

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



FCI ST75 FLOW METER

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

FCI FLUID COMPONENTS
INTERNATIONAL LLC

ST75 Series Features

- Direct mass, standard volumetric or standard velocity flow measurement
- Triple outputs: flow rate, temperature and total flow
- HART I/O (ST75A, ST75AV)
- Non-clogging, no moving parts
- 2 line digital display option
- Small, compact design
- Easy installation
- Built-in Vortab® flow conditioning (ST75V, ST75AV)
- SIL compliant

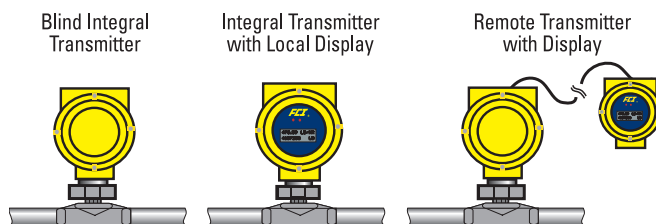


Figure 1: ST75 Series standard configurations

* For pipes larger than 2 inches [51 mm] see FCI 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	ST75A	ST75V	ST75AV
Vortab flow conditioning			■	■
Dual 4-20 mA outputs	■	■	■	■
4-20 mA per NAMUR NE43	■	■	■	■
HART I/O		■		■
500 Hz pulse output	■	■	■	■
Maximum remote distance	50' [15 m]	100' [30 m]	50' [15 m]	100' [30 m]
SIL compliance rating		■		■
Warranty Standard	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, CO₂, argon and all inert gases, compressed air and more.

Easy to Install, Easy to Use

Models ST75 and ST75A 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 (18V to 36V) or AC (85V to 265V) power.

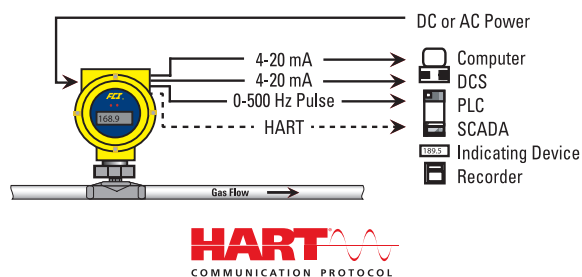
Extensive Outputs Assure Application Compatibility

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 ST75A and ST75AV 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

A two-way HART bus over the #1 4-20 mA output is provided with Models ST75A and ST75AV. The HART bus complies with revision level 7 protocol, is fully compatible with all versions of HART field communicators and control systems, and has been certified by the FieldComm organization.

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	Ethyl Acrylate	Ketene	Phenol
Acetic Acid	Ethyl Alcohol	Krypton	Phosgene
Acetone	Ethyl Amine	Landfill Gas	Propadiene
Acetonitrile	Ethyl Benzene	M-Cresol	Propane
Acetyl Chloride	Ethyl Bromide	Mercury	Propanol
Air	Ethyl Chloride	Methane	Propyl Chloride
Allyl Chloride	Ethyl Fluoride	Methanol	Propylene
Ammonia	Ethyl Mercaptan	Methyl Acetate	Propylene Oxide
Aniline	Ethylene	Methyl Alcohol	Propyne
Argon	Ethylene	Methyl Amine	P-Xylene
Benzene	Dichloride	Methyl Butane	R-11
Bio-Gas	Ethylene Oxide	Methyl Fluoride	R-12
Boron Trifluoride	Flare Gas	Methyl Formate	R-13
Bromine	Fluorine	Methyl Hexane	R-13B1
Bromobenzene	Fluorobenzene	Methyl Hydrazine	R-14
Butadiene	Fluoroform	Methyl	R-21
Butene	Freon-11	Mercaptan	R-22
Butylene Oxide	Freon-12	Methyl Octane	R-23
Butyne	Freon-13	Methyl Pentane	R-112
Carbon Dioxide	Freon-14	Methylal	R-113
Carbon Disulfide	Freon-21	Methylene Chloride	R-114
Carbon Monoxide	Freon-22	Morpholine	R-114B2
Carbon Tetrachloride	Freon-23	M-Xylene	R-115
Carbonyl Sulfide	Furan	Naphthalene	R-116
Chlorine	Halon	Natural Gas	R-134A
Chlorobenzene	Helium	N-Butane	R-142B
Chloroethane	Heptene	N-Butane	R-152A
Chloroform	Hexanol	N-Butanol	R-216
Chloromethane	Hexene	N-Butyl Alcohol	R-500
Chloroprene	Hydrazine	N-Decane	R-502
Cis-2-Butene	Hydrogen	N-Dodecane	R-503
Cis-2-Hexene	Hydrogen Bromide	Neon	R-504
Compressed Air	Hydrogen Chloride	Neopentane	R-C318
Cumene	Hydrogen Chloride	N-Heptane	Radon
Cyanogen	Hydrogen Cyanide	N-Hexane	Silane
Cyclobutane	Hydrogen Deuteride	Nitric Oxide	Silicon Tetrachloride
Cyclohexane	Hydrogen Fluoride	Nitrogen	Styrene
Cyclooctane	Hydrogen Fluoride	Nitrogen Dioxide	Sulfur Dioxide
Cyclopentane	Hydrogen Iodide	Nitromethane	Sulfur Hexafluoride
Cyclopropane	Hydrogen Peroxide	Nitrous Oxide	Sulfur Trioxide
Decene	Hydrogen Sulfide	N-Nonane	Superheated Thiophene
Deuterium	Iodine	N-Octane	Titanium Tetrachloride
Deuterium Oxide	Isobutane	Nonene	Toluene
Diethyl Amine	Isobutene	N-Pentane	Trans-2-Butene
Diethyl Ether	Isobutyl Alcohol	N-Propanol	Trimethyl Amine
Diethyl Ketone	Isoheptane	N-Propyl Amine	Triptane
Digester Gas	Isohexane	N-Undecane	Uranium Hexafluoride
Dimethyl Ether	Isooctane	Octene	Vinyl Acetate
Dimethyl Propane	Isopentane	Oxygen	Vinyl Chloride
Dimethyl Sulfide	Isoprene	O-Xylene	Vinyl Fluoride
Ethane	Isopropyl Alcohol	Ozone	Vinyl Formate
Ethanol	Isopropyl Amine	Pentanol	
Ethyl Acetate		Pentene	

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 Compatibility:** 1/4" to 2" [6 mm to 51 mm]¹

- **Range**²

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]
3/4"	0.25	[0,42]	99.08	[168,33]

- **Accuracy**

Model ST75, ST75 A

Standard: ±2% reading, ±0.5% full scale
Optional: ±1% reading, ±0.5% full scale

Model ST75V, ST75 AV

Standard: ±1% reading, ±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]

- **Agency Approvals**

FM, FMc:	Class I, Division 1, Groups B, C, D; T4 Ta= +60°C; Type 4X, IP66 Class II/III, Division 1, Groups E, F, G; T4 Ta= +60°C; Type 4X, IP66 <i>Model ST75 and ST75V also include:</i> Nonincendive for Class I, Division 2, Groups A, B, C and D; T4 Ta= +60°C; Type 4X, IP66
ATEX:	Zone 1, Zone 21 II 2 G Ex db IIC T6...T1 Gb II 2 D Ex tb IIIC T85°C...T300°C Db; IP66/IP67 Ta= -40°C to +65°C
IECEx:	Ex db IIC T6...T1 Gb; Ex tb IIIC T85°C...T300°C Db; IP66/IP67 Ta= -40°C to +65°C
Other:	EAC (TRCU) Russia, NEPSI, CE Marking, CPA, PED, CRN
SIL:	SIL 1 compliant, safe failure fraction (SFF) 78.5% to 81.1%

- **Warranty**

ST75, ST75V: 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; ST75V and ST75AV flow body is schedule 40 stainless steel

- **Maximum Operating Pressure**

T-fitting [NPT female]: 240 psi [16.5 barg]
Tube: 600 psi [41 barg]

- **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

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**

DC: 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 (Version 7); FieldComm Group certified
Available over output #1; DD file included

- **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.

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.

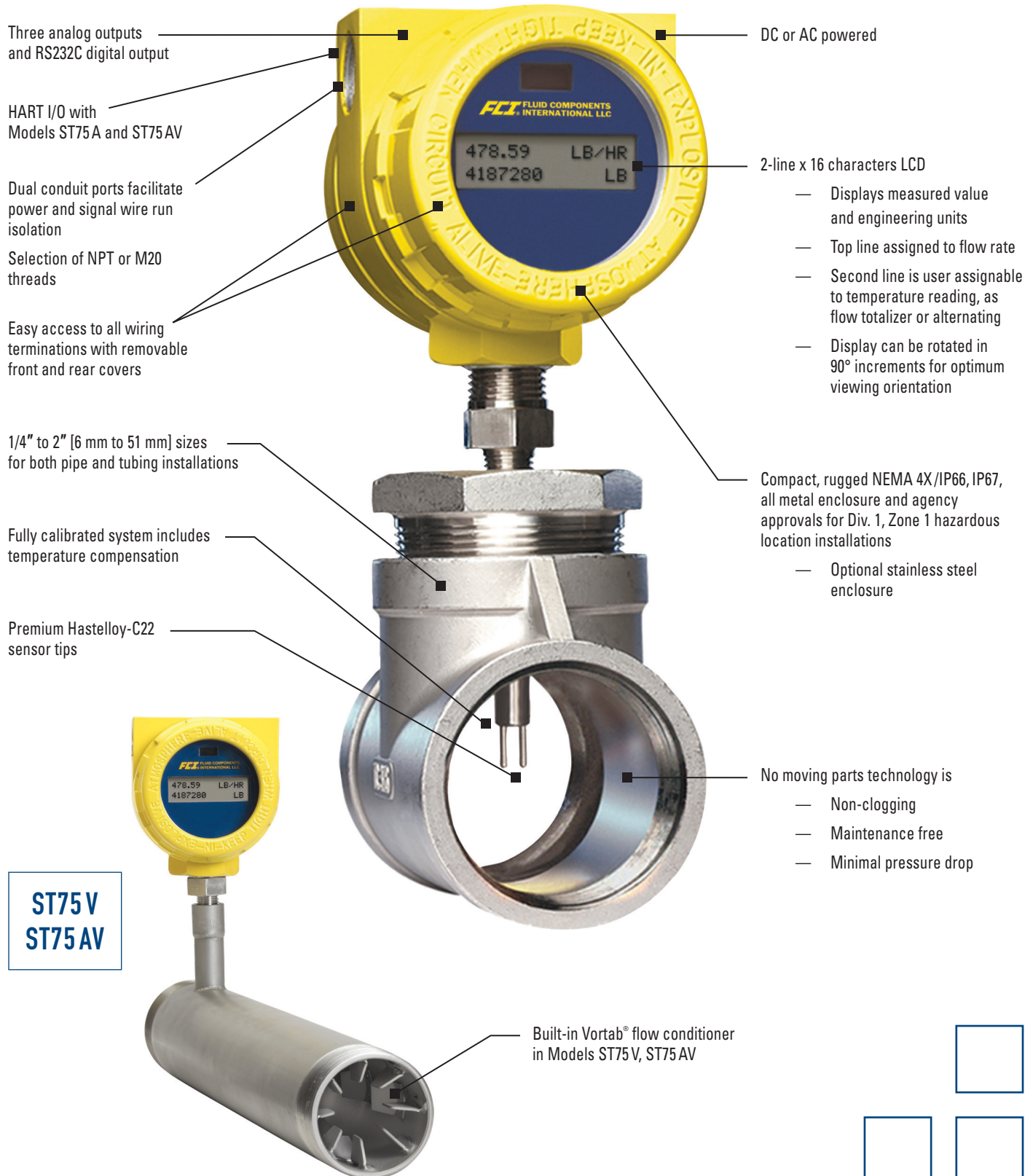
¹ For line sizes > 2 inches [> 51 mm] see FCI insertion-style flow meters

² Actual range subject to gas type and specific conditions

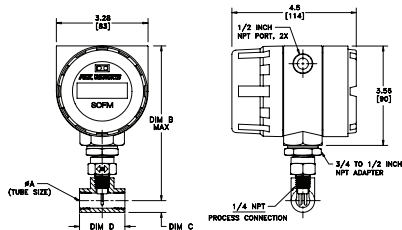
ST75 Series Features

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.



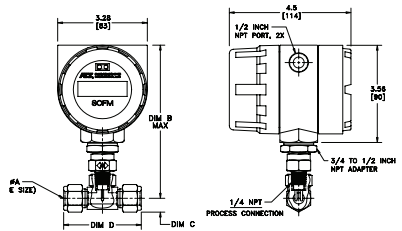
Models ST75/ST75A Pipe (NPT) Tee Configuration



1. DIMENSIONS IN INCHES, BRACKETS [] ARE IN mm.
2. REDUCERS USED ON LARGER PIPE TEES (NOT SHOWN) ALLOW FOR MAX B DIMENSION.
3. PIPE TEES ARE 150 # CLASS.

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]

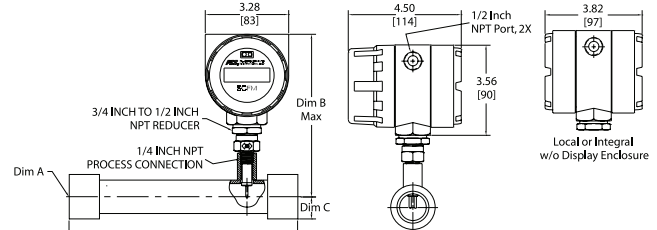
Models ST75/ST75A Tube Tee Configuration



1. DIMENSIONS IN INCHES, BRACKETS [] ARE IN mm.
2. COMPRESSION FITTING FERRULES 316 SST.

Tube Tee Configuration			
DIM A Pipe Size	DIM B Top to Flow CL	DIM C Flow CL to Bottom	DIM D Tee Length
1/4"	5.7 [144,8] Max.	0.33 [8,39]	2.34 [59,44]
1/2"	5.9 [149,9] Max.	0.53 [13,46]	2.84 [72,14]
3/4"	7.8 [198,1] Max.	0.87 [22,10]	3.86 [98,04]

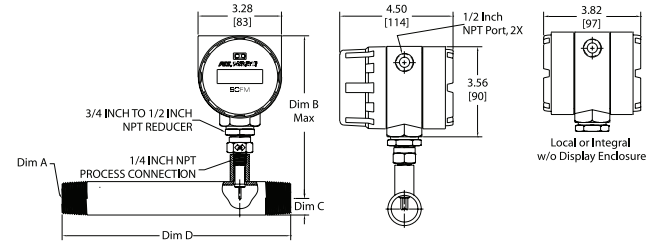
Models ST75V/ST75AV Female NPT



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

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]

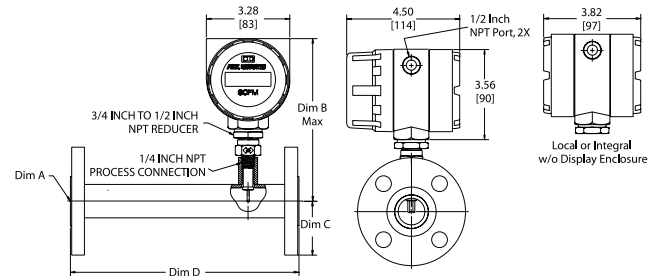
Models ST75V/ST75AV Male NPT



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

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 ST75V/ST75AV 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 www.FluidComponents.com 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.



- **ST100 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

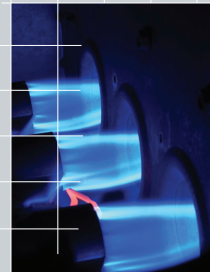
ST75 Series models are tested and calibrated to rigorous standards so that you get the instrument that does the job specified. To design and produce the highest quality flow instrumentation, FCI operates a world-class flow calibration laboratory with calibrations performed on more than 19 different flow 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 unmatched 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.





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