

CANopen

Device Profile for Encoders

CiA Draft Standard Proposal 406

- not recommended for implementation, may be changed without notification -

Version 2.0

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1 SCOPE

This document represents the *CANopen* device profiles for incremental and absolute, linear and rotary encoders. Besides position and velocity output possibility complete cam functionality is covered. In addition it is possible to handle multi sensors through one CANopen device.

All the above devices use communication techniques which conform to those described in the CiA Draft Standard DS-301 (*CANopen* Communication Profile for industrial systems based on CAL). This document should be consulted in parallel to this profile.

Changes to version 1.0:

In difference to the version 1.0 the objects 6100h and 6101h are removed.

In object 6508h the time period to store the operating time of the device will not longer be defined.

The version 1.0 is extended by objects for covering multi-sensor devices. Additional outputs for preset values, velocity, module identification are included.

An extra chapter „8.2 encoder cams“ is included covering the complete definition of functionalities for cams in encoders.

2 REFERENCES

- [1]: ISO 11898: Road Vehicles Interchange of Digital Information - Controller Area Network (CAN) for high-speed Communication, November 1993
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- [3]: CiA DS-201 V1.1, CAN in the OSI Reference Model, February 1996
- [4]: CiA DS-202-1 V1.1, CMS Service Specification, February 1996
- [5]: CiA DS-202-2 V1.1, CMS Protocol Specification, February 1996
- [6]: CiA DS-202-3 V1.1, CMS Encoding Rules, February 1996
- [7]: CiA DS-203-1 V1.1, NMT Service Specification, February 1996
- [8]: CiA DS-203-2 V1.1, NMT Protocol Specification, February 1996
- [9]: CiA DS-204-1 V1.1, DBT Service Specification, February 1996
- [10]: CiA DS-204-2 V1.1, DBT Protocol Specification, February 1996
- [11]: CiA DS-205-1 V1.1, LMT Service Specification, February 1996
- [12]: CiA DS-205-2 V1.1, LMT Protocol Specification, February 1996
- [13]: CiA DS-206 V1.1, Recommended Standard CAL Modul Data Sheet, February 1996
- [14]: CiA DS-207 V1.1, Application Layer Naming Conventions, February 1996
- [15]: CiA DS-301 V3.0, CANopen Communication Profile based on CAL, October 1996

3 DEFINITIONS, ACRYOMS AND ABBRIVIATIONS

CAL

CAN Application Layer. The application layer for CAN-based networks as specified by CiA in Draft Standard 201 ... 207.

CAN

Controller Area Network. Data link layer protocol for serial communication as specified in ISO 11898.

CiA

CAN in Automation international manufacturer and user organisation e.V.: non-profit association for Controller Area Network (CAN).

CMS

CAN-based Message Specification. One of the service elements of the application layer in the CAN Reference Model.

COB

Communication Object. (CAN Message) A unit of transportation in a CAN Network. Data must be sent accross a Network inside a COB.

COB-ID

COB-Identifier. Identifies a COB uniquely in a Network. The identifier determines the priority of that COB in the MAC sub-layer too.

DBT

Distributor. One of the service elements of the application in the CAN Reference Model. It is the responsibility of the DBT to distribute COB-ID's to the COB's that are used by CMS.

LMT

Layer Management. One of the service elements of the application in the CAN Reference Model. It serves to configure parameters of each layer in the CAN Reference Model.

NMT

Network Management. One of the service elements of the application in the CAN Reference Model. It performs initialisation, configuration and error handling in a CAN network.

PDO

Process Data Object. Object for data exchange between several devices.

SDO

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

4 OPERATING PRINCIPLE

4.1 Introduction

The purpose of encoders is to detect positions of any kind of machine tools. Encoders detect positions and transmit the position values across the CAN network. They can receive configuration information via the service data objects, conversion parameters for calculating an - to the application adapted - position value. In the operational status, the position value can be read from the encoder by RemoteTransmissionRequest telegrams or Sync Telegrams. Additionally, the encoders can transmit cyclic the position values.

4.2 Standardisation Via Profiling

The two principal advantages of the profile approach to device specification are in the areas of system integration and device standardisation. If two independent manufacturers are to design products which are to communicate with each other then each manufacturer must be provided with a specification of the other manufacturers device. This specification could take any forms if left to individual manufacturers to produce. The concept of device profiling provides a standard for producing such specifications. By adopting this approach all manufacturers will specify their devices in a similar fashion which greatly reduces the effort involved in system integration.

The other advantage of the profile approach to device specification is that it can be used to guide manufacturers into producing standardised devices. The advantages of standardised devices are numerous. Perhaps most importantly the idea of a standardised device decouples a system integrator from a specific supplier. If one supplier cannot meet product demand, for example, the integrator can use devices from another supplier without having to re-configure network software. On the other hand the supplier is not forced any more to implement a private protocol for each customer.

This device profile defines two encoder classes, a standard device C1 and an extended device C2. The standard device C1 specifies basic functionality which every device within that class must exhibit. The extended device C2 offers a variety of features with mandatory and optional functions. The mandatory functions of both, class C1 and class C2, are necessary to ensure non-manufacturer-specific operations of a device.

The concept of device standardisation is extended by the notion of optional functionality defined within the standard device profiles. Such optional functionality does not have to be implemented by all manufacturers. However, if a manufacturer wishes to implement such functionality he must do so in the manner defined in the profile.

The concept of optional functionality provides a very powerful mechanism to ensure all manufacturers implementing particular functionality do so in a defined fashion¹.

The device profiles provide a mechanism by which manufacturers wishing to implement truly manufacturer specific functionality can do so. This is clearly necessary since it would be impossible to anticipate all possible device functionality and define this in the optional category of each device class. This approach guarantees that the standard device profiles are 'future proof'.

By defining mandatory device characteristics in class C1 basic network and encoder operation is guaranteed. By defining an extended class C2 a degree of defined flexibility can be built in. By leaving 'hooks' for optional and manufacturer specific functionality manufacturers will not be constrained to an out-of-date standard.

¹ For example, the extended encoder device defines optional functionality of alarm messages for power-on sequences. If a system integrator wants to have this feature, it is well defined in the operating parameters as optional function.

4.3 The Object Dictionary

The most important part of a device profile is the object dictionary description. The object dictionary is essentially a grouping of objects accessible via the network in an ordered pre-defined fashion. Each object within the dictionary is addressed using a 16-bit index.

The overall layout of the standard object dictionary is shown below:

Index (hex)	Object
0000	not used
0001-001F	Static Data Types
0020-003F	Complex Data Types
0040-005F	Manufacturer Specific Data Types
0060-0FFF	Reserved for further use
1000-1FFF	Communication Profile Area
2000-5FFF	Manufacturer Specific Profile Area
6000-9FFF	Standardised Device Profile Area
A000-FFFF	Reserved for further use

The Standard Object Dictionary may contain a maximum of 65536 entries which are addressed through a 16 bit index.

The Static Data Types at indices 0001_h through 001F_h contain type definitions for standard data types like Boolean, integer, floating point, string, etc. These entries are included for reference only. They cannot be read or written.

Complex Data Types at indices 0020_h through 003F_h are pre-defined structures that are composed of standard types and are common to all devices.

Manufacturer Specific Data Types at indices 0040_h through 005F_h are also structures composed of standard data types but are specific to a particular device.

The Communication Profile Area at indices 1000_h through 1FFF_h contains the communication specific parameters for the CAN network. These entries are common to all devices.

The Standardised Device Profile Area at indices 6000_h through 9FFF_h contains all data objects common to a class of devices that can be read or written via the network.

The object dictionary for each device type has a range of mandatory entries. These entries ensure that all devices of a particular class behave in a defined manner (at least from a functionality viewpoint). The object dictionary concept caters for optional device features which means a manufacturer does not have to provide certain extended functionality on his devices but if he wishes to do so, he must do it in the pre-defined fashion.

By defining object dictionary entries for anticipated increased functionality in a optional category manufacturers wishing to implement enhanced functionality will do so in the same way and use the indices 2000_h through 5FFF_h for truly manufacturer specific functionality.

4.3.1 Index and Sub-Index Usage

A 16-bit index is used to address all entries within the object dictionary. In case of a simple variable this references the value of this variable directly. In case of records and arrays however, the index addresses the whole data structure.

To allow individual elements of the structure to be accessed via the network a sub-index has to be defined. For single object dictionary entries as an unsigned8, Boolean, integer32 etc. the value for the sub-index is always zero. For complex object dictionary entries such as arrays or records with multiple data fields the sub-index references fields within a data structure pointed to the main index.

5 ENCODER PROFILE

The encoder profile describes the functionality of encoders connected to CAN networks. The functionalities are divided into two device classes:

5.1 Class C1

Class C1 is the mandatory class with a basic range of functions that all encoders must support. The class C1 encoder can optionally support class C2 functions, these functions must however be implemented according to the profile.

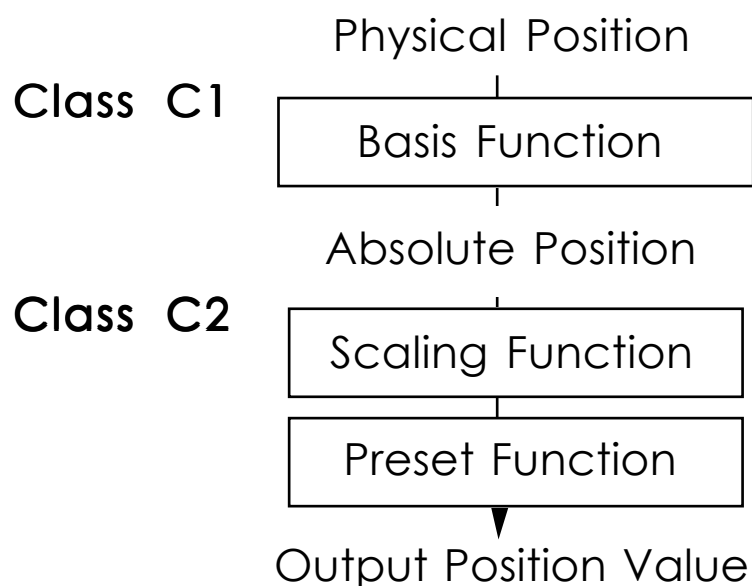
5.2 Class C2

Class C2 encoders support all class C1 functions and extended functions defined in class C2.

5.3 Diagnostic Area

In addition to the two classes C1 and C2, there are pre-defined areas and reserved parameters for manufacturer specific functions in the Standardised Device Profile Area.

5.4 Functional Overview



6 EMERGENCY MESSAGES

6.1 Principle

Emergency messages are triggered by the occurrence of a device internal malfunction and are transmitted from the concerned application device to the other devices with highest priority. This makes them suitable for interrupt type error alerts.

6.2 Error Code Meanings

According to [15] the Emergency Object Usage is specified for encoder devices as follows:

Error Code (hex)	Meaning	Defined by
0000	No Error	Comm. Prof.
1000	Generic Error	Comm. Prof.
2000	Current	Comm. Prof.
2100	Device input current	Comm. Prof.
2110	Input current too high	Encoder Prof.
3000	Voltage	
3100	Device input voltage	Comm. Prof.
3110	Input voltage out of range	Encoder Prof.
4000	Temperature	Comm. Prof.
	Temp. inside out of range	
5000	Device Hardware	Comm. Prof.
5100	Hardware memory error	Encoder Prof.
6000	Device Software	Comm. Prof.
7000	Additional modules	Comm. Prof.
8000	Monitoring	Comm. Prof.
9000	External error	Comm. Prof.
F000	Additional Functions	Comm. Prof.
FFFF	Device specific.	Comm. Prof.

7 THE COMMUNICATION PROFILE

Two process data objects (PDO) are implemented in the device. One is used for asynchronous transmission and the other one for the cyclic transmission functions.

The output position value is transmitted in binary code:

COB-ID	Output Position Value			
11 Bit	Byte 0	Byte 1	Byte 2	Byte 3
	2^7 to 2^0	2^{15} to 2^8	2^{23} to 2^{16}	2^{31} to 2^{24}

7.1 1st Transmit PDO (asynchronous transmission)

This PDO transmit the position value of the encoder in an asynchronous way. The cyclic timer is stored in index 6200_h.

Index	Sub-Index	Comment	Default Value
1800 _h	0	number of supported entries	3
	1	COB-ID used by PDO 1	refer to [15]
	2	transmission type	254
	3	inhibit time	0

Index	Sub-Index	Comment	Default Value
1A00 _h	0	number of mapped objects	1
	1	Position value	60040020 _h *

(*) The default value for multi-sensor devices is: 60200120_h.

7.2 2nd Transmit PDO (synchronous transmission)

This PDO transmit the position value of the encoder in a cyclic way (on request). Request by remote frame and/or sync telegrams.

Index	Sub-Index	Comment	Default Value
1802 _h	0	number of supported entries	3
	1	COB-ID used by PDO 2	refer to [15]
	2	transmission type	1
	3	inhibit time	0

Index	Sub-Index	Comment	Default Value
1A02 _h	0	number of mapped objects	1
	1	Position value	60040020 _h *

(*) The default value for multi-sensor devices is: 60200120_h.

7.3 Standard Objects

Following table gives an overview on the supported indices in the Communication Profile Area:

Index (hex)	Object	Name	Type	Attr.	C1	C2
1000	VAR	device type	Unsigned32	const	m	
1001	VAR	error register	Unsigned8	ro	m	
1002	VAR	manufacturer status register	Unsigned32	ro	o	o
1003	ARRAY	pre-defined error field	Unsigned32	ro	o	o
1004	ARRAY	Number of PDOs supported	Unsigned32	ro	o	o
1005	VAR	COB-ID SYNC-message	Unsigned32	rw	o	o
1008	VAR	device name	Vis-String	const	o	o
1009	VAR	hardware version	Vis-String	const	o	o
100A	VAR	software version	Vis-String	const	o	o
100B	VAR	Node-ID	Unsigned32	ro	o	o
100C	VAR	guard time	Unsigned32	rw	o	o
100D	VAR	life time factor	Unsigned32	rw	o	o
100E	VAR	COB-ID guarding protocol	Unsigned32	rw	o	o
100F	VAR	number of SDO's supported	Unsigned32	ro	o	o
1010	VAR	store parameters	Unsigned32	rw	m	m
...		refer to [15]				

7.4 Detailed Specification Communication specific Objects

Except of the index 1000_h all objects are properly specified in [15] and are used in the according manner. For the encoder profile it is reasonable to specify one object in detail.

Object 1000_h: Device Type

Contains information about the device type. The object at index 1000_h describes the type of device and its functionality. It is composed of a 16 bit field which describes the device profile that is used (Device Profile Number 406 = 196_h) and a second 16 bit field which gives information on the type of encoder.

OBJECT DESCRIPTION

INDEX	1000 _h
Name	Device_type
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C1 Mandatory
Access	ro
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Device Type			
Device Profile Number		Encoder Type	
Byte 0	Byte 1	Byte 2	Byte 3
196 _h		2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

ENCODER TYPE

Code	Definition
01	SingleTurn absolute rotary encoder
02	MultiTurn absolute rotary encoder
03	SingleTurn absolute rotary encoder with electronic turncount
04	Incremental rotary encoder
05	Incremental rotary encoder with electronic counting
06	Incremental linear encoder
07	Incremental linear encoder with electronic counting
08	Absolute linear encoder
09	Absolute linear encoder with cyclic coding
10	Multi-Sensor encoder interface
11 ... 65535	Currently not assigned

8 STANDARDIZED ENCODER PROFILE AREA

Each encoder shares the dictionary entries from 6000_h to 65FF_h. These entries are common to encoders. NOTE that all indices shown in the 'Index' column are hexadecimal.

The overview of all common entries are shown below. C1 and C2 stand for the device classes C1 and C2, the M and O in both classes stand for mandatory and optional functions respectively. Mandatory commands have been kept to a minimum of essential encoder functionalities to allow maximum flexibility and acceptance.

Index	Object	Name	Data Length	Attr.	C1	C2
Parameters						
6000	VAR	Operating parameters	Unsigned16	rw	m/o	m/o
6001	VAR	Measuring units per revolution	Unsigned32	rw		m
6002	VAR	Total measuring range in measuring units	Unsigned32	rw		m
6003	VAR	Preset value	Unsigned32	rw		m
6004	VAR	Position value	Unsigned32	ro	m	
6005	REC	Linear encoder measuring step settings	Unsigned32	ro		m
6010	VAR	Preset value for multi-sensor devices	Unsigned32	rw		m
6020	VAR	Position value for multi-sensor devices	Integer32	ro	m	
6030	VAR	Speed value	Integer16	ro		m
6200	VAR	Cyclic timer	Unsigned16	rw		m
6300	ARRAY	Cam state register	Unsigned8	ro		o
6301	ARRAY	Cam enable register	Unsigned8	rw		o
6302	ARRAY	Cam polarity register	Unsigned8	rw		o
6310	ARRAY	Cam 1 low limit	Integer32	rw		o
6311	ARRAY	Cam 2 low limit	Integer32	rw		o
...		...				
6317	ARRAY	Cam 8 low limit	Integer32	rw		o
6320	ARRAY	Cam 1 high limit	Integer32	rw		o
6321	ARRAY	Cam 2 high limit	Integer32	rw		o
...		...				
6327	ARRAY	Cam 8 high limit	Integer32	rw		o
6330	ARRAY	Cam 1 hysteresis	Unsigned16	rw		o
6331	ARRAY	Cam 2 hysteresis	Unsigned16	rw		o
...		...				

Index	Object	Name	Data Length	Attr.	C1	C2
Parameters						
6337	ARRAY	Cam 8 hysteresis	Unsigned16	rw		o
6400	ARRAY	Area state register	Unsigned8	ro		o
6401	ARRAY	Work area low limit	Integer32	rw		o
6402	ARRAY	Work area high limit	Integer32	rw		o

Diagnostics						
6500	VAR	Operating status	Unsigned16	ro	m	
6501	VAR	SingleTurn resolution (rotary), Measuring step (linear)	Unsigned32	ro	m	
6502	VAR	Number of distinguishable revolutions	Unsigned16	ro	m	
6503	VAR	Alarms	Unsigned16	ro		m
6504	VAR	Supported alarms	Unsigned16	ro		m
6505	VAR	Warnings	Unsigned16	ro		m
6506	VAR	Supported Warnings	Unsigned16	ro		m
6507	VAR	Profile and software version	Unsigned32	ro		m
6508	VAR	Operating time	Unsigned32	ro		m
6509	VAR	Offset value	Integer32	ro		m
650A	REC	Module identification	Integer32	ro		m
650B	VAR	Serial number	Unsigned32	ro		m

On the following pages each single object is explained in detail.

8.1 Encoder Parameters

8.1.1 Object 6000_h - Operating Parameters

The Operating Parameters contain the functions for code sequence, Commissioning diagnostic control and scaling function control.

CODE SEQUENCE:

The code sequence defines whether increasing or decreasing position values are output when the encoder shaft rotates clockwise or counterclockwise as seen on the shaft.

COMMISSIONING DIAGNOSTIC CONTROL:

With the commissioning diagnostic function it is possible to check the encoder components responsible for position detection at encoder stand still. This enables an extensive check of the correctness of the position values.

The commissioning diagnostic is initiated by the commissioning bit in the operating parameters. If errors are detected it will be announced by the according alarm bits.

SCALING FUNCTION CONTROL:

With the scaling function the encoder numerical value is converted in software to change the physical resolution of the encoder.

The parameters „Measuring units per revolution“ and „Total measuring range in measuring units“ are the scaling parameters. The scaling function bit is set in the operating parameters. If the scaling function bit is set to zero, the scaling function is disabled.

OBJECT DESCRIPTION

INDEX	6000 _h
Name	Operating_parameters
Object Code	VAR
Data Type	Unsigned16
Access	rw

STRUCTURE OF PARAMETER

Bit	Function	Bit = 0	Bit =1	C1	C2
0	Code Sequence	CW	CCW	m	
1	Commissioning Diagnostic Control	Disa.	Enab.		o
2	Scaling function control	Disa.	Enab.		m
3	Reserved for further use				m
4	Reserved for further use				m
5	Reserved for further use				m
6	Reserved for further use				m
7	Reserved for further use				m
8	Reserved for further use				m
9	Reserved for further use				m
10	Reserved for further use				m
11	Reserved for further use				m
12	Manufacturer specific functions				o
13	Manufacturer specific functions				o
14	Manufacturer specific functions				o
15	Manufacturer specific functions				o

8.1.2 Object 6001_h - Measuring units per revolution

The parameter „Measuring units per revolution“ sets the number of distinguishable steps per revolution.

OBJECT DESCRIPTION

INDEX	6001 _h
Name	Measuring_units_per_revolution
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C2 Mandatory
Access	rw
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Measuring units per revolution			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.1.3 Object 6002_h - Total measuring range in measuring units

The parameter „Total measuring range in measuring units“ sets the number of distinguishable steps over the total measuring range.

OBJECT DESCRIPTION

INDEX	6002 _h
Name	Total_measuring_range_in_measuring_units
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C2 Mandatory
Access	rw
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Total measuring range in measuring units			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.1.4 Object 6003_h - Preset value

The Preset function supports adaption of the encoder zero point to the mechanical zero point of the system. For multi-sensor devices refer to object 6010_h.

The output position value is set to the parameter „Preset value“ and the offset from the position value is calculated and stored in the encoder.

OBJECT DESCRIPTION

INDEX	6003 _h
Name	Preset_value
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C2 Mandatory
Access	rw
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Preset value			
Byte 0	Byte 1	Byte 2	Byte 3
2^7 to 2^0	2^{15} to 2^8	2^{23} to 2^{16}	2^{31} to 2^{24}

8.1.5 Object 6004_h - Position value

The object 6004_h „Position value“ defines the output position value for the communication objects 1800_h and 1802_h. For multi-sensor devices refer to object 6020_h.

OBJECT DESCRIPTION

INDEX	6004 _h
Name	Position_value
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C1 Mandatory
Access	ro
PDO Mapping	yes
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Position value			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.1.6 Object 6005_h - Linear encoder measuring step settings

The parameter „Linear encoder measuring step settings“ defines the measuring step settings for the position value(s) and the speed value(s) for linear encoders.

This object is only mandatory for linear encoders (refer to object 1000_h).

OBJECT DESCRIPTION

INDEX	6005 _h
Name	Linear_encoder_measuring_step_settings
Object Code	REC
Data Type	Unsigned32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_objects
Object Class	C2 Mandatory
Access	ro
PDO Mapping	no
Value Range	1 - 2
Mandatory Range	1
Default Value	no

Sub-Index	01 _h
Description	Position measuring step in 0.001 μm
Object Class	C2 Mandatory
Access	rw
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Speed measuring step in 0.01 mm/s
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

8.1.7 Object 6010_h - Preset values for multi-sensor devices

The parameter „Preset values for multi-sensor devices“ is similar to object 6003_h. In sub-index 00_h the number of supported channels is defined.

The Preset function supports adaption of the encoder zero point to the mechanical zero point of the system.

The output position values in the sub-indices of object 6020_h are set to the sub-indices of the parameter „Preset value“ in object 6010_h, accordingly. The offset from the position value is calculated and stored in the encoder.

This object is only mandatory for multi-sensor encoders (object 1000_h encoder type: code 10).

OBJECT DESCRIPTION

INDEX	6010 _h
Name	Preset_value_for_multisensor_devices
Object Code	ARRAY
Data Type	Unsigned8

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	C2 Mandatory
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	1
Default Value	no

Sub-Index	01 _h
Description	Preset_value_channel_1
Object Class	C2 Mandatory
Access	rw
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Preset_value_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Preset_value_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Preset value for multi-sensor devices			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.1.8 Object 6020_h - Position values for multi-sensor devices

Similar to object 6004_h the parameter „Position values for multi-sensor devices“ defines the output position value(s) for the communication objects 1800_h and 1802_h.

This object is only mandatory for multi-sensor encoders (object 1000_h encoder type: code 10).

OBJECT DESCRIPTION

INDEX	6020 _h
Name	Position_value_for_multisensor_devices
Object Code	ARRAY
Data Type	Unsigned8

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	C1 Mandatory
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	1
Default Value	no

Sub-Index	01 _h
Description	Position_value_channel_1
Object Class	C1 Mandatory
Access	rw
PDO Mapping	yes
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Position_value_channel_2
Object Class	optional
Access	rw
PDO Mapping	yes
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Position_value_channel_FE
Object Class	optional
Access	rw
PDO Mapping	yes
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Position value for multi-sensor devices			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.1.9 Object 6030_h - Speed value

The parameter „Speed value“ defines the output speed value(s). For linear encoders the speed measuring step is defined in object 6005_h, sub-index 02_h. For rotary encoders the speed dimension is always measuring units per second:

$$\text{speed} = \frac{\text{measuring units}}{\text{second}}$$

This object is only mandatory for multi-sensor encoders (object 1000_h encoder type: code 10).

OBJECT DESCRIPTION

INDEX	6030 _h
Name	Speed_value
Object Code	ARRAY
Data Type	Unsigned8

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	C2 Mandatory
Access	ro
PDO Mapping	no
Value Range	0 - 254
Mandatory Range	0
Default Value	no

Sub-Index	01 _h
Description	Speed_value_channel_1
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Integer16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Speed_value_channel_2
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Integer16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Speed_value_channel_FE
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Integer16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Speed value	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.1.10 Object 6200_h - Cyclic timer

Object 6200_h contains the parameter „Cyclic timer“. The cyclic timer defines the transmission period for all asynchronous PDOs (e.g. PDO 1800_h). A cyclic transmission of the position value is set, when the cyclic timer is programmed > 0. Values between 1 ms and 65535 ms can be selected.

E.g.: 1 ms = 1_h
256 ms = 100_h

OBJECT DESCRIPTION

INDEX	6200 _h
Name	Cyclic timer
Object Code	VAR
Data Type	Unsigned16

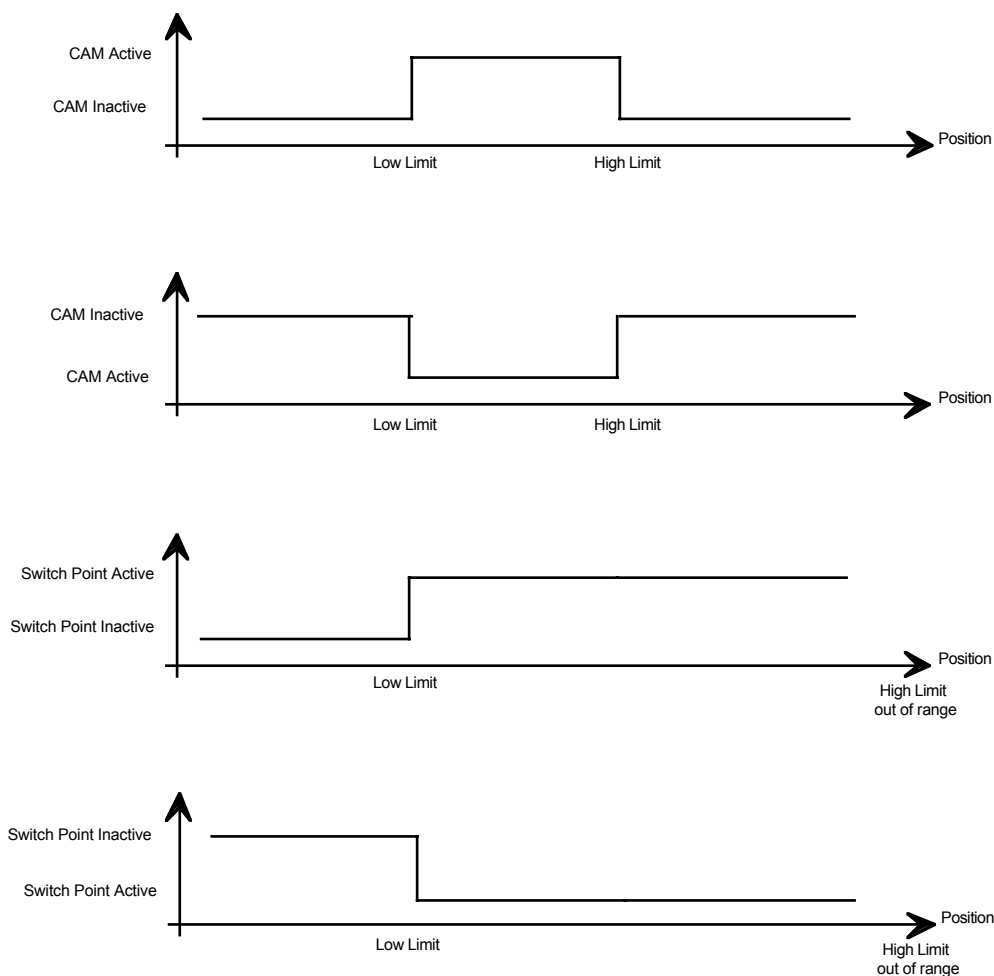
VALUE DESCRIPTION

Object Class	C2 Mandatory
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	0 _h

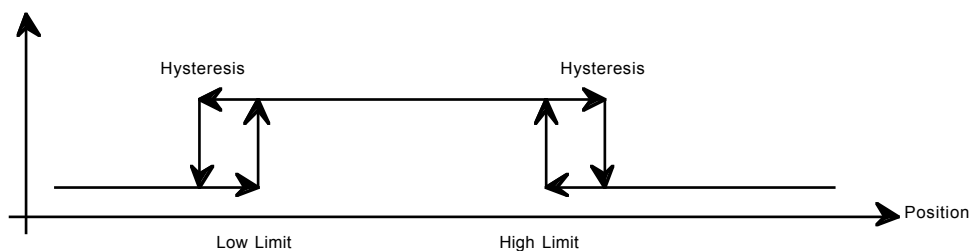
8.2 Encoder Cams

Optional up to 254 cam position channels with a maximum of 8 cam's each channel can be supported by encoder devices. Each cam has parameters for the minimum switch point, the maximum switch point and setting a hysteresis to the switch points.

Possible usage of cam's and switch points:



Usage of hysteresis:



8.2.1 Object 6300_h - Cam state register

The parameter „Cam state register“ defines the status bit of the cam in a cam channel. The status bit set to 1 defines „cam active“. The status bit set to 0 defines „cam inactive“. If the polarity bit of a cam is set (refer to index 6302_h) the actual cam state will be inverted.

OBJECT DESCRIPTION

INDEX	6300 _h
Name	Cam_state_register
Object Code	ARRAY
Data Type	Unsigned8

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	1
Default Value	no

Sub-Index	01 _h
Description	Cam_state_channel_1
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam_state_channel_2
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam_state_channel_FE
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam State register							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
CAM_No_8	CAM_No_7	CAM_No_6	CAM_No_5	CAM_No_4	CAM_No_3	CAM_No_2	CAM_No_1
State	State	State	State	State	State	State	State

8.2.2 Object 6301_h - Cam enable

Each Cam_enable_channel contains the calculation state for a maximum of 8 cam's for one position channel. If the enable bit is set to 1, the cam state will be calculated by the device. In the other case the cam state of the related cam will be set permanently to 0.

OBJECT DESCRIPTION

INDEX	6301 _h
Name	Cam_enable
Object Code	ARRAY
Data Type	Unsigned8

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	1
Default Value	no

Sub-Index	01 _h
Description	Cam_enable_channel_1
Object Class	optional
Access	rw
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	0 _h

Sub-Index	02 _h
Description	Cam_enable_channel_2
Object Class	optional
Access	rw
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	0 _h

...

Sub-Index	FE _h
Description	Cam_enable_channel_FE
Object Class	optional
Access	rw
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	0 _h

STRUCTURE OF PARAMETER

Cam Enable							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
CAM_No_8	CAM_No_7	CAM_No_6	CAM_No_5	CAM_No_4	CAM_No_3	CAM_No_2	CAM_No_1
Enable	Enable	Enable	Enable	Enable	Enable	Enable	Enable

8.2.3 Object 6302_h - Cam polarity

Each Cam_polarity_channel contains the actual polarity settings for a maximum of 8 cam's for one position channel. If the polarity bit is set to 1, the cam state of an active cam will signal by setting the related cam state bit to zero. In the other case the cam state of the related cam will not be inverted.

OBJECT DESCRIPTION

INDEX	6302 _h
Name	Cam_polarity
Object Code	ARRAY
Data Type	Unsigned8

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	1
Default Value	no

Sub-Index	01 _h
Description	Cam_polarity_channel_1
Object Class	optional
Access	rw
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	0 _h

Sub-Index	02 _h
Description	Cam_polarity_channel_2
Object Class	optional
Access	rw
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	0 _h

...

Sub-Index	FE _h
Description	Cam_polarity_channel_FE
Object Class	optional
Access	rw
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	0 _h

STRUCTURE OF PARAMETER

Cam polarity							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
CAM_No_8	CAM_No_7	CAM_No_6	CAM_No_5	CAM_No_4	CAM_No_3	CAM_No_2	CAM_No_1
Polarity	Polarity	Polarity	Polarity	Polarity	Polarity	Polarity	Polarity

8.2.4 Object 6310_h - Cam 1 low limit

Each Cam_low_limit_channel contains the switch point for the lower limit setting for a maximum of 8 cam's for one position channel.

OBJECT DESCRIPTION

INDEX	6310 _h
Name	Cam1_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam1_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam1_low_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam1_low_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 1 low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.5 Object 6311_h - Cam 2 low limit

OBJECT DESCRIPTION

INDEX	6311 _h
Name	Cam2_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam2_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam2_low_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam2_low_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 2 low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.6 Object 6312_h - Cam 3 low limit

OBJECT DESCRIPTION

INDEX	6312 _h
Name	Cam3_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam3_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam3_low_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam3_low_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 3 low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.7 Object 6313_h - Cam 4 low limit

OBJECT DESCRIPTION

INDEX	6313 _h
Name	Cam4_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam4_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam4_low_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam4_low_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 4 low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.8 Object 6314_h - Cam 5 low limit

OBJECT DESCRIPTION

INDEX	6314 _h
Name	Cam5_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam5_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam5_low_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam5_low_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 5 low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.9 Object 6315_h - Cam 6 low limit

OBJECT DESCRIPTION

INDEX	6315h
Name	Cam6_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam6_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam6_low_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam6_low_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 6 low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.10 Object 6316_h - Cam 7 low limit

OBJECT DESCRIPTION

INDEX	6316 _h
Name	Cam7_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam7_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam7_low_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam7_low_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 7 low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.11 Object 6317_h - Cam 8 low limit

OBJECT DESCRIPTION

INDEX	6317 _h
Name	Cam8_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam8_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam8_low_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam8_low_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 8 low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.12 Object 6320_h - Cam 1 high limit

Each Cam_high_limit_channel contains the switch point for the higher limit setting for a maximum of 8 cam's for one position channel.

OBJECT DESCRIPTION

INDEX	6320 _h
Name	Cam1_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam1_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam1_high_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam1_high_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 1 high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.13 Object 6321_h - Cam 2 high limit

OBJECT DESCRIPTION

INDEX	6321 _h
Name	Cam2_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam2_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam2_high_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam2_high_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 2 high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.14 Object 6322_h - Cam 3 high limit

OBJECT DESCRIPTION

INDEX	6322 _h
Name	Cam3_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam3_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam3_high_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam3_high_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 3 high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.15 Object 6323_h - Cam 4 high limit

OBJECT DESCRIPTION

INDEX	6323 _h
Name	Cam4_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam4_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam4_high_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam4_high_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 4 high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.16 Object 6324_h - Cam 5 high limit

OBJECT DESCRIPTION

INDEX	6324 _h
Name	Cam5_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam5_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam5_high_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam5_high_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 5 high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.17 Object 6325_h - Cam 6 high limit

OBJECT DESCRIPTION

INDEX	6325 _h
Name	Cam6_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam6_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam6_high_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam6_high_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 6 high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.18 Object 6326_h - Cam 7 high limit

OBJECT DESCRIPTION

INDEX	6326 _h
Name	Cam7_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam7_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam7_high_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam7_high_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 7 high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.19 Object 6327_h - Cam 8 high limit

OBJECT DESCRIPTION

INDEX	6327 _h
Name	Cam8_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam8_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam8_high_limit_channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam8_high_limit_channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 8 high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.2.20 Object 6330_h - Cam 1 hysteresis

Each Cam_ hysteresis _channel contains the delay setting of switch points for a maximum of 8 cam's for one position channel. For illustration of the hysteresis functionality refer to chapter „8.2 Encoder Cams“.

OBJECT DESCRIPTION

INDEX	6330 _h
Name	Cam1_hysteresis_limit
Object Code	ARRAY
Data Type	Unsigned16

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam1_hysteresis_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam1_ hysteresis _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam1_ hysteresis _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 1 hysteresis	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.2.21 Object 6331_h - Cam 2 hysteresis

OBJECT DESCRIPTION

INDEX	6331 _h
Name	Cam2_hysteresis_limit
Object Code	ARRAY
Data Type	Unsigned16

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam2_hysteresis _channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam2_ hysteresis _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam2_ hysteresis _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 2 hysteresis	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.2.22 Object 6332_h - Cam 3 hysteresis

OBJECT DESCRIPTION

INDEX	6332 _h
Name	Cam3_hysteresis_limit
Object Code	ARRAY
Data Type	Unsigned16

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam3_hysteresis _channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam3_ hysteresis _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam3_ hysteresis _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 3 hysteresis	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.2.23 Object 6333_h - Cam 4 hysteresis

OBJECT DESCRIPTION

INDEX	6333 _h
Name	Cam4_hysteresis_limit
Object Code	ARRAY
Data Type	Unsigned16

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam4_hysteresis _channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam4_ hysteresis _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam4_ hysteresis _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 4 hysteresis	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.2.24 Object 6334_h - Cam 5 hysteresis

OBJECT DESCRIPTION

INDEX	6334 _h
Name	Cam5_hysteresis_limit
Object Code	ARRAY
Data Type	Unsigned16

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam5_hysteresis _channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam5_ hysteresis _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam5_ hysteresis _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 5 hysteresis	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.2.25 Object 6335_h - Cam 6 hysteresis

OBJECT DESCRIPTION

INDEX	6335 _h
Name	Cam6_hysteresis_limit
Object Code	ARRAY
Data Type	Unsigned16

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam6_hysteresis_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam6_ hysteresis _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam6_ hysteresis _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 6 hysteresis	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.2.26 Object 6336_h - Cam 7 hysteresis

OBJECT DESCRIPTION

INDEX	6336 _h
Name	Cam7_hysteresis_limit
Object Code	ARRAY
Data Type	Unsigned16

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam7_hysteresis_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam7_ hysteresis _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam7_ hysteresis _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 7 hysteresis	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.2.27 Object 6337_h - Cam 8 hysteresis

OBJECT DESCRIPTION

INDEX	6337 _h
Name	Cam8_hysteresis_limit
Object Code	ARRAY
Data Type	Unsigned16

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Cam8_hysteresis _channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Cam8_ hysteresis _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Cam8_ hysteresis _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Cam 8 hysteresis	
Byte 0	Byte 1
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.3 Work Area Supervision

It is possible for encoders to define a so called user defined working area. The actual work area information with work area low limit and work area high limit can be stored in objects 6401_h and 6402_h, respectively. This way object 6400_h can also be used as software limit switches.

8.3.1 Object 6400_h - Area state register

The object „area state register“ contains the actual area status of the encoder position. If the position is out of range, a bit will be set in the related position line. If the position is lower than the position value set in object 6401_h „work area low limit“ then bit 2 flags the underflow. If the position is higher than the position value set in object 6402_h „work area high limit“ then bit 1 flags the overflow. If the manufacturer minimum position value or the manufacturer maximum position value (refer to object 650A_h „Module identification“) is reached, bit 0 flags „out of range“.

OBJECT DESCRIPTION

INDEX	6400 _h
Name	Area_state_register
Object Code	ARRAY
Data Type	Unsigned8

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Work_area_state_channel_1
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Work_area_state _channel_2
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Work_area_state _channel_FE
Object Class	optional
Access	ro
PDO Mapping	yes
Value Range	Unsigned8
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Work_area_state							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved	reserved	reserved	reserved	reserved	range underflow	range overflow	out of range

8.3.2 Object 6401_h - Work area low limit

The object „work area low limit“ contains the position value, at which bit 2 of the according work_area_state_channel in object 6400_h flags the underflow of the related work area.

OBJECT DESCRIPTION

INDEX	6401 _h
Name	Work_area_low_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Work_area_low_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Work_area_low_limit _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Work_area_low_limit _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Work area low limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.3.3 Object 6402_h - Work area high limit

The object „work area high limit“ contains the position value, at which bit 1 of the according work_area_state_channel in object 6400_h flags the overflow of the related work area.

OBJECT DESCRIPTION

INDEX	6402 _h
Name	Work_area_high_limit
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	Number_of_available_channels
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	1 - 254
Mandatory Range	no
Default Value	no

Sub-Index	01 _h
Description	Work_area_high_limit_channel_1
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	Work_area_high_limit _channel_2
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

...

Sub-Index	FE _h
Description	Work_area_high_limit _channel_FE
Object Class	optional
Access	rw
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Work area high limit			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.4 Encoder Diagnostics

All encoder diagnostics are read from securely stored parameters.

8.4.1 Object 6500_h - Operating status

This object contains the operating status of the encoder. It gives information on encoder internal programmed parameters.

OBJECT DESCRIPTION

INDEX	6500 _h
Name	Operating Status
Object Code	VAR
Data Type	Unsigned16
Access	ro

STRUCTURE OF PARAMETER

Bit	Function	Bit = 0	Bit =1	C1	C2
0	Code Sequence	CW	CCW	m	
1	Commissioning Diagnostic Control	Not Supp.	Supp.		o
2	Scaling function control	Disa.	Enab.		m
3	Reserved for further use				m
4	Reserved for further use				m
5	Reserved for further use				m
6	Reserved for further use				m
7	Reserved for further use				m
8	Reserved for further use				m
9	Reserved for further use				m
10	Reserved for further use				m
11	Reserved for further use				m
12	Manufacturer specific functions				o
13	Manufacturer specific functions				o
14	Manufacturer specific functions				o
15	Manufacturer specific functions				o

8.4.2 Object 6501_h - SingleTurn resolution (rotary), Measuring step (linear)

The SingleTurn resolution in object 6501_h has different contents depending on the encoder type.

8.4.2.1 Rotary or angle encoders

For rotary or angle encoders object 6501_h gives the number of measuring steps per revolution that are output for the absolute singleturn position value. The maximum singleturn resolution is 2^{32} .

OBJECT DESCRIPTION

INDEX	6501 _h
Name	SingleTurn_resolution
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C1 Mandatory
Access	ro
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

SingleTurn resolution			
Byte 0	Byte 1	Byte 2	Byte 3
2^7 to 2^0	2^{15} to 2^8	2^{23} to 2^{16}	2^{31} to 2^{24}

8.4.2.2 Linear encoders

For linear encoders object 6501_h indicates the measuring step that is output by the encoder. The measuring step is given in nm (0.001μm).

E.g.: 1 μm = 00 00 03 E8_h

OBJECT DESCRIPTION

INDEX	6501 _h
Name	Measuring_step
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C1 Mandatory
Access	ro
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Measuring step			
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ²³ to 2 ¹⁶	2 ³¹ to 2 ²⁴

8.4.3 Object 6502_h - Number of distinguishable revolutions

This object contains the number of distinguishable revolutions that the encoder can output. For a MultiTurn encoder the number of distinguishable revolutions and the SingleTurn resolution gives the measuring range according to the formula below. The maximum number of distinguishable revolutions is 65536 (16 bits).

Measuring range = Number of distinguishable revolutions · SingleTurn resolution

OBJECT DESCRIPTION

INDEX	6502 _h
Name	Number_of_distinguishable_revolutions
Object Code	VAR
Data Type	Unsigned16

VALUE DESCRIPTION

Object Class	C1 Mandatory
Access	ro
PDO Mapping	no
Value Range	Unsigned16
Mandatory Range	no
Default Value	no

8.4.4 Object 6503_h - Alarms

Additionally to the emergency messages, object 6503_h provides further alarm messages. An alarm is set if a malfunction in the encoder could lead to incorrect position value. If an alarm occurs, the according bit is set to logical high until the alarm is cleared and the encoder is able to provide an accurate position value.

OBJECT DESCRIPTION

INDEX	6503 _h
Name	Alarms
Object Code	VAR
Data Type	Unsigned16
Access	ro

STRUCTURE OF PARAMETER

Bit	Function	Bit = 0	Bit =1	C1	C2
0	Position error	No	Yes	o	o
1	Commissioning diagnostics	OK	Error	o	o
2	Reserved for further use				m
3	Reserved for further use				m
4	Reserved for further use				m
5	Reserved for further use				m
6	Reserved for further use				m
7	Reserved for further use				m
8	Reserved for further use				m
9	Reserved for further use				m
10	Reserved for further use				m
11	Reserved for further use				m
12	Manufacturer specific functions				o
13	Manufacturer specific functions				o
14	Manufacturer specific functions				o
15	Manufacturer specific functions				o

8.4.5 Object 6504_h - Supported alarms

Object 6504_h contains the information on supported alarms by the encoder.

OBJECT DESCRIPTION

INDEX	6504 _h
Name	Supported_alarms
Object Code	VAR
Data Type	Unsigned16
Access	ro

STRUCTURE OF PARAMETER

Bit	Function	Bit = 0	Bit =1	C1	C2
0	Position error	No	Yes		m
1	Commissioning diagnostics	No	Yes		m
2	Reserved for further use				m
3	Reserved for further use				m
4	Reserved for further use				m
5	Reserved for further use				m
6	Reserved for further use				m
7	Reserved for further use				m
8	Reserved for further use				m
9	Reserved for further use				m
10	Reserved for further use				m
11	Reserved for further use				m
12	Manufacturer specific functions				o
13	Manufacturer specific functions				o
14	Manufacturer specific functions				o
15	Manufacturer specific functions				o

8.4.6 Object 6505_h - Warnings

Warnings indicate that tolerances for certain internal parameters of the encoder have been exceeded. In contrast to alarm and emergency messages warnings do not imply incorrect position values. All warnings are cleared if the tolerances are again within normal parameters. For the operating time limit warning (bit 3) the warning is only set again after a power-on sequence.

OBJECT DESCRIPTION

INDEX	6505 _h
Name	Warnings
Object Code	VAR
Data Type	Unsigned16
Access	ro

STRUCTURE OF PARAMETER

Bit	Function	Bit = 0	Bit =1	C1	C2
0	Frequency exceeded	No	Yes	o	o
1	Light control reserve	Not reached	Error	o	o
2	CPU watchdog status	OK	Reset generated	o	o
3	Operating time limit warning	No	Yes	o	o
4	Battery charge	OK	Too low	o	o
5	Reference point	Reached	Not reached	o	o
6	Reserved for further use				m
7	Reserved for further use				m
8	Reserved for further use				m
9	Reserved for further use				m
10	Reserved for further use				m
11	Reserved for further use				m
12	Manufacturer specific functions				o
13	Manufacturer specific functions				o
14	Manufacturer specific functions				o
15	Manufacturer specific functions				o

8.4.7 Object 6506_h - Supported warnings

Object 6506_h contains the information on supported warnings by the encoder.

OBJECT DESCRIPTION

INDEX	6506 _h
Name	Supported_warnings
Object Code	VAR
Data Type	Unsigned16
Access	ro

STRUCTURE OF PARAMETER

Bit	Function	Bit = 0	Bit =1	C1	C2
0	Frequency exceeded	Not supp.	Supported		m
1	Light control reserve	Not supp.	Supported		m
2	CPU watchdog status	Not supp.	Supported		m
3	Operating time limit warning	Not supp.	Supported		m
4	Battery charge	Not supp.	Supported		m
5	Reference point	Not supp.	Supported		m
6	Reserved for further use				m
7	Reserved for further use				m
8	Reserved for further use				m
9	Reserved for further use				m
10	Reserved for further use				m
11	Reserved for further use				m
12	Manufacturer specific functions				o
13	Manufacturer specific functions				o
14	Manufacturer specific functions				o
15	Manufacturer specific functions				o

8.4.8 Object 6507_h - Profile and software version

This object contains in the 1st 16 bits the profile version which is implemented in the encoder. It is combined to a revision number and an index.

E.g.: Profile version: 1.40
 Binary code: 00000001 01000000
 Hexadecimal: 1_h 40_h

The 2nd 16 bits contain the software version which is implemented in the encoder. It is combined to a revision number and an index.

E.g.: Software version: 1.40
 Binary code: 00000001 01000000
 Hexadecimal: 1_h 40_h

OBJECT DESCRIPTION

INDEX	6507 _h
Name	Profile_and_software_version
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C2 Mandatory
Access	ro
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

STRUCTURE OF PARAMETER

Profile version		Software version	
Byte 0	Byte 1	Byte 2	Byte 3
2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸	2 ⁷ to 2 ⁰	2 ¹⁵ to 2 ⁸

8.4.9 Object 6508_h - Operating time

Object 6508_h contains the parameter operating time. The operating time monitor stores the operating time for the encoder in operating hours. The operating time is stored in the encoder non volatile memory as long as the encoder is power supplied. The operating time value is presented in 0.1 hours as an unsigned 32 binary value.

If the operating time function is not used the operating time value is set to the maximum value (FF FF FF FF h) by the encoder manufacturer.

OBJECT DESCRIPTION

INDEX	6508 _h
Name	Operating time
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C2 Mandatory
Access	ro
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

8.4.10 Object 6509_h - Offset value

Object 6509_h contains the parameter offset value. The offset value is calculated by the preset function and shifts the position value with the calculated value. The offset value is stored and can be read from the encoder.

OBJECT DESCRIPTION

INDEX	6509 _h
Name	Offset_value
Object Code	VAR
Data Type	Integer32

VALUE DESCRIPTION

Object Class	C2 Mandatory
Access	ro
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

8.4.11 Object 650A_h - Module identification

Object 650A_h contains the parameter „Module identification“: manufacturer offset value, manufacturer minimum position value, manufacturer maximum position value.

In sub-index 00_h, the manufacturer offset value is stored. This value gives information on the shift of the zero point in the number of positions from the physical zero point of the encoder disk.

In sub-index 01_h and 02_h the manufacturer minimum and maximum position value is stored, respectively.

All three values are given in number of steps according to the basic resolution of the encoder and are located in write protected memory area only changeable by the encoder manufacturer.

OBJECT DESCRIPTION

INDEX	650A _h
Name	Module_identification
Object Code	ARRAY
Data Type	Integer32

VALUE DESCRIPTION

Sub-Index	00 _h
Description	manufacturer_offset_value
Object Class	C2 Mandatory
Access	ro
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	0 _h

Sub-Index	01 _h
Description	manufacturer_min_position_value
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

Sub-Index	02 _h
Description	manufacturer_max_position_value
Object Class	optional
Access	ro
PDO Mapping	no
Value Range	Integer32
Mandatory Range	no
Default Value	no

8.4.12 Object 650B_h - Serial number

Object 650B_h contains the encoder serial number. It is given as an unsigned32 binary value. If the parameter serial number is not used the value is set to maximum value FF FF FF FF_h by the encoder manufacturer.

OBJECT DESCRIPTION

INDEX	650B _h
Name	Serial_number
Object Code	VAR
Data Type	Unsigned32

VALUE DESCRIPTION

Object Class	C2 Mandatory
Access	ro
PDO Mapping	no
Value Range	Unsigned32
Mandatory Range	no
Default Value	no

8.5 Other Objects

Objects 650C_h to 65FF_h are reserved for further use.