# STP110 Mass Flow Meter with VeriCal FLUID COMPONENTS

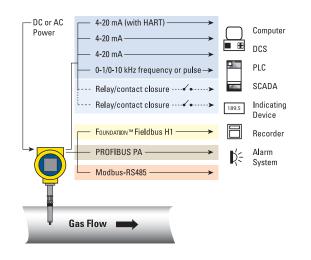
# Thermal Dispersion Air/Gas Insertion Flow Meter with Pressure Measurement



The Model STP110 is the only insertion thermal dispersion gas mass flow meter available featuring pressure measurement to create a triple function solution (flow + temperature + pressure) in a single tap point insertion instrument an industry first and FCI exclusive feature. Model STP110 features FCI's exclusive patented VeriCal system. VeriCal provides you with the ability to perform periodic field validation and verification of the flow meter's measuring performance and calibration without extracting the flow meter from the pipe or process.

### **Flow Element and Process Connections**

- All welded construction
- 316L stainless steel
- Fast response and extra-rugged duty choices
- Variable (adjustable) and fixed insertion depths
- NPT, flanges, hot-tap retractable packing gland connections



# **Model STP110 Features**

- Validate Performance On-Site in Minutes
- Save Costs, No Need to Remove Flow Meter from Process
- Comply with ISO and Local Regulations for Periodic Calibration Verification
- Compatible with More than 200 Gases
- Direct Mass Flow Measurement
- Triple Function Flow, Temperature and Pressure
- Temperature Service to 212 °F [100 °C]
- No Moving Parts, Non-Clogging
- Easy, Low Cost Single Point Insertion
- Best-In-Class Digital/Graphical Readout
- Multiple Analog Outputs
- Extensive Bus Communications Options
- Agency Approvals on Full Instrument
- Provides In-Situ Flow Element Cleaning
- On-Board Data Logger

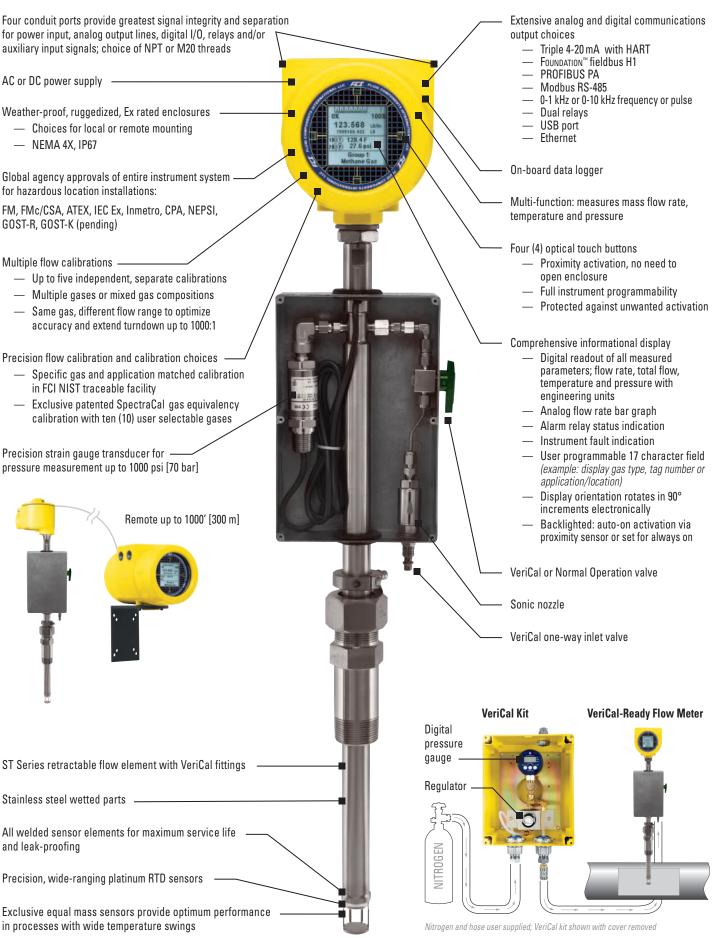
### **Transmitter and Electronics**

- All metal enclosure
- Four (4) conduit ports
- 2" x 2" [50 mm x 50 mm] backlighted LCD readout/display
- Flow, total flow, temperature and pressure
- Triple analog outputs with HART
- FOUNDATION<sup>™</sup> fieldbus, PROFIBUS PA, Modbus options
- Dual relays/alarms option
- Integral or remote mounting (up to 1000')
- AC or DC power
- Agency approvals for Division 1, Zone 1 hazardous locations
- Standard and extended range temperature compensation
- Data logging to removable micro-SD card

#### Calibration

- Calibrated to your installation conditions and gas specifications on one of 18 precision, NIST traceable flow stands
- Up to five (5) unique calibrations stored onboard
- SpectraCal<sup>™</sup> 10 user selectable / changeable gases

# Model STP110 Features



# Model STP110 Single Point Insertion Mass Flow Meter Specifications

### Instrument

- Measuring Capability: Flow rate, total flow, temperature and pressure
- Basic Style: Insertion, single element with pressure measurement and VeriCal<sup>™</sup> capability Flow Measurement Range: 0.25 SFPS to 600 SFPS [0,07 NMPS to 172 NMPS]
- Air at standard conditions;  $ar{7}0\,^{
  m oF}$  and 14.7 psia [0  $^{
  m oC}$  and 1013,25 bar (a)] Temperature Measurement Range: Commensurate with element:
- see operating temperature in flow element specification **Pressure Measurement Range**

# Available Ranges

0 psig to 50 psig [0 bar (g) to 3,4 bar (g)]

- 0 psig to 160 psig [0 bar(g) to 11 bar(g)]
- 0 psig to 500 psig [0 bar(g) to 34 bar(g)
- 0 psig to 1000 psig 0 bar (g) to 70 bar (g)]
- Media: All gases that are compatible with the flow element material

#### Accuracy Flow:

Gas Specific Calibration: ±0.75% reading, ±0.5% full scale

SpectraCal<sup>™</sup> Gas Equivalency: Typically ±4% reading, ±0.5% full scale; gas conditions specific to application will determine accuracy; utilize FCI's online tool, AVAL, to evaluate your application and provide expected accuracy

Temperature: ±2 °F [±1,1 °C] (display only, flow rate must be greater than 5 AFPS [1,5 m/sec]) Pressure: ±0.25% full scale pressure range

#### Repeatability

Flow: ±0.5% reading

**Temperature:**  $\pm 1 \text{ °F} [\pm 1 \text{ °C}]$  (flow rate must be greater than 5 AFPS) **Pressure:** ≤±1.0% of span

#### **Temperature Coefficient**

With optional temperature compensation; valid from 10% to 100% of full scale calibration

Flow: Maximum ±0.015% of reading / °F [±0.03% of reading / °C]

#### **Turndown Ratio**

Standard: Factory set and field adjustable from 10:1 to 100:1 within calibrated flow range

**Temperature Compensation** 

Standard: ±30 °F [±16 °C] Optional: ±100 °F [±55 °C]

#### **Agency Approvals**

FM, FMc (Canadian): Class I, Division 1, Hazardous Locations; Groups B,C,D,E,F,G

ATEX and IECEx: Zone 1, II 2 GD Ex d IIC T4 NEPSI, CPA, Inmetro, GOST-R, GOST-K pending

EX-rated pressure sensor:

FM, CSA: Class I, Division 1, Groups A, B, C, D

Dust ignition proof for Class II, Division 1, Groups E.F.G

- ATEX: 2 G Ex d C T4, Ex d IIC T5, Ex d IIC T6
- Calibration: Performed on NIST traceable equipment

# Flow Element

#### Material of Construction

- All-welded 316L stainless steel
- **Operating Pressure** limited by pressure sensor

Fixed Connection NPT: Per pressure sensor rating or 1000 psig [70 bar(g), whichever is less Fixed Connection Flanged: Per pressure sensor rating or flange rating, whichever is less

#### **Operating Temperature (Process)**

Standard Pressure Sensor: 32 °F to 176 °F [0 °C to 80 °C] Ex Rated Pressure Sensor: -22 °F to 212 °F [-30 °C to 100 °C]

# **Process Connection**

**Retractable Packing Glands** 

Low pressure 50 psig [3,5 bar (g)]) or medium pressure (500 psig [34 bar (g)]) with graphite or Teflon packing material; 1 1/4" male NPT or ANSI or DIN flange

Teflon packing required when process media is ozone, chlorine or bromine Fixed Fittings: 1" male NPT or ANSI or DIN flange

Insertion Length: Field adjustable lengths

- 1" to 6" [25 mm to 152 mm]
- 1" to 12" [25 mm to 305 mm] 1" to 21" [25 mm to 533 mm]
- 1" to 60" [25 mm to 1524 mm]

Fixed lengths from 2.6" to 60" [66 mm to 1524 mm]

Remote Transmitter Configurations: Transmitter may be mounted remotely from flow element using interconnecting cable (up to 1000' [300 m]); remote mount required when medium pressure packing gland is required

#### Pressure Sensor

**Ex Rated Sensor** 

Standard Sensor
Pressure range
Over pressure safety
Burst pressure
Wetted Materials:
Connection
Pressure Sensor

e	50	3,4	160	11	500	34	1000	70	
safety	100	7	290	20	1000	70	1740	120	
е	250	17,24	500	34	2500	172	7975	550	
ials: 1 Sensor	316L PH 13-8 SS		316L 316L		316L 316L		316L 316L		
•	PSI	Bar	PSI	Bar	PSI	Bar	PSI	Bar	
e	50	3,4	160	11	500	34	1000	70	
safety	240	16.55	1160	80	1160	80	1740	120	

95,84

5800

Bar PSI Bar

400

Stainless steel

SS and Elgiloy

PSI

7970

Stainless steel

SS and Elgilov

Bar

549,5

Bar

PSI

PSI

1390

Stainless steel

Stainless steel

Pressure range	50	3,4
Over pressure safety	240	16,55
Burst pressure	290	20
Wetted Materials:		
Connection	Stainle	ss steel
Pressure Sensor	Stainle	ss steel

# Flow Transmitter/Electronics

Operating Temperature: 0 °F to 150 °F [-18 ° to 65 °C]

#### Input Power

AC: 85 Vac to 265 Vac

**DC:** 24 Vdc ± 20%

Outputs 

#### Analog

Standard: Three (3) 4-20 mA\*, 0-1kHz, or 0-10 kHz pulse/frequency 4-20 mA outputs are user assignable to flow rate, temperature and/or if so equipped, pressure; outputs are user programmable to full flow range or subsets of full flow range; pulse/frequency output is user selectable as pulse for external counter/flow totalizer, or as 0-1 kHz or 0-10 kHz frequency representing flow rate

Outputs are isolated and have fault indication per NAMUR NE43 guidelines, user selectable for high (>21.0 mA) or low (<3.6 mA)

Optional: Standard output plus two (2) 2A SPDT relays

Relays independently user assignable to flow, temperature or pressure; user programmable for hi/lo trip, hysteresis from 00.0 to 99.9 counts and time delay from 00.0 to 99.9 seconds

### Digital

Standard: USB. Ethernet

Optional: HART (comes standard with analog outputs, V7 compliant) FOUNDATION<sup>™</sup> fieldbus H1, PROFIBUS PA or Modbus RS-485

#### **Auxiliary Inputs**

Two 4-20 mA input channels; used for FCI administered special configurations to allow STP110 series to accept outputs from external devices such as gas analyzers, gas composition or pressure sensors

#### Enclosures Main Transmitter/Electronics:

NEMA 4X, IP67; polyester powder coated aluminum; 1 conduit port threaded as 1 " NPT or M20x1.5; 5.40" x 4.82" [137.2 mm x 122 mm]

#### Local Enclosure (Remote Configuration):

NEMA 4X, IP67; polyester coated aluminum; 1 conduit port threaded as 1 " NPT or M20x1.5; 5.40 " x 4.82 " [137.2 mm x 122 mm]

### Data Logger

User programmable for readings per time increment to a maximum of 1 reading/ second; removable, circuit board-mountable 2GB micro-SD (secure digital) memory card supplied; stores approximately 21M readings in ASCII comma-separated format

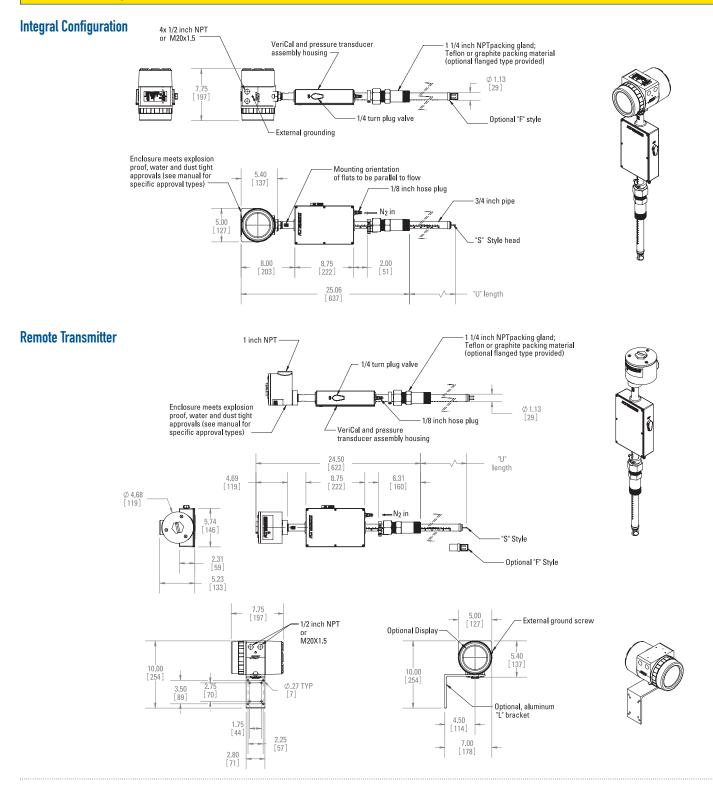
#### Readout/Display and Optical Touch Buttons (Optional):

- Large 2" x 2" [50 mm x 50 mm] LCD; digital plus bar graph and engineering units
  - Digital displays of flow rate, total flow, temperature and pressure (with STP models); user selectable for engineering units
  - Analog bar graph of flow rate
  - Relay/alarm status indication
  - User programmable 17 alphanumeric character field associated with each calibration group
- Set-Up & Service mode displays text and service codes
- Backlighted backlight activated by proximity motion detection, or user may set for always on
- Four (4) optical touch buttons for user programming of instrument set-up and service interrogation
- Optical touch button activation through front window no need to open enclosure to access or activate
- Display is electronically rotatable in 90° increments to optimize viewing angle

Note: If readout/display not ordered, all user set-up and service interrogation must be done via computer link to bus comm and/or USB port.

Specifications at reference operating conditions of 70 °F, 14.7 psia [21.1 °C, 1.013 bar (a)] and straight pipe run 20d upstream, 10d downstream. FCI is a continuous improvement company; specifications subject to change without notice

# Model STP110 Single Point Insertion Mass Flow Meter



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0311 OK

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

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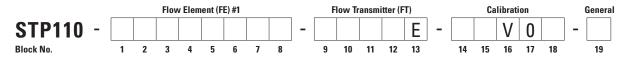
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# Order Information Sheet (OIS)

**STP110** 

# Insertion Air/Gas Mass Flow and Pressure Meter with VeriCal<sup>™</sup>



**INSTRUCTIONS:** To order an **STP110**, 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 Eleme	ent				
Code	[BLOCK 1	] Flow Elei	ment: Type ar	nd Materials of Construct	tion
Y	-FP style	with pressur	e and VeriCa	l; 316L stainless steel	
w	Agency ap	proved, cust	omer specifi	ed	
*	Other, not a	agency appr	oved		
Code		] Pressure rials of Cons		nt: Range, Temperature S	Service
Standard Non-Ex Rated	Ex Rated	Range		Standard	Ex
1	5	0 psig to 50 [0 bar (g) to	psig 3,447 bar(g)]	32°F to 176°F [0°C to 80°C]; PH 13-8 SS	-22 °F to 212 °F [-30 °C to 100 °C]; 316L
2	6	0 psig to 16 [0 bar (g) to	0 psig 11,03 bar(g)]	32 °F to 176 °F [0 °C to 80 °C]; 316L	-22 °F to 212 °F [-30 °C to 100 °C]; 316L
3	7	0 psig to 50 [0 bar (g) to	0 psig 34,47 bar(g)]	32 °F to 176 °F [0 °C to 80 °C]; 316L	-22 °F to 212 °F [-30 °C to 100 °C]; 316L and Elgiloy
4	8	0 psig to 10 [0 bar (g) to		32 °F to 176 °F [0 °C to 80 °C]; 316L	-22 °F to 212 °F [-30 °C to 100 °C]; 316L and Elgiloy
W *	W *		proved, custo agency appro	omer specified oved	
Code BLOCK 3	Code BLOCK 4	[ BLOCKS Process C	3-4] onnections		
Retractable	e Packing G	land, Low Pr	essure; 50 ps	sig [3,5 bar(g)] <sup>2</sup>	
Р	0	1		graphite packing	
н	0	1 1/4 inch,	male NPT;	Teflon packing	
Q	Table A	Flange <sup>5, 15</sup>		graphite packing	
К	Table A	Flange <sup>5, 15</sup>		Teflon packing	
Retractable	e Packing G	land, Mediu	n Pressure; S	500 psig [34 bar(g)] <sup>2, 17</sup>	
R	0	1 1/4 inch,	male NPT;	graphite packing	
L	0	1 1/4 inch,	male NPT;	Teflon packing	
т	Table A	Flange <sup>5, 15</sup>	;	graphite packing	
v	Table A	Flange <sup>5, 15</sup>		Teflon packing	
Fixed	I	I			
Y	0	1 inch, ma	e NPT		
F	Table A	Flange <sup>15</sup>			
Other or Sp	ecial	-			
W	W	Agency ap	proved, cust	omer specified	
*	*	Other, not	agency appro	oved	
Code BLOCK 5	Code BLOCK 6		[BLOCKS 5- Insertion Ler		
0	6	0	Variable lend	th: 1 inch to 6 inch [25 mi	m to 152 mm]
1	2		-	th: 1 inch to 12 inch [25 n	
2	1	0	Variable leng	th: 1 inch to 21 inch [25 n	nm to 533 mm]
3	6	0	Variable leng	)th: 1 inch to 36 inch [25 n	nm to 914 mm]
6	0	0	Variable leng	th: 1 inch to 60 inch [25 n	nm 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 <i>E.g. 18 inches = 18.0, max. length is 99.9 inches</i>			
Code	[BLOCK 8]	] Pipe Mou	inting and Flo	ow Direction	
1	Horizonta	l, flow right-t	o-left or vert	ical up	
2		-	-right or vert		
-			5		

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

(continued next page)

Table A – Flange [ BLOCK 4]					
CS 15	316L SS	Hast C Material			
F	2	Н	ANSI	1 1/2 inch	150 lb
K	В	J	ANSI	1 1/2 inch	300 lb
Р	3	М	ANSI	2 inch	150 lb
R	L	Ν	ANSI	2 inch	300 lb
	v		DIN	DN40	PN40
	6		DIN	DN50	PN16
	Y		DIN	DN50	PN40
	W Agency appvd, custmr spec'd				stmr spec'd

#### Notes

- Teflon packing material must be ordered when the process media is ozone, chlorine or bromine. Contact FCI.
- Transmitter enclosure has four (4) female conduit ports, NPT = 1/2", metric = M20x1.5. With remote mount, the local enclosure's conduit port (attached to the flow element) varies by type of process connection and enclosure material specified:

				Stainless Steel		
<u>Model</u>	Process <u>Connection</u>	NPT Metric		<u>NPT</u>	<u>Metric</u>	
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)

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 <sup>7,16</sup>		
Α	10 feet [3 meters] PVC jacketed <sup>8</sup>		
В	25 feet [7,6 meters] PVC jacketed <sup>8</sup>		
C	50 feet [15 meters] PVC jacketed <sup>8</sup>		
D	100 feet [30 meters] PVC jacketed <sup>8</sup>		
1	10 feet [3 meters] Teflon jacketed <sup>8</sup>		
2	25 feet [7,6 meters] Teflon jacketed <sup>8</sup>		
3	50 feet [15 meters] Teflon jacketed <sup>8</sup>		
4	100 feet [30 meters] Teflon jacketed <sup>8</sup>		
w	Other		
*	Non agency approved cable type or length other than above		
Code	[BLOCK 11] Transmitter Power Supply and Display		
Α	24 Vdc power (19.2 Vdc to 28.8 Vdc); no digital display		
В	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 <sup>9</sup>		
м	Modbus 485 <sup>9</sup>		
Р	PROFIBUS-PA <sup>9</sup>		
P W	PROFIBUS-PA® Other		
W	Other		

#### Calibration 10, 11, 12

Code	[BLOCK 14] Ca	libration Application			
Standard C	alibration: General l	Purpose			
Α	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 Ca	libration: Calibratior	n matched to user specified gas, flow range and conditions			
В	Air				
C	Specific gas equiv	Specific gas equivalency (digester gas, flue gas, etc.)			
E	Nitrogen, helium,	argon, CO <sub>2</sub> , compressed air, digester gas			
1	Natural gas (90%	or greater methane content)			
F	Hydrocarbons (me	ethane, ethane, propane, etc.)			
G	Hydrogen or hydro	ogen mixture			
S	Flare gas, SR2x sp See specifications	lit-range, double calibration points, maximun 5% rdg accuracy			
<b>W</b> <sup>13</sup>	Agency approved,	, customer specified			
Code	[BLOCK 15] Ca	librations, Setup and Conditions			
0	Standard				
Α	Extended tempera	ture compensation			
В	Extended range (>100:1 turndown)				
C	Vortab (VEL, VFK, VIS, VMR or VSR)				
1	Vortab (VIP)	Vortab (VIP)			
D	Flat velocity profil	e			
E	Extended tempera	ture compensation and extended range			
F	Extended tempera	ture compensation and Vortab (VEL, VFK, VIS, VMR or VSR)			
2	Extended tempera	ture compensation and Vortab (VIP)			
G	Extended tempera	Extended temperature compensation and flat velocity profile			
н	Extended range and Vortab (VEL, VFK, VIS, VMR or VSR)				
J	Extended range a	nd flat velocity profile			
3	Extended range a	nd Vortab (VIP)			
к	Extended tempera (VEL, VFK, VIS, VN	ture compensation, extended range and Vortab IR or VSR)			
4	Extended tempera	ture compensation, extended range and Vortab (VIP)			
L	Extended tempera	ture compensation, extended range and flat velocity profile			

#### Code [BLOCKS 16-17] Second Calibration

V 0 VeriCal calibration

Code	[BLOCK 18]	Additional Calibration Groups
------	------------	-------------------------------

0 Not required

- 3 Three (3) calibration groups; two as specified in Blocks 14-17, plus one additional<sup>14</sup>
- 4 Four (4) calibration groups; two as specified in Blocks 14-17, plus two additional<sup>14</sup>
- 5 Five (5) calibration groups; two as specified in Blocks 14-17, plus three additional <sup>14</sup>

#### General

Code	[BLOCK 19] Agency Approval
CE Mark a	lways included
0	Not required
1	FM, FMc <sup>20</sup>
3	ATEX, IECEx <sup>16,20</sup>
5	EAC / TR CU (Russia) <sup>20</sup>
6	Inmetro <sup>20</sup>
7	NEPSI 20
*	Other Contact FCI for other approvals and conditions of use

#### Notes

- 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.
- 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.
- Transmitter setup, changes to factory supplied standard settings, verification or modification to calibration parameters or diagnostics requires external source communication with the transmitter.
- Customer specified calibration must not exceed temperature and pressure limitations of the ST100 Series product specifications.
- 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 nonarmored cable supplied are user supplied or selected from ST100 accessories list and ordered separately, enter Code 0 in Block 10.
- 20. Requires selection of Ex rated pressure sensor Block 2 Code must be 5, 6, 7 or 8.

#### Accessories

Part Number	Description			
020849-03	VeriCal Kit Precision flow regulator, digital pressure gauge and interconnection hardware within NEMA 4 [IP66] rated enclosure; 25 foot [7,6 meter] quick- disconnect air hose			
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 <b>remote</b> 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.

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