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Variable Area Flowmeters VA Master

Proven measurement for gases, liquids and steam



- Cost-effective measuring system
- Indication on site without external power supply
- Measurement of even small gas and liquid flows
- Independent of electrical conductivity
- Versions approved for use in hazardous areas
- High reproducibility

Distributor Slovakia: Mahrlo www.marweb.sk

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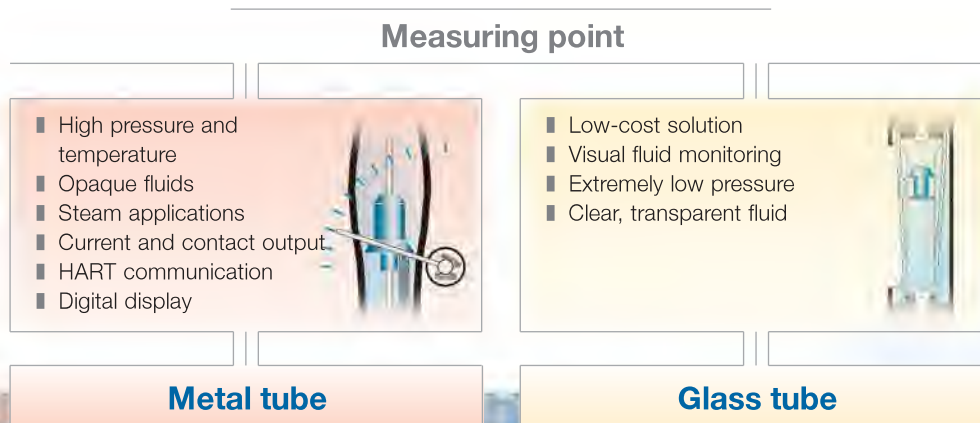
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Metal tube – Glass tube

The ABB product range includes both metal tube and glass tube instrument lines and is used in the widest variety of applications:



The purgemeters of both product lines are available with a differential pressure regulator that balances pressure variations in the system and provides a constant flow rate. ABB flowmeters can easily handle very small measuring ranges, e.g. in labs, and high flow rates for rugged industrial applications.

Application examples in various industries

Analytical	Mixing, dosing, monitoring
Automotive	Test benches, lubricants, cooling water
Chemical & petrochemical	Dosing of dyes/additives, separation/lubrication
Glass	Flame control
Heating, ventilation, air conditioning	Ensure constant flow rate
Industrial furnace construction	Burner control
Lab	Sampling, separation
Agricultural	Spraying, e.g. fertilizers
Medical	Flow monitoring, anesthesia
Food and beverages	Aeration, homogeneous mixture
Oil and gas	Rinsing, tanks, boilers
Pulp & paper	Ensure constant flow rate
Pharmaceutical	Filling, injection
Water & waste water	Pump control

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Overview metal tube devices



The well-proven, robust metal tube flowmeters are suitable for a wide range of applications. They have proved their worth for aggressive and opaque fluids or extremely demanding operating conditions. They are indispensable for applications requiring high pressure and temperature resistance.

Measuring point

- Flow rate 0.1...120.000 l/h (Qv) water or 0.008...3,600 m³/h (Qn) air (14.7 psia and 32 °F)
- Stainless steel primary
- Alarm contacts
- 4...20 mA output signal

Metal tube

2.5...120,000 l/h (Qv) water or 0.1...1,600 m³/h (Qn) air at 1.013 bar (a) and 0 °C (14.7 psia and 32 °F)

0.1...3,000 l/h (Qv) water or 0.008...90 m³/h (Qn) air at 1.013 bar (a) and 0 °C (14.7 psia and 32 °F)

FAM540



- Accuracy class 1.6
- HART communication
- Easy configuration
- Two-line graphical display
- Current and contact output

FAM3200



- Accuracy class 6
- Dosing
- Low-cost device
- Low installation costs
- Differential pressure regulation



Overview glass tube devices

These universal flowmeters are used in many industries for measuring and dosing liquids and gases. Due to the combination of various process-wetted materials they are suitable for even aggressive fluids.

Measuring point

- Flow rate 0.002...17.600 l/h (Qv) water or 4 cm³/min...520 m³/h (Qn) air at 1.013 bar (a) and 0 °C (14.7 psia and 32 °F)
- Visual fluid monitoring
- Alarm contacts

Glass tube

0.002...17,600 l/h (Qv) water or 4 cm³/min...520 m³/h air at 1.013 bar (a) and 0 °C (14.7 psia and 32 °F)

0.002...140 l/h (Qv) water or 4 cm³/min...4 m³/h air at 1.013 bar (a) and 0 °C (14.7 psia and 32 °F)

FAG1190



- Accuracy class 1.6
- Variety of process connections
- Measurement of more than 140 l/h water or 520 m³/h air

FAG6100



- Accuracy class 1.6...6
- Dosing
- Low-cost device
- Low installation costs
- Differential pressure regulation



VA Master FAM540



The FAM540 series is based on a modular system offering flowmeters with a simple indicator or including an advanced electronic transmitter. The combination of the various models with the different indicators provides suitable flow solutions for each application. The comfortable operation via the graphical display allows an simple adjustment to changing operating conditions.

Measuring ranges, water

DN	Minimum	Maximum	Unit
15 (1/2")	3...30	80...800	l/h
25 (1")	28...280	600...6000	l/h
50 (2")	0.4...4.2	2...24	m ³ /h
80 (3")	0.7...7.0	5...54	m ³ /h
100 (4")	2.5...25	10...120	m ³ /h

Measuring ranges, air 1 bar(a) 0 °C (14.7 psia and 32 °F)

15 (1/2")	0.1...1.2	2.5...25	m ³ /h
25 (1")	1.5...20	15...180	m ³ /h
50 (2")	10...125	60...720	m ³ /h
80 (3")	20...210	150...1550	m ³ /h



FAM540 gives the suitable view on the process for each application offering different indicator options:

- Analog indicator with or without alarm contacts
- Analog indicator with electronic transmitter with or without display

The display delivers outstanding advantages like the simultaneous indication of flow and counter, the user-friendly menu-driven operation in clear text, the configurable switching output as well as the self-testing functionality for the simplified commissioning.

All indicators have an excellent instrument read out because the needle's vibrations are substantially minimized.

Various application ranges

- Device designs ranging from simple to demanding applications
- Standard fluid temperature up to 400 °C (750 °F)
- Insulation up to flange diameter due to the unique decouple-proof magnetic follower system
- Flameproof enclosure or intrinsically safe to ATEX, FM, CSA, IEC Ex

Process safety

- 4...20 mA with integrated alarm function for min. and max. values
- Contact outputs according to Namur
- SIL2 certification for devices with alarm contacts
- Primaries conforming to NACE per MR-0175

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Advantages of the Microprocessor Transmitter

- Convenient and intuitive operation with clear text configuration
- Medium properties can be changed at any time
- Configuration possible without opening the housing
- Automatic self-monitoring with error diagnosis
- Flow rate values are readable even in case of power failure

Technical Data

- **Power supply:** 10...46 V DC (Ex 10...28 V DC)
- **Current output:** 4...20 mA, load < 750 ohm
- **Digital output (Namur):**
Function selectable in the software
 - Alarm: Min, Max or Min-Max
 - Pulse output: fmax 100 Hz, 1...256 ms pulse width
- **Display:** High-contrast LCD with clear text configuration



Mechanical indicator
with/without alarm contacts

Indicator w. electr. transmitter
4...20 mA output with/without display

FAM541 Standard line



For universal application

DN 15 ...100 (1/2"...4")
28 l/h...120 m³/h water
0.83...1550 m³/h air
1013 mbar (a) 0 °C
(14.7 psia and 32 °F)
-55...400 °C (-67...750 °F)
Fluid temperature

FAM544 Sanitary line



For applications in the food and beverage/
pharmaceutical industries

DN 15...80 (1/2"...3")
28 l/h...53 m³/h water
0.83...1550 m³/h air
1013 mbar (a) 0 °C
(14.7 psia and 32 °F)
-40...140 °C (-40...280 °F)
Fluid temperature

FAM545 PTFE liner



For aggressive fluids

DN 25...80 (1"...3")
230 l/h...27 m³/h water
9.4...880 m³/h air
1013 mbar (a) 0 °C
(14.7 psia and 32 °F)
-20...125 °C (-4...260 °F)
Fluid temperature

FAM546 Heat jacket line



For temperature-sensitive processes

DN 25...100 (1"...4")
28 l/h...53 m³/h water
0.83...1550 m³/h air
1013 mbar (a) 0 °C
(14.7 psia and 32 °F)
-55...400 °C (-67...750 °F)
Fluid temperature

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FAM3200



This small variable area flowmeter with its all-metal design ensures that even under extreme conditions measuring the flow rate of gases and liquids is straightforward. Opaque fluids, which are primarily used in the chemical, petrochemical and pharmaceutical industries, are not a problem for this flowmeter.



Measuring ranges, water

Size	Minimum	Maximum	Unit
1/4"	0,1...1	10...100	l/h
3/8"	10...100	30...300	l/h
1/2"	40...400	80...800	l/h
1"	80...800	300...3000	l/h

Measuring ranges, air 1 bar(a) 0 °C (14.7 psia and 32 °F)

1/4"	8...48	500...3100	l/h
3/8"	500...3200	800...9200	l/h
1/2"	2000...12500	2000...24000	l/h

Device features

- Needle valves in the inlet or outlet
- Differential pressure regulator for constant mass flow
- Short installation length (only 90 mm)
- Measuring range up to 3000 l/h (H₂O)
- Choice of product-specific scale or neutral percentage scale

Sturdy Technology

- Process connections with NPT internal threads
- Horizontal or vertical process connections in 1/4" size
- Vertical process connections in 3/8"...1" sizes
- Decouple-proof and non-reactive magnetic follower system
- Robust design
- Standard pressure level PN100 with vertical process connections

Economic Use

When designing these devices, special attention was paid to flexibility and the capability to adapt to the prevalent operating conditions. The installation length of only 90 mm with horizontal connections allows for easy installation in confined spaces. The meter's sturdy all-metal design is easy to service and requires little maintenance.

- Cost-saving installation due to threaded connections; no expensive counter-flanges required
- Space-saving installation
- Robust design

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FAG1190



This variable area flowmeter is a cost-effective and universal measuring instrument.

The process-wetted components are available in various materials. Due to the wide range of different float types and measuring tubes, these devices can be adapted easily to the prevalent operating conditions.



Measuring ranges, water

Size	Minimum	Maximum	Unit
1/4"	0.002...0.032	15...135	l/h
1/2"	4...43	45...419	l/h
3/4"	14...144	130...1300	l/h
1"	30...310	420...2800	l/h
1 1/2"	50...560	400...4800	l/h
2"	140...1420	3400...17000	l/h

Measuring ranges, air 1 bar(a) 0 °C (14.7 psia and 32 °F)

1/4"	0.2...3	400...4000	l/h
1/2"	2.4...21.2	30...180	l/min
3/4"	6...71	110...760	l/min
1"	12...154	460...2320	l/min
1 1/2"	30...370	1450...4600	l/min
2"	60...700	1700...8700	l/min

Device features

- Cost-effective measuring system
- Customer-specific flow units
- Visual fluid monitoring
- Thread and flange connection
- Optional alarm contacts for 1/2" and above
- Measuring tube and float can be replaced independently of each other
- Easy tube disassembly through O-ring seals

Technical Data

- Stainless steel housing
- Process-wetted parts made of 1.4571
- Maximum of two adjustable alarm contacts
- II 3 G T6 or II 3 D T85 °C...Tmed
- EEx nA IIC T6 (alarm only)
- Gasket variants conforming with FDA

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FAG6100

The variable area flow meters of the FAG6100 series are designed for measuring, dosing and monitoring small liquid or gas flows. They are best suited for use as bubbling instruments for level and density measurement and for flushing differential pressure lines in the lab or in apparatus engineering.



Measuring ranges, water

Size	Minimum	Maximum	Unit
1/16"*	2...32	80...1160	cm ³ /h
1/8"	0.02...0.26	0.8...8	l/h
1/4"	0.3...4.6	15...135	l/h

Measuring ranges, air 1 bar(a) 0 °C (14.7 psia and 32 °F)

1/16"*	0.2...3	3...41	l/h
1/8"	2...22	20...280	l/h
1/4"	15...225	400...4000	l/h

* only available as FAG6142 with 4" scale length

Device features

With the built-in needle valve the flow rate can be both adjusted and regulated. An attached differential pressure regulator in combination with the needle valve maintains the flow rate independently of any pressure variations. The optional limit contacts are essential components for monitoring the preset flow rate values. This is how processes can be controlled in an optimal way with a single device.

- Space-saving installation
- Visual fluid monitoring
- Easy to service snap-in design
- Alarm sensors for monitoring a preset measuring range (optional)
- Differential pressure regulator for constant fluid flow (optional)

Technical Data

- Robust housing made of Cr-Ni steel (IP 54)
- Indication on site
- Needle valves in the inlet or outlet, as required
- Optional alarm contacts for 1/8" and higher
- II 2GD c 135 °C (without alarm)
- II 2G c 135 °C (with alarm)

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Metal Cone Variable Area Flowmeter VA Master FAM540

Ordering information (FAM541)

Main order number

Additional order no.

Variant digit no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
VA Master metal tube float flowmeter	FAM541						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Indicator / Output signal																				
Analog indicator / No indicator		A																		
Analog indicator / Min alarm		B																		
Analog indicator / Max alarm		C																		
Analog indicator / Min and max alarm		D																		
Analog indicator / 4 ... 20 mA with HART protocol		E																		
Analog indicator with LCD display / 4 ... 20 mA with HART protocol		F																		
Housing material / Cable connection																				
Aluminum / M20 x 1.5 cable gland		1																		
Aluminum / 1/2 in. NPT thread		2																		
Stainless steel / M20 x 1.5 cable gland		1) 3																		
Stainless steel / 1/2 inch NPT thread		1) 4																		
Explosion protection and approvals																				
None		Y 0																		
ATEX / IEC category 3 (Zone 2 / 21), Ex n		2) B 1																		
ATEX / IEC category 2 (Zone 1 / 21), Ex i, Ex c		2) A 4																		
ATEX / IEC category 2 (Zone 1 / 21), Ex d + Ex i		3) A 9																		
FM / CSA, Class I, Div 1, 2 (Zone 1, 2), XP + IS, NI		4) F 3																		
FM / CSA, Class I, Div 1, 2 (Zone 1, 2), IS, NI		4) F 4																		
Process connection																				
Flange		F 1																		
Flange with groove (DIN 2512)		F 2																		
Female thread, metric (DN25 = PN100, DN40 = PN40)		5) T 1																		
Nominal diameter																				
DN 15		A																		
DN 25		B																		
DN 40		N																		
DN 50		C																		
DN 80		D																		
DN 100		6) E																		
Float design																				
Standard		1																		
With gas damping		7) 3																		
Pressure rating																				
PN 16		D 2																		
PN 40		D 4																		
PN 64		8) D 5																		
PN 100		9) D 6																		
ASME CL 150		A 1																		
ASME CL 300		A 3																		
ASME CL 600		9) A 6																		
JIS 10K		9) J 1																		
Design level																				
(Specified by ABB)																				X
Meter tube / float combination																				
(Specified by ABB.) See flow range tables.																				X X

Continued on next page

- 1) Not available with Ex d or XP types of Ex protection.
- 2) Analog indicator without output signal design: ATEX approval only; IEC Ex not available.
- 3) With Ex d cable gland. Not available for analog indicator without output signal design:
- 4) Only with 1/2 inch NPT cable entry.
- 5) Not available with FM / CSA approval.
- 6) Meter only suitable for measuring fluids.
- 7) For DN 15 ... DN 80 (1/2 ... 3 inch) only.
- 8) Not available with DN 40 (1-1/2 inch).
- 9) Not available with DN 40 (1-1/2 inch) or DN 100 (4 inch).

Metal Cone Variable Area Flowmeter VA Master FAM540

Continued

	Main order number													Additional order no.	
	Variant digit no.														
	1 - 6	7	8	9	10	11	12	13	14	15	16	17	18		19
	FAM541	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
Flowmeter sensor															
None, only secondary meter														10)	Y0
Standard														11)	Y1
Measured value error															
1.6 % qg = 50 % acc. to VDE / VDI 3513														11)	A1
1 % of end value															AA
4 % of end value (high viscosity, without calculation)															AK
4 % of end value (high viscosity, with calculation)															AL
Material: 3.1, 3.2; test certificate / NACE															
Material confirmation with inspection certificate 3.1 to EN 10204															C2
Material confirmation with inspection certificate 3.2 to EN 10204															C3
Material confirmation NACE MR 01-75 with acceptance test certificate 3.1 to EN 10204															CN
Material: 2.1; order conformity															
Certificate of compliance 2.1 to EN 10204 for order conformity															C4
Certificates: 3.1; visual, dimensional, functional															
Acceptance test certificate 3.1 to EN 10204 for visual, dimensional, and functional checks															C6
Certificates: 3.1; PMI test															
Acceptance test certificate 3.1 to EN 10204 for Positive Material Identification (PMI)															CA
Certificates: 3.1; compression test															
Compression test to AD2000															CB
Test package (compression test, non-destructive material test, welder test, welding procedure test)															CP
Certificates: Calibration, test report															
Certificate of compliance 2.1 to EN 10204 with confirmation of accuracy															CM
Calibration certificate with confirmation of accuracy and calibration data															CE
Other user certificates															
Russia: Metrological and GOST R certificate															CG1
Kazakhstan: Metrological and GOST K certificate (in preparation)															CG2
Ukraine: Metrological certificate															CG3
Belarus: Metrological certificate															CG6
Additional Ex certificates and approvals															
Russia: GOST-Ex and RTN certificate															EG7
Kazakhstan: Ex permission certificate (in preparation)															EG3
Ukraine: GOST Ex and Ex permission certificate (in preparation)															EG5
Belarus: GGTN certificate															EG9
Language of documentation															
German															M1
English														11)	M5
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)															MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)															ME
Applications															
Oil- and grease-free for oxygen applications															P1
Meter name plate															
Stainless steel plate with TAG no.															T0
Adhesive label with TAG no.														11)	TC
Float material															
Stainless steel 1.4571 (AISI 316Ti SST)														11)	F1
Scale design															
Directly readable scale														11)	SD
Percentage scale															SP
Bar graph														12)	SB
Ambient temperature range															
Extended -40 ... 85 °C (without Ex protection) / -40 ... 60 °C (with Ex protection)														13)	R5
Standard -20 ... 85 °C (without Ex protection) / -20 ... 60 °C (with Ex protection)														11)	R6

10) For Ex version on request.

11) Standard, specified automatically by ABB if no customer specifications have been provided.

12) Recommended for indicator with transmitter (4 ... 20 mA) with display.

13) Not available for analog indicator with alarm.

Metal Cone Variable Area Flowmeter VA Master FAM540

Ordering information (FAM544)

		Main order number																	Additional order no.
Variant digit no.	1 - 6	7	8	9	10	11	12	13	14	15	16	17	18	19					
VA Master metal tube float flowmeter	FAM544	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX	
Indicator / Output signal																			
Analog indicator / No indicator		A																	
Analog indicator / Min alarm		B																	
Analog indicator / Max alarm		C																	
Analog indicator / Min and max alarm		D																	
Analog indicator / 4 ... 20 mA with HART protocol		E																	
Analog indicator with LCD display / 4 ... 20 mA with HART protocol		F																	
Housing material / Cable connection																			
Aluminum / M20 x 1.5 cable gland		1																	
Aluminum / 1/2 inch NPT thread		2																	
Stainless steel / M20 x 1.5 cable gland		1) 3																	
Stainless steel / 1/2 inch NPT thread		1) 4																	
Explosion protection and approvals																			
None						Y	0												
ATEX / IEC category 3 (Zone 2 / 21), Ex n		2)				B	1												
ATEX / IEC category 2 (Zone 1 / 21), Ex i, Ex c		2)				A	4												
ATEX / IEC category 2 (Zone 1 / 21), Ex d + Ex i		3)				A	9												
FM / CSA, Class I, Div 1, 2 (Zone 1, 2), XP + IS, NI		4)				F	3												
FM / CSA, Class I, Div 1, 2 (Zone 1, 2), IS, NI		4)				F	4												
Process connection																			
Threads DIN 11851						S	1												
SMS 1145						S	2												
Nominal diameter																			
DN 25								5)	B										
DN 40 (SMS 1145: DN 38)									N										
DN 50 (SMS 1145: DN 51)									C										
DN 80 (SMS 1145: DN 76)									D										
DN 100 (4 inch) (SMS 1145: DN 102)									E										
Float design																			
Standard										1									
Pressure rating																			
PN 6		6)									D	0							
PN 25		7)										D	3						
PN 40		8)											D	4					
Design level																			
(Specified by ABB)																	X		
Meter tube / float combination																			
(Specified by ABB.) See flow range tables																	X	X	

Continued on next page

- 1) Not available with Ex d or XP types of Ex protection
- 2) Analog indicator without output signal design: ATEX approval only; IEC Ex not available
- 3) With Ex d cable gland. Not available for analog indicator without output signal design:
- 4) Only with 1/2 inch NPT cable entry.
- 5) Only available with DIN 11851 connections.
- 6) Only for SMS 1145 connections.
- 7) For DN 50 and DN 80 (2 inch and 3 inch)
- 8) For DN 25 and DN 40 (2 inch and 3 inch)

Metal Cone Variable Area Flowmeter VA Master FAM540

Continued

	Main order number														Additional order no.
	Variant digit no.														
	1 - 6	7	8	9	10	11	12	13	14	15	16	17	18	19	
	FAM544	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
Flowmeter sensor															
None, only secondary meter														9)	Y0
Standard														10)	Y1
Measured value error															
1.6 % qg = 50 % acc. to VDE / VDI 3513														10)	A1
1 % of end value															AA
4 % of end value (high viscosity, without calculation)															AK
4 % of end value (high viscosity, with calculation)															AL
Material: 3.1, 3.2; test certificate / NACE															
Material confirmation with inspection certificate 3.1 to EN 10204															C2
Material confirmation with inspection certificate 3.2 to EN 10204															C3
Material confirmation NACE MR 01-75 with acceptance test certificate 3.1 to EN 10204															CN
Material: 2.1; order conformity															
Certificate of compliance 2.1 to EN 10204 for order conformity															C4
Certificates: 3.1; visual, dimensional, functional															
Acceptance test certificate 3.1 to EN 10204 for visual, dimensional, and functional checks															C6
Certificates: 3.1; PMI test															
Acceptance test certificate 3.1 to EN 10204 for Positive Material Identification (PMI)															CA
Certificates: 3.1; compression test															
Compression test to AD2000															CB
Test package (compression test, non-destructive material test, welder test, welding procedure test)															CP
Certificates: Calibration, test report															
Certificate of compliance 2.1 to EN 10204 with confirmation of accuracy															CM
Calibration certificate with confirmation of accuracy and calibration data															CE
Other user certificates															
Russia: Metrological and GOST R certificate															CG1
Kazakhstan: Metrological and GOST K certificate (in preparation)															CG2
Ukraine: Metrological certificate															CG3
Belarus: Metrological certificate															CG6
Additional Ex certificates and approvals															
Russia: GOST-Ex and RTN certificate															EG7
Kazakhstan: Ex permission certificate (in preparation)															EG3
Ukraine: GOST Ex and Ex permission certificate (in preparation)															EG5
Belarus: GGTN certificate															EG9
Language of documentation															
German															M1
English														10)	M5
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)															MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)															ME
Applications															
Oil- and grease-free for oxygen applications															P1
Meter name plate															
Stainless steel plate with TAG no.															T0
Adhesive label with TAG no.														10)	TC
Float material															
Stainless steel 1.4571 (AISI 316Ti SST)														10)	F1
Scale design															
Directly readable scale														10)	SD
Percentage scale															SP
Bar graph														11)	SB
Ambient temperature range															
Extended -40 ... 85 °C (without Ex protection) / -40 ... 60 °C (with Ex protection)														12)	R5
Standard -20 ... 85 °C (without Ex protection) / -20 ... 60 °C (with Ex protection)														10)	R6

9) For Ex version on request.

10) Standard, specified automatically by ABB if no customer specifications have been provided

11) Recommended for indicator with transmitter (4 ... 20 mA) with display

12) Not available for analog indicator with alarm

Metal Cone Variable Area Flowmeter VA Master FAM540

Ordering information (FAM545)

		Main order number																	Additional order no.
Variant digit no.		1 - 6	7	8	9	10	11	12	13	14	15	16	17	18	19				
VA Master metal tube float flowmeter		FAM545	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX		
Indicator / Output signal																			
Analog indicator / No indicator			A																
Analog indicator / Min alarm			B																
Analog indicator / Max alarm			C																
Analog indicator / Min and max alarm			D																
Analog indicator / 4 ... 20 mA with HART protocol			E																
Analog indicator with LCD display / 4 ... 20 mA with HART protocol			F																
Housing material / Cable connection																			
Aluminum / M20 x 1.5 cable gland			1																
Aluminum / 1/2 inch NPT thread			2																
Stainless steel / M20 x 1.5 cable gland			1) 3																
Stainless steel / 1/2 inch NPT thread			1) 4																
Explosion protection and approvals																			
None						Y 0													
ATEX / IEC category 3 (Zone 2 / 21), Ex n		2)				B 1													
ATEX / IEC category 2 (Zone 1 / 21), Ex i, Ex c		2)				A 4													
ATEX / IEC category 2 (Zone 1 / 21), Ex d + Ex i		3)				A 9													
FM / CSA, Class I, Div 1, 2 (Zone 1, 2), XP + IS, NI		4)				F 3													
FM / CSA, Class I, Div 1, 2 (Zone 1, 2), IS, NI		4)				F 4													
Process connection																			
Flange							F 1												
Nominal diameter																			
DN 25									B										
DN 50									C										
DN 80									D										
Float design																			
Standard										1									
Pressure rating																			
PN 40											D 4								
ASME CL 150											A 1								
ASME CL 300											A 3								
Design level																			
(Specified by ABB)														X					
Meter tube / float combination																			
(Specified by ABB.) See flow range tables															X	X			

Continued on next page

- 1) Not available with Ex d or XP types of Ex protection.
- 2) Analog indicator without output signal design: ATEX approval only; IEC Ex not available.
- 3) Not available for analog indicator with alarm.
- 4) Only with 1/2 inch NPT cable entry.

Metal Cone Variable Area Flowmeter VA Master FAM540

Continued

	Main order number													Additional order no.		
	Variant digit no.	1 - 6	7	8	9	10	11	12	13	14	15	16	17		18	19
		FAM545	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
Flowmeter sensor																
None, only secondary meter															5)	Y0
Standard															6)	Y1
Measured value error																
2.5 % qg = 50 % acc. to VDE / VDI 3513															6)	A2
4 % of end value (high viscosity, without calculation)																AK
Material: 3.1, 3.2; test certificate / NACE																
Material confirmation with inspection certificate 3.1 to EN 10204																C2
Material confirmation with inspection certificate 3.2 to EN 10204																C3
Material confirmation NACE MR 01-75 with acceptance test certificate 3.1 to EN 10204																CN
Material: 2.1; order conformity																
Certificate of compliance 2.1 to EN 10204 for order conformity																C4
Certificates: 3.1; visual, dimensional, functional																
Acceptance test certificate 3.1 to EN 10204 for visual, dimensional, and functional checks																C6
Certificates: 3.1; PMI test																
Acceptance test certificate 3.1 to EN 10204 for Positive Material Identification (PMI)																CA
Certificates: 3.1; compression test																
Compression test to AD2000																CB
Test package (compression test, non-destructive material test, welder test, welding procedure test)																CP
Certificates: Calibration, test report																
Certificate of compliance 2.1 to EN 10204 with confirmation of accuracy																CM
Calibration certificate with confirmation of accuracy and calibration data																CE
Other user certificates																
Russia: Metrological and GOST R certificate																CG1
Kazakhstan: Metrological and GOST K certificate (in preparation)																CG2
Ukraine: Metrological certificate																CG3
Belarus: Metrological certificate																CG6
Additional Ex certificates and approvals																
Russia: GOST-Ex and RTN certificate																EG7
Kazakhstan: Ex permission certificate (in preparation)																EG3
Ukraine: GOST Ex and Ex permission certificate (in preparation)																EG5
Belarus: GGTN certificate																EG9
Language of documentation																
German																M1
English															6)	M5
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																ME
Applications																
Oil- and grease-free for oxygen applications																P1
Meter name plate																
Stainless steel plate with TAG no.																T0
Adhesive label with TAG no.															6)	TC
Float material																
PTFE															6)	F2
Scale design																
Directly readable scale															6)	SD
Percentage scale																SP
Bar graph															7)	SB
Ambient temperature range																
Extended -40 ... 85 °C (without Ex protection) / -40 ... 60 °C (with Ex protection)															8)	R5
Standard -20 ... 85 °C (without Ex protection) / -20 ... 60 °C (with Ex protection)															6)	R6

5) For Ex version on request.

6) Standard, specified automatically by ABB if no customer specifications have been provided.

7) Recommended for indicator with transmitter (4 ... 20 mA) with display.

8) Not available for analog indicator with alarm.

Metal Cone Variable Area Flowmeter VA Master FAM540

Ordering information (FAM546)

Main order number

Additional order no.

Variant digit no.	1 - 6	7	8	9	10	11	12	13	14	15	16	17	18	19
VA Master metal tube float flowmeter	FAM546	X	X	X	X	X	X	X	X	X	X	X	X	X
Indicator / Output signal														
Analog indicator / No indicator		A												
Analog indicator / Min alarm		B												
Analog indicator / Max alarm		C												
Analog indicator / Min and max alarm		D												
Analog indicator / 4 ... 20 mA with HART protocol		E												
Analog indicator with LCD display / 4 ... 20 mA with HART protocol		F												
Housing material / Cable connection														
Aluminum / M20 x 1.5 cable gland		1												
Aluminum / 1/2 inch NPT thread		2												
Stainless steel / M20 x 1.5 cable gland		1) 3												
Stainless steel / 1/2 inch NPT thread		1) 4												
Explosion protection and approvals														
None						Y	0							
ATEX / IEC category 3 (Zone 2 / 21), Ex n	2)					B	1							
ATEX / IEC category 2 (Zone 1 / 21), Ex i, Ex c	2)					A	4							
ATEX / IEC category 2 (Zone 1 / 21), Ex d + Ex i	3)					A	9							
FM / CSA, Class I, Div 1, 2 (Zone 1, 2), XP + IS, NI	4)					F	3							
FM / CSA, Class I, Div 1, 2 (Zone 1, 2), IS, NI	4)					F	4							
Process connection														
Flange						F	1							
Nominal diameter														
DN 25								B						
DN 50								C						
DN 80								D						
DN 100								E						
Float design														
Standard										1				
With gas damping										3				
Pressure rating														
PN 16											D	2		
PN 40											D	4		
PN 63											D	5		
PN 100											D	6		
ASME CL 150											A	1		
ASME CL 300											A	3		
ASME CL 600											A	6		
Design level														
(Specified by ABB)													X	
Meter tube / float combination														
(Specified by ABB.) See flow range tables													X	X

XX

Continued on next page

- 1) Not available with Ex d or XP types of Ex protection
- 2) Analog indicator without output signal design: ATEX approval only; IEC Ex not available
- 3) With Ex d cable gland. Not available for analog indicator without output signal design:
- 4) Only with 1/2 inch NPT cable entry

Metal Cone Variable Area Flowmeter VA Master FAM540

Continued

	Main order number													Additional order no.			
	Variant digit no.	1 - 6	7	8	9	10	11	12	13	14	15	16	17		18	19	
		FAM546	X	X	X	X	X	X	X	X	X	X	X	X	X	XX	
Flowmeter sensor																	
None, only secondary meter																5)	Y0
Standard																6)	Y1
Measured value error																	
1.6 % qg = 50 % acc. to VDE / VDI 3513																6)	A1
1 % of end value																	AA
4 % of end value (high viscosity, without calculation)																	AK
4 % of end value (high viscosity, with calculation)																	AL
Material: 3.1, 3.2; test certificate / NACE																	
Material confirmation with inspection certificate 3.1 to EN 10204																	C2
Material confirmation with inspection certificate 3.2 to EN 10204																	C3
Material confirmation NACE MR 01-75 with acceptance test certificate 3.1 to EN 10204																	CN
Material: 2.1; order conformity																	
Certificate of compliance 2.1 to EN 10204 for order conformity																	C4
Certificates: 3.1; visual, dimensional, functional																	
Acceptance test certificate 3.1 to EN 10204 for visual, dimensional, and functional checks																	C6
Certificates: 3.1; PMI test																	
Acceptance test certificate 3.1 to EN 10204 for Positive Material Identification (PMI)																	CA
Certificates: 3.1; compression test																	
Compression test to AD2000																	CB
Test package (compression test, non-destructive material test, welder test, welding procedure test)																	CP
Certificates: Calibration, test report																	
Certificate of compliance 2.1 to EN 10204 with confirmation of accuracy																	CM
Calibration certificate with confirmation of accuracy and calibration data																	CE
Other user certificates																	
Russia: Metrological and GOST R certificate																	CG1
Kazakhstan: Metrological and GOST K certificate (in preparation)																	CG2
Ukraine: Metrological certificate																	CG3
Belarus: Metrological certificate																	CG6
Additional Ex certificates and approvals																	
Russia: GOST-Ex and RTN certificate																	EG7
Kazakhstan: Ex permission certificate (in preparation)																	EG3
Ukraine: GOST Ex and Ex permission certificate (in preparation)																	EG5
Belarus: GGTN certificate																	EG9
Language of documentation																	
German																	M1
English																6)	M5
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																	MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																	ME
Applications																	
Oil- and grease-free for oxygen applications																	P1
Meter name plate																	
Stainless steel plate with TAG no.																	T0
Adhesive label with TAG no.																6)	TC
Float material																	
Stainless steel 1.4571 (AISI 316Ti SST)																6)	F1
Scale design																	
Directly readable scale																6)	SD
Percentage scale																	SP
Bar graph																7)	SB
Ambient temperature range																	
Extended -40 ... 85 °C (without Ex protection) / -40 ... 60 °C (with Ex protection)																8)	R5
Standard -20 ... 85 °C (without Ex protection) / -20 ... 60 °C (with Ex protection)																6)	R6

5) For Ex version on request

6) Standard, specified automatically by ABB if no customer specifications have been provided

7) Recommended for indicator with transmitter (4 ... 20 mA) with display

8) Not available for analog indicator with alarm