



IFC 100 Supplementary instructions

Signal converter for electromagnetic flowmeters

Description of PROFIBUS interface

PROFIBUS PA:

PROFIBUS device with MBP Physical Interface and PA Profile 3.02

PROFIBUS DP:

PROFIBUS device with RS485 Physical Interface and PA Profile 3.02



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1.1 Scope of the document

These instructions are supplementary to the signal converter Handbook. For all other data, use the relevant chapters of the Handbook. If you do not have this document, please contact the nearest office or download them from the manufacturer's internet site.



INFORMATION!

The information in this chapter only contains the data applicable to PROFIBUS communication. The technical data in the Handbook shall be valid in its current version, provided that it is not rendered invalid or replaced by this supplement.

1.2 Scope of delivery

The information in this chapter only contains the data applicable to PROFIBUS communication. The technical data in the Handbook shall be valid in its current version, provided that it is not rendered invalid or replaced by this supplement.

A device for PROFIBUS communication is supplied with:

- Supplementary instructions for PROFIBUS communication
- PROFIBUS device data files (GSD) which can be also downloaded from the manufacturer's internet site

1.3 Special notes

Don't switch off (power off) the signal converter immediately after manual change of parameter values:

- Please wait approx. 10 seconds before you switch off the signal converter after you have done both a parameter download via PROFIBUS or a manual change of a parameter value via the local display.



CAUTION!

Please wait approx. 15 seconds before you switch off the signal converter after you have carried out a "Factory Reset" (PROFIBUS "Coldstart") via PROFIBUS or local display.

"Deactivation of the Service Parameter Lock" of the signal converter via PROFIBUS:

- After writing down the service password (via PROFIBUS) the "Deactivation of the Service Parameter Lock" will last at least 20 minutes if the internal password timer of the signal converter won't be retriggered by writing this password again. The "Deactivation of the Service Parameter Lock" will be terminated at once by a PROFIBUS Coldstart / Warmstart or if the internal password timer of the signal converter elapsed.

2.1 Software history

Issued	Signal converter		Application program		System integration			
	Mth./year	Hardware	Firmware	Hardware	Software	Driver	Version	Model name
xx/14	Signal converter with RS485 interface + PA Profile 3.02		V3.0.0 / 131129	Simatic PCS7	HW Config	GSD manuf. specific	KR014502.GSD	IFC100(RS485) Rev.1
				other SPS of other manufact.	other Software of other SPS manufact.	GSD profile specific	PA039740.GSD	Flow with 1AI, 1TOT (PhyL 0)
				Laptop / PC	PDM (≥ 8.0)	DD (Ident.-No.)	*	-
					Pactware	DTM ≥	**	-

*: IFC 100 PROFIBUS DD 01.01 PDM 6x8x

** : IFC 100 PROFIBUS DTM 1.0.0 FDT 1.2

2.2 System configuration of PROFIBUS DP network

The following diagram shows a typical network configuration with PROFIBUS devices with RS485 interface in a non-hazardous environment. The PROFIBUS devices with RS485 interface do not need any segment coupler. They are connected directly to the PROFIBUS DP network.

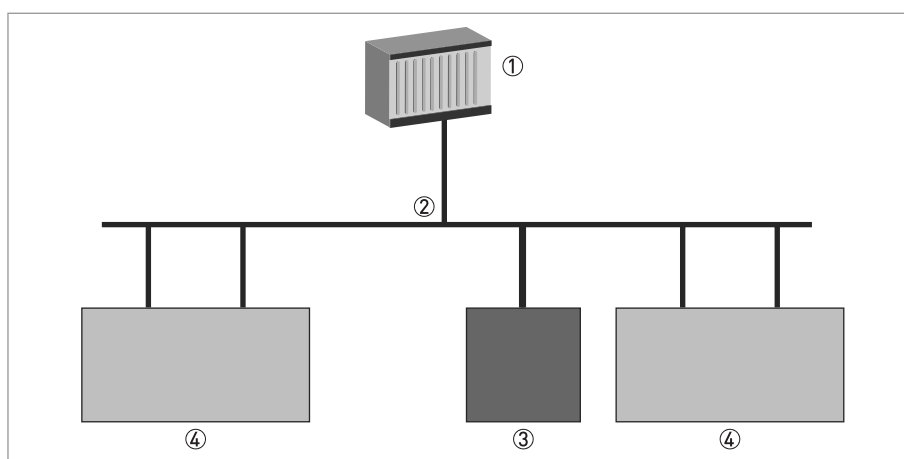


Figure 2-1: PROFIBUS DP network

- ① SPS
- ② PROFIBUS DP network with max. 12 Mbit/s
- ③ Signal converter
- ④ Other devices with PROFIBUS RS485 interface

2.3 Electrical connection for DP signal converter



INFORMATION!

For a detailed description of the electrical connections please refer to the standard signal converter handbook.

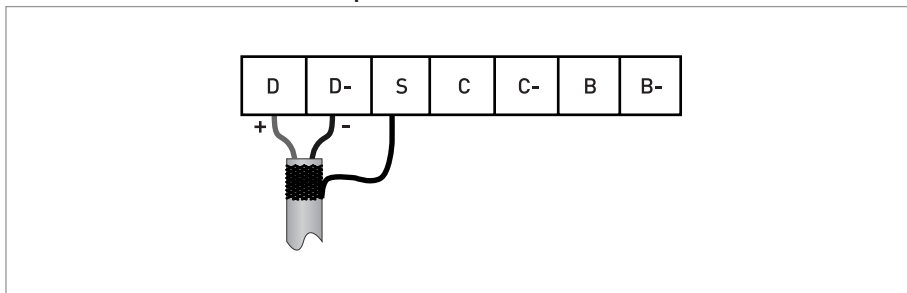
Refer also to the Installation Guideline for PROFIBUS DP/FMS (PNO Order Number 2.112/2.111).

Internal connection

Signal converter terminals	D	D-	S	C	C-	B	B-
PROFIBUS designation	+B	-A		-T	+T	+B	-A
	①	②		③	④	⑤	⑥

- ① TxD+/RxD+ first connection
- ② TxD-/RxD- first connection
- ③ Termination negative
- ④ Termination positive
- ⑤ TxD+/RxD+ second connection
- ⑥ TxD-/RxD- second connection

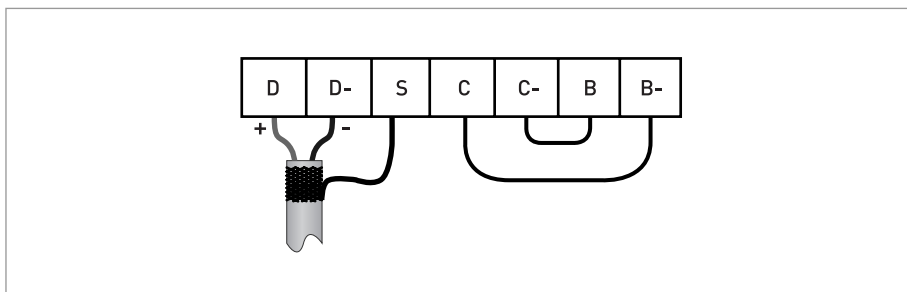
External connection with spur



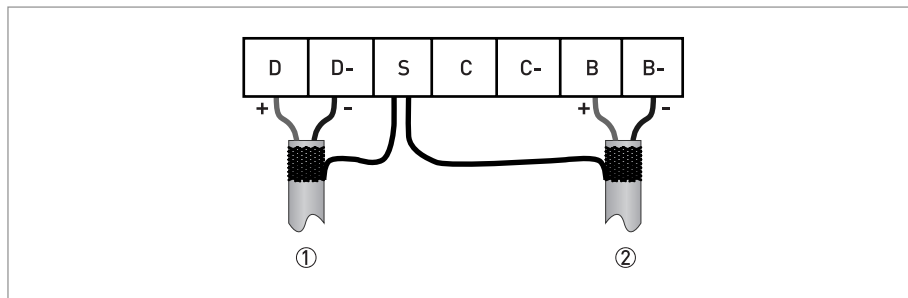
CAUTION!

Spurs are not allowed at high data rates!

External connection to a trunk as last device with active internal bus termination



External connection to a trunk



① e.g. incoming data lines

② e.g. outgoing data lines

2.4 Technical data

Hardware

Type	PROFIBUS RS485 interface according to IEC 61158-2
Connection	Dependent of polarity; please note at electrical connection!

Software

GSD	GSD file on CD-ROM or from internet site
Device profile	PA Profile compact class B, V 3.02
Address range	0...126 (default 126)
	0...125 via PROFIBUS service set_slave_add
	0...126 via local display
	126 via factory_reset = 2712
Local control	Local display and operator interface at device
SAPs	2 x MS1 SAPs – acyclic interface to PLC
	3 x MS2 SAPs – the number of MS2 Service Access Points is typically equal to the maximum number of master class 2 tools
Function blocks	1 x TB = Transducer Block: contains the parameters and functions defined in PA Profile 3.02
	1 x PB = Physical Block: contains the parameters defined in PA Profile 3.02
	5 x AI = Analog Input Blocks: contains the parameters defined in PA Profile 3.02
	3 x TOT = Totalizer Function Blocks: contains the parameters defined in PA Profile 3.02

**INFORMATION!***Max. Baudrate = 1.5 Mbaud*

2.5 GSD files for the data transfer

A PROFIBUS GSD ZIP file (e.g. GSD.zip; including both all GSD files and additional data files) you can get on a CD ROM or can be downloaded from the internet. The GSD file contains information that will be needed for project planning of the PROFIBUS communication network.

The relevant data files (e.g. _____.bmp / _____.dib) must be loaded into the bus configuration system/master system before start-up of the bus system.

2.5.1 Cyclic data exchange

During network configuration the user has to define which function block outputs of the signal converter should be transferred cyclically to the master. Network configuration will be done using one of the GSD files described before. The order of transmission of a function block always remains the same even if a function block is defined as an "Empty" block (**if so, no function block output data will be sent to the master and all function block outputs following the empty block will move up one position**).

2.5.2 Baud rate

Supported baud rates are listed in the GSD file. After power-on or PROFIBUS timeout a baud rate search is active to detect the current transfer speed on the bus. It is not necessary to set the baud rate manually.

If the data transmission rate is changed during operation the baud rate search will not be started by the device. A new power-up or a manual interruption of the PROFIBUS communication is required to activate the baud rate search in this case.

2.5.3 Ident.-No. supported

The signal converter with PROFIBUS RS485 interface is based on PROFIBUS PA Profile V 3.02. The device supports two Ident-No.:

- Ident-No. "4502hex" belongs to the GSD file KR014502.GSD and includes the complete functionality of the electromagnetic flowmeter.
- The application of the manufacturer independent Ident-No. "9740hex" (GSD file "PA039740.GSD") provides interchangeability of devices, i.e. an exchange of electromagnetic flowmeters of different vendors.

Please follow the instructions in the manual of the host supplier when installing the GSD File you need and the additional files (IFC100____.bmp and IFC100____.dib) into the PLC.



INFORMATION!

The device entry of the signal converter with PROFIBUS RS485 Interface and PA Profile 3.02 will show up within the slave family PROFIBUS PA of the device list.

2.5.4 Manufacturer specific GSD files: KR024502.GSD

The manufacturer delivers the GSD files with the entire device functionality, which is listed as follows:

Block number	Default configuration Function block output: value and status	KR024502.GSD Ident-No. 4502	Default unit
1	Volume Flow	AI-FB	m ³ /h
2	Volume Totalizer	Totalizer-FB	m ³
3	Volume Totalizer	Totalizer-FB	m ³
4	Mass Totalizer	Totalizer-FB	kg
5	Mass Flow	AI-FB	kg/s
6	Speed Flow	AI-FB	m/s
7	Coil Temperature	AI-FB	K
8	Conductivity	AI-FB	S/m
X	Electronic Temperature	AI-FB	°C
X	Supply (internal supply voltage for the PROFIBUS interface)	AI-FB	V
X	Diag. Electrode Noise	AI-FB	m/s
X	Diag. DC Terminal 2	AI-FB	V
X	Diag. DC Terminal 3	AI-FB	V

- AI: Analog Input Function Block
- FB: Function Block
- X: Block number 1, 5, 6, 7 or 8

There will be two additional output values available by changing the function block channel parameters of the above mentioned "Analog Input Function Blocks".

There are separate settings to select the units for local display and PROFIBUS. Modifications of the units of the display will have no effect on the data transferred via PROFIBUS. A master class 2 tool is required to modify the units for PROFIBUS transfer.

**INFORMATION!**

During network configuration the user has to define which function block outputs of the signal converter should be transferred cyclically to the master. This is performed by a bus configuration tool (e.g. "HW- Config" for PC-S7 from Siemens). This tool offers specific functions as follows:

1. It is possible to configure an "Empty" block (the code of an "Empty" block is defined as 0x00) on each block number. This implies: no data are transmitted in the cyclic data telegram for this block.
2. There is NO "Totalizer (TOT)" function block allowed on block position 1, 5, 6, 7 and 8! On these positions, only an "Analog Input (AI)" function block or an "Empty" block is allowed!
(Note: All codes supported by "Analog Input (AI)" - and "Totalizer (TOT)" – function blocks will be found in the corresponding GSD files.)
3. There is NO "Analog Input (AI)" function block allowed on block position 2, 3 and 4! On these positions, only a "Totalizer (TOT)" function block or an "Empty" block is allowed!
4. There is a choice of 7 different totalizer functions, which can be allocated to the blocks 2, 3 and/or 4.

Definition of totalizer functions

Total	cyclic transfer of the totalizer value with status to the master
SetTot + Total	cyclic transfer of the totalizer value with status to the master + cyclic control data from master to the device via the parameter SetTot
ModeTot + Total	cyclic transfer of the totalizer value with status to the master + cyclic control data from master to the device via the parameter ModeTot
SetTot + ModeTot + Total	cyclic transfer of the totalizer value with status to the master + cyclic control data from master to the device via the parameters SetTot and ModeTot (in the given order)
SetTot	cyclic control data from master to the device via the parameter SetTot
ModeTot	cyclic control data from master to the device via the parameter ModeTot
SetTot + ModeTot	cyclic control data from master to the device via the parameters SetTot and ModeTot (in the given order)

Both, the Byte SetTot and ModeTot are cyclically sent from the master to the device if these bytes are inserted as output data via the PLC configurator. The meaning of these control bytes are as follows:

Function of control bytes

SetTot	
SetTot = 0	Totalizer is totalizing.
SetTot = 1	Totalizer will be reset to 0 and stays at 0 until SetTot is switched back again to 0. If the value of SetTot changes from "1" to "0" the totalizer starts counting from 0.
SetTot = 2	Totalizer is set to the value defined by PresetTot. PresetTot can be written via an acyclic master (totalizer in block 2 = Slot 2 Index 32; totalizer in block 3 = Slot 3 Index 32; totalizer in block 4 = Slot 4 Index 32). If the value of SetTot changes from "2" to "0" the totalizer starts counting from the current value defined by PresetTot.
SetTot > 2	Not allowed. Value is ignored; totalizer remains in its last valid setting.
ModeTot	
ModeTot = 0	Totalizer totalizes positive and negative values.
ModeTot = 1	Totalizes only positive values.
ModeTot = 2	Totalizes only negative values.
ModeTot = 3	Totalizer is stopped, no totalization will be done.
ModeTot = 248	Totalizes all values as positive, negative values will be multiplied with -1.0.
ModeTot = 249	Totalizes all values as negative, positive values will be multiplied with -1.0.

All other values of ModeTot not allowed. Value is ignored; totalizer remains in its last valid setting.

The standard block configuration may be changed by the customer but using the default settings is highly recommended. If the standard block configuration should be changed by the customer an acyclic master tool or the device display menu must be used to change the "channel parameter" value of the block which should be connected to another transducer output value.

The manufacturer specific GSD files KR014502.GSD includes the following functionality:

- GSD Revision 5.02
- PROFIBUS PA Profile 3.02x and I&M
- Auto_Baud_supp = 1; 1 = supported
- Set_Slave_Add_supp = 1; 1 = supported
- Ident_Maintenance_supp = 1; 1 = supported
- Fail_Safe (Extended DP-Features)
- C2_Max_Data_Len = 132
- Max_Initiate_PDU_Length = 132



INFORMATION!

More detailed information will be found in the corresponding GSD file.

2.5.5 Profile specific GSD file: PA039740.GSD

The functionality of the profile specific GSD file is limited. This GSD file includes only two blocks:

Block number	Standard configuration Function block output value	PA039740.GSD Ident-No. 9740	Default unit
1	Volume Flow	AI-FB	m ³ /h
2	Volume Totalizer	Totalizer-FB	m ³

The device has to be switched from "full functionality" to "interchangeable basic configuration" by using one of three a master class 2 tool (IDENT_NUMBER_SELECTOR: Slot 0, Index 40; change byte value to 0) or the device display menu or automatically during communication setup by a master class 1 tool (automatic Ident_Number adaptation of PROFIBUS PA Profile 3.02 is implemented). In the next step, the device has to be configured using the PA039740.GSD file.

2.5.6 Using the display menu to distinguish the current revision of the device (PA)

Use the display to open the Fct. B3.5 or C5.8.2 of the signal converter. You will get the following information:

- KROHNE Ident.-No. (of the assembled PROFIBUS PCB)
- Software revision (of the PROFIBUS software)
- Date of production (of the PROFIBUS device)

3.1 Software history

Issued	Signal converter		Application program		System integration		
	Mth./year	Hardware	Firmware	Hardware	Software	Driver	Version
xx/14	Signal converter with MBP interface + PA Profile 3.02	V3.0.0 / 131129	Simatic PCS7 other SPS of other manufact.	HW Config other Software of other SPS manufact.	GSD manuf. specific for stand. DP/PA segment coupler	KR014503.GSD	IFC100 (MBP) Rev.1
					GSD profile specific	PA139740.GSD	Flow with 1AI, 1TOT (PhyL 1)
			Laptop / PC	PDM (≥ 8.0)	DD (Ident.-No.)	*	-
				Pactware	DTM ≥	**	-

*: IFC 100 PROFIBUS DD 01.01 PDM 6x8x

** : IFC 100 PROFIBUS DTM 1.0.0 FDT 1.2

3.2 System configuration of PROFIBUS PA network

The following diagram shows a typical instrumentation with PROFIBUS PA devices with MBP interface in hazardous and non-hazardous locations, including connections of conventional devices (e.g. with 4...20 mA signals) in a PROFIBUS network.

As a rule, the PROFIBUS PA segment is connected to a segment coupler which, among other things, carries out the conversion to the PROFIBUS DP bus line. It should be mentioned that the segment coupler is normally set to a fixed baud rate on the DP side.

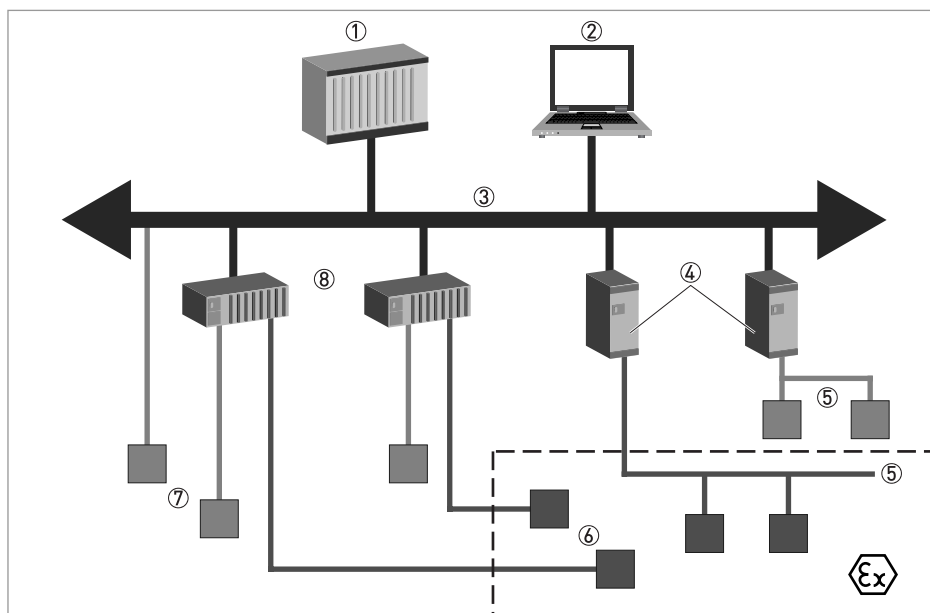


Figure 3-1: PROFIBUS PA network

- ① Control system (PLC); class 1 master
- ② Engineering or operation control tool; class 2 master
- ③ PROFIBUS DP network with max. 12 Mbit/s
- ④ PROFIBUS PA segment coupler DP / PA
- ⑤ PROFIBUS PA network with 31.25 kbit/s
- ⑥ HART[®] device
- ⑦ More devices with 4...20 mA
- ⑧ Analogue I/O module

3.3 Electrical connection for PA signal converter

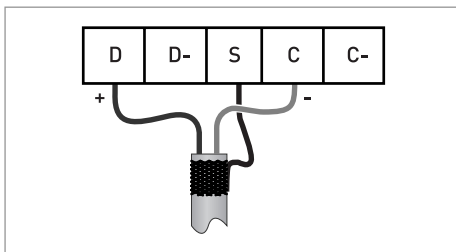


INFORMATION!

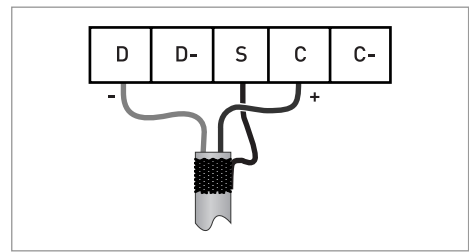
The wiring between the device and the PROFIBUS PA bus cable is independant of polarity. The signal converter PROFIBUS PA interface will operate only if the additional power supply for the device is connected/available.

For a detailed description of the electrical connections please refer to the standard signal converter handbook. Refer also to the PROFIBUS PA user and installation guideline (Version 2.2, February 2003 PNO order no. 2.092).

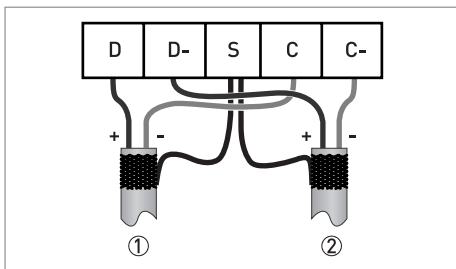
Connection to a spur



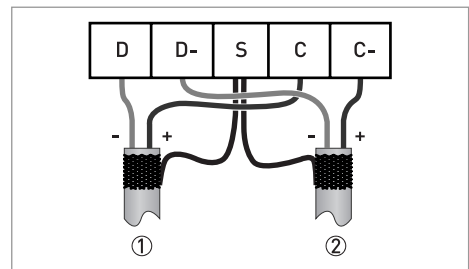
or



Connection to a trunk



or



① e.g. incoming data lines

② e.g. outgoing data lines

3.4 Technical data

Hardware

Type	PROFIBUS MBP interface according to IEC 61158-2 with 31.25 kbits/s; voltage mode
Connection	Independent of polarity at electrical connection
Base current	10.5 mA
FDE	Yes, separate fault disconnection electronics provided (FDE = Fault Disconnection Electronics)
Fault current	6 mA (fault current = max. continuous current – base current)
Starting current	<10.5 mA
Ex approval	Ex ia IIC or Ex ib IIC/IIB, FISCO Device
	For detailed information refer to standard product documentation.

Software

GSD	GSD file on CD-ROM or from internet site
Device profile	PA Profile compact class B, V 3.02
Address range	0...126 (default 126)
	0...125 via PROFIBUS service set_slave_add
	0...126 via local display
	126 via factory_reset = 2712
Local control	Local display and operator interface at device
SAPs	2 x MS1 SAPs – acyclic interface to PLC
	3 x MS2 SAPs – the number of MS2 Service Access Points is typically equal to the maximum number of master class 2 tools
Function blocks	1 x TB = Transducer Block: contains the parameters and functions defined in PA Profile 3.02
	1 x PB = Physical Block: contains the parameters defined in PA Profile 3.02
	5 x AI = Analog Input Blocks: contains the parameters defined in PA Profile 3.02
	3 x TOT = Totalizer Function Blocks: contains the parameters defined in PA Profile 3.02

3.5 GSD files for the data transfer

A PROFIBUS GSD ZIP file (e.g. GSD.zip; including both all GSD files and additional data files) you can get on a CD ROM or can be downloaded from the internet. The GSD file contains information that will be needed for project planning of the PROFIBUS communication network.

The relevant data files (e.g. _____.bmp / _____.dib) must be loaded into the bus configuration system/master system before start-up of the bus system.

3.5.1 Cyclic data exchange

During network configuration the user has to define which function block outputs of the signal converter should be transferred cyclically to the master. Network configuration will be done using one of the GSD files described before. The order of transmission of a function block always remains the same even if a function block is defined as an "Empty" block (**if so, no function block output data will be sent to the master and all function block outputs following the empty block will move up one position**).

3.5.2 Ident.-No. supported

The signal converter with PROFIBUS MBP interface is based on PROFIBUS PA Profile V 3.02. The device supports two Ident-No.:

- Ident-No. "4503hex" belongs to the GSD file KR014503.GSD and includes the complete functionality of the electromagnetic flowmeter.
- The application of the manufacturer independent Ident-No. "9740hex" (GSD file "PA139740.GSD") provides interchangeability of devices, i.e. an exchange of electromagnetic flowmeters of different vendors.

Please follow the instructions in the manual of the host supplier when installing the GSD File you need and the additional files (_____.bmp and _____.dib) into the PLC.



INFORMATION!

If separated by the bus configuration system the device entry of the PROFIBUS MBP interface with PA Profile 3.02 will be located within the slave family PROFIBUS PA.

3.5.3 Manufacturer specific GSD file: KR014503.GSD

**INFORMATION!**

For devices with MBP interface there is only one type of GSD files in our GSD compilation. This GSD file will be valid for both, a standard DP/PA segment coupler and the segment coupler SK2/SK3 of Pepperl & Fuchs.

This GSD file supports device functionality as described below:

Block number	Default configuration Function block output: value and status	KR014503.GSD Ident-No. 4503	Default unit
1	Volume Flow	AI-FB	m ³ /h
2	Volume Totalizer	Totalizer-FB	m ³
3	Volume Totalizer	Totalizer-FB	m ³
4	Mass Totalizer	Totalizer-FB	kg
5	Mass Flow	AI-FB	kg/s
6	Speed Flow	AI-FB	m/s
7	Coil Temperature	AI-FB	K
8	Conductivity	AI-FB	S/m
X	Electronic Temperature	AI-FB	°C
X	Supply (internal supply voltage for the PROFIBUS interface)	AI-FB	V
X	DIAG_ELECTRODE_NOISE	AI-FB	m/s
X	DIAG_DC_TERMINAL_2	AI-FB	V
X	DIAG_DC_TERMINAL_3	AI-FB	V

- AI: Analog Input Function Block
- FB: Function Block
- X: Block number 1, 5, 6, 7 or 8

There will be five additional output values available by changing the function block channel parameters of the above mentioned "Analog Input Function Blocks".

There are separate settings to select the units for local display and PROFIBUS. Modifications of the units of the display will have no effect on the data transferred via PROFIBUS. A master class 2 tool is required to modify the units for PROFIBUS transfer.

**INFORMATION!**

During network configuration the user has to define which function block outputs of the signal converter should be transferred cyclically to the master. This is performed by a bus configuration tool (e.g. "HW- Config" for PC-S7 from Siemens). This tool offers specific functions as follows:

1. It is possible to configure an "Empty" block (the code of an "Empty" block is defined as 0x00) on each block number. This implies: no data are transmitted in the cyclic data telegram for this block.
2. There is NO "Totalizer (TOT)" function block allowed on block position 1, 5, 6, 7 and 8! On these positions, only an "Analog Input (AI)" function block or an "Empty" block is allowed!
(Note: All codes supported by "Analog Input (AI)" - and "Totalizer (TOT)" – function blocks will be found in the corresponding GSD files.)
3. There is NO "Analog Input (AI)" function block allowed on block position 2, 3 and 4! On these positions, only a "Totalizer (TOT)" function block or an "Empty" block is allowed!
4. There is a choice of 7 different totalizer functions, which can be allocated to the blocks 2, 3 and/or 4.

Definition of totalizer functions

Total	cyclic transfer of the totalizer value with status to the master
SetTot + Total	cyclic transfer of the totalizer value with status to the master + cyclic control data from master to the device via the parameter SetTot
ModeTot + Total	cyclic transfer of the totalizer value with status to the master + cyclic control data from master to the device via the parameter ModeTot
SetTot + ModeTot + Total	cyclic transfer of the totalizer value with status to the master + cyclic control data from master to the device via the parameters SetTot and ModeTot (in the given order)
SetTot	cyclic control data from master to the device via the parameter SetTot
ModeTot	cyclic control data from master to the device via the parameter ModeTot
SetTot + ModeTot	cyclic control data from master to the device via the parameters SetTot and ModeTot (in the given order)

Both, the Byte SetTot and ModeTot are cyclically sent from the Master to the device if these bytes are inserted as output data via the PLC configurator. The meaning of these control bytes are as follows:

Function of control bytes

SetTot	
SetTot = 0	Totalizer is totalizing.
SetTot = 1	Totalizer will be reset to 0 and stays at 0 until SetTot is switched back again to 0. If the value of SetTot changes from "1" to "0" the totalizer starts counting from 0.
SetTot = 2	Totalizer is set to the value defined by PresetTot. PresetTot can be written via an acyclic master (totalizer in block 2 = Slot 2 Index 32; totalizer in block 3 = Slot 3 Index 32; totalizer in block 4 = Slot 4 Index 32). If the value of SetTot changes from "2" to "0" the totalizer starts counting from the current value defined by PresetTot.
SetTot > 2	Not allowed. Value is ignored; totalizer remains in its last valid setting.
ModeTot	
ModeTot = 0	Totalizer totalizes positive and negative values.
ModeTot = 1	Totalizes only positive values.
ModeTot = 2	Totalizes only negative values.
ModeTot = 3	Totalizer is stopped, no totalization will be done.
ModeTot = 248	Totalizes all values as positive, negative values will be multiplied with -1.0.
ModeTot = 249	Totalizes all values as negative, positive values will be multiplied with -1.0.

All other values of ModeTot not allowed. Value is ignored; totalizer remains in its last valid setting.

The standard block configuration may be changed by the customer but using the default settings is highly recommended. If the standard block configuration should be changed by the customer an acyclic master tool or the device display menu must be used to change the "channel parameter" value of the block which should be connected to another transducer output value.

3.5.4 Profile specific GSD file: PA139740.GSD

The functionality of the profile specific GSD file is limited. This GSD file includes only two blocks:

Block number	Standard configuration Function block output value	PA139740.GSD Ident-No. 9740	Default unit
1	Volume Flow	AI-FB	m ³ /h
2	Volume Totalizer	Totalizer-FB	m ³

The device has to be switched from "full functionality" to "interchangeable basic configuration" by using one of three a master class 2 tool (IDENT_NUMBER_SELECTOR: Slot 0, Index 40; change byte value to 0) or the device display menu or automatically during communication setup by a master class 1 tool (automatic Ident_Number adaptation of PROFIBUS PA Profile 3.02 is implemented). In the next step, the device has to be configured using the PA139740.GSD file.

3.5.5 Using the display menu to distinguish the current revision of the device (PA)

Use the display to open the Fct. B3.5 or C5.8.2 of the signal converter. You will get the following information:

- KROHNE Ident.-No. (of the assembled PROFIBUS PCB)
- Software revision (of the PROFIBUS software)
- Date of production (of the PROFIBUS device)

4.1 Function blocks

The PROFIBUS MBP interface is based on the PROFIBUS PA Profile Version 3.02 and supports the following blocks:

- 1 physical block.
This block contains the parameters defined in PA Profile 3.02.
- 1 transducer block for electromagnetic flow devices.
This block provides the parameters and functions defined in PA Profile 3.02.
- 5 Analog Input (AI) function blocks.
As default: Volume Flow / Mass Flow / Speed Flow / Coil Temperature / Conductivity.
- 3 totalizer (TOT) function blocks.
As default the first two totalizers will totalize volume and the third one will totalize mass.

4.2 Data structure of function block output values

The data structure of function block outputs consists of 5 bytes: a 4 byte float value (Float Format according IEEE Standard 754 Short Real Number) followed by a 1 byte status value. If all 8 function block outputs have been configured (see above), 40 bytes will be transmitted.

4.2.1 Float value

Example of float format

Byte n								Byte n+1							
Bit7	Bit6							Bit7	Bit6						
VZ	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	2 ⁻¹	2 ⁻²	2 ⁻³	2 ⁻⁴	2 ⁻⁵	2 ⁻⁶	2 ⁻⁷
	Exponent							Mantissa							

Byte n+2								Byte n+3							
Bit7								Bit7							
2 ⁻⁸	2 ⁻⁹	2 ⁻¹⁰	2 ⁻¹¹	2 ⁻¹²	2 ⁻¹³	2 ⁻¹⁴	2 ⁻¹⁵	2 ⁻¹⁶	2 ⁻¹⁷	2 ⁻¹⁸	2 ⁻¹⁹	2 ⁻²⁰	2 ⁻²¹	2 ⁻²²	2 ⁻²³
Mantissa								Mantissa							

Example (binary): 40 F0 00 00 (hex) = 0100 0000 1111 0000 0000 0000 0000 0000

Formula:

$$\text{value} = (-1)^{VZ} * 2^{(\text{Exponent} - 127)} * (1 + \text{Mantissa})$$

$$\text{value} = (-1)^0 * 2^{(129 - 127)} * (1 + 2^{-1} + 2^{-2} + 2^{-3})$$

$$\text{value} = 1 * 4 * (1 + 0.5 + 0.25 + 0.125)$$

$$\text{value} = 7.5$$

4.2.2 Status value

The IFC100 PROFIBUS interface supports the PROFIBUS PA Profile Version 3.02. In this profile the "Condensed status and Diagnosis" has replaced by default the "Classic Status and Diagnosis" of the PROFIBUS PA Profile Version 3.0. But "Classic Status and Diagnosis" is still available. It is implemented for backwards compatibility to "older" devices or PLC systems which do not support "Condensed status and Diagnosis" until now.

The "Condensed Status and Diagnosis" has been created and implemented to make both diagnostic events more obvious and allow support of predictive and preventive maintenance.

The device may be switched from "Condensed status and Diagnosis" to "Classic Status and Diagnosis" by using one of both a master class 2 tool (COND_STATUS_DIAG: Slot 0, Index 43; change byte value to 0 - possible only if no cyclic communication has been established) or automatically during communication setup by a master class 1 tool (by writing the SetPrm service parameter PRM_COND).

4.2.3 Status (if "Condensed Status and Diagnosis" selected - selected by default)

The "Condensed" status codes have been defined to allow easier decoding of the information provided by the PROFIBUS devices. The "Condensed" status codes are a subset of the "Classic" status codes plus new additional ones and can be reduced to an application specific subset defined in e.g. NE 107.

The meanings of the status byte (unsigned integer) are described in the following tables.

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	0							= bad
0	1							= uncertain
1	0							= good (Non Cascade)
1	1							= good (Cascade) - not supported

Status = bad

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	0	0	0	0	0	0	0	= non-specific (not provided by the device)
0	0	1	0	0	0	1	1	= passivated (diagnostic alerts inhibited)
0	0	1	0	0	1	x	x	= maintenance alarm, more diagnosis available
0	0	1	0	1	0	x	x	= process related, no maintenance
0	0	1	1	1	1	x	x	= function check / local override; value not usable

Status = uncertain

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	
0	1	0	0	1	0	x	x	= substitute set
0	1	0	0	1	1	1	1	= initial value
0	1	1	0	1	0	x	x	= maintenance demanded
0	1	1	1	0	0	1	1	= simulated value, start
0	1	1	1	0	1	x	x	= simulated value, end
0	1	1	1	1	0	x	x	= process related, no maintenance

Status = good (Non Cascade)

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	
1	0	0	0	0	0	0	0	= ok
1	0	0	0	0	1	x	x	= update event
1	0	0	0	1	0	0	1	= advisory alarm, low limit
1	0	0	0	1	0	1	0	= advisory alarm, high limit
1	0	0	0	1	1	0	1	= critical alarm, low limit
1	0	0	0	1	1	1	0	= critical alarm, high limit
1	0	1	0	0	0	x	x	= initiate fail safe (not provided by IFC100)
1	0	1	0	0	1	x	x	= maintenance required
1	0	1	0	1	0	x	x	= maintenance demanded
1	0	1	1	1	1	x	x	function check

Status = Limits

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	
						0	0	= ok
						0	1	= low limited
						1	0	= high limited
						1	1	= constant

Check the first two quality bits in order to get the quality information of the measurement value:

- **Good (Non Cascade):** function block output value is ok and can be used without restrictions
- **Good (Cascade):** will not be supported, because it is not applicable for the device
- **Uncertain:** function block output value can be used but the accuracy can not be guaranteed (e.g. function block outputs value has been frozen or A/D converter is saturated or out of range)
- **Bad:** function block output value is bad - don't use it for process control!

The "Quality-Substatus" and "Limit" bits will be used for further diagnostics or limit checking.



INFORMATION!

The status should be monitored because a number will be transmitted even if the status of the measurement value is bad or uncertain. This is the only way to check the quality of the transmitted measurement values.

4.2.4 Status (if "Classic status and Diagnosis" selected)

The meanings of the status byte (unsigned integer) are described in the following tables.

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	0							= bad
0	1							= uncertain
1	0							= good (Non Cascade)
1	1							= good (Cascade) - not supported

Status = bad

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
0	0	0	0	0	0			= non-specific
0	0	0	0	0	1			= configuration error
0	0	0	0	1	0			= not connected
0	0	0	0	1	1			= device failure
0	0	0	1	0	0			= sensor failure
0	0	0	1	0	1			= no communication (last usable value)
0	0	0	1	1	0			= no communication (no usable value)
0	0	0	1	1	1			= out of service

Status = uncertain

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	
0	1	0	0	0	0			= non-specific
0	1	0	0	0	1			= last usable value
0	1	0	0	1	0			= substitute-set
0	1	0	0	1	1			= initial value
0	1	0	1	0	0			= sensor conversion not accurate
0	1	0	1	0	1			= engineering unit violation (unit not in the valid set)
0	1	0	1	1	0			= sub-normal
0	1	0	1	1	1			= configuration error
0	1	1	0	0	0			= simulated value

Status = good (Non Cascade)

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	
1	0	0	0	0	0			= ok
1	0	0	0	0	1			= update event
1	0	0	0	1	0			= active advisory alarm (priority < 8)
1	0	0	0	1	1			= active advisory alarm (priority > 8)
1	0	0	1	0	0			= unacknowledged update event
1	0	0	1	0	1			= unacknowledged advisory alarm
1	0	0	1	1	0			= unacknowledged critical alarm
1	0	1	0	0	0			= initiate fail safe
1	0	1	0	0	1			= maintenance required

Status = Limits

Quality		Quality substatus				Limits		
Gr	Gr	QS	QS	QS	QS	Qu	Qu	
2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	
						0	0	= ok
						0	1	= low limited
						1	0	= high limited
						1	1	= constant

Check the first two quality bits in order to get the quality information of the measurement value:

- **Good (Non Cascade):** function block output value is ok and can be used without restrictions
- **Good (Cascade):** will not be supported, because it is not applicable for the device
- **Uncertain:** function block output value can be used but the accuracy can not be guaranteed (e.g. function block outputs value has been frozen or A/D converter is saturated or out of range)
- **Bad:** function block output value is bad - don't use it for process control!

The "Quality-Substatus" and "Limit" bits will be used for further diagnostics or limit checking.



INFORMATION!

The status should be monitored because a number will be transmitted even if the status of the measurement value is bad or uncertain. This is the only way to check the quality of the transmitted measurement values.

4.3 Diagnosis parameter

4.3.1 Diagnosis

Parameter DIAGNOSIS will contain detailed information of the device, bitwise coded. More than one message possible at once (as below-mentioned). If MSB of byte 4 is set to 1 than more diagnose information is available in the DIAGNOSIS_EXTENSION parameter.

The manufacturer specific parameter "DIAGNOSIS_EXTENSION" will contain bitwise coded more detailed information of the internal status conditions and error conditions of the PROFIBUS device.

The corresponding GSD file will contain all messages supported by this device - have a look at the UNIT_DIAG_BIT(i) definitions.

4.3.2 DIAGNOSIS (if "Condensed Status and Diagnosis" selected)

Octet number	Bit number	Subparameter	Indication type	Default value	Description
1	0	Reserved		0	Reserved for use by PNO
	1	Reserved		0	Reserved for use by PNO
	2	Reserved		0	Reserved for use by PNO
	3	Reserved		0	Reserved for use by PNO
	4	Reserved		0	Reserved for use by PNO
	5	Reserved		0	Reserved for use by PNO
	6	Reserved		0	Reserved for use by PNO
	7	Reserved		0	Reserved for use by PNO

Octet number	Bit number	Subparameter	Indication type	Default value	Description
2	0	Reserved		0	Reserved for use by PNO
	1	Reserved		0	Reserved for use by PNO
	2	Reserved		0	Reserved for use by PNO
	3	DIA_WARMSTART	A	0	Restart (warmstart)
	4	DIA_COLDSTART	A	0	Coldstart (with default data)
	5	DIA_MAINTENANCE	R	0	Maintenance required
	6	DIA_CHARACT	R	0	Characteristics invalid
	7	IDENT_NUMBER_VIOLATION	R	0	Ident. No. violation: Set to 1 if the Ident_Number of the running cyclic data transfer and the value of physical block IDENT_NUMBER_SELECTOR parameter are different
3	0	DIA_MAINTENANCE_ALARM		0	Failure of the device
	1	DIA_MAINTENANCE_DEMANDED		0	Maintenance demanded
	2	DIA_FUNCTION_CHECK		0	Function check / Simulation / MAN-mode
	3	DIA_INV_PRO_COND		0	Invalid process condition (e.g. Bad/Unc.-Process related, no maintenance)
	4	Reserved		0	Reserved for use by PNO
	5	Reserved		0	Reserved for use by PNO
	6	Reserved		0	Reserved for use by PNO
	7	Reserved		0	Reserved for use by PNO
4	0	Reserved		0	Reserved for use by PNO
	1	Reserved		0	Reserved for use by PNO
	2	Reserved		0	Reserved for use by PNO
	3	Reserved		0	Reserved for use by PNO
	4	Reserved		0	Reserved for use by PNO
	5	Reserved		0	Reserved for use by PNO
	6	Reserved		0	Reserved for use by PNO
	7	EXTENSION_AVAILABLE		0	Extension available: More diagnose information available in the Diagnosis_Extension parameter (if available)

4.3.3 DIAGNOSIS_EXTENSION (if "Condensed Status and "Diagnosis" selected)

Octet number	Bit number	Error class	Subparameter	Comment
1	7	F!	RAM_ROM_ERROR	Hardware errors in general concerning storage devices [*]
	6	F!	PARAMETER_ERROR	Parameter errors in general [*]
	5	F!	SYSTEM_ERROR	System errors in general [*]
	4	F!	LEVEL_MEASUREMENT_ERROR	Level measurement errors of a device with PF option
	3	F	CURRENT_A_ERROR	Current input A errors
	2	F	CURRENT_B_ERROR	Current input B errors
	1	F	SENSOR_ERROR	Physical sensor errors
	0	F	EMPTY_PIPE_DETECTED	Empty pipe detected
2	7	F	FLOW_EXCEEDING_LIMIT	Flow exceeding sensor limits
	6	F	CONVERTER_ERROR	Converter errors occurred - not process related
	5	F	IO_CONNECTION_ERROR	Errors at the IO terminals detected
	4	F	IO_OVERRANGE_DETECTED	Overrange at one of the IO functions detected
	3	F	APPLICATION_FAILURE	Application failures in general [*]
	2	-	Reserved	-
	1	-	Reserved	-
	0	-	Reserved	-
3	7	S	SENSOR_DIAGNOSTIC	Application / device errors occurred concerning the sensor
	6	S	CONVERTER_DIAGNOSTIC	Application / device errors occurred concerning the converter
	5	S	ELECTRONIC_TEMPERATURE	Electronic temperature exceeding the limit inside the housing
	4	S	PIPE_NOT_FULL	Pipe is not full
	3	S	OVERFLOW_COUNTER	Maximum range of counting exceeded - restart counting at 0.
	2	S	OUT_OF_SPECIFICATION	Out of specification in general [*]
	1	-	Reserved	-
	0	-	Reserved	-
4	7	-	Reserved	-
	6	M	DATA_SET_ERROR	Data set errors have been detected
	5	M	WRITE_CYCLES_EXCEEDED	Max. number of guaranteed write cycles have been exceeded of at least one of the storage devices
	4	C	SIMULATION_RUNNING	A value is simulated or a test function is active
	3	I	COMMUNICATION_PROFIBUS	No PROFIBUS communication and/or data exchange between PROFIBUS master and device
	2	I	POWER_FAIL	Power down has been detected
	1	I	OPERATING_STATE_INFORMATION	Information messages available [*]
	0	-	Reserved	-

Octet number	Bit number	Error class	Subparameter	Comment
5	7	F!	BM_DEV_ERROR	Set, if any event group is set, which is mapped to F! [*] [**]
	6	-	Reserved	-
	5	-	Reserved	-
	4	-	Reserved	-
	3	-	Reserved	-
	2	-	Reserved	-
	1	-	Reserved	-
	0	-	Reserved	-
6	7	F!	NO_BASIC_DEVICE_COM	No communication possible between basic device and PROFIBUS module [*] [**]
	6	F!	PARA_UPDATE_ERROR	Error occurred during reading parameter necessary for PROFIBUS module [*] [**]
	5	F!	MEAS_AVAILABLE_NO	Measurement channel failed (no more available) [*] [**]
	4	F!	CPU_ERROR	General CPU error of the PROFIBUS module [*] [**]
	3	F!	MEM_ERROR	General memory error of the PROFIBUS module [*] [**]
	2	M	CYCLE_OVERFLOW	Write cycle overflow of memory devices of the PROFIBUS module [*] [**]
	1	-	Reserved	-
	0	-	Reserved	-

[*]: Error class not changeable at all

[**]: Additional information only

F!: Device Error

F: Application Error

S: Uncertain measurement / measurement out of specification

C: Simulation of the measured value

I: Information



INFORMATION!

For a more detailed description of the above-mentioned subparameters please check the signal converter handbook (section: Status messages and diagnostic information)

4.3.4 Mapping of DIAGNOSIS_EXTENSION bits into DIAGNOSIS bits

How to read this table:

If e.g. an SENSOR_ERROR error has been detected by the device itself the below-mentioned DIAGNOSIS_EXTENSION bit will be set:

- DIAGNOSIS_EXTENSION (Octet 1 / Bit 1): SENSOR_ERROR

These bit will be mapped to the below-mentioned DIAGNOSIS bits (which will be set additionally):

- DIAGNOSIS (Octet 3 / Bit 3): DIA_INV_PRO_COND
- DIAGNOSIS (Octet 4 / Bit 7): EXTENSION_AVAILABLE

DIAGNOSIS_EXTENSION				DIAGNOSIS																	
				1				2			3			... 4							
				0...7	0...2	3	4	5	6	7	0	1	2	3	4	...	6	7			
Octet number	Bit number	Error class	Subparameter	Reserved	Reserved	Reserved	Reserved	DIA_WARMSTART	DIA_COLDSTART	DIA_MAINTENANCE	Reserved	IDENT_NUMBER_Violation	DIA_MAINTENANCE_ALARM	DIA_MAINTENANCE_DEMANDED	DIA_FUNCTION_CHECK	DIA_INV_PRO_COND	Reserved	...	Reserved	EXTENSION_AVAILABLE	
1	7	F!	RAM_ROM_ERROR										1								X
	6	F!	PARAMETER_ERROR										1								X
	5	F!	SYSTEM_ERROR										1								X
	4	F!	LEVEL_MEASUREMENT_ERROR										1								X
	3	F	CURRENT_A_ERROR													X					X
	2	F	CURRENT_B_ERROR													X					X
	1	F	SENSOR_ERROR													X					X
	0	F	EMPTY_PIPE_DETECTED													X					X
2	7	F	FLOW_EXCEEDING_LIMIT													X					X
	6	F	CONVERTER_ERROR													X					X
	5	F	IO_CONNECTION_ERROR													X					X
	4	F	IO_OVERRANGE_DETECTED													X					X
	3	F	APPLICATION_FAILURE													X					X
	2		Reserved																		X
	1		Reserved																		X
	0		Reserved																		X

DIAGNOSIS_EXTENSION				DIAGNOSIS																	
				1		2					3				...	4					
				0...7	0...2	3	4	5	6	7	0	1	2	3	4	...	6	7			
Octet number	Bit number	Error class	Subparameter	Reserved	Reserved	Reserved	Reserved	DIA_WARMSTART	DIA_COLDSTART	DIA_MAINTENANCE	Reserved	IDENT_NUMBER_Violation	DIA_MAINTENANCE_ALARM	DIA_MAINTENANCE_DEMANDED	DIA_FUNCTION_CHECK	DIA_INV_PRO_COND	Reserved	...	Reserved	EXTENSION_AVAILABLE	
3	7	S	SENSOR_DIAGNOSTIC											X							X
	6	S	CONVERTER_DIAGNOSTIC											X							X
	5	S	ELECTRONIC_TEMPERATURE											X							X
	4	S	PIPE_NOT_FULL											X							X
	3	S	OVERFLOW_COUNTER											X							X
	2	S	OUT_OF_SPECIFICATION											X							X
	1		Reserved																		X
	0		Reserved																		X
4	7		Reserved																		X
	6	M	DATA_SET_ERROR						X												X
	5	M	WRITE_CYCLES_EXCEEDED						X												X
	4	C	SIMULATION_RUNNING												X						X
	3	I	COMMUNICATION_PROFIBUS																		X
	2	I	POWER_FAIL																		X
	1	I	OPERATING_STATE_INFORMATION																		X
	0		Reserved																		X
5	7	F!	BM_DEV_ERROR										1								X
	6		Reserved																		X
	5		Reserved																		X
	4		Reserved																		X
	3		Reserved																		X
	2		Reserved																		X
	1		Reserved																		X
	0		Reserved																		X

DIAGNOSIS_EXTENSION				DIAGNOSIS																	
				1		2					3				...		4				
				0...7	0...2	3	4	5	6	7	0	1	2	3	4	...	6	7			
Octet number	Bit number	Error class	Subparameter	Reserved	Reserved	Reserved	Reserved	DIA_WARMSTART	DIA_COLDSTART	DIA_MAINTENANCE	Reserved	IDENT_NUMBER_Violation	DIA_MAINTENANCE_ALARM	DIA_MAINTENANCE_DEMANDED	DIA_FUNCTION_CHECK	DIA_INV_PRO_COND	Reserved	...	Reserved	EXTENSION_AVAILABLE	
6	7	F!	NO_BASIC_DEVICE_COM										1								X
	6	F!	PARA_UPDATE_ERROR										1								X
	5	F!	MEAS_AVAILABLE_NO										1								X
	4	F!	CPU_ERROR										1								X
	3	F!	MEM_ERROR										1								X
	2	M	CYCLE_OVERVLOW						X												X
	1		Reserved																		X
	0		Reserved																		X

1 :Ext_Diag (Bit 3 of Station_Status_1) will be set additionally

X :Corresponding DIAGNOSIS bits is set to 1 if status occurred

4.3.5 DIAGNOSIS (if "Classic Status and Diagnosis" selected)

Octet number	Bit number	Subparameter	Indication type	Default value	Description
1	0	DIA_HW_ELECTR		0	Hardware failure electronics
	1	DIA_HW_MECH		0	Hardware failure mechanics
	2	DIA_TEMP_MOTOR		0	Motor temperature too high
	3	DIA_TEMP_ELECTR		0	Electronic temperature too high
	4	DIA_MEM_CHKSUM		0	Memory error
	5	DIA_MEASUREMENT		0	Measurement failure
	6	DIA_NOT_INIT		0	Device not initialized
	7	DIA_INIT_ERR		0	Device initialization failed

Octet number	Bit number	Subparameter	Indication type	Default value	Description
2	0	DIA_ZERO_ERR		0	Zero point error
	1	DIA_SUPPLY		0	Power supply failed
	2	DIA_CONF_INVALID		0	Configuration invalid
	3	DIA_WARMSTART	A	0	Restart (warmstart)
	4	DIA_COLDSTART	A	0	Coldstart (with default data)
	5	DIA_MAINTENANCE	R	0	Maintenance required
	6	DIA_CHARACTER	R	0	Characteristics invalid
	7	IDENT_NUMBER_VIOLATION	R	0	Ident. No. violation: Set to 1 if the Ident_Number of the running cyclic data transfer and the value of physical block IDENT_NUMBER_SELECTOR parameter are different
3	0	Reserved		0	Reserved for use by PNO
	1	Reserved		0	Reserved for use by PNO
	2	Reserved		0	Reserved for use by PNO
	3	Reserved		0	Reserved for use by PNO
	4	Reserved		0	Reserved for use by PNO
	5	Reserved		0	Reserved for use by PNO
	6	Reserved		0	Reserved for use by PNO
	7	Reserved		0	Reserved for use by PNO
4	0	Reserved		0	Reserved for use by PNO
	1	Reserved		0	Reserved for use by PNO
	2	Reserved		0	Reserved for use by PNO
	3	Reserved		0	Reserved for use by PNO
	4	Reserved		0	Reserved for use by PNO
	5	Reserved		0	Reserved for use by PNO
	6	Reserved		0	Reserved for use by PNO
	7	EXTENSION_AVAILABLE		0	Extension available: More diagnose information available in the Diagnosis_Extension parameter (if available)

4.3.6 DIAGNOSIS_EXTENSION (if "Classic Status and "Diagnosis" selected)

Octet number	Bit number	Error class	Subparameter	Comment
1	7	F!	RAM_ROM_ERROR	Hardware errors in general concerning storage devices [*]
	6	F!	PARAMETER_ERROR	Parameter errors in general [*]
	5	F!	SYSTEM_ERROR	System errors in general [*]
	4	F!	LEVEL_MEASUREMENT_ERROR	Level measurement errors of a device with PF option
	3	F	CURRENT_A_ERROR	Current input A errors
	2	F	CURRENT_B_ERROR	Current input B errors
	1	F	SENSOR_ERROR	Physical sensor errors
	0	F	EMPTY_PIPE_DETECTED	Empty pipe detected
2	7	F	FLOW_EXCEEDING_LIMIT	Flow exceeding sensor limits
	6	F	CONVERTER_ERROR	Converter errors occurred - not process related
	5	F	IO_CONNECTION_ERROR	Errors at the IO terminals detected
	4	F	IO_OVERRANGE_DETECTED	Overrange at one of the IO functions detected
	3	F	APPLICATION_FAILURE	Application failures in general [*]
	2	-	Reserved	-
	1	-	Reserved	-
	0	-	Reserved	-
3	7	S	SENSOR_DIAGNOSTIC	Application / device errors occurred concerning the sensor
	6	S	CONVERTER_DIAGNOSTIC	Application / device errors occurred concerning the converter
	5	S	ELECTRONIC_TEMPERATURE	Electronic temperature exceeding the limit inside the housing
	4	S	PIPE_NOT_FULL	Pipe is not full
	3	S	OVERFLOW_COUNTER	Maximum range of counting exceeded - restart counting at 0.
	2	S	OUT_OF_SPECIFICATION	Out of specification in general [*]
	1	-	Reserved	-
	0	-	Reserved	-
4	7	-	Reserved	-
	6	M	DATA_SET_ERROR	Data set errors have been detected
	5	M	WRITE_CYCLES_EXCEEDED	Max. number of guaranteed write cycles have been exceeded of at least one of the storage devices
	4	C	SIMULATION_RUNNING	A value is simulated or a test function is active
	3	I	COMMUNICATION_PROFIBUS	No PROFIBUS communication and/or data exchange between PROFIBUS master and device
	2	I	POWER_FAIL	Power down has been detected
	1	I	OPERATING_STATE_INFORMATION	Information messages available [*]
	0	-	Reserved	-

Octet number	Bit number	Error class	Subparameter	Comment
5	7	F!	BM_DEV_ERROR	Set, if any event group is set, which is mapped to F! [*] [**]
	6	-	Reserved	-
	5	-	Reserved	-
	4	-	Reserved	-
	3	-	Reserved	-
	2	-	Reserved	-
	1	-	Reserved	-
	0	-	Reserved	-
6	7	F!	NO_BASIC_DEVICE_COM	No communication possible between basic device and PROFIBUS module [*] [**]
	6	F!	PARA_UPDATE_ERROR	Error occurred during reading parameter necessary for PROFIBUS module [*] [**]
	5	F!	MEAS_AVAILABLE_NO	Measurement channel failed (no more available) [*] [**]
	4	F!	CPU_ERROR	General CPU error of the PROFIBUS module [*] [**]
	3	F!	MEM_ERROR	General memory error of the PROFIBUS module [*] [**]
	2	M	CYCLE_OVERFLOW	Write cycle overflow of memory devices of the PROFIBUS module [*] [**]
	1	-	Reserved	-
	0	-	Reserved	-

[*]: Error class not changeable at all

[**]: Additional information only

F!: Device Error

F: Application Error

S: Uncertain measurement / measurement out of specification

C: Simulation of the measured value

I: Information



INFORMATION!

For a more detailed description of the above-mentioned subparameters please check the signal converter handbook (section: Status messages and diagnostic information)

4.3.7 Mapping of DIAGNOSIS_EXTENSION bits into DIAGNOSIS bits

How to read this table:

If e.g. an SENSOR_ERROR error has been detected by the device itself the below-mentioned DIAGNOSIS_EXTENSION bit will be set:

- DIAGNOSIS_EXTENSION (Octet 1 / Bit 1): SENSOR_ERROR

These bit will be mapped to the below-mentioned DIAGNOSIS bits (which will be set additionally):

- DIAGNOSIS (Octet 1 / Bit 5): DIA_MEASUREMENT
- DIAGNOSIS (Octet 4 / Bit 7): EXTENSION_AVAILABLE

DIAGNOSIS_EXTENSION			DIAGNOSIS																				
			1							2							3	4					
			0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	7		
Octet number	Bit number	Subparameter	DIA_HW_ELECTR	DIA_HW_MECH	DIA_TEMP_MOTOR	DIA_TEMP_ELECTR	DIA_MEM_CHKSUM	DIA_MEASUREMENT	DIA_NOT_INIT	DIA_INIT_ERR	DIA_ZERO_ERR	DIA_SUPPLY	DIA_CONF_INVAL	DIA_WARMSTART	DIA_COLDSTART	DIA_MAINTENANCE	DIA_CHARACT	IDENT NUMBER Violation	Reserved	Reserved	EXTENSION_AVAILABLE		
1	7	RAM_ROM_ERROR	1																			X	
	6	PARAMETER_ERROR	1																				X
	5	SYSTEM_ERROR	1																				X
	4	LEVEL_MEASUREMENT_ERROR	1																				X
	3	CURRENT_A_ERROR						X															X
	2	CURRENT_B_ERROR						X															X
	1	SENSOR_ERROR						X															X
	0	EMPTY_PIPE_DETECTED						X															X
2	7	FLOW_EXCEEDING_LIMIT						X															X
	6	CONVERTER_ERROR						X															X
	5	IO_CONNECTION_ERROR						X															X
	4	IO_OVERRANGE_DETECTED						X															X
	3	APPLICATION_FAILURE						X															X
	2	Reserved																					X
	1	Reserved																					X
	0	Reserved																					X

DIAGNOSIS_EXTENSION			DIAGNOSIS																			
			1							2							3		4			
			0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	7	
Octet number	Bit number	Subparameter	DIA_HW_ELECTR	DIA_HW_MECH	DIA_TEMP_MOTOR	DIA_TEMP_ELECTR	DIA_MEM_CHKSUM	DIA_MEASUREMENT	DIA_NOT_INIT	DIA_INIT_ERR	DIA_ZERO_ERR	DIA_SUPPLY	DIA_CONF_INVAL	DIA_WARMSTART	DIA_COLDSTART	DIA_MAINTENANCE	DIA_CHARACT	IDENT NUMBER Violation	Reserved	Reserved	EXTENSION_AVAILABLE	
3	7	SENSOR_DIAGNOSTIC					X														X	
	6	CONVERTER_DIAGNOSTIC					X															X
	5	ELECTRONIC_TEMPERATURE					X															X
	4	PIPE_NOT_FULL					X															X
	3	OVERFLOW_COUNTER					X															X
	2	OUT_OF_SPECIFICATION					X															X
	1	Reserved																				X
	0	Reserved																				X
4	7	Reserved																				X
	6	DATA_SET_ERROR																				X
	5	WRITE_CYCLES_EXCEEDED																				X
	4	SIMULATION_RUNNING																				X
	3	COMMUNICATION_PROFIBUS																				X
	2	POWER_FAIL					X															X
	1	OPERATING_STATE_INFORMATION					X															X
	0	Reserved																				X
5	7	BM_DEV_ERROR	1																			X
	6	Reserved					X															X
	5	Reserved					X															X
	4	Reserved					X															X
	3	Reserved					X															X
	2	Reserved					X															X
	1	Reserved					X															X
	0	Reserved																				X

DIAGNOSIS_EXTENSION			DIAGNOSIS														3	4					
			1							2													
			0	1	2	3	4	5	6	7	0	1	2	3	4	5			6	7	7
Octet number	Bit number	Subparameter	DIA_HW_ELECTR	DIA_HW_MECH	DIA_TEMP_MOTOR	DIA_TEMP_ELECTR	DIA_MEM_CHKSUM	DIA_MEASUREMENT	DIA_NOT_INIT	DIA_INIT_ERR	DIA_ZERO_ERR	DIA_SUPPLY	DIA_CONF_INVAL	DIA_WARMSTART	DIA_COLDSTART	DIA_MAINTENANCE	DIA_CHARACT	IDENT NUMBER Violation	Reserved	Reserved	EXTENSION_AVAILABLE		
6	7	NO_BASIC_DEVICE_COM	1																			X	
	6	PARA_UPDATE_ERROR	1																				X
	5	MEAS_AVAILABLE_NO	1																				X
	4	CPU_ERROR	1																				X
	3	MEM_ERROR	1																				X
	2	CYCLE_OVERFLOW														X							X
	1	Reserved																					X
	0	Reserved																					X

1 :Ext_Diag (Bit 3 of Station_Status_1) will be set additionally

X :Corresponding DIAGNOSIS bits is set to 1 if status occurred

Detailed description of special settings concerning the PROFIBUS features easily operated via the local display menu of the signal converter (refer to the following sections). For a detailed description of the menus and functions in general please refer to the standard product documentation of the signal converter.

5.1 Menu A, quick setup

No.	Function	Settings / descriptions
-----	----------	-------------------------

A2 Tag

A2	Tag	Tag descriptor of the physical block of the PROFIBUS module will be displayed. The Tag descriptor provides an application specific reference to the blocks. It will be assigned by the user of the device. The Tag descriptor is an octet string (a visible string will be preferred) consisting of 32 byte and may be amended by the user.
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A3 reset

A3	reset	-
A3.1	reset errors	This menu function can be used to reset all errors that are not removed automatically (power fail, totalizer overflow) reset? Select: no / yes no: Exit the function. yes: Resets the errors and exits the function.
The following reset menus for the totalizer are only available, if the quick access has been activated in the menu "setup > device > quick setup". Each totalizer can be activated for quick access independently.		
A3.2	FB2 totalizer 1	For PROFIBUS devices: The totalizer can be reset to zero in this menu.
A3.3	FB3 totalizer 2	
A3.4	FB4 totalizer 3	

A4 station address

A4	station address	Selects the address of the device at the PROFIBUS interface. The PROFIBUS address can also be changed using the PROFIBUS service "set_slave_add". The input range is 0...125 according to the PROFIBUS specification. Address 126 is the default address and cannot be set via the PROFIBUS service "set_slave_add" - use menu instead to reset to default address.
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5.2 Menu B, test

No.	Function	Settings / descriptions
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B3 information

B3.5	PROFIBUS	Available if there is a PROFIBUS interface in existence; displays the following mentioned information about the PROFIBUS interface: Ident No. / software revision no. of the PROFIBUS software / production date
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5.3 Menu C, setup

No.	Function	Settings / descriptions
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C3 I/O totalizer

C3.1	FB2 totalizer 1	Set function of totalizer <input type="checkbox"/> <input type="checkbox"/> stands for 1, 2, 3 (= totalizer 1, 2, 3)
C3.2	FB3 totalizer 2	
C3.3	FB4 totalizer 3	
C3. <input type="checkbox"/> .1	funct. of totalizer	Select: sum totalizer (counts positive and negative values) / +totalizer (counts only the positive values) / -totalizer (counts only the negative values) / hold totalizer (totalizer is stopped, no counting) / all as positive (neg. input will be multiplied with -1.0) / all as negative (pos. values will be multiplied with 1.0)
C3. <input type="checkbox"/> .2	measurement	Selection of the measurement for totalizer <input type="checkbox"/> Select: volume flow / mass flow
C3. <input type="checkbox"/> .3	preset value	Predefines a threshold (using high low limit value of the totalizer affected; the THRESHOLD bit will be set in the long status information bytes of the interface if the actual value of the totalizer is outside these limits. This can be also used for a status output.
C3. <input type="checkbox"/> .4	reset totalizer	The current value of the totalizer can be set to zero. Select: no / yes (reset totalizer 1...3)
C3. <input type="checkbox"/> .5	error behaviour	Defines the behaviour of this function block in case of errors. Select: hold meas. value / ignore error / stop totalizer hold meas. value: Totalization is continued based on the last incoming value with good status before the first occurrence of bad status. ignore error: Totalization is continued using the input values despite the bad status. The status is ignored. stop totalizer: Totalization is stopped during occurrence of bad status of incoming values.
C3. <input type="checkbox"/> .6	information	Serial no. of the I/O board, software version no. and production date of the circuit board will be displayed

C4 I/O PROFIBUS

C4	I/O PROFIBUS	Using the menu functions mentioned below you will be able to control basically the five analog input blocks of this PROFIBUS device. These five menus are identical so they are grouped together and their functions are described in one go.
C4.1	FB1 analog inp.	There are 5 analog input blocks. <input type="checkbox"/> stands for the 5 analog input blocks: FB1 (<input type="checkbox"/> = 1), FB5 (<input type="checkbox"/> = 2), FB6 (<input type="checkbox"/> = 3), FB7 (<input type="checkbox"/> = 4) and FB8 (<input type="checkbox"/> = 5)
C4.2	FB5 analog inp.	
C4.3	FB6 analog inp.	
C4.4	FB7 analog inp.	
C4.5	FB8 analog inp.	
C4. <input type="checkbox"/> .1	measurement	Select measurement for the analog input blocks: flow speed / volume flow / mass flow / coil temperature / conductivity / temperature (electronic temperature) / supply (internal supply voltage for PROFIBUS interface) / electrode noise (diagnosis value) / terminal 2 DC (diagnosis value) / terminal 3 DC (diagnosis value)
C4. <input type="checkbox"/> .2	time constant	Set time constant for this function block (<input type="checkbox"/>).

No.	Function	Settings / descriptions
C4.□.3	error behaviour	Defines the behaviour of this function block in case of errors.
		Select: hold value / ignore error / replace value
		hold value: Last valid OUT value stored will be used as OUT value. ignore error: OUT has the wrong calculated value and status "Bad" as calculated. replace value: The "replacement value" will be used as OUT value.
C4.□.4	replacement value	Available, if the error behaviour "replace value" is selected. Defines the value that replaces the measured value at this function block in case of an error.

C5 device

C5.1.1	Tag	Tag descriptor of the physical block of the PROFIBUS module will be displayed. The Tag descriptor provides an application specific reference to the blocks. It will be assigned by the user of the device. The Tag descriptor is an octet string (a visible string will be preferred) consisting of 32 byte and may be amended by the user.
C5.3	1. meas. page	Setting of the measurement for the 1st measuring page.
C5.3.1	function	Specify number of measured value lines (font size)
		Select: one line / two lines / three lines
C5.3.2	measurement 1.line	Specify measurement for 1st line.
		Select: volume flow / mass flow / diagnosis value / flow speed / coil temperature / conductivity
C5.3.8	measurement 2.line	Specify measurement of 2nd line (only available if this 2.line is activated)
		Select: bar graph (for the measurement selected in 1.line) / volume flow / mass flow / diagnosis value / flow speed / FB2 totalizer 1 / FB3 totalizer 2 / FB4 totalizer 3 / conductivity / coil temperature / operating hours
C5.3.10	measurement 3.line	Specify measurement of 3rd line (only available if this 3.line is activated)
		Select: volume flow / mass flow / diagnosis value / flow speed / FB2 totalizer 1 / FB3 totalizer 2 / FB4 totalizer 3 / conductivity / coil temperature / operating hours
C5.4	2. meas. page	Setting of the measurement for the second measuring page.
		For PROFIBUS devices this page shows only the PROFIBUS values FB1...FB8.
C5.4.1 C5.4.3 C5.4.5	measurement 1.line measurement 2.line measurement 3.line	Select the measurement of the 1st, 2nd and 3rd line: FB1 analog inp. / FB2 totalizer 1 / FB3 totalizer 2 / FB4 totalizer 3 / FB5 analog inp. / FB6 analog inp. / FB7 analog inp. / FB8 analog inp.
C5.4.2 C5.4.4 C5.4.6	format 1.line format 2.line format 3.line	Fixed number of digits after the decimal point or automatic, where the number of digits is automatically adjusted to the available space.
C5.6	special functions	-
C5.6.1	reset errors	This menu function can be used to reset all errors that are not removed automatically (power fail, totalizer overflow)
		reset? Select: no / yes
Note: With the following two functions data and settings of the PROFIBUS interface are not saved or loaded!		
C5.6.2	save settings	Save current settings. Select: break (exit function without saving) / backup 1 (save in storage location 1) / backup 2 (save in storage location 2)
		Query: continue copy? (cannot be undone) Select: no (exit function without saving) / yes (copy current settings to storage backup 1 or backup 2)

No.	Function	Settings / descriptions
C5.6.3	load settings	Load saved settings. Select: break (exit function without loading) / factory settings (load in state as delivered) / backup 1 (load data from storage location 1) / backup 2 (load data from storage location 2) / load sensor data (factory settings of calibration data)
		Query: continue copy? (cannot be undone) Select: no (exit the function without saving) / yes (load data from the selected storage location)
C5.8	physical block	This menu is only available, if a PROFIBUS interface is present.
C5.8.1	station address	Selects the PROFIBUS station address of the device.
		The PROFIBUS address can also be changed using the PROFIBUS service "set_slave_add". The input range is 0...125 according to the PROFIBUS specification. Address 126 is the default address and cannot be set via the PROFIBUS service "set_slave_add" - use menu instead to reset to default address.
C5.8.2	information	Available if there is a PROFIBUS interface in existence; displays the following mentioned information about the PROFIBUS interface: Ident No. / software revision no. of the PROFIBUS software / production date
C5.8.3	diag. extension	Content of the PROFIBUS diagnosis extension is displayed.
C5.8.4	diag. extension 2	Content of the additional diagnosis is displayed.
C5.8.5	diag. extension i	i = internal
		Content of the internal PROFIBUS diagnosis extension is displayed.
C5.8.6	diag. extension h	h = history
		Content of the PROFIBUS diagnosis extension is displayed. Shows diagnosis information of all diagnosis bits, which are set again since the last delete.
C5.8.7	diag. extension i h	i = internal h = history
		Content of the internal PROFIBUS diagnosis extension is displayed.
C5.8.8	Identification No.	Sets different device modes for the cyclic communication of the PROFIBUS interface.
		Select: signal converter (the normal settings incl. all manufacturer specific parameters are supported) / profile (uses only the profile defined functions, no extras, only profile specific parameters are supported) / automatic (automatic adaptation of the Identification No. of the PROFIBUS PA slave to the configuration requested by a PROFIBUS master without additional interaction of the user during start-up)
C5.8.9	condensed status	Indicates the mode of a device that can be configured for status and diagnostic behaviour.
		0: Classic status and diagnosis information provided 1: Condensed status and diagnosis information provided
C5.9	quick setup	Activate quick access in quick setup menu; default setting: quick setup is active (yes)
		Select: yes (switched on) / no (switched off)
C5.9.1	reset totalizer 1 / counter 1	The reset can be activated in the "quick setup" to get a quick access of the function. Select: yes (activated) / no (switched off)
C5.9.2	reset totalizer 2 / counter 2	
C5.9.3	reset totalizer 3 / counter 3	

5.4 Menu D, service

This menu is protected. You will need to use the service password to gain access.

No.	Function	Settings / descriptions
D2	service parameters	In this menu all functions related to different data sets can be found.
D2.1	cold start	Resetting of the signal converter can be done here but all changes up to this point are automatically stored and cannot be discarded. Select: no (terminates the function) / yes (performs the reset and leaves the setting mode)
D2.2	save factory data	Copies the actual data into the factory setting; this overwrites the factory settings done during calibration! Query: save settings? (cannot be undone) Select: break (exit function without saving) / factory settings (saves the settings as factory settings) Query: continue copy? (cannot be undone) Select: no (exit function without saving) / yes (copy current settings to the selected storage location)
D2.9	Identification No.	Sets different device modes for the cyclic communication of the PROFIBUS interface. Select: signal converter (the normal settings incl. all manufacturer specific parameters are supported) / profile (uses only the profile defined functions, no extras, only profile specific parameters are supported) / automatic (automatic adaptation of the Identification No. of the PROFIBUS PA slave to the configuration requested by a PROFIBUS master without additional interaction of the user during start-up)
D2.10	PB cold start	Initiates a PROFIBUS cold start. During a PROFIBUS cold start nearly all parameter values of the whole device will be set to their default values (Exceptions are the PROFIBUS address and the identification No.). For these functions / parameters all changed settings are received. The cold start will be carried out without disconnecting an already established connection to a PROFIBUS master system. Query: reset? (to default values) = cold start begins Select: no (terminates the function) / yes (PROFIBUS cold start will be carried out at once; the setting mode is terminated)
D2.12	diag. extension h	h = history Delete the stored history. Query: reset? = reset history to 0) Select: no (no change) / yes (all saved data are deleted)
D2.14	condensed status	Indicates the mode of a device that can be configured for status and diagnostic behaviour. 0: Classic status and diagnosis information provided 1: Condensed status and diagnosis information provided
D2.15	diag. extension i h	i = internal h = history Delete the stored history. Query: reset? = reset history to 0) Select: no (no change) / yes (all saved data are deleted)









KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature assemblies
- Pressure transmitters
- Analysis products
- Products and systems for the oil & gas industry
- Measuring systems for the marine industry

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