ADDENDUM TO OPERATING INSTRUCTIONS

FLOWSIC600-XT

Interfaces:

Encoder
Modbus

SICK
Sensor Intelligence.

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Glossary

ATEX	Atmosphères Explosifs: Abbreviation for European directives related to safety in potentially explosive atmospheres
CSA	Canadian Standards Association (www.csa.ca)
DC	Direct Current
HF	High Frequency, e. g., HF pulses (high frequency pulses)
IEC	International Electronical Commission
IECEx	IEC system for certification in accordance with standards for devices for use in potentially explosive atmospheres
IP*xy*	Ingress Protection: Degree of protection of a device according to IEC/DIN EN 60529; *x* designates protection against contact and impurities, *y* protection against moisture.
LF	Low Frequency, e. g., LF pulses (low-frequency pulses)
MDR	Manufacturer Data Record
NAMUR	Abbreviation for "Normen-Arbeitsgemeinschaft für Mess- und Regeltechnik in der chemischen Industrie", now "Interessengemeinschaft Automatisierungstechnik der Prozessindustrie" (www.namur.de)

Warning Symbols


IMMEDIATE HAZARD
of severe injuries or death


Hazard (general)


Hazard by electrical voltage

Hazard in potentially explosive atmospheres


Hazard by explosive substances/mixtures


Hazard by unhealthy substances


Hazard by toxic substances

Warning Levels / Signal Words

DANGER
Risk or hazardous situation which will result in severe personal injury or death.

WARNING
Risk or hazardous situation which *could* result in severe personal injury or death.

CAUTION
Hazard or unsafe practice which *could* result in less severe or minor injuries.

NOTICE
Hazard which could result in property damage.

Information Symbols

Information on product condition with regard to protection against explosions (general)


Information on product characteristics related to European Directive ATEX

Information on product characteristics related to explosion protection in accordance with the IECEx scheme.


Important technical information for this product


Important information on electric or electronic functions


Nice to know


Supplementary information


Link referring to information at another place

FLOWSIC600-XT

1 Important Information

About this document
For your safety

1.1 About this document

This document supplements and is to be used only in combination with the Operating Instructions FLOWSIC600-XT.

1.2 For your Safety

NOTICE:

- ► Read the Operating Instructions carefully before using the FLOWSIC600-XT.
- ► Pay special attention to all safety instructions and warnings concerning assembly, installation and operation of the device!

FLOWSIC600-XT

2 Overview

Physical interfaces
Terminal assignment

2.1 Physical interfaces

FLOWSIC600-XT has 4 serial interfaces for communication:

- Interface 0

  Interface 0 (UART0) is an optically isolated interface for remote communication. For Ex-d IO, it can be addressed on the hardware side via the RS232 interface or RS485#1 on IF1. The RS232 interface has an activatable RTS/CTS handshake for complete support of modem connections. This interface supports communication protocols Modbus RTU and ASCII.

- Interface 1

  Interface 1 (UART1) is an optically isolated local interface. Communication via this interface is performed via the display using an optical head HIE-04 (USB) or HIE-03 (RS232). It is used exclusively for local communication for start-up or during service. The interface settings are fixed to 38400 baud, 8N1 and Modbus RTU. A firmware update can also be performed via this interface.

- Interface 2

  Interface 2 (UART2) is an optically isolated interface for remote communication. For Ex-d IO, it can be addressed on the hardware side on the IF2 circuit board, either alternatively via RS485#3, the analog output as HART slave or via the XPORT Ethernet module. Alternatively, it can provide the encoder protocol for Ex-d IO via the DO circuit board. The protocols supported are Modbus RTU / ASCII / TCP, encoder and HART slave.

- Interface 3

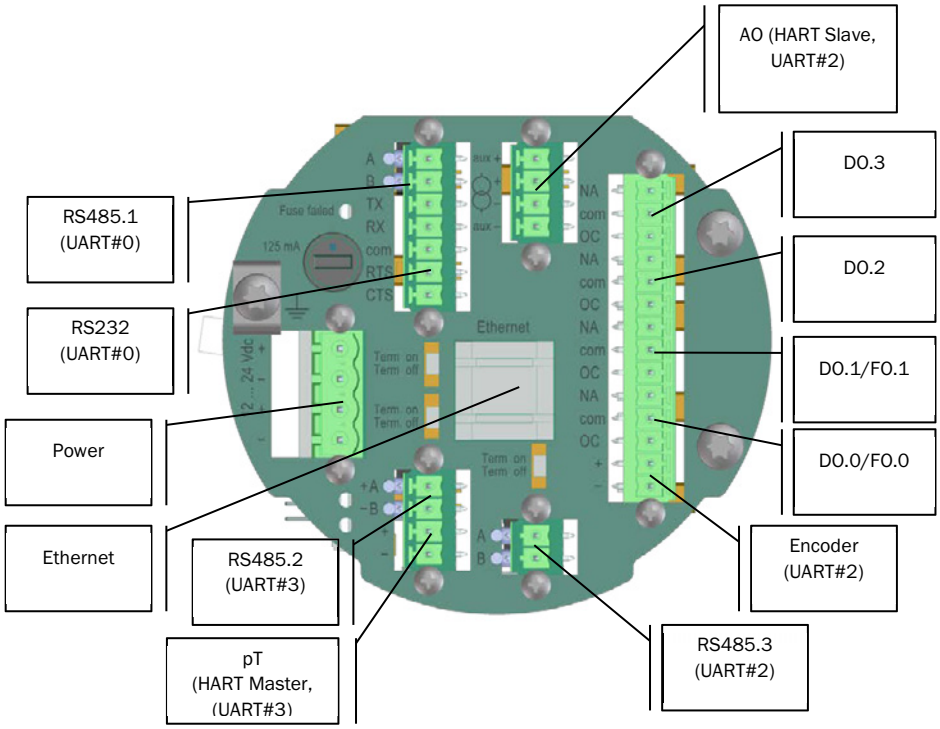
  Interface 3 (UART3) is an optically isolated interface for remote communication or for querying pressure and temperature sensors. For Ex-d IO, it can be addressed on the hardware side via RS485#2 or the HART master connection on the IF1 circuit board. The protocols supported are Modbus RTU / ASCII, HART-PT and Elgas-PT. For HART-PT, the pressure and temperature sensors with HART capability connected to the HART master interface on IF1 are queried. For Elgas-PT, the Elgas pressure and temperature sensors that are connected to the RS485#2 interface are queried. Details can be found in Section Pressure and temperature measurement.

2.2 Terminal assignment

Connection parameters, see Operating Instructions

Terminal assignment Ex-d terminal compartment

Fig. 1 Terminal assignment Ex-d terminal compartment



Terminal assignment Ex-e terminal compartment

Fig. 2 Terminal assignment Ex-e terminal compartment

Without Ethernet

Vdc +		1	13	OC.0	NAM.0
Vdc -		2	14	GND.0	
pT +	2A	3	15	OC.1	NAM.1
pT -	2B	4	16	GND.1	
aux +		5	17	OC.2	NAM.2
⌀ +		6	18	GND.2	
⌀ -		7	19	OC.3	NAM.3
aux -		8	20	GND.3	
3A	Enc +	9	21	1A	TX
3B	Enc -	10	22	1B	RX
CTS		11	23		COMM
RTS		*12*	24	n.c.	

With Ethernet

Vdc +		1	13	OC.0	NAM.0
Vdc -		2	14	GND.0	
pT +	2A	3	15	OC.1	NAM.1
pT -	2B	4	16	GND.1	
aux +		5	17	OC.2	NAM.2
⌀ +		6	18	GND.2	
⌀ -		7	19	OC.3	NAM.3
aux -		8	20	GND.3	
3A	Enc +	9	21	1A	TX
3B	Enc -	10	22	1B	RX
CTS		11	23		COMM
RTS		*12*	24	n.c.	

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3 Encoder

Activation
Configuration

3.1 Activation

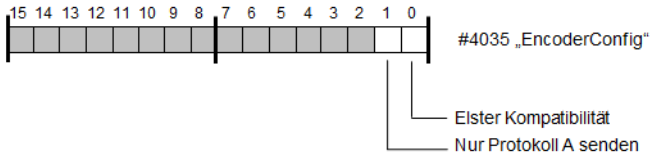
The encoder output is activated with the UART2 protocol setting to encoder. The other interface settings, such as baud rate (2400 baud) and bit configuration (7E1), are automatically set correctly.

3.2 Configuration

The encoder protocol is sent immediately after the request (application of supply voltage to the encoder terminals). The protocol is repeated in 0.5 s intervals when the supply voltage is maintained at the output. By default, the “standard protocol” (type A) is sent with the meter level. The “Device type protocol” (type B) with device information is sent once every 100 output protocols. The sent meter level is equivalent to the upper 8 significant digits of the total operating volume Voriginal (sum of forward and backward, each uninterrupted and interrupted).

Various further settings can be made with configuration register #4035 “EncoderConfig”. On the one hand, the Elster compatible encoder protocol can be activated. With this setting, the blockcheck character is transmitted inverted. On the other hand, the sporadic sending of protocol type B can be suppressed. The following figure shows the significance of the register:

Fig. 3 Configuration register #4035 “EncoderConfig”



FLOWSIC600-XT

4 Modbus

4.1 Overview

FLOWSIC600-XT supports MODBUS dialects RTU and ASCII. These can be set on most available interfaces. Additionally, a Uart2 MODBUS-TCP is available via an XPORT module. The additional settings are described in Section MODBUS-TCP.

For data transmission with the MODBUS protocol, different modes that realize compatibility with various deviating register interfaces are possible in addition to the standard register interface. Using service address 253, a device can always be addressed, irrespective of which Modbus address or which register setting are set.

4.2 Register setting “FL600-XT”

MODBUS has been implemented in accordance with the specification as per “modbus.org”. Commands “0x03 - Read Multiple Registers” and “0x10 - Write Multiple Registers” are fully supported. Other commands are not supported.

Access to the registers must always be made according to the register length of the register involved. Read or write access to parts of the register length are not allowed. Registers comprising more than 16-bit data define a register area that is not used by other registers. This means, in MODBUS addressing, a gap equivalent to the register size is always left. For example, a Float32 value with address *#4000* always has 2 registers (*#4000* and *#4001*). The next value can then be defined as from address *#4002*. A query to address *#4001* is not allowed.

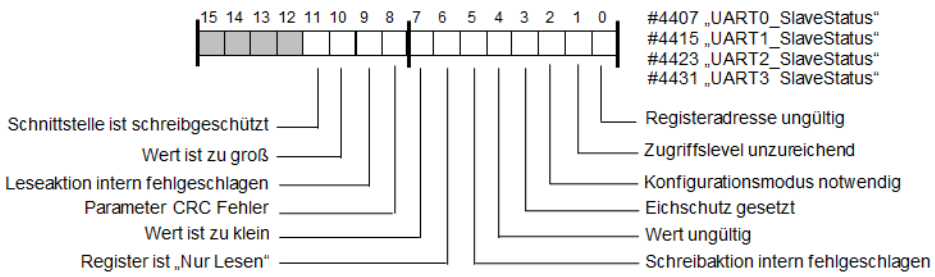
In accordance with the specification in modus.org, the protocol uses a “big-Endian” transmission, i.e. MSB-first is always transmitted. Only the transmission of data types of size 16 bits and 32 bits is defined in the specification.

However, data coding must be defined because large data types are also defined in FLOWSIC600-XT (fields, structures). For this purpose, the specification referred to above is extended so that also data types larger than 32 bits are always transmitted MSB-first. The data defined as register area (equivalent to a variable) are therefore transmitted complete as MSB-first irrespective of the underlying data types. With reference to an INTEL architecture, all data types are transmitted “inverted”.

The MODBUS address of FLOWSIC600-XT can be set to distinguish various devices during connection. This can be adjusted individually for each interface. In case of an error (e.g. transmission error or values to be written invalid), the MODBUS specification defines a reply telegram which does not allow adequate conclusions with regard to the error cause. For this reason, additional status registers were defined which reflect the error cause of the access made to the respective interface in detail. The contents of the specified registers reflect the result or the error cause of the last interface activity.

The following diagram shows the significance of the registers in detail:

Fig. 4 Status register



Register *#4400* "*Get_UART_ID*" was defined which returns the number of the physical device interface (0=UART0, 1=UART1, ..) when queried because the MODBUS master device (PC operating program or querying device) does not know the device interface it uses for communication.

A master mode can be activated for every interface where measured data with flow measuring rate are sent as Modbus RTU protocol.

4.3 Modbus TCP

With the protocol setting, Ethernet is available at UART2 as MODBUS-TCP via an XPORT module. The remaining interface parameters are automatically set to 57600, 8N1. The XPORT module must be configured accordingly.

The port address is fixed to 502 according to specification MODBUS-TCP. The values for IP address, Gateway and network mask can be set. AutoIP/DHCP is used when IP address 0.0.0.0 is set.

The following registers are available:

Reg.No.	Designation	Significance	Data type	Format
#4036	IPAddress	IP address	Uint32	aa.bb.cc.dd
#4038	Gateway	Gateway	Uint32	aa.bb.cc.dd
#4040	Netmask	Network mask	Uint32	aa.bb.cc.dd
#4042	MAC_Address	MAC address	Uint8[18]	Ansi string

The network parameters are saved in XPORT. In case of a change, they are first active after deactivation of the maintenance mode. For this purpose, the XPORT is reset for a short time and restarted; a possibly existing connection will be interrupted.

Modbus TCP protocol supports all characteristics named under “Modbus protocol”.

4.4 Register setting “Instance-F (DSFG)”

This mode provides connection to customer devices by means of the instance-F protocol of DSFG. The query range goes from register 32768 to register 33278 (256 32bit register). Modbus function 0x03 (Read-Multiple-Registers) is supported. All valid block queries in the area are answered. A zero is returned when a value is not defined or used.

When a Modbus query with service address 253 is set, it will be treated as if the FL600-XT standard register setting was set. This means that a connection with an operating program in point-to-point operation is also possible after switching the register setting.

FLOWSIC600-XT

5 Annex

5.1 Modbus registers FLOWSIC600-XT

Fig. 5 Block 1

Block 1						
Nr	**Gruppe**	**RegName**	**RegNr**	**Datentyp**	**Einheit SI**	**Einheit US**
1	Infodaten	Serial_Device	3118	uint32	-	-
2		Firmware_Version	3101	uint16	-	-
3		Firmware_CRC	3106	uint32	-	-
4		MetrologyCRC	3255	uint16	-	-
5		Parameter_CRC_ID	3251	uint16	-	-
6		Parameter_CRC_Sensor	3252	uint16	-	-
7		Parameter_CRC_Adjust	3253	uint16	-	-
8		Parameter_CRC_User	3254	uint16	-	-
9		PathNumber	7513	uint16	-	-
10		Impulse_Factor	4009	IEEE-Float	Imp/m³	Imp/ft³
11		AdjustQt	7707	IEEE-Float	m³/h(1)	ft³/h(1)
12	Betriebswerte	Flowrate	9388	IEEE-Float	m³/h(1)	ft³/h(1)
13		EVC_NormFlow	4683	IEEE-Float	m³/h(1)	ft³/h(1)
14		VelocityOfGas	9390	IEEE-Float	m/s	ft/s
15		SpeedOfSound	9392	IEEE-Float	m/s	ft/s
16		Pressure_Act	4725	IEEE-Float	bar(a)(2)	psi(a)(2)
17		Temperature_Act	4728	IEEE-Float	°C(3)	°F(3)
18		GlobalStatus	3200	uint16	-	-
19		ActualStatus	3201	uint32	-	-
20		SummaryStatus	3203	uint32	-	-
21		RTC_Date	4300	uint32	ddmmyyyy(4)	ddmmyyyy(4)
22		RTC_Time	4302	uint32	hhmmss	hhmmss
23		Impulse_Frequency	4016	sint16	Hz	Hz
24	Betriebsvolumina	TotalizerResolution	4503	sint16	-	-
25		ForwardVolume	4504	uint32	m³	ft³
26		ReverseVolume	4506	uint32	m³	ft³
27		ForwardVolumeErr	4508	uint32	m³	ft³
28		ReverseVolumeErr	4510	uint32	m³	ft³
29		ForwardVolumeTotal	4512	uint32	m³	ft³
30		ReverseVolumeTotal	4514	uint32	m³	ft³
31	Externe Live-Werte	Pressure_Extern	4733	IEEE-Float	bar(a)(2)	psi(a)(2)
32		Temperature_Extern	4735	IEEE-Float	°C(3)	°F(3)
33		SOSTheoretic	4737	IEEE-Float	m/s	ft/s
34		Compress_Extern	4739	IEEE-Float	-	-
35	Pfad-VOG	VOG 1-1	9405	IEEE-Float	m/s	ft/s
36		VOG 1-2	9431	IEEE-Float	m/s	ft/s
37		VOG 1-3	9457	IEEE-Float	m/s	ft/s
38		VOG 1-4	9483	IEEE-Float	m/s	ft/s
39		VOG 2-1	9509	IEEE-Float	m/s	ft/s
40		VOG 2-2	9535	IEEE-Float	m/s	ft/s
41		VOG 2-3	9561	IEEE-Float	m/s	ft/s
42		VOG 2-4	9587	IEEE-Float	m/s	ft/s
43	Pfad-SOS	SOS 1-1	9407	IEEE-Float	m/s	ft/s
44		SOS 1-2	9433	IEEE-Float	m/s	ft/s
45		SOS 1-3	9459	IEEE-Float	m/s	ft/s
46		SOS 1-4	9485	IEEE-Float	m/s	ft/s
47		SOS 2-1	9511	IEEE-Float	m/s	ft/s
48		SOS 2-2	9537	IEEE-Float	m/s	ft/s
49		SOS 2-3	9563	IEEE-Float	m/s	ft/s
50		SOS 2-4	9589	IEEE-Float	m/s	ft/s

(1) weitere Einstellmöglichkeit mit Flowunit (m³/h, ft³/h, m³/d, ft³/d, l/min)
(2) weitere Einstellmöglichkeit mit PressUnit (bar,psi,kPa,Mpa,kg/cm²) und Presstype (absolute, relative)
(3) weitere Einstellmöglichkeit mit TempUnit (°C,°F,K,R)
(4) weitere Einstellmöglichkeit mit DateTimeFormat (ddmmyyyy, mmddyyyy)

Fig. 6 Block 2

Block 2						
Nr	**Gruppe**	**Wert**	**RegNr**	**Datentyp**	**Einheit SI**	**Einheit US**
1	Pfad-Performance	Performance 1-1	9409	uint16	%	%
2		Performance 1-2	9435	uint16	%	%
3		Performance 1-3	9461	uint16	%	%
4		Performance 1-4	9487	uint16	%	%
5		Performance 2-1	9513	uint16	%	%
6		Performance 2-2	9539	uint16	%	%
7		Performance 2-3	9565	uint16	%	%
8		Performance 2-4	9591	uint16	%	%
9	Pfad-Status	PathStatus 1-1	9410	uint16	-	-
10		PathStatus 1-2	9436	uint16	-	-
11		PathStatus 1-3	9462	uint16	-	-
12		PathStatus 1-4	9488	uint16	-	-
13		PathStatus 2-1	9514	uint16	-	-
14		PathStatus 2-2	9540	uint16	-	-
15		PathStatus 2-3	9566	uint16	-	-
16		PathStatus 2-4	9592	uint16	-	-
17	Pfad-SNR	SNR 1-1 AB	9425	IEEE-Float	dB	dB
18		SNR 1-1 BA	9426	IEEE-Float	dB	dB
19		SNR 1-2 AB	9451	IEEE-Float	dB	dB
20		SNR 1-2 BA	9452	IEEE-Float	dB	dB
21		SNR 1-3 AB	9477	IEEE-Float	dB	dB
22		SNR 1-3 BA	9478	IEEE-Float	dB	dB
23		SNR 1-4 AB	9503	IEEE-Float	dB	dB
24		SNR 1-4 BA	9504	IEEE-Float	dB	dB
25		SNR 2-1 AB	9529	IEEE-Float	dB	dB
26		SNR 2-1 BA	9530	IEEE-Float	dB	dB
27		SNR 2-2 AB	9555	IEEE-Float	dB	dB
28		SNR 2-2 BA	9556	IEEE-Float	dB	dB
29		SNR 2-3 AB	9581	IEEE-Float	dB	dB
30		SNR 2-3 BA	9582	IEEE-Float	dB	dB
31		SNR 2-4 AB	9607	IEEE-Float	dB	dB
32		SNR 2-4 BA	9608	IEEE-Float	dB	dB
33	Pfad-AGC	AGC 1-1 AB	9427	IEEE-Float	dB	dB
34		AGC 1-1 BA	9428	IEEE-Float	dB	dB
35		AGC 1-2 AB	9453	IEEE-Float	dB	dB
36		AGC 1-2 BA	9454	IEEE-Float	dB	dB
37		AGC 1-3 AB	9479	IEEE-Float	dB	dB
38		AGC 1-3 BA	9480	IEEE-Float	dB	dB
39		AGC 1-4 AB	9505	IEEE-Float	dB	dB
40		AGC 1-4 BA	9506	IEEE-Float	dB	dB
41		AGC 2-1 AB	9531	IEEE-Float	dB	dB
42		AGC 2-1 BA	9532	IEEE-Float	dB	dB
43		AGC 2-2 AB	9557	IEEE-Float	dB	dB
44		AGC 2-2 BA	9558	IEEE-Float	dB	dB
45		AGC 2-3 AB	9583	IEEE-Float	dB	dB
46		AGC 2-3 BA	9584	IEEE-Float	dB	dB
47		AGC 2-4 AB	9609	IEEE-Float	dB	dB
48		AGC 2-4 BA	9610	IEEE-Float	dB	dB
49	Diagnoseübersicht	WarningActivationMask	6814	uint32	-	-
50		DiagStatus	6800	uint32	-	-

5.2 Register setting “Instance-F (DSFG)

Fig. 7 Supprted registers

MODBUS data structure, based on document gasinfo_07.xls, DSfG specification of data instance F "flow meter"					**Modbus register addresses FL600XT**
Address (hex / dez)	**Type**	**Name**	**Access**	**Description**	register #
		path independent values (actual)			
8000 / 32768	**float**	**flow rate (pos. FR1, neg. FR2)**		[m3/h]	#9388
8002 / 32770	**float**	**Velocity of Gas (pos. FR1, neg. FR2)**		[m/s]	#9390
8004 / 32772	**float**	**Speed of Sound**		[m/s]	#9392
8006 / 32774	**dword**	**gas volume counter total FR1 (V_total_r1=Vact_r1+Vact_err_r1)**		[m3]	#4512
8008 /32776	**dword**	**gas volume counter total FR2 (V_total_r2=Vact_r2+Vact_err_r2)**		[m3]	#4514
800A / 32778	**dword**	**gas volume counter FR1 (Vact_r1)**		[m3]	#4504
800C / 32780	**dword**	**gas volume counter FR2 (Vact_r2)**		[m3]	#4506
800E / 32782	**dword**	**error gas volume counter FR1 (Vact_err_r1)**		[m3]	#4508
8010 / 32784	**dword**	**error gas volume counter FR2 (Vact_err_r2)**		[m3]	#4510
8012 / 32786	**dword**	**counter resolution**		decimal power of the least significient digit (admissable value -3,-2, -1, 0, 1, 2, 3)	#4503
8014 / 32788	**dword**	**flow rate greater than Qt**		0=no, uneven 0 = yes	abs(#9388)>#7707
8016 / 32790	**dword**	**signal acceptance**		"traffic light": 0..33 = red, 34..66 = yellow, 67..100 = green [1]	0 = keine Messung möglich 33 = nicht kompensierbarer Pfadausfall 66 = kompensierbarer Pfadausfal 100 = Alle Pfade messfähig
8018 / 32792	**dword**	**error status**		0=no, not equal 0 = yes	Bit 0x0001 in #3200 nicht gesetzt (Measure invalid)
801A / 32794	**dword**	**number of paths**			Anzahl der Messpfade
801C / 32796	**float**	**deviation speed of sound path 1**		[%] c_1_dev = (c_1-c)/c*100	(#9407 / #9392 -1)*100
801E / 32798	**float**	**deviation speed of sound path 2**		[%] c_2_dev = (c_2-c)/c*100	(#9433 / #9392 -1)*100
8020 / 32800	**float**	**deviation speed of sound path 3**		[%] c_3_dev = (c_3-c)/c*100	(#9459 / #9392 -1)*100
8022 / 32802	**float**	**deviation speed of sound path 4**		[%] c_4_dev = (c_4-c)/c*100	(#9485 / #9392 -1)*100
8024 / 32804	**float**	**deviation speed of sound path 5**		[%] c_5_dev = (c_5-c)/c*100	(#9511 / #9392 -1)*100
8026 / 32806	**float**	**deviation speed of sound path 6**		[%] c_6_dev = (c_6-c)/c*100	(#9537 / #9392 -1)*100
8028 / 32808	**float**	**deviation speed of sound path 7**		[%] c_7_dev = (c_7-c)/c*100	(#9563 / #9392 -1)*100
802A / 32810	**float**	**deviation speed of sound path 8**		[%] c_8_dev = (c_8-c)/c*100	(#9589 / #9392 -1)*100
802C / 32812		**reserved for additional paths and optional data set**			0
807D / 32814		**signature**			0
		path related values path 1 (actual)			
8080 / 32896	**float**	**velocity of the acoustic path**		[m/s]	#9405
8082 / 32898	**float**	**speed of sound**		[m/s]	#9407
8084 / 32900	**float**	**signal acceptance rate**		[%]	#9409
8086 / 32902	**float**	**signal to noise ratio (SNR) AB**		[dB]	#9425 / 100
8088 / 32904	**float**	**signal to noise ratio (SNR) BA**		[dB]	#9426 / 100
808A / 32906	**float**	**signal gain (AGC) AB**		[dB]	#9427 / 100
808C / 32908	**float**	**signal gain (AGC) BA**		[dB]	#9428 / 100
808E / 32910	**float**	**reserved, always = 0**			0
		path related values path 2 (actual)			
8090 / 32912	**float**	**velocity of the acoustic path**		[m/s]	#9431
8092 / 32914	**float**	**speed of sound**		[m/s]	#9433
8094 / 32916	**float**	**signal acceptance rate**		[%]	#9435
8096 / 32918	**float**	**signal to noise ratio (SNR) AB**		[dB]	#9451 / 100
8098 / 32920	**float**	**signal to noise ratio (SNR) BA**		[dB]	#9452 / 100
8099 / 32922	**float**	**signal gain (AGC) AB**		[dB]	#9453 / 100
809C / 32924	**float**	**signal gain (AGC) BA**		[dB]	#9454 / 100
809E / 32926	**float**	**reserved, always = 0**			0
		path related values path 3 (actual)			
80A0 / 32928	**float**	**velocity of the acoustic path**		[m/s]	#9457
80A2 / 32930	**float**	**speed of sound**		[m/s]	#9459
80A4 / 32932	**float**	**signal acceptance rate**		[%]	#9461
80A6 / 32934	**float**	**signal to noise ratio (SNR) AB**		[dB]	#9462 / 100
80A8 / 32936	**float**	**signal to noise ratio (SNR) BA**		[dB]	#9463 / 100
80AA / 32938	**float**	**signal gain (AGC) AB**		[dB]	#9464 / 100
80AC / 32940	**float**	**signal gain (AGC) BA**		[dB]	#9465 / 100
80AE / 32942	**float**	**reserved, always = 0**			0

Fig. 8 Supported regisers (page 2)

		path related values path 4 (actual)			
80B0 / 32944	**float**	**velocity of the acoustic path**		[m/s]	#9483
80B2 /32946	**float**	**speed of sound**		[m/s]	#9485
80B4 / 32948	**float**	**signal acceptance rate**		[%]	#9487
80B6 / 32950	**float**	**signal to noise ratio (SNR) AB**		[dB]	#9488 / 100
80B8 / 32952	**float**	**signal to noise ratio (SNR) BA**		[dB]	#9489 / 100
80BA / 32954	**float**	**signal gain (AGC) AB**		[dB]	#9490 / 100
80BC / 32956	**float**	**signal gain (AGC) BA**		[dB]	#9491 / 100
80BE / 32958	**float**	**reserved, always = 0**			0
		path related values path 5 (actual)			
80C0 / 32960	**float**	**velocity of the acoustic path**		[m/s]	#9509
80C2 / 32962	**float**	**speed of sound**		[m/s]	#9511
80C4 / 32964	**float**	**signal acceptance rate**		[%]	#9513
80C6 / 32966	**float**	**signal to noise ratio (SNR) AB**		[dB]	#9514 / 100
80C8 / 32968	**float**	**signal to noise ratio (SNR) BA**		[dB]	#9515 / 100
80CA / 32970	**float**	**signal gain (AGC) AB**		[dB]	#9516 / 100
80CC / 32972	**float**	**signal gain (AGC) BA**		[dB]	#9517 / 100
80CE / 32974	**float**	**reserved, always = 0**			0
		path related values path 6 (actual)			
80D0 / 32976	**float**	**velocity of the acoustic path**		[m/s]	#9535
80D2 / 32978	**float**	**speed of sound**		[m/s]	#9537
80D4 / 32980	**float**	**signal acceptance rate**		[%]	#9539
80D6 / 32982	**float**	**signal to noise ratio (SNR) AB**		[dB]	#9540 / 100
80D8 / 32984	**float**	**signal to noise ratio (SNR) BA**		[dB]	#9541 / 100
80D9 / 32986	**float**	**signal gain (AGC) AB**		[dB]	#9542 / 100
80DC / 32988	**float**	**signal gain (AGC) BA**		[dB]	#9543 / 100
80DE / 32990	**float**	**reserved, always = 0**			0
		path related values path 7 (actual)			
80E0 / 32992	**float**	**velocity of the acoustic path**		[m/s]	#9561
80E2 / 32994	**float**	**speed of sound**		[m/s]	#9563
80E4 / 32996	**float**	**signal acceptance rate**		[%]	#9565
80E6 / 32998	**float**	**signal to noise ratio (SNR) AB**		[dB]	#9566 / 100
80E8 / 33000	**float**	**signal to noise ratio (SNR) BA**		[dB]	#9567 / 100
80EA / 33002	**float**	**signal gain (AGC) AB**		[dB]	#9568 / 100
80EC / 33004	**float**	**signal gain (AGC) BA**		[dB]	#9569 / 100
80EE / 33006	**float**	**reserved, always = 0**			0
		path related values path 8 (actual)			
80F0 / 33008	**float**	**velocity of the acoustic path**		[m/s]	#9587
80F2 / 33010	**float**	**speed of sound**		[m/s]	#9589
80F4 / 33012	**float**	**signal acceptance rate**		[%]	#9591
80F6 / 33014	**float**	**signal to noise ratio (SNR) AB**		[dB]	#9592 / 100
80F8 / 33016	**float**	**signal to noise ratio (SNR) BA**		[dB]	#9593 / 100
80FA / 33018	**float**	**signal gain (AGC) AB**		[dB]	#9594 / 100
80FC / 33020	**float**	**signal gain (AGC) BA**		[dB]	#9595 / 100
80FE / 33022	**float**	**reserved, always = 0**			0
8100 / 33024		**reserved for additional paths**			0
81FE / 33278					0

[1] Signal acceptance rate:
A single value, manufactorer specific calculated from all individual signal acceptance rate per path and normalized.
The normalized value represents manufacturer independend a value between 0 and 100. Zero represents maximum worse and 100 represents maximum good. Values outside of this specified range are not allowed.
For signal acceptance rate values between 0 and 33, the value of register "error state" is not 0.

Modbus arrangements:
Modbus implementation according to:
http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf
http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf
protocol variant RTU
factory default 9600 baud, optional 19200, 38400
all register 16 Bit long, always two registers used for one data element
MSbyte first, MSword first
Measuring values in 32 Bit float according IEEE754
Integer values except counter values as 32bit Integer with sign
counter values in 32 Bit dword, overrun 9-stellig dezimal, also von 9 9999 9999 nach 0
Alle Register für Werte nicht vorhandener Pfade dürfen fehlen

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