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 RS485#1 on IF1. 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, 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 and encoder.

- 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 and HART-PT. For HART-PT, the pressure and temperature sensors with HART capability connected to the HART master interface on IF1 are queried.

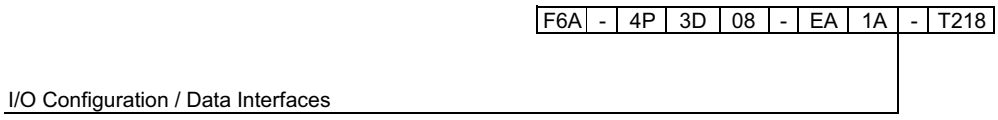
NOTICE:

- ► The physical interfaces are available for all electronics versions (Ex-d, Ex-e, Ex-i).
- ► Ethernet ist not available for intrinsically safe version of electronics (Ex-i).

Available interface configurations

The interface configuration can be identified in the model name which is located on the type plate:

Fig. 1 Model name (example)



► For a complete description of the model name refer to Operating Instructions FLOWSIC600-XT, § 9.6 „Model Name“.

Table 1 Available Interface configurations

Model Name Code	DO.0 Status Output 1	DO.1 Status Output 2	FO.2 Pulse Output 1	FO.3 Pulse Output 2	RS485.1	RS485.2	RS485.3	Ethernet	AO Analog Output	Encoder	HART p/T Module
Intrinsically Safe Versions (Ex i)											
1A	x	x	x	x	x	x	x				
1J	x	x	x	x	x	x				x	
2A	x	x	x	x	x		x				x
Flameproof / Increased Safety Version (Ex d / e)											
1B	x	x	x	x	x	x	x		x		
1D	x	x	x	x	x	x			x	x	
1E	x	x	x	x	x	x		x	x		
2B	x	x	x	x	x				x		x
2D	x	x	x	x	x				x	x	x
2E	x	x	x	x	x			x	x		x

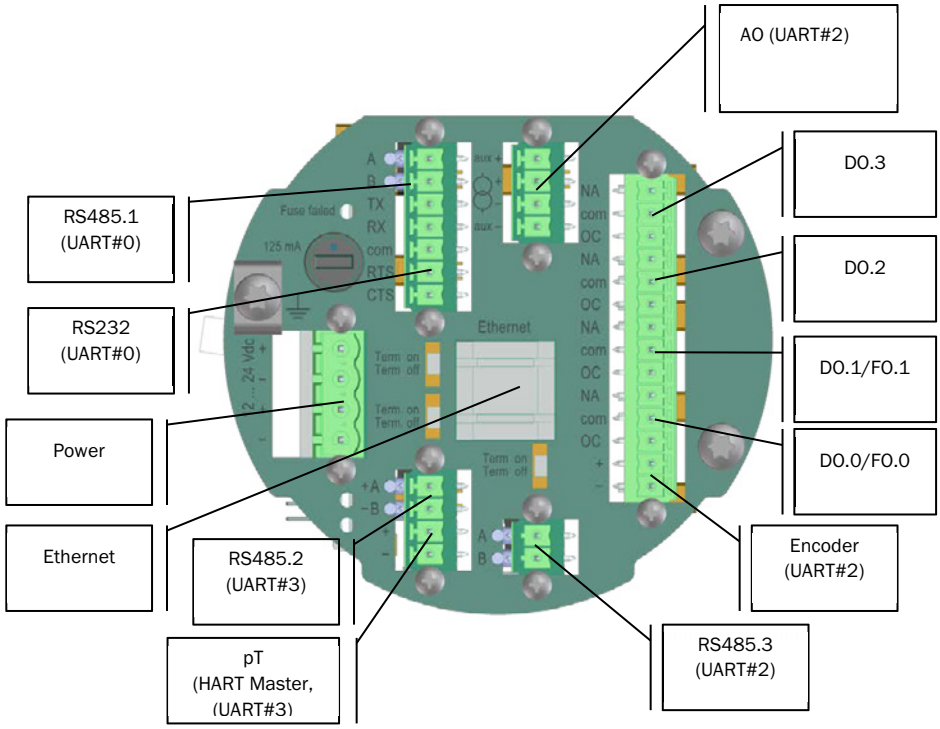
2.2 Terminal assignment

2.2.1 Terminal assignment Ex-d and Ex-e terminal compartment

Connection parameters, see Operating Instructions FLOWSIC600-XT, § 3 „Connection parameters of inputs and outputs“.

Terminal assignment Ex-d terminal compartment

Fig. 2 Terminal assignment Ex-d terminal compartment



Terminal assignment Ex-e terminal compartment

NOTICE:
With Ex-e wiring, the Ex-d inputs and outputs run through a line duct to the Ex-e terminals in the Ex-e terminal compartment.

Fig. 3 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

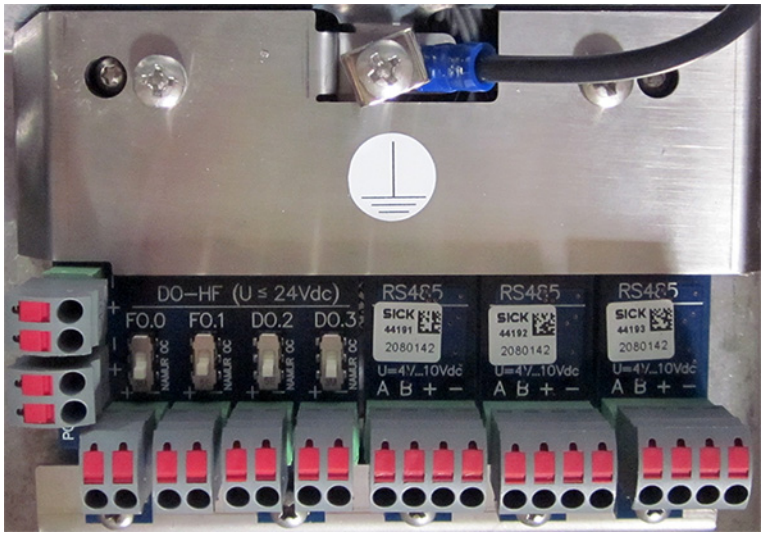
Vdc +		1	13	OC.0	NAM.0
Vdc -		2	14	GND.0	
pT +	2A	3	15	OC.1	NAM.1
pT -	2B	4	16	GND.1	
aux +		5	17	OC.2	NAM.2
⨀ +		6	18	GND.2	
⨀ -		7	19	OC.3	NAM.3
aux -		8	20	GND.3	
3A	Enc +	9	21	1A	TX
3B	Enc -	10	22	1B	RX
CTS		11	23		COMM
RTS		*12*	24	n.c.	

2.2.2 Terminal assignment Ex-i terminal compartment

Safety-relevant parameters for Ex-i installation, see Operating Instructions FLOWSIC600-XT, §9.1 for installation according to ATEX/IECEx and §9.2 for installation according to CSA .

Connections in the Ex-i terminal compartment are labelled corresponding to the input/ output configuration selected.

Fig. 4 Terminal assignment Ex-i terminal compartment (example Model name code: 1A)



► For wiring examples for Ex-i terminal assignment, please refer to Operating Instructions FLOWSIC600-XT, § 9.3 „Wiring Examples“.

FLOWSIC600-XT

3 Encoder

Activation
Configuration

3.1 Activation

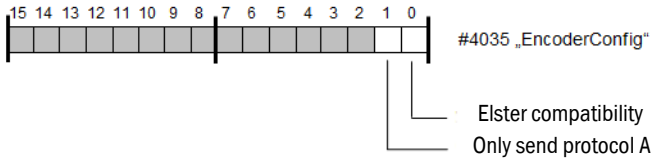
The encoder output is activated with the UART2 protocol setting to encoder. The other interface settings, such as baud rate (2400 baud) and bit configuration (7E1), are automatically set correctly.

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. 5 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.

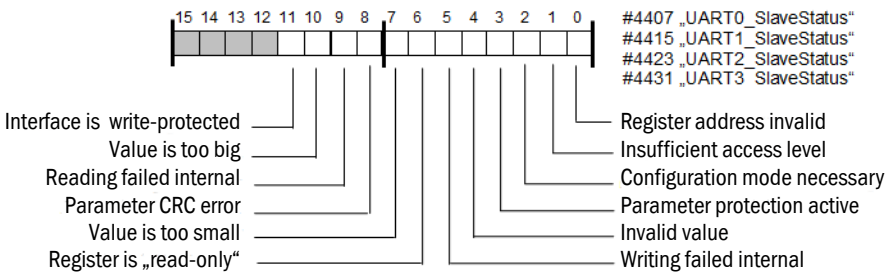
In accordance with the specification in modus.org, the protocol uses a “big-Endian” transmission, i.e. MSB-first is always transmitted. Only the transmission of data types of size 16 bits and 32 bits is defined in the specification.

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. 6 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

Modbus registers FLOWSIC600-XT
Register setting “Instance-F (DSFG)“

5.1 Modbus registers FLOWSIC600-XT

Fig. 7 Block 1

Block 1							
No	**Address**	**Group**	**RegName**	**RegNo**	**Data type**	**Unit SI**	**Unit US**
1	1000	Info data	Serial_Device	3118	uint32	-	-
2	1002		Firmware_Version	3101	uint16	-	-
3	1003		Firmware_CRC	3106	uint32	-	-
4	1005		MetrologyCRC	3255	uint16	-	-
5	1006		Parameter_CRC_ID	3251	uint16	-	-
6	1007		Parameter_CRC_Sensor	3252	uint16	-	-
7	1008		Parameter_CRC_Adjust	3253	uint16	-	-
8	1009		Parameter_CRC_User	3254	uint16	-	-
9	1010		PathNumber	7513	uint16	-	-
10	1011		Impulse_Factor	4009	float32	Imp/m³	Imp/ft³
11	1013		AdjustQt	7707	float32	m³/h(1)	ft³/h(1)
12	1015	Operation parameters	Flowrate	9388	float32	m³/h(1)	ft³/h(1)
13	1017		EVC_NormFlow	4683	float32	m³/h(1)	ft³/h(1)
14	1019		VelocityOfGas	9390	float32	m/s	ft/s
15	1021		SpeedOfSound	9392	float32	m/s	ft/s
16	1023		Pressure_Act	4725	float32	bar(a)(2)	psi(a)(2)
17	1025		Temperature_Act	4730	float32	°C(3)	°F(3)
18	1027		GlobalStatus	3200	uint16	-	-
19	1028		ActualStatus	3201	uint32	-	-
20	1030		SummaryStatus	3203	uint32	-	-
21	1032		RTC_Date	4300	uint32	ddmmyyyy(4)	ddmmyyyy(4)
22	1034		RTC_Time	4302	uint32	hhmmss	hhmmss
23	1036		Impulse_Frequency	4016	sint16	Hz	Hz
24	1037	Volumes at operating conditions	TotalizerResolution	4386	sint16	-	-
25	1038		ForwardVolume	4387	uint32	m³	ft³
26	1040		ReverseVolume	4389	uint32	m³	ft³
27	1042		ForwardVolumeErr	4391	uint32	m³	ft³
28	1044		ReverseVolumeErr	4393	uint32	m³	ft³
29	1046		ForwardVolumeTotal	4395	uint32	m³	ft³
30	1048		ReverseVolumeTotal	4397	uint32	m³	ft³
31	1050	External live values	Pressure_Extern	4733	float32	bar(a)(2)	psi(a)(2)
32	1052		Temperature_Extern	4735	float32	°C(3)	°F(3)
33	1054		SOSTheoretic	4737	float32	m/s	ft/s
34	1056		Compress_Extern	4739	float32	-	-
35	1058	Path VOG	VOG 1-1	9405	float32	m/s	ft/s
36	1060		VOG 1-2	9431	float32	m/s	ft/s
37	1062		VOG 1-3	9457	float32	m/s	ft/s
38	1064		VOG 1-4	9483	float32	m/s	ft/s
39	1066		VOG 2-1	9509	float32	m/s	ft/s
40	1068		VOG 2-2	9535	float32	m/s	ft/s
41	1070		VOG 2-3	9561	float32	m/s	ft/s
42	1072		VOG 2-4	9587	float32	m/s	ft/s
43	1074	Path SOS	SOS 1-1	9407	float32	m/s	ft/s
44	1076		SOS 1-2	9433	float32	m/s	ft/s
45	1078		SOS 1-3	9459	float32	m/s	ft/s
46	1080		SOS 1-4	9485	float32	m/s	ft/s
47	1082		SOS 2-1	9511	float32	m/s	ft/s
48	1084		SOS 2-2	9537	float32	m/s	ft/s
49	1086		SOS 2-3	9563	float32	m/s	ft/s
50	1088		SOS 2-4	9589	float32	m/s	ft/s

(1) further setting options with Flowunit (m³/h, ft³/h, m³/d, ft³/d, l/min)
(2) further setting options with PressUnit (bar,psi,kPa,Mpa,kg/cm²) and Presstype (absolute, relative)
(3) further setting options with TempUnit (°C,°F,K,R)
(4) further setting options with DateTimeFormat (ddmmyyyy, mmddyyyy)

Fig. 8 Block 2

Block 2							
No	**Address**	**Group**	**RegName**	**RegNo**	**Data type**	**Unit SI**	**Unit US**
1	1500	Path performance	AcceptanceRate 1-1	9409	uint16	%	%
2	1501		AcceptanceRate 1-2	9435	uint16	%	%
3	1502		AcceptanceRate 1-3	9461	uint16	%	%
4	1503		AcceptanceRate 1-4	9487	uint16	%	%
5	1504		AcceptanceRate 2-1	9513	uint16	%	%
6	1505		AcceptanceRate 2-2	9539	uint16	%	%
7	1506		AcceptanceRate 2-3	9565	uint16	%	%
8	1507		AcceptanceRate 2-4	9591	uint16	%	%
9	1508	Path status	PathStatus 1-1	9410	uint16	-	-
10	1509		PathStatus 1-2	9436	uint16	-	-
11	1510		PathStatus 1-3	9462	uint16	-	-
12	1511		PathStatus 1-4	9488	uint16	-	-
13	1512		PathStatus 2-1	9514	uint16	-	-
14	1513		PathStatus 2-2	9540	uint16	-	-
15	1514		PathStatus 2-3	9566	uint16	-	-
16	1515		PathStatus 2-4	9592	uint16	-	-
17	1516	Path SNR	SNR 1-1 AB	9425	float32	dB	dB
18	1518		SNR 1-1 BA	9426	float32	dB	dB
19	1520		SNR 1-2 AB	9451	float32	dB	dB
20	1522		SNR 1-2 BA	9452	float32	dB	dB
21	1524		SNR 1-3 AB	9477	float32	dB	dB
22	1526		SNR 1-3 BA	9478	float32	dB	dB
23	1528		SNR 1-4 AB	9503	float32	dB	dB
24	1530		SNR 1-4 BA	9504	float32	dB	dB
25	1532		SNR 2-1 AB	9529	float32	dB	dB
26	1534		SNR 2-1 BA	9530	float32	dB	dB
27	1536		SNR 2-2 AB	9555	float32	dB	dB
28	1538		SNR 2-2 BA	9556	float32	dB	dB
29	1540		SNR 2-3 AB	9581	float32	dB	dB
30	1542		SNR 2-3 BA	9582	float32	dB	dB
31	1544		SNR 2-4 AB	9607	float32	dB	dB
32	1546		SNR 2-4 BA	9608	float32	dB	dB
33	1548	Path AGC	AGC 1-1 AB	9427	float32	dB	dB
34	1550		AGC 1-1 BA	9428	float32	dB	dB
35	1552		AGC 1-2 AB	9453	float32	dB	dB
36	1554		AGC 1-2 BA	9454	float32	dB	dB
37	1556		AGC 1-3 AB	9479	float32	dB	dB
38	1558		AGC 1-3 BA	9480	float32	dB	dB
39	1560		AGC 1-4 AB	9505	float32	dB	dB
40	1562		AGC 1-4 BA	9506	float32	dB	dB
41	1564		AGC 2-1 AB	9531	float32	dB	dB
42	1566		AGC 2-1 BA	9532	float32	dB	dB
43	1568		AGC 2-2 AB	9557	float32	dB	dB
44	1570		AGC 2-2 BA	9558	float32	dB	dB
45	1572		AGC 2-3 AB	9583	float32	dB	dB
46	1574		AGC 2-3 BA	9584	float32	dB	dB
47	1576		AGC 2-4 AB	9609	float32	dB	dB
48	1578		AGC 2-4 BA	9610	float32	dB	dB
49	1580	Diagnosis overview	WarningActivationMask	6814	uint32	-	-
50	1582		DiagStatus	6800	uint32	-	-

5.2 Register setting “Instance-F (DSFG)“

Fig. 9 Supported registers (page 1)

Address (hex / dez)	Typ	Name	Description	Calculation / REG
		path independent values (actual)		
8000 / 32768	float32	flow rate (pos. FR1, neg. FR2)	[m3/h]	#9388
8002 / 32770	float32	Velocity of Gas (pos. FR1, neg. FR2)	[m/s]	#9390
8004 / 32772	float32	Speed of Sound	[m/s]	#9392
8006 / 32774	uint32	gas volume counter total FR1 (V_total_r1=Vact_r1+Vact_err_r1)	[m3]	#4512
8008 /32776	uint32	gas volume counter total FR2 (V_total_r2=Vact_r2+Vact_err_r2)	[m3]	#4514
800A / 32778	uint32	gas volume counter FR1 (Vact_r1)	[m3]	#4504
800C / 32780	uint32	gas volume counter FR2 (Vact_r2)	[m3]	#4506
800E / 32782	uint32	error gas volume counter FR1 (Vact_err_r1)	[m3]	#4508
8010 / 32784	uint32	error gas volume counter FR2 (Vact_err_r2)	[m3]	#4510
8012 / 32786	sint32	counter resolution	decimal power of the least significient digit (admissable value -3,-2, -1, 0, 1, 2, 3)	#4503
8014 / 32788	sint32	flow rate greater than Qt	0=no, uneven 0 = yes	abs(#9388)>#7707
8016 / 32790	sint32	signal acceptance	"traffic light": 0..33 = red, 34..66 = yellow, 67..100 = green [1]	0 = no measurement possible 33 = path failure - no compensation possible 66 = path failure - compensation possible 100 = all paths capable to measure
8018 / 32792	sint32	error status	0=no, not equal 0 = yes	Bit 0x0001 in #3200 not set (Measure invalid)
801A / 32794	sint32	number of paths		Anzahl der Messpfade
801C / 32796	float32	deviation speed of sound path 1	[%] c_1_dev = (c_1-c)/c*100	(#9407 / #9392 -1)*100
801E / 32798	float32	deviation speed of sound path 2	[%] c_2_dev = (c_2-c)/c*100	(#9433 / #9392 -1)*100
8020 / 32800	float32	deviation speed of sound path 3	[%] c_3_dev = (c_3-c)/c*100	(#9459 / #9392 -1)*100
8022 / 32802	float32	deviation speed of sound path 4	[%] c_4_dev = (c_4-c)/c*100	(#9485 / #9392 -1)*100
8024 / 32804	float32	deviation speed of sound path 5	[%] c_5_dev = (c_5-c)/c*100	(#9511 / #9392 -1)*100
8026 / 32806	float32	deviation speed of sound path 6	[%] c_6_dev = (c_6-c)/c*100	(#9537 / #9392 -1)*100
8028 / 32808	float32	deviation speed of sound path 7	[%] c_7_dev = (c_7-c)/c*100	(#9563 / #9392 -1)*100
802A / 32810	float32	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 signature		0
807D / 32814				0

		path related values path 1 (actual)		
8080 / 32896	float32	velocity of the acoustic path	[m/s]	#9405
8082 / 32898	float32	speed of sound	[m/s]	#9407
8084 / 32900	float32	signal acceptance rate	[%]	#9409
8086 / 32902	float32	signal to noise ratio (SNR) AB	[dB]	#9425 / 100
8088 / 32904	float32	signal to noise ratio (SNR) BA	[dB]	#9426 / 100
808A / 32906	float32	signal gain (AGC) AB	[dB]	#9427 / 100
808C / 32908	float32	signal gain (AGC) BA	[dB]	#9428 / 100
808E / 32910	float32	reserved, always = 0		0

		path related values path 2 (actual)		
8090 / 32912	float32	velocity of the acoustic path	[m/s]	#9431
8092 / 32914	float32	speed of sound	[m/s]	#9433
8094 / 32916	float32	signal acceptance rate	[%]	#9435
8096 / 32918	float32	signal to noise ratio (SNR) AB	[dB]	#9451 / 100
8098 / 32920	float32	signal to noise ratio (SNR) BA	[dB]	#9452 / 100
8099 / 32922	float32	signal gain (AGC) AB	[dB]	#9453 / 100
809C / 32924	float32	signal gain (AGC) BA	[dB]	#9454 / 100
809E / 32926	float32	reserved, always = 0		0

		path related values path 3 (actual)		
80A0 / 32928	float32	velocity of the acoustic path	[m/s]	#9457
80A2 / 32930	float32	speed of sound	[m/s]	#9459
80A4 / 32932	float32	signal acceptance rate	[%]	#9461
80A6 / 32934	float32	signal to noise ratio (SNR) AB	[dB]	#9477 / 100
80A8 / 32936	float32	signal to noise ratio (SNR) BA	[dB]	#9478 / 100
80AA / 32938	float32	signal gain (AGC) AB	[dB]	#9479 / 100
80AC / 32940	float32	signal gain (AGC) BA	[dB]	#9480 / 100
80AE / 32942	float32	reserved, always = 0		0

Fig. 10 Supported registers (page 2)

		path related values path 4 (actual)		
80B0 / 32944	float32	velocity of the acoustic path	[m/s]	#9483
80B2 /32946	float32	speed of sound	[m/s]	#9485
80B4 / 32948	float32	signal acceptance rate	[%]	#9487
80B6 / 32950	float32	signal to noise ratio (SNR) AB	[dB]	#9503 / 100
80B8 / 32952	float32	signal to noise ratio (SNR) BA	[dB]	#9504 / 100
80BA / 32954	float32	signal gain (AGC) AB	[dB]	#9505 / 100
80BC / 32956	float32	signal gain (AGC) BA	[dB]	#9506 / 100
80BE / 32958	float32	reserved, always = 0		0

		path related values path 5 (actual)		
80C0 / 32960	float32	velocity of the acoustic path	[m/s]	#9509
80C2 / 32962	float32	speed of sound	[m/s]	#9511
80C4 / 32964	float32	signal acceptance rate	[%]	#9513
80C6 / 32966	float32	signal to noise ratio (SNR) AB	[dB]	#9529 / 100
80C8 / 32968	float32	signal to noise ratio (SNR) BA	[dB]	#9530 / 100
80CA / 32970	float32	signal gain (AGC) AB	[dB]	#9531 / 100
80CC / 32972	float32	signal gain (AGC) BA	[dB]	#9532 / 100
80CE / 32974	float32	reserved, always = 0		0

		path related values path 6 (actual)		
80D0 / 32976	float32	velocity of the acoustic path	[m/s]	#9535
80D2 / 32978	float32	speed of sound	[m/s]	#9537
80D4 / 32980	float32	signal acceptance rate	[%]	#9539
80D6 / 32982	float32	signal to noise ratio (SNR) AB	[dB]	#9555 / 100
80D8 / 32984	float32	signal to noise ratio (SNR) BA	[dB]	#9556 / 100
80D9 / 32986	float32	signal gain (AGC) AB	[dB]	#9557 / 100
80DC / 32988	float32	signal gain (AGC) BA	[dB]	#9558 / 100
80DE / 32990	float32	reserved, always = 0		0

		path related values path 7 (actual)		
80E0 / 32992	float32	velocity of the acoustic path	[m/s]	#9561
80E2 / 32994	float32	speed of sound	[m/s]	#9563
80E4 / 32996	float32	signal acceptance rate	[%]	#9565
80E6 / 32998	float32	signal to noise ratio (SNR) AB	[dB]	#9581 / 100
80E8 / 33000	float32	signal to noise ratio (SNR) BA	[dB]	#9582 / 100
80EA / 33002	float32	signal gain (AGC) AB	[dB]	#9583 / 100
80EC / 33004	float32	signal gain (AGC) BA	[dB]	#9584 / 100
80EE / 33006	float32	reserved, always = 0		0

		path related values path 8 (actual)		
80F0 / 33008	float32	velocity of the acoustic path	[m/s]	#9587
80F2 / 33010	float32	speed of sound	[m/s]	#9589
80F4 / 33012	float32	signal acceptance rate	[%]	#9591
80F6 / 33014	float32	signal to noise ratio (SNR) AB	[dB]	#9607 / 100
80F8 / 33016	float32	signal to noise ratio (SNR) BA	[dB]	#9608 / 100
80FA / 33018	float32	signal gain (AGC) AB	[dB]	#9609 / 100
80FC / 33020	float32	signal gain (AGC) BA	[dB]	#9610 / 100
80FE / 33022	float32	reserved, always = 0		0
8100 / 33024		reserved for additional paths		0
81FE / 33278				0

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