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Data Sheet

D184S031U02

FieldIT

Electromagnetic Flowmeter COPA-XM / MAG-XM

IndustrialIT enabled

Function

- The flowrate of liquids, slurries, pastes and sludges can be measured accurately with the electromagnetic flowmeter
- Minimum conductivity 5 µS/cm
- The measurement system consists of a flowmeter primary and a converter in a compact or remote mounted design

Applications

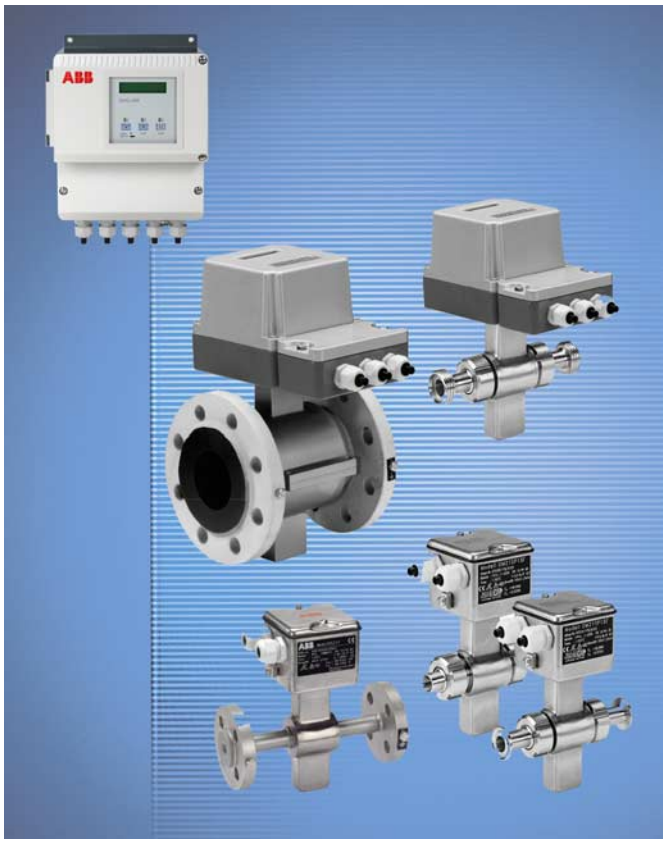
- Suitable for flow metering in the chemical and pharmaceutical industries, the food industry, in water and waste water treatment facilities and all other industry branches
- The multitude of products being metered confirms the flexibility and effectiveness of the metering principle

Instrument Advantages

- Simple, menu controlled operating structure
- Configure externally using a Magnetic Stick
- EEPROM-Module for easiest converter exchange
- Long term, stable accuracy ≤ 0.4 % of rate, option ≤ 0.2 % of rate
- Current and pulse outputs, contact input and output user configurable
- HART-Protocol with 4-20 mA
- PROFIBUS DP

Important Instrument Features

- Designed in accord with PED-Directive 97/23/EC [Pressure Equipment Directive]
- Flanges per DIN/ASME/ANSI/JIS DN 3 - DN 2000 [1/10” - 40”]
- Variable process connections DN 1 - DN 100 [1/25” - 4”]



HART® FIELD COMMUNICATIONS PROTOCOL

PROFI PROCESS FIELD BUS

pulsed DC magnetic field
compact and remote designs

ABB

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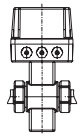
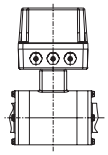
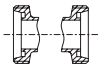
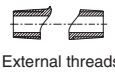
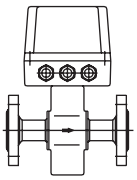
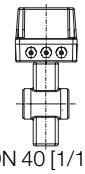
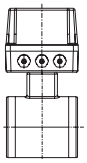
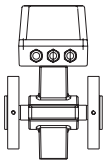
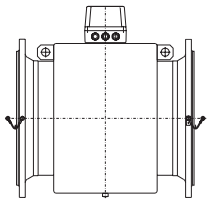
Overview, Flowmeter Primary and Converter Designs COPA-XM

Variable Connections	Connection Types	Fixed Flanges	Wafer Design	Fixed Flanges
 DN 3 - DN 40 [1/10"-1½"]  DN 50 - DN 100 [2"-4"]	 Weld stubs  Food Ind. fittings  Tri-Clamp  External threads Add'l types see Dimensions, others upon request		 DN 3-DN 40 [1/10"-1½"]  DN 50 - DN 100 [2"-4"]	 

Accuracy	0.4% of rate, option 0.2% of rate			
Flowmeter primary materials	Stainless steel housing Series 2000			Alum. Series 4000
Flowmeter Primary				
Model number	DM23*	DM23F	DM23W	DM43F
Process Connections	DN Inch PN *	DN PN	DN Inch PN	DN PN
Wafer design	3–100 1/10-4 – W	–	3– 50 1/10-2 10–40 65–100 2½-4 10–16	–
Flanged DIN 2501	3–100 – F	3–100 10–40	–	3–2000 10–40
Flanged ASME/ANSI	3–100 1/10-4 – F	1/10"–4" CL150–300	–	1/10"–80" CL150–300
Food ind. fitting DIN 11851	25–100 1-4 16 S	–	–	–
Weld stubs DIN 11850	3–100 1/10-4 10 R	–	–	–
Weld stubs DIN 2463	3–100 1/10-4 10 Q	–	–	–
Weld stubs ISO 2037	25–100 1-4 40 P	–	–	–
Tri-Clamp DIN 32676	25–100 1-4 10 T	–	–	–
External threads ISO 228	3– 25 1/10-1 10 E	–	–	–
1/8" Sanitary connector	1– 2 1/25-3/32 10 B	–	–	–
Liner	PEEK, Torlon (<DN3 [1/10"]) PFA (>DN2 [3/32"])	PFA	PFA	Hard/soft rubber, PTFE, PFA, others
Conductivity	≥ 5 µS/cm			
Electrodes	SS No. 1.4571[316Ti], 1.4539, Hastelloy B-2/C-4, Platinum-Iridium, Tantalum, Titanium			
Process connection material	SS No. 1.4404[316L], 1.4571[316Ti], PVC, POM	SS No. 1.4571[316Ti]	–	Steel, SS No. 1.4571[316Ti]
Protection Class	IP 67	IP 67	IP 67	IP 67
Fluid temperature	-25 to 130 °C	-40 to 130 °C	-25 to 130 °C	-25 to 130 °C
Approvals				
Hygienic & sterile requirements	CIP/SIP-capable FML, 3A, EHEDG (Cleanability)			CIP-capable
Converter				
Supply power	24 V, 115 V, 230 V AC, 24 V DC			
Current output standard	0/2–10 mA, 0–5 mA, 0/4–20 mA, 0/4–10/12–20 mA			
Pulse output, 1-channel std.	active, 24 V, optocoupler			
Ext. zero return	yes			
Ext. totalizer reset	yes			
Forward/reverse metering	yes			
Data link	RS485, PROFIBUS DP			
Communication	ASCII-Protocol, PROFIBUS DP, HART-Protocol®			
Fluid monitoring std.	yes, from DN 10 [3/8"]			
Self monitoring	yes			
Local display/totalization	yes			
2 Flow ranges	yes, switching automatic or externally			
Preset counter	yes, START/STOP using contact input, stop using contact output			
Auto. density correction	yes, manual entry (totalizer and display in weight units)			

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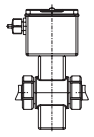
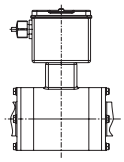
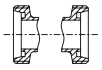
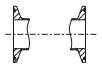
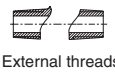
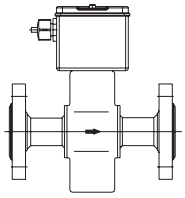
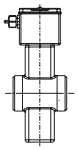
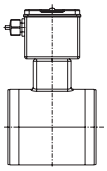
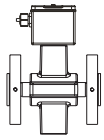
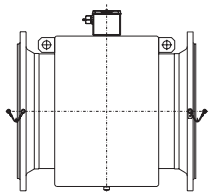
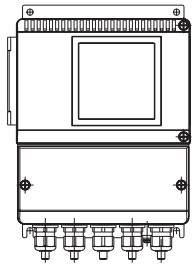
Overview, Flowmeter and Converter Designs MAG-XM

Variable Connections	Connection Types	Fixed Flanges	Wafer Design	Fixed Flanges
 DN 3 - DN 40 [1/10"-1½"]  DN 50 - DN 100 [2"-4"]	 Weld stubs  Food Ind. fittings  Tri-Clamp  External threads Add'l types see Dimensions, others upon request		 DN 3-DN 40 [1/10"-1½"]  DN 50 - DN 100 [2"-4"]	 

Accuracy	0.4% of rate, option 0.2% of rate			
Flowmeter primary materials	Stainless steel housing Series 2000			Alum Series 4000
Flowmeter Primary				
Model number	DM21*	DM21F	DM21W	DM41F
Process Connections	DN Inch PN *	DN PN	DN Inch PN	DN PN
Wafer design	3–100 1/10-4 – W	–	3– 50 1/10-2 10–40 65–100 2½-4 10–16	–
Flanged DIN 2501	3–100 – F	3–100 10–40	–	3–2000 10–40
Flanged ASME/ANSI	3–100 1/10-4 – F	1/10"–4" CL150–300	–	1/10"–80" CL150–300
Food ind. fitting DIN 11851	25–100 1-4 16 S	–	–	–
Weld stubs DIN 11850	3–100 1/10-4 10 R	–	–	–
Weld stubs DIN 2463	3–100 1/10-4 10 Q	–	–	–
Weld stubs ISO 2037	25–100 1-4 40 P	–	–	–
Tri-Clamp DIN 32676	25–100 1-4 10 T	–	–	–
External threads ISO 228	3– 25 1/10-1 10 E	–	–	–
1/8" Sanitary connector	1– 2 1/25-3/32 10 B	–	–	–
Liner	PEEK, Torlon (<DN3 [1/10"]) PFA (>DN2 [3/32"])	PFA	PFA	Hard/soft rubber, PTFE, PFA, others
Conductivity	≥ 5 µS/cm			
Electrodes	SS No. 1.4571[316Ti], 1.4539, Hastelloy B-2/C-4, Platinum-Iridium, Tantalum, Titanium			
Process connection material	SS No. 1.4404 [316L]	SS No. 1.4571[316Ti]	–	Steel, SS No. 1.4571[316Ti]
Protection Class	IP 67 / IP 68	IP 67 / IP 68	IP 67 / IP 68	IP 67 / IP 68
Fluid temperature	-25 to 130 °C	-40 to 130 °C	-25 to 130 °C	-25 to 130 °C / 180 °C
Approvals				
Hygienic & sterile requirements	CIP/SIP-capable FML, 3A, EHEDG (Cleanability)			CIP-capable
Converter				
Model number	50XM200			
Supply power	24 V, 115 V, 230 V AC, 24 V DC			
Current output standard	0/2–10 mA, 0–5 mA, 0/4–20 mA, 0/4–10/12–20 mA			
Pulse output, 1-channel std.	active, 24 V, optocoupler			
Ext. zero return	yes			
Ext. totalizer reset	yes			
Forward/reverse metering	yes			
Data link	RS485, PROFIBUS DP			
Communication	ASCII-Protocol, PROFIBUS DP, HART-Protocol®			
Fluid monitoring std.	yes, from DN 10 [3/8"]			
Self monitoring	yes			
Local display/totalization	yes			
2 Flow ranges	yes, automatic or external switching			
Preset counter	yes, START/STOP using contact input, stop using contact output			
Auto. density correction	yes, manual entry (totalizer and display in weight units)			
Housing	Field mount housing			

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Accuracy, Reference Conditions and Principle of Operation

Reference Conditions per EN 29104

Fluid Temperature
20 °C ± 2 K

Ambient Temperature
20 °C ± 2 K

Supply Power
Nominal voltage per name plate U_N ± 1%

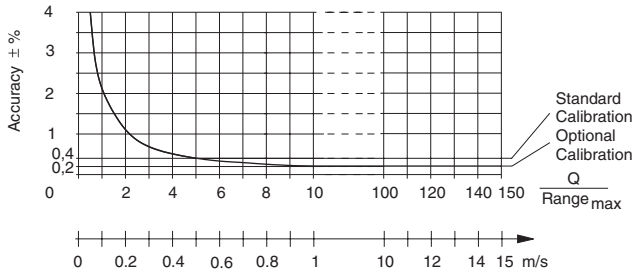
Installation Conditions, Straight Pipe Sections
Upstream > 10 x D,
Downstream > 5 x D,
D = Flowmeter primary size
Please note the COPA-XM/MAG-XM Operating Instruction.

Warm Up Phase
30 min

Effect on Analog Output
Same as pulse output plus ± 0.1% of rate

Temperature Effects
0.1% of rate /10 °C

Pulse Output
Standard: Q> 0.05 $Range_{max}$ ± 0.4% of rate
Q< 0.05 $Range_{max}$ ± 0.0002 $Range_{max}$
Optional: Q> 0.1 $Range_{max}$ ± 0.2% of rate
Q< 0.1 $Range_{max}$ ± 0.0002 $Range_{max}$



Information:
$Range_{max}$ is the flowrate equivalent to a flow velocity of 10 m/s (see Table Page 6)

Fig. 1: Accuracy

Principle of Operation

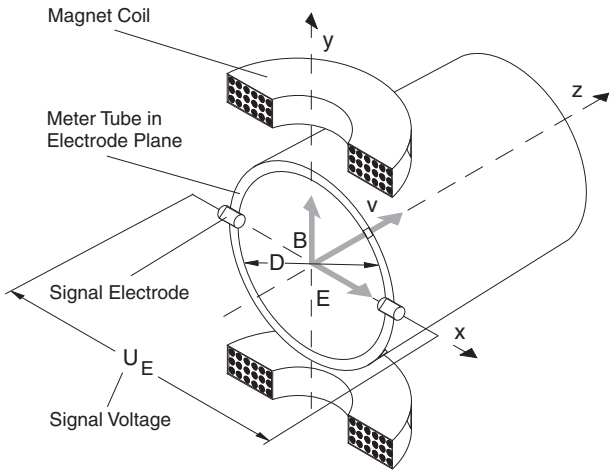
Faraday's Laws of Induction form the basis for the electromagnetic flowmeters. It states that a voltage is induced in a conductor as it moves through a magnetic field.

This principle is applied to a conductive fluid which flows through a magnetic field generated perpendicular to the flow direction (see Schematic).

The voltage induced in the fluid is measured at two electrodes, installed diametrically opposite to each other. This signal voltage U_E is proportional to the magnetic induction B, the electrode spacing D and the average flow velocity v.

Noting that the magnetic induction B and the electrode spacing D are constants, indicates that a proportionality exists between the signal voltage U_E and the average flow velocity v. The equation for the volume flow shows that the signal voltage U_E is linear and proportional to the volume flowrate.

The induced signal voltage is processed in the converter into scaled, analog and digital signals.



U_E = Signal voltage
B = Magnetic induction
D = Electrode spacing
v = Average flow velocity
q_v = Volume flowrate

$U_E \sim B \cdot D \cdot v$

$q_v = \frac{D^2 \pi}{4} \cdot v$

$U_E \sim q_v$

Fig. 2: Electromagnetic Flowmeter Schematic

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Installation Requirements and Flowmeter Primary Grounding Procedures

In- and Outlet Straight Sections

The measurement principle is independent of the flow profile as long as eddies do not extend into the region where the measurements are made, e.g. after double elbows in 2 planes, tangential entries or partially opened gate valves installed directly upstream from the flowmeter. In such situations measures to normalize the flow profile are required. It is recommended that flow control devices be installed downstream from the flowmeter primary.

Grounding

Grounding the flowmeter primary is necessary not only for safety reasons but also to assure proper operation of the electromagnetic flowmeter. The grounding screws on the flowmeter primary, which correspond to VDE 0100, Part 540, are to be connected to earth potential. For measurement reasons this potential should be identical to the fluid potential if at all possible.

In applications using plastic or insulating lined pipelines the

Installations in Larger Size Pipelines

The flowmeter can be installed in larger size pipelines without problems using reducer sections (e.g. flanged reducers per DIN EN 545). The pressure drop when reducers are used can be determined from the Nomograph, Fig. 4. The procedure for determining the pressure drop is as follows:

1. Calculate the diameter ratio d/D.
2. Calculate the flow velocity as a function of the flowmeter size and the flowrate:

$$v = \frac{\text{Q (Flowrate)}}{\text{Flowmeter Primary Constant}}$$

The flow velocity can also be determined from the Flowrate Nomographs, Fig. 16 and Fig. 17.

3. In Fig. 4 read the “Pressure drop” value, y-axis, at the intersection of the “Diameter Ratio”, x-axis, and the “Flow Velocity” curve.

Specifications Flowmeter Primary

Meter Size DN	Inch	Std. Press. Rating PN	Min. Flow Range Flow Velocity. 0 to 0.5 m/s	Max. Flow Range Flow Velocity. 0 to 10 m/s	Max. Flow Range Flow Velocity. 0 to 15 m/s
1	1/25	10	0 to 0.03 l/min	0 to 0.6 l/min	0 to 0.9 l/min
1.5	1/16	10	0 to 0.06 l/min	0 to 1.2 l/min	0 to 1.8 l/min
2	3/32	10	0 to 0.1 l/min	0 to 2 l/min	0 to 3 l/min
3	1/10	40	0 to 0.2 l/min	0 to 4 l/min	0 to 6 l/min
4	5/32	40	0 to 0.4 l/min	0 to 8 l/min	0 to 12 l/min
6	1/4	40	0 to 1 l/min	0 to 20 l/min	0 to 30 l/min
8	5/16	40	0 to 1.5 l/min	0 to 30 l/min	0 to 45 l/min
10	3/8	40	0 to 2.25 l/min	0 to 45 l/min	0 to 67.5 l/min
15	1/2	40	0 to 5 l/min	0 to 100 l/min	0 to 150 l/min
20	3/4	40	0 to 7.5 l/min	0 to 150 l/min	0 to 225 l/min
25	1	40	0 to 10 l/min	0 to 200 l/min	0 to 300 l/min
32	1-1/4	40	0 to 20 l/min	0 to 400 l/min	0 to 600 l/min
40	1-1/2	40	0 to 30 l/min	0 to 600 l/min	0 to 900 l/min
50	2	40	0 to 3 m^3/h	0 to 60 m^3/h	0 to 90 m^3/h
65	2-1/2	40	0 to 6 m^3/h	0 to 120 m^3/h	0 to 180 m^3/h
80	3	40	0 to 9 m^3/h	0 to 180 m^3/h	0 to 270 m^3/h
100	4	16	0 to 12 m^3/h	0 to 240 m^3/h	0 to 360 m^3/h
125	5	16	0 to 21 m^3/h	0 to 420 m^3/h	0 to 630 m^3/h
150	6	16	0 to 30 m^3/h	0 to 600 m^3/h	0 to 900 m^3/h
200	8	10/16	0 to 54 m^3/h'	0 to 1080 m^3/h	0 to 1620 m^3/h
250	10	10/16	0 to 90 m^3/h	0 to 1800 m^3/h	0 to 2700 m^3/h
300	12	10/16	0 to 120 m^3/h	0 to 2400 m^3/h	0 to 3600 m^3/h
350	14	10/16	0 to 165 m^3/h	0 to 3300 m^3/h	0 to 4950 m^3/h
400	16	10/16	0 to 225 m^3/h	0 to 4500 m^3/h	0 to 6750 m^3/h
500	20	10	0 to 330 m^3/h	0 to 6600 m^3/h	0 to 9900 m^3/h
600	24	10	0 to 480 m^3/h	0 to 9600 m^3/h	0 to 14400 m^3/h
700	28	10	0 to 660 m^3/h	0 to 13200 m^3/h	0 to 19800 m^3/h
800	32	10	0 to 900 m^3/h	0 to 18000 m^3/h	0 to 27000 m^3/h
900	36	10	0 to 1200 m^3/h	0 to 24000 m^3/h	0 to 36000 m^3/h
1000	40	10	0 to 1350 m^3/h	0 to 27000 m^3/h	0 to 40500 m^3/h
1200	48	6	0 to 2100 m^3/h	0 to 42000 m^3/h	0 to 63000 m^3/h
1400	54	6	0 to 2700 m^3/h	0 to 54000 m^3/h	0 to 81000 m^3/h
1600	64	6	0 to 3600 m^3/h	0 to 72000 m^3/h	0 to 108000 m^3/h
1800	72	6	0 to 4500 m^3/h	0 to 90000 m^3/h	0 to 135000 m^3/h
2000	80	6	0 to 5700 m^3/h	0 to 114000 m^3/h	0 to 171000 m^3/h

Information:
The flow range end value can be set anywhere between 0.5 and 15 m/s, even though the flow rate nomographs on Page 10 only cover a range from 0.5 to 10 m/s. (For max. flow range end values see last column in the above table).

Flanged Design and Pressure Ratings

Meter Size DN / Inch	Flanges	Material	PN	PED
3–25 1/10"–1"	DIN ASME JIS	SS1.4571[316Ti] or Steel	40 bar CL 150, CL 300 10 bar	SEP Art.3 Par. 3
32 1-1/4"	DIN ASME JIS	SS1.4571[316Ti] or Steel	40 bar CL 150, CL 300 10 bar	Certificate of Compliance for Category III, Module B1 + D, Fluid Group 1
40 1-1/2"	DIN ASME JIS	SS1.4571[316Ti] or Steel	40 bar CL 150, CL 300 10 bar	
50 2"	DIN ASME JIS	SS1.4571[316Ti] or Steel	40 bar CL 150, CL 300 10 bar	
65 2-1/2"	DIN ASME JIS	SS1.4571[316Ti] or Steel	16, 40 bar CL 150, CL 300 10 bar	
80 3"	DIN ASME JIS	SS1.4571[316Ti] or Steel	40 bar CL 150, CL 300 10 bar	
100 4"	DIN ASME JIS	SS1.4571[316Ti] or Steel	16, 40 bar CL 150, CL 300 10 bar	
125 5"	DIN ASME	SS1.4571[316Ti] or Steel	16, 40 bar CL 150, CL 300	
150 6"	DIN ASME	SS1.4571[316Ti] or Steel	16, 40 bar CL 150, CL 300	
200 8"	DIN ASME	SS1.4571[316Ti] or Steel	10, 16, 25, 40 bar CL 150, CL 300	
250 10"	DIN ASME	SS1.4571[316Ti] or Steel	10, 16, 25, 40 bar CL 150, CL 300	
300 12"	DIN ASME	SS1.4571[316Ti] or Steel	10, 16, 25, 40 bar CL 150, CL 300	
350–600 14"–24"	DIN ASME	SS1.4571[316Ti] or Steel	10, 16, 25, bar CL 150	
700–1000 28"–40"	DIN ASME	SS1.4571[316Ti] or Steel	10, 16, 25, bar CL 150	Water Meters per Art.1 Par. (3) No. 3.2
1200–2000 48"–80"	DIN	SS1.4571[316Ti] or Steel	6, 10, 16, bar	

Temperature Diagram Flanged Design

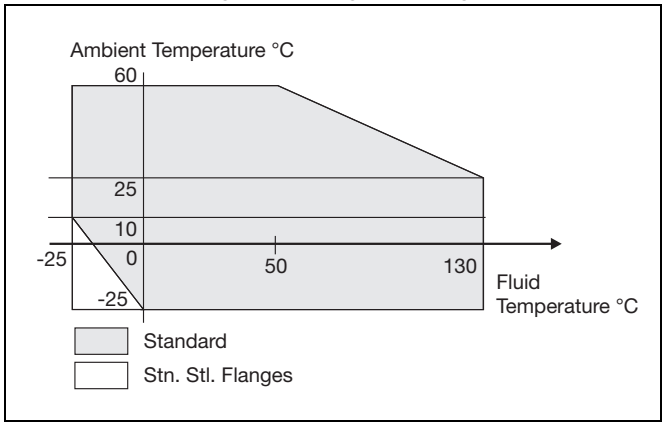


Fig. 5: Fluid Temperature as a Function of the Ambient Temperature COPA-XM

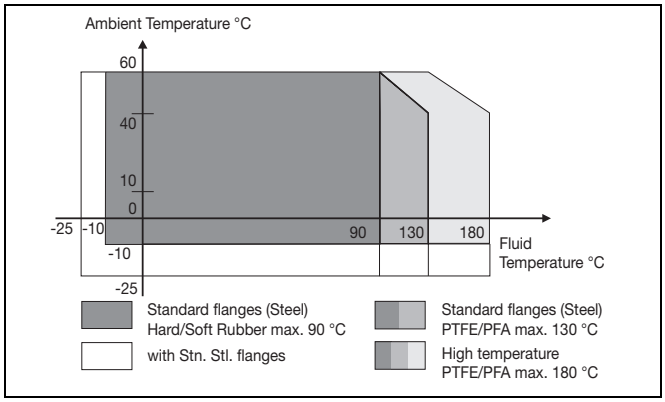


Fig. 6: Fluid Temperature as a Function of the Ambient Temperature

Max. Allowable Cleaning Temperature

CIP-cleaning	Liner Flowmeter Primary	$T_{max.}$ °C	t_{max} Minutes	$T_{Amb.}$ °C
Steam cleaning	PTFE, PFA, PEEK, Torlon	150	60	25
Liquid cleaning	PTFE, PFA, PEEK, Torlon	140	60	25

If the ambient temperature >25 °C, the difference must be subtracted from the max. cleaning temperature. $T_{max} - \Delta$ °C.
Δ °C = ($T_{Amb.}$ -25 °C)

Implementation of the Directive 97/23/EG „Pressure Equipment Directive“

The Pressure Equipment Directive is implemented as follows:

- Classify all instruments as Category III (Pipelines for gaseous Liquids, Group 1)
- Compliance evaluation per module combination B1 and D
  - B1: EU proposed test by a certified authority (TÜV)
  - D: Evaluation and monitoring of the QA-system for the manufacture, test and inspection by a certified authority (TÜV)
- Fulfillment of the safety requirements through use of the AD-2000-Pamphlets

Exceptions to the Directive:
Flowmeter sizes DN 1 to DN 25 [1/25”- 1”] are manufactured according to SEP Art. 3 Par. 3 and do not receive a CE-Mark. Similarly, flowmeter sizes DN 700 to DN 2000 [28”-80”] are assigned according to Art. 1 Par. (3) No. 3.2, since these are used in water supply and distribution networks and for the flow of waste water together with the connected equipment within the application range of the Directive.

! Information: „Water“ is defined as potable water, waste water and treated waste water
„Networks as well their connected equipment“ is defined as: complete systems for the supply and distribution of water and waste water. They extend to the withdrawal point in buildings, industrial systems and factories and include the equipment, which is closely associated with these networks, such as water totalizers and pipeline valves. Pressurized tanks, expansion tanks are not considered as parts of the „network and the connected equipment“ and therefore are not excepted.

Material Strength Curves

Liners: PTFE, Hard/Soft Rubber (limited to 90 °C)

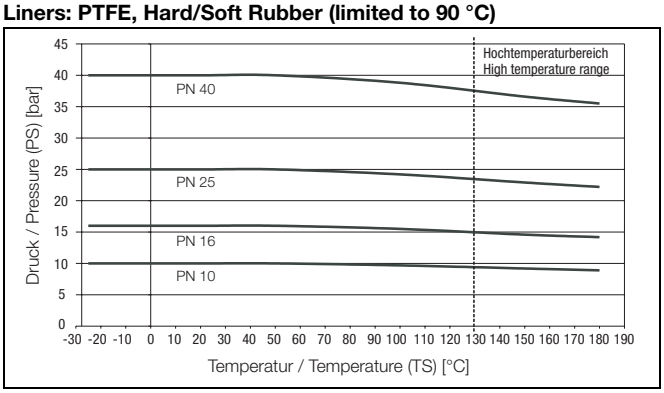


Fig. 7: DIN-Flanges SS No.1.4571[316Ti] to DN 600

Liners: PTFE, Hard/Soft Rubber (limited to 90 °C)

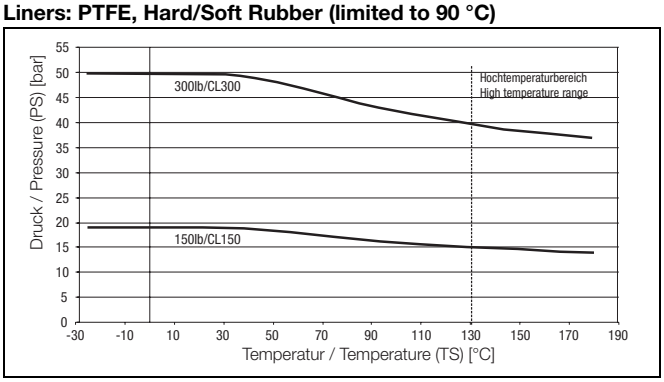


Fig. 8: ASME/ANSI-Flanges SS No.1.4571[316Ti] to 24”

Liners: PTFE, Hard/Soft Rubber (limited to 90 °C)

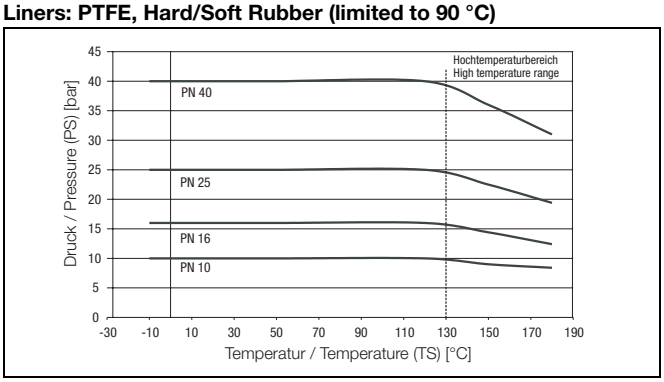


Fig. 9: DIN-Flanges Steel to DN 600

Liners: PTFE, Hard/Soft Rubber (limited to 90 °C)

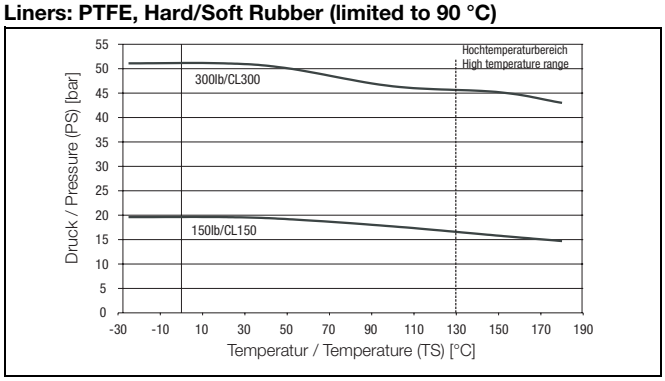


Fig. 10: ASME/ANSI-Flanges Steel to 24”

JIS 10K-B2210 Flange SS No. 1.4571 [316Ti] or Steel

Meter Size DN	Material	PN	TS [°C]	PS [bar]
32–100	SS No.1.4571[3156Ti]	10	-25 to +180	10
32–100	Steel	10	-10 to +180	10

Liners: PTFE, Hard/Soft Rubber (limited to 90 °C)

Liners: Hard/Soft Rubber ≤ 90 °C

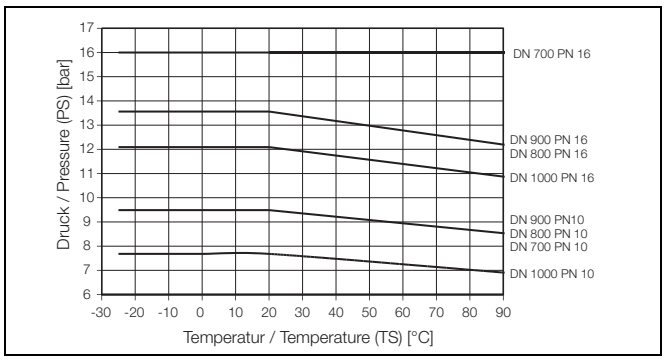


Fig. 11: DIN-Flanges SS No. 1.4571 [316Ti] ≤ DN 1000

Liners: Hard/Soft Rubber ≤ 90 °C

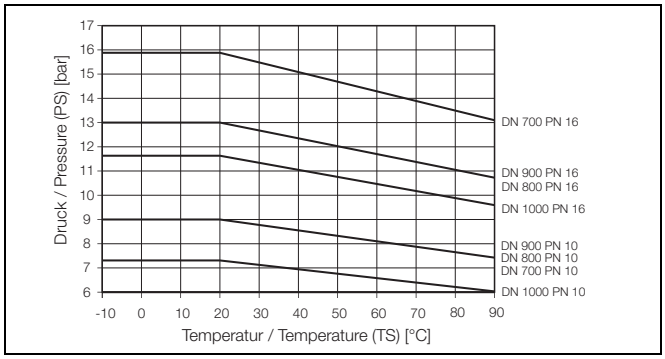


Fig. 12: DIN-Flanges Steel ≤ DN 1000

Liners Hard/Soft Rubber

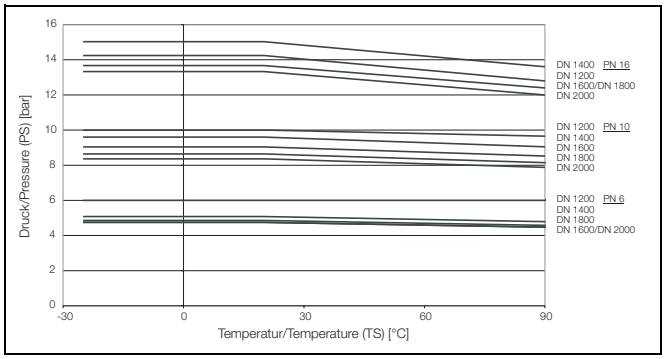


Fig. 13: DIN-Flanges SS No. 1.4571[316Ti] DN 1200 - DN 2000

Liners: Hard/Soft Rubber

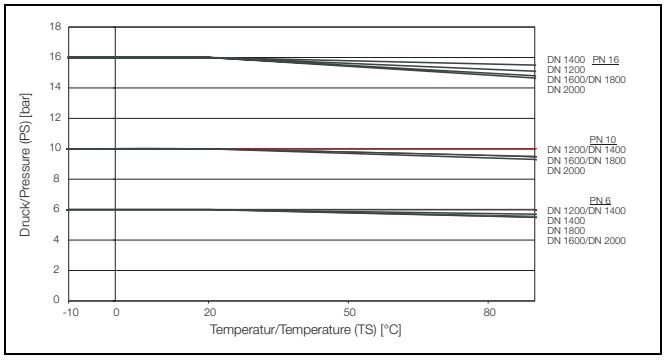


Fig. 14: DIN-Flanges Steel DN 1200 - DN 2000

Liners: PFA Wafer Design

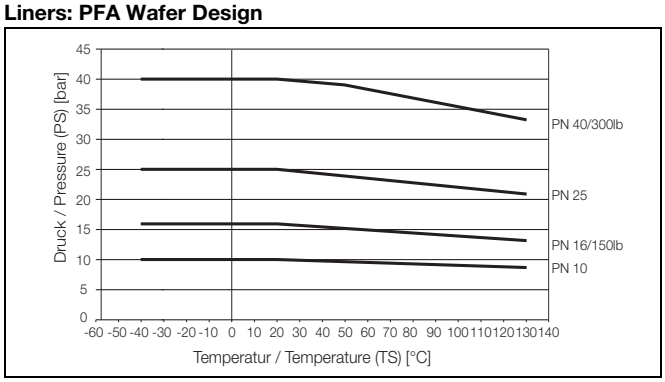


Fig. 15: PFA Wafer Design

JIS 10K-B2210 Wafer Design

Meter Size DN	Material	PN	TS [°C]	PS [bar]
32–100	SS No.1.4404[316L] SS No. 1.4435[316L] SS No. 1.4301[304]	10	-40 – +130	10

Overview, Series 2000 Versions

Model		SE21							SE21W	
Meter Size	Process Conn's	1/8"-Sanitary	External Threads	Tri-Clamp DIN 32676	Weld Stubs DIN 11850	Weld Stubs DIN 2463	Weld Stubs ISO 2037	Food Ind. Fittings DIN 11851	Wafer Design	PED
DN 1	1/25"	X								SEP Art. 3, Par. 3
DN 2	3/32"	X								
DN 3	1/10"		X	X	X	X		X	X	
DN 4	4/32"		X	X	X	X		X	X	
DN 6	1/4"		X	X	X	X		X	X	
DN 8	5/16"		X	X	X	X		X	X	
DN 10	3/8"		X	X	X	X		X	X	
DN 15	1/2"		X	X	X	X		X	X	
DN 20	3/4"		X	X	X	X		X	X	
DN 25	1"		X	X	X	X	X	X	X	
DN 32	1-1/4"			X	X	X	X	X	X	Compliance Evaluation per Category III Module B1 + D, Fluid Group 1
DN 40	1-11/2"			X	X	X	X	X	X	
DN 50	2"			X	X	X	X	X	X	
DN 65	2-1/2"			X	X	X	X	X	X	
DN 80	3"			X	X	X	X	X	X	
DN 100	4"			X	X	X	X	X	X	

X = Available

Protection Class per EN 60529

IP 67 Standard
IP 68 (only for MAG-XM)

Pipeline Vibration

Maximum allowable 15 m/s^2 (10 – 150 Hz)

Design

Meter Tube

Stainless steel No. 1.4301 [304]

DN 3 to DN 300 [1/10" to 12"]

Two piece housing: Cast Alum, painted[1)]

Flanges

Steel galvanized standard
Stainless steel 1.4571 [316Ti] (≤ DN15 [1/2"] standard)

DN 350 to DN 2000

Welded steel construction, painted[1)]

Flanges

Steel, painted standard
Stainless steel 1.4571 [316Ti]

1) Paint coat 60 µm thick, RAL 9002

Connection Box

Cast Alum, painted
Paint coat 60 µm thick
Center: RAL 7012
Cover: RAL 9002

Weight

See Dimensions Drawings

Laid Length Flanged (Short Design)

Meter sizes DN 3 – DN 400 [1/10" – 16"] correspond to the lengths defined in DIN Flange Design VDE/VDI 2641 and DVGW Working Paper W420 (Water Totalizer, Design WP ISO 4064 Short as well as ISO 13359).

ASME/ANSI CL 150/CL 300

With PFA, flanged (Short Design)

ASME/ANSI CL 150/CL 300

With PTFE, hard/soft rubber
Laid length Series 1000
Protection flanges for laid length Series 1000 L+20 mm ≤ DN 80 [3"]
L+25 mm from DN 100 [4"] can be specified.

Flowrate Nomographs

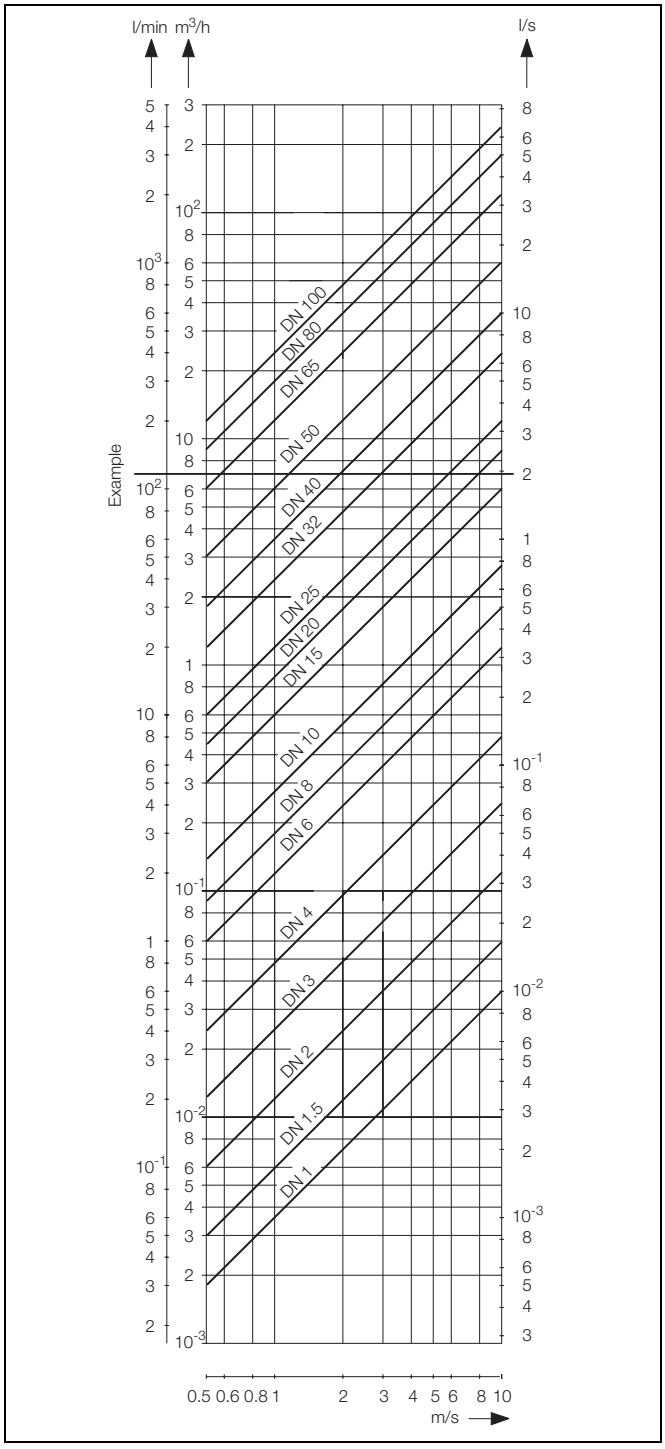


Fig. 16: Flowrate Nomograph DN 1 to DN 100 [1/25" to 4"]

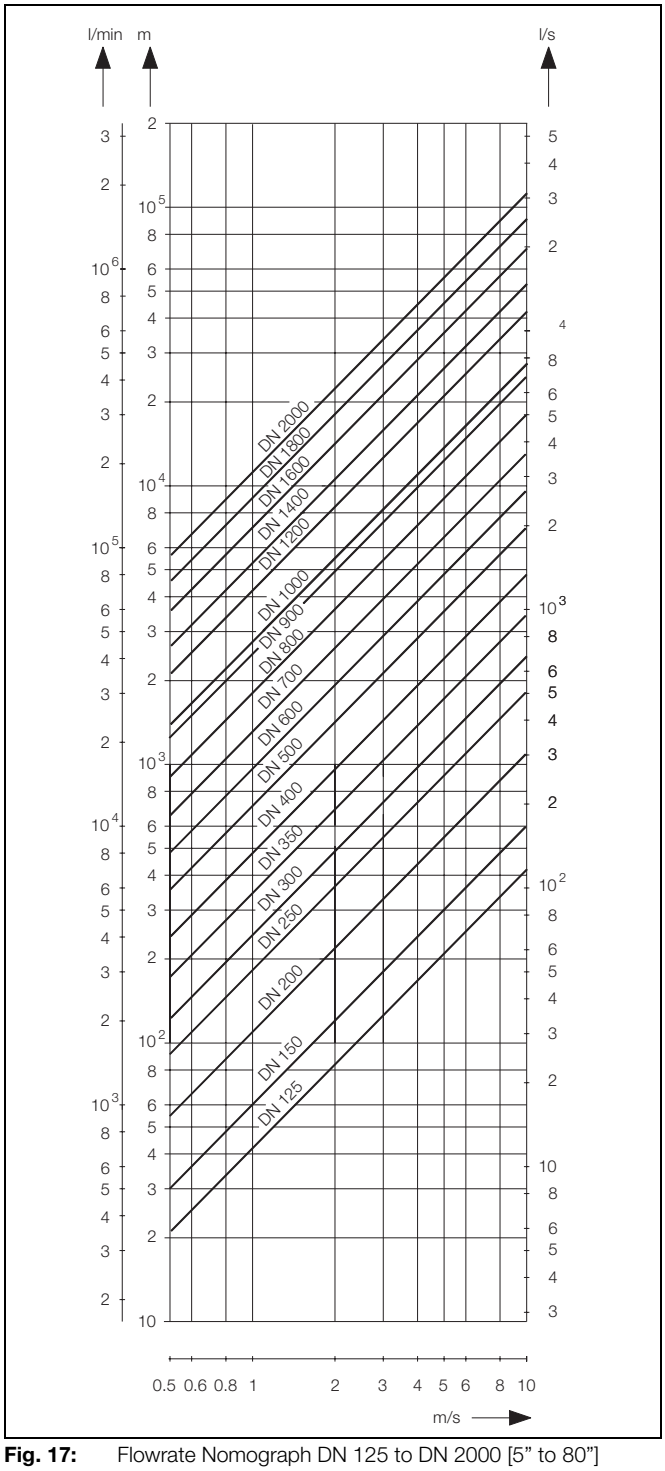


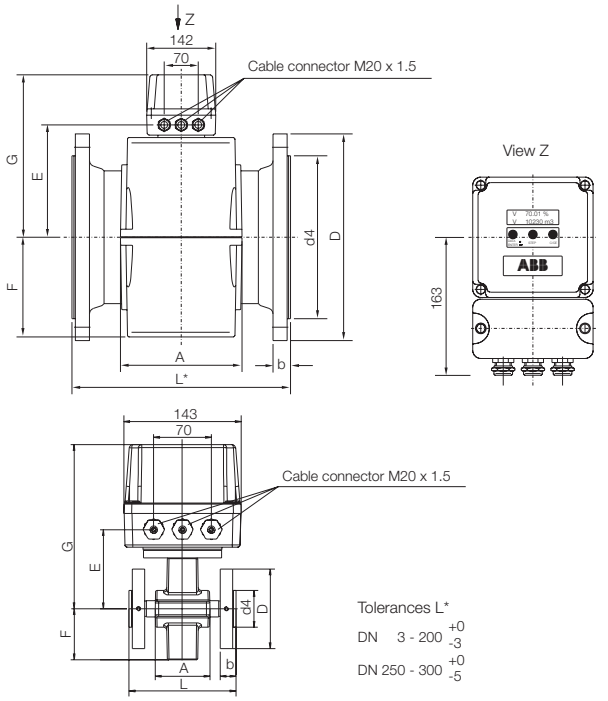
Fig. 17: Flowrate Nomograph DN 125 to DN 2000 [5" to 80"]

Flowrate Nomograph
The volume flowrate is a function of the flow velocity and the flowmeter size. The Flowrate Nomographs, Fig. 16 and Fig. 17, indicate the flowrate range for a specific flowmeter size and which flowmeter sizes are suitable for a specific flowrate.

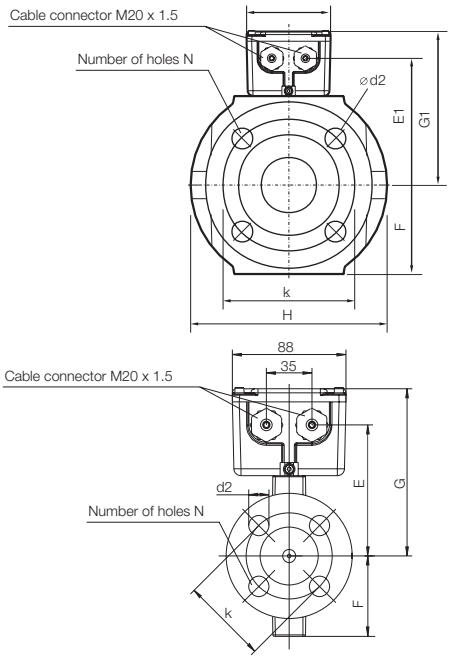
Example:
Flowrate = 7 m^3/h (maximum value = range end value). Suitable are flowmeter sizes DN 20 to DN 65 [3/4" to 2-/12"] for a flow velocity between 0.5 and 10 m/s.

Dimension Drawings Flowmeter Primaries DN 3 to DN 300 [1/10" to 12"], DIN Flanges Models DM43F and DM41F

COPA-XM



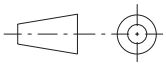
MAG-XM



Flange Dimensions								Instrument Dimensions										COPA-XM	MAG-XM
DN	PN[1]	D	d4	b	k	d2	N	A	L*	L[2]	L[3]	E	E1[4]	F	G	G1[4]	H	Weight kg	Weight kg
3-8	10-40	90	40	18	60	14	4	67	130	133	136	96	101	62	200	129	75	5	4
10	10-40	90	40	18	60	14	4	67	200	203	206	96	101	62	200	129	75	5.5	4.5
15	10-40	95	45	18	65	14	4	67	200	203	206	96	101	62	200	129	75	5.5	4.5
20	10-40	105	58	20	75	14	4	87	200	203	206	107	112	73	200	140	95	6	5
25	10-40	115	68	20	85	14	4	87	200	203	206	107	112	73	200	140	95	6.5	5.5
32	10-40	140	78	20	100	18	4	95	200	203	206	112	117	78	200	145	102	8	7
40	10-40	150	88	20	110	18	4	100	200	203	206	116	121	82	200	149	112	8.5	7.5
50	10-40	165	102	21	125	18	4	116	200	203	206	124	129	90	208	157	130	10	9
65	10-16	185	124	21	145	18	4	100	200	203	206	148	153	104	222	171	146	14	13
	25-40	185	124	25	145	18	8	100	200	203	206	148	153	104	222	171	146	14	13
80	10-40	200	138	23	160	18	8	100	200	203	206	154	159	110	228	177	163	17	16
100	10-16	220	158	23	180	18	8	130	250	253	256	174	179	130	248	197	190	18	17
	25-40	235	162	27	190	22	8	130	250	253	256	174	179	130	248	197	190	18	17
125	10-16	250	188	25	210	18	8	124	250	255	260	152	170	127	261	195	252	31	24
	25-40	270	188	29	220	26	8	124	250	255	260	152	170	127	261	195	252	37	27
150	10-16	285	212	25	240	22	8	170	300	305	310	173	191	148	282	216	290	29	28
	25-40	300	218	31	250	26	8	170	300	305	310	173	191	148	282	216	290	35	34
200	10	340	268	28	295	22	8	195	350	355	360	205	222	179	314	247	365	55	54
	16	340	268	28	295	22	12	195	350	355	360	205	222	179	314	247	365	55	54
250	10	395	320	30	350	22	12	250	450	455	460	233	250	207	336	275	426	81	80
	16	405	320	30	355	26	12	250	450	455	460	233	250	207	336	275	426	81	80
300	10	445	370	31	400	22	12	250	500	505	510	276	293	250	379	318	510	87	86
	16	460	378	33	410	26	12	250	500	505	510	276	293	250	379	318	510	92	86

1) Other pressure ratings upon request.
2) Standard with a grounding plate mounted on one flange, SS No. 1.4571[316Ti]. Other materials upon request. See information note "Grounding".
3) With protection flanges. Protection flanges provide the ground connection, grounding plates not required. Also available with Series 1000 protection flanges, dimensions see Page 15.
4) Only with MAG-XM, for high temperature design + 120 mm.

All dim´s in mm



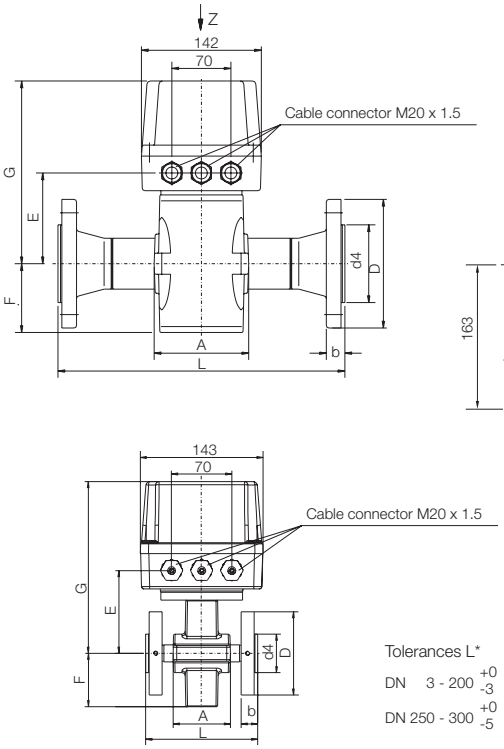
ISO Projection Method E

Fig. 18: Flowmeter Primaries DN 3 to DN 300, DIN Flanges

Dimension Drawings Flowmeter Primaries 1/10” to 12” [DN 3 to DN 300], ASME/ANSI Flanges

Models DM43F and DM41F

COPA-XM

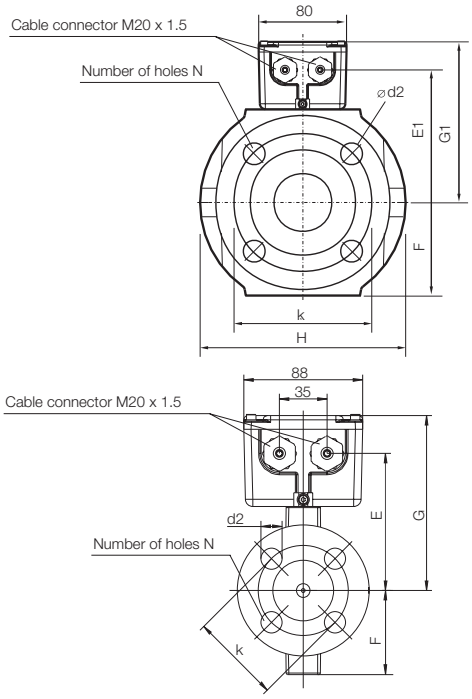


Tolerances L*

DN 3 - 200 $^{+0}_{-3}$

DN 250 - 300 $^{+0}_{-5}$

MAG-XM



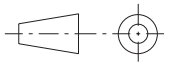
Meter Size	Instrument Dimensions ASME/ANSI CL 150/CL 300							Flange Dimensions ASME/ANSI CL 150								Flange Dimensions ASME/ANSI CL 300						COPA-XM	MAG-XM
DN	Inch	A	L	L[1]	L[2]	E	E1[3]	G	G1	D	d4	b	k	d2	N	D	d4	b	k	d2	N	Weight kg	Weight kg
3-8	1/10-5/16	67	130	133	136	96	101	200	129	89	35	13	60	16	4	95	35	16	67	16	4	5.0	4.0
10, 15	3/8, 1/2	67	270	273	276	96	101	200	129	89	35	13	60	16	4	95	35	16	67	16	4	5.5	4.5
20	3/4	87	270	273	276	107	112	200	140	89	43	14	70	16	4	117	43	18	83	16	4	6	5
25	1	87	270	273	276	107	112	200	140	108	51	16	80	16	4	124	51	20	89	16	4	6.5	5.5
32	1 1/4	95	280	283	286	112	117	200	145	117	64	18	89	16	4	134	64	21	99	19	4	8	7
40	1 1/2	100	280	283	286	116	121	200	149	127	73	20	99	16	4	156	73	23	115	23	4	8.5	7.5
50	2	116	280	283	286	124	129	208	157	152	92	21	121	19	4	165	92	24	127	19	8	10	9
65	2 1/2	100	330	333	336	148	153	222	171	178	105	25	140	19	4	191	105	27	150	23	8	14	13
80	3	100	340	343	346	154	159	228	177	191	127	26	153	19	4	210	127	30	168	23	8	15	16
100	4	130	400	403	406	174	179	248	197	229	157	26	191	19	8	254	157	34	200	22	8	18	17
125	5	124	450	455	460	152	169	261	195	254	186	28	216	22	8	280	186	39	235	22	8	37	36/38
150	6	170	450	455	460	173	190	282	216	279	216	30	241	22	8	318	216	41	270	22	12	39	38
200	8	195	500	505	510	205	222	314	248	343	270	34	298	22	8	381	270	47	330	25	12	67	66
250	10	250	550	555	560	233	250	342	276	406	324	35	362	25	12	445	324	53	387	28	16	98	98
300	12	250	620	625	630	260	293	362	317	483	381	37	432	26	12	521	381	56	451	32	16	125/184	124/181

1) Standard with a grounding plate mounted on one flange, SS No. 1.4571[316Ti]. Other materials upon request. See information note “Grounding”.

2) With protection flanges. Protection flanges provide the ground connection, grounding plates not required. Also available with Series 1000 protection flanges, dimensions see Page 15.

3) Only with MAG-XM, for high temperature design + 120 mm.

All dim´s in mm



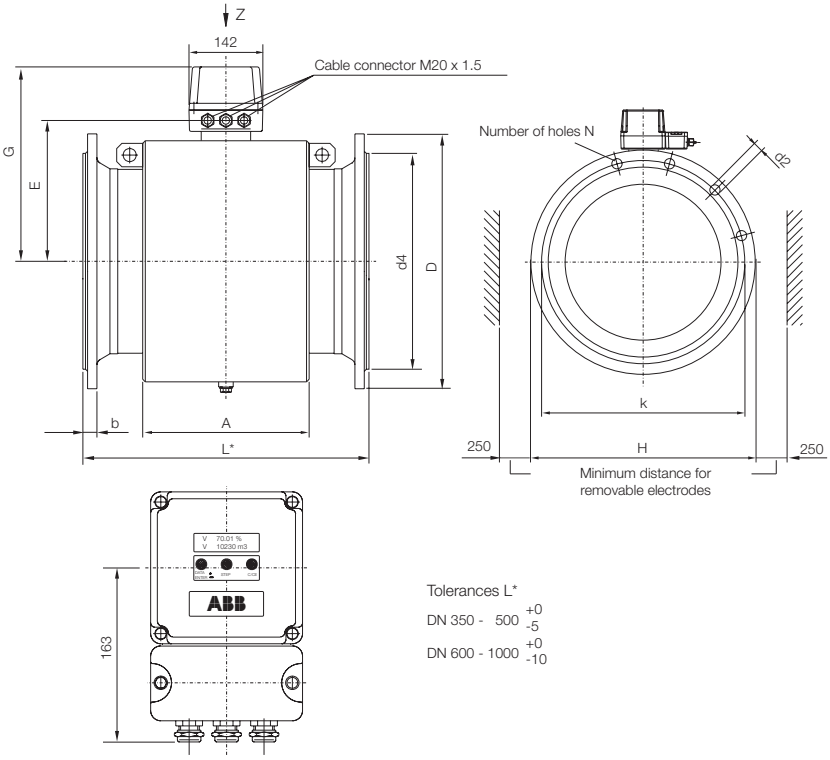
ISO Projection Method E

Fig. 19: Flowmeter Primaries 1/10” to 12” [DN 3 to DN 300], ASME/ANSI Flanges

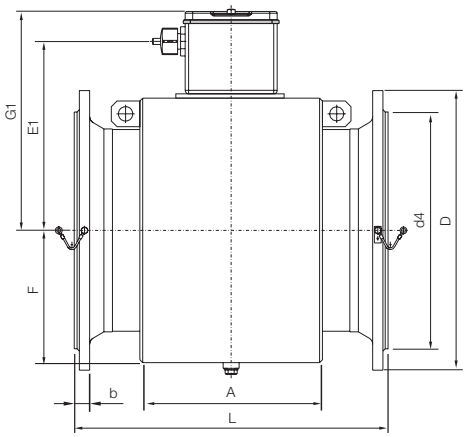
Dimension Drawings Flowmeter Primaries DN 350 to DN 1000 [14" to 40"], DIN Flanges

Models DM43F and DM41F

COPA-XM



MAG-XM



Meter Size		Flange Dimensions							Instrument Dimensions							COPA-XM	MAG-XM
DN[1]	PN[2]	D	d4	b	k	d2	N	A	Protection Flange none[3] L	Protection Flange with[4] L	E	E1	G	G1	H	Weight kg	Weight kg
350	10	505	430	31	460	22	16	322	550	560	285	313	381	341	505	142	140
350	16	520	438	35	470	26	16	322	550	560	285	313	381	341	520	142	182
400	10	565	482	31	515	26	16	370	600	610	314	339	417	367	565	164	148
400	16	580	490	37	525	30	16	370	600	610	311	339	407	367	580	171	192
500	10	670	585	33	620	26	20	407	650	660	347	375	443	403	670	210	216
600	10	780	685	33	725	30	20	469	780	790	398	426	501	454	780	281	243
700	10	895	800	35	840	30	24	537	910	920	441	469	544	495	895	392	390
800	10	1015	905	37	950	33	24	605	1040	1050	494	519	597	545	1015	409	407
900	10	1115	1005	39	1050	33	28	671	1170	1180	544	569	647	595	1115	487	485
1000	10	1230	1110	39	1160	36	28	739	1300	1310	594	619	697	645	1230	579	575

1) >DN 1000[40"] with/without protection flanges upon request.
2) Standard pressure ratings. Others upon request.
3) Grounding plates to DN 800[32"] L + 5 mm. See information note „Grounding".
4) Protection flanges provide the ground connection, grounding plates not required.
Also available with Series 1000 protection flanges, dimensions see Page 15.

All dim´s in mm

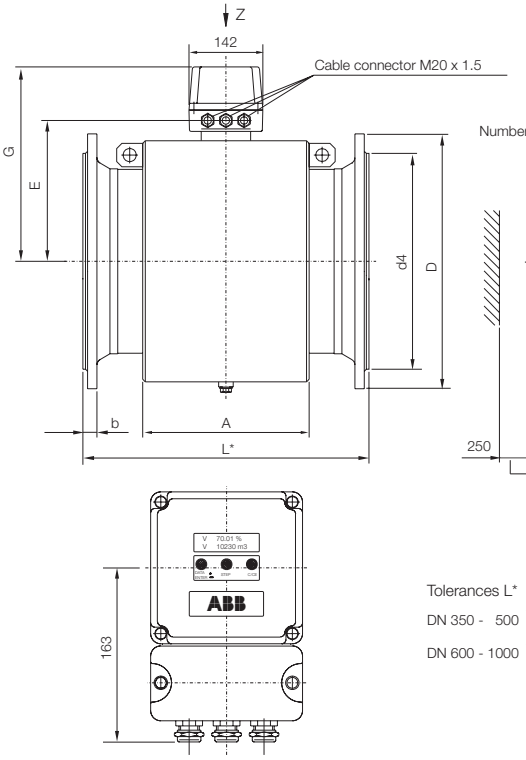
ISO Projection Method E

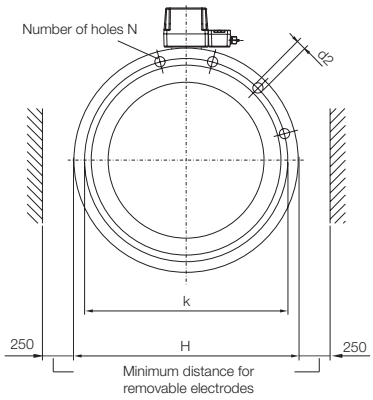
Fig. 20: Flowmeter Primaries DN 350 to DN 1000 [14" to 40"], DIN Flanges

Dimension Drawings Flowmeter Primaries 14” to 40” [DN 350 to DN 1000], ASME/ANSI Flanges

Models DM43F and DM41F

COPA-XM



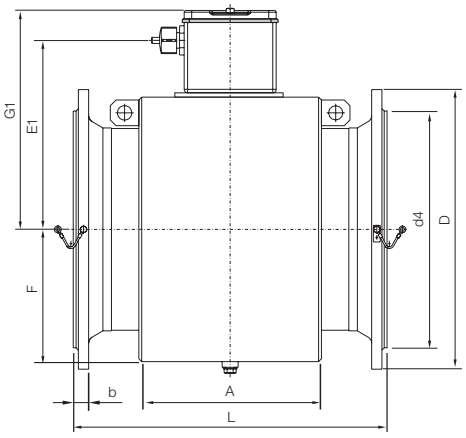


Tolerances L*

DN 350 - 500 $^{+0}_{-5}$

DN 600 - 1000 $^{+0}_{-10}$

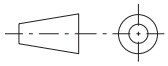
MAG-XM



Meter Size		Instrument Dimensions									Flange Dimensions ASME/ANSI CL 150[1]						COPA-XM	MAG-XM
DN	Inch	A	L	L[2]	L[3]	E	E1	F	G	G1	D	k	d4	d2	N	b	Weight kg	Weight kg
350	14	322	650	655	660	285	313	250	381	341	534	476	413	28.6	12	40	180	178
400	16	370	700	705	710	314	329	275	417	367	597	540	470	28.6	16	42	227	225
500	20	416	780	785	790	347	375	310	443	403	699	635	584	31.7	20	48	265	263
600	24	469	850	855	860	501	423	361	398	454	813	749	692	34.9	20	53	329	327
700	28	537	910	915	920	544	469	405	441	495	837	749	762	34.9	20	50	387	385
800	32	605	1040	1045	1050	597	519	455	494	545	942	900	864	22.2	48	51	515	513
900	36	671	1170	1175	1180	647	569	505	544	595	1057	1010	972	25.4	44	57	664	662
1000	40	739	1300	1305	1310	697	619	555	594	645	1380	1210	1140	56	28	63	1134	1132

1) Other pressure ratings and >40” [DN 1000] upon request.
2) Grounding plate mounted to one flange in SS No. 1.4571[316Ti]
3) Grounding plates to DN 800[32”] L + 5 mm. See information note „Grounding“.
   Other materials upon request. L = 5 mm
4) With protection flanges mounted on both flanges, grounding plates not required L = 10 mm.
   Also available with Series 1000 protection flanges, dimensions see Page 15.

All dim´s in mm



ISO Projection Method E

Fig. 21: Flowmeter Primaries 14” to 40” [DN 350 to DN 1000], ASME/ANSI Flanges

Ordering Information Flanged Meters, Models DM43F and DM41F

In addition to the Ordering Number please include the following information: fluid, fluid temperature, operating pressure, flow range, pipeline type (grounding plate, grounding electrode)[1)]

	COPA-XM														MAG-XM											
Ordering Number																										
Conductivity ≥ 5 µS/cm	**DM43F**														**DM41F**											
Liner Material																										
Hard rubber (DN 15 to DN 2000 [1/2" to 80"]) KTW approved	**H**														**H**											
Soft rubber (DN 50 to DN 2000 [2" to 80"])	**S**														**S**											
PTFE (DN 10 to DN 600 [3/8" to 24"])	**T**														**T**											
PFA (DN 3 to DN 8 [1/10" to 5/16"])	**P**														**P**											
Others	**Z**														**Z**											
Meter Size																										
DN 3 1/10"		**03**														**03**										
DN 4 5/32"		**04**														**04**										
DN 6 1/4"		**06**														**06**										
DN 8 5/16"		**08**														**08**										
DN 10 3/8"		**10**														**10**										
DN 15 1/2"		**15**														**15**										
DN 20 3/4"		**20**														**20**										
DN 25 1"		**25**														**25**										
DN 32 1-1/4"		**32**														**32**										
DN 40 1-1/2"		**40**														**40**										
DN 50 2"		**50**														**50**										
DN 65 2-1/2"		**65**														**65**										
DN 80 3"		**80**														**80**										
DN 100 4"		**1H**														**1H**										
DN 125 5"		**1Q**														**1Q**										
DN 150 6"		**1F**														**1F**										
DN 200 8"		**2H**														**2H**										
DN 250 10"		**2F**														**2F**										
DN 300 12"		**3H**														**3H**										
DN 350 14"		**3F**														**3F**										
DN 400 16"		**4H**														**4H**										
DN 500 2-"		**5H**														**5H**										
DN 600 24"		**6H**														**6H**										
DN 700 28"		**7H**														**7H**										
DN 800 32"		**8H**														**8H**										
DN 900 36"		**9H**														**9H**										
DN 1000 40"		**1T**														**1T**										
DN 1200 48"		**12**														**12**										
DN 1400 54"		**14**														**14**										
DN 1600 64"		**16**														**16**										
DN 1800 72"		**18**														**18**										
DN 2000 80"		**2T**														**2T**										
Others		**99**														**99**										
Signal Electrode Material[2)]																										
SS No. 1.4571 [316Ti]			**S**														**S**									
Hastelloy B-2			**B**														**B**									
Hastelloy C-4			**H**														**H**									
Titanium			**M**														**M**									
Tantalum			**T**														**T**									
SS No. 1.4539[3)]			**F**														**F**									
Platinum-Iridium			**P**														**P**									
Pressure Rating																										
DIN PN 10				**C**														**C**								
DIN PN 16				**D**														**D**								
DIN PN 25				**E**														**E**								
DIN PN 40				**F**														**F**								
Others				**Z**														**Z**								
JIS K10 ≤ DN 100				**K**														**K**								
ASME/ANSI CL 150 (laid length Series 1000, except PFA				**P**														**P**								
ASME/ANSI CL 300 (laid length Series 1000, except PFA				**Q**														**Q**								
Others				**Z**														**Z**								
Flange Material																										
Steel (standard from DN 20 [3/4"])					**1**														**1**							
SS No. 1.4571[316Ti] (standard for DN3-DN15 [1/10"-1/2"], option from DN20 [3/4"])					**3**														**3**							
Others upon request					**9**														**9**							
Flange Accessories																										
None						**A**														**A**						
Protection plates SS No. 1.4571[316Ti] (mounted on both flanges)						**B**														**B**						
Grounding plate SS No. 1.4571[316Ti] (mounted on one flange)						**C**														**C**						
Protection flanges SS No. 1.4571[316Ti] (mounted on both flanges)[3)]						**D**														**D**						

Continued on next page

1) If a grounding plate is required (see Ordering No.). The grounding plate is made of SS No. 1.4571[316Ti]. Others upon request.
2) From DN 125 [5"] a grounding surface is integrated in the hard/soft rubber liners, standard.
3) Only for laid length Series 1000 and ASME/ANSI/DIN-flanges. Laid length ≤ DN 80 [3"] L + 20 mm, from DN 100 [4"] L + 25 mm.

Continuation Ordering Information

COPA-XM		MAG-XM	
Ordering Number	**DM43F**	**DM41F/DM42F**	
Temperature Range			
Standard (see Specifications Liner Materials) ≤ 130 °C	**S**	≤ 130 °C	**S**
High temperature design ≤ 180 °C (only MAG-XM)		≤ 180 °C	**H**
Certifications			
Standard, none	**A**		**A**
Material Certificate per EN 10204 3.1B and Pressure Test per AD-2000	**D**		**D**
Inspection Certificate per EN 10204 3.1B	**F**		**E**
Pressure Test per AD-2000	**G**		**F**
Calibration Certificate			
None	**A**		**A**
Certified, Cold Water/Waste Water	**B**		**B**
Certified, Liquids other than Water	**C**		**C**
Protection Class			
IP 67	**2**	IP 67	**2**
IP 68 (only MAG-XM)		IP 68	**3**
IP 67 with NPT threads (only MAG-XM)		IP 67 with NPT threads	**4**
IP 67 with PF threads (only MAG-XM)		IP 67 with PF threads	**5**
Supply Power			
230 V 50/60 Hz	**B**		
115 V/ 120 V 50/60 Hz	**C**		
24 V 50/60 Hz	**F**		
24 V DC	**H**		
Display			
With lighted display standard	**D**		
Contact In-/Output			
Optocoupler	**0**		
Relay	**1**		
In-/Output Options none/with communication			
Current output, pulse output active	**1**		
Current output, pulse output passive	**3**		
Current output, pulse output passive, HART-Protocol	**4**		
Current output, pulse output active, HART-Protocol	**5**		
Current output, RS485 (ASCII-Protocol)	**6**		
Current output, PROFIBUS DP	**7**		
Current output, PROFIBUS DP (with M12 plug)	**9**		
Parameter Entry Operation			
Standard with 3 keys and Magnetic Stick (Enter data without removing the housing cover)	**B**		

Ordering Information for converter see Page 37

Additional ordering information can be provided in writing.

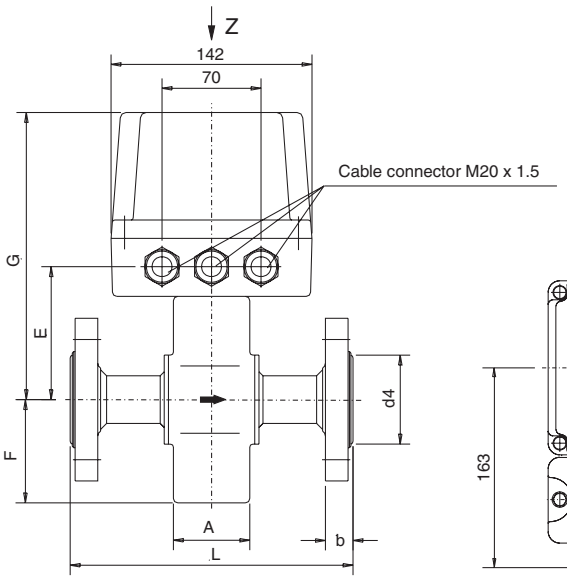
Name Plate
German
English
French

Electrode Design
Standard
Conical head (from DN 10 [3/8"] material SS No. 1.4539
e.g. for high grease content fluids)

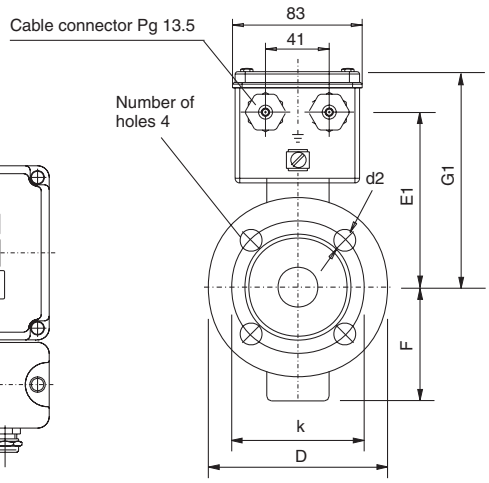
Information:
Please indicate in writing if a ± 0.2 % of rate calibration is required.

Dimension Drawings Stn. Stl. Flowmeter Primaries Models DM23F and DM21F, DN 3-40 [1/10”-1½”] Flanged

COPA-XM



MAG-XM



Dimensions DIN Flanges

Liner PFA														COPA-XM	MAG-XM
DN	PN	L[1)]	A	b	D	k	E	E1	F	G	G1	d2	d4	Weight appr. kg	Weight appr. kg
3-8	10-40	130	37	18	90	60	84	108	62	190	134	14	42	5.5	3.5
10,15		200	37	18	95	65	84	108	62	190	134	14	35	5.5	3.5
20		200	42	20	105	75	88	120	66	194	136	14	41	5.5	3.5
25		200	54	20	115	85	95	127	73	201	143	14	54	6	4
32		200	62	20	140	100	100	132	78	206	148	14	64	7	5
40		200	67	20	150	110	104	136	82	210	152	14	74	7.5	5.5

Dimensions ASME/ANSI Flanges

Liner PFA															COPA-XM	MAG-XM
Meter Size	Connec-tions	PN	L[1)]	A	b	D	k	E	E1	F	G	G1	d2	d4	Weight appr. kg	Weight appr. kg
1/10”-5/16”	1/2“	CL 150	130	37	12.6	88.9	60.3	84	108	62	190	134	15.9	42	5.5	3.5
3/8”, 1/2”	1/2“		200	37	12.6	88.9	60.3	84	108	62	190	134	15.9	34.8	5.5	3.5
3/4”	3/4“		200	42	14.2	98.4	69.8	88	120	66	194	136	15.9	42.9	5.5	3.5
1”	1“		200	54	15.8	108	79.2	95	127	73	201	143	15.9	50.8	6	4
1 1/4”	1 1/4“		200	62	17.4	117.5	88.9	100	132	78	206	148	15.9	63.5	7	5
1 1/2”	1 1/2“		200	67	19	127	98.6	104	136	82	210	152	15.9	73.0	7.5	5.5
1/10”-5/16”	1/2“	CL 300	130	37	15.8	95.2	66.7	84	108	62	190	134	15.9	42	5.5	3.5
3/8”,1/2”	1/2“		200	37	15.8	95.2	66.7	84	108	62	190	134	15.9	34.8	5.5	3.5
3/4”	3/4“		200	42	17.4	117.5	82.5	88	120	66	194	136	19	42.9	5.5	3.5
1”	1“		200	54	19.0	123.8	88.9	95	127	73	201	143	19	50.8	6	4
1 1/4”	1 1/4“		200	62	20.5	133.3	98.4	100	132	78	206	148	19	63.5	7	5
1 1/2”	1 1/2“		200	67	22.1	155.6	114.3	104	136	82	210	152	22.2	73.0	7.5	5.5

1)) If a grounding plate is required, L + 3 mm, material upon request.
With 2 grounding plates (protection plates) L + 6 mm, material upon request.

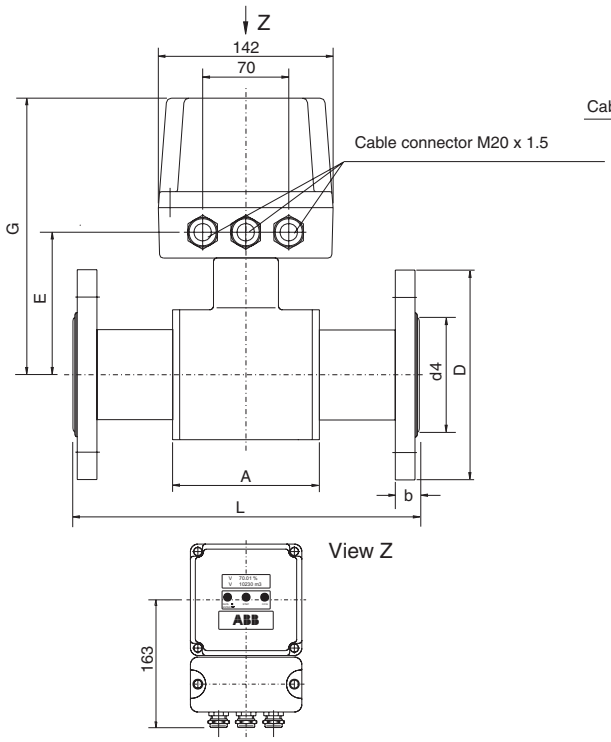
All dim´s in mm

ISO Projection Method E

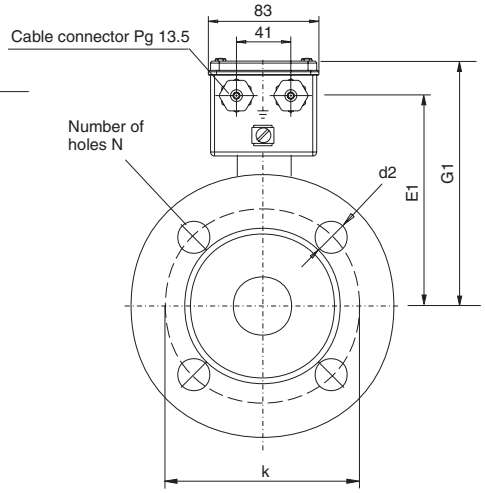
Fig. 22: Flowmeter Primaries DN 3 to DN 40 [1/10” to 1-1/2”]

Dimension Drawings Stn. Stl. Flowmeter Primaries Models DM23F and DM21F, DN 50-100 [2”-4”] Flanged

COPA-XM



MAG-XM



Dimensions DIN Flanges

Liner PFA														COPA-XM	MAG-XM
DN	PN	L[1)]	A	b	D	k	E	E1	G	G1	d2	d4	N	Weight appr. kg	Weight appr. kg
50	10-40	200	100	24	165	125	117	135	214	161	18	104	4	10	8
65	10-16	200	107	26	185	145	131	149	228	175	18	124	4	12	10
	25-40	200	107	26	185	145	131	149	228	175	18	124	8	12	10
80	10-40	200	107	28	200	160	137	155	234	181	18	139	8	14	12
100	10-16	250	159	24	220	180	157	175	254	201	18	161	8	20	18
	25-40	250	159	28	235	190	157	175	254	201	22	167	8	20	18

Dimensions ASME/ANSI Flanges

Liner PFA														COPA-XM	MAG-XM
DN	PN	L[1)]	A	b	D	k	E	E1	G	G1	d2	d4	N	Weight appr. kg	Weight appr. kg
2”	CL 150	200	100	23	152	121	117	135	214	163	19	99	4	10	8
2 1/2”		200	107	26	178	140	131	149	228	177	19	118	4	12	10
3”		200	107	28	191	152	137	155	234	183	19	131	4	14	12
4”		250	159	28	229	190	157	175	254	203	19	171	8	20	18
2”	CL 300	200	100	26	165	127	117	135	214	163	19	102	8	10	8
2 1/2”		200	107	29	191	149	131	149	228	177	22	124	8	12	10
3”		200	107	32	210	168	137	155	234	183	22	143	8	14	12
4”		250	159	36	254	200	157	175	254	203	22	177	8	20	18

1) If a grounding plate is required, L + 3 mm, material upon request.
With 2 grounding plates (protection plates) L + 6 mm, material upon request.

All dim´s in mm

ISO Projection Method E

Fig. 23: Flowmeter Primaries DN 50 to DN 100 [2” to 4”]

Ordering Information Stn. Stl. Flowmeter Primaries Flanged DN 3 to DN 100 [1/10” to 4”]

In addition to the Ordering Number please include the following information: fluid, fluid temperature, operating pressure, flow range, pipeline type (grounding plate)[1)]

	COPA-XM											MAG-XM										
Ordering Number																						
Conductivity ≥ 5 µS/cm	**DM23F**											**DM21F**										
Liner Material: PFA		**P**											**P**									
Meter Size																						
DN 3	1/10”		**03**											**03**								
DN 4	5/32”		**04**											**04**								
DN 6	1/4”		**06**											**06**								
DN 8	5/16”		**08**											**08**								
DN 10	3/8”		**10**											**10**								
DN 15	1/2”		**15**											**15**								
DN 20	3/4”		**20**											**20**								
DN 25	1”		**25**											**25**								
DN 32	1-1/4”		**32**											**32**								
DN 40	1-1/2”		**40**											**40**								
DN 50	2”		**50**											**50**								
DN 65	2-1/2”		**65**											**65**								
DN 80	3”		**80**											**80**								
DN 100	4”		**1H**											**1H**								
Signal Electrode Material/ Grounding Electrode Material																						
SS No. 1.4571[316Ti]	/ none			**S**											**S**							
Hastelloy B-2	/ none			**B**											**B**							
Hastelloy C-4	/ none			**H**											**H**							
Titanium	/ none			**M**											**M**							
Tantalum	/ none			**T**											**T**							
SS No. 1.4539	/ none (Food Ind. applications)			**F**											**F**							
Platinum-Iridium	/ none			**P**											**P**							
Others				**Z**											**Z**							
SS No. 1.4571[316Ti	/ with			**E**											**E**							
Hastelloy B-s	/ with			**N**											**N**							
Hastelloy C-4	/ with			**O**											**O**							
Titanium	/ with			**I**											**I**							
Tantalum	/ with			**Q**											**Q**							
SS No. 1.4539	/ with (Food Ind. applications)			**R**											**R**							
Platinum-Iridium	/ with			**G**											**G**							
Others				**Z**											**Z**							
Pressure Rating																						
PN 10					**C**											**C**						
PN 16 standard DN 100 [4”]					**D**											**D**						
PN 25					**E**											**E**						
PN 40 standard DN 3- 80 [1/10”- 3”]					**F**											**F**						
JIS K10					**K**											**K**						
ASME/ANSI CL 150					**P**											**P**						
ASME/ANSI CL 300					**Q**											**Q**						
Others					**Z**											**Z**						
Process Connection Material																						
SS No. 1.4571 [316Ti]						**3**											**3**					
Others						**9**											**9**					
Accessories												**Accessories**										
None							**A**					None							**A**			
Protection plates SS No. 1.4571 (mounted on both flanges)							**Q**					Protection plate[1)]							**Q**			
Grounding plate SS No. 1.4571 (mounted on one flange)							**R**					Grounding plate[1)]							**R**			
Temperature Range																						
Standard design ≤ 130 °C								**S**				≤ 130 °C								**S**		
High temperature design ≤ 180 °C (only MAG-XM)												≤ 180 °C								**H**		

Continued on next page

1) Protection plates (2 grounding plates) mounted on both flanges and grounding plate mounted on one flange, material SS No. 1.4571[316Ti]. Others upon request.

Continuation Ordering Information

	COPA-XM	MAG-XM
Ordering Number	**DM23F**	**DM21F/DM22F**
Certifications		
Standard, none	**A**	**A**
Material Certificate per EN 10204 3.1B and Pressure Test per AD-2000	**D**	**D**
Inspection Certificate per EN 10204 3.1B	**F**	**F**
Pressure Test per AD-2000	**G**	**G**
Calibration Certificate		
None	**A**	**A**
Certified, Cold Water/Waste Water	**B**	**B**
Certified, Liquids other than Water	**C**	**C**
Protection Class		
IP 67	**2**	IP 67 **2**
IP 68 (only MAG-XM)		IP 68 **3**
IP 67 with NPT-threads (only MAG-XM)		IP 67 with NPT-threads **4**
IP 67 with PF-threads (only MAG-XM)		IP 67 with PF-threads **5**
Supply Power		
230 V, 50/60 Hz	**B**	
115 V/120 V, 50/60 Hz	**C**	
24 V, 50/60 Hz	**F**	
24 V DC	**H**	
Display		
With lighted display standard	**D**	
Contact In-/Output		
Optocoupler	**0**	
Relay	**1**	
In-/Output Options		
Current output, pulse output active	**1**	
Current output, pulse output passive	**3**	
Current output, pulse output passive, HART-Protocol	**4**	
Current output, pulse output active, HART-Protocol	**5**	
Current output, RS485 (ASCII-Protocol)	**6**	
Current output, PROFIBUS DP	**7**	
Current output, PROFIBUS DP (with M12 plug)	**9**	
Parameter Entry Operation		
Standard with 3 keys and Magnetic Stick (Enter data without removing the housing cover)	**B**	

Ordering Information for converter see Page 37

Additional ordering information can be provided in writing:

Name Plate
German
English
French

Electrode Design
Standard
Conical head (from DN 10 [3/8"] material SS No. 1.4539
e.g. for high grease content fluids).

Information:
Please indicate in writing if a ± 0.2 % of rate calibration is required.

Specifications Stn. Stl. Flowmeter Primaries, Mod. DM21_ or DM23_, DN 1 to DN 100 [1/25" to 4"]

Ambient Conditions

Ambient Temperature

-25 °C to + 60 °C

Fluid Temperature

- 40 °C to + 130 °C, CIP-capable, see Temperature Diagram and max. allowable cleaning temperatures.

Maximum Allowable Ambient Temperature as a Function of the Fluid Temperature for Stn. Stl. Process Connections and Wafer Designs.

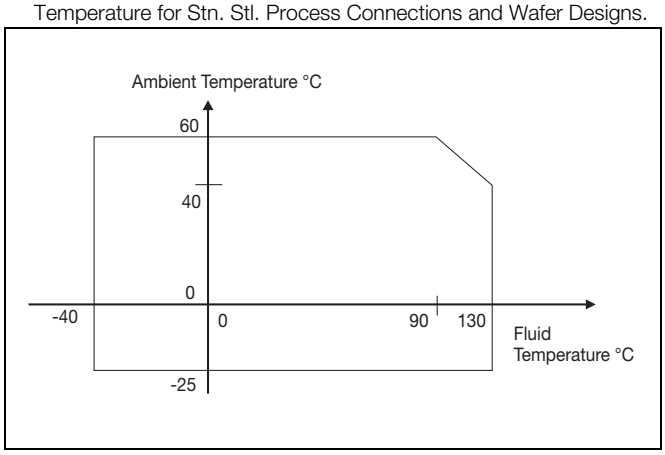


Fig. 24: Temperature Diagram

Fluid Temperature DN 1-2

-10 °C to +120 °C, CIP-capable to max. 120 °C

Storage Temperature

-25 °C to +70 °C

Minimum Allowable Absolute Pressure

Liner	Meter Size DN	Meter Size Inch	$P_{Operate}$ mbar abs	at	$T_{Operate}$ °C
PFA	3 – 100	1/10 – 4	0	≤	130
PEEK/Torlon	1 – 2	1/25–3/32	0	≤	130

Maximum Allowable Fluid Temperature and Pressure

Process Connections Liner PFA	Meter Size DN	Meter Size Inch	$P_{Operate}$ bar	at	$T_{Operate}$ °C
Wafer design	3 – 50 65 – 100	1/10 – 2 2-1/2– 4	40 16	≤ ≤	20 130
Weld stubs	3 – 100	1/10 – 4	10	≤	130
Food Ind. fittings DIN 11851	3 – 100	1/10 – 4	10	≤	130
Tri-Clamp DIN 32676	3 – 100	1/10 – 4	10	≤	130
External threads ISO 228	3 – 25	1/10 – 1	10	≤	130
1/8"-Sanitary connectors	1 – 2	1/25–3/32	10	≤	120

Protection Class

IP 67 Standard, IP 68 only MAG-XM

Pipeline Vibration

Max. allow. 15 m/s^2 (10 - 150 Hz)

Maximum Allowable Cleaning Temperatures

CIP-Cleaning	Liner	T_{max} °C	T_{max} Minutes	T_{Umg} °C
Steam cleaning	PFA/PEEK	150	60	25
Liquid cleaning	PFA/PEEK/Torlon	140	60	25

If the ambient temperature >25 °C, the difference must be subtracted from the max. cleaning temperature.
T_{max} - Δ °C, Δ °C = ($T_{Amb.}$ -25 °C).

Maximum Allowable Temperature Shock

Liner	Temp.-Shock max. Temp.-Diff. °C	Temp.-Gradient °C/min
PFA, PEEK, Torlon	any	any

Specifications Flowmeter Primary

Materials, Flowmeter Primary

Liner Material	Electrode Material Standard	Electrode Material Others	Electrode Design Standard	Electrode Design Others
PFA, PEEK, Torlon	Hast.-C4 (1.4539 for Food Ind. fittings & Tri-Clamp)	Hast.-B2 SS1.4539[316Ti] SS 1.4571 Tantalum, Titanium, Platinum-Iridium	Nail head	Conical head (≥DN 10 [3/8"] SS No. 1.4539)

Process Conn. Material	Standard	Option
Wafer design	none	
Weld stubs	SS No. 1.4404 [316L]	upon request
Food Ind. fitting	SS No. 1.4404 [316L]	upon request
Tri-Clamp	SS No. 1.4404 [316L]	upon request
External threads	SS No. 1.4404 [316L]	upon request
1/8"-Sanitary connector	SS No. 1.4571 [316Ti]	POM, Brass, PVC
Connection Box COPA-XM	Cast Alum., painted, paint coat Lower section: dark gray, RAL 7012 Cover: RAL 9002	
MAG-XM	Stn. stl.	–
Meter tube	SS No. 1.4301 [304]	–
Cable connector	Polyamide	PVDF
Flowmeter primary housing	Deep drawn housing SS No. 1.4301[304]	

Process Conn. Design	Gasket Material
Wafer design	None
Weld stubs, flanged, Food Ind. fitting Tri-Clamp External threads	EPDM (Ethylene-Propylene) std. for FDA-Approval (CIP) capable, no oil or grease) Silicone with FDA-Approval (Option, resistant to oils and grease)
Flat housing gasket	Silicone (resistant to oils and grease)

Process Connections

DN 1 – 2 [1/25" – 3/32"]

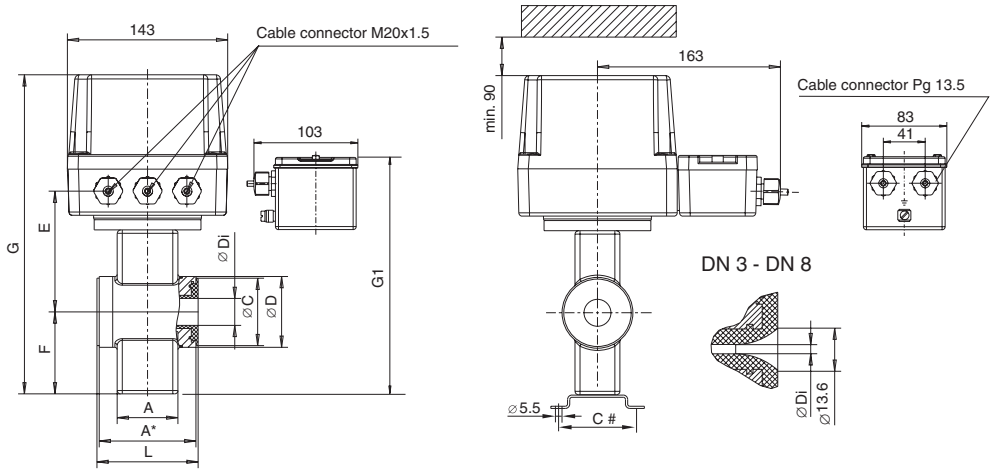
1/8" Sanitary connector with 2 grounding electrodes made of the same material as the signal electrodes, standard

DN 3 – 100 [1/10" – 4"]

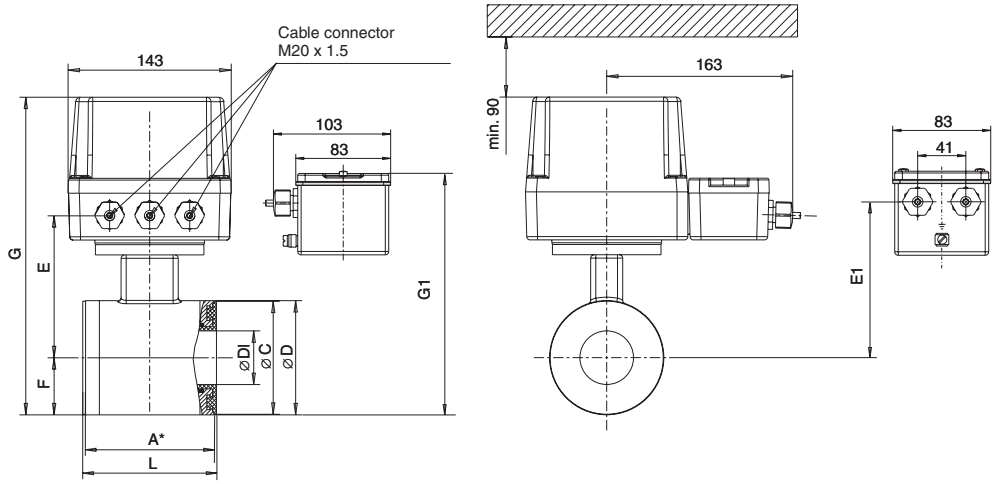
Wafer design, Tri-Clamp, Food Ind. fitting, external threads, others upon request

Dimension Drawings Stn. Stl. Flowmeter Primaries, Wafer Design, DN3–100 [1/10”-4”], Mod. DM21W and DM23W

DN 3 – DN 40
1/10” – 1-1/2”



DN 50 – DN 100
2” – 4”



Size DN	Size Inch	PN	L[1)]	A*	A	⌀ C	⌀Di	⌀D	E	E1	F	G	G1 MAG-XM	COPA-XM Wgt. appr. kg	MAG-XM Wgt. appr. kg
3	1/10	10–40 CL 150/ CL 300 JIS	68	64	37	42	3	45	96	108	62	262	197	3.5	1.5
4	5/32						4								
6	1/4						6								
8	5/16						8								
10	3/8						10								
15	1/2						15								
20	3/4		78	74	42	50	20	54	100	112	66	270	205	4	2.0
25	1		90	86	54	59	25	63	107	119	73	284	219	4	2.0
32	1-1/4		98	94	62	69	32	73	112	124	78	294	229	4.5	2.5
40	1-1/2		103	99	67	77	40	82	116	128	82	302	237	5	3.0
50	2		117	112	–	95	47	100	124	136	50	278	213	6	4.0
65	2-1/2	10–16 CL 150 JIS	103	99	–	111	62	116	138	150	58	300	235	6.5	4.5
80	3		103	99	–	128	74	133	144	157	66.5	314.5	250	8.5	6.5
100	4		133	129	–	155	96	160	164	176	80	348	283	10.5	8.5

1) Laid lengths with 2 grounding plates L + 3 mm
Mounting element, option

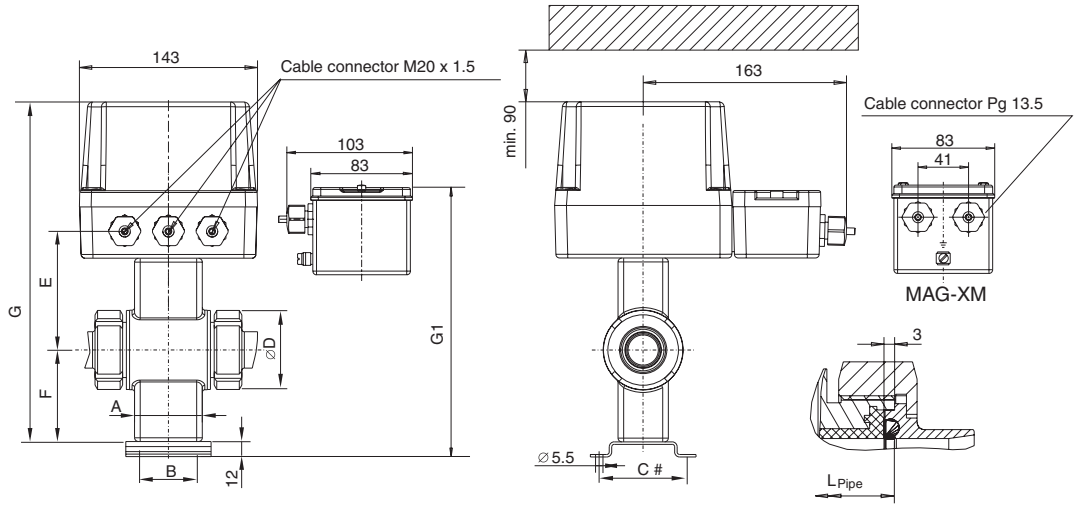
All dim´s in mm

ISO Projection Method E

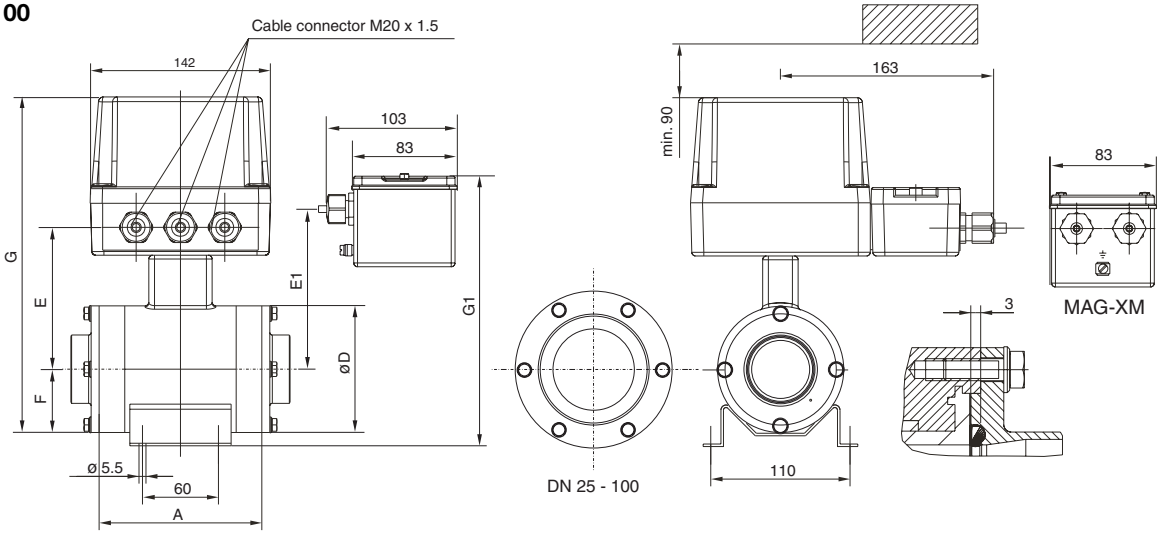
Fig. 25: Dimension Drawings, Models DM21W and DM23W, DN 3 to DN 100 [1/10” to 4”], Wafer Design

Dimension Drawings Flowmeter Primaries, Variable Process Connections, Mod. DM21_ and DM23_

DN 3 – DN 40
1/10” – 1-1/2”



DN 50 – DN 100
2” – 4”



Meter Size DN	Inch	A	B	C	ØD	E	E1	F	G	G1 MAG-XM	L_{Piie}	SW	COPA-XM Wgt. appr. kg[1)]	MAG-XM Wgt. appr. kg[1)]
3–10	1/10-3/8	37	28	50	–	96	108	62	262	197	85	46	5.0	1.5
15	1/2	37	28	50	–	96	108	62	262	197	85		5.0	1.5
20	3/4	42	28	50	–	100	112	66	270	205	90	60	5.0	2.0
25	1	54	46	70	–	107	119	73	284	219	105		5.5	2.0
32	1-1/4	62	46	70	–	112	124	78	294	229	120	75	6.0	2.5
40	1-1/2	67	46	70	–	116	128	82	302	237	125		6.5	3.0
50	2	128	60	110	100	124	136	50	278	213	–	–	8.0	4.0
65	2-1/2	114	60	110	116	138	150	58	300	235	–	–	8.5	4.5
80	3	114	60	110	133	144	157	66.5	314.5	250	–	–	10.0	6.5
100	4	144	60	110	160	164	176	80	348	283	–	–	12.5	9.0

Laid lengths with process connections see Page 24
1) Plus process connection weight see Page 24
Mounting element, option

All dim´s in mm

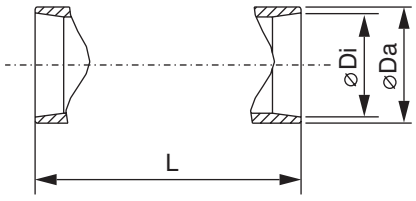
ISO Projection Method E

Fig. 26: Dimension Drawings, Models DM21 and DM23, DN 3 to DN 100 [1/10” to 4”], Variable Process Connections

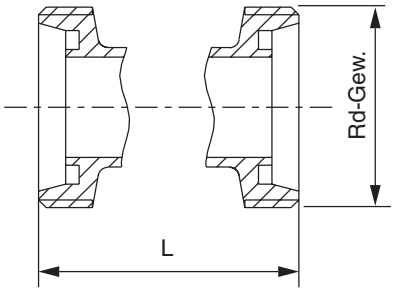
Dimension Drawings Stn. Stl. Flowmeter Primaries, Adapters for Variable Process Connections

Meter Size		Weld Stubs											
		ISO 2037				DIN 11850				DIN 2463			
DN	Inch	∅ Di	∅ Da	L	Wgt./kg	∅ Di	∅ Da	L	Wgt./kg	∅ Di	∅ Da	L	Wgt./kg
3-10	1/10-3/8	-	-	-	-	10.0	13.0	127	0.4	10.3	13.5	127	0.4
15	1/2	-	-	-	-	16.0	19.0	127	0.4	18.1	21.3	127	0.4
20	3/4	-	-	-	-	20.0	23.0	132	0.7	23.7	26.9	132	0.7
25	1	22.6	25.0	149	0.7	26.0	29.0	149	0.7	25	28	149	0.7
32	1-1/4	31.3	33.7	166	1.0	32.0	34.0	166	1.0	32	35	166	1.0
40	1-1/2	35.6	38.0	171	1.0	38.0	41.0	171	1.0	36.8	40	171	1.0
50	2	48.6	51.0	173	1.0	50.0	54.0	173	1.0	49	52	173	1.0
65	2-1/2	60.3	63.5	165	1.4	66.0	70.0	165	1.4	66	70	165	1.4
80	3	72.9	76.1	169	2.0	81.0	85.0	169	2.0	81	85	169	2.0
100	4	97.6	101.6	199	2.6	100.0	104.0	199	2.6	100	104	227	3.0

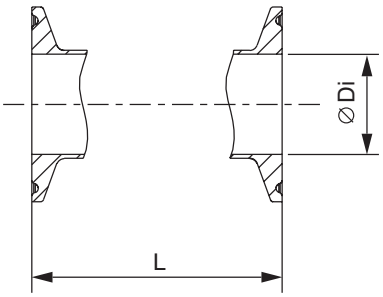
Meter Size		Food Ind. Fittings						Tri-Clamp					
		DIN 11851			DIN11864-1 (Form B)			DIN 32676			ISO 2852		
DN	Inch	Rd. Wgt.	L	Wgt./kg	Rd. Wgt.	L	Wgt./kg	∅ Di	L	Wgt./kg	∅ Di	L	Wgt./kg
3-10	1/10-3/8	28 x 1/8”	169	0.5	34 x 1/8”	161	0.5	10.0	163	0.5	-	-	-
15	1/2	34 x 1/8”	169	0.5	44 x 1/6”	161	0.5	16.0	163	0.5	-	-	-
20	3/4	44 x 1/6”	180	0.9	44 x 1/6”	170	0.9	20.0	168	0.7	-	-	-
25	1	52 x 1/6”	207	0.9	52 x 1/6”	197	0.9	26.0	192	0.8	22.6	192	0.8
32	1-1/4	58 x 1/6”	230	1.4	58 x 1/6”	220	1.4	32.0	209	1.5	-	-	-
40	1-1/2	65 x 1/6”	237	1.4	65 x 1/6”	227	1.4	38.0	214	1.4	35.6	214	1.4
50	2	78 x 1/6”	243	1.4	78 x 1/6”	233	1.4	50.0	216	1.2	48.6	216	1.2
65	2-1/2	95 x 1/6”	245	2.2	95 x 1/6”	233	2.2	66.0	221	1.6	60.3	221	1.6
80	3	110 x 1/4”	259	3.2	110 x 1/4”	245	3.2	81.0	225	2.4	72.9	225	2.4
100	4	130 x 1/4”	307	4.4	130 x 1/4”	291	4.4	100.0	255	3.1	97.6	255	3.1



Weld stubs per DIN 11850
or ISO 2037 or DIN 2463



Food Ind. fittings per
DIN 11851 or 11864-1 Form B



Tri-Clamp per
DIN 32676 or ISO 2852

Fig. 27: Dimension Drawings, DN 3 to DN 100 [1/10” to 4”], Adapter for Variable Process Connections

Dimension Drawings Stn. Stl. Flowmeter Primaries, Adapters for Variable Process Connections

Meter Size DN	Meter Size Inch	Weld Stubs DIN 11850 L	Weld Stubs Wgt. kg[1)]	Food Ind. Fittings DIN 11851 L	Food Ind. Fittings Wgt. kg[1)]
3-10	1/10-3/8	127	0.4	169	0.5
15	1/2	127	0.4	169	0.5
20	3/4	132	0.7	180	0.9
25	1	149	0.7	207	0.9
32	1-1/4	166	1.0	230	1.4
40	1-1/2	171	1.0	237	1.4
50	2	173	1.0	243	1.4
65	2-1/2	165	1.4	245	2.2
80	3	169	2.0	259	3.2

Meter Size DN	Meter Size Inch	External Threads ISO 228 / DIN 2999 R	a	L	Weight kg[1)]
3-10	1/10-3/8	3/8”	18	139	0.4
15	1/2	1/2“	18	139	0.4
20	3/4	3/4”	25	164	0.8
25	1	1”	25	179	0.8

1) Weight per pair

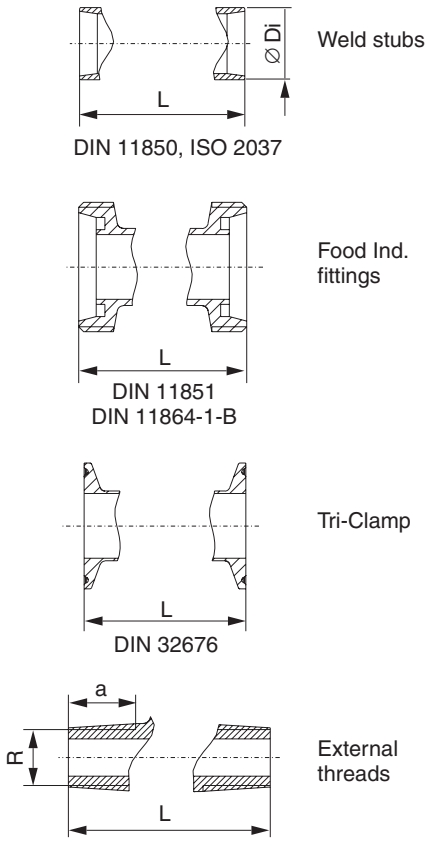
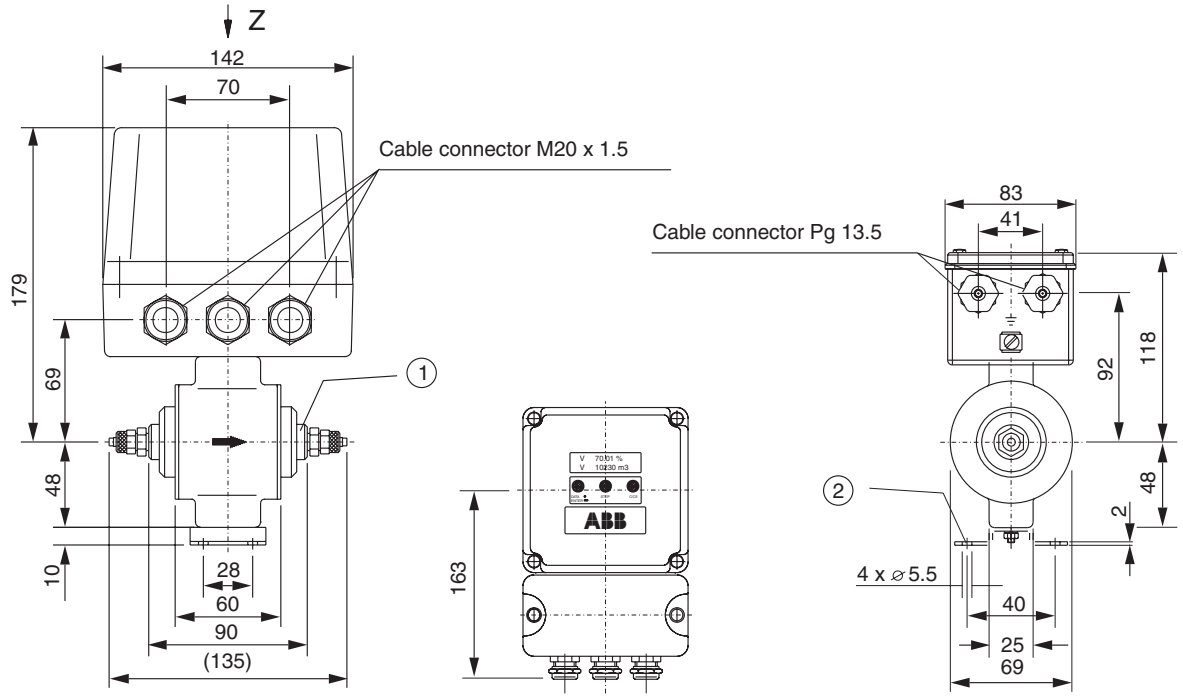


Fig. 28: Dimension Drawings: Models DM21 and DM23, DN 3 to DN 100 [1/10” to 4”], Adapter for Variable Process Connections

Dimension Drawings: Stn. Stl. Flowmeter Primaries, 1/8“-Sanitary Connector, DN 1 to DN 2 [1/25” to 3/32”]



Comments:
① Connection dimensions for G 1/8” internal threads
② Mounting element optional

Caution:

There are grounding electrodes installed in the standard made of the same material as the signal electrodes.

Process Connections	Meter Size DN	Meter Size Inch	PN	COPA-XM Weight kg	MAG-XM Weight kg
1/8” Sanitary Connector[1)]	1 - 2	1/25 - 3/32	10	3.5	1.5

1) For hose 6 x 4 mm

All dim´s in mm

ISO Projection Method E

Fig. 29: Dimension Drawings: Flowmeter Primaries DN 1 to DN 2 [1/25” to 3/32”], Models DM23B and DM21B

Ordering Information Stainless Steel Flowmeter Primary

In addition to the Ordering Number please include the following information: fluid, fluid temperature, operating pressure, flow range, pipeline type (grounding plate, grounding electrode)[1)]

	COPA-XM	MAG-XM
Ordering Number		
Conductivity ≥ 5 µS/cm	**DM23**	**DM21**
Process Connections		
Wafer design	**W**	**W**
Weld stubs DIN 11850	**R**	**R**
Weld stubs DIN 2463	**Q**	**Q**
Weld stubs ISO 2037	**P**	**P**
Food Ind. fittings DIN 11851	**S**	**S**
Tri-Clamp DIN 32676	**T**	**T**
External threads ISO 228/DIN 2999DN 3-25	**E**	**E**
1/8"-Sanitary connectors DN 1-2 [1/25"-3/32"]	**B**	**B**
Others	**Z**	**Z**
Liner Material		
PFA (DN 3 - 100) [1/10"-4"]	**P**	**P**
PEEK (DN 1-2) [1/25"-3/32"]	**K**	**K**
Torlon (DN 1- 2) [1/25"-3/32"]	**N**	**N**
Meter Size		
DN 1 1/25"	**01**	**01**
DN 1.5 1/16"	**1S**	**1S**
DN 2 3/32"	**02**	**02**
DN 3 1/10"	**03**	**03**
DN 4 5/32"	**04**	**04**
DN 6 1/4"	**06**	**06**
DN 8 5/16"	**08**	**08**
DN 10 3/8"	**10**	**10**
DN 15 1/2"	**15**	**15**
DN 20 3/4"	**20**	**20**
DN 25 1"	**25**	**25**
DN 32 1-1/4"	**32**	**32**
DN 40 1-1/2"	**40**	**40**
DN 50 2"	**50**	**50**
DN 65 2-1/2"	**65**	**65**
DN 80 3"	**80**	**80**
DN 100 4"	**1H**	**1H**
Signal Electrode Material/ Grounding Electrode Material[2)]		
SS No. 1.4571[316Ti] /none	**S**	**S**
Hastelloy B-2 /none	**B**	**B**
Hastelloy C-4 /none standard	**H**	**H**
Titanium /none	**M**	**M**
Tantalum /none	**T**	**T**
SS No. 1.4539 /none (Food Ind. applications)	**F**	**F**
Platinum-Iridium /none	**P**	**P**
SS No. 1.4571 /with	**E**	**E**
Hastelloy B-2 /with	**N**	**N**
Hastelloy C-4 /with standard	**O**	**O**
Titanium /with	**I**	**I**
Tantalum /with	**Q**	**Q**
SS No. 1.4539 /with (Food Ind. applications)	**R**	**R**
Platinum-Iridium /with	**G**	**G**
Others	**Z**	**Z**
Pressure Rating		
PN 10 Tri-Clamp, External Threads, Food Ind. fitting, weld stubs	**C**	**C**
PN 16 Wafer design DN 65 - 1002-1/2" - 4"	**D**	**D**
PN 40 Wafer design DN 3 - 501/10" - 2"	**F**	**F**
JIS K10 Wafer design DN 3 - 1001/10" - 4"	**K**	**K**
ASME/ANSI CL 150 Wafer design DN 3 - 1001/10" - 4"	**P**	**P**
ASME/ANSI CL 300 Wafer design DN 3 - 501/10" - 2"	**Q**	**Q**
Others	**Z**	**Z**

Continued on next page

1) Only required for wafer design meters with insulated pipelines.
2) Always specify grounding electrode material for DN 1-2 [1/25"-3/32"], standard.

Continuation Ordering Information

	COPA-XM	MAG-XM
Ordering Number	**DM23**	**DM21**
Process Connection Material		
None	(only wafer design)	**0**	**0**
SS No. 1.4571[316Ti]	(only DN 1 - 2 [1/25"-3/32"])	**3**	**3**
SS No. 1.4404[316L]	standard	**4**	**4**
PVC	(only PVC solvent weld sleeve)	**7**	**7**
POM	(DN 1-2 [1/25"-3/32"])	**8**	**8**
Others		**9**	**9**
Accessories		
Without mounting element		**A**	Without mounting element **A**
With mounting element		**C**	With mounting element **C**
Temperature Range		
Standard design ≤ 130 °C		**S**	≤ 130 °C **S**
Certifications		
Standard, none		**A**	**A**
Material Certificate per EN 10204 3.1B and Pressure Test per AD-2000		**D**	**D**
Inspection Certificate per EN 10204 3.1B		**F**	**F**
Pressure Test per AD-2000		**G**	**G**
Calibration Certificate		
None		**A**	**A**
Certified, Cold Water/Waste Water		**B**	**B**
Certified, Liquids other than Water		**C**	**C**
Protection Class		
IP 67		**2**	IP 67 **2**
IP 68 (only MAG-XM)			IP 68 **3**
Supply Power		
230 V;	50/60 Hz	**B**	
115/120 V;	50/60 Hz	**C**	
24 V;	50/60 Hz	**F**	
24 V DC		**H**	
Display		
With		**D**	
Contact In-/Output		
Optocoupler		**0**	
Relay		**1**	
In-/Output Options without/with Communication		
Current output, pulse output active		**1**	
Current output, pulse output passive		**3**	
Current output, pulse output passive, HART-Protocol		**4**	
Current output, pulse output active, HART-Protocol		**5**	
Current output, RS485 (ASCII-Protocol)		**6**	
Current output, PROFIBUS DP		**7**	
Current output, PROFIBUS DP (with M12 plug)		**9**	
Parameter Entry Operation		
Standard with 3 keys and Magnetic Stick (Enter data without removing the housing cover)		**B**	

Ordering information for converter see Page 37

Additional ordering information can be provided in writing.

Name Plate

German
English
French

Gasket Material

EPDM with FDA-Approval
EPDM
Silicone
PTFE (Teflon)
None

Electrode Design

Standard
Conical head (from DN 10 [3/8"] material SS No. 1.4539) *
Others

* For applications with high grease content fluids

Information:
Please indicate in writing if a ± 0.2 % of rate calibration is required.

Specifications Converter

Fig. 30: Converter MAG-XM

Flow Range
End value can be set anywhere between 0.5 and 15 m/s

Forward/Reverse Metering
The flow direction is indicated by arrows in the display and signalled externally over a relay contact or optocoupler.

Accuracy
≤ 0.4% of rate, option 0.2% of rate

Minimum Conductivity
≥ 5 µS/cm
(≥ 20 µS/cm for flowmeter primaries DN 1 - DN 1.5 [1/25" - 3/32"])

Reproducibility
≤ 0.1% of rate

Response Time (0-99% equiv. to 5 τ)
For a 0-99% step change ≥ 0.125 s to 0.5 s

Supply Power
115/230 V AC -15%/+10%
24 V AC -15%/+10%
50/60 Hz ± 6%
24 V DC -25%/+30% ripple ≤ 1.5 Vs.

Magnetic Field Supply
Standard: 6 1/4, 7 1/2 Hz, 12 1/2, 15 Hz, 25, 30 Hz

Power
≤ 23 VA (flowmeter primary including the converter)

Ambient Temperature
-25 to +60 °C

Protection Class per EN 60529
IP 67 for field mount housing,
IP 67 COPA-XM

Design
Field mount housing, cast light metal[1)]

1) Paint coat 60 µm thick, lower section RAL 7012 upper section (cover) RAL 9002.

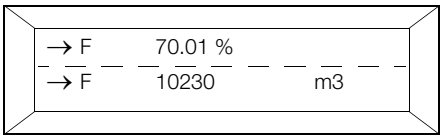
Electrical Connections
Screw terminals, cable connectors M20 x 1.5

Weight
Approx. 3.8 kg field mount housing

Signal Cable (only MAG-XM)
The max. signal cable length between the flowmeter primary and the converter is 200 m, ≥ 200 m upon request. Each flowmeter system is shipped with a 10 m long signal cable. If a length greater than 10 m is required, see Ordering Information Converter Page 37, Footnote.

Parameter Entries
The data can be entered in 9 languages using the keypad on the converter. It is also possible to enter data externally without opening the cover using a Magnetic Stick. Data security is provided by a NV-RAM. All parameters and totalizer values are stored in an NV-RAM for a 10 year period when the supply power is turned off or interrupted without batteries.

Display
2x16-character LCD-dot matrix display with LED background lighting. The flow is totalized internally, separate for each flow direction, in one of 16 different units. The flowrate value can be display in percent or one of 45 different units.



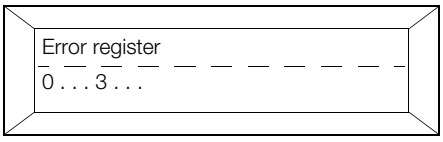
The units listed below can be selected using the arrow keys. These units are used for $Range_{max}$, Q_{max} forward and reverse and the flowrate display, when a direct reading engineering unit is selected.
In Multiplex operation the flowrate in %, direct reading engineering units or as a bargraph, forward and reverse totalizer values, TAG-No. or current output value can additionally be selected for display in the 1st and 2nd lines.

Unit	Second	Minute	Hour	Day
Milliliter	ml/s	ml/min	ml/h	
Liter	l/s	l/min	l/h	
Hectoliter	hl/s	hl/min	hl/h	
Megaliter		Ml/min	Ml/h	Ml/day
Cubic meter	m^3/s	m^3/min	m^3/h	
Imperial-gallon per	igps	igpm	igph	
U.S.-mill.-gall. per/d				mgd
U.S.-gall. per		gpm	gph	
Barrel Brewery	bbl/s	bbl/min	bbl/h	
Barrel Petrochemical		bls/min	bls/h	bls/day
Gram	g/s	g/min	g/h	
U.S. Ton		uton/min	uton/h	uton/day
Kilogram	kg/s	kg/min	kg/h	
Ton	t/s	t/min	t/h	
Pound	lb/s	lb/min	lb/h	
Kilo-gallon per	kgal/s	kgal/min	kgal/h	

Data Storage Module (external EEPROM)

When the flowmeter is shipped the external EEPROM is plugged into a socket on the connection board in the converter. The calibration data for the flowmeter primary and meter installation site parameters are stored in the EEPROM.

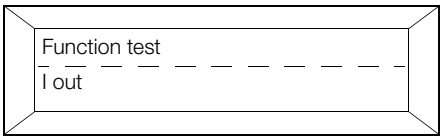
System Monitor – Alarm Output



Automatic system monitoring with error diagnostics displayed together with an alarm signal over the contact output. All errors detected are stored in the error register.

Design	Optocoupler	Relay
Terminals	P1, P2	P1, P2
Function	EB, CB	96, 97
Operating voltage	16 V ≤ U_{CEH} <30 V 0 V ≤ U_{CEL} <2 V	16 V ≤ U <30 V
Operating current	0 mA ≤ I_{CEH} <0.2 mA 2 mA ≤ I_{CEL} <15 mA	0 mA ≤ I <250 mA P ≤ 3 Watt

The individual subassemblies can be tested using the Function Test submenu. The values for all outputs can be simulated providing the ability to perform checks during start-up.



Automatic Empty Pipe Detector
(available from DN 10 [3/8"] and from 20 µS/cm)

Automatic recognition of an empty pipe condition using the Empty Pipe Detector which sends a signal over the contact output and displays a message, max. signal cable length is 50 m for MAG-XM. If the empty pipe detector is turned on and the pipe empties, the current output is set to 0 % (3.6 or 4 mA for 4-20 mA) or 130 % of the current end value and the pulse totalization is stopped.

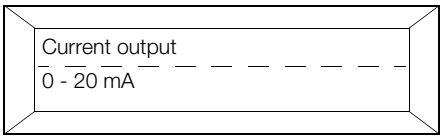
Information:
The instrument conforms to the NAMUR-Recommendations "EMC-Directive for Manufacturers and Operators of Electrical Instruments and Systems" Part 1, 5/93 and EMC-Directive 89/336/EWG (EN 50081-1, EN 50082).

Caution:
When the housing cover is open, EMC and contact protection is no longer provided.

Output Signals Standard

Isolation In-/Output

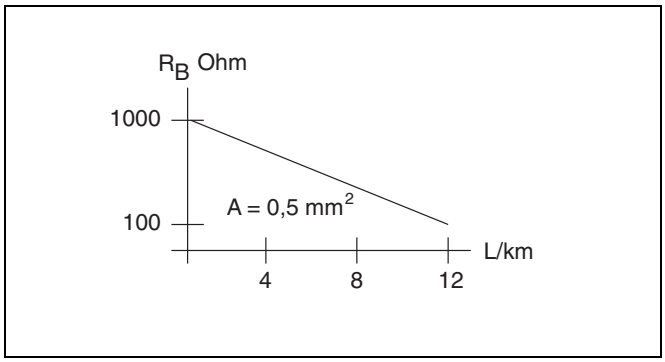
The current and pulse outputs are isolated from the input circuit and from each other.



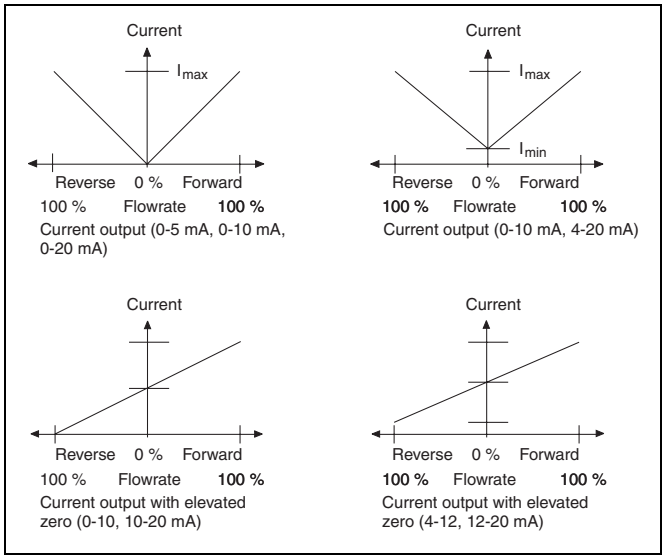
Current Output, Selectable, Terminals +/-

Range	Load Resistance
0 - 5 mA	≤ 4000 Ω
0/2 - 10 mA	≤ 2000 Ω
0/4 - 20 mA	≤ 1000 Ω

Load Curve 0/4 - 20 mA



Output Characteristic



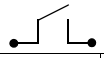
Scaled Pulse Output

The scaled pulse output is a 1-channel output with a max. frequency of 5 kHz and a pulse factor between 0.001 and 1000 for multiplying the values in the display e.g. 1 pulse/m^3 x 1000.
The pulse width can be set between 0.100 ms and 2000 ms. Jumpers on the connection board are used to configure the pulse output as passive or active. The output can be reconfigured whenever required.

Design	Active		Passive	
	COPA-XM	MAG-XM	COPA-XM	MAG-XM
Terminal Function	V1, V3 g2, 10	V8, V9	V1, V3 G2, 61	V8, V9
Operating voltage	16 V ≤ U ≤ 30 V DC load ≥ 150 Ohm fmax = 5 kHz		16 V ≤ U_{CEH} <30 V DC 0 V ≤ U_{CEL} <2 V 0 mA ≤ I_{CEH} <0.2 mA 2 mA ≤ I_{CEL} < 250 mA fmax = 5 kHz	
Operating current and frequency	When a mechanical counter is used, it is recommended that the pulse width be set ≥ 30 ms and fmax ≤ 3 Hz		When a mechanical counter is used, it is recommended that the pulse width be set ≥ 30 ms and fmax ≤ 3 Hz	

Programmable Input

The following functions can be assigned to the contact input, active or passive, in the software

Function	Active or Passive
	Normally open 
External Zero Return When the pipeline is empty all output signals can be turned off.	X / X
External Totalizer Reset The internal totalizers and any overflow counter values can be reset when the contact is activated.	X / X
Flow Range 1/2 *) External flow range selection Flow range 2 is selected when the contact is closed.	X / X
START/STOP *) Preset Counter External contact to start metering a predetermined quantity. To initiate a safety stop, activate the contact again.	X / X
Terminals	X1, U2 [1] Jumper G2 - g2 / X1, G2
Operating voltage	16 V ≤ U_{CEH} <30 V 0 V ≤ U_{CEL} <2 V R_i = 2.0 kΩ
Operating current	0 mA ≤ U_{CEH} <0.2 mA 2 mA ≤ U_{CEL} <15 mA

1) Optional function for COPA-XM (internal 24 V DC supply)
*) The functions must first be selected in the submenu "Operating mode".
X = Function can be selected in the software

Information:
The contact input should be actuated by closing it for more than 1s (preset counter START/STOP >350 ms but not longer than 1.5 s).

Alarm Output

Automatic system monitor including CPU failure check with error diagnostics in the display and an error signal over the passive contact output. The errors 0-9 are stored in the submenu Alarm as a check. The contact opens during an alarm condition.

Programmable Output

Contact output, passive, the following functions can be assigned to the output in the software:

Function	Normally Closed or	Open
General alarm	X	X
Empty pipe	X	X
MAX-Alarm	X	X
MIN-Alarm	X	X
MAX-MIN-Alarm	X	X
F/R-signal	Contact is closed for the forward direction	
2 flow ranges*)	Contact is closed for flow range 2	
Preset counter*)	Contact opens when the preset value is reached (contact closes for the next start command and remains closed during the batch or filling)	

Design	Optocoupler or	Relay
Terminals COPA-XM Function	G2, P7 E9, C9	G2, P7 39, 40
Terminals MAG-XM Function	P1, P2 EB, CB	P1, P2 96, 97
Pulse output scaled f = 0-10 kHz Terminals COPA-XM Function Terminals MAG-XM Function	G2, P7 59, 60 V5, V6 59, 60	– – – –
Operating voltage	16 V ≤ U_{CEH} <30 V 0 V ≤ U_{CEL} <2 V	16 V ≤ U ≤ 30 V
Operating current	0 mA ≤ U_{CEH} <0.2 mA 2 mA ≤ U_{CEL} <15 mA	0 mA ≤ I <250 mA P ≤ 3 Watt

Output Signal Option HART®-Protocol

The HART®-Protocol provides for communication between a process control system, Hand Terminal and the EMF field instrument. The communication signals, which are superimposed as an AC voltage on the current output, do not affect any other instruments connected to the current output. This option is only available with a 4-20 mA current output. Terminals: +/-.

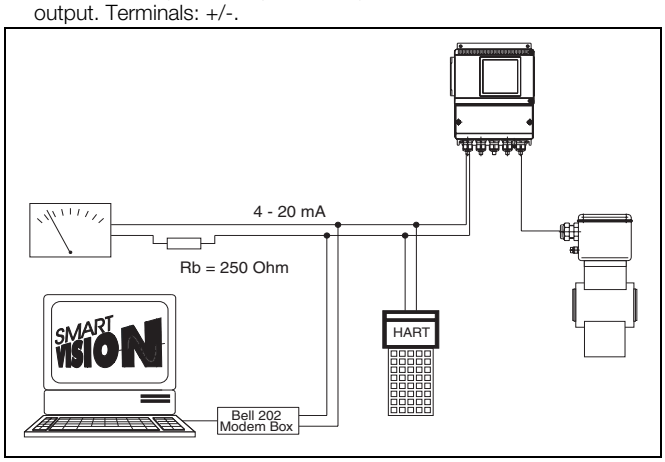


Fig. 31: Communication with HART-Protocol

Transmission Type

FSK-Modulation on the current output 4-20 mA per Bell 202 Standard.

Baudrate

1200 Baud

Format

Logic 1: 1200 Hz, Logic 0: 2200 Hz

Cable

AWG 24 twisted

Max. Cable Length

1500 m

Max. Signal Amplitude

1.2 mA_{pp}

Current Output Load

Min.: >250 Ω, max.: <1000 Ω

RS 485

V_{pp} = 5 V. Input impedance: ≥ 12 kW,
Max. cable length: 1200 m.
Baudrate: 110-9600 Baud, 14400/28800 Baud.
Max. 32 instruments in parallel on a single bus. A shielded data cable with individually twisted pairs is recommended.
Terminals: V1, V2, V3, V4; Function T-, T+, R-, R+.

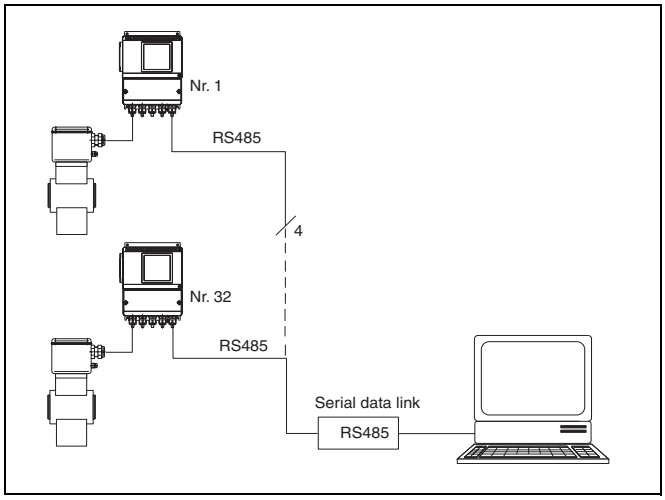


Fig. 32: Communication with RS 485 Data Link

PROFIBUS DP per DIN 19245

Terminals: V1, V2, V4, G2

Terminal	Function		Description
V1	B	RxD/TxD-P	Receive/send-data-P
V2	A	RxD/TxD-N	Receive/send-data-N
V4	VP		Supply voltage-plus P5V
G2	C	DGND	Data reference potential-M5V

A shielded and twisted data cable recommended.
Max. cable length 1200 m (cable Type A)
Characteristic impedance 135-165 Ohm
Max. 32 instruments on a single bus
Baudrate: 9.6-1500 kbit/s
Distributed capacitance <30 pF/m, loop resistance 110 Ω/km
Tap lines only up to 1 m.
In- and outgoing cables on the same terminal.

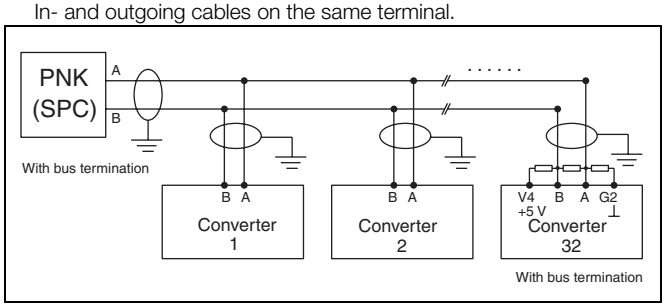
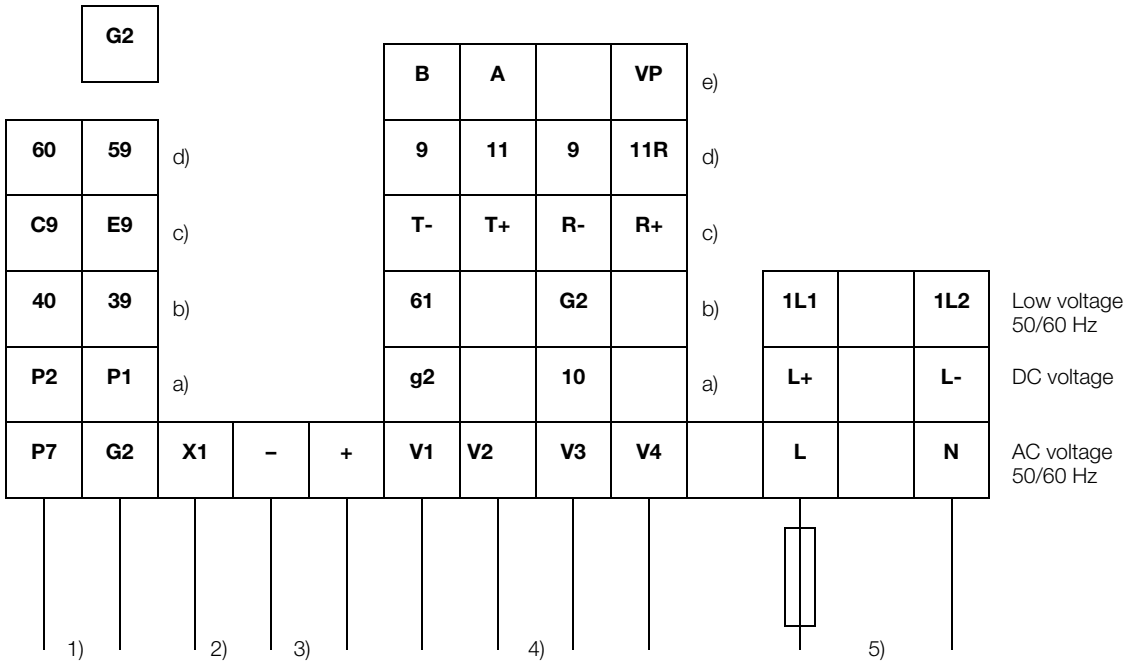


Fig. 33: Bus Connections

GSD [DD] File (Device Descriptor File)

The name of the diskette is ABB_6666.GSD and is included in the shipment. For data link description see separate Document ABB-Part.-No. D184B093U02.

Interconnection Diagram



1) Contact output terminals P7, G2
Contact configuration and function is selected in the Ordering Information.
a)[1] The following functions can be assigned to the contact output in:
General alarm, limit alarm, empty pipe, forward direction signal, flow range signal,
end contact preset counter, function P1/P2,
Optocoupler: 16 V ≤ U_{CEH} < 30 V, 0 V ≤ U_{CEL} < 2 V, 0 mA ≤ I_{CEH} < 0.2 mA, 2 mA ≤ I_{CEL} < 15 mA or
Relay: 16 V ≤ U < 30 V, 0 mA ≤ I < 250 mA, P ≤ 3 Watt
b) Alarm output relay contact; normally closed, specifications see a), function 39, 40
c) Alarm output optocoupler; normally closed, specifications see a), function C9, E9
d) Scaled pulse output 0-10 kHz optocoupler output, specifications see a), function 59, 60

2)[2] Contact input terminals G2, X1
The following functions can be assigned to the contact output in the software:
External zero return, external totalizer reset, flow range 2,
Start/stop preset counter, passive 16 V ≤ U < 30 V, R_i = 2 kΩ

3) Current output selectable, load ≤ 1000 Ohm for 0/4-20 mA, 0-10-20 mA,
4-12, 12-20 mA, load ≤ 2000 Ohm for 0/2-10 mA, load ≤ 4000 Ohm for 0-5 mA.
Option HART-Protocol with 4-20 mA per Bell 202 Standard,
Specifications see Page 31.

4) Scaled pulse output 1-channel, active or passive, pulse width can be set between
0.100 ms and 2000 ms or serial data link ASCII or DP terminals V1-V4
a) Active, 24 V DC load ≥ 150 Ohm, f_{max} = 5 kHz
Function 10, g2
b) Passive, function 61, G2
c)[3] Serial data link RS 485, function T-, T+, R-, R+, pulse output not available.
d) Option: Scaled pulse output 2-channel, data link not available
Active 24 V DC load ≥ 150 Ω or passive relay contact (normally open), ≤ 3 W; ≤ 250 mA; ≤ 28 V DC, f_{max} = 20 Hz
or passive optocoupler, 5 V < U_{CE} < 28 V DC; 5 mA < I_{CE} < 30 mA; f_{max} = 5 Hz
terminals: V1, V2 forward; function 9, 11
terminals: V3, V4 reverse; function 9, 11R
e) Data link PROFIBUS DP, terminals V1, V2, V4, G2, function (RxD/TxD-P(B), RxD/TxD-N(A),
+5 V (VP), DGND (G2) for bus termination). Pulse output not available.

5) Supply power, see Name Plate

[1] The factory default setting for the contact output is the forward flow direction signal.
[2] The factory default setting for the contact input is the external zero return function.
[3] When connecting to a RS 485 data link a shielded cable with individually twisted pairs is recommended.

Fig. 34: Interconnection Diagram COPA-XM and COPA-XM

Interconnection Diagram for Peripherals

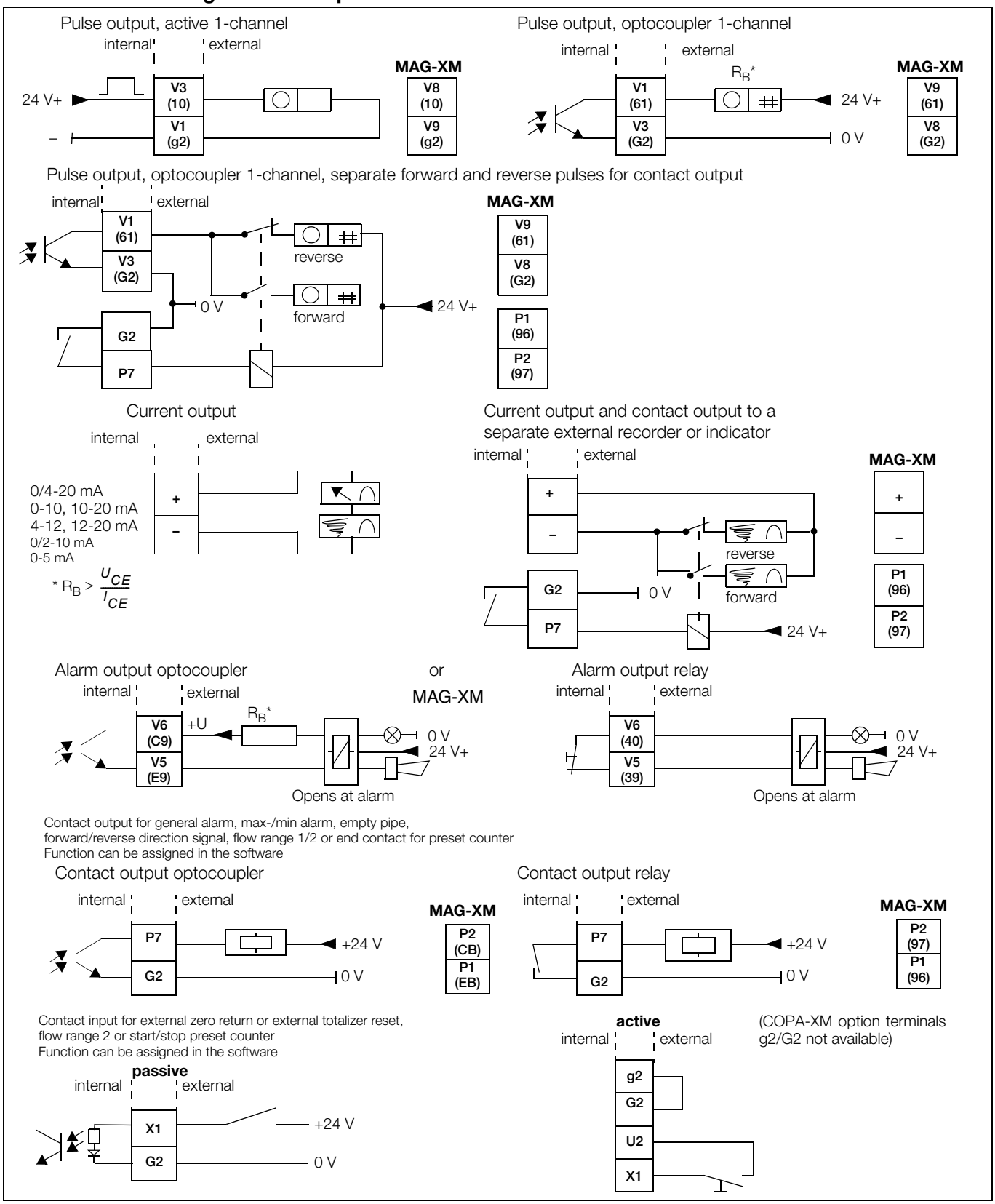
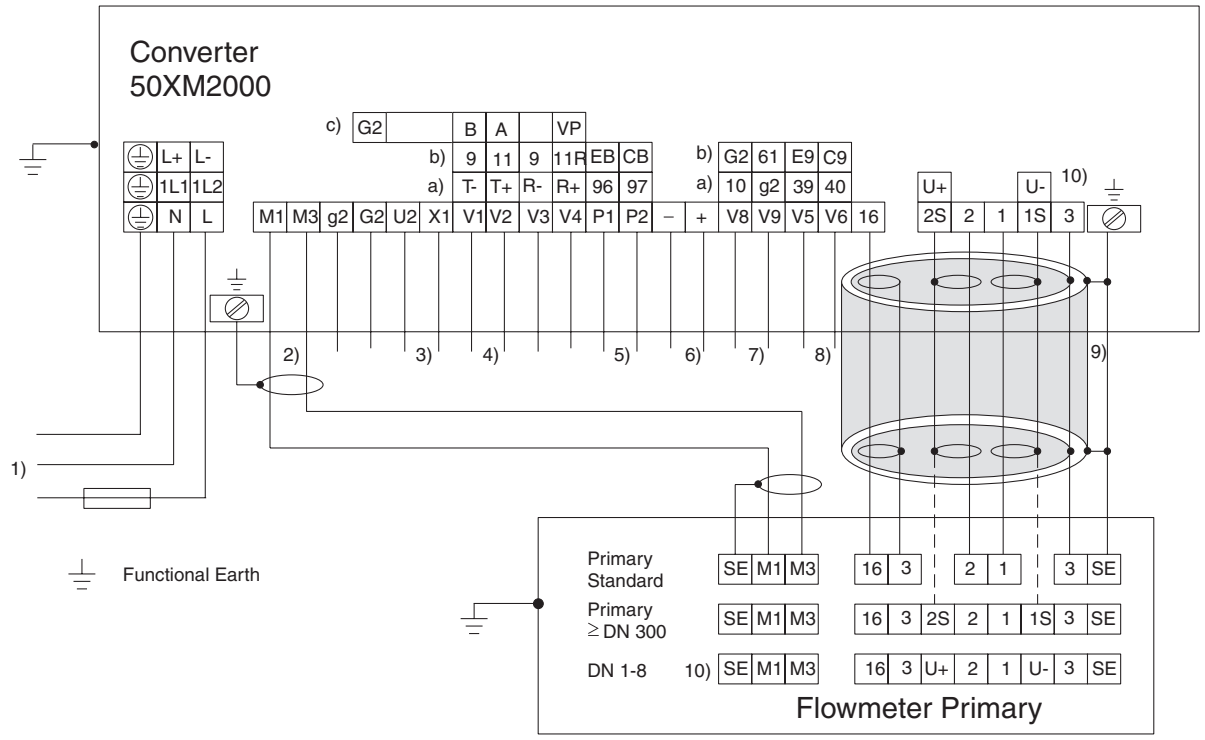


Fig. 35: Interconnection Diagram for Peripherals

Interconnection Diagram Converter MAG-XM

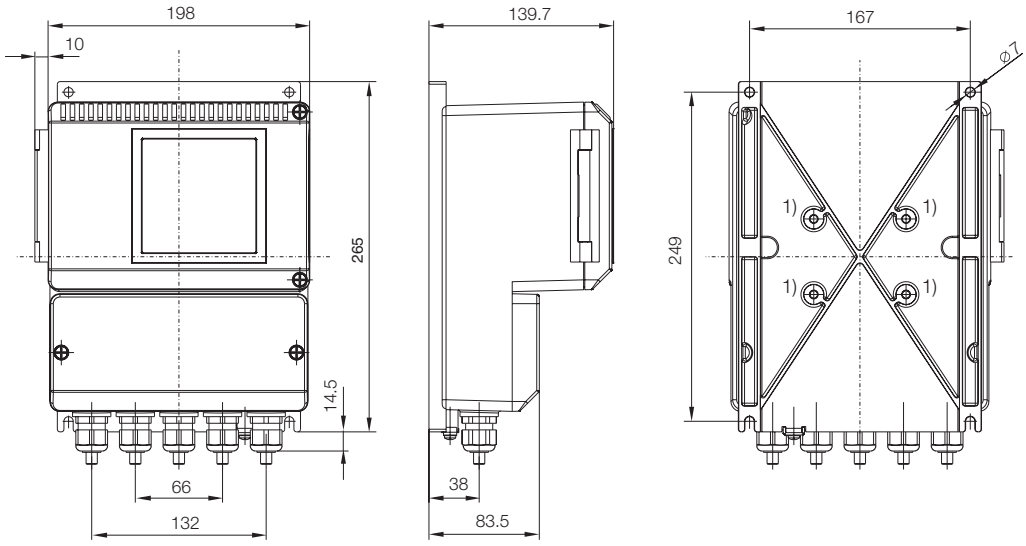


1) Supply Power, see Name Plate
2) Excitation cable to flowmeter primary (e.g. shielded 2x1.5 mm^2), terminals M1, M3)
3) Contact input, function assigned in the software as ext. zero return
or ext. totalizer reset or ext. flow range selection or start contact for preset counter passive,
over contact (normally open), with ext. current supply, 16 V ≤ U_{CEH} ≤ 30 V DC, R_i = 2kΩ
terminals X1, G2. active, over contact (normally open), terminals X2, U2, jumper terminals g2/G2
4) a) Data link RS 485[1)], terminals V1-V4, function (T-, T+, R-, R+)
b) Option: Scaled pulse output 2-channel
active, 24 V DC, load ≥ 150 Ω or passive relay contact (normally open), ≤ 3 W; ≤ 250 mA; ≤ 28 V DC,
f_{max} = 20 Hz or passive optocoupler, 5 V < U_{CE} < 28 V DC, 5 mA < I_{CE} < 30 mA; fmax 5 kHz
terminals: V1, V2 forward; function 9, 11
terminals: V3, V4 reverse; function 9, 11R
c) Data link PROFIBUS DP, terminals V1, V2, V4, G2, function (RxD/TxD-P(B), RxD/TxD-N(A),
+5 V (VP), DGND (G2) for bus termination.
5) Contact output, function assigned in the software as general alarm, limit alarm, empty pipe,
forward direction signal, 2 flow ranges or preset counter
over relay contact ≤ 3 W; ≤ 250 mA; ≤ 30 V DC, terminals P1/P2, function (96/97)
over optocoupler 16 V ≤ U_{CEH} ≤ 30 V DC, 2 mA ≤ I_{CEL} < 15 mA, terminals P1/P2, function (EB/CB)
6) Current output selectable, 0/4-20 mA load ≤ 1000 Ω, 0/2-10 mA v ≤ 2000 Ω, 0-5 mA load ≤ 4000 Ω,
terminals +/–)
7) * Scaled pulse output forward/and reverse;
a) Active, 24 V DC, load ≥ 150 Ω, f_{max} = 5 kHz, terminals V8, V9, function (g2/10)
b) Passive, 5 mA ≤ I ≤ 250 mA, 5 V ≤ U ≤ 25 V DC, f_{max} = 5 kHz, terminals V8/V9, function (G2/61)
8) a) Alarm output, relay contact ≤ 3 W; ≤ 250 mA; ≤ 30 V DC, opens during alarm, terminals V6/V6 function (39/40)
b) Alarm output, optocoupler 16 V ≤ U_{CEH} ≤ 30 V DC, 2 mA ≤ I_{CEL} < 15 mA, I_{CE} ≤ 7.5 mA, terminals V5/V6,
function (E9, C9)
9) Shielded signal cable, FP Part No. D173D018U02, 10 m included in shipment.
10) Voltage supply for preamplifier in flowmeter primary (DN 1-8 [1/25" - 5/16"]) and for flowmeter primaries
with a signal cable length ≥ 200 m, terminals +U, –U.

*) Scaled pulse output, active or passive, pulse width can be set between 0.100 and 2000 ms.
1) When connecting a RS 485 data link a shielded data cable with individually twisted pairs is recommended.
ℹ When PROFIBUS DP is specified the pulse output active is not available

Fig. 36: Interconnection Diagram MAG-XM

Dimension Drawings Field Mount Housing



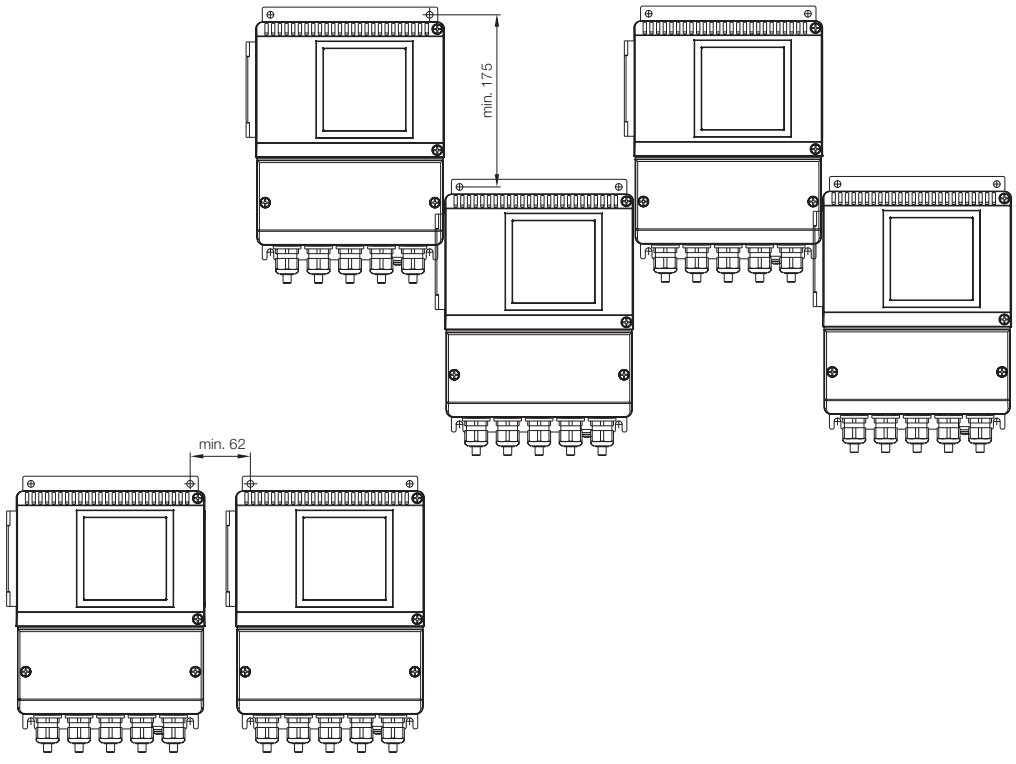
Field mounting housing with window

Cable connector M20 x 1.5

Mounting dimensions

1) Mounting holes for pipe mounting kit 2" pipe mounting

mounting kit upon request



Alle Maße in mm

Projektion nach ISO Methode E

Fig. 37: Dimension Drawings Field Mount Converter Housing with Mounting Suggestions

Ordering Information Converter MAG-XM

Accuracy: 0.4 % of rate, Option 0.2 % of rate

Ordering Number													
Remote Converter	**50XM2**												
For connection to a flowmeter primary													
Standard flowmeter primary		**1**											
DN 1-8 [1/25"-5/16"] and flowmeter primaries with preamplifiers		**2**											
Design Level													
(Specified by ABB Automation Products)			*****										
Software Level													
Generation (Specified by ABB Automation Products)				*****									
Approvals													
None					**A**								
Others					**Z**								
Housing													
Field mount housing with window						**B**							
Contact Outputs, Alarm and Configurable Output													
Optocoupler							**1**						
Relay							**2**						
Pulse Output, 1-Channel Terminals V8/V9 Standard													
Active								**1**					
Passive								**2**					
Operating Mode													
Continuous flow metering									**A**				
Entry Parameter Operation													
Standard with 3 keys and Magnetic Stick operation										**B**			
Accessories													
None											**A**		
Serial data link RS 485[1)]											**C**		
HART-Protocol											**D**		
PROFIBUS DP[1)]											**E**		
Supply Power													
230 V, 50/60 Hz												**B**	
115/120 V, 50/60 Hz												**C**	
24 V, 50/60 Hz												**F**	
24 V DC												**H**	
Name Plate													
German													**1**
English													**2**
French													**3**
Others upon request													**9**

1) Passive pulse output available.

Signal cable: A 10 m long signal cable is included with the shipment. If a longer cable is required please order under Part No. D173D018U02.

Ordering Information Test Simulator

Ordering Number						
Flowmeter Primary Simulator	**55XC4**					
Setting the Flowrate Value						
None (only adapter)		**0**				
3-Digit switch in 1000 steps		**1**				
Supply Power[1]						
None (adapter order only)			**0**			
110 V-240 V (50/60 Hz) with Schuko plug			**1**			
24 V/48 V (AC/DC) with 4 mm plug			**2**			
110 V-240 V (50/60 Hz) with USA plug			**3**			
Others			**9**			
Accessories						
None				**0**		
Adapter for converters 50XM2000/50XE4000/E4/50XF4000				**1**		
Adapter for Simulator 55XC2000[2]				**2**		
Adapter for converter S4				**5**		
Others				**9**		
Design Level						
(Specified by ABB Automation Products)					*****	
Name Plate						
German						**1**
English						**2**
French						**3**

1) The supply power must agree with the specifications on the converter Name Plate.
2) The adapter listed above for converters 50XM2000/50XE4000/E4 is also used for Simulator 55XC2000.
If both adapters are required, then the Ordering Number for each adapter is to be used.

Software
Meter location documentation software for PC available upon request.
SMART VISION Communication Tool for HART®
Free 90 day evaluation version upon request.

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