

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Overview



SITRANS F X vortex flowmeters provide accurate volumetric and mass flow measurement of steam, gases and liquids as an all-in-one solution with integrated temperature and pressure compensation.

Benefits

- All devices have 2-wire technology and HART communication
- Temperature compensation for saturated steam as standard feature
- Integrated temperature and pressure compensation enabling direct compensation of density
- Pressure, temperature and flow can be read at a single point. No additional installation of pressure and temperature sensors
- Direct measurement of energy
- Optimum process reliability thanks to Intelligent Signal Processing (ISP) - stable readings, free of external perturbations
- Fully welded stainless steel construction with high corrosion, pressure and temperature resistance
- Maintenance-free sensor design
- Ready to use due to plug & play feature. No additional cabling work
- Minimal pressure drop








Application

The SITRANS FX300 is a compact flowmeter in a single or dual transmitter version, suitable for measuring industrial steam, gases, as well as conductive and non-conductive liquids. E.g. steam (saturated steam, superheated steam), industrial gases (compressed air, nitrogen, liquefied gases, flue gases), and conductive and non-conductive liquids (demineralized water, boiler feed water, solvents, heat transfer oil).

The main applications of SITRANS FX300 can be found in the following sectors:

- Chemical
- Petrochemical
- Oil & Gas
- Power plants
 - Air
 - Heating
 - Cooling
 - Chilling
- Food & beverage
 - Pharmaceutical
 - Sugar refineries
 - Dairies
 - Breweries
 - Production of soft drinks
- Refining
- Water & waste water

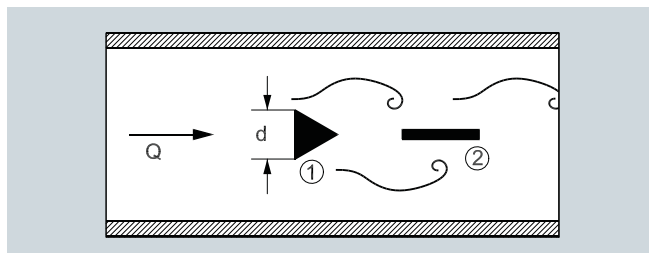
System Overview

Version	Single transmitter			Dual transmitter
	Standard	Pressure sensor	Pressure sensor and isolation valve	
Options				Standard
Flange				
Sandwich				

Function

Operating Principle

SITRANS F X vortex flowmeters measure flow rate by detecting the frequency at which alternating vortices are shed from a bluff body inserted into the flow stream. This principle of measurement is known as Von Karman's vortex street principle: alternating vortices form behind an object in a stream. The frequency of the alternating vortices is proportional to the flow rate. The passage of a vortex causes a slight stress on a pick-up placed downstream of the bluff body. The stress is picked up and counted as pressure surges by a dual Piezo crystal placed inside the wing.



① = Bluff Body, ② = Pick-up

The flowmeter calculates the flow velocity using the following equation:

$$Q = A \cdot V = A \cdot d / St \cdot f = 101,93 \cdot f / K \text{ [m}^3\text{/h]}$$

Where:

- Q = flow rate [m³/h]
- f = vortex shedding frequency [Hz]
- K = calibration constant [pulses/ft³]
- d = diameter of the bluff body [m]
- St = Strouhal Number
- A = cross-section area [m²]
- V = flow velocity [m/s]

Requirements

In order to generate the vortex streets, the medium must have a minimum velocity:

- For steam and gases, the flow rate must be 2 to 80 m/s (6.6 to 262 ft/s)
- For liquids the flow rate must be 0.4 to 10 m/s (1.3 to 32.8 ft/s)

Design

SITRANS FX300 volumetric and mass flowmeter is available in the following configurations:

SITRANS FX300 Single transmitter

The single transmitter is available as a flange or sandwich solution in the following versions:

- **Vortex standard flowmeter**
Measurement with integrated temperature sensor as standard feature
- **Vortex flowmeter with pressure sensor**
Measurement with integrated temperature and pressure sensors for compensation of gases, wet gases, gas mixtures or steam (for energy measurement).
- **Vortex flowmeter with pressure sensor and isolation valve**
Allowing the pressure sensor to be shut off for the purpose of pressure or leak testing of the pipeline or for being exchanged without interrupting the process. Using the built-in two-way valve, the pressure sensor can also be calibrated and tested at a later time.

SITRANS FX300 Dual transmitter

This is a genuine redundant system with two independent sensors and two converters providing twofold functional reliability and availability of the measurement. This variant is optimally suited for measurements in multi-product pipelines.

The dual converter is available as:

- **Vortex standard flowmeter**
Measurement with temperature sensor for saturated steam compensation as standard feature

Technical specifications

Input	
Measuring range limits	See „Dimensional Drawings“
Media pressure	1 ... 100 bar (Higher pressures on request)
Output	
Current output	
• Measuring range	4 ... 20 mA
• Over range	20.8 mA ± 1 % (105 % ± 1 %)
• Load	
- min.	100 Ω
- max.	$R_{max} = (U_{Power\ Supply} - 14\ V) / 22\ mA$
• Error signal	NAMUR NE 43
• Maximum output	22 mA (112.5 %)
• Multidrop mode	4 mA
Digital output	
• Communication	HART
• Physical layer	FSK
• Device category	Transmitter
Pulse Output	
(Passive pulse output, needs separate power supply. Pulse output has to be defined in the Option menu Y47 totalizer or energy unit has to be entered. E.g.: 1 pulse/kg or 1 pulse/10 m ³)	
• Pulse frequency	Max. 0.5 Hz
• Power supply	Min. 24 V DC as NAMUR or
• Non-Ex version	open < 1 mA, max. 36 V, closed 100 mA, $U < 2\ V$
• Ex version	open < 1 mA, max. 30 V, closed 100 mA, $U < 2\ V$

Accuracy

Standard version

- For liquids
- $Re \geq 20\ 000$ ± 0.75 %
- For steam and gases
- $Re \geq 20\ 000$ ± 1 %
- For steam, gases and liquids
- $10\ 000 < Re < 20\ 000$ ± 2 %

Pressure and temperature-compensated version

- For liquids
- $10\ 000 < Re < 20\ 000$ ± 2 %
- $Re \geq 20\ 000$ ± 0.75 %
- For gases and steam
- $10\ 000 < Re < 20\ 000$ ± 2.5 %
- $Re \geq 20\ 000$ ± 1.5 %

Repeatability ± 0,1 %

Installation conditions

(At different conditions, e.g. installation after control valve, bends or reductions, please refer to the operating instructions.)

- Inlet run ≥ 20 x DN
- Outlet run ≥ 5 x DN

Software

Uncompensated for gases, steam and liquids, but temperature-compensated for saturated steam Select 1

Density-compensated by temperature and pressure for superheated steam, no energy calculation Select 4

Gross heat

When the device has to operate as an energy calculation device Select 5

In options Y51 to Y56 add information regarding:

- Y51 Variable current output
- Y52 Power unit
Select one of the following units from power units table in Y52: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom)
- Y53 Fullscale power value
- Y54 Variable pulse output
- Y55 Totalizer on/off
- Y56 Configures for totalizer select one of the following units from energy units table in Y56: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom).

Gases and wet gases Select 7

Wet gases Select Y49 and enter relative humidity in %

FAD - Free Air Delivery

When the device has to operate close to a compressor Select 8

In Y81 to Y87 add information regarding:

- Y81 Inlet suction temperature
- Y82 Atmosphere pressure
- Y83 Pressure drop filter
- Y84 Inlet relative humidity
- Y85 Actual revolutions per minute (of compressor)
- Y86 Rated rpm of compressor
- Y87 Outlet relative humidity. This information is available from compressor supplier.

Mixed gases

When the fluid is a gas mixture, make an SDR request (sheet available on intranet) and fill in gas names and amount in %

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Rated operation conditions

Ambient temperature	
• Non-Ex version	-40 ... +85 °C (-40 ... +185 °F)
• Ex version	-40 ... +65 °C (-40 ... +149 °F)
Storage temperature	-50 ... +85 °C (-58 ... +185 °F)
Media temperature	-40 ... +240 °C (-40 ... +464 °F)
Density	Taken into consideration when rating
Viscosity	< 10 cP
Reynolds number	10 000 ... 2 300 000
Media pressure limit	Max. 100 bar (Higher pressure on request. Make an SDR request, sheet available on intranet)

Design

Material	
• Sensor: house/pick-up	1.4404(316L)/1.4435(316L) Hastelloy C22 available (make an SDR request, sheet available on intranet)
• Housing: transmitter	Aluminium Aluminium (paint petrol) for increased requirement
• Sensor gaskets: for pick-up and pressure sensor	1.4435(316L)/FPM or FFKM FPM (Viton®) by steam and non-aggressive gases. FFKM (Kalrez®) by chlorine and other aggressive gases (only available together with a pressure sensor).
Process connections	Flange norm EN 1092-1 form B1/B2 or ASME B16.5 RF. Other flanges on request. Make an SDR request, sheet available on intranet
• Flange version	DN 15 ... 300 (½ ... 12")
• Sandwich version	DN 15 ... 100 (½ ... 4")
Degree of protection	IP66/IP67
Dimensions and weights	See „Dimensional Drawings“

Display and operating interface

Local display	2 lines, 10 characters per line
Languages	German, English, French

Power supply

• Standard version	14 ... 36 V DC
• Ex version	14 ... 30 V DC

Certificates and approvals

Explosion protection	
• ATEX	II 2G EEx d ia [ia] IIC T6
• FM US/C	Class I, II, III, Div 1 & 2

Calibration

All flowmeters will be delivered with a 3 point calibration certificate

Material Certificate

Certificate of compliance, pressure test, material certificate, material in acc. of NACE and PMI of pressure bearing metal parts.

Cleaning

Choice Cleaning Class1 when fluid is oxygen or contains chloride.

Certificates

X-ray test on pressurized weldings and dye penetration test on pressure bearing weldings

Dye penetration test

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Selection and Ordering data		Order No.
SITRANS FX300 Flanged Single transmitter and T_{max} = 240 °C (464 °F)		7 ME 2 6 0 0 -
Connection size	Sensor size	
DN 15 (½")	DN 15	1 A
DN 25 (1")	DN 25	2 B
DN 40 (1½")	DN 40	2 K
DN 50 (2")	DN 50	2 R
DN 80 (3")	DN 80	3 L
DN 100 (4")	DN 100	3 S
DN 150 (6")	DN 150	4 M
DN 200 (8")	DN 200	4 T
DN 250 (10")	DN 250	4 W
DN 300 (12")	DN 300	5 E
Flange norm and nominal pressure		
Form B1/B2	EN 1092-1	
PN 10	DN 200 ... 300	A
PN 16	DN 50 ... 300	B
PN 25	DN 200 ... 300	C
PN 40	DN 15 ... 300	D
PN 63	DN 50 ... 150	E
PN 100	DN 15 ... 150	F
RF	ASME B16.5	
150 lb	½ ... 12"	J
300 lb	½ ... 12"	K
600 lb	½ ... 6"	L
Sensor material/Gasket		
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM		1
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM		5
Transmitter design		
Compact, none cable		1
Approval and cable gland		
Non Ex, M20x1,5		1
Non Ex, ½" NPT		2
ATEX, M20x1,5		4
ATEX, ½" NPT		5
FM US/C, M20x1,5		6
FM US/C, ½" NPT		7
Transmitter, display and communication		
With display, HART		A
Pressure sensor and isolation valve		
Without pressure sensor		A
With pressure sensor, range:		
4 bar		B
6 bar		D
10 bar		E
16 bar		G
25 bar		H
40 bar		K
60 bar		L
100 bar		N
With isolation valve and pressure sensor, range:		
4 bar		P
6 bar		Q
10 bar		R
16 bar		S
25 bar		U
40 bar		V
60 bar		W
100 bar		Y

Selection and Ordering data		Order No.
SITRANS FX300 Flanged Single transmitter and T_{max} = 240 °C (464 °F)		7 ME 2 6 0 0 -
Software		
Uncompensated for gases, wet gases, steam and liquids, respectively, temperature compensation for saturated steam		1
Density compensation for superheated steam		4
Density compensation for superheated steam and setting of Gross heat Opt. Y51 ... Y56 for Energy measuring		5
Density compensation for gases and wet gases and setting of Relative humidity at opt. Y49		7
Density compensation for gases, wet gases and setting of FAD - free air delivery Opt. Y49 and Y81 ... Y87 for Compressor settings		8
Selection and Ordering data		Order code
Further designs		
Please add "-Z" to Order No. and specify Order code.		
Converter housing material		
Aluminium for increased requirement, color: petrol green		A10
Material certificate		
Certificate of compliance EN 10204-2.1		C10
Pressure test + 3.1 accordance EN 10204		C11
Material certificate pressure parts + certificate 3.1		C12
Material in accordance with NACE MR 0175-01		C13
PMI of pressure bearing metal parts + certificate 3.1		C14
Material certificate pressure parts + PMI/certificate 3.1		C15
Calibration certificate FX300		
As standard the flow device has a 3-point calibration certificate.		
Calibration certificate (5 point)		D11
Hardness test		
Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01		H30
Cleaning for oil and fat		
Class 1 increased requirement (customer-specified)		K46
Class 1 and 3.1 (EN 10204)		K48
Certificates		
X-ray test on pressurized weldings		M56
Dye penetration test on pressure bearing weldings		M58
Tag name plate		
Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)		Y17
Stainless steel tag with 2,5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)		Y18

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Selection and Ordering data	Order code
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Additional data

Please add "-Z" to Order No. and specify Order code and plain text.

Input process data

Medium: Specify steam, gas, liquid or customised	Y40
Temperature: Specify max./operating temperature and units	Y41
Pressure: Specify max./operating pressure and units	Y42
Density; (only by customized medium): Specify medium density and units	Y43
Viscosity; (only by customized medium): Specify medium viscosity and units	Y44
Flow rate: Specify min./max. flow rate and units	Y45
Setting of pulse output: Specify totalizer or energy unit (1 pulse/unit)	Y47
Relative humidity (amount in %)	Y49

Settings of gross heat

Variable current output	Y51
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special(custom))	Y52
Fullscale power value	Y53
Variable pulse output	Y54
Totalizer on/off	Y55
Configure totalizer (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special(custom))	Y56

Settings of FAD

Inlet suction temperature	Y81
Atmosphere pressure	Y82
Pressure drop filter	Y83
Inlet relative humidity	Y84
Actual revolutions per minute (of compressor)	Y85
Rated Rpm of compressor	Y86
Outlet relative humidity This information is available from compressor supplier.	Y87

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Selection and Ordering data		Order No.
SITRANS FX300 Sandwich Single transmitter and T_{max} = 240 °C (464 °F)		7 ME 2 7 0 0 -
Connection size	Sensor size	1 A
DN 15 (½")	DN 15	2 B
DN 25 (1")	DN 25	2 K
DN 40 (1½")	DN 40	2 R
DN 50 (2")	DN 50	3 L
DN 80 (3")	DN 80	3 S
DN 100 (4")	DN 100	
Nominal pressure		
EN		B
PN 16	DN 50 ... 100	D
PN 40	DN 15 ... 100	E
PN 63	DN 50 ... 100	F
PN 100	DN 15 ... 100	
ASME		J
150 lb	½ ... 4"	K
300 lb	½ ... 4"	L
600 lb	½ ... 4"	
Sensor material/Gasket		1
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM		5
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM		
Transducer design		1
Compact, no cable		
Approval and cable gland		
Non Ex, M20x1,5		1
Non Ex, ½" NPT		2
ATEX, M20x1,5		4
ATEX, ½" NPT		5
FM US/C, M20x1.5		6
FM US/C, ½" NPT		7
Transmitter, display and communication		A
With display, HART		
Pressure sensor and isolation valve		A
Without pressure sensor		
With pressure sensor, range:		B
4 bar		D
6 bar		E
10 bar		G
16 bar		H
25 bar		K
40 bar		L
60 bar		N
100 bar		
With isolation valve and pressure sensor, range:		P
4 bar		Q
6 bar		R
10 bar		S
16 bar		U
25 bar		V
40 bar		W
60 bar		Y
100 bar		
Software		1
Uncompensated for gases, wet gases, steam and liquids respectively temperature compensation for saturated steam		
Density compensation for superheated steam		4
Density compensation for superheated steam and setting of Gross heat Opt. Y51 ... Y56 for Energy measuring		5
Density compensation for gases and wet gases and setting of Relative humidity at opt. Y49		7
Density compensation for gases, wet gases and setting of FAD - free air delivery Opt. Y49 and Y81 ... Y87 for Compressor settings		8

Selection and Ordering data	Order code
Further designs Please add "-Z" to Order No. and specify Order code.	
Converter housing material Aluminium for increased requirement, color: petrol green	A10
Material certificate Certificate of compliance EN 10204-2.1	C10
Pressure test + 3.1 accordance EN 10204	C11
Material certificate pressure parts + certificate 3.1	C12
Material in accordance with NACE MR 0175-01	C13
PMI of pressure bearing metal parts + certificate 3.1	C14
Material certificate pressure parts + PMI/certificate 3.1	C15
Calibration certificate FX300 As standard the flow device has a 3-point calibration certificate.	
Calibration certificate (5-point)	D11
Hardness test Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01	H30
Cleaning for oil and fat Class 1 increased requirement (customer-specified)	K46
Class 1 and 3.1 (EN 10204)	K48
Certificates X-ray test on pressurized weldings	M56
Dye penetration test on pressure bearing weldings	M58
Tag name plate Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	Y17
Stainless steel tag with 2,5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	Y18

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Selection and Ordering data Order code

Additional data

Please add "-Z" to Order No. and specify Order code and plain text.

Input process data

Medium: Specify steam, gas, liquid and customised	Y40
Temperature: Specify max./operating temperature and units	Y41
Pressure: Specify max./operating pressure and units	Y42
Density: (only by customized medium): Specify medium density and units	Y43
Viscosity: (only by customized medium): Specify medium viscosity and units	Y44
Flow rate: Specify min./max. flow rate and units	Y45
Setting of pulse output: Specify totalizer or energy unit (1 pulse/unit)	Y47
Relative humidity (amount in %)	Y49

Settings of gross heat

Variable current output	Y51
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special(custom))	Y52
Fullscale power value	Y53
Variable pulse output	Y54
Totalizer on/off	Y55
Configure totalizer (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special(custom))	Y56

Settings of FAD

Inlet suction temperature	Y81
Atmosphere pressure	Y82
Pressure drop filter	Y83
Inlet relative humidity	Y84
Actual revolutions per minute (of compressor)	Y85
Rated Rpm of compressor	Y86
Outlet relative humidity This information is available from compressor supplier.	Y87

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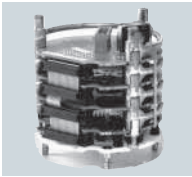



Selection and Ordering data		Order No.	Selection and Ordering data		Order code
SITRANS FX300 Flanged Dual transmitter and T_{max} = 240 °C (464 °F)		7 ME 2 8 0 0 -	Further designs		
			Please add "-Z" to Order No. and specify Order code.		
Connection size	Sensor size		Converter housing material		
DN 40 (1½")	DN 40	2 K	Aluminium for increased requirement, color: petrol green		A10
DN 50 (2")	DN 50	2 R			
DN 80 (3")	DN 80	3 L			
DN 100 (4")	DN 100	3 S	Material certificate		
DN 150 (6")	DN 150	4 M	Certificate of compliance EN 10204-2.1		C10
DN 200 (8")	DN 200	4 T	Pressure test + 3.1 accordance EN 10204		C11
DN 250 (10")	DN 250	4 W	Material certificate pressure parts + certificate 3.1		C12
DN 300 (12")	DN 300	5 E	Material in accordance with NACE MR 0175-01		C13
Flange norm and nominal pressure			PMI of pressure bearing metal parts + certificate 3.1		C14
			Material certificate pressure parts + PMI/certificate 3.1		C15
Form B1/B2	EN 1092-1	A	Calibration certificate FX300		
PN 10	DN 200 ... 300	B	As standard the flow device has a 3-point calibration certificate.		
PN 16	DN 50 ... 300	C	Calibration certificate (5-point)		D11
PN 25	DN 200 ... 300	D	Hardness test		
PN 40	DN 40 ... 300	E	Hardness test on pressure bearing parts + 3.1		H30
PN 63	DN 50 ... 150	F	Equotip LD procedure according to NACE MR 0175-01		
PN 100	DN 40 ... 150	J	Cleaning for oil and fat		
RF	ASME B16.5	K	Class 1 increased requirement (customer-specified)		K46
150 lb	1½ ... 12"	L	Class 1 and 3.1 (EN 10204)		K48
300 lb	1½ ... 12"	1	Certificates		
600 lb	1½ ... 6"	5	X-ray test on pressurized weldings		M56
Sensor material/Gasket			Dye penetration test on pressure bearing weldings		M58
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM			Tag name plate		
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM			Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)		Y17
Transducer design			Stainless steel tag with 2,5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)		Y18
Compact, no cable			Additional data		
Approval and cable gland			Please add "-Z" to Order No. and specify Order code and plain text.		
Non Ex, M20x1,5			Input process data		
Non Ex, ½" NPT			Medium: Specify steam, gas, liquid and customised		Y40
ATEX, M20x1,5			Temperature: Specify max./operating temperature and units		Y41
ATEX, ½" NPT			Pressure: Specify max./operating pressure and units		Y42
FM US/C, M20x1.5			Density; (only by customized medium): Specify medium density and units		Y43
FM US/C, ½" NPT			Viscosity; (only by customized medium): Specify medium viscosity and units		Y44
Transmitter, display and communication			Flow rate: Specify min./max. flow rate and units		Y45
With display, HART			Setting of pulse output; Specify totalizer or energy unit (1 pulse/unit)		Y47
Pressure sensor and isolation valve			Relative humidity (amount in %)		Y49
Without pressure sensor					
Software					
Uncompensated for gases, wet gases, steam and liquids respectively temperature compensation for saturated steam					


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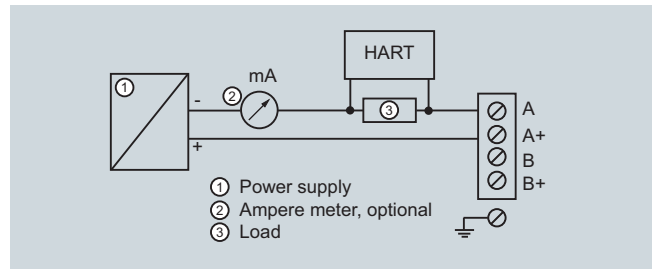
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Accessories or spare parts for SITRANS FX300

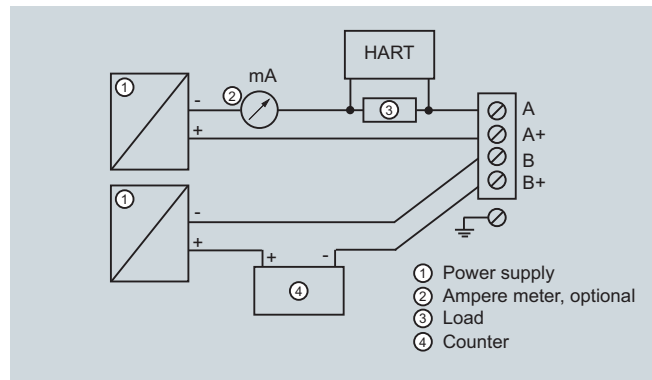
Description	Order No.	
Seal disc 21,8-12-0,1	A5E02181439	
Socket only for DN 15/25 ; 1/2"	On request	
Socket only for DN 15/25 ; 1"	On request	
Pickup 1.4404	On request	
O-ring pickup	A5E02181464	
O-ring for pressure screw 17,13 x 2,62-FPM-70	A5E02181488	
Pressure sensor 4/6/10/16/25/40/60/100 bar	On request	
Cover gasket O-Ring 91.67 x 3.5	A5E02181492	
Converter housing gasket 59,35,5-2-N	A5E02181495	
O-ring DIN3771-20 x 1-FPM	A5E02181515	
O-ring 10x2-NBR	A5E02181525	
DUBOX plug, 5-pole-RM2	A5E02181527	
Electronic		
• Basic D-HART	A5E02181531	
• Steam D-HART	A5E02181541	
• Gas D-HART	A5E02181544	
Display	A5E02181558	
Cable feedthrough 10-pole (non Ex). O-ring for cable feedthrough 21,89 x 2,62 10-pole plug	A5E02181562	
Sensor replacement (incl. Seal disc, pickup, O-rings for pickup, and pressure screw		
• DN 15 (incl. 1/2" socket)	A5E02181087	
• DN 25 (incl. 1" socket)	A5E02181116	
• DN 40 ... 100	A5E02181152	
• DN 150 ... 300	A5E02275105	
Pressure sensor replacement (Incl. pressure sensor, DUBOX plug, 2 O-rings and calibration certificate)		
• 4 bar (58 psi)	A5E02181157	
• 6 bar (87 psi)	A5E02181175	
• 10 bar (145 psi)	A5E02181180	
• 16 bar (232 psi)	A5E02181221	
• 25 bar (363 psi)	A5E02181307	
• 40 bar (580 psi)	A5E02181316	
• 60 bar (870 psi)	A5E02181322	
• 100 bar (1450 psi)	A5E02181437	

Description	Order No.	
Service Toolbox for changing software (basic, steam and gas) and different settings in the electronic.	A5E02375819	

Schematics



Load for HART communication

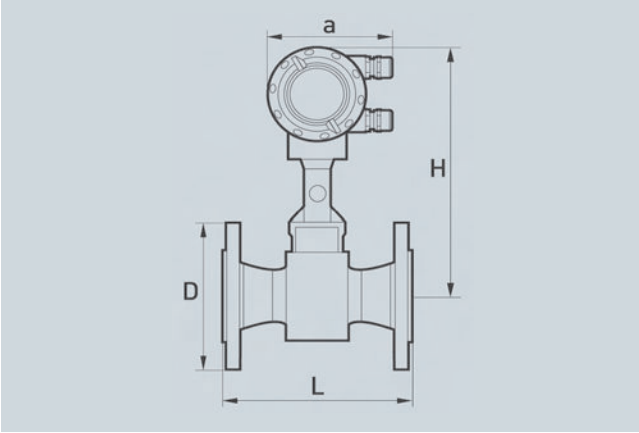


Connection pulse output

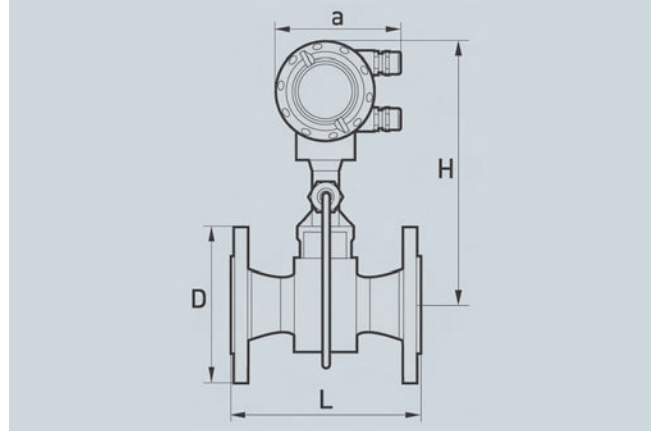
SITRANS F flowmeters SITRANS F X

SITRANS FX300

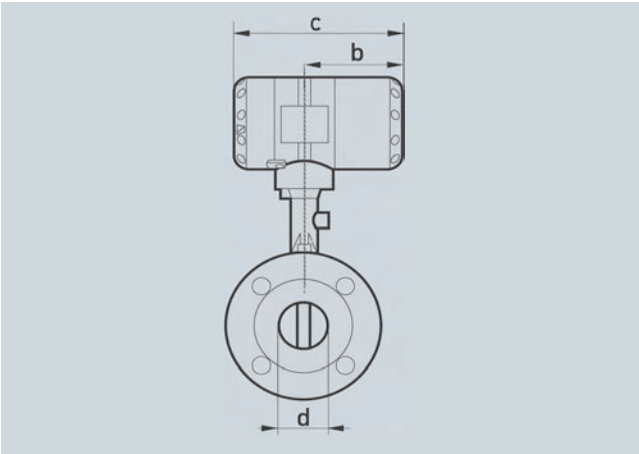
Dimensional drawings



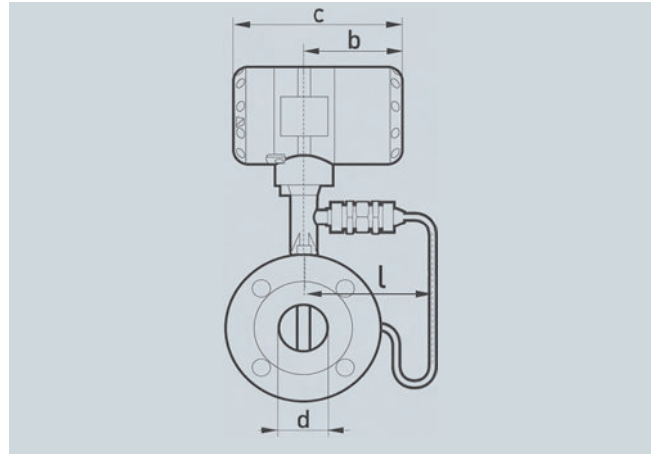
Flange version, frontal view, a = 133 mm (5.24 inches)



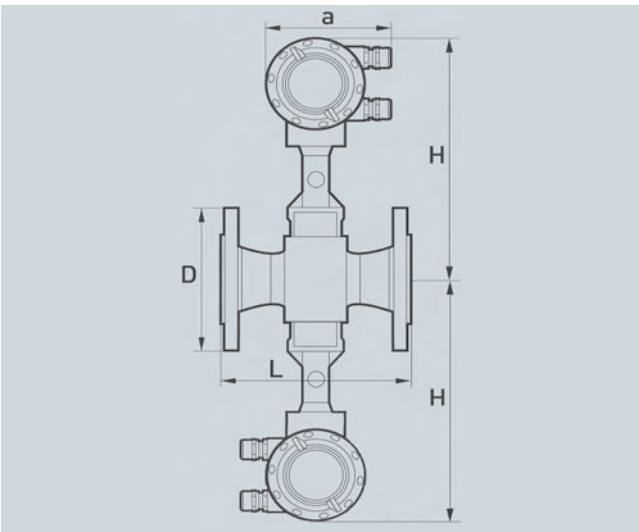
Flange version, frontal view, a = 133 mm (5.24 inches)



Flange version, side view, b = 105 mm (4.13 inches),
c = 179 mm (7.05 inches)



Flange version, side view, b = 105 mm (4.13 inches),
c = 179 mm (7.05 inches)



Flange version, dual converter, specified weight + 2.80 kg (6.17 lb)

4

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Flange version EN1092-1

Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
		DN	PN	d	D	L	H	I
15	40	17.3 (0.68)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	6.1 (13.45)	5.5 (12.13)
15	100	17.3 (0.68)	105 (4.13)	200 (7.87)	265 (10.43)	144 (5.67)	7.1 (15.65)	6.5 (14.33)
25	40	28.5 (1.12)	115 (4.53)	200 (7.87)	265 (10.43)	144 (5.67)	7.9 (17.42)	7.3 (16.09)
25	100	28.5 (1.12)	140 (5.51)	200 (7.87)	265 (10.43)	144 (5.67)	9.9 (21.83)	9.3 (20.50)
40	40	43.1 (1.70)	150 (5.91)	200 (7.87)	270 (10.63)	144 (5.67)	10.8 (23.81)	10.2 (22.49)
40	100	42.5 (1.67)	170 (6.69)	200 (7.87)	270 (10.63)	144 (5.67)	14.8 (32.63)	14.2 (31.31)
50	16	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.7 (28.00)	12.1 (26.68)
50	40	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.9 (28.44)	12.3 (27.12)
50	63	54.5 (2.15)	180 (7.09)	200 (7.87)	275 (10.83)	144 (5.67)	16.9 (37.26)	16.3 (35.94)
50	100	53.9 (2.12)	195 (7.68)	200 (7.87)	275 (10.83)	144 (5.67)	18.4 (40.57)	17.8 (39.24)
80	16	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	17.4 (38.36)	16.8 (37.04)
80	40	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	19.4 (42.77)	18.8 (41.45)
80	63	81.7 (3.22)	215 (8.46)	200 (7.87)	290 (11.42)	154 (6.06)	23.4 (51.59)	22.8 (50.27)
80	100	80.9 (3.19)	230 (9.06)	200 (7.87)	290 (11.42)	154 (6.06)	27.4 (60.41)	26.8 (59.08)
100	16	107.1 (4.22)	220 (8.66)	250 (9.84)	310 (12.20)	164 (6.46)	22 (48.50)	21.4 (47.18)
100	40	107.1 (4.22)	235 (9.25)	250 (9.84)	310 (12.20)	164 (6.46)	25 (55.12)	24.4 (53.79)
100	63	106.3 (4.19)	250 (9.84)	250 (9.84)	310 (12.20)	164 (6.46)	30 (66.14)	29.4 (64.82)
100	100	104.3 (4.11)	265 (10.43)	250 (9.84)	310 (12.20)	164 (6.46)	36 (79.37)	35.4 (78.04)
150	16	159.3 (6.27)	285 (11.22)	300 (11.81)	325 (12.80)	174 (6.85)	35.8 (78.93)	35.2 (77.60)
150	40	159.3 (6.27)	300 (11.81)	300 (11.81)	325 (12.80)	174 (6.85)	41.8 (92.15)	41.2 (90.83)
150	63	157.1 (6.19)	345 (13.58)	300 (11.81)	325 (12.80)	174 (6.85)	59.8 (131.84)	59.2 (130.51)
150	100	154.1 (6.07)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	67.8 (149.47)	67.2 (148.15)
200	10	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	38.4 (84.66)	37.8 (83.33)
200	16	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	38.4 (84.66)	37.8 (83.33)
200	25	206.5 (8.13)	360 (14.17)	300 (11.81)	350 (13.78)	194 (7.64)	47.4 (104.50)	46.8 (103.18)
200	40	206.5 (8.13)	375 (14.76)	300 (11.81)	350 (13.78)	194 (7.64)	55.4 (122.14)	54.8 (120.81)
250	10	260.4 (10.25)	395 (15.55)	380 (14.96)	370 (14.57)	224 (8.82)	58.0 (127.87)	57.4 (126.55)
250	16	260.4 (10.25)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	59.0 (130.07)	58.4 (128.75)
250	25	258.8 (10.19)	425 (16.73)	380 (14.96)	370 (14.57)	224 (8.82)	75.0 (165.35)	74.4 (164.02)
250	40	258.8 (10.19)	450 (17.72)	380 (14.96)	370 (14.57)	224 (8.82)	93.0 (205.03)	92.4 (203.71)
300	10	309.7 (12.19)	445 (17.52)	450 (17.72)	395 (15.55)	244 (9.61)	76.3 (168.21)	75.7 (166.89)
300	16	309.7 (12.19)	460 (18.11)	450 (17.72)	395 (15.55)	244 (9.61)	82.8 (182.54)	82.2 (181.22)
300	25	307.9 (12.12)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	99.3 (218.92)	98.7 (217.60)
300	40	307.9 (12.12)	515 (20.28)	450 (17.72)	395 (15.55)	244 (9.61)	128.1 (282.41)	127.5 (281.09)

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Flange version ASME B16.5

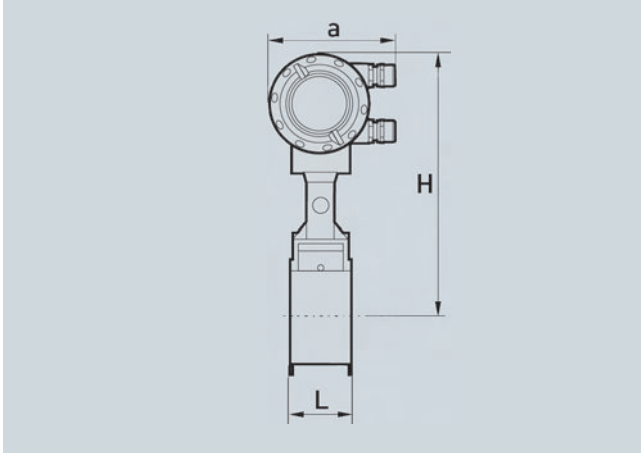
Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
		d	D	L	H	I	Flowmeter (with pressure sensor)	Flowmeter (without pressure sensor)
DN	class							
½	150	15.8 (0.62)	90 (3.54)	200 (7.87)	265 (10.43)	144 (5.67)	5.1 (11.24)	4.5 (9.92)
½	300	15.8 (0.62)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.5 (12.13)	4.9 (10.80)
½	600	13.9 (0.55)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.7 (12.57)	5.1 (11.24)
1	150	26.6 (1.05)	110 (4.33)	200 (7.87)	265 (10.43)	144 (5.67)	6.8 (14.99)	6.2 (13.67)
1	300	26.6 (1.05)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	7.8 (17.20)	7.2 (15.87)
1	600	24.3 (0.96)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	8.1 (17.86)	7.5 (16.53)
1½	150	40.9 (1.61)	125 (4.92)	200 (7.87)	270 (10.63)	144 (5.67)	8.9 (19.62)	8.3 (18.30)
1½	300	40.9 (1.61)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	11 (24.25)	10.4 (22.93)
1½	600	38.1 (1.50)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	12 (26.46)	11.4 (25.13)
2	150	52.6 (2.07)	150 (5.91)	200 (7.87)	275 (10.83)	144 (5.67)	11.6 (25.57)	11 (24.25)
2	300	52.6 (2.07)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	13 (28.66)	12.4 (27.34)
2	600	49.3 (1.94)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	14.5 (31.97)	13.9 (30.64)
3	150	78 (3.07)	190 (7.48)	200 (7.87)	290 (11.42)	154 (6.06)	20.4 (44.97)	19.8 (43.65)
3	300	78 (3.07)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	23.4 (51.59)	22.8 (50.27)
3	600	73.7 (2.90)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	24.4 (53.79)	23.8 (52.47)
4	150	102.4 (4.03)	230 (9.06)	250 (9.84)	310 (12.20)	164 (6.46)	24 (52.91)	23.4 (51.59)
4	300	102.4 (4.03)	255 (10.04)	250 (9.84)	310 (12.20)	164 (6.46)	32 (70.55)	31.4 (69.23)
4	600	97.2 (3.83)	275 (10.83)	250 (9.84)	310 (12.20)	164 (6.46)	41 (90.39)	40.4 (89.07)
6	150	154.2 (6.07)	280 (11.02)	300 (11.81)	325 (12.80)	174 (6.85)	36.8 (81.13)	36.2 (79.81)
6	300	154.2 (6.07)	320 (12.60)	300 (11.81)	325 (12.80)	174 (6.85)	51.8 (114.20)	51.2 (112.88)
6	600	146.3 (5.76)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	76.8 (169.31)	46.2 (101.85)
8	150	202.7 (7.98)	345 (13.58)	300 (11.81)	350 (13.78)	194 (7.64)	50.6 (111.55)	50.0 (110.23)
8	300	202.7 (7.98)	380 (14.96)	300 (11.81)	350 (13.78)	194 (7.64)	75.4 (166.23)	74.8 (164.91)
10	150	254.5 (10.02)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	75.0 (165.35)	74.4 (164.02)
10	300	254.5 (10.02)	455 (17.91)	380 (14.96)	370 (14.57)	224 (8.82)	107.0 (235.89)	106.4 (234.57)
12	150	304.8 (12.00)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	106.9 (235.67)	106.3 (234.35)
12	300	304.8 (12.00)	520 (20.47)	450 (17.72)	395 (15.55)	244 (9.61)	151.9 (334.88)	151.3 (333.56)

SITRANS F flowmeters

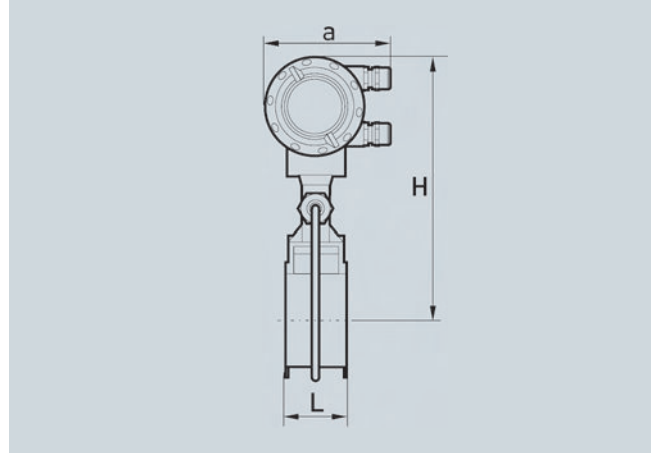
SITRANS F X

SITRANS FX300

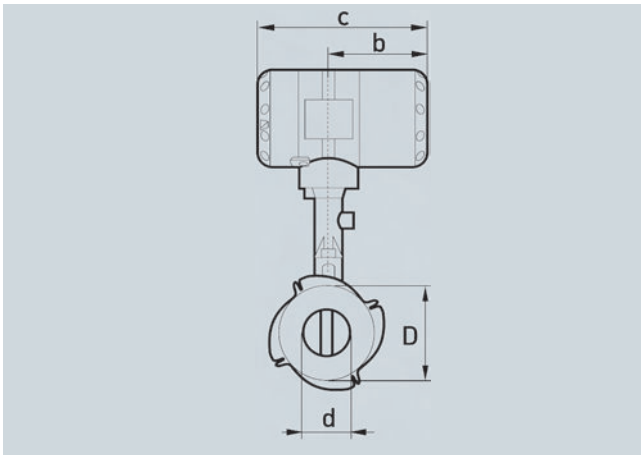
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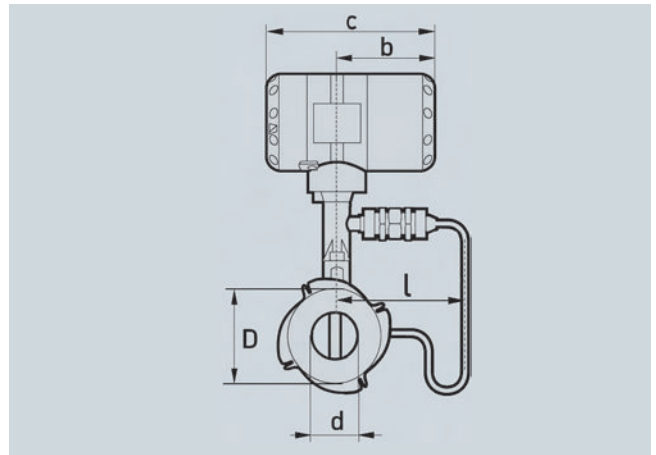
Sandwich version, front view, a = 133 mm (5.24 inches)



Sandwich version, front view, a = 133 mm (5.25 inches)



Sandwich version, side view, b = 105 mm (4.13 inches), c = 179 mm (7.05 inches)



Sandwich version, side view, b = 105 mm (4.13 inches), c = 179 mm (7.05 inches)

Sandwich version EN

Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
		d	D	L	H	I	Flowmeter (with pressure sensor)	Flowmeter (without pressure sensor)
DN	PN							
15	16 ... 100	16 (0.63)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	4.1 (9.04)	3.5 (7.72)
25	16 ... 100	24 (0.94)	65 (2.56)	65 (2.56)	265 (10.43)	144 (5.67)	4.9 (10.80)	4.3 (9.48)
40	16 ... 100	38 (1.50)	82 (3.23)	65 (2.56)	270 (10.63)	144 (5.67)	5.5 (12.13)	4.9 (10.80)
50	16 ... 100	50 (1.97)	102 (4.02)	65 (2.56)	275 (10.83)	144 (5.67)	6.6 (14.55)	6 (13.23)
80	16 ... 100	74 (2.91)	135 (5.31)	65 (2.56)	290 (11.42)	155 (6.10)	8.8 (19.40)	8.2 (18.08)
100	16 ... 100	97 (3.82)	158 (6.22)	65 (2.56)	310 (12.20)	164 (6.46)	10.1 (22.27)	9.5 (20.94)

Sandwich version ASME

Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
		d	D	L	H	I	Flowmeter (with pressure sensor)	Flowmeter (without pressure sensor)
DN	class							
½"	150, 300	16 (0.63)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	4.1 (9.04)	3.5 (7.72)
½"	600	16 (0.55)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	4.1 (9.04)	3.5 (7.72)
1"	150, 300, 600	24 (0.94)	65 (2.56)	65 (2.56)	265 (10.43)	144 (5.67)	4.9 (10.80)	4.3 (9.48)
1½"	150, 300, 600	38 (1.50)	82 (3.23)	65 (2.56)	270 (10.63)	144 (5.67)	5.5 (12.13)	4.9 (10.80)
2"	150, 300, 600	50 (1.97)	102 (4.02)	65 (2.56)	275 (10.83)	144 (5.67)	6.6 (14.55)	6 (13.23)
3"	150, 300, 600	74 (2.91)	135 (5.31)	65 (2.56)	290 (11.42)	155 (6.10)	8.8 (19.40)	8.2 (18.08)
4"	150, 300, 600	97 (3.82)	158 (6.22)	65 (2.56)	310 (12.20)	164 (6.46)	10.1 (22.27)	9.5 (20.94)

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Flow tables

Measuring Range Limits

Size		Q _{min}	Q _{max}	Q _{min}	Q _{max}
DN to EN 1092-1	DN to ASME B16.5	EN 1092-1 [m ³ /h]	EN 1092-1 [m ³ /h]	ASME B16.5 [m ³ /h]	ASME B16.5 [m ³ /h]
Water					
15	½"	0.45	5.07	0.44	4.94
25	1"	0.81	11.40	0.81	11.40
40	1½"	2.04	28.58	2.04	28.58
50	2"	3.53	49.48	3.53	49.48
80	3"	7.74	108.37	7.74	108.37
100	4"	13.30	186.22	13.30	186.21
150	6"	30.13	421.86	30.13	421.86
200	8"	56.6	792.42	56.60	792.42
250	10"	90.48	1 266.8	90.48	1 266.8
300	12"	131.41	1 839.8	131.41	1 839.8

Values based on water at 20 °C (68 °F) and 1.013 bar_{abs} (14.7 psi_{abs})

Air

15	½"	6.80	25.33	6.72	24.70
25	1"	10.20	81.43	10.20	81.43
40	1½"	25.35	326.63	25.35	326.63
50	2"	43.89	565.49	43.89	565.49
80	3"	96.14	1 238.64	96.14	1 238.60
100	4"	165.19	2 128.27	165.19	2 128.27
150	6"	374.23	4 821.60	374.23	4 821.60
200	8"	702.95	9 056.8	702.95	9 056.8
250	10"	1 123.7	14 478.0	1 123.7	14 478.0
300	12"	1 632.1	21 028.0	1 632.1	21 028.0

Values based on air at 20 °C (68 °F) and 1.013 bar_{abs} (14.7 psi_{abs})

Flow rate limits

Product	Nominal diameters		Minimum flow rates	Maximum flow rates
	to EN	to ASME	[m/s]	[m/s]
Liquids	DN 15 ... DN 300	DN ½" ... DN 12"	$0.5 \times (998/\rho)^{0.5 \ 1)}$	$7 \times (998/\rho)^{0.47 \ 1)}$
Gas, steam/vapor	DN 15 ... DN 300	DN ½" ... DN 12"	$6 \times (1.29/\rho)^{0.5 \ 2)}$	$7 \times (998/\rho)^{0.47 \ 3)}$

ρ = operating density [kg/m³]

1) Minimum flow rate 0.4 m/s (1.3 ft/s), maximum flow rate 10 m/s (32.8 ft/s)

2) Minimum flow rate 2 m/s (6.6 ft/s), maximum flow rate 80 m/s (262 ft/s)

3) Minimum flow rate 2 m/s (6.6 ft/s), maximum flow rate 80 m/s (262 ft/s); DN 15: 45 m/s (148 ft/s) and DN 25: 70 m/s (230 ft/s)

Measuring range saturated steam: 1 to 7 bar

Overpressure [bar]		1		3.5		5.2		7	
Density [kg/m ³]		1.13498		2.4258		3.27653		4.16732	
Temperature [°C]		120.6		148.2		160.4		170.6	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	5.87	28.75	7.68	61.46	8.93	83.01	10.06	105.57
25	1"	11.82	92.42	17.28	197.53	20.09	266.81	22.66	339.35
40	1½"	29.64	370.71	43.33	792.33	50.63	1 070.2	56.8	1 361.2
50	2"	51.31	641.82	75.02	1 371.8	87.19	1 852.8	98.33	2 356.6
80	3"	112.41	1 405.8	164.33	3 004.7	191	4 058.4	215.39	5 161.8
100	4"	193.14	2 415.5	282.36	5 162.7	328.16	6 973.3	370.09	8 869.2
150	6"	437.56	5 472.4	639.69	11 696	743.45	15 798	838.44	20 093
200	8"	821.9	10 279.0	1 201.6	21 970.0	1 396.5	29 675.0	1 574.9	37 743
250	10"	1 313.9	16 433.0	1 920.9	35 122.0	2 232.5	47 439.0	2 517.7	60 337
300	12"	1 908.3	23 866.0	2 789.8	51 010.0	3 242.4	68 899.0	3 656.6	87 630

Measuring range saturated steam: 10.5 to 20 bar

Overpressure [bar]		10.5		14		17.5		20	
Density [kg/m ³]		5.88803		7.60297		9.31702		10.5442	
Temperature [°C]		186.2		198.5		208.7		215	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	12.78	149.17	16.51	192.61	20.23	236.04	22.89	267.12
25	1"	26.93	479.46	30.6	619.11	33.87	758.69	36.04	858.62
40	1½"	67.51	1 878.2	76.72	2 150.7	84.93	2 395.3	90.35	2 557.7
50	2"	116.89	3 251.7	132.82	3 723.4	147.03	4 147	156.42	4 428.1
80	3"	256.03	7 122.4	290.93	8 155.8	322.06	9 083.7	342.62	9 699.3
100	4"	439.91	12 238	499.9	14 013	553.38	15 608	588.69	16 666
150	6"	996.62	27 725	1 132.5	31 747	1 253.7	35 359	1 333.7	37 756
200	8"	1 872.1	52 079	2 127.3	59 634	2 354.9	66 419	2 505.2	70 921
250	10"	2 992.7	83 254	3 400.7	95 333	3 764.6	106 180	4 004.9	113 380
300	12"	4 346.5	120 920	4 939.1	138 460	5 467.5	154 210	5 816.5	164 660

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Measuring range saturated steam: 15 to 100 psig

Overpressure [psig]		15		50		75		100	
Density [lbs/ft ³]		0.0719		0.1497		0.2036		0.2569	
Temperature [°F]		249.98		297.86		320.36		338.184	
Flow [lbs/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	12.95	64.35	16.83	133.87	19.62	182.02	22.04	229.63
25	1"	26.25	206.83	37.86	430.3	44.15	585.06	49.59	738.09
40	1½"	65.81	829.61	94.92	1 726	110.68	2 346.7	124.32	2 960.5
50	2"	113.94	1 436.3	164.34	2 988	191.63	4 062.9	215.23	5 125.6
80	3"	249.57	3 146.1	360	6 545.3	419.74	8 899.4	471.45	11 227
100	4"	428.81	5 405.7	618.51	11 246	721.21	15 291	810.06	19 291
150	6"	971.47	12 246	1 401.2	25 478	1 633.9	34 642	1 835.2	43 703
200	8"	1 824.8	23 004	2 632.1	47 859	3 069.1	65 072	3 447.2	82 092
250	10"	2 917.2	36 774	4 207.7	76 508	4 906.4	104 030	5 510.8	131 230
300	12"	4 236.8	53 410	6 111.1	111 120	7 125.8	151 080	8 003.6	190 600

Measuring range saturated steam: 150 to 300 psig

Overpressure [psig]		150		200		250		300	
Density [lbs/ft ³]		0.3627		0.4681		0.5735		0.6792	
Temperature [°F]		366.08		388.04		406.22		422.06	
Flow [lbs/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	27.79	324.21	35.86	418.47	43.94	512.66	52.04	607.12
25	1"	58.93	1 042.1	66.94	1 345.1	74.1	1 647.8	80.63	1 951.5
40	1½"	147.72	4 107.2	167.83	4 702.8	185.76	5 237	202.15	5 728
50	2"	255.75	7 111.9	290.56	8 141.9	321.6	9 066.8	350	9 917
80	3"	560.19	15 578	636.44	17 834	704.43	19 860	766.6	21 722
100	4"	962.54	26 766	1 093.5	30 643	1 210.4	34 124	1 317.2	37 324
150	6"	2 180.6	60 639	2 477.4	69 421	2 742.1	77 307	2 984	84 556
200	8"	4 096.1	113 900	4 653.6	130 400	5 150.7	145 210	5 605.2	158 830
250	10"	6 548.1	182 090	7 439.3	208 460	8 234.1	232 140	8 960.6	253 910
300	12"	9 510.2	264 460	10 805	302 760	11 959	337 150	13 014	368 770