Overview

SITRANS FUH1010 clamp-on non-intrusive ultrasonic flowmeter is ideal for applications carrying crude oil, refined petroleum or liquefied gas.

SITRANS FUH1010 has three application areas: Interface detectors, precision volume or standard volume flowmeters.

Benefits

For all SITRANS FUH1010 products

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio, 30:1
- Choice of single, dual, or optional, three or four path versions.
  - Single path version reduces initial investment
  - Two or optional three and four path versions provide higher accuracy, especially where limited straight run or poor flow profile exists
- WideBeam technology
  - Helps provide improved accuracy over a wide range of liquid conditions and flow rates
  - Accommodates pipelines transporting multiple liquid products
- ZeroMatic Path automatically corrects for zero drift without stopping flow

Interface detection

- Outputs liquid density and API as a direct replacement for intrusive densitometers
- Exceptional repeatability is maintained, independent of changes in temperature, pressure or viscosity
- No need for straight run

Precision volume

- Moderate cost
- Precise measurement is maintained with automatic “Reynolds Number” compensation for temperature and viscosity changes.

Standard volume (High end system)

- Exceptional repeatability is maintained, independent of changes in temperature, density or viscosity
- Batch interface and product quality diagnostics provided
- Density and API outputs provided
- Scraper (“pig”) detection provided

Application

Interface detection

- Precise identification of interfaces on multi-liquid pipelines
- Product identification
- Density indication

Precision volume

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume (High end system)

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- “Pig” detection
- Chemical and petrochemical processing

Design

SITRANS FUH1010 is available in two enclosures:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
  - Single path
  - Dual path
  - Optional four path
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum, stainless steel hardware, with glass window
  - Single path
  - Dual path
  - Four path (optional)

- There are 2 types of mounting assemblies
  - Aluminum mounting frames (default)
  - Stainless steel High precision mount (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flowmeters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- Current, voltage, status alarm, frequency outputs and communications HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2, VT100 RS 232 (see specification section for details)
- Analog inputs (see specification section for details)
- ZeroMatic Path automatically corrects for zero drift
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options
### Technical specifications

#### Specifications for interface detectors

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>± 0.05 of API No.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>± 0.01 of API No.</td>
</tr>
</tbody>
</table>

#### Specifications for volumetric and mass flowmeters

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow range</td>
<td>± 12 m/s (± 40 ft/s), bidirectional</td>
</tr>
<tr>
<td>Flow sensitivity</td>
<td>0.0003 m/s (0.001 ft/s), flow rate independent</td>
</tr>
</tbody>
</table>

#### Accuracy

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical accuracy</td>
<td>± 0.15 % to 0.3 % of flow, depending on version</td>
</tr>
<tr>
<td>Calibratable accuracy</td>
<td>± 0.05 % of flow, maximum</td>
</tr>
<tr>
<td>Batch repeatability</td>
<td>± 0.05 % of flow, maximum</td>
</tr>
</tbody>
</table>

#### Specifications for all SITRANS FUH1010 products

<table>
<thead>
<tr>
<th>Input specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe size</td>
<td>6.4 mm ... 9.14 m (0.25” ... 360”)</td>
</tr>
<tr>
<td>Analog inputs</td>
<td>Current: 4 x 4 ... 20 mA</td>
</tr>
</tbody>
</table>

#### Output

- **Standard outputs**
  - Current: 20 mA (1 kΩ at 30 VDC)
  - Voltage: 10 V DC (5 kΩ minimum)
  - Pulse Rate: 5 kHz, Digital Quad.
  - VT100 RS 232
- **Extended outputs**
  - HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2
  - 4 x 4 ... 20 mA
  - Form C relays
  - Digital pulse

#### Status/Alarm I/O

- Programmable relays
- Totalizer clear switch input (not for IP65 (NEMA 4X) enclosure) \(^1\)
- Totalizer hold switch input

### Accuracy

- **Zero Drift**: 0.0003 m/s (0.001 ft/s), with ZeroMatic Path active (not provided for interface detector)
- **Data refresh rate**: 5 Hz

### Rated operation conditions

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP65 (NEMA 4X)</td>
</tr>
<tr>
<td>Liquid temperature</td>
<td>-40 ... +120 °C (-40 ... +250 °F)</td>
</tr>
<tr>
<td>Optional</td>
<td>IP66 (NEMA 7)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-40 ... +230 °C (-40 ... +450 °F)</td>
</tr>
</tbody>
</table>

### Design

- **Dimensions**: see SITRANS F US Clamp-on “System info and selection guide”
- **Weight**: see diagrams

### Power supply

- **IP65 (NEMA 4X) wall mount and IP66 (NEMA 7) wall mount explosionproof**: 90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W

### Indication and operation

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data logger memory</td>
<td>1 MByte</td>
</tr>
<tr>
<td>Display</td>
<td>128 x 240 pixel LCD with backlight</td>
</tr>
<tr>
<td>Keypad</td>
<td>33 keypad buttons with tactile feedback</td>
</tr>
<tr>
<td>Language options</td>
<td>English, Spanish, German, Italian, French</td>
</tr>
</tbody>
</table>

\(^1\) Totalizer switch inputs are not provided for the interface detector.
### Certificates and approvals

#### IP65 (NEMA 4X) wall mount enclosure

- Transmitter
  - N-I Class I, Div 2
  - S Class II, Div 2
- Sensor
  - I.S. Class I, II, Div 1

#### CE
- EMC Directive 2014/30/EU
- ATEX Directive 2014/34/EU

#### C-TICK

#### ATEX
- Transmitter:
  - Ex II (1) G [Ex ia] IIC
  - EX II 3 (1) G Ex nC [ia] IIC T5
- Sensors:
  - Ex II 1 G Ex ia IIC T5

#### IP66 (NEMA 7) wall mount explosionproof enclosure ratings

- Transmitter
  - XP Class I, Div 1
  - D-I Class II, Div 1
  - N-I Class I, Div 2
  - S Class II, Div 2
- Sensor
  - I.S. Class I, II, Div 1

#### CE
- EMC Directive 2014/30/EU
- ATEX Directive 2014/34/EU

#### ATEX
- Transmitter:
  - Ex II (1) G [Ex ia] IIC
  - Ex II 3 (1) G Ex nC [ia] IIC T5
  - Ex II 2 (1) G Ex d [ia IIC] IIIB + H2 T5
- Sensors:
  - Ex II 1 G Ex ia IIC T5
Flow Measurement
SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

**Standard MLFB for quick delivery on SITRANS FUH1010 (Oil)**

<table>
<thead>
<tr>
<th>Selection and Ordering data</th>
<th>Article No.</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITRANS FUH1010 (Oil)</td>
<td>7 ME 3 6 0</td>
<td>K 1 2 + K 1 2 + R 1 2</td>
</tr>
</tbody>
</table>

- Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

### Design
- IP65 (NEMA 4X) wall mount

### Number of ultrasonic paths/meter type
- Dual path Standard Volume

### Flowmeter functions and I/O configurations
- Includes graphic or digital display, IP66 (BN66665 (NEMA 4X)) and IP66 (NEMA 7) wall mount explosionproof units:
  - Standard I/O
    - Graphic display
    - 2 x 0 ... 10 V
    - 2 x 4 ... 20 mA (active)
    - 2 x 0 ... 5 kHz pulse outputs (TTL)
    - 4 x form C relays
    - 4 x logic inputs (totalizer control, TTL)
    - 4 x 4 ... 20 mA analog input
    - 1 x Pt100 RTD input per channel

### Meter power options
- 90 ... 240 V AC

### Communication options
- VT100 RS 232
- A

### RTD temperature sensor
- Includes mounting hardware for pipes above 1.5"/38 mm OD
- No RTDs
- 1 x standard clamp-on RTD
- 2 x standard clamp-on RTD
- 1 x submersible clamp-on RTD
- 2 x submersible clamp-on RTD
- 4 x logic inputs (totalizer control, TTL)
- 4 x 4 ... 20 mA analog input
- 1 x Pt100 RTD input per channel

**Notes:**
1. Temperature input is required for SITRANS FUH1010 systems
2. Only the Interface detector set up as a dual channel can use 2 RTD’s

### Sensor for channel 1
- (includes pipe mounting kit and spacer bar for indicated max. outer diam. listed)
- No sensor
- C2H (high precision) 1)
- D1H (high precision) 1)
- D4H (high precision) 1)
- D1H (high precision) 1) High Temperature to 104 °C/220 °F

### Sensor for channel 2
- (includes pipe mounting kit and spacer bar for indicated max. OD listed)
- No sensor
- C2H (high precision) 1)
- D1H (high precision) 1)
- D4H (high precision) 1)
- D1H (high precision) 1) High Temperature to 104 °C/220 °F

### Approvals
- FM/CSA/CE (default)
- ATEX, CE, C-TICK

Standard MLFB product offering represents 4 to 6 weeks delivery time

1) Made with stainless steel construction.

For sensor and RTD cables for quick delivery see tables at end of section.
### Selection and Ordering data

<table>
<thead>
<tr>
<th>SITRANS FUH1010 (Oil)</th>
<th>Article No.</th>
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<tr>
<td>IP65 (NEMA 4X) wall mount</td>
<td>7ME3600-</td>
<td></td>
</tr>
<tr>
<td>IP66 (NEMA 7) wall mount explosionproof</td>
<td>7ME3603-</td>
<td></td>
</tr>
</tbody>
</table>

**Click on the Article No. for the online configuration in the PIA Life Cycle Portal.**

### Number of ultrasonic paths/meter type

| Single path (precision volume) | 0 |
| Single path (interface detector) | 1 |
| Dual channel/Dual path (interface detector) | 2 |
| Dual path (precision volume) | 3 |
| Dual path (standard volume/mass) | 4 |
| Special: Four path (standard volume/mass) only | 9 |

### Flowmeter functions and I/O configurations

- **Standard I/O**
  - Graphic display
  - 2 x 0...10 V
  - 2 x 4...20 mA (active)
  - 2 x 0...5 kHz pulse outputs (TTL)
  - 4 x form C relays
  - 4 x logic inputs (totalizer control, TTL)
  - 1 x Pt100 RTD input per channel (Dual channel/path)
  - 1 x Pt100 RTD input (Multi channel/path)
- **Extended I/O**
  - Graphic display
  - 2 x 0...10 V
  - 2 x 4...20 mA (active)
  - 2 x 4...20 mA (passive)
  - 2 x 0...5 kHz pulse outputs (TTL or OC)
  - 4 x form C relays
  - 4 x logic inputs (totalizer control, TTL)
  - 1 x Pt100 RTD input analog input (Dual channel/path)
  - 1 x Pt100 RTD input (Multi channel/path)

### Meter power options

- 90...240 V AC
- 9...36 V DC

### Communication options

- VT100 RS 232
- HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2, VT100 RS 232

### Selection and Ordering data

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<tr>
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<td>7ME3603-</td>
<td></td>
</tr>
</tbody>
</table>

**RTD temperature sensor**

(includes mounting hardware for pipes above 1.5” OD)

- No RTDs (Note: temperature input is required for SITRANS FUH systems)
- 1 x Standard clamp-on RTD
- 2 x Standard clamp-on RTD
- 1 x Submersible clamp-on RTD
- 2 x Submersible clamp-on RTD

**Sensor for channel/path 1**

(includes standard pipe mounting kit and spacer bar for indicated max. outer diameter listed)

See “Sensor selection charts” for specifications.

**Sensor selection charts**

- For the following High Precision sensors, temperature range is -40 °C to +120 °C (-40 °F to +248 °F), nominal 21 °C (70 °F):
  - A2H (high precision) Trackmount and straps provided up to 75 mm (3”)
  - A3H (high precision) Trackmount and straps provided up to 75 mm (3”)
  - B1H (high precision) Trackmount and straps provided up to 125 mm (5”)
  - B2H (high precision) Trackmount and straps provided up to 125 mm (5”)
  - B3H (high precision) Trackmount and straps provided up to 125 mm (5”)
  - C1H (high precision) Mounting frame and straps provided up to 600 mm (24”) 1)
  - C2H (high precision) Mounting frame and straps provided up to 600 mm (24”) 2)
  - D1H (high precision) Mounting frame and straps provided up to 1200 mm (48”) 1)
  - D2H (high precision) Mounting frame and straps provided up to 1200 mm (48”) 2)
  - D3H (high precision) Mounting frame and straps provided up to 1200 mm (48”) 3)
  - D4H (high precision) Mounting frame and straps provided up to 1200 mm (48”) 4)
### Selection and Ordering data

<table>
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<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>7ME3603-</td>
<td></td>
</tr>
</tbody>
</table>

**SITRANS FUH1010 (Oil)**
- IP65 (NEMA 4X) wall mount
- IP66 (NEMA 7) wall mount explosionproof

### Sensor for channel/path 1 (continued)

For the following High Precision sensors, temperature range is -40 °C to +120 °C (-40 °F to +248 °F), nominal 65 °C (150 °F):
- B1H (high temperature range HP)
- B2H (high temperature range HP)
- B3H (high temperature range HP)
- C1H (high temperature range HP)\(^3\)
- C2H (high temperature range HP)\(^3\)
- D1H (high temperature range HP)\(^3\)
- D2H (high temperature range HP)\(^3\)
- D3H (high temperature range HP)\(^3\)
- D4H (high temperature range HP)\(^3\)

### Sensor for channel/path 2

(incudes pipe mounting kit and spacer bar for indicated max. outer diameter listed)

For the following High Precision sensors, temperature range is -40 °C to +120 °C (-40 °F to +248 °F), nominal 21 °C (70 °F):
- A2H (high precision) Trackmount and straps provided up to 75 mm (3")
- A3H (high precision) Trackmount and straps provided up to 75 mm (3")
- B1H (high precision) Trackmount and straps provided up to 125 mm (5")
- B2H (high precision) Trackmount and straps provided up to 125 mm (5")
- B3H (high precision) Trackmount and straps provided up to 125 mm (5")
- C1H (high precision)\(^3\) Mounting frame and straps provided up to 600 mm (24")\(^1\)
- C2H (high precision)\(^3\) Mounting frame and straps provided up to 600 mm (24")\(^1\)
- D1H (high precision)\(^3\) Mounting frame and straps provided up to 1200 mm (48")\(^1\)
- D2H (high precision)\(^3\) Mounting frame and straps provided up to 1200 mm (48")\(^1\)
- D3H (high precision)\(^3\) Mounting frame and straps provided up to 1200 mm (48")\(^1\)
- D4H (high precision)\(^3\) Mounting frame and straps provided up to 1200 mm (48")\(^1\)

### Approvals

- FM/CSA/CE/C-TICK (default), also for non hazardous area
- ATEX

1) Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).
2) Dual channel interface detector only
3) Made with stainless steel construction.

### Selection and Ordering data

<table>
<thead>
<tr>
<th>Article No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>7ME3600-7ME3603-</td>
<td></td>
</tr>
</tbody>
</table>

**SITRANS FUH1010 (Oil)**
- IP65 (NEMA 4X) wall mount
- IP66 (NEMA 7) wall mount explosionproof

### Further designs

- Please add "Z" to Article No. and specify Order code(s).

**Cable assembly for sensors (add for # of paths)**
- See "Sensor cable selection chart" K..

**Cable assembly for RTDs (add for # of RTDs)**
- See "RTD cable selection chart" R..

**Cable termination kit (for one cable pair)**
- Termination for standard, plenum and armored sensor cable T01
- Termination for submersible cable T11
- RTD cable termination kit for standard RTD T21
- RTD cable termination kit for submersible RTD T31
- Cable gland kit TS1

**Tag name plate**
- Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.) Y19
MLFB example

Application example

A clamp-on meter is required for a 12” carbon steel hydrocarbon line flowing multiple products, with a wall thickness of 12.7 mm (0.5”). Meter electronics are to be located in a Class I Div 2 area only 60 ft from the pipeline. 12 V DC power is available at the site.

Dual path operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Article No.: 7ME3600-3CB00-3QQ1-Z

Selection and Ordering data

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Operating Instructions for SITRANS FUH1010</th>
</tr>
</thead>
<tbody>
<tr>
<td>A5E3600-3CB00-3QQ1-Z</td>
<td>Operating Instructions for SITRANS FUH1010</td>
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<tbody>
<tr>
<td>A5E3600-3CB00-3QQ1-Z</td>
<td>Operating Instructions for SITRANS FUH1010</td>
</tr>
</tbody>
</table>

High precision sensor selection chart IP68

Based on pipe wall thickness (steel pipes only)

<table>
<thead>
<tr>
<th>Sensor Code</th>
<th>Order Code</th>
<th>Pipe wall (mm)</th>
<th>Pipe wall (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe wall min.</td>
<td>Pipe wall max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1H</td>
<td>G</td>
<td>0.64</td>
<td>1.02</td>
</tr>
<tr>
<td>A2H</td>
<td>H</td>
<td>1.02</td>
<td>1.52</td>
</tr>
<tr>
<td>A3H</td>
<td>J</td>
<td>1.52</td>
<td>2.03</td>
</tr>
<tr>
<td>B1H</td>
<td>K</td>
<td>2.03</td>
<td>3.05</td>
</tr>
<tr>
<td>B2H</td>
<td>L</td>
<td>3.05</td>
<td>4.06</td>
</tr>
<tr>
<td>C1H</td>
<td>M</td>
<td>4.06</td>
<td>5.84</td>
</tr>
<tr>
<td>C2H</td>
<td>N</td>
<td>5.84</td>
<td>8.13</td>
</tr>
<tr>
<td>D1H</td>
<td>P</td>
<td>8.13</td>
<td>11.18</td>
</tr>
<tr>
<td>D2H</td>
<td>Q</td>
<td>11.18</td>
<td>15.75</td>
</tr>
<tr>
<td>D4H</td>
<td>R</td>
<td>15.75</td>
<td>31.75</td>
</tr>
<tr>
<td>B3H</td>
<td>T</td>
<td>2.7</td>
<td>3.3</td>
</tr>
<tr>
<td>D3H</td>
<td>U</td>
<td>7.4</td>
<td>9.0</td>
</tr>
</tbody>
</table>

Sensor cable codes for length and type options

Order code

<table>
<thead>
<tr>
<th>Sensor code for path 1</th>
<th>Sensor code for path 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>K01</td>
<td>K03</td>
</tr>
<tr>
<td>K01</td>
<td>K03</td>
</tr>
<tr>
<td>K01</td>
<td>R03</td>
</tr>
<tr>
<td>K01</td>
<td>R03</td>
</tr>
</tbody>
</table>

RTD cable codes for length and type

<table>
<thead>
<tr>
<th>Cable length m (ft)</th>
<th>Standard (telfon wrapped)</th>
<th>Submersible (extruded jacket)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40...+200 °C</td>
<td>-40...+392 °F</td>
<td>-40...+392 °F</td>
</tr>
<tr>
<td>6 (20)</td>
<td>R01 1)</td>
<td>R01 1)</td>
</tr>
<tr>
<td>15 (50)</td>
<td>R02 1)</td>
<td>R02 1)</td>
</tr>
<tr>
<td>30 (100)</td>
<td>R03 1)</td>
<td>R03 1)</td>
</tr>
<tr>
<td>46 (150)</td>
<td>R04</td>
<td>R04</td>
</tr>
<tr>
<td>61 (200)</td>
<td>R05</td>
<td>R05</td>
</tr>
<tr>
<td>91 (300)</td>
<td>R06</td>
<td>R06</td>
</tr>
</tbody>
</table>

1) Standard MLFB for quick delivery