



Code 85204 Edition 12-2015

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If total failure or malfunction of the sensor can cause danger or injury to the operator or damage to the machinery or equipment it is recommended that additional safety measures should be incorporated into the system.

Any alteration, reconstruction or extension of the sensor is not allowed. Sensor must be operated only within values specified in the datasheet.

Connection to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by trained staff.

Disregard of this advice can lead to malfunctions, damage to property or personal injury and releases the manufacturer from product liability.



DANGER

Do not open sensor

Release of spring under tension can result in injury!

Do not snap cable

Uncontrolled cable retraction can break off cable fixing. Broken fixing and cable can result in injury. Also sensor will be damaged!

Do not travel over range

Uncontrolled cable retraction can result in injury. Also sensor will be damaged!

Special attention during mounting and operation of metal cable sensors

Risk of injury by the measuring cable!

Sensors without cover / housing (OEM sensors)

Risk of injury by moving parts. Mounting and operation of the sensor only with appropriate safety equipment that an injury is impossible!

Do not exceed maximum operating voltage listed in the catalog

Risk of injury. Sensor will be damage



NOTICE

- Before connecting the sensor to the CANbus the devices have to be checked for correct bitrate and unique node-IDs. Both parameters are configurable by Layer-Setting-Service (LSS) or by Service Data Object (SDO).
- After power-on the sensor will enter pre-operational state and send a bootup message being ready for configuration by Service Data Objects. Parameters configured by the user can be stored nonvolatile by SAVE command.
- On receiving „NMT-Node-Start“the sensor transits to operational state and starts process data transmission.
- When „Auto-Start“is configured the sensor will automatically transit to operational after boot-up without a need for the Node-Start message. Node monitoring is supported by Heartbeat protocol.
The Heartbeat protocol provides automatic transmission of the node status (heartbeat message) by the slave within producer heartbeat time window.
- Following the CAN example protocols included in this manual the sensor may be used without CANopen master device.



CAUTION

- Do not damage cable!
- Cable must not be oiled or lubricated!
- Do not snap cable!
- Do not travel over range!
- Do not crack cable!

- Cable travel should be axial to the cable outlet (no misalignment allowed!)
- Do not drag cable along objects!

Precautions



Do not let snap the cable

Uncontrolled retraction of cable may damage sensor.
No warranty will be granted for snapped cables.

Mounting hints for unfavorable conditions

If possible fasten cable fixing with cable in retracted position.
For example, fit a mounting loop and put it around your wrist.
Do not remove the mounting loop before the cable is fastened.
The cable clip may be opened for easy attachment.

Mounting

To ensure proper operation, install the sensor only as described in this manual.

2. INTRODUCTION

The purpose of GSF position sensors is to transform position of a linear and guided movement into an electrical signal. Specifications of measuring range, environment, handling and connections as specified in the catalog, must be followed.

The catalog is part of this instruction manual. If the catalog is not available it may be requested by stating the respective model number. Linear motion of the measuring cable (flexible stainless steel) is converted into rotation by means of a precision cable drum. A spring motor provides torque for the cable retraction. Special design assures precise and reproducible winding of the measuring cable. Cable extraction or retraction is transformed into an electrical signal.

The sensor is based on state-of-the-art multiturn potentiometric technology implementing the functions of a CAN BUS network slave device conforming to standard CANopen protocol proposed by C.i.A. (Can in Automation) and described in the document entitled "CANOpen Application Layer and Communication Profile DS 301 v. 4.2" and in other documents mentioned below. Other reference documents used are C.i.A. DS-410 Device Profile for inclinometer and C.i.A. DSP-305 Layer Setting Services and Protocol V1.1.1.

This document describes the standard CANopen implementations created. It is addressed to CANopen network system integrators and to CANopen device designers who already know the content of the above-mentioned standards defined by C.i.A... The details of aspects defined by CANopen do not pertain to the purpose of this text.

For further information on the protocol you can also contact us via e-mail: at www.gefran.com or contact the GEFTRAN office nearest to you.

Definition and Shortening

CAN: Controller Area Network.

Describes a serial communication bus that implements the "physical" level 1 and the "data link" level 2 of the ISO/OSI reference model.

CAL: CAN Application Layer.

Describes implementation of the CAN in the level 7 "application" of the ISO/OSI reference model from which CANopen derives.

CMS: CAN Message Specification.

CAL service element. Defines the CAN Application Layer for the various industrial applications.

COB: Communication Object.

Unit of transport of data in a CAN network (a CAN message). A maximum of 2048 COBs may be present in a CAN network, each of which may transport from 0 to a maximum of 8 bytes.

COB-ID: COB Identifier.

Identifying element of a CAN message. The identifier determines the priority of a COB in case of multiple messages in the network.

D1 – D8: Data from 1 to 8.

Number of bytes in the data field of a CAN message.

DLC: Data Length code.

Number of data bytes transmitted in a single frame.

ISO: International Standard Organization.

International authority providing standards for various merchandise sectors.

NMT: Network Management.

CAL service element. Describes how to configure, initialize, manage errors in a CAN network.

PDO: Process Data Object.

Process data communication objects (with high priority).

RXSDO: Receive SDO.

SDO objects received from the remote device.

SDO: Service Data Object.

Service data communication objects (with low priority). The value of this data is contained in the "Objects Dictionary" of each device in the CAN network.

TXPDO: Transmit PDO.

PDO objects transmitted by the remote device.

TXSDO: Transmit SDO.

SDO objects transmitted by the remote device.

N.B.: The numbers followed by the suffix "h" represent a hexadecimal value, with suffix "b" a binary value, and with suffix "d" a decimal value. The value is decimal unless specified otherwise.

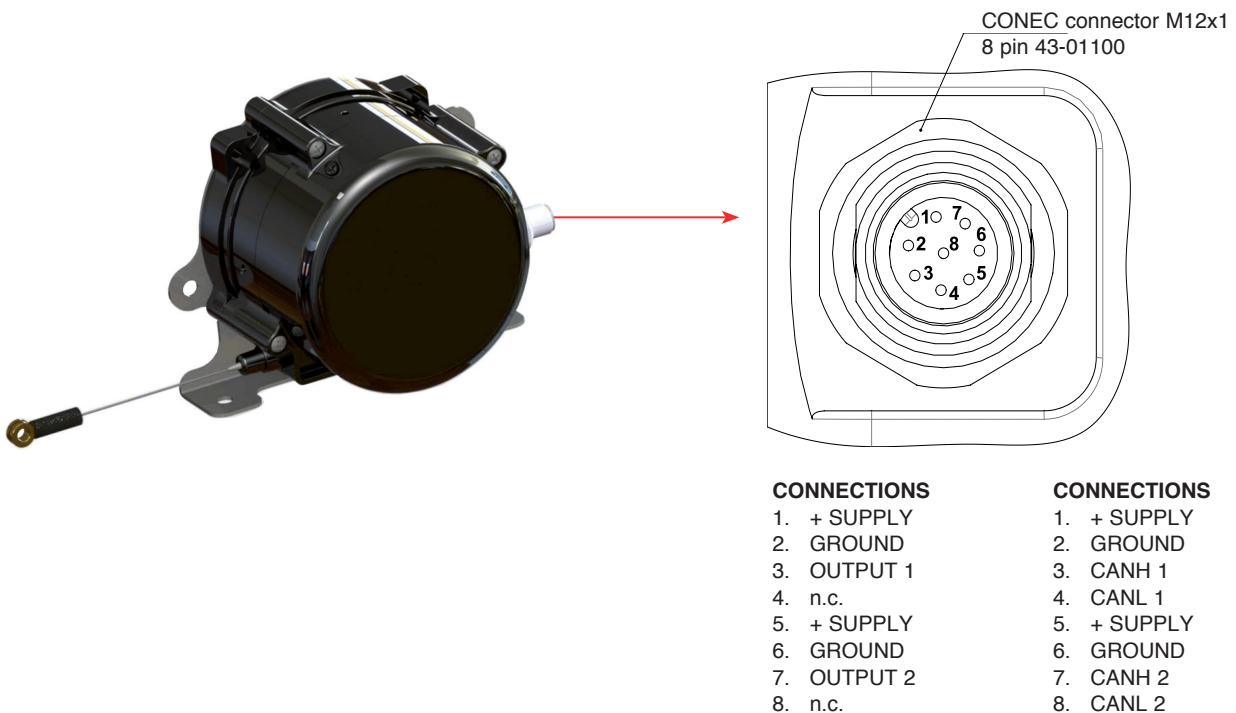
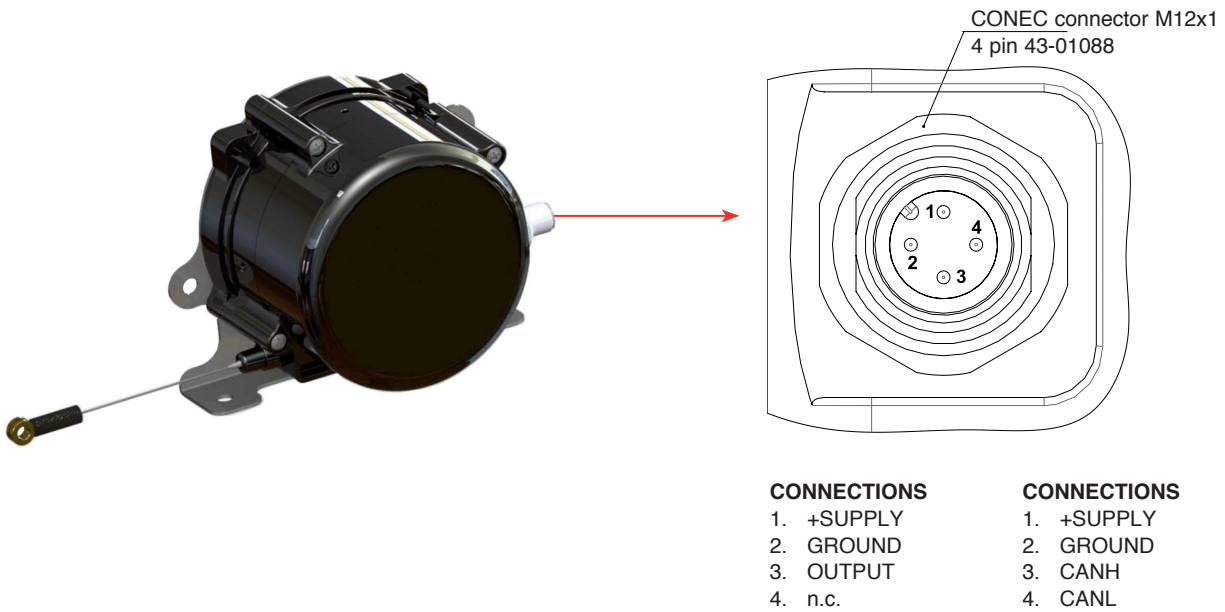
3. ELECTRICAL CONNECTIONS

For the connections refer to the table below:

CONEC M12x1 - 4 poles 43-01088	Meaning
1	+Vs (+10 ... +36 Vdc)
2	O GND
5	CAN H
6	CAN-L

Note: please make sure that the CANbus is terminated.

The impedance measured between CAN H and CAN L must be 60 ohm that means the cable must be connected to a 120 ohm resistor on each ends of the bus line. Internally the transducer is not terminated with the resistor of 120 ohm. Do not confuse the signal lines of the CAN bus, otherwise communication with the transducer is impossible.



4. NETWORK MANAGEMENT (NMT)

The device supports CANopen network management functionality NMT Slave (Minimum Boot Up):

5. BAUD RATE

Node ID can be configurable via SDO communication object 0x20F2 and 0x20F3 (see communication examples at the end of this document).

The default Baud rate is 250kbit/s.

Important Note:

Changing this parameter can disturb the network! Use this service only if one device is connected to the network!

6. Node-ID

Node ID can be configurable via SDO communication object 0x20F0 and 0x20F1 (see communication examples at the end of this document).

The default Node-ID is 7F.

Important Note:

Changing this parameter can disturb the network! Use this service only if one device is connected to the network!

7. PARAMETER SETTINGS

All object dictionary parameters (objects with marking PARA) can be saved in a special section of the internal EEPROM and secured by checksum calculation. The special LSS parameters (objects with marking LSS-PARA), also part of the object dictionary, will be also saved in a special section of the internal EEPROM and secured by checksum calculation. Due to the internal architecture of the microcontroller the parameter write cycles are limited to 100,000 cycles.

8. RESTORE DEFAULT PARAMETERS

Not supported.

9. HEARTBEAT

The heartbeat mechanism for this device is established through cyclic transmission of the heartbeat message done by the heartbeat producer.

One or more devices in the network are aware of this heartbeat message. If the heartbeat cycle fails from the heartbeat producer the local application on the heartbeat consumer will be informed about that event.

The implementation of either guarding or heartbeat is mandatory.

The device supports **Heartbeat Producer** functionality. The producer heartbeat time is defined in object 0x1017.

Heartbeat Message

COB-ID	Byte	0
700+Node-ID	Content	NMT State

10. ERROR HANDLING

Principle

Emergency messages (EMCY) shall be triggered by internal errors on device and they are assigned the highest possible priority to ensure that they get access to the bus without delay (**EMCY Producer**). By default, the EMCY contains the error field with pre-defined error numbers and additional information.

Error Behavior (object 0x4000)

If a serious device failure is detected the object 0x4000 specifies, to which state the module shall be set:

- 0: pre-operational
- 1: no state change (default)
- 2: stopped

EMCY Message

The EMCY COB-ID is defined in object 0x1014. The EMCY message consists of 8 bytes. It contains an emergency error code, the contents of object 0x1001 and 5 byte of manufacturer specific error code. This device uses only the 1st byte as manufacturer specific error code.

Byte	Byte1 Byte2	Byte3	Byte4	Byte5	Byte6 Byte7 Byte8
Description	Emergency Error Code ¹⁾	Error Register (object 0x1001 ²⁾)	Manufacturer specific error code (always 0x00)	Manufacturer specific error code (object 0x4001)	Manufacturer specific error code NOT IMPLEMENTED (always 0x00)
¹⁾ Error Code	0x0000 Error Reset or no Error (Error Register = 0) 0x1000 Generic error				
²⁾ Always 0					

Supported Manufacturer Specific Error Codes (object 0x4001)

Manufacturer Specific Error Code (bit field)	Description
0bxxxxxx1	Generic Error (e.g. potentiometric signal under/above limits, temperature under/above limits)
0bxxx1xxxx\	Program checksum error
0bxx1xxxxx	Flash limit reached - error
0bx1xxxxxx	LSS Parameter checksum error

11. SDO COMMUNICATION

The device fulfils the SDO Server functionality.

12. PDO COMMUNICATION and Length Calculation

Transmit PDO #0 – Length calculation GSF-xxx

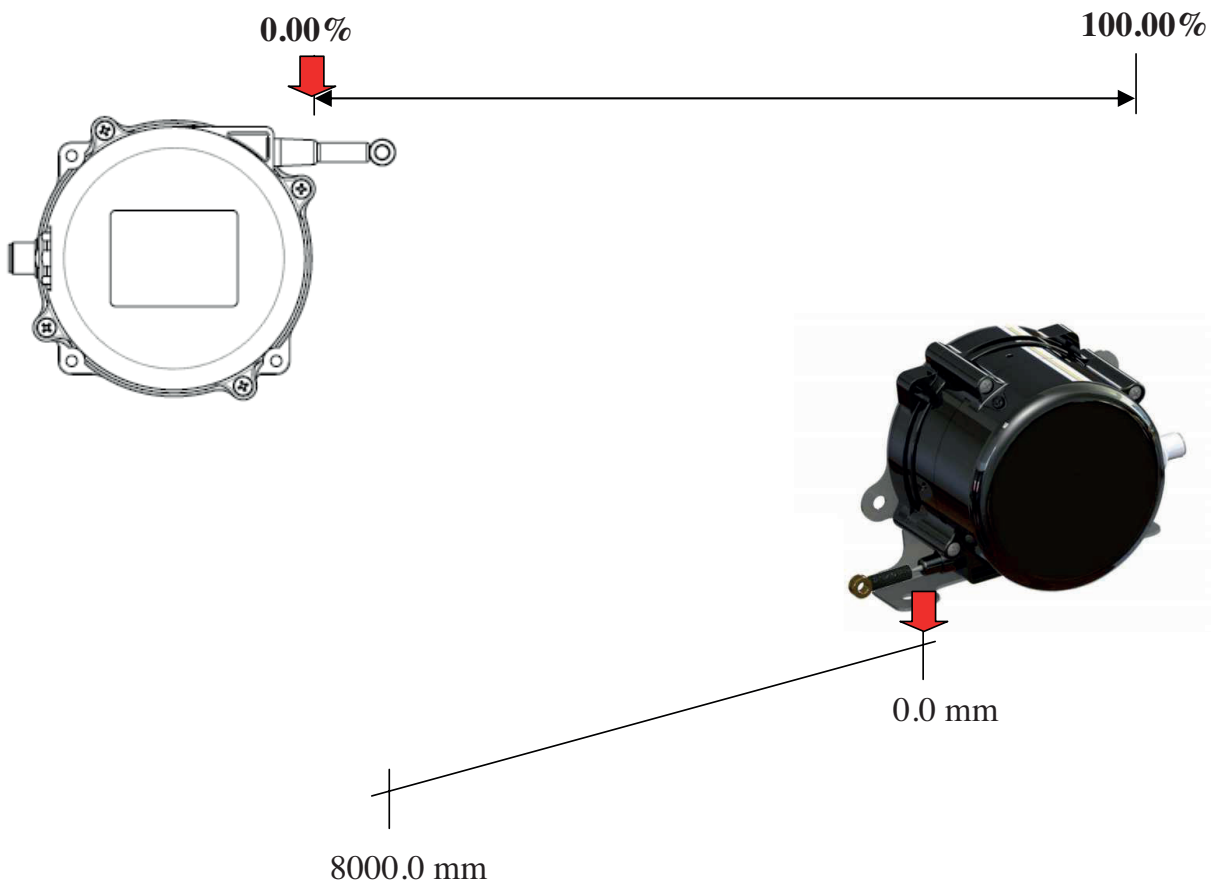
This PDO transmits the length value of the position sensor. The Tx PDO #0 shall be transmitted cyclically, if the cyclic timer (object 0x1800.5) is programmed > 0. Values between 4ms and 65535 ms shall be selectable by parameter settings. The Tx PDO #0 will be transmitted by entering the "Operational" state.

Byte	Byte1	Byte2	Byte3	Byte4	Byte5 Byte6 Byte7 Byte8
Description	POSITION VALUE (object 0x6004) Low-Byte LSB	POSITION VALUE (object 0x6004) ...	POSITION VALUE (object 0x6004) ...	POSITION VALUE (object 0x6004) High-Byte MSB	(0x00)

12.1 EXAMPLE 1: TPDO #0 length 0.0 mm

In the following figures an example of PDO mapping is reported in the case of:

- Node-ID = 7Fh
- Baude-rate = 250 kBaud
- Linear-encoder Cia406 setting as follow:
 - I. Total Measuring Range (object 0x6002.0) = 8000 mm (800 steps x 10 mm)
 - II. Preset Value (object 0x6003.0) = 0 mm (0 steps x 10³ nm)
 - III. Measuring Step (object 0x6005.0) = 0.5 mm (500 steps x 10³ nm)
 - IV. Position Value (object 0x6004.0):



ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
1FFh	00h	00h	00h	00h	00h	00h	00h	00h

Position Value:

Byte 1 LSB (00h) = 00h

Byte 2 = 00h

Byte 3 = 00h

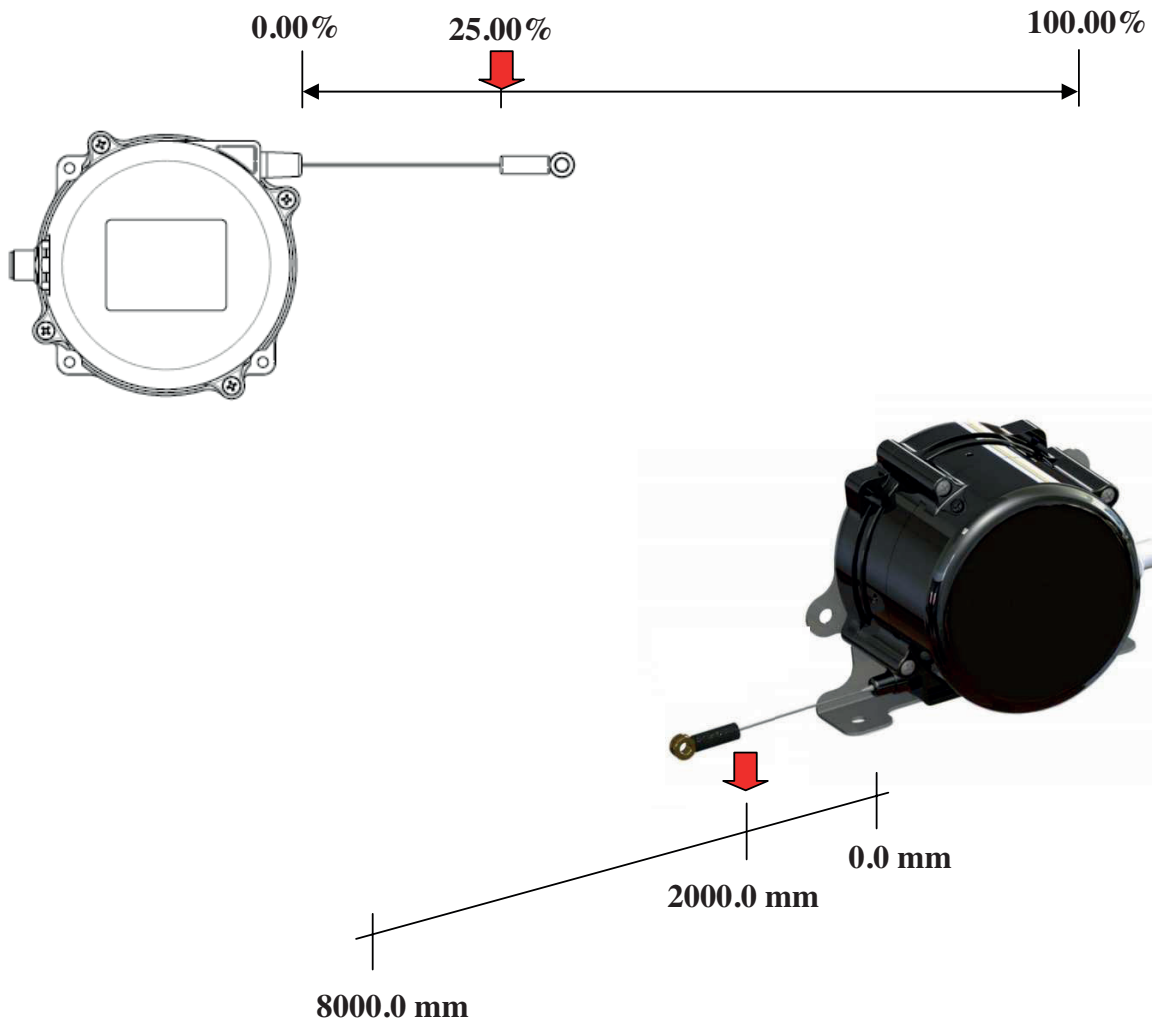
Byte 4 (MSB) = 00h

Position Value = 00000000h to decimal 0d (resolution 0.5 mm) = 0 mm

12.2 EXAMPLE 2: TPDO #0 length 2000.0 mm

In the following figures an example of PDO mapping is reported in the case of:

- Node-ID = 7Fh
- Baud-rate = 250 kBaud
- Linear-encoder Cia406 setting as follow:
 - I. Total Measuring Range (object 0x6002.0) = 8000 mm (800 steps x 10 mm)
 - II. Preset Value (object 0x6003.0) = 0 mm (0 steps x 10³ nm)
 - III. Measuring Step (object 0x6005.0) = 0.5 mm (500 steps x 10³ nm)
 - IV. Position Value (object 0x6004.0):



ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
1FFh	A0h	0Fh	00h	00h	00h	00h	00h	00h

Position Value:

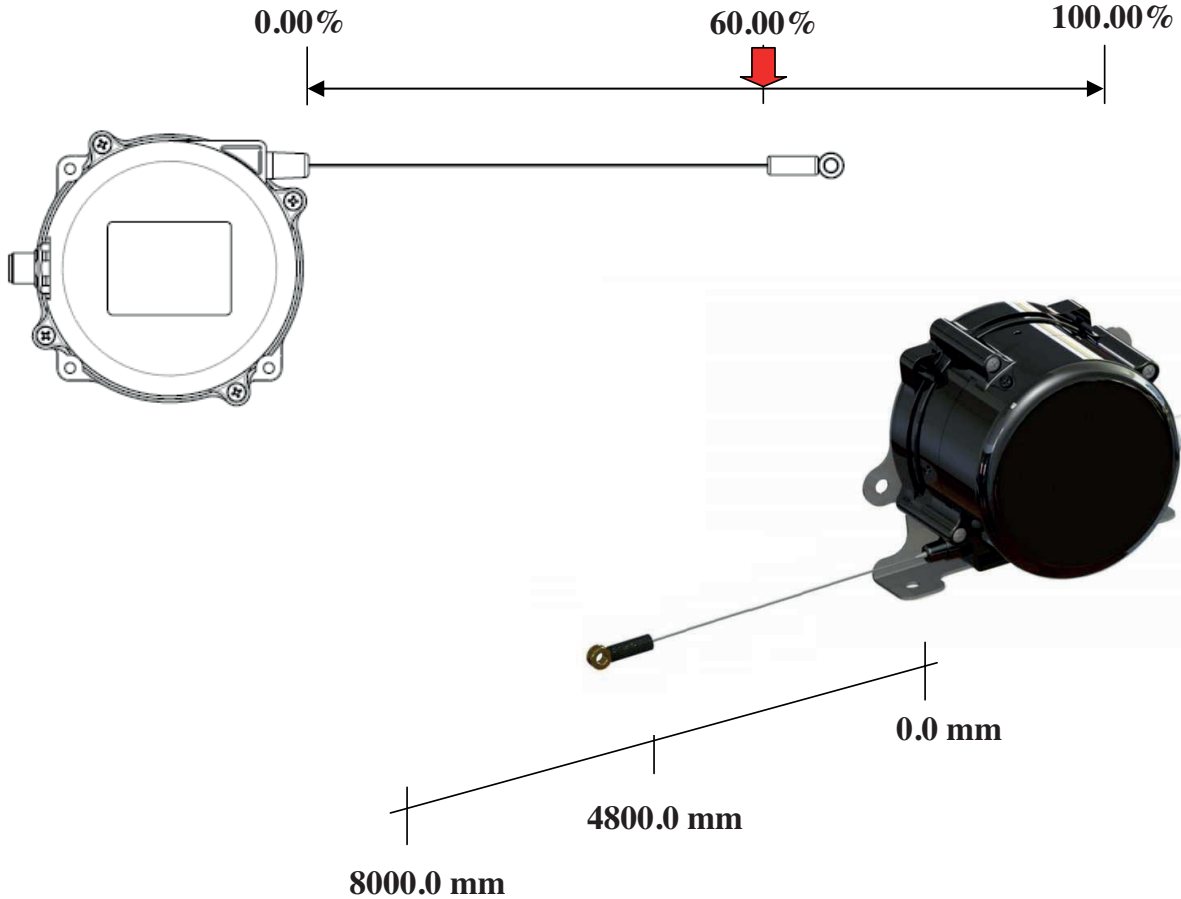
Byte 1 (LSB) = A0h
 Byte 2 = 0Fh
 Byte 3 = 00h
 Byte 4 (MSB) = 00h

Position Value = 00000FA0h to decimal 4000d (resolution 0.5 mm) = 2000.0 mm

12.3 EXAMPLE 3: TPDO #0 length 4800.0 mm

In the following figures an example of PDO mapping is reported in the case of:

- Node-ID = 7Fh
- Baude-rate = 250 kBaud
- Linear-encoder Cia406 setting as follow:
 - I. Total Measuring Range (object 0x6002.0) = 8000 mm (800 steps x 10 mm)
 - II. Preset Value (object 0x6003.0) = 0 mm (0 steps x 10³ nm)
 - III. Measuring Step (object 0x6005.0) = 0.5 mm (500 steps x 10³ nm)
 - IV. Position Value (object 0x6004.0):



ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
1FFh	80h	25h	00h	00h	00h	00h	00h	00h

Position Value:

Byte 1 (LSB) = 80h

Byte 2 = 25h

Byte 3 = 00h

Byte 4 (MSB) = 00h

Position Value = 00002580h to decimal 9600d (resolution 0.5 mm) = 4800.0 mm

13. CANopen FEATURES SUMMARY

Communication Profile

The parameters which are critical for communication are determined in the Communication profile.
This area is common for all CANopen devices.

Index	Sub Index	Name	Type	Access	Default value	Comments
1000h		Device Profile	Unsigned 32	Ro	0x0008019A	Profile 410: Device profile for inclinometer (not fully implemented).
1001h		Error Register	Unsigned 8	Ro	0x00	Always ZERO
1008h		Manufacturer Device Name	String	Const	"GSF"	Refer to GEFTRAN products catalogue: GSF: Dual-axis or single-axis inclinometer sensor
1009h		Manufacturer Hardware Version	String	Const	"1.00"	
100Ah		Manufacturer Software Version	String	Const	"1.10"	
1010h	0	Number of Entries	Unsigned 8	Ro	1	"save" (0x65766173) to store all parameters (objects with marking PARA)
	1	Save all Parameters	Unsigned 32	Wo		
1014h	0	Emergency ID	Unsigned 32	Ro	0x80 + Nodo-ID	
1017h	0	Producer Time / Heart Beat	Unsigned 16	Rw	0	Min= 0 & Max=65535 with unit = 1ms If 0: NOT USED From 1 to 19 NOT ACCEPTED From 20 to 65535 ACCEPTED
1018h	0	Identity Object	Unsigned 8	Ro	4	Refer to "Gefran Product Overview CANopen" Gefran Vendor ID:0x0000093
	1	Vendor ID	Unsigned 32	Ro	0x0000093	
	2	Product Code	Unsigned 32	Ro	0x0000064	
	3	Revision Number	Unsigned 32	Ro	0x0000001	
1200h	SDO Server Parameter					
	0	Number of Entries	Unsigned 8	Ro	2	
	1	COB-ID Client to Server (Rx)	Unsigned 32	Ro	0x600+ Node-ID	
	2	COB-ID Server to Server (Tx)	Unsigned 32	Ro	0x580+ Node-ID	
1800h	0	1 st Transmit PDO Parameter	Unsigned 8	Ro		
	1	COB-ID	Unsigned 32	Ro	180h + Node-ID	
	2	Transmission Type Trans PDO	Unsigned 8	Rw	254 (0xFE)	0x01...0xF0 = synch cyclic Outputs are only updated after "n" synch objects. n = 0x01 (1) ... 0xF0 (240) 0xFC not implemented 0xFD not implemented 0xFE = asynch 0xFF = not implemented
	5	Event timer Trans PDO-PARA	Unsigned 16	Rw	100	Min= 4 & Max=65535 with unit = 1ms
1A00h	Tx PDO [X] 0 Mapping Parameter					
	0	Number of entries	Unsigned 8	Ro	1	Position Value
	1	1 st Mapped Object	Unsigned 32	Ro	0x60040010	
1A03h	Tx PDO [X] 2 Mapping Parameter					
	0	Number of entries	Unsigned 8	Ro	1	CAMs State
	1	1 ^o Mapped Object	Unsigned 32	Ro	0x63000108	

Ro = the parameter can be read only

Rw = the parameter can be read and also written

Wo = the parameter can be written only

Manufacturer Specific Profile Objects

In this section you will find the manufacturer specific profile indices for the transducer.

Index	Sub Index	Name	Type	Access	Default value	Comments
20F0h	0	Setting of the Node ID	Unsigned 8	Rw	0x7F (=127d)	The node ID used to access the sensor in the CANopen network
20F1h	0	Setting of the Node ID	Unsigned 8	Rw	0x7F (=127d)	The node ID used to access the sensor in the CANopen network

A change of the Node ID is only accepted if the entries 20F0 and 20F1 contain the same changed value.

Values below 1 / above 127 are not accepted; the existing setting remains valid.

After setting the new entries a reset must be made so that the new entries become valid (switch off the module for a short time).

Index	Sub Index	Name	Type	Access	Default value	Comments
20F2h	0	Setting of the Baud rate	Unsigned 8	Rw	0x03 (250 kBaud)	Baud rate of the CAN network 0 = 1000 kBaud 1 = 800 kBaud 2 = 500 kBaud 3 = 250 kBaud (default) 4 = 125 kBaud 5 = 100 kBaud 6 = 50 kBaud 7 = 20 kBaud
20F3h	0	Setting of the Baud rate	Unsigned 8	Rw	0x03 (250 kBaud)	Baud rate of the CAN network 0 = 1000 kBaud 1 = 800 kBaud 2 = 500 kBaud 3 = 250 kBaud (default) 4 = 125 kBaud 5 = 100 kBaud 6 = 50 kBaud 7 = 20 kBaud

A change of the Baud rate is only accepted if the entries 20F2 and 20F3 contain the same changed value.

Values above 7 are not accepted; the existing setting remains valid.

After setting the new entries a reset must be made so that the new entries become valid (switch off the module for a short time).

Manufacturer Specific Profile Objects

In this section you will find the manufacturer specific profile indices for the transducer.

Index	Sub Index	Name	Type	Access	Default value	Comments
4000h		Error Behavior - PARA	Unsigned 8	Rw	1	0: Pre-operational 1: no state change 2: stopped Min=0 & Max=255
4001h		Error Code	Unsigned 8	Ro	0	0: no error Min=0 & Max=255
5000h		Automatic NMT Start after Power-On - PARA	Unsigned 8	Rw	0	0: not activated 1: activated Min=0 & Max=1

Ro = the parameter can be read only

Rw = the parameter can be read and also written

Manufacturer Specific Profile Objects (according to CiA DS-406)

In this section you will find the manufacturer specific profile indices for the transducer as LINEAR ENCODER.

Index	Sub Index	Name	Type	Access	Default value	Comments
6000h	0	Operating Parameters	Unsigned 16	Ro	0x00 (0d)	Contain the functions for code sequence, commissioning diagnostic control and scaling function control. (*) <i>Optional functions NOT activated in standard versions (always 0x00).</i>
6002h	0	Total Measuring Range	Unsigned 32	Ro	-	Measuring range in 10 mmm steps. <i>Example:</i> Measuring Range 8000 mm Total Measuring Range = 0x0320 (800d)
6003h	0	Preset Value	Unsigned 32	Rw	0x00 (0d)	The Preset function supports adaption of the GSF zero point to the mechanical zero point of the system. The output position value is set to the parameter „Preset value“ and the offset from the position value is calculated and stored in the GSF
6004h	0	Position Value	Unsigned 32	Ro	-	The object 6004h „Position value“ defines the output position value for the communication objects 1800h.
6005h	0	Measuring Steps	Unsigned 32	Rw	0x03E8 (1000d) 10 ³ nm	The parameter „Linear encoder measuring step settings“ defines the measuring step settings for the position value. 10 ³ ... 10 ⁶ nm

Ro = the parameter can be read only

Rw = the parameter can be read and also written

In this section you will find the manufacturer specific profile indices for the transducer as CAM (*optional functions NOT activated in standard version*)

Index	Sub Index	Name	Type	Access	Default value	Comments
6300h	0	CAM State Register	Unsigned 8	Ro	0x00 (0d)	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 6302h) the actual cam state will be inverted.
6301h	0	CAM Enable Register	Unsigned 8	Rw	0x00 (0d)	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.
6302h	0	CAM Polarity Register	Unsigned 8	Rw	0x00 (0d)	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.
6310h	0	CAM 1 – LOW LIMIT	Unsigned 32	Rw	0x00 (0d)	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.

Index	Sub Index	Name	Type	Access	Default value	Comments
6311h	0	CAM 2 – LOW LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6312h	0	CAM 3 – LOW LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6313h	0	CAM 4 – LOW LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6314h	0	CAM 5 – LOW LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6315h	0	CAM 6 – LOW LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6316h	0	CAM 7 – LOW LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6317h	0	CAM 8 – LOW LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6320h	0	CAM 1 – HIGH LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6321h	0	CAM 2 – HIGH LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6322h	0	CAM 3 – HIGH LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6323h	0	CAM 4 – HIGH LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6324h	0	CAM 5 – HIGH LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6325h	0	CAM 6 – HIGH LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6326h	0	CAM 7 – HIGH LIMIT	Unsigned 32	Rw	0x00 (0d)	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.
6327h	0	CAM 8 – HIGH LIMIT	Unsigned 32	Rw	0x00 (0d)	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.

Ro = the parameter can be read only

Rw = the parameter can be read and also written

Wo = the parameter can be written only

(*) Operating Parameters (Object 0x6000)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
-	-	-	-	-	-	-	-	-	-	-	-	MD	SF	-	-
MSB	LSB

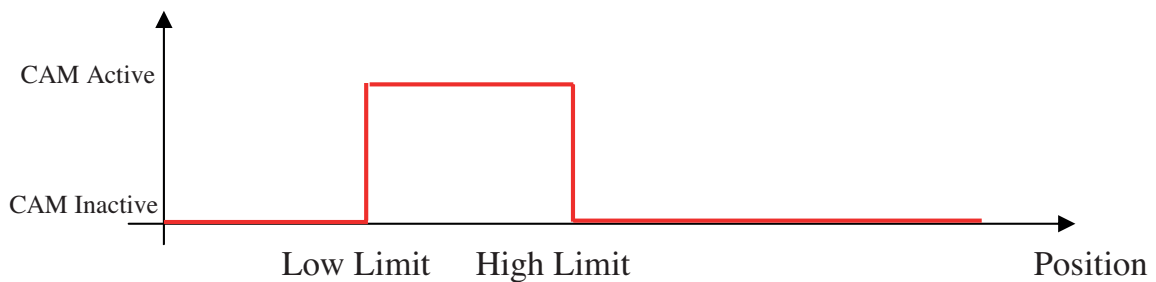
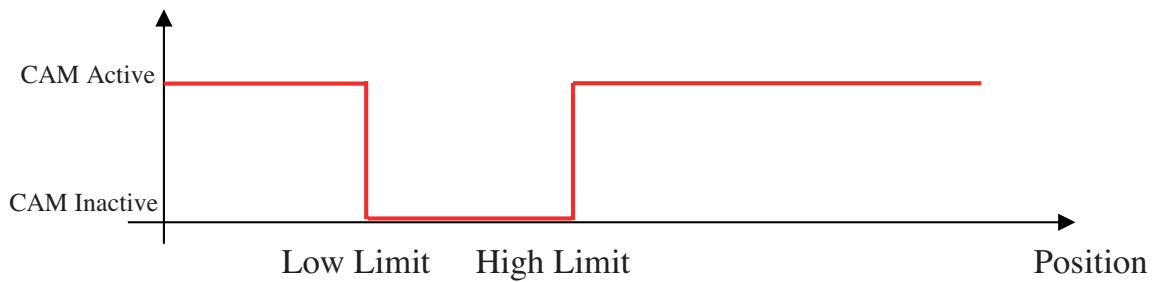
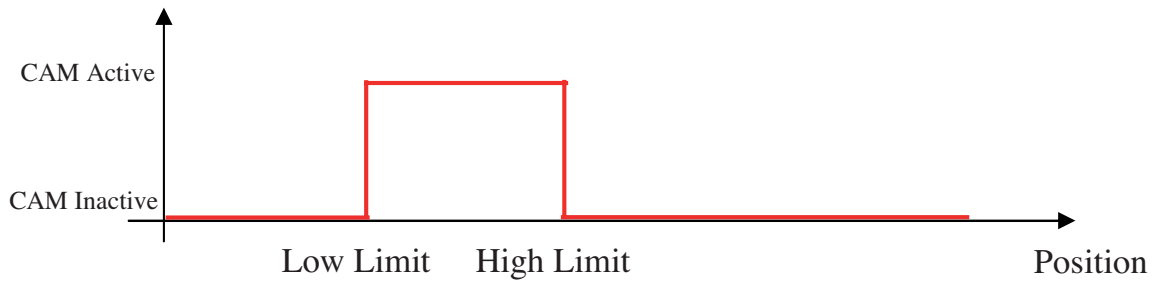
MD = 0/1 Measuring Direction UP/DOWN

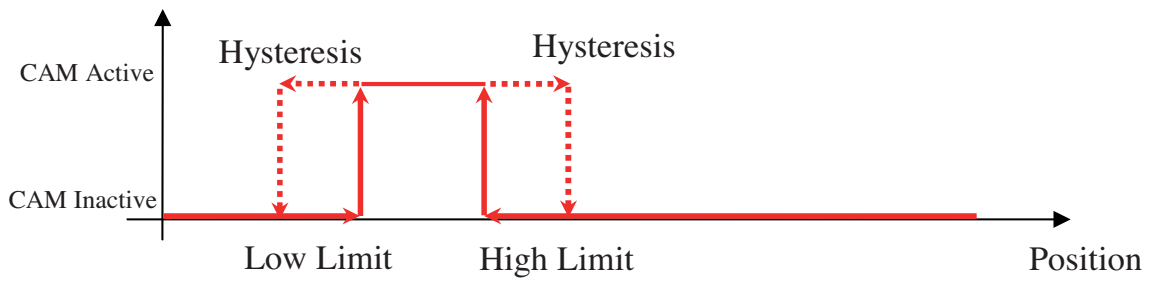
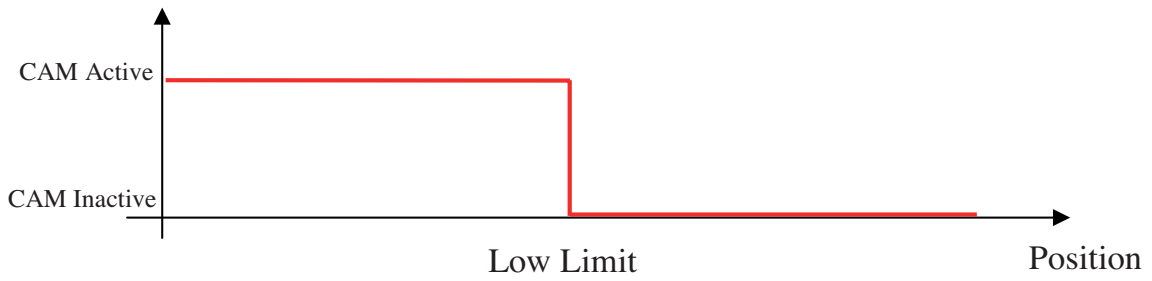
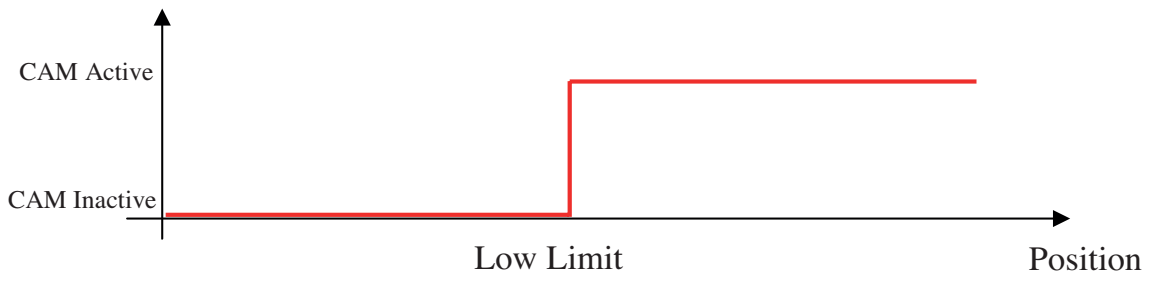
SF = 0/1 Scaling Function DISABLE/ENABLE

GSF Cams functionality (optional functions NOT activated in standard version)

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:





1) How to change the Baud Rate Setting from 250 kbaud to 500 kbaud

With Service Data Object (S.D.O.) the access to entries of a device Object Dictionary is provided. As these entries may contain data of arbitrary size and data type SDOs can be used to transfer multiple data sets from a client to a server and vice versa.

Structure of SDO-request by the Master

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
600+Node-ID	8	CMD	Index		Sub-Index	Data			

Structure of SDO-answer by the Slave

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
580+Node-ID	8	CMD	Index		Sub-Index	Data			

Write first SDO (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	2Fh	F2h	20h	00h	02h	00h	00h	00h

Write second SDO (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	2Fh	F3h	20h	00h	02h	00h	00h	00h

Object:

20F2h	0	Setting of the Baude rate	Unsigned 8	Rw	0x03 (250 kBaud)	Baud rate of the CAN network 0 = 1000 kBaud 1 = 800 kBaud 2 = 500 kBaud 3 = 250 kBaud (default) 4 = 125 kBaud 5 = 100 kBaud 6 = 50 kBaud 7 = 20 kBaud
20F3h	0	Setting of the Baude rate	Unsigned 8	Rw	0x03 (250 kBaud)	Baud rate of the CAN network 0 = 1000 kBaud 1 = 800 kBaud 2 = 500 kBaud 3 = 250 kBaud (default) 4 = 125 kBaud 5 = 100 kBaud 6 = 50 kBaud 7 = 20 kBaud

The supported baudrate are listed in the following table:

Byte5	Baudrate
07h	20 kBaud
06h	50 kBaud
05h	100 kBaud
04h	125 kBaud
03h	250 kBaud
02h	500 kBaud
01h	800 kBaud
00h	1000 kBaud

The answer after successful storing you will receive is:

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	F2h	20h	00h	00h	00h	00h	00h

and

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	F3h	20h	00h	00h	00h	00h	00h

IMPORTANT NOTE:

A change of the Baud rate is only accepted if the entries 0x20F2 and 0x20F3 contain the same changed value. Values above 7 are not accepted; the existing setting remains valid.

After setting the new entries a reset must be made so that the new entries become valid (switch off the module for a short time).

2) How to change the ID-Node from 0x7Fh (127d) to 0x06h (6d)

With Service Data Object (S.D.O.) the access to entries of a device Object Dictionary is provided. As these entries may contain data of arbitrary size and data type SDOs can be used to transfer multiple data sets from a client to a server and vice versa.

Structure of SDO-request by the Master

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
600+Node-ID	8	CMD	Index		Sub-Index	Data			

Structure of SDO-answer by the Slave

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
580+Node-ID	8	CMD	Index		Sub-Index	Data			

Write first SDO (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	2Fh	F0h	20h	00h	06h	00h	00h	00h

Write second SDO (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	2Fh	F1h	20h	00h	06h	00h	00h	00h

Object:

20F0h	0	Setting of the Node ID	Unsigned 8	Rw	0x7F (= 127d)	The Node ID used to access the sensor in the CANopen
20F1h	0	Setting of the Node ID	Unsigned 8	Rw	0x7F (= 127d)	The Node ID used to access the sensor in the CANopen

The supported Node-ID are 0x01 to 0x7F

The answers after successful storing you will receive is:

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	F0h	20h	00h	00h	00h	00h	00h

and

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	F1h	20h	00h	00h	00h	00h	00h

IMPORTANT NOTE:

A change of the Node ID is only accepted if the entries 0x20F0 and 0x20F1 contain the same changed value. Values below 1 / above 127 are not accepted; the existing setting remains valid. After setting the new entries a reset must be made so that the new entries become valid (switch off the module for a short time).

3) How to change the PDO rate (time interval) from 100 ms to 20 ms

With Service Data Object (S.D.O.) the access to entries of a device Object Dictionary is provided. As these entries may contain data of arbitrary size and data type SDOs can be used to transfer multiple data sets from a client to a server and vice versa.

Structure of SDO-request by the Master

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
600+Node-ID	8	CMD	Index		Sub-Index	Data	Data		

Structure of SDO-answer by the Slave

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
580+Node-ID	8	CMD	Index		Sub-Index	Data	Data		

Write (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	2Bh	00h	18h	05h	14h	00h	00h	00h

Object:

1800h	0	1 st Transmit PDO Parameter	Unsigned 8	Ro		
	1	COB-ID	Unsigned 32	Ro	180h+ Node-ID	
	2	Transmission Type	Unsigned 8	Rw	254	Asynchronous transmission.
	3	Inhibit Time	Unsigned 16	Ro	0	Min=0 & Max=65535 with unit=1ms
	4	Reserved	//	//		
	5	Timer	Unsigned 16	Rw	100	Min=0 & Max=65535 with unit=1ms

The answer after successful storing you will receive is:

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	00h	18h	05h	00h	00h	00h	00h

With the aim to save functionality write the “save” command as below:

Write (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	23h	10h	10h	01h	73h	61h	76h	65h

Note: save command is given by sending the code:

73h	61h	76h	65h
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Where:

73h = ASCII code "s"

61h = ASCII code "a"

76h = ASCII code "v"

65h = ASCII code "e"

The answer after successful storing you will receive is:

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	10h	10h	01h	00h	00h	00h	00h

IMPORTANT NOTE:

After setting the new entries a reset must be made so that the new entries become valid (switch off the module for a short time).

**4) How to activate an automatic NMT Start after Power ON
(the PDO will be send automatically after power ON)**

With Service Data Object (S.D.O.) the access to entries of a device Object Dictionary is provided. As these entries may contain data of arbitrary size and data type SDOs can be used to transfer multiple data sets from a client to a server and vice versa.

Structure of SDO-request by the Master

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
600+Node-ID	8	CMD	Index		Sub-Index	Data			

Structure of SDO-answer by the Slave

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
580+Node-ID	8	CMD	Index		Sub-Index	Data			

Write (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	2Fh	00h	50h	00h	01h	00h	00h	00h

Object:

5000h		Automatic NMT Start after Power-On - PARA	Unsigned 8	Rw	1	0: not activated 1: activated Min=0 & Max=1
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The answer after successful storing you will receive is:

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	00h	50h	00h	00h	00h	00h	00h

With the aim to save functionality write the “save” command as below:

Write (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	23h	10h	10h	01h	73h	61h	76h	65h

Note: save command is given by sending the code:

73h	61h	76h	65h
-----	-----	-----	-----

Where:

73h = ASCII code "s"

61h = ASCII code "a"

76h = ASCII code "v"

65h = ASCII code "e"

The answer after successful storing you will receive is:

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	10h	10h	01h	00h	00h	00h	00h

IMPORTANT NOTE:

After setting the new entries a reset must be made so that the new entries become valid (switch off the module for a short time).

5) How to Preset the Position Value (via object 0x6003.0) to 0.0 mm

The value "...Preset Value" (object 0x6003.0) affects the display of the Position Value. The value entered in "...Preset Value" immediately corrects the measured value of the sensor cell at the instant tacc. A typical application is the compensation of display errors due to mounting (e.g. sensor zeroing).

The sensor must first be brought to a defined position.

With Service Data Object (S.D.O.) the access to entries of a device Object Dictionary is provided. As these entries may contain data of arbitrary size and data type SDOs can be used to transfer multiple data sets from a client to a server and vice versa.

Structure of SDO-request by the Master

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
600+Node-ID	8	CMD	Index		Sub-Index	Data	Data	Data	Data

Structure of SDO-answer by the Slave

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
580+Node-ID	8	CMD	Index		Sub-Index	Data	Data	Data	Data

Write (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	2Bh	12h	60h	00h	00h	00h	00h	00h

Object:

6003h	0	Preset Value	Unsigned 32	Rw	0x00 (0d)	The Preset function supports adaption of the GSF zero point to the mechanical zero point of the system. The output position value is set to the parameter „Preset value“ and the offset from the position value is calculated and stored in the GSF			
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The answer after successful storing you will receive is:

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	03h	60h	01h	00h	00h	00h	00h

With the aim to save functionality write the “save” command as below:

Write (in the example the Node-ID = 0x7F)

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
67Fh	23h	10h	10h	01h	73h	61h	76h	65h

Note: save command is given by sending the code:

73h	61h	76h	65h
-----	-----	-----	-----

Where:

73h = ASCII code "s"

61h = ASCII code "a"

76h = ASCII code "v"

65h = ASCII code "e"

The answer after successful storing you will receive is:

ID	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
5FFh	60h	10h	10h	01h	00h	00h	00h	00h

IMPORTANT NOTE:

After setting the new entries a reset must be made so that the new entries become valid (switch off the module for a short time).

