TWK - ELEKTRONIK GmbH

Specifications for Inclination sensor

NBN 65- … C3 … Nxx

In case of output of accelerations:

Article number NVA65- … Bxx, based on model NBN65
xx: special NVA versions

with
Standard CAN

CANopen DS 301

Version 20.05.2015

Inhalt

1 General

Refer to data sheet 11918 for the electrical and mechanical data.

The sensor system is planned as a component for use in open-air systems such as cranes, lifting platforms, solar systems, etc.

A MEMS acceleration sensor with downstream controller is used as the sensor system.

Data output is carried out using the standard CANopen protocol.

The sensor is equipped with a filter circuit to prevent fast transients and surge voltages on the supply up to 2 kV.

Instead of the inclination, certain special NBN versions directly output the acceleration (<u>without</u> constant component suppression → including static acceleration) (not converted into an inclination). These models bear the usual designation of TWK vibration sensors NVA65-Bxx with special variants xx. However, they differ from the standard NVAs in terms of hardware and parameterisation capability. Instead of the usual NVA documents (data sheet 12634 and specification NVA12657), this specification (NBN12527) and, with restrictions, data sheet NBN11918 apply to these special models (example: NVA65-A100S-1-B14).

2 CANopen functionality

2.1 General

The following baud rates are possible. Default: 20 kBit/s.

Baud rates for X2 Modus:

Oscillator [MHz]	Baud rate [kBit/s]	Number of time units	Sample point	BRPR	SJW	PRS	PHS1	PHS2
16	1000	8	6	1	0	1	2	1
	800	10	8	1	0	2	3	1
	500	16	14	1	0	5	6	1
	250	16	14	3	0	5	6	1
	125	16	14	7	0	5	6	1
	50	16	14	19/13h	0	5	6	1
	20	**16**	**14**	**49/31h**	**0**	**5**	**6**	**1**

2.2 Behaviour in case of error

If the encoder detects an error (node not in STOP status), it sends an emergency message. The error code is stored in object 6503. Object '1029 Error behaviour' is not implemented. In case of error the inclinometer changes to the status PREOPERATIONAL. If the error is not existent any more (error of CAN channel) an EMC message is sent, the error bit is erased. The time distance between Emergency messages is determined through object '1015 Inhibit Time'. The error states of the inclinometer will be present until Reset or Power on.

Emergency Message format:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
EMC Error Code		Error Register	Object 6503		n. u.	n. u.	n. u.

n. u.: not used

EMC Error Codes:

0x FFFF customer error; error in sensor system

0x8120 Error passive status

0x8140 return from status Bus Off

0x8110 Overrun Error message lost.

Error Register Codes see object 1001.

Data format on the bus: Intel format.

Two kinds of errors are distinguished:

1. Error in sensor system (error code 0xFFFF)
   All errors which avoid properly work of the sensor.
2. Communication error (Error code 0x81xx)
   Error due to the bus system, not caused by the sensor.

In case of an error due to the bus system the user has to judge the whole system and to configure the reactions on it.

Examples:

CRC error EEPROM

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Errorcode		Errorregister	Device specific Error		Not used		
0xFF	0xFF	0x81	0x00	Obj. 6503 0x20	0x00	0x00	0x00

Error passive

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Errorcode		Errorregister	Device specific Error		Not used		
0x20	0x81	0x11	0x00	0x00	0x00	0x00	0x00

Return from Bus off

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Errorcode		Errorregister	Device specific Error		Not used		
0x40	0x81	0x11	0x00	0x00	0x00	0x00	0x00

After expiration of Inhibit Time the message „fehlerfreier Betrieb (operation with no error)“ follows:

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Errorcode		Errorregister	Device specific Error		Not used		
0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00

3 CANopen Profile definition

3.1 Overview

Table of all objects

Index	datatype	description	Datalength	storage	M / O	Page
1000	VAR	device_type	LONG	ro	M	10
1001	VAR	error_register	BYTE	ro	M	10
1005	VAR	COB-ID_SYNC	LONG	rw	O	11
1008	VAR	manufacturer_device_name	STRING	ro	O	11
1009	VAR	manufacturer_hardware_version	STRING	ro	O	11
100A	VAR	manufacturer_software_version	STRING	ro	O	11
100E	ARRAY	COB-ID-guarding	LONG	ro	O	12
1010	ARRAY	store_parameters	LONG	-	O	12
1011	ARRAY	restore_default_parameters	LONG	-	O	12
1014	VAR	COB-ID-EMCY	LONG	rw	O	12
1015	VAR	inhibit_time_EMCY	LONG	rw	O	13
1017	VAR	producer_heartbeat_time	WORD	rw	O	13
1018	RECORD	identity object		ro	M	13
Transmit SRDO Communication Parameter						
1800	RECORD	PDO communication parameter		rw	M	14
1801	RECORD	PDO communication parameter		rw	M	14
Inclinometer Objects						
6000	VAR	resolution	WORD	rw	M	18
6010	VAR	position_x_axis	WORD	ro	M	18
6011	VAR	operating_x_axis	BYTE	r/w	M	18
6012	VAR	preset_x_axis	WORD	r/w	M	19
6020	VAR	position_y_axis	WORD	ro	O	19
6021	VAR	operating_y_axis	BYTE	r/w	O	19
6022	VAR	preset_y_axis	WORD	r/w	O	20
6030	VAR	position_z_axis	WORD	ro	O	20
6031	VAR	operating_z_axis	BYTE	r/w	O	20
6032	VAR	preset_z_axis	WORD	r/w	O	21
Objects manufacturer specific						
6200	VAR	cyclic_timer	WORD	rw	O	17
Objects of diagnosis						
6503	VAR	Alarms	WORD	ro	M	22
6504	VAR	supported_alarms	WORD	ro	M 2	22
6506	VAR	supported_warnings	WORD	ro	M 2	22
6507	VAR	profile_and_software_version	LONG	ro	M 2	22
6508	VAR	operating_time	LONG	ro	M 2	23
650B	VAR	serial_number	LONG	ro	M 2	23
LMT Objects						
2000	VAR	node-ID	BYTE	rw	O	16
2001	VAR	bit_rate	BYTE	rw	O	16

Mapping Objects						
1A00	ARRAY	PDO1 mapping parameter		ro	M	15
1A01	ARRAY	PDO2 mapping parameter		ro	M	15

3.2 Process Data Objects PDO

The sensor sends 12 significant data bits.

On every PDO three axis are put out from the objects 6010, 6020 and 6030.

Standard type NBN65 as an inclinometer: inclination angles are output.

Special NVA65 types on the basis of NBN: acceleration values are output.

PDO 1/2

Byte 0								Byte 1							
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LSB								x- axis						MSB	

Byte 2								Byte 3							
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LSB								y- axis						MSB	

Byte 4								Byte 5							
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LSB								z- axis						MSB	

3.3 Service data Objects SDOs

3.3.1 Object 1000 device_typ

The types of sensors are defined as follows:

Coding	Device Typ description
1	One axis with resolution max. 16-bit
2	Two axis with resolution max. 16-bit
3	One axis with resolution max. 32-bit
4	Two axis with resolution max. 32-bit
0005h to 0FFFh	Reserved
1000h to FFFEh	Manufacturer-specifc

Structure device_type:

	Byte 0	Byte 1	Byte 2	Byte 3
Device type	Device Profil Number		Inclinometer Type	
NBN	0x10	0x04	0x02	0x00

device_type

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/value	Action	default
1000	0	device_type	Long -	Long	ro	ROM	0x00020410	-	-

3.3.2 Object 1001 error_register

Bit	M / O	description
0	M	generic error
1	O	current
2	O	voltage
3	O	temperature
4	O	communication error (overrun,error state)
5	O	device profile specific
6	O	Reserved (always 0)
7	O	manufacturer specific

The error register ist the global register. All errors are subsumed in Bit 0. Supported are generic-, communications- and manufacturer specific errors. In every case of error the bit 'generic errror ' is set. In object 'Alarms 6503' can be recognized which error is occurred.

error_register

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/value	Action	default
1001	0	error_register	Byte	Byte	ro	RAM	0, 0x 41, 0x81	-	-

3.3.3 Object 1005 COB-ID-SYNC

Identifies Sync Message, which is sent from the master.
No plausibility check or area check takes place. No support of 29 Bit identifier.

COB-ID-SYNC

Index	Sub	description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/value	Action	default
1005	0	COB-ID-SYNC	Long	Long	rw	E²ROM	1...0x7FF	-	0x80

3.3.4 Object 1008 manufacturer_device_name

Name of the set storaged as string and put out via SDO segment transfer.
“Inclinometer NBN”

manufacturer_device_name

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1008	0	manufacturer_device_name	String	String	ro	ROM	s.o.	-	-

3.3.5 Object 1009 manufacturer_hardware_version

Hardware version of the set stored as string and put out via SDO segment transfer „P-0641”.

manufacturer_hardware_version

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1009	0	manufacturer_hardware_version	String	String	ro	ROM	s.o.	-	-

3.3.6 Object 100A manufacturer_software_version

Software version of the set storaged as string and put out via SDO segment transfer 'NBN Std'.

manufacturer_software_version

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
100A	0	manufacturer_software_version	String	String	ro	ROM	s.o.	-	-

3.3.7 Object 100E COB-ID_GUARD

The object list contains this object because the Guard identifier is a parameter of the manufacturer programming. Type 'read only. No relevance for the customer.

No support of 29 Bit identifier.

COB-ID_GUARD

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
100E	0	COB-ID_GUARD	Long	Long	ro	ROM	0...0x7FF	1)	0x700+Node-Id

1) To chosen identifier the node id has to be added.

3.3.8 Object 1010 store_parameters

Transfer of 'save' in subindex 01 as a pass word all objects which can be written are stored in E²PROM. Object cannot be changed. Read out is possible. 1 is returned (storage via command page 93 DS 301 4.1).

store_parameters

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1010	0	largest_supported_sub-index	-	-	ro	ROM	1	-	-
	1	save_all_parameters	Long	Long	rd / (wr)	ROM	"save"	1)	1

1) Parameters are saved in E²PROM if pass word is correct (save).

3.3.9 Object 1011 restore_default_parameters

Input 'load' as a pass word in subindex 01: default parameters are loaded into RAM. Read out is possible. 1 is returned (Device restores parameters).

restore_default_parameters

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1011	0	largest_supported_sub-index	-	-	ro	ROM	1	-	-
	1	load_all_default_parameters	Long	Long	rd / (wr)	ROM	"load"	1)	1

1) Default parameters are loaded into RAM if pass word is correct (load).

3.3.10 Object 1014 COB-ID-EMCY

Identifier for Emergency Message which is sent by the inclinometer if an alarm occurs.

The identifier is after "Load Default": COB-ID-EMCY + Node Id.

Changing COB ID by the customer the node id is not added any more.

No plausibility check or area check takes place.

No support of 29 Bit identifier.

COB-ID-EMCY

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1014	0	COB-ID-EMCY	Long	Long	rw	E²PROM	-	1)	0x80+Node-Id

1) Evaluation default – status then addition node id.

3.3.11 Object 1015 inhibit_time_EMCY

Time of blocking for reduction of bus occupation in case of EMCY messages which follow very quick. Basis unit: 100µs.

inhibit_time_EMCY

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1015	0	inhibit_time_EMCY	Word	Word	rw	E²PROM	0...0xFFFF	-	1000

3.3.12 Object 1017 producer_heartbeat_time

Value >0 in this object: Heartbeat message on identifier Guard COB Id + Node Id is sent in ms in interval producer_heartbeat_time.

producer_heardbeat_time

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1017	0	producer_heardbeat_time	Word	Word	rw	E²PROM	0...0xFFFF	-	0

Format of Heartbeat Message:

Bit Nr.	7	6	5	4	3	2	1	0
Inhalt	0	Status subscriber						

0: BOOTUP

4: STOPPED

5: OPERATIONAL

127: PRE-OPERATIONAL

3.3.13 Object 1018 identity_object

Contains to the inclinometer dedicated data.

Object is address for Layer Setting Service (LSS).

It is to enter:

1. Manufacturer Id — from CiA
2. Product Code — TWK intern
3. Revision number — TWK Software Revision number
4. Serial number

Serial number can be written in status of manufacturer programming via LSS.

identity_object

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1018	0	largest_supported_sub-index	-	-	ro	ROM	4	-	-
	1	vendor-ID	Long	Long	ro	ROM	0x0000 010D	-	-
	2	product_code	Long	Long	ro	ROM	0x0000 8000	-	-
	3	revision_number	Long	Long	ro	ROM	0x10001	-	-
	4	serial_number	Long	Long	ro(rw)	E²PROM	0……	1)	-

1) Can be written in status manufacturer programming.

3.4 Controlling of Process Data Objects

3.4.1 Structure COB ID

The process data are put out via two Process Data Objects (PDOs).

MSB LSB

EN	x	x	x	x	x	X	x	0	COB ID High	COB ID Low

MSB is the Enable Bit.
Bit 31 = 0 PDO enabled
Bit 31 = 1 PDO disabled

No plausibility check of the other bits. No support of 29 Bit identifier

Table of Transmission types

0 take over with Sync Data and output if changing.
1-240 take over with 1. Sync Data, with n th (1-240) Sync-command output.
252 take over with Sync Data, output with RTR.
253 take over with RTR Data and output.
254 take over data and output if changing.

3.4.2 Object 1800 PDO_asyncron

All asynchronous and cyclic events.
Cycle Timer Objekt 6200 has influence on this PDO.
No synchronous data output possible.
With Transmission type 252 a synchronous data output/take over is possible.
PDO COB Id: Input PDO COB Id. Return: PDO COB Id + Node Id
COB ID: no plausibility check
Inhibit time adjustable in steps 100 µs. Minimum value 1 ms.

Transmit PDO 1

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1800	0	Largest Subindex	-	-	ro	ROM	3	-	-
	1	COB Id	Long	Long	rd / wr	E²PROM	-	1)	0x180
	2	Transmissions type	Byte	Byte	rd / wr	E²PROM	252, 253, 254	-	253
	3	Inhibit time	Word	Word	rd / wr	E²PROM	-	-	0

1) To chosen identifier the node id is added (reading / upload).

3.4.3 Object 1801 Transmit PDO synchron

All synchronous events are executed via this PDO.

For this PDO no inhibit timer is implemented because no capacity overload on the bus is possible within synchronous data output.

No plausibility check for the COB ID.

Transmit PDO 2

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1801	0	größter Subindex	-	-	ro	ROM	2	-	-
	1	COB Id	Long	Long	rd / wr	E²PROM	-	1)	0x280
	2	Transmissions type	Byte	Byte	rd / wr	E²PROM	0....240	-	1

1) To chosen identifier the node id is added (reading / upload).

3.5 Mapping Objects

3.5.1 Object 1A00 Transmit PDO 1 Mapping

The parameter contains for every "Mapping" Object following Coding:

Byte 0	Byte 1	Byte 2	Byte 3
Index		Subindex	Length

Length in hex code (number of bits).

Transmit PDO 1 Mapping

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1A00	0	Largest Subindex	-	-	ro	ROM	1	-	-
	1	first_PDO_mapping_object	Long	Long	ro	ROM	0x6010 0010	-	-
	2	second _PDO_mapping_object	Long	Long	ro	ROM	0x6020 0010	-	-
	3	third _PDO_mapping_object	Long	Long	ro	ROM	0x6030 0010	-	-

3.5.2 Object 1A01 Transmit PDO 2 Mapping

The parameter contains for every "Mapping" Object following Coding:

Byte 0	Byte 1	Byte 2	Byte 3
Index		Subindex	Length

Length in hex code (number of bits).

Transmit PDO 2 Mapping

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
1A01	0	largest Subindex	-	-	ro	ROM	1	-	-
	1	first_PDO_mapping_object	Long	Long	ro	ROM	0x6010 0010	-	-
	2	second _PDO_mapping_object	Long	Long	ro	ROM	0x6020 0010	-	-
	3	third _PDO_mapping_object	Long	Long	ro	ROM	0x6030 0010	-	-

3.6 LMT Objects

3.6.1 Object 2000 node-ID

This is the node ID of the inclinometer. This parameter is valid after storage via object 1010 and after power on.

node-ID

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
2000	0	node-ID	Byte	Byte	rw	E²PROM	1 ...127	-	0x01

3.6.2 Object 2001 bit_rate

Baud rate of CAB bus.

This object can be changed as well via LSS.

See Index of bitrate in following table.

Index	Baud rate [kBaud/s]
0	1000
1	500
2	500
3	250
4	125
5	125
6	50
7	**20**

This parameter is valid after storage via object 1010 and after power on.

bit_rate

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
2001	0	bit_rate	Byte	Byte	rw	E²PROM	0 ...7	-	7

3.7 Objects manufacturer specific

3.7.1 Object 6200 Cyclic Timer

Values > 0: Object 'Position value' is sent cyclic with value ' Cyclic Timer' in ms on PDO 1.

Cyclic Timer

Index	Sub	Description	Length		Storage		Area/ Value	Action	default
			COM	MEM	Typ	Ort			
6200	0	cyclic_timer	Word	Word	rw	XRAM	0...0xFFFF	-	0

3.8 Objects according to profile definition

3.8.1 Object 6000 resolution

Represents the resolution of the 16 bit objects in 1/1000°. If the resolution is not adjustable this parameter is read only. **At NVA65 a resolution of 4096 digit/g is valid.**

Table:

Value	Definition of resolution
1	0,001°
10	0,01°
100	0,1°
1000	1°

resolution

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6000	0	resolution	Word	Word	rw	E²PROM	**s. Tabelle**	Sen	10

3.8.2 Object 6010 position_x_axis

Inclination/acceleration of x-axis with resolution of object 6000.
Is this object disabled (object 6011), the output value is '0'.
Parameter is not to change.

position_x_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6010	0	position_x_axis	Word	Word	ro	E²PROM	0 … 65536	Sen	-

3.8.3 Object 6011 operating_x_axis

Operating Byte of x-axis (inclination or acceleration). This parameter shows how to interpret value of object 6010, resp. if 6010 is active. Only bits Scaling and Inversion are aktiv. All other bits have to be constant zero.
Strukture.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ms			r			s	i

Feld	Value	description
ms		Manufacturer specific
r	0	Reserved
s (scaling)	0	Scaling not enabled
	1	Scaling enabled
i (inversion)	0	Inversion not enabled
	1	Inversion enabled

Is the scaling bit switched off, the value of object 6010 is '0'.

operating_x_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6011	0	operating_x_axis	Byte	Byte	rw	E²PROM	0x02	Sen	-

3.8.4 Object 6012 Preset_x_axis

Preset of x-axis. Resolution as object 6000.

The preset value can differ max. +/-5 ° (+/- 500 digit at NVA) from actual position. If the difference is larger: 'Value range of parameter exceeded' returns as message.

preset_x_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6012	0	preset_x_axis	Word	Word	rw	E²PROM	0 … 5000 0…500 depending of obj. 6000	Sen	0x0

3.8.5 Object 6020 position_y_axis

Inclination/acceleration of x-axis with resolution of object 6000.
Is this object disabled (object 6021), the output value is '0'.
Parameter is not to change.

position_y_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6020	0	position_y_axis	Word	Word	ro	E²PROM	0… 65536	Sen	-

3.8.6 Object 6021 operating_y_axis

Operating Byte of y-axis (inclination or acceleration). This parameter shows how to interpret value of object 6020, resp. if 6020 is active. Only bits Scaling and Inversion are aktiv. All other bits have to be constant zero.

Strukture:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ms			r			s	i

Feld	Value	Description
ms		Manufacturer specific
r	0	reserved
s (scaling)	0	Scaling not enabled
	1	Scaling enabled
i (inversion)	0	Inversion not enabled
	1	Inversion enabled

Is the scaling bit switched off, the value of object 6020 is '0'

operating_y_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6021	0	operating_y_axis	Byte	Byte	rw	E²PROM	0x02	Sen	-

3.8.7 Object 6022 Preset_y_axis

Preset of x-axis. Resolution as object 6000.

The preset value can differ max. +/-5 ° (+/- 500 digit at NVA) from actual position. If the difference is larger: 'Value range of parameter exceeded' returns as message.

preset_y_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6022	0	preset_y_axis	Word	Word	rw	E²PROM	0 … 5000 0…500 abhängig von Objekt 6000	Sen	0x0

3.8.8 Object 6030 position_z_axis

Inclination/acceleration of x-axis with resolution of object 6000.

Is this object disabled (object 6031), the output value is '0'.

Parameter is not to change.

position_z_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6030	0	position_z_axis	Word	Word	ro	E²PROM	0… 65536	SEN	-

3.8.9 Object 6031 operating_z_axis

Operating Byte of y-axis (inclination or acceleration). This parameter shows how to interpret value of object 6030, resp. if 6030 is active. Only bits Scaling and Inversion are aktiv. All other bits have to be constant zero.

Strukture:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ms			r			s	i

Feld	Value	Description
ms		Manufacturer specific
r	0	Reserved
s (scaling)	0	Scaling not enabled
	1	Scaling enabled
i (inversion)	0	Inversion not enabled
	1	Inversion enabled

Is the scaling bit switched off, the value of object 6030 is '0'. The bit Inversion inverts the position value, sign changes.

operating_z_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6031	0	operating_z_axis	Byte	Byte	ro	E²PROM	0x00, 0x01, 0x02, 0x03	Sen	0x02

3.8.10 Object 6032 preset_z_axis

Preset of z-axis. Resolution as object 6000.

The preset value can differ max. +/-5 ° (+/- 500 digit at NVA) from actual position. If the difference is larger: 'Value range of parameter exceeded' returns as message.

preset_z_axis

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6032	0	preset_z_axis	Word	Word	rw	E²PROM	0… 65536	SEN	0

3.9 Diagnosis Objects

3.9.1 Object 6503 alarms

Only one error byte internally. In case of alarm an Emergency Message is sended.
SDO upload: the error byte is storaged in the MSB of the object.
The following errore are evaluated/analyzed:

Bit	Kind of error
0 - 1	Not used
2	Not used
3	internally Inclinometer error
4	EEPROM error New initialisation took place
5	CRC error EEPROM
6	Supply out of Range
7	Error of sensor

Internally Inclinometer error:
ROM, RAM, XRAM error, Communication error between sensor and controller.

alarms

Index	Sub	Description	Length		Storage		Area/ Value	Action	default
			COM	MEM	Typ	Ort			
6503	0	alarms	Word	Byte	ro	RAM	-	s.o.	-

3.9.2 Object 6504 supported_alarms

Supported alarms.
Like Index 6503, possible Error indication.

supportes_alarms

Index	Sub	Description	Length		Storage		Area/ Value	Action	default
			COM	MEM	Typ	Ort			
6504	0	supported_alarms	Word	Word	ro	ROM	0xF800	-	-

3.9.3 Object 6506 supported_warnings

Supported warnings.
No warnings supported. Object 6506 is not valid.

supported_warnings

Index	Sub	Description	Length		Storage		Area/ Value	Action	default
			COM	MEM	Typ	Ort			
6506	0	supported_warnings	Word	Word	ro	ROM	0	-	-

3.9.4 Object 6507 profile_and_software_version

Profile and software version of the inclinometer.
BCD coded by byte.
Version 2.5 means 0x25.

Contains actual version of inclinometer profile.

Profile Version		Software Version	
Byte 0	Byte 1	Byte 2	Byte 3
Bit 7 - 0	Bit 15 - 8	Bit 7 - 0	Bit 15 - 8

profile_and_software_version

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6507	0	profile_and_software_ version	Long	Long	ro	ROM	0x04100100	-	-

3.9.5 Object 6508 Operating time

Not used.

Operating time

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
6508	0	operating time	Long	Long	ro	ROM	0xFFFF FFFF	-	-

3.9.6 Object 650B serial_number

Contains serial number. Programmed by manufacturing.

serial_number

Index	Sub	Description	Length COM	Length MEM	Storage Typ	Storage Ort	Area/ Value	Action	default
650B	0	serial_number	Long	Long	ro(rw)	XRAM	0....	1)	-

1) Programmed by manufacturing.