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 CH₄ composition for a CH₄/CO₂ 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
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) (CH₄) (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: -13ºF to 149ºF (‐25ºC to 65ºC)
  - Remote aluminum display: -40ºF to 149ºF (‐40ºC to 65ºC)
  - Remote polycarbonate display: -13ºF to 122ºF (‐25ºC to 50ºC)

PROCESS CONDITIONS

- **Process pressure rating**
  - Up to 150 PSIG (10 BARg)

- **Process temperature rating**
  - -40ºF to 257ºF (‐40ºC to 125ºC)

APPROVALS

- **EPA mandatory GHG certification**
  - 40 CFR 98.34(c)(1)

- **Alarm output conformity**
  - NAMUR NE43

- **European Union CE compliance**
  - EMC, LVD, PED, ROHS, and WEEE

- **Canadian Registration**
  - CRN

- **cETLus, ATEX, IECEx approvals for Explosive Atmospheres protection by Flameproof and Increased Safety**

- **Communication protocols**
  - HART (v7 FSK) and PROFIBUS DP

- **SIL1 certification**
  - via TÜV Rheinland

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, NCNM, NLPM, NMS, 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

- **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**

**Series 454FTB-WGF**
**Series 454FTB-WGF**

**Series 454FTB-WGF Outline Drawings (cont’d)**

**TABLE 1. Probe Diameter Dimension**

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0.75</td>
</tr>
<tr>
<td>16</td>
<td>1.00</td>
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</tbody>
</table>

**TABLE 2. Enclosure Dimension (cont’d)**

<table>
<thead>
<tr>
<th>INPUT POWER</th>
<th>DISPLAY KEYPAD</th>
<th>W1 (MAX)</th>
<th>W2 (MAX)</th>
<th>W3 (MAX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>YES</td>
<td>3.65 (92.96mm)</td>
<td>5.01 (127.25mm)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>3.18 (80.38mm)</td>
<td>4.69 (118.67mm)</td>
<td>N/A</td>
</tr>
<tr>
<td>24VDC</td>
<td>YES</td>
<td>3.65 (92.96mm)</td>
<td>5.01 (127.25mm)</td>
<td>N/A</td>
</tr>
<tr>
<td>24VDC</td>
<td>NO</td>
<td>3.41 (86.42mm)</td>
<td>4.69 (118.67mm)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**NOTES:**

1) FOR FLANGED OPTION: L = (U + L2 - 2.00 [50.8mm]), 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 TERMINAL 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.
## Parent Number

<table>
<thead>
<tr>
<th>Parent Number</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>756410</td>
<td>454FTB-WGF</td>
</tr>
</tbody>
</table>

### Option

#### 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

- **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

<table>
<thead>
<tr>
<th>Option</th>
<th>Compression Fittings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>None</td>
</tr>
<tr>
<td>2B</td>
<td>0.75&quot; MNPT (0.75&quot; probe only), stainless steel front and back ferrules</td>
</tr>
<tr>
<td>2D</td>
<td>0.75&quot; MNPT (0.75&quot; probe only), PTFE-compound front and back ferrules</td>
</tr>
<tr>
<td>2G</td>
<td>1&quot; MNPT (0.75&quot; or 1&quot; probe), stainless steel front and back ferrules</td>
</tr>
<tr>
<td>2J</td>
<td>1&quot; MNPT (0.75&quot; or 1&quot; probe), PTFE-compound front and back ferrules</td>
</tr>
</tbody>
</table>

#### Option 1

<table>
<thead>
<tr>
<th>Class 150 lbs.</th>
<th>Class 300 lbs.</th>
<th>ANSI 16.5 Flange</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>1A</td>
<td>None</td>
</tr>
<tr>
<td>3D</td>
<td>4E</td>
<td>0.75&quot; (19 mm)</td>
</tr>
<tr>
<td>3F</td>
<td>4G</td>
<td>1&quot; (25 mm)</td>
</tr>
<tr>
<td>3J</td>
<td>4K</td>
<td>1.5&quot; (38 mm)</td>
</tr>
<tr>
<td>3L</td>
<td>4M</td>
<td>2.5&quot; (51 mm)</td>
</tr>
<tr>
<td>3N</td>
<td>4P</td>
<td>2.5&quot; (64 mm)</td>
</tr>
<tr>
<td>3S</td>
<td>4T</td>
<td>3&quot; (76 mm)</td>
</tr>
<tr>
<td>3U</td>
<td>4V</td>
<td>4&quot; (102 mm)</td>
</tr>
</tbody>
</table>

#### 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 — Standard Display viewing  
  - **Aluminum Type 4, IP66 enclosure**  
  - Flameproof: cETLus, ATEX, and IECEx  
  - Ex db IIB + H2 TS...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 — Display rotated 180° for viewing  
  - **Aluminum Type 4, IP66 enclosure**  
  - Flameproof: cETLus, ATEX, and IECEx  
  - Ex db IIB + H2 TS...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  
  - Flameproof: cETLus, ATEX, and IECEx  
  - Ex db IIB + H2 TS...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, and IECEx  
  - Ex db IIB + H2 TS...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)

#### 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.

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**Insertion Thermal Mass Flow Meter**

Series 454FTB-WGF

Parent Number

F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13

F5 Option Flange U Dimension

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F6 Option Electronics Configuration (ATEX Flameproof Pending)

<table>
<thead>
<tr>
<th>Option</th>
<th>Configuration</th>
</tr>
</thead>
</table>
| A      | Integral — Standard Display viewing  
  - Aluminum Type 4, IP66 enclosure  
  - Flameproof: cETLus, ATEX, and IECEx  
  - Ex db IIB + H2 TS...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 — Display rotated 180° for viewing  
  - Aluminum Type 4, IP66 enclosure  
  - Flameproof: cETLus, ATEX, and IECEx  
  - Ex db IIB + H2 TS...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  
  - Flameproof: cETLus, ATEX, and IECEx  
  - Ex db IIB + H2 TS...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, and IECEx  
  - Ex db IIB + H2 TS...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) |

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Series 454FTB-WGF

more on next page
<table>
<thead>
<tr>
<th>F9</th>
<th>Option</th>
<th>Communications and Inputs/Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Standard</td>
<td>Two 4-20mA isolated outputs</td>
</tr>
<tr>
<td>3</td>
<td>Full</td>
<td>Two 4-20mA isolated outputs, two relays, two digital inputs, one non-isolated 4-20mA input</td>
</tr>
<tr>
<td>5</td>
<td>HART-1</td>
<td>One 4-20mA isolated output, two relays, two digital inputs, one non-isolated 4-20mA input</td>
</tr>
<tr>
<td>6</td>
<td>HART-2</td>
<td>Two 4-20mA isolated outputs, two relays, two digital inputs, one non-isolated 4-20mA input</td>
</tr>
<tr>
<td>8</td>
<td>Profibus DP</td>
<td>Two 4-20mA isolated outputs, two relays, two digital inputs, one non-isolated 4-20mA input</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F10</th>
<th>Option</th>
<th>Gas Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Air (laboratory calibration)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Methane and Carbon Dioxide mix (correlation calibration)</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Shifting CH4 composition in a CH4/CO2 binary gas mix (correlation calibration)</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>One correlation calibration curve (multiple gas compositions up to five gases)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Two correlation calibration curves (multiple gas compositions up to five gases each)</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>Three correlation calibration curves (multiple gas compositions up to five gases each)</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Four correlation calibration curves (multiple gas compositions up to five gases each)</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Five correlation calibration curves (multiple gas compositions up to five gases each)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F11</th>
<th>Option</th>
<th>Percent of Methane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Enter two digits for percent of methane. Enter two zeros (00) for Air only. Enter YY for all other gases.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F12</th>
<th>Option</th>
<th>Velocity Calibration Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>300 SFPM (1.4 NMPS)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>600 SFPM (2.8 NMPS)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>1,000 SFPM (4.7 NMPS)</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>2,000 SFPM (9.3 NMPS)</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>4,000 SFPM (18.6 NMPS) *</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>6,000 SFPM (28 NMPS) * †</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>9,000 SFPM (41.9 NMPS) * †</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>12,000 SFPM (56 NMPS) * †</td>
<td></td>
</tr>
</tbody>
</table>

* Reduced condensate immunity in Biogas  
† Reduced condensate immunity in Air

<table>
<thead>
<tr>
<th>F13</th>
<th>Option</th>
<th>Calibration Type</th>
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<tbody>
<tr>
<td>1</td>
<td>Correlation</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Laboratory</td>
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</tbody>
</table>

**Note:** Add the letter “S” to the end of Feature 13 to include SIL1 certification via TUV Rheinland.