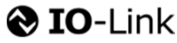


IO-Link Implementation		
		IO-Link Version 1.1
Vendor ID		234 (0x00EA)
Device ID		100310 (0x0187D6)
SIO-Mode		Yes
Baudrate		38.4 kBd (COM2)
Minimum cycle time		3.4 ms
Processdata input		4 byte
Processdata output		2 byte

Process Data						
Process Data In	Name	Bits		Access		Remark
PD In Byte 0	Signal H2 (part present)	0		ro		Vacuum is over H2 & not yet under H2-h2
	Signal H1 (in Control range)	1		ro		Vacuum value within In setpoint area (only in setpoint mode)
	control mode	2		ro		1 = Speed demand 0 = setpoint for control
	CM-Autoset acknowledged	3		ro		Acknowledge that the Autoset function has been completed
	EPC-Select acknowledged	4		ro		Acknowledge that EPC values 1 and 2 have been switched according to EPC-Select: 0 - EPC-Select = 00 1 - otherwise
	Signal H3 (part detached)	5		ro		The part has been detached after a suction cycle
	Device status	7..6		ro		00 - [green] Device is working optimally 01 - [yellow] Device is working but there are warnings 10 - [orange] Device is working but there are severe warnings 11 - [red] Device is not working properly
PD In Byte 1	EPC value 1	7...0		ro		EPC value 1 (byte) Holds 8bit value as selected by EPC-Select (see PD Out Byte 0)
PD In Byte 2	EPC value 2, high-byte	7...0		ro		EPC value 2 (word) Holds 16bit value as selected by EPC-Select (see PD Out Byte 0)
PD In Byte 3	EPC value 2, low-byte	7...0		ro		
Process Data Out	Name	Bits		Access		Remark
PD Out Byte 0	Vacuum	0		wo		Vacuum on/off
	Drop-off	1		wo		Activate Drop-off
	control mode	2				1 = Speed demand 0 = setpoint for control
	CM Autoset	3		wo		Perform CM Autoset function
	EPC-Select	5..4		wo		Select the function of EPC values 1 and 2 in PD In (content is 2 bit binary coded integer) 0: EPC value 1 = actual power in % EPC value 2 = System vacuum (1 mbar) 1: EPC value 1 = CM-Warnings (see ISDU 146 for bit definitions) EPC value 2 = Evacuation time t1 (1 msec) 2: EPC value 1 = Leakage of last suction cycle (1 mbar/sec) max. 255 mbar EPC value 2 = Last measured free-flow vacuum (1 mbar) 3: EPC value 1 = Primary supply voltage (0.1 Volt) max.25,5V EPC value 2 = Energy consumption of last suction cycle (Ws)
	Profile-Set	7..6		wo		Select Production Profile (content is 2-bit binary coded integer) 0: Activate Production Setup Profile P0 1: Activate Production Setup Profile P1 2: Activate Production Setup Profile P2 3: Activate Production Setup Profile P3
PD Out Byte 1	Vacuum demand / setpoint for control	7...0		wo		Vacuum demand in % / setpoint for control mode 1 in 10 mbar

ISDU Parameters									
(all ISDUs use subindex 0 only)									
ISDU Index		Subindex	Display Appearance	Parameter	Data width	Value range	Access	Default value	Remark
dec	hex	dec							
Identification									
Device Management									
16	0x0010	0		Vendor name	15 bytes		ro	J. Schmalz GmbH	Manufacturer designation
17	0x0011	0		Vendor text	15 bytes		ro	www.schmalz.com	Internet address
18	0x0012	0		Product name	32 bytes		ro	ECBPi	General product name
19	0x0013	0		Product ID	32 bytes		ro	ECBPi	General product name
20	0x0014	0		Product text	30 bytes		ro	ECBPi	Order-Code (partial); for complete Order-Code read Index 0xFE
21	0x0015	0		Serial number	9 bytes		ro	999000002	Serial number
22	0x0016	0		Hardware revision	2 bytes		ro	02	Hardware revision
23	0x0017	0		Firmware revision	4 bytes		ro	1.00	Firmware revision
240	0x00F0	0		Unique Device Identification	20 bytes		ro	101421221005502341003101	10,14,2,1,3,2,2,0,100,2,38,0,234,Device ID, SerNr.,
241	0x00F1	0		Feature List	11 bytes		ro	101421322100550	10,14,2,1,3,2,2,0,100,2,38
250	0x00FA	0		Article number	14 bytes		ro	10.03.01.00314	Order-Nr.
251	0x00FB	0		Article revision	2 bytes		ro	01	Article revision
252	0x00FC	0		Production Code	3 bytes		ro	H17	code of production
254	0x00FE	0		Product text (detailed)	64 bytes		ro	ECBPi 12 24V-DC M12-8	Order-Code (complete)



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Device Localization

24	0x0018	0	Application specific tag	0...32 bytes		rw	***	Deviceidentification
242	0x00F2	0	Equipment identification: (tag 3)	64 bytes		rw	***	Installationidentification
246	0x00F6	0	Geolocation	64 bytes		rw	***	OPC-UA Companion standard for auto-ID
247	0x00F7	0	Weblink to IODD	64 bytes		rw	www.schmalz.com/xxx/	User string to store web link to IODD file
248	0x00F8	0	LINK to IOT-Server	64 bytes		rw	myproduct.schmalz.com	Web link to NFC app (base URL for NFC tag)
249	0x00F9	0	Storage location (tag 2)	0...32 bytes		rw	***	User string to store storage location
253	0x00FD	0	Installation Date	16 bytes		rw	***	User string to store date of installation

Parameter

Device Settings

Commands

2	0x0002	0	System command	1 byte	5, 130, 165, 167, 168,169	wo	0	0x05 (dec 5): Force upload of parameter data into the master 0x82 (dec 130): Reset device parameters to factory defaults 0xA5 (dec 165): Calibrate vacuum sensor 0xA7 (dec 167): Reset erasable counter 0xA8 (dec 168): Reset voltage min/max (Sensor & Actor) & Temperatur 0xA9 (dec 169): Reset vacuum min/max
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Access Control

12	0x000C	0	Device access locks		2 bytes	0,2, 4	rw	0	Bit 0: reserved Bit 1: no action Bit 2: local parameterization lock (lock menu editing, value not changeable)
77	0x004D	0	Pin	Menu PIN code	2 bytes	0 - 999	rw	0	0 = menu editing unlocked >0 = menu editing locked with pin-code
90	0x005A	0	Extended Device Access Locks		1 byte	0 - 3 8-10 16-19 24-27	rw	0	Bit 0: NFC write lock Bit 1: NFC disable Bit 2: reserved Bit 3: local user interface locked (manual mode locked) Bit 4: IO-Link event lock (suppress sending IO-Link events) Bit 5-7: reserved
91	0x005B	0	NFC PIN code		2 bytes	0-999	rw	0	Pass code for writing data from NFC app

Initial settings

69	0x0045	0	bLo	Blow-off mode	1 byte	0 - 2	rw	0	0 = Externally controlled lay-down (-E-) 1 = Internally controlled lay-down – time-dependent (I-t) 2 = Externally controlled lay-down – time-dependent (E-t)
70	0x0046	0	SST	SoftStart	1byte	0-1	rw	0	0 = no SoftStart 1 = SoftStart
71	0x0047	0	o-2	OUT2 function	1 byte	0 - 1	rw	0	0 = NO 1 = NC
72	0x0048	0	o-3	OUT3 function	1 byte	0 - 1	rw	0	0 = NO 1 = NC
73	0x0049	1	tYI	Signal type Input	1 byte	0 - 1	rw	0	0 = PNP 1 = NPN
73	0x0049	2	tY0	Signal type Output	1 byte	0 - 1	rw	0	0 = PNP 1 = NPN
74	0x004A	0	uni	Vacuum display unit	1 byte	0 - 3	rw	0	0 = mbar 1 = kPa 2 = inHg 3= psi
75	0x004B	0	dLY	Output filter	1 byte	0 - 3	rw	1	0 = Off 1 = 10ms 2 = 50ms 3 = 200ms
76	0x004C	0	Eco	Eco-Mode (after 1 min)	1 byte	0 - 2	rw	0	0 = off 1 = on (full eco mode with display switching off , only one point) 2 = Lo (medium eco mode with display dimmed to 50%)
79	0x004F	0	dPy	Display rotation	1 byte	0 - 1	rw	0	0 = standard 1 = rotated


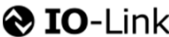

Process Settings



Production Setup - Profile P0

78	0x004E	0	ctr	control mode vacuum/speed	1 bytes	0-1	rw	0	0 = vacuum as controlled value 1 = motor speed as controle value
100	0x0064	0	H-1	Setpoint H1	2 bytes	(998 >= H1 >= (H2+H1*0,1)) & (H1 > H2+10)	rw	550	H1 - 10% has to be over H2 Unit: 1 mbar bzw. kPa, inHg, psi
101	0x0065	0	SPE	Speed in %	1 bytes	0-100	rw	100	Unit: %
102	0x0066	0	H-2	Setpoint H2	2 bytes	(H1*0,9 >= H2 >= (h2+2)	rw	400	Unit: 1 mbar
103	0x0067	0	h-2	Hyteresis h2	2 bytes	(H2-2) >= h2 >= 10	rw	20	Unit: 1 mbar
106	0x006A	0	tbL	Duration automatic drop off (LayDownTime)	2 bytes	100 - 9999	rw	2000	Unit: 1 ms
107	0x006B	0	t-1	Permissible evacuation time (t1)	2 bytes	0, 10 - 9999	rw	1000	Unit: 1 ms
108	0x006C	0	-L-	Permissible leakage rate (L)	2 bytes	1-999	rw	250	Unit: 1 mbar/sec
119	0x0077	0	Profile name	1...32 bytes		rw	***		

Production Setup - Profile P1

181	0x00B5	0	ctr	1 bytes	0-1	rw	0	Profile P-1 (selected by PD Out 0 - Profile-Set = 1)
182	0x00B6	0	Setpoint H1	2 bytes	998 >= H1 >= (H2+H1*0,1)	rw	400	
183	0x00B7	0	Speed SPE in %	1 bytes	0-100	rw	100	
184	0x00B8	0	Setpoint H2	2 bytes	(H1*0,9 >= H2 >= (h2+2)	rw	300	
185	0x00B9	0	Hysteresis h2	2 bytes	(H2-2) >= h2 >= 10	rw	15	

IO-Link Data Dictionary										ECBPI
10.03.01.00314/ 10.03.01.00364 ECBPI										27.03.2019
				J. Schmalz GmbH Johannes-Schmalz-Str. 1, D 72293 Glatten T: +49 7443 2403-0 schmalz@schmalz.de						
186	0x00BA	0	Duration automatic drop off (LayDownTime)	2 bytes	100 - 9999	rw	1500			
187	0x00BB	0	Permissible evacuation time	2 bytes	0, 10 - 9999	rw	400			
188	0x00BC	0	Permissible leakage rate	2 bytes	1 - 999	rw	250			
199	0x00C7	0	Profile name	1...32 bytes		rw	***			
⊞ Production Setup - Profile P2										
201	0x00C9	0	ctr	1 bytes	0-1	rw	0	Profile P-2 (selected by PD Out 0 - Profile-Set = 2)		
202	0x00CA	0	Setpoint H1	2 bytes	998 >= H1 >= (H2+H1*0.1)	rw	600			
203	0x00CB	0	Speed SPE in %	1 bytes	0-100	rw	100			
204	0x00CC	0	Setpoint H2	2 bytes	(H1*0,9) >= H2 >= (h2+2)	rw	500			
205	0x00CD	0	Hysteresis h2	2 bytes	(H2-2) >= h2 >= 10	rw	15			
206	0x00CE	0	Duration automatic drop off (layDownTime)	2 bytes	100 - 9999	rw	2000			
207	0x00CF	0	Permissible evacuation time	2 bytes	0, 10 - 9999	rw	600			
208	0x00D0	0	Permissible leakage rate	2 bytes	1 - 999	rw	250			
219	0x00DB	0	Profile name	1...32 bytes		rw	***			
⊞ Production Setup - Profile P3										
221	0x00DD	0	ctr	1 bytes	0-1	rw	0	Profile P-3 (selected by PD Out 0 - Profile-Set = 3)		
222	0x00DE	0	Setpoint H1	2 bytes	998 >= H1 >= (H2+H1*0,1)	rw	700			
223	0x00DF	0	Speed SPE in %	1 bytes	0-100	rw	100			
224	0x00E0	0	Setpoint H2	2 bytes	(H1*0,9) >= H2 >= (h2+2)	rw	600			
225	0x00E1	0	Hysteresis h2	2 bytes	(H2-2) >= h2 >= 10	rw	15			
226	0x00E2	0	Duration automatic drop off (layDownTime)	2 bytes	100 - 9999	rw	2000			
227	0x00E3	0	Permissible evacuation time	2 bytes	0, 10 - 9999	rw	1000			
228	0x00E4	0	Permissible leakage rate	2 bytes	1-999	rw	250			
239	0x00EF	0	Profile name	1...32 bytes		rw	***			
⊞ Observation										
⊞ Monitoring										
⊞ Process Data										
40	0x0028	0	Process Data In Copy	see PD in		ro	-	Copy of currently active process data input (length see above)		
41	0x0029	0	Process Data Out Copy	see PD out		ro	-	Copy of currently active process data output (length see above)		
64	0x0040	0	Vacuum Value	6 bytes		ro	-	subindex 0 for access to all primary supply voltage values		
64	0x0040	1	Vacuum Value, live	2 bytes		ro	-	Vacuum Value as measured by the device		
64	0x0040	2	Vacuum Value, min	2 bytes		ro	-	min. value of Vacuum Value as measured by the device - rest by ISDU 0x0002		
64	0x0040	3	Vacuum Value, max	2 bytes		ro	-	max. value of Vacuum Value as measured by the device-rest by ISDU 0x0002		
66	0x0042	0	Primary supply voltage	6 bytes		ro	-	subindex 0 for access to all primary supply voltage values		
66	0x0042	1	Primary supply voltage, live	2 bytes		ro	-	Primary supply voltage (US) as measured by the device (unit: 0.1 Volt)		
66	0x0042	2	Primary supply voltage, min	2 bytes		ro	-	min. value of primary supply voltage (unit: 0.1 Volt) - rest by ISDU 0x0002		
66	0x0042	3	Primary supply voltage, max	2 bytes		ro	-	max. value of primary supply voltage (unit: 0.1 Volt) - rest by ISDU 0x0002		
67	0x0043	0	Auxiliary supply voltage	6 bytes		ro	-	subindex 0 for access to all auxiliary supply voltage values		
67	0x0043	1	Auxiliary supply voltage, live	2 bytes		ro	-	Auxiliary supply voltage (UA) as measured by the device (unit: 0.1 Volt)		
67	0x0043	2	Auxiliary supply voltage, min	2 bytes		ro	-	min. value of auxiliary supply voltage (unit: 0.1 Volt) - rest by ISDU 0x0002		
67	0x0043	3	Auxiliary supply voltage, max	2 bytes		ro	-	max. value of auxiliary supply voltage (unit: 0.1 Volt) - rest by ISDU 0x0002		
68	0x0044	1	Temperature live	2 bytes		ro		Temperature (unit 0,1 °C)		
68	0x0044	2	Temperature min	2 bytes		ro		Lowest measured Temperature since power-up (unit 0,1 °C)		
68	0x0044	3	Temperature max	2 bytes		ro		Highest measured Temperature since power-up (unit 0,1 °C)		
148	0x0094	0	Evacuation time t0	2 bytes		ro		Time from start of suction to H2 (unit: 1 ms)		
149	0x0095	0	Evacuation time t1	2 bytes		ro		Time from H2 to H1 (unit: 1 ms)		
160	0x00A0	0	Leakage rate	2 bytes		ro		Leakage of last suction cycle (unit: 1 mbar/sec)		
161	0x00A1	0	Free-flow vacuum	2 bytes		ro		Last measured free-flow vacuum (unit: 1 mbar)		
164	0x00A4	0	Max. reached vacuum in last cycle	2 bytes		ro		Maximum vacuum value of last suction cycle		
⊞ Communication Mode										
564	0x0234	0	Communication Mode	1 byte		ro		Currently active communication mode: 0x00 = SIO mode 0x10 = IO-Link Revision 1.0 (set by master) 0x11 = IO-Link Revision 1.1 (set by master)		
⊞ Counters										
140	0x008C	0	cc1	Vacuum-on counter	4 bytes	ro		Total number of suction cycles (stored all 300 cycles)		
141	0x008D	0	cc2	total time of suction	4 bytes	ro		total time of suction (unit sec.) (stored all 50 sec.)		
142	0x008E	0	cc3	Condition Monitoring counter	4 bytes	ro		Total number of warnings (stored all 50 sec.)		
143	0x008F	0	ct1	Vacuum-on counter	4 bytes	ro		Can be reset by System Command "Reset erasable counters"		

IO-Link Data Dictionary									
10.03.01.00314/ 10.03.01.00364 ECBPi									
		J. Schmalz GmbH Johannes-Schmalz-Str. 1, D 72293 Glatten T: +49 7443 2403-0 schmalz@schmalz.de							
144	0x0090	0	ct2	total time of suction	4 bytes		ro		Can be reset by System Command "Reset erasable counters"
145	0x0091	0	ct3	Condition Monitoring counter	4 bytes		ro		Can be reset by System Command "Reset erasable counters"
⊞ Diagnosis									
⊞ Device Status									
32	0x0020	0		Error Count	2 byte		ro	-	Errors since power-on or reset
36	0x0024	0		Device Status	1 byte		ro	-	0 = Device is operating properly (GN) 1 = Maintenance required (Yellow) 2 = Out of Spec (Yellow - Red) 3 = Functional check (Yellow - Red) 4 = Failure (red)
37	0x0025	0		Detailed Device Status	20*3byte		ro		Information about currently pending events (Event-List) Byte 1: 0x74 = error, 0xE4 = warning, 0xD4 = message Byte 2..3 = ID Event Code (see below)
138	0x008A	1		Extended Device Status - Type	1 byte		ro		Extended Device Status - Type (see below) 0x10: Device operation properly
138	0x008A	2		Extended Device Status - ID	2 byte		ro		Event Code of current device status (see table below)
139	0x008B	0		NFC Status	1 byte		ro		Result of recent NFC activity: 0x00: Data valid, write finished successfully 0x23: Write failed: Write access locked 0x30: Write failed: parameter(s) out of range 0x31: value greater then limit 0x32: value lesser then limit 0x41: Write failed: parameter set inconsistent 0xA1: Write failed: invalid authorisation 0xA2: NFC not available 0xA3: Write failed: invalid data structure 0xA5: Write pending 0xA6: NFC internal error
130	0x0082	0		Active error code	1 byte		ro		00 = No error Bit 0 = Elektronik error Bit 1 = Sensor Voltage to low Bit 2 = Sensor Voltage overrun Bit 3 = Actor Voltage to low Bit 4 = Actor Voltage overrun Bit 5 = Sensor Voltage less then 18V Bit 6 = Sensor calibration failed Bit 7 = reserved EEPROM
⊞ Condition Monitoring [CM]									
146.0	0x0092	0		Condition monitoring	1 Bit		ro		reserved
146.1	0x0092	0		Condition monitoring	1 Bit		ro		1 = Evacuation time t1 above limit [t-1] last cycle
146.2	0x0092	0		Condition monitoring	1 Bit		ro		1 = Leakage rate above limit [-L-] last cycle
146.3	0x0092	0		Condition monitoring	1 Bit		ro		1 = H1 not reached in suction cycle last cycle
146.4	0x0092	0		Condition monitoring	1 Bit		ro		1 = Free-flow vacuum > (H2-h2) but < H1 last cycle
146.5	0x0092	0		Condition monitoring	1 Bit		ro		1 = Primary voltage US outside of optimal range
146.6	0x0092	0		Condition monitoring	1 Bit		ro		1 = Actuator voltage UA outside of optimal range
146.7	0x0092	0		Condition monitoring	1 Bit		ro		Temperature over 50°C
⊞ Energy Monitoring [EM]									
157	0x009D			Energy consumption per cycle	2 bytes		ro		Energy consumption of last suction cycle (unit: 1 Ws)
⊞ Predictive Maintenance [PM]									
162	0x00A2	0		Quality (tightness)	1 byte		ro		Quality of last suction cycle (unit: 1 %)
163	0x00A3	0		Performance (flow)	1 byte		ro		Last measured performance level (unit: 1 %)

Event Codes of IO-Link Events and ISDU 138 (Extended Device Status)						
Event code		Event name	Event type	Extended Device Status -Type		Remark
dec	hex					
4096	0x1000	General malfunction	Error	0x81	Defect lower	E01: internal error
6144	0x1800	Calibration OK	Notification	-		Calibration offset 0 set successfully
6145	0x1801	Calibration failed	Notification	-		E03: Sensor calibration failed
35841	0x8C01	Simulation active	Warning	0x21	Warning lower	Manual Mode activ
20736	0x5100	General Power supply fault	Error	0x42	Critical Condition upper	E07:Primary supply Voltage US to low (21,6/18,8V)
20752	0x5110	Primary supply voltage overrun	Warning	0x42	Critical Condition upper	E17: Primary supply Voltage US to high (26,4/28V)
20754	0x5112	Actor voltage to low	Warning	0x42	Critical Condition upper	E05: Actor Voltage UA to low (21,6/18,8V)
6162	0x1812	Actor voltage overrun	Warning	0x42	Critical Condition upper	E15: Actor Voltage UA to high (26,4/ 28V)
6156	0x180C	CM:Primary voltage US outside of optimal range	Warning	0x22	Warning upper	Primary voltage US outside of optimal range
6157	0x180D	CM:Actor voltage UA outside of optimal range	Warning	0x22	Warning upper	Actor voltage UA outside of optimal range
16384	0x4000	CM: temperature out of range	Warning	0x22	Warning upper	temperature over 50°C
6152	0x1808	CM: Evacuation time t1 above limit [t-1]	Warning	0x21	Warning lower	Evacuation time t1 above limit [t-1]
6153	0x1809	CM: Leakage rate above limit [-L-]	Warning	0x21	Warning lower	Leakage rate above limit [-L-]
6154	0x180A	CM: H1 not reached in suction cycle	Warning	0x22	Warning upper	H1 not reached in suction cycle
6155	0x180B	CM: Free-flow vacuum > (H2-h2) but < H1	Warning	0x21	Warning lower	Free-flow vacuum > (H2-h2) but < H1
6161	0x1811	EEPROM Error	Error	0x81	Defect lower	wrong Data in EEPROM or EEPROM fault