



## VLM30 In-line Vortex Flowmeter

### Description

Vortex flowmeters measure the flow of liquid, gas and steam by detecting the frequency at which vortices are alternately shed from a bluff body. According to proven laws of physics, the frequency at which the vortices are alternately shed is directly proportional to the flow velocity.

In-line vortex flowmeters measure flow by detecting the local velocity at a strategically located position within the pipe. The VLM30 detects the frequency at which vortices are alternately shed from the bluff body located within the sensor head.

The VLM30 uses the local velocity, along with other parameters, such as fluid type, pipe size and Reynolds number to calculate the average pipe velocity, and consequently, the volumetric flowrate.

The VLM30 In-line Vortex Flowmeter utilises three primary sensing elements to measure the mass flowrate of steam, liquids and gases:

- Vortex shedding velocity sensor
- RTD temperature sensor
- Solid-state pressure transducer

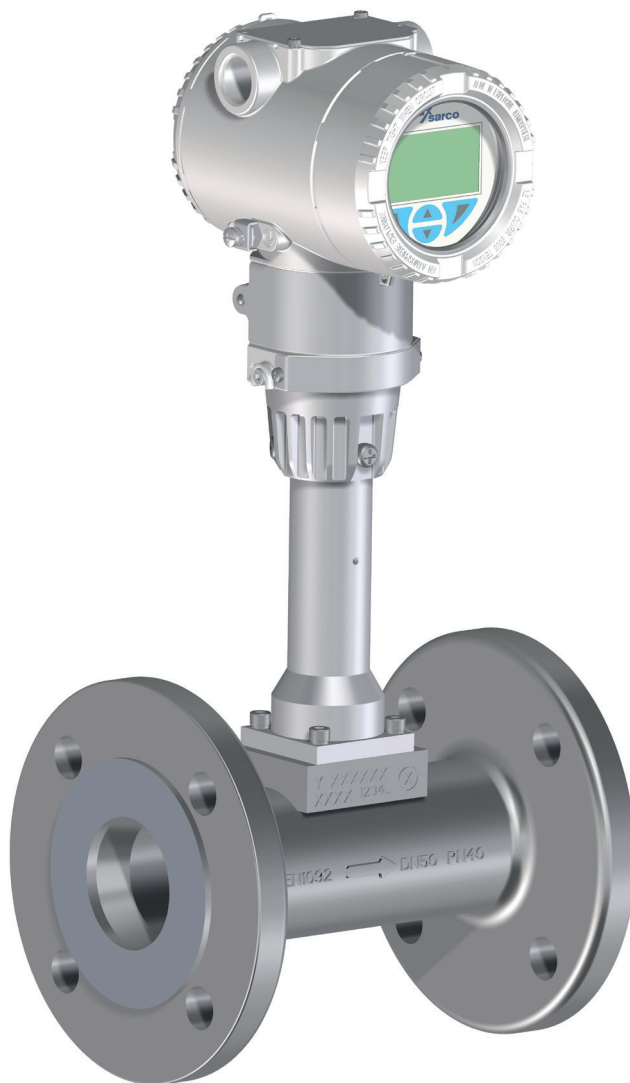
### VLM30 range

The **VLM30-S** vortex flowmeter for vapor, liquid and gas, with optional graphical display, optional binary output and optional integrated temperature measurement.

The **VLM30-E** vortex flowmeter for vapor, liquid and gas, with integrated binary output, temperature compensation, and flow computer functionality. The device offers the option of directly connecting remote temperature transmitters, pressure transmitters, or gas analysers

### Compliance

- Electromagnetic Compatibility Directive
- Low Voltage Directive



## Approvals

<b>EMC</b>	Electromagnetic compatibility of equipment for process and lab control technology 5/93 and EMC Directive 2004/108/EC (EN 61326-1). Devices with HART communication are optionally available with EMC protection in accordance with NAMUR NE 21.
<b>EC1395</b>	This product is not to be used on steam, liquid or gas that either forms an ingredient of, or comes into direct contact with food products in the EU.

**Caution: When selecting a vortex flow meter for steam flow measuring, care must be taken around the low flow velocity as this can cause instability in the flow measurement readings. Please ensure the appropriate flow meter size is selected via the sizing tool for the application.**

## Sizes and pipe connections

### Flanged <sup>1</sup>

DN25, DN40, DN50, DN80, DN100, DN150, DN200, DN250 and DN300  
Flanged EN 1092-1 PN16, PN40, PN63, PN100 connections

or

1", 1½", 2", 3", 4", 6", 8", 10" and 12"

Flanged ASME 16.5 Class 150, 300 and 600 connections

### Wafer type <sup>2</sup>

DN25, DN40, DN50, DN80, DN100 and DN150 suitable for fitting between EN 1092-1 PN40/PN63 flanges

or

1", 1½", 2", 3", 4" and 6" suitable for fitting between ASME B16.5 Class 300/600 flanges <sup>2</sup>

### Notes:

<sup>1</sup> PN160/Class 900 available upon special request

<sup>2</sup> ANSI 600 or PN100 pressure rating available upon special request. Standard wafer unit is rated to PN63/ANSI 300.

## Technical data

	<b>Meter Tube</b>	Stainless steel 1.4571 (AISI 316 Ti)/AISI 316L/CF8C/C3FM	
<b>Wetted materials</b>	<b>Sensor</b>	Stainless steel 1.4571 (AISI 316 Ti)	
	<b>Sensor gasket*</b>	PTFE O-ring/Kalrez 6375 O-ring (optional)/Graphite (optional for high temperature design)	
<b>Application</b>	Any gas, liquid or steam compatible with stainless steel and other listed wetted materials. Not recommended for multi-phase fluids.		
<b>Environmental</b>	Electrical Safety EN61010-1:2010		
	<b>LVD</b>	Overvoltage Category II	
		Pollution Degree 2	
	<b>EMC</b>	Emissions	Group 1, Class A (Suitable for Industrial Environments only)
		Immunity	Suitable for Industrial Environments
<b>Enclosure</b>	IP 66, IP67 and NEMA 4x in accordance with EN60529		

## Technical data (continued)

	Style connection	Rating
Pressure ratings	Flanged <sup>1</sup>	ASME Class 150
		ASME Class 300
		ASME Class 600
		EN 1092-1 PN16
		EN1092-1 PN40
		EN 1092-1 PN63
		EN 1092-1 PN100, DN25 - DN200 only
	Wafer <sup>2</sup>	For installing between 1" to 6" ASME Class 300/600 or DN15 to DN100 EN 1092-1 PN40/PN63/PN100 flanges

### Notes:

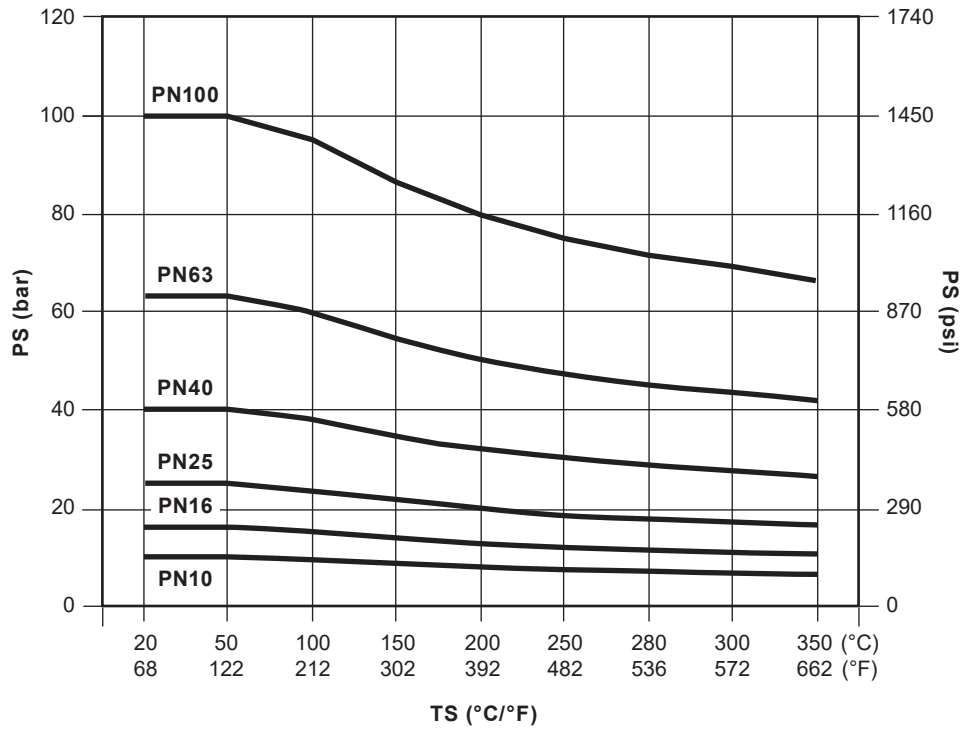
<sup>1</sup> PN160 Available upon special request

<sup>2</sup> ANSI 600 or PN100 pressure rating available upon special request. Standard wafer unit is rated to PN63/ANSI 300.

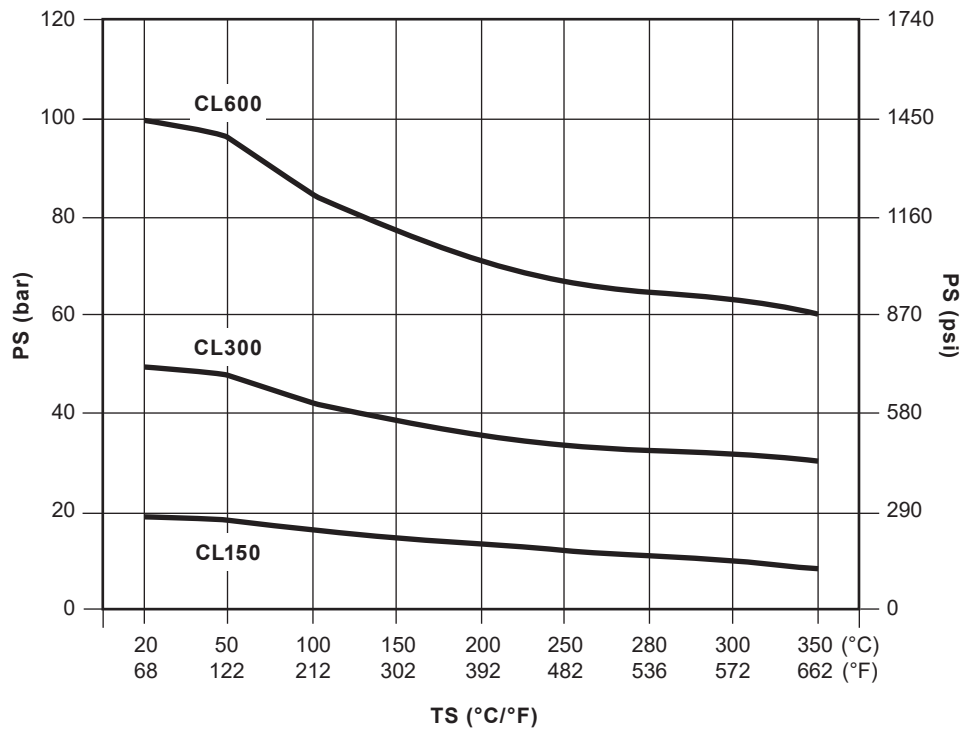
		Supply voltage	Power consumption	
Power requirements	Transmitter	12 to 42 Vdc	N/A	
	Devices with HART communication	12 to 24 Vdc	< 1 W	
	Devices with Modbus communication	9 to 30 Vdc	< 1 W	
Display	VLM30 - S	Optional LCD indicator with four operating buttons for operation through front glass		
	VLM30 - E	Standard LCD indicator with four operating buttons for operation through front glass		
Output signal	HART Digital Communication	Support for HART communications up to the HART 7 protocol.		
	ModBus Communication	Modbus RTU - RS485 serial connection (optional for ModBus)		
	4 to 20 mA	Re-Transmission of flow or temperature		
	Digital Contact Output	VLM30-S	Functions - Frequency, Pulse, Binary.	
		VLM30-E	Optoelectronic coupler, 16 to 30 Vdc, max 20 mA	
Input Signal	4 to 20 mA	For remote transmitter, e.g. for temperature, pressure, etc.		
		16 to 30 Vdc, 3.8 to 20.5 mA		
Cable Glands	Aluminium/M20 x 1.5 (2 Places)			
	Aluminium/½" NPT (2 Places)			

# Pressure/temperature limits - VLM30

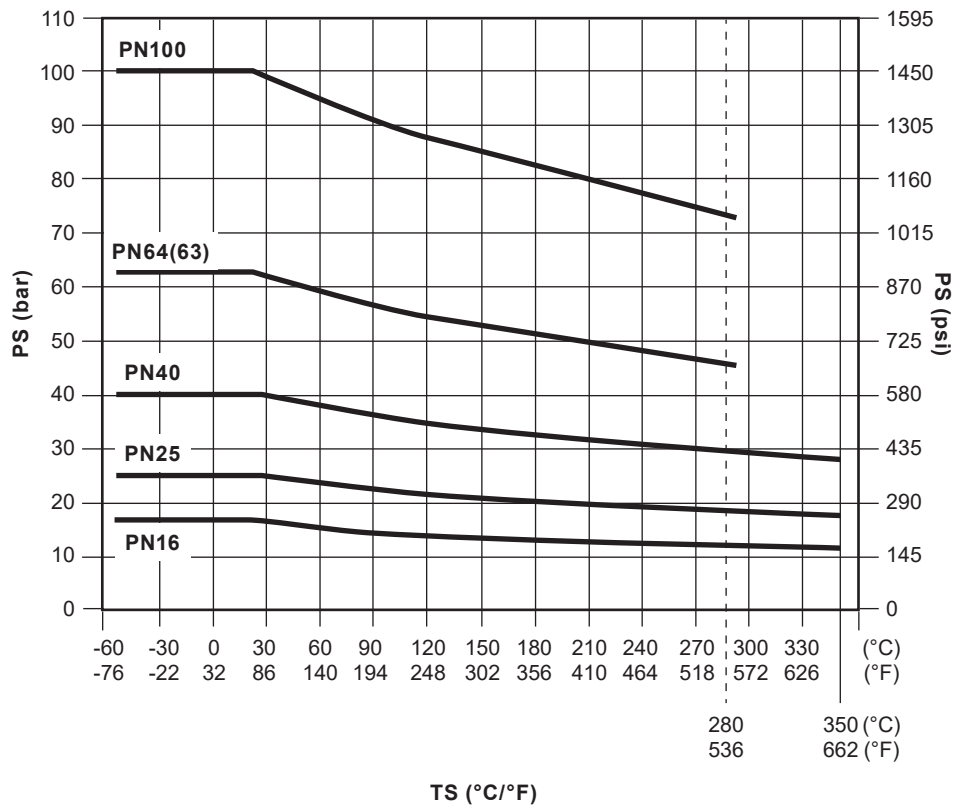
## Flanged Devices - DIN Flange process connection



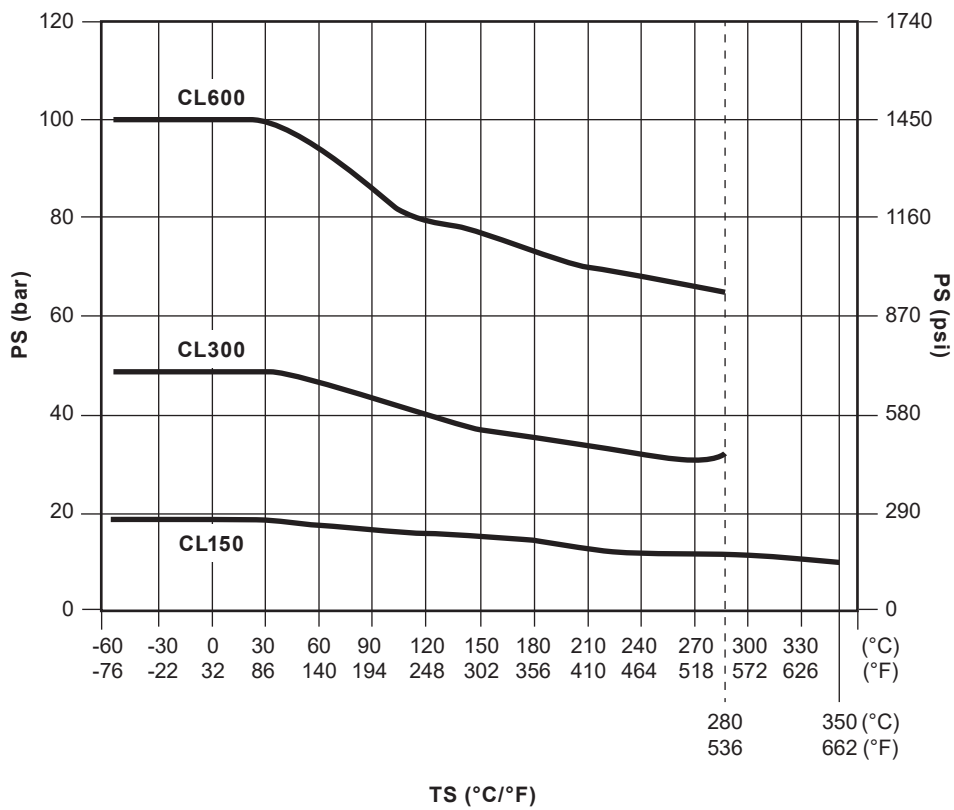
## Flanged Devices - ASME Flange process connection



**Wafer Type Devices - DIN Wafer type process connection**



**Wafer Type Devices - ASME Wafer type process connection**



## Body material: Stainless Steel

Body design conditions		Class 150	Class 300	Class 600
Minimum allowable temperature			-200 °C (-328 °F)	
Maximum process temperature	Standard version		280 °C (536 °F)	
	High temperature version		350 °C (662 °F)	
Minimum process temperature			-255 °C (-67 °F)	
Electronic ambient temperature range	Operating		-20 to +85 °C (-4 to +185 °F)	
	Storage		-40 to +85 °C (-40 to +185 °F)	

## Performance specifications

### Under reference conditions

**Accuracy** Mass flowrate accuracy for gas and steam based on 50 - 100% of pressure range

Process variables	Liquids	Gas and steam	Repeatability	
			DN25-150	DN200-300
Mass flowrate	±0.75%	±0.90% of rate	0.2%	0.25%
Volumetric flowrate	±0.65% of rate	±0.90% of rate		
Temperature	±1C or 1% of measured value			

**Response time** 200 ms (1 tau) or 3/f in seconds (with deactivated damping, the respective greater value shall apply). The response time depends on the respective vortex frequency f. Low flow rates can result in higher response times.

\* Indication of accuracy in % of the measured value (% of measured value)

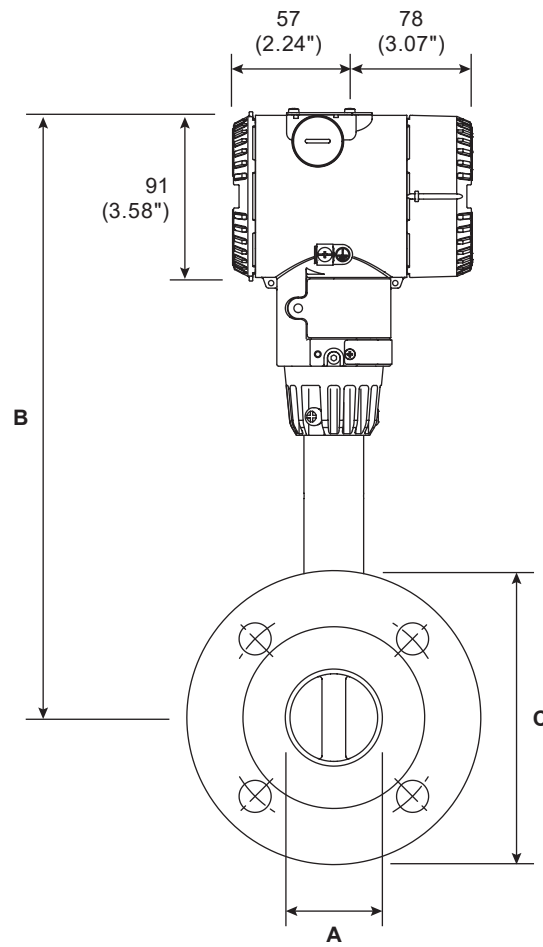
## Measuring accuracy - Reference conditions

### Flow measurement

Set flow range	0.5 to 1 x $Q_{vmax}$ DN
Ambient temperature	20 °C (68 °F) ±2 K
Relative humidity	65 %, ±5 %
Air Pressure	86 to 106 kPa
Power supply	24 Vdc
Signal cable length (for remote mount design)	30 m (98 ft)
Current output load	250 Ω (only 4 to 20 mA)
Measuring medium for calibration	Water, approx. 20 °C (68 °F), 2 bar (29 psi) Air, 960 mbar abs. ±50 mbar (14 psi a ±0.7 psi), 24 °C ±4 °C (75 °F ±7 °F)
Calibration loop internal diameter	corresponds to inside diameter of device
Unobstructed straight inlet section	15 × DN
Outlet section	5 × DN
Pressure measurement	3 x DN to 5 x DN behind the flowmeter

**Dimensions (approximate) in mm (inches)**

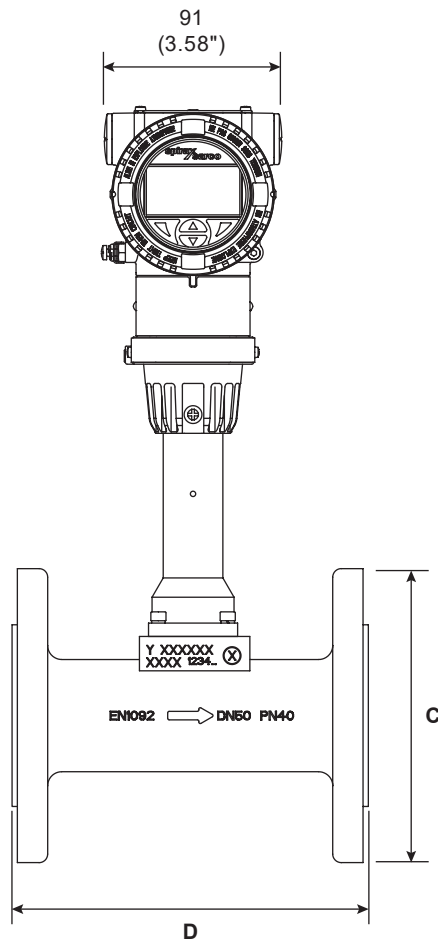
**Flanged type connection**



Connection	A	B	C					
			Pressure rating EN1092-1					
EN1092-1	ASME		PN10	PN16	PN25	PN40	PN63	PN100
DN25	1"	359 (14.13")	115 (4.53")	115 (4.53")	115 (4.53")	115 (4.53")	140 (5.51")	140 (5.51")
DN40	1½"	337 (13.27")	150 (5.91")	150 (5.91")	150 (5.91")	150 (5.91")	170 (6.69")	170 (6.69")
DN50	2"	334 (13.54")	165 (6.5")	165 (6.5")	165 (6.5")	165 (6.5")	180 (7.09")	195 (7.68")
DN80	3"	362 (14.25")	200 (7.87")	200 (7.87")	200 (7.87")	200 (7.87")	215 (8.46")	230 (9.06")
DN100	4"	371 (14.61")	220 (8.66")	220 (8.66")	235 (9.25")	235 (9.25")	250 (9.84")	265 (10.43")
DN150	6"	398 (15.67")	285 (11.22")	285 (11.22")	300 (11.81")	300 (11.81")	345 (12.56")	355 (13.98")
DN200	8"	460 (18.11")	340 (13.39")	340 (13.39")	360 (14.17")	375 (14.76")	415 (16.34")	
DN250	10"	485 (19.09")	395 (15.55")	405 (15.94")	425 (16.73")	450 (17.72")	470 (18.5")	
DN300	12"	510 (20.08")	445 (17.52")	460 (18.11")	485 (19.09")	515 (20.28")	530 (20.87")	

**Dimensions** (approximate) in mm (inches)

**Flanged type connection** (continued)

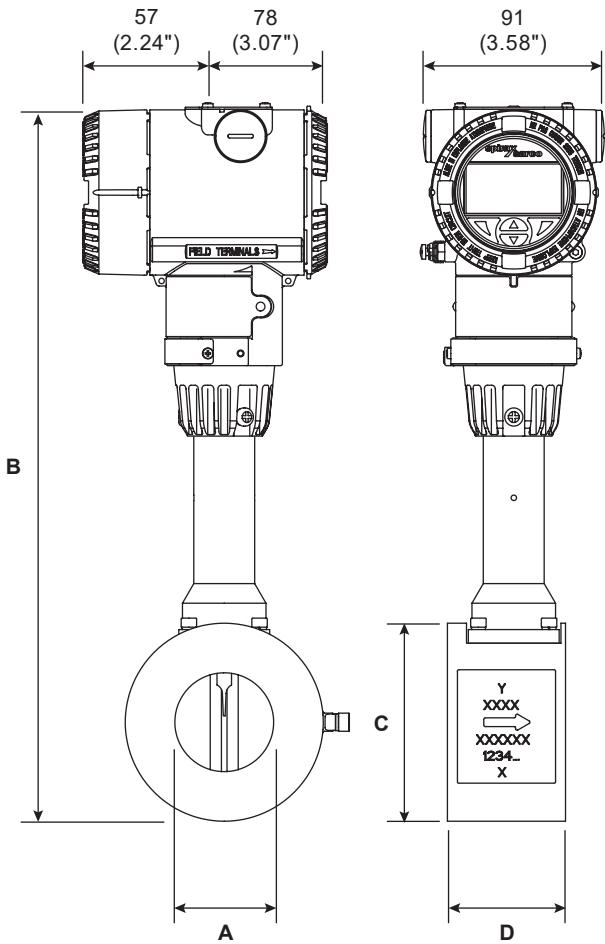


Connection	C			D					
	Pressure rating ASME CLASS			Pressure rating EN1092-1			Pressure rating ASME CLASS		
	Class 150	Class 300	Class 600	PN 10-40	PN 63	PN 100	Class 150	Class 300	Class 600
EN1092-1	Class 150	Class 300	Class 600	PN 10-40	PN 63	PN 100	Class 150	Class 300	Class 600
DN25	108 (4.25")	124 (4.88")	124 (4.88")	200 (7.87")	210 (8.27")	210 (8.27")	200 (7.87")	200 (7.87")	200 (7.87")
DN40	127 (5")	155.6 (6.13")	155.6 (6.13")	200 (7.87")	220 (8.66")	220 (8.66")	200 (7.87")	200 (7.87")	235 (9.25")
DN50	152.4 (6")	165 (6.5")	165 (6.5")	200 (7.87")	220 (8.66")	230 (9.06")	200 (7.87")	200 (7.87")	240 (9.45")
DN80	190.5 (7.5")	209.5 (8.25")	209.5 (8.25")	200 (7.87")	250 (9.84")	260 (10.24")	200 (7.87")	200 (7.87")	265 (10.43")
DN100	228.6 (9")	254 (8.25")	273.1 (10.75")	250 (9.84")	270 (10.63")	300 (11.81")	250 (9.84")	250 (9.84")	315 (12.4")
DN150	279.4 (11")	317.5 (12.5")	355.6 (14")	300 (11.82")	330 (12.99")	370 (14.57")	300 (11.81")	300 (11.81")	365 (14.37")
DN200	343 (13.5")	381 (15")	419.1 (16.52")	350 (13.78")	370 (14.57")		350 (13.78")	370 (14.57")	415 (16.34")
DN250	406.4 (16")	444.5 (17.5")	508 (20")	450 (17.72")	450 (17.72")		450 (17.72")	450 (17.72")	470 (18.5")
DN300	482 (19")	520.7 (20.5")	558.8 (22")	500 (19.69")	500 (19.69")		500 (19.69")	500 (19.69")	580 (22.83")



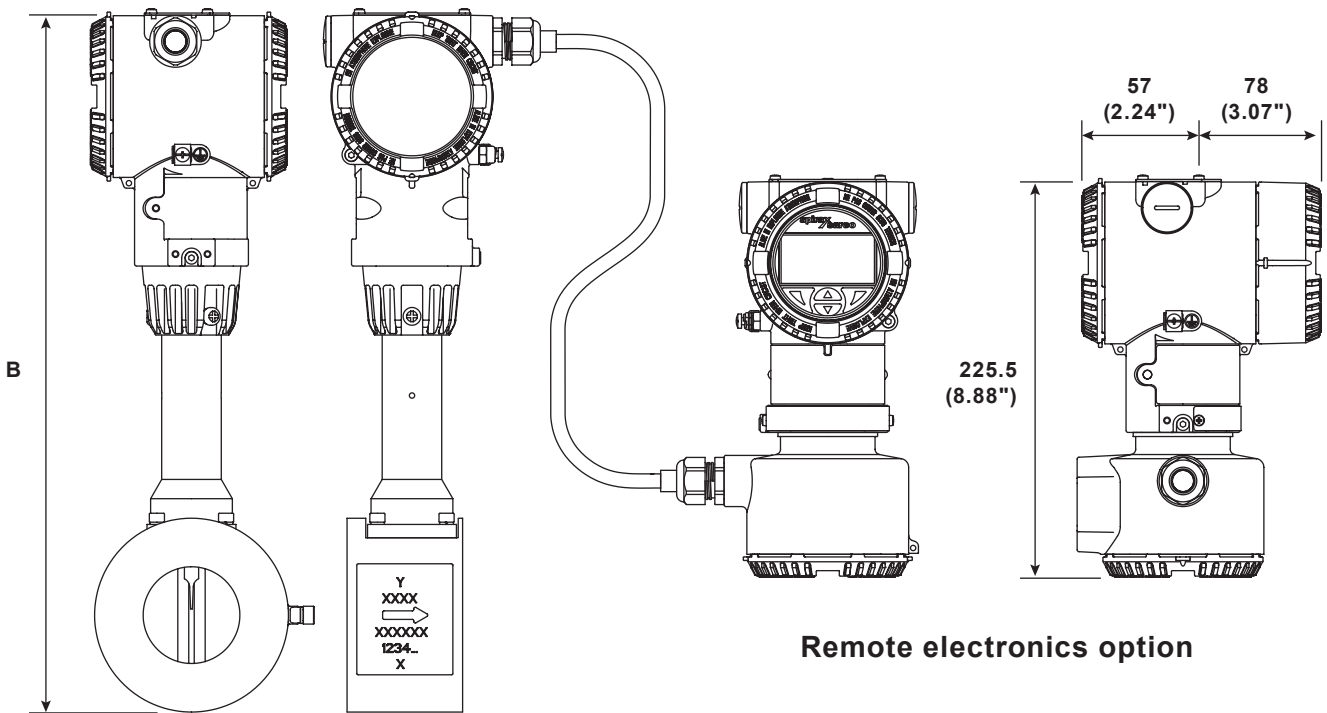
**Dimensions (approximate) in mm (inches)**

**Wafer type connection**



Connection		A	B	
EN1092-1		ASME	EN1092-1 PN16/43/63	ASME CLASS 150/300
DN25	1"	320 (12.6")	73 (2.87")	
DN40	1½"	336 (13.23")	94 (3.7")	
DN50	2"	334 (13.54")	109 (4.29")	
DN80	3"	358 (14.09")	144 (5.67")	
DN100	4"	336 (14.41")	164 (6.46")	
DN150	6"	398 (15.67")	220 (8.66")	

Connection		C	D	
EN1092-1		EN1092-1 PN16/43/63	ASME CLASS 150/300	
DN25	1"	65 (2.56")	112.5 (4.43")	
DN40	1½"		113 (4.45")	
DN50	2"		112.5 (4.43")	
DN80	3"		111 (4.37")	
DN100	4"		116 (4.57")	
DN150	6"		137 (5.39")	



**Remote electronics option**

## Weights (approx) in kg (lbs)

EN1092-1	Wafer models		Flanged models							
	PN40/63	Class 150/300	PN10/16	PN25/40	PN63	PN100	ASME 150	ASME 300	ASME 600	
DN25 1"	4.1 (9)	5.1 (11.2)	5.1 (11.2)	5.1 (11.2)	7.8 (17.2)	7.8 (17.2)	5.7 (12.6)	6.7 (14.8)	7.3 (16.1)	
DN40 1½"	4.8 (10.6)	6.1 (13.4)	6.6 (14.6)	6.6 (14.6)	10.1 (22.3)	10.1 (22.3)	8.5 (18.7)	10.9 (24)	12.1 (26.7)	
DN50 2"	5.6 (12.3)	8.4 (18.5)	8.7 (19.2)	8.7 (19.2)	12.2 (26.9)	15.1 (33.3)	10.1 (22.3)	11.7 (25.8)	13.6 (30)	
DN80 3"	7.6 (16.8)	11.2 (24.7)	13.1 (28.9)	13.1 (28.9)	17 (37.5)	21.4 (53.1)	17.6 (38.8)	21.7 (47.8)	25.8 (56.9)	
DN100 4"	8.5 (18.7)	17.2 (24.7)	14 (30.09)	17.8 (39.2)	24.1 (53.1)	32.2 (71)	20.1 (44.3)	28.8 (63.5)	41.4 (91.3)	
DN150 6"	13 (28.7)	25.7 (56.7)	25.4 (56)	33.6 (74.1)	53.8 (118.6)	70.4 (155.2)	32.8 (72.3)	49.8 (109.9)	81.6 (179.9)	
DN200 8"			45.3 (99.9)	66.3 (146.2)	93.1 (205.3)		51 (112.4)	77 (233.7)	106 (233.7)	
DN250 10"			67.4 (148.6)	106.4 (234.6)	135.6 (298.9)		77 (169.8)	106 (233.7)	156 (343.9)	
DN300 12"			77.2 (170.2)	123.2 (271.6)	170.6 (376.1)		95 (205)	143 (315.3)	196 (432.1)	

For remote electronics add 4.4 kg (9.7 lbs)

## Water flowrates

Size			m³/hr		US GPM	
			Minimum	Maximum	Minimum	Maximum
Nominal pipe size	25 mm	1"	0.5	15	2.2	67
	40 mm	1 ½"	1.3	38	5.5	165
	50 mm	2"	2.1	63	9.2	276
	80 mm	3"	4.7	140	21	618
	100 mm	4"	8.1	244	36	1 075
	150 mm	6"	18	554	81	2 437
	200 mm	8"	32	970	142	4 270
	250 mm	10"	53	1 586	233	6 981
Stainless steel	300 mm	12"	77	2 303	338	10 139

## Sizing considerations

	Straight run piping requirements	Inlet Section	Outlet Section
Piping conditions	Straight pipe section	minimum 15 × DN	minimum 5 × DN
	Valve upstream of the meter tube	minimum 50 × DN	minimum 5 × DN
	Pipe reduction	minimum 15 × DN	minimum 5 × DN
	Pipe extension	minimum 18 × DN	minimum 5 × DN
	<p><b>D = Internal diameter of the pipe</b> - If there is not a sufficient straight run of pipe, a flow rectifier may be used to reduce the above diameter measurements. Consult your local Spirax Sarco representative or the factory for your specific application.</p>		

## How to order

## Selection:

Category	Description	Suffix Code	Example
<b>Base Model</b>	In-line multivariable mass vortex flowmeter	VLM30-S	<b>VLM30</b>
	In-line multivariable mass vortex flowmeter with integrated binary output, temperature compensation, and flow computer functionality.	VLM30-E	
<b>Explosion Protection Certification</b>	None (Safe area)	Y0	<b>Y0</b>
<b>System Design</b>	Integral single sensor.	C1	<b>C1</b>
	Remote single sensor - 5 m (16") signal cable supplied.	R1	
<b>Process connection type</b>	Wafer/DN25 (1")/DN25 (1")	W025R0	<b>F050R0</b>
	Wafer/DN40 (1½")/DN40 (1½")	W040R0	
	Wafer/DN50 (2")/DN50 (2")	W050R0	
	Wafer/DN80 (3")/DN80 (3")	W080R0	
	Wafer/DN100 (4")/DN100 (4")	W100R0	
	Wafer/DN150 (6")/DN150 (6")	W150R0	
	Flange/DN25 (1")/DN25 (1")	F025R0	
	Flange/DN40 (1½")/DN40 (1½")	F040R0	
	Flange/DN50 (2")/DN50 (2")	F050R0	
	Flange/DN80 (3")/DN80 (3")	F080R0	
	Flange/DN100 (4")/DN100 (4")	F100R0	
	Flange/DN150 (6")/DN150 (6")	F150R0	
	Flange/DN200 (8")/DN200 (8")	F200R0	
	Flange/DN250 (10")/DN250 (10")	F250R0	
Flange/DN300 (12")/DN300 (12")	F300R0		
<b>Pressure range</b>	PN10	D1	<b>D4</b>
	PN16	D2	
	PN25	D3	
	PN40	D4	
	PN63	D5	
	PN100	D6	
	ASME Class 150	A1	
	ASME Class 300	A3	
	ASME Class 600	A6	
	<b>Temperature Range of Measuring Medium</b>	Standard -55 °C to +280 °C (-67 °F to +536 °F)	
Extended -55 °C to +350 °C (-67 °F to +662 °F)		B2	

'How to order' continued on next page

## How to order (continued)

### Selection:

<b>Housing Material/ Cable gland threads</b>	Aluminium/M20 x 1.5 (2 Places)	A1	<b>A1</b>
	Aluminium/1/2" NPT (2 Places)	B1	
<b>Output Signal</b>	HART Digital Communication and 4 to 20 mA	H1	<b>H1</b>
	HART Digital Communication, 4 to 20 mA and digital contact output	H5	
	MODBUS Communication with digital contact output	M4	
<b>Integrated digital display (LCD)</b>	Display and Glass cover	L1	<b>L1</b>
<b>Piezo sensor sealing material</b>	PTFE - Suitable for -20 °C to +260 °C (-4 °F to +500 °F)	SP0	<b>SP0</b>
	Graphite - Suitable for -55 °C to 350 °C (-67 °F to 662 °F) <sup>3</sup>	SP2	
<b>Ambient temperature range</b>	Extended -40 °C to +85 °C (-40 °F to 185 °F)	TA4	
<b>Signal cable length (Remote sensor models only)</b>	10m (32' Approx)	SC2	
	20m (64' Approx)	SC4	
	30m (96' Approx)	SC6	
<b>Calibration type</b>	5 Point Calibration	R5	
	Material monitoring with inspection cert. 3.1 Acc. to EN 10204.	C2	
	Declaration of compliance with the order 3.1 Acc. to EN 10204	C4	
	Inspection cert. 3.1 Acc to EN 10204 of positive material identification PMI with material analysis	C5	
	Inspection cert. 3.1 Acc to EN 10204 of visual, dimensional and functional test.	C6	
	Inspection cert. 3.1 Acc to EN 10204 of positive material identification and PMI	CA	
	Pressure test Acc. To factory plan	CB	
	EC1935 Compliance	CF	
	Material monitoring to NACE MR 01-75 with inspection cert. 3.1 ACC. to EN 10204 <sup>4</sup>	CN	
	Test package (pressure test, non-destructive test, welder and welding procedure cert)	CT	
<b>Documentation language</b>	English	M5	
	Basic setup for steam	NCS	
<b>Configuration/Setup</b>	Full application factory set up	NCC	
	Standard setup for water	NC1	
<b>Hardware options</b>	Integral RTD	G1	
<b>Operation mode</b>	Energy Flow (only with Modbus comms)	N1	

#### Notes:

<sup>3</sup> Extended temperature range 'B2' must be selected in conjunction with 'SP2'.

<sup>4</sup> CN is not available when C2 is selected.

### How to order example:

1 off Spirax Sarco VLM30-S.Y0.C1.F050R0.D4.A1.A1.H1-L1.SP0 in-line vortex flowmeter for installation between EN 1092 PN40 flanges.