

Software instruction for CMP 8271 CANopen pressure transmitter

CANopen®



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1. Introduction

This instruction manual covers the supported CANopen functionality and device-specific features of the Trafag CANopen pressure transmitter CMP 8271 which are not defined in the CANopen standard. The general functionality of the CANopen protocol is defined in the standards DS-301 V4.2.0 and DS-404 V1.2 by CiA CAN in Automation (www.can-cia.org).

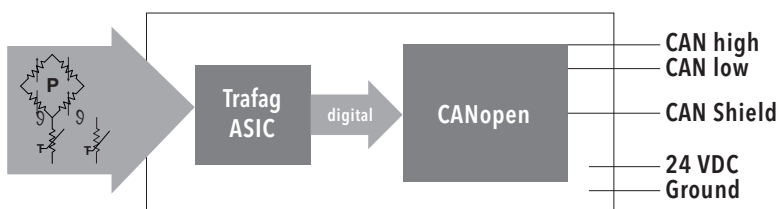
This software instruction manual is dedicated to professionals with CANopen knowhow.

The installation instruction for the CMP 8271 is available at www.trafag.com/H73619.

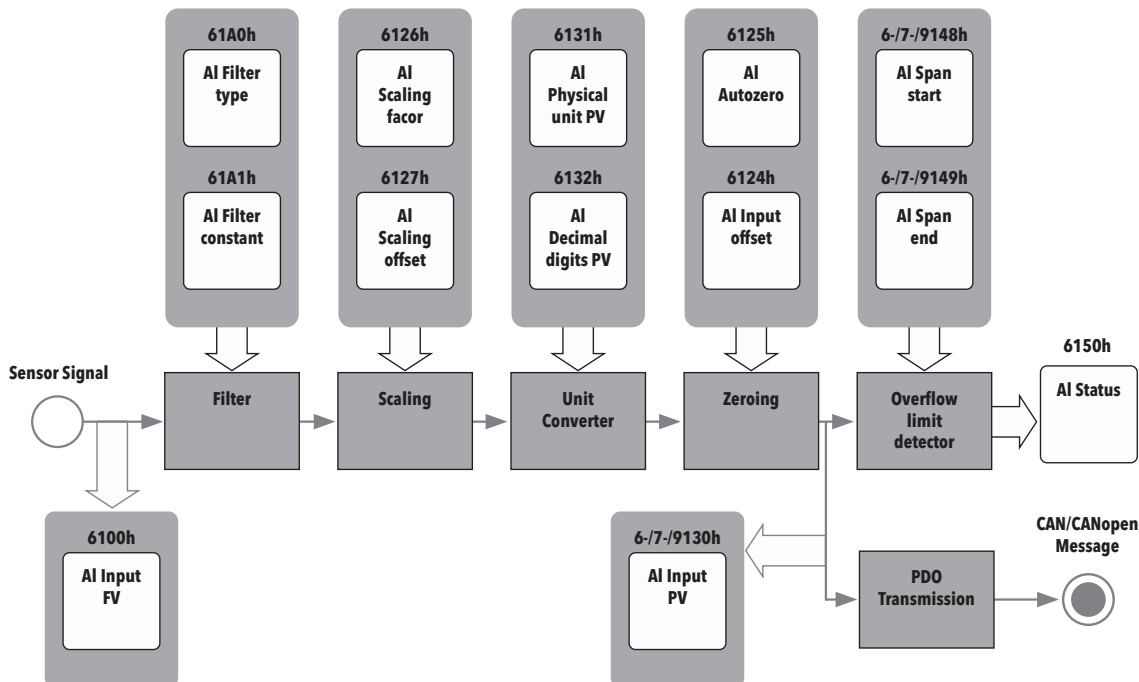
2. Device description CMP 8271

2.1. Overview

The CMP 8271 CANopen pressure transmitter is a pressure transmitter with CANopen interface according CiA (CAN in Automation) specification DS-301/DS-404. The physical CAN interface is according DIN-standard ISO 11898.



2.2. Processing of measured value



2.3. Functionality

- Baudrates: All CiA baudrates from 10kbit/s ... 1Mbit/s, Autobaud Detection Mode

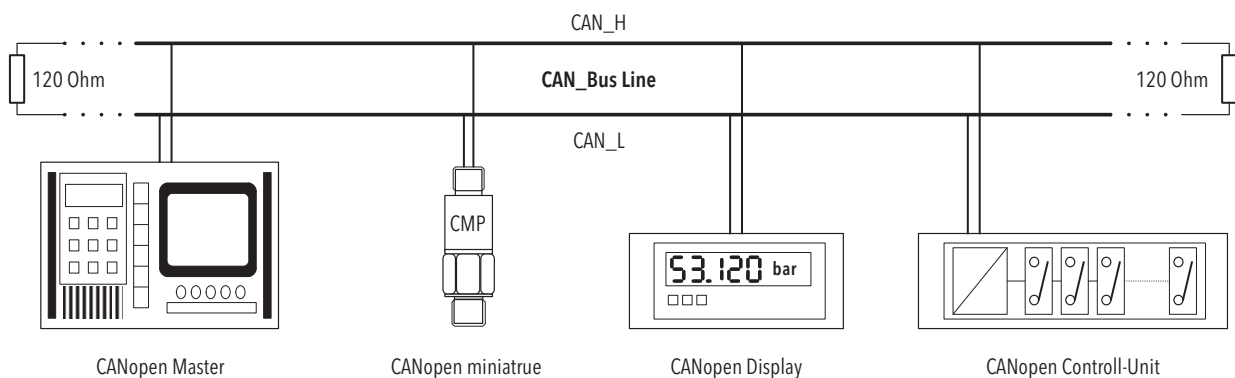
Baudrate [kbit/s]	Index 4002h:0 Value [decimal]
1'000	1'000
800	800
500	500
250	250
125	125
50	50
20	20
10	10
automatic bit rate detection	0

- CiA conformance tested
- Output signal: CAN BUS (ISO 11898-2)
- CANopen: DS301
- Device profile: DS404-1
- CiA bus speeds: 10kbit/s ... 1Mbit/s
- Autobaud / Baudrate detection
- Supports 11 bit identifiers: CAN 2.0 A/B
- SDO-Server: 1
- TX-PDOs: 2
- PDO modes: time-triggered, sync (cyclic)
- PDO mapping: yes
- All standardized data types for PDOs: Floating point, integer with 32, 16 bits
- Frequency of measurement and transmission: Up to 1kHz
- Measuring filter: Repeating average and moving average acc. DS-404-1
- Eligible, prefix adjustable units for pressure: bar, Pa, psi, mmHg, atm, at; temperature: °C, °F, K
- Auto-zero function
- Auto-Start-Mode for operation without master
- LSS (DS305) implemented
- Error control with Heartbeat
- Emergency message
- Separate storage of parameters for communication and application
- Flash-Update

3. Electrical connection

Signal	Description
(CAN_SHLD)	Shield / Housing
+24 VDC	Positive supply / 8...32V
GND	Ground / 0V
CAN_H	CAN_H bus line (dominant high)
CAN_L	CAN_L bus line (dominant low)

For the assignment to the pins or wires of the electrical connection, refer to the type label of the individual pressure transmitter.



To ensure a reliable bus communication, the bus needs to be terminated on both sides with CANopen specified resistors of 120 Ohm.

4. PDO Process data-objects

4.1. Generation of process data

For the transmission of measuring values, up to two TPDOs (transmit process data objects) can be configured. The configuration is according to the standard DS-301, i.e. via

- 1800h and 1801h
- 1A00h and 1A01h

The Object Dictionary (OD) table in section 10 lists, which objects may be mapped to PDOs.

4.2. Transmission types

The transmission type defines, when a measurement value is transmitted as PDO. The CMP 8271 offers the transmission modes according CANopen standard DS-301:

- time-triggered (1ms ... 65535 ms)
- sync (cyclic/asyndic)

5. Emergency Message Error Codes

Error Code	Description
Generic	generic errors
0000h	generic - error reset or no error
1000h	generic - error
Ambient / Device temperature	temperature errors
4000h	temperature – generic error
CANopen device hardware	hardware errors
5000h	hardware – generic error
5001h	hardware – modules initialization error
5002h	hardware – hardware identification/compatibility error
5003h	hardware – file system mounting error
5004h	hardware – sensor external clock error
5005h	hardware – sensor boot failure error
5006h	hardware – sensor break error
5007h	hardware – sensor RAM CRC error
CANopen device software	Internal software errors
6100h	Internal software – generic error
6101h	Internal software – unexpected device reset error
CANopen device software	Data set errors
6300h	Data set – generic error
6301h	Data set – boot configuration loading error
6302h	Data set – communication configuration loading error
6303h	Data set – application configuration loading error
Monitoring	Monitoring
8000h	Monitoring – generic error
8001h	Monitoring – temperature rail error
8002h	Monitoring – pressure rail error

6. NMT Network Management

According to CiA 301.

7. LSS Layer Setting Services

LSS supported, according CiA
(inquiry services unsupported)

8. Error control services

Service heartbeat event : supported (according CiA 301)
Service node/life guarding: not supported

9. Firmware Update

The update the firmware of the CMP 8271 according CANopen standard DS-302-3 (Additional application layer functions, part 3, configuration and program download) can be carried out with most commercially available tools.
For supported objects see Object Dictionary (OD).

10. Object Dictionary Documentation CMP 8271

10.1. Notations

- Hexadecimal numbers are written as hex-digits, with postfix 'h', e.g., 1F51h
- Decimal numbers are written without any pre- or postfix
- Bit positions (individuals or groups) are written in square brackets and are numbered from right to left, the 1st bit having index 0, e.g., in the 8bit number 02h, bit [1] == 1, all other bits are zero, i.e., bit [0] == 0 and bit [2 ... 7] == 0
- Default values which are regular subject to change (i.e., they do not have a static default value), are denoted by their variable name \$VARIABLE_NAME.

10.2. Communication Segment

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping		
1000h Device type	00h	Device type	00020194h	According CiA 301 specification. This object's numerical value encodes the type of this device. While running the application:	UNSIGNED32	ro	no		
				bits [0 ... 15]				profile number	0194h / 404
				bits [16 ... 31]				provided analog input blocks (for pressure measurement)	0002h / 2
				While in bootloader mode:					
				bits [0 ... 32]				character string 'BOOT'	424f4f54h / 1112493908
1001h Error register	00h	Error register	0	According CiA 301 specification.	UNSIGNED8	ro	no		
				bit [0]				a set bit indicates that the device's pressure sensor and/or temperature sensor (if available) are in error state	1: active error 0: no error
				bit [1 ... 7]				reserved	always 0
				Expect incorrect measurements if any of these bits are set.					

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping		
1002h Manufacturer status register	00h	Manufacturer status register	0	According CiA 301 specification.	UNSIGNED32	ro	optional, TPDO only		
				bit [0]				a set bit indicates that the pressure sensor and/or temperature sensor (if available) are in error state	1: active error 0: no error
				bit [1]				a set bit indicates that the Trafag internal prodcol is in an error state note: Trafag internal use only	1: active error 0: no error
				bit [2]				a set bit indicates a device overall error	1: active error 0: no error
				Each status bit may aggregate multiple other status bits (i.e., more status details) of the device. Refer to the following objects to gather more detail information: • 3000h: Status binary-flags-group field • 3001h: Status uint32-value field • 3002h: Status float-value field					
1003h Predefined error field	00h	Highest subindex supported / number of past errors since last clearance		According CiA 301 specification. Subindex 0 represents the number of (past) errors in this error field (log). Example: • subindex 00h == 0 indicates empty error history, i.e., accessing subindices 01h ... 0Ah is not supported • subindex 00h == 5 indicates that the last 5 errors may be accessed via subindex 01h ... 05h, newest in subindex 01h The logged errors are those sent via EMCY messages in the past. The newest error is always in subindex 01h, older errors thus are moved to the next higher subindex accordingly. For clearing the error history, write 00h to subindex 0.	UNSIGNED8	rw	no		
	01h	standard error field	n/a	newest error – if available	UNSIGNED32	ro	no		
	02h	standard error field	n/a	2 nd newest error – if available	UNSIGNED32	ro	no		
	03h	standard error field	n/a	3 rd	UNSIGNED32	ro	no		
	04h	standard error field	n/a	4 th	UNSIGNED32	ro	no		
	05h	standard error field	n/a	5 th	UNSIGNED32	ro	no		
	06h	standard error field	n/a	6 th	UNSIGNED32	ro	no		
	07h	standard error field	n/a	7 th	UNSIGNED32	ro	no		
	08h	standard error field	n/a	8 th	UNSIGNED32	ro	no		
	09h	standard error field	n/a	9 th	UNSIGNED32	ro	no		
	0Ah	standard error field	n/a	10 th	UNSIGNED32	ro	no		

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping
1005h COB-ID SYNC message	00h	COB-ID SYNC message	00000080h	According CiA 301 specification.	UNSIGNED32	rw	no
				bit[0 ... 10]			
				11-bit CAN-ID (CAN base frame)			
				COB-ID interpreted as SYNC			
				bit[11 ... 28]			
				not supported (CAN extended frame)			
1008h Manufacturer device name	00h	Manufacturer device name	'CMP 8271 Pressuresensor Trafag'	According CiA 301 specification.	VISIBLE_ STRING NG	const	no
				This object provides the device's name as a string (w/o quotation marks).			
1009h Manufacturer hardware version	00h	Manufacturer hardware version	\$HARDWARE_ VERSION	According CiA 301 specification.	VISIBLE_ STRING NG	const	no
				A 32 bytes sized string (33 including 0-termination) is returned which encodes the transmitter's electronics hardware version.			
				For example, the following string may be returned (w/o quotation marks):			
				'...0C00B53171b20210327Lot3N443'			
100Ah Manufacturer software version	00h	Manufacturer software version	\$SOFTWARE_ VERSION	According CiA 301 specification.	VISIBLE_ STRING NG	const	no
				A variable sized string (maximum 50 characters) is returned which encodes the transmitters software version.			
				For example, the following string may be returned (w/o quotation marks):			
				'0C00-01.00-f00295b0-2021.03.11-17:43'			
1010h Store parameters	00h	Highest subindex supported	4	According CiA 301 specification.	UNSIGNED8	const	no
				For subindices 01h ... 04h:			
				Write the byte sequence 65766173h (ascii for 'save' in reverse order) to store the according parameter group to nonvolatile memory.			
1010h Store parameters	01h	Save all parameters	1	Persist all parameters to nonvolatile memory.	UNSIGNED32	rw	no
1010h Store parameters	02h	Save communication parameters	1	Persist all parameters of objects in range 1000h ... 1FFFh to nonvolatile memory.	UNSIGNED32	rw	no
1010h Store parameters	03h	Save application parameters	1	Persist all parameters of objects in range 6000h ... 9FFFh to nonvolatile memory.	UNSIGNED32	rw	no
				Additionally, persist all parameters of the following object to nonvolatile memory:			
				4000h : NV user storage			

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping	
1011h Restore default parameters	00h	Highest subindex supported	4	According CiA 301 specification. For subindices 01h ... 04h: Write the byte sequence 64616F6Ch (ascii for 'load' in reverse order) to restore the according parameter group to factory default values. Note: The factory default values do not get activated immediately after issuing the restore command to the according subindex. The activation occurs as follows:	UNSIGNED8	const	no	
				power cycling the device				Every restored parameter from any parameter group (communication, application, boot; subindex 02h ... 04h) is now active.
				request: NMT node reset				All restored parameters from communication or application parameter group (subindex 02h ... 03h) are now active.
				request: NMT communication reset				All restored parameters from communication parameter group (subindex 02h) are now active.
	01h	Restore all default parameters	1	Restore all parameters to factory default values.	UNSIGNED32	rw	no	
	02h	Restore communication default parameters	1	Restore all parameters of objects in range 1000h ... 1FFFh to factory default values.	UNSIGNED32	rw	no	
	03h	Restore application default parameters	1	Restore all parameters of objects in range 6000h ... 9FFFh to factory default values. Additionally, restore all parameters of following object to factory default values: 4000h : NV user storage	UNSIGNED32	rw	no	

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping		
1014h COB-ID EMCY	00h	COB ID EMCY	\$NODE_ID + 80h	According CiA 301 specification.	UNSIGNED32	rw	no		
				bit [0 ... 10]				11-bit CAN-ID (can base frame)	COB-ID interpreted as SYNC
				bit [11 ... 28]				not supported (CAN extended frame)	always 0 (base frame only support)
				bit [29]				specifies frame type (base vs. extended)	always 0 (base frame only support)
				bit [30]				reserved	always 0
				bit [31]				validity	0: EMCY exists / is valid 1: EMCY doesn't exist / is invalid
Note:									
EMCY messages are sent on any occurring condition as described in section '5. Emergency Message Error Codes'.									
EMCY code 0000h is transmitted to indicate the cleared error state if after one or more errors all error conditions are cleared again in the device. However, most error states remain permanent or at least until a power cycle occurs. See also related objects 1001h and 1029h.									
On active EMCY situation and NMT state being operational, the device may or may not leave NMT state operation depending on the value set by object 1029h.									
1017h Producer heart-beat time	00h	Producer heartbeat time	1000	According CiA 301 specification. Cycle duration in [ms] after which the device sends the next heartbeat. 0 disables heartbeat sending.	UNSIGNED16	rw	no		
1018h Identity object	00h	Highest subindex supported	4	According CiA 301 specification. This object's subindices 01h ... 04h provide general device identification information.	UNSIGNED8	ro	no		
	01h	Vendor-ID	3Dh	Trafag (vendor) identification	UNSIGNED32	ro	no		
	02h	Product code	8271	Product code (in decimal system interpretation)	UNSIGNED32	ro	no		
	03h	Revision number	\$DEVICE REVISION	Major and minor device (software) revision number.	UNSIGNED32	ro	no		
				bit [0 ... 15]				minor revision number	
				bit [16 ... 31]				major revision number	
04h	Serial number	\$SERIAL NUMBER	Unique serial number.	UNSIGNED32	ro	no			

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping						
1029h Error behavior	00h	Highest subindex supported	2	According CiA 301 specification. This object's subindices 01h ... 02h specify the device's reaction to error conditions, regarding changing its NMT state: Supported values are: <table><tr><td>0</td><td>On error: Change to NMT state 'Pre-operational' (only if currently in NMT state Operational)</td></tr><tr><td>1</td><td>On error: Do not change the NMT state</td></tr><tr><td>2</td><td>On error: Change to NMT state 'Stopped'</td></tr></table> Note: Even though meaningful values are 0 ... 2 only, the complete number range 0 ... 254 is accepted by the device, according to CiA spec.	0	On error: Change to NMT state 'Pre-operational' (only if currently in NMT state Operational)	1	On error: Do not change the NMT state	2	On error: Change to NMT state 'Stopped'	UNSIGNED8	ro	no
	0	On error: Change to NMT state 'Pre-operational' (only if currently in NMT state Operational)											
	1	On error: Do not change the NMT state											
2	On error: Change to NMT state 'Stopped'												
01h	Communication error	0	Specifies the device's behavior on the following error occurrences: - bus-off conditions detected - Heartbeat event occurred.	UNSIGNED8	rw	no							
02h	Specific error class	0	Specifies the device's behavior on the following error conditions: - device profile specific (severe) error occurred - manufacturer specific (severe) error occurred The following conditions are considered for NMT state change: - if any of the flags of object 3000h:1 is set, i.e.: EMCY condition occurred - if any of the flags of object 3000h:3 is set, i.e.: EMCY condition occurred Notes: In that case, also an EMCY may be sent - see object 1014h. In contrast to sub-index 1, the valid number range is restricted to 0 ... 2.	UNSIGNED8	rw	no							

Object	Sub	Name	Default Value	Description			Data Type	Access	PDO Mapping															
1800h TPDO 1 Communication parameter	00h	Highest subindex supported	5	According CiA 301 specification. This object's subindices 01h, 02h, 03h, 05h specify the TPDOs communication parameters.			UNSIGNED8	ro	no															
	01h	COB-ID	\$NODE_ID + 00000180h	<table><tr><td>bit [0 ... 10]</td><td>11-bit CAN-ID (CAN base frame)</td><td>COB-ID interpreted as SYNC</td></tr><tr><td>bit [11 ... 28]</td><td>not supported (CAN extended frame)</td><td>always 0 (base frame only support)</td></tr><tr><td>bit [29]</td><td>specifies frame type (base vs. extended)</td><td>always 0 (base frame only support)</td></tr><tr><td>bit [30]</td><td>RTR</td><td>0: RTR allowed on this PDO 1: RTR not allowed on this PDO</td></tr><tr><td>bit [31]</td><td>validity</td><td>0: PDO exists / is valid 1: PDO doesn't exist / is invalid</td></tr></table> Note: Changing bit [0 ... 29] is allowed only if bit [31] is set (==1).			bit [0 ... 10]	11-bit CAN-ID (CAN base frame)	COB-ID interpreted as SYNC	bit [11 ... 28]	not supported (CAN extended frame)	always 0 (base frame only support)	bit [29]	specifies frame type (base vs. extended)	always 0 (base frame only support)	bit [30]	RTR	0: RTR allowed on this PDO 1: RTR not allowed on this PDO	bit [31]	validity	0: PDO exists / is valid 1: PDO doesn't exist / is invalid	UNSIGNED32	rw	no
	bit [0 ... 10]	11-bit CAN-ID (CAN base frame)	COB-ID interpreted as SYNC																					
	bit [11 ... 28]	not supported (CAN extended frame)	always 0 (base frame only support)																					
	bit [29]	specifies frame type (base vs. extended)	always 0 (base frame only support)																					
	bit [30]	RTR	0: RTR allowed on this PDO 1: RTR not allowed on this PDO																					
	bit [31]	validity	0: PDO exists / is valid 1: PDO doesn't exist / is invalid																					
	02h	Transmission type	255	The following transmission types for TPDO transmissions are supported: <table><tr><td>01h</td><td>synchronous - cyclic on every sync</td></tr><tr><td>02h</td><td>synchronous - cyclic on every 2nd SYNC</td></tr><tr><td>...</td><td>...</td></tr><tr><td>F0h</td><td>synchronous - cyclic on every 240th SYNC</td></tr><tr><td>FCh</td><td>RTR-only - synchronous</td></tr><tr><td>FDh</td><td>RTR-only - event-driven</td></tr><tr><td>FFh</td><td>event-driven - time based</td></tr></table> Note: Unlisted transmission type are not supported.			01h	synchronous - cyclic on every sync	02h	synchronous - cyclic on every 2nd SYNC	...	...	F0h	synchronous - cyclic on every 240th SYNC	FCh	RTR-only - synchronous	FDh	RTR-only - event-driven	FFh	event-driven - time based	UNSIGNED8	rw	no	
	01h	synchronous - cyclic on every sync																						
	02h	synchronous - cyclic on every 2nd SYNC																						
...	...																							
F0h	synchronous - cyclic on every 240th SYNC																							
FCh	RTR-only - synchronous																							
FDh	RTR-only - event-driven																							
FFh	event-driven - time based																							
03h	Inhibit time	0	The inhibit time represents the minimum time interval for TPDO transmission if the transmission type is set FFh. Unit: [100us] 0 disables the inhibit time.			UNSIGNED16	rw	no																
05h	Event timer	1000	The maximum time interval after which a TPDO is transmitted if the transmission type is FFh. Unit: [1ms] 0 disables the event timer.			UNSIGNED16	rw	no																

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping									
1801h TPDO 2 Communication parameter	00h	Highest subindex supported	5	Similar to index 1800h	UNSIGNED8	ro	no									
	01h	COB-ID	\$NODE_ID + 80000280h		UNSIGNED32	rw	no									
	02h	Transmission type	255		UNSIGNED8	rw	no									
	03h	Inhibit time	0		UNSIGNED16	rw	no									
	05h	Event timer	1000		UNSIGNED16	rw	no									
	1A00h TPDO 1 Mapping parameter	00h	Highest subindex supported		2	According CiA 301 specification. This object's subindices 01h, 02h, 03h, 04h specify the objects which are mapped to this TPDO. I.e., at most 4 different objects may be mapped to this TPDO. The subindex 00h denotes the number of active object mappings, i.e., the last active subindex in range 01h ... 04h. E.g., a value of 2 means 2 mappings are active: subindex 01h and 02h. The encoding of the mapping values is as follows for all subindices:			rw	no						
				<table><tr><td>bit [0 ... 7]</td><td>data length in [bit]</td><td>e.g., 20h for a 32bit value</td></tr><tr><td>bit [8 ... 15]</td><td>subindex of mapped object</td><td>e.g., 01h (AI input PV 1 (pressure))</td></tr><tr><td>bit [16 ... 31]</td><td>index of mapped object</td><td>e.g., 6130h (AI input PV)</td></tr></table>	bit [0 ... 7]	data length in [bit]	e.g., 20h for a 32bit value	bit [8 ... 15]	subindex of mapped object	e.g., 01h (AI input PV 1 (pressure))	bit [16 ... 31]	index of mapped object	e.g., 6130h (AI input PV)			
bit [0 ... 7]	data length in [bit]	e.g., 20h for a 32bit value														
bit [8 ... 15]	subindex of mapped object	e.g., 01h (AI input PV 1 (pressure))														
bit [16 ... 31]	index of mapped object	e.g., 6130h (AI input PV)														
				Note: Remapping TPDOs / objects, has to be done as follows during NMT states Operational or Pre-Operational: 1. Deactivate the TPDO by setting to 1 bit [31] of 1800h:1 2. Disable this object's mappings by clearing 1A00h:0 to 0 3. Modify this object's mappings, i.e., change as required 1A00h:1 ... 1A00h:4 4. Enable this object's mappings again by setting 1A00h:0 to the number of mappings (1 ... 4) 5. Activate TPDO again by clearing to 0 bit [31] of 1800h:1												
	01h	TPDO 1 mapping entry 1	61300120h	1 st mapped object	UNSIGNED32	rw	no									
	02h	TPDO 1 mapping entry 2	61300220h	2 nd mapped object	UNSIGNED32	rw	no									
	03h	TPDO 1 mapping entry 3	0	3 rd mapped object	UNSIGNED32	rw	no									
	04h	TPDO 1 mapping entry 4	0	4 th mapped object	UNSIGNED32	rw	no									

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping							
1A01h TPDO 2 Mapping parameter	00h	Highest subindex supported	0	Similar to index 1A00	UNSIGNED8	rw	no							
	01h	TPDO 2 mapping entry 1	0		UNSIGNED32	rw	no							
	02h	TPDO 2 mapping entry 2	0		UNSIGNED32	rw	no							
	03h	TPDO 2 mapping entry 3	0		UNSIGNED32	rw	no							
	04h	TPDO 2 mapping entry 4	0		UNSIGNED32	rw	no							
1F51h Program control	00h	Highest subindex supported	1	According CiA 302-3 specification.	UNSIGNED8	ro	no							
	01h	Program control	1	Read the value to get current program execution state: <table><tr><td>0</td><td>program stopped/bootloader active state</td></tr><tr><td>1</td><td>program running state</td></tr></table> Write the value to change the programs execution state: <table><tr><td>0 or 2</td><td>activate 'program stopped/bootloader active' state while being in 'program running' state (no effect if 'program stopped/bootloader active' state is already active)</td></tr><tr><td>1</td><td>activate 'program running' state while being in 'program stopped/bootloader active' state (no effect if 'program running' state is already active)</td></tr></table> Note: The device's SDO server does not acknowledge the SDO transfer when changing the device execution state from 'program running' to 'program stopped/bootloader active' state; i.e., for the client application, a timeout will occur after the SDO transfer. However, the client may query as usual the SDO server in both states after having changed the state. The SDO server will acknowledge correctly the current (newly set) state. Note 2: After having changed the state from 'program running' to 'program stopped/bootloader active' the device will be reachable by its: • persistent node id • persistent bitrate - if persistent bitrate is NOT set to 0 (zero), aka. autobaud • previously active bitrate - if persistent bitrate IS set to 0 (zero), aka. autobaud If starting the device directly in 'program stopped/bootloader active' state after a power cycle (e.g., because there is no valid application present on the device on startup), then: • node-id = 126 • bitrate = 250 kbit/s	0	program stopped/bootloader active state	1	program running state	0 or 2	activate 'program stopped/bootloader active' state while being in 'program running' state (no effect if 'program stopped/bootloader active' state is already active)	1	activate 'program running' state while being in 'program stopped/bootloader active' state (no effect if 'program running' state is already active)	UNSIGNED8	rw
0	program stopped/bootloader active state													
1	program running state													
0 or 2	activate 'program stopped/bootloader active' state while being in 'program running' state (no effect if 'program stopped/bootloader active' state is already active)													
1	activate 'program running' state while being in 'program stopped/bootloader active' state (no effect if 'program running' state is already active)													

Object	Sub	Name	Default Value	Description			Data Type	Access	PDO Mapping
1F56h Application identification	00h	Highest subindex supported	1	According CiA 302-3 specification.			UNSIGNED8	ro	no
	01h	Application information 1	\$APPLICATION CRC	The value returned depends on the current program execution state:			UNSIGNED32	ro	no
				program stopped/bootloader active state	0				
				program running state	CRC of existing application (> 0)				
1F57h Flash status	00h	Highest subindex supported	1	According CiA 302-3 specification.			UNSIGNED8	ro	no
	01h	Flash status 1	0	The returned value's interpretation depends on the current program execution state:			UNSIGNED32	ro	no
				program stopped/bootloader active state	according: CiA 302-3: 4.4.4 Object 1F57h - Flash status identification				
				program running state	00000000h	flash configuration block is ok			
					00000006h	configuration block is not ok (Data format error or data CRC error)			
1F80h NMT startup	00h	NMT startup	0	According CiA 302-2 specification. This object configures the device's startup behavior.			UNSIGNED32	rw	no
				bit [0 ... 7] == 00h	device enters NMT state 'pre-operational' after initialization				
				bit [0 ... 7] == 08h	device enters NMT state 'operational' automatically after initialization (self-starting) Note: The device won't enter NMT state 'operational' automatically if the device detects any errors during star- tup, i.e. if object 1001h is NOT 0. In such a situation, the device will remain in NMT state 'pre-operational'.				
				bit [8 ... 31]	reserved, always 0				

10.3. Manufacturer Segment

Object	Sub	Name	Default Value	Description			Data Type	Access	PDO Mapping
3000h Status flags field	00h	Highest subindex supported	3	Manufacturer / Trafag specific. This array contains multiple status flag groups – one status flag group per subindex – each subindex (group) containing multiple flags (individual bits). I.e., each group may encode up to 32 different flags. For the individual status flag group descriptions, see the following subindices.			UNSIGNED8	ro	no
	01h	Sensor status flags	0	This flag group contains pressure sensor and temperature sensor (if available) related status flags.			UNSIGNED32	ro	optional
				bit [0]	error sensor initialization	1: active error 0: no error			
				bit [1]	error external clock				
				bit [2]	error boot failure				
				bit [3]	error temperature rail				
				bit [4]	error pressure rail				
				bit [5]	error sensor-break				
	bit [6]	error CRC (RAM)							
	02h	Prodcol status flags	0	This flag group contains production relevant prodcol status flags. Intended for manufacturer internal use only. Currently the set is empty			UNSIGNED32	ro	optional
03h	System status flags	0	This flag group contains transmitter wide system status flags.			UNSIGNED32	ro	optional	
			bit [0]	error modules initialization	1: active error 0: no error				
			bit [1]	error hardware incompatibility					
			bit [2]	error filesystem mounting					
			bit [3]	error boot cfg file loading					
			bit [4]	error communication cfg file loading					
			bit [5]	error application cfg file loading					
bit [6]	error unexpected device reset								

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping
4000h NV user storage	00h	Highest subindex supported	16	Manufacturer / Trafag specific. This index provides a nonvolatile user data store. Total data store size: 64 Bytes Organization: 16 x UNSIGNED32 words, which are mapped to subindices 1 ... 16 of this object. Note: The NV user data store is part of the 'application' NV storage. I.e. - To persist the current user data store to nonvolatile (NV) memory: Do 'save application parameters' (refer to object 1010h:3) - To reset the user data store to its factory default values (0): Do 'restore application parameters', (refer to object 1011h:3) To overwrite the user data store held currently in RAM with the user data store held in nonvolatile memory: Do NMT 'reset application' or power cycle the device.	UNSIGNED8	const	no
	01h	U32 entry 1	0	1 st UNSIGNED32 user data store	UNSIGNED32	rw	no
	02h	U32 entry 2	0	2 nd UNSIGNED32 user data store	UNSIGNED32	rw	no
	03h	U32 entry 3	0	3 rd UNSIGNED32 user data store	UNSIGNED32	rw	no
	04h	U32 entry 4	0	4 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	05h	U32 entry 5	0	5 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	06h	U32 entry 6	0	6 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	07h	U32 entry 7	0	7 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	08h	U32 entry 8	0	8 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	09h	U32 entry 9	0	9 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	0Ah	U32 entry 10	0	10 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	0Bh	U32 entry 11	0	11 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	0Ch	U32 entry 12	0	12 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	0Dh	U32 entry 13	0	13 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	0Eh	U32 entry 14	0	14 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	0Fh	U32 entry 15	0	15 th UNSIGNED32 user data store	UNSIGNED32	rw	no
	10h	U32 entry 16	0	16 th UNSIGNED32 user data store	UNSIGNED32	rw	no

10.4. Device Profile Segment

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping
6100h AI input FV	00h	Highest subindex supported	2	According CiA 404-1 specification. The output of this object's subindices is the device's last measured value in (internal) SI units (unit not changeable). See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI input FV 1 pressure	\$FV_1	Pressure value [unit] = Pascal	REAL32	ro	optional, TPDO only
	02h	AI input FV 2 temperature	constant: 0 (zero) K	Temperature value – if the temperature is not measured, the value is 0 (zero) K. [unit] = Kelvin	REAL32	ro	optional, TPDO only
6110h AI sensor type	00h	Highest subindex supported	2	According CiA 404-1 specification. This object indicates the available sensor types, whose measurement values are available via the respective subindices 01h.	UNSIGNED8	ro	no
	01h	AI sensor type 1	90	Pressure transducer	UNSIGNED16	const	no
	02h	AI sensor type 2	100	Temperature transducer	UNSIGNED16	const	no
6124h AI input offset	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 01h ... represent the additional offset value for the PV unit-scaled measurement values. Note: The offset values may be modified either via this object, or – alternatively - by auto-zero object (refer to 6125h) See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI input offset 1	0	Pressure Offset (in selected PV unit)	REAL32	rw	no
	02h	AI input offset 2	0	Temperature Offset (in selected PV unit)	REAL32	rw	no
6125h AI autozero	00h	Highest subindex supported	2	According CiA 404-1 specification. Writing the value 6f72657Ah (ascii for 'zero' in reverse order) to one of the subindices 01h ... sets the currently active value as autozero value (refer to 6124h) such, that the analog input PV value (refer to x130h) is zero. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI autozero 1	n/a	Auto-zero the process value (PV) pressure	UNSIGNED32	wo	no
	02h	AI autozero 2	n/a	Auto-zero the process value (PV) temperature	UNSIGNED32	wo	no

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping
6126h AI scaling factor	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 01h ... allow specifying a scaling factor for the according field value (FV). Note: Scaled and offset FV is calculated with the usual polynomial: $\text{output} = \text{input} * \text{scaling_factor} + \text{scaling_offset}$. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI scaling factor 1	1	Scaling factor for pressure FV	REAL32	rw	no
	02h	AI scaling factor 2	1	Scaling factor for temperature FV	REAL32	rw	no
6127h AI scaling offset	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 01h ... allow specifying an offset to be added to the according field value (FV). Note: Scaled and offset FV is calculated with the usual polynomial: $\text{output} = \text{input} * \text{scaling_factor} + \text{scaling_offset}$. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI scaling offset 1	0	Offset value for pressure FV	REAL32	rw	no
	02h	AI scaling offset 2	0	Offset value for temperature FV	REAL32	rw	no
6130h AI input PV	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 01h ... provide the PV (process value) of the measurement. It contains all the specified operations done on the FV (field value), such as filtering, scaling, offsetting, unit conversion and auto-zeroing. Its number format is REAL32. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI input PV 1 pressure	\$PV_1	Pressure process value [unit]: depending on 6131h	REAL32	ro	optional, TPDO only
	02h	AI input PV 2 temperature	constant: -273.15°C	Temperature process value [unit]: depending on 6131h	REAL32	ro	optional, TPDO only

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping																									
6131h AI physical unit PV	00h	Highest subindex supported	2	According CiA 404-1 and CiA 303-2 specification. This object's subindices 01h ... specify the physical unit with which the according PV is made available via object 6130h. Additional to the unit, a prefix may be specified. Prefixes allow to scale the value by a power of ten. The number encoding of subindices 01h ... is as follows: <table><tr><td>bit [0 ... 15]</td><td>not used</td><td>always 0</td></tr><tr><td>bit [16 ... 23]</td><td>SI-numerator code</td><td>allowed values depend on the subindex; see description below for further details.</td></tr><tr><td>bit [24 ... 31]</td><td>prefix code (exponent) n. The according PV is <u>divided</u> by 10ⁿ before it is output via object 6130h.</td><td> allowed range of n: -18 (atto) ... 0 ... +18 (exa) where n is encoded in 8bit two's complement: e.g. <table><tr><th>divisor 10ⁿ</th><th>prefix code n</th></tr><tr><td>10¹⁸</td><td>18d == 12h</td></tr><tr><td>....</td><td></td></tr><tr><td>10¹</td><td>1d == 01h</td></tr><tr><td>10⁰</td><td>0d == 00h</td></tr><tr><td>10⁻¹</td><td>-1d == FFh</td></tr><tr><td>....</td><td></td></tr><tr><td>10⁻¹⁸</td><td>-18 == EEh</td></tr></table></td></tr></table> See also diagram 'measurement value processing'.	bit [0 ... 15]	not used	always 0	bit [16 ... 23]	SI-numerator code	allowed values depend on the subindex; see description below for further details.	bit [24 ... 31]	prefix code (exponent) n. The according PV is <u>divided</u> by 10 ⁿ before it is output via object 6130h.	allowed range of n: -18 (atto) ... 0 ... +18 (exa) where n is encoded in 8bit two's complement: e.g. <table><tr><th>divisor 10ⁿ</th><th>prefix code n</th></tr><tr><td>10¹⁸</td><td>18d == 12h</td></tr><tr><td>....</td><td></td></tr><tr><td>10¹</td><td>1d == 01h</td></tr><tr><td>10⁰</td><td>0d == 00h</td></tr><tr><td>10⁻¹</td><td>-1d == FFh</td></tr><tr><td>....</td><td></td></tr><tr><td>10⁻¹⁸</td><td>-18 == EEh</td></tr></table>	divisor 10 ⁿ	prefix code n	10 ¹⁸	18d == 12h			10 ¹	1d == 01h	10 ⁰	0d == 00h	10 ⁻¹	-1d == FFh			10 ⁻¹⁸	-18 == EEh	UNSIGNED8	ro	no
bit [0 ... 15]	not used	always 0																														
bit [16 ... 23]	SI-numerator code	allowed values depend on the subindex; see description below for further details.																														
bit [24 ... 31]	prefix code (exponent) n. The according PV is <u>divided</u> by 10 ⁿ before it is output via object 6130h.	allowed range of n: -18 (atto) ... 0 ... +18 (exa) where n is encoded in 8bit two's complement: e.g. <table><tr><th>divisor 10ⁿ</th><th>prefix code n</th></tr><tr><td>10¹⁸</td><td>18d == 12h</td></tr><tr><td>....</td><td></td></tr><tr><td>10¹</td><td>1d == 01h</td></tr><tr><td>10⁰</td><td>0d == 00h</td></tr><tr><td>10⁻¹</td><td>-1d == FFh</td></tr><tr><td>....</td><td></td></tr><tr><td>10⁻¹⁸</td><td>-18 == EEh</td></tr></table>	divisor 10 ⁿ	prefix code n	10 ¹⁸	18d == 12h			10 ¹	1d == 01h	10 ⁰	0d == 00h	10 ⁻¹	-1d == FFh			10 ⁻¹⁸	-18 == EEh														
divisor 10 ⁿ	prefix code n																															
10 ¹⁸	18d == 12h																															
....																																
10 ¹	1d == 01h																															
10 ⁰	0d == 00h																															
10 ⁻¹	-1d == FFh																															
....																																
10 ⁻¹⁸	-18 == EEh																															

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping																					
	01h	AI physical unit PV 1	004E0000h	Physical unit specifier and prefix code for pressure process value SI-numerator codes, bit [16 ... 23]: <table><tr><td>22h</td><td>pascal</td><td>[Pa]</td></tr><tr><td>4Eh</td><td>bar</td><td>[bar]</td></tr><tr><td>ABh</td><td>pound force per square inch</td><td>[psi]</td></tr><tr><td>A0h</td><td>millimeter quicksilver @0°C</td><td>[mmHg, @0°C]</td></tr><tr><td>A2h</td><td>millimeter water @4°C</td><td>[mmH₂O, @4°C]</td></tr><tr><td>A1h</td><td>technical atmosphere</td><td>[at]</td></tr><tr><td>A4h</td><td>physical atmosphere</td><td>[atm]</td></tr></table> Examples: For output PV 1 (pressure) in kPa set 6131h:1 = 03220000h. For output PV 1 (pressure) in mbar set 6131h:1 = FD4E0000h.	22h	pascal	[Pa]	4Eh	bar	[bar]	ABh	pound force per square inch	[psi]	A0h	millimeter quicksilver @0°C	[mmHg, @0°C]	A2h	millimeter water @4°C	[mmH ₂ O, @4°C]	A1h	technical atmosphere	[at]	A4h	physical atmosphere	[atm]	UNSIGNED32	rw	no
22h	pascal	[Pa]																										
4Eh	bar	[bar]																										
ABh	pound force per square inch	[psi]																										
A0h	millimeter quicksilver @0°C	[mmHg, @0°C]																										
A2h	millimeter water @4°C	[mmH ₂ O, @4°C]																										
A1h	technical atmosphere	[at]																										
A4h	physical atmosphere	[atm]																										
	02h	AI physical unit PV 2	002D0000h	Physical unit specifier and prefix code for temperature process value SI-numerator codes, bit [16 ... 23]: <table><tr><td>05h</td><td>kelvin</td><td>[k]</td></tr><tr><td>2Dh</td><td>degree Celsius</td><td>[°C]</td></tr><tr><td>ACh</td><td>degree fahrenheit</td><td>[°F]</td></tr></table> Example: For output PV 2 (temperature) in °C set 6131:2 = 002D0000h.	05h	kelvin	[k]	2Dh	degree Celsius	[°C]	ACh	degree fahrenheit	[°F]	UNSIGNED32	rw	no												
05h	kelvin	[k]																										
2Dh	degree Celsius	[°C]																										
ACh	degree fahrenheit	[°F]																										

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping
6132h AI decimal digits PV	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices define the number of places the decimal point of the according PV value is shifted to the right, before being truncated and output as an INTEGER16 or INTEGER32 PV value (refer to objects 7130h and 9130h) E.g. If this value is set to 3, a PV value of 2.048 (REAL32) is output as 2048 in INTEGER16 and INTEGER32 format. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI decimal digits PV 1	0	Pressure PV decimal point shift.	UNSIGNED8	rw	no
	02h	AI decimal digits PV 2	0	Temperature PV decimal point shift.	UNSIGNED8	rw	no
6148h AI span start	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 1 ... specify the (upper/lower) limit of the process value span, for which no over-/underflow flags are set in index 6150h. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI span start 1	\$PRESSURE MIN	Span start (lower limit) of pressure PV.	REAL32	rw	no
	02h	AI span start 2	-40	Span start (lower limit) of temperature PV.	REAL32	rw	no
6149h AI span end	00	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 1 ... specify the (upper/lower) limit of the process value span, for which no over-/underflow flags are set in index 6150h. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI span end 1	\$PRESSURE MAX	Span end (upper limit) of pressure PV.	REAL32	rw	no
	02h	AI span end 2	125	Span end (upper limit) of temperature PV.	REAL32	rw	no

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping		
6150h AI status	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices reflect the status of the according AI PV channels.	UNSIGNED8	ro	no		
				bit [0]				invalid value	is set (==1), if any of the according PV values (x130h) is invalid, i.e. - it has been clipped (out of numeric range), or - sensor break has been detected it is cleared (==0) otherwise.
				bit [1]				positive overload	is set (==1), if any of the according PV values (x130h) is bigger than its respective span end value, specified by x149h it is cleared (==0) otherwise.
				bit [2]				negative overload	is set (==1), if any of the according PV values (x130h) is smaller than its respective span start, specified by x148h it is cleared (==0) otherwise.
				bit [3..7]				not used	not used, always 0
				Note: This status is re-evaluated on every new measurement; except for sensor break, whose status is updated every second only. Note 2: bit [1] or bit [2] are guaranteed to be set exclusively (according CiA 404-1), if span-end >= span-start. If, however, span-end < span-start, then bit [1] and bit [2] may be set simultaneously. See also diagram 'measurement value processing'.					
01h	AI status 1	\$STATUS_1	Status of pressure PV	UNSIGNED8	ro	optional			
02h	AI status 2	\$STATUS_2	Status of temperature PV	UNSIGNED8	ro	optional			

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping									
61A0h AI filter type	00h	Highest subindex supported	2	According CiA 404-1 specification. This and object's 61A1h subindices 01h ... specify the filter type and settings to apply to the according FV measurements. 61A0h specifies the filter type; 61A1h specifies the settings. Following types are supported:	UNSIGNED8	ro	no									
				<table><tr><td>0</td><td>no filter</td><td>$Value_N = Input_N$</td></tr><tr><td>1</td><td>moving average</td><td>$Value_N = Value_{N-1} + \frac{Input_N - Value_{N-1}}{Filterconstant}$ Object 61A1h provides the according <i>Filterconstant</i></td></tr><tr><td>2</td><td>repeating average</td><td>$Value = \frac{\sum_{n=1}^N Input_n}{N}$ Object 61A1h provides the according <i>N</i>.</td></tr></table>				0	no filter	$Value_N = Input_N$	1	moving average	$Value_N = Value_{N-1} + \frac{Input_N - Value_{N-1}}{Filterconstant}$ Object 61A1h provides the according <i>Filterconstant</i>	2	repeating average	$Value = \frac{\sum_{n=1}^N Input_n}{N}$ Object 61A1h provides the according <i>N</i> .
				0				no filter	$Value_N = Input_N$							
				1				moving average	$Value_N = Value_{N-1} + \frac{Input_N - Value_{N-1}}{Filterconstant}$ Object 61A1h provides the according <i>Filterconstant</i>							
2	repeating average	$Value = \frac{\sum_{n=1}^N Input_n}{N}$ Object 61A1h provides the according <i>N</i> .														
If a filter type value > 2 is provided, this value is accepted; however, it will have the same effect as 'no filter' (filter type value == 0). See also diagram 'measurement value processing'.																
	01h	AI filter type 1	0	Filter type value for pressure FV.	UNSIGNED8	rw	no									
	02h	AI filter type 2	0	Filter type value for temperature FV.	UNSIGNED8	rw	no									
61A1h AI filter constant	00h	Highest subindex supported	2	According CiA 404-1 specification. This and object's 61A0h subindices 01h ... specify the filter settings and type to apply to the according FV measurements. 61A1h specifies the settings which represent filter constant or N, depending on selected filter type - via object 61A0h. Allowed values for Subindex 1 ... : >= 1 (0 is not allowed). See also diagram 'measurement value processing'.	UNSIGNED8	ro	no									
	01h	AI filter constant 1	1	Filter constant or N for pressure FV filter, depending on selected filter type.	UNSIGNED8	rw	no									
	02h	AI filter constant 2	1	Filter constant or N for temperature FV filter, depending on selected filter type.	UNSIGNED8	rw	no									

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping
7130h AI input PV int16	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 01h ... provide the PV (process value) of the measurement. It contains all the specified operations done on the FV (field value), such as filtering, scaling, offsetting, unit conversion and auto-zeroing. Its number format is INTEGER16 and its decimal point shift is done according to object 6132h. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI input PV 1 pressure int16	\$PV_1	Pressure process value [unit] : depending on 6131h	INTEGER16	ro	optional, TPDO only
	02h	AI input PV 2 temperature int16	constant: -273°C	Temperature process value [unit] : depending on 6131h	INTEGER16	ro	optional, TPDO only
7148h AI span start int16	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 1 ... specify the (upper/lower) limit of the process value span, for which no over-/underflow flags are set in index 6150h. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI span start 1 int16	-32768	Span start (lower limit) of pressure PV in INTEGER16 format.	INTEGER16	rw	no
	02h	AI span start 2 int16	-32768	Span start (lower limit) of temperature PV in INTEGER16 format.	INTEGER16	rw	no
7149h AI span end int16	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 1 ... specify the (upper/lower) limit of the process value span, for which no over-/underflow flags are set in index 6150h. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI span end 1 int16	32767	Span end (upper limit) of pressure PV in INTEGER16 format.	INTEGER16	rw	no
	02h	AI span end 2 int16	32767	(Upper limit) of temperature PV in INTEGER16 format.	INTEGER16	rw	no
9130h AI input PV int32	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 01h ... provide the PV (process value) of the measurement. It contains all the specified operations done on the FV (field value), such as filtering, scaling, offsetting, unit conversion and auto-zeroing. Its number format is INTEGER32 and its decimal point shift is done according to object 6132h. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI input PV 1 pressure int32	\$PV_1	Pressure process value [unit] : depending on 6131h	INTEGER32	ro	optional, TPDO only
	02h	AI input PV 2 temperature int32	constant: -273°C	Temperature process value [unit] : depending on 6131h	INTEGER32	ro	optional, TPDO only

Object	Sub	Name	Default Value	Description	Data Type	Access	PDO Mapping
9148h AI span start int32	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 1 ... specify the (upper/lower) limit of the process value span, for which no over-/underflow flags are set in index 6150h. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI span start 1 int32	-2147483648	Span start (lower limit) of pressure PV in INTEGER32 format.	INTEGER32	rw	no
	02h	AI span start 2 int32	-2147483648	Span start (lower limit) of temperature PV in INTEGER32 format.	INTEGER32	rw	no
9149h AI span end int32	00h	Highest subindex supported	2	According CiA 404-1 specification. This object's subindices 1 ... specify the (upper/lower) limit of the process value span, for which no over-/underflow flags are set in index 6150h. See also diagram 'measurement value processing'.	UNSIGNED8	ro	no
	01h	AI span end 1 int32	2147483647	Span end (upper limit) of pressure PV in INTEGER32 format.	INTEGER32	rw	no
	02h	AI span end 2 int32	2147483647	Span end (upper limit) of temperature PV in INTEGER32 format.	INTEGER32	rw	no

11. Release notes

Release	Date	Comments
OC00-01.02	June 2021	First Firmware release in production
OC00-01.03	November 2022	CiA Conformity approved. Deactivated node-ID and baud rate change via SDO transfer to comply with CiA conformity current standards (node-ID and baud rate must be changed via LSS protocol). Thus removed subindex 4 on index 0x1010/0x1011 (save/restore boot parameters) and deactivated SDO access to index 0x4001 (pending node-ID) and 0x4002 (pending bitrate).