

Type 8681

CANopen

Objects

Document version 1.7

Supplement to Operating Instructions

1 History

Document version	EDS version	Firmware version	Date	Changes
1.7	1.7	B.02.00.00	2020-05-12	<ul style="list-style-type: none"> - columns "data memory", "factory reset", "device reset" added to object description tables - abbreviations chapter added - "NamurStatus" added to cyclic data - added objects: <ul style="list-style-type: none"> - 0x2004subD (Device Status Object – Device Boot Counter) - 0x2004sub12 (Device Status Object – Operation Time Since Last Boot) - 0x210A (Trigger Maintenance Function) - 0x2502sub1 (NamurStatus) - 0x2C05sub8 (Device Configuration - Feedback Priority) - 0x2C07subA (Device Status - Current Position [mm]) - 0x2C08 (WMS) - 0x2C11 (Device Specific LED Mode) - 0x2C12 (Valve Mode Feedback Colors) - 0x2C13 (Valve Mode Feedback Blink Mode) - changed objects: <ul style="list-style-type: none"> - 0x2120 (LED Modi) Valve modes, device specific mode added; Value is updated, if LED Modi is configured via DIP switch - 0x2122 (LED Extern Color) Support of blink mode added - 0x2501sub1 (Current position) - 0x2C06sub1 (Diagnose – ErrorByte) Bit definitions changed - 0x2C06sub2 (Diagnose – WarningByte) Bit definition changed - minor description changes: objects <ul style="list-style-type: none"> - 0x2001sub1 (Device Communication Object - Baudrate) - 0x2001sub2 (Device Communication Object - Address) - 0x2001sub3 (Device Communication Object – bueS Mode) - 0x2002sub4 (User Configuration Object - Displayed Device Name) - 0x2002sub5 (User Configuration Object - Static NodeID) added - 0x2C02 (Manual Valve Control) - 0x2C04subF (Service Parameters - Service Indication Option) - 0x2C05sub1, 2, 7 (Device Configuration) - 0x2C07sub7 (Device State - Service Indication State) - 0x2C26 (Factory Reset Function) - 0x2C27 (Confirm Maintenance Function) - removed not relevant internal objects: <ul style="list-style-type: none"> - 0x2001subC, E, F (Device Communication Object – Deallocation Delay, Producer error field 1-64, 65-128) - 0x2002sub1 (User Configuration Object – Unique Device Name) - 0x2003 (Error Management Object) - 0x2010 (Physical Group) - 0x2C00 (Add Device Identity): sub1, 3, 4 - removed not relevant documentation <ul style="list-style-type: none"> - 0x20F0 (Config Client): sub1
1.4	1.6	B.00.00.00	2018-09-03	<ul style="list-style-type: none"> - added data types - added 0x2003sub4, 0x2C07sub7 - fixed sub no. of 0x2C07sub4 Valve state in description - added description of objects: 0x2004sub1, 0x2004subE, 0x20F0, 0x2C01, 0x2C02, 0x2C05sub7
1.3	1.6	B.00.00.00	2018-05-23	Draft version
1.2	1.5	A.80.02.11	2017-10-26	Draft version: Moved some attachments to new chapter "Important information" Changes for Firmware ≥ A.80.02.11 - Object 0x2122 (LED Extern Color) is stored persistently

Document version	EDS version	Firmware version	Date	Changes
1.1	1.4	A.80.01.00	2017-09-28	<p>Draft version: Changes for Firmware \geq A.80.01.00</p> <p>Changed objects:</p> <ul style="list-style-type: none"> - 0x2004sub3 Device Supply Voltage parameter now read only - 0x2500sub1 Feedbacks: UNSIGNED8 instead of INTEGER8, parameter name changed - 0x2501sub1 Current position as REAL32 value in m (instead of UINT8 value in mm), parameter name changed - 0x2540sub1 Valves: UNSIGNED8 instead of INTEGER8, parameter name changed - 0x2C06 Diagnose: bits added for Errorbyte and Info/Warningbyte - Cyclic PDO data (refer to chapter 3.3) <p>Deleted objects:</p> <ul style="list-style-type: none"> - 0x2C03 Feedback Fields: sub1... sub6 (UNSIGNED8 values in 0.1mm) substituted by 0x2C03 sub7... subC (REAL32 values in m) <p>New objects:</p> <ul style="list-style-type: none"> - 0x2120 LED Modi - 0x2122 LED Extern Color - 0x2C03 sub7... subC Feedback Fields as REAL32 values in m
1.0	1.1	A.02.00.00	2017-06-20	Initial draft version

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2 Abbreviations

Common abbreviations:

Abbreviation	Meaning
büS	Bürkert system bus

Following datatype abbreviations are used in this document:

Abbreviation	Meaning
UI8	Unsigned8 (8bit)
UI16	Unsigned16 (16bit)
UI32	Unsigned32 (32bit)
UI64	Unsigned64 (64bit)
FL32	Real32 (Float, 32bit)
STR	String (Byte array of max. 19 Bytes, characters coded with "UTF-8")

Following abbreviations are used for expressing conditions:

Abbreviation	Meaning
!=	Not equal
==	Equals

3 Important Information

3.1 Baudrates

The used baud rate can be set in *Baudrate* in the Device Communication Object (0x2001sub1) in case the DIP switches for setting the baud rate have the following position:

DIP7 = On, DIP8 = On.

Supported baud rates are specified in the EDS-file.

Possible values are:

0: 1000 kbit/s	5: 100 kbit/s
1: 800 kbit/s (not supported)	6: 50 kbit/s
2: 500 kbit/s (default)	7: 20 kbit/s
3: 250 kbit/s	8: 10 kbit/s
4: 125 kbit/s	

3.2 Resets

A reset can be called by writing the following values in the Device Communication Object (0x2001sub4).

Possible values are:

- 0:** No reset
- 1:** Communication Reset
- 2:** Node reset (restart device)

3.3 Cyclic data

RPDOs (receive data)

- Receive PDO Mapping Parameter 0:

Sub1: Setpoint (object 2540sub1) EDS version ≥ 1.7
 Valves (object 2540sub1) EDS version < 1.7

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used					Solenoid Valve 3	Solenoid Valve 2	Solenoid Valve 1
					0 = OFF, 1 = ON		

TPDOs (transmit data)

- Transmit PDO Mapping Parameter 0:

Sub1: Feedback (object 2500sub1) EDS version ≥ 1.7
 Feedbacks (object 2500sub1) EDS version < 1.7

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used				Position S4	Position S3	Position S2	Position S1
				0 = OFF, 1 = ON			

Sub2: Position [m] *) as FL32 (object 2501sub1) EDS version ≥ 1.7
 Current Position [m] *) as FL32 (object 2501sub1) EDS version 1.4 ... 1.6
 Current Position [mm] as UI8 (object 2501sub1) EDS version < 1.4

*) (1 mm resolution)

Sub3: NamurStatus as UI8 (object 2502sub1) EDS version ≥ 1.7

4 Objects

For further information about standard CANopen objects see document “Integration of Bürkert devices in CANopen networks”

<https://www.buerkert.de/de/Media/plm/MAN/MA/MAME23-Software-EU-EN.pdf?id=MAN00000000000000001000310294ENI>

Column label	Description
Sub	Sub index of object
Name	Name of object in EDS file
Description	Object description
Access type	General CANopen access rights: RO = read only, RW = read write
Data type	Data type of sub index / object (if only sub index 0 exists)
Data memory	Sub index is handled by configuration client
Factory reset	Sub index will be reset to factory default settings, if factory reset function is executed
Device reset	Sub index will be reset to factory default settings, if device reset function is executed

4.1 0x2000 Bürkert Device Description Object

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Device Name	<i>Device name</i> <i>Used to identify the device in a bus system by name (e.g. Bürkert Communicator)</i>	RO	STR			
0x2	Ident Number	<i>Device identification number</i>	RO	UI32			
0x3	Manufacture Date	<i>Manufacture Date</i>	RO	STR			
0x4	Software Ident Number	<i>Identification number of firmware</i>	RO	UI32			
0x5	Software Version	<i>Firmware version number</i>	RO	UI32			
0x6	Hardware Version	<i>Hardware version number</i>	RO	UI32			
0x7	Serial Number	<i>Serial number of device</i>	RO	UI32			
0x8	Product Code	<i>Type of product (type code)</i>	RO	UI32			
0x9	Product Group	<i>Bürkert specific product group like sensor, actuator, ...</i> <i>Used for bus system configuration</i>	RO	UI8			

4.2 0x2001 Device Communication Object

sub	name	description	access	type	data	type	data	memory	factory	reset	device	reset			
0x1	Baudrate	Selectable via DIP switch for setting the baud rate, read at start-up	RW	UI8	X	X									
		DIP7											DIP8	Baudrate	value
		off											off	125 kbit/s	4
		on											off	250 kbit/s	3
		off											on	500 kbit/s	2
on	on	Defined by current value *) Values are specified by CANopen (details see also chapter 3.1). Possible values are: 0: 1000 kbit/s 1: 800 kbit/s (not supported) 2: 500 kbit/s (default) 3: 250 kbit/s 4: 125 kbit/s 5: 100 kbit/s 6: 50 kbit/s 7: 20 kbit/s 8: 10 kbit/s													
*) is overwritten in case of changed DIP switches at start-up															
0x2	Address	Device address range 0..127 Behaviour depends on DIP switches for setting the address, read at start-up (see object 0x2C05sub1).	RW	UI8	X	X									
		DIP 1..6										CANopen	büS mode		
		000000										EDS version ≤ 1.6 Node ID software configured by this object *) **) EDS version ≥ 1.7: Node ID handling depends on 0x2002sub5 Static NodeID. If Static NodeID == 0, Node ID is software configured by this object **)	EDS version ≤ 1.6: Node ID handled automatically EDS version ≥ 1.7: Node ID handling depends on 0x2002sub5 Static NodeID		
		Other combinations										Node ID configured by DIP switches			
*) Value is overwritten in case of another DIP switch configuration at next startup. **) A configured value of 0 is treated as Node ID 1.															
0x3	bueS Mode	Read at start-up 0 : CANopen Used for CANopen applications 1: büS mode CANopen enhanced with Buerkert specific communication parts EDS version ≥ 1.7: 129: Standalone Used for standalone devices No error handling / indication of bus communication / bus configuration errors. Valves are controlled by 0x2540sub1 (Valves – Setpoint) in automatic mode. Initial value corresponds to the configured safety position (0x2C04sub8, 0x2C04sub9).	RW	UI8	X	X									
0x4	Reset	Handles different device resets 0: No reset 1: Communication Reset 2: Node reset (restart device)	RW	UI8											
0x5	bueS Version	version number of the büS driver	RO	UI32											
0x6	Rx error count	occurred Rx errors since devices lifetime	RO	UI8											
0x7	Rx error count max	maximal value of occurred Rx errors	RW	UI8											

sub	name	description	access type	data type	data memory	factory reset	device reset
0x8	Tx error count	<i>occurred Tx errors since devices lifetime</i>	RO	UI8			
0x9	Tx error count max	<i>maximal value of occurred Tx errors</i>	RW	UI8			
0xA	CAN operation status	<i>operation status of CAN</i> 4 - stopped 5 - operational 127 - pre-operational	RW	UI8			
0xC	Deallocation delay	<i>Not part of EDS file.</i> <i>Delay[ms] that bueS partner allocation waits after remove node before start search again</i>	RW	UI16	X	X	
0xD	EDS Version	<i>Version of the EDS file</i>	RO	UI8			

4.3 0x2002 User Configuration Object

sub	name	description	access type	data type	data memory	factory reset	device reset						
0x1	Unique Device Name	<p>Not part of EDS file. Do not change.</p> <p>If hardware DIP switches for CANopen address are changed, the unique device name will be automatically adopted at startup as follows:</p> <table><tr><td>DIP 1..6</td><td>X</td></tr><tr><td>000000</td><td><ID><SN> with <ID> device ident number (8digits, with leading zeros) <SN> device serial number (8digits, with leading zeros)</td></tr><tr><td>Other combinations</td><td>Head_8681_#<NODE_ID> <NODE_ID> : configured (fixed) CANopen address (2digits with leading zeros)</td></tr></table>	DIP 1..6	X	000000	<ID><SN> with <ID> device ident number (8digits, with leading zeros) <SN> device serial number (8digits, with leading zeros)	Other combinations	Head_8681_#<NODE_ID> <NODE_ID> : configured (fixed) CANopen address (2digits with leading zeros)	RW	STR	x	x	
DIP 1..6	X												
000000	<ID><SN> with <ID> device ident number (8digits, with leading zeros) <SN> device serial number (8digits, with leading zeros)												
Other combinations	Head_8681_#<NODE_ID> <NODE_ID> : configured (fixed) CANopen address (2digits with leading zeros)												
0x2	Location Information	Additional user information about the devices location	RW	STR	x	x							
0x3	User Description	Additional user information about the device	RW	STR	x	x							
0x4	Displayed Device Name	<p>Device (TAG) name (is also displayed in Bürkert Communicator)</p> <p>Default value depends on DIP switch CAN address settings and is updated, if no user specific displayed device name was configured. An empty Displayed Device Name is filled with default value at next device startup.</p> <p>Default value if DIP switch CAN address setting is</p> <p>0: "Control Head X" (X = last 4 digits of serial number)</p> <p>> 0: "Head_8681_#XX" (XX = CAN Address configured by DIP switches, with leading zero)</p>	RW	STR	x	x							

sub	name	description	access	type	data	type	data	memory	factory	reset	device	reset
0x5	Static NodeID	<p>Not part of EDS file. EDS version ≥ 1.7 In bÜS mode: 0 – Automatic CANopen address 1..127 – Fixed CANopen address *)</p> <p>In CANopen mode: 0 – CANopen address defined by 0x2001sub2 1..127 – Fixed CANopen address *)</p> <p>If CANopen address 1...63 is configured by hardware DIP switches, object Static NodeID will be overwritten with the configured value after next device restart. If hardware DIP switches are reset to 0 (CANopen address is software configured), object Static NodeID will be reset once to 0 after next device restart.</p> <p>*) If the device does not get the configured fixed CANopen address, the solenoid valves will stay in configured security position and an error signal will be indicated.</p>	RW		UI8		x		x			

4.4 0x2004 Device Status Object

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Device Status NamurNe107	Corresponds to the device status *)	RO	UI8			
0x3	Device Supply Voltage	Supply voltage in volt	RO	FL32			
0x4	Operation Time_[s]	Device operating time counter in seconds	RO	UI32			
0x7	Maximum Device Supply Voltage	Maximum device power supply voltage since start-up in volt	RO	FL32			
0x8	Minimum Device Supply Voltage	Minimum device power supply voltage since start-up in volt	RO	FL32			
0xD	Device Boot Counter	EDS version ≥ 1.7 Number of device starts (since firmware update to B.02.00.00)	RO	UI32			
0xE	Trans Mem Status	Represents a combined status and mode of the configuration client. (Inactive configuration client function if bueS Mode (0x2001sub3) == 'CANopen') 6 - Client searching for provider 7 - Client is managed by a provider 8 - Changes available 9 - Provider search turned off 10 - Client is waiting for provider 11 - Client has been reconfigured 6, 7, 8, 11: Client on 9: Client off 10: Client Automatically switch on	RW	UI8		x	x
0x12	Operation Time Since Last Boot	Operation time since last device restart in seconds	RO	UI32			

*) Details of Device Status NamurNe107:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	Namur mode: 0 – auto 1 – manual 2 – flashing		Namur state: 0 – diagnose passive (normal) 1 – diagnose active 2 – maintenance required 3 – out of specification 4 – check function (warning) 5 – error			

4.5 0x2101 Locating Function

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	call/cancel	<p>Activate or deactivate locating function:</p> <p>This function enables a device in the system to be located using the PLC. The top LED indicator will briefly start to flash for about 10 seconds when the locating function is activated (fast flashing LEDs)</p> <p>1 = activated 0 = deactivated</p>	RW	UI8			

4.6 0x210A Trigger Maintenance Function (EDS version ≥ 1.7)

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	call/cancel	<p>Trigger a maintenance signal from extern:</p> <p>0: Deactivated. 1: Activated.</p> <p>The top LED indicator shows a maintenance required signal until reboot or set 0 to the call/cancel Object, if</p> <ul style="list-style-type: none"> there is no warning / error to be indicated <p>AND</p> <ul style="list-style-type: none"> one of the following LED modes is selected by 0x2120 LED Modi: <p>0 – NAMUR mode 3 – Valve mode + errors + warnings 7 – Device specific</p>	RW	UI8	x	x	

4.7 0x2120 LED Modi (EDS version ≥ 1.4)

sub	name	description	access type	data type	data memory	factory reset	device reset
0x0	LED Modi	<p>Select LED indicator mode in case DIP switch "Color" is set to DIP 1, 2, 3, 4, 5 = ON, DIP 6 = OFF;</p> <p>EDS- Version ≥ 1.7: all other DIP switch "Color" settings: Object reflects current selected LED modi and is updated regularly. In case any DIP switch Color changed, the object is updated approx. 5 seconds after the DIP switch change. A further DIP switch change within this time will delay the update by additional 5 seconds.</p> <p>Please refer to the operating instructions for a description of the possible indicator modes.</p> <p>EDS version ≥ 1.7:</p> <ul style="list-style-type: none"> 0 – NAMUR mode 1 – Valve mode (position signal, no errors) *) 2 – Valve mode + errors (red) *) 3 – Valve mode + errors (red) + warnings (orange, yellow, blue) *) 4 – Fixed color mode configured by object 0x2122 (LED Extern Color)) 6 – (Top) LEDs off 7 – Device specific configured by object 0x2C11 (Device Specific LED Mode) <p>*) Position colors and blink modes can be configured by objects 0x2C12 (Valve Mode Feedback Colors) and 0x2C13 (Valve Mode Feedback Blink Modes)</p> <p>EDS versions 1.4 ... 1.6 support only following modes: 0 (NAMUR mode), 4 (Fixed color mode), 6 (LEDs off)</p>	RW	UI32	x	x	

4.8 0x2122 LED Extern Color (EDS version \geq 1.4)

sub	name	description	access	type	data	type	data	memory	factory	reset	device	reset
0x0	LED Extern Color	<i>In case of</i> 1. Setting DIP switch color to DIP 1, 2, 3, 4, 5 = ON, DIP 6 = OFF ((TOP) LED color assignment is defined by object 0x2120 LED Modi) AND 2. Setting object 0x2120 LED Modi to 4 (Fixed Color) <i>the color of TOP LEDs is controlled externally by writing a corresponding value to this object *):</i> <i>(EDS version 1.4: not stored persistently)</i> <i>(EDS version \geq 1.5: stored persistently)</i>	RW		UI32		x		x			

*) Details on color value:

Byte 3		Byte 2	Byte 1	Byte 0
Bit 4-7	Bit 0-3	Bit 0-7	Bit 0-7	Bit 0-7
0x0	Blink mode	RGB: blue component	RGB: green component	RGB: red component
0x1	<i>0x0: Always on</i> EDS version \geq 1.7: <i>0x1: Slow flashing</i> <i>0x2: Fast flashing</i> <i>0x3: Double flashing</i>	0x00	0x00	Fixed color list: <i>0x00: Off</i> <i>0x01: White</i> <i>0x02: Green</i> <i>0x03: Blue</i> <i>0x04: Yellow</i> <i>0x05: Orange</i> <i>0x06: Red</i>

Example values:

TOP LED Color (Always on)	Value	Byte 3	Byte 2	Byte 1	Byte 0
White	0x10000001	0x10	0x00	0x00	0x01
Red	0x10000006	0x10	0x00	0x00	0x06
Orange	0x10000005	0x10	0x00	0x00	0x05
Yellow	0x10000004	0x10	0x00	0x00	0x04
Green	0x10000002	0x10	0x00	0x00	0x02
Blue	0x10000003	0x10	0x00	0x00	0x03
LED Off	0x10000000	0x10	0x00	0x00	0x00

4.9 0x2500 Feedbacks

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Feedback (EDS ≥ 1.7) Feedbacks (EDS 1.4 ... 1.6) Value (EDS < 1.4)	Cyclic updated status of feedback signals *). It's mapped on TPDO 0 (0x1A00sub1).	RWR	UI8			

*) Details of Feedback bits:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used				Position S4	Position S3	Position S2	Position S1
				0 = OFF, 1 = ON			

4.10x2501 Current position

4.10.1 Position as FL32 value in m (1 mm resolution, EDS version ≥ 1.4)

For firmware revisions ≥ A.80.00.00

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Position (EDS ≥ 1.7) Current Position (EDS 1.4 ... 1.6)	Cyclic updated current position in m (1 mm resolution *). It's mapped on TPDO 0 (0x1A00sub2).	RWR	FL32			

*) The current position with a higher resolution (0.1 mm) is available for acyclic communication via object 0x2C07 Device State.

4.10.2 Position as UI8 value in mm (EDS version < 1.4)

For firmware revisions < A.80.00.00

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Value	Cyclic updated current position in mm. It's mapped on TPDO 0 (0x1A00sub2).	RWR	UI8			

4.11 0x2502 Namur Status (EDS version ≥ 1.7)

For firmware revisions \geq B.02.00.00

sub	name	description	access	type	data	type	data	memory	factory	reset	device	reset
0x1	NamurStatus	<i>Bit 0-3: NAMUR state</i> 0 - Normal 1 - Diagnostics active 2 - Maintenance required 3 - Out of specification 4 - Warning 5 - Error <i>It's mapped on TPDO 0 (0x1A00sub3).</i>	RWR		UI8							

4.12 0x2540 Valves

sub	name	description	access	type	data	type	data	memory	factory	reset	device	reset
0x1	Setpoint (EDS ≥ 1.7) Valves (EDS 1.4 ...1.6) Value (EDS < 1.4)	<i>Cyclic setpoint for solenoid valves in automatic mode *).</i> <i>It's mapped on RPDO 0 (0x1600sub1).</i>	RWW		UI8							

*) Details on cyclic solenoid valves setpoint:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used					Solenoid Valve 3	Solenoid Valve 2	Solenoid Valve 1
					0 = OFF, 1 = ON		

4.13 0x2C00 Additional Device Identity

sub	name	description	access type	data type	data memory	factory reset	device reset
0x2	Device Ident Number Customer	Customer specific device identification number	RO	UI32			
0x5	PCB Ident Number	Buerkert specific PCB identification number	RO	UI32			
0x6	PCB Ident Number Customer	Customer specific PCB identification number	RO	UI32			
0x7	PCB Serial Number	PCB serial number	RO	UI32			
0x8	PCB Hardware Version	PCB hardware version	RO	UI8			
0x9	PCB Hardware Index	PCB hardware index	RO	UI8			
0xA	Software Version	Firmware version as a readable string	RO	STR			

4.14 0x2C01 Life Data

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Operation Hours Total	Operation hours total.	RO	UI32		x	
0x2	Operation Hours Resettable	Resettable operation hours. *)	RO	UI32		x	x
0x3	Cycles V1 Total	Total switching cycles of solenoid valve V1.	RO	UI32		x	
0x4	Cycles V1 Resettable	Resettable switching cycles of solenoid valve V1. *)	RO	UI32		x	x
0x5	Cycles V2 Total	Switching cycles of solenoid valve V2.	RO	UI32		x	
0x6	Cycles V2 Resettable	Resettable switching cycles of solenoid valve V2. *)	RO	UI32		x	x
0x7	Cycles V3 Total	Switching cycles of solenoid valve V3.	RO	UI32		x	
0x8	Cycles V3 Resettable	Resettable switching cycles of solenoid valve V3. *)	RO	UI32		x	x

*) Can be reset e.g. with Daily Counter Reset Function (refer to 0x2C24)

4.15 0x2C02 Manual Valve Control

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Valves Mode	Mode of solenoid valves V1, V2, V3 0 – Automatic mode 1 – Manual mode After startup automatic mode is automatically selected.	RW	UI8			
0x2	Valves Manual Control Value	Solenoid valves setpoint *) in manual mode. Not stored persistently.	RW	UI8			

*) Details on solenoid valves setpoint bits in manual mode:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used					Solenoid Valve 3	Solenoid Valve 2	Solenoid Valve 1
					0 = OFF, 1 = ON		

4.16 0x2C03 Feedback Fields

4.16.1 FL32 value in mm (0.1 mm resolution, EDS version ≥ 1.4)

For firmware versions $\geq A.80.00.00$

sub	name	description	access type	data type	data memory	factory reset	device reset
0x7	TP1 Positive	Feedback field size at top of position S1 in mm *).	RW	FL32	x	x	x
0x8	TP1 Negative	Feedback field size at bottom of position S1 in mm *).	RW	FL32	x	x	x
0x9	TP2 Positive	Feedback field size at top of position S2 in mm *).	RW	FL32	x	x	x
0xA	TP2 Negative	Feedback field size at bottom of position S2 in mm *).	RW	FL32	x	x	x
0xB	TP3 Positive	Feedback field size at top of position S3 in mm *).	RW	FL32	x	x	x
0xC	TP3 Negative	Feedback field size at bottom of position S3 in mm *).	RW	FL32	x	x	x

*) resolution: 0.1 mm

4.16.2 UI8 value in 0.1 mm (EDS version < 1.4)

For firmware versions $< A.80.00.00$

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	TP1 Positive	Feedback field size at top of position S1 in 0.1 mm. (e.g. a value of 30 corresponds to a size of 3.0 mm.)	RW	UI8	x	x	x
0x2	TP1 Negative	Feedback field size at bottom of position S1 in 0.1 mm.	RW	UI8	x	x	x
0x3	TP2 Positive	Feedback field size at top of position S2 in 0.1 mm.	RW	UI8	x	x	x
0x4	TP2 Negative	Feedback field size at bottom of position S2 in 0.1 mm.	RW	UI8	x	x	x
0x5	TP3 Positive	Feedback field size at top of position S3 in 0.1 mm.	RW	UI8	x	x	x
0x6	TP3 Negative	Feedback field size at bottom of position S3 in 0.1 mm.	RW	UI8	x	x	x

4.17 0x2C04 Service Parameters

sub	name	description	access type	data type	data memory	factory reset	device reset																						
0x1	Magnetic Manual Control Active	Activation / Deactivation: 1 - ON, 0 - OFF	RW	UI8	x	x	x																						
0x2	Service Indication Time Active	Activation / Deactivation of service indication after expired time : 1 - ON, 0 - OFF Expired time is counted by "Operating Hours Resettable" (0x2C01 sub 2). If enabled, service indication will be raised after time "Maintenance At Days" (0x2C04 sub 4) expired.	RW	UI8	x	x	x																						
0x3	Service Indication Cycles Active	Activation / Deactivation of service indication after expired solenoid valve cycles V1, V2 or V3 : 1 - ON, 0 - OFF Cycles are counted by "Cycles Vx Resettable" (V1: 0x2C01 sub 4, V2: 0x2C01 sub 6, V3: 0x2C01 sub 8). If enabled, service indication will be raised if at least one of the resettable cycle counter exceeds its corresponding limit "Maintenance At Cycles Vx" (V1: 0x2C04 sub 5, V2: 0x2C04 sub 6, V3: 0x2C04 sub 7)	RW	UI8	x	x	x																						
0x4	Maintenance At Days	Time based service indication interval. Refer to 0x2C04 sub 2 for details.	RW	UI16	x	x	x																						
0x5	Maintenance At Cycles V1 (x 1000)	Cycle based service indication interval for solenoid valve V1. A value of 10 corresponds to 10 x 1000 = 10000 cycles. Refer to 0x2C04 sub 3 for details.	RW	UI8	x	x	x																						
0x6	Maintenance At Cycles V2 (x 1000)	Cycle based service indication interval for solenoid valve V2. A value of 10 corresponds to 10 x 1000 = 10000 cycles. Refer to 0x2C04 sub 3 for details.	RW	UI8	x	x	x																						
0x7	Maintenance At Cycles V3 (x 1000)	Cycle based service indication interval for solenoid valve V3. A value of 10 corresponds to 10 x 1000 = 10000 cycles. Refer to 0x2C04 sub 3 for details.	RW	UI8	x	x	x																						
0x8	Safety Mode	Behaviour of solenoid valves in automatic mode in case of communication loss / internal error: 0 – Safety Position Solenoid valves are controlled by value from "Valves Safety Position" (refer to object 0x2C04 sub 9) 1 – Last Position Solenoid valves are controlled by hold value "Valves" from before the communication loss. (refer to object 0x2540 sub 1) A communication loss is detected in several ways *): bÜS: Producer is lost. CANopen: The master heartbeat must be observed (by the slave). The master registered its heartbeat information in the slave. (object 0x1016 Consumer Heartbeat Time) A communication loss can only be detected if slave is in operational mode. Same behavior applies by changing to preoperational mode or stopped mode.	RW	UI8	x	x																							
0x9	Valves Safety Position	Control bits for solenoid valves safety position (used only in case "Safety Mode" (0x2C04 sub 8) is set to 0 "Safety Position") <table border="1" data-bbox="539 1892 1050 2020"> <tr> <td>Bit 7</td><td>Bit 6</td><td>Bit 5</td><td>Bit 4</td><td>Bit 3</td><td>Bit 2</td><td>Bit 1</td><td>Bit 0</td></tr> <tr> <td colspan="5" rowspan="3">Not used</td> <td colspan="3">Solenoid Valve</td> </tr> <tr> <td>V3</td><td>V2</td><td>V1</td> </tr> <tr> <td colspan="3">0 = OFF, 1 = ON</td> </tr> </table>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Not used					Solenoid Valve			V3	V2	V1	0 = OFF, 1 = ON			RW	UI8	x	x	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0																						
Not used					Solenoid Valve																								
					V3	V2	V1																						
					0 = OFF, 1 = ON																								
0xA	Use Of External Ini S4 (0 - Closer, 1 - Opener)	Real function of the external initiator S4: 0 – Closer (NO), 1 – Opener (NC)	RW	UI8	x	x	x																						

sub	name	description	access type	data type	data memory	factory reset	device reset
0xB	S4 As S1	Use S4 as S1: 0 – No, 1 – Yes	RW	UI8	x	x	x
0xE	WMS Filter	Filter for position measuring system. 0 – Standard, 1 – Array, 2 – Special	RW	UI8	x	x	
0xF	Service Indication Display Option	Optical display of service indication via TOP LEDs only for following LED Modi (object 0x2120): - Device Specific: 8681 Classic modes - Valve Mode + Errors + Warning (from firmware B.02.00) 0 – Enabled 1 – Disabled 2 – Disabled until next maintenance confirmation by “Confirm Maintenance Function” (object 0x2C27)	RW	UI8	x	x	x

*) to sub 8:

Communication active:

- būs Partner allocation active and producer found defined by būs-Map.
- CANopen Master registered its heartbeat information in the slave and slave is in operational mode.

Communication loss:

- būs Producer lost
- CANopen Slave did not received master heartbeat in time (e.g. master didn't send heartbeat in time).
Slave left operational mode.

4.18 0x2C05 Device Configuration

sub	name	description	access type	data type	data memory	factory reset	device reset																																								
0x1	DIP Switch CAN	<p>Status of DIP switches for CAN Node ID and baud rate at startup of device.</p> <p>For details refer to operating instructions.</p> <table border="1"> <tr> <td>Bit 7</td><td>Bit 6</td><td>Bit 5</td><td>Bit 4</td><td>Bit 3</td><td>Bit 2</td><td>Bit 1</td><td>Bit 0</td></tr> <tr> <td colspan="8">DIP switch</td></tr> <tr> <td colspan="2">Baud rate setting</td><td colspan="6">Address setting *)</td></tr> <tr> <td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr> <tr> <td colspan="8">0 = OFF, 1 = ON</td></tr> </table> <p>*) If CANopen address 1..63 is configured by hardware dip switches, object 0x2002sub5 Static NodeID will be overwritten with the configured value after next device restart.</p> <p>If hardware DIP switches for CANopen address are reset to address 0, object 0x2002sub5 Static NodeID will be reset once to 0 after next device restart.</p>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	DIP switch								Baud rate setting		Address setting *)						8	7	6	5	4	3	2	1	0 = OFF, 1 = ON								RO	UI8			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0																																								
DIP switch																																															
Baud rate setting		Address setting *)																																													
8	7	6	5	4	3	2	1																																								
0 = OFF, 1 = ON																																															
0x2	DIP Switch Color	<p>Status of DIP switches for LED color assignment.</p> <p>For details refer to operating instructions.</p> <table border="1"> <tr> <td>Bit 7</td><td>Bit 6</td><td>Bit 5</td><td>Bit 4</td><td>Bit 3</td><td>Bit 2</td><td>Bit 1</td><td>Bit 0</td></tr> <tr> <td colspan="8">DIP switch</td></tr> <tr> <td colspan="2">Not used.</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr> <tr> <td colspan="8">0 = OFF, 1 = ON</td></tr> </table> <p>EDS version \geq 1.4: If DIP switch setting DIP 1, 2, 3, 4, 5 = ON, DIP 6 = OFF: LED color assignment is configured by parameter LED Modi 0x2120.</p> <p>EDS version \geq 1.7: If LED color assignment is defined by DIP switch (i.e. DIP switch setting is not DIP 1, 2, 3, 4, 5 = ON, DIP 6 = OFF): Objects LED Modi 0x2120 and Device Specific LED Mode 0x2C11 are updated approx. 5 seconds after the DIP switch change. A further DIP switch change within this time will delay the update by additional 5 seconds.</p>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	DIP switch								Not used.		6	5	4	3	2	1	0 = OFF, 1 = ON								RO	UI8											
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0																																								
DIP switch																																															
Not used.		6	5	4	3	2	1																																								
0 = OFF, 1 = ON																																															
0x7	Use Special Sensor Index	<p>Automatic set point connection (for valve control).</p> <p>For valve control in automatic mode.</p> <p>Only relevant if bueS Mode (0x2001sub3) = 'bÜS' and if the control head has a fixed device address (configured by DIP switch) > 0.</p> <p>The cyclic connection to the valve set point producer und its unique device name are automatically configured according to the selected presetting rule:</p> <p>0: Off (for individual connections via bÜS map) 1: On (for systems with preconfigured gateway)</p> <p>Internal objects are configured as follows (*)</p> <p>0x2580sub1: Gateway_8681 0x2580sub2: 0x2500 + fixed device address - 1</p> <p>(*)EDS version < 1.7: at startup EDS version \geq 1.7: at startup if DIP switch for device address changed compared to last startup.</p>	RW	UI8	x	x																																									
0x8	Feedback Priority	<p>Configuration of priority of feedback positions for LED indication. For details refer to operating instructions.</p>	RW	UI8	x	x																																									

4.19 0x2C06 Diagnose

sub	name	description	access	type	data	type	data	memory	factory	reset	device	reset
0x1	ErrorByte	Description of bits refer to *)	RO	UI32								
0x2	Info/WarningByte	Description of bits refer to **)	RO	UI32								

*) Details of ErrorByte

EDS versions 1.1 – 1.6:

Bit	Bitmask	Description	Available since EDS version
0	0x00000001	Teach or autotune function required (No position taught)	1.1
1	0x00000002	Bus error	
2	0x00000004	büS: address conflict	
3	0x00000008	büS: PDO producer not found	
4	0x00000010	büS: no cyclic data from PDO producer	
8	0x00000100	Memory error device parameter	1.1
9	0x00000200	Memory error feedback positions	1.4
10	0x00000400	Memory error factory data	1.1
13	0x00002000	Memory error device default data	
16	0x00010000	Memory error device settings bus	
17	0x00020000	Memory error device settings common	Only in 1.1
18	0x00040000	Memory error device settings partner allocation	1.1
20	0x00100000	Error measuring power supply	1.4

EDS version 1.7:

Bit	Bitmask	Description	Available since EDS version
0	0x00000001	Teach function required (No position taught)	1.1
1	0x00000002	Bus error ***)	
2	0x00000004	büS: address conflict ***)	
3	0x00000008	büS: PDO producer not found ***)	
4	0x00000010	büS: no cyclic data from PDO producer ***)	
5	0x00000020	Teach function error	1.7
6	0x00000040	WMS signal error	1.7
8	0x00000100	Error persistent memory	1.7
20	0x00100000	Error measuring power supply	1.4

***) Details of Info/WarningByte

Bit	Bitmask	Description	Available since EDS version
0	0x00000001	--	1.1
1	0x00000002	Solenoid valves in safety position	
2	0x00000004	Service / maintenance required	
4	0x00000010	Internal safety position active: all solenoid valves off	1.6
5	0x00000020	büS: No PDO producer configured ***)	1.7
8	0x00000100	Memory error live data counters	1.1 – 1.6
		--	1.7
12	0x00001000	Config Client not active	1.4
13	0x00002000	Config Client: device configuration not synchronized with Config Provider	
14	0x00004000	Config Client: Config Provider not found	
20	0x00100000	Trigger Maintenance Function active	1.7

***) since EDS-Version 1.7: Bit is not set if büS-Mode == "Standalone"

4.20 0x2C07 Device State

sub	name	description	access type	data type	data memory	factory reset	device reset																																								
0x1	Mode	<div>Current device mode:</div> <table><tr><td>0</td><td>Automatic mode</td><td>4</td><td>Manual mode</td></tr><tr><td>1</td><td>Test mode</td><td>5</td><td>Autotune mode</td></tr><tr><td>2</td><td>Test mode</td><td>6</td><td>(reserved)</td></tr><tr><td>3</td><td>Magnet tool active</td><td>7</td><td>Device Reset mode</td></tr></table>	0	Automatic mode	4	Manual mode	1	Test mode	5	Autotune mode	2	Test mode	6	(reserved)	3	Magnet tool active	7	Device Reset mode	RO	UI8																											
0	Automatic mode	4	Manual mode																																												
1	Test mode	5	Autotune mode																																												
2	Test mode	6	(reserved)																																												
3	Magnet tool active	7	Device Reset mode																																												
0x2	Teach State	<div>current teach state of Positions S1 ... S3 – bit coded</div> <table><tr><td>Bit 7</td><td>Bit 6</td><td>Bit 5</td><td>Bit 4</td><td>Bit 3</td><td>Bit 2</td><td>Bit 1</td><td>Bit 0</td></tr><tr><td colspan="5">Not used</td><td colspan="3">Position</td></tr><tr><td colspan="5"></td><td>S3</td><td>S2</td><td>S1</td></tr><tr><td colspan="5"></td><td colspan="3">0 – not taught</td></tr><tr><td colspan="5"></td><td colspan="3">1 – taught</td></tr></table>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Not used					Position								S3	S2	S1						0 – not taught								1 – taught			RO	UI8			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0																																								
Not used					Position																																										
					S3	S2	S1																																								
					0 – not taught																																										
					1 – taught																																										
0x4	Valves State	<div>Current state of the solenoid valves – bit coded</div> <table><tr><td>Bit 7</td><td>Bit 6</td><td>Bit 5</td><td>Bit 4</td><td>Bit 3</td><td>Bit 2</td><td>Bit 1</td><td>Bit 0</td></tr><tr><td colspan="5">Not used</td><td colspan="3">Solenoid valve</td></tr><tr><td colspan="5"></td><td>V3</td><td>V2</td><td>V1</td></tr><tr><td colspan="5"></td><td colspan="3">0 – not activated</td></tr><tr><td colspan="5"></td><td colspan="3">1 – activated</td></tr></table>	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Not used					Solenoid valve								V3	V2	V1						0 – not activated								1 – activated			RO	UI8			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0																																								
Not used					Solenoid valve																																										
					V3	V2	V1																																								
					0 – not activated																																										
					1 – activated																																										
0x7	Service Indication State	<div>Current state of service indication</div> <div>0 – disabled</div> <div>1 – enabled</div> <div>2 - enabled and maintenance required</div> <div>The status of “Trigger Maintenance Function” (0x210A) is not considered.</div>	RO	UI8																																											
0x8	Current Position [0.1mm]	<div>Current position in 0.1mm</div> <div>A value of 51 corresponds to 5.1 mm.</div>	RO	UI16																																											
0xA	Current Position [mm]	<div>EDS version ≥ 1.7:</div> <div>Current position in mm (Resolution: 0.1 mm)</div>	RO	FL32																																											

4.21 0x2C08 WMS (EDS version ≥ 1.7)

WMS = position measuring system

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	TeachPos_S1	WMS value of teach position S1 in digits; 0 if not taught	RO	UI16			
0x2	TeachPos_S2	WMS value of teach position S2 in digits; 0 if not taught	RO	UI16			
0x3	TeachPos_S3	WMS value of teach position S3 in digits; 0 if not taught	RO	UI16			
0x4	Tol_S1_pos	WMS value of upper feedback limit of S1 in digits	RO	UI16			
0x5	Tol_S1_neg	WMS value of lower feedback limit of S1 in digits	RO	UI16			
0x6	Tol_S2_pos	WMS value of upper feedback limit of S2 in digits	RO	UI16			
0x7	Tol_S2_neg	WMS value of lower feedback limit of S2 in digits	RO	UI16			
0x8	Tol_S3_pos	WMS value of upper feedback limit of S3 in digits	RO	UI16			
0x9	Tol_S3_neg	WMS value of lower feedback limit of S3 in digits	RO	UI16			
0xA	WMS_Pos	WMS position value in digits	RO	UI16			

4.22 0x2C10 Maintenance

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Last Maintenance Date	Date of last maintenance	RO	STR			
0x2	Last Maintenance By	Name of person / company who performed last maintenance	RO	STR			
0x3	Cycles V1 To Next Maintenance	Left cycles of solenoid valve Vx (X=1, 2, 3) to next maintenance notification. A value ≥ 99999999 indicates disabled service notification function for valve cycles. (object 0x2C04sub3 Service Indication Cycles Active).	RO	UI32			
0x4	Cycles V2 To Next Maintenance		RO	UI32			
0x5	Cycles V3 To Next Maintenance		RO	UI32			
0x6	OpHours To Next Maintenance	Left operation hours to next maintenance notification. A value ≥ 99999999 indicates disabled service notification function for operation hours (object 0x2C04sub2 Service Indication Time Active).	RO	UI32			

4.23 0x2C11 Device Specific LED Mode (EDS version ≥ 1.7)

sub	name	Description	access type	data type	data memory	factory reset	device reset
0x0	Device Specific LED Mode	<p>Selection of device specific LED mode *).</p> <p>Selected mode gets only active in case</p> <ul style="list-style-type: none"> DIP switch "Color" is set to DIP 1, 2, 3, 4, 5 = ON, DIP 6 = OFF (software defined LED mode) <p>AND</p> <ul style="list-style-type: none"> Object 0x2120 (LED Modi) is set to 7 (Device specific) <p>If DIP switch "Color" is set to DIP 5, 6 = OFF, (hardware defined 8681 Classic LED Mode), this object reflects the hardware configured 8681 Classic LED Mode. Object reflects current selected LED modi and is updated regularly. In case any DIP switch Color changed, the object is updated approx. 5 seconds after the DIP switch change. A further DIP switch change within this time will delay the update by additional 5 seconds.</p>	RW	UI8	x	x	

*) Details on available device specific LED modes

Value	Device specific LED mode
0	8681 Classic 0
1	8681 Classic 1
...	...
15	8681 Classic 15

Refer to operating instructions for details.

4.24 0x2C12 Valve Mode Feedback Colors (EDS version ≥ 1.7)

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Color Position S1	Color for indication of position S1 *)	RW	UI32	x	x	
0x2	Color Position S2	Color for indication of position S2 *)	RW	UI32	x	x	
0x3	Color Position S3	Color for indication of position S3 *)	RW	UI32	x	x	
0x4	Color Position S4	Color for indication of position S4 *)	RW	UI32	x	x	
0x5	Color Position None	Color for indication of no active position *)	RW	UI32	x	x	

*) Details on color value:

Byte 3		Byte 2	Byte 1	Byte 0
Bit 4-7	Bit 0-3	Bit 0-7	Bit 0-7	Bit 0-7
0x0	0x0	RGB: blue component	RGB: green component	RGB: red component
0x1	0x0	0x00	0x00	Fixed color list: 0x00: Off 0x01: White 0x02: Green 0x03: Blue 0x04: Yellow 0x05: Orange 0x06: Red

Example values:

TOP LED Color	Value	Byte 3	Byte 2	Byte 1	Byte 0
White	0x10000001	0x10	0x00	0x00	0x01
Red	0x10000006	0x10	0x00	0x00	0x06
Orange	0x10000005	0x10	0x00	0x00	0x05
Yellow	0x10000004	0x10	0x00	0x00	0x04
Green	0x10000002	0x10	0x00	0x00	0x02
Blue	0x10000003	0x10	0x00	0x00	0x03
LED Off	0x10000000	0x10	0x00	0x00	0x00

4.25 0x2C13 Valve Mode Feedback Blink Modes (EDS version ≥ 1.7)

sub	name	description	access type	data type	data memory	factory reset	device reset
0x3	Blink Mode Position S3	Blink mode for indication of position S3 **)	RW	UI8	x	x	
0x4	Blink Mode Position S4	Blink mode for indication of position S4 **)	RW	UI8	x	x	

**) Details on blinking mode value:

- 0: Permanent on
- 1: Blinking 250 ms ON, 250 ms OFF
- 2: Blinking 125 ms ON, 125 ms OFF

4.26 0x2C20 AutoTune (Automatic Teach) Function

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	AutoTune No	Number of Autotune (1 – 6), which shall be started with call / cancel	RW	UI8			
0x2	result	0xFF: function is still running, otherwise function is finished (acyclic value) 0x00: Autotune function successfully finished 0x01: Autotune start failed, Autotune already running. 0x02: Autotune start failed, not all solenoid valves off 0x03: Autotune start failed, invalid AutoTune number 0x10: Autotune error, Teachreset failed 0x11: Autotune error, teaching POS 1 failed 0x12: Autotune error, teaching POS 2 failed 0x13: Autotune error, teaching POS 3 failed 0x21: Autotune error, returning to POS 1 failed 0x22: Autotune error, returning to POS 2 failed 0xFE: Autotune cancelled	RO	UI8			
0x3	call/cancel	1: call the function 0: finishes or aborts the function (has to be set after function is finished, result value is reset to 0xFF)	RW	UI8			

How to use:

1. Check if unused (*call/cancel* == 0 ?)
2. Set *AutoTune No*
3. Set *call/cancel* = 1, for starting function
4. Function is finished if *result* != 0xFF (SDO request required)
5. Finish function (set *call/cancel* = 0) → result will be 0xFF again

4.27 0x2C21 (Manual) Teach Function

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	TeachPos	Number of teach position (1, 2 or 3), which shall be taught with call / cancel	RW	UI8			
0x2	result	0xFF: function is still running, otherwise function is finished (acyclic value) 0x00: Teach function successfully finished 0x01: Teach function failed 0x02: Teach function start failed 0x03: Teach function start failed, invalid TeachPos number	RO	UI8			
0x3	call/cancel	1: call the function 0: finishes or aborts the function (has to be set after function is finished, result value is reset to 0xFF)	RW	UI8			

How to use:

1. Check if unused (*call/cancel* == 0 ?)
2. Set *TeachPos*
3. Set *call/cancel* = 1, for starting function
4. Function is finished if *result* != 0xFF (SDO request required)
5. Finish function (set *call/cancel* = 0) → (*result* will be 0xFF again)

4.28 0x2C22 TeachReset Function

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	call/cancel	1: call the function 0: finishes or aborts the function (has to be set after function is finished)	RW	UI8			

How to use:

1. Check if unused (*call/cancel* == 0 ?)
2. Set *call/cancel* = 1, for starting function
3. Wait 200ms
4. Finish function (set *call/cancel* = 0)

4.29 0x2C23 DeviceReset Function

Attention: Refer to operating instructions of type 8681 before starting this function!

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	call/cancel	1: call the function 0: finishes or aborts the function (has to be set after function is finished)	RW	UI8			

How to use:

1. Check if unused (*call/cancel* == 0 ?)
2. Set *call/cancel* = 1, for starting function
3. Wait 200ms
4. Finish function (set *call/cancel* = 0)

4.30 0x2C24 Daily Counter Reset Function

sub	name	Description	access type	data type	data memory	factory reset	device reset
0x1	Counter Selection Bit Mask	Bit mask, which daily counter(s) shall be reset *)	RW	UI8			
0x2	result	0xFF: function is still running, otherwise function is finished (acyclic value) 0x00: Function successfully finished 0x01: No counter in Counter Selection Bit Mask selected 0x02: Reset failed 0xFE: Cancelled	RO	UI8			
0x3	call/cancel	1: call the function 0: finishes or aborts the function (has to be set after function is finished, result value is reset to 0xFF)	RW	UI8			

*) Details of Counter Selection Bit Mask:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used				Operation hours resettable	(Daily) cycle counter resettable		
					V3	V2	V1
				0 – no reset, 1 - reset			

How to use:

1. Check if unused (*call/cancel* == 0 ?)
2. Set *Counter Selection Bit Mask*
3. Set *call/cancel* = 1, for starting function
4. Function is finished if *result* != 0xFF (SDO request required)
5. Finish function (set *call/cancel* = 0) → *result* will be 0xFF again

4.31 0x2C26 Factory Reset Function

Attention: Refer to operating instructions of type 8681 before starting this function!
The device requires a restart afterwards to apply the changed settings.

Warning: It is possible that your settings for the device e.g. baud rate, device address etc. are changed and the communication with device fails with the restored settings.

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	call/cancel	1: call the function 0: finishes or aborts the function (has to be set after function is finished)	RW	UI8			

How to use:

1. Check if unused (*call/cancel* == 0 ?)
2. Set *call/cancel* = 1, for starting function
3. Wait at least 5000 ms
4. Finish function (set *call/cancel* = 0)
5. Restart device (e.g. by applying of Node Reset: write 0x02 to 0x2001sub4)

4.32 0x2C27 Confirm Maintenance Function

- Resets daily resettable operation hour and solenoid valve cycle counters.
- Stores maintenance date and name of service staff.
- Resets service parameter Service Indication Display Option (0x2C04subF) to "Enable" (in case it was set to 2 - Disabled until next maintenance confirmation by "Confirm Maintenance Function" (object 0x2C27)).

sub	name	description	access type	data type	data memory	factory reset	device reset
0x1	Maintenance Date	Use format YYYY-MM-DD hh:mm (will be written to 0x2C10sub1 (Last Maintenance Date))	RW	STR			
0x2	Maintenance By	Maintenance done by (will be written to 0x2C10sub2 (Last Maintenance By))	RW	STR			
0x3	result	0xFF: function is still running, otherwise function is finished (acyclic value) 0x00: Function successfully finished 0x01: Error resetting counters 0x02: Error storing maintenance data 0x03: Error resetting service indication display option	RO	UI8			
0x4	call/cancel	1: call the function 0: finishes or aborts the function (has to be set after function is finished, result value is reset to 0xFF)	RW	UI8			

How to use:

1. Check if unused (*call/cancel* == 0 ?)
2. Set *Maintenance Date*
3. Set *Maintenance By*
4. Set *call/cancel* = 1, for starting function
5. Function is finished if *result* != 0xFF (SDO request required)
6. Finish function (set *call/cancel* = 0) → *result* will be 0xFF again

4.33 0x2C28 Feedback Field Reset Function

Resets the selected feedback field(s) to default values.

sub	name	description	access	type	data	type	data	memory	factory	reset	device	reset
0x1	Feedback Field Selection Bit Mask	Bit mask, which feedback fields shall be reset to default values *)	RW		UI8							
0x2	result	0xFF: function is still running, otherwise function is finished (acyclic value) 0x00: Function successfully finished 0x01: No feedback field selected in counter in Feedback Field Selection Bit Mask 0x02: Reset failed	RO		UI8							
0x3	call/cancel	1: call the function 0: finishes or aborts the function (has to be set after function is finished, result value is reset to 0xFF)	RW		UI8							

*) Details of Feedback Field Selection Bit Mask:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used					Feedback fields		
					S3	S2	S1
					0 – no reset, 1 - reset		

How to use:

1. Check if unused (*call/cancel* == 0 ?)
2. Set *Feedback Field Selection Bit Mask*
3. Set *call/cancel* = 1, for starting function
4. Function is finished if *result* != 0xFF (SDO request required)
5. Finish function (set *call/cancel* = 0) → *result* will be 0xFF again