

### 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 fiber-glass 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

## Flow Measurement

### SITRANS F US Clamp-on

#### SITRANS FUH1010 (Oil)

#### Technical specifications

##### Specifications for interface detectors

###### Accuracy

Accuracy	± 0.05 of API No.
Repeatability	± 0.01 of API No.

##### Specifications for volumetric and mass flowmeters

###### Input

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent

###### Accuracy

Typical accuracy	± 0.5 to 1 % of flow
Calibratable accuracy	± 0.15 % ... 0.3 % of flow, depending on version
Batch repeatability	± 0.05 % of flow, maximum

##### Specifications for all SITRANS FUH1010 products

###### Input

Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Analog inputs	• Current: 4 x 4 ... 20 mA

###### Output

Standard outputs	<ul style="list-style-type: none"> <li>• Current: 20 mA (1 kΩ at 30 VDC)</li> <li>• Voltage: 10 V DC (5 kΩ minimum)</li> <li>• Pulse Rate: 5 kHz, Digital Quad.</li> <li>• VT100 RS 232</li> </ul>
Extended outputs	<ul style="list-style-type: none"> <li>• HART, BACnet MSTP/BACnet IP, Modbus RTU &amp; TCP/IP, Ethernet IP, Johnson N2</li> <li>• 4 x 4 ... 20 mA</li> <li>• Form C relays</li> <li>• Digital pulse</li> </ul>
Status/Alarm I/O	<ul style="list-style-type: none"> <li>• Programmable relays</li> <li>• Totalizer clear switch input (not for IP65 (NEMA 4X) enclosure)<sup>1)</sup></li> <li>• Totalizer hold switch input</li> </ul>

##### 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

Degree of protection	<ul style="list-style-type: none"> <li>• Wall mount IP65 (NEMA 4X)</li> <li>• Wall mount explosionproof IP66 (NEMA 7)</li> </ul>
Liquid temperature	<ul style="list-style-type: none"> <li>• Standard -40 ... +120 °C (-40 ... +250 °F)</li> <li>• Optional -40 ... +230 °C (-40 ... +450 °F)</li> </ul>
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

##### Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

##### Power supply

<ul style="list-style-type: none"> <li>• IP65 (NEMA 4X) wall mount and IP66 (NEMA 7) wall mount explosionproof</li> </ul>	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
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##### Indication and operation

Data logger memory	1 MByte
Display	<ul style="list-style-type: none"> <li>• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures</li> </ul>
Keypad	<ul style="list-style-type: none"> <li>• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures</li> </ul>
Language options	English, Spanish, German, Italian, French

<sup>1)</sup> Totalizer switch inputs are not provided for the interface detector.

### Certificates and approvals

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

FM and CSA

- 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

FM and CSA

- 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] IIB + H2  
T5
- Sensors:  
Ex II 1 G Ex ia IIC T5



Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
<b>SITRANS FUH1010 (Oil)</b> <ul style="list-style-type: none"> <li>• IP65 (NEMA 4X) wall mount</li> <li>• IP66 (NEMA 7) wall mount explosionproof</li> </ul> <p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>	<b>7ME3600-</b>		<b>SITRANS FUH1010 (Oil)</b> <ul style="list-style-type: none"> <li>• IP65 (NEMA 4X) wall mount</li> <li>• IP66 (NEMA 7) wall mount explosionproof</li> </ul>	<b>7ME3600-</b>	
	<b>7ME3603-</b>			<b>7ME3603-</b>	
	0 -			0 -	
<b>Number of ultrasonic paths/meter type</b>			<b>RTD temperature sensor</b> (includes mounting hardware for pipes above 1.5" OD)		
Single path (precision volume)	0		No RTDs (Note: temperature input is required for SITRANS FUH systems)	0	
Single path (interface detector)	1		1 x Standard clamp-on RTD	1	
Dual channel/Dual path (interface detector)	2		2 x Standard clamp-on RTD <sup>2)</sup>	2	
Dual path (precision volume)	3		1 x Submersible clamp-on RTD	3	
Dual path (standard volume/mass)	4		2 x Submersible clamp-on RTD <sup>2)</sup>	4	
Special: Four path (standard volume/mass) only	9	H 1 A	<b>Sensor for channel/path 1</b> (includes standard pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.		
<b>Flowmeter functions and I/O configurations</b> Includes graphic or digital display IP65 (NEMA 4X) wall mount and IP66 (NEMA 7 wall mount explosionproof) units			no sensor	A	
<ul style="list-style-type: none"> <li>• Standard I/O               <ul style="list-style-type: none"> <li>- Graphic display</li> <li>- 2 x 0 ... 10 V</li> <li>- 2 x 4 ... 20 mA (active)</li> <li>- 2 x 0 ... 5 kHz pulse outputs (TTL)</li> <li>- 4 x form C relays</li> <li>- 4 x logic inputs (totalizer control, TTL)</li> <li>- 4 x 4 ... 20 mA analog input</li> <li>- 1 x Pt100 RTD input per channel (Dual channel/path)</li> <li>- 1 x Pt100 RTD input (Multi channel/path)</li> </ul> </li> </ul>	A		For the following High Precision sensors, temperature range is -40 °C to +120 °C (-40 °F to +248 °F), nominal 21 °C (70 °F):		
<ul style="list-style-type: none"> <li>• Extended I/O               <ul style="list-style-type: none"> <li>- Graphic display</li> <li>- 2 x 0 ... 10 V</li> <li>- 2 x 4 ... 20 mA (active)</li> <li>- 2 x 4 ... 20 mA (passive)</li> <li>- 2 x 0 ... 5 kHz pulse outputs (TTL or OC)</li> <li>- 4 x form C relays</li> <li>- 4 x logic inputs (totalizer control, TTL)</li> <li>- 4 x 4 ... 20 mA analog input</li> <li>- 1 x Pt100 RTD input per channel (Dual channel/path)</li> <li>- 1 x Pt100 RTD input (Multi channel/path)</li> </ul> </li> </ul>	C		A2H (high precision) Trackmount and straps provided up to 75 mm (3")	H	
<b>Meter power options</b>			A3H (high precision) Trackmount and straps provided up to 75 mm (3")	J	
90 ... 240 V AC	A		B1H (high precision) Trackmount and straps provided up to 125 mm (5")	K	
9 ... 36 V DC	B		B2H (high precision) Trackmount and straps provided up to 125 mm (5")	L	
<b>Communication options</b>			B3H (high precision) Trackmount and straps provided up to 125 mm (5")	T	
VT100 RS 232	0		C1H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 600 mm (24") <sup>1)</sup>	M	
HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2, VT100 RS 232	2		C2H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 600 mm (24") <sup>1)</sup>	N	
			D1H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 1200 mm (48") <sup>1)</sup>	P	
			D2H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 1200 mm (48") <sup>1)</sup>	Q	
			D3H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 1200 mm (48") <sup>1)</sup>	U	
			D4H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 1200 mm (48") <sup>1)</sup>	R	

## Flow Measurement

### SITRANS F US Clamp-on

#### SITRANS FUH1010 (Oil)

##### Selection and Ordering data

Selection and Ordering data	Article No.	Ord. code
• IP65 (NEMA 4X) wall mount	<b>7ME3600-</b>	
• IP66 (NEMA 7) wall mount explosionproof	<b>7ME3603-</b>	
	<b>0 -</b>	

##### 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)	Z	P 1 K
B2H (high temperature range HP)	Z	P 1 L
B3H (high temperature range HP)	Z	P 1 T
C1H (high temperature range HP) <sup>3)</sup>	Z	P 1 M
C2H (high temperature range HP) <sup>3)</sup>	Z	P 1 N
D1H (high temperature range HP) <sup>1)3)</sup>	Z	P 1 P
D2H (high temperature range HP) <sup>1)3)</sup>	Z	P 1 Q
D3H (high temperature range HP) <sup>1)3)</sup>	Z	P 1 U
D4H (high temperature range HP) <sup>1)3)</sup>	Z	P 1 R

##### Sensor for channel/path 2

(includes pipe mounting kit and spacer bar for indicated max. outer diameter listed)  
See "Sensor selection charts" for specifications.

no sensor		A
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")		H
A3H (high precision) Trackmount and straps provided up to 75 mm (3")		J
B1H (high precision) Trackmount and straps provided up to 125 mm (5")		K
B2H (high precision) Trackmount and straps provided up to 125 mm (5")		L
B3H (high precision) Trackmount and straps provided up to 125 mm (5")		T
C1H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 600 mm (24") <sup>1)</sup>		M
C2H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 600 mm (24") <sup>1)</sup>		N
D1H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 1200 mm (48") <sup>1)</sup>		P
D2H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 1200 mm (48") <sup>1)</sup>		Q
D3H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 1200 mm (48") <sup>1)</sup>		U
D4H (high precision) <sup>3)</sup> Mounting frame and straps provided up to 1200 mm (48") <sup>1)</sup>		R

##### Selection and Ordering data

Selection and Ordering data	Article No.	Ord. code
• IP65 (NEMA 4X) wall mount	<b>7ME3600-</b>	
• IP66 (NEMA 7) wall mount explosionproof	<b>7ME3603-</b>	
	<b>0 -</b>	

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)	Z	Q 1 K
B2H (high temperature range HP)	Z	Q 1 L
B3H (high temperature range HP)	Z	Q 1 T
C1H (high temperature range HP) <sup>3)</sup>	Z	Q 1 M
C2H (high temperature range HP) <sup>3)</sup>	Z	Q 1 N
D1H (high temperature range HP) <sup>1)3)</sup>	Z	Q 1 P
D2H (high temperature range HP) <sup>1)3)</sup>	Z	Q 1 Q
D3H (high temperature range HP) <sup>1)3)</sup>	Z	Q 1 U
D4H (high temperature range HP) <sup>1)3)</sup>	Z	Q 1 R

##### Approvals

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

ATEX

<sup>1)</sup> 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).

<sup>2)</sup> Dual channel interface detector only

<sup>3)</sup> Made with stainless steel construction.

##### Selection and Ordering data

Selection and Ordering data	Order code
<b>Further designs</b>	
Please add <b>"-Z"</b> to Article No. and specify Order code(s).	
Cable assembly for sensors (add for # of paths) See "Sensor cable selection chart"	<b>K..</b>
Cable assembly for RTDs (add for # of RTDs) See "RTD cable selection chart"	<b>R..</b>
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored sensor cable	<b>T01</b>
• Termination for submersible cable	<b>T11</b>
• RTD cable termination kit for standard RTD	<b>T21</b>
• RTD cable termination kit for submersible RTD	<b>T31</b>
• Cable gland kit	<b>T51</b>
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)	<b>Y19</b>

Selection and Ordering data	Article No.
<b>Operating Instructions for SITRANS FUH1010</b>	
English NEMA 4X & NEMA 7 wall mount Standard Volume	<b>A5E02951449</b>
German NEMA 4X & NEMA 7 wall mount Standard Volume	<b>A5E02951529</b>
English NEMA 4X & NEMA 7 wall mount explosionproof Precision Volume	<b>CQO:1010PVNFM-3</b>
English NEMA 4X & NEMA 7 wall mount explosionproof Interface Detector	<b>A5E02951504</b>
All literature is available to download for free, in a range of languages, at <a href="http://www.siemens.com/processinstrumentation/documentation">www.siemens.com/processinstrumentation/documentation</a>	

### 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**  
**K03 + K03 + R03**

Selection and Ordering data	Article No.	Ord. code
<b>SITRANS FUH1010 meter family</b>	<b>7ME3600</b>	
IP65 (NEMA 4X) enclosure	<b>0</b>	
Dual path precision volume	<b>3</b>	
Custody Transfer option with digital pulse	<b>C</b>	
9 ... 36 V DC power option	<b>B</b>	
VT100 RS 232	<b>0</b>	
RTD required for viscosity comp	<b>3</b>	
Sensor code for path 1	<b>Q</b>	
Sensor code for path 2	<b>Q</b>	
FM approval required	<b>1</b>	
30 m (100 ft) sensor cable for path 1		<b>K03</b>
30 m (100 ft) sensor cable for path 2		<b>K03</b>
30 m (100 ft) cable for RTD		<b>R03</b>

### High precision sensor selection chart IP68

Based on pipe wall thickness (steel pipes only)					
Sensor Pipe wall	Order Code	Pipe wall (mm)		Pipe wall (inch)	
		min.	max.	min.	max.
A1H	<b>G</b>	0.64	1.02	0.025	0.04
A2H	<b>H</b>	1.02	1.52	0.04	0.06
A3H	<b>J</b>	1.52	2.03	0.06	0.08
B1H	<b>K</b>	2.03	3.05	0.08	0.12
B2H	<b>L</b>	3.05	4.06	0.12	0.16
C1H <sup>1)</sup>	<b>M</b>	4.06	5.84	0.16	0.23
C2H <sup>1)</sup>	<b>N</b>	5.84	8.13	0.23	0.32
D1H <sup>1)</sup>	<b>P</b>	8.13	11.18	0.32	0.44
D2H <sup>1)</sup>	<b>Q</b>	11.18	15.75	0.44	0.62
D4H <sup>1)</sup>	<b>R</b>	15.75	31.75	0.62	1.25
B3H <sup>1)</sup>	<b>T</b>	2.7	3.3	0.106	0.128
D3H <sup>1)</sup>	<b>U</b>	7.4	9.0	0.293	0.354

<sup>1)</sup> Made with stainless steel construction.

### Sensor Cable Selection Chart

Sensor cable codes for length and type options				
Cable length m (ft)	Standard (PVC jacket)	Submersible (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored
	-40...+80 °C (-40...+176 °F)	-40...+80 °C (-40...+176 °F)	-40...+200 °C (-40...+392 °F)	-40...+80 °C (-40...+176 °F)
Order code				
6 (20)	<b>K01<sup>1)</sup></b>	<b>K11</b>	<b>K21</b>	<b>K31</b>
15 (50)	<b>K02</b>	<b>K12<sup>1)</sup></b>	<b>K22</b>	<b>K32<sup>1)</sup></b>
30 (100)	<b>K03<sup>1)</sup></b>	<b>K13<sup>1)</sup></b>	<b>K23</b>	<b>K33</b>
46 (150)	<b>K04<sup>1)</sup></b>	<b>K14</b>	<b>K24</b>	<b>K34</b>
61 (200)	<b>K05</b>	<b>K15</b>	<b>K25</b>	<b>K35</b>
91 (300)	<b>K06</b>	<b>K16</b>	<b>K26</b>	<b>K36</b>

<sup>1)</sup> Standard MLFB for quick delivery

### RTD Cable Selection Chart

RTD cable codes for length and type		
Cable length m (ft)	Standard (teflon wrapped)	Submersible (extruded jacket)
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
Order code		
6 (20)	<b>R01<sup>1)</sup></b>	<b>R11</b>
15 (50)	<b>R02<sup>1)</sup></b>	<b>R12</b>
30 (100)	<b>R03<sup>1)</sup></b>	<b>R13</b>
46 (150)	<b>R04</b>	<b>R14</b>
61 (200)	<b>R05</b>	<b>R15</b>
91 (300)	<b>R06</b>	<b>R16</b>

<sup>1)</sup> Standard MLFB for quick delivery