

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

Overview



SITRANS FUG1010 clamp-on non-intrusive ultrasonic flow transmitter is ideal for natural and process gas applications, including checkmetering, allocation, production, storage and gas fired power station applications.

SITRANS FUG1010 is available in single, dual and optional four path configurations, with your choice of IP65 (NEMA 4X) wall mount and IP66 (NEMA 7) wall mount explosionproof enclosures.

Benefits

- 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 as found in turbine and PD meters
- Eliminates the pressure drop or energy loss in orifice metering
- Wide turn-down ratio
- Choice of single, dual or optional four path versions
 - Single path version reduces initial investment
 - Multiple path versions provide higher accuracy, especially with limited straight run and poor flow profile conditions
 - In diametric reflect mode configuration, the meter is less sensitive to crossflow and swirl
- Wide-Beam technology provides improved accuracy over a wide range of flow velocity and operating pressure
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Tolerant of most wet gas conditions
- Immune to most pressure reducing valve noise
- Optional rugged stainless steel sensor enclosure permits permanent and direct burial installations
- Easy to use "Si-Ware" diagnostic software

Application

SITRANS FUG1010 is ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Production
- Storage

Design

SITRANS FUG1010 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
 - Four path (optional)
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum stainless steel hardware, with glass window
 - Single path
 - Dual path
 - Four path (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display transmitters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS 232 outputs (see specification section for details)
- Analog inputs for pressure and temperature
- ZeroMatic Path automatically compensates for zero flow drift
- Bidirectional flow operation
- 1 Mbyte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options
- Internal AGA-8 table for fixed gas composition is available for standard volume computation.
- Complete application and operation diagnostics, to assure calibration and operational integrity
- Upward compatibility and compliance with AGA-10 speed of sound measurement practice

Technical specifications

Input		Accuracy	
Flow range	± 30 m/s (± 100 ft/s), bidirectional	Typical accuracy	1 % ... 2 % of actual volume reading (higher accuracy is pipe condition and flow profile dependent)
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent	Calibratable Accuracy	± 0.2 ... 0.5 % of flow
Minimum pressure	7 ... 10 bar (100 ... 145 psi), typical (gas composition and application dependent; plastic pipes support operation at atmospheric pressure)	Repeatability	0.05 % ... 0.1 %, of actual volume reading, for 1.5 ... 30 m/s (5 ... 100 ft/s) velocities (pipe condition dependent)
Pipe size	25 mm ... 1.52 m (1" ... 48") (for other sizes, consult factory)	Zero drift	0.0003 m/s (0.001 ft/s), with ZeroMatic Path active
Analog inputs	Current: 20 mA, programmable	Data refresh rate	5 Hz
Output		Rated operation conditions	
Standard outputs	<ul style="list-style-type: none"> Current: 20 mA, a programmable, standard Additional 2 x optional Voltage: 10 V DC, menu programmable Open collector digital pulses (quadrature) Pulse rate: 5 kHz VT100 RS 232 	Degree of protection	<ul style="list-style-type: none"> Wall mount IP65 (NEMA 4X) Wall mount explosionproof IP66 (NEMA 7)
Extended outputs	<ul style="list-style-type: none"> HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2 	Gas temperature	-40 ... +60 °C (-40 ... +140 °F) (for higher temperatures consult factory)
Status/Alarm I/O	<ul style="list-style-type: none"> Programmable form C relays Programmable N.O. Mer. Wet. Relays optional 1 Totalizer clear switch input 1 Totalizer hold switch input 	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"> For IP65 (NEMA 4X) and IP66 (NEMA 7) 	<ul style="list-style-type: none"> 90 ... 240 V AC, 50 ... 60 Hz (30 VA) or 9 ... 36 V DC (12 W)
		Indication and operation	
		Data logger memory	1 Mbyte, programmable for 17 data functions
		Display	<ul style="list-style-type: none"> IP65 (NEMA 4X) and IP66 (NEMA 7) enclosures 128 x 240 pixel LCD with backlight
		Keypad	<ul style="list-style-type: none"> IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures 33 keypad buttons with tactile feedback
		Language options	English, Spanish, German, Italian, French

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Certificates and approvals

IP65 (NEMA 4X) wall mount flow display transmitter ratings

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

C-TICK

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

Standard MLFB for quick delivery on SITRANS FUG1010 (Gas)

Selection and Ordering data

Article No.

Order code

SITRANS FUG1010 (Gas)

7ME361 - - - - 0 - - - - K12 + K12 + R12

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Design

IP65 (NEMA 4X) wall mount

Number of ultrasonic paths

Dual path

Flowmeter functions and I/O configurations

includes graphic or digital display

• Extended I/O

- Graphic display
- 2 x 0 ... 10 V
- 2 x 4 ... 20 mA (active)
- 2 x 4 ... 20 mA (passive)
- 2 x 0 ... 5 kHz pulse outputs (TTL or OC)
- 4 x form C relays
- 4 x logic inputs (totalizer control, TTL)
- 4 x 4 ... 20 mA analog input
- 1 x Pt100 RTD input per channel (Dual channel/path)

Meter power options

9 ... 36 V, DC

Communication options

VT100 RS 232

HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2

RTD temperature sensor

(includes mounting hardware for pipes above 1.5"/38 mm OD)

No RTDs

1 x standard clamp-on RTD

2 x standard clamp-on RTD

1 x submersible clamp-on RTD

2 x submersible clamp-on RTD

Notes:

1. Temperature input is required for FUH systems
2. Only the Interface detector set up as a dual channel can use 2 RTD's

Sensor for channel 1

(includes pipe mounting kit and spacer bar for indicated max. OD listed)

See "Sensor selection charts" for specifications.

no sensor

C2H (high precision)¹⁾ Mounting frame and straps provided up to 600 mm (24")D1H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")D2H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")

Sensor for channel 2

(includes pipe mounting kit and spacer bar for indicated max. OD listed)

See "Sensor selection charts" for specifications.

no sensor

C2H (high precision)¹⁾ Mounting frame and straps provided up to 600 mm (24")D1H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")D2H (high precision)¹⁾ Mounting frame and straps provided up to 1200 mm (48")

Approvals

FM/CSA/CE (default)

ATEX, CE, C-TICK

Standard MLFB product offering represents 4 to 6 weeks delivery time

For sensor and RTD cables for quick delivery see tables at end of section.

¹⁾ Made with stainless steel construction.

Article No.	Order code
7ME361 - - - - 0 - - - -	K12 + K12 + R12
0	
2	
B	
B	
0	
1	
0	
1	
2	
3	
4	
A	
N	
P	
Q	
A	
N	
P	
Q	
1	
2	

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Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 (Gas)	7ME3610-	
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP66 (NEMA 7) wall mount explosionproof 	7ME3613-	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	0 -	
Number of channels/ultrasonic paths		
Single path	1	
Dual path	2	
Special: Four path (NEMA 4X and NEMA 7 wall mount 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	A	
<ul style="list-style-type: none"> • Standard I/O <ul style="list-style-type: none"> - Graphic display - 2 x 0 ... 10 V - 2 x 4 ... 20 mA (active) - 2 x 0 ... 5 kHz pulse outputs (TTL) - 4 x form C relays - 4 x logic inputs (totalizer control, TTL) - 4 x 4 ... 20 mA analog input - 1 x Pt100 RTD input per channel (Dual channel/path) - 1 x Pt100 RTD input (Multi channel/path) • Extended I/O (Dual and multi channel/path only) <ul style="list-style-type: none"> - Graphic display - 2 x 0 ... 10 V - 2 x 4 ... 20 mA (active) - 2 x 4 ... 20 mA (passive) - 2 x 0 ... 5 kHz pulse outputs (TTL or OC) - 4 x form C relays - 4 x logic inputs (totalizer control, TTL) - 4 x 4 ... 20 mA analog input - 1 x Pt100 RTD input per channel (Dual channel/path) - 1 x Pt100 RTD input (Multi channel/path) 	B	
Meter power options		
90 ... 240 V AC	A	
9 ... 36 V DC	B	
Communication options		
VT100 RS 232	0	
HART, BACnet MSTP/BACnet IP, Modbus RTU & TCP/IP, Ethernet IP, Johnson N2, VT100 RS 232	1	
RTD temperature sensor (includes mounting hardware for pipes above 1.5" outer diameter)		
No RTDs	0	
1 x standard clamp-on RTD	1	
2 x standard clamp-on RTD	2	
1 x submersible clamp-on RTD	3	
2 x submersible clamp-on RTD	4	

Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 (Gas)	7ME3610-	
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP66 (NEMA 7) wall mount explosionproof 	7ME3613-	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	0 -	
Sensor for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection chart" 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):		
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) ²⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾		M
C2H (high precision) ²⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾		N
D1H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		P
D2H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		Q
D3H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		U
D4H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		R
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) ²⁾	Z	P 1 M
C2H (high temperature range HP) ²⁾	Z	P 1 N
D1H (high temperature range HP) ¹⁾²⁾	Z	P 1 P
D2H (high temperature range HP) ¹⁾²⁾	Z	P 1 Q
D3H (high temperature range HP) ¹⁾²⁾	Z	P 1 U
D4H (high temperature range HP) ¹⁾²⁾	Z	P 1 R

Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 (Gas)	7ME3610-	
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP66 (NEMA 7) wall mount explosionproof 	7ME3613-	
	0 -	
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection chart" 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):		
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) ²⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾		M
C2H (high precision) ²⁾ Mounting frame and straps provided up to 600 mm (24") ¹⁾		N
D1H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		P
D2H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		Q
D3H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		U
D4H (high precision) ²⁾ Mounting frame and straps provided up to 1200 mm (48") ¹⁾		R
Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.		Z
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)		Q 1 K
B2H (high temperature range HP)		Q 1 L
B3H (high temperature range HP)		Q 1 T
C1H (high temperature range HP) ²⁾		Q 1 M
C2H (high temperature range HP) ²⁾		Q 1 N
D1H (high temperature range HP) ²⁾		Q 1 P
D2H (high temperature range HP) ²⁾		Q 1 Q
D3H (high temperature range HP) ²⁾		Q 1 U
D4H (high temperature range HP) ²⁾		Q 1 R
Approvals		
FM/CSA/CE/C-TICK (default)		1
ATEX, CE, C-TICK		2

¹⁾ 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).

²⁾ Made with stainless steel construction.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article 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)	
<ul style="list-style-type: none"> • Termination for standard, plenum and armored sensor cable • Termination for submersible sensor cable • RTD cable termination kit for standard RTD • RTD cable termination kit for submersible RTD • Insert RTD cable termination kit • Cable gland kit 	T01 T11 T21 T31 T41 T51
Tag name plate	
• 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 300 mm (12") carbon steel gas line with a wall thickness of 12.7 mm (0.5"). Meter electronics are to be located in a Class I Div 2 area only 18 m (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.: **7ME3610-2BB00-0QQ1-Z**
K03 + K03

Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 meter family	7 ME 3 6 1 -	0 -
IP65 (NEMA 4X) wall mount	0	
Dual path	2	
Option with digital pulse	B	
9 ... 36 V DC power option	B	
RS 232 Standard	0	
No RTD required	0	
Sensor code for path 1	Q	
Sensor code for path 2	Q	
FM approval required	1	
30 m (100 ft) sensor cab. for path 1		K 0 3
30 m (100 ft) sensor cab. for path 2		K 0 3

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Selection and Ordering data

Article No.

Operating Instructions for SITRANS FUG1010

English NEMA 4X wall mount & NEMA 7 wall mount explosionproof

A5E02951519

German NEMA 4X wall mount & NEMA 7 wall mount explosionproof

A5E02951531

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

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.
B1H	K	2.0	3.0	0.08	0.12
B2H	L	3.0	4.1	0.12	0.16
B3H	T	2.7	3.3	0.106	0.128
C1H ¹⁾	M	4.1	5.8	0.16	0.23
C2H ¹⁾	N	5.8	8.1	0.23	0.32
D1H ¹⁾	P	8.1	11.2	0.32	0.44
D2H ¹⁾	Q	11.2	15.7	0.44	0.62
D3H ¹⁾	U	7.4	9.0	0.293	0.354
D4H ¹⁾	R	15.7	31.8	0.62	1.25

¹⁾ Made with stainless steel construction.

Sensor Cable (pair) 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)	K01¹⁾	K11	K21	K31
15 (50)	K02	K12¹⁾	K22	K32¹⁾
30 (100)	K03¹⁾	K13¹⁾	K23	K33
46 (150)	K04¹⁾	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06¹⁾	K16	K26	K36

¹⁾ Standard MLFB for quick deliver

RTD Cable (single) 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)	R01¹⁾	R11
15 (50)	R02¹⁾	R12
30 (100)	R03¹⁾	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

¹⁾ Standard MLFB for quick deliver