

SITRANS F flowmeters

SITRANS F US

SITRANS FUE1010 Energy clamp-on

Overview



SITRANS FUE1010 is a highly accurate clamp-on non-intrusive ultrasonic flow display computer for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time coefficient of performance (COP) for HVAC systems.

SITRANS FUE1010 is available in single and dual channel or dual path configurations, with your choice of IP65 (NEMA 4X) dedicated wall mount or IP40 (NEMA 1) portable enclosures.

Benefits

- Measures energy rate and total consumption with highest accuracy available
- Accurately measures at both low flow rates and low differential temperatures
- 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
- Choice of single or dual channel / dual path or dual mode operation:
 - Dual channel operation reduces the cost for the system on a per channel measurement basis and permits measuring hot and chilled water lines at the same time
 - Dual path capability insures high flow measurement accuracy on installations with less than desirable piping runs
- Ability to operate in either Wide-Beam Transit-time or reflexor (Doppler) mode for applications with high aeration
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

FUE1010 is ideally suited to thermal energy / power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

Design

FUE1010 is available in three configurations:

- IP65 (NEMA 4X) Enclosure
 - Single channel
 - Dual channel / dual path
- IP40 (NEMA 1) Portable Enclosure
 - Single channel
- IP40 (NEMA 1) Portable Impact Resistant Enclosure
 - Dual channel / dual path

Function

- Flow display computer has an integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- 4-wire 1000 Ω platinum RTD's for supply and return temperature measurements are precision matched to within 0.01 °C (0.02 °F)
- Temperature is factory calibrated with built-in field calibrator
- Built-in energy/BTU mode
- Detection of aeration and cavitation caused by worn or damaged impellers, misaligned shafts, etc.
- Reverse flow and empty pipe detection
- Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes:
 - Cooling load (kW/ton)
 - Coefficient of performance (COP)
 - Energy efficiency ratio (EER)
- Optional current inputs
- Digital communication options:
 - MODBUS / Metasys N2 (IP65 (NEMA 4X) only)
 - Dial-up modem (IP65 (NEMA 4X) only)
 - RS232 Serial digital port (standard)
- Zeromatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

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Technical specifications

SITRANS FUE1010

Input

Flow range	0 ... 12 m/s (0 ... 40 ft/s), bi-directional
Flow sensitivity	0.0003 m/s (0.001 ft/s)
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional Inputs, single channel	<ul style="list-style-type: none"> • Current: 2x 4 ... 20 mA • Voltage: 2x 0 ... 10 V DC • Temperature: 2x 4 wire 1 kΩ RTD • Totalizer commands (clear/hold)

Output

Outputs, single channel	<ul style="list-style-type: none"> • Current: 2x 4 ... 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2x 0 ... 10 V DC (5 kΩ minimum) • Status Alarm: 4x SPDT Relays • Frequency: 2x 0 ... 5000 Hz • RS232
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Accuracy

Accuracy	$\pm 0.5\% \dots 1.0\%$ of flow, for velocities greater than 0.3 m/s (1 ft/s) $\pm 0.0015 \dots 0.003$ m/s ($\pm 0.005 \dots 0.01$ ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	$\pm 0.15\%$ of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

Rated operation conditions

Degree of protection	Dedicated wall mount enclosure: IP65 (NEMA 4X) Portable enclosures: IP40 (NEMA 1)
Liquid Temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Transducer temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-62 ... +232 °C (-80 ... +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

90 ... 240 V AC, 50-60 Hz, 30 VA
or
9 ... 36 V DC, 12 W

Indication and operation

Data logger memory	1 Mbyte of storage
Display	128 x 240 pixel LCD with back- light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French

Certificates and approvals

• Dedicated wall mount enclosure	FM CSA CE • LVD IEC 61010-1 • EMC EN61000-6-2, -4
• Portable enclosures	UL ULc CE • LVD IEC 61010-1; CB Test Certificate • EMC EN61000-6-2, -4

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Selection and Ordering data	Order-No.	Ord. code
SITRANS FUE1010 Energy clamp-on		
• Dedicated IP65 (NEMA 4X)	F	◆ 7ME3500-
• Portables IP40 (NEMA 1) battery powered	F	◆ 7ME3502-
	■ ■ ■ ■ ■ - 0 ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	
Transducer for channel 1 (continued)		
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	P 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	P 1 C
High temperature range HP transducer size B1H for temperatures up to 104 °C (220 °F)	Z	P 1 K
High temperature range HP transducer size B2H for temperatures up to 104 °C (220 °F)	Z	P 1 L
High temperature range HP transducer size C1H for temperatures up to 104 °C (220 °F)	Z	P 1 M
High temperature range HP transducer size C2H for temperatures up to 104 °C (220 °F)	Z	P 1 N
High temperature range HP transducer size D1H for temperatures up to 104 °C (220 °F)	Z	P 1 P
High temperature range HP transducer size D2H for temperatures up to 104 °C (220 °F)	Z	P 1 Q
High temperature range HP transducer size D4H for temperatures up to 104 °C (220 °F)	Z	P 1 R
Transducer for channel 2		
(includes pipe mounting kit for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.		
no transducer		A
A2 universal to 3"/track mount		B
B3 universal to 5"/track mount	◆	C
C3 universal to 13"/mounting frame	◆	D
D3 universal to 24"/mounting frame	◆	E
E2 universal to 48"/mounting frame	◆	F
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
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
D4H (high precision) to 48"/mounting frame		R
Doppler to 12" with chain or strap kit		S
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 transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))	Z	Q 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	Q 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	Q 1 C
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

Selection and Ordering data	Order-No.	Ord. code
SITRANS FUE1010 Energy clamp-on		
• Dedicated IP65 (NEMA 4X)	F	◆ 7ME3500-
• Portables IP40 (NEMA 1) battery powered	F	◆ 7ME3502-
	■ ■ ■ ■ ■ - 0 ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	
Transducer for channel 2 (continued)		
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 D4H for temperatures up to 104 °C (220 °F)	Z	Q 1 R
Approvals		
FM/CSA/CE Dedicated		1
UL/ULc/CE Portable		2
◆ Mainstream products (delivery time 4 to 6 weeks)		

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Selection and Ordering data

Further designs

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

Selection and Ordering data	Order code
Cable assembly for transducers (add for # of channels) 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) dedicated only	
• Termination for standard, plenum and armored transducer cable	T01
• Termination for submersible transducer cable	T11
• RTD cable termination kit for standard RTD	T21
• RTD cable termination kit for submersible RTD	T31
• Insert RTD cable termination kit	T41
Languages (Meter, Labels and Documentation), English (default)	
• German	B10
• French	B12
• Spanish	B13
• Italian	B14
Wet flow transfer calibration (priced for 1 pipe calibration)	
• 6 point up to 4 inch (DN 100)	D10
• 6 point up to 5 to 8 inch (DN 125 to DN 200)	D11
• 6 point up to 10 to 12 inch (DN 250 to DN 300)	D12
• 6 point up to 14 to 16 inch (DN 350 to DN 400)	D13
• 6 point up to 18 to 20 inch (DN 450 to DN 500)	D14
• 6 point up to 22 to 24 inch (DN 550 to DN 600)	D15
• 6 point up to 26 to 30 inch (DN 650 to DN 750)	D16
• 6 point up to 32 to 36 inch (DN 800 to DN 900)	D17
Tag name plate	
• Stainless steel tag with 3.2 mm (0.13 inch) character size (26 characters max.)	Y17
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)	Y19

MLFB example

Application example

A dedicated clamp-on energy meter is required for two separate returns lines. Both will use clamp-on RTDs for the supply and return lines. AC power is available and data access will be via MODBUS communication.

Pipe 1 is a DN150 (6") schedule 40 carbon steel line
Pipe 2 is a DN 300 (12") ductile iron line

MLFB Order No.: **7ME3500-2DA10-2NE0-Z**
K03 + K05 + R03 + R05 + R02 + R03

Selection and Ordering data

Selection and Ordering data	Order-No.	Ord. code
FUE1010 meter family	7ME3500-2DA10-2NE0-Z	
IP65 (NEMA 4X) enclosure	0	
Dual channel	2	
Dedicated Type 1 I/O option	D	
90 ... 230 V AC power option	A	
MODBUS option	1	
2 pairs of clamp-on RTDs	2	
Transducer code for 6" pipe	N	
Transducer code for 12" pipe	E	
No approval required	0	
30 m (100 ft) transducer cable for channel 1		K03
61 m (200 ft) transducer cable for channel 1		K05
30 m (100 ft) cable for RTD 1		R03
61 m (200 ft) cable for RTD 2		R05
15 m (50 ft) cable for RTD 3		R02
30 m (100 ft) cable for RTD 4		R03

Transducer selection charts**Universal transducers for any pipe material**

Transducer	Order code	Outer diameter range (mm)		Outer diameter range (inches)	
		min	max	min	max
A2	B	12.7	50.8	0.5	2
B3	C	19	127	0.75	5
C3	D	51	305	2	12
D3	E	203	610	8	24
E2	F	254	6096	10	240

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	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H	M	4.06	5.84	0.16	0.23
C2H	N	5.84	8.13	0.23	0.32
D1H	P	8.13	11.18	0.32	0.44
D2H	Q	11.18	15.75	0.44	0.62
D4H	R	15.75	31.75	0.62	1.25

Transducer cable selection chart**Transducer cable codes for length and type options**

Cable length m (ft)	Standard (PVC jacket)	Submersible ¹⁾ (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored ¹⁾
	-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)	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

¹⁾ Submersible and armored transducer cable is not available for portable versions.

RTD cable selection chart**RTD cable codes for length and type**

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

¹⁾ Submersible RTD cable is not available for portable versions.