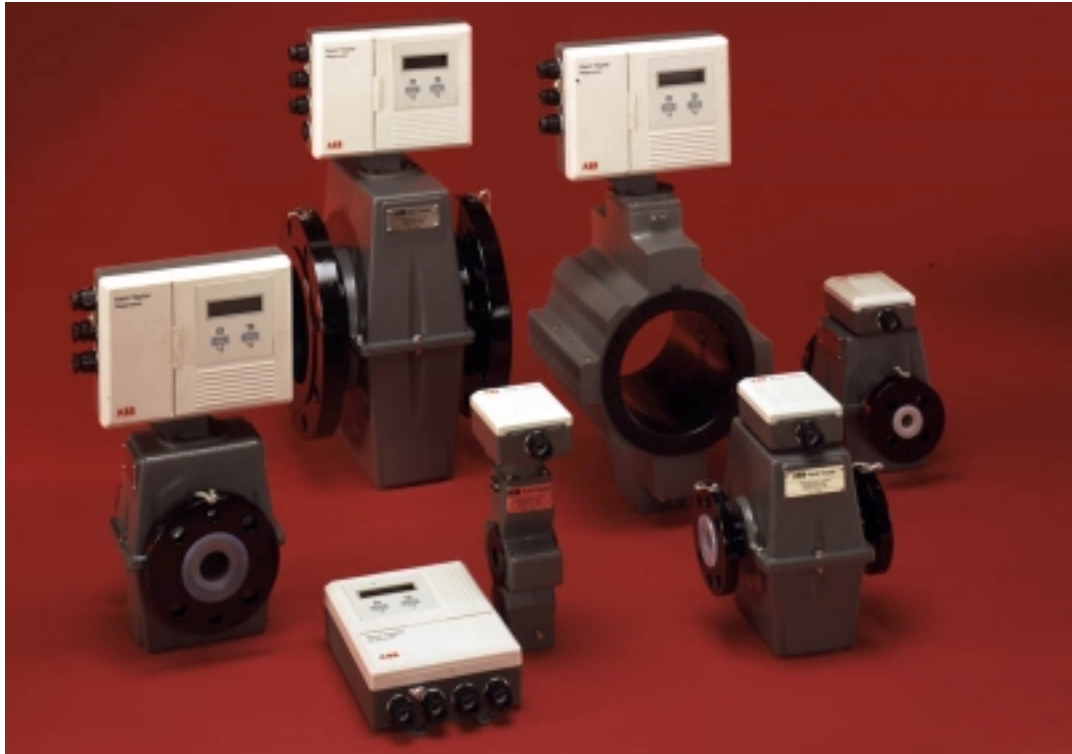


Specification DataFile



- Process MagMaster for unrivalled flow performance – $\pm 0.2\%$ accuracy. Operable flow range of 1000:1.
- Slurry MagMaster for all slurries, pulps and pastes.
- In-built quality and reliability.
- New technology SMART transmitter uses surface mount technology and provides self-monitoring and diagnostic functions.
- Submersible and buriable sensors.
- CENELEC approved for zone 1 hazardous areas.
- Comprehensive range of corrosion and abrasion resistant construction materials.
- Bi-directional system.
- Optional 32-character display.
- Customer interface in choice of language.
- Approved calibration rigs traceable to National Standards in UK, USA and Australia.

INTRODUCTION

MAGMASTER, THE NEXT generation electromagnetic flowmeter, takes flow metering to new levels of capability and performance.

The key to MagMaster's performance is the new sensor design with ultra linear magnetics and the new technology sensor drive and signal processing system. A quantum leap in magflow technology.

Two versions – Process MagMaster and Slurry MagMaster – a wide choice of materials, a range of optional features and bore sizes from 15 to 1600mm, allow you to specify the meter to precisely match your application. Add 'in-built quality' and ABB's experience and expertise in flow, and the answer to your flow application is obvious.

SPECIFICATION – SYSTEM

MagMaster is available in sizes 15 to 1600mm with integral and remote transmitters. System specification is detailed below. See also 'Specification – Sensors' and 'Specification – Transmitter'.

Configuration

Transmitter may be integral with sensor for sizes ≤ 400 mm, or remote from sensor for all sizes

Separation (remote transmitters)

The lower of 100m or 5 x min. conductivity ($\mu\text{S}/\text{cm}$).
Longer lengths to special order

Accuracy (under reference conditions)

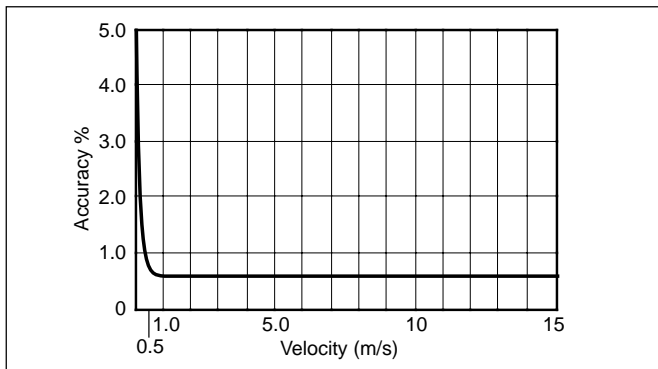
Flanged sensors

Display, Serial comms., Frequency output

$\pm 0.2\%$ of reading or ± 0.001 m/s (whichever is the greater) up to a maximum velocity of > 15 m/s. See diagram below

Analog output

As Frequency output plus ± 0.008 mA



MagMaster Display Accuracy

Wafer sensors

As for flanged meters plus $\pm 0.3\%$ of reading

Pressure effect

Less than 0.15% over the operating range of the instrument

Temperature effect

Transmitter – display, frequency output, serial comms., $< \pm 0.08\%$ of reading per 10°C

Analog output – as frequency plus $< \pm 0.08\%$ of reading per 10°C

Sensor – $< \pm 0.03\%$ of rate per 10°C

Repeatability and Reproducibility

$\pm 0.05\%$ or ± 0.25 mm/s, whichever is the greater

Power supply variation

Negligible effect – within published specification

Conductivity

Liquids and slurries having a conductivity of not less than $5\mu\text{S}/\text{cm}$ ($5\mu\text{mho}/\text{cm}$)

Mounting

Directly into pipeline at any attitude, but ensuring that the electrodes are not in the vertical plane

Recommended mating pipe conditions

Upstream – 5 to 10 diameters straight pipe depending on performance requirements and upstream disturbance

Downstream – 2 to 3 diameters straight pipe depending on performance requirements and downstream disturbance

Power consumption

Less than 20VA

Hazardous area certificate

CENELEC Approved to EEx e m ia IIC T4 ($T_{amb} 60^\circ\text{C}$)

Detector head located in zone 1 or 2, zone 0 inside pipe

Transmitter located in safe area. (For hazardous area approval the sensor must not be permanently submerged but may be subject to accidental flooding)

Warm-up time

1 minute

Calibration

3-point, 8-point, witnessed and NAMAS (200 to 1600mm only) calibration options

Sensor cable connection

Standard, high temperature or armoured

SPECIFICATION – SENSORS

MagMaster sensors are available in flanged and wafer format and offer a wide choice of lining and electrode materials to satisfy all applications.

Sizes

27 sizes from 15 to 1600mm ($1/2$ in. to 66in.)

Metering tube

Stainless steel

Lining*

PFA perfluoro-alkoxy – UKWFBS listed for potable water,

Elastomer – UKWFBS listed for potable water,

Polypropylene – UKWFBS listed for potable water,

Ebonite, Bonded FEP, Polyurethane & Neoprene

Electrodes*

Non-removable. Stainless steel, Hastelloy 'C', Titanium, Tantalum and Platinum Iridium

Earthing electrode*

Fitted as standard in flanged meters 15 to 150mm ($1/2$ in. to 6in.) in the same material as measuring electrodes

Process connections:

Flat face carbon steel flanges to mate with BS4504, DIN, UNI, AFNOR, AnSI, AS2129 and BS10 flanges

or

Wafer meters – to mate with the following flange standards

Nom. Bore		BS4504 2.5/6 bar	BS4504 10, 16, 25, 40 bar	ANSI 150	ANSI 300	BS10 Table D & E
mm	in.					
25	1	*	*	*	*	*
40	1 1/2	*	*	*	*	*
50	2	*	*	*	*	*
80	3	*	*	*	*	*
100	4	*	*	*	*	*
150	6	*	*	*	*	*

* Refer to Table B for option details

Pressure Limitations

Flanged meters	Sizes 15 to 600mm (1/2in. to 24in.) – maximum pressure dictated by flange rating.
	Sizes above 600mm (24in.) – maximum pressure 6 bars irrespective of flange rating. Higher pressures to special order
Wafer meters	50 bars

Temperature

Sensors (with integral transmitters)

Ambient	-10° to 60°C
Process fluid	
Polyurethane lining	-10° to 70°C
All other linings	-10° to 80°C

Sensors (non-integral transmitter)* – see Table A below

*For transmitter see 'Specification – Transmitter'.

Environmental Protection

- Transmitters and sensors with integral transmitters
IP68/NEMA 4X
- Flanged sensors, no integral transmitters
IP68/NEMA 6
(5m submersion depth for sizes ≤ 150mm indefinitely)
(10m submersion depth for sizes > 150mm indefinitely)
- Buriable
≤ 400mm are buriable to 5m depth
- Wafer sensors
IP65/NEMA 4X

Sensor Housing

- Wafer meters
Epoxy coated SG iron
- Flanged meters
≤ 150mm – cast aluminium alloy, epoxy coated
- Non-hazardous area meters
200/300mm – ABS. 350/600mm GRP
700/1600mm – steel side panels
- Hazardous area meters
15/150mm – aluminium alloy
200/600mm – fabricated steel

Specification – Transmitter

The new technology, microprocessor-based MagMaster transmitter is available in two versions – Process MagMaster and Slurry MagMaster.

Slurry MagMaster is for use on all slurries, pulps and pastes and incorporates a unique sensor drive and signal processing system. This ensures stable, accurate readings and eliminates traditional problems of noisy signals and spurious outputs.

Process MagMaster is the first choice meter for all general applications and provides unsurpassed performance at the most competitive price.

Display (optional)

32-character (two lines) high temperature super twist L.C.D. alpha-numeric display of flow rate, total flow, alarm conditions etc. Display scrolled and reset by magnetic reed switches

Internal totalizer

9-digit for forward, reverse and nett totals

Programming

If data is supplied with order the transmitter is fully programmed before despatch. The transmitter can subsequently be easily reprogrammed on site using a local hand-held terminal with no effect on performance. The transmitter is programmed in a wide choice of engineering units and is fully flexible, e.g. rate and total can be in different units

Test mode

After the transmitter has been programmed, operation of the test mode drives all outputs to programmed value to provide total system test

Customer Interface and Display

Multilingual choice of English, French, Spanish, Italian as standard. Other languages as specials

Power Supply

Universal switch mode
a.c. 85 to 265V 45 to 400Hz at 20VA max.
or
d.c. 11 to 40V at 20VA max.

Table A Temperature Limits for Sensors (No integral transmitter)

Build Standard	Ambient Temp. °C (°F)	Process Fluid Temperature °C (°F)						
		Poly-propylene	FEP 'Teflon'	Elastomer	Ebonite	Poly-urethane	PFA 'Teflon'	Neoprene
Standard construction, non-HA	60 (140)	80 (176)	80 (176)	80 (176)	80 (176)	70 (158)	80 (176)	80 (176)
HA approved, standard temp.	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
**HA approved, high temp.	60 (140)	100 (212)	120 (248)*	120 (248)*	95 (203)	70 (158)	120 (248)*	110 (230)*
**High temp., non-HA	60 (140)	100 (212)	120 (248)	120 (248)	95 (203)	70 (158)	120 (248)	110 (230)
Special high temp., non-HA	120 (248)	100 (212)	120 (248)	120 (248)	95 (203)	70 (158)	120 (248)	110 (230)

* 200 to 600mm sizes limited to 100°C (212°F)

Outputs

- i) Analog
Fully programmable for zero, f.s.d., up to 21mA and flow direction
Fully isolated. Output capability >15V
- ii) Dual analog (optional)
As (i) but separate outputs for forward and reverse flow
Non-active output is 4mA or 0mA
- iii) & iv) Dual pulse
Forward and reverse flows 0 to 800Hz square wave or fixed pulse width up to 2.5s. Fully programmable for pulse rate, cutoff, pulse width etc. Minimum frequency resolution < 0.1 pulse/day. Frequency limit settable 1Hz to 800Hz in 1Hz steps. Isolated protected transistor switch capable of sinking > 250mA .
Voltage < 35V
- v) & vi) Dual alarms
Isolated protected transistor switch capable of sinking > 250mA to power 0V. Voltage < 35V
Note. Not isolated from frequency output
Fully programmable for high/low flow rates, liquid sensing fault conditions, forward/reverse, polarity (normally open/close), analog over range, pulse over range, pulse cutoff, etc
- vii) RS232C
Local data connector for hand held configurator/
setup via 9-pin 'D' connector
- viii) Serial communication RS423/RS422 (optional)
Compatible data link

Input

External isolated contact closure for totalizer reset.

Note. Not isolated from pulse and alarm outputs.

Isolation

Galvanic separation to 50V d.c.between analog, pulse/ alarm and earth/ground.

Temperature

Operating -10° to 60°C

Storage -15° to 75°C

Environmental protection

IP65/NEMA 4X. Separate termination and electronics compartments. IP65/NEMA 4X segregated.

Approvals

Designed in accordance with IEC950, CSA, FM and UL requirements

Electrical safety – BS4743 Class 1. (IEC 348)

Vibration specification – BS2011: Part 2.1Fc : 1983

EMC Specification

- 1) Conforms to BS6667 Part 3 'Radiated susceptibility to 10V/m'
- 2) Conforms to BS6527 'Terminal voltage and radiated emissions'
- 3) Conforms to BS800 'Interference Power'

Configuration

Configuration stored in a non-volatile memory (typically 10-year retention). User preset values may be altered

Enclosure

Glass loaded polypropylene, polycarbonate window

Self diagnostic

Transmitter confirms correct operation of hardware with fault diagnosis e.g. coil drive

Flow velocity setting

Rangeable for flows corresponding to a maximum velocity of >15m/s

Liquid sensing

Programmable for nominal conductivity level. Liquid sensing results in drive to zero

Interchangeability

Transmitters are fully interchangeable with all sizes of MagMaster sensor and configurable on site. System specification not affected by transmitter change

Electrical connections

20mm plastic glands, or 20mm brass glands, or 0.5in. NPT gland plate

Time constant

Fully programmable from 1s to greater than 100s

Integral transmitter display orientation

The display is factory positioned to suit the specified sensor orientation (i.e. horizontal or vertical).The display is either in standard orientation, +90°, +180° or 270°

Table B Construction Options

Size		End Mating Connections						Lining Material						Electrode Material					Protection				Transmitter		Earthing					
mm	in.	Wafer	6 bar metric	10 bar metric	16 bar metric	40 bar metric	ANSI B16.-5 Class 150	BS19/AS2129 Table 'D'	BS10/AS2129 Table 'e'	PFA (Teflon)(UKWFBS listed)	Polypropylene (UKFWBS listed)	Teflon bonded FEP	Elastomer (UKWFBS listed)	Ebonite	Polyurethane	Neoprene	Stainless Steel	Hastelloy 'C'	Titanium	Tantalum	Platinum Iridium	IP 65	IP 68	Buriable	Hazardous area	Integral	Remote	Electrode	Flanges	
15	1/2		*	*	*	*	*	*	*								*	*	*	*	*	*	①	①	①	*	*	②	*	
20	3/4			*	*	*	*	*	*								*	*	*	*	*	*	①	①	①	*	*	②	*	
25	1	*							*	*							*	*	*	*	*	*			①	*	*		*	
40	1 1/2	*							*												*	*			①	*	*		*	
50	2	*							*	*							*	*	*	*	*	*	①		①	*	*		*	
65	2 1/2			*	*	④	*	*	*	*							*	*	*	*	*	*	①		①	*	*		②	*
80	3	*							*	*							*	*	*	*	*	*			①	*	*		*	
100	4	*							*	*							*	*	*	*	*	*	①		①	*	*		②	*
150	6	*							*	*		*					*	*	*	*	*	*			①	*	*		②	*
200	8			*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	①	①	①	*	*			*
250	10			*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	①	①	①	*	*			*
300	12			*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	①	①	①	*	*			*
350	14			*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	①	①	①	*	*			*
400	16			*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	①	①	①	*	*			*
450	18			*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*		*		*			*
500	20			*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*		*		*			*
600	24			*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*		*		*			*
700	27	*	③	③			*	③			*			*	*	*	*	*	*	*	*	*	*				*			*
	30						*	③			*			*	*	*	*	*	*	*	*	*	*				*			*
800		*	③	③							*			*	*	*	*	*	*	*	*	*	*				*			*
900	36	*	③	③			*	③			*			*	*	*	*	*	*	*	*	*	*				*			*
1000	39	*	③	③			*	③			*			*	*	*	*	*	*	*	*	*	*				*			*
	42						*	③			*			*	*	*	*	*	*	*	*	*	*				*			*
1200	48	*	③	③			*	③			*			*	*	*	*	*	*	*	*	*	*				*			*
1400	54	*	③	③							*			*	*	*	*	*	*	*	*	*	*				*			*
	60										*			*	*	*	*	*	*	*	*	*	*				*			*
1600	66	*	③	③							*			*	*	*	*	*	*	*	*	*	*				*			*

* = Standard option

① = Remote transmitter version only

② = Fitted as standard

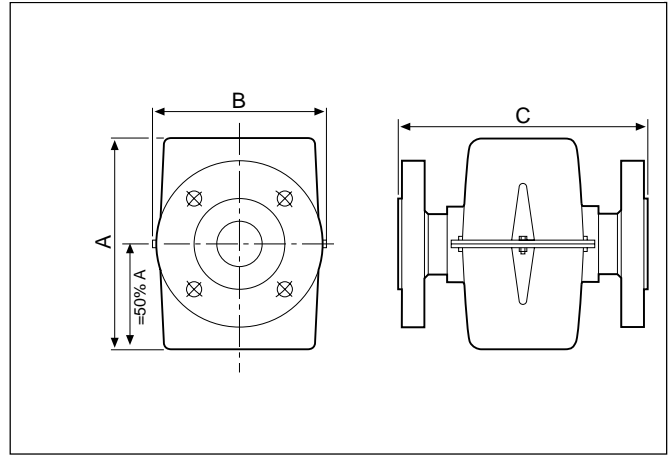
③ = Maximum working pressure 6 bar as standard. Higher pressure to order.

④ = Maximum working pressure 30 bar to special order.

DIMENSIONS

15 to 150mm flanged sensors without transmitter or terminal box

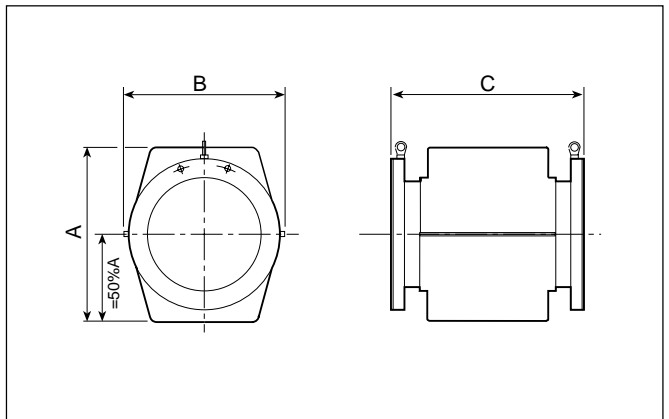
Meter Size NB	Dimensions			Approx. Weight	
	A	B	C	kg	lb
15mm	174	140	200	6.9	15.2
20mm	174	140	200	6.9	15.2
25mm	210	176	200	6.9	15.2
40mm	210	176	200	9.05	20.0
50mm	210	176	200	10.35	22.9
65mm	280	219	200	18.00	39.8
80mm	280	219	200	18.00	39.8
100mm	312	230.5	250	24.4	53.9
150mm	370	281	300	38.0	84.0



DIMENSIONS

200 to 600mm flanged sensors without transmitter or terminal box

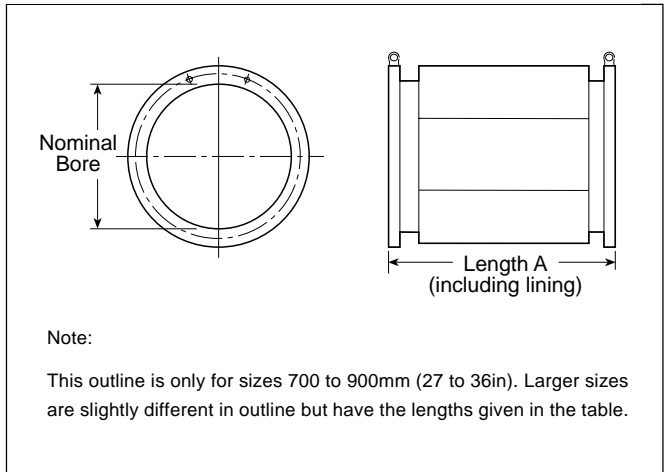
Meter Size NB	Dimensions			Approx. Weight	
	A	B	C	kg	lb
200mm	400	396	418	57	126
250mm	446	442	488	73	161
300mm	508	510	538	100	220
350mm	560	562	568	134	295
400mm	614	596	618	172	378
450mm	656	640	698	207	455
500mm	710	700	768	241	530
600mm	810	810	918	309	680



DIMENSIONS

700 to 1600mm flanged sensors without terminal box

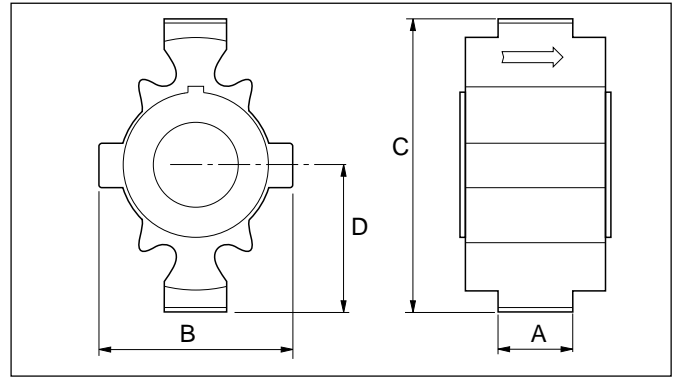
Meter Size NB		Length 'A'		Approx. Weight (10lb bar flanges)	
mm	in	mm	in	kg	lb
700	27	1140	44.9	530	1166
	30	1200	47.2	600	1320
800		1270	50.0	610	1345
900	36	1410	55.5	770	1694
1000	39	1550	61.0	1000	2205
	42	1617	63.7	1250	2750
1200	48	1812	71.3	1400	3080
1400	54	2112	83.1	1800	3960
	60	2262	89.1	1950	4290
1600	66	1412	95.0	2620	5764



DIMENSIONS

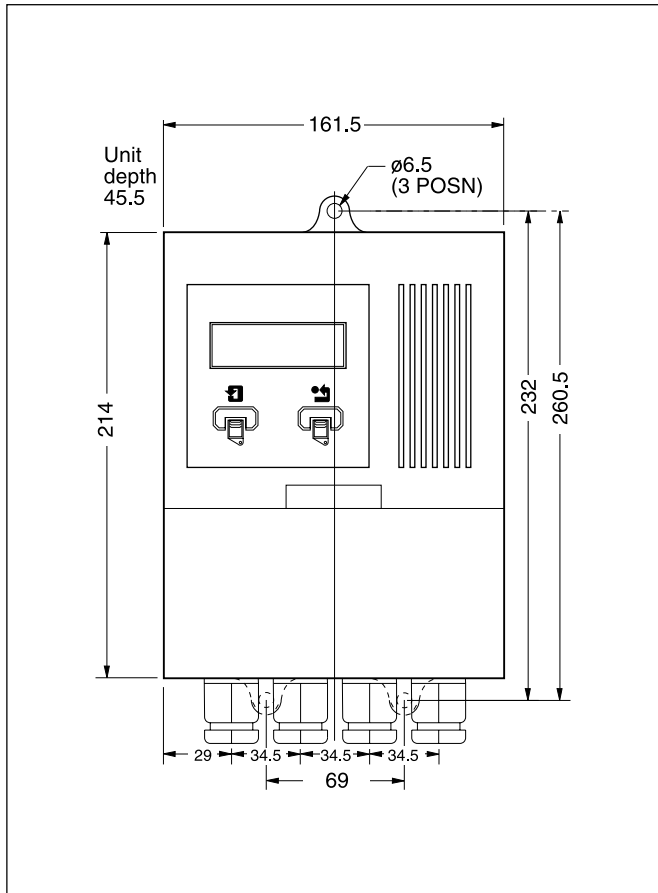
Wafer meters without transmitter or terminal box

Meter Size NB		Length mm	Width mm	Height mm		Weight	
mm	in	A	B	C	D	kg	lb
25	1	64	110	212	95	2.5	7.7
40	1½	85	115	238	108	2.5	7.7
50	2	90	124	238	110	5.3	13.9
80	3	120	170	282	130	9.3	22.6
100	4	150	200	342	160	14.1	33.2
150	6	225	250	402	190	26.5	60.6



DIMENSIONS

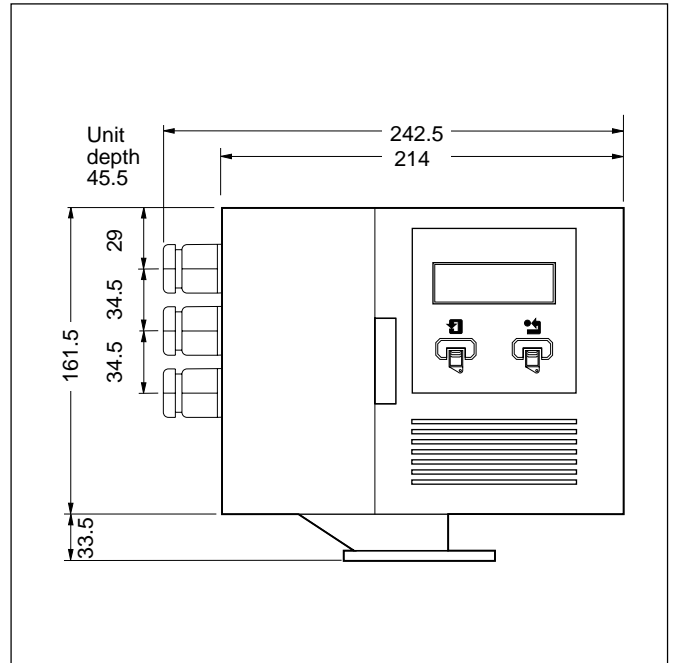
Remote transmitter



Transmitter weight: 0.75kg (1.66lb)

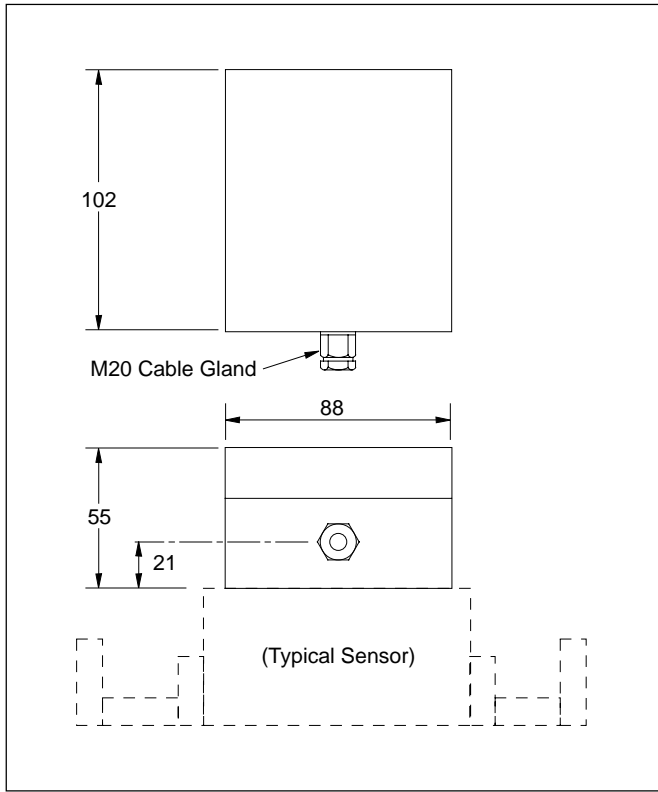
DIMENSIONS

Integral transmitter (mounted on sensor)



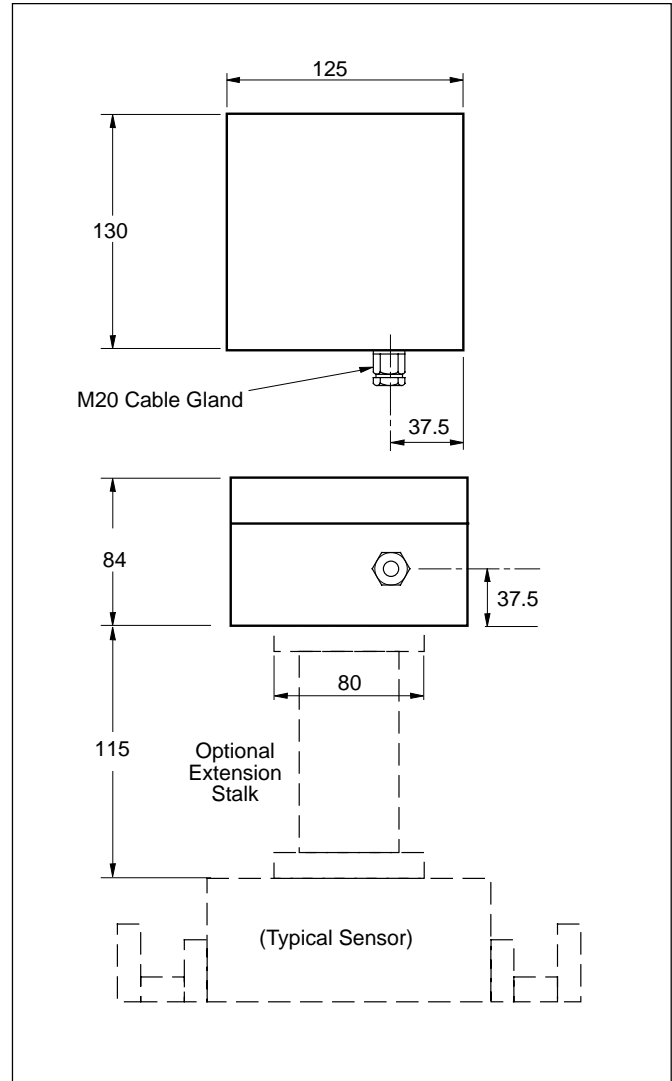
DIMENSIONS

Standard terminal box (mounted on sensor)



DIMENSIONS

Hazardous area terminal box (mounted on sensor)



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