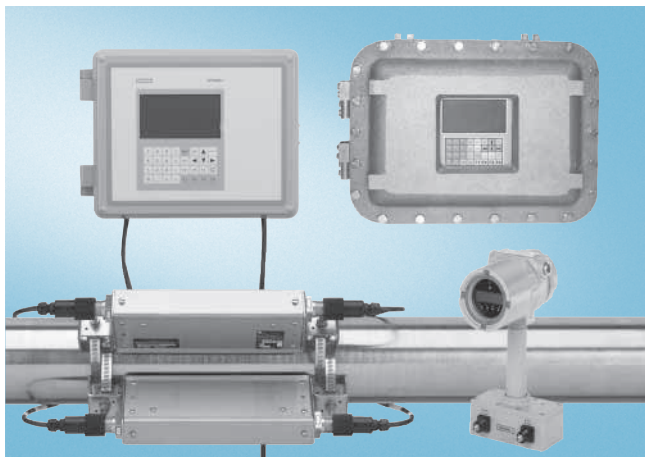


# SITRANS F flowmeters

## SITRANS F US

### SITRANS FUH1010 Oil clamp-on

#### 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, volumetric flowmeters and mass or standard volume flowmeters.

#### Benefits

##### For all FUH1010 products

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers 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 beam versions.
  - Single beam version reduces initial investment
  - Two or optional three and four beam versions provide higher accuracy, especially where limited straight run or poor flow profile exists
- Wide-Beam 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 detectors / Density meters (“interface detector”)

- 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

##### Viscosity compensated volumetric flowmeters (“precision volume”)

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

##### Standard volume (net) mass flowmeters (“standard volume / mass”)

- 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 detectors / Density meters

- Precise identification of interfaces on multi-liquid pipelines
- Rapid and precise scraper “pig” indication
- Product identification
- Density indication

##### Viscosity compensated volumetric flowmeters

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

##### Standard volume (net) mass flowmeters

- 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

FUH1010 is available in three enclosures:

- IP65 (NEMA 4X) Enclosure
  - Single beam
  - Dual beam
  - Optional four beam
- IP65 (NEMA 7) Compact explosionproof enclosure
  - Single beam
  - Dual beam (option)
- IP66 (NEMA 7) Wall mount explosionproof enclosure
  - Single beam
  - Dual beam
  - Four beam (optional)

#### Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow meters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow meters has a 2 x 16 alphanumeric LCD display
- Current, voltage, status alarm, frequency and RS232 outputs (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

# SITRANS F flowmeters

## SITRANS F US

### SITRANS FUH1010 Oil clamp-on

#### Technical specifications

##### SITRANS FUH1010

##### 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

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

##### Specifications for all FUH1010 products

##### Input

Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Analog inputs	<ul style="list-style-type: none"> <li>Current: 4x 4 ... 20 mA (IP65 (NEMA 7) enclosure has (2))</li> </ul>

##### Output

Outputs	<ul style="list-style-type: none"> <li>Current: 2x 4 ... 20 mA (1 kΩ at 30 VDC)</li> <li>Voltage: 2x 0 ... 10 V DC (5 kΩ minimum) (None for IP65 (NEMA 7) enclosure)</li> <li>1x 0 ... 5 kHz Pulse Rate, Digital Quad. (None for IP65 (NEMA 7) enclosure)</li> <li>RS232 Serial Port</li> </ul>
Optional outputs	<ul style="list-style-type: none"> <li>MODBUS (not for IP65 (NEMA 7) enclosure)</li> <li>RS232 standard</li> <li>Up to 4x additional 4 ... 20 mA (not for IP65 (NEMA 7) enclosure)</li> <li>4x Mercury wetted relays (not for IP65 (NEMA 7) enclosure)</li> <li>Up to 4x digital pulse (not for IP65 (NEMA 7) enclosure)</li> </ul>

##### Status/Alarm I/O

- 4x Programmable relays (not for IP65 (NEMA 7) enclosure)
- 2x Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only)
- 1x Totalizer clear switch input (not for IP65 (NEMA 4X) enclosure)<sup>1)</sup>
- 1x Totalizer hold switch input (not for IP65 (NEMA 7) enclosure)<sup>1)</sup>
- 1x Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only)<sup>1)</sup>
- 1x Opto iso. totalizer hold switch input (for IP65 (NEMA 7) enclosure, only)<sup>1)</sup>

##### Accuracy

Zero Drift	0.0003 m/s (0.001 ft/s), with Zero-Matic Path active (not provided for interface detector)
Data refresh rate	5 Hz (80 Hz output for flow rate available on special order)

##### Rated operation conditions

Degree of protection	
• Wall mount enclosure	IP65 (NEMA 4X)
• Compact explosionproof	IP65 (NEMA 7)
• Wall mount explosionproof	IP66 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
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

• IP65 (NEMA 4X) and IP66 (NEMA 7) Wall Mount	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
• IP65 (NEMA 7) Compact	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W

##### Indication and operation

Data logger memory	1 MByte
Display	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	128 x 240 pixel LCD with backlight
• IP65 (NEMA 7) Enclosure	2 x 16 Alphanumeric LCD Display
Keypad	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	33 keypad buttons with tactile feedback
• IP65 (NEMA 7) Enclosure	5 Magnetic hall effect switches
Language options	English, Spanish, German, Italian, French

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

# SITRANS F flowmeters

## SITRANS F US

### SITRANS FUH1010 Oil clamp-on

#### Certificates and approvals

##### IP65 (NEMA 4X) flow display computer ratings

FM and CSA	I.S. Class I, II, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	<ul style="list-style-type: none"> <li>Flowmeter: Ex II (1) G [EEx ia] IIC EX II 3 (1) G EEx nC [ia] IIC T5</li> <li>Transducers: Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 for use with flowmeter in safe area only</li> </ul>
CCOE (India)	EEx (ia)
INMETRO (Brazil)	<ul style="list-style-type: none"> <li>Flowmeter: [BR-Ex ia] IIC T6</li> <li>Transducers: BR-Ex ia IIC T6 IP65</li> </ul>
GoST Ratings (Russia)	Flowmeter: [Exia] IIC Transducers: Exia IIC T5

##### IP65 (NEMA 7) compact explosionproof enclosure ratings

FM and CSA	Ex Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	<ul style="list-style-type: none"> <li>Flowmeter: Ex II 2 (1) G EEx d [ia] IIC T5</li> <li>Transducers: Ex II 1 G EEx ia IIC T5</li> </ul>
CCOE (India)	EEx d
INMETRO (Brazil)	<ul style="list-style-type: none"> <li>Flowmeter: BR-Ex d [ia] IIC T6</li> <li>Transducers: BR-Ex ia IIC T6 IP65</li> </ul>

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

FM and CSA	Ex Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 (FM only)
ATEX	<ul style="list-style-type: none"> <li>Flowmeter: Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 Ex II 2 (1) G EEx d [ia IIC] IIB T5</li> <li>Transducers: Ex II 1 G EEx ia IIC T5</li> </ul>
INMETRO (Brazil)	<ul style="list-style-type: none"> <li>Flowmeter: [BR-Ex ia] IIC T6 BR-Ex nC [ia] IIC T6 BR-Ex d [ia] IIC T6</li> <li>Transducers: BR-Ex ia IIC T6 IP65</li> </ul>

# SITRANS F flowmeters

## SITRANS F US

### SITRANS FUH1010 Oil clamp-on

Selection and Ordering data	Order-No.	Ord. code
<b>SITRANS FUH1010 Oil clamp-on</b>		
• IP65 (NEMA 4X) F	◆	<b>7ME3600-</b>
• IP65 (NEMA 7) compact F		<b>7ME3601-</b>
• IP66 (NEMA 7) wall mounted (no display window) F		<b>7ME3602-</b>
• IP66 (NEMA 7) wall mounted (with display window) F		<b>7ME3603-</b>
■ ■ ■ ■ 0 - ■ ■ ■ ■ ■ ■ ■ ■		
<b>Number of ultrasonic beams / meter type</b>		
Single beam (precision volume)	0	
Single beam (interface detector)	1	
Dual channel/Dual beam (interface detector)	2	
Dual beam (precision volume) ◆	3	
Dual beam (standard volume / mass)	4	
Special: Four beam (standard volume/mass) only	9	H 1 A
<b>Flowmeter functions and I/O configurations</b>		
Includes graphic or digital display		
<u>IP65 (NEMA 4X) and IP66 (NEMA 7 wall mounted) units</u>		
• Standard ◆	A	
- Graphic display		
- 4x 4 ... 20 mA analog input		
- 2x 0 ... 10 V		
- 2x 4 ... 20 mA analog output		
- 2x pulse output		
- 4x Mercury wetted relays (form C for interface detector)		
- 2x RTD input		
• Enhanced I/O option C		
- additional 2x 4 ... 20 mA outputs		
- Form C relays		
- 4x digital pulse outputs (2x open collector and 2x 0 ... 5 V TTL)		
<u>IP65 (NEMA 7) compact units</u>		
• Standard D		
- Digital display		
- 2x 4 ... 20 mA (Loop)		
- 2x 4 ... 20 mA analog input		
- 2x status (open collector)		
- 1x RTD input		
• Digital pulse option F		
- 1x digital pulse open collector output		
- 2x 4 ... 20 mA (Loop)		
- 2x 4 ... 20 mA analog input		
- 1x status (open collector)		
- 1x RTD input		
• Other version (Expanded I/O for non-custody meters or dry contact relays for custody) Add order code and plain text. Z		J 1 Y
• Other version (Mercury wetted or dry contact relays) Add order code and plain text. Z		J 1 A
- Dry contact form C relays for standard meter		
- Mercury wetted relays for enhanced I/O meters Z		
<b>Meter power options</b>		
90 ... 240 V AC ◆	A	
9 ... 36 V DC (except compact NEMA 7)	B	
9 ... 36 V DC negative GND (compact only)	J	
9 ... 36 V DC positive GND (compact only)	K	
<b>Communication options</b>		
RS232 (standard) ◆	0	
MODBUS (excludes NEMA 7 compact)	1	

Selection and Ordering data	Order-No.	Ord. code
<b>SITRANS FUH1010 Oil clamp-on</b>		
• IP65 (NEMA 4X) F	◆	<b>7ME3600-</b>
• IP65 (NEMA 7) compact F		<b>7ME3601-</b>
• IP66 (NEMA 7) wall mounted (no display window) F		<b>7ME3602-</b>
• IP66 (NEMA 7) wall mounted (with display window) F		<b>7ME3603-</b>
■ ■ ■ ■ 0 - ■ ■ ■ ■ ■ ■ ■ ■		
<b>RTD temperature sensor</b>		
(includes mounting hardware for pipes above 1.5" OD)		
No RTDs (Note: temperature input is required for FUH systems) ◆	0	
1x standard clamp-on RTD ◆	1	
2x standard clamp-on RTD	2	
1x submersible clamp-on RTD ◆	3	
2x submersible clamp-on RTD	4	
Special (for insert style RTDs)	9	N 1 Y
<b>Transducer for channel/beam 1</b>		
(includes standard pipe mounting kit and spacer bar for indicated max. outer diameter listed)		
See „Transducer selection charts“ for specifications		
no transducer ◆		A
A1H (high precision) to 3"/track mount		G
A2H (high precision) to 3"/track mount		H
A3H (high precision) to 3"/track mount		J
B1H (high precision) to 5"/track mount		K
B2H (high precision) to 5"/track mount		L
B3H (high precision) to 5"/track mount		T
C1H (high precision) to 24"/mounting frame ◆		M
C2H (high precision) to 24"/mounting frame ◆		N
D1H (high precision) to 48"/mounting frame ◆		P
D2H (high precision) to 48"/mounting frame ◆		Q
D3H (high precision) to 48"/mounting frame		U
D4H (high precision) to 48"/mounting frame		R
Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text. Z		P 1 Y
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)		Z
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)		Z
High temperature range HP transducer size B3H for temperatures up to 104 °C (220 °F)		Z
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)		Z
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)		Z
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)		Z
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)		Z
High temperature range HP transducer size D3H for temperatures up to 104 °C (220 °F)		Z
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)		Z

◆ Mainstream products (delivery time 4 to 6 weeks)



F) Subject to export regulations AL: 91999, ECCN: N.

# SITRANS F flowmeters

## SITRANS F US

### SITRANS FUH1010 Oil clamp-on

#### Selection and Ordering data

SITRANS FUH1010 Oil clamp-on

- IP65 (NEMA 4X) F) **7ME3600-**
- IP65 (NEMA 7) compact F) **7ME3601-**
- IP66 (NEMA 7) wall mounted (no display window) F) **7ME3602-**
- IP66 (NEMA 7) wall mounted (with display window) F) **7ME3603-**

0 -

#### Transducer for channel/beam 2

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

Transducer description	Order-No.	Ord. code
no transducer	A	
A1H (high precision) to 3"/track mount	G	
A2H (high precision) to 3"/track mount	H	
A3H (high precision) to 3"/track mount	J	
B1H (high precision) to 5"/track mount	K	
B2H (high precision) to 5"/track mount	L	
B3H (high precision) to 5"/track mount	T	
C1H (high precision) to 24"/mounting frame	M	
C2H (high precision) to 24"/mounting frame	N	
D1H (high precision) to 48"/mounting frame	P	
D2H (high precision) to 48"/mounting frame	Q	
D3H (high precision) to 48"/mounting frame	U	
D4H (high precision) to 48"/mounting frame	R	
Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.	Z	Q 1 Y
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)	Z	Q 1 K
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)	Z	Q 1 L
High temperature range HP transducer size B3H for temperatures up to 104 °C (220 °F)	Z	Q 1 T
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)	Z	Q 1 M
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)	Z	Q 1 N
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)	Z	Q 1 P
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)	Z	Q 1 Q
High temperature range HP transducer size D3H for temperatures up to 104 °C (220 °F)	Z	Q 1 U
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)	Z	Q 1 R

#### Approvals

FM/CSA (default), also for non hazardous area	1	
ATEX	2	
INMETRO (Brazil)	3	
Special ATEX EEx m add Order code and plain text: Length of integral cable: .....	9	R 1 Y

- ◆ Mainstream products (delivery time 4 to 6 weeks)

#### Selection and Ordering data

Order code

#### Further designs

Please add „-Z“ to Order No. and specify Order code(s).

Cable assembly for transducers (add for # of beams) See „Transducer 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 transducer cable	T01
• Termination for submersible cable	T11
• RTD cable termination kit for standard RTD	T21
• RTD cable termination kit for submersible RTD	T31
Languages (Meter, Labels and Documentation), English (default)	
• German	B10
• French	B12
• Spanish	B13
• Italian	B14
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) characters (26 characters max.)	Y17
• 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 is 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 beam operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Order No.: **7ME3600-3CB00-3QQ1-Z**  
**K03 + K03 + R03**

#### Selection and Ordering data

Order-No. Ord. code

Order-No.	Ord. code
<b>7ME3600-3CB00-3QQ1-Z</b>	
IP65 (NEMA 4X) enclosure	0
Dual beam precision volume	3
Custody Transfer option with digital pulse	C
9 ... 36 V DC power option	B
RS232 Standard	0
RTD required for viscosity comp	3
Transducer code for path 1	Q
Transducer code for path 2	Q
FM approval required	1
30 m (100 ft) transducer cable for path 1	K 0 3
30 m (100 ft) transducer cable for path 2	K 0 3
30 m (100 ft) cable for RTD	R 0 3

F) Subject to export regulations AL: 91999, ECCN: N.

# SITRANS F flowmeters

## SITRANS F US

**SITRANS FUH1010 Oil clamp-on**

### Transducer Selection Chart

High precision transducers for steel pipe with outer diameter/wall thickness ratio >10

Transducer	Order Code	Pipe wall (mm)		Pipe wall (inches)	
		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	<b>M</b>	4.06	5.84	0.16	0.23
C2H	<b>N</b>	5.84	8.13	0.23	0.32
D1H	<b>P</b>	8.13	11.18	0.32	0.44
D2H	<b>Q</b>	11.18	15.75	0.44	0.62
D4H	<b>R</b>	15.75	31.75	0.62	1.25
B3H	<b>T</b>	2.7	3.3	0.106	0.128
D3H	<b>U</b>	7.4	9.0	0.293	0.354

### Transducer Cable Selection Chart

Transducer 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</b>	<b>K11</b>	<b>K21</b>	<b>K31</b>
15 (50)	<b>K02</b>	<b>K12</b>	<b>K22</b>	<b>K32</b>
30 (100)	<b>K03</b>	<b>K13</b>	<b>K23</b>	<b>K33</b>
46 (150)	<b>K04</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>

### 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</b>	<b>R11</b>
15 (50)	<b>R02</b>	<b>R12</b>
30 (100)	<b>R03</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>