

Model 8400A Magnetic Flowmeter in wafer version



The 8400A magnetic flow tube can be used with IMT30A, IMT31A and IMT33A magnetic flow transmitters.

- ▶ Lightweight and compact
- ▶ Excellent price performance ratio
- ▶ Quick and easy to install

Equipment should be installed, operated, serviced, and maintained only by qualified personnel.

No responsibility is assumed by Schneider Electric for any consequences arising from the use of this material.

1 Product features	3
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1.1 Cost efficient and reliable flow tube	3
1.2 Options	5
1.3 Measuring principle.....	6
2 Technical data	7
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2.1 Technical data.....	7
2.2 Measuring accuracy	11
2.3 Dimensions and weights	12
3 Model code	15
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4 Notes	17
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1.1 Cost efficient and reliable flow tube

The flangeless **8400A** electromagnetic flow tube is compact and lightweight. The design is robust with the highly resistant, reinforced PFA liner and Hastelloy[®] electrodes. This offers an excellent chemical resistance.

The device is a cost-efficient and reliable solution for a wide range of applications. For industries varying from water and wastewater, agriculture, utilities and from fire-fighting to machine building.



- ① Wafer design
- ② PFA liner
- ③ Hastelloy[®] electrodes

Highlights

- Sandwich (wafer) design
- Lightweight and compact for easy handling and space saving installation
- Affordable price
- Excellent chemical resistance
- Bi-directional measurements
- No pressure loss
- Insensitive to vibrations
- No internal moving parts, no maintenance

Industries

- Machine building
- Energy, HVAC
- Water & wastewater
- Agriculture
- Process industries

Applications

- Mixing, batching and dosing systems, filtration systems, pump control
- Water flow monitoring
- Water circulation and treatment systems
- Fire-fighting systems, foam mixing, control of sprinkler systems
- Heat transfer and cooling systems
- Water including; raw water, process water, wastewater, salt water, heated and cooled water
- Mud, slurry, sludge, manure

1.2 Options



The **8400A** flow tube is available in a diameter range from DN10 up to DN150 / 3/8...6".

The compact flangeless flow tube meets all applicable process connections: EN 1092, DIN, ANSI and JIS.



Signal transmitters

The **8400A** flow tube is compatible with the IMT30A, IMT31A and IMT33A signal transmitter.

The flangeless flowmeter is suitable for compact (integral) and remote mounting.

1.3 Measuring principle

An electrically conductive fluid flows inside an electrically insulated pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils.

Inside of the fluid, a voltage U is generated:

$$U = v * k * B * D$$

in which:

v = mean flow velocity

k = factor correcting for geometry

B = magnetic field strength

D = inner diameter of flowmeter

The signal voltage U is picked off by electrodes and is proportional to the mean flow velocity v and thus the flow rate Q . A signal transmitter is used to amplify the signal voltage, filter it and convert it into signals for totalizing, recording and output processing.

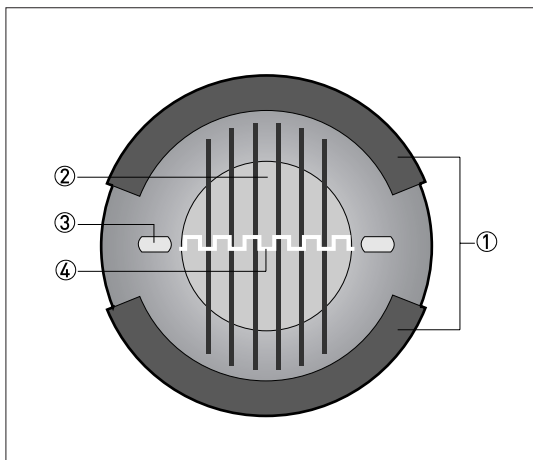


Figure 1-1: Measuring principle

- ① Field coils
- ② Magnetic field
- ③ Electrodes
- ④ Induced voltage (proportional to flow velocity)

2.1 Technical data

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website.*

Measuring system

Measuring principle	Faraday's law of induction
Application range	Electrically conductive fluids
Measured value	
Primary measured value	Flow velocity
Secondary measured value	Volume flow

Design

Features	Wafer design
	PFA liner and Hastelloy® electrodes
	Lightweight and compact
Modular construction	The measurement system consists of a flow tube and a signal transmitter. It is available as compact and as separate version. Additional information can be found in the documentation of the signal transmitter.
Compact version	With signal transmitter IMT30A: 8400A + IMT30A 4
	With signal transmitter IMT31A: 8400A + IMT31A 4
	With signal transmitter IMT33A: 8400A + IMT33A 4
Remote version	In wall (W) mount version with signal transmitter IMT30A: 8400A + IMT30A N
	In wall (W) mount version with signal transmitter IMT31A: 8400A + IMT31A N
	In field (F) or wall (W) mount version with signal transmitter IMT33A: 8400 + IMT33A N or H
Nominal diameter	DN10...150/ 3/8...6"

Measuring accuracy

Maximum measuring error	IMT30A: down to 0.5% of the measured value \pm 1 mm/s
	IMT31A: down to 0.4% of the measured value \pm 1 mm/s
	IMT33A: down to 0.3% of the measured value \pm 2 mm/s
	The maximum measuring error depends on the installation conditions
	For detailed information refer to <i>Measuring accuracy</i> on page 11.
Repeatability	\pm 0.1% of the measured value (mv); minimum 1 mm/s
Calibration	2 point calibration by direct volume comparison

Operating conditions

Temperature	
Process temperature	-25...+120°C/ -13...+248°F
Ambient temperature	-25...+65°C/ -13...+149°F
Protect the electronics against self-heating at ambient temperatures above +55°C/ +131°F	
Storage temperature	-50...+70°C/ -58...+158°F
Measuring range	-12...+12 m/s / -40...+40 ft/s
Pressure	
Ambient pressure	Atmospheric
Operating pressure	Up to 16 bar/230 psi
Vacuum load	0 mbar/psi absolute
Pressure loss	Negligible
Pressure ranges for secondary containment	Pressure resistant up to 40 bar/580 psi
	Burst pressure up to approximately 160 bar/2320 psi
Chemical properties	
Physical condition	Electrically conductive liquids
Electrical conductivity	Standard: $\geq 5 \mu\text{S}/\text{cm}$
	Demineralised water: $\geq 20 \mu\text{S}/\text{cm}$
Permissible gas content (volume)	IMT30A: $\leq 3\%$
	IMT31A: $\leq 3\%$
	IMT33A: $\leq 5\%$
Permissible solid content (volume)	IMT30A: $\leq 10\%$
	IMT31A: $\leq 10\%$
	IMT33A: $\leq 70\%$

Installation conditions

Installation	Assure that the flow tube is always fully filled
	For detailed information refer to the manual of the flow tube and signal transmitter
Flow direction	Forward and reverse
	Arrow on the flow tube indicates positive flow direction
Inlet run	$\geq 5 \text{ DN}$
Outlet run	$\geq 2 \text{ DN}$
Dimensions and weights	For detailed information refer to <i>Dimensions and weights</i> on page 12.

Materials

Flow tube housing	DN10...40 / 3/8...1½": malleable iron (GTW-S-38-12)
	DN50...150 / 2...6": sheet steel
Measuring tube	Austenitic stainless steel
Liner	PFA
Protective coating	On exterior of the meter: housing, signal transmitter (compact version) and/or connection box (field version).
	Standard coating
Connection box	Only for remote versions
	Standard: die-cast aluminium
	Option: stainless steel
Measuring electrodes	Hastelloy® C
Grounding rings	Standard: for DN10...15 / 3/8...½": integrated in flow tube construction
	Optional: for DN25...150 / 1...6"
	Stainless steel 316L (1.4404)
	Grounding rings can be omitted with virtual reference option for the signal transmitter IMT33A
Mounting material	DN40...150 / 1½...6"
	Standard: rubber centering sleeves
	Option: galvanised steel or stainless steel stud bolts and nuts

Process connections

Counter flanges	
EN 1092-1	DN10...80: PN 16 or PN 40 DN100...150: PN 16 (standard); PN 40 on request
ASME	3/8...6": 150 lb / RF 3/8...4": 300 lb / RF
JIS	DN10...100: JIS 20K (≤ 16 bar); DN150: JIS 10K (≤ 10 bar)

Electrical connections

	For full detail refer to the relevant documentation of the signal transmitter
Signal cable (for remote systems only)	
Type A (DS)	In combination with the signal transmitter IMT30A, IMT31A and IMT33A
	Standard cable, double shielded. Max. length: 600 meter / 1968 feet (depends on electrical conductivity and flow tube)
Type B (BTS)	Only in combination with the signal transmitter IMT33A
	Optional cable, triple shielded. Max. length: 600 meter / 1968 feet (depends on electrical conductivity and flow tube).
I/O	For full details of I/O options, including data streams and protocols, see technical datasheet of the relevant signal transmitter.

Approvals and certifications

CE	
This device fulfils the statutory requirements of the EU directives. The manufacturer certifies successful testing of the product by applying the CE mark.	
	For full information of the EU directive & standards and the approved certifications; please refer to the EU Declaration of Conformity or the website of the manufacturer.
Hazardous areas	
FM	In combination with signal transmitter IMT33A 4 or H
	Class I, Div. 2, Groups A, B, C and D.
	Class II, Div. 2, Groups F and G.
	Class III, Div. 2
CSA	In combination with signal transmitter IMT33A 4 or H
	Class I, Div. 2; Groups A; B; C and D
	Class II, Div. 2; Groups F and G
cCSAus OL	Valid for signal transmitter IMT31A 4/N and IMT33A 4/N/H
Other approvals and standards	
Custody transfer	Only in combination with signal transmitter IMT33A
	Cold water
	MID Annex MI-001 type examination certificate
	Liquids other than water
	MID Annex MI-005 type examination certificate
Protection category acc. to IEC 60529	Standard: IP66/67, NEMA 4/4X/6.
	IP67/69 with IMT31A (stainless steel) signal transmitter
Shock test	IEC 60068-2-27
	30 g for 18 ms
Vibration test	IEC 60068-2-24
	f = 20...2000 Hz, rms = 4.5 g, t = 30 min

2.2 Measuring accuracy

Every electromagnetic flowmeter is calibrated by direct volume comparison. The wet calibration validates the performance of the flowmeter under reference conditions against accuracy limits.

The accuracy limits of electromagnetic flowmeters are typically the result of the combined effect of linearity, zero point stability and calibration uncertainty.

Reference conditions

- Medium: water
- Temperature: +5...+35°C / +41...+95°F
- Operating pressure: 0.1...5 barg / 1.5...72.5 psig
- Inlet section: ≥ 5 DN
- Outlet section: ≥ 2 DN

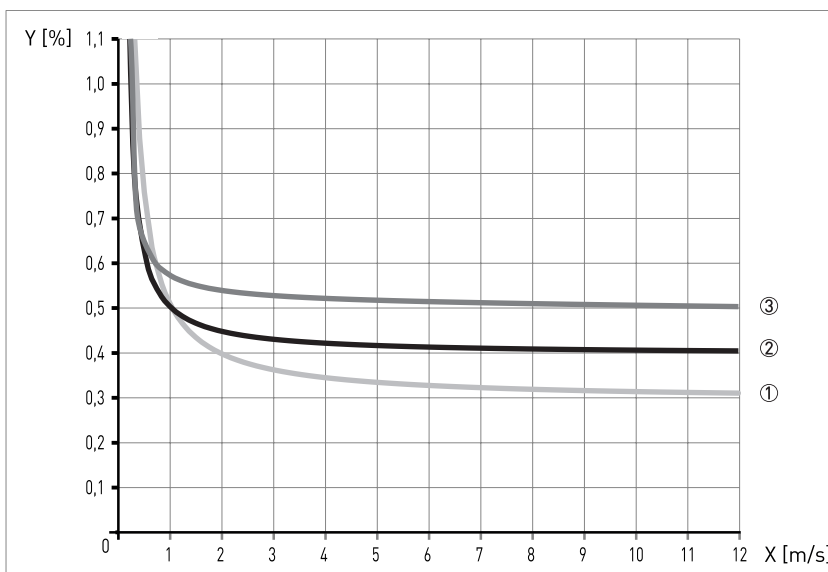


Figure 2-1: Flow velocity vs. accuracy

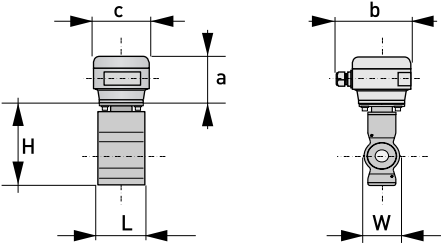
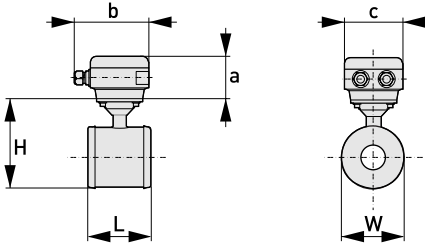
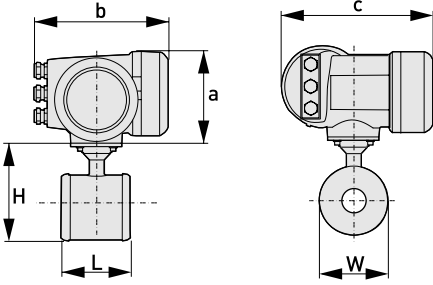
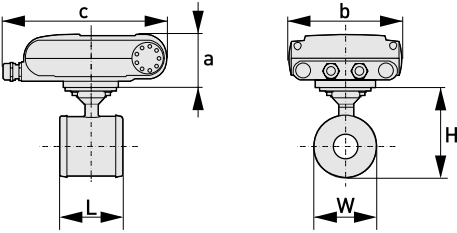
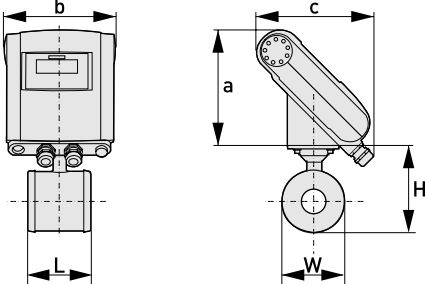
X [m/s]: flow velocity

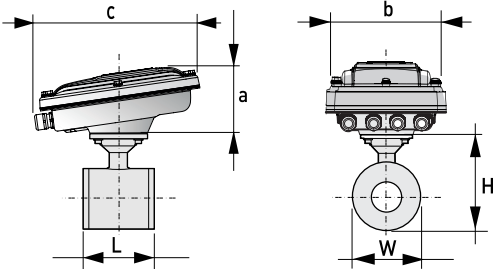
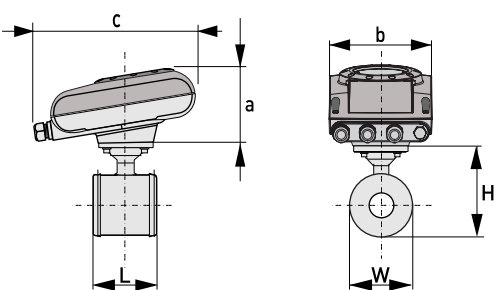
Y [%]: deviation from the actual measured value (mv)

Accuracy

Flow tube diameter	Signal transmitter type	Accuracy	Curve
DN10...150 (3/8...6")	IMT30A	0.5% of mv + 1 mm/s	③
DN10...150 (3/8...6")	IMT31A	0.4% of mv + 1 mm/s	②
DN10...150 (3/8...6")	IMT33A	0.3% of mv + 2 mm/s	①

2.3 Dimensions and weights

<p>Remote version: DN10...40 / 3/8...1½"</p>		<p>a = 88 mm / 3.5"</p> <p>b = 139 mm / 5.5" ①</p> <p>c = 106 mm / 4.2"</p> <p>Total height = H + a</p>
<p>Remote version: DN50...150 / 2...6"</p>		<p>a = 88 mm / 3.5"</p> <p>b = 139 mm / 5.5" ①</p> <p>c = 106 mm / 4.2"</p> <p>Total height = H + a</p>
<p>Compact version with IMT33A</p>		<p>a = 155 mm / 6.1"</p> <p>b = 230 mm / 9.1" ①</p> <p>c = 260 mm / 10.2"</p> <p>Total height = H + a</p>
<p>Compact version with IMT31A (0°)</p>		<p>a = 82 mm / 3.2"</p> <p>b = 161 mm / 6.3"</p> <p>c = 257 mm / 10.1" ①</p> <p>Total height = H + a</p>
<p>Compact version with IMT31A (45°)</p>		<p>a = 186 mm / 7.3"</p> <p>b = 161 mm / 6.3"</p> <p>c = 184 mm / 7.3" ①</p> <p>Total height = H + a</p>

Compact stainless steel version with IMT31A (10°)		<p>a = 100 mm / 4"</p> <p>b = 187 mm / 7.36" ①</p> <p>c = 270 mm / 10.63"</p> <p>Total height = H + a</p>
Compact version with IMT30A		<p>a = 101 mm / 3.98"</p> <p>b = 157 mm / 6.18"</p> <p>c = 260 mm / 10.24" ①</p> <p>Total height = H + a</p>

① The value may vary depending on the used cable glands.

- All data given in the following tables are based on standard versions of the flow tube only.
- Especially for smaller nominal sizes of the flow tube, the signal transmitter can be bigger than the tube.
- Note that for other pressure ratings than mentioned, the dimensions may be different.
- For full information on signal transmitter dimensions see relevant documentation.

EN 1092-1

Nominal size DN	Dimensions [mm]			Approx. weight [kg]
	L	H	W	
10	68	137	47	1.7
15	68	137	47	1.7
25	54	147	66	1.7
40	78	162	82	2.6
50	100	151	101	4.2
80	150	180	130	5.7
100	200	207	156	10.5
150	200	271	219	15.0

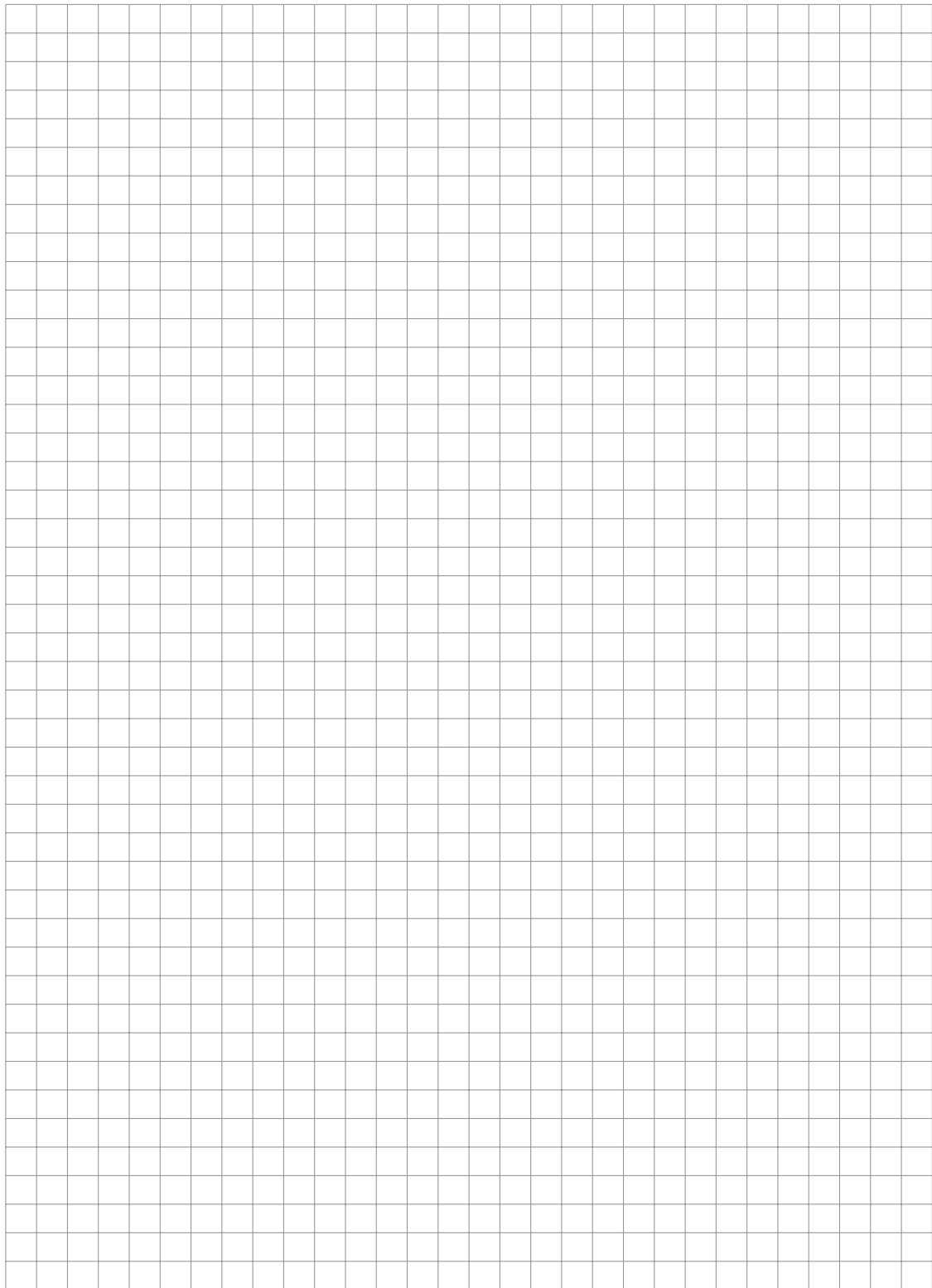
ASME B16.5

Nominal size ASME	Dimensions [inch]			Approx. weight [lb]
	L	H	W	
3/8"	2.68	5.39	1.85	3.7
1/2"	2.68	5.39	1.85	3.7
1"	2.13	5.79	2.6	3.7
1 1/2"	3.07	6.38	3.23	5.7
2"	3.94	5.94	3.98	9.3
3"	5.91	7.08	5.12	12.6
4"	7.87	8.15	6.14	23.1
6"	7.87	10.67	8.62	33.1

Model	Description, check www.BuyAutomation.com for availability
	Schneider Electric Model 8400A Magnetic Flow Tube
843EA 84HAA 8401A 841HA 8402A 8403A 8404A 8406A	Nominal diameter and liner DN10, 3/8" - PFA DN15...1/2" - PFA DN25...1" - PFA DN40...1 1/2" - PFA DN50...2" - PFA DN80...3" - PFA DN100...4" - PFA DN150...6" - PFA
3 5 A B M N	Nominal pressure (centering for) PN 16 EN 1092-1 (DN100...150) max. working pressure 16 bar PN 40 EN 1092-1 (DN100) derated/max. working pressure 16 bar 150 lbs RF ASME B 16.5 (3/8"...6") max. working pressure 232 psi 300 lbs RF ASME B 16.5 (3/8"...4") derated/max. working pressure 232 psi JIS 20 K (DN10...100 3/8" ...4") derated/max. working pressure 16 bar JIS 10 K (DN50 6") max. working pressure 10 bar
0 3 5 A C	Approval Non Ex Ex Zone 2 (for IMT33A compact and field only) FM Class I DIV 2 (for IMT33A compact and Field only) cCSAus OL (IMT33A compact and field & IMT31A compact and wall only) CSA Class I DIV 2 (for IMT33A compact and field)
1 4 5 6 A B C	System design - Cable connection Compact/Integral design with aluminum transmitter housing/cable connections at the transmitter Separate design with aluminum connection box / 1/2" NPT cable connections Separate design with aluminum connection box / PF 1/2" cable connections Separate design with aluminum connection box / M20 x 1.5 cable connections Separate design with stainless steel connection box / 1/2" NPT Separate design with stainless steel connection box / PF 1/2" cable connections Separate design with stainless steel connection box / M20 x 1.5 cable connections
0 3 4 C D K L	Transmitter model Without IMT31A (Compact /Integral Design) IMT31A (Wall Mount Version) IMT33A (Compact /Integral Design) IMT33A (Field Mount Version) IMT30A (Compact /Integral Design) IMT33A (Wall Mount Version)
1 2 3	Mounting Material Steel, galvanized / rubber sleeves Stainless steel A2 / rubber sleeves Rubber sleeves
3 G	Grounding ring material St. steel DIN 1.4404 316L (DN10...15 3/8"...1/2"), without (DN25...150 1"...6") St. steel DIN 1.4404 316L (DN25...150 1"...6")
B	Electrodes Standard, Hastelloy C22
0	Protection class / dimension (face-to-face) IP66 67 & Standard dimension
0 1 Y	Cable Compact (none) - Seperate (remote) DS Separate BTS Without

Model	Description, check www.BuyAutomation.com for availability
0 1 2 3 4 5 6 7 8 Y	Cable length Compact - None - Separate - 5 m - 15 ft 10 m - 30 ft 15 m - 45 ft 20 m - 60 ft 25 m - 75 ft 30 m - 90 ft 40 m - 120 ft 50 m - 150 ft 100 m - 300 ft Without
0 2 3	Calibration Standard calibration Standard calibration + 316/1.4401 tag plate (120 x 46 mm) Standard calibration + 316/1.4401 tag plate (67 x 25 mm)
0	Special Standard
H	Version Standard
0	Construction requirements Standard
0	QA / QC requirements Standard
0	Ratio of CT-calibration Standard, R=80
0	Warranty Standard
0	Instruction language Standard







ORDERING INSTRUCTIONS

1. Model Number.
2. Flow Data:
 - a. Maximum, minimum, and normal flow rate.
 - b. Fluid composition and viscosity at operating temperatures.
 - c. Fluid density or relative density (specific gravity).
 - d. Maximum, minimum and normal operating temperatures.
 - e. Maximum, minimum and normal operating pressures.
 - f. Mating pipe schedule.
 - g. Type and location (distance) of upstream disturbance.
3. Calibration Information (analog output only); maximum flow rate 20 mA output.
4. Electric Classification.
5. Optional Selections and Accessories.
6. Customer Tag Data.

FLOWEXPERTPRO SIZING APPLICATION

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