Output Error Value Float (6445_h)

On condition that the corresponding Error Mode is active, device failures (see chapter 5.2) shall set the outputs to the value configured by this object.

If the object is not supported, the device shall behave accordingly to 6444_h object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Output Error Value Integer object (6444_h) shall cause also value change in 6445_h object and vice versa.

Object Description

INDEX	6445_h
Name	Analogue Output Error Value Float
Object Code	Array
Data Type	Float
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Float
Default Value	0.0

8.6.9 Analogue Output Offset Integer (6446_h)

This object shall set the offset in Integer format for output data (6413_h object).

If the object is not supported, the device shall behave accordingly to 6441_h object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Output Offset Float object (6441_h) shall cause also value change in 6446_h object and vice versa.

Object Description

INDEX	6446_h
Name	Analogue Output Offset Integer
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default Value	0_h

8.6.10 Analogue Output Scaling Integer (6447_h)

This object shall set the scaling in Integer format for output data (6413_h object).

If the object is not supported, the device shall behave accordingly to 6442_h object, or if that object is also not supported, the device shall behave accordingly to the default value.

Note: Configuration of the Analogue Output Scaling Float object (6442_h) shall cause also value change in 6447_h object and vice versa.

Object Description

INDEX	6447_h
Name	Analogue Output Scaling Integer
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Integer32
Default Value	1_h

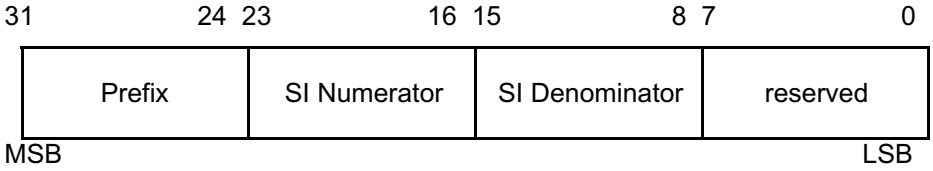
Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default	1_h

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Integer32
Default	1_h

8.6.11 Analogue Output SI Unit (6450_h)

This object shall assign SI units and prefixes for analogue outputs. The structure of the SI unit entry shall be as followed:



The values for prefix, SI numerator, and SI denominator are specified in /3/.

Object Description

INDEX	6450_h
Name	Analogue Output SI Unit
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number of Analogue Outputs
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to FE_h
Default Value	No

Sub-Index	1_h
Description	Analogue Output 1
Access	rw
Entry Category	Mandatory
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

Sub-Index	2_h
Description	Analogue Output 2
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

to

Sub-Index	FE_h
Description	Analogue Output 254
Access	rw
Entry Category	Optional
PDO Mapping	Optional
Value Range	Unsigned32
Default Value	No

8.7 General device profile objects

8.7.1 Device type (67FF)

This object shall describe the first virtual device in a multiple device module according to /2/.

Appendix A: Joystick

This appendix proposes the use of DS-401 for joysticks adopted as a special input module. This input module supports digital inputs and analogue inputs. The digital inputs are the buttons of the joystick and the analogue inputs are the proportional input values. Optional there are digital outputs for indicating LEDs or general purposes..

A1 Pre-defined communication objects for joysticks

A1.1 Index 1000_h (device type)

The specific functionality is defined as a joystick with digital and analogue inputs.

Additional Information		Device Profile Number	Remarks
Specific Functionality	I/O Functionality		
1_h	5_h	191_h	I/O functionality without digital outputs
1_h	7_h	191_h	I/O functionality with digital outputs

A2 Joystick buttons

The buttons use the functionality for digital inputs with 8-bit access. It is mandatory to support 6000_h object and optionally the related configuration objects.

A3 Joystick proportional inputs

The proportional inputs representing the joystick position use the functionality for analogue inputs with signed 16-bit access. An analogue value of zero represents the zero position of the joystick. It is mandatory to support object 6401_h and optionally all related configuration objects.

The default value for the object 6430_h (Analogue Input SI Unit) is:

31 24	23 16	15 8	7 0
00_h	00_h	00_h	00_h

MSB LSB

A4 Joystick PDO mappings

A4.1 1st TPDO mapping (buttons)

The first TPDO transmits the values of maximum 8 x 8 buttons. The first 8 buttons (Index 6000_h sub-index 1_h) are specified for the following purpose, all other buttons provide manufacturer-specific behaviour:

7							0
unused	unused	unused	unused	unused	memory z-axis	memory y-axis	memory x-axis

MSB LSB

The memory buttons for x-, y-, and z-axes shall freeze the proportional values of the related axes:

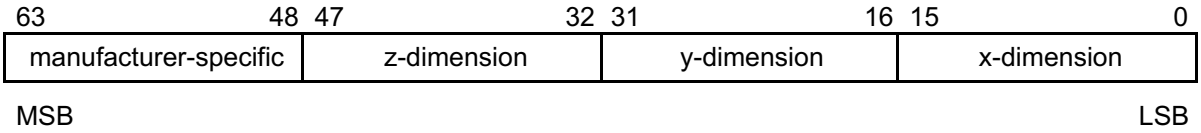
1 = memory function on (freeze proportional values)

0 = memory function off (release proportional values)

It is optional to include the freezing function into the joystick itself. In this case the proportional values will not be modified any more if the memory function is switched on.
Otherwise freezing must be done by the application and the Buttons must be interpreted as freezing request. In this case the memory buttons have no effect on the proportional input values.
If the joystick does not support memory function, the first digital input byte (Object 6000_h Sub-index 1_h) remains unused and will be forced to 0.

A4.2 2nd TPDO mapping (proportional inputs)

The second TPDO transmits the 16-bit values of maximum 4 proportional inputs. The first 3 analogue values (Index 6010_h sub-index 1_h .. 3_h) are used for the three dimensions (x, y, z), the other analogue value is manufacturer-specific.



A4.3 Joystick implementation hints

A4.3.1 Periodical PDO transmission

If periodical PDO transmission is requested, the event timer should be set to ≠ 0.

A4.3.2 Additional proportional inputs

If additional proportional inputs are required, the pre-defined 3rd and 4th TPDO should be used.

A4.3.3 Transmission of proportional inputs

In order to transmit only the first proportional value different from 0, the analogue input set-up objects should be used.