FCI ST75 Series Flow Meters

Small Line, Mass Flow Meters for Industrial and Commercial Process Gases

Low cost, easy installation flow measuring for 1/4 inch to 2 inch [6 mm to 51 mm] line sizes



Burner/Boiler Fuel and Air Feed Lines Industrial Furnaces, Kilns and Oven Fuel/Air Controls Natural Gas Sub-Metering Heat Treating Gas Controls Air Compressor System Control and Point-of-Use Monitoring Chiller Air Flow Measurements Co-Gen and Turbine Generator Fuel Flow Measurements Dosing and Gas Injection Rate Controls



ST75 Series Features

- Direct mass, standard volumetric or standard velocity flow measurement
- Triple outputs: flow rate, temperature and total flow
- HART or Modbus I/O (ST75 A, ST75 AV)
- Non-clogging, no moving parts
- 2 line digital display option
- Small, compact design
- Easy installation
- Built-in Vortab[®] flow conditioning (ST75V, ST75AV)
- SIL compliant



Figure 1: ST75 Series standard configurations

* For pipes larger than 2 inches [51 mm] see FCl insertion style flow meters.

Superior Air and Gas Flow Measurement

ST75 is an accurate, no moving parts, direct mass flow measurement and monitoring solution for fuel gases, air, compressed air, inert and other gas flows within industrial processes. There are four base models in the series: ST75, ST75A, ST75V, and ST75AV. The "A" suffix models provide enhanced features and HART I/O (see chart below); the "V" suffix models include built-in Vortab flow conditioners. They are available in six different sizes for direct, in-line installation in line sizes from 1/4 inch to 2 inch [6 mm to 51 mm]. *

Model	ST75	ST75 A	ST75 V	ST75 AV
Vortab flow conditioning				
Dual 4-20 mA outputs per NAMUR NE43				
500 Hz pulse output				
HART (v7) I/O				
Modbus (485 RTU/ASCII)				
Dual line LCD readout Optional				
Maximum remote distance Maximum	50′[15 m]	100′[30 m]	50′[15 m]	100′[30 m]
SIL compliance rating				
Ex hazardous location approvals	-			
Warranty	1 year	2 years	1 year	2 years

By combining precision lithography structured platinum RTD sensors embedded in FCI's equal mass thermowells with microprocessor electronics and precise actual gas calibration, the ST75 achieves outstanding flow measurement performance. Using FCI's proven thermal dispersion technology, the ST75's direct mass flow measurement eliminates the cost and space of additional sensors required by inferred technologies. With its 100:1 turndown and flow ranges from 0.01 SCFM to 559 SCFM [0,01 NCMH to 950 NCMH], the ST75 measures over a wide flow range, from low to high flow conditions. The ST75 is available in specific calibrations for most gases including natural gas, methane and other hydrocarbon gases, as well as nitrogen, CO_{γ} , argon and all inert gases, compressed air and more.

Easy to Install, Easy to Use

Models ST75 and ST75 A have a standard "T" fitting design that allows for fast, simple in-line installation. Standard NPT line size selections include 1/4 inch, 1/2 inch, 3/4 inch, 1 inch, 1-1/2 inch and 2 inch. For compression fitting tube applications, selections include 1/4 inch, 1/2 inch and 1 inch. For installations with inadequate straight-run or obstructed flows that prevent a fully developed profile for accurate flow measurement with the standard ST75, Models ST75V and ST75AV provide the solution. FCI's ST75V and ST75AV include all of the features and functionality of the ST75 plus built-in Vortab flow conditioning.

Vortab flow conditioners are the flow conditioning technology proven and recommended by flow measurement experts to eliminate both swirl and velocity profile distortions to ensure accurate flow measurement. Vortab flow conditioners also are the lowest pressure loss solution of all flow conditioning techniques. FCI is the exclusive provider of Vortab flow conditioners for use with thermal mass flow meters such as the ST75 V and ST75 AV.

To serve a variety of application and installation requirements, the ST75 Series is available in three standard configurations (see Figure 1 on page 2).

To provide convenient and easy access for wire-up and signal isolation, the instrument's enclosure features dual conduit ports in either NPT or M20 threads, as well as removable front and rear covers. ST75 models can be ordered for DC (18 V to 36 V) or AC (85 V to 265 V) power.

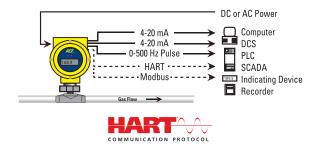
Extensive Outputs Assure Application Compatibility

ST75 provides the most comprehensive selection of outputs in its class. Dual analog outputs, a pulse output and a digital, serial I/O are standard on all models. Models ST75 A and ST75 AV include HART.

Dual 4-20 mA analog outputs are field assignable to flow rate and/or temperature. These outputs are user scalable to the instrument's full calibrated range or any subset. Flow rate is selectable for reading in mass flow or standard volumetric engineering units. A 0-500 Hz pulse output of flow is provided for interface to totalizers

Models ST75A and ST75AV include a selection of either HART or Modbus 1/0. HART is available over output #1, is version 7 compliant and is fully compatible with all versions of HART field communicators and control systems. FCI's HART I/0 and its DD file are certified compliant by FieldComm Group. Modbus is RS485 in accordance with EIA/TIA-485 standard and is RTU and ASCII compatible.

In all models a standard RS232C serial I/O link is provided for instrument configuration, service/troubleshooting data, and measured readings.



Designed and Built to Last

ST75 will significantly reduce maintenance costs and time. ST75 is a no moving parts design that virtually eliminates the wear out, clogging and excessive pressure drop associated with other flow metering techniques. The sensor element is all-welded stainless steel with Hastelloy-C tips that provide extra protection against invasive conditions within the pipe. The instrument's electronics are housed in an all-metal, aluminum, or stainless steel NEMA 4X (IP66, IP67) rated enclosure to provide the ruggedness and dust/weather proof protection needed to ensure long-life in industrial and commercial installations.

Find your gas here?

FCI has provided thermal mass flow meter solutions for all of these and more...

Acetaldehyde Acetic Acid Acetone Acetonitrile Acetyl Chloride Air Allyl Chloride Ammonia Aniline Argon Benzene **Bio-Gas** Boron Trifluoride Bromine Bromobenzene Butadiene Butene Butylene Oxide Butyne Carbon Dioxide Carbon Disulfide Carbon Monoxide Carbon Tetrachloride Carbonyl Sulfide Chlorine Chlorobenzene Chloroethane Chloroform Chloromethane Chloroprene Cis-2-Butene Cis-2-Hexene Compressed Air Cumene Cyanogen Cyclobutane Cvclohexane Cyclooctane Cvclopentane Cyclopropane Decene Deuterium Deuterium Oxide **Diethyl Amine Diethyl Ether Diethyl Ketone Digester Gas** Dimethyl Ether Dimethyl Propane **Dimethyl Sulfide** Ethane Ethanol Ethyl Acetate

Ethyl Acrylate Ethyl Alcohol Ethyl Amine Ethyl Benzene Ethyl Bromide Ethyl Chloride Ethyl Fluoride Ethyl Mercaptan Ethylene Ethvlene Dichloride Ethylene Oxide Flare Gas Fluorine Fluorobenzene Fluoroform Freon-11 Freon-12 Freon-13 Freon-14 Freon-21 Freon-22 Freon-23 Furan Halon Helium Heptene Hexanol Hexene Hydrazine Hydrogen Hydrogen Bromide Hydrogen Chloride Hydrogen Cyanide Hydrogen Deuteride Hydrogen Fluoride Hydrogen lodide Hydrogen Peroxide Hydrogen Sulfide lodine Isobutane Isobutene Isobutyl Alcohol Isoheptane Isohexane Isooctane Isopentane Isoprene Isopropyl Alcohol Isopropyl Amine

Ketene Krypton Landfill Gas M-Cresol Mercury Methane Methanol Methyl Acetate Methyl Alcohol Methyl Amine Methyl Butane Methyl Fluoride Methyl Formate Methyl Hexane Methyl Hydrazine Methyl Mercaptan Methyl Octane Methyl Pentane Methylal Methylene Chloride Morpholine M-Xylene Naphthalene Natural Gas N-Butane N-Butane N-Butanol N-Butyl Alcohol N-Decane N-Dodecane Neon Neopentane N-Heptane N-Hexane Nitric Oxide Nitrogen Nitrogen Dioxide Nitromethane Nitrous Oxide N-Nonane N-Octane Nonene N-Pentane N-Propanol N-Propyl Alcohol N-Propyl Amine N-Undecane Octene Oxygen 0-Xylene Ozone Pentanol Pentene

Phenol Phosgene Propadiene Propane Propanol Propyl Chloride Propylene Propylene Oxide Propyne P-Xylene R-11 R-12 R-13 R-13B1 R-14 R-21 R-22 R-23 R-112 R-113 R-114 R-114B2 R-115 R-116 R-134A R-142B R-152A R-216 R-500 R-502 R-503 R-504 R-C318 Radon Silane Silicon Tetrachloride Styrene Sulfur Dioxide Sulfur Hexafluoride Sulfur Trioxide Superheated Thiophene Titanium Tetrachloride Toluene Trans-2-Butene Trimethyl Amine Triptane Uranium Hexafluoride Vinvl Acetate Vinyl Chloride Vinyl Fluoride Vinyl Formate

ST75 Series Flow Meter Specifications

Instrument

- Media: Air, compressed air, nitrogen, oxygen, argon, CO₂, ozone, other inert gases, natural gas, other hydrocarbon gases, and hydrogen
- Pipe/Line Size Compatability: 1/4" to 2" [6 mm to 51 mm]¹

Range²

NPT Line Size	Minimum SCFM	Minimum [NCMH]	Maximum SCFM	Maximum [NCMH]	
1/4″	0.04	[0,07]	17.34	[29,47]	
1/2″	0.13	[0,22]	50.64	[86,04]	
3/4"	0.22	[0,38]	88.88	[151,00]	
1″	0.35	[0,59]	139.95	[237,78]	
1-1/2"	0.85	[1,44]	339.31	[576,48]	
2"	1.40	[2,38]	559.27	[950,20]	

Tubing Line Size	Minimum SCFM	Minimum [NCMH]	Maximum SCFM	Maximum [NCMH]
1/4″	0.01	[0,01]	3.02	[5,14]
1/2″	0.05	[0,09]	21.15	[35,94]
1″	0.25	[0,42]	99.08	[168,33]

Accuracy

Model ST75, ST75 A

Standard:			±0.5%	full	scale
Optional:	±1%	reading,	±0.5%	full	scale

Model ST75V, ST75 AV Standard: $\pm\,1\%$ reading, $\pm\,0.5\%$ full scale

Repeatability: ±0.5% reading

Turndown Ratio: 3:1 to 100:1

Temperature Compensation Standard: 40 °F to 100 °F [4 °C to 38 °C] Optional: 0 °F to 250 °F [-18 °C to 121 °C]

Warranty

ST75, ST75 V: One year ST75A, ST75AV: Two years

Flow Element

- Installation: In-line "T," NPT or tube
- Type: Thermal dispersion
- **Material of Construction**

All-welded 316 stainless steel probe element with Hastelloy-C22 thermowells; 316 stainless steel NPT and tube fittings; ST75 V and ST75 ÁV flow body is schedule 40 stainless steel

Operating Temperature (Process) 0 °F to 250 °F [-18 °C to 121 °C]

Process Connection

Model ST75, ST75 A T-fitting [NPT female]: 1/4", 1/2", 3/4", 1", 1 1/2" or 2" Tubing: 1/4", 1/2" or 1"

Model ST75 V, ST75 AV Female NPT, Male NPT, ANSI flanges, DIN flanges

Maximum Operating Pressure

Pipe Tee w/ Flanges

ST75, ST75A	All Except w/CRN	w/CRN
T-fitting (NPT female)	240 psi [16.5 bar(g)]	240 psi [16.5 bar(g)]
Tube Tee	600 psi [41 bar(g)]	600 psi [41 bar(g)]
		(6.5.1)
ST75V, ST75AV	All Except w/CRN	w/CRN
Pipe Tee w/ female NPT (except 1/4")	600 psi [41 bar(g)]	240 psi [16.5 bar(g)]
Pipe Tee w/ female NPT (1/4")	240 psi [16.5 bar(g)]	240 psi [16.5 bar(g)]
Pipe Tee w/ male NPT (except 1/4")	600 psi [41 bar(g)]	240 psi [16.5 bar(g)]
Pipe Tee w/ male NPT (1/4")	240 psi [16.5 bar(g)]	240 psi [16.5 bar(g)]

Per ASME B16.5

Per ASME B16.5

Transmitter

Enclosure

Rating: NEMA 4X, IP66, IP67 Material Standard: Aluminum, polyester powder coated Optional: 316 stainless steel

Conduit/Cable Port: Dual, 1/2" NPT or M20x1.5

Operating Temperature

0 °F to 140 °F [-18 °C to 60 °C]

Input Power

- 18 Vdc to 36 Vdc (6 watt maximum) AC: 85 Vac to 265 Vac (12 watt maximum)
 - (CE Marking approval from 100 Vac to 240 Vac)

Output Signal Standard

(2) 4-20 mA, user assignable to flow rate and/or temperature

(1) 0-500 Hz pulse for total flow

Output #1 have fault indication per NAMUR NE43 guidelines; user selectable for high (>21.0 mA) or low (<3.6 mA)

Bus Communications (ST75A/ST75AV) HART or Modbus

Version 7; FieldComm Group certifed; available over output #1; HART: DD file included with ELA/TLA 495 standard Mod

loubus.	no465 (in accordanc	e with EIA/ IIA-485 Standard)
Modbus	device type:	Slave
Address	range:	0-255
Support	ed function codes:	03,04

Supported baud rate: 9600,19200

RTU and ASCII; standard MS (16 bit), Transmission mode: standard LS (16 bit), Daniel extensions (32 bit)

Response time (delay between polls): 50 ms or greater

Functions

Flow rate, temperature, totalized flow (single precision), Readings: flow engineering units, temperature engineering units Other:

Enable (activate) totalizer, reset totalizer, change K factor

Communication Port: RS232C standard

Digital Display (optional): 2-line x 16 characters LCD. Displays measured value and engineering units. Top line assigned to flow rate. Second line is user assignable to temperature reading, as flow totalizer or alternating. Display can be rotated in 90° increments for optimum viewing orientation.

Agency Approvals

FM, FMc:	Explosion-Proof for Class I, Division 1, Groups B, C and D; Dust-Ignition-proof for Class II/ III, Division 1, Groups E, F and G; Nonincendive for Class I, Division 2, Groups A, B, C and D Hazardous (Classified) Locations; Type 4X, IP66; T4 Ta = 60°C.
ATEX/UKEX:	II 2 G Ex db IIC T6T1 Gb II 2 D Ex tb IIIC T85°CT300°C Db; IP66/IP67 Ta= - 40°C to +65°C
IECEx:	Ex db IIC T6T1 Gb; Ex tb IIIC T85°CT300°C Db; IP66/IP67 Ta=-40°C to +65°C
Other Compliances:	EAC/TR CU, NEPSI, EQM ECAS, RoHS CE Marking, CPA, PED, CRN, UKEX, probe complies with NEC & CEC code requirements of ANSI / ISA 12.27.01-2011 as a single seal device.
SIL (ST75 A, ST75 AV):	SIL 1 compliant, safe failure fraction (SFF) 78.5% to 81.1%

Specifications at reference operating conditions of 70 °F, 14.7 psia [21.1 °C, 1.013 bar(a)] and for Models ST75, ST75A straight pipe run 20d upstream, 10d downstream

FCI is a continuous improvement company. Specifications subject to change without notice.

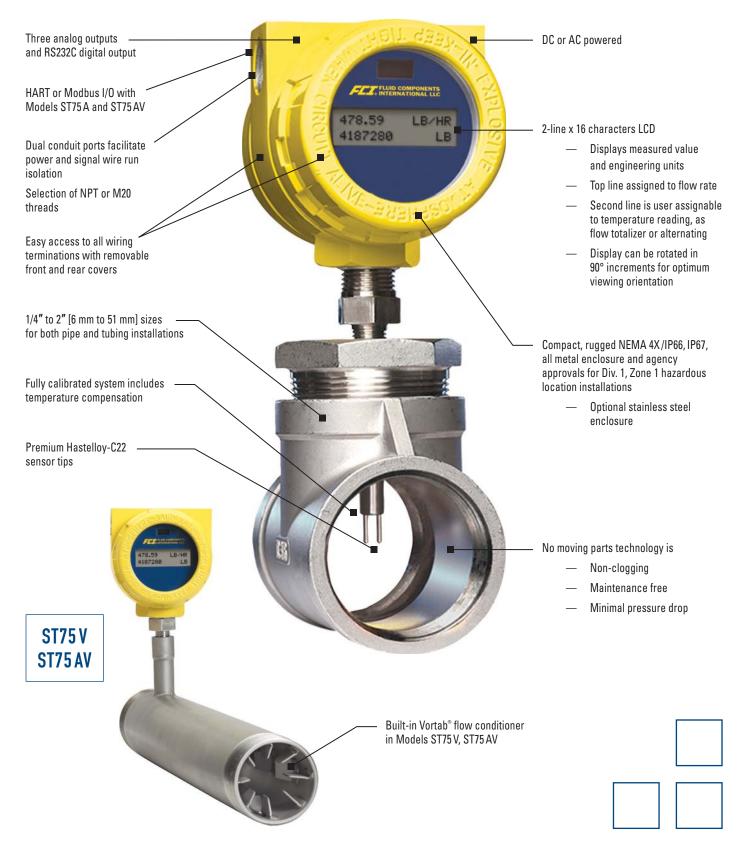
¹ For line sizes > 2 inches [> 51 mm] see FCl insrtion-style flow meters

² Actual range subject to gas type and specific conditions

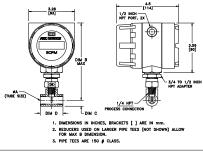
ST75 Series Features

In-line, Mass Flow Measurement

With premium components and attention to detail, FCI's ST75 series provides long-lasting flow meter quality and value. Its features and functions ensure application compatibility, maximum installation convenience, superior industrial durability and lowest maintenance.

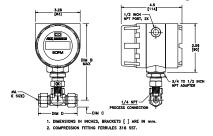


Models ST75 / ST75 A Pipe (NPT) Tee Configuration



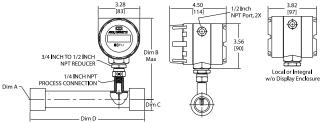
Pipe (NPT) Tee Configuration					
DIM A Pipe Size	DIM B Top to Flow CL	DIM C Flow CL to Bottom	DIM D Tee Length		
1/4″	6.0 [152,4] Max.	0.38 [9,65]	1.54 [39,12]		
1/2″	6.5 [165,1] Max.	0.56 [14,22]	2.28 [57,91]		
3/4"	7.0 [177,8] Max.	0.68 [17,27]	2.56 [65,02]		
1″	7.3 [185,4] Max.	0.86 [21,84]	2.92 [74,17]		
1 1/2"	7.8 [198,1] Max.	1.17 [29,72]	3.82 [97,03]		
2″	8.0 [203,2] Max.	1.42 [36,07]	4.66 [118,40]		

Models ST75 / ST75 A Tube Tee Configuration



	Tube Tee Configuration					
	DIM A Pipe Size	DIM B Top to Flow CL	DIM C Flow CL to Bottom	DIM D Tee Length		
Ì	1/4″	5.7 [144,8] Max.	0.33 [8,39]	2.34 [59,44]		
ĺ	1/2″	5.9 [149,9] Max.	0.53 [13,46]	2.84 [72,14]		
[1″	7.8 [198,1] Max.	0.87 [22,10]	3.86 [98,04]		





3.82

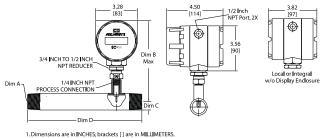
[97

1. Dimensions are in INCHES; brackets [] are in MILLIMETERS.

Models ST75 V / ST75 AV Female NPT

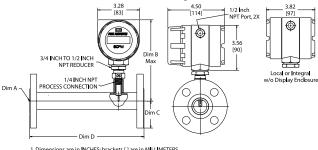
Female NPT Configuration					
DIM A Pipe Size	DIM B Top to Flow CL	DIM C Flow CL to Bottom	DIM D VMR Length		
1/4″	5.50 [140]	0.38 [9,5]	5.00 [127]		
1/2″	5.69 [144,5]	0.57 [14]	7.50 [190,5]		
3/4"	6.45 [164]	0.69 [17,5]	9.00 [229]		
1″	6.44 [163,5]	0.88 [22]	9.00 [229]		
1 1/2"	6.42 [163]	1.25 [32]	13.50 [343]		
2"	6.43 [163]	1.50 [38]	18.00 [457]		

Models ST75 V / ST75 AV Male NPT



	Male NPT Configuration					
DIM A Pipe Size	DIM B Top to Flow CL	DIM C Flow CL to Bottom	DIM D Tee Length			
1/4″	5.50 [140]	0.38 [9,5]	5.00 [127]			
1/2"	5.69 [144,5]	0.42 [10,6]	7.50 [190,5]			
3/4″	6.45 [164]	0.51 [13]	9.00 [229]			
1″	6.44 [163,5]	0.65 [16,5]	9.00 [229]			
1 1/2"	6.42 [163]	.95 [24]	13.50 [343]			
2″	6.43 [163]	1.19 [30]	18.00 [457]			

Models ST75 V / ST75 AV Flanged



^{1.} Dimensions are in INCHES; brackets [] are in MILLIMETERS. 2. Flanges are 150# Class.

	Flanged Configuration					
DIM A Pipe Size	DIM B Top to Flow CL	DIM C Flow CL to Bottom	DIM D Tee Length			
1/4"	n/a	n/a	n/a			
1/2"	5.69 [144,5]	1.75 [45]	7.50 [190,5]			
3/4"	6.45 [164]	1.94 [49]	9.00 [229]			
1"	6.44 [163,5]	2.12 [54]	9.00 [229]			
1 1/2"	6.42 [163]	2.50 [64]	13.50 [343]			
2"	6.43 [163]	3.00 [76]	18.00 [457]			

More Air / Gas Mass Flow Meter Solutions

In addition to the ST75 Series, FCI manufactures a broad line of thermal dispersion flow meter products for industrial and plant applications. From general-purpose air flow measurement to special-function, mixed gas flare flows; from small line sizes to the largest stacks and ducts, FCI has the selection to best solve your applications and ensure optimum solutions. Contact your local FCI representative or visit <u>www.FluidComponents.com</u> for detailed product information and specifications on these products.



ST50 Series models are compact and economical, yet full featured air and gas meters designed for air, compressed air, nitrogen (ST50) and biogas, digester gas, natural gas (ST51, ST51 A) applications.



ST80 Series for all gases, combines high-performance, extensive installation options and an array of output choices to meet the needs of the most demanding industrial applications.



ST100A Series is industry's most advanced gas flow meters. All gases, flow, temperature and pressure, multiple outputs, bus communications, graphical display, multiple calibrations, VeriCal, on-board data logger, and more.



MT Series "multi-point" flow measuring systems can be configured with two (2) to eight (8) flow sensing elements to optimize measurements within the largest of pipe and duct sizes.

FCI's World Class Calibration Ensures Installed Accuracy

ST75 Series models are tested and calibrated to rigorous standards so that you get the instrument that does the job specified. To design and produce the highest quality flow instrumentation, FCI operates a world-class flow calibration laboratory with calibrations performed on more than 19 different flow stands, using equipment traceable to NIST (US National Institute of Standards and Technology), and ISO/IEC 17025 (International Standards for test lab quality systems).

To achieve the highest possible accuracy in ST75 Series, FCI utilizes these precision flow stands to flow actual gases and reference fluids matched to the temperature and process conditions of your application.

Other suppliers are often limited only to air calibrations and rely on non-field tested or un-validated theoretical equivalencies for other gases and gas mixtures. This procedure can be inadequate and create measurement and output errors well outside published specifications. FCI calibration capabilities are un-matched in the industry, providing you with total confidence that your installation meets its published specifications and your application needs.

More than 19 precision flow stands to match NIST traceable fluids, process conditions, flow rates and line sizes specified in your application.











A PST BRAND

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