ST100 Series Flare Gas Flow Meters

FCI® FLUID COMPONENTS INTERNATIONAL LLC

Flow Meter Solutions for Land Based and Offshore Platform Flares

Flaring systems are used to burn-off and dispose of waste, excess or off-gases, and as a safety system to protect processes and equipment. They are found throughout the world in oil and gas processing systems, refineries and petrochemical plants. Flare flow meters are a critical component used in these systems to monitor, measure and report the gas flows within these systems. Flare flow meters provide plant operations with a tool to signal abnormal process changes, early leak detection, and report on flared gases to comply with environmental agency reporting.

ST100 Series Flare Gas Flow Meters

- **Oil, gas, petrochemical plant flares and feed lines**
- **LP and HP flare applications**
- **Environmental agency and emission trading compliance with exclusive SR2x™ option**
- **Lowest total installed cost solution**
- **Flow range from 0.25 SFPS to 1000 SFPS [0,07 NMPS to 305 NMPS]**
- **Mixed hydrocarbon gases calibration**
- **Up to five (5) separate, unique calibrations**
- **Direct mass flow measuring; no need for temperature and pressure sensors**
- **Up to 1000:1 turndown**
- **Patented in-situ calibration verification option**
- **Analog outputs or digital bus communications**
- **Global agency approvals for Ex installations**
- **Exclusive dual-element systems for larger flare lines**
- **All stainless steel enclosure option for offshore installations**
- **Auxiliary input channels for interface with gas analyzers**

FCI has been a leading provider of flare gas flow meter solutions for more than two decades. FCI flow meters are installed in both land-based and offshore platform flare systems throughout the world. The new ST100 Series flow meters leverage these experiences with extensive features and functions that extend and optimize their application in flare flow measurement.

Whether your flares are single-line or a large flaring system with a complex array of tributary lines and mixed gases, there is an FCI solution. From superior low flow measurement to detect the smallest leaks and up to 1000 SFPS [305 NMPS] to accurately measure major upset conditions at very high flows, FCI ST100 Series flow meters are your best solution.

The ST100 Series flow meters combine a broad range of easy to install insertion flow elements with industry's most powerful and flexible electronics/transmitter and specialized, precision flare gas calibrations. With wide turn downs, specific calibrations for mixed gas compositions, FCI exclusive SR2x split-range/dual calibration (see page 3), and maximum output flexibility with 4-20 mA analog outputs or bus communications such as HART, FOUNDATION™ fieldbus, or Modbus, ST100 Series delivers a truly state-of-the-art gas flow meter for industrial process, plant and offshore flare applications.

ST100 Series Features

Four conduit ports provide greatest signal integrity and separation for power input, analog output lines, digital I/O, relays and/or auxiliary input signals; choice of NPT or M20 threads

AC or DC power supply

Weather-proof, ruggedized, Ex rated enclosures
- Choices for local or remote mounting
- NEMA 4X, IP67
- Aluminum or optional all stainless steel

Global agency approvals of entire instrument system for hazardous location installations:

FM, FMc, ATEX, IEC, NEPSI, CPA, Inmetro, GOST*

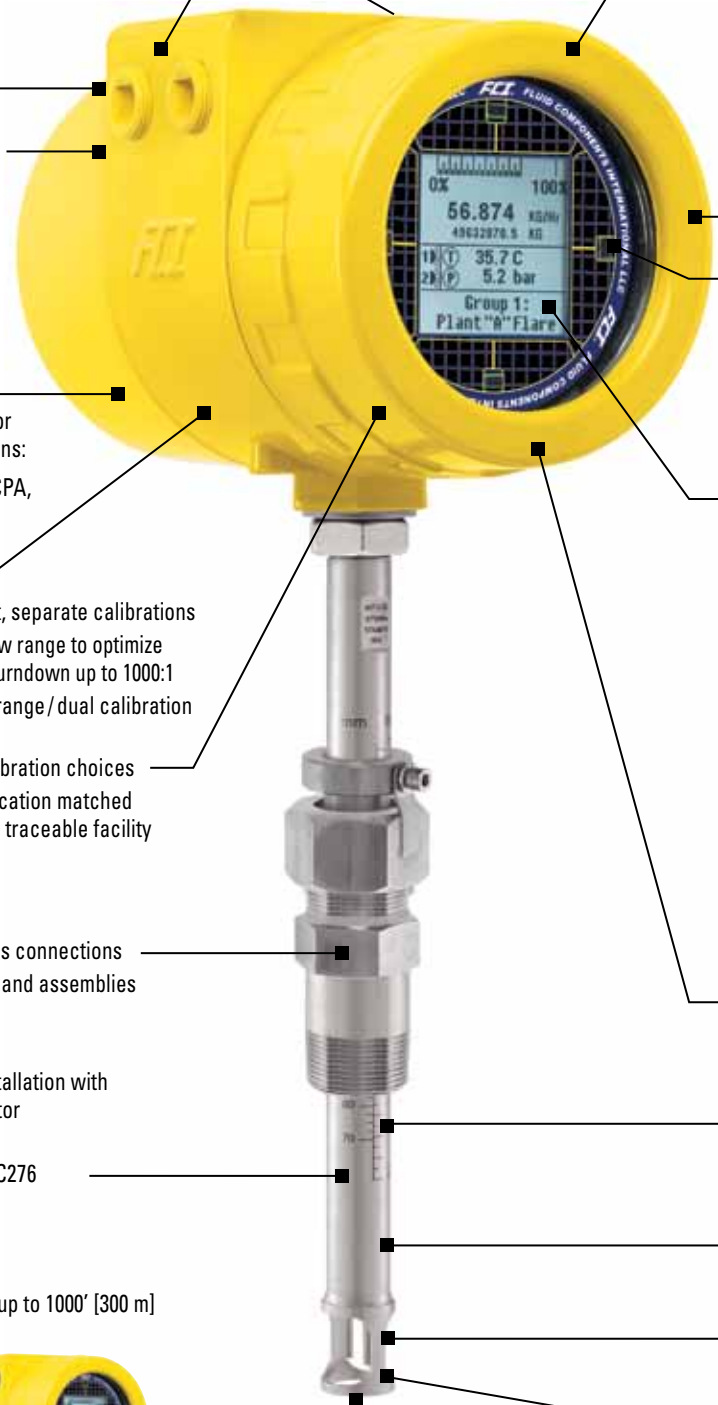
Multiple calibrations
- Up to five independent, separate calibrations
- Same gas, different flow range to optimize accuracy and extend turndown up to 1000:1
- Exclusive SR2x™ split range/dual calibration

Precision calibration and calibration choices
- Specific gas and application matched calibration in FCI NIST traceable facility

Extensive selection of process connections
- Retractable packing gland assemblies
- Fixed connections
- ANSI or DIN flanges
- Simple, adjustable installation with threaded NPT connector

Stainless steel or Hastelloy-C276 wetted parts

Remote up to 1000' [300 m]



Extensive analog and digital communications output choices
- Triple 4-20 mA with HART
- FOUNDATION™ fieldbus H1
- PROFIBUS PA
- Modbus RS-485
- 0-1 kHz or 0-10 kHz frequency or pulse
- Dual relays
- USB port
- Ethernet

On-board data logger

Four (4) optical touch buttons
- Proximity activation, no need to open enclosure
- Full instrument programmability
- Protected against unwanted activation

Comprehensive informational display
- Digital readout of all measured parameters; flow rate, total flow, temperature and pressure with engineering units
- Analog flow rate bar graph
- Alarm relay status indication
- Instrument fault indication
- User programmable 17 character field *(example: display gas type, tag number or application/location)*
- Display orientation rotates in 90° increments electronically
- Backlighted: auto-on activation via proximity sensor or set for always on

Multi-function: measures mass flow rate and temperature; STP Series adds pressure measurement

Permanent laser-etched depth gauge markings; ensures accurate centering of adjustable-length elements

All welded sensor elements for maximum service life and leak-proofing

Precision, wide-ranging platinum RTD sensors

Exclusive equal mass sensors provide optimum performance in processes with wide temperature swings

Choice of flow element styles to optimize application performance
- FP style *(shown)*
- S style

* *Some approvals pending at time of publication; contact FCI for most current status*

FCI Exclusive Split-range, Dual Calibration – SR2x™
(Environmental Agency and Emissions Trading Compliance)

Many oil & gas operations, refineries and chemical plants have flare applications uniquely challenged with two diverse flow conditions, very low flow under normal conditions and very high flow during an upset/blowdown condition. These industries are then further challenged to comply with environmental agencies and emissions trading regulations for their flares stipulating flow meter accuracy of ±5% of reading throughout the entire measuring range. FCI answers this challenge with our exclusive SR2x split-range/dual calibration option in the ST100 Series which provides:

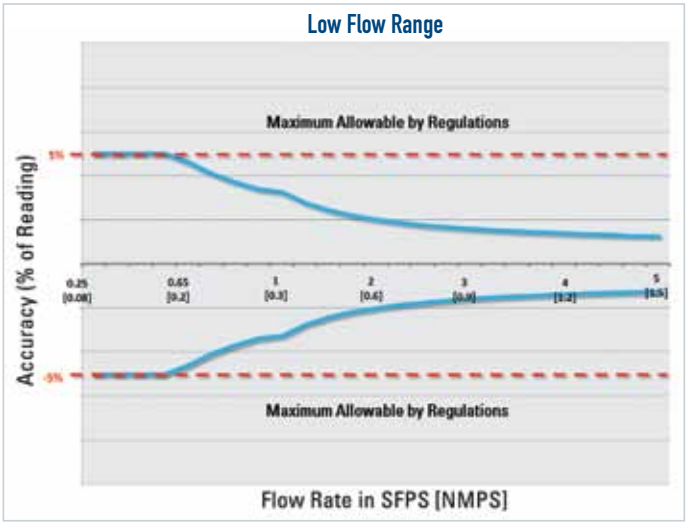
- **Split ranges:** Two separate and discrete ranges, one optimized in the low flow range and one optimized in the high flow range
- **Double calibration points** strategically placed and optimized in the low flow range and high flow range to achieve ±0.75% reading, ±0.5% of full scale to a maximum of ±5% of reading
- **Dual 4-20mA analog outputs:** One dedicated to the low flow range and the other to high flow range; this ensures maximum resolution of both the low flow and high flow range at the DCS, or, if any of the bus communications are specified, a single, contiguous high accuracy digital value over the entire flow range is sent to the DCS

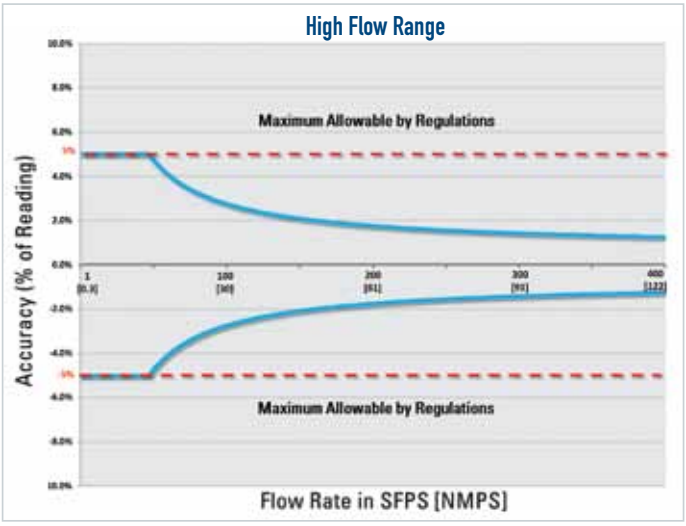
When your flare application is characterized by this difficult low flow/high flow situation, FCI's ST100 Series will provide a regulatory compliant, exclusive thermal dispersion flow meter solution.

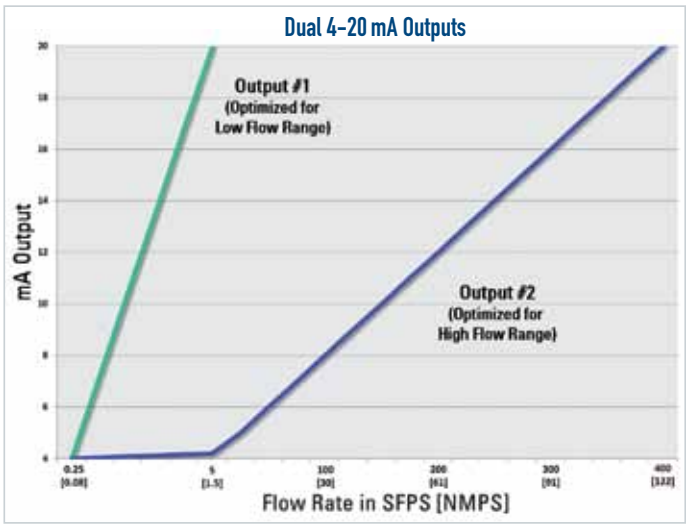
FCI Flare Gas Flow Meter Users *(partial list)*

ADGAS
AERA ENERGY
ALLIED PETRO-CHEMICAL LLC
AMERADA HESS
AMOCO TRINIDATE OIL CO
ANADARKO
ANKOR ENERGY LLC
AOC TEXAS CITY
APACHE
ARKEMA
ATLAS PIPELINE
ATOFINA
ATOFINA PETRO-CHEMICALS
BAPCO
BASF CORP
BAYER MATERIAL SCIENCE
BG EXPLORATION
BOAP OLEFINS
BOSNA -S OIL
BP
BUMI CARE OFFSHORE PRODUCTION
CARMEL OLEFINS
CENEX
CEPSA
CHEVRON
CHEVRON PHILLIPS
CHEVRON TEXACO
CONOCO PHILLIPS
DAQING PETRO-CHEMICAL
DEVON CANADA
DOW
DYNEGY
E.I. DUPONT
EASTMAN CHEMICAL
EL PASO PRODUCTION CO
ELK CITY OKLAHOMA PIPELINE
EMPRESA PETRO
EQUILON ENTERPRISES
EQUISTAR CHEMICALS
ERG
ETHYL PETROLEUM ADDITIVES INC
EVALCO
EXCELVER CORP
EXTERRAN
EXXON MOBIL
EXXON MOBIL CHEMICAL
FOREST OIL
FORTISTAR METHANE GROUP
FRONTIER EL DORADO REFINING
GASCO
GODLEY GAS PLT
GULF ISLAND LLC
GULF LIQUIDS LLC
HILDALGO PLATFORM
HITCO CARBON COMPOSITES INC
HOLLY REFINING & MARKETING
HOUSTON REFINING
HUNTSMAN
INDIAN OIL CORP
INNOVENE USA LLC
INVISTA INC
IOCL
KHALDA PETROLEUM
KINDER MORGAN
KUWAIT NATIONAL PETROLEUM
KUWAIT OIL CO
LASMO
LDH ENERGY
LUBRIZOL
MARKWEST ENERGY
MARTIN MIDSTREAM
MARYSVILLE HYDROCARBONS
MERIT ENERGY
MILLENIUM PETROCHEMICALS
MM PRIMA DESHECHA ENERGY LLC
MOBIL CHEMICAL INC
MOTIVA
ENTERPRISES
MURPHY EXPLORATION
NAM
NEO TAUNTON LLC
NORCO / RESOLUTION LLC
OIL REFINERIES LTD
ONEOK
ONGA
ONGC
ORICA CHEMICALS
ORIGIN ENERGY
PAN AMERICAN ENERGY
PASADENA HYDROGEN PLANT
PECTEN CAMEROON CO
PEMEX
PENN WEST PETROLEUM LTD
PERTAMINA
PETROBRAS
PETROFAC
PETRONAS
PETROZUATA
POLIMERI
PPG INDUSTRIES
QUIMEX
REPSOL
SABIC
SABINE PLANT
SAUDI ARAMCO
SECCO
SHANGHAI PETROCHEMICAL
SHELL
SHELL CHEMICAL
SICHUAN PETROCHEMICAL
SINCLAIR REFINERY
SINOPEC YANGZI PETROCHEMICAL
SIPETROL
SOLUTIA INC
SOLVAY
SOMERSET ENERGY REFINING
SUNCOR
SYNERGAS
TALISMAN ENERGY
TARGA RESOURCES
TENNESSE GAS PIPELINE
TESORO
TEXAS EASTMAN
TOTAL
TOTAL PETRO-CHEMICALS
UNION CARBIDE
UNITED GASCO
VALERO
VENOCO
WILLIAMS FIELD SERVICES
WRB REFINING LLC
YANSHAN PETROCHEMICAL
ZHAIKMUNAI OIL

Examples of Performance in 0.25 SFPS to 400 SFPS [0.08 NMPS to 122 NMPS]

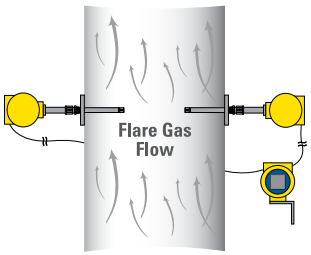






Dual-Element Systems

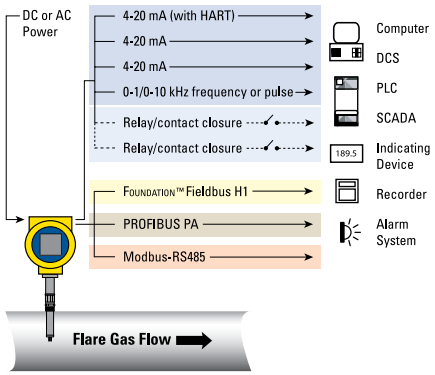
In pipe sizes larger than 16 inches [406 mm] a dual-element averaging system may provide better measurement performance and a more viable solution when it is impractical or impossible to provide the required straight-run or installation of a flow conditioner is difficult. ST100 Series models ST102A, ST112A, STP102A, and STP112A are dual-element averaging systems.



To determine if your flare meter application will benefit from using a dual-element averaging design, submit an FCI application data sheet or use AVAL, FCI's online flow meter sizing tool.

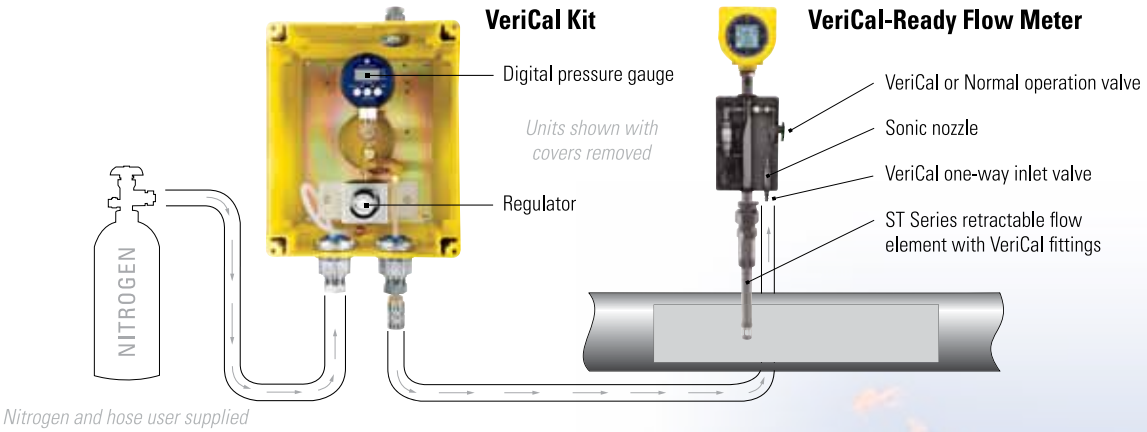
Communicate the Flow

Local readout, multiple 4-20 mA analog outputs, digital bus communications including HART, FOUNDATION™ fieldbus, Modbus and more, are all available with ST100 Series to provide the flare flow data to you and your systems. There is simply no other flare meter with the comprehensive selection of interfaces as ST100 Series. And, should you ever want to change or upgrade, ST100 is field upgradeable to any of the available outputs.



VeriCal™ In-Situ Calibration Verification

Many flare meter installations, either per plant edict or for compliance with environmental regulations, require regular validation of calibration. Traditionally this has required a cumbersome and costly project to remove the meter from service and return it to a lab, which is particularly frustrating if the meter is found to still be within calibrated specifications. FCI's exclusive VeriCal option eliminates the need for unnecessary de-installation. The VeriCal system provides a simple-to-use tool to verify the FCI flow meter is still within calibration without extracting the meter from pipe. The VeriCal system consists of a special VeriCal ready flow sensor, a portable VeriCal Kit (which can be used with any number of VeriCal-ready ST100 flow meters) and an additional benchmark calibration document to which field verification samples are compared. For more detailed information on VeriCal, please refer to FCI ST100 Series brochure.



Nitrogen and hose user supplied

"FCI flow meters have been providing accurate and easy-to-obtain venting data at our offshore facilities."

– M. Skaer, Facilities Engineer
ANKOR Energy LLC

Flare gas applications present several unique challenges to plant, process and instrument engineers when selecting a flow meter solution. These can include many or even all of the following:

- **Both low and high flow conditions –** low flow sensitivity is critical to capture leaking relief valves and sensing air leaking into system, and very high flows occur during upset conditions
- **Mixed gases –** flow meter calibration specifically for hydrocarbon composition gases and matched to actual process conditions
- **Large pipe sizes –** as line sizes increase effective and suitable flow metering technologies decrease
- **Lack of available straight-run –** larger line size and limited real estate, particularly on off-shore platforms, are restrictive to providing required straight-run to achieve repeatable flow metering accuracy
- **Compliance with local environmental regulations –** meet performance and calibration procedures mandated within local regulations such as US EPA's 10 CFR 40; 40 CFR 98; EU Directives 2003/87/EC and 2007/589/EC; US MMR 30 CFR Part 250, Subpart K, Section 250 and others
- **Limited access –** Pipe access and reaccess for installation, maintenance or servicing is difficult; spool-piece flow meters may require prolonged process shut-down and extensive on-site labor costs to install
- **Agency approvals for installation in hazardous (Ex) locations –** The entire flow metering instrument should carry agency approval credentials for installation in environments with potential hazardous gases; enclosure only ratings are inadequate (and risky)
- **Offshore platforms corrosive salt water –** offshore platform may require use of stainless steel on all exposed instrument materials, including sensors, process connections and enclosures

Key Criteria For Flare Flow Meter Selection

- Meet local environmental agency requirements for accuracy and periodic calibration verification
- Wide turndown for both low flow and high flow conditions
- Certified calibration for mixed hydrocarbon flare gases
- Multiple calibrations for variations in composition
- Direct mass flow measurement
- Easy to install, minimal penetration points
- Non-clogging, non-fouling, no moving parts design for lowest maintenance
- Agency approved for installation in explosive gas classified environments
- Stainless steel wetted parts and optional stainless steel process connections and enclosure housings

Comparison of Flow Meters Applied in Flares

	FCI Thermal Dispersion	Ultrasonic	Optical
Purchase Cost	$	$$$	$$
Installation Costs	$	$$$$	$$
Single Insertion Tap Installation	✔		✔
Sensor Alignment Critical		✔	
Flow Range ≥328 FPS [100 MPS]	✔ 1000 FPS [305 MPS]	✔ 394 FPS [120 MPS]	✔ 500 FPS [150 MPS]
Turn-down to 1000:1	✔	✔	✔
Direct Mass Flow Measuring	✔	NO *(Additional expense, process tap points and wire-ups for temperature and pressure sensors)*	NO *(Additional expense, process tap points and wire-ups for temperature and pressure sensors)*
Meets Environmental Agency Specifications for Accuracy	✔	✔	✔
SR2x™ Split-Range, Dual Calibration	✔	NO	NO
Temperature Service to 850 °F [454 °C]	✔	NO 536 °F [280 °C]	NO 212 °F [100 °C]
Pressure Service to 1000 psi [70 bar]	✔	✔	NO 300 psi [20 bar]

If you have previously applied thermal mass flow meters in your flare applications, look no further than ST100 for your next generation solutions. If you have never considered thermal flow meters for your flares, FCI's ST100 Series provides unsurpassed features, functions, performance and calibrations optimized for flare applications that deliver the best possible solution.

General Specifications Summary

Instrument

- **Measuring Capability**
  Flow rate, total flow and temperature (optional pressure)
- **Accuracy**
  Flow
  Standard: ±0.75% reading, ±0.5% full scale
  With SR2x: ±0.75% reading, ±0.5% full scale or ±5% of reading – whichever is better
  Temperature: ±2 °F [±1,1 °C]
- **Repeatability**
  Flow: ±0.5% reading
  Temperature: ±1 °F [±1 °C]
- **Turndown Ratio**
  Standard: Up to 1000:1
  With SR2x: Low flow range 20:1 up to 40:1; high flow range up to 1000:1
  Total effectively up to 4000:1

Flow Element

- **Material of Construction**
  All-welded 316L stainless steel; Hastelloy-C optional
- **Operating Pressure**
  Up to 1000 psig [69 bar(g)] depending on process connection type
- **Operating Temperature (Process)**
  From -40 °F to 850 °F [-40 °C to 454 °C]
- **Pipe Sizes Supported**
  2 1/2″ to 99″ [63 mm to 215 mm] *For smaller line sizes, see Model ST100L*
- **Process Connection**
  Retractable packing glands 50 psi, 500 psi, 1000 psi [3,4 bar, 34 bar, 70 bar], ANSI or DIN flange adjustable; or welded fixed, compression fittings

Flow Transmitter/Electronics

- **Enclosures**
  Polyester powder coated aluminum; optional all stainless steel; four (4) conduit ports threaded as 1/2″ NPT or M20
- **Dust/Water Protection**
  IP67, NEMA 4X
- **Power Supply**
  24 Vdc or 85 Vac to 265 Vac
- **Remoteable**
  Yes, up to 1000′ [300 m]
- **Outputs**
  Three (3) 4-20 mA with HART + one (1) frequency/pulse
  Selectable as 0-1 kHz or 0-10 kHz

  Three (3) 4-20 mA with HART + one (1) frequency/pulse
  Selectable as 0-1 kHz or 0-10 kHz + two (2) 2A relays

  With SR2x, one 4-20 mA output is dedicated to flow rate for low flow range, and one is dedicated to flow for high flow range

  FOUNDATION fieldbus H1

  PROFIBUS PA

  Modbus RS-485

  USB connected serial port and ethernet port always included
- **Inputs**
  Two (2) 4-20 mA
- **Readout/Display and Optical Touch Buttons (Optional)**
  Digital/graphical backlighted LCD; displays all process measurements continuously; includes four (4) optically activated (through glass) programming buttons
- **Calibrations**
  Up to five (5) unique calibrations stored and electronically selectable
- **Data Logger**
  On-board micro-SD (secure digital) memory card; 2 GB capacity supplied, stores approximately 21 M readings

Other Options

- **VeriCal™ In-Situ Calibration Verification System**
- **Dual-Element Systems**
- **Pressure Measurement**
- **Vortab® Flow Conditioners**
- **Transmitter Sun Shield**

For complete details and specifications
please see FCI's ST100 Series brochure – visit
www.FluidComponents.com
to request a copy or download a PDF

For smaller line applications (<2 1/2″ [63 mm]) such as flare purge lines or assist gas feed lines, look to FCI in-line style flow meters – **ST100L** or **ST75-ST75V Series**.

FCI FLUID COMPONENTS INTERNATIONAL LLC

Locally Represented By:

Visit FCI online at www.FluidComponents.com | FCI is ISO 9001:2000 and AS9100 Certified

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Order Information Sheet (OIS)

ST100

Insertion Air/Gas Mass Flow Meter

	Flow Element (FE)								Flow Transmitter (FT)					Calibration					General
ST100 -		0							-				E	-					-	
Block No.	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16	17	18	19

INSTRUCTIONS: To order an **ST100**, please fill in each numbered block above by selecting required codes from the corresponding categories below. Use of any "W" or "*" codes requires prior approval from FCI. For special data, documentation, test reports or required quality reports, refer to FCI's Engineering and Quality Assurance Order Information Sheets (OIS).

Flow Element

Code			[BLOCK 1] Flow Element: Temperature Service, Type and Materials of Construction
350°F [177°C]	500°F [260°C]	850°F [454°C]	
1	2	3[1]	–FPC style; 316L stainless steel
A	B	C[1]	–FPC style; Hastelloy C276
4	5	6[1]	–FP style; 316L stainless steel
D	E	F[1]	–FP style; Hastelloy C276
7	8	9[1]	–S style; 316L stainless steel
G	H	J[1]	–S style; Hastelloy C276
W	W	W[1]	Agency approved, customer specified
*	*	*	Other, not agency approved

Code	[BLOCK 2]
0	*Block 2 Code is always "0"*

Code BLOCK 3	Code BLOCK 4	[BLOCKS 3-4] Process Connections
Compression Fitting, Teflon Ferrule[3]		
C	0	3/4 inch, male NPT[4]
D	0	1 inch, male NPT[4]
G	Table A	Flange, tapped and threaded for 3/4 inch fitting[15]
Compression Fitting, Metal Ferrule[3] *Metal ferrule permanent locks after tightening*		
M	0	3/4 inch, male NPT[4]
N	0	1 inch, male NPT[4]
J	Table A	Flange, tapped and threaded for 3/4 inch fitting[15]
Retractable Packing Gland, Low Pressure; 50 psig [3,5 bar (g)][2]		
P	0	1 1/4 inch, male NPT; graphite packing
H	0	1 1/4 inch, male NPT; Teflon packing
Q	Table A	Flange[5,15]; graphite packing
K	Table A	Flange[5,15]; Teflon packing
Retractable Packing Gland, Medium Pressure; 500 psig [34 bar (g)][2,17]		
R	0	1 1/4 inch, male NPT; graphite packing
L	0	1 1/4 inch, male NPT; Teflon packing
T	Table A	Flange[5,15]; graphite packing
V	Table A	Flange[5,15]; Teflon packing
Fixed		
Y	0	1 inch, male NPT
F	Table A	Flange[15]
Other or Special		
W	W	Agency approved, customer specified
*	*	Other, not agency approved

Code BLOCK 5	Code BLOCK 6	Code BLOCK 7	[BLOCKS 5-7] Insertion Length
0	6	0	Variable length: 1 inch to 6 inch [25 mm to 152 mm]
1	2	0	Variable length: 1 inch to 12 inch [25 mm to 305 mm]
2	1	0	Variable length: 1 inch to 21 inch [25 mm to 533 mm]
3	6	0	Variable length: 1 inch to 36 inch [25 mm to 914 mm]
6	0	0	Variable length: 1 inch to 60 inch [25 mm to 1524 mm]
☐	☐	. ☐	Fixed length (required if Code Y or F in Block 3) or custom variable length; specify req'd length to 0.1 inch *E.g. 18 inches = 18.0, max. length is 99.9 inches*

Code	[BLOCK 8] Pipe Mounting and Flow Direction
1	Horizontal, flow right-to-left or vertical up
2	Horizontal, flow left-to-right or vertical down

(continued next page)

Table A – Flange [BLOCK 4]

CS[15]	316L SS	Hast C	Material		
D	1	C	ANSI	1 inch	150 lb
E	A	G	ANSI	1 inch	300 lb
F	2	H	ANSI	1 1/2 inch	150 lb
K	B	J	ANSI	1 1/2 inch	300 lb
P	3	M	ANSI	2 inch	150 lb
R	L	N	ANSI	2 inch	300 lb
	T		DIN	DN25	PN40
	V		DIN	DN40	PN40
	6		DIN	DN50	PN16
	Y		DIN	DN50	PN40
W			Agency appvd, custmr spec'd		

Notes

1. **850°F [454°C] temperature service**: All compression fittings and fixed flanged of 1 inch or DN25 process connections are not valid. Process connections in Block 3 must be P, H, Q, K, R, L, T, V, Y, or F; and if Code F, Block 4 cannot be code D, 1, C, E, A, G or T. Model ST100 transmitter maximum temperature is 150 °F [65 °C] and Model ST102 A is 120 °F [49 °C], so remote mounting (Block 9, Code 2, B, 4 or D) and use of Teflon jacked cable (Block 10, Code 1, 2, 3, or 4) is recommended.
2. Teflon packing material must be ordered when the process media is ozone, chlorine or bromine. *Contact FCI.*
3. Teflon ferrule maximum is 200 °F [93 °C], 150 psig [10 bar (g)]. Metal ferrule maximum is 500 °F [260 °C], 1000 psig [69 bar (g)].
4. –S style sensor is retractable (will recess) into both 3/4 " and 1 " NPT. –FP style sensor is retractable (will recess) into 1 " NPT only.
5. Minimum flange size is 1 1/2 " or DN40.
6. Transmitter enclosure has four (4) female conduit ports, NPT = 1/2 ", metric = M20 x 1.5. With remote mount, the local enclosure's conduit port (attached to the flow element) varies by type of process connection and enclosure material specified:

		Aluminum		Stainless Steel	
Model	**Process Connection**	**NPT**	**Metric**	**NPT**	**Metric**
ST100, ST102A	Block 3 = C, D, G, M, N, J, F*	(2) 1/2 "	(2) M20 x 1.5	(1) 1/2 "	(1) M20 x 1.5
ST100, ST102A	Block 3 = P, H, Q, K, R, L, T, V, Y, F**	(1) 1/2 "	(1) M20 x 1.5	(1) 1/2 "	(1) M20 x 1.5
ST100L	Block 3 = Any	(2) 1/2 "	(2) M20 x 1.5	(1) 1/2 "	(1) M20 x 1.5
ST110, ST112A, and all STP	Block 3 = Any	(1) 1/2 "	(1) M20 x 1.5	(1) 1/2 "	(1) M20 x 1.5

* with 1" or DN25 flange

** with flange size larger than 1" or DN25

15. Cannot select carbon steel flange when Hastelloy type flow element is selected in Block 1.
17. Selection of medium pressure packing gland requires remote mount configuration. Block 9 must be Code 2, B, 4 or D.

(continued from previous page)

Transmitter and Electronics

Code	[BLOCK 9] Transmitter Mounting, Enclosure Material and Cable Entry Threading
1	Integral mount, aluminum; NPT cable entries [6]
A	Integral mount, aluminum; metric cable entries [6]
2	Remote mount, aluminum; NPT cable entries [6]
B	Remote mount, aluminum; metric cable entries [6]
3	Integral mount, stainless steel; NPT cable entries [6]
C	Integral mount, stainless steel; metric cable entries [6]
4	Remote mount, stainless steel; NPT cable entries [6]
D	Remote mount, stainless steel; metric cable entries [6]
W	Agency approved, customer specified
*****	Other, not agency approved

Code	[BLOCK 10] Interconnecting Cable Length for Remote Configuration
0	Not required *Specify with integral configurations, user supplied cable, or if cable ordered as separate line item from ST100 series accessories* [7, 16]
A	10 feet [3 meters] PVC jacketed [8]
B	25 feet [7,6 meters] PVC jacketed [8]
C	50 feet [15 meters] PVC jacketed [8]
D	100 feet [30 meters] PVC jacketed [8]
1	10 feet [3 meters] Teflon jacketed [8]
2	25 feet [7,6 meters] Teflon jacketed [8]
3	50 feet [15 meters] Teflon jacketed [8]
4	100 feet [30 meters] Teflon jacketed [8]
W	Other
*****	Non agency approved cable type or length other than above

Code	[BLOCK 11] Transmitter Power Supply and Display
A	24 Vdc power (19.2 Vdc to 28.8 Vdc); no digital display
B	24 Vdc power (19.2 Vdc to 28.8 Vdc); with display
C	85 Vac to 265 Vac power; no display
D	85 Vac to 265 Vac power; with digital display

Code	[BLOCK 12] Transmitter Outputs and Communications
1	(3) 4-20 mA outputs, one with HART; (1) frequency/pulse output
F	FOUNDATION™ fieldbus H1 [9]
M	Modbus 485 [9]
P	PROFIBUS-PA [9]
W	Other
*****	Other, not agency approved

Code	[BLOCK 13]
E	Always "E"

Calibration [10, 11, 12]

Code	[BLOCK 14] Calibration Application	
Standard Calibration: General Purpose		
A	Air:	1.25 SFPS to 125 SFPS; 10 psia to 65 psia; 40 °F to 100 °F [0,4 NMPS to 38 NMPS; 0,7 bar(a) to 3,5 bar(a); 4 °C to 38 °C]
D	Compressed air:	6 SFPS to 600 SFPS; 50 psia to 165 psia; 40 °F to 100 °F [1,8 NMPS to 183 NMPS; 3,5 bar(a) to 11 bar(a); 4 °C to 38 °C]
Custom Calibration: Calibration matched to user specified gas, flow range and conditions		
B	Air	
C	Specific gas equivalency (digester gas, flue gas, etc.)	
E	Nitrogen, helium, argon, CO_2, compressed air, digester gas	
1	Natural gas (90% or greater methane content)	
F	Hydrocarbons (methane, ethane, propane, etc.)	
G	Hydrogen or hydrogen mixture	
S	Flare gas, SR2x split-range, double calibration points, maximun 5% rdg accuracy *See specifications*	
W [13]	Agency approved, customer specified	

Code	[BLOCK 15] Calibrations, Setup and Conditions
0	Standard
A	Extended temperature compensation
B	Extended range (>100:1 turndown)
C	Vortab (VEL, VFK, VIS, VMR or VSR)
1	Vortab (VIP)

Code	[BLOCK 15] Calibrations, Setup and Conditions
D	Flat velocity profile
E	Extended temperature compensation and extended range
F	Extended temperature compensation and Vortab (VEL, VFK, VIS, VMR or VSR)
2	Extended temperature compensation and Vortab (VIP)
G	Extended temperature compensation and flat velocity profile
H	Extended range and Vortab (VEL, VFK, VIS, VMR or VSR)
J	Extended range and flat velocity profile
3	Extended range and Vortab (VIP)
K	Extended temperature compensation, extended range and Vortab (VEL, VFK, VIS, VMR or VSR)
4	Extended temperature compensation, extended range and Vortab (VIP)
L	Extended temperature compensation, extended range and flat velocity profile

Code	[BLOCKS 16-17] Second Calibration
0 0	Not required
☐ ☐	Select from Codes shown in Blocks 14-15

Code	[BLOCK 18] Additional Calibration Groups
0	Not required
3	Three (3) calibration groups; two as specified in Blocks 14-17, plus one additional [14]
4	Four (4) calibration groups; two as specified in Blocks 14-17, plus two additional [14]
5	Five (5) calibration groups; two as specified in Blocks 14-17, plus three additional [14]

General

Code	[BLOCK 19] Agency Approval
CE Mark always included	
0	Not required
1	FM, FMc
3	ATEX, IECEx [16]
5	EAC / TR CU (Russia)
6	Inmetro
7	NEPSI
*****	Other *Contact FCI for other approvals and conditions of use*

Notes

6. *See Notes, page 1*
7. Remote cable in an ST100 Series model is 8-conductor; remote cable in an STP100 Series model is 10-conductor. For user-supplied cable, overall shielded conductor type is required and wire resistance must be less than 8 Ohms.
8. Cable suitable for conduit and some cable gland systems. For other cable gland system choices, see ST100 accessories list or contact FCI to supply separately. PVC cable maximum temperature 176 °F [80 °C]; Teflon cable maximum temperature 392 °F [200 °C].
9. No analog, frequency/pulse, or other digital bus communications.
10. FCI standard conditions are 14.7 psia [1,01 bar(a)] and 70 °F [21.1 °C].
11. Calibration codes must be selected using FCI's proprietary AVAL application evaluation software.
12. Transmitter setup, changes to factory supplied standard settings, verification or modification to calibration parameters or diagnostics requires external source communication with the transmitter.
13. Customer specified calibration must not exceed temperature and pressure limitations of the ST100 Series product specifications.
14. May specify up to three (3) additional calibrations for a total of five (5). Contact FCI for instructions on how to specify third, fourth and/or fifth calibration.
16. ATEX/IECEx rated remote requires cable glands or conduit fittings which meet or exceed the installation area's required rating. When rated cable glands, armored cables and non-armored cable supplied are user supplied or selected from ST100 accessories list and ordered separately, enter Code 0 in Block 10.

Accessories

Part Number	Description
Sun Shield Kits Shades main transmitter, electronics, and/or display from direct sunlight; 316L stainless steel; attached directly to housing; kit includes shield, all hardware for attachment and instruction sheet	
023241-01	For use with **integral** mount transmitter
023237-01	For use with **remote** mount transmitter

Refer to separate ST100 Series Accessories List for a complete listing of all accessories such as cabling, ball valves, documentation test and QA documents and certificates, and spare parts.