TECHNICAL SPECIFICATIONS

KURZ INSTRUMENTS INC.

Insertion Flow Meter
Series 454FTB-WGF

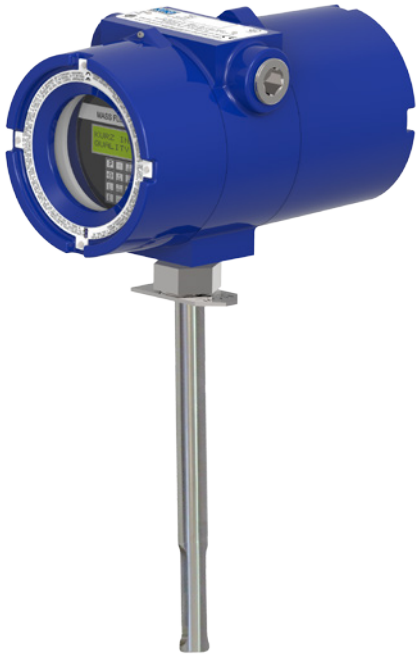
The Kurz WGF single-point insertion flow meter for condensing gas environments includes the qualities and features found in all Kurz constant temperature thermal flow meters that make them outperform all other currently available thermal mass flow meters, including:

- The first thermal mass flow meter offering accurate and reliable condensing gas flow measurements (patent pending)
- Built-in dry gas flow calculation on all flow units for saturated processes
- User-selectable CH_4 composition for a CH_4/CO_2 gas mix
- Multiple gas calibrations for up to five user-selectable pure or mixed gas calibration curves
- The highest repeatability, accuracy, and reliability available
- The fastest response to temperature and velocity changes in the industry
- Constant temperature thermal technology
- Interchangeable sensor and electronics (single circuit board) — no matched sets
- Continuous self-monitoring electronics that verify the integrity of sensor wiring and measurements
- Zero velocity as a valid data point
- Sensor does not overheat at zero flow by using a unique constant temperature control method and power limiting design
- Completely field configurable using the local user interface or via a computer connection
- Supports HART, Profibus DP, and Modbus communication protocols
- User-programmable correction factors to compensate for velocity profiles
- Velocity-temperature mapping for wide ranging velocity and temperature
- User-programmable or auto-adjusting for shifting gas composition or multiple gas calibrations
- Sensor Blockage Correction Factor (SBCF)
- Flexibility with transmitter-attached or transmitter-separate designs
- Patented digital sensor control circuit (US 7,418,878)

Kurz Instruments is dedicated to manufacturing and marketing the best thermal mass flow meters available and to support our customers in their efforts to improve their businesses.

Applications

Biogas
Wastewater facilities
Landfill sites
Fogging in stacks
Fan inlets
EPA greenhouse gas emissions



Kurz Instruments, Inc.
2411 Garden Road
Monterey, CA 93940
800-424-7356
www.kurzinstruments.com

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SPECIFICATIONS

- **Velocity range**
  0 to 4,000 SFPM (18.6 NMPS) (Air)
  0 to 3,000 SFPM (14 NMPS) (50/50 Biogas)
  0 to 2,000 SFPM (9.3 NMPS) (CH_4)
  (Up to 12,000 SFPM (56 NMPS) available with reduced condensate immunity)
- **Flow accuracy** (SCFM at laboratory conditions)
  ± (1% of reading +20 SFPM)
- **0.25% reading repeatability**
- **Velocity time constant**
  1.5 second for velocity changes at 4,000 SFPM (constant temperature)
- **Process temperature time constant**
  10 seconds for temp changes at 1,000 SFPM (constant velocity)
- **Electronics operating temperature**
  Integral display
  -13°F to 149°F (-25°C to 65°C)
  Remote aluminum enclosure
  -40°F to 149°F (-40°C to 65°C)
  Remote polycarbonate enclosure
  -13°F to 122°F (-25°C to 50°C)

PROCESS CONDITIONS

- **Process pressure rating**
  Up to 150 PSIG (10 BARg)
- **Process temperature rating**
  -40°F to 257°F (-40°C to 125°C)

APPROVALS

- **EPA mandatory GHG certification**
  40 CFR 98.34(c)(1)
- **Alarm output conformity**
  NAMUR NE43
- **CE and UKCA compliance**
  EMC, LVD, PED, ROHS, and WEEE
- **Canadian Registration**
  CRN
- **cETLus, ATEX, UKEX, IECEx approvals for Explosive Atmospheres protection by Flameproof and Increased Safety**
  EN/IEC/UL/CSA C22.2/60079-0
  EN/IEC/UL/CSA C22.2/60079-1
  EN/IEC/UL/CSA C22.2/60079-7
  Class I, Div. 1, Group B, C, and D
  Class I, Div. 2, Group A, B, C, and D

TRANSMITTER FEATURES

- **Aluminum (Type 4, IP66) dual chamber polyester powder-coated enclosure**
- **Adjustable display/keypad orientation**
- **Optically-isolated loop powered 4-20mA output** (±48 VDC isolation)
  12-bit resolution and accuracy
  Maximum loop resistance is 300Ω at 18 VDC, 550Ω at 24 VDC, 1400Ω at 36 VDC
- **Input power**
  AC (85-264 V 50/60 Hz, 24 watts max.) or DC (24 V ±10%), 1 A max.
- **Integral or remote user interface**
- **Easy-to-use interface**
- **Backlit display / keypad**
  2-lines of 16-characters each
- **User-configurable flow display (scrolling or static)**
- **User-configurable English or metric units for mass flow rate, mass velocity, and process temperature**
  °C, °F, KGH, KGM, NCMH, NLPM, NMPS, PPH, PPM, SCFH, SCFM, SCMH, SFPM, SLPM, SMPS
- **Velocity-dependent correction factors for flow rate**
- **Built-in dry gas flow calculation for saturated processes**
- **Two optically isolated solid-state relays / alarms**
  Configurable as alarm outputs or pulsed totalizer output, or air purge cleaning
- **Built-in zero-mid-span drift check**
- **Built-in flow totalizers and elapsed time**
- **User-configurable digital filtering from 0 to 600 seconds**
- **Configuration/data access**
  USB or RS-485 Modbus (ASCII or RTU)
- **Meter memory**
  200 recent events, top 20 min/max, and 56 hours (10 second samples of trends)
- **3-year warranty**

SUPPORT & ELEMENT COMPONENTS

- **Sensor material**
  C-276 alloy all-welded sensor construction (standard)
- **Sensor support**
  316L stainless steel (standard)
  C-276 alloy (optional)
- **Sensor support diameter**
  3/4" and 1" (19 mm and 25mm)
- **Sensor support length**
  6" to 60" (152 mm to 1524 mm)
- **3-year warranty**

OPTIONS

- **Enclosures**
  Aluminum, stainless steel, or remote-only polycarbonate
- **Multiple gas calibrations with up to five curves loaded in memory**
- **User-selectable gas composition**
- **One 4-20mA non-isolated analog input**
- **Flow valve PID controller and configurable control application**
  Permits controlling set point velocity or flow rate through available control valve, damper, or 4-20mA interface
- **Digital input dedicated to purge and zero-mid-span drift check**
- **Pulsed output as a remote flow totalizer**
- **Hardware accessories**
  Available hardware includes flanges, ball valves, restraints, retractors, cable glands, conduit seals, cable, compression fittings, packing glands, and branch fittings
- **Communication protocols**
  HART (v7 FSK) and PROFIBUS DP
- **SIL1 certification**
  via TUV Rheinland

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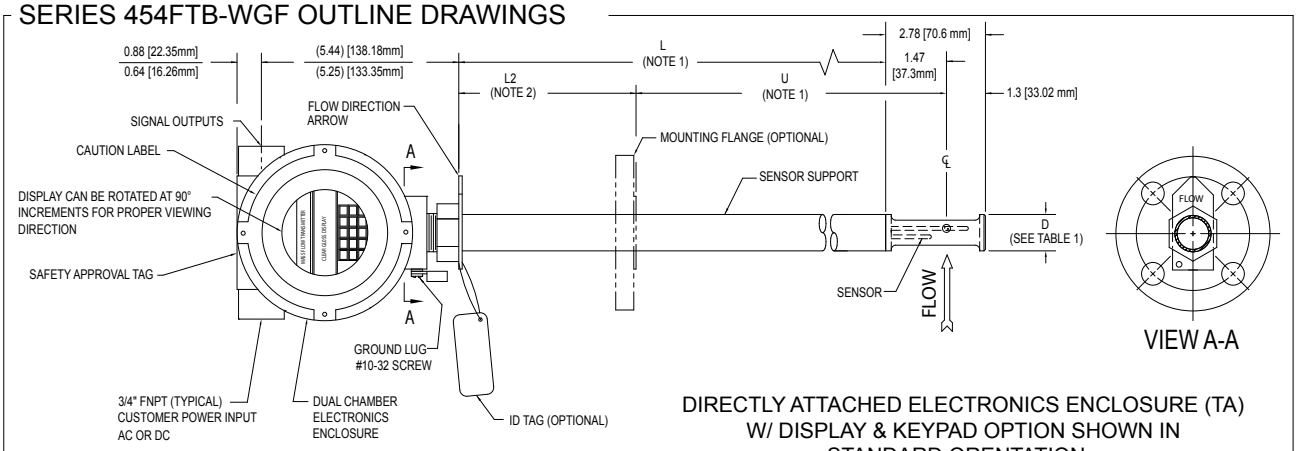
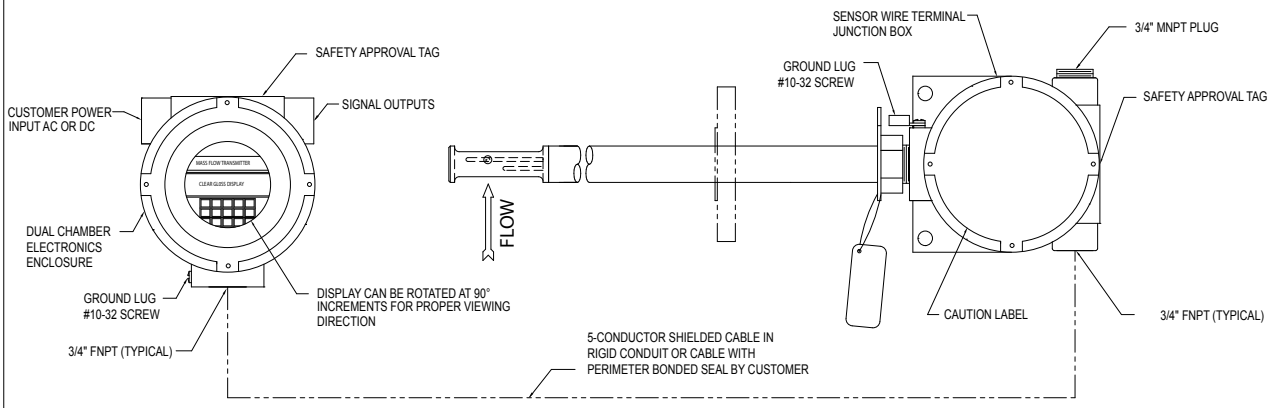
SERIES 454FTB-WGF OUTLINE DRAWINGS



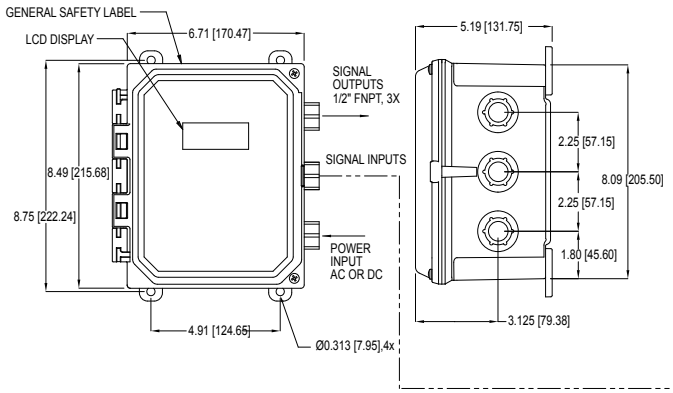
DIRECTLY ATTACHED ELECTRONICS ENCLOSURE (TA)
W/ DISPLAY & KEYPAD OPTION SHOWN IN
STANDARD ORENTATION
(NOTE 5)



SENSOR ELECTRONICS FOR
REMOTELY ATTACHED
ELECTRONICS ENCLOSURE (TS)
W/ DISPLAY & KEYPAD OPTION (SHOWN)
(NOTE 4) (NOTE 5)

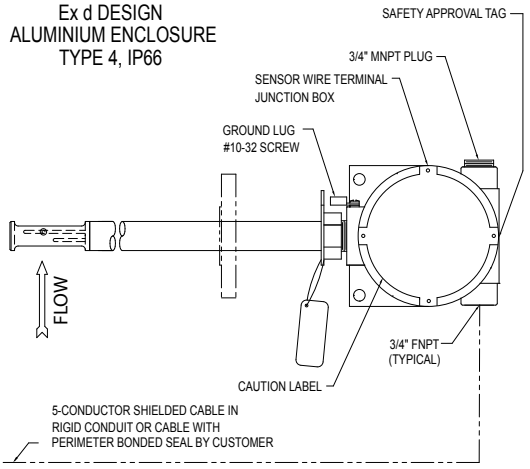
PROBE ASSEMBLY FOR
REMOTELY ATTACHED
ELECTRONICS ENCLOSURE (TS)
(NOTE 3) (NOTE 5)

ZONE 2
Ex e DESIGN
POLYCARBONATE ENCLOSURE



SENSOR ELECTRONICS FOR REMOTELY ATTACHED
ELECTRONICS ENCLOSURE (PTS) (WALL MOUNT)
W/ DISPLAY & KEYPAD OPTION (SHOWN)
(NOTES 5 & 6)

ZONE 1
Ex d DESIGN
ALUMINIUM ENCLOSURE
TYPE 4, IP66



PROBE ASSEMBLY FOR REMOTELY ATTACHED
ELECTRONICS ENCLOSURE (TS)
(NOTES 5 & 6)

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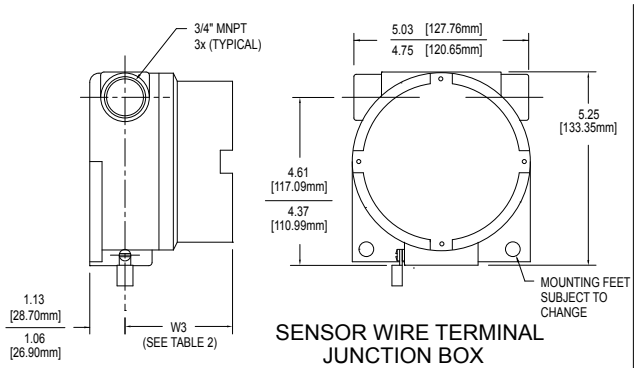
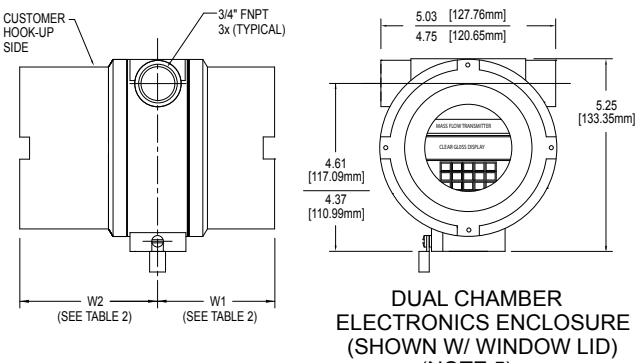
SERIES 454FTB-WGF OUTLINE DRAWINGS (cont'd)



SENSOR WIRE TERMINAL
JUNCTION BOX
(NOTE 4) (NOTE 5)



DUAL CHAMBER
ELECTRONICS ENCLOSURE
(SHOWN W/ WINDOW LID)
(NOTE 5)

TABLE 1. PROBE DIAMETER DIMENSION

MODEL NO.	D
-12	0.75 [19.05mm]
-16	1.00 [25.4mm]

TABLE 2. ENCLOSURE DIMENSION (NOTE 5)

INPUT POWER	DISPLAY / KEYPAD	W1 (MAX.) / (MIN.)	W2 (MAX.) / (MIN.)	W3 (MAX.) / (MIN.)
AC	YES	3.63 [92.20mm] / 3.41 [86.61mm]	5.01 [127.25mm] / 4.69 [119.13mm]	N/A
AC	NO	3.16 [80.26mm] / 2.81 [71.37mm]	5.01 [127.25mm] / 4.69 [119.13mm]	N/A
24VDC	YES	3.63 [92.20mm] / 3.41 [86.61mm]	5.01 [127.25mm] / 4.69 [119.13mm]	N/A
24VDC	NO (NOTE 4)	N/A	N/A	5.01 [127.25mm] / 4.88 [123.95mm]
SENSOR WIRE TERMINAL J-BOX (FOR REMOTE OPT.)		N/A	N/A	3.16 [80.26mm] / 2.81 [71.37mm]

NOTES:

1) FOR FLANGED OPTION: L = (U + L2 - 1.47 [37.3mm]), U (MIN.) = 4.00 [101.6mm].
2) L2 (MIN.) FOR -HT TO BE 5.00 [127mm].
3) THIS PROBE CONFIGURATION ALSO USED FOR DIRECTLY ATTACHED, DC POWERED, NO DISPLAY.
4) SENSOR WIRE TERMINIAL JUNCTION BOX USED FOR SENSOR ELECTRONICS FOR DC POWERED, NO DISPLAY.
5) ENCLOSURE STYLES AND DIMENSIONS ARE SUBJECT TO CHANGE.
6) THIS CONFIGURATIONS ALLOWS FOR PROBE ASSY TO BE MOUNTED IN ZONE 1 AREA AND FOR REMOTE ELECTRONICS TO BE MOUNTED IN ZONE 2 AREA.

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756 4 1 0	__	__	__	__ __	__ __ __	__	__	__	__	__	__ __	__	__
Parent number	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13

Parent Number	Model
756410	454FTB-WGF

F1	Option	Probe Support Diameter
	B	0.75" (19 mm) (6" – 36" probe length)
	C	1" (25 mm) (6" – 60" probe length)

F2	Option	Probe Support & Flange Material
	2	316L stainless steel
	3	C-276 alloy

F3	Option	Probe Support Length	
	B	6" (152 mm)	(0.75" or 1" probe)
	C	9" (229 mm)	(0.75" or 1" probe)
	D	12" (305 mm)	(0.75" or 1" probe)
	F	18" (457 mm)	(0.75" or 1" probe)
	H	24" (610 mm)	(0.75" or 1" probe)
	J	30" (762 mm)	(0.75" or 1" probe)
	K	36" (914 mm)	(0.75" or 1" probe)
	M	48" (1219 mm)	(1" probe)
	P	60" (1524 mm)	(1" probe)

F4	Compression Fittings or Flanges
	Choose one only - None, Compression Fitting, or Flange

Option	Compression Fittings
1A	None
2B	0.75" MNPT (0.75" probe only), stainless steel front and back ferrules
2D	0.75" MNPT (0.75" probe only), PTFE-compound front and back ferrules
2G	1" MNPT (0.75" or 1" probe), stainless steel front and back ferrules
2J	1" MNPT (0.75" or 1" probe), PTFE-compound front and back ferrules

Option 1 Class 150 lbs.	Option 2 Class 300 lbs.	ANSI 16.5 Flange	
1A	1A	None	
3D	4E	0.75" (19 mm)	0.75" and 1" probe diameter
3F	4G	1" (25 mm)	
3J	4K	1.5" (38 mm)	
3L	4M	2" (51 mm)	
3N	4P	2.5" (64 mm)	1" probe
3S	4T	3" (76 mm)	
3U	4V	4" (102 mm)	

F5	Option	Flange U Dimension
	___	Enter 000 for no flange connection. Enter U-dimension to nearest 10th of an inch without a decimal point. For example, 7.7" is 077 and 23.6" is 236. **Note:** Convert metric units to English units.

F6	Option	Electronics Configuration
	A	Integral — Aluminum Type 4, IP66 enclosure Flameproof: cETLus, ATEX, UKEX, and IECEx Ex db IIB + H2 T5…T3 Gb; Class I Zone 1 AEx db IIB + H2 T5…T3 Gb Class I Division 1, Groups B, C, and D DC Electronics Enclosure: Ta = -40°C to 65°C (T4) AC Electronics Enclosure: Ta= -40°C to 50°C (T4) or to 65°C: 150°C (T3) Sensing Element: Tp = -40°C to 45°C (T4) or to 110°C (T3)
	E	Integral — Aluminum Type 4, IP66 enclosure rotated 180° Flameproof: cETLus, ATEX, UKEX, and IECEx Ex db IIB + H2 T5…T3 Gb; Class I Zone 1 AEx db IIB + H2 T5…T3 Gb Class I Division 1, Groups B, C, and D DC Electronics Enclosure: Ta = -40°C to 65°C (T4) AC Electronics Enclosure: Ta= -40°C to 50°C (T4) or to 65°C: 150°C (T3) Sensing Element: Tp = -40°C to 45°C (T4) or to 110°C (T3)
	H	Remote — Transmitter and sensing element separate Electronics enclosure: Stainless Steel Type 4x, IP66 Sensor Enclosure: Stainless Steel Type 4x, IP66 Flameproof: cETLus, ATEX, UKEX, and IECEx Ex db IIB + H2 T5…T3 Gb; Class I Zone 1 AEx db IIB + H2 T5…T3 Gb Class I Division 1, Groups B, C, and D DC Electronics Enclosure: Ta = -40°C to 65°C (T4) AC Electronics Enclosure: Ta= -40°C to 50°C (T4) or to 65°C: 150°C (T3) Sensor Enclosure: Ta = -40°C to 75°C (T5) Sensing Element: Tp = -40°C to 45°C (T4) or to 110°C (T3)
	J	Remote — Transmitter and sensing element separate Aluminum Type 4, IP66 enclosures Flameproof: cETLus, ATEX, UKEX, and IECEx Ex db IIB + H2 T5…T3 Gb; Class I Zone 1 AEx db IIB + H2 T5…T3 Gb Class I Division 1, Groups B, C, and D DC Electronics Enclosure: Ta = -40°C to 65°C (T4) AC Electronics Enclosure: Ta= -40°C to 50°C (T4) or to 65°C: 150°C (T3) Sensing Element: Tp = -40°C to 45°C (T4) or to 110°C (T3)
	M	Remote — Transmitter and sensing element separate Electronics enclosure: Polycarbonate Type 4, IP54 Sensor Enclosure: Aluminum Type 4, IP66 Transmitter Protection by Increased Safety: cETLus, ATEX, UKEX, and IECEx Ex ec IIC T5…T3 Gc; Class I Zone 2 AEx ec IIC T5…T3 Gc Class I Division 2, Groups A, B, C, and D Ta: -25°C to 50°C (T4) Sensing Element Protection by Flameproof: cETLus, ATEX, UKEX, and IECEx Ex db IIB + H2 T5…T3 Gb; Class I Zone 1 AEx db IIB + H2 T5…T3 Gb Class I Division 1, Groups B, C, and D Ta = -40°C to 75°C (T5) Sensing Element: Tp = -40°C to 45°C (T4) or to 110°C (T3)

F7	Option	Display / Keypad
	1	Display / Keypad
	2	Blind

F8	Option	Power
	A	AC (85-265V 47/63 Hz, 24 watts max)
	D	DC (24V ±10%), 1 A max.

more on next page

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F9	Option	Communications and Inputs/Outputs
	2	Standard — Two 4-20mA isolated outputs
	3	Full — Two 4-20mA isolated outputs, two relays, two digital inputs, one non-isolated 4-20mA input
	5	HART-1 — One 4-20mA isolated output, two relays, two digital inputs, one non-isolated 4-20mA input
	6	HART-2 — Two 4-20mA isolated outputs, two relays, two digital inputs, one non-isolated 4-20mA input
	8	Profibus DP — Two 4-20mA isolated outputs, two relays, two digital inputs, one non-isolated 4-20mA input

F10	Option	Gas Type
	A	Air (laboratory calibration)
	D	Methane and Carbon Dioxide mix (correlation calibration)
	H	Shifting CH_4 composition in a $CH_4/C0_2$ binary gas mix (correlation calibration)
	M	One correlation calibration curve (multiple gas compositions up to five gases)
	N	Two correlation calibration curves (multiple gas compositions up to five gases each)
	O	Three correlation calibration curves (multiple gas compositions up to five gases each)
	P	Four correlation calibration curves (multiple gas compositions up to five gases each)
	Q	Five correlation calibration curves (multiple gas compositions up to five gases each)

F11	Option	Percent of Methane
	__	Enter two digits for percent of methane. Enter two zeros (00) for **Air only**. Enter **YY** for all other gases.

F12	Option	Velocity Calibration Range	
	B	300 SFPM	(1.4 NMPS)
	C	600 SFPM	(2.8 NMPS)
	E	1,000 SFPM	(4.7 NMPS)
	G	2,000 SFPM	(9.3 NMPS)
	K	4,000 SFPM	(18.6 NMPS) *
	M	6,000 SFPM	(28 NMPS) * †
	P	9,000 SFPM	(41.9 NMPS) * †
	R	12,000 SFPM	(56 NMPS) * †
			* Reduced condensate immunity in Biogas † Reduced condensate immunity in Air

F13	Option	Calibration Type
	1	Correlation
	2	Laboratory
	Note:	Add the letter "S" to the end of Feature 13 to include SIL1 certification via TUV Rheinland.