

SITRANS FUS1010 Standard clamp-on

Overview



SITRANS FUS1010 is the most versatile clamp-on ultrasonic flowmeter available today. It can operate in either WideBeam Transit-Time or Reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUS1010 is available in single, dual channel/dual path and optional four channel/four path configurations. You have a choice of IP65 (NEMA 4X), IP65 (NEMA7) and IP66 (NEMA 7) explosion proof enclosures.

Benefits

- Versatility; there is no need to change meters when operating conditions change
- 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 channel or dual channel/dual path, with doppler capability. Four channel/four beam optional.
 - Optional four channels allow measurement of four independent pipes at the same time, reducing overall ownership costs
 - Dual mode allows for transit time and reflexor operation at the same time on the same pipe
 - Dual path allows for two sets of transducers to be set up on one pipe and averaged for higher accuracy
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

FUS1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
 - Raw water
 - Potable water
 - Sludges
 - Chemicals
- Wastewater industry
 - Raw sewage
 - Effluent
 - Sludges
 - Mixed liquor
 - Chemicals
- HVAC industry
 - Chillers
 - Condensers
 - Hot and cold water systems
- Power industry
 - Nuclear
 - Fossil
 - Hydroelectric
- Processing industry
 - Process control
 - Batching
 - Rate indication
 - Volumetric and mass measurement

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Design

FUS1010 is available in three configurations:

- IP65 (NEMA 4X) enclosure
 - Single channel
 - Dual channel / dual path
 - Four channel (optional)
- IP65 (NEMA 7) Compact explosion proof enclosure
 - Single channel
 - Dual channel / dual path
- IP66 (NEMA 7) Wall mount explosion proof enclosure
 - Single channel
 - Dual channel / dual path
 - Four channel (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display computers 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 display computer has a 2 x 16 Alphanumeric LCD display
- Current, voltage, status alarm, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- Zeromatic Path automatically sets zero
- 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 FUS1010 Standard clamp-on

Technical specifications

SITRANS FUS1010, IP65 (NEMA 4X) Flow display computer



Enclosure IP65 (NEMA 4X)

Input

Flow range	$\pm 12 \text{ m/s}$ ($\pm 40 \text{ ft/s}$), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional inputs	<ul style="list-style-type: none"> • Current: 2x 4 ... 20 mA DC • Voltage: 2x 0 ... 10 V DC • Temperature: 2x 4 wire 1 kΩ RTD
Single channel	

Output

Outputs	<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 min.) • Status Alarm: 4x SPDT relays • Frequency: 2x 0 ... 5 kHz • RS232
Single channel	

Accuracy

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

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)
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Data refresh rate

5 Hz

Rated operation conditions

Degree of protection	IP65 (NEMA 4X)
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	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W

Indication and operation

Data logger memory	1 MByte
Display	128 x 240 pixel LCD with backlight
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French

Certificates and approvals

FM and CSA ratings	I.S. Class 1, 2, Div 1 N-I Class 1, Div 2 S Class 2, Div 2 (FM only)
ATEX ratings	
• Flow display computer	Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5
• Transducers	Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 (for use with flowmeter in safe area)
CCOE rating	EEx (ia)
CEPEL ratings	
• Flow display computer	[BR-Ex ia] IIC T6 (pending on 4 channel) BR-Ex nc [ia] IIC T6 (pending)
• Transducers	BR-Ex ia IIC T6 IP65
GoST ratings	
• Flow display computer	[Exia]IIC
• Transducers	0ExialICT5

SITRANS FUS1010 Standard clamp-on

SITRANS FUS1010, IP65 (NEMA 7) Compact explosion proof



Enclosure IP65 (NEMA 7)

Input

Flow range	$\pm 12 \text{ m/s}$ ($\pm 40 \text{ ft/s}$), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional inputs single channel	<ul style="list-style-type: none"> • Current: 1x 4 ... 20 mA DC • Temperature: 2x 4 wire 1 kΩ RTD

Output

Outputs single channel	<ul style="list-style-type: none"> • Current (externally powered): 1x 4 ... 20 mA DC (1 kΩ at 30 V DC) • Status Alarm: 1x Isolated open collector • Frequency: 2x 0 ... 5 kHz • RS232
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Accuracy

Calibratable accuracy	0.1% (API proving method)
Intrinsic accuracy	<ul style="list-style-type: none"> $\pm 0.5\%$... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	<ul style="list-style-type: none"> $\pm 0.15\%$ 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)

Data refresh rate

5 Hz

Rated operation conditions

Degree of protection	IP65 (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

90 ... 240 V AC, 50 ... 60 Hz,
15 VA or
9 ... 36 V DC, 10 W

SITRANS F flowmeters

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SITRANS FUS1010, IP66 (NEMA 7) Wall mount explosion proof enclosure



Enclosure IP66 (NEMA 7)

Input

Flow range	$\pm 12 \text{ m/s}$ ($\pm 40 \text{ ft/s}$), bidirectional
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 DC • Voltage: 2x 0 ... 10 V DC • Temperature: 2x 4 wire 1 kΩ RTD

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 min.) • Status Alarm: 4x SPDT Relays • Frequency: 2x 0 ... 5 kHz • RS232
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Accuracy

Accuracy	$\pm 0.5\%$... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
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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)
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Data refresh rate

5 Hz

Rated operation conditions

Degree of protection	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	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	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

FM and CSA ratings	Ex Class 1, Div 1 D-I Class 2, Div 1 I.S. Class 1, Div 1 N-I Class 1, Div 2 S Class 2, Div 2 (FM only)
ATEX ratings	
• Flow display computer	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 Ex II 2 (1) G EEx d [ia IIC] IIB + H2 T5
• Transducers	Ex II 1 G EEx ia IIC T5
CEPEL ratings	
• Flow display computer	[BR-Ex ia] IIC T6 (pending) BR-Ex nC [ia] IIC T6 (pending) BR-Ex d [ia] IIC T6 (pending)
• Transducers	BR-Ex ia IIC T6 IP65

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Selection and Ordering data	Order-No.	Ord. code	Selection and Ordering data	Order-No.	Ord. code
SITRANS FUS1010 Standard clamp-on			SITRANS FUS1010 Standard clamp-on		
• IP65 (NEMA 4X)	7ME3530 -		• IP65 (NEMA 4X)	7ME3530 -	
• IP65 (NEMA 7) compact	7ME3531 -		• IP65 (NEMA 7) compact	7ME3531 -	
• IP66 (NEMA 7) wall mounted	7ME3532 -		• IP66 (NEMA 7) wall mounted	7ME3532 -	
	0 -	H1Y		0 -	A
Number of channels/ultrasonic beams	1		Transducer for channel 1	B	
Single channel	2		(includes pipe mounting kit and spacer bar for indicated max. OD listed)	C	
Dual channel / Dual beam	9		See „Transducer selection charts“ for specifications.	D	
Special: Four channel / Four Beam (NEMA 4X and NEMA 7 wall mount only)			no transducer	E	
			A2 universal	F	
Flowmeter functions and I/O configurations			to 3"/track mount	G	
includes graphic or digital display and Reflxor capability for all except IP65 (NEMA 7) compact units			B3 universal	H	
<u>IP65 (NEMA 4X) and IP66 (NEMA 7 wall mounted) units</u>			to 5"/track mount	J	
• Type 1 Standard	A		C3 universal	K	
- 2x 0 ... 10 V			to 13"/mounting frame	L	
- 2x 4 ... 20 mA			D3 universal	M	
- 2x pulse output			to 24"/mounting frame	N	
- 4x relay C type			E2 universal	P	
• Type 3 option adder	C		to 48"/mounting frame	Q	
- UniMass capability with 2x RTD input and			A1H (high precision)	R	
- 4x 4 ... 20 mA analog input			to 3"/track mount	S	
<u>IP65 (NEMA 7) compact units</u>	D		A2H (high precision)	Z	P1Y
• Type 1 Standard			to 3"/track mount		
- 1x 4 ... 20 mA (Loop) and 1x status (open collector) per channel			A3H (high precision)		
- 1x pulse output for single channel units only			to 3"/track mount		
• Type 3 option adder	F		B1H (high precision)		
- UniMass capability with 1 RTD input and			to 5"/track mount		
- 1x analog input per channel			B2H (high precision)		
• Other version (Expanded I/O and/or Mercury wetted relays)	Z		to 24"/mounting frame		
Add order code and plain text.			C1H (high precision)		
Meter power options			to 24"/mounting frame		
90 ... 240 V AC	A		C2H (high precision)		
9 ... 36 V DC (except compact NEMA 7)	B		to 48"/mounting frame		
9 ... 36 V DC negative GND (compact only)	J		D1H (high precision)		
9 ... 36 V DC positive GND (compact only)	K		to 48"/mounting frame		
Communication options	0		D2H (high precision)		
RS232 (standard)	1		to 48"/mounting frame		
MODBUS (dedicated only, excludes NEMA 7 compact)	2		D4H (high precision)		
Ethernet (dedicated only, excludes NEMA 7 compact)	9		Doppler		
Special: Dial up Modem (dedicated only, excludes compact NEMA 7)			to 12" with strap kit (not for IP65 (NEMA 7))		
RTD temperature sensor	0		Transducer for channel 2	A	
(includes mounting hardware for pipes between 1.5" and 24" outer diameter)	1		(includes pipe mounting kit for indicated max. OD listed)	B	
No RTDs	2		See „Transducer selection charts“ for specifications.	C	
1x standard clamp-on RTD	3		no transducer	D	
2x standard clamp-on RTD	4		A2 universal	E	
1x submersible clamp-on RTD	5		to 3"/track mount	F	
2x submersible clamp-on RTD	6		B3 universal	G	
Special (for insert style RTDs)	9		to 5"/track mount	H	
			C3 universal	J	
			D3 universal	K	
			E2 universal	L	
			A1H (high precision)	M	
			to 24"/mounting frame	N	
			A2H (high precision)	P	
			to 24"/mounting frame	Q	
			A3H (high precision)	R	
			to 48"/mounting frame	S	
			B1H (high precision)	Z	Q1Y
			to 5"/track mount		
			B2H (high precision)		
			C1H (high precision)		
			to 24"/mounting frame		
			C2H (high precision)		
			to 48"/mounting frame		
			D1H (high precision)		
			to 48"/mounting frame		
			D2H (high precision)		
			to 48"/mounting frame		
			D4H (high precision)		
			Doppler		
			to 12" with chain or strap kit (not for IP65 (NEMA 7))		
Approvals	0		Other versions (different size, type, mount, temperature range, or corrosion resistant), add Order code and plain text.		
no approval	1				
FM/CSA	2				
ATEX EEx ia	3				
CEPEL					
Special ATEX EEx m	9				
add Order code and plain text:					
Length of integral cable:					

SITRANS F flowmeters

SITRANS F US

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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 No. of channels) See „Transducer cable selection chart“	K..	
Cable assembly for RTDs (add for No. 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 transducer cable	T11	
• RTD cable termination kit for standard RTD	T21	
• RTD cable termination kit for submersible RTD	T31	
Languages (Meter, Labels and Documentation)		
• German	B10	
• French	B12	
• Spanish	B13	
• Italian	B14	
Wet flow transfer calibration		
• Standard In-house 6 point calibration (up to 6" or DN 150)	D10	
Tag name plate		
• Stainless steel with 12 mm characters (max 15 char.)	Y17	
• Stainless steel with 8 mm characters (max 15 char.)	Y19	

MLFB example

Application example

A clamp-on meter is required for a 12" carbon steel jet fuel line, with a wall thickness of 12.7 mm (0.5"). Meter electronics is to be located in a Class 1 Div 2 area only 18 m (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.

MLFB Order No.: **7ME3530-2AB00-0QQ1-Z**
K03 + K03

Selection and Ordering data		Order-No.	Ord. code
FUS1010 meter family			
IP65 (NEMA 4X) enclosure	7 ME 353	0	
Dual Beam		2	
Standard I/O option		A	
9 ... 36 V DC power option		B	
RS232 Standard		0	
No RTD required		Q	
Transducer code for path 1		Q	
Transducer code for path 2		1	
FM approval required		K 0 3	
30 m (100 ft) transducer cable for path 1		K 0 3	
30 m (100 ft) transducer cable for path 2		K 0 3	

Transducer selection charts

Universal transducers for any pipe material

Trans-ducer	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

Trans-ducer	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 (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...+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

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)	-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