

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 measurement 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 or energy consumption
- 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
- Compact or remote design
- Pressure and temperature compensation for fluctuating volume flows
- Measurement of consumption in compressed air systems
- No risk of deposits or damage (sensor in the turbulent area)
- All units parameterized prior to delivery

Application

The SITRANS FX300 is a 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).




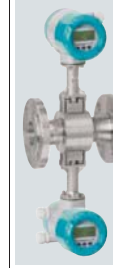



Design

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a remote version the transducer cables are pre-mounted and ready for installation.

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
Options	Standard	Pressure sensor	Pressure sensor and isolation valve	Standard
Flange				
Sandwich				

Function

Operating Principle

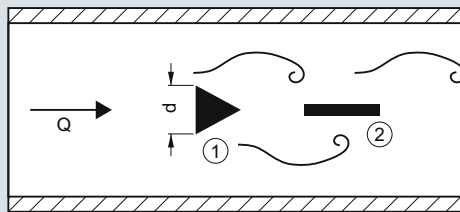
SITRANS F X vortex flowmeters measure flow rate by detecting the frequency at which alternating vortices are shed from a bluff body inserted into the flow stream. This principle of measurement is known as Von Karman's vortex street principle: alternating vortices form behind an object in a stream. The 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.

Flow Measurement

SITRANS F X

SITRANS FX300



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/m³]

d = width 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 velocity must be 2 to 80 m/s (6.6 to 262 ft/s)
- For liquids the flow velocity 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 (14.5 ... 1450 psi) (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.	$R_{\max} = (U_{\text{Power Supply}} - 14 \text{ V}) / 22 \text{ mA}$
• 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, $U < 2 \text{ V}$
• Ex version	open < 1 mA, max. 30 V, closed 100 mA, $U < 2 \text{ V}$
Accuracy	
Standard version	
• For liquids	
- Re ≥ 20 000	± 0.75 %
• For steam and gases	
- Re ≥ 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 ≥ 20 000	± 0.75 %
• For gases and steam	
- 10 000 < Re < 20 000	± 2.5 %
- Re ≥ 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	Order option 1
Density-compensated by temperature and pressure for superheated steam, no energy calculation	Order option 4
Gross heat When the device has to operate as an energy calculation device	Order option 5
In options Y51 to Y56 add information regarding:	<ul style="list-style-type: none"> • 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	Order option 7
Wet gases	Select Y49 and enter relative humidity in %
FAD - Free Air Delivery When the device has to operate close to a compressor	Order option 8
In Y81 to Y87 add information regarding:	<ul style="list-style-type: none"> • Y81 Inlet suction temperature • Y82 Atmosphere pressure • Y83 Pressure drop at inlet 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, contact your local Siemens representative and provide gas names and amount in %.
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 (1450 psi) Higher pressure on request (contact your local Siemens representative)

Design	
Material	
• Sensor: house/pick-up	AISI 316L (1.4404)/ AISI 316L (1.4435)
	Hastelloy C22/2.4602 available on request (contact your local Siemens representative)
• Housing: transmitter	Aluminum for increased requirements
• Sensor gaskets: for pick-up and pressure sensor	AISI 316L (1.4435) / 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 (contact your local Siemens representative)
• 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 and 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	
	Choose 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

Flow Measurement

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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		
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/ FPM		1
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/ FFKM		5
Transmitter design		
Compact version - no cable		1
Approval and cable gland		
Non-Ex, M20 x 1.5		1
Non-Ex, ½" NPT		2
IEC Ex, M20 x 1.5		3
ATEX, M20 x 1.5		4
ATEX, ½" NPT		5
FM US/C, M20 x 1.5		6
FM US/C, ½" NPT		7
IEC Ex, ½" NPT		8
Transmitter, display and communication		
With display, HART		A
Pressure sensor and isolation valve		
Without pressure sensor		A
With pressure sensor, range:		
4 bar (58 psi)		B
6 bar (87 psi)		D
10 bar (145 psi)		E
16 bar (232 psi)		G
25 bar (363 psi)		H
40 bar (580 psi)		K
60 bar (870 psi)		L
100 bar (1450 psi)		N
With isolation valve and pressure sensor, range:		
4 bar (58 psi)		P
6 bar (87 psi)		Q
10 bar (145 psi)		R
16 bar (232 psi)		S
25 bar (363 psi)		U
40 bar (580 psi)		V
60 bar (870 psi)		W
100 bar (1450 psi)		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
Additional information Please add “-Z” to Order No. and specify as minimum Order code Y40, Y41, Y42 and Y45 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 customer-specified medium): Specify medium density and units	Y43
Viscosity (only by customer-specified 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 % of process medium)	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

Operating instructions

Description	Order No.
English	A5E2100423

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Selection and Ordering data	Order code
Further designs Please add “-Z” to Order No. and specify Order code.	
Converter housing material	
Aluminum 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) and 3.1 (EN 10204)	K46
Class 2 and 3.1 (EN 10204)	K48
Certificates	
X-ray test on pressure bearing 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

Flow Measurement

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Selection and Ordering data		Order No.
SITRANS FX300 Sandwich Single transmitter and $T_{max} = 240\text{ °C (464 °F)}$		7 ME 2 7 0 0 -
Connection size	Sensor size	
DN 15 (1/2")	DN 15	1 A
DN 25 (1")	DN 25	2 B
DN 40 (1 1/2")	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
Nominal pressure		
EN		
PN 16	DN 50 ... 100	B
PN 40	DN 15 ... 100	D
PN 63	DN 50 ... 100	E
PN 100	DN 15 ... 100	F
ASME		
150 lb	1/2 ... 4"	J
300 lb	1/2 ... 4"	K
600 lb	1/2 ... 4"	L
Sensor material/Gasket		
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FPM		1
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FFKM		5
Transmitter design		
Compact version - no cable		1
Approval and cable gland		
Non-Ex, M20 x 1.5		1
Non-Ex, 1/2" NPT		2
IEC Ex, M20 x 1.5		3
ATEX, M20 x 1.5		4
ATEX, 1/2" NPT		5
FM US/C, M20 x 1.5		6
FM US/C, 1/2" NPT		7
IEC Ex, 1/2" NPT		8
Transmitter, display and communication		
With display, HART		A
Pressure sensor and isolation valve		
Without pressure sensor		A
With pressure sensor, range:		
4 bar (58 psi)		B
6 bar (87 psi)		D
10 bar (145 psi)		E
16 bar (232 psi)		G
25 bar (363 psi)		H
40 bar (580 psi)		K
60 bar (870 psi)		L
100 bar (1450 psi)		N
With isolation valve and pressure sensor, range:		
4 bar (58 psi)		P
6 bar (87 psi)		Q
10 bar (145 psi)		R
16 bar (232 psi)		S
25 bar (363 psi)		U
40 bar (580 psi)		V
60 bar (870 psi)		W
100 bar (1450 psi)		Y

Selection and Ordering data		Order No.
SITRANS FX300 Sandwich Single transmitter and $T_{max} = 240\text{ °C (464 °F)}$		7 ME 2 7 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
Additional information Please add “-Z” to Order No. and specify as minimum Order code Y40, Y41, Y42 and Y45 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 customer-specified medium): Specify medium density and units	Y43
Viscosity (only by customer-specified 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 % of process medium)	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	Y87
This information is available from compressor supplier.	

Operating instructions

Description	Order No.
English	A5E2100423

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

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<http://www.siemens.com/flowdocumentation>

Selection and Ordering data	Order code
Further designs Please add “-Z” to Order No. and specify Order code.	
Converter housing material	
Aluminum 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) and 3.1 (EN 10204)	K46
Class 2 and 3.1 (EN 10204)	K48
Certificates	
X-ray test on pressure bearing 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

Flow Measurement

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Selection and Ordering data		Order No.
SITRANS FX300 Flanged Dual transmitter and $T_{max} = 240\text{ °C (464 °F)}$		7 ME 2 8 0 0 -
Connection size	Sensor size	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	4 M
DN 150 (6")	DN 150	4 T
DN 200 (8")	DN 200	4 W
DN 250 (10")	DN 250	5 E
DN 300 (12")	DN 300	
Flange norm and nominal pressure		
Form B1/B2	EN 1092-1	A
PN 10	DN 200 ... 300	B
PN 16	DN 50 ... 300	C
PN 25	DN 200 ... 300	D
PN 40	DN 40 ... 300	E
PN 63	DN 50 ... 150	F
PN 100	DN 40 ... 150	
RF	ASME B16.5	J
150 lb	1½ ... 12"	K
300 lb	1½ ... 12"	L
600 lb	1½ ... 6"	
Sensor material/Gasket		
Stainless steel AISI 316L (1.4404)/ AISI 316L (1.4435)/FPM		1
Stainless steel AISI 316L (1.4404)/ AISI 316L (1.4435)/FFKM		5
Transmitter design		
Compact version - no cable		1
Approval and cable gland		
Non-Ex, M20 x 1.5		1
Non-Ex, ½" NPT		2
IEC Ex, M20 x 1.5		3
ATEX, M20 x 1.5		4
ATEX, ½" NPT		5
FM US/C, M20 x 1.5		6
FM US/C, ½" NPT		7
IEC Ex, ½" NPT		8
Transmitter, display and communication		
With display, HART		A
Pressure sensor and isolation valve		
Without pressure sensor		A
Software		
Uncompensated for gases, wet gases, steam and liquids respectively temperature compensation for saturated steam		1





Selection and Ordering data		Order code
Additional information Please add "-Z" to Order No. and specify as minimum Order code Y40, Y41, Y42 and Y45 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 customer-specified medium): Specify medium density and units		Y43
Viscosity (only by customer-specified 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 % of process medium)		Y49

Operating instructions for SITRANS FX300

Description	Order No.
English	A5E2100423
This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.	
All literature is also available for free at: http://www.siemens.com/flowdocumentation	

Selection and Ordering data		Order code
Further designs Please add "-Z" to Order No. and specify Order code.		
Converter housing material		
Aluminum 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) and 3.1 (EN 10204)		K46
Class 2 and 3.1 (EN 10204)		K48
Certificates		
X-ray test on pressure bearing 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

SITRANS FX300 spare parts

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 AISI 316L/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 for sensor	A5E02181515	
O-ring 10x2-NBR for lead- through	A5E02181525	
DUBOX plug, 5-pole-RM2	A5E02181527	
Electronic <ul style="list-style-type: none"> • Basic D-HART • Steam D-HART • Gas D-HART 	A5E02181531 A5E02181541 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 <ul style="list-style-type: none"> • DN 15 (incl. 1/2" socket) • DN 25 (incl. 1" socket) • DN 40 ... 100 • DN 150 ... 300 	A5E02181087 A5E02181116 A5E02181152 A5E02275105	
Pressure sensor replacement (Incl. pressure sensor, DUBOX plug, 2 O-rings and calibration certificate) <ul style="list-style-type: none"> • 4 bar (58 psi) • 6 bar (87 psi) • 10 bar (145 psi) • 16 bar (232 psi) • 25 bar (363 psi) • 40 bar (580 psi) • 60 bar (870 psi) • 100 bar (1450 psi) 	A5E02181157 A5E02181175 A5E02181180 A5E02181221 A5E02181307 A5E02181316 A5E02181322 A5E02181437	

Description

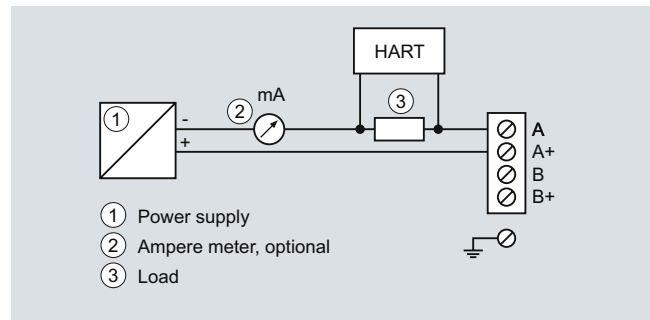
Service Toolbox for changing software (basic, steam and gas) and different settings in the electronic

Order No.

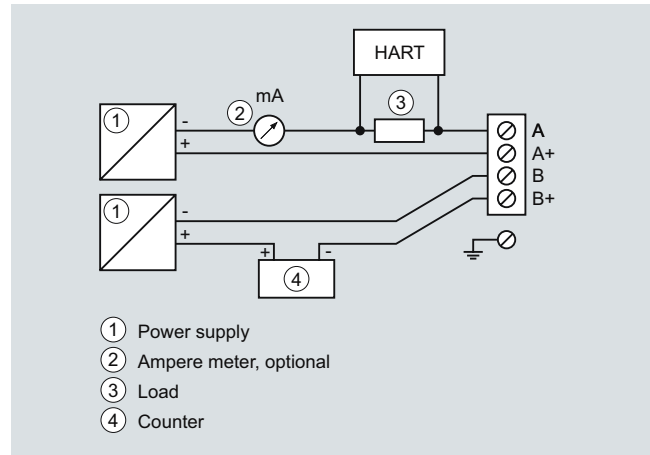
A5E02375819



Schematics



Load for HART communication

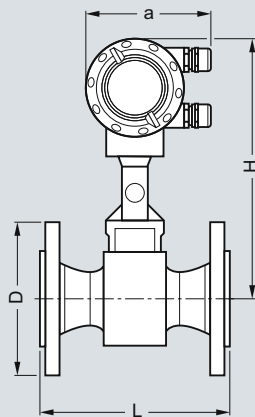


Connection pulse output

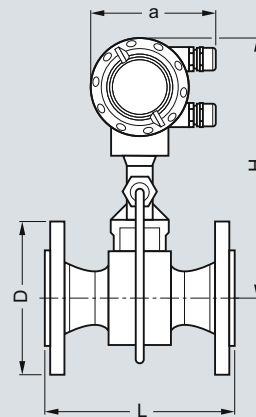
Flow Measurement SITRANS F X

SITRANS FX300

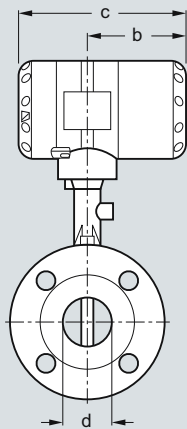
Dimensional drawings



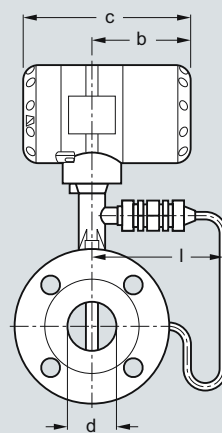
Flange version, frontal view, $a = 133 \text{ mm}$ (5.24 inch)



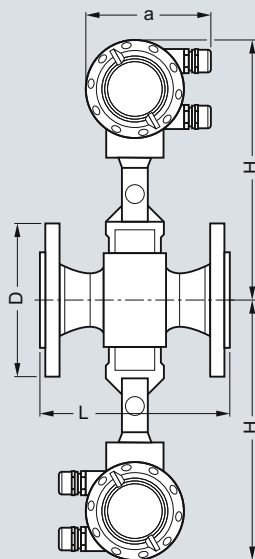
Flange version with pressure sensor, frontal view, $a = 133 \text{ mm}$ (5.24 inch)



Flange version, side view, $b = 105 \text{ mm}$ (4.13 inch),
 $c = 179 \text{ mm}$ (7.05 inch)



Flange version with pressure sensor, side view,
 $b = 105 \text{ mm}$ (4.13 inch), $c = 179 \text{ mm}$ (7.05 inch)



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

Flange version EN1092-1

Size DN	Pressure rating PN	Dimensions [mm (inch)]					Weight [kg (lb)]	
		d	D	L	H	I	Flowmeter (without pres- sure sensor)	Flowmeter (with pressure sensor)
15	40	17.3 (0.68)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.5 (12.13)	6.1 (13.45)
15	100	17.3 (0.68)	105 (4.13)	200 (7.87)	265 (10.43)	144 (5.67)	6.5 (14.33)	7.1 (15.65)
25	40	28.5 (1.12)	115 (4.53)	200 (7.87)	265 (10.43)	144 (5.67)	7.3 (16.09)	7.9 (17.42)
25	100	28.5 (1.12)	140 (5.51)	200 (7.87)	265 (10.43)	144 (5.67)	9.3 (20.50)	9.9 (21.83)
40	40	43.1 (1.70)	150 (5.91)	200 (7.87)	270 (10.63)	144 (5.67)	10.2 (22.49)	10.8 (23.81)
40	100	42.5 (1.67)	170 (6.69)	200 (7.87)	270 (10.63)	144 (5.67)	14.2 (31.31)	14.8 (32.63)
50	16	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.1 (26.68)	12.7 (28.00)
50	40	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.3 (27.12)	12.9 (28.44)
50	63	54.5 (2.15)	180 (7.09)	200 (7.87)	275 (10.83)	144 (5.67)	16.3 (35.94)	16.9 (37.26)
50	100	53.9 (2.12)	195 (7.68)	200 (7.87)	275 (10.83)	144 (5.67)	17.8 (39.24)	18.4 (40.57)
80	16	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	16.8 (37.04)	17.4 (38.36)
80	40	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	18.8 (41.45)	19.4 (42.77)
80	63	81.7 (3.22)	215 (8.46)	200 (7.87)	290 (11.42)	154 (6.06)	22.8 (50.27)	23.4 (51.59)
80	100	80.9 (3.19)	230 (9.06)	200 (7.87)	290 (11.42)	154 (6.06)	26.8 (59.08)	27.4 (60.41)
100	16	107.1 (4.22)	220 (8.66)	250 (9.84)	310 (12.20)	164 (6.46)	21.4 (47.18)	22 (48.50)
100	40	107.1 (4.22)	235 (9.25)	250 (9.84)	310 (12.20)	164 (6.46)	24.4 (53.79)	25 (55.12)
100	63	106.3 (4.19)	250 (9.84)	250 (9.84)	310 (12.20)	164 (6.46)	29.4 (64.82)	30 (66.14)
100	100	104.3 (4.11)	265 (10.43)	250 (9.84)	310 (12.20)	164 (6.46)	35.4 (78.04)	36 (79.37)
150	16	159.3 (6.27)	285 (11.22)	300 (11.81)	325 (12.80)	174 (6.85)	35.2 (77.60)	35.8 (78.93)
150	40	159.3 (6.27)	300 (11.81)	300 (11.81)	325 (12.80)	174 (6.85)	41.2 (90.83)	41.8 (92.15)
150	63	157.1 (6.19)	345 (13.58)	300 (11.81)	325 (12.80)	174 (6.85)	59.2 (130.51)	59.8 (131.84)
150	100	154.1 (6.07)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	67.2 (148.15)	67.8 (149.47)
200	10	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	37.8 (83.33)	38.4 (84.66)
200	16	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	37.8 (83.33)	38.4 (84.66)
200	25	206.5 (8.13)	360 (14.17)	300 (11.81)	350 (13.78)	194 (7.64)	46.8 (103.18)	47.4 (104.50)
200	40	206.5 (8.13)	375 (14.76)	300 (11.81)	350 (13.78)	194 (7.64)	54.8 (120.81)	55.4 (122.14)
250	10	260.4 (10.25)	395 (15.55)	380 (14.96)	370 (14.57)	224 (8.82)	57.4 (126.55)	58.0 (127.87)
250	16	260.4 (10.25)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	58.4 (128.75)	59.0 (130.07)
250	25	258.8 (10.19)	425 (16.73)	380 (14.96)	370 (14.57)	224 (8.82)	74.4 (164.02)	75.0 (165.35)
250	40	258.8 (10.19)	450 (17.72)	380 (14.96)	370 (14.57)	224 (8.82)	92.4 (203.71)	93.0 (205.03)
300	10	309.7 (12.19)	445 (17.52)	450 (17.72)	395 (15.55)	244 (9.61)	75.7 (166.89)	76.3 (168.21)
300	16	309.7 (12.19)	460 (18.11)	450 (17.72)	395 (15.55)	244 (9.61)	82.2 (181.22)	82.8 (182.54)
300	25	307.9 (12.12)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	98.7 (217.60)	99.3 (218.92)
300	40	307.9 (12.12)	515 (20.28)	450 (17.72)	395 (15.55)	244 (9.61)	127.5 (281.09)	128.1 (282.41)

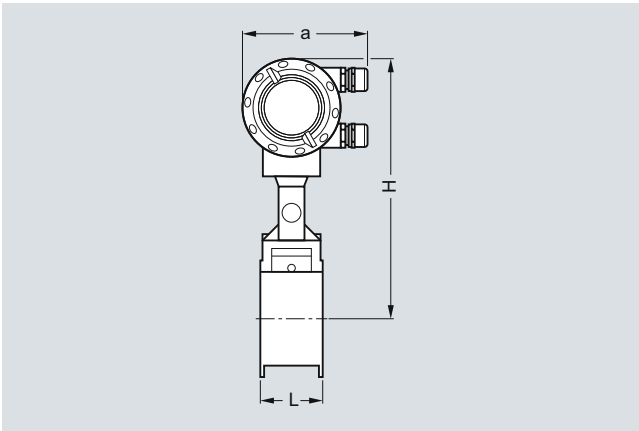
Flow Measurement

SITRANS F X

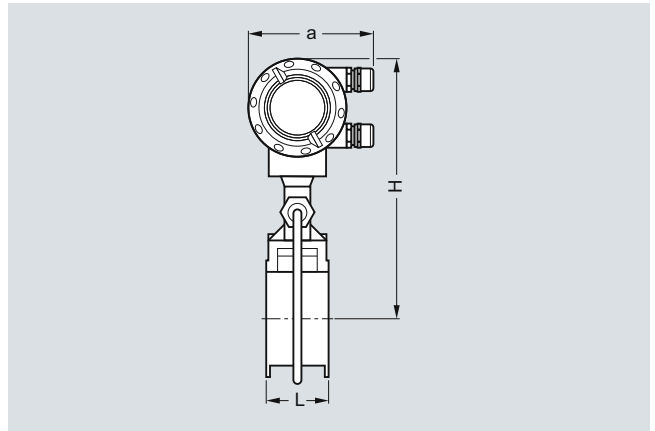
SITRANS FX300

Flange version ASME B16.5

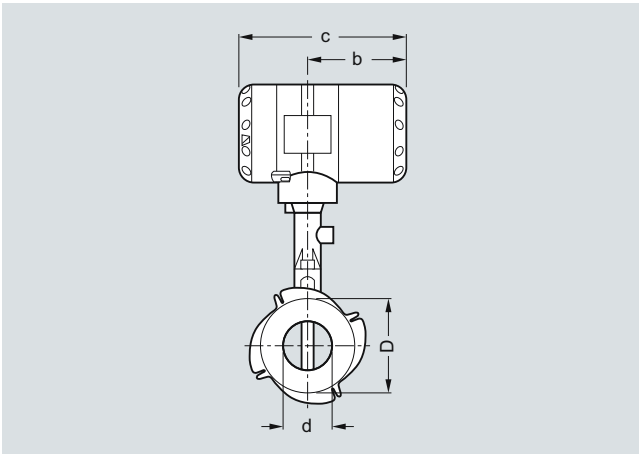
Size DN	Pressure rating Class	Dimensions [mm (inch)]					Weight [kg (lb)]	
		d	D	L	H	I	Flowmeter (without pres- sure sensor)	Flowmeter (with pressure sensor)
½	150	15.8 (0.62)	90 (3.54)	200 (7.87)	265 (10.43)	144 (5.67)	4.5 (9.92)	5.1 (11.24)
½	300	15.8 (0.62)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)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



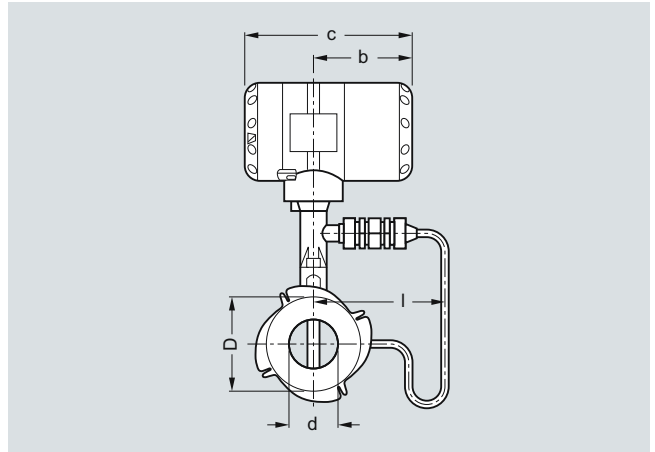
Sandwich version, front view, a = 133 mm (5.24 inch)



Sandwich version with pressure sensor, front view, a = 133 mm (5.24 inch)



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



Sandwich version with pressure sensor, side view,
b = 105 mm (4.13 inch), c = 179 mm (7.05 inch)

Flow Measurement

SITRANS F X

SITRANS FX300

Sandwich version EN

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

Sandwich version ASME

Size DN	Pressure rating Class	Dimensions [inch]					Weight [lb]	
		d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pressure sensor)
½"	150, 300, 600	0.63	1.77	2.56	10.43	5.67	7.72	9.04
1"	150, 300, 600	0.94	2.56	2.56	10.43	5.67	9.48	10.80
1½"	150, 300, 600	1.50	3.23	2.56	10.63	5.67	10.80	12.13
2"	150, 300, 600	1.97	4.02	2.56	10.83	5.67	13.23	14.55
3"	150, 300, 600	2.91	5.31	2.56	11.42	6.10	18.08	19.40
4"	150, 300, 600	3.82	6.22	2.56	12.20	6.46	20.94	22.27

3

Flow tables

Measuring Range Limits

Water

Size DN to EN 1092-1	DN to ASME B16.5	Q _{min} EN 1092-1 [m ³ /h]	Q _{max} EN 1092-1 [m ³ /h]	Q _{min} ASME B16.5 [m ³ /h]	Q _{max} ASME B16.5 [m ³ /h]
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"	56.60	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)

Air

Size DN to EN 1092-1	DN to ASME B16.5	Q _{min} EN 1092-1 [m ³ /h]	Q _{max} EN 1092-1 [m ³ /h]	Q _{min} ASME B16.5 [m ³ /h]	Q _{max} ASME B16.5 [m ³ /h]
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 [m/s]	Maximum flow rates [m/s]
	to EN	to ASME		
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 0.3 m/s (0.984 ft/s), maximum flow rate 7 m/s (23 ft/s)

2) Minimum flow rate 2 m/s (6.6 ft/s)

3) 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)

Flow Measurement

SITRANS F X

SITRANS FX300

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

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

