

General Specifications

US300FM Ultrasonic Flowmeter

GENERAL

US300FM is a ultrasonic flowmeter that measures the flow in a pipe fully filled with liquid.

It can be fixed to the wall or to the 2" (50mm) pipe with optional pipe mounting fixture. The housing and the transducers are made for rough industrial environment.

The measuring principle is based on the influence of the flowing fluid to the travelling time of sound. The sound is transmitted through the pipe and the transit time difference between the forward and backward beams is used to determine the flow velocity (transit time method).

The measurement is non-intrusive. No cutting of the pipe is necessary. The measurement is independent of fluid pressure or conductivity. Owing to its clamp on transducers the installation is easy.

For the hygienic measurement, there is no risk of contamination and suitable for ultra clean liquids as the transducers do not touch the liquid. Also, there is no risk of corrosion when used with aggressive media.

The instrument can work with up to two pairs of transducers. This enables you to measure the average flow for disturbed flow profile (two path measurement), the differential flow of two independent flows, or simply two different flows independently.

FEATURES

- Maximum two channel inputs (two path measurement) possible
- Two current outputs maximum (The flow data and the sound speed in the liquid can be assigned at the same time)
- Small and light (depth about 7cm, weight about 2.8kg)
- Wall mounting or optional 2" (50mm) pipe mounting
- Interactive set-up menu for easy installation
- Three types of transducers cover the pipe size from 25mm to 6500mm. For the fluid temperature, one for general temperature (up to 130 deg C) and the other for high temperature (up to 200 deg C) is available.
- Owing to its unique digital signal processing the anti air bubble performance is high.



STANDARD SPECIFICATIONS

General

Fluid

: Liquid (Turbidity < 10,000 mg/L, fluid sound speed 800 to 3500m/s)
Tolerance to entrained air and/or solids is strongly dependent upon pipe size and the size and distribution of the air bubbles and particles

Measured quantities

: Volume flow, mass flow (by setting density), flow velocity, sound speed in the fluid

Measuring principle

: Transit time method using ultrasonic signal

Pipe size

: 25 to 6500 mm

Pipe and lining material

: Carbon steel, Stainless steel, Grey cast iron, Ductile iron, Copper, Glass, PVC, etc

Flow velocity range

: 0.01 to 25 m/s

Resolution

: 0.025 cm/s

Accuracy

: 1 to 3% of reading depending on application

Measuring cycle

: 100 to 1000 Hz (when only one channel input)

Straight pipe run in the upstream

: 10 to 50 diameters, depending on the kind of the flow disturbance

ULTRASONIC FLOWMETER (US300FM)

Construction

Housing material
: Aluminium (powder coated)
Water and dust-proof
: IP54 (EN60529)

Mounting Method

Wall mounting
2" (50mm) pipe mounting

Input

Number of input channels
: 1 to 2 (Channel A, Channel B).

Output

Current output
: 1 to 2 outputs
Range: 4 to 20mA, Flow velocity, volume flow, or sound speed in the liquid can be freely assigned
Frequency output
: 0 to 1 output (total output number of current and frequency outputs is maximum 2)
Range: 0 to 1kHz
Contact type: Open-collector, 24V/4mA
The value indicates instantaneous flow rate.
Binary output (pulse or alarm)
: 0 to 2 outputs
Contact type: Open-collector, 24V/4mA
The output values are selectable for each output.
The pulse outputs indicate the total volume flow (0.01 to 1000/unit) with pulse width 80 to 1000 ms.
Terminal type
: Screw-type pillar terminals

Display and Setting

LCD display
: 2x16 characters LCD with back light.
Two values can be displayed at the same time.
Keyboard
: 15 keys (numeric and function keys).
Easy operation by the interactive menu display.

Parameter setting storage function

Function
: Storage of pipe and fluid parameters (Maximum 80 different settings)

Calculation function

Flow value
: Flow velocity
Volume flow or mass flow rate and totalization (both positive and negative flow totalization)
Sound velocity
: Sound velocity in the fluid
Calculation for the two flow inputs
: Two values from average, sum, or difference of the channel A and channel B inputs are freely available
Output assignment
: Calculated values above except for the wall thickness can be freely assigned to the actual outputs (two channel independent outputs available)
Output damping
: 0 to 100 seconds

Alarm

Alarm items
: High limit, low-limit, flow direction change, quantity limit (for batch operation), error (measurement impossible)
Output hold type
: Non-hold or Hold
Output contact direction
: Normal Open or Normal Close

Data logging function (for maintenance purposes only)

Function
: Store measured values in the internal memory (used with communication function below)
Memory size
: 27,000 values

Communication function (for maintenance purposes only)

Function
: On-line/Off-line output of the measured values to personal computers or serial printers. Communication port is only accessible when the front cover is removed.
Type
: RS232
Connector
: D-sub 9-pin connector, male

Time-programmable measurement function

Function
: Automatic start and stop of the measurement using internal clock.
Can be used with data logging function or communication

Power supply

Power supply type
: 100 to 240VAC or 24VDC
Power consumption
: less than 15W

Safety and EMC standard

General safety
: EN61010 (CE marking)
EMC regulation
: EN50081 (CE marking)
AS/NZS 2064 (C-Tick mark)

Operating conditions

Ambient temperature
: -10 to +60 deg C

TRANSDUCERS(US300FT)

Type of usage

Dust and water-proof

: General purpose: IP65 (EN60529)

: Immersible: IP67 (EN60529)

Pipe size type

: Medium size: 25 to 400 mm

Large size: 100 to 2500 mm

Very large size: 2000 to 6500 mm

Fluid temperature

: General temp. type: -30 to +130 deg C

High temp. type: -30 to +200 deg C

Construction

Case material

: Stainless steel

Contact surface material

: General temp. type: PEEK (Poly Ether Ether Keton)

High temp. type: Polyimid

Cable protection material

: Stainless flexible tube (from sensor block to terminal box)

Junction box:

: A junction box is equipped at the cable end

Optional extension cable (US300FC)

: Connection cable is used from the junction box to the main unit. The length is from 1 to 300m.

ACCESSORIES

Standard accessories for US300FM

: User's Manual

Others (fixing hardware, couplant, etc)

: Some are selectable in the model and suffix code (see next page) of the main unit or transducers, or separate orders are also possible

DATA TRANSFER SOFTWARE

Function

: Download and upload of the parameters or download of logging data via RS232 communication port (for maintenance purposes only)

Standard accessories

: RS232 cable and RS232 adapter 9/25

Operating system

: Windows 95, 98, ME, NT, 2000

Language

: English / German version

MODEL AND SUFFIX CODE

Ultrasonic flowmeter

Model	Suffix code	Specification
US300FM.	Ultrasonic flowmeter,
Output	-A1.	One current output
	-A2.	Two current outputs
Power Supply Adapter and AC cable	1.	100 to 240V AC
	4.	24V DC
	-1.	One input ch. (one-path)
	-2.	Two input ch. (two-path)
Electrical Connection	-4.	ISO M20 X 1.5 female
Option	/PU1.	One binary (pulse or alarm) output (open-collector) (Note)
	/PU2.	Two binary (pulse or alarm) outputs (open-collector) (Note)
	/FQ1.	Frequency output (open-collector, 0 to 1kHz) (Note)
	/BGT.	Tag number on the nameplate (in the nameplate label, maximum 16 characters)
	/SCT.	Tag number on stainless steel tag plate (max. 16 characters)
	/PMT.	Pipe mounting fixture

(Note) Option /PU1 and /PU2 are exclusive.

Option /FQ1 is not selectable for two current output (-A2) models.

Connection cable

Model	Suffix code	Specification
US300FC.	Connection Cable
Length	-Gxxx.	xxx. Cable length 001 to 300 (m)

Data transfer software

Model	Suffix code	Specification
US300SA.	Data transfer software (Windows versions) Including connecting kit (RS232 cable for connection with IBM-PC, RS 232 adapter 9/25)
Language	-1.	English / German version
	00.	Always 00

Transducers

Model	Suffix code	Specification
US300FT.	Transducers
Usage	-G.	General purpose (IP65)
	-W.	Immersible (IP67)
Pipe Size / Fluid Temperature	BG.	Medium & General (with 3m cable) (Note)
	BH.	Medium & High (with 3m cable) (Note)
	CG.	Large & General (with 4.4m cable) (Note)
	CH.	Large & High (with 4.4m cable) (Note)
	DG.	Very large & General (with 12m cable) (Note)
		(Note) B: Medium size (25 to 400mm) C: Large size (100 to 2500mm) D: Very large (2000 to 6500mm) G: General temp. (-30 to +130 deg C) H: High temp. (-30 to +200 deg C)
	-N.	Always N
Fixing band, strap and clips	B.	For 25 to 400mm Two fixing straps One strap of 10m length Two clips of medium type Two clips of large type
	C.	For 1400 to 2800mm One strap of 20m length Two clips of large type
	D.	For 2800 to 6500mm One strap of 20m length Two clips of large type
	N.	None
Acoustic couplant	G.	General temperature type (-30 to +130 deg C)
	H.	High temperature type (-30 to +200 deg C)
	N.	None
Options	/TTP.	Transducer tag plate maximum 16 characters)
	/KM1	ATEX approved EExm II T4-T6 for use in Zone 1 and 2 locations

ACCESSORIES (for ultrasonic flowmeter US300FM)

Model	Description
USPA201	Pipe mounting fixture (to add the option /PMT)

ACCESSORIES (Others)

Model	Description
USPA401	RS232 cable
USPA402	RS232 adapter 9/25
USPA411	Measuring tape

ACCESSORIES (for transducers US300FT)

Model	Description
USPA001	Fixing strap (10m length)
USPA002	Fixing strap (20m length)
USPA011	Fixing clips (medium type for pipe size 40 to 100mm) Set of two clips
USPA012	Fixing clips (large type for pipe size 100 to 6500mm) Set of two clips
USPA021	Screwed clamp (fixing band) (only for pipe size 25 to 50mm)
USPA032	Fixing chain (and extension) (2m length, one required for each 600mm diameter)
USPA033	Repair set for fixing chain
USPA034	Fixing Chain Retaining Clips set of two (for use with USPA032)
USPA054	Mounting fixture standard type (for transducers medium pipes size type, temperature -30 to +200 deg C set of two blocks)
USPA055	Mounting fixture magnetic general temperature type (for transducers medium pipe size type, temperature -30 to +100 deg C set of two blocks)
USPA057	Mounting fixture standard type (for transducers large or very large pipe size type, temperature -30 to +200 deg C set of two blocks)
USPA058	Mounting fixture magnetic general temperature type (for transducers large or very large pipe size type, temperature -30 to +100 deg C set of two blocks)
USPA073	Additional magnets for mounting fixture magnetic general temperature type (for transducers medium pipe size type, temperature -30 to +100 deg C set of two magnets)
USPA075	Additional magnets for mounting fixture magnetic general temperature type (for transducers large or very large pipe size type, temperature -30 to +100 deg C set of two magnets)
USPA081	Ruler for mounting fixture (marked length 120mm)
USPA082	Ruler for the mounting fixture (marked length 330mm)
USPA091	Acoustic couplant for general temperature (100g, -30 to +130 deg C)
USPA092	Acoustic couplant for general temperature (100g, -30 to +200 deg C)

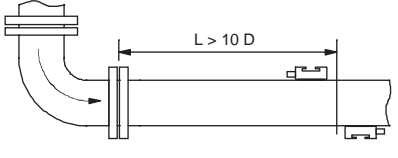
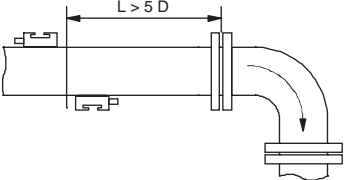
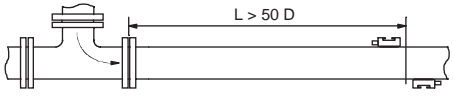
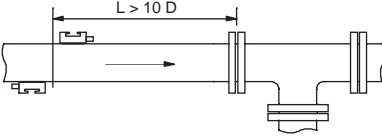
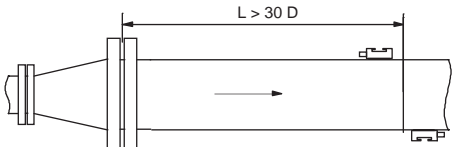
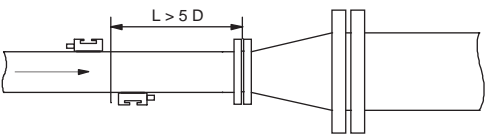
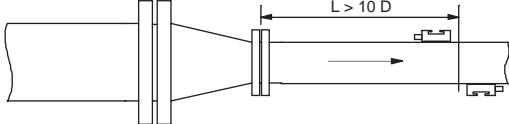
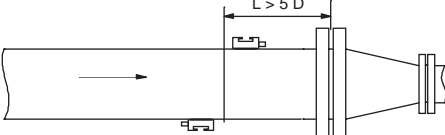
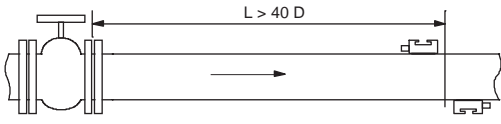
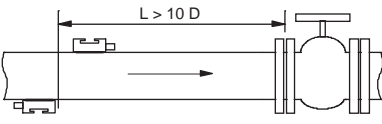
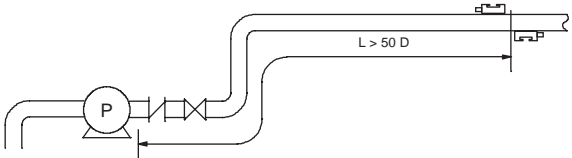
INSTALLATION CONDITION

Notice for Installation

(1) The pipe must be always full with liquid.

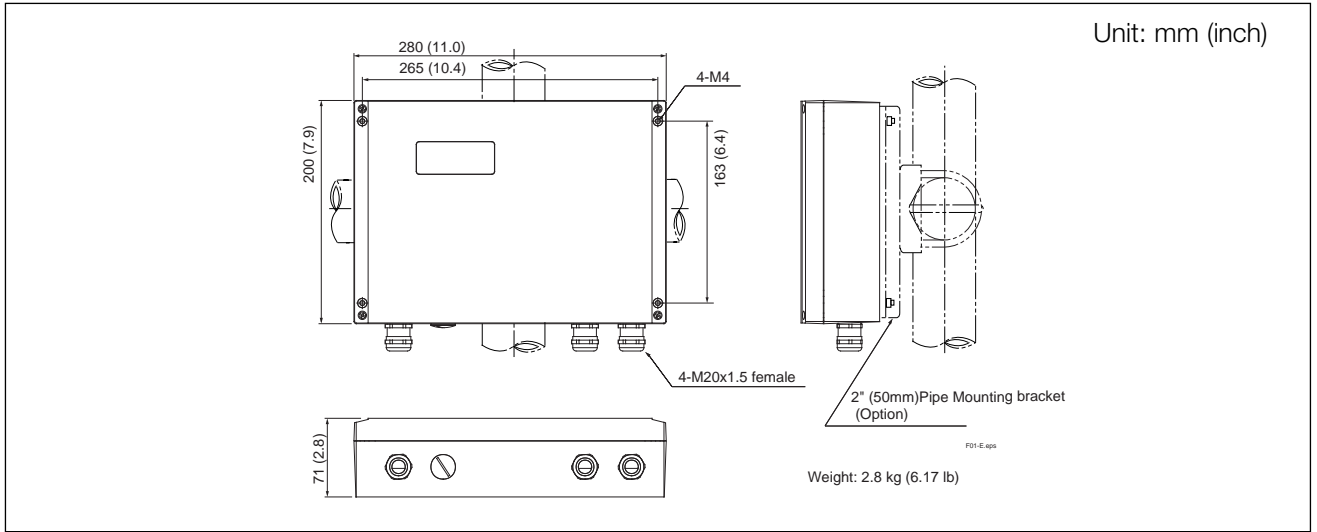
(2) It is recommended to use an area of straight pipe run at the upstream and downstream direction of the transducers as shown below.

Piping layout and straight pipe run (D: Pipe diameter)

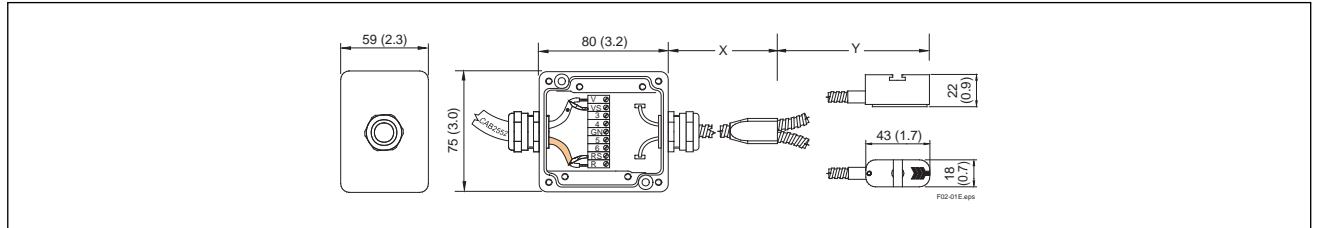
Type	Upstream Direction	Downstream Direction
90°-elbow	<p>L > 10D</p> 	<p>L > 5D</p> 
T-section	<p>L > 50D</p> 	<p>L > 10D</p> 
Diffuser	<p>L > 30D</p> 	<p>L > 5D</p> 
Reducer	<p>L > 10D</p> 	<p>L > 5D</p> 
Valve	<p>L > 40D</p> 	<p>L > 10D</p> 
Pump	<p>L > 50D</p> 	

DIMENSIONAL DRAWINGS

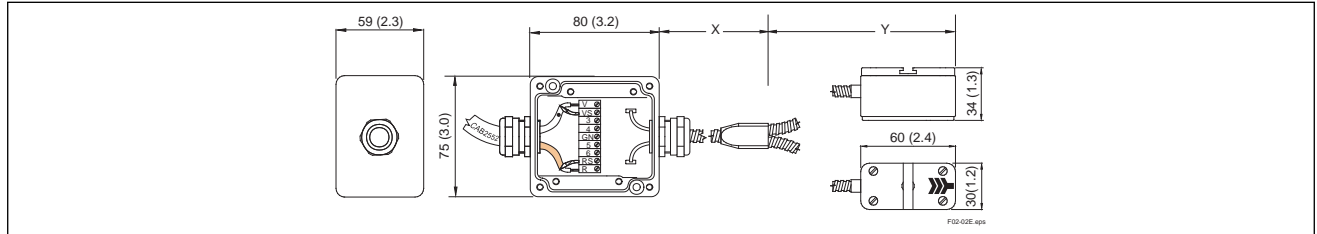
Ultrasonic Flowmeter US300FM



Transducers US300FT- □ B □



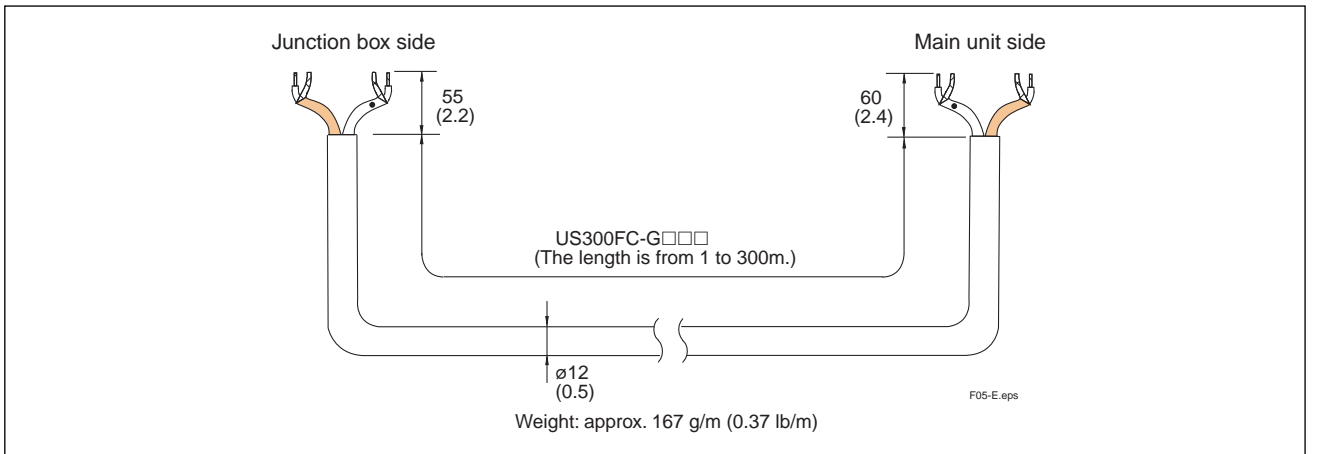
Transducers US300FT- □ C □, US300FT- □ D □



Transducers	X m (inch)	Y m (inch)	X+Y m (inch)	Weight kg (lb)
US300FT- □B□	2.0 (78.7)	1.0 (39.4)	3.0 (118.1)	0.9 (1.98)
US300FT- □C□	2.0 (78.7)	2.4 (94.5)	4.4 (173.2)	1.5 (3.31)
US300FT- □D□	5.0 (196.9)	7.0 (275.6)	12.0 (472.4)	2.5 (5.51)

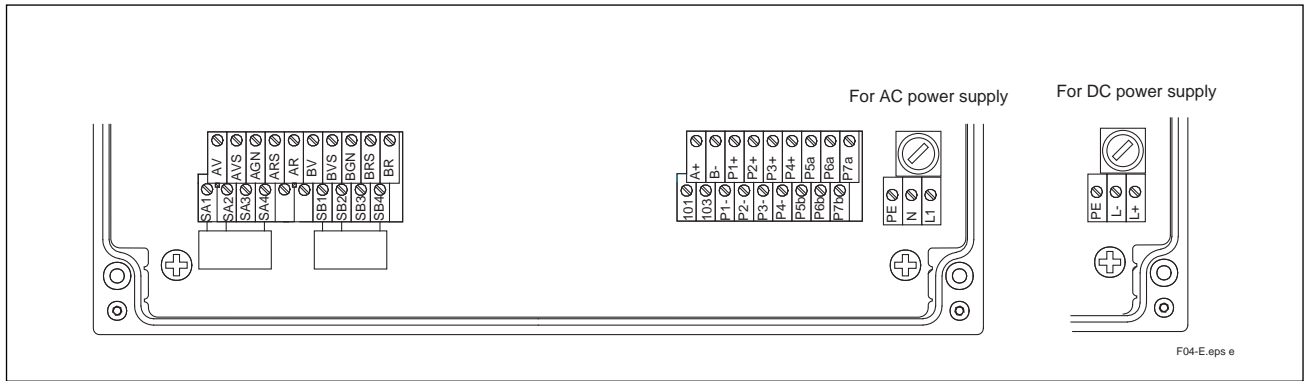
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Connection Cable US300FC



WIRING

Terminal Layout



Terminal Designations

Terminal Name	Description
AV AVS	Upstream transducer signal for channel A
AR ARS	Downstream transducer signal for channel A
BV BVS	Upstream transducer signal for channel B
BR BRS	Downstream transducer signal for channel B
SA1 SA2 SA3 SA4	Sensor ROM for channel A (connected when shipped)
SB1 SB2 SB3 SB4	Sensor ROM for channel B (connected when shipped)

Terminal Name	Description
P1+ P1-	Current output (+,-)
P2+ P2-	Current output (+,-) or Frequency output(+,-) depending on the specification (optional)
P5a P5b	Binary (pulse or alarm) output depending on the specification (optional)
P6a P6b	Same as above
PE N L1	Earth Neutral AC power supply (100 to 240 V AC)
PE L- L+	(Earth) DC- DC+ (24 V DC)

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Ordering Information

Specify the following when ordering.

1. Model, suffix and option code

(1) First, specify the main unit US300FM, the transducers US300FT (one pair of transducers when using only one channel, or two pairs when using two channels), and the connection cable US300FC (one cable when using only one channel, or two cables when using two channels). The transducers and cables can be added later but the number of channels for the main unit can not be added later.

(2) Specify the accessories when necessary or suitable.

For example we may use "fixing chain" instead of "fixing strap" to fix the transducers to the pipe. Please consult us for the details.

2. Tag number (when necessary)

Maximum sixteen (16) characters for the cases below.

(1) In the nameplate label of the main unit US300FM (necessary to specify the option /BGT at the same time)

(2) In the stainless steel tag plate hanged onto the main unit US300FM (necessary to specify the option /SCT at the same time)

(3) In the tag plate for the transducers US300FT (necessary to specify the option /TTP at the same time)

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