

IntelliTop® 2.0

Control Head

IO-Link IODD



Supplement to Operating Instructions

Document version 1.0.0

We reserve the right to make technical changes without notice.
Technische Änderungen vorbehalten.
Sous réserve de modifications techniques.

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IntelliTop® 2.0 IO-Link IODD

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1 History

Document version	IODD version / Firmware version	Date	Changes
1.0.0	V1.0 (2020-09-24) / A.01.00.00	2020-10-08	Version for series devices. Chapter 4: remark added to factory reset system command Chapter 5: 0x2C06 Diagnose: Error bits added 0x2C0A IPF: Remark for AART_D added 0x2C43 Travel time limits: added remark of teach process impact Chapter 6: added Event " <i>Internal error: PCB calibration required</i> " (for IO-Link Class B devices).
0.1.6	V1.0 (2020-09-03) / A.00.02.00	2020-09-10	Preliminary version for preseries devices

2 Abbreviations

Following datatype abbreviations are used in this document:

Abbreviation	IO-Link type	Length
BOOL	BooleanT	1 bit
UI8	UIntegerT	1 byte (8 bit)
SI8	SIntegerT	1 byte (8 bit)
UI16	UIntegerT	2 bytes (16 bit)
UI32	UIntegerT	4 bytes (32 bit)
UI64	UIntegerT	8 bytes (64 bit)
FL32	Float32T	Real32 (Float, 32bit)
STR	StringT	20 characters characters coded with "US-ASCII"

Following abbreviations are used for expressing conditions:

Abbreviation	Meaning
!=	Not equal
==	Equals

Description of used table columns:

Column label	Description
Sub	Sub-index of object
Name	Name of object in IODD file
Description	Object description
Access type	IO-Link access rights: RO = read only, RW = read write
Data type	Data type of sub index / object (if only sub index 0 exists)
Data memory	Data storage
Reset group	Sub index will be reset to factory default settings, if corresponding reset group is reset. (Refer to reset group overview below.)

Reset group overview:

Reset Group	Description	For details refer to description of object
A	Factory reset	0x2C16 Factory Reset
B	Partial factory reset (device reset function)	0x2C16 Factory Reset
C	Teach reset	0x2C15 Teach functions: sub0x4 Teach reset command
D	Counter reset	0x2C43 Advanced Diagnostics Limits / Control: sub0x10 Reset command
E	Feedback Field reset	0x2C03 Feedback Field: sub0xD Reset Command

3 Process Data, IO-Link

3.1 Process input data (PDin)

Length: 6 bytes

	↓ Bitoffset Position						↓ Bitoffset Device Status			↓ Bitoffset Valve Mode		↓ Bitoffset Position S4		↓ Bitoffset Position S3		↓ Bitoffset Position S2		↓ Bitoffset Position S1	
Bits	47	..	16	15	...	8	7	..	4	3		2		1		0			
Sub index	1			2			3			4		5		6		7			
Data type	Float32T			UIntegerT			UIntegerT			BooleanT		BooleanT		BooleanT		BooleanT			
Name	Position			Device Status			Valve Mode			S4		S3		S2		S1			
Length [Bits]	32			8			4			1		1		1		1			

Sub-index	Bit offset	Length (bits)	Data type	Description
1	16	32	Float32T	Position in mm (resolution 0.1mm)
2	8	8	UIntegerT	Device status – values: 0: normal 1: diagnose active 2: maintenance required 3: out of specification 4: warning 5: error Bit 4-7 reserved
3	4	4	UIntegerT	Valve Mode – values: 0: Initialization 1: Normal operation 2: Teach function active 3: SafePos active 4: Manual control active 5: Service Mode active 6: Internal SafePos active (all valves off)
4	3	1	BooleanT	Feedback Position 4 (External initiator, S4) True = On False = Off
5	2	1	BooleanT	Feedback position 3 (S3) True = On False = Off
6	1	1	BooleanT	Feedback position 2 (S2) True = On False = Off
7	0	1	BooleanT	Feedback position 1 (S1) True = On False = Off

3.2 Process output data (PDout)

Length: 1 byte

					Bitoffset Locating function ↓	Bitoffset Set point V3 ↓	Bitoffset Set point V2 ↓	Bitoffset Set point V1 ↓
Bits	7	6	5	4	3	2	1	0
Sub-index					1	2	3	4
Data type					BooleanT	BooleanT	BooleanT	BooleanT
Name	Not used				Locate	V3	V2	V1
Length[Bits]	4				1	1	1	1

Sub-index	Bit offset	Length (bits)	Data type	Description
1	3	1	BooleanT	Locating function (fast flashing LEDs) True = Activated False = Deactivated
2	2	1	BooleanT	Set point valve 3 (V3): True = Open False = Closed
3	1	1	BooleanT	Set point valve 2 (V2): True = Open False = Closed If feature AART_D for double acting valves is activated, V2 set point will not be used. V2 is actuated by set point for valve V1.
4	0	1	BooleanT	Set point valve 1 (V1): True = Open False = Closed If feature AART_D for double acting valves is activated, V2 will be actuated automatically by set point for valve V1.

4 Supported IO-Link system commands

command	Description
128	Device reset (restart)
130	Restore factory settings **)
160	Start automatic teach function 1
161	Start automatic teach function 2
162	Start automatic teach function 3 *)
163	Start automatic teach function 4 *)
164	Start automatic teach function 5 *)
165	Start automatic teach function 6 *)
166	Start manual teach function position S1
167	Start manual teach function position S2
168	Start manual teach function position S3
169	Feedback Field Mode 1
170	Feedback Field Mode 2
171	Feedback Field Mode 3
172	Feedback Field Mode 4
173	Feedback Field Mode 5 (Reserved for future use)
174	Feedback Field Mode 6 (Reserved for future use)

*) If feature AART_D for double acting valves enabled (see object 0x2C05sub6), automatic teach functions 3-6 are without function.

**) Device restarts after factory reset if triggered by system command.
IO-Link connection has to be established again by the IO-Link master.

5 Non-cyclic parameters (On-Request Data (ISDU))

Following datatype abbreviations are used in this document:

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SI8	SIntegerT	1 byte (8 bit)
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UI64	UIntegerT	8 bytes (64 bit)
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Following abbreviations are used for expressing conditions:

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Data memory	Data storage
Reset group	Sub index will be reset to factory default settings, if corresponding reset group is reset. (Refer to reset group overview below.)

Reset group overview:

Reset Group	Description	For details refer to chapter
A	Factory reset	5.24 0x2C16 Factory Reset
B	Partial factory reset (device reset function)	5.24 0x2C16 Factory Reset
C	Teach reset	5.23 0x2C15 Teach functions: sub0x4 Teach reset command
D	Counter reset	5.28 0x2C43 Advanced Diagnostics Limits / Control: sub0x10 Diagnosis command
E	Feedback Field reset	5.12 0x2C03 Feedback Fields: sub0xD Reset Command

5.1 Supported common IO-Link data objects

Index (dec)	Object name	Access	Length	Data type	Remark *)
0x0000 (0)	Direct Parameter Page 1	R		RecordT	Redirected to the page communication channel, see 10.7.5
0x0001 (1)	Direct Parameter Page 2	R/W		RecordT	Redirected to the page communication channel, see 10.7.5
0x0002 (2)	System-Command	W	1 octet	UIntegerT	Command Code Definition (See B.2.2)
0x0003 (3)	Data Storage Index	R/W	variable	RecordT	Set of data objects for storage (See B.2.3)
0x000C (12)	Device Access Locks	R/W	2 octets	RecordT	Standardized Device locking functions (See B.2.4)
0x0010 (16)	Vendor Name	R	max. 64 octets	STR	Informative (See B.2.8)
0x0011 (17)	Vendor Text	R	max. 64 octets	STR	Additional vendor information (See B.2.9)
0x0012 (18)	Product Name	R	max. 64 octets	STR	Detailed product or type name (See B.2.10)
0x0013 (19)	Product ID	R	max. 64 octets	STR	Product or type identification (See B.2.11 for details)
0x0014 (20)	Product Text	R	max. 64 octets	STR	Description of Device function or characteristic (See B.2.12)
0x0015 (21)	Serial- Number	R	max. 16 octets	STR	Vendor specific serial number (See B.2.13)
0x0016 (22)	Hardware Revision	R	max. 64 octets	STR	Vendor specific format (See B.2.14)
0x0017 (23)	Firmware Revision	R	max. 64 octets	STR	Vendor specific format (See B.2.15)
0x0018 (24)	Application Specific Tag	R/W	19 octets	STR	Tag location or tag function defined by user (See B.2.16)
0x0024 (36)	Device Status	R	1 octet	UIntegerT	Contains current status of the Device (See B.2.18)
0x0025 (37)	Detailed Device Status	R	variable	ArrayT of OctetStringT3	See B.2.19

*) Referenced chapters refer to “IO-Link Interface and System Specification”
(File name: IOL-Interface-Spec_10002_V112_Jul13)

5.2 0x2000 Device Description Object

Index: 0x2000 (8192)

sub	name	description	access type	data type	data memory	reset group
0x1	Device Name	<i>Device name Used to identify the device in Service Tool.</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		

5.3 0x2002 User Configuration Object

Index: 0x2002 (8194)

sub	name	description	access type	data type	data memory	reset group
0x1	Unique Device Name	<i>Do not change.</i> <ID><SN> with <ID> device ident number (8digits, with leading zeros) <SN> device serial number (8digits, with leading zeros)	RW	STR	x	A
0x2	Location Information	<i>Additional user information about the devices location</i>	RW	STR	x	A
0x3	User Description	<i>Additional user information about the device</i>	RW	STR	x	A
0x4	Displayed Device Name	<i>Device (TAG) name</i>	RW	STR	x	A

5.4 0x2004 Device Status Object

Index: 0x2004 (8196)

sub	name	description	access type	data type	data memory	reset group
0x1	Device Status NamurNe107	<i>Corresponds to the device status *)</i>	RO	UI8		
0x2	Device Temperature	<i>Temperature of the device in kelvin</i>	RO	FL32		
0x3	Device Supply Voltage	<i>Supply voltage in volt</i>	RO	FL32		
0x4	Operation Time_[s]	<i>Device operating time counter in seconds</i>	RO	UI32		
0x5	Maximum Device Temperature	<i>Maximum internal device temperature in kelvin throughout the device's service life</i>	RO	FL32		
0x6	Minimum Device Temperature	<i>Minimum internal device temperature in kelvin throughout the device's service life</i>	RO	FL32		
0x7	Maximum Device Supply Voltage	<i>Maximum device power supply voltage since start-up in volt</i>	RO	FL32		
0x8	Minimum Device Supply Voltage	<i>Minimum device power supply voltage since start-up in volt</i>	RO	FL32		
0xD	Device Boot Counter	<i>Number of device starts</i>	RO	UI32		
0x13	Actuator Supply Voltage	<i>Class A devices: Supply voltage for actuators in volt. Class B devices: Supply voltage of second power supply for actuators in volt.</i>	RO	FL32		

*) 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			

5.5 0x200A Power Supply Alarm Values

Index: 0x200A (8202)

sub	name	description	access type	data type	data memory	reset group
0x1	Voltage error limit high	In volt. If the supply voltage exceeds this value, an error message is output.	RO	FL32		
0x2	Voltage error limit low	In volt. If the supply voltage falls below this value, an error message is output.	RO	FL32		
0x3	Voltage warning limit high	In volt. If the supply voltage exceeds this value, a warning message is output.	RW	FL32	x	A
0x4	Voltage warning limit low	In volt. If the supply voltage falls below this value, a warning message is output.	RW	FL32	x	A
0x5	Voltage hysteresis	In volt. 1.0 means limit +/- 0.5 volts.	RO	FL32		

5.6 0x200B Temperature Alarm Values

Index: 0x200B (8203)

sub	name	description	access type	data type	data memory	reset group
0x1	Temperature error limit high	In kelvin. If the temperature exceeds this value, an error message is output.	RO	FL32		
0x2	Temperature error limit low	In kelvin. If the temperature falls below this value, an error message is output.	RO	FL32		
0x3	Temperature warning limit high	In kelvin. If the temperature exceeds this value, a warning message is output.	RO	FL32		
0x4	Temperature warning limit low	In kelvin. If the temperature falls below this value, a warning message is output.	RO	FL32		
0x5	Temperature hysteresis	In kelvin. 4.0 means limit +/-2 kelvin.	RO	FL32		
0x6	Calibration temperature	For future use.	RO	FL32		
0x7	Calibration offset	For future use.	RO	FL32		

5.7 0x2101 Locating Function

Index: 0x2101 (8449)

sub	name	description	access type	data type	data memory	reset group
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> <p>Use this function only if device is in DL (Data Link layer) state "PreOperate".</p> <p>In DL state "Operate" use the locating function in the cyclic process output data (PDout), refer also to chapter 3.2.</p>	RW	UI8		

5.8 0x210A Trigger Maintenance Function

Index: 0x210A (8458)

sub	name	description	access type	data type	data memory	reset group
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>Additionally a warning is output.</p>	RW	UI8		

5.9 0x2C00 Additional Device Identity

Index: 0x2C00 (11264)

sub	name	description	access type	data type	data memory	reset group
0x2	Device Ident Number Customer	<i>Customer specific device identification number</i>	RO	UI32		
0x5	PCB Ident Number	<i>PCB identification number</i>	RO	UI32		
0x6	PCB Ident Number Customer	<i>Customer specific PCB identification number</i>	RO	UI32		
0x7	PCB Serial Number	<i>PCB serial number</i>	RO	UI32		
0x8	PCB Hardware Version	<i>PCB hardware version</i>	RO	UI8		
0x9	PCB Hardware Index	<i>PCB hardware index</i>	RO	UI8		

5.10 0x2C01 Life Data

Index: 0x2C01 (11265)

sub	name	description	access type	data type	data memory	reset group
0x1	Operation Hours Total	<i>Operation hours total.</i>	RO	UI32		A
0x2	Operation Hours Resettable	<i>Resettable operation hours. *)</i>	RO	UI32		A, B, D
0x3	Cycles V1 Total	<i>Total switching cycles of solenoid valve V1.</i>	RO	UI32		A
0x4	Cycles V1 Resettable	<i>Resettable switching cycles of solenoid valve V1. *)</i>	RO	UI32		A, B, D
0x5	Cycles V2 Total	<i>Switching cycles of solenoid valve V2.</i>	RO	UI32		A
0x6	Cycles V2 Resettable	<i>Resettable switching cycles of solenoid valve V2. *)</i>	RO	UI32		A, B, D
0x7	Cycles V3 Total	<i>Switching cycles of solenoid valve V3.</i>	RO	UI32		A
0x8	Cycles V3 Resettable	<i>Resettable switching cycles of solenoid valve V3. *)</i>	RO	UI32		A, B, D

*) Can be reset e.g. with Advanced Diagnostics Limits / Control (refer to 0x2C43sub0x10)

5.11 0x2C02 CMD set point

Index: 0x2C02 (11265)

sub	name	description	access type	data type	data memory	reset group
0x1	CMD set point value source	<p>Select CMD set point value source: Configure the source of the control signal for solenoid valves 0 – IO-Link 1 – Manual set point value (see sub index 0x2) *) Selection is stored persistently.</p> <p>CMD set point value source is reset to IO-Link during Automatic teach function, Service Mode, Device Reset Mode.</p>	RW	UI8	x	A
0x2	Manual CMD set point	<p>Manual set point value for solenoid valves *) **) Value is stored persistently.</p>	RW	UI8		A

*) When 0x2C02sub1 CMD set point value source is switched from IO-Link to Manual set point value, 0x2C02sub2 Manual CMD set point is updated with latest solenoid valve set points to provide bumpless switching to manual valve control.

**) Details on solenoid valves set point 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		
					#) If feature AART_D for double acting valves enabled: set point for valve V1 is also used as set point for valve V2.		

5.12 0x2C03 Feedback Fields

Index: 0x2C03 (11267)

sub	name	description	access type	data type	data memory	reset group
0x7	TP1 Positive	Feedback field size at top of position S1 in mm *).	RW	FL32	x	A, B, E
0x8	TP1 Negative	Feedback field size at bottom of position S1 in mm *).	RW	FL32	x	A, B, E
0x9	TP2 Positive	Feedback field size at top of position S2 in mm *).	RW	FL32	x	A, B, E
0xA	TP2 Negative	Feedback field size at bottom of position S2 in mm *).	RW	FL32	x	A, B, E
0xB	TP3 Positive	Feedback field size at top of position S3 in mm *).	RW	FL32	x	A, B, E
0xC	TP3 Negative	Feedback field size at bottom of position S3 in mm *).	RW	FL32	x	A, B, E
0xD	Reset Command	Bit mask, which feedback fields shall be reset to default values **)	RW	UI8		
0xE	Feedback Field Mode Command	Reset Feedback Field sizes to predefined values ***)	RW	UI8		

*) resolution: 0.1 mm

**) Feedback Field Reset Command - details

Bit	Bit = 1	Affected objects
0	Reset Feedback fields S1	0x2C03sub7, 0x2C03sub8
1	Reset Feedback fields S2	0x2C03sub9, 0x2C03subA
2	Reset Feedback fields S3	0x2C03subB, 0x2C03subC

***) Feedback Field Mode Command - details

Value	Command	Affected objects
0	Do nothing	
1	Feedback Field Mode 1	0x2C03sub7-subC
2	Feedback Field Mode 2	
3	Feedback Field Mode 3	
4	Feedback Field Mode 4	
5	Reserved	
6	Reserved	

5.13 0x2C04 Control head settings (Service Parameters)

Index: 0x2C04 (11268)

sub	name	description	access type	data type	data memory	reset group																						
0x1	Magnetic Manual Control Active	Activation / Deactivation: 1 - On, 0 - Off	RW	UI8	x	A,B																						
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 / warning will be raised after time "Maintenance At Days" (0x2C04 sub 4) expired.	RW	UI8	x	A,B																						
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 / warning will be raised if at least one of the resettable cycle counter exceeds its corresponding limit "Maintenance At Cycles Vx" (V1: 0x2C04 sub 0x11, V2: 0x2C04 sub 0x12, V3: 0x2C004 sub 0x13)	RW	UI8	x	A,B																						
0x4	Maintenance At Days	Time based service indication interval in days. Refer to 0x2C04 sub 2 for details.	RW	UI16	x	A,B																						
0x8	Set-point error (Safety Mode)	Select reaction in the event of a set point error (bus error or invalid process data): 0 – Safety Position Solenoid valves are controlled by value from "Valves Safety Position" (refer to object 0x2C04 sub 9) 1 – Maintain Position (Last position) Solenoid valves are controlled by hold set point values V1, V2, V3 of process output data (PDout) from before the communication loss.	RW	UI8	x	A																						
0x9	Valves Safety Position	Control bits for solenoid valves safety position (used only in case set point error (Safety Mode, 0x2C04 sub 8) is set to 0 "Safety Position") <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="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> ^{#)} If feature AART_D for double acting valves enabled: set point for valve V1 is also used as Safety Position for valve V2.	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	A
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	S4 Control Function	External initiator S4 controls 0 – Valve Plate is closed 1 – Valve Plate is open	RW	UI8	x	A,B																						
0xB	S4 As S1	Use S4 as S1: 0 – Off, 1 – On	RW	UI8	x	A,B																						
0xC	All Valves Possible	0 – Only one valve of V1, V2, V3 1 – All valves V1, V2, V3 can be actuated at one time Setting not active, if feature AART_D for double acting valves enabled.	RW	UI8	X	A, B																						
0xE	WMS Filter	Filter for position measuring system (WMS). 0 – Standard, 1 – Array, 2 – Special	RW	UI8	x	A																						

sub	name	description	access type	data type	data memory	reset group
0xF	Service Indication Display Option	<i>Optical display of service indication via top LED indicator</i> 0 – Enabled 1 – Disabled	RW	UI8	x	A,B
0x10	Local control lock (Device lock)	<i>Activate or deactivate local operation:</i> <i>Buttons for manual operation (manual teach / reset functions) inside the device are deactivated to prevent unintentional operation</i> 0 = Not deactivated (buttons are enabled) 1 = Deactivated (buttons are disabled)	RW	UI8	x	A
0x11	Maintenance At Cycles V1	<i>Cycle based service indication interval for solenoid valve V1. Refer to 0x2C04 sub 3 for details.</i>	RW	UI32	x	A,B
0x12	Maintenance At Cycles V2	<i>Cycle based service indication interval for solenoid valve V2. Refer to 0x2C04 sub 3 for details.</i>	RW	UI32	x	A,B
0x13	Maintenance At Cycles V3	<i>Cycle based service indication interval for solenoid valve V3. Refer to 0x2C04 sub 3 for details.</i>	RW	UI32	x	A,B
0x14	Cycle Stroke Color S3/S4	0 – Same color. different blink pattern. 1 – Different color. same blink pattern.	RW	UI8	x	A, B

5.14 0x2C05 Device Configuration

Index: 0x2C05 (11269)

sub	name	description	access type	data type	data memory	reset group
0x06	Active Features	<i>Bit 1: AART_D for double acting valves: set point for V1 is also used as set point for V2.</i>	RO	UI32		

5.15 0x2C06 Diagnose

Index: 0x2C06 (11270)

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

*) Details of ErrorByte

Bit	Bitmask	Description
0	0x00000001	Teach function required (No position taught)
1	0x00000002	IO-Link set-point value error (Bus error)
2	0x00000004	Internal - Reserved
3	0x00000008	Internal - Reserved
4	0x00000010	Internal - Reserved
5	0x00000020	Teach function error
6	0x00000040	WMS (position measuring system) signal error
7	0x00000080	Incorrect (process) valve position
8	0x00000100	Error persistent memory
16	0x00010000	Switching timeout error
20	0x00100000	Error power supply measurement
21	0x00200000	Internal common error
22	0x00400000	Error actuator power supply (Class B devices only) ¹⁾
23	0x00800000	Error power supply ¹⁾
24	0x01000000	Error device temperature ¹⁾
31	0x80000000	PCB calibration required ¹⁾ (electronics module, Class B devices only)

¹⁾ Available from Firmware A.01.00.00

***) Details of Info/WarningByte

Bit	Bitmask	Description
0	0x00000001	--
1	0x00000002	Solenoid valves in safety position
2	0x00000004	Service / maintenance required
4	0x00000010	Internal safety position active: all solenoid valves off
5	0x00000020	Internal - Reserved
8	0x00000100	Internal - Reserved
12	0x00001000	Internal - Reserved
13	0x00002000	Internal - Reserved
14	0x00004000	Internal - Reserved
16	0x00010000	Travel accumulator threshold reached
17	0x00020000	Valve switching cycle threshold reached
18	0x00040000	Operating time threshold reached
19	0x00080000	Travel Timeout threshold reached
20	0x00100000	Trigger Maintenance Function active

5.16 0x2C07 Device State

Index: 0x2C07 (11271)

sub	name	description	access type	data type	data memory	reset group																																								
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>Feedback Field mode</td></tr><tr><td>3</td><td>Service mode</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	Feedback Field mode	3	Service mode	7	Device Reset mode	RO	UI8																										
0	Automatic mode	4	Manual mode																																											
1	Test mode	5	Autotune mode																																											
2	Test mode	6	Feedback Field mode																																											
3	Service mode	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																																										

5.17 0x2C08 WMS

Index: 0x2C08 (11272)

WMS = position measuring system

sub	name	description	access type	data type	data memory	reset group
0x1	Feedback position S1	WMS value of teach position S1 in digits; 0 if not taught	RO	UI16		A, B, C
0x2	Feedback position S2	WMS value of teach position S2 in digits; 0 if not taught	RO	UI16		A, B, C
0x3	Feedback position S3	WMS value of teach position S3 in digits; 0 if not taught	RO	UI16		A, B, C
0x4	Feedback field S1 upper limit	WMS value of upper feedback limit of S1 in digits	RO	UI16		A, B, C
0x5	Feedback field S1 lower limit	WMS value of lower feedback limit of S1 in digits	RO	UI16		A, B, C
0x6	Feedback field S2 upper limit	WMS value of upper feedback limit of S2 in digits	RO	UI16		A, B, C
0x7	Feedback field S2 lower limit	WMS value of lower feedback limit of S2 in digits	RO	UI16		A, B, C
0x8	Feedback field S3 upper limit	WMS value of upper feedback limit of S3 in digits	RO	UI16		A, B, C
0x9	Feedback field S3 lower limit	WMS value of lower feedback limit of S3 in digits	RO	UI16		A, B, C
0xA	WMS Position	WMS position value in digits	RO	UI16		

5.18 0x2C0A Intelli Pulse Flush (IPF)

Index: 0x2C0A (11274)

Intelli Pulse Flush functionality is **not** supported for devices with activated feature AART_D for double acting process valves.

sub	name	description	access type	data type	data memory	reset group
0x1	IPF V2 Enable	Enables IPF functionality for Lower-Seat-Lift (pilot valve V2) 0 – Disabled, 1 – Enabled	RW	UI8	x	A, B
0x2	IPF V2 Delay	Delay in ms. Recommended value (presets): D620, D365it valves: 70 ms D600, Secure valves: 350ms	RW	UI16	x	A, B
0x3	IPF V3 Enable	Enables IPF functionality for Upper-Seat-Lift (pilot valve V3) 0 – Disabled, 1 - Enabled	RW	UI8	x	A, B
0x4	IPF V3 Delay with proxy	Delay with upper seat detection (via external initiator / proximity switch) in ms	RW	UI16	x	A, B
0x5	IPF V3 Delay without proxy	Delay without upper seat detection in ms	RW	UI16	x	A, B
0x6	Apply presets	Allows quick configuration: 0 – Done / Nothing to do 1 – Enable IPF V2 for D620, D365it valves 2 – Enable IPF V2 for D600, Secure valves 3 – Enable IPF V3 31 – Enable IPF V3 + IPF V2 for D620, D365it valves 32 – Enable IPF V3 + IPF V2 for D600, Secure valves 252 – Disable IPF V2 253 – Disable IPF V3 255 – Disable IPF V2 + IPF V3	RW	UI8		

5.190x2C10 Maintenance

Index: 0x2C10 (11280)

sub	name	description	access type	data type	data memory	reset group
0x1	Last Maintenance Date	<i>Date of last maintenance</i>	RW	STR		A
0x2	Last Maintenance By	<i>Name of person / company who performed last maintenance</i>	RW	STR		A
0x3	Cycles V1 To Next Maintenance	<i>Left switching cycles of solenoid valve Vx (x=1, 2, 3) to next maintenance notification.</i>	RO	UI32		
0x4	Cycles V2 To Next Maintenance	<i>Calculation: 0x2C01sub4/6/8 (Cycles V1/2/3 Resettable) – 0x2C04sub11/12/13 (Maintenance At Cycles V1/2/3)</i>	RO	UI32		
0x5	Cycles V3 To Next Maintenance	<i>A value of 0 indicates maintenance required. A value of 0xFFFFFFFF indicates disabled service notification function for valve cycles. (object 0x2C04sub3 Service Indication Cycles Active).</i>	RO	UI32		
0x6	OpHours To Next Maintenance	<i>Left operation hours to next maintenance notification. Calculation: 0x2C01sub2 (Operation Hours Resettable) – 24h/day * 0x2C04sub4 (Maintenance At Days) A value of 0 indicates maintenance required. A value ≥ 99999999 indicates disabled service notification function for operation hours (object 0x2C04sub2 Service Indication Time Active).</i>	RO	UI32		

5.200x2C11 Top LED Mode

Index: 0x2C11 (11281)

sub	name	description	access type	data type	data memory	reset group
0x0	Top LED Mode	<i>Selection of LED mode for Top LEDs *).</i>	RW	UI8	x	A

*) Details on available LED modes

Value	LED mode
0	0 (DIP Color 0000)
1	1 (DIP Color 1000)
2	2 (DIP Color 0100)
3	3 (DIP Color 1100)
4	4 (DIP Color 0010)
5	5 (DIP Color 1010)
6	6 (DIP Color 0110)
7	7 (DIP Color 1110)

Value	LED mode
8	8 (DIP Color 0001)
9	9 (DIP Color 1001)
10	10 (DIP Color 0101)
11	11 (DIP Color 1101)
12	12 (DIP Color 0011)
13	13 (DIP Color 1011)
14	14 (DIP Color 0111)
15	15 (DIP Color 1111)

Refer to operating instructions for details.

5.21 0x2C12 Top LED Color Adaption

Index: 0x2C12 (11282)

sub	name	description	access type	data type	data memory	reset group
0x1	Display green as	<i>Displayed color with Top LEDs instead of green color *)</i>	RW	UI32	x	A
0x2	Display yellow as	<i>Displayed color with Top LEDs instead of yellow color *)</i>	RW	UI32	x	A
0x3	Display red as	<i>Displayed color with Top LEDs instead of red color *)</i>	RW	UI32	x	A
0x4	Display blue as	<i>Displayed color with Top LEDs instead of blue *) (used for service notification)</i>	RW	UI32	x	A
0x5	Display white as	<i>Displayed color with Top LEDs instead of white *) (used for localizing function in case no feedback position is indicated)</i>	RW	UI32	x	A

*) Details on color value:

Top LED Color	Value	Byte 3	Byte 2	Byte 1	Byte 0
Predefined fixed colors					
LED Off	0x10000000	0x10	0x00	0x00	0x00
White	0x10000001				0x01
Green	0x10000002				0x02
Blue	0x10000003				0x03
Yellow	0x10000004				0x04
Orange	0x10000005				0x05
Red	0x10000006				0x06
Mixed colors		0x00	RGB: blue component	RGB: green component	RGB: red component
<i>Examples:</i>					
Pink	0x00FF00FF	0x00	0xFF	0x00	0xFF
Turquoise	0x00FFFF00	0x00	0xFF	0xFF	0x00

5.22 0x2C14 Actuator Supply Alarm Values (Class B only)

Index: 0x2C14 (11284)

sub	name	description	access type	data type	data memory	reset group
0x1	Voltage error limit high	<i>In volt. If the actuator supply voltage exceeds this value, an error message is output.</i>	RO	FL32		
0x2	Voltage error limit low	<i>In volt. If the actuator supply voltage falls below this value, an error message is output.</i>	RO	FL32		

5.23 0x2C15 Teach functions

Index: 0x2C15 (11285)

sub	name	description	access type	data type	data memory	reset group
0x1	Teach function state	<p><i>State of teach function</i></p> <p>0: Complete</p> <p>1: Initialization</p> <p>2: Process valve Open</p> <p>3: Process valve Close</p> <p>4: Process valve Open Clock Valve Plate</p> <p>5: Process valve Close Clock Valve Plate</p> <p>6: Process valve Open Intermediate Position</p> <p>7: Process valve Close Intermediate Position</p> <p>11: Process valve Closed Position Teach Position S1</p> <p>12: Process valve Open Position Teach Position S2</p> <p>13: Process valve Intermediate Position Teach Position S3</p> <p>14: Process valve Clock Valve Plate Teach Position S3</p> <p>-1: Abort by user</p> <p>-2: Timeout reaching position S1</p> <p>-3: Timeout reaching position S2</p> <p>-4: Error teaching position S1</p> <p>-5: Error teaching position S2</p> <p>-6: Error teaching position S3</p> <p>-7: Error teach reset</p> <p>-8: Reserved teach function.</p> <p>-9: Error storing values</p> <p>-11: Function not started (not all solenoid valves off)</p> <p>-12: Error determining switching times</p>	RO	SI8		

sub	name	description	access type	data type	data memory	reset group
0x2	Teach function start	<p><i>Start teach function</i></p> <p><i>Automatic teach functions 1-6 measure</i></p> <ul style="list-style-type: none"> positions S1, S2 and S3 (only automatic teach functions 3, 5, 6) travelling times assigned to actuated valve <p><i>Manual teach functions assign the current position value to the selected position</i></p> <p>0: Finished / teach function aborted 1...6: Start automatic teach function 1...6 *) 11: Start manual teach function S1 12: Start manual teach function S2 13: Start manual teach function S3</p> <p>*) If feature AART_D enabled (see object 0x2C05sub6), automatic teach functions 3-6 are without function.</p>	RW	UI8		
0x3	Is taught (Teach state)	<p><i>Indicates, which positions S1 ... S3 are taught – bit coded:</i></p> <p>Bit0 = Position S1 Bit1 = Position S2 Bit2 = Position S3</p> <p><i>Values:</i></p> <p>0 – not taught 1 – taught</p>	RO	UI8		
0x4	Teach reset command	<p><i>Reset automatic or manually taught values</i></p> <p>0: Finished / teach reset function aborted 1: Reset all taught positions (S1, S2, S3) 2: Reset all taught positions (S1, S2, S3) and travelling times 0x2C15sub5 - subA</p>	RW	UI8		
0x5	Travel Time V1 On	<p><i>If solenoid valve V1 was switched on:</i></p> <p><i>Time (in ms) measured during automatic teach function from leaving static position (tolerance band or S4) until reaching static position (tolerance band or S4)</i></p>	RO	UI16		
0x6	Travel Time V1 Off	<p><i>If solenoid valve V1 was switched off:</i></p> <p><i>Time (in ms) measured during automatic teach function from leaving static position (tolerance band or S4) until reaching static position (tolerance band or S4)</i></p>	RO	UI16		
0x7	Travel Time V2 On	Refer to Travel Time V1 On (0x2C15sub5), but with solenoid valve V2	RO	UI16		
0x8	Travel Time V2 Off	Refer to Travel Time V1 Off (0x2C15sub6), but with solenoid valve V2	RO	UI16		
0x9	Travel Time V3 On	Refer to Travel Time V1 On (0x2C15sub5), but with solenoid valve V3	RO	UI16		
0xA	Travel Time V3 Off	Refer to Travel Time V1 Off (0x2C15sub6), but with solenoid valve V3	RO	UI16		

5.240x2C16 Factory Reset

Index: 0x2C16 (11286)

Attention: Refer to operating instructions of IntelliTop® 2.0 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 are changed and the communication with device fails with the restored settings.

sub	name	description	access type	data type	data memory	reset group
0x0	Factory Reset	<p>Factory reset parameters</p> <p>Refer to operating instructions of IntelliTop® 2.0 before starting this function!</p> <p>0: Finished</p> <p>99: Partial factory reset (reset group B) start (device reset function)</p> <p>111: Factory reset (reset group A) start</p>	RW	UI8		

5.25 0x2C40 Advanced Diagnostics Totalizers

Index: 0x2C40 (11328)

sub	name	description	access type	data type	data memory	reset group
0x1	Travel accumulator	Travel accumulator total [mm] Travel distance of the valve spindle. Added up from factory default / last factory reset.	RO	FL32		A
0x2	Travel accumulator resettable	Travel accumulator resettable [mm] Travel distance of the valve spindle is added up since last reset (e.g. once maintenance is complete)	RO	FL32		A,D
0x3	Travel accumulator V1	Travel accumulator total [mm] Travel distance of the valve spindle if only solenoid valve V1 was switched on / off. Added up from factory default / last factory reset.	RO	FL32		A
0x4	Travel accumulator V1 resettable	Travel accumulator resettable [mm] Travel distance of the valve spindle if only solenoid valve V1 was switched on / off. Added up since last reset (e.g. once maintenance is complete)	RO	FL32		A,D
0x5	Travel accumulator V2	Travel accumulator total [mm] Travel distance of the valve spindle if only solenoid valve V2 was switched on / off. *) Added up from factory default / last factory reset.	RO	FL32		A
0x6	Travel accumulator V2 resettable	Travel accumulator resettable [mm] Travel distance of the valve spindle if only solenoid valve V2 was switched on / off. Added up since last reset (e.g. once maintenance is complete) *)	RO	FL32		A,D
0x7	Travel accumulator V3	Travel accumulator total [mm] Travel distance of the valve spindle if only solenoid valve V3 was switched on / off. Added up from factory default / last factory reset.	RO	FL32		A
0x8	Travel accumulator V3 resettable	Travel accumulator resettable [mm] Travel distance of the valve spindle if only solenoid valve V3 was switched on / off. Added up since last reset (e.g. once maintenance is complete)	RO	FL32		A,D

*) Inactive in case of enabled feature AART_D for double acting valves (see object 0x2C05sub6).

5.26 0x2C41 Advanced Diagnostics Counters

Index: 0x2C41 (11329)

sub	name	description	access type	data type	data memory	reset group
0x1	Travel time V1 On Error counter	Number of times "Travel Time Limit V1 On" threshold exceeded (resettable): Value (0x2C43sub5 "Travel Time Limit V1 On") + "Time Tolerance" (0x2C43subB) has been exceeded	RO	UI32		A, D
0x2	Travel time V1 Off Error counter	Number of times "Travel Time Limit V1 Off" threshold exceeded (resettable): Value (0x2C43sub6 "Travel Time Limit V1 Off") + "Time Tolerance" (0x2C43subB) has been exceeded	RO	UI32		A, D
0x3	Travel time V2 On Error counter	Number of times "Travel Time Limit V2 On" threshold exceeded (resettable): *) Value (0x2C43sub7 "Travel Time Limit V2 On") + "Time Tolerance" (0x2C43subB) has been exceeded	RO	UI32		A, D

sub	name	description	access type	data type	data memory	reset group
0x4	Travel time V2 Off Error counter	Number of times "Travel Time Limit V2 Off" threshold exceeded (resettable): *) Value (0x2C43sub8 "Travel Time Limit V2 Off") + "Time Tolerance" (0x2C43subB) has been exceeded	RO	UI32		A, D
0x5	Travel time V3 On Error counter	Number of times "Travel Time Limit V3 On" threshold exceeded (resettable): Value (0x2C43sub9 "Travel Time Limit V3 On") + "Time Tolerance" (0x2C43subB) has been exceeded	RO	UI32		A, D
0x6	Travel time V3 Off Error counter	Number of times "Travel Time Limit V3 Off" threshold exceeded (resettable): Value (0x2C43subA "Travel Time Limit V3 Off") + "Time Tolerance" (0x2C43subB) has been exceeded	RO	UI32		A, D
0x7	Switching Timeout Counter V1	Number of switching timeouts, if solenoid valves V1 was switched on / off	RO	UI32		A, D
0x8	Switching Timeout Counter V2	Number of switching timeouts, if solenoid valves V2 was switched on / off *)	RO	UI32		A, D
0x9	Switching Timeout Counter V3	Number of switching timeouts, if solenoid valves V2 was switched on / off	RO	UI32		A, D
0xA	Teach function counter	Number of teach functions performed	RO	UI32		A

*) Inactive in case of enabled feature AART_D for double acting valves (see object 0x2C05sub6).

5.27 0x2C42 Advanced Diagnostics Values

Index: 0x2C42 (11330)

sub	name	description	access type	data type	data memory	reset group
0x1	Travel Time V1 On	If solenoid valve V1 was switched on: Time (in ms) measured from leaving static position (tolerance band or S4) until reaching static position (tolerance band or S4)	RO	UI16		
0x2	Travel Time V1 Off	If solenoid valve V1 was switched off: Time (in ms) measured from leaving static position (tolerance band or S4) until reaching static position (tolerance band or S4)	RO	UI16		
0x3	Travel Time V2 On	Refer to Travel Time V1 On, but with solenoid valve V2 *)	RO	UI16		
0x4	Travel Time V2 Off	Refer to Travel Time V1 Off, but with solenoid valve V2 *)	RO	UI16		
0x5	Travel Time V3 On	Refer to Travel Time V1 On, but with solenoid valve V3	RO	UI16		
0x6	Travel Time V3 Off	Refer to Travel Time V1 Off, but with solenoid valve V3	RO	UI16		

*) Inactive in case of enabled feature AART_D for double acting valves (see object 0x2C05sub6).

5.28 0x2C43 Advanced Diagnostics Limits / Control

Index: 0x2C43 (11331)

sub	name	description	access type	data type	data memory	reset group
0x1	Travel accumulator limit	Travel accumulator: Activate or deactivate maintenance threshold [mm] 0: Diagnostics deactivated >0: Diagnostics activated Warning is output when the resettable travel accumulator reaches this threshold	RW	FL32	x	A
0x2	Travel accumulator V1 limit	Travel accumulator: Activate or deactivate maintenance threshold [mm] 0: Diagnostics deactivated >0: Diagnostics activated Warning is output when the resettable travel accumulator reaches this threshold	RW	FL32	x	A
0x3	Travel accumulator V2 limit	Travel accumulator: Activate or deactivate maintenance threshold [mm] 0: Diagnostics deactivated >0: Diagnostics activated Warning is output when the resettable travel accumulator reaches this threshold	RW	FL32	x	A
0x4	Travel accumulator V3 limit	Travel accumulator: Activate or deactivate maintenance threshold [mm] 0: Diagnostics deactivated >0: Diagnostics activated Warning is output when the resettable travel accumulator reaches this threshold	RW	FL32	x	A
0x5	Travel Time Limit V1 On	Maximum travel time if solenoid valve V1 is actuated [ms]: Adjustable travel time from which a warning (active) should be generated to indicate potential faults in the system (e.g. pilot pressure too low, excessive friction in actuator, etc.). A warning is generated if travel time exceeded limit + time tolerance (0x2C43subB). Value 0 [ms] disables this travel time monitoring function. A teach function may evoke a travel time warning, if travel time monitoring function was already activated.	RW	UI16	x	A
0x6	Travel Time Limit V1 Off	Maximum travel time if solenoid valve V1 is switched off [ms]: Refer to Travel Time Limit V1 On for further details	RW	UI16	x	A
0x7	Travel Time Limit V2 On	Refer to Travel Time Limit V1 On, but with solenoid valve V2 *)	RW	UI16	x	A
0x8	Travel Time Limit V2 Off	Refer to Travel Time Limit V1 Off, but with solenoid valve V2 *)	RW	UI16	x	A
0x9	Travel Time Limit V3 On	Refer to Travel Time Limit V1 On, but with solenoid valve V3	RW	UI16	x	A
0xA	Travel Time Limit V3 Off	Refer to Travel Time Limit V1 Off, but with solenoid valve V3	RW	UI16	x	A
0xB	Time tolerance	Tolerance for configurable Travel Time Limits [%]: Specifies the tolerance for the parameters "Travel Time Limit V1/V2/V3 On/Off" (0x2C43sub5 – subA), from which point an active warning is generated.	RW	UI8	x	A

sub	name	description	access type	data type	data memory	reset group
0xC	Switching timeout detection	<p>Activate or deactivate switching time timeout detection: If activated, switching time timeouts will be detected whenever the end position is not reached within a certain time (refer to sub index 0xD – 0xF) and an error is output. Requires at least two detectable end positions. Not active during automatic teach function. Switching timeouts are measured, if only 1 solenoid valve is switched on / off and max. 1 solenoid valve is active. **)</p> <p>Bit – coded: Bit0 = Switching timeout detection V1 Bit1 = Switching timeout detection V2 Bit2 = Switching timeout detection V3 Values: 0: Deactivated, 1: Activated</p>	RW	UI8	x	A
0xD	Switching timeout V1	Select maximum time by which the end position should be reached [ms]	RW	UI16	x	A
0xE	Switching timeout V2	Select maximum time by which the end position should be reached [ms] *)	RW	UI16	x	A
0xF	Switching timeout V3	Select maximum time by which the end position should be reached [ms]	RW	UI16	x	A
0x10	Diagnosis command	<p>Reset counters / Import vales. Selection is bit-coded. All bits = 0: command finished For details refer to table ***) below.</p>	RW	UI32		

*) Inactive in case of enabled feature AART_D for double acting valves (see object 0x2C05sub6).

**) in case of enabled feature AART_D for double acting valves (see object 0x2C05sub6):

Pilot valve V2 is actuated almost together with V1. Switching timeout detection ignores pilot valve V2 actuation.

Switching timeout detection V2 is not working. Use switching timeout detection V1 to check pilot valve V1 and V2.

***) Diagnosis command - details

Bit	Bit = 1	Affected objects
0	Reset operation hour counter	0x2C01sub2
1	Reset switching cycles V1	0x2C01sub4
2	Reset switching cycles V2	0x2C01sub6
3	Reset switching cycles V3	0x2C01sub8
4	Reset travel accumulator	0x2C40sub2
5	Reset travel accumulator V1	0x2C40sub4
6	Reset travel accumulator V2	0x2C40sub6
7	Reset travel accumulator V3	0x2C40sub8
8	Reset number of Travel timeouts V1 On	0x2C41sub1
9	Reset number of Travel timeouts V1 Off	0x2C41sub2
10	Reset number of Travel timeouts V2 On	0x2C41sub3
11	Reset number of Travel timeouts V2 Off	0x2C41sub4
12	Reset number of Travel timeouts V3 On	0x2C41sub5
13	Reset number of Travel timeouts V3 Off	0x2C41sub6
14	Reset number of switching time timeouts V1	0x2C41sub7
15	Reset number of switching time timeouts V2	0x2C41sub8
16	Reset number of switching time timeouts V3	0x2C41sub9
17	Copy measured travel times V1 On / Off from 0x2C42sub1, 0x2C42sub2	0x2C43sub5, 0x2C43sub6
18	Copy measured travel times V2 On / Off from 0x2C42sub3, 0x2C42sub4	0x2C43sub7, 0x2C43sub8
19	Copy measured travel times V3 On / Off from 0x2C42sub5, 0x2C42sub6	0x2C43sub9, 0x2C43subA

6 Events

Event Code	Event Type	Description	Action
0x1000 (4096)	ERROR	General malfunction - unknown error	Restart device If fault persists, contact Pentair Südmo GmbH Service.
0x4000 (16384)	ERROR	Temperature error overload - device temperature for operation too high	Modify ambient temperature. If fault persists, contact Pentair Südmo GmbH Service.
0x4210 (16912)	WARNING	Temperature warning upper threshold exceeded - ambient temperature too high or excessive friction in actuator	Reduce ambient temperature. If fault persists, contact Pentair Südmo GmbH Service.
0x4220 (16928)	WARNING	Temperature warning lower threshold exceeded - ambient temperature too low.	Increase ambient temperature
0x5100 (20736)	ERROR	General power supply error - supply voltage for operation of device too low	Check supply voltage If fault persists, contact Pentair Südmo GmbH Service.
0x5110 (20752)	WARNING	Voltage warning upper threshold exceeded - supply voltage too high	Check supply voltage
0x5111 (20753)	WARNING	Voltage warning lower threshold exceeded - supply voltage too low	Check supply voltage
0x6000 (24576)	ERROR	Internal software error	Restart device If fault persists, contact Pentair Südmo GmbH Service.
0x1801 (6145)	ERROR	General power supply error - supply voltage for operation of device too high	Check supply voltage If fault persists, contact Pentair Südmo GmbH Service.
0x1802 (6146)	ERROR	Temperature error lower threshold exceeded - ambient temperature too low	Increase ambient temperature
0x1804 (6148)	ERROR	Internal error: WMS signal error (WMS: position measuring system)	Check the target for correct mounting and condition If fault persists, contact Pentair Südmo GmbH Service
0x1809 (6153)	ERROR	Nonvolatile storage memory isn't usable	Restart device If fault persists, contact Pentair Südmo GmbH Service.
0x180A (6154)	WARNING	Teach function required	Starting teach function
0x180B (6155)	ERROR	Teach function error	Check pilot pressure Check pilot valves Restart teach function If fault persists, contact Pentair Südmo GmbH Service.
0x180C (6156)	WARNING	Exceed travel accumulator limit	Where appropriate, check wear-and-tear parts in pneumatic actuator and valve
0x180D (6157)	WARNING	Exceed valve cycle limit	Where appropriate, check wear-and-tear parts in pneumatic actuator and valve

Event Code	Event Type	Description	Action
0x180E (6158)	WARNING	Exceed operation time limit	Perform maintenance as appropriate
0x180F (6159)	WARNING	At least one travel time threshold (specified travel time and tolerance) exceeded	1. Check compressed air supply 2. Check actuator and valve for friction
0x1811 (6161)	ERROR	Switching timeout - end position not reached	Check pilot pressure Check pilot valve Restart teach function If fault persists, contact Pentair Südm GmbH Service
0x1813 (6163)	WARNING	Automatic teach function active	Wait until automatic teach function has been completed
0x1814 (6164)	ERROR	IO-Link error	Check IO-Link connection
0x1815 (6165)	WARNING	Manual valve control active (Valves Mode = MAN)	To disable manual valve control, refer to description of object 0x2C02.
0x1816 (6166)	WARNING	Service Mode active	To disable Service Mode apply the magnetic service tool or restart device.
0x1817 (6167)	ERROR	PCB not supported by current firmware	Restart device. If fault persists, contact Pentair Südm GmbH Service.
0x1818 (6168)	WARNING	User triggered maintenance signal Device marked e.g. for maintenance purposes.	To disable signal refer to description of object 0x210A or restart device.
0x1819 (6169)	ERROR	Class B devices only: Overvoltage actuator supply detected	Check actuator supply voltage If fault persists, contact Pentair Südm GmbH Service.
0x181A (6170)	ERROR	Class B devices only: Undervoltage actuator supply detected	
0x181B (6171)	ERROR	Class B devices only: Out of specification actuator supply voltage detected	
0x181C (6172)	ERROR	Error power supply measurement	Check supply voltage. Restart device. If fault persists, contact Pentair Südm GmbH Service.
0x181D (6173)	ERROR	Incorrect valve position	Check process valve air supply assignment Check settings of 0x2C11 Top LED mode If fault persists, contact Pentair Südm GmbH Service.
0x181E (6174)	ERROR	Class B devices only: PCB calibration required.	Contact Pentair Südm GmbH Service.