

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

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

- 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
- Rapid and precise scraper "pig" indication
- 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

- 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 three 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
- IP65 (NEMA 7) compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
 - Single path
 - Dual path (option)
- 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 weld seal (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
- IP65 (NEMA 7) compact explosionproof flowmeter has a 2 x 16 alpha-numeric 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

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	<ul style="list-style-type: none"> Current: 4 x 4 ... 20 mA (IP65 (NEMA 7) enclosure has (2))

Output

Standard outputs	<ul style="list-style-type: none"> Current: 4 x 4 ... 20 mA (1 kΩ at 30 VDC) Voltage: 2 x 0 ... 10 V DC (5 kΩ minimum) (None for IP65 (NEMA 7) enclosure) 1 x 0 ... 5 kHz Pulse Rate, Digital Quad. (None for IP65 (NEMA 7) enclosure) RS232 Serial Port
Extended outputs	<ul style="list-style-type: none"> MODBUS (not for IP65 (NEMA 7) enclosure) Up to 4 x additional 4 ... 20 mA (not for IP65 (NEMA 7) enclosure) 4 x Mercury wetted relays (not for IP65 (NEMA 7) enclosure) Up to 4 x digital pulse (not for IP65 (NEMA 7) enclosure)
Status/Alarm I/O	<ul style="list-style-type: none"> 4 x Programmable relays (not for IP65 (NEMA 7) enclosure) 2 x Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only) 1 x Totalizer clear switch input (not for IP65 (NEMA 4X) enclosure)¹⁾ 1 x Totalizer hold switch input (not for IP65 (NEMA 7) enclosure)¹⁾ 1 x Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only)¹⁾ 1 x Opto iso. totalizer hold switch input (for IP65 (NEMA 7) enclosure, only)¹⁾

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"> Wall mount IP65 (NEMA 4X) Compact explosionproof IP65 (NEMA 7) Wall mount explosionproof IP66 (NEMA 7)
Liquid temperature	<ul style="list-style-type: none"> 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

<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> IP65 (NEMA 7) compact explosionproof 	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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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

¹⁾ Totalizer switch inputs are not provided for the interface detector.

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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 2004/108/EC
ATEX Directive 94/9/EC

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

INMETRO (Brazil)

- Transmitter:
[BR-Ex ia] IIC
BR-Ex nC [ia] IIC T5
- Sensors:
BR-Ex ia IIC T5

IECEX

Pending

IP65 (NEMA 7) compact explosion-proof 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 2004/108/EC
• ATEX Directive 94/9/EC

C-TICK

ATEX

- Transmitter:
Ex II 2 (1) G Ex d [ia] IIB + H2 T5
- Sensors:
Ex II 1 G Ex ia IIC T5

INMETRO (Brazil)

- Transmitter:
BR-Ex d [ia] IIC T5
- Sensors:
BR-Ex ia IIC T5

IECEX

Pending

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 2004/108/EC
ATEX Directive 94/9/EC

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

INMETRO (Brazil)

- Transmitter:
[BR-Ex ia] IIC
BR-Ex d [ia IIC] IIB T5

IECEX

Pending

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Selection and Ordering data

SITRANS FUH1010 (Oil)

- IP65 (NEMA 4X) wall mount L) **7ME3600-**
- IP65 (NEMA 7) compact explosionproof L) **7ME3601-**
- IP66 (NEMA 7) wall mount explosionproof L) **7ME3603-**

0 -

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 | H 1 A | |

Flowmeter functions and I/O configurations

Includes graphic or digital display

IP65 (NEMA 4X) wall mount and IP66 (NEMA 7 wall mount explosionproof) units

- Standard **A**
 - Graphic display
 - 4 x 4 ... 20 mA analog input
 - 2 x 0 ... 10 V
 - 2 x 4 ... 20 mA analog output
 - 2 x pulse output
 - 4 x Mercury wetted relays (form C for interface detector)
 - 2 x RTD input

- Extended I/O option **C**
 - additional 2 x 4 ... 20 mA outputs
 - Form C relays
 - 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL)

IP65 (NEMA 7) compact explosionproof units

- Standard **D**
 - Digital display
 - 2 x 4 ... 20 mA (Loop)
 - 2 x 4 ... 20 mA analog input
 - 2 x status (open collector)
 - 1 x RTD input
- Digital pulse option **F**
 - 1 x digital pulse open collector output
 - 2 x 4 ... 20 mA (Loop)
 - 2 x 4 ... 20 mA analog input
 - 1 x status (open collector)
 - 1 x RTD input
- Other version (Mercury wetted or dry contact relays) Add order code and plain text.
 - Dry contact form C relays for standard meter **Z** **J 1 A**
 - Mercury wetted relays for extended I/O meters **Z** **J 1 D**

Meter power options

- | | | |
|---|----------|--|
| 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 | |

Communication options

- | | | |
|----------------------------------|---|--|
| RS232 (standard) | 0 | |
| MODBUS (excludes NEMA 7 compact) | 1 | |

Selection and Ordering data

SITRANS FUH1010 (Oil)

- IP65 (NEMA 4X) wall mount L) **7ME3600-**
- IP65 (NEMA 7) compact explosionproof L) **7ME3601-**
- IP66 (NEMA 7) wall mount explosionproof L) **7ME3603-**

0 -

RTD temperature sensor

(includes mounting hardware for pipes above 1.5" OD)

- | | |
|---|----------|
| No RTDs (Note: temperature input is required for SITRANS FUH systems) | 0 |
| 1 x Standard clamp-on RTD | 1 |
| 2 x Standard clamp-on RTD ²⁾ | 2 |
| 1 x Submersible clamp-on RTD | 3 |
| 2 x Submersible clamp-on RTD ²⁾ | 4 |

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.

no sensor **A**

For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °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) | Mounting frame and straps provided up to 1200 mm (48") ¹⁾ | M |
| C2H (high precision) | Mounting frame and straps provided up to 1200 mm (48") ¹⁾ | N |
| D1H (high precision) | Mounting frame and straps provided up to 1200 mm (48") ¹⁾ | P |
| D2H (high precision) | Mounting frame and straps provided up to 1200 mm (48") ¹⁾ | Q |
| D3H (high precision) | Mounting frame and straps provided up to 1200 mm (48") ¹⁾ | U |
| D4H (high precision) | Mounting frame and straps provided up to 1200 mm (48") ¹⁾ | R |

¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

²⁾ Dual channel interface detector only

L) Subject to export regulations AL: N, ECCN: 3A991X.

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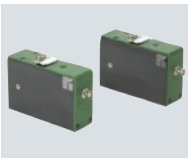










Selection and Ordering data	Order No.	Ord. code
SITRANS FUH1010 (Oil)		
• IP65 (NEMA 4X) wall mount	L) 7ME3600-	
• IP65 (NEMA 7) compact explosionproof	L) 7ME3601-	
• IP66 (NEMA 7) wall mount explosionproof	L) 7ME3603-	
	0 -	
Sensor for channel/path 1 (continued)		
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °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)	Z	P 1 M
C2H (high temperature range HP)	Z	P 1 N
D1H (high temperature range HP) ¹⁾	Z	P 1 P
D2H (high temperature range HP) ¹⁾	Z	P 1 Q
D3H (high temperature range HP) ¹⁾	Z	P 1 U
D4H (high temperature range HP) ¹⁾	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 A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °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) Mounting frame and straps provided up to 1200 mm (48") ¹⁾		M
C2H (high precision) Mounting frame and straps provided up to 1200 mm (48") ¹⁾		N
D1H (high precision) Mounting frame and straps provided up to 1200 mm (48") ¹⁾		P
D2H (high precision) Mounting frame and straps provided up to 1200 mm (48") ¹⁾		Q
D3H (high precision) Mounting frame and straps provided up to 1200 mm (48") ¹⁾		U
D4H (high precision) Mounting frame and straps provided up to 1200 mm (48") ¹⁾		R

Selection and Ordering data	Order No.	Ord. code
SITRANS FUH1010 (Oil)		
• IP65 (NEMA 4X) wall mount	L) 7ME3600-	
• IP65 (NEMA 7) compact explosionproof	L) 7ME3601-	
• IP66 (NEMA 7) wall mount explosionproof	L) 7ME3603-	
	0 -	
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °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)	Z	Q 1 M
C2H (high temperature range HP)	Z	Q 1 N
D1H (high temperature range HP) ¹⁾	Z	Q 1 P
D2H (high temperature range HP) ¹⁾	Z	Q 1 Q
D3H (high temperature range HP) ¹⁾	Z	Q 1 U
D4H (high temperature range HP) ¹⁾	Z	Q 1 R
Approvals		
FM/CSA/CE/C-TICK (default), also for non hazardous area		1
ATEX		2
INMETRO (Brazil)		3
¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).		
L) Subject to export regulations AL: N, ECCN: 3A991X.		

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Order 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
Languages (Meter 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 (68 characters max.)	Y19

4





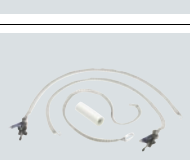


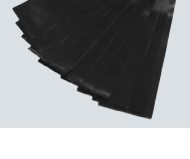
Accessories/Spare parts for clamp-on ultrasonic flowmeters

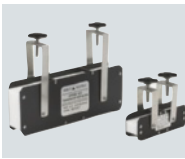

Description	Order No.		Description	Order No.	
Universal Portable Sensors Selected generally for portable systems where a wide variety of pipes are to be measured. Since they are selected based on diameter only, a wide range of pipe sizes and materials can be covered with a minimum number of sensors. These can also be selected as a cost savings on applications where standard accuracy is sufficient.	D) 7ME3951-...		Mounting Frames These items are useful in simplifying sensor installation. They are strapped to the pipe first then the sensors are installed, making the installation less cumbersome and more precise. They also enable easy repeated mounting of the sensors assuring conformation to the original sensor positioning. They may be left in place at each measurement location where periodic flow surveys are conducted to simplify subsequent installations and ensure repeatable results.	D) 7ME3960-...	
High Precision Sensors Selected generally for dedicated meters since the need to cover a range of pipes is not a requirement. They provide the highest accuracy achievable by the meters and therefore should be selected whenever higher accuracy/repeatability is required. They are only applicable to steel pipes but no other metals, and are selected solely by wall thickness.	D) 7ME3950-...		Spacer Bars Sensors are required to be mounted at a set distance from each other as determined by pipe size and medium being measured. The spacer bar simplifies this requirement by eliminating the need to undertake a precise dimensional measurement. The flowmeter will specify a specific spacing index which is easily accommodated with the marked indices on the bar.	D) 7ME3960-...	
High Temperature Sensors Are selected whenever pipe temperature will exceed 250 °F (120 °C) up to a maximum of 450 °F (232 °C). They are universal type and can therefore be used on any pipe material and are selected by pipe diameter.	D) 7ME3950-...		Clamp-On RTD's 1000 Ω platinum RTD's for use where temperature is required. Used with Energy Meters to record supply/return temperature. For this purpose precision matched pairs (to 0.02 °C) are supplied. Single RTD's are also used with SITRANS FUH and SITRANS FUG meters to enable live calculations of "Liquid" and Standard Volume Correction.	D) 7ME3950-...	
Weld Seal Mount These provide the most secure and strongest mounting of the flow sensors. They are generally selected for "High End" meter types where maximum performance criteria applies. They accommodate high precision sensors designed to mount inside these enclosures. May be welded to the pipe if so desired by the customer. They come in 2-piece or 1-piece configurations depending upon the application pipe size and type (Liquid/Gas).	D) 7ME3960-...		Insert RTD's Are identical to clamp-on RTD's as described above except that they are inserted into the pipe (In a Thermowell). They provide more precise and quicker responding temperature measurement. They are selected when precise temperature measurement of the actual liquid or gas is required as opposed to pipe "skin temperature". Since they project into the pipe they cannot be used in pipeline that undergo periodic "pigging".	D) 7ME3950-...	
Mounting tracks Typically used on smaller pipes for easier and more stable mounting for dedicated universal style sensor size A or B, also available for dedicated high precision sensor size A or B.	D) 7ME3960-...		Standard Cable (Flow Sensor or RTD) Selected for general purpose installations where no special application requirements exist.	D) 7ME3960-...	
			Submersible Cable (Flow Sensor) Polyethylene jacketed, for locations that experience periodic or continual submersion of the flow sensors.	D) 7ME3960-...	

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Accessories/Spare parts

Description	Order No.	
Plenum Cable (Flow Sensor or RTD) For temperatures above 180 °F. Teflon jacketed to withstand high temperatures, is used when high temp sensors are specified.	D) 7ME3960-...	
Armored Cable (Flow Sensor) Double shielded cable, selected when cable will not be installed in conduit between meter and sensors.	D) 7ME3960-...	
Temperature sensor cable Cable to connect field installed RTD to flow meter, available in Teflon wrapped, plenum or submersible grade. Typically used for SITRANS FUE, FUH and FUG series meters where a temperature sensor is employed.	D) 7ME3960-...	
Straps Used to fasten sensors or mounting frames to pipe for dedicated meter installations. Stainless steel construction for corrosion resistance.	D) 7ME3960-...	
Chains (EZ clamps) Used to fasten portable sensors or mounting frames to pipe. Thumbscrews eliminate need for hand tools when mounting sensors, and allow for easy on/off operations.	D) 7ME3960-...	
Ultrasonic Couplant Fills any voids between sensor emitting surface and pipe wall to allow maximum energy transfer between sensor and pipe. Several different types of couplants are employed as determined by the application conditions and type of installation (Temporary or permanent).	D) 7ME3960-...	
Dry Couplant The dry coupling pad is intended for use in any liquid, clamp-on transit time or Doppler applications that require a more durable coupling material. Installation is easy by simply placing one strip of material between sensor and pipe. Not intended for clamp-on gas where damping material is used. The temperature range is -34 to +200 °C (-30 to +392 °F).	D) 7ME3960-...	
Damping Material Used with gas meters, and required as part of their sensor installation. This material absorbs excess ultrasonic energy from the pipe wall to enable the meter to detect and operate with low amplitude sensor signals normally associated with Clamp-on Gas applications.	D) 7ME3960-...	

Description	Order No.	
Test Block Used for checking operation of a meter and sensors prior to a field installation, or as a troubleshooting tool. Selected by sensor size, each block accommodates 2 sensor sizes. Available only for universal sensors.	D) 7ME3960-...	
Termination Kit (Flow Sensor or RTD) Provides the connectors, labels and shrink tubing or other associated hardware to complete the termination of a specific cable type. These can be provided in cases where users will be purchasing bulk cable directly and cutting to length at their site, or when existing cable length is to be altered. Selected by cable type.	D) 7ME3960-...	

Selection and Ordering data	Order No.
<i>Spare parts (System)</i>	
SITRANS F US clamp-on	7ME 3 9 4 0 -
Power supplies, batteries and chargers	
Power supply 90 ... 240 V AC	
• for IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof	D) 0 PA 0 0
• for IP65 (NEMA 7) compact explosionproof	D) 2 PA 0 0
Power supply 9 ... 36 V DC	
• for IP65 (NEMA 4X) wall mount or IP66 (NEMA7) wall mount explosionproof	K) 0 PB 0 0
• negative ground for NEMA 7 compact explosionproof	D) 2 PJ 0 0
• positive ground for NEMA 7 compact explosionproof	D) 2 PK 0 0
Portable meter batteries and accessories	
• Internal battery (Portable meters only)	D) 3 PP 0 0
IP67 Portable meter charger	
• Type A for Europe (CEE7/7)	D) 3 PC 0 0
• Type C for Australia (AS3112)	D) 3 PD 0 0
• Type D for UK (BS1363)	D) 3 PE 0 0
• Type J for Japan (JIS8303)	D) 3 PF 0 0
• Type K for US (NEMA 5-15P)	D) 3 PG 0 0
• Type L for Switzerland (SEV1011)	D) 3 PH 0 0
IP40 Portable meter charger	
• Type A for Europe (CEE7/7)	D) 4 PC 0 0
• Type C for Australia (AS3112)	D) 4 PD 0 0
• Type D for UK (BS1363)	D) 4 PE 0 0
• Type J for Japan (JIS8303)	D) 4 PF 0 0
• Type K for US (NEMA 5-15P)	D) 4 PG 0 0
• Type L for Switzerland (SEV1011)	D) 4 PH 0 0
MODBUS system computer modules	
MODBUS converter module	D) CQO-1015N-5M
Mounting kit (type 1) for MODBUS converter module	D) CQO-1015N-5M-MK1
Mounting kit (type 2) for MODBUS converter module	D) CQO-1015N-5M-MK2
Mounting kit (type 3) for MODBUS converter module	D) CQO-1015N-5M-MK3
Field configuration kit with manual, for MODBUS converter module	D) CQO-1015N-5M-FK1
Pipe mounting brackets	
2 inch pipe mounting bracket for IP65 (NEMA 7) compact explosionproof	D) CQO-1012XMB-1
2 inch pipe mounting bracket for IP65 (NEMA 4X) wall mount	D) CQO-1012NMB-1

D) Subject to export regulations AL: N, ECCN: EAR99H.

K) Subject to export regulations AL: N, ECCN: 5A991X.

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Selection and Ordering data	Order No.
<i>Spare parts (Sensors)</i>	
SITRANS F US clamp-on	
Meter type	
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	D) 7ME3950 - ■■■■
Portable (SITRANS FUP1010 or FUE1010)	D) 7ME3951-0 ■■■■
Approvals	
UL, ULc, CE (Portable only)	0
FM/CSA hazardous (classified) locations	1
ATEX Ex II 1G Ex ia IIC T5 (not for RTDs)	2
INMETRO (not for RTDs)	3
Spare sensor code	
<u>For liquid flow sensors pipe ranges please refer to sensor selection chart in the SITRANS FUS1010 section</u>	
<u>Liquid flow sensors for use with mounting frames or tracks (including portable)</u>	
A2 universal	LB00
B3 universal	LC00
C3 universal	LD00
D3 universal	LE00
E2 universal	LF00
A1H (high precision)	LG00
A2H (high precision)	LH00
A3H (high precision)	LJ00
B1H (high precision)	LK00
B2H (high precision)	LL00
B3H (high precision)	LT00
C1H (high precision)	LM00
C2H (high precision)	LN00
D1H (high precision)	LP00
D2H (high precision)	LQ00
D3H (high precision)	LU00
D4H (high precision)	LR00
Doppler	LS00
<u>High precision liquid sensor for weld seal enclosures</u>	
C1H (high precision, weld seal)	SM00
C2H (high precision, weld seal)	SN00
D1H (high precision, weld seal)	SP00
D2H (high precision, weld seal)	SQ00
D3H (high precision, weld seal)	SU00
D4H (high precision, weld seal)	SR00

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<i>Spare parts (Sensors)</i>	
SITRANS F US clamp-on	
Meter type	
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	D) 7ME3950 - ■■■■
Portable (SITRANS FUP1010 or FUE1010)	D) 7ME3951-0 ■■■■
<u>High temperature universal liquid sensors</u>	
Note: not available with INMETRO approval	
High temp. sensor size 1 for up to 230 °C (12.7 to 100 mm diam.)	LA10
High temp. sensor size 2 for up to 230 °C (30 to 200 mm diam.)	LA20
High temp. sensor size 3 for up to 230 °C (150 to 600 diam.)	LA30
High temp. sensor size 4 for up to 230 °C (400 to 1200 diam.)	LA40
<u>For gas flow sensors pipe ranges please refer to sensor selection chart in the SITRANS FUG1010 section</u>	
<u>High precision gas flow sensors for use with mounting frames or tracks</u>	
B1H (high precision)	GK00
B2H (high precision)	GL00
B3H (high precision)	GT00
C1H (high precision)	GM00
C2H (high precision)	GN00
D1H (high precision)	GP00
D2H (high precision)	GQ00
D3H (high precision)	GU00
D4H (high precision)	GR00
<u>High precision gas sensor for weld seal enclosures</u>	
C1H (high precision, weld seal)	HM00
C2H (high precision, weld seal)	HN00
D1H (high precision, weld seal)	HP00
D2H (high precision, weld seal)	HQ00
D3H (high precision, weld seal)	HU00
D4H (high precision, weld seal)	HR00
D) Subject to export regulations AL: N, ECCN: EAR99H	

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Selection and Ordering data	Order No.	Selection and Ordering data	Order No.
Spare parts (Sensors)		Spare parts (Miscellaneous)	
SITRANS F US clamp-on		SITRANS F US clamp-on	D) 7ME3960 -
Meter type		Meter design	
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	D) 7ME3950 -	IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof	0
Portable (SITRANS FUP1010 or FUE1010)	D) 7ME3951 - 0	IP65 (NEMA 7) compact	2
<u>Standard RTD sensors (not for energy systems)</u>		IP67 weatherproof portable	3
Standard clamp-on RTD	1TA00	IP40 (NEMA 1) Portable	4
Submersible clamp-on RTD (not for Portable)	1TB00	Dedicated sensor mounting hardware	
Insertion style RTD pair (size 1), 140 mm (5.5 inch)	1TJ00	Sensor mounting tracks (aluminium with mounting straps) for pipes < 125 mm (5 inch)	
Insertion style RTD pair (size 2), 216 mm (8.5 inch)	1TJ01	• Universal sensor size A or B	0MA00
Insertion style RTD pair (size 3), 292 mm (11.5 inch)	1TJ02	• High precision sensor size A or B	0MB00
Insertion style RTD pair (size 4), 368 mm (14.5 inch)	1TJ03	Sensor mounting frames for	
<u>Standard for energy system (matched pair)</u>		• Universal sensor size B (for pipes > 125 mm (5 inch))	D) CQO-1012FN-PB
Standard clamp-on RTD	1TA10	• Universal sensor size C	0MC00
Insertion style RTD pair (size 1) for SITRANS FUE1010, 140 mm (5.5 inch)	1TJ10	• Universal sensor size D	0MC01
Insertion style RTD pair (size 2) for SITRANS FUE1010, 216 mm (8.5 inch)	1TJ11	• Universal sensor size E	0MC02
Insertion style RTD pair (size 3) for SITRANS FUE1010, 292 mm (11.5 inch)	1TJ12	• High precision sensor size B (for pipes > 125 mm (5 inch))	D) CQO-1012FNH-PB
Insertion style RTD pair (size 4) for SITRANS FUE1010, 368 mm (14.5 inch)	1TJ13	• High precision sensor size C	0MD00
1) Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012-BN-4)		• High precision sensor size D	0MD01
D) Subject to export regulations AL: N, ECCN: EAR99H.		Mounting straps for mounting frames (slotted stainless steel)	
		• For pipes from DN 50 to DN 150	0SM00
		• For pipes from DN 50 to DN 300	0SM10
		• For pipes from DN 300 to DN 600	0SM20
		• For pipes from DN 600 to DN 1200	0SM30
		• For pipes from DN 1200 to DN 1500	0SM40
		• For pipes from DN 1500 to DN 2100	0SM50
		• For pipes from DN 2100 to DN 3000	0SM60
		Spacer bars (for indexing sensors on pipe)	
		• Spacer bars for pipes to 200 mm/8 inch (liquid), 600 mm / 24 inch (gas)	0MS10
		• Spacer bars for pipes to 500 mm/20 inch (liquid), DN 1200 / 48 inch (gas)	0MS20
		• Spacer bars for pipes to 800 mm/32 inch (liquid)	0MS30
		• Spacer bars for pipes to 1200 mm/48 inch (liquid) Only use in conjunction with 7ME3960-0MS30	0MS40
		Weld seal mounting enclosures for liquid and gas sensors	
		• Single enclosure for size C high precision	0WS20
		• Single enclosure for size D high precision	0WS30
		• Single enclosure for size E universal	0WS40
		• Dual enclosure for size C high precision	0WD20
		• Dual enclosure for size D high precision	0WD30
		• Dual enclosure for size E universal	0WD40

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<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	D) 7ME3960 -
Stainless steel straps for weld seal enclosure mounting	
• Mounting strap for pipe diameter to 300 mm (13 inch)	0SM01
• Mounting strap for pipe diameter to 600 mm (24 inch)	0SM11
• Mounting strap for pipe diameter to 1200 mm (48 inch)	0SM21
• Mounting strap for pipe diameter to 1500 mm (60 inch)	0SM31
• Mounting strap for pipe diameter to 2130 mm (84 inch)	0SM41
• Mounting strap for pipe diameter to 3050 mm (120 inch)	0SM51
Stainless mounting tracks for high temp 991 sensors	
• Size 1 high temp sensor pair	D) CQO-992MTNHMSH-1
• Size 2 high temp sensor pair	D) CQO-992MTNHMSH-2
• Size 3 high temp sensor pair	D) CQO-992MTNHMSH-3
• Size 4 high temp sensor pair	D) CQO-992MTNHMSH-4
Clamp-on RTD mounting hardware for dedicated systems	
• RTD mounting hardware for dedicated system: 152 to 610 mm (6 to 24 inch)	0MR00
• RTD mounting hardware for dedicated system: 12.7 to 50.8 mm (0.5 to 2 inch)	0MR01
• RTD mounting hardware for dedicated system: 31.8 to 203.2 mm (1.25 to 8 inch)	0MR02
• RTD mounting hardware for dedicated system: 508 to 1219 mm (20 to 48 inch)	0MR04
• Junction box for clamp on RTD's	D) CQO-992ECJ
Portable sensor mounting hardware	
Sensor mounting tracks for portable sensors (aluminum with mounting chains) for pipes < 125 mm (5 inch) for	
• Universal sensor size A or B	3MA00
• High precision sensor size A or B	3MB00
Sensor mounting frames	
• Universal sensor size B (for pipes >125 mm (5 inch))	D) CQO-1012FP-PB
• Universal sensor size C	3MC00
• Universal sensor size D	3MC01
• Universal sensor size E	3MC02
• High precision sensor size B (for pipes > 125 mm (5 inch))	D) CQO-1012FPH-PB
• High precision sensor size C	3MD00
• High precision sensor size D	3MD01
Spacer bar (for indexing portable sensors)	3MS00
Mounting chain and EZ clamp hardware	
• EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch); handles all transducers except "D" size HP and "E" size univ.	D) CQO-1012Z-1
• EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch) for "D" size HP and "E" size universal	D) CQO-1012Z-2
• Mounting chain for portable sensors: 4 x 760 mm lengths	3CM10
• Mounting chain for portable sensors: 2 x 760 mm and 2 x 1500 mm lengths	3CM20

Selection and Ordering data	Order No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	D) 7ME3960 -
RTD mounting hardware for portable system	3MR00
Sensor connector adaptors	
• "F" connector to BNC adapter (order 2 per sensor set)	D) CQO-1012NFPA
SITRANS FST020 Sensor trackmounts	
• Single enclosure mounting track for "A" size Xdcr pair, Reflect	D) CQO-1022A1R
• Single enclosure mounting track for "B" size Xdcr pair, Reflect	D) CQO-1022B1R
• Dual enclosure mounting track for "B" size Xdcr pair, Reflect/Direct	D) CQO-1022B2R
• Single enclosure mounting track for "C" size Xdcr pair, Reflect	D) CQO-1022C1R
• Dual enclosure mounting track for "C" size Xdcr pair, Reflect/Direct	D) CQO-1022C2R
• Dual enclosure mounting track for "D" size Xdcr pair, Reflect/Direct	D) CQO-1022D2R
D) Subject to export regulations AL: N, ECCN: EAR99H.	

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Accessories/Spare parts

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<i>Spare parts (Miscellaneous)</i>		<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	D) 7ME3960 -	SITRANS F US clamp-on	D) 7ME3960 -
Insert RTD Thermowells		Ultrasonic couplants	
• Thermowell std. duty uninsulated pipe 140 mm (5.5 inch)	D) CQO-1012TW-1	• Temporary water based for portable systems: 350 ml (12 oz): -34 ... +38 °C (-30 ... +100 °F)	0UC10
• Thermowell std. duty uninsulated pipe 216 mm (8.5 inch)	D) CQO-1012TW-2	• Permanent synthetic polymer based: 90 ml (3 oz) -40 ... +190 °C (-40 ... +375 °F)	0UC20
• Thermowell std. duty uninsulated pipe 292 mm (11.5 inch)	D) CQO-1012TW-3	• Permanent high temp fluoroether: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)	0UC30
• Thermowell std. duty with lagging 140 mm (5.5 inch)	D) CQO-1012TW-1L	• Permanent high temp fluoroether: 163 ml (5.5 oz): -40 ... +230 °C (-40 ... +450 °F)	0UC50
• Thermowell std. duty with lagging 216 mm (8.5 inch)	D) CQO-1012TW-2L	• Permanent vulcanizing silicone rubber couplant: 90 ml (3 oz): -40 ... +120 °C (-40 ... +250 °F)	D) CQO-CC112
• Thermowell std. duty with lagging 292 mm (11.5 inch)	D) CQO-1012TW-3L	• Permanent high temp silicone grease: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)	D) CQO-CC117
Sensor cables for (Use "Sensor cable selection chart" to complete Order No. with ##)		• Permanent high temp silicone grease: 150 ml (5 oz): -40 ... +230 °C (-40 ... +450 °F)	D) CQO-CC117A
• IP65 (NEMA 4X) wall mount or IP 66 (NEMA 7) wall mount explosionproof	0CK##	• Couplant for submersible sensor applications	D) CQO-CC120
• IP65 (NEMA 7) compact explosionproof	2CK##	• Dry coupling pads (qty of 10): -34 to +200 °C (-30 to +392 °F)	0UC40
• IP67 Weatherproof portable	3CK##	Pipe damping films for SITRANS FUG gas systems	
• IP40 (NEMA 1) Portable	4CK##	• B1, B2, B3, C1 and C2 sensors	0DM10
RTD cables for (Use "Sensor cable selection chart" to complete Order No. with ##)		• D1 and D3 sensors	0DM20
• All dedicated systems	0CR##	• D2 sensor	0DM30
• IP67 Weatherproof portable	3CR##	• D4 sensor	0DM40
• IP40 (NEMA 1) Portable	4CR##	Serial RS232 Cables and I/O Adapters	
Dedicated cable termination kits		• RS232 Cable for all dedicated meters	0CS00
• Standard, plenum and armored sensor cable (NEMA 4X wall mount and NEMA 7 wall mount explosionproof)	0CT01	• RS232 Cable for IP66 weatherproof portable meter	3CS00
• Submersible sensor cable (NEMA 4X wall mount and NEMA 7 wall mount explosionproof)	0CT11	• RS232 Cable for IP40 Portable meter	4CS00
• Standard and plenum sensor cable (SITRANS FST020)	1CT01	• I/O adapter for IP66 Weatherproof portable meter	3AD00
• Standard, plenum and armored sensor cable (NEMA 7 compact explosionproof)	2CT01	Universal Sensor Test Blocks	
• Submersible sensor cable (NEMA 7 compact explosionproof)	2CT11	• Test block for size A and B universal sensors	0TB10
• Clamp-on RTD cable termination kit for standard RTD	0CT21	• Test block for size C and D universal sensors	0TB20
• Clamp-on RTD cable termination kit for submersible RTD	0CT31	Field Manuals	
• Insert RTD cable termination kit	0CT41	• CD with documentation for SITRANS F US Clamp-on ultrasonic flowmeters (English)	D) A5E02830664-03

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Accessories/Spare parts

Sensor cable selection chart (Dedicated, pair)

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

Sensor cable selection chart (SITRANS FUP1010, FUE1010 Portable, pair)

Sensor cable codes for length and type options		
Cable length m (ft)	Standard -40 ... + 80 °C (-40 ... +176 °F)	Plenum -40 ... + 200 °C (-40 ... +392 °F)
Order Code		
6 (20)	K01	K21
15 (50)	K02	K22
30 (100)	K03	K23

RTD cable selection chart (Dedicated, each)

RTD cable codes for length and type				
Cable length m (ft)	Standard -40 ... +200 °C (-40 ... +392 °F)	Submersible -40 ... +200 °C (-40 ... +392 °F)	for insert RTD -40 ... +200 °C (-40 ... 392 °F)	for submersible insert RTD -40 ... +200 °C (-40 ... 392 °F)
Order code				
6 (20)	R01	R11	R21	R31
15 (50)	R02	R12	R22	R32
30 (100)	R03	R13	R23	R33
46 (150)	R04	R14	R24	R34
61 (200)	R05	R15	R25	R35
91 (300)	R06	R16	R26	R36

RTD cable selection chart (SITRANS FUP1010, FUE1010 Portable, each)

RTD cable codes for length and type options	
Cable length m (ft)	IP67 -40 ... + 200 °C (-40 ... +392 °F)
Order Code	
6 (20)	R11
15 (50)	R12
30 (100)	R13

Accessories - Standard MLFB offering

Description	Order No.
Insert RTD size 1	D) 7ME3950-1TJ10
Thermowell size 1 w/lagging	D) CQO:1012TW-1L
EZ Clamp 1 ... 24 inch	D) CQO:1012Z-1
Junction Box for Clamp RTD	D) CQO:992ECJ
Term kit standard, Plenum, Armored sensor cable	D) 7ME3960-0CT01
Term kit Submersible sensor cable	D) 7ME3960-0CT11
C1 Weld seal	D) 7ME3960-0WS20
D1 Weld Seal	D) 7ME3960-0WS30
C2 Weld Seal	D) 7ME3960-0WD20
D2 Weld Seal	D) 7ME3960-0WD30
Straps size 2	D) 7ME3960-0SM11
Straps size 3	D) 7ME3960-0SM21
Straps size 4	D) 7ME3960-0SM31
Weld seal sensors C2 FM	D) 7ME3950-1SN00
Weld seal sensors D1 FM	D) 7ME3950-1SP00
Weld seal sensors D2 FM	D) 7ME3950-1SQ00
Weld seal sensors D4 FM	D) 7ME3950-1SR00
Weld seal sensors C2 ATEX	D) 7ME3950-2SN00
Weld seal sensors D1 ATEX	D) 7ME3950-2SP00
Weld seal sensors D2 ATEX	D) 7ME3950-2SQ00
Weld seal sensors D4 ATEX	D) 7ME3950-2SR00
Weld seal sensors Gas C2 FM	D) 7ME3950-1HN00
Weld seal sensors Gas D1 FM	D) 7ME3950-1HP00
Weld seal sensors Gas D2 FM	D) 7ME3950-1HQ00
Weld seal sensors Gas D4 FM	D) 7ME3950-1HR00
Weld seal sensors Gas C2 ATEX	D) 7ME3950-2HN00
Weld seal sensors Gas D1 ATEX	D) 7ME3950-2HP00
Weld seal sensors Gas D2 ATEX	D) 7ME3950-2HQ00
Weld seal sensors Gas D4 ATEX	D) 7ME3950-2HR00

Standard MLFB product offering represents 4 to 6 weeks delivery time.

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