

*code 85191A Edit. 02 - 02-2012-ENG*

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**Summary**

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# 1. INTRODUCTION

The MD/WD/KD pressure transducer implements 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. 4.0" dated 16 June 1999 and in other documents mentioned below.

To enable the application with less recent CANopen networks and devices, we guarantee compatibility with the document entitled "CANopen Communication Profile DS 301 v. 3.0" and "CAL."

The MD transducer conforms to Standard DP 404 v. 2.0 of 11/05/1998.

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 CiA. 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](http://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.

## 2. ELECTRICAL CONNECTIONS

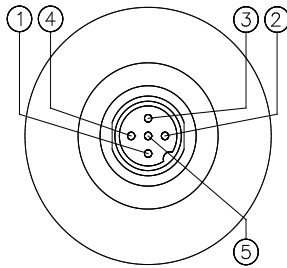
Gefran suggest to use a Belden cable model 3084A or equivalent. For the connections refer to the table below:

Color	Meaning	Connector M12
Red	Supply	2
Black	Supply GND	3
White	CAN H	4
Light Blue	CAN L	5

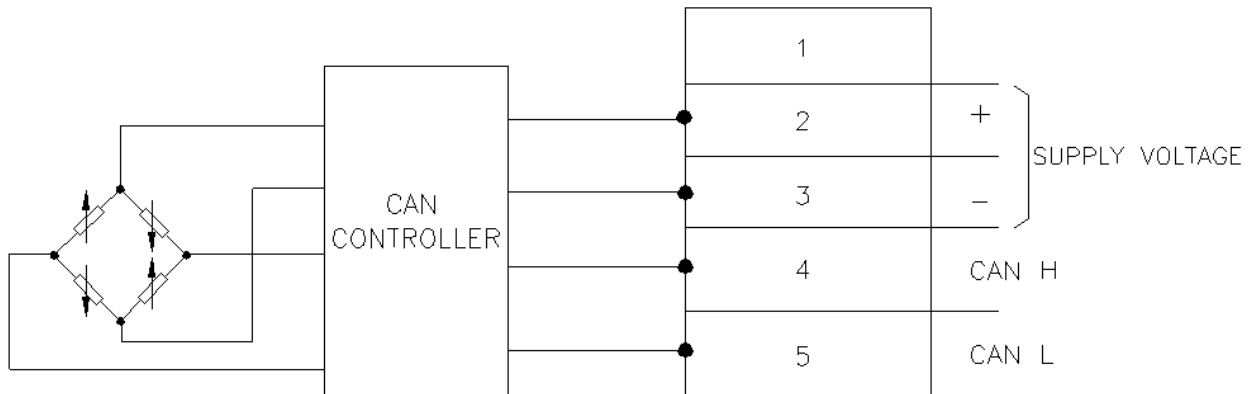
**Note:** please make sure that the CANbus is terminated.

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.



### Wiring



**Note:** the cable shield should be grounded on both ends.

### 3. USING THE TRANSDUCERS

#### Baudrate and Node-ID Setting

By default the Baudrate is set to 500 Kbps and Node-ID is set to number 127. The selection can be done with a CAN command (see object 2000h and 2001h of the Manufacturer Profile).

The new parameters has effect only after a reset node command or a hardware reset.

In CANopen networks the highest address is limited to 127, also a Node-ID of 0 is not allowed. Every node within a CANopen network must have a unique ID, two nodes with the same ID are not allowed.

The supported baudrates of the transducer are given in the following table. The values are recommended by the CiA.

The Baudrate selection can be done via CAN using the appropriate command (see object 2001h in the Manufacturer Profile); in the table are shown the allowed Baudrate values and the values that have to be transmitted on the Can bus in order to change the Baudrate to the desired value too.

Baudrate (kBit / s)	Number
1000	9
800	8
500	7
250	6
125	5
100	4
50	3
20	2
10	1

The maximum cable length depends on the selected baudrate. The following table shows the maximum cable length recommended by CiA.

Baudrate (kBit / s)	Cable length in m
1000	25
800	50
500	100
250	250
125	500
100	650
50	1000
20	2500
10	5000

#### Diagnosis in Pre-Operational State

After power-on the LED present on the top of the transducer will be turned on and off for a short moment and turned on again.

Status of the LED	Meaning
Quick flashing (2 times per second)	Device is in Pre-Operational state
Off	Supply voltage not ok, hardware not ok
Short Flashes every second (10ms flashes)	Input is left open or wrong sensor type
On	Supply Voltage ok but no CAN connection; maybe the wrong baudrate is selected or any other physical error on the bus.

## Diagnosis in Operational State

With the help of the LED the communication on the CAN bus as well as the state of the sensor input can be supervised.

Status of the LED	Meaning
Quick flashing (2 times per second)	Device is in Pre-Operational state
Slow blinking (1 Hz)	Device is in Operational State and there is communication with the device via CANbus
Short Flashes every second (10ms flashes)	Input is left open or wrong sensor type

## Diagnosis in Stop State

Status of the LED	Meaning
On	Device is in Stop State

## 4. CANOpen PROTOCOL

### Communication Object

In order to reduce configuration effort for simple networks a default identifier allocation scheme is defined.

The Predefined Connection Set uses a standard CAN frame with 11 bits identifier (COB-ID) which consists of 4 bit of Function Code (which determines the object priority) and 7 bit of Node-ID (which allows to uniquely identify the node).

If the COB-ID is equal to zero the message is broadcast that means it is applied to all the nodes in the network.

**COB-ID = Function Code (4 Bit) + Module-ID (7 Bit)**

Object	Function Code (bin)	COB-ID Hex	COB-ID Dec
NMT	0000	000	0
SYNC	0001	080	128
EMERGENCY	0001	081-0FF	129-255
TX PDO1	0011	181-1FF	385-511
TX PDO2	0101	281-2FF	641-767
TX SDO	1011	581-5FF	1409-1535
RX SDO	1100	601-67F	1537-1663
HEART BEAT	1110	701-77F	1793-1919

### Network Management

The Network Management (NMT) is node oriented and follows a Master / Slave structure. NMT objects are used for executing NMT services. Through NMT services nodes are initialised, started, monitored, resetted or stopped.

All nodes are regarded as Slaves. Every node is uniquely identified in the network by its Node-ID ( 1 to 127 ).

The possible operative states are:

- Initialization
- Pre – Operational
- Operational
- Stopped

The following table shows the relation between communication states and communication objects. Services on the listed communication objects may only be executed if the devices involved in the communication are in the appropriate communication states.

Object	Initialization	Pre-Operational	Operational	Stop
Network Management		X	X	
SYNC		X	X	
EMERGENCY		X	X	
PDO			X	
SDO		X	X	
Heart Beat Protocol		X	X	X
Boot up	X			

The **Initialization** state is divided into three sub-states:

1. **INIT:** this is the first sub-state the device enters after a power-on or hardware reset.  
After finishing the basic node initialisation the device executes the write boot-up object service and enters the state Pre-Operational autonomously. Power-on values are the last stored parameters.
2. **RESET APPLICATION:** In this state the parameters of the manufacturer specific profile area and of the standardised device profile area are set to their power-on values. After setting of the power-on values the state Reset Communication is entered autonomously.
3. **RESET COMMUNICATION:** In this state the parameters of the communication profile area are set to their power-on values. After this the state Init is entered autonomously.

In the **Pre-Operational** state communication via SDO is possible. PDO communication is not allowed. The node may be switched into the operational state directly by sending a start remote node.

In the **Operational** state all communication objects are active. Object Dictionary Access via SDO is possible and the node can handle PDO-communication.

In the **Stopped** state the device stop the communication altogether. If active is possible the heart beat transmission. To modify the operative state of a node on the network, the Master sends on the CAN network the following message:

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
0	2	CS	Node-ID	X	X	X	X	X	X

**CS** = Command Specifier, is the code that corresponds to the operative state.

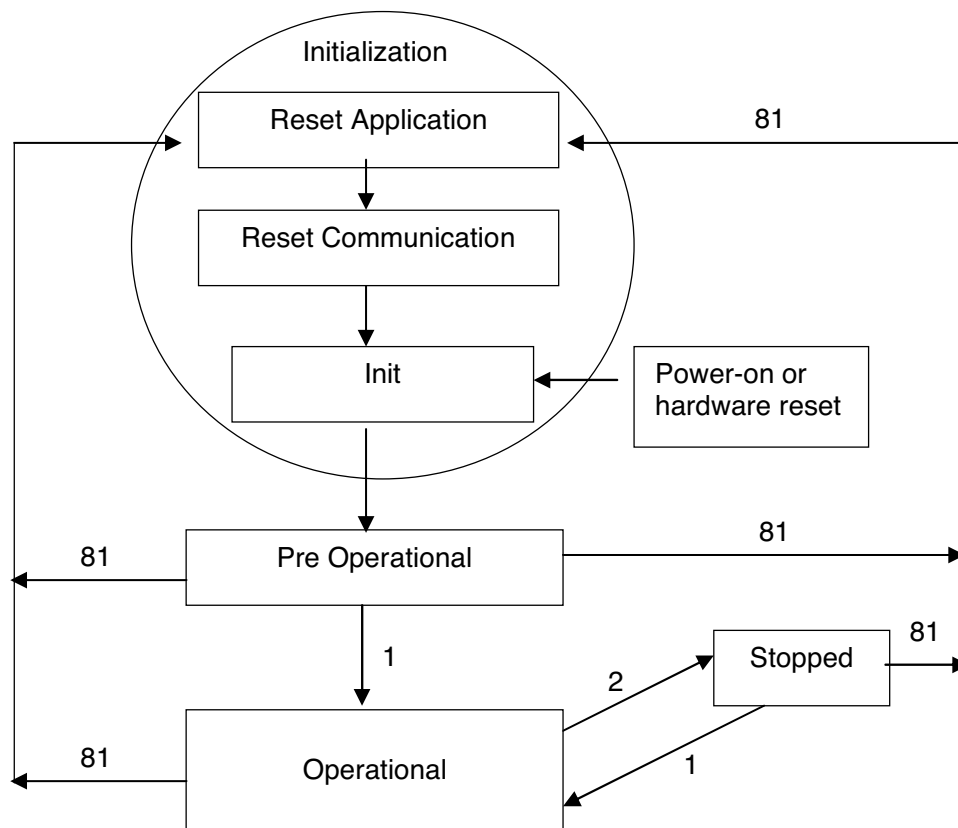
CS	Operative State
1	Operational
2	Stopped
80	Pre-Operational
81	Reset Application
82	Reset Communication

**Node-ID** = is the number that uniquely identify a device on the network. If the Node-ID is equal to zero the command is sent to all nodes presents on the network.

After power-up the transducer transmits a "Boot-Up Message". This message does not contain any information except the "Heart Beat"-ID which is by default 700h (1792d) + Node-ID.

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
700+Node-ID (1792d)	1	0	X	X	X	X	X	X	X

The flow chart shows the states diagram of a device:



## Heart Beat Protocol

On switching on the Heart Beat protocol any other node on the CAN-bus can survey the sending node (Heart Beat producer). This technique is used to monitor the active nodes on the bus for safety reasons.

For example nodes which send data autonomously only every 2 minutes, it can be better for the master to survey the node in the meantime.

The Identifier for the Heart Beat producer has the following structure:

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
700+Node-ID (1792d)	1	S	X	X	X	X	X	X	X

The COB-ID can not be changed.

The parameter “S” represents the operative state of the Slave:

S	Operative State
00h	Boot-up
04h	Stop
05h	Operational
7Fh	Pre-Operational

The delay for sending the Heart Beat message is selected under Index 1017h (see the Communication profile).

## SYNC

Synchronous transmission of a message means that the transmission of the P.D.O is fixed in time with respect to the transmission of the SYNC message.

The Synchronisation Object is broadcasted periodically by the SYNC producer. In order to guarantee timely access to the CAN bus the SYNC is given a very high priority identifier (see object 1005h of the Communication profile).

The SYNC has the following structure:

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
80 (128d)	0	X	X	X	X	X	X	X	X

As defined by the synchronous transmission, this message affect only the nodes with the parameter “Transmission Type” (see object 1800h and 1801h of the Communication Profile) between 0d to 240d.



## P.D.O. Communication

The PDO (Process Data Objects) communication service is a method to receive all information from the node in one CAN message. PDO communication with the transducer is only possible in Operational Mode.

The transducer uses a fixed PDO-Mapping, the first PDO contains the pressure value and the input state and the second PDO contains the A/D values, the operating time and the maximum peak measure.

The PDO 1 is by default switched on, the PDO 2 is normally switched off.

### PDO 1 structure: (default = ON)

COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
180+Node-ID (384d)	X	X	X	X	X	X	X	X
	Pressure value (object 7130h)		Analog Input status (object 6150h)	Not used	Not used		Not used	

### PDO 2 structure: (default = OFF)

COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
280+Node-ID (640d)	X	X	X	X	X	X	X	X
	A/D values (object 7100h)		Operating time (object 2230h sub 1)			Maximum peak (object 2220h sub 1)		

## S.D.O.

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.

The contents of the data are defined within the Object Dictionary.

### Structure of SDO-request by the Master

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600+Node-ID (1536d)	8	CMD	Index		Sub-Index	Data			

### Structure of SDO-answer by the Slave

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
580+Node-ID (1408d)	8	CMD	Index		Sub-Index	Data			

The Command Byte **CMD** has the following meaning:

CMD	Meaning
40h	Master wants to read from Slave
42h	Slave answers on the read-request
22h	Master wants to write to Slave
60h	Slave answers on the write-request

The bytes order for the fields "**Index**" and "**Data**" is least significant byte first (Intel format), except for "String" data type (see SDO dictionary).

The minimum time delay between two succeeding SDO-commands should be at least 20ms.

Faster communication might lead to an unpredictable device status.

## S.D.O. Error Messages

The access to an unsupported object (index) leads to an SDO-Error Message. This SDO-Error Message has the following format:

**PDO 1 structure: (default = ON)**

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
	8	80h	Index		Sub-Index	Additional Code		Error Code	Error Class

The COB-ID as well as the Index and Sub-Index correspond to the SDO request.

The error messages may have the following contents:

Error Class	Error Code	Additional Code	Meaning
05h	04h	00h 01h	Client/Server command specifier not valid or unknown
06h	01h	00h 01h	Attempt to read a write only object
06h	01h	00h 02h	Attempt to write a read only object
06h	09h	00h 11h	Sub-index does not exist
06h	02h	00h 00h	Object does not exist

## Emergency Message

Emergency objects are triggered by the occurrence of a device internal error situation and are transmitted from an emergency producer on the device.

An emergency is different from a SDO Error Message. The last one only holds the access error to the object dictionary, whereas an emergency display a severe hardware/software failure.

The emergency message has the following structure:

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
80+Node-ID(128d)	8	Error Code		00h	Manufacturer Specific Error Field				

Supported Error Codes:

Error Code	Meaning
00 00h	No Error
FF 00h	Device Specific Error
81 00h	Communication Error

### Device Specific Error

Sensor break or a short-circuit of sensor

Byte 4 (first byte of the Manufacturer Specific Error Field) holds the information about the specific error type.

b7	b6	b5	b4	b3	b2	b1	b0
			Input 1				Input 1
Short-Circuit of Sensor				Sensor break	Sensor break	Sensor break	Sensor break

## Communication Error

The transducer supports the generation of communication errors. For this error type the internal state of the CAN controller is monitored.

Byte 4 (first byte of the Manufacturer Specific Error Field) holds the value BEh in case of a CAN-bus error.

The value of Byte 5 defines the error type.

Description of byte 5:

b7	b6	b5	b4	b3	b2	b1	b0
Status							

### Status:

#### b7 - Bit is set **Bus Off Status**

The CAN controller is in bus-off state because the error counters reached the maximum value.

#### b6 - Bit is set **Warning Status**

The CAN controller is in warning status.

## 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.

This layout closely conforms with other industrial serial bus system concepts.

Index (hex)	Object
0000	Not used
0001-001F	Static Data Types
0020-003F	Complex Data Types
0040-005F	Manufacturer Specific Complex Data Types
0060-007F	Device Profile Specific Static Data Types
0080-009F	Device Profile Complex Data Types
00A0-0FFF	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

## 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	Pag
1000h	0	Device Profile	Unsigned 32	Ro	Value for DP404	13
1001h	0	Error Register	Unsigned 8	Ro	0	13
1005h	0	COB-ID SYNC-Message	Unsigned 32	Rw	80h	14
1008h	0	Manufacturer Device Name	String	Ro	GSWD	14
1009h	0	Manufacturer Hardware Version	String	Ro	1.01	15
100Ah	0	Manufacturer Software Version	String	Ro	2.01	15
1010h	0	Store Parameter	Unsigned 8	Ro	1	16
	1	Store all Parameters	Unsigned 32	Rw		
1011h	0	Restore Default Parameters	Unsigned 8	Ro	1	16
	1	Restore all Parameters	Unsigned 32	Rw		
1014h	0	Emergency ID	Unsigned 32	Rw	80h + Node-ID	17
1017h	0	Producer Time / Heart Beat	Unsigned 16	Rw	0	17
1018h	0	Identity Object	Unsigned 8	Ro	4	18
	1	Vendor ID	Unsigned 32	Ro	93h	
	2	Product Code	Unsigned 32	Ro	WD0	
	3	Revision Number	Unsigned 32	Ro	00010001h	
	4	Serial Number	Unsigned 32	Ro	yy / ww / s.n. h	
1800h	0	1 <sup>st</sup> Transmit PDO Parameter	Unsigned 8	Ro	5	19
	1	COB-ID	Unsigned 32	Rw	180h + Node-ID	
	2	Transmission Type	Unsigned 8	Rw	FEh	
	3	Reserved	//	//		
	4	Reserved	//	//		
	5	Timer	Unsigned 16	Rw	14h	
1801h	0	2 <sup>nd</sup> Transmit PDO Parameter	Unsigned 8	Ro	5	21
	1	COB-ID	Unsigned 32	Rw	280h + Node-ID	
	2	Transmission Type	Unsigned 8	Rw	FEh	
	3	Reserved	//	//		
	4	Reserved	//	//		
	5	Timer	Unsigned 16	Rw	14h	
1A00h	0	1 <sup>st</sup> Transmit PDO Mapping	Unsigned 8	Ro	2	23
	1	1 <sup>st</sup> Mapped Object	Unsigned 32	Ro	71300110h	
	2	2 <sup>nd</sup> Mapped Object	Unsigned 32	Ro	61500108h	
1A01h	0	2 <sup>nd</sup> Transmit PDO Mapping	Unsigned 8	Ro	3	23
	1	1 <sup>st</sup> Mapped Object	Unsigned 32	Ro	71000110h	
	2	2 <sup>nd</sup> Mapped Object	Unsigned 32	Ro	22300120h	
	3	3 <sup>th</sup> Mapped Object	Unsigned 32	Ro	22200108h	

Ro = the parameter can be read only

Rw = the parameter can be read and also written

Wo = the parameter can be written only

## 1000h Device Profile

By a read-access on Index 1000h the Device Profile can be polled.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1000h	0	Device Profile	Ro	Unsigned 32

**Example:** Read-Access, Node-ID = 2, Index 1000h, Sub-Index = not supported within this Index

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	00h	10h	00h	00h	00h	00h	00h

As answer you will receive from the transducer is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	00h	10h	00h	94h	01h	22h	00h

Byte 5 + Byte 6 = 0194h = 404d (Device Profile Number)

Byte 7 + Byte 8 = 0022h = 22 (Additional Information) - Analog Input + Alarm function

Index 1000h is Read-Only, no Sub-Indices are supported. By writing on this Index (or reading a Sub-Index unequal to "0") you will receive a SDO-Communication Error (see "SDO-Error Messages").

## 1001h Error Register

By a read-access on Index 1001h the state of the error register can be polled

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1001h	0	Error Register	Ro	Unsigned 8

**Example:** Read-Access, Node-ID = 2, Index 1001h, Sub-Index = not supported within this Index

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	01h	10h	00h	00h	00h	00h	00h

As answer you will receive on byte 5 the Error status of the device. The following errors are supported:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	01h	10h	00h	00h	00h	00h	00h

**No Error: no bits set in Byte 5**

### Generic Error: Bit 1 in Byte 5

The Generic Error is generated by the signal input of the transducer. This error means: Break or Short-Circuit of the connected sensor or a positive overload.

### Communication Error: Bit 4 in Byte 5

The Communication Error will be generated by (physical) errors on the CAN-network. A complete list of supported Communication Errors can be seen under "Emergency Message".

Index 1001h is Read-Only, no Sub-Indices are supported. By writing to this Index (or reading a Sub-Index unequal to "0") you will receive a SDO-Communication Error (see "SDO-Error Messages").

## Index 1005h COB-ID SYNC Message

The object 1005h defines the identifier (COB) for the Synchronisation Object (SYNC). On reception of a message with this identifier the transmission of PDOs is initiated (refer to "PDO-Communication").

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1005h	0	COB-ID SYNC Message	Rw	Unsigned 32

The COB-ID SYNC identifier has the following structure:

Bit 31	Bit 30	Bit 29	Bit 11-28	Bit 10-0
1	X	0	0	11 bit Identifier

**Example:** Read-Access, Node-ID = 2, Index 1005h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	05h	10h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	05h	10h	01h	80h	00h	00h	80h

The default identifier is 80h in order to ensure a high priority of the SYNC-message.

A change of this parameter will not be stored inside the EEPROM automatically. This has to be done manually by the user (see "Store All Parameters").

## 1008h Manufacturer Device Name

By a read-access on Index 1008h the Manufacturer Device Name can be polled.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1008h	0	Manufacturer Device Name	Ro	String

**Example:** Read-Access, Node-ID = 2, Index 1008h, Sub-Index = not supported within this Index

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	08h	10h	00h	00h	00h	00h	00h

As answer you will receive from the transducer a message with ASCII-coded hardware version:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	08h	10h	00h	47h	53h	57h	44h

Byte 5 = 47h represents ASCII = G

Byte 6 = 53h represents ASCII = S

Byte 7 = 57h represents ASCII = W

Byte 8 = 44h represents ASCII = D

Index 1008h is Read-Only, no Sub-Indices are supported. By writing on this Index (or reading a Sub-Index unequal to "0") you will receive a SDO-Communication Error (see "SDO-Error Messages").

## 1009h Manufacturer Hardware Version

By a read-access on Index 1009h the Manufacturer Hardware Version can be polled.  
The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1009h	0	Manufacturer Hardware Version	Ro	String

**Example:** Read-Access, Node-ID = 2, Index 1009h, Sub-Index = not supported within this Index

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	09h	10h	00h	00h	00h	00h	00h

As answer you will receive from the transducer a message with ASCII-coded Hardware version.

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	09h	10h	00h	31h	2Eh	30h	31h

Byte 5 = 31h represents ASCII = 1

Byte 6 = 2Eh represents ASCII = .

Byte 7 = 30h represents ASCII = 0

Byte 8 = 31h represents ASCII = 1

Index 1009h is Read-Only, no Sub-Indices are supported. By writing on this Index (or reading a Sub-Index unequal to "0") you will receive a SDO-Communication Error (see "SDO-Error Messages" on 8.4.2).

## 100Ah Manufacturer Software Version

By a read-access on Index 100Ah the Manufacturer Software Version can be polled.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
100Ah	0	Manufacturer Software Version	Ro	String

**Example:** Read-Access, Node-ID = 2, Index 100Ah, Sub-Index = not supported within this Index

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	0Ah	10h	00	00	00	00	00

As answer you will receive from the transducer a message with ASCII-coded Software version:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	0Ah	10h	00h	32h	2Eh	30h	31h

Byte 5 = 31h represents ASCII = 2

Byte 6 = 30h represents ASCII = .

Byte 7 = 2Eh represents ASCII = 0

Byte 8 = 32h represents ASCII = 1

Index 100Ah is Read-Only, no Sub-Indices are supported. By writing on this Index (or reading a Sub-Index equal to 0") you will receive a SDO-Communication Error (see "SDO-Error Messages").

## 1010h Store All Parameters

By writing on Index 1010h all parameters changed are stored on the EEPROM  
The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1010h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Store all Parameters	Rw	Unsigned 32

The storing will be generated by transmitting the code "save" as ASCII in the data area of Index 1010h. The message has the following format:

**Example:** Write-Access, Node-ID = 2, Index 1010h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	10h	10h	01h	73h	61h	76h	65h

The answer after successful storing you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	10h	10h	01h	00	00	00	00

## 1011h Restore Default Parameter

By writing on Index 1011h the default parameters can be loaded.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1011h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Restore Default Parameters	Rw	Unsigned 32

The default parameters values are shown in the list below.

Index	Name	Default
6112h	Operating Mode	1 (Channel On)
6144h	Analog Input Lower limit	0
6145h	Analog Input Upper limit	0
2000h	Node – ID	127d (or according to customer order)
2001h	Baudrate setting	7d (500KB) (or according to customer order)
6509h	Alarm 1 Action	0
6519h	Alarm 2 Action	0
750Ah	Alarm 1 Level	0
750Bh	Alarm 1 Hysteresis	0
751Ah	Alarm 2 Level	0
751Bh	Alarm 2 Hysteresis	0
7124h	Input Offset	0
1014h	Emergency ID	80h + ID
1017h	Producer Time / Heart Beat	0 ms
1005h	SYNC-ID	80 h
1800h	PDO 1 – Parameter	PDO active, ID 180h + Node-ID, Transmission type FEh, Timer 14h (or according to customer order)
1801h	PDO 2 – Parameter	PDO not active, ID 280h + Node-ID, Transmission type FEh, Timer 14h (or according to customer order)



The loading will be generated by transmitting the code "load" as ASCII in the data-area of Index 1011h.

The message has to look like the following example:

**Example:** Write-Access, Node-ID = 2, Index 1011h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	11h	10h	01h	6Ch	6Fh	61h	64h

The answer after successful loading you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	11h	10h	01h	00	00	00	00

### Index 1014h Emergency ID

By accessing this object the ID of the Emergency message can be changed.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1014h	0	Emergency ID (32 bit)	Rw	Unsigned 32

The Emergency-ID has the following structure:

Bit 31	Bit 30	Bit 29	Bit 11-28	Bit 10-0
0	0	0	0	11 bit Identifier

**Example:** Read-Access, Node-ID = 2, Index 1014h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	14h	10h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	14h	10h	01h	82h	00h	00h	00h

Byte 5 holds the Emergency ID. By default the ID is set to 80h + module address.  
This ID reserves high priority for the emergency messages.

A change of this parameter will not be stored inside the EEPROM automatically. This has to be done manually by the user (see "Store All Parameters").

### Index 1017h Producer Time / Heart Beat

Within this Index the timer for the transmission of Heart Beat messages can be changed.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1017h	0	Timer in ms (16 bit)	Rw	Unsigned 16

By default the timer is set to 0. When changing the timer to a value greater 5 ms the transducer will begin to send Heart Beat messages autonomously.

The timer is a ms-timer with multiples of 5 ms. Any value unequal to a multiple of 5 written to the module will be rounded. The value is a 16-bit value.

If for example written to the module a value of 112 ms, this value will be changed to 110 ms.

**Example:** Write parameter, Module-ID = 2, Index 1017h, Sub-Index = not supported, Timer = 1000 ms

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	17h	10h	E8h	03h	00h	00h	00h

Data bytes 4+5 contain the value 03E8h which represents a producer time of 1000 ms.

The answer you will receive from the module is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	17h	10h	00	00	00	00	00

A change of these parameters will not be stored inside the EEPROM automatically. This has to be done manually by the user (see "Store All Parameters").

### 1018h Identity Object

Index 1018h contains the so called "Identity Object" which includes several parameters.

The Index has the following structure:

Index	Sub-Index	Parameter	Access	Type
1018h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Vendor ID	Ro	Unsigned 32
	2	Product Code	Ro	Unsigned 32
	3	Revision Number	Ro	Unsigned 32
	4	Serial Number	Ro	Unsigned 32

#### Sub-Index 1 Vendor ID

The vendor ID is an unique number which can be used to identify the manufacturer of the device.

The numbers are managed by the CiA (<http://www.can-cia.de>) worldwide. Gefran Sensori has the ID = 93h.

**Example:** Read-Access, Node-ID = 2, Index 1018h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	18h	10h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	18h	10h	01h	93h	00h	0h	00h

The Byte five holds the Vendor ID code.

### Sub-Index 2 Product Code

The product code is a manufacturer specific code, which in our case represents the model of the transducer (ex. WD0).

**Example:** Read-Access, Node-ID = 2, Index 1018h, Sub-Index = 02h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	18h	10h	02h	00h	00h	00h	00h

As answer you will receive from the transducer a message with ASCII-coded hardware version:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	18h	10h	02h	00h	30h	44h	57h

Byte 6 = 30h represents ASCII = 0

Byte 7 = 44h represents ASCII = D

Byte 8 = 57h represents ASCII = W

The transducer is the model WD0.

### Sub-Index 3 Revision Number

The revision number consists of two 16bit values. The higher 16 bits represents the revision of the CANopen parts of the software and the lower 16 bits represents the general firmware release.

**Example:** Read-Access, Node-ID = 2, Index 1018h, Sub-Index = 03h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	18h	10h	03h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	18h	10h	03h	02h	00h	02h	00h

Index	Sub-Index	Parameter	Access	Type
1017h	0	Timer in ms (16 bit)	Rw	Unsigned 16

### Sub-Index 4 Serial Number

The serial number is also manufacturer specific and represents the coded date, on which the module was checked and calibrated.

**Example:** Read-Access, Node-ID = 2, Index 1018h, Sub-Index = 04h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	18h	10h	04h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	18h	10h	04h	02h	15h	10h	02h

The transducer serial number is: 02165378

Index 1018h is Read-Only. By writing on this Index (or reading an unsupported Sub-Index) you will receive a SDO - Communication Error (see "SDO-Error Messages").

## Index 1800h PDO 1 Parameters

The object 1800h defines communication parameters for the first transmit PDO. The PDO can only be used in Operational Mode.

The PDO may not be requested faster than 1ms by the SYNC-service, because new pressure values for the input is available every 1ms.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1800h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Identifier of PDO 1 (COB-ID)	Rw	Unsigned 32
	2	Transmission Type	Rw	Unsigned 8
	3	Reserved		
	4	Reserved		
	5	Timer	Rw	Unsigned 16

### Sub-Index 1 Identifier of PDO 1

The default identifier is 180h + module-address. This value defines the identifier that is used for PDO 1.

The 32-bit value has the following structure:

Bit 31	Bit 30 – 11	Bit 10 – 0
0 / 1	0	ID 11 bit

In order to enable the PDO the most significant bit (Bit 31) must be set to 0. In order to disable the PDO the most significant bit must be set to 1.

In the default setting the PDO is active (Bit 31 = 0).

**Example:** Read-Access, Node-ID = 2, Index 1800h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	00h	18h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	00h	18h	01h	82h	01h	00h	00h

The identifier of the PDO 1 is 00000182h (PDO active)

### Sub-Index 2 Transmission Type

The transmission type defines the transmission type of the PDO. The device has three different types of transmission.

By writing to Sub-Index 02 the transmission type can be selected.

The following types are supported:

Transmission Type	Description
0 (0h)	Acyclic synchron The module sends on every SYNC-Message
1 – 240d (1- F0h)	Cyclic synchron The module sends on every n-th SYNC-Message (with n = 1 .. 240)
254d (FEh)	Manufacturer specific The module sends autonomously every x ms. The value for x can be selected in Sub-Index 05.

If selected Transmission Type 254d (manufacturer specific) and the value for transmission delay (Sub-Index 05) is greater than 5ms, the module will begin to transmit PDOs after receiving a "Start Node"-command from the master.

**Example:** Read-Access, Node-ID = 2, Index 1800h, Sub-Index = 02h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	00h	18h	02h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	00h	18h	02h	FEh	00h	00h	00h

The transmission type of the PDO 1 is FEh = 254d

**Sub-Index 3 Reserved**  
**Sub-Index 4 Reserved**

**Sub-Index 5 Timer**

As mentioned before, the transmission timer for PDOs can be selected under Sub-Index 05. The timer is a ms-timer with multiples of 5ms.

Any value unequal to a multiple of 5 written to the module will be rounded. The value is a 16-bit value.

If for example written to the module a value of 112(ms), this value will be changed to 110(ms).

Only in Operational Mode the module will send PDOs with timer delay.

**Example:** Read-Access, Node-ID = 2, Index 1800h, Sub-Index = 05h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	00h	18h	05h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	00h	18h	05h	14h	00h	00h	00h

The transmission timer of the PDO 1 is 14h = 20 ms

A change of these parameters will not be stored inside the EEPROM automatically. This has to be done manually by the user (see "Store All Parameters").

**Index 1801h PDO 2 Parameters**

The object 1801h defines communication parameters for the second transmit PDO. The PDO can only be used in Operational Mode.

The PDO may not be requested faster than 1ms by the SYNC-service. It is recommended to request the PDO not faster than 1ms, because new A/D converter values for the input is available every 1ms.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1801h	0	Largest Sub-Index supported	Ro	Unsigned 8
	1	Identifier of PDO 2 (COB-ID)	Rw	Unsigned 32
	2	Transmission Type	Rw	Unsigned 8
	3	Reserved		
	4	Reserved		
	5	Timer	Rw	Unsigned 16

## Sub-Index 1 Identifier of PDO 2

The default identifier is 280h + module-address. The value on Sub-Index 1 defines the identifier that is used for PDO 2.

The 32-bit value has the following structure:

Bit 31	Bit 30 – 11	Bit 10 – 0
0 / 1	0	ID 11 bit

In order to enable the PDO the most significant bit (Bit 31) must be set to 0. In order to disable the PDO the most significant bit must be set to 1.

In the default setting of the PDO is **not active** (Bit 31 = 1).

**Example:** Read-Access, Node-ID = 2, Index 1801h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	01h	18h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	01h	18h	01h	82h	02h	00h	80h

The identifier of the PDO 2 is 80000282h (PDO not active)

## Sub-Index 2 Transmission Type

The transmission type (Sub-Index 2) defines the transmission type of the PDO. The device has three different types of transmission.

By writing to Sub-Index 02 the transmission type can be selected.

The following types are supported:

Transmission Type	Description
0 (0h)	Acyclic synchron The module sends on every SYNC-Message
1 – 240d (1- F0h)	Cyclic synchron The module sends on every n-th SYNC-Message (with n = 1 .. 240)
254d (FEh)	Manufacturer specific The module sends autonomously every x ms. The value for x can be selected in Sub-Index 05.

If selected Transmission Type 254d (manufacturer specific) and the value for transmission delay (Sub-Index 05) is greater 5ms, the module will begin to transmit PDOs after receiving a "Start Node"-command from the master.

**Example:** Read-Access, Node-ID = 2, Index 1801h, Sub-Index = 02h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	01h	18h	02h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	01h	18h	02h	FEh	00h	00h	00h

The transmission type of the PDO 2 is FEh = 254d

### Sub-Index 3 Reserved

### Sub-Index 4 Reserved

### Sub-Index 5 Timer

As mentioned before, the transmission timer for PDOs can be selected under Sub-Index 05. The timer is a ms-timer with multiples of 5ms.

Any value unequal to a multiple of 5 written to the module will be rounded. The value is a 16-bit value. If for example written to the module a value of 112(ms), this value will be changed to 110(ms).

Only in Operational Mode the module will send PDOs with timer delay.

**Example:** Read-Access, Node-ID = 2, Index 1801h, Sub-Index = 05h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	01h	18h	05h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	01h	18h	05h	14h	00h	00h	00h

The transmission timer of the PDO 2 is 14h = 20 ms

A change of these parameters will not be stored inside the EE-PROM automatically. This has to be done manually by the user (see "Store All Parameters").

### Index 1A00h PDO 1 Mapping

The object 1A00h defines the PDO mapping for the first PDO. The transducer uses a fixed PDO-Mapping.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1A00h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	1st object	Ro	Unsigned 32
	2	2st object	Ro	Unsigned 32

The first object mapped is the Process Values (object 7130h)

The second object mapped is the Analog Input Status (object 6150h)

### Index 1A01h PDO 2 Mapping

The object 1A01h defines the PDO mapping for the second PDO. The transducer uses a fixed PDO-Mapping.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
1A01h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	1st object	Ro	Unsigned 32
	2	2st object	Ro	Unsigned 32
	3	3st object	Ro	Unsigned 32

The CAN message for the first PDO has the following structure:

The first object mapped is the **A/D value (object 7100h)**

The second object mapped is the **Operating Time (object 2230h)**

The third object mapped is the **Maximum Peak (object 2220h)**

## Device Profile Objects

In this section you will find all device profile specific indices for the transducer. These indices are implemented according to the DS-404 device profile.

Index	Sub Index	Name	Type	Access	Default value	Pag
6110h	0	Sensor Type (SubIndex SUPP.)	Unsigned 8	Ro	1	25
	1	Parameter of the sensor type	Unsigned 16	Ro	5Ah = 90d = Pressure transducer	
6112h	0	Op. Mode (SubIndex SUPP.)	Unsigned 8	Ro	1	25
	1	Operating Mode	Unsigned 8	Rw	1	
6125h	0	Autozero (SubIndex SUPP.)	Unsigned 8	Ro	1	26
	1	Autozero	Unsigned 32	Wo		
6131h	0	Unit (SubIndex SUPP.)	Unsigned 8	Ro	1	26
	1	Physical Unit Process Value	Unsigned 32	Rw	2310h (Bar)	
6132h	0	Digits (SubIndex SUPP.)	Unsigned 8	Ro		27
	1	Decimal Digits Process Value	Unsigned 8	Rw	Depends on FS (0,1 or 2)	
6144h	0	Lower Limit (SubIndex SUPP.)	Unsigned 8	Ro	1	27
	1	Analog Input Lower limit	Unsigned 16	Rw	0	
6145h	0	Upper Limit (SubIndex SUPP.)	Unsigned 8	Ro	1	27
	1	Analog Input Upper limit	Unsigned 16	Rw	0	
6150h	0	Status (SubIndex SUPP.)	Unsigned 8	Ro	1	28
	1	Analog Input Status	Unsigned 8	Ro	0	
6508h	0	Alarm 1 Type(SubIndex SUPP.)	Unsigned 8	Ro	1	29
	1	Alarm 1 Type	Unsigned 16	Ro	2h (above or equal)	
6509h	0	Alarm 1 Act. (SubIndex SUPP.)	Unsigned 8	Ro	1	29
	1	Alarm 1 Action	Unsigned 16	Rw	0	
6518h	0	Alarm 2 Type(SubIndex SUPP.)	Unsigned 8	Ro	1	29
	1	Alarm 2 Type	Unsigned 16	Ro	3h (below)	
6519h	0	Alarm 2 Act. (SubIndex SUPP.)	Unsigned 8	Ro	1	29
	1	Alarm 2 Action	Unsigned 16	Rw	0	
7100h	0	ADC value (SubIndex SUPP.)	Unsigned 8	Ro	1	30
	1	ADC value	Unsigned 16	Ro		
7124h	0	Input Offset (SubIndex SUPP.)	Unsigned 8	Ro	1	30
	1	Input Offset	Unsigned 16	Rw	0	
7130h	0	ProcessValue(SubIndex SUPP.)	Unsigned 8	Ro	1	31
	1	Analog Input Process Value	Unsigned 16	Ro		
7500h	0	Alarm1 val (SubIndex SUPP.)	Unsigned 8	Ro	1	31
	1	Alarm 1 Input value	Unsigned 16	Ro		
750Ah	0	Alarm1 Lev (SubIndex SUPP.)	Unsigned 8	Ro	1	32
	1	Alarm 1 Level	Unsigned 16	Rw	0	
750Bh	0	Alarm1 Hyst(SubIndex SUPP.)	Unsigned 8	Ro	1	33
	1	Alarm 1 Hysteresis	Unsigned 16	Rw	0	
7510h	0	Alarm2 val (SubIndex SUPP.)	Unsigned 8	Ro	1	31
	1	Alarm 2 Input value	Unsigned 16	Ro		
751Ah	0	Alarm2 Lev (SubIndex SUPP.)	Unsigned 8	Ro	1	32
	1	Alarm 2 Level	Unsigned 16	Rw	0	
751Bh	0	Alarm2 Hyst(SubIndex SUPP.)	Unsigned 8	Ro	1	33
	1	Alarm 2 Hysteresis	Unsigned 16	Rw	0	

Ro = the parameter can be read only

Rw = the parameter can be read and also written

Wo = the parameter can be written only



## Index 6110h Sensor Type

By a read-access on Index 6110h the sensor type can be polled.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
6110h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Parameter channel 1	Ro	Unsigned 16

**Example:** Read-Access, Node-ID = 2, Index 6110h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	10h	61h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	10h	61h	01h	5Ah	00h	00h	00h

Parameter (Byte 5)	Sensor Type
5Ah = 90d	Pressure transducer

Index 6110h is Read-Only. By writing on this Index you will receive a SDO-Communication Error (see "SDO-Error Messages").

## Index 6112h Operating Mode

Writing and Reading of Operating Mode from the different channels is done with Index 6112h.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
6112h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Parameter channel 1	Rw	Unsigned 8

The different Operating Modes which are supported are shown in the following list:

Parameter	Status
00 h	Channel Off
01 h	Normal Operation

By default the channel is turned on. That means the pressure can be measured just after the initial power-up.

**Example:** You do not want to use the input for your application. To turn the input off, you have to send the following message:

Write access, Module-ID = 2, Index = 6112h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	12h	61h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	12h	61h	01h	00h	00h	00h	00h

The input is now turned off. When requesting data from that input you will always receive the value 0.

A change of this parameter will not be stored inside the EEPROM automatically. This has to be done manually by the user (see "Store All Parameters").

## Index 6125h Autozero

By writing on Index 6125h the actual measuring value will be interpreted as zero. Internally the actual measuring value will be monitored to the manufacturer threshold value.

If the threshold is exceeded, the autozero-access will lead to an error-message.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
6125h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Autozero	Wo	Unsigned 32

The autozero will be generated by transmitting the code "zero" as ASCII in the data area of Index 6125h sub1. The message has the following format:

**Example:** Write-Access, Node-ID = 2, Index 6125h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	25h	61h	01h	7Ah	65h	72h	6Fh

The answer (after successful storing of the message) you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	25h	61h	01h	00h	00h	00h	00h

A change of this parameter will be stored inside the EEPROM automatically.

## Index 6131h Physical Unit Process Value

Index 6131h has read and write access. By selecting this index the physical unit of the process value can be changed.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
6131h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Physical Unit for Input 1	Rw	Unsigned 32

**Example:** Read Access, Module-ID = 2, Index = 6131h, Sub-Index=1

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	31h	61h	01h	00	00	00	00

The answer to this request is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	31h	61h	01h	10h	23h	00h	00h

The data bytes 5 + 6 hold the value of the physical unit. Here in the example you see 2310h – Bar.

The physical units available are the following:

Unit	Value (Hex)
Bar	2310
Kpa	2323
Psi	2330
Kg/cm <sup>2</sup>	2340

By changing the unit by the operator, the internal calculation will be changed according to the selected physical unit. A change of this parameter will be stored inside the EEPROM automatically.

The parameters affected by the changing of the physical unit are: full scale, alarm 1 level, alarm 2 level, alarm 1 hysteresis, alarm 2 hysteresis, maximum peak, 80 % full scale, input offset, lower input limit, upper input limit.

The physical unit could not be changed if one of these parameters will lead to an overflow condition.

## Index 6132h Decimal Digits Process Value

Index 6132h has read and write access. By selecting this index the decimal digit of the process value can be changed.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
6132h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Number Decimal Digits for Input 1	Rw	Unsigned 8

**Example:** Read-Access, Node-ID = 2, Index 6132h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	32h	61h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	32h	61h	01h	01h	00h	00h	00h

Data byte 5 holds the value 01h, i.e. the process values are represented with one decimal digit. The possible number of decimal digits are: 0,1 or 2.

By changing the decimal digit, the internal calculation will be changed according to the selected decimal point. A change of this parameter will be stored inside the EEPROM automatically.

The parameters affected by the changing of the physical unit are: full scale, alarm 1 level, alarm 2 level, alarm 1 hysteresis, alarm 2 hysteresis, maximum peak, 80 % full scale, input offset, lower input limit, upper input limit.

The decimal digit could not be changed if one of these parameters will lead to an overflow condition.

## Index 6144 h Analog Input Lower Limit

## Index 6145 h Analog Input Upper Limit

The objects 6144h and 6145h are specified as “fixed” lower and upper limit for PDO-sending. If only the lower limit (object 6144h) is specified on the transducer, PDO 1 will only be sent if the input value is higher then the lower limit.

If only the higher limit (object 6145h) is specified, PDO 1 will be sent while values are in the range from zero to the specified upper limit.

If both limits are specified, PDO 1 will be sent while values are between lower and upper limit.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
6144h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Analog Input Lower Limit	Rw	Unsigned 16

Index	Sub-Index	Parameter	Access	Type
6145h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Analog Input Upper Limit	Rw	Unsigned 16

**Example:** Write-Access, Node-ID = 2, Index 6144h, Sub-Index = 01h , Lower Threshold=C8h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	44h	61h	01h	C8h	00h	00h	00h

The answer (after succesful storing) you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	44h	61h	01h	00h	00h	00h	00h

## Index 6150h Analog Input Status

By a read-access on Index 6150h the Input State of the device can be requested.

This object is read-only and has the following structure:

Index	Sub-Index	Parameter	Access	Type
6150h	0	Number of Inputs	Ro	Unsigned 8
	1	Input Status	Ro	Unsigned 8

**Example:** Read-Access, Node-ID = 2, Index 6150h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	50h	61h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	50h	61h	01h	03h	00h	00h	00h

Data byte 5 holds the value 03h, i.e. there is a positive overload.

The data byte 5 of the CAN message represents the input state in the following manner:

Parameter	Status
00 h	Measuring Value valid
01 h	Measuring Value not valid
02 h	Full scale exceeded
03 h	Positive Overload (input >10%FS)

If the measured value is within the input range, the request will return the value 00h, i.e. process value is valid.

## Index 6508 h Alarm 1 Type

## Index 6518 h Alarm 2 Type

The objects 6508h and 6518h specifies the alarm type. The alarm type could not be changed by the customer.

The default values are:

Alarm	Code	Type
Alarm 1	02h	Above or Equal
Alarm 2	03h	Below

These objects are read-only and have the following structure:

Index	Sub-Index	Parameter	Access	Type
6508h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 1 type	Ro	Unsigned 16

Index	Sub-Index	Parameter	Access	Type
6518h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 2 type	Ro	Unsigned 16

**Example:** Read-Access, Node-ID = 2, Index 6508h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	08h	65h	01h	00h	00h	00h	00h

The answer (after succesful storing) you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	08h	65h	01h	02h	00h	00h	00h

Byte 5 holds the value 02h.

**Example:** Read-Access, Node-ID = 2, Index 6518h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	18h	65h	01h	00h	00h	00h	00h

The answer you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	18h	65h	01h	03h	00h	00h	00h

Byte 5 holds the value 03h

#### Index 6509 h Alarm 1 Action

#### Index 6519 h Alarm 2 Action

The objects 6509h and 6519h specifies if the alarm is active or not. By default they are inactive.

The possible values are:

Value	Meaning
00h	Alarm not active
01h	Alarm active

These objects have the following structure:

Index	Sub-Index	Parameter	Access	Type
6509h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 1 Action	Rw	Unsigned 16
6519h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 2 Action	Rw	Unsigned 16

**Example:** Read-Access, Node-ID = 2, Index 6509h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	09h	65h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	09h	65h	01h	01h	00h	00h	00h

Byte 5 holds the value 01h, that means the Alarm is active.

#### Index 7100h A/D value

By a read-access on Index 7100h the value of the A/D-converter (field value) can be requested.

This object is read-only and has the following structure:

Index	Sub-Index	Parameter	Access	Type
7100h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	A/D-value	Ro	Unsigned 16

**Example:** Read-Access, Node-ID = 2, Index 7100h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	00h	71h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	00h	71h	01h	LBh	HBh	00h	00h

Byte 4 holds the number of the input channel, i.e. 1 in this example. In byte 5 and 6 the value of the A/D-converter is given in Intel-Format (Low-Byte first).

### Index 7124h Input Offset

Index 7124h has read and write access. By selecting this index the offset to the process value can be changed. The offset always has the actual physical unit.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
7124h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Offset (16 bit)	Rw	Unsigned 16

**Example:** Read-Access, Node-ID = 2, Index 7124h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	24h	71h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	24h	71h	01h	LBh	HBh	00	00

Byte 5+6 contains the offset data as 16 bit.

### Index 7130h Analog Input Process value

By a read-access on Index 7130h the process value can be requested. This is the pressure value measured in the selected physical unit.

This object is read-only and has the following structure:

Index	Sub-Index	Parameter	Access	Type
7130h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Process Value	Ro	Unsigned 16

**Example:** Read-Access, Node-ID = 2, Index 7130h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	30h	71h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	30h	71h	01h	LB	HB	00h	00h

Byte 4 holds the number of the input channel, i.e. 1 in this example. In byte 5 and 6 the process value given in Intel-Format (Low-Byte first, 16-Bit Signed Integer).

In case of an input signal error the value will be EEEh. At the same time the objects 1001h ("Error-Register") and 6150h ("Analog Input State") will hold an appropriate error code.

Also an emergency message will be sent by the device in that case (refer to "Emergency Message").

**Index 7500 h Alarm 1 Input Value****Index 7510 h Alarm 2 Input Value**

The objects 7500h and 7510h represents the process value which is the input to the alarm function block.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
7500h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 1 Input value	Ro	Unsigned 16

Index	Sub-Index	Parameter	Access	Type
7510h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 2 Input value	Ro	Unsigned 16

**Index 750Ah Alarm 1 Level****Index 751Ah Alarm 2 Level**

The objects 750Ah and 751Ah represents the level which the Alarm Input Value is compared with Alarm 1 represents the lower limit and Alarm 2 the upper limit. By default they are set to zero.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
750Ah	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 1 Level	Rw	Unsigned 16

Index	Sub-Index	Parameter	Access	Type
751Ah	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 2 Level	Rw	Unsigned 16

**Example:** Node-ID = 2, Alarm 1 active , Alarm 2 not active

Alarm 1 level = 1C8h (object 750Ah)

When reaching the level of 1C8 (Input value greater then Alarm 1 Level) the device sends the EMCY:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
82	8	FFh	00h	00h	00h	10h	00h	00h	00h

When the input value becomes less then Alarm 1 Level (minus Alarm 1 Hysteresis ) the EMCY is “reset”. That means you will get all “00h” in the according EMCY-message (-> no faults detected).

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
82	8	00h	00h	00h	00h	00h	00h	00h	00h

**Example:** Node-ID = 2, Alarm 1 active , Alarm 2 active

Alarm 1 level = 1C8h (object 750Ah)

Alarm 2 level = 5F0h (object 750Ah)

Alarm 1 works as described above. Alarm 2 is an alarm which works as “Input value less then Alarm 2 Level”.

When reaching first time the value of 5F0 (plus Alarm 1 Hysteresis ) the Alarm 2 is reset.

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
82	8	00h	00h	00h	00h	00h	00h	00h	00h

When falling the input value again under the value of 5F0 the alarm becomes active again

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
82	8	FFh	00h	00h	00h	20h	00h	00h	00h

**Index 750Bh Alarm 1 Hysteresis**  
**Index 751Bh Alarm 2 Hysteresis**

The objects 750Bh and 751Bh represents the hysteresis which is used for the comparison of the Alarm Input Value and Alarm Level.

It could be used to avoid Emergency Message when the Alarm Input Values are noisy. By default they are set to zero.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
750Bh	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 1 Hysteresis	Rw	Unsigned 16

Index	Sub-Index	Parameter	Access	Type
751Bh	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Alarm 2 Hysteresis	Rw	Unsigned 16

**Example:** Read-Access, Node-ID = 2, Index 750Bh, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	0Bh	75h	01h	00h	00h	00h	00h

The answer you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	0Bh	75h	01h	F0h	00h	00h	00h

Byte 5 holds the value F0h that represents the Alarm 1 Hysteresis.



## Manufacturer Specific Profile Objects

In this section you will find the manufacturer specific profile indices for the transducer. These indices are implemented according to the DS-404 device profile.

Index	Sub Index	Name	Type	Access	Default value	Pag
2000h	0	Node-ID (Supp. Subindex)	Unsigned 8	Ro	1	35
	1	Node-ID	Unsigned 8	Rw	127	
2001h	0	Baudrate (Supp. Subindex)	Unsigned 8	Ro	1	35
	1	Baudrate	Unsigned 8	Rw	7 (500KB)	
2131h	0	Full scale (Supp. Subindex)	Unsigned 8	Ro	1	36
	1	Transducer full scale	Integer 16	Ro		
2200h	0	Cal80 (Supp. Subindex)	Unsigned 8	Ro	1	36
	1	Calibration 80%FS	Integer 16	Ro		
2210h	0	Temperature (Supp. Subindex)	Unsigned 8	Ro	2	37
	1	Temperature – T ambient	Integer 16	Ro		
	2	Temperature	Integer 16	Ro		
2220h	0	Peak (Supp. Subindex)	Unsigned 8	Ro	2	37
	1	Read the maximum peak	Unsigned 16	Ro		
	2	Reset the maximum peak	Unsigned 16	Wo		
2230h	0	Op. time (Supp. Subindex)	Unsigned 8	Ro	2	38
	1	Time counter	Integer 32	Ro		
	2	Number of reset	Integer 32	Ro		

### Index 2000h Node-ID Setting

By writing on Index 2000h the node-ID setting can be changed. The setting is active only after a reset-node command or a power up. (\*) See settings.

When entering values that exceed the supported address-range an error-message will be sent.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
2000h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Node – ID	Rw	Unsigned 8

The message has the following format:

**Example:** Write-Access, Node-ID = 2, Index 2000h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	00h	20h	01h	08h	00h	00h	00h

Byte 5 hold the new node-id number

The answer after successful storing you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	00h	20h	01h	00h	00h	00h	00h

After the reset-node the device will work with the node-ID = 8

## Index 2001h Baudrate Setting

By writing on Index 2001h the baudrate setting can be changed. The setting is active only after a reset-node command or a power up. (\*) See setting.

When entering values that exceed the supported range an error-message will be sent.

The object has the following structure:

Index	Sub-Index	Parameter	Access	Type
2001h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Baudrate	Rw	Unsigned 8

The supported baudrate are listed in the following table:

Byte 5	Baudrate
1	10 Kbaud
2	20 Kbaud
3	50 Kbaud
4	100 Kbaud
5	125 Kbaud
6	250 Kbaud
7	500 Kbaud
8	800 Kbaud
9	1 Mbaud

The message has the following format:

**Example:** Write-Access, Node-ID = 2, Index 2001h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	01h	20h	01h	05h	00h	00h	00h

Byte 5 hold the new baudrate setting.

The answer after successful storing you will receive is:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	01h	20h	01h	00h	00h	00h	00h

After the reset the device will work with a baudrate of 125 Kbaud.

## Index 2131 h Transducer Full Scale

By a read-access on Index 2131h the transducer full scale can be requested.

This object is read-only and has the following structure:

Index	Sub-Index	Parameter	Access	Type
2131h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Transducer full scale	Ro	Integer 16

**Example:** Read-Access, Node-ID = 1, Index 2131h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	31h	21h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	31h	21h	01h	LBh	HBh	00h	00h

In byte 5 and 6 the full scale given in Intel-Format (Low-Byte first, example 88B8h = 350 bar) Index 2131h is Read-Only.

By writing on this Index you will receive a SDO-Communication Error (see "SDO-Error Messages").

## Index 2200h Calibration 80% FS

By a read-access on Index 2200h the real 80% F.S. of the transducer can be requested.

This object has the following structure:

Index	Sub-Index	Parameter	Access	Type
2200h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Transducer Cal	Ro	Integer 16

**Example:** Read-Access, Node-ID = 2, Index 2220h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	20h	22h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	20h	22h	01h	LBh	HBh	00h	00h

In byte 5 and 6 the full scale given in Intel-Format (Low-Byte first, example 6D60h = 280 bar --> 80% of 350bar)

## Object 2210 h Circuit temperature

By a read-access on Index 2210h the circuit temperature in °C can be requested.

This object is read-only and has the following structure:

Index	Sub-Index	Parameter	Access	Type
2210h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Circuit temperature – T ambient	Ro	Integer 16
	2	Circuit temperature	Ro	Integer 16

The sub-index 1 holds the difference between the circuit temperature and the ambient temperature (25°C).

The sub-index 2 holds the effective circuit temperature

**Example:** Read-Access, Node-ID = 1, Index 2210h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	10h	22h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	10h	22h	01h	LBh	HBh	00h	00h

In byte 5 and 6 the temperature in °C with one decimal digit is given in Intel-Format (Low-Byte first, example 0112h = 274dec= 27.4°C) Index 2210h is Read-Only.

By writing on this Index you will receive a SDO-Communication Error (see "SDO-Error Messages").

## Object 2220 h Maximum Peak

By a read-access on Index 2220h sub-index 1 the maximum pressure peak measured can be requested. The maximum peak could be reset by writing on sub-index 2.

This object is read-only and has the following structure:

Index	Sub-Index	Parameter	Access	Type
2220h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Maximum peak	Ro	Unsigned 16
	2	Reset Maximum peak	Wo	Unsigned 16

**Example:** Read-Access, Node-ID = 1, Index 2220h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	20h	22h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	20h	22h	01h	LBh	HBh	00h	00h

In byte 5 and 6 the maximum pressure peak measure is given in Intel-Format (Low-Byte first, 16-Bit Signed Integer).  
(example 7148h = 29000dec= 290 bar)

**Example:** Write-Access, Node-ID = 2, Index 2220h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	22h	20h	22h	02h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	60h	20h	22h	02h	00h	00h	00h	00h

After a successful writing the Maximum peak is reset.

## Index 2230h Operating Time

By a read-access on Index 2230h the operating time can be requested.

This object is read-only and has the following structure:

Index	Sub-Index	Parameter	Access	Type
2230h	0	Number of Sub-Index supported	Ro	Unsigned 8
	1	Operating time	Ro	Integer 32
	2	Number of reset / power up sequences	Ro	Integer 32

The operating time is stored in sub-index 1 every 5 minutes. The sub-index 2 contains the number of power up of the transducer and the number of reset (a reset is done if the timer doesn't reach 5 minutes).

**Example:** Read-Access, Node-ID = 1, Index 2230h, Sub-Index = 01h

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1538	8	40h	30h	22h	01h	00h	00h	00h	00h

As answer you will receive from the transducer:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1410	8	42h	30h	22h	01h	78h	00h	00h	00h

In byte 5 ,6, 7 and 8 the operating time is given in Intel-Format  
(Low-Byte first, example 00000078h = 120d = 120\*5 = 600 minutes)

Index 2230h is Read-Only. By writing on this Index you will receive a SDO-Communication Error  
(see "SDO-Error Messages").

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