

**CiA 401**



*Device profile for generic I/O modules*

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## HISTORY

<b>Date</b>	<b>Changes</b>
2002-05-17	<i>Publication of version 2.1 as draft standard</i>
2006-10-02	<i>Publication of version 3.0 as draft standard proposal</i> <ul style="list-style-type: none"><li>- Editorial and lay-out changes have been made</li><li>- Object 1000<sub>n</sub>: Additional definitions</li><li>- Detailed definitions of PDO parameters have been included</li><li>- Additional PDO mapping for joystick devices</li><li>- Warning if analogue input global interrupt is disabled</li><li>- Additional dead-band objects for joystick devices</li></ul>
2008-06-03	<i>Publication of version 3.0 as draft standard</i>

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## 1 Scope

This specification represents the CANopen device profile for generic digital and analogue input and output modules. Devices compliant to this specification use communication techniques, which conform to those described in the CANopen application layer and communication profile specification. In addition, programmable I/O devices may use communication techniques, which conform to those described in the CANopen additional application layer functions.

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

## 2 Normative references

/CiA301/	CiA 301, CANopen application layer and communication profile
/CiA303-2/	CiA 303-2, CANopen additional specification – Part 2: Representation of SI units and prefixes
/CiA305/	CiA 305, CANopen layer setting services

## 3 Definitions and abbreviations

### 3.1 Definition

The definitions given in /CiA301/ and /CiA303-2/ apply for this specification, too.

### 3.2 Abbreviations

CAN	Controller area network
CAN-ID	CAN identifier
COB	Communication object
COB-ID	COB identifier
I/O	Input and output
PDO	Process data object
RPDO	Receive process data object
SDO	Service data object
TPDO	Transmit process data object

## 4 Operating principle

### 4.1 Introduction

The purpose of I/O modules is to connect sensors and actuators to CANopen networks. In NMT operational mode, input data are transmitted from the inputs via TPDOs. By default, the PDO transmission is triggered by an interrupt (event). Optionally PDOs are 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 is changeable via SDO, if variable PDO mapping is supported. An I/O module provides optionally sync producer/consumer, time-stamp producer/consumer and emergency producer/consumer functionality. For new designs, it is recommended to support Heartbeat functionality.

## 4.2 Node-ID assignment

The node-ID assignment is manufacturer specific. If a node-ID assignment via CAN network is required (e.g. for IP 67-rated devices), it is recommended to use the layer setting protocols as defined in /CiA305/.

## 5 Error handling

### 5.1 Principle

Emergency messages are 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 contain the error field with pre-defined error numbers and additional information.

### 5.2 Error behavior

If a serious device failure is detected the module shall enter by default autonomously the Pre-operational state. If 1029<sub>h</sub> 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 Analogue input disable warning

If the CANopen device transits to NMT operational state and the Analogue input global interrupt object (6423<sub>h</sub>) is set to FALSE, it shall transmit an Emergency message with the error code 0080<sub>h</sub>. This Emergency message shall not cause a transition into NMT pre-operational or NMT stopped state.

### 5.4 Additional error code definitions

Error code definitions used by this profile are given in Table 1.

**Table 1 — Error code definition**

Error code	Definition
0080 <sub>h</sub>	Warning: Analogue inputs disabled
2310 <sub>h</sub>	Current at outputs too high (overload)
2320 <sub>h</sub>	Short circuit at outputs
2330 <sub>h</sub>	Load dump at outputs
3110 <sub>h</sub>	Input voltage too high
3120 <sub>h</sub>	Input voltage too low
3210 <sub>h</sub>	Internal voltage too high



Error code	Definition
3220 <sub>h</sub>	Internal voltage too low
3310 <sub>h</sub>	Output voltage too high
3320 <sub>h</sub>	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 may be implemented 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 pre-mapped digital input or output channels, the analogue default PDOs shall not be used to map digital inputs or outputs by default. The additional digital I/Os may use additional PDOs. This shall correspond to additional analogue channels.

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

### 6.2 Pre-defined communication objects

Devices compliant with this specification come with default values for some communication objects (1000<sub>h</sub> to 1FFF<sub>h</sub>), which are not specified in all details in /CiA301/.

#### 6.2.1 Object 1000<sub>h</sub>: Device type

This object describes the type of device and its functionality. For multiple device modules the *additional information* field shall contain FFFF<sub>h</sub>. In this case, the 67FF<sub>h</sub> object shall be implemented. Figure 1 shows the value structure as defined in /CiA301/ and defines the *additional information* field. Table 2 defines the values for the fields *I/O functionality* and *M*. The pre-defined, generic PDO mapping is described in this specification, the device-specific PDO mapping is not in the scope of this specification.

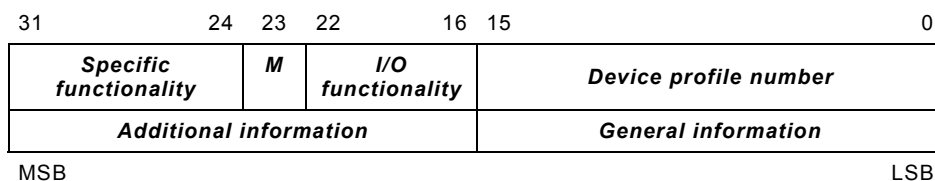


Figure 1 — Value structure

Table 2 — Value definition for *I/O functionality* and *M*

Field name	Definition
Device profile number	401 <sub>d</sub>
I/O functionality – Bit 16	1 <sub>b</sub> = digital input(s) implemented      0 <sub>b</sub> = not implemented
I/O functionality – Bit 17	1 <sub>b</sub> = digital output(s) implemented      0 <sub>b</sub> = not implemented
I/O functionality – Bit 18	1 <sub>b</sub> = analogue input(s) implemented      0 <sub>b</sub> = not implemented
I/O functionality – Bit 19	1 <sub>b</sub> = analogue output(s) implemented      0 <sub>b</sub> = not implemented

Field name	Definition
I/O functionality – Bit 20 to Bit 22	Reserved
M(apping of PDOs)	1 <sub>b</sub> = Device-specific PDO mapping is supported 0 <sub>b</sub> = Pre-defined, generic PDO mapping is supported (see 6.2.4 to 6.2.11)
NOTE Any combination of digital/analogue, inputs and outputs is allowed; one of the bits 16 to 19 shall be 1 <sub>b</sub> .	

Table 3 defines the values of the specific functionality sub-field.

**Table 3 — Value definition for the specific functionality**

Code	Function	Reference
00 <sub>h</sub>	No specific function	-
01 <sub>h</sub>	Joystick	Appendix A
02 <sub>h</sub>	Joystick	Appendix A
03 <sub>h</sub>	Joystick	Appendix A
04 <sub>h</sub> to FF <sub>h</sub>	Reserved	-

### 6.2.2 Object 1001<sub>h</sub>: Error register

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

### 6.2.3 Object 1029<sub>h</sub>: Error behavior

The object specifies to which state an I/O module shall be set, when a communication error, output error or input error is detected. The following values are defined, all others are reserved:

00<sub>h</sub> = transit to NMT pre-operational (only if the current NMT state is operational) state

01<sub>h</sub> = remain in current NMT state

02<sub>h</sub> = transit to NMT stopped state

In addition to the specification in /CiA301/ the following sub-indices may be implemented.

Table 4 specifies the entry description.

**Table 4 — Entry description**

Attribute	Value
Sub-Index	02 <sub>h</sub>
Description	Output error
Access	rw
Entry category	Optional
PDO mapping	No
Value range	00 <sub>h</sub> to 02 <sub>h</sub>
Default value	00 <sub>h</sub>

Sub-Index	03 <sub>h</sub>
Description	Input error
Access	rw
Entry category	Optional
PDO mapping	No
Value range	00 <sub>h</sub> to 02 <sub>h</sub>
Default value	00 <sub>h</sub>

NOTE If the object 1029<sub>h</sub> is not implemented, the device behaves in case of communication, input or output failures as defined by the default value.

#### 6.2.4 RPDO 1 (digital outputs)

This RPDO receives the values of up to 64 digital outputs.

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).

Table 5 defines the object description and Table 6 defines the entry description of the RPDO communication parameter.

**Table 5 — Object description**

Attribute	Value
INDEX	1400 <sub>h</sub>
Name	RPDO 1 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Conditional: Mandatory, if M-bit in object 1000 <sub>h</sub> is set to 0 <sub>b</sub> and bit 17 in object 1000 <sub>h</sub> is set to 1 <sub>b</sub>

**Table 6 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	02 <sub>h</sub>
Default value	02 <sub>h</sub>
Sub-Index	01 <sub>h</sub>
Description	COB-ID
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	0000 0200 <sub>h</sub> + node-ID

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Sub-Index	02 <sub>h</sub>
Description	Transmission type
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	255 <sub>d</sub>

Table 7 defines the object description and Table 8 defines the entry description of the RPDO mapping parameter. The number of mapped objects into this RPDO depends on the hardware.

**Table 7 — Object description**

Attribute	Value
INDEX	1600 <sub>h</sub>
Name	RPDO 1 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Conditional: Mandatory, if 1400 <sub>h</sub> is implemented

**Table 8 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 08 <sub>h</sub>
Default value	01 <sub>h</sub> to 08 <sub>h</sub>
Sub-Index	01 <sub>h</sub>
Description	1 <sup>st</sup> application object
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	6200 01 08 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	2 <sup>nd</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6200 02 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6200 02 08 <sub>h</sub>
to	

Sub-Index	08 <sub>h</sub>
Description	8 <sup>th</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6200 08 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6200 08 08 <sub>h</sub>

### 6.2.5 TPDO 1 (digital inputs)

This TPDO transmits event-driven the values of maximum 64 digital inputs. 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.

Table 9 defines the object description and Table 10 defines the entry description of the TPDO communication parameter. The values are defined in /CiA301/. The sub-index 04<sub>h</sub> is reserved for compatibility reasons and shall not be implemented.

**Table 9 — Object description**

Attribute	Value
INDEX	1800 <sub>h</sub>
Name	TPDO 1 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Conditional: Mandatory, if M-bit in object 1000 <sub>h</sub> is set to 0 <sub>b</sub> and bit 16 in object 1000 <sub>h</sub> is set to 1 <sub>b</sub>

**Table 10 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	02 <sub>h</sub> to 05 <sub>h</sub>
Default value	Manufacturer-specific
Sub-Index	01 <sub>h</sub>
Description	COB-ID used by PDO
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	{0000 0180 <sub>h</sub> , 4000 0180 <sub>h</sub> } + node-ID

Sub-Index	02 <sub>h</sub>
Description	Transmission type
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	255 <sub>d</sub>
Sub-Index	03 <sub>h</sub>
Description	Inhibit time
Access	rw
Entry category	Optional
PDO mapping	No
Value range	See /CiA301/
Default value	00 <sub>h</sub>
Sub-Index	05 <sub>h</sub>
Description	Event timer
Access	rw
Entry category	Optional
PDO mapping	No
Value range	See /CiA301/
Default value	00 <sub>h</sub>

Table 11 defines the object description and Table 12 defines the entry description of the TPDO mapping parameter. The number of mapped objects into this TPDO depends on the hardware.

**Table 11 — Object description**

Attribute	Value
INDEX	1A00 <sub>h</sub>
Name	TPDO 1 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Conditional: Mandatory, if 1800 <sub>h</sub> is implemented

**Table 12 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 08 <sub>h</sub>
Default value	01 <sub>h</sub> to 08 <sub>h</sub>

Sub-Index	01 <sub>h</sub>
Description	1 <sup>st</sup> application object
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	6000 01 08 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	2 <sup>nd</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6000 02 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6000 02 08 <sub>h</sub>
to	
Sub-Index	08 <sub>h</sub>
Description	8 <sup>th</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6000 08 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6000 08 08 <sub>h</sub>

### 6.2.6 RPDO 2 (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).

Table 13 defines the object description and Table 14 defines the entry description of the RPDO communication parameter.

**Table 13 — Object description**

Attribute	Value
INDEX	1401 <sub>h</sub>
Name	RPDO 2 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Conditional: Mandatory, if M-bit in object 1000 <sub>h</sub> is set to 0 <sub>b</sub> and bit 19 in object 1000 <sub>h</sub> is set to 1 <sub>b</sub>

**Table 14 — Entry description**

Attribute	Value
-----------	-------

Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	02 <sub>h</sub>
Default value	02 <sub>h</sub>
Sub-Index	01 <sub>h</sub>
Description	COB-ID
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	0000 0300 <sub>h</sub> + node-ID
Sub-Index	02 <sub>h</sub>
Description	Transmission type
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	255 <sub>d</sub>

Table 15 defines the object description and Table 16 defines the entry description of the RPDO mapping parameter. The number of mapped objects into this RPDO depends on the hardware.

**Table 15 — Object description**

Attribute	Value
INDEX	1601 <sub>h</sub>
Name	RPDO 2mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Conditional: Mandatory, if 1401 <sub>h</sub> is implemented

**Table 16 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 04 <sub>h</sub>
Default value	01 <sub>h</sub> to 04 <sub>h</sub>



Sub-Index	01 <sub>h</sub>
Description	1 <sup>st</sup> application object
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	6411 01 10 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	2 <sup>nd</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6411 02 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6411 02 10 <sub>h</sub>
to	
Sub-Index	04 <sub>h</sub>
Description	4 <sup>th</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6411 04 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6411 04 10 <sub>h</sub>

### 6.2.7 TPDO 2 (analogue inputs)

This TPDO transmits event-driven the 16-bit values of maximum 4 analogue inputs. By default the interrupt source (6423<sub>h</sub> object) shall be disabled. If one of the mapped analogue input changes its value and 6423<sub>h</sub> object is enabled, the PDO is transmitted immediately. If an analogue interrupt condition is enabled, the PDO is transmitted only if this interrupt condition is fulfilled. If more than one interrupt condition is enabled; the PDO is transmitted if one of these conditions is fulfilled.

Table 17 defines the object description and Table 18 defines the entry description of the TPDO communication parameter. The values are defined in /CiA301/. The sub-index 04<sub>h</sub> is reserved for compatibility reasons and shall not be implemented.

**Table 17 — Object description**

Attribute	Value
INDEX	1801 <sub>h</sub>
Name	TPDO 2 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Conditional: Mandatory, if M-bit in object 1000 <sub>h</sub> is set to 0 <sub>b</sub> and bit 18 in object 1000 <sub>h</sub> is set to 1 <sub>b</sub>

**Table 18 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	02 <sub>h</sub> to 05 <sub>h</sub>
Default value	Manufacturer-specific
Sub-Index	01 <sub>h</sub>
Description	COB-ID
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	{0000 0280 <sub>h</sub> , 4000 0280 <sub>h</sub> } + node-ID
Sub-Index	02 <sub>h</sub>
Description	Transmission type
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	255 <sub>d</sub>
Sub-Index	03 <sub>h</sub>
Description	Inhibit time
Access	rw
Entry category	Optional
PDO mapping	No
Value range	See /CiA301/
Default value	00 <sub>h</sub>
Sub-Index	05 <sub>h</sub>
Description	Event timer
Access	rw
Entry category	Optional
PDO mapping	No
Value range	See /CiA301/
Default value	00 <sub>h</sub>

Table 19 defines the object description and Table 20 defines the entry description of the TPDO mapping parameter. The number of mapped objects into this TPDO depends on the hardware.

**Table 19 — Object description**

Attribute	Value
INDEX	1A01 <sub>h</sub>
Name	TPDO 2 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Conditional: Mandatory, if 1801 <sub>h</sub> is implemented

**Table 20 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 04 <sub>h</sub>
Default value	01 <sub>h</sub> to 04 <sub>h</sub>
Sub-Index	01 <sub>h</sub>
Description	1 <sup>st</sup> application object
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	6401 01 10 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	2 <sup>nd</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6401 02 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6401 02 10 <sub>h</sub>
to	
Sub-Index	04 <sub>h</sub>
Description	4 <sup>th</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6401 04 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6401 04 10 <sub>h</sub>

### 6.2.8 RPDO 3 (additional analogue outputs)

This RPDO receives asynchronously the 16-bit values of maximum 4 analogue outputs.

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).

Table 21 defines the object description and Table 22 defines the entry description of the RPDO communication parameter.

**Table 21 — Object description**

Attribute	Value
INDEX	1402 <sub>h</sub>
Name	RPDO 3 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Conditional: Mandatory, if M-bit in object 1000 <sub>h</sub> is set to 0 <sub>b</sub> , bit 19 in object 1000 <sub>h</sub> is set to 1 <sub>b</sub> and more than 4 analogue outputs are implemented

**Table 22 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	02 <sub>h</sub>
Default value	02 <sub>h</sub>
Sub-Index	01 <sub>h</sub>
Description	COB-ID
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	0000 0400 <sub>h</sub> + node-ID
Sub-Index	02 <sub>h</sub>
Description	Transmission type
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	255 <sub>d</sub>

Table 23 defines the object description and Table 24 defines the entry description of the RPDO mapping parameter. The number of mapped objects into this RPDO depends on the hardware.

**Table 23 — Object description**

Attribute	Value
INDEX	1602 <sub>h</sub>
Name	RPDO 3 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Conditional: Mandatory, if 1402 <sub>h</sub> is implemented

**Table 24 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 04 <sub>h</sub>
Default value	01 <sub>h</sub> to 04 <sub>h</sub>
Sub-Index	01 <sub>h</sub>
Description	1 <sup>st</sup> application object
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	6411 05 10 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	2 <sup>nd</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6411 06 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6411 06 10 <sub>h</sub>
to	
Sub-Index	04 <sub>h</sub>
Description	4 <sup>th</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6411 08 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6411 08 10 <sub>h</sub>

### 6.2.9 TPDO 3 (additional analogue inputs)

This TPDO transmits event-driven the 16-bit values of maximum 4 analogue inputs. By default the interrupt source (6423<sub>h</sub> object) is disabled. If one of the mapped analogue input changes its value and 6423<sub>h</sub> object is enabled, the PDO is transmitted immediately. If an analogue interrupt condition is enabled; the PDO is transmitted only if this interrupt condition is fulfilled. If more than one interrupt condition is enabled; the PDO is transmitted if one of these conditions is fulfilled.

Table 25 defines the object description and Table 26 defines the entry description of the TPDO communication parameter. The values are defined in /CiA301/. The sub-index 04<sub>h</sub> is reserved for compatibility reasons and shall not be implemented.

**Table 25 — Object description**

Attribute	Value
INDEX	1802 <sub>h</sub>
Name	TPDO 3 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Conditional: Mandatory, if M-bit in object 1000 <sub>h</sub> is set to 0 <sub>b</sub> , bit 18 in object 1000 <sub>h</sub> is set to 1 <sub>b</sub> and more than 4 analogue inputs are implemented

**Table 26 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	02 <sub>h</sub> to 05 <sub>h</sub>
Default value	Manufacturer-specific
Sub-Index	01 <sub>h</sub>
Description	COB-ID
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	{0000 0380 <sub>h</sub> , 4000 0380 <sub>h</sub> } + node-ID
Sub-Index	02 <sub>h</sub>
Description	Transmission type
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	255 <sub>d</sub>

Sub-Index	03 <sub>h</sub>
Description	Inhibit timer
Access	rw
Entry category	Optional
PDO mapping	No
Value range	See /CiA301/
Default value	00 <sub>h</sub>
Sub-Index	05 <sub>h</sub>
Description	Event timer
Access	rw
Entry category	Optional
PDO mapping	No
Value range	See /CiA301/
Default value	00 <sub>h</sub>

Table 27 defines the object description and Table 28 defines the entry description of the TPDO mapping parameter. The number of mapped objects into this TPDO depends on the hardware.

**Table 27 — Object description**

Attribute	Value
INDEX	1A02 <sub>h</sub>
Name	TPDO 3 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Conditional: Mandatory, if 1802 <sub>h</sub> is implemented

**Table 28 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 04 <sub>h</sub>
Default value	01 <sub>h</sub> to 04 <sub>h</sub>

Sub-Index	01 <sub>h</sub>
Description	1 <sup>st</sup> application object
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	6401 05 10 <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	2 <sup>nd</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6401 06 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6401 06 10 <sub>h</sub>
to	
Sub-Index	04 <sub>h</sub>
Description	4 <sup>th</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6401 08 <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6401 08 10 <sub>h</sub>

### 6.2.10 RPDO 4 (additional analogue outputs)

This RPDO receives asynchronously the 16-bit values of maximum 4 analogue outputs. 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).

Table 29 defines the object description and Table 30 defines the entry description of the RPDO communication parameter.

**Table 29 — Object description**

Attribute	Value
INDEX	1403 <sub>h</sub>
Name	RPDO 4 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Conditional: Mandatory, if M-bit in object 1000 <sub>h</sub> is set to 0 <sub>b</sub> , bit 19 in object 1000 <sub>h</sub> is set to 1 <sub>b</sub> and more than 8 analogue outputs are implemented

**Table 30 — Entry description**

Attribute	Value
-----------	-------



Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	02 <sub>h</sub>
Default value	02 <sub>h</sub>
Sub-Index	01 <sub>h</sub>
Description	COB-ID
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	0000 0500 <sub>h</sub> + node-ID
Sub-Index	02 <sub>h</sub>
Description	Transmission type
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	255 <sub>d</sub>

Table 31 defines the object description and Table 32 defines the entry description of the RPDO mapping parameter. The number of mapped objects into this RPDO depends on the hardware.

**Table 31 — Object description**

Attribute	Value
INDEX	1603 <sub>h</sub>
Name	RPDO 4 mapping parameter
Object code	Record
Data type	PDO mapping parameter record
Category	Conditional: Mandatory, if 1403 <sub>h</sub> is implemented

**Table 32 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 04 <sub>h</sub>
Default value	01 <sub>h</sub> to 04 <sub>h</sub>

Sub-Index	01 <sub>h</sub>
Description	1 <sup>st</sup> application object
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	6411 09 10 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	2 <sup>nd</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6411 0A <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6411 0A 10 <sub>h</sub>
to	
Sub-Index	04 <sub>h</sub>
Description	4 <sup>th</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6411 0C <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6411 0C 10 <sub>h</sub>

### 6.2.11 TPDO 4 (additional analogue inputs)

This TPDO transmits event-driven the 16-bit values of maximum 4 analogue inputs. By default the interrupt source (6423<sub>h</sub> object) is disabled. If one of the mapped analogue input changes its value and 6423<sub>h</sub> object is enabled, the PDO is transmitted immediately. If an analogue interrupt condition is enabled; the PDO is transmitted only if this interrupt condition is fulfilled. If more than one interrupt condition is enabled; the PDO is transmitted if one of these conditions is fulfilled.

Table 33 defines the object description and Table 34 defines the entry description of the TPDO communication parameter. The values are defined in /CiA301/. The sub-index 04<sub>h</sub> is reserved for compatibility reasons and shall not be implemented.

**Table 33 — Object description**

Attribute	Value
INDEX	1803 <sub>h</sub>
Name	TPDO 4 communication parameter
Object code	Record
Data type	PDO communication parameter record
Category	Conditional: Mandatory, if M-bit in object 1000 <sub>h</sub> is set to 0 <sub>b</sub> , bit 18 in object 1000 <sub>h</sub> is set to 1 <sub>b</sub> and more than 8 analogue inputs are implemented

**Table 34 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	02 <sub>h</sub> to 05 <sub>h</sub>
Default value	Manufacturer-specific
Sub-Index	01 <sub>h</sub>
Description	COB-ID
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	{0000 0480 <sub>h</sub> , 4000 0480 <sub>h</sub> } + node-ID
Sub-Index	02 <sub>h</sub>
Description	Transmission type
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	255 <sub>d</sub>
Sub-Index	03 <sub>h</sub>
Description	Inhibit time
Access	rw
Entry category	Optional
PDO mapping	No
Value range	See /CiA301/
Default value	00 <sub>h</sub>
Sub-Index	05 <sub>h</sub>
Description	Event timer
Access	rw
Entry category	Optional
PDO mapping	No
Value range	See /CiA301/
Default value	00 <sub>h</sub>

Table 35 defines the object description and Table 36 defines the entry description of the TPDO mapping parameter. The number of mapped objects into this TPDO depends on the hardware.

**Table 35 — Object description**

Attribute	Value
INDEX	1A03 <sub>h</sub>
Name	TPDO 4 mapping parameter
Object code	Record
Data type	PDO mapping
Category	Conditional: Mandatory, if 1803 <sub>h</sub> is implemented

**Table 36 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Highest sub-index supported
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 04 <sub>h</sub>
Default value	01 <sub>h</sub> to 04 <sub>h</sub>
Sub-Index	01 <sub>h</sub>
Description	1 <sup>st</sup> application object
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	See /CiA301/
Default value	6401 09 10 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	2 <sup>nd</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6401 0A <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6401 0A 10 <sub>h</sub>
to	
Sub-Index	04 <sub>h</sub>
Description	4 <sup>th</sup> application object
Access	rw
Entry category	Conditional: Mandatory, if object 6401 0C <sub>h</sub> is implemented
PDO mapping	No
Value range	See /CiA301/
Default value	6401 0C 10 <sub>h</sub>

### 6.2.12 Manufacturer-specific PDOs

RPDO 5 to 512 and TPDO 5 to 512 are manufacturer-specific. They shall not be enabled by default.

## 7 Object dictionary

### 7.1 Introduction

Each I/O module compliant with this device profile shall share the CANopen object dictionary entries from 6000<sub>h</sub> to 67FF<sub>h</sub>. These entries are common to all I/O modules and each module only implements those objects relevant to its functions.

NOTE The manufacturer may add application-specific objects (2000<sub>h</sub> to 5FFF<sub>h</sub>) in order to provide manufacturer-specific functionality.

### 7.2 Input and output function principles

#### 7.2.1 Object dictionary for the digital input and output modules

##### 7.2.1.1 Command sequence

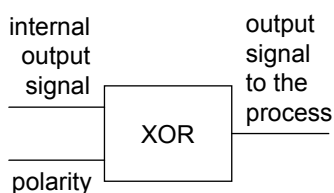
It is possible to switch the modules output or input polarity. This feature is the one which is nearest to the sensors and actuators, e.g. if the polarity of an output is enabled and the output is set to high, then the output level is '0'.

Table 37 defines the profile command sequence.

**Table 37 — 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	

Figure 2 shows an example of the polarity with a digital output.



**Figure 2 — Polarity bit for digital outputs (example)**

##### 7.2.1.2 1-, 8-, 16- and 32-bit access

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<sub>h</sub> object (change polarity input 8-bit) sub-index 1<sub>n</sub> has the value AA<sub>h</sub> and sub-index 2<sub>n</sub> the value 0F<sub>h</sub>, 6102<sub>h</sub> object (change polarity input 16-bit) sub-index 1<sub>n</sub> shall have the value 0FAA<sub>h</sub>.

##### 7.2.1.3 I/O channel to sub-index relation

The bit position shall be calculated by the following formula:

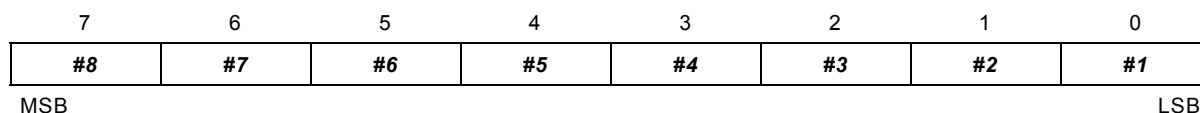
$$\text{Bit position} = (\text{I/O channel no.} - 1) \text{ MOD } (\text{length of data type})$$

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

$$\text{Sub-index} = (\text{I/O channel no.} - 1) \text{ DIV } (\text{length of data type}) + 1$$

Figure 3 shows an example.

Sub-index 01<sub>h</sub>



Sub-index 02<sub>h</sub>

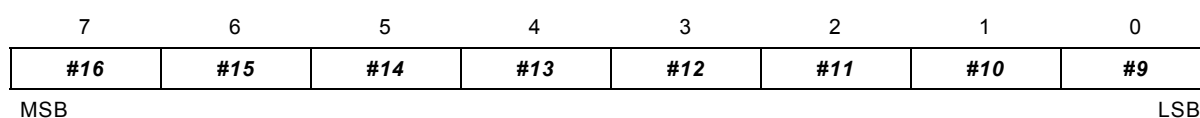


Figure 3 — Example for 8-bit access

### 7.2.2 Digital input module

There are different access methods defined. By default, 8-bit access shall be supported; the other access methods are optional. Figure 4 shows the relationship between the digital input objects for an 8-bit access.

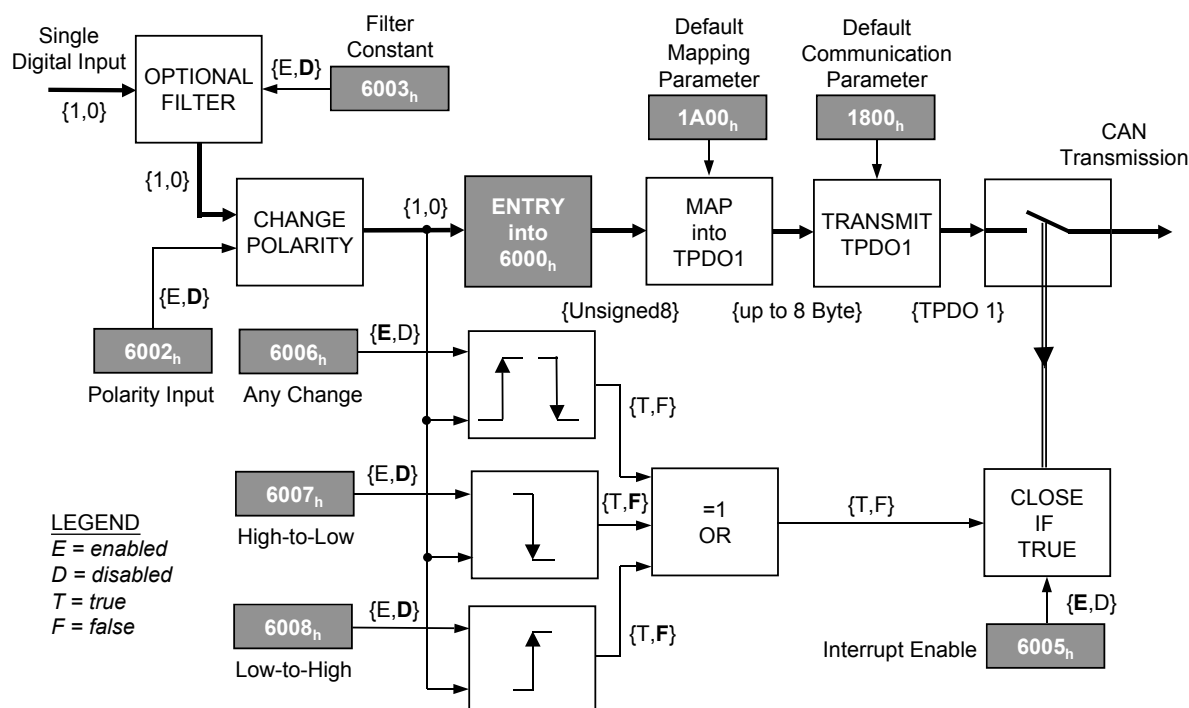


Figure 4 — Block diagram for digital inputs

### 7.2.3 Digital output module

There are different access methods defined. By default, 8-bit access shall be supported; the other access methods are optional. Figure 5 shows the relationship between the digital output objects for an 8-bit access.

NOTE 1 After power-on or NMT reset application the write output objects are in default state. The digital output application only accepts digital output settings after the device has received the first heartbeat from the device that sets the outputs, or the NMT master has node guarded the device for the first time.

NOTE 2 Device internal failures that cause the digital outputs to error states include Heartbeat events from the device that sets the outputs, or Life guarding events. If node/life guarding is used and the device with NMT master capability is not the digital output setting device, the Node guarding application is responsible to stop the guarding of the digital output device.

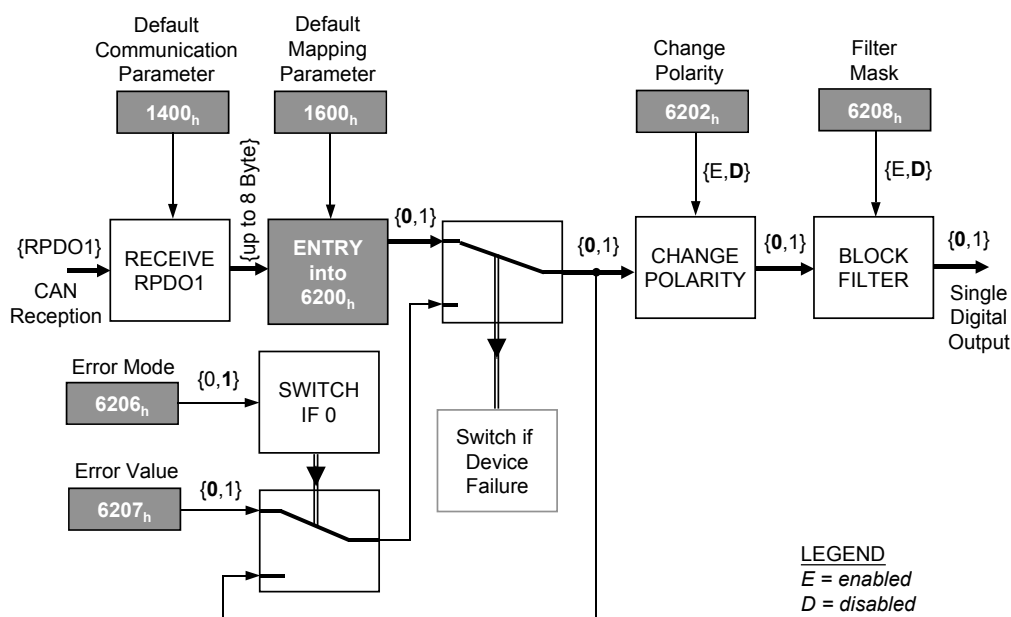


Figure 5 — Block diagram for digital outputs

### 7.2.4 Analogue input module

There are different access methods defined. By default, 16-bit access shall be supported; the other access methods are optional. Figure 6 shows the relationship between the analogue input objects for 16-bit access.

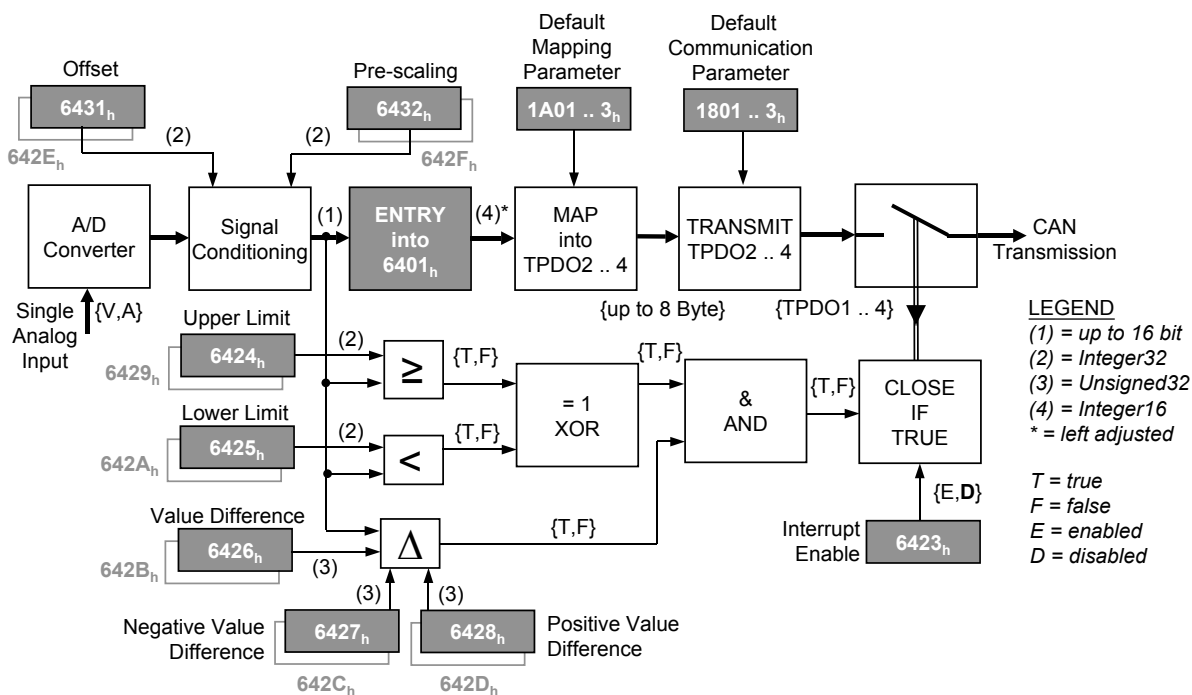


Figure 6 — Block diagram for analogue inputs

### 7.2.5 Analogue output module

There are different access methods defined. By default, 16-bit access shall be supported; the other access methods are optional. Figure 7 shows the relationship between the analogue output objects for 16-bit access.

NOTE 1 After power-on or NMT reset application the write analogue output objects are in default state. The analogue output application only accepts analogue output settings after the device has received the first heartbeat from the device that sets the outputs, or the NMT master has node guarded the device for the first time.

NOTE 2 Device internal failures that cause the analogue outputs to error states include Heartbeat events from the device that sets the outputs, or Life guarding events. If node/life guarding is used and the device with NMT master capability is not the analogue output setting device, the Node guarding application is responsible to stop the guarding of the analog output device.



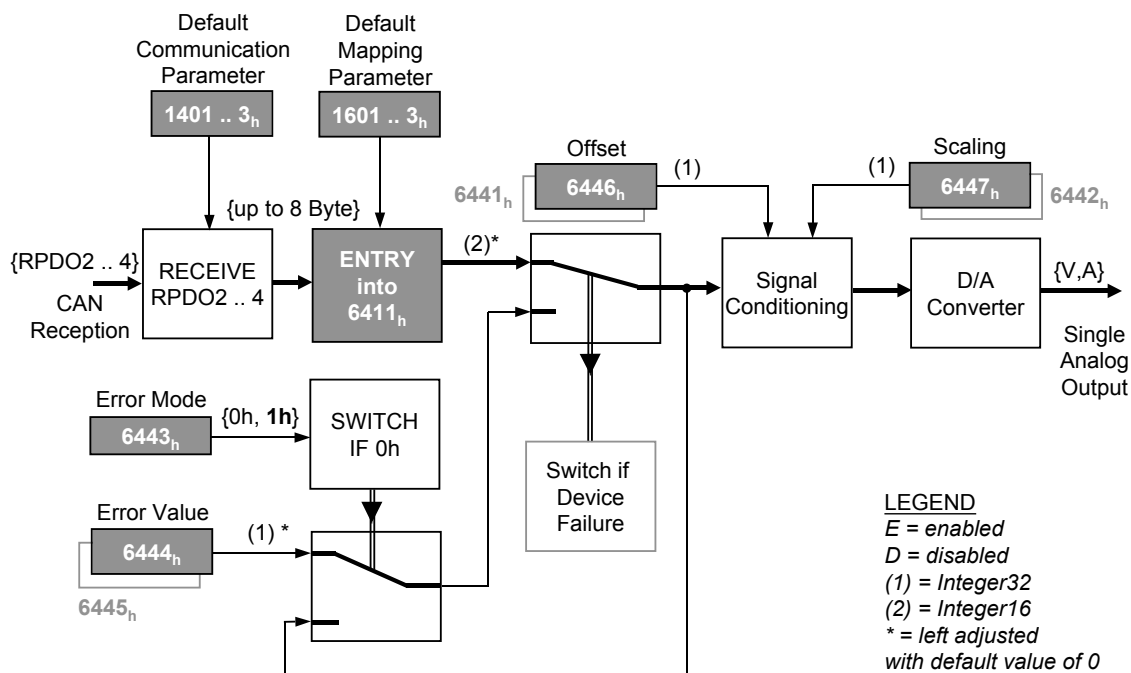


Figure 7 — Block diagram for analogue outputs

## 8 Detailed object definitions

### 8.1 Introduction

Each object is defined by the object and entry descriptions. The attribute values for object and entry descriptions are specified in /CiA301/.

### 8.2 Digital input module

#### 8.2.1 Object 6000<sub>h</sub>: Read input 8-bit

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.

Table 38 specifies the object description, and Table 39 specifies the entry description.

Table 38 — Object description

Attribute	Value
INDEX	6000 <sub>h</sub>
Name	Read input 8 bit
Object code	Array
Data type	Unsigned8
Category	Conditional: Device with digital inputs

**Table 39 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	Device-specific
Sub-Index	01 <sub>h</sub>
Description	Read input 01 <sub>h</sub> to 08 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Default
Value range	Unsigned8
Default value	No
Sub-Index	02 <sub>h</sub>
Description	Read input 09 <sub>h</sub> to 10 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Default
Value range	Unsigned8
Default value	No
to	
Sub-Index	08 <sub>h</sub>
Description	Read input 39 <sub>h</sub> to 40 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Default
Value range	Unsigned8
Default value	No
Sub-Index	09 <sub>h</sub>
Description	Read input 41 <sub>h</sub> to 48 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	No
to	

Sub-Index	FE <sub>h</sub>
Description	Read input 7E8 <sub>h</sub> to 7F0 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	No

### 8.2.2 Object 6002<sub>h</sub>: Polarity input 8-bit

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.

Table 40 specifies the object description, and Table 41 specifies the entry description.

**Table 40 — Object description**

Attribute	Value
INDEX	6002 <sub>h</sub>
Name	Polarity input 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 41 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Polarity input 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Possible
Value range	Unsigned8
Default value	00 <sub>h</sub>

Sub-Index	02 <sub>h</sub>
Description	Polarity input 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Possible
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Polarity input 7E8 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>

### 8.2.3 Object 6003<sub>h</sub>: Filter constant input 8-bit

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

Table 42 specifies the object description, and Table 43 specifies the entry description.

**Table 42 — Object description**

Attribute	Value
INDEX	6003 <sub>h</sub>
Name	Filter constant input 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 43 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Filter constant input 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Filter constant input 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Filter constant input 7E8 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>

#### 8.2.4 Object 6005<sub>h</sub>: Global interrupt enable digital 8-bit

This object shall enable and disable globally the interrupt behavior without changing the interrupt masks. In event-driven mode the device transmits the input values depending on the interrupt masks in objects 6006<sub>h</sub>, 6007<sub>h</sub>, and 6008 (resp. 6050<sub>h</sub> to 6057<sub>h</sub>, 6060<sub>h</sub> to 6067<sub>h</sub>, 6070<sub>h</sub> to 6077<sub>h</sub>, or 6106<sub>h</sub>, 6107<sub>h</sub>, 6108<sub>h</sub>, or 6126<sub>h</sub>, 6127<sub>h</sub>, 6127<sub>h</sub>) 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

Table 44 specifies the object description, and Table 45 specifies the entry description.

**Table 44 — Object description**

Attribute	Value
INDEX	6005 <sub>h</sub>
Name	Global interrupt enable digital 8-bit
Object code	Variable
Data type	Boolean
Category	Optional

**Table 45 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Access	rw
PDO mapping	No
Value range	Boolean
Default value	TRUE

**8.2.5 Object 6006<sub>h</sub>: Interrupt mask any change 8-bit**

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

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

Table 46 specifies the object description, Table 47 and specifies the entry description.

**Table 46 — Object description**

Attribute	Value
INDEX	6006 <sub>h</sub>
Name	Interrupt mask any change 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 47 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Interrupt any change 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>

Sub-Index	02 <sub>h</sub>
Description	Interrupt any change 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Interrupt any change 7E8 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>

### 8.2.6 Object 6007<sub>h</sub>: Interrupt mask low-to-high 8-bit

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<sub>h</sub> object (Interrupt mask any change 8-bit). If inputs are inverted by 6002<sub>h</sub> object (polarity input 8-bit), the positive logical edge shall correspond to negative physical edge.

1 = interrupt enabled                      0 = interrupt disabled

Table 48 specifies the object description, and Table 49 specifies the entry description.

**Table 48 — Object description**

Attribute	Value
INDEX	6007 <sub>h</sub>
Name	Interrupt mask low-to-high 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 49 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Interrupt low-to-high 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Interrupt low-to-high 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Interrupt low-to-high 7E8 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>

### 8.2.7 Object 6008<sub>h</sub>: Interrupt mask high-to-low 8-bit

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<sub>h</sub> object (Interrupt mask any change 8-bit). If inputs are inverted by 6002<sub>h</sub> object (polarity input 8-bit), the negative logical edge shall correspond to positive physical edge.

1 = interrupt enabled                      0 = interrupt disabled

Table 50 specifies the object description, and Table 51 specifies the entry description.

**Table 50 — Object description**

Attribute	Value
INDEX	6008 <sub>h</sub>
Name	Interrupt mask high-to-low 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional



**Table 51 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Interrupt high-to-low 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Interrupt high-to-low 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Interrupt high-to-low 7F1 <sub>h</sub> to 7F8 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>

**8.2.8 Object 6020<sub>h</sub> to 6027<sub>h</sub>: Read input bit 1 to 128 to read input bit 897 to 1024**

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

Table 52 specifies the object description, and Table 53 specifies the entry description.

**Table 52 — Object description**

Attribute	Value
INDEX	6020 <sub>h</sub>
Name	Read input bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 53 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Read single input 01 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	No
Sub-Index	02 <sub>h</sub>
Description	Read single input 02 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	No
to	
Sub-Index	80 <sub>h</sub>
Description	Read single input 80 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	No

**8.2.9 Object 6030<sub>h</sub> to 6037<sub>h</sub>: Polarity input bit 1 to 128 to polarity input bit 897 to 1024**

These objects shall define the polarity of single input lines. A maximum of 128 input lines is addressable at one index. The 6030<sub>h</sub> object shall address the input lines 1 to 128, the 6031<sub>h</sub> 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.

Table 54 specifies the object description, and Table 55 specifies the entry description.

**Table 54 — Object description**

Attribute	Value
INDEX	6030 <sub>h</sub>
Name	Polarity input bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 55 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Polarity input bit 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
Sub-Index	02 <sub>h</sub>
Description	Polarity input bit 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
to	

Sub-Index	80 <sub>h</sub>
Description	Polarity input bit 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

**8.2.10 Object 6038<sub>h</sub> to 603F<sub>h</sub>: Filter constant input bit 1 to 128 to filter constant input bit 897 to 1024**

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<sub>h</sub> object shall address the input lines 1 to 128, the 6039<sub>h</sub> object shall address the input lines 129 to 256, etc.

TRUE = enabled                      FALSE = disable

Table 56 specifies the object description, and Table 57 specifies the entry description.

**Table 56 — Object description**

Attribute	Value
INDEX	6038 <sub>h</sub>
Name	Filter constant input bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 57 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Filter constant input bit 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

Sub-Index	02 <sub>h</sub>
Description	Filter constant input bit 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
to	
Sub-Index	80 <sub>h</sub>
Description	Filter constant input bit 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

**8.2.11 Object 6050<sub>h</sub> to 6057<sub>h</sub>: Interrupt mask input bit any change 1 to 128 to interrupt mask input bit any change 897 to 1024**

These objects shall set interrupt masks for single input lines. A maximum of 128 bit inputs is addressable at one index. The 6050<sub>h</sub> object shall address the input lines 1 to 128, the 6051<sub>h</sub> 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.

Table 58 specifies the object description, and Table 59 specifies the entry description.

**Table 58 — Object description**

Attribute	Value
INDEX	6050 <sub>h</sub>
Name	Interrupt mask input bit any change 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 59 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Interrupt mask any change input bit 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	TRUE
to	
Sub-Index	02 <sub>h</sub>
Description	Interrupt mask any change input bit 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	TRUE
to	
Sub-Index	80 <sub>h</sub>
Description	Interrupt mask any change input bit 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	TRUE

**8.2.12 Object 6060<sub>h</sub> to 6067<sub>h</sub>: Interrupt mask input low-to-high bit 1 to 128 to interrupt mask input low-to-high bit 897 to 1024**

These objects shall set interrupt masks for a single input line. A maximum of 128 bit inputs is addressable at one index. The 6060<sub>h</sub> object shall address the input lines 1 to 128, the 6061<sub>h</sub> object shall address the input lines 129 to 256, etc. The values shall be in an "OR" connection to the values of 6050<sub>h</sub> to 6057<sub>h</sub> objects (interrupt mask any change). If inputs are inverted by 6030<sub>h</sub> to 6037<sub>h</sub> 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.

Table 60 specifies the object description, and Table 61 specifies the entry description.

**Table 60 — Object description**

Attribute	Value
INDEX	6060 <sub>h</sub>
Name	Interrupt mask input low-to-high bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 61 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 1-bit
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Interrupt mask low-to-high input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
Sub-Index	02 <sub>h</sub>
Description	Interrupt mask low-to-high input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
to	
Sub-Index	80 <sub>h</sub>
Description	Interrupt mask low-to-high input 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

**8.2.13 Object 6070<sub>h</sub> to 6077<sub>h</sub>: Interrupt mask input high-to-low bit 1 to 128 to interrupt mask input high-to-low bit 897 to 1024**

These objects shall set interrupt masks for single input lines. A maximum of 128 bit inputs is addressable at one index. The 6070<sub>h</sub> object shall address the input lines 1 to 128, the 6071<sub>h</sub> object shall address the input lines 129 to 256, etc. The values shall be in an "OR" connection to the values of 6050<sub>h</sub> to 6057<sub>h</sub> objects (interrupt mask any change). If inputs are inverted by 6030<sub>h</sub> to 6037<sub>h</sub> 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.

Table 62 specifies the object description, and Table 63 specifies the entry description.

**Table 62 — Object description**

Attribute	Value
INDEX	6070 <sub>h</sub>
Name	Interrupt mask input high-to-low bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 63 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 1-bit
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Interrupt mask high-to-low input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
Sub-Index	02 <sub>h</sub>
Description	Interrupt mask high-to-low input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
to	
Sub-Index	80 <sub>h</sub>
Description	Interrupt mask high-to-low input 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE



### 8.2.14 Object 6100<sub>h</sub>: Read input 16-bit

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

Table 64 specifies the object description, and Table 65 specifies the entry description.

**Table 64 — Object description**

Attribute	Value
INDEX	6100 <sub>h</sub>
Name	Read input 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 65 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Read input 01 <sub>h</sub> to 10 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	No
Sub-Index	02 <sub>h</sub>
Description	Read input 11 <sub>h</sub> to 20 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	No
to	

Sub-Index	FE <sub>h</sub>
Description	Read input FD0 <sub>h</sub> to FE0 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	No

**8.2.15 Object 6102<sub>h</sub>: Polarity input 16-bit**

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.

Table 66 specifies the object description, and Table 67 specifies the entry description.

**Table 66 — Object description**

Attribute	Value
INDEX	6102 <sub>h</sub>
Name	Polarity input 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 67 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Polarity input 01 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

Sub-Index	02 <sub>h</sub>
Description	Polarity input 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Polarity input FD1 <sub>h</sub> to FF0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

### 8.2.16 Object 6103<sub>h</sub>: Filter constant input 16-bit

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

Table 68 specifies the object description, and Table 69 specifies the entry description.

**Table 68 — Object description**

Attribute	Value
INDEX	6103 <sub>h</sub>
Name	Filter constant input 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 69 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Filter constant input 01 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Filter constant input 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Filter constant input FD1 <sub>h</sub> to FE0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

**8.2.17 Object 6106<sub>h</sub>: Interrupt mask input any change 16-bit**

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.

Table 70 specifies the object description, and Table 71 specifies the entry description.

**Table 70 — Object description**

Attribute	Value
INDEX	6106 <sub>h</sub>
Name	Interrupt mask input any change 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 71 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Interrupt any change inputs 01 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Interrupt any change inputs 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Interrupt any change inputs FD1 <sub>h</sub> to FE0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF <sub>h</sub>

**8.2.18 Object 6107<sub>h</sub>: Interrupt mask input low-to-high 16-bit**

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<sub>h</sub> object (interrupt mask any change 16-bit). If inputs are inverted by 6102<sub>h</sub> 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.

Table 72 specifies the object description, and Table 73 specifies the entry description.

**Table 72 — Object description**

Attribute	Value
INDEX	6107 <sub>h</sub>
Name	Interrupt mask input low-to-high 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 73 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
to	
Sub-Index	01 <sub>h</sub>
Description	Interrupt low-to-high inputs 01 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Interrupt low-to-high inputs 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Interrupt low-to-high inputs FD1 <sub>n</sub> to FE0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

### 8.2.19 Object 6108<sub>h</sub>: Interrupt mask input high-to-low 16-bit

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<sub>h</sub> object (interrupt mask any change 16-bit). If inputs are inverted by 6102<sub>h</sub> 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.

Table 74 specifies the object description, and Table 75 specifies the entry description

**Table 74 — Object description**

Attribute	Value
INDEX	6108 <sub>h</sub>
Name	Interrupt mask input high-to-low 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 75 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Interrupt high-to-low inputs 01 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Interrupt high-to-low inputs 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

to	
Sub-Index	FE <sub>n</sub>
Description	Interrupt high-to-low inputs FD1 <sub>n</sub> to FE0 <sub>n</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

### 8.2.20 Object 6120<sub>h</sub>: Read input 32-bit

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).

Table 76 specifies the object description, and Table 77 specifies the entry description.

**Table 76 — Object description**

Attribute	Value
INDEX	6120 <sub>h</sub>
Name	Read input 4 Byte
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 77 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Read inputs 01 <sub>n</sub> to 20 <sub>n</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	No



Sub-Index	02 <sub>h</sub>
Description	Read inputs 21 <sub>n</sub> to 40 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	No
to	
Sub-Index	FE <sub>n</sub>
Description	Read inputs 1FA0 <sub>h</sub> to 1FC0 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	No

**8.2.21 Object 6122<sub>h</sub>: Polarity input 32-bit**

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.

Table 78 specifies the object description, and Table 79 specifies the entry description.

**Table 78 — Object description**

Attribute	Value
INDEX	6122 <sub>h</sub>
Name	Polarity input 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 79 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 32-bit
Access	ro
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	0000 0000 <sub>h</sub>

Sub-Index	01 <sub>h</sub>
Description	Polarity inputs 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Polarity inputs 21 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	No
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Polarity inputs 1FA0 <sub>h</sub> to 1FC0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

### 8.2.22 Object 6123<sub>h</sub>: Filter constant input 32-bit

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

Table 80 specifies the object description, and Table 81 specifies the entry description.

**Table 80 — Object description**

Attribute	Value
INDEX	6123 <sub>h</sub>
Name	Filter constant input 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 81 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Filter constant inputs 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Filter constant inputs 21 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Filter constant inputs 1FA1 <sub>h</sub> to 1FC0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

### 8.2.23 Object 6126<sub>h</sub>: Interrupt mask input any change 32-bit

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.

Table 82 specifies the object description, and Table 83 specifies the entry description.

**Table 82 — Object description**

Attribute	Value
INDEX	6126 <sub>h</sub>
Name	Interrupt mask input any change 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 83 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Interrupt any change input 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Interrupt any change input 21 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Interrupt any change input 1FA1 <sub>h</sub> to 1FC0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>

### 8.2.24 Object 6127<sub>h</sub>: Interrupt mask input low-to-high 32-bit

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<sub>h</sub> object (interrupt mask any change 32-bit). If inputs are inverted by 6122<sub>h</sub> 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.

Table 84 specifies the object description, and Table 85 specifies the entry description.

**Table 84 — Object description**

Attribute	Value
INDEX	6127 <sub>h</sub>
Name	Interrupt mask input low-to-high 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 85 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of inputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Interrupt low-to-high input 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Interrupt low-to-high input 21 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

to	
Sub-Index	FE <sub>n</sub>
Description	Interrupt low-to-high input 1FA1 <sub>n</sub> to 1FC0 <sub>n</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>n</sub>

### 8.2.25 Object 6128<sub>n</sub>: Interrupt mask input high-to-low 32-bit

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<sub>n</sub> object (interrupt mask any change 32-bit). If inputs are inverted by 6122<sub>n</sub> 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.

Table 86 specifies the object description, and Table 87 specifies the entry description.

**Table 86 — Object description**

Attribute	Value
INDEX	6128 <sub>n</sub>
Name	Interrupt mask input high-to-low 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 87 — Entry description**

Attribute	Value
Sub-Index	00 <sub>n</sub>
Description	Number of inputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>n</sub> to FE <sub>n</sub>
Default value	No
Sub-Index	01 <sub>n</sub>
Description	Interrupt high-to-low input 01 <sub>n</sub> to 20 <sub>n</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>n</sub>

Sub-Index	02 <sub>h</sub>
Description	Interrupt high-to-low input 21 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Interrupt high-to-low input 1FA1 <sub>h</sub> to 1FC0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default Value	0000 0000 <sub>h</sub>

### 8.3 Digital output module

#### 8.3.1 Object 6200<sub>h</sub>: Write output 8-bit

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.

Table 88 specifies the object description, and Table 89 specifies the entry description.

**Table 88 — Object description**

Attribute	Value
INDEX	6200 <sub>h</sub>
Name	Write output 8-bit
Object code	Array
Data type	Unsigned8
Category	Conditional: Device with digital outputs

**Table 89 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Write output 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Default
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Write output 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Default
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	08 <sub>h</sub>
Description	Write output 39 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Default
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	09 <sub>h</sub>
Description	Write output 41 <sub>h</sub> to 48 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Write output 7E9 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>

### 8.3.2 Object 6202<sub>h</sub>: Change polarity output 8-bit

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.

Table 90 specifies the object description, and Table 91 specifies the entry description.

**Table 90 — Object description**

Attribute	Value
INDEX	6202 <sub>h</sub>
Name	Change polarity output 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 91 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Change polarity output 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Change polarity output 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Change polarity output 7E9 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>

### 8.3.3 Object 6206<sub>h</sub>: Error mode output 8-bit

This object indicates, whether an output is set to a pre-defined error value (see 6207<sub>h</sub> 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<sub>h</sub> 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.

Table 92 specifies the object description, and Table 93 specifies the entry description.

**Table 92 — Object description**

Attribute	Value
INDEX	6206 <sub>h</sub>
Name	Error mode output 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 93 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Error mode output 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Error mode output 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>
to	

Sub-Index	FE <sub>h</sub>
Description	Error mode output 7E9 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>

### 8.3.4 Object 6207<sub>h</sub>: Error value output 8-bit

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<sub>h</sub> object is enabled

1 = output shall be set to '1' in case of fault, if 6206<sub>h</sub> object is enabled

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

Table 94 specifies the object description, and Table 95 specifies the entry description.

**Table 94 — Object description**

Attribute	Value
INDEX	6207 <sub>h</sub>
Name	Error value output 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 95 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Error value output 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>

Sub-Index	02 <sub>h</sub>
Description	Error value output 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Error value output 7E9 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	00 <sub>h</sub>

### 8.3.5 Object 6208<sub>h</sub>: Filter mask output 8-bit

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.

Table 96 specifies the object description, and Table 97 specifies the entry description.

**Table 96 — Object description**

Attribute	Value
INDEX	6208 <sub>h</sub>
Name	Filter mask output 8-bit
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 97 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Filter mask output 01 <sub>h</sub> to 08 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Filter mask output 09 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Filter mask output 7E9 <sub>h</sub> to 7F0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	FF <sub>h</sub>

### 8.3.6 Object 6220<sub>h</sub> to 6227<sub>h</sub>: Write output bit 1 to 128 to write output bit 897 to 1024

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

Table 98 specifies the object description, and Table 99 specifies the entry description.

**Table 98 — Object description**

Attribute	Value
Name	Write output bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 99 — Entry description**

Attribute	Value
Description	Number of outputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Write output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
Sub-Index	02 <sub>h</sub>
Description	Write output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
to	
Sub-Index	80 <sub>h</sub>
Description	Write output 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

### 8.3.7 Object 6240<sub>h</sub> to 6247<sub>h</sub>: Change polarity output bit 1 to 128 to change polarity output bit 897 to 1024

These objects shall set the polarity of single output lines. A maximum of 128 outputs is addressable at one index. The 6240<sub>h</sub> object shall address output lines 1 to 128, the 6241<sub>h</sub> 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.

Table 100 specifies the object description, and Table 101 specifies the entry description.

**Table 100 — Object description**

Attribute	Value
INDEX	6240 <sub>h</sub>
Name	Change polarity output bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 101 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No
to	
Sub-Index	01 <sub>h</sub>
Description	Change polarity output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
to	
Sub-Index	02 <sub>h</sub>
Description	Change polarity output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
to	
Sub-Index	80 <sub>h</sub>
Description	Change polarity output 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

**8.3.8 Object 6250<sub>h</sub> to 6257<sub>h</sub>: Error mode output lines 1 to 128 to error mode output lines 897 to 1024**

These objects indicate, whether an output is set to a pre-defined error value (see 6260<sub>h</sub> to 6267<sub>h</sub> 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<sub>h</sub> object shall address output lines 1 to 128, the 6251<sub>h</sub> object shall address output lines 129 to 256, etc.

TRUE = output value shall take the pre-defined condition as specified in 6260<sub>h</sub> to 6267<sub>h</sub> 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.

Table 102 specifies the object description, and Table 103 specifies the entry description.

**Table 102 — Object description**

Attribute	Value
INDEX	6250 <sub>h</sub>
Name	Error mode output lines 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 103 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Error mode output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	TRUE
Sub-Index	02 <sub>h</sub>
Description	Error mode output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	TRUE
to	
Sub-Index	80 <sub>h</sub>
Description	Error mode output 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	TRUE



**8.3.9 Object 6260<sub>h</sub> to 6267<sub>h</sub>: Error value output bit 1 to 128 to error value output bit 897 to 1024**

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<sub>h</sub> object shall address output lines 1 to 128, the 6261<sub>h</sub> 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<sub>h</sub> to 6257<sub>h</sub>) is enabled

TRUE = output shall be set to '1' in case of fault, if the corresponding object (6250<sub>h</sub> to 6257<sub>h</sub>) is enabled

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

Table 104 specifies the object description, and Table 105 specifies the entry description.

**Table 104 — Object description**

Attribute	Value
INDEX	6260 <sub>h</sub>
Name	Error value output bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 105 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Error value output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

Sub-Index	02 <sub>h</sub>
Description	Error value output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE
to	
Sub-Index	80 <sub>h</sub>
Description	Error value output 80 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

**8.3.10 Object 6270<sub>h</sub> to 6277<sub>h</sub>: Filter mask output bit 1 to 128 to filter mask output bit 897 to 1024**

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<sub>h</sub> object shall address output lines 1 to 128, the 6271<sub>h</sub> object shall address output lines 129 to 256, etc.

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

Table 106 specifies the object description, and Table 107 specifies the entry description.

**Table 106 — Object description**

Attribute	Value
INDEX	6270 <sub>h</sub>
Name	Filter mask output bit 01 <sub>h</sub> to 80 <sub>h</sub>
Object code	Array
Data type	Boolean
Category	Optional

**Table 107 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 1-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 80 <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Filter mask output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Boolean
Default value	TRUE
Sub-Index	02 <sub>h</sub>
Description	Filter mask output 02 <sub>h</sub>
Data type	Boolean
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	TRUE
to	
Sub-Index	80 <sub>h</sub>
Description	Filter mask output 80 <sub>h</sub>
Data type	Boolean
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Boolean
Default value	TRUE

### 8.3.11 Object 6300<sub>h</sub>: Write output 16-bit

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).

Table 108 specifies the object description, and Table 109 specifies the entry description.

**Table 108 — Object description**

Attribute	Value
INDEX	6300 <sub>h</sub>
Name	Write output 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 109 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Write output 01 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Write output 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Write output FE0 <sub>h</sub> to FF0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

**8.3.12 Object 6302<sub>h</sub>: Change polarity output 16-bit**

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.

Table 110 specifies the object description, and Table 111 specifies the entry description.

**Table 110 — Object description**

Attribute	Value
INDEX	6302 <sub>h</sub>
Name	Change polarity output 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 111 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Polarity output 01 <sub>h</sub> to 10 <sub>h</sub>
Data type	Unsigned16
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	Unsigned16
Default value	0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Polarity output 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Polarity output FE0 <sub>h</sub> to FF0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

### 8.3.13 Object 6306<sub>h</sub>: Error mode output 16-bit

These objects indicate, whether an output is set to a pre-defined error value (see 6307<sub>h</sub> 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<sub>h</sub> 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.

Table 112 specifies the object description, and Table 113 specifies the entry description.

**Table 112 — Object description**

Attribute	Value
INDEX	6306 <sub>h</sub>
Name	Error mode output 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 113 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Error mode output 01 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Error mode output 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF <sub>h</sub>
to	

Sub-Index	FE <sub>n</sub>
Description	Error mode output FE0 <sub>n</sub> to FF0 <sub>n</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF <sub>n</sub>

**8.3.14 Object 6307<sub>n</sub>: Error value output 16-bit**

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 6306h object is enabled

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

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

Table 114 specifies the object description, and Table 115 specifies the entry description.

**Table 114 — Object description**

Attribute	Value
INDEX	6307 <sub>n</sub>
Name	Error value output 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 115 — Entry description**

Attribute	Value
Sub-Index	00 <sub>n</sub>
Description	Number of outputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>n</sub> to FE <sub>n</sub>
Default value	No
Sub-Index	01 <sub>n</sub>
Description	Error value output 01 <sub>n</sub> to 10 <sub>n</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>n</sub>

Sub-Index	02 <sub>h</sub>
Description	Error value output 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Error value output FE0 <sub>h</sub> to FF0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	0000 <sub>h</sub>

### 8.3.15 Object 6308<sub>h</sub>: Filter mask output 16-bit

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.

Table 116 specifies the object description, and Table 117 specifies the entry description.

**Table 116 — Object description**

Attribute	Value
INDEX	6308 <sub>h</sub>
Name	Filter mask output 16-bit
Object code	Array
Data type	Unsigned16
Category	Optional

**Table 117 —Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No



Sub-Index	01 <sub>h</sub>
Description	Filter mask output 01 <sub>h</sub> to 10 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Filter mask output 11 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF
to	
Sub-Index	FE <sub>h</sub>
Description	Filter mask output FE0 <sub>h</sub> to FF0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned16
Default value	FFFF <sub>h</sub>

### 8.3.16 Object 6320<sub>h</sub>: Write output 32-bit

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).

Table 118 specifies the object description, and Table 119 specifies the entry description.

**Table 118 — Object description**

Attribute	Value
INDEX	6320 <sub>h</sub>
Name	Write output 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 119 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Write output 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Write output 21 <sub>h</sub> to 40 <sub>h</sub>
Data type	Unsigned32
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Write output 1FC0 <sub>h</sub> to 1FE0 <sub>h</sub>
Data type	Unsigned32
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

**8.3.17 Object 6322<sub>h</sub>: Change polarity output 32-bit**

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.

Table 120 specifies the object description, and Table 121 specifies the entry description.

**Table 120 — Object description**

Attribute	Value
INDEX	6322 <sub>h</sub>
Name	Change polarity output 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 121 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Polarity output 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	No
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Polarity output 21 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Polarity output 1FC0 <sub>h</sub> to 1FE0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

### 8.3.18 Object 6326<sub>h</sub>: Error mode output 32-bit

These objects indicate, whether an output is set to a pre-defined error value (see also 6327<sub>h</sub> 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<sub>h</sub> 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.

Table 122 specifies the object description, and Table 123 specifies the entry description.

**Table 122 — Object description**

Attribute	Value
INDEX	6326 <sub>h</sub>
Name	Error mode output 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 123 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Error mode output 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Error mode output 21 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>
to	

Sub-Index	FE <sub>h</sub>
Description	Error mode output 1FC0 <sub>h</sub> to 1FE0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>

### 8.3.19 Object 6327<sub>h</sub>: Error value output 32-bit

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<sub>h</sub> object is enabled

1 = output shall be set to '1' in case of fault, if 6326<sub>h</sub> object is enabled

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

Table 124 specifies the object description, and Table 125 specifies the entry description.

**Table 124 — Object description**

Attribute	Value
INDEX	6327 <sub>h</sub>
Name	Error value output 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 125 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Error value output 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

Sub-Index	02 <sub>h</sub>
Description	Error value output 21 <sub>h</sub> to 40 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Error value output 1FC0 <sub>h</sub> to 1FE0 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

**8.3.20 Object 6328<sub>h</sub>: Filter mask output 32-bit**

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.

Table 126 specifies the object description, and Table 127 specifies the entry description.

**Table 126 — Object description**

Attribute	Value
INDEX	6328 <sub>h</sub>
Name	Filter mask output 32-bit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 127 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of outputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Filter mask output 01 <sub>h</sub> to 20 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Filter mask output 21 <sub>h</sub> to 40 <sub>h</sub>
Data type	Unsigned32
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Filter mask output 1FC0 <sub>h</sub> to 1FE0 <sub>h</sub>
Data type	Unsigned32
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	FFFF FFFF <sub>h</sub>

## 8.4 Analogue input module

### 8.4.1 Object 6400<sub>h</sub>: Read analogue input 8-bit

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.

Table 128 specifies the object description, and Table 129 specifies the entry description.

**Table 128 — Object description**

Attribute	Value
INDEX	6400 <sub>h</sub>
Name	Read analogue input 8-bit
Object code	Array
Data type	Integer8
Category	Optional

**Table 129 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer8
Default value	No
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Integer8
Default value	No
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Integer8
Default value	No

**8.4.2 Object 6401<sub>h</sub>: Read analogue input 16-bit**

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.



Table 130 specifies the object description, and Table 131 specifies the entry description.

**Table 130 — Object description**

Attribute	Value
INDEX	6401 <sub>h</sub>
Name	Read analogue input 16-bit
Object code	Array
Data type	Integer16
Category	Conditional: Device with analog input

**Table 131 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
to	
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Default
Value range	Integer16
Default value	No
to	
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Default
Value range	Integer16
Default value	No
to	
Sub-Index	0C <sub>h</sub>
Description	Analogue input 0C <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Default
Value range	Integer
Default value	No
to	

Sub-Index	0D <sub>n</sub>
Description	Analogue input 0D <sub>n</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Integer16
Default value	No
to	
Sub-Index	FE <sub>n</sub>
Description	Analogue input FE <sub>n</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Integer16
Default value	No

### 8.4.3 Object 6402<sub>h</sub>: Read analogue input 32-bit

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.

Table 132 specifies the object description, and Table 133 specifies the entry description

**Table 132 — Object description**

Attribute	Value
INDEX	6402 <sub>h</sub>
Name	Read analogue input 32-bit
Object code	Array
Data type	Integer32
Category	Optional

**Table 133 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer32
Default value	No
to	
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	No
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	No

#### 8.4.4 Object 6403<sub>h</sub>: Read analogue input float

This object shall read the float value of the input channel 'n'. The float value shall be calculated by the following formula:

$$\text{Float value} = \text{integer value} \times \text{input scale} + \text{offset value}$$

Table 134 specifies the object description, and Table 135 specifies the entry description.

**Table 134 — Object description**

Attribute	Value
INDEX	6403 <sub>h</sub>
Name	Read analogue input float
Object code	Array
Data type	Real32
Category	Optional

**Table 135 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs float
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	No
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	No
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	No

**8.4.5 Object 6404<sub>h</sub>: Read manufacturer-specific analogue input**

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

Table 136 specifies the object description, and Table 137 specifies the entry description.

**Table 136 — Object description**

Attribute	Value
INDEX	6404 <sub>h</sub>
Name	Read manufacturer specific analogue input
Object code	Array
Data type	Manufacturer-specific
Category	Optional

**Table 137 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
to	
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Optional
Value range	Manufacturer-specific
Default value	No
to	
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Manufacturer-specific
Default value	No
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Manufacturer-specific
Default value	No

## 8.5 Analogue output module

### 8.5.1 Object 6410<sub>h</sub>: Write analogue output 8-bit

This object shall write an integer8 value to the output channel 'n'. The value shall be always left adjusted.

Table 138 specifies the object description, and Table 139 specifies the entry description.

**Table 138 — Object description**

Attribute	Value
INDEX	6410 <sub>h</sub>
Name	Write analogue output 8-bit
Object code	Array
Data type	Integer8
Category	Optional

**Table 139 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs 8-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer8
Default value	00 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer8
Default value	00 <sub>h</sub>
to	

Sub-Index	FE <sub>n</sub>
Description	Analogue output FE <sub>n</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer8
Default value	00 <sub>h</sub>

### 8.5.2 Object 6411<sub>h</sub>: Write analogue output 16-bit

This object shall write an integer16 value to the output channel 'n'. The value shall be always left adjusted.

Table 140 specifies the object description, and Table 141 specifies the entry description.

**Table 140 — Object description**

Attribute	Value
INDEX	6411 <sub>h</sub>
Name	Write analogue output 16-bit
Object code	Array
Data type	Integer16
Category	Conditional: Device with analogue output

**Table 141 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs 16-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>n</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Default
Value range	Integer16
Default value	0000 <sub>h</sub>

Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Default
Value range	Integer
Default value	0000 <sub>h</sub>
to	
Sub-Index	0C <sub>h</sub>
Description	Analogue output 0C <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Default
Value range	Integer16
Default value	0000 <sub>h</sub>
to	
Sub-Index	0D <sub>h</sub>
Description	Analogue output 0D <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer16
Default value	0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer16
Default value	0000 <sub>h</sub>

**8.5.3 Object 6412<sub>h</sub>: Write analogue output 32-bit**

This object shall write an integer32 value to the output channel 'n'. The value shall be always left adjusted.

Table 142 specifies the object description, and Table 143 specifies the entry description.

**Table 142 — Object description**

Attribute	Value
INDEX	6412 <sub>h</sub>
Name	Write analogue output 32-bit
Object code	Array
Data type	Integer32
Category	Optional



**Table 143 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs 32-bit
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>

**8.5.4 Object 6413<sub>h</sub>: Write analogue output float**

This object shall write the float value to the output channel 'n'. The Integer value shall be calculated by the following formula:

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

Table 144 specifies the object description, and Table 145 specifies the entry description.

**Table 144 — Object description**

Attribute	Value
INDEX	6413 <sub>h</sub>
Name	Write analogue output float
Object code	Array
Data type	Real32
Category	Optional

**Table 145 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs float
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

### 8.5.5 Object 6414<sub>h</sub>: Write manufacturer-specific analogue output

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

Table 146 specifies the object description, and Table 147 specifies the entry description.

**Table 146 — Object description**

Attribute	Value
INDEX	6414 <sub>h</sub>
Name	Write manufacturer specific analogue output
Object code	Record or Array
Data type	Manufacturer-specific
Category	Optional

**Table 147 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Manufacturer-specific
Default value	Manufacturer-specific
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Manufacturer-specific
Default value	Manufacturer-specific
to	

Sub-Index	FE <sub>n</sub>
Description	Analogue output FE <sub>n</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Manufacturer-specific
Default value	Manufacturer-specific

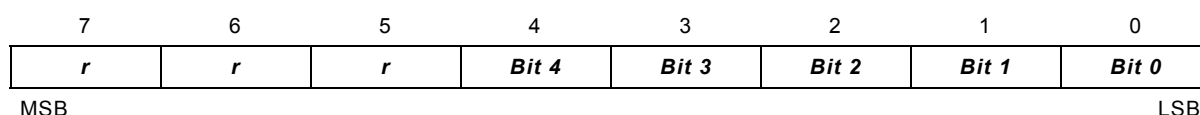
## 8.6 Analogue input set-ups

### 8.6.1 Object 6420<sub>h</sub>

Reserved for compatibility reason.

### 8.6.2 Object 6421<sub>h</sub>: Analogue input interrupt trigger selection

This object determines, which events shall cause an interrupt for a specific channel. Figure 8 specifies the object structure and Table 148 specifies the value definition. All bits set to 1<sub>b</sub> shall trigger the corresponding analogue input. If the object is not supported, the device shall behave accordingly to the default value.



**Figure 8 — Object structure**

**Table 148 — Value definition**

Field	Value	Definition
<i>Bit 0</i>	0 <sub>b</sub> 1 <sub>b</sub>	Upper limit not exceeded Upper limit exceeded
<i>Bit 1</i>	0 <sub>b</sub> 1 <sub>b</sub>	Input not below lower limit Input below lower limit
<i>Bit 2</i>	0 <sub>b</sub> 1 <sub>b</sub>	Input not changed by more than delta Input changed by more than delta
<i>Bit 3</i>	0 <sub>b</sub> 1 <sub>b</sub>	Input not reduced by more than negative delta Input reduced by more than negative delta
<i>Bit 4</i>	0 <sub>b</sub> 1 <sub>b</sub>	Input not increased by more than positive delta Input increased by more than positive delta
<i>r</i>	0 <sub>b</sub>	Reserved for future use

Table 149 specifies the object description, and Table 150 specifies the entry description.

**Table 149 — Object description**

Attribute	Value
INDEX	6421 <sub>h</sub>
Name	Interrupt trigger selection
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 150 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	See above
Default value	07 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	See above
Default value	07 <sub>h</sub>
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	See above
Default value	07 <sub>h</sub>

**8.6.3 Object 6422<sub>h</sub>: Analogue input interrupt source**

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.

Table 151 specifies the object description, and Table 152 specifies the entry description.

**Table 151 — Object description**

Attribute	Value
INDEX	6422 <sub>h</sub>
Name	Analogue input Interrupt Source
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 152 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of interrupt source banks
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 08 <sub>h</sub>
Default value	No
to	
Sub-Index	01 <sub>h</sub>
Description	Interrupt source bank 01 <sub>h</sub>
Access	ro
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	No
to	
Sub-Index	02 <sub>h</sub>
Description	Interrupt source bank 02 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	No
to	
Sub-Index	08 <sub>h</sub>
Description	Interrupt source bank 08 <sub>h</sub>
Access	ro
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	No

#### 8.6.4 Object 6423<sub>h</sub>: Analogue input global interrupt enable

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

TRUE = global interrupt enabled

FALSE = global interrupt disabled

Table 153 specifies the object description, and Table 154 specifies the entry description.

**Table 153 — Object description**

Attribute	Value
INDEX	6423 <sub>h</sub>
Name	Analogue input global interrupt enable
Object code	Variable
Data type	Boolean
Category	Conditional: Device with analogue input

**Table 154 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Access	rw
PDO mapping	Optional
Value range	Boolean
Default value	FALSE

#### 8.6.5 Object 6424<sub>h</sub>: Analogue input interrupt upper limit integer

If enabled (see 6423<sub>h</sub> 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<sub>h</sub>).

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

Configuration of the analogue input interrupt upper limit float object (6429<sub>h</sub>) shall cause also value change in the 6424<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 155 specifies the object description, and Table 156 specifies the entry description.

**Table 155 — Object description**

Attribute	Value
INDEX	6424 <sub>h</sub>
Name	Analogue input Interrupt upper limit integer
Object code	Array
Data type	Integer32
Category	Optional

**Table 156 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>

**8.6.6 Object 6425<sub>h</sub>: Analogue input interrupt lower limit integer**

If enabled (see 6423<sub>h</sub> 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<sub>h</sub>).

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

Configuration of the analogue input interrupt lower limit float object (642A<sub>h</sub>) shall cause also value change in the 6425<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.



Table 157 specifies the object description, and Table 158 specifies the entry description.

**Table 157 — Object description**

Attribute	Value
INDEX	6425 <sub>h</sub>
Name	Analogue input interrupt lower limit integer
Object code	Array
Data type	Integer32
Category	Optional

**Table 158 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>

### 8.6.7 Object 6426<sub>h</sub>: Analogue input interrupt delta unsigned

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

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

Configuration of the analogue input interrupt delta float object (642B<sub>h</sub>) shall cause also value change in 6426<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 159 specifies the object description, and Table 160 specifies the entry description.

**Table 159 — Object description**

Attribute	Value
INDEX	6426 <sub>h</sub>
Name	Analogue input interrupt delta unsigned
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 160 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	

Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

### 8.6.8 Object 6427<sub>h</sub>: Analogue input interrupt negative delta unsigned

This object shall set the negative delta value (falling below the last communicated value) for interrupt-enabled analogue inputs (see 6423<sub>h</sub> object).

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

Configuration of the analogue input interrupt negative delta float object (642C<sub>h</sub>) shall cause also value change in the 6427<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 161 specifies the object description, and Table 162 specifies the entry description.

**Table 161 — Object description**

Attribute	Value
INDEX	6427 <sub>h</sub>
Name	Analogue input interrupt negative delta unsigned
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 162 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

**8.6.9 Object 6428<sub>h</sub>: Analogue input interrupt positive delta unsigned**

This object shall set the positive delta value (rising above the last communicated value) for interrupt-enabled analogue inputs (see 6423<sub>h</sub> object).

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

Configuration of the analogue input interrupt positive delta float object (642D<sub>h</sub>) shall cause also value change in the 6428<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 163 specifies the object description, and Table 164 specifies the entry description.

**Table 163 — Object description**

Attribute	Value
INDEX	6428 <sub>h</sub>
Name	Analogue input interrupt positive delta unsigned
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 164 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

**8.6.10 Object 6429<sub>h</sub>: Analogue input interrupt upper limit float**

This object shall set the converted upper limits for interrupt-enabled analogue inputs (see 6423<sub>h</sub> 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<sub>h</sub>).

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

Configuration of the analogue input interrupt upper limit integer object (6424<sub>h</sub>) shall cause also value change in the 6429<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 165 specifies the object description, and Table 166 specifies the entry description.

**Table 165 — Object description**

Attribute	Value
INDEX	6429 <sub>h</sub>
Name	Analogue input interrupt upper limit float
Object code	Array
Data type	Real32
Category	Optional

**Table 166 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

**8.6.11 Object 642A<sub>h</sub>: Analogue input interrupt lower limit float**

This object shall set the lower limits for interrupt-enabled analogue inputs (see 6423<sub>h</sub> 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<sub>h</sub>).

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

Configuration of the analogue input interrupt lower limit integer object (6425<sub>h</sub>) shall cause also value change in the 642A<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 167 specifies the object description, and Table 168 specifies the entry description.

**Table 167 — Object description**

Attribute	Value
INDEX	642A <sub>h</sub>
Name	Analogue input interrupt lower limit float
Object code	Array
Data type	Real32
Category	Optional

**Table 168 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
to	
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

### 8.6.12 Object 642B<sub>h</sub>: Analogue input interrupt delta float

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<sub>h</sub> object).

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

Configuration of the analogue input interrupt delta unsigned object (6426<sub>h</sub>) shall cause also value change in the 642B<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 169 specifies the object description, and Table 170 specifies the entry description.

**Table 169 — Object description**

Attribute	Value
INDEX	642B <sub>h</sub>
Name	Analogue input interrupt delta float
Object code	Array
Data type	Real32
Category	Optional

**Table 170 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	



Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

### 8.6.13 Object 642C<sub>h</sub>: Analogue input interrupt negative delta float

This object shall set the negative delta value (falling below the last sample) in float format for interrupt-enabled analogue inputs (see 6423<sub>h</sub> object).

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

Configuration of the analogue input interrupt negative delta unsigned object (6427<sub>h</sub>) shall cause also value change in the 642C<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 171 specifies the object description, and Table 172 specifies the entry description.

**Table 171 — Object description**

Attribute	Value
INDEX	642C <sub>h</sub>
Name	Analogue input interrupt negative delta float
Object code	Array
Data type	Real32
Category	Optional

**Table 172 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0

Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

**8.6.14 Object 642D<sub>h</sub>: Analogue input interrupt positive delta float**

This object shall set the positive delta value (rising above the last sample) in float format for interrupt-enabled analogue inputs (see 6423<sub>h</sub> object).

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

Configuration of the analogue input interrupt positive delta unsigned object (6428<sub>h</sub>) shall cause also value change in the 642D<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 173 specifies the object description, and Table 174 specifies the entry description.

**Table 173 — OBJECT DESCRIPTION**

Attribute	Value
INDEX	642D <sub>h</sub>
Name	Analogue input interrupt positive delta float
Object code	Array
Data type	Real32
Category	Optional

**Table 174 — ENTRY DESCRIPTION**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

**8.6.15 Object 642E<sub>h</sub>: Analogue input offset float**

This object shall set the offsets in float format for input data (6403<sub>h</sub> object) for channel 'n'.

If the object is not supported, the device shall behave accordingly to 6431<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue input offset integer object (6431<sub>h</sub>) shall cause also value change in the 642E<sub>h</sub> object and vice versa.

Table 175 specifies the object description, and Table 176 specifies the entry description.

**Table 175 — OBJECT DESCRIPTION**

Attribute	Value
INDEX	642E <sub>h</sub>
Name	Analogue input offset float
Object code	Array
Data type	Real32
Category	Optional

**Table 176 — ENTRY DESCRIPTION**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

**8.6.16 Object 642F<sub>h</sub>: Analogue input pre-scaling float**

This object shall set the pre-scaling in float format for input data (6403<sub>h</sub> object).

If the object is not supported, the device shall behave accordingly to 6432<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue input pre-scaling integer object (6432<sub>h</sub>) shall cause also value change in the 642F<sub>h</sub> object and vice versa.

Table 177 specifies the object description, and Table 178 specifies the entry description.

**Table 177 — OBJECT DESCRIPTION**

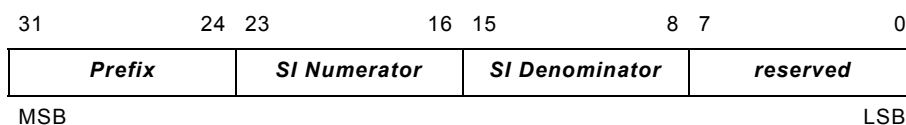
Attribute	Value
INDEX	642F <sub>h</sub>
Name	Analogue input pre-scaling float
Object code	Array
Data type	Real32
Category	Optional

**Table 178 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	1,0
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	1,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	1,0

### 8.6.17 Object 6430<sub>h</sub>: Analogue input SI unit

This object shall assign SI units and prefixes for analogue inputs. The value structure is defined in Figure 9.



**Figure 9 — Value structure**

The values for prefix, SI numerator, and SI denominator are specified in /CiA303-2/.

Table 179 specifies the object description, and Table 180 specifies the entry description.

**Table 179 — Object description**

Attribute	Value
INDEX	6430 <sub>h</sub>
Name	Analogue input SI unit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 180 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	No

Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	No
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	No

### 8.6.18 Object 6431<sub>h</sub>: Analogue input offset integer

This object shall set the offset in integer format for input data (6403<sub>h</sub> object).

If the object is not supported, the device shall behave accordingly to 642E<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue input offset float object (642E<sub>h</sub>) shall cause also value change in the 6431<sub>h</sub> object and vice versa.

Table 181 specifies the object description, and Table 182 specifies the entry description.

**Table 181 — Object description**

Attribute	Value
INDEX	6431 <sub>h</sub>
Name	Analogue input offset integer
Object code	Array
Data type	Integer32
Category	Optional

**Table 182 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>

### 8.6.19 Object 6432<sub>h</sub>: Analogue input pre-scaling integer

This object shall set the pre-scaling in integer format or input data (6403<sub>h</sub> object).

If the object is not supported, the device shall behave accordingly to 642F<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue input pre-scaling float object (642F<sub>h</sub>) shall cause also value change in the 6432<sub>h</sub> object and vice versa.

Table 183 specifies the object description, and Table 184 specifies the entry description.

**Table 183 — Object description**

Attribute	Value
INDEX	6432 <sub>h</sub>
Name	Analogue input pre-scaling integer
Object code	Array
Data type	Integer32
Category	Optional



**Table 184 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer32
Default value	0000 0001 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0001 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue input FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0001 <sub>h</sub>

## 8.7 Analogue output set-ups

### 8.7.1 Object 6440<sub>h</sub>

Reserved for compatibility reason.

### 8.7.2 Object 6441<sub>h</sub>: Analogue output offset float

This object shall set the offset in float format for output data (6413<sub>h</sub> object).

If the object is not supported, the device shall behave accordingly to 6446<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue output offset integer object (6446<sub>h</sub>) shall cause also value change in the 6441<sub>h</sub> object and vice versa.

Table 185 specifies the object description, and Table 186 specifies the entry description.

**Table 185 — Object description**

Attribute	Value
INDEX	6441 <sub>h</sub>
Name	Analogue output offset float
Object code	Array
Data type	Real32
Category	Optional

**Table 186 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	

Sub-Index	FE <sub>n</sub>
Description	Analogue output FE <sub>n</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

### 8.7.3 Object 6442<sub>h</sub>: Analogue output scaling float

This object shall set the scaling in float format for output data (6413<sub>h</sub> object).

If the object is not supported, the device shall behave accordingly to 6447<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue output scaling integer object (6447<sub>h</sub>) shall cause also value change in the 6442<sub>h</sub> object and vice versa.

Table 187 specifies the object description, and Table 188 specifies the entry description.

**Table 187 — Object description**

Attribute	Value
INDEX	6442 <sub>h</sub>
Name	Analogue output scaling float
Object code	Array
Data type	Real32
Category	Optional

**Table 188 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	1,0

Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default	1,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default	1,0

#### 8.7.4 Object 6443<sub>h</sub>: Analogue output error mode

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

0<sub>h</sub> = actual value rest                      1<sub>h</sub> = reverts to error value integer (6444<sub>h</sub>)  
 others = reserved

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

Table 189 specifies the object description, and Table 190 specifies the entry description.

**Table 189 — Object description**

Attribute	Value
INDEX	6443 <sub>h</sub>
Name	Analogue output error mode
Object code	Array
Data type	Unsigned8
Category	Optional

**Table 190 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Error mode analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned8
Default value	01 <sub>h</sub>
to	
Sub-Index	02 <sub>h</sub>
Description	Error mode analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	01 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Error mode analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned8
Default value	01 <sub>h</sub>

**8.7.5 Object 6444<sub>h</sub>: Analogue output error value integer**

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<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue output error value float object (6445<sub>h</sub>) shall cause also value change in the 6444<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 191 specifies the object description, and Table 192 specifies the entry description.

**Table 191 — Object description**

Attribute	Value
INDEX	6444 <sub>h</sub>
Name	Analogue output error value integer
Object code	Array
Data type	Integer32
Category	Optional

**Table 192 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>

### 8.7.8 Object 6445<sub>h</sub>: Analogue output error value float

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<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue output error value integer object (6444<sub>h</sub>) shall cause also value change in the 6445<sub>h</sub> object and vice versa.

NOTE The value of this object is not scaled and not offset.

Table 193 specifies the object description, and Table 194 specifies the entry description.

**Table 193 — Object description**

Attribute	Value
INDEX	6445 <sub>h</sub>
Name	Analogue output error value float
Object code	Array
Data type	Real32
Category	Optional

**Table 194 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
to	
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Real32
Default value	0,0

### 8.7.9 Object 6446<sub>h</sub>: Analogue output offset integer

This object shall set the offset in integer format for output data (6413<sub>h</sub> object).

If the object is not supported, the device shall behave accordingly to 6441<sub>h</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue output offset float object (6441<sub>h</sub>) shall cause also value change in the 6446<sub>h</sub> object and vice versa.

Table 195 specifies the object description, and Table 196 specifies the entry description.

**Table 195 — Object description**

Attribute	Value
INDEX	6446 <sub>h</sub>
Name	Analogue output offset integer
Object code	Array
Data type	Integer32
Category	Optional

**Table 196 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>h</sub>
to	



Sub-Index	FE <sub>n</sub>
Description	Analogue output FE <sub>n</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default value	0000 0000 <sub>n</sub>

### 8.7.10 Object 6447<sub>n</sub>: Analogue output scaling integer

This object shall set the scaling in integer format for output data (6413<sub>n</sub> object).

If the object is not supported, the device shall behave accordingly to 6442<sub>n</sub> object, or if that object is also not supported, the device shall behave accordingly to the default value.

Configuration of the analogue output scaling float object (6442<sub>n</sub>) shall cause also value change in the 6447<sub>n</sub> object and vice versa.

Table 197 specifies the object description, and Table 198 specifies the entry description.

**Table 197 — Object description**

Attribute	Value
INDEX	6447 <sub>n</sub>
Name	Analogue output scaling integer
Object code	Array
Data type	Integer32
Category	Optional

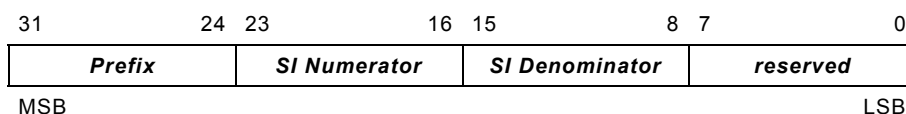
**Table 198 — Entry description**

Attribute	Value
Sub-Index	00 <sub>n</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>n</sub> to FE <sub>n</sub>
Default value	No
Sub-Index	01 <sub>n</sub>
Description	Analogue output 01 <sub>n</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Integer32
Default value	0000 0001 <sub>n</sub>

Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default	0000 0001 <sub>h</sub>
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Integer32
Default	0000 0001 <sub>h</sub>

### 8.7.11 Object 6450<sub>h</sub>: Analogue output SI unit

This object shall assign SI units and prefixes for analogue outputs. The value structure is defined in Figure 10.



**Figure 10 — Value structure**

The values for prefix, SI numerator, and SI denominator are specified in /CiA303-2/.

Table 199 specifies the object description, and Table 200 specifies the entry description.

**Table 199 — Object description**

Attribute	Value
INDEX	6450 <sub>h</sub>
Name	Analogue output SI unit
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 200 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue outputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to FE <sub>h</sub>
Default value	No

Sub-Index	01 <sub>h</sub>
Description	Analogue output 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	No
Sub-Index	02 <sub>h</sub>
Description	Analogue output 02 <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	No
to	
Sub-Index	FE <sub>h</sub>
Description	Analogue output FE <sub>h</sub>
Access	rw
Entry category	Optional
PDO mapping	Optional
Value range	Unsigned32
Default value	No

## 8.8 General device profile objects

### 8.8.1 Object 67FF<sub>h</sub>: Device type

This object shall describe the first logical device in a multiple device module according to /CiA301/.

## Annex A : Joystick

### A.1 Scope

This appendix defines 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.

### A.2 Pre-defined communication objects for joysticks

#### A.2.1 Object 1000<sub>h</sub>: Device type

The specific functionality is defined as a joystick with digital and analogue inputs. Table 201 specifies the values.

Table 201 — Value definitions

Additional information		Device profile number	Description
Specific functionality	I/O functionality		
01 <sub>h</sub>	05 <sub>h</sub>	0191 <sub>h</sub>	I/O functionality without digital outputs
01 <sub>h</sub>	07 <sub>h</sub>	0191 <sub>h</sub>	I/O functionality with digital outputs
02 <sub>h</sub>	07 <sub>h</sub>	0191 <sub>h</sub>	Special PDO mapping for 3-D joystick is used
03 <sub>h</sub>	07 <sub>h</sub>	0191 <sub>h</sub>	Special PDO mapping for 2-D joystick is used

### A.3 Joystick buttons

The buttons use the functionality for digital inputs with 8-bit access. The 6000<sub>h</sub> object shall be supported and the related configuration objects may be implemented.

### A.4 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. The object 6401<sub>h</sub> shall be supported and all related configuration objects may be implemented.

The default value for the object 6430<sub>h</sub> (analogue input SI unit) is defined in Figure 11.

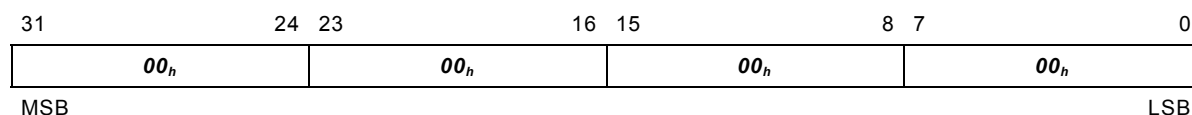


Figure 11 — Default value for object 6430<sub>h</sub>

### A.5 Joystick PDO mappings

#### A.5.1 Introduction

The joystick device supports the generic CiA 401 mapping as defined in clause A.5.2 and A.5.3 or the specific joystick mappings as defined in clause A.5.4 and A.5.5.

### A.5.2 1st TPDO mapping (buttons)

The first TPDO transmits the values of maximum 8 x 8 buttons. The first 8 buttons (Index 6000<sub>h</sub> sub-index 01<sub>h</sub>) are defined in Figure 12. The unused bits may be used manufacturer-specific.

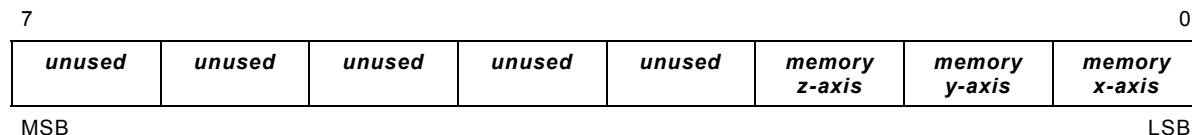


Figure 12 — Structure of object 6000 01<sub>h</sub>

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)

NOTE It is optional to include the freezing function into the joystick itself. In this case, the proportional values are not modified any more if the memory function is switched on.

Otherwise freezing is done by the application and the buttons are 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 bits 0 to 2 shall be 0 and the bits 2 to 7 of the first digital input byte (Object 6000 01<sub>h</sub>) are used manufacturer-specific.

### A.5.3 2nd TPDO mapping (proportional inputs)

The second TPDO transmits the 16-bit values of maximum 4 proportional inputs. The first 3 analogue values (Object 6401 01<sub>h</sub> to 03<sub>h</sub>) are used for the three dimensions (x, y, z), the other analogue value is manufacturer-specific.

Figure 13 shows the structure of this TPDO.

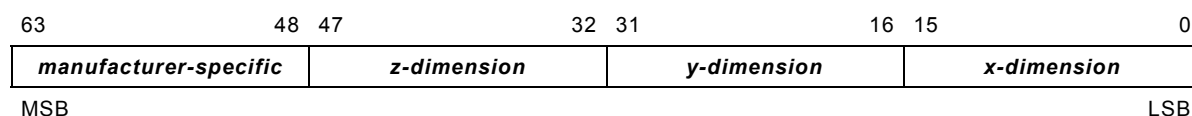


Figure 13 — Structure of the second TPDO

### A.5.4 Specific PDO mapping for 3-D joysticks

If the specific functionality field is 02<sub>h</sub>, the joystick shall use the first TPDO with the pre-defined mapping as shown in Figure 14.

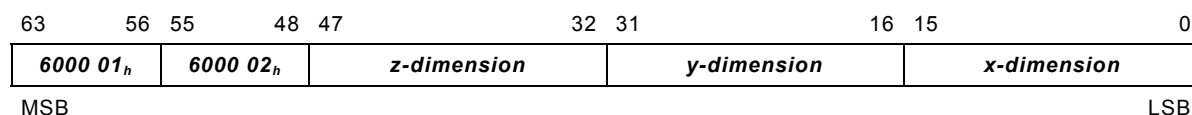


Figure 14 — Structure of the first TPDO

### A.5.5 Specific PDO mapping for 2-D joysticks

If the specific functionality field is 03<sub>h</sub>, the joystick shall use the first TPDO with the pre-defined mapping as shown in Figure 15.

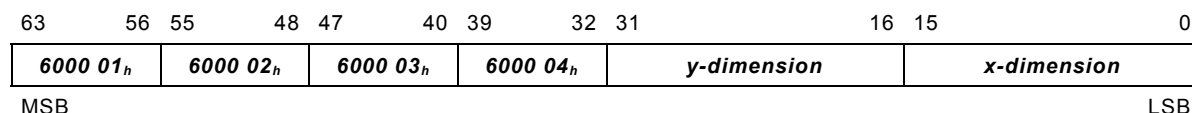


Figure 15 — Structure of the first TPDO

## A.6 Joystick signal conditioning

### A.6.1 Introduction

The analogue inputs representing the x, y, and z dimension are pre-scaled and offset by using the objects 6432<sub>h</sub> (642F<sub>h</sub>) respectively 6431<sub>h</sub> (642E<sub>h</sub>). If a deadband and post-scaling are required, the objects 6460<sub>h</sub> (6461<sub>h</sub>) respectively 6462<sub>h</sub> (6463<sub>h</sub>) are used.

### A.6.2 Object 6460<sub>h</sub>: Analogue input dead-band unsigned

This object shall set the dead-band for the analogue inputs (6401 01<sub>h</sub> to 03<sub>h</sub>). Figure 16 shows the relationship between the analogue input objects with dead-band-functionality for 16-bit (and 32-bit) access.

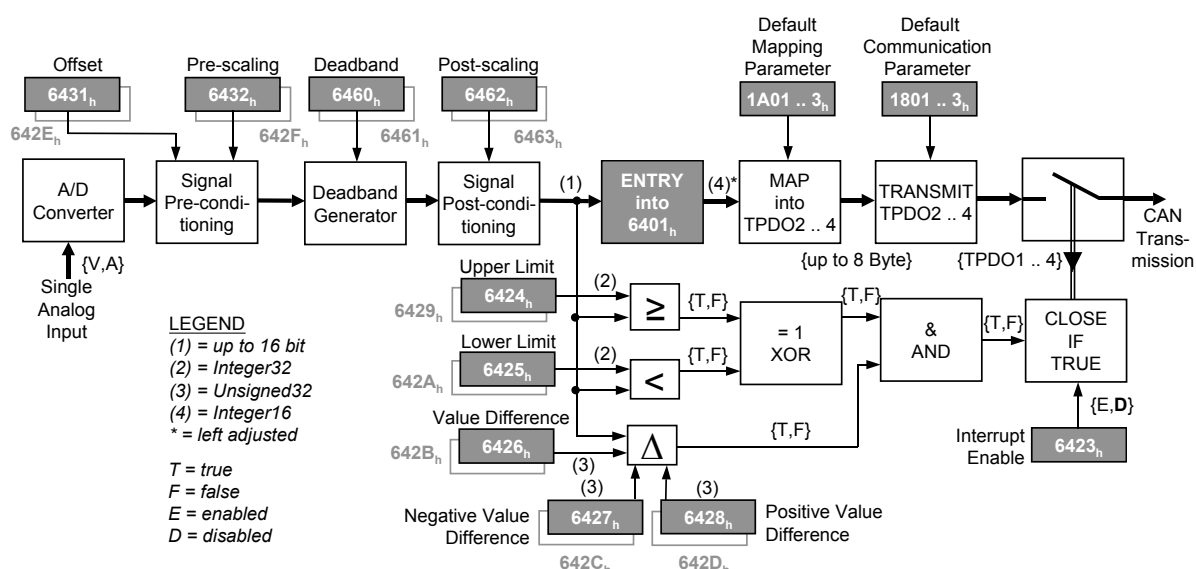


Figure 16 – Analogue Input with dead-band-functionality

Configuration of the analogue input dead-band float object (6461<sub>h</sub>) shall cause also value change in the 6460<sub>h</sub> object and vice versa.

Table 202 specifies the object description and Table 203 specifies the entry description.

Table 202 — Object description

Attribute	Value
INDEX	6460 <sub>h</sub>
Name	Analogue input dead-band unsigned
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 203 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	03 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	03 <sub>h</sub>
Description	Analogue input 03 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

**A.6.3 Object 6461<sub>h</sub>: Analogue input dead-band float**

This object shall set the dead-band for the analogue inputs (6401 01<sub>h</sub> to 03<sub>h</sub>).

Configuration of the analogue input dead-band unsigned object (6460<sub>h</sub>) shall cause also value change in the 6461<sub>h</sub> object and vice versa.

Table 204 specifies the object description and Table 205 specifies the entry description.

**Table 204 — Object description**

Attribute	Value
INDEX	642A <sub>h</sub>
Name	Analogue input dead-band float
Object code	Array
Data type	Real32
Category	Optional

**Table 205 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	03 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
Sub-Index	03 <sub>h</sub>
Description	Analogue input 03 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0

**A.6.4 Object 6462<sub>h</sub>: Analogue input post-scaling unsigned**

This object shall set the gain after the addition of dead-band-functionality for the analogue inputs (6401 01<sub>h</sub> to 03<sub>h</sub>).



Configuration of the analogue input post-scaling float object (6463<sub>h</sub>) shall cause also value change in the 6462<sub>h</sub> object and vice versa.

Table 202 specifies the object description and Table 203 specifies the entry description.

**Table 206 — Object description**

Attribute	Value
INDEX	6462 <sub>h</sub>
Name	Analogue input post-scaling unsigned
Object code	Array
Data type	Unsigned32
Category	Optional

**Table 207 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number of analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 03 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>
Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

Sub-Index	03 <sub>h</sub>
Description	Analogue input 03 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Unsigned32
Default value	0000 0000 <sub>h</sub>

#### A.6.5 Object 6463<sub>h</sub>: Analogue input post-scaling float

This object shall set the gain after the addition of dead-band-functionality for the analogue inputs (6401 01<sub>h</sub> to 03<sub>h</sub>).

Configuration of the analogue input post-scaling unsigned object (6462<sub>h</sub>) shall cause also value change in the 6463<sub>h</sub> object and vice versa.

Table 208 specifies the object description and Table 209 specifies the entry description.

**Table 208 — Object description**

Attribute	Value
INDEX	6463 <sub>h</sub>
Name	Analogue input post-scaling float
Object code	Array
Data type	Real32
Category	Optional

**Table 209 — Entry description**

Attribute	Value
Sub-Index	00 <sub>h</sub>
Description	Number analogue inputs
Access	ro
Entry category	Mandatory
PDO mapping	No
Value range	01 <sub>h</sub> to 03 <sub>h</sub>
Default value	No
Sub-Index	01 <sub>h</sub>
Description	Analogue input 01 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0

Sub-Index	02 <sub>h</sub>
Description	Analogue input 02 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0
Sub-Index	03 <sub>h</sub>
Description	Analogue input 03 <sub>h</sub>
Access	rw
Entry category	Mandatory
PDO mapping	Optional
Value range	Real32
Default value	0,0

## A.7 Joystick implementation hints

### A.7.1 Periodical PDO transmission

If periodical PDO transmission is requested, the event timer is set to  $\neq 0$ .

### A.7.2 Additional proportional inputs

If additional proportional inputs are required, the pre-defined 3<sup>rd</sup> and 4<sup>th</sup> TPDO are used.

### A.7.3 Transmission of proportional inputs

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