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Special Documentation
Proline Promag/Promass EtherNet/IP

System integration

EtherNet/IP

Endress+Hauser
People for Process Automation

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1 About this document

1.1 Document function

This manual is Special Documentation; it does not replace the Operating Instructions pertaining to the device. It serves as a reference manual and a complementary source of information for the integration of field devices with a digital EtherNet/IP interface into process control systems and controllers.

The output data indicated in the Operating Instructions are hereby corrected and are used for implicit data exchange, e.g. for resetting the totalizers or starting a verification process.

1.2 Target audience

The document is aimed at specialists who integrate measuring devices into various control systems with specific configurations.

1.3 Content and scope

This Special Documentation contains the following information:
- Product features and availability
- Integration of the measuring device into a plant network

1.4 Symbols

1.4.1 Safety symbols

DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

CAUTION
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol contains information on procedures and other facts which do not result in personal injury.

1.4.2 Symbols for certain types of information

Symbol	Meaning
	Tip Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Notice or individual step to be observed

Symbol	Meaning
1., 2., 3...	Series of steps
↳	Result of a step
	Operation via local display
	Operation via operating tool
	Write-protected parameter

1.4.3 Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

1.5 Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR code) on the nameplate

This Special Documentation is available:
- On the CD-ROM supplied with the device (depending on the device version ordered)
- In the Download Area of the Endress+Hauser Internet site: www.endress.com → Downloads

This documentation is an integral part of the following Operating Instructions:

Electromagnetic flowmeters

Measuring device	Documentation code
Promag E 100	BA01308D
Promag H 100	BA01173D
Promag P 100	BA01174D
Promag H 300	BA01716D
Promag P 300	BA01717D
Promag W 300	BA01937D
Promag D 400	BA01212D
Promag L 400	BA01213D
Promag W 400	BA01214D
Promag H 500	BA01720D
Promag P 500	BA01721D
Promag W 500	BA01922D

Coriolis flowmeters

Measuring device	Documentation code
Promass A 100	BA01182D
Cubemass C 100	BA01183D
Promass E 100 (8E1B**-...)	BA01064D
Promass E 100 (8E1C**-...)	BA01712D
Promass F 100	BA01065D
Promass G 100	BA01347D
Promass H 100	BA01184D
Promass I 100	BA01066D
Promass O 100	BA01185D
Promass P 100	BA01067D
Promass S 100	BA01068D
Promass X 100	BA01186D
Promass A 300 (8A3B**-...)	BA01699D
Promass A 300 (8A3C**-...)	BA01844D
Cubemass C 300	BA01726D
Promass E 300	BA01727D
Promass F 300	BA01728D
Promass H 300	BA01729D
Promass I 300	BA01730D
Promass O 300	BA01731D
Promass P 300	BA01732D
Promass Q 300	BA01733D
Promass S 300	BA01734D
Promass X 300	BA01735D
Promass A 500 (8A5B**-...)	BA01747D
Promass A 500 (8A5C**-...)	BA01885D
Cubemass C 500	BA01748D
Promass E 500	BA01749D
Promass F 500	BA01750D
Promass H 500	BA01751D
Promass I 500	BA01752D
Promass O 500	BA01753D
Promass P 500	BA01754D
Promass Q 500	BA01755D
Promass S 500	BA01756D
Promass X 500	BA01757D

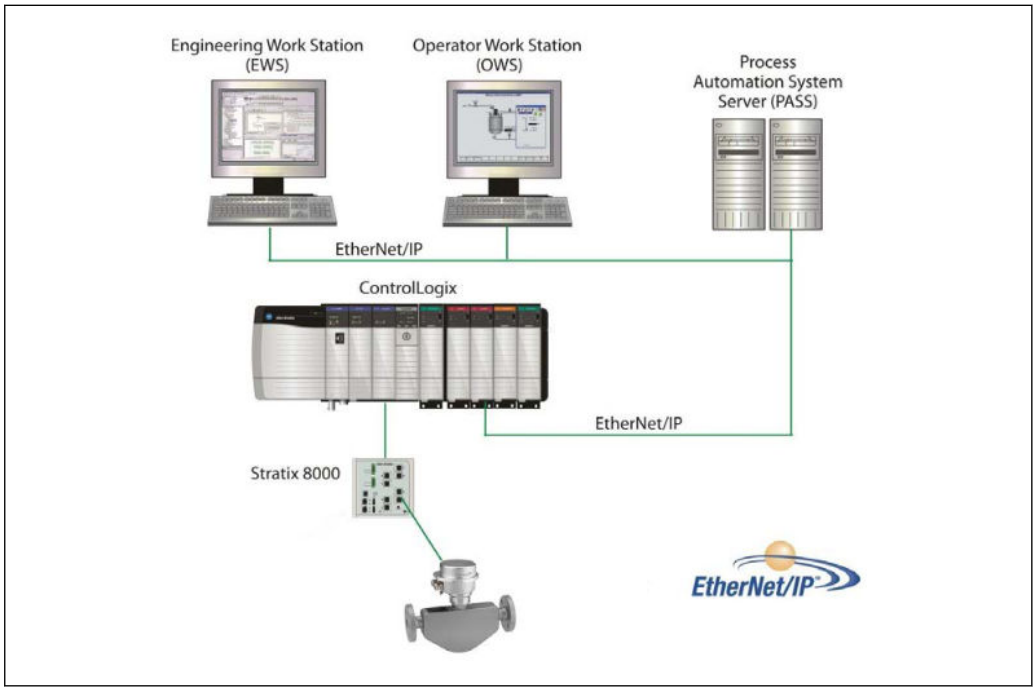
1.6 Registered trademarks

EtherNet/IP™
Trademark of ODVA, Inc.

2 System integration

The measuring device is integrated into a plant network for permanent access to measured values and status information for SCADA applications. This is possible in the following way:

2.1 LAN interface and network



1 *Automation system, e.g. ControlLogix 5000 (Rockwell Automation)*

2.2 Connecting the measuring device with the Ethernet network

The measuring device is integrated into the plant network via the device's Ethernet interface (port RJ45) with an Ethernet / EtherNet/IP network/switch.

NOTICE

Electrical safety is compromised by an incorrect connection!

- ▶ Have electrical connection work carried out by appropriately trained specialists only.
- ▶ Observe applicable federal/national installation codes and regulations.
- ▶ Comply with local workplace safety regulations.
- ▶ Always connect the protective ground cable ⏚ before connecting additional cables.
- ▶ When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

An adapter for RJ45 and the M12 connector is optionally available:

The adapter connects the Ethernet interface (port RJ45) to an M12 connector mounted in the cable entry. Therefore the connection to the interface can be established via an M12 connector without opening the measuring device.

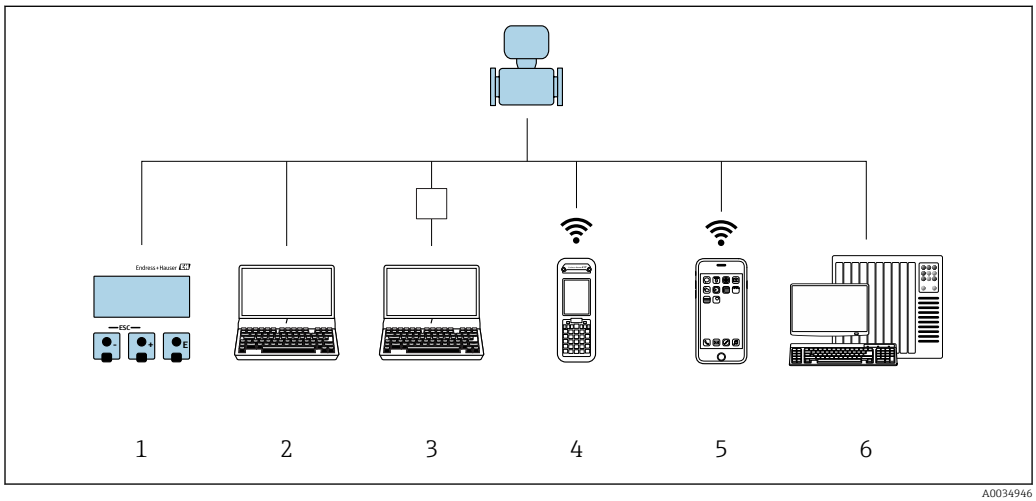
Note the following when connecting without an adapter:

- Recommended cable: CAT 5e, CAT 6 or CAT 7, with shielded connector
- Bending radius: 5 x cable thickness
- Please refer to the relevant Operating Instructions for additional information

3 Commissioning

Following the electrical and mechanical installation of the device, provide voltage to the measuring device.

3.1 Accessing device parameters



2 *Overview of the operating options*

1 *Local operation via display module*
2 *Computer with Web browser (e.g. Internet Explorer) or with operating tool (e.g. FieldCare, DeviceCare) via service interface (RJ-45) or WLAN interface of the measuring device*
3 *Computer with Web browser (e.g. Internet Explorer) or with operating tool (e.g. FieldCare, DeviceCare) via Ethernet switch if the measuring device is integrated into an Ethernet network*
4 *Field Xpert SFX350 or SFX370 via WLAN interface*
5 *Mobile handheld terminal via WLAN interface*
6 *Control system (e.g. PLC)*

For detailed information on the operation of the device:
Operating Instructions for the measuring device → 5

3.2 Implicit data exchange – Promag 100

The following modules are available for data exchange with the field device:

Block model

The block model shows which input and output data the measuring device makes available for implicit messaging. Cyclical data exchange is performed using an EtherNet/IP scanner, e.g. a distributed control system.

Measuring device					Control system
Transducer Block	Input Assembly Fix (Assem100) 40 byte	→ 🖹 9	Permanently assigned input group	→	EtherNet/IP
	Input Assembly Configurable (Assem101) 88 byte	→ 🖹 11	Configurable input group	→	
	Output Assembly Fix (Assem102) 56 byte	→ 🖹 12	Permanently assigned output group	←	
	Config Assembly (Assem104) 398 byte		Permanently assigned Configuration		

3.2.1 Input module (Assembly 100 fix)

Output data of the field device in a pre-defined quantity and sequence to the controller.

Permanently assigned input group

Input Assembly Fix (Assem100), 40 byte

Description		Byte
1.	File header (not visible)	1-4
2.	Actual diagnostics [1) 2)]	5-8
3.	Volume flow	9-12
4.	Mass flow	13-16
5.	Corrected volume flow	17-20
6.	Conductivity	21-24
7.	Temperature	25-28
8.	Totalizer 1	29-32
9.	Totalizer 2	33-36
10.	Totalizer 3	37-40

1) Diagnostic information via EtherNet/IP
2) See the following table → 🖹 9

Current diagnostics information	Diagnostic number	Description
0	–	Device ok
16777276	F281	Electronic initialization
16777312	F437	Configuration incompatible
16777319	F242	Software incompatible
16777323	F252	Modules incompatible
16777337	F272	Main electronic failure
16777340	F270	Main electronic failure

Current diagnostics information	Diagnostic number	Description
16777341	F271	Main electronic failure
16777343	F270	Main electronic failure
16777344	F270	Main electronic failure
16777355	F410	Data transfer
16777368	F273	Main electronic failure
16777375	F270	Main electronic failure
16777376	F083	Memory content
16777409	F833	Electronic temperature too low
16777411	F832	Electronic temperature too high
16777413	F834	Process temperature too high
16777414	F835	Process temperature too low
16777429	F022	Sensor temperature
16777430	F022	Sensor temperature
16777441	F311	Electronic failure
16777445	F273	Main electronic failure
16777447	F082	Data storage
16777450	F190	Special event 1
16777483	F273	Main electronic failure
16777490	F390	Special event 2
16777497	F222	Electronic drift
16777500	F062	Sensor connection
16777509	F990	Special event 4
16777545	F262	Module connection
16777546	F537	Configuration
16777547	F201	Device failure
16777563	F500	Electrode 1 potential exceeded
16777564	F500	Electrode 2 potential exceeded
16777565	F500	Electrode difference voltage too high
16777579	F531	Empty pipe detection
16777581	F382	Data storage
16777582	F383	Memory content
16777583	F283	Memory content
33554536	C411	Up-/download active
33554537	C411	Up-/download active
33554540	C411	Up-/download active
33554576	C484	Failure mode simulation
33554579	C485	Process value simulation
33554580	C453	Flow override
33554625	C833	Electronic temperature too low
33554627	C832	Electronic temperature too high
33554629	C834	Process temperature too high
33554630	C835	Process temperature too low

Current diagnostics information	Diagnostic number	Description
33554778	C530	Electrode cleaning is running
33554795	C531	Empty pipe detection
33554926	C302	Device verification active
67108970	M438	Dataset
67109057	M833	Electronic temperature too low
67109059	M832	Electronic temperature too high
67109061	M834	Process temperature too high
67109062	M835	Process temperature too low
67109090	M311	Electronic failure
67109156	M590	Special event 3
67109227	M531	Empty pipe detection
134217873	S842	Process limit
134217874	S862	Pipe empty

3.2.2 Input module (Assembly 101 user-configurable)

User-configurable output data of the field device to the controller. Some selection options, such as Heartbeat Verification, are optionally available.

Configurable input group

Input Assembly Configurable (Assem101), 88 byte

Description	Format
1. - 10. Input values 1 to 10 [1]	Real
11. - 20. Input values 11 to 20 [2]	Double integer

1) See the following table → 🖹 11
2) See the following table → 🖹 11

Possible input values

Possible input values 1 to 10		
▪ Off ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow	▪ Temperature ▪ Conductivity ▪ Totalizer 1 ▪ Totalizer 2	▪ Totalizer 3 ▪ Electronic temperature ▪ Flow velocity

Possible input values 11 to 20		
▪ Off ▪ Current diagnostic ▪ Previous diagnostic ▪ Mass flow unit ▪ Volume flow unit	▪ Corrected volume flow unit ▪ Temperature unit ▪ Conductivity unit ▪ Totalizer 1 unit ▪ Totalizer 2 unit	▪ Totalizer 3 unit ▪ Flow velocity unit ▪ Verification results [1] ▪ Verification status [1]

1) Only available with the Heartbeat Verification application package.

3.2.3 Output module (Assembly 102 fix)

Input data to the field device in a pre-defined quantity and sequence from the controller. The following data are necessary for this:

Permanently assigned output group

Output Assembly Fix (Assem102), 56 byte

Description (format)	Byte	Bit	Value/code: function/unit
1. Totalizer 1 control activation	1	1	▪ 0: Disable ▪ 1: Enable
2. Totalizer 2 control activation		2	
3. Totalizer 3 control activation		3	
4. Reference density compensation activation		4	
5. Temperature compensation activation		5	
6. Verification activation		6	
7. Not used		7	–
8. Not used		8	–
9. Not used	2-4	24	–
10. Totalizer 1 – control (integer)	5+6	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
11. Not used	7+8	16	–
12. Totalizer 2 – control (integer)	9+10	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
13. Not used	11+12	16	–
14. Totalizer 3 – control (integer)	13+14	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
15. Not used	15+16	16	–
16. External density (real)	17-20	32	External reference density to field device in "IEEE 754" data format

Description (format)	Byte	Bit	Value/code: function/unit
17. External density unit (integer)	21+22	16	▪ 12040: g/cm³ ▪ 2088: g/m³ ▪ 2109: kg/dm³ ▪ 12048: kg/l ▪ 12039: kg/m³ ▪ 2204: SD4°C ▪ 2277: SD15°C ▪ 2230: SD20°C ▪ 2228: SG4°C ▪ 2226: SG15°C ▪ 2227: SG20°C ▪ 12044: lb/ft³ ▪ 12043: lb/gal (us) ▪ 2174: lb/bbl (us;liq.) ▪ 2173: lb/bbl (us;beer) ▪ 2175: lb/bbl (us;oil) ▪ 2176: lb/bbl (us;tank) ▪ 2180: lb/gal (imp) ▪ 2179: lb/bbl (imp;oil) Signed integers (16 bit)
18. Not used	23+24	16	–
19. External temperature (real)	25-28	32	External reference temperature to field device in the "IEEE 754" data format
20. External temperature unit (integer)	29+30	16	▪ 4608: °C ▪ 4609: °F ▪ 4610: K ▪ 4611: °R Signed integers (16 bit)
21. Not used	31+32	16	–
22. Start verification (integer)	33+34	16	▪ -32713: Cancel ▪ -32378: Start Signed integers (16 bit)
23. Not used	35+36	176	–

Use of the totalizer

e.g. reset totalizer 1 in Output Assembly Fix (Assem102)

1. Activation of totalizer control function:
   In the 1st module (totalizer 1 control activation), send a 1 to the device.
2. Reset the totalizer:
   In the 10th module (totalizer 1 – control (integer)), send a 198 to the device.

3.3 Implicit data exchange – Promag 300/500

The following modules are available for data exchange with the field device:

Block model

The block model shows which input and output data the measuring device makes available for implicit messaging. Cyclical data exchange is performed using an EtherNet/IP scanner, e.g. a distributed control system.

Measuring device					Control system
Transducer Block	Input Assembly Fix (Assem100) 40 byte	→ 14	Permanently assigned input group	→	EtherNet/IP
	Input Assembly Configurable (Assem101) 88 byte	→ 18	Configurable input group	→	
	Volume flow fixed input assembly (Assem106) 40 byte	→ 19	Permanently assigned input group	→	
	Mass flow fixed input assembly (Assem107) 58 byte	→ 19	Permanently assigned input group	→	
	Heartbeat monitoring fixed input assembly [1] (Assem112) 44 byte	→ 20	Permanently assigned input group	→	
	Output Assembly Fix (Assem102) 30 byte	→ 20	Permanently assigned output group	←	
	Config Assembly (Assem104) 398 byte		Permanently assigned Configuration		

1) Only available with the Heartbeat Verification application package.

3.3.1 Input module (Assembly 100 fix)

Output data of the field device in a pre-defined quantity and sequence to the controller.

Permanently assigned input group

Input Assembly Fix (Assem100), 40 byte

Description		Byte
1.	File header (not visible)	1-4
2.	Actual diagnostics [1) 2)]	5-8
3.	Volume flow	9-12
4.	Mass flow	13-16
5.	Corrected volume flow	17-20
6.	Conductivity	21-24
7.	Temperature	25-28
8.	Totalizer 1	29-32
9.	Totalizer 2	33-36
10.	Totalizer 3	37-40

1) Diagnostic information via EtherNet/IP
2) See the following table → 15

Current diagnostics information	Diagnostic number	Description
0	–	Device ok
65579	F043	Sensor short circuit
65618	F082	Data storage
65619	F083	Memory content
65706	F170	Coil resistance
65716	F180	Temperature sensor defective
65717	F181	Sensor connection
65737	F201	Device failure
65778	F242	Software incompatible
65788	F252	Modules incompatible
65798	F262	Sensor electronic connection faulty
65806	F270	Main electronic failure
65807	F271	Main electronic failure
65808	F272	Main electronic failure
65809	F273	Main electronic failure
65811	F275	I/O module 1 defective
65812	F276	I/O module 1 faulty
65819	F283	Memory content
65867	F331	Firmware update failed
65868	F332	Writing in HistoROM backup failed
65897	F361	I/O module 1 faulty
65908	F372	Sensor electronic (ISEM) faulty
65909	F373	Sensor electronic (ISEM) faulty
65911	F375	I/O 1 communication failed
65912	F376	Sensor electronic (ISEM) faulty
65913	F377	Sensor electronic (ISEM) faulty
65918	F382	Data storage
65919	F383	Memory content
65923	F387	HistoROM backup failed
65946	F410	Data transfer
65973	F437	Configuration incompatible
66048	F512	Sensor electronic (ISEM) faulty
66056	F520	I/O 1 hardware configuration invalid
66067	F531	Empty pipe adjustment faulty
66073	F537	Configuration
66339	F803	Current loop
66368	F832	Electronic temperature too high
66369	F833	Electronic temperature too low
66370	F834	Process temperature too high
66371	F835	Process temperature too low
66418	F882	Input signal
66473	F937	Sensor symmetry

Current diagnostics information	Diagnostic number	Description
66474	F938	EMC interference
66498	F962	Empty pipe
131115	C043	Sensor short circuit
131374	C302	Device verification active
131448	C376	Sensor electronic (ISEM) faulty
131449	C377	Sensor electronic (ISEM) faulty
131484	C412	Processing download
131503	C431	Trim 1
131525	C453	Flow override
131556	C484	Failure mode simulation
131557	C485	Measured variable simulation
131558	C486	Current input 1 simulation
131563	C491	Current output 1 simulation
131564	C492	Simulation frequency output 1
131565	C493	Simulation pulse output 1
131566	C494	Switch output simulation 1
131567	C495	Diagnostic event simulation
131568	C496	Status input simulation
131583	C511	ISEM settings faulty
131602	C530	Electrode cleaning is running
131603	C531	Empty pipe adjustment faulty
131666	C594	Relay output simulation
131904	C832	Electronic temperature too high
131905	C833	Electronic temperature too low
131906	C834	Process temperature too high
131907	C835	Process temperature too low
132009	C937	Sensor symmetry
132010	C938	EMC interference
132034	C962	Pipe empty
262187	M043	Sensor short circuit
262313	M169	Conductivity measurement failed
262447	M303	I/O 1 configuration changed
262455	M311	Electronic failure
262474	M330	Flash file invalid
262520	M376	Sensor electronic (ISEM) faulty
262521	M377	Sensor electronic (ISEM) faulty
262582	M438	Dataset
262675	M531	Empty pipe adjustment faulty
262976	M832	Electronic temperature too high
262977	M833	Electronic temperature too low
262978	M834	Process temperature too high
262979	M835	Process temperature too low
263081	M937	Sensor symmetry

Current diagnostics information	Diagnostic number	Description
263082	M938	EMC interference
263106	M962	Pipe empty
524331	S043	Sensor short circuit
524664	S376	Sensor electronic (ISEM) faulty
524665	S377	Sensor electronic (ISEM) faulty
524729	S441	Current output 1
524730	S442	Frequency output 1
524731	S443	Pulse output 1
524732	S444	Current input 1
524819	S531	Empty pipe adjustment faulty
525120	M832	Electronic temperature too high
525121	M833	Electronic temperature too low
525122	M834	Process temperature too high
525123	M835	Process temperature too low
525130	S842	Process limit
525225	S937	Sensor symmetry
525226	S938	EMC interference
525249	S961	Electrode potential out of specification
525250	S962	Pipe empty
16843027	F275	I/O module 2 defective
16843028	F276	I/O module 2 faulty
16843113	F361	I/O module 2 faulty
16843127	F375	I/O 2 communication failed
16843272	F520	I/O 2 hardware configuration invalid
16908719	C431	Trim 2
16908774	C486	Current input 2 simulation
16908779	C491	Current output 2 simulation
16908780	C492	Simulation frequency output 2
16908781	C493	Simulation pulse output 2
16908782	C494	Switch output simulation 2
16908784	C496	Status input simulation
16908882	C594	Relay output simulation
17039663	M303	I/O 2 configuration changed
17301945	S441	Current output 2
17301946	S442	Frequency output 2
17301947	S443	Pulse output 2
17301948	S444	Current input 2
33620243	F275	I/O module 3 defective
33620244	F276	I/O module 3 faulty
33620329	F361	I/O module 3 faulty
33620343	F375	I/O 3 communication failed

Current diagnostics information	Diagnostic number	Description
33620488	F520	I/O 3 hardware configuration invalid
33685935	C431	Trim 3
33685990	C486	Current input 3 simulation
33685995	C491	Current output 3 simulation
33685996	C492	Simulation frequency output 3
33685997	C493	Simulation pulse output 3
33685998	C494	Switch output simulation 3
33686000	C496	Status input simulation
33686098	C594	Relay output simulation
33816879	M303	I/O 3 configuration changed
34079161	S441	Current output 3
34079162	S442	Frequency output 3
34079163	S443	Pulse output 3
34079164	S444	Current input 3
50397459	F275	I/O module 4 defective
50397460	F276	I/O module 4 faulty
50397545	F361	I/O module 4 faulty
50397559	F375	I/O 4 communication failed
50397704	F520	I/O 4 hardware configuration invalid
50594095	M303	I/O 4 configuration changed

3.3.2 Input module (Assembly 101 user-configurable)

User-configurable output data of the field device to the controller. Some selection options, such as Heartbeat Verification, are optionally available.

Configurable input group

Input assembly custom (Assem101), 88 byte

Description	Format
1. - 10. Input values 1 to 10 [1)]	Real
11. - 20. Input values 11 to 20 [2)]	Double integer

1) See the following table → 🖹 18
2) See the following table → 🖹 19

Possible input values

Possible input values 1 to 10		
▪ Off ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow	▪ Flow velocity ▪ Conductivity ▪ Corrected conductivity ▪ Temperature	▪ Electronic temperature ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3

Possible input values 11 to 20		
▪ Off ▪ Current diagnostic ▪ Previous diagnostic ▪ Mass flow unit ▪ Volume flow unit ▪ Corrected volume flow unit	▪ Temperature unit ▪ Conductivity unit ▪ Totalizer 1 unit ▪ Totalizer 2 unit ▪ Totalizer 3 unit	▪ Verification results [1] ▪ Verification status [1]

1) Only available with the Heartbeat Verification application package.

3.3.3 Input module volume flow (Assembly 106 fix)

Permanently assigned input group

Volume flow fixed input assembly (Assem106), 40 byte

Description	Byte
1. File header (not visible)	1-4
2. Actual diagnostics [1] [2]	5-8
3. Volume flow	9-12
4. Corrected volume flow	13-16
5. Conductivity	17-20
6. Temperature	21-24
7. Totalizer 1	25-28
8. Volume flow unit	29-30
9. Corrected volume flow unit	31-32
10. Conductivity unit	33-34
11. Temperature unit	35-36
12. Totalizer 1 unit	37-38
13. Padding byte	39-40

1) Diagnostic information via EtherNet/IP
2) See table → 🖹 15

3.3.4 Input module mass flow (Assembly 107 fix)

Permanently assigned input group

Mass flow fixed input assembly (Assem107), 58 byte

Description	Byte
→ **Input module volume flow (Assembly 106 fix)** → 🖹 19	1-40
1. Mass flow	41-44
2. Totalizer 2	45-48
3. Totalizer 3	49-52
4. Mass flow unit	53-54
5. Totalizer 2 unit	55-56
6. Totalizer 3 unit	57-58

3.3.5 Input module Heartbeat (Assembly 112 fix)

Permanently assigned input group

Heartbeat monitoring fixed input assembly (Assem112), 44 byte [1)]

Description	Byte
→ **Input module volume flow (Assembly 106 fix)** → 19	1-40
1. Verification status [2)]	41-42
2. Verification result [2)]	43-44

1) Only available with the Heartbeat Verification application package.
2) See the following table → 20

Input variable	Description
1. Verification status	▪ -32291: Done ▪ -32294: Busy ▪ 275: Failed ▪ -32375: Not done Signed integers (16 bit)
2. Verification result	▪ -32540: Not used ▪ 809: Passed ▪ -32375: Not done ▪ 2280: Not plugged ▪ 275: Failed Signed integers (16 bit)

3.3.6 Output module (Assembly 102 fix)

Input data to the field device in a pre-defined quantity and sequence from the controller. The following data are necessary for this:

Permanently assigned output group

Output Assembly Fix (Assem102), 30 byte

Description (format)	Byte	Bit	Value/code: function/unit
1. Totalizer 1 control activation	1	1	▪ 0: Disable ▪ 1: Enable
2. Totalizer 2 control activation		2	
3. Totalizer 3 control activation		3	
4. Reference density compensation activation		4	
5. Temperature compensation activation		5	
6. Verification activation		6	
7. Flow override activation		7	
8. Not used		8	
9. Not used	2	8	–
10. Not used	3+4	16	–
11. Totalizer 1 – control (integer)	5+6	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization ▪ -32608: Stop Signed integers (16 bit)

Description (format)	Byte	Bit	Value/code: function/unit
12. Totalizer 2 – control (integer)	7+8	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization ▪ -32608: Stop Signed integers (16 bit)
13. Totalizer 3 – control (integer)	9+10	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization ▪ -32608: Stop Signed integers (16 bit)
14. Not used	11+12	16	–
15. External density (real)	13-16	32	External reference density to field device in "IEEE 754" data format
16. External density unit (integer)	17+18	16	▪ 12040: g/cm^3 ▪ 12051: g/m^3 ▪ 12048: kg/l ▪ 12053: kg/dm^3 ▪ 12039: kg/m^3 ▪ 12065: SD4°C ▪ 12066: SD15°C ▪ 12067: SD20°C ▪ 12068: SG4°C ▪ 12069: SG15°C ▪ 12070: SG20°C ▪ 12044: lb/ft^3 ▪ 12043: lb/gal (us) ▪ 12058: lb/bbl (us;liq.) ▪ 12057: lb/bbl (us;beer) ▪ 12059: lb/bbl (us;oil) ▪ 12060: lb/bbl (us;tank) ▪ 12063: lb/gal (imp) ▪ 12061: lb/bbl (imp;beer) ▪ 12062: lb/bbl (imp;oil) Signed integers (16 bit)
17. Not used	19+20	16	–
18. External temperature (real)	21-24	32	External reference temperature to field device in the "IEEE 754" data format
19. External temperature unit (integer)	25+26	16	▪ 4608: °C ▪ 4609: °F ▪ 4610: K ▪ 4611: °R Signed integers (16 bit)
20. Start verification (integer)	27+28	16	▪ -32713: Cancel ▪ -32378: Start Signed integers (16 bit)
21. Flow override – control	29+30	16	▪ -32532: Off ▪ -32530: On Signed integers (16 bit)

Use of the totalizer

e.g. reset totalizer 1 in Output Assembly Fix (Assem102)

1. Activation of totalizer control function:
   In the 1st module (totalizer 1 control activation), send a 1 to the device.
2. Reset the totalizer:
   In the 11th module (totalizer 1 – control (integer)), send a 198 to the device.

3.4 Implicit data exchange – Promag 400

The following modules are available for data exchange with the field device:

Block model

The block model shows which input and output data the measuring device makes available for implicit messaging. Cyclical data exchange is performed using an EtherNet/IP scanner, e.g. a distributed control system.

Measuring device					Control system
Transducer Block	Input Assembly Fix (Assem100) 40 byte	→ 23	Permanently assigned input group	→	EtherNet/IP
	Input Assembly Configurable (Assem101) 88 byte	→ 27	Configurable input group	→	
	Output Assembly Fix (Assem102) 56 byte	→ 28	Permanently assigned output group	←	
	Config Assembly (Assem104) 398 byte		Permanently assigned Configuration		

3.4.1 Input module (Assembly 100 fix)

Output data of the field device in a pre-defined quantity and sequence to the controller.

Permanently assigned input group

Input Assembly Fix (Assem100), 40 byte

Description	Byte
1. File header (not visible)	1-4
2. Actual diagnostics [1) 2)]	5-8
3. Volume flow	9-12
4. Mass flow	13-16
6. Conductivity	17-20
8. Totalizer 1	21-24
9. Totalizer 2	25-28
10. Totalizer 3	29-32

1) Diagnostic information via EtherNet/IP
2) See the following table → 23

Current diagnostics information	Diagnostic number	Description
0	–	Device ok
16777265	F882	Input signal
16777276	F281	Electronic initialization
16777312	F437	Configuration incompatible
16777319	F242	Software incompatible
16777323	F252	Modules incompatible
16777337	F272	Main electronic failure
16777340	F270	Main electronic failure
16777341	F271	Main electronic failure

Current diagnostics information	Diagnostic number	Description
16777343	F270	Main electronic failure
16777344	F270	Main electronic failure
16777355	F410	Data transfer
16777368	F273	Main electronic failure
16777375	F270	Main electronic failure
16777376	F083	Memory content
16777409	F833	Electronic temperature too low
16777411	F832	Electronic temperature too high
16777413	F834	Process temperature too high
16777414	F835	Process temperature too low
16777429	F022	Sensor temperature
16777430	F022	Sensor temperature
16777441	F311	Electronic failure
16777445	F273	Main electronic failure
16777447	F082	Data storage
16777450	F190	Special event 1
16777483	F273	Main electronic failure
16777490	F390	Special event 2
16777497	F222	Electronic drift
16777500	F062	Sensor connection
16777508	F590	Special event 3
16777509	F990	Special event 4
16777545	F262	Module connection
16777546	F537	Configuration
16777547	F201	Device failure
16777563	F500	Electrode 1 potential exceeded
16777564	F500	Electrode 2 potential exceeded
16777565	F500	Electrode difference voltage too high
16777581	F382	Data storage
16777582	F383	Memory content
16777583	F283	Memory content
25165873	F882	Input signal
25165884	F281	Electronic initialization
25165920	F437	Configuration incompatible
25165927	F242	Software incompatible
25165931	F252	Modules incompatible
25165945	F272	Main electronic failure
25165948	F270	Main electronic failure
25165949	F271	Main electronic failure
25165963	F410	Data transfer
25165976	F273	Main electronic failure
25165984	F083	Memory content

Current diagnostics information	Diagnostic number	Description
25166017	F833	Electronic temperature too low
25166019	F832	Electronic temperature too high
25166021	F834	Process temperature too high
25166022	F835	Process temperature too low
25166037	F022	Sensor temperature
25166049	F311	Electronic failure
25166055	F082	Data storage
25166058	F190	Special event 1
25166098	F390	Special event 2
25166105	F222	Electronic drift
25166108	F062	Sensor connection
25166116	F590	Special event 3
25166117	F990	Special event 4
25166153	F262	Module connection
25166154	F537	Configuration
25166155	F201	Device failure
25166171	F500	Electrode 1 potential exceeded
25166189	F382	Data storage
25166190	F383	Memory content
25166191	F283	Memory content
33554536	C411	Up-/download active
33554537	C411	Up-/download active
33554540	C411	Up-/download active
33554576	C484	Failure mode simulation
33554579	C485	Process value simulation
33554580	C453	Flow override
33554625	C833	Electronic temperature too low
33554627	C832	Electronic temperature too high
33554629	C834	Process temperature too high
33554630	C835	Process temperature too low
33554778	C530	Electrode cleaning is running
33554782	C495	Diagnostic event simulation
33554926	C302	Device verification active
41943144	C411	Up-/download active
41943184	C484	Failure mode simulation
41943187	C485	Process value simulation
41943188	C453	Flow override
41943233	C833	Electronic temperature too low
41943235	C832	Electronic temperature too high
41943237	C834	Process temperature too high
41943238	C835	Process temperature too low
41943386	C530	Electrode cleaning is running
41943390	C495	Diagnostic event simulation

Current diagnostics information	Diagnostic number	Description
41943534	C302	Device verification active
67108970	M438	Dataset
67109057	M833	Electronic temperature too low
67109059	M832	Electronic temperature too high
67109061	M834	Process temperature too high
67109062	M835	Process temperature too low
67109090	M311	Electronic failure
75497578	M438	Dataset
75497665	M833	Electronic temperature too low
75497667	M832	Electronic temperature too high
75497669	M834	Process temperature too high
75497670	M835	Process temperature too low
134217873	S842	Process limit
134217874	S862	Pipe empty
134217921	S833	Electronic temperature too low
134217923	S832	Electronic temperature too high
134217925	S834	Process temperature too high
134217926	S835	Process temperature too low
134218011	S937	EMC interference
134218013	S004	Sensor
134218067	S043	Sensor short circuit
134218068	S937	EMC interference
134218071	S322	Electronic drift
134218072	S322	Electronic drift
134218091	S531	Empty pipe detection
142606481	S842	Process limit
142606482	S862	Pipe empty
142606529	S833	Electronic temperature too low
142606531	S832	Electronic temperature too high
142606533	S834	Process temperature too high
142606534	S835	Process temperature too low
142606619	S937	EMC interference
142606621	S004	Sensor
142606675	S043	Sensor short circuit
142606679	S322	Electronic drift
142606699	S531	Empty pipe detection
268435545	I1089	Power on
268435546	I1090	Configuration reset
268435547	I1091	Configuration changed
268435548	I1092	Trend data deleted
268435566	I1110	Write protection switch changed
268435593	I1137	Electronic changed
268435607	I1151	History reset

Current diagnostics information	Diagnostic number	Description
268435611	I1155	Reset electronic temperature
268435612	I1156	Memory error trend
268435613	I1157	Memory error event list
268435641	I1185	Display backup done
268435642	I1186	Restore via display done
268435643	I1187	Settings downloaded with display
268435644	I1188	Display data cleared
268435645	I1189	Backup compared
268435712	I1256	Display: access status changed
268435791	I1335	Firmware changed
268435807	I1351	Empty pipe detection adjustment failure
268435809	I1353	Empty pipe detection adjustment Ok
268435817	I1361	Wrong web server login
268435853	I1397	Fieldbus: access status changed
268435854	I1398	CDI: access status changed
268435900	I1444	Device verification passed
268435901	I1445	Device verification failed
268435913	I1457	Failed:Measured error verification
268435915	I1459	Failed: I/O module verification
268435917	I1461	Failed: Sensor verification
268435918	I1462	Failed: Sensor electronic module verific.

3.4.2 Input module (Assembly 101 user-configurable)

User-configurable output data of the field device to the controller. Some selection options, such as Heartbeat Verification, are optionally available.

Configurable input group

Input Assembly Configurable (Assem101), 88 byte

Description	Format
1. - 10. Input values 1 to 10 [1)]	Real
11. - 20. Input values 11 to 20 [2)]	Double integer

1) See the following table → 📄 27
2) See the following table → 📄 28

Possible input values

Possible input values 1 to 10		
▪ Off ▪ Mass flow ▪ Volume flow	▪ Conductivity ▪ Totalizer 1 ▪ Totalizer 2	▪ Totalizer 3 ▪ Electronic temperature ▪ Flow velocity

Possible input values 11 to 20		
▪ Off ▪ Current diagnostic ▪ Previous diagnostic ▪ Mass flow unit ▪ Volume flow unit	▪ Temperature unit ▪ Conductivity unit ▪ Totalizer 1 unit ▪ Totalizer 2 unit ▪ Totalizer 3 unit	▪ Flow velocity unit ▪ Verification results [1] ▪ Verification status [1]

1) Only available with the Heartbeat Verification application package.

3.4.3 Output module (Assembly 102 fix)

Input data to the field device in a pre-defined quantity and sequence from the controller. The following data are necessary for this:

Permanently assigned output group

Output Assembly Fix (Assem102), 56 byte

Description (format)	Byte	Bit	Value/code: function/unit
1. Totalizer 1 control activation	1	1	▪ 0: Disable ▪ 1: Enable
2. Totalizer 2 control activation		2	
3. Totalizer 3 control activation		3	
4. Reference density compensation activation		4	
5. Verification activation		5	
6. Not used		6	–
7. Not used		7	–
8. Not used		8	–
9. Not used	2-4	–	–
10. Totalizer 1 – control (integer)	5+6	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
11. Not used	7+8	16	–
12. Totalizer 2 – control (integer)	9+10	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
13. Not used	11+12	16	–
14. Totalizer 3 – control (integer)	13+14	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
15. Not used	15+16	16	–
16. External density (real)	17-20	32	External reference density to field device in "IEEE 754" data format

Description (format)	Byte	Bit	Value/code: function/unit
17. External density unit (integer)	21+22	16	▪ 12040: g/cm³ ▪ 2088: g/m³ ▪ 2109: kg/dm³ ▪ 12048: kg/l ▪ 12039: kg/m³ ▪ 2204: SD4°C ▪ 2277: SD15°C ▪ 2230: SD20°C ▪ 2228: SG4°C ▪ 2226: SG15°C ▪ 2227: SG20°C ▪ 12044: lb/ft³ ▪ 12043: lb/gal (us) ▪ 2174: lb/bbl (us;liq.) ▪ 2173: lb/bbl (us;beer) ▪ 2175: lb/bbl (us;oil) ▪ 2176: lb/bbl (us;tank) ▪ 2180: lb/gal (imp) ▪ 2179: lb/bbl (imp;oil) Signed integers (16 bit)
18. Not used	23+24	16	–
19. Start verification (integer)	25+26	16	▪ -32713: Cancel ▪ -32378: Start Signed integers (16 bit)
20. Not used	27-56	16	–

Use of the totalizer

e.g. reset totalizer 1 in Output Assembly Fix (Assem102)

1. Activation of totalizer control function:
   In the 1st module (totalizer 1 control activation), send a 1 to the device.
2. Reset the totalizer:
   In the 10th module (totalizer 1 – control (integer)), send a 198 to the device.

3.5 Implicit data exchange – Promass 100

The following modules are available for data exchange with the field device:

Block model

The block model shows which input and output data the measuring device makes available for implicit messaging. Cyclical data exchange is performed using an EtherNet/IP scanner, e.g. a distributed control system.

Measuring device					Control system
Transducer Block	Input Assembly Fix (Assem100) 44 byte	→ 30	Permanently assigned input group	→	EtherNet/IP
	Input assembly custom (Assem101) 88 byte	→ 34	Configurable input group	→	
	Output assembly fix (Assem102) 64 Byte	→ 35	Permanently assigned output group	←	
	Config assembly (Assem104) 398 byte		Permanently assigned Configuration	→	

3.5.1 Input module (Assembly 100 fix)

Output data of the field device in a pre-defined quantity and sequence to the controller.

Permanently assigned input group

Input assembly fixed (Assem100), 44 byte

Description		Byte
1.	File header (not visible)	1-4
2.	Actual diagnostics [1) 2)]	5-8
3.	Mass flow	9-12
4.	Volume flow	13-16
5.	Corrected volume flow	17-20
6.	Temperature	21-24
7.	Density	25-28
8.	Reference density	29-32
9.	Totalizer 1	33-36
10.	Totalizer 2	37-40
11.	Totalizer 3	41-44

1) Diagnostic information via EtherNet/IP
2) See the following table → 30

Current diagnostics information	Diagnostic number	Description
0	–	Device ok
16777265	F882	Input signal
16777296	F910	Tubes not oscillating
16777312	F437	Configuration incompatible
16777319	F242	Software incompatible
16777323	F252	Modules incompatible
16777337	F272	Main electronic failure

Current diagnostics information	Diagnostic number	Description
16777340	F270	Main electronic failure
16777341	F271	Main electronic failure
16777343	F270	Main electronic failure
16777344	F270	Main electronic failure
16777352	F825	Operating temperature
16777355	F410	Data transfer
16777368	F273	Main electronic failure
16777375	F270	Main electronic failure
16777376	F083	Memory content
16777377	F270	Main electronic failure
16777406	F022	Sensor temperature
16777407	F022	Sensor temperature
16777409	F833	Electronic temperature too low
16777411	F832	Electronic temperature too high
16777413	F834	Process temperature too high
16777414	F835	Process temperature too low
16777428	F270	Main electronic failure
16777429	F022	Sensor temperature
16777430	F022	Sensor temperature
16777435	F062	Sensor connection
16777436	F062	Sensor connection
16777441	F311	Electronic failure
16777445	F273	Main electronic failure
16777447	F082	Data storage
16777450	F190	Special event 1
16777483	F273	Main electronic failure
16777490	F390	Special event 2
16777491	F062	Sensor connection
16777492	F062	Sensor connection
16777503	F992	Special event 12
16777508	F590	Special event 3
16777509	F990	Special event 4
16777510	F991	Special event 8
16777511	F591	Special event 7
16777512	F391	Special event 6
16777513	F191	Special event 5
16777545	F262	Module connection
16777546	F537	Configuration
16777547	F201	Device failure
16777552	F192	Special event 9
16777553	F392	Special event 10
16777554	F592	Special event 11
16777581	F382	Data storage

Current diagnostics information	Diagnostic number	Description
16777582	F383	Memory content
16777583	F283	Memory content
16777671	F144	Measured error too high
33554536	C411	Up-/download active
33554537	C411	Up-/download active
33554540	C411	Up-/download active
33554576	C484	Failure mode simulation
33554579	C485	Process value simulation
33554580	C453	Flow override
33554625	C833	Electronic temperature too low
33554627	C832	Electronic temperature too high
33554629	C834	Process temperature too high
33554630	C835	Process temperature too low
33554719	C992	Special event 12
33554768	C192	Special event 9
33554769	C392	Special event 10
33554770	C592	Special event 11
33554782	C495	Diagnostic event simulation
33554926	C302	Device verification active
67108970	M438	Dataset
67109057	M833	Electronic temperature too low
67109059	M832	Electronic temperature too high
67109061	M834	Process temperature too high
67109062	M835	Process temperature too low
67109090	M311	Electronic failure
67109151	M992	Special event 12
67109200	M192	Special event 9
67109201	M392	Special event 10
67109202	M592	Special event 11
134217861	S825	Operating temperature
134217863	S825	Operating temperature
134217873	S842	Process limit
134217874	S862	Pipe empty
134217920	S830	Sensor temperature too high
134217921	S833	Electronic temperature too low
134217922	S831	Sensor temperature too low
134217923	S832	Electronic temperature too high
134217924	S912	Medium inhomogeneous
134217925	S834	Process temperature too high
134217926	S835	Process temperature too low
134217928	S046	Sensor limit exceeded
134217930	S046	Sensor limit exceeded
134217932	S140	Sensor signal

Current diagnostics information	Diagnostic number	Description
134217933	S913	Medium unsuitable
134217934	S274	Main electronic failure
134217935	S274	Main electronic failure
134217951	S912	Medium inhomogeneous
134218005	S912	Inhomogeneous
134218015	S992	Special event 12
134218019	S843	Process limit
134218064	S192	Special event 9
134218065	S392	Special event 10
134218066	S592	Special event 11
134218082	S912	Inhomogeneous
134218088	S948	Tube damping too high
134218182	S944	Monitoring failed
268435545	I1089	Power on
268435546	I1090	Configuration reset
268435547	I1091	Configuration changed
268435566	I1110	Write protection switch changed
268435567	I1111	Density adjust failure
268435593	I1137	Electronic changed
268435607	I1151	History reset
268435611	I1155	Reset electronic temperature
268435613	I1157	Memory error event list
268435641	I1185	Display backup done
268435642	I1186	Restore via display done
268435643	I1187	Settings downloaded with display
268435644	I1188	Display data cleared
268435645	I1189	Backup compared
268435665	I1209	Density adjustment OK
268435677	I1221	Error during zero point adjustment
268435678	I1222	Zero point adjustment OK
268435712	I1256	Display: access status changed
268435720	I1264	Safety sequence aborted
268435791	I1335	Firmware changed
268435817	I1361	Wrong web server login
268435853	I1397	Fieldbus: access status changed
268435854	I1398	CDI: access status changed
268435900	I1444	Device verification passed
268435901	I1445	Device verification failed
268435902	I1446	Device verification active
268435903	I1447	Record application reference data
268435904	I1448	Application reference data recorded
268435905	I1449	Recording application ref. data failed

Current diagnostics information	Diagnostic number	Description
268435906	I1450	Monitoring off
268435907	I1451	Monitoring on
268435913	I1457	Failed:Measured error verification
268435915	I1459	Failed: I/O module verification
268435916	I1460	Failed: Sensor integrity verification
268435917	I1461	Failed: Sensor verification
268435918	I1462	Failed: Sensor electronic module verific.

3.5.2 Input module (Assembly 101 user-configurable)

User-configurable output data of the field device to the controller. Some selection options, such as Heartbeat Verification, are optionally available.

Configurable input group

Input assembly custom (Assem101), 88 byte

Description	Format
1. - 10. Input values 1 to 10 [1]	Real
11. - 20. Input values 11 to 20 [2]	Double integer

1) See the following table → 34
2) See the following table → 34

Possible input values

Possible input values 1 to 10		
▪ Off ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow [1] ▪ Carrier mass flow [1] ▪ Density ▪ Reference density ▪ Concentration [1] ▪ Dynamic viscosity [2] ▪ Kinematic viscosity [2] ▪ Temperature-compensated dynamic viscosity [2]	▪ Temperature-compensated kinematic viscosity [2] ▪ Temperature ▪ Carrier tube temperature [3] ▪ Electronic temperature ▪ Oscillation frequency 0 ▪ Oscillation frequency 1 [3] ▪ Oscillation amplitude 0 ▪ Oscillation amplitude 1 [3] ▪ Frequency fluctuation 0 ▪ Frequency fluctuation 1 [3] ▪ Oscillation damping 0 ▪ Oscillation damping 1	▪ Tube damping fluctuation 0 ▪ Tube damping fluctuation 1 ▪ Signal asymmetry ▪ Exciter current 0 ▪ Exciter current 1 [3] ▪ Monitoring of exciter current 1 ▪ Monitoring of exciter current 2 [3] ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3 ▪ HBSI [3]

1) Only available with the Concentration application package.
2) Only available with the Viscosity application package
3) Only available with the Heartbeat Verification application package.

Possible input values 11 to 20		
▪ Off ▪ Current diagnostic ▪ Previous diagnostic ▪ Mass flow unit ▪ Volume flow unit ▪ Corrected volume flow unit	▪ Temperature unit ▪ Density unit ▪ Reference density unit ▪ Concentration unit ▪ Dynamic viscosity unit ▪ Kinematic viscosity unit	▪ Current unit ▪ Totalizer 1 unit ▪ Totalizer 2 unit ▪ Totalizer 3 unit ▪ Verification results ▪ Verification status

3.5.3 Output module (Assembly 102 fix)

Input data to the field device in a pre-defined quantity and sequence from the controller. The following data are necessary for this:

Permanently assigned output group

Output assembly fix (Assem102), 64 byte

Description (format)	Byte	Bit	Value
1. Totalizer 1 control activation	1	1	▪ 0: Disable ▪ 1: Enable
2. Totalizer 2 control activation		2	
3. Totalizer 3 control activation		3	
4. Pressure compensation activation		4	
5. Reference density compensation activation		5	
6. Temperature compensation activation		6	
7. Verification activation		7	
8. Not used		8	–
9. Not used	2-4	–	–
10. Totalizer 1 – control (integer)	5+6	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
11. Not used	7+8	16	–
12. Totalizer 2 – control (integer)	9+10	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
13. Not used	11+12	16	–
14. Totalizer 3 – control (integer)	13+14	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold ▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization Signed integers (16 bit)
15. Not used	15+16	16	–
16. External pressure (real)	17-20	32	Data format: Byte 1 to 4: External pressure Floating-point number (IEEE754)

Description (format)	Byte	Bit	Value
17. External pressure unit (integer)	21+22	16	▪ 2165: Pa a ▪ 2116: kPa a ▪ 2137: MPa a ▪ 4871: bar a ▪ 2166: Pa g ▪ 2117: kPa g ▪ 2138: MPa g ▪ 2053: bar g ▪ 2182: Psi a ▪ 2183: Psi g ▪ 2244: User pressure Signed integers (16 bit)
18. Not used	23+24	16	–
19. External reference density (real)	25-28	32	Data format: Byte 1 to 4: External ref. density Floating-point number (IEEE754)
20. External reference density unit (integer)	29+30	16	▪ 2112: kg/Nm^3 ▪ 2113: kg/Nl ▪ 2092: g/Scm^3 ▪ 2114: kg/Scm^3 ▪ 2181: lb/Sft^3 Signed integers (16 bit)
21. Not used	31+32	16	–
22. External temperature (real)	33-36	32	Data format: Byte 1 to 4: External temperature Floating-point number (IEEE754)
23. External temperature unit (integer)	37+38	16	▪ 4608: °C ▪ 4609: °F ▪ 4610: K ▪ 4611: °R Signed integers (16 bit)
24. Not used	39+40	16	–
25. Start verification (integer)	41+42	16	▪ -32713: Cancel ▪ -32378: Start Signed integers (16 bit)
26. Not used	43-64	16	–

Use of the totalizer

e.g. reset totalizer 1 in Output Assembly Fix (Assem102)

1. Activation of totalizer control function:
   In the 1st module (totalizer 1 control activation), send a 1 to the device.
2. Reset the totalizer:
   In the 10th module (totalizer 1 – control (integer)), send a 198 to the device.

3.6 Implicit data exchange – Promass 300/500

The following modules are available for data exchange with the field device:

Block model

The block model shows which input and output data the measuring device makes available for implicit messaging. Cyclical data exchange is performed using an EtherNet/IP scanner, e.g. a distributed control system.

Measuring device					Control system
Transducer Block	Input Assembly Fix (Assem100) 44 byte	→ 37	Permanently assigned input group	→	EtherNet/IP
	Input assembly custom (Assem101) 88 byte	→ 42	Configurable input group	→	
	Mass flow fixed input assembly (Assem106) 32 byte	→ 43	Permanently assigned input group	→	
	Volume flow fixed input assembly (Assem107) 62 byte	→ 43	Permanently assigned input group	→	
	Viscosity fixed input assembly [1] (Assem108) 52 byte	→ 43	Permanently assigned input group	→	
	Concentration fixed input assembly [2] (Assem109) 66 byte	→ 44	Permanently assigned input group	→	
	API fixed input assembly [3] (Assem110) 60 byte	→ 44	Permanently assigned input group	→	
	Water cut % fixed input assembly [3] (Assem111) 76 byte	→ 45	Permanently assigned input group	→	
	Heartbeat monitoring fixed input assembly [4] (Assem112) 100 byte	→ 45	Permanently assigned input group	→	
	Output assembly fix (Assem102) 52 byte	→ 46	Permanently assigned output group	←	
	Config assembly (Assem104) 398 byte		Permanently assigned Configuration		

1) Only available with the Viscosity application package.
2) Only available with the Concentration application package.
3) Only available with the Petroleum application package.
4) Only available with the Heartbeat Verification application package.

3.6.1 Input module (Assembly 100 fix)

Output data of the field device in a pre-defined quantity and sequence to the controller.

Permanently assigned input group

Input Assembly Fix (Assem100), 44 byte

Description		Byte
1.	File header (not visible)	1-4
2.	Actual diagnostics [1] [2]	5-8
3.	Mass flow	9-12
4.	Volume flow	13-16

Description		Byte
5.	Corrected volume flow	17-20
6.	Temperature	21-24
7.	Density	25-28
8.	Reference density	29-32
9.	Totalizer 1	33-36
10.	Totalizer 2	37-40
11.	Totalizer 3	41-44

1) Diagnostic information via EtherNet/IP
2) See the following table → 🖹 38

Current diagnostics information	Diagnostic number	Description
0	–	Device ok
65558	F022	Temperature sensor defective
65582	F046	Sensor limit exceeded
65598	F062	Sensor connection faulty
65618	F082	Data storage
65619	F083	Memory content
65676	F140	Sensor signal asymmetrical
65680	F144	Measured error too high
65737	F201	Device failure
65778	F242	Software incompatible
65788	F252	Modules incompatible
65798	F262	Sensor electronic connection faulty
65806	F270	Main electronic failure
65807	F271	Main electronic failure
65808	F272	Main electronic failure
65809	F273	Main electronic failure
65811	F275	I/O module 1 defective
65812	F276	I/O module 1 faulty
65819	F283	Memory content
65867	F331	Firmware update failed
65868	F332	Writing in HistoROM backup failed
65897	F361	I/O module 1 faulty
65908	F372	Sensor electronic (ISEM) faulty
65909	F373	Sensor electronic (ISEM) faulty
65910	F374	Sensor electronic (ISEM) faulty
65911	F375	I/O 1 communication failed
65918	F382	Data storage
65919	F383	Memory content
65923	F387	HistoROM backup failed
65946	F410	Data transfer
65973	F437	Configuration incompatible

Current diagnostics information	Diagnostic number	Description
66056	F520	I/O 1 hardware configuration invalid
66073	F537	Configuration
66339	F803	Current loop
66366	F830	Sensor temperature too high
66367	F831	Sensor temperature too low
66368	F832	Electronic temperature too high
66369	F833	Electronic temperature too low
66370	F834	Process temperature too high
66371	F835	Process temperature too low
66398	F862	Partly filled pipe
66418	F882	Input signal
66446	F910	Tubes not oscillating
66448	F912	Medium inhomogeneous
66449	F913	Medium unsuitable
66480	F944	Monitoring failed
66484	F948	Oscillation damping too high
131118	C046	Sensor limit exceeded
131212	C140	Sensor signal asymmetrical
131216	C144	Measured error too high
131374	C302	Device verification active
131446	C374	Sensor electronic (ISEM) faulty
131484	C412	Processing download
131503	C431	Trim 1
131525	C453	Flow override
131556	C484	Failure mode simulation
131557	C485	Measured variable simulation
131558	C486	Current input 1 simulation
131563	C491	Current output 1 simulation
131564	C492	Simulation frequency output 1
131565	C493	Simulation pulse output 1
131566	C494	Switch output simulation 1
131567	C495	Diagnostic event simulation
131568	C496	Status input simulation
131666	C594	Relay output simulation
131902	C830	Sensor temperature too high
131903	C831	Sensor temperature too low
131904	C832	Electronic temperature too high
131905	C833	Electronic temperature too low
131906	C834	Process temperature too high
131907	C835	Process temperature too low
131934	C862	Partly filled pipe
131984	C912	Medium inhomogeneous

Current diagnostics information	Diagnostic number	Description
131985	C913	Medium unsuitable
132016	C944	Monitoring failed
132020	C948	Oscillation damping too high
262190	M046	Sensor limit exceeded
262284	M140	Sensor signal asymmetrical
262288	M144	Measured error too high
262447	M303	I/O 1 configuration changed
262455	M311	Electronic failure
262474	M330	Flash file invalid
262518	M374	Sensor electronic (ISEM) faulty
262582	M438	Dataset
262974	M830	Sensor temperature too high
262975	M831	Sensor temperature too low
262976	M832	Electronic temperature too high
262977	M833	Electronic temperature too low
262978	M834	Process temperature too high
262979	M835	Process temperature too low
263006	M862	Partly filled pipe
263056	M912	Medium inhomogeneous
263057	M913	Medium unsuitable
263088	M944	Monitoring failed
263092	M948	Oscillation damping too high
524334	S046	Sensor limit exceeded
524351	S063	Exciter current faulty
524428	S140	Sensor signal asymmetrical
524432	S144	Measured error too high
524662	S374	Sensor electronic (ISEM) faulty
524729	S441	Current output 1
524730	S442	Frequency output 1
524731	S443	Pulse output 1
524732	S444	Current input 1
524816	S528	Concentration settings faulty
524817	S529	Concentration settings faulty
525118	M830	Sensor temperature too high
525119	M831	Sensor temperature too low
525120	M832	Electronic temperature too high
525121	M833	Electronic temperature too low
525122	M834	Process temperature too high
525123	M835	Process temperature too low
525130	S842	Process limit
525150	S862	Partly filled pipe
525200	S912	Medium inhomogeneous
525201	S913	Medium unsuitable

Current diagnostics information	Diagnostic number	Description
525229	S941	API temperature out of specification
525230	S942	API density out of specification
525231	S943	API pressure out of specification
525232	S944	Monitoring failed
525236	S948	Oscillation damping too high
16843027	F275	I/O module 2 defective
16843028	F276	I/O module 2 faulty
16843113	F361	I/O module 2 faulty
16843127	F375	I/O 2 communication failed
16843272	F520	I/O 2 hardware configuration invalid
16908719	C431	Trim 2
16908774	C486	Current input 2 simulation
16908779	C491	Current output 2 simulation
16908780	C492	Simulation frequency output 2
16908781	C493	Simulation pulse output 2
16908782	C494	Switch output simulation 2
16908784	C496	Status input simulation
16908882	C594	Relay output simulation
17039663	M303	I/O 2 configuration changed
17301945	S441	Current output 2
17301946	S442	Frequency output 2
17301947	S443	Pulse output 2
17301948	S444	Current input 2
33620243	F275	I/O module 3 defective
33620244	F276	I/O module 3 faulty
33620329	F361	I/O module 3 faulty
33620343	F375	I/O 3 communication failed
33620488	F520	I/O 3 hardware configuration invalid
33685935	C431	Trim 3
33685990	C486	Current input 3 simulation
33685995	C491	Current output 3 simulation
33685996	C492	Simulation frequency output 3
33685997	C493	Simulation pulse output 3
33685998	C494	Switch output simulation 3
33686000	C496	Status input simulation
33686098	C594	Relay output simulation
33816879	M303	I/O 3 configuration changed
34079161	S441	Current output 3
34079162	S442	Frequency output 3
34079163	S443	Pulse output 3
34079164	S444	Current input 3

Current diagnostics information	Diagnostic number	Description
50397459	F275	I/O module 4 defective
50397460	F276	I/O module 4 faulty
50397545	F361	I/O module 4 faulty
50397559	F375	I/O 4 communication failed
50397704	F520	I/O 4 hardware configuration invalid
50594095	M303	I/O 4 configuration changed

3.6.2 Input module (Assembly 101 user-configurable)

User-configurable output data of the field device to the controller. Some selection options, such as Heartbeat Verification, are optionally available.

Configurable input group

Input assembly custom (Assem101), 88 byte

Description	Format
1. - 10. Input values 1 to 10 [1]	Real
11. - 20. Input values 11 to 20 [2]	Double integer

1) See the following table → 🖹 42
2) See the following table → 🖹 42

Possible input values

Possible input values 1 to 10		
▪ Off ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow ▪ Carrier mass flow ▪ Target volume flow ▪ Carrier volume flow ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Density ▪ Reference density ▪ Concentration ▪ Dynamic viscosity ▪ Kinematic viscosity	▪ Temperature-compensated dynamic viscosity ▪ Temperature-compensated kinematic viscosity ▪ Temperature ▪ Carrier pipe temperature ▪ Electronic temperature ▪ Oscillation frequency 0 ▪ Oscillation frequency 1 ▪ Oscillation amplitude 0 ▪ Oscillation amplitude 1 ▪ Oscillation damping 0 ▪ Oscillation damping 1 ▪ Oscillation damping fluctuation 0 ▪ Oscillation damping fluctuation 1 ▪ Signal asymmetry	▪ Exciter current 0 ▪ Exciter current 1 ▪ Monitoring of exciter current 0 ▪ Monitoring of exciter current 1 ▪ HBSI ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3 ▪ Reference density replacement ▪ GSV flow ▪ GSV flow replacement ▪ NSV flow ▪ NSV flow replacement ▪ S&W volume flow

Possible input values 11 to 20		
▪ Off ▪ Current diagnostic ▪ Previous diagnostic ▪ Mass flow unit ▪ Volume flow unit ▪ Corrected volume flow unit	▪ Temperature unit ▪ Density unit ▪ Reference density unit ▪ Concentration unit ▪ Totalizer 1 unit ▪ Totalizer 2 unit	▪ Totalizer 3 unit ▪ Verification results [1] ▪ Verification status [1] ▪ Status zero point adjustment

1) Only available with the Heartbeat Verification application package.

3.6.3 Input module mass flow (Assembly 106 fix)

Permanently assigned input group

Mass flow fixed input assembly (Assem106), 32 byte

Description	Byte
1. File header (not visible)	1-4
2. Actual diagnostics [1) 2)]	5-8
3. Mass flow	9-12
4. Density	13-16
5. Temperature	17-20
6. Value of totalizer 1	21-24
7. Mass flow unit	25-26
8. Density unit	27-28
9. Temperature unit	29-30
10. Totalizer 1 unit	31-32

1) Diagnostic information via EtherNet/IP
2) See table → 38

3.6.4 Input module volume flow (Assembly 107 fix)

Permanently assigned input group

Volume flow fixed input assembly (Assem107), 62 byte

Description	Byte
→ **Input module mass flow (Assembly 106 fix)** → 42	1-32
1. Volume flow	33-36
2. Corrected volume flow	37-40
3. Reference density	41-44
4. Value of totalizer 2	45-48
5. Value of totalizer 3	49-52
6. Volume flow unit	53-54
7. Corrected volume flow unit	55-56
8. Reference density unit	57-58
9. Totalizer 2 unit	59-60
10. Totalizer 3 unit	61-62

3.6.5 Input module viscosity (Assembly 108 fix)

Permanently assigned input group

Viscosity fixed input assembly (Assem108), 52 byte [1)]

Description	Byte
→ **Input module mass flow (Assembly 106 fix)** → 42	1-32
1. Dynamic viscosity	33-36
2. Kinematic viscosity	37-40
3. Temperature-compensated dynamic viscosity	41-44
4. Temperature-compensated kinematic viscosity	45-48

Description	Byte
5. Dynamic viscosity unit	49-50
6. Kinematic viscosity unit	51-52

1) Only available with the Viscosity application package.

3.6.6 Input module concentration (Assembly 109 fix)

Permanently assigned input group

Concentration fixed input assembly (Assem109), 66 byte [1)]

Description	Byte
→ **Input module mass flow (Assembly 106 fix)** → 42	1-32
1. Target mass flow	33-36
2. Carrier mass flow	37-40
3. Target volume flow	41-44
4. Carrier volume flow	45-48
5. Target corrected volume flow	49-52
6. Carrier corrected volume flow	53-56
7. Concentration	57-60
8. Volume flow unit	61-62
9. Corrected volume flow unit	63-64
10. Concentration unit	65-66

1) Only available with the Concentration application package.

3.6.7 Input module API (Assembly 110 fix)

Permanently assigned input group

API fixed input assembly (Assem110), 60 byte [1)]

Description	Byte
→ **Input module mass flow (Assembly 106 fix)** → 42	1-32
1. Reference density replacement	33-36
2. Raw corrected volume flow	37-40
3. Raw corrected volume flow replacement	41-44
4. Net corrected volume flow	45-48
5. Net corrected volume flow replacement	49-52
6. Sediment and water volume flow	53-56
7. Volume flow unit	57-58
8. Reference density unit	59-60

1) Only available with the Petroleum application package.

3.6.8 Input module Water cut % (Assembly 111 fix)

Permanently assigned input group

Water cut % fixed input assembly (Assem111), 76 byte [1)]

Description	Byte
→ **Input module mass flow (Assembly 106 fix)** → 🖹 42	1-32
1. Oil density	33-36
2. Water density	37-40
3. Water cut %	41-44
4. Oil mass flow	45-48
5. Water mass flow	49-52
6. Oil volume flow	53-56
7. Water volume flow	57-60
8. Oil corrected volume flow	61-64
9. Water corrected volume flow	65-68
10. Volume flow unit	69-70
11. Corrected volume flow unit	71-72
12. Oil density unit	73-74
13. Water density unit	75-76

1) Only available with the Petroleum application package.

3.6.9 Input module Heartbeat (Assembly 112 fix)

Permanently assigned input group

Heartbeat monitoring fixed input assembly (Assem112), 100 byte [1)]

Description	Byte
→ **Input module mass flow (Assembly 106 fix)** → 🖹 42	1-32
1. Signal asymmetry	33-36
2. Oscillation frequency 0	37-40
3. Oscillation frequency 1	41-44
4. Oscillation amplitude 0	45-48
5. Oscillation amplitude 1	49-52
6. Oscillation damping 0	53-56
7. Oscillation damping 1	57-60
8. Oscillation damping fluctuation 0	61-64
9. Oscillation damping fluctuation 1	65-68
10. Exciter current 0	69-72
11. Exciter current 1	73-76
12. HBSI	77-80
13. Current oscillation frequency 0	81-84
14. Current oscillation frequency 1	85-88
15. Electronic temperature	89-92
16. Carrier pipe temperature	93-96

Description	Byte
17. Verification status [2]	97-98
18. Verification result [2]	99-100

1) Only available with the Heartbeat Verification application package.
2) See the following table → 46

Input variable	Description
1. Verification status	▪ -32291: Done ▪ -32294: Busy ▪ 275: Failed ▪ -32375: Not done Signed integers (16 bit)
2. Verification result	▪ -32540: Not used ▪ 809: Passed ▪ -32375: Not done ▪ 2280: Not plugged ▪ 275: Failed Signed integers (16 bit)

3.6.10 Output module (Assembly 102 fix)

Input data to the field device in a pre-defined quantity and sequence from the controller. The following data are necessary for this:

Permanently assigned output group

Output assembly fix (Assem102), 52 byte

Description (format)	Byte	Bit	Value
1. Totalizer 1 control activation	1	0	▪ 0: Disable ▪ 1: Enable
2. Totalizer 2 control activation		1	
3. Totalizer 3 control activation		2	
4. Verification activation		3	
5. Concentration liquid type activation		4	
6. Pressure compensation activation		5	
7. Reference density compensation activation		6	
8. Temperature compensation activation		7	
9. S&W compensation % activation	2	0	▪ 0: Disable ▪ 1: Enable
10. Water cut % activation		1	
11. Flow override activation		2	
12. Zero point adjustment activation		3	
13. Not used		4	
14. Not used		5	
15. Not used		6	
16. Not used		7	
17. Not used	3+4	16	–
18. Totalizer 1 – control (integer)	5+6	16	▪ -32226: Totalize ▪ -32490: Reset (0) + hold ▪ -32228: Preset + hold
19. Totalizer 2 – control (integer)	7+8	16	

Description (format)	Byte	Bit	Value
20. Totalizer 3 – control (integer)	9+10	16	▪ 198: Reset (0) + start totalization ▪ 199: Preset + start totalization ▪ -32608: Stop Signed integers (16 bit)
21. Start verification (integer)	11+12	16	▪ -32713: Cancel ▪ -32378: Start Signed integers (16 bit)
22. Selection of concentration liquid type	13+14	16	▪ -32532: Off ▪ 3065: Sucrose in water ▪ 3063: Glucose in water ▪ 3062: Fructose in water ▪ 3064: Invert sugar in water ▪ 3073: HFCS42 ▪ 3074: HFCS55 ▪ 3072: HFCS90 ▪ 3081: Wort ▪ 3060: Ethanol in water ▪ 3061: Methanol in water ▪ 3077: Hydrogen peroxide in water ▪ 3068: Hydrochloric acid ▪ 3079: Sulfuric acid ▪ 3069: Nitric acid ▪ 3070: Phosphoric acid ▪ 3071: Sodium hydroxide ▪ 3075: Potassium hydroxide ▪ 3066: Ammonium nitrate in water ▪ 3067: Iron(III) chloride in water ▪ 3099: % mass / % volume ▪ 3082: Coef Set 1 ▪ 3083: Coef Set 2 ▪ 3084: Coef Set 3
23. Not used	15+16	16	–
24. External pressure (real)	17-20	32	Data format: Byte 1 to 4: External pressure Floating-point number (IEEE754)
25. External pressure unit (integer)	21+22	16	▪ 2165: Pa a ▪ 2116: kPa a ▪ 2137: MPa a ▪ 4871: bar a ▪ 2166: Pa g ▪ 2117: kPa g ▪ 2138: MPa g ▪ 2053: bar g ▪ 2182: Psi a ▪ 2183: Psi g ▪ 2244: User pressure Signed integers (16 bit)
26. Not used	23+24	16	–
27. External reference density (real)	25-28	32	Data format: Byte 1 to 4: External ref. density Floating-point number (IEEE754)

Description (format)	Byte	Bit	Value
28. External reference density unit (integer)	29+30	16	▪ 12054: kg/Nm³ ▪ 12055: kg/Nl ▪ 12052: g/Scm³ ▪ 12056: kg/Scm³ ▪ 12064: lb/Sft³ ▪ 2328: °APIbase ▪ 2329: RD15°C ▪ 2330: RD20°C ▪ 2331: RD60°F Signed integers (16 bit)
29. Not used	31+32	16	–
30. External temperature (real)	33-36	32	Data format: Byte 1 to 4: External temperature Floating-point number (IEEE754)
31. External temperature unit (integer)	37+38	16	▪ 4608: °C ▪ 4609: °F ▪ 4610: K ▪ 4611: °R Signed integers (16 bit)
32. Not used	39+40	16	–
33. External S&W % (Real)	41-44	32	Data format: Byte 1 to 4: External temperature Floating-point number (IEEE754)
34. External water cut % (Real)	45-48	32	Data format: Byte 1 to 4: External temperature Floating-point number (IEEE754)
35. Flow override – control	49+50	16	▪ -32532: Off ▪ -32530: On Signed integers (16 bit)
36. Zero point adjustment – control	51+52	16	▪ -32713: Cancel ▪ -32294: Busy ▪ 248: Error zero point adjustment ▪ -32378: Start Signed integers (16 bit)

Use of the totalizer

e.g. reset totalizer 1 in Output Assembly Fix (Assem102)

1. Activation of totalizer control function:
   In the 1st module (totalizer 1 control activation), send a 1 to the device.
2. Reset the totalizer:
   In the 18th module (totalizer 1 – control (integer)), send a 198 to the device.

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