VersaFlow
Ultrasonic clamp-on Flowmeter
Technical Datasheet

34-VF-03-14
June 1, 2007

Specification

Clamp-on technology

HONEYWELL'S VERSAFLOW stands for continuity and long term reliability. Flow measurement can be done anywhere and start-up is immediate. The new VERSAFLOW clamp-on flowmeter for liquids with its robust industrial construction and regreasing concept provides a revolutionary solution for easy handling.

Figure 1 – VersaFlow Ultrasonic clamp-on Flowmeter

Highlights

- Minimised uncertainty
- Optimised reliability
- Minimal maintenance
- Efficient regreasing concept
- Easy sensor mounting
- Installation wizard
- All in one system

Applications

- Chemical addition
- General process control
- Cooling water circuits
- Broad range of refined hydrocarbons
- Potable water
- De-ionized and demineralized water
- Sanitary flow rate measurements
- Purified water

Industries

- Chemicals
- Petrochemicals
- Power plants
- Water
- Oil & Gas
- Semi-conductor
- Food & Beverages
- Pharmaceuticals

VERSAFLOW variants

The VERSAFLOW is an ultrasonic clamp-on flowmeter that can be fitted on the outside of piping to measure the flowrate of liquids. The flowmeters consists of a combination of one or two VERSAFLOW clamp-on sensor(s) and one TWS9000 ultrasonic flow converter.

VERSAFLOW clamp-on sensors

1
2
3
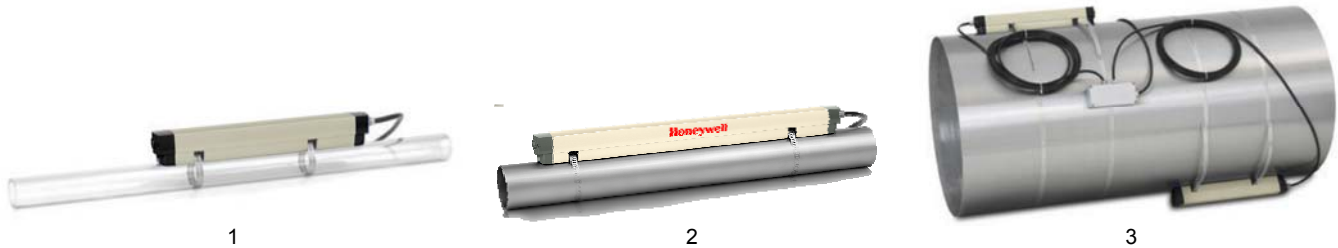
1. Small: chemical addition applications, cooling circuits
2. Medium: purified water applications, hydrocarbons
3. Large: all water applications, especially for large pipe sizes

TWS9000 ultrasonic flow converter

1
2

1. TWS9000 W: Wall mounted, PA, non-Ex, IP65
2. TWS9000 F: Field version, die-cast aluminum, (non-) Ex, IP66/67

Options

1. VERSAFLOW XT-small: sensor for extended temperature
2. VERSAFLOW XT-medium: Sensor for extended temperature

Technical Data

Ultrasonic flowmeter VERSAFLOW

Versions

VERSAFLOW	Standard
VERSAFLOW - Ex, zone 1/2	Option

Performance

Measurement functionality	Standard actual volume flow rate and totalised volume
Measuring range	0...20 m/s / 0...66 ft/s
Max. deviation (under reference conditions]	<± 1% of M.V. for DN ≥ 50 mm / 2", v > 0.5 m/s / 1.5 ft/s
	<± 3% of M.V. for DN < 50 mm / 2", v > 0.5 m/s / 1.5 ft/s
Repeatability	<± 0.2%
Process conditions	Solid particle content < 5% (by volume)
	Gas content < 2% (by volume)

Measurement configurations

Single path, single pipe or dual path/dual pipe	Standard

Ultrasonic flow sensor VERSAFLOW

Versions

VERSAFLOW - small (DN15...DN100 / ½"...4")	Standard
VERSAFLOW - medium (DN50...DN600 / 2...24")	Standard
VERSAFLOW - large (DN200...DN4000 / 8...160")	Standard
VERSAFLOW - small (ext. temp. DN15...DN100 / ½ ...4")	Option
VERSAFLOW - medium (ext. temp. DN50...DN600 / 2..24")	Option

Pipe specifications

Material: metal, plastic, ceramic, asbestos cement, internal/external coated pipes (coatings and liners fully bonded to pipe wall)	Standard
Maximum pipewall thickness of 200 mm / 7.87"	Standard

Protection category

IP67	Standard

Electric signal level

Ex-I, intrinsically safe circuits, floating	Standard

Process temperature

-40...120°C / -40...284°F	Standard
-50...200°C / -58...392°F, XT version	Option

Sensor cable length

5 m / 15 ft	Standard
10 m / 30ft	Option
20 m / 60ft	Option
30 m / 90ft	Option

Recommended mounting area

Inlet	≥ 10DN
Outlet	≥ 5DN

Ultrasonic flow converter TWS9000

Versions

W (wall)	TWS9000 W (general purpose)
F (field)	TWS9000 F (non-Ex)
F(/i-)Eex, zone 1/2	TWS9000 F-Ex

Display languages

With Local display	Standard
English, French, German	Standard

Flow sensor

VERSAFLOW	DN15...4000 / ½"...160[1]

Communication

Current, pulse & status output	Standard
HART® communication, control input	Standard

Power supply

100...230 VAC (-15/+10%), 50/60 Hz	Standard
24 VAC/DC	Option
Power consumption	22 VA

Approvals

EEx - zone ½	Option
FM - Class I DIV ½	Option
CSA - GP / Class I DIV ½	Option

Protection category

W (wall)	IP65 (eq. to NEMA 4/4X)
F (field)	IP66/67 (eq. to NEMA6)

Temperature

Process	see flow sensor
Ambient	-40....60°C / -40....140°F
Storage	-50....70°C / -58....158°F

Cable connection

M20 x 1.5	Standard
½" NPT	Option
PF ½"	Option

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[1] Outer Diameter: 20…4300 mm / 0.79…169.29"

Materials used

Polyamide - polycarbonate (W-version)	Standard
Die-cast aluminium with polyurethane coating) (F-version)	Standard
Stainless steel 316 L / 1.4404 (F-version)	Option

Overall functionality

Highlights	Continuous measurement of actual volume flow rate, flow velocity, velocity of sound, damping of acoustic signal, signal to noise ratio
	Flow direction (forward or reverse)
	Totalisation of volume flow
	Reliability of flow measurement, Quality of acoustic signal

Current output

Function	All operating data configurable; galvanically isolated; HART® communication
Settings	
Q = 0%	0...15 mA
Q = 100%	10...22 mA
Error identification	0...22 mA
Connection Active:	
Basic/Modular IO	$I \leq 22$ mA / $R_L \leq 1$ kOhm
Ex-I I/O	$I \leq 22$ mA / $R_L \leq 470\ \Omega$
	$U_O = 21V$ / $I_O = 90$ mA
	$P_O = 0.5$ W
	$C_O = 90$ nF / $L_O = 2$ mH
Connection Passive:	
Basic/Modular IO	$L \leq 22mA$ / $U \leq 32$ VDC
Ex-I I/O	$I \leq 22$ mA
	$U_i = 30$ V / $I_i = 100$ mA
	$P_i = 1$ W
	$C_i = 10$ nF / $L_i \sim 0$ mH

Pulse output and status output

Function	Configurable as pulse output, identification for automatic range change, indicator of flow direction, overflow, errors, trip point or empty pipe indication
	Valve control, if batch control function is activated
Settings	
Q = 100%	0.0001...10000 pulses/s or pulses/volume
Pulse width	0.1 ...1000 ms or auto or sym.
Status	On or Off
Connection Active:	
Basic IO	On request
Ex-I I/O	On request
Connection Passive:	
Basic IO	$f \leq 10$ kHz: $I \leq 20$ mA
	$f \leq 10$ Hz: $I \leq 100$ mA
	$U \leq 32$ VDC / $I \leq 100$ mA
Ex-I I/O	Acc. EN 60947-5-6
	$U_i = 30$V / $I_i = 100$ mA
	$P_i = 1$ W
	$C_i = 10$ nF/$L_i \sim 0$ mH
Connection NAMUR:	
Basic IO	On request
Ex-I I/O	"Active"

Control input

Function	Freeze output (e.g. during cleaning), forced return to zero, counter and error reset, ext. range selection.
Settings	Freeze outputs, output zero, reset counter, reset error
Connection Active:	
Basic IO	I_{nom} 16mA / U_{nom} 24VDC
Ex-I I/O	Acc. EN 60947-5-6
Connection Passive:	
Basic IO	$U \leq 32$ VDC
	$U_{on} \geq 19$ VDC / $U_{off} < 2.5$ VDC
Ex-I I/O	On request
Connection NAMUR:	
Basic IO	On request
Ex-I I/O	"Active"

I/O Specifications

Overall functionality

Function	Continuous measurement of actual volume flow, mass flow, flow speed velocity of sound gain SNR diagnosis value
	Bidirectional flow measurement and totalisation
	Signal quality bar graph

Current output

Function	All operating data configurable; galvanically isolated; HART® communication
Settings	Q = 0%:0...15mA
	Q = 100%: 10...22mA
	Error identification: 0...22mA
Connection	
Basic / Modular IO: Active	$I \leq 22mA / R_L \leq 1 kOhm$
Ex-i: Active	$I \leq 22mA / R_L \leq 470 Ohm$
	$U_O = 21V/I_0 = 90mA$
	P0 = 0.5W
	$C0 = 90nF / L_0 = 2mH$
Basic/ Modular IO: Passive	$I \leq 22mA / U \leq 32VDC$
Ex-i: Passive	$I \leq 22mA$
	$U_i = 30V / I_i = 100mA$
	$P_i = 1W$
	$C_i = 10nF / L_i \sim 0mH$

Pulse output and Status output

Function	Configurable as pulse output, identification for automatic range change, indicator of flow direction, overflow, errors, trip point or empty pipe indication
Settings	Q = 100%: 0.0001... 10000 pulses per second or pulses per unit volume
	Pulse width: 0.05...2000ms or auto or sym.
	Status: On or Off
Connection	
Basic/ Modular IO: Passive	$f \leq 10kHz: I \leq 20mA$
	$f \leq 10Hz: I \leq 100mA$
	$U \leq 32 VDC / I \leq 100mA$
Passive	$U_i = 30V / I_i = 100mA$
	$P_i = 1W$
	$C_j = 10nF / L_i \sim 0mH$
Active	$U_{nom} = 24VDC / I <1mA$
	$U_0 = 1.5 V$ at 10mA
Namur (ace. to EN 60947-5-6)	Passive

Control input

Function	Freeze output (e.g. during cleaning), forced return to zero, counter and error reset, ext. range selection.
Settings	Freeze outputs, output zero, reset counter, reset error, start batch (in batch mode)
Connection	
Basic / Modular IO: Active	$I_{nom} = 16mA / U_{nom} = 24VDC$
Basic/ Modular IO: Passive	$U \leq 32VDC$
	$U_{on} > 19VDC / U_{off} < 2.5VDC$
Namur (ace. to EN 60947-5-6)	Active

I/O-module combination possibilities

Communication	Basic I/O	Ex-i I/O[1]	Modular I/O[2]

Current output

	Basic I/O	Ex-i I/O	Modular I/O
Active / passive	standard	standard	standard
HART	standard	standard	standard

Pulse and status output

	Basic I/O	Ex-i I/O	Modular I/O
Active	on request	on request	optional
Passive	standard	standard	optional
Namur (acc. to EN 60947-5-6)	on request	on request	optional

Control Input

	Basic I/O	Ex-i I/O	Modular I/O
Active	on request	on request	optional
Passive	standard	optional	optional
Namur (acc. to EN 60947-5-6)	on request	on request	optional

Foundation Fieldbus

	Basic I/O	Ex-i I/O	Modular I/O
Foundation Fieldbus (pending)	on request	optional	optional

Protection

	Basic I/O	Ex-i I/O	Modular I/O
Ex-d / e	optional	optional	optional

■ standard   ▨ optional   ☐ on request

Note:

[1] Ex-i I/O: up to 1 additional in-/output modules possible (see I/O-module combinations)

[2] Modular I/O: up to 2 additional in-/output module possible (see I/0-module combinations)

I/O modules

1	I/O	2	1st module	3	2nd module	
1	Basic	0	no module possible	0	no module possible	
2	Ex-i (Ia + Pp)	1	Ex-i (Ia + Pp/Cp)			
3	Ex-i (Ip + Pp)	2	Ex-i (Ip + Pp/Cp)			
4	Modular (Ia + Pa)	8	no module	8	no module	
6	Modular (Ia + Pp)	A	Ia	A	Ia	Ia = current output - active
7	Modular (Ia + Pn)	B	Ip	B	Ip	Ip = current output - passive
8	Modular (Ip + Pa)	C	Pa/Sa	C	Pa/Sa	Pa/Sa = pulse/status output - active, high current
B	Modular (Ip + Pp)	E	Pp/Sp	E	Pp/Sp	Pp/Sp = pulse/status output - passive, high current
C	Modular (Ip + Pn)	F	Pn/Sn	F	Pn/Sn	Pn/Sn = pulse/status output - passive, Namur

The TWS9000 with standard basic I/O covers almost all applications, having k I/Os:

- active/passive current output (+HART®)
- passive pulse/status output
- passive status output
- passive status output / control input

The I/0-module combination is thus 1-0-0 (see above).

The TWS9000 with modular I/O can be tailor-made to any application:

- Suppose you require a converter with passive pulse output and 3 passive current outputs. The I/0-module combination then becomes B-B-B.
- Suppose you require a converter with 2 active pulse/status outputs. The I/0-module combination then becomes either 4-C-8 or 8-C-8 (depending on whether active or passive current output is required). The latter '8' indicates that 1 additional module can be added in future.
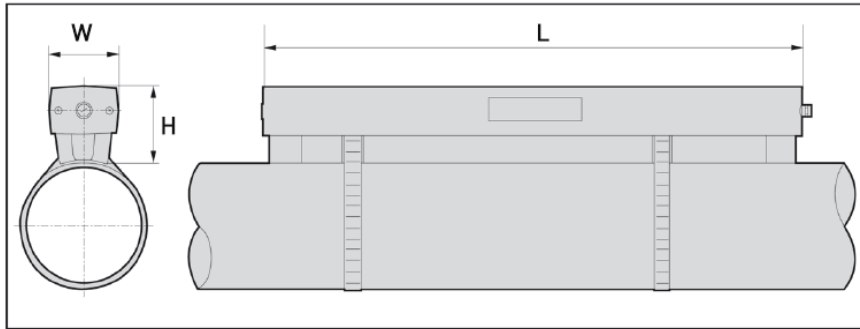
Example for combination of I/O's

Basic I/O

1	2	3
1	0	0

Ex- I/O

1	2	3
2	0	0
	1	
	2	

1	2	3
3	0	0
	1	
	2	

1	2	3
D	0	0
	1	
	2	

1	2	3
E	0	0
	1	
	2	

Modular I/O

1	2	3
4	8	8
	A	B
		A
		C
		G
	C	8
		C
		G
	G	8
		G

1	2	3
8	8	8
	B	8
		B
		C
		G
	C	8
		C
		G
	G	8
		G

1	2	3
D	8	8
	A	8
		A
		C
		K
	C	8
		C
		K
	K	8
		K

1	2	3
6	8	8
	A	8
		A
		E
		K
	E	8
		E
		K
	K	8
		K

1	2	3
C	8	8
	B	8
		B
		E
		K
	E	8
		E
		K
	H	8
		H

1	2	3
E	8	8
	A	8
		A
		C
		K
	C	8
		C
		K
	K	8
		K

1	2	3
7	8	8
	A	8
		A
		F
		H
	F	8
		F
		H
	H	8
		H

1	2	3
C	8	8
	B	8
		B
		F
		H
	F	8
		F
		H
	H	8
		H

1	2	3
F	8	0
	A	
	B	
	C	
	D	
	E	
	F	
	G	
	H	
	K	

Dimensions and weights

Version	Dimensions [mm]			Approx. weight (without cable / strip)
	L	H	W	[kg]
small	496.3	71	63.1	2.7
medium	826.3	71	63.1	3.6
large	496.3[1]	71[1]	63.1[1]	2.7[1]

Version	Dimensions [inches]			Approx. weight (without cable / strip)
	L	H	W	[lbs]
small	19.5	2.8	2.5	6.0
medium	32.5	2.8	2.5	7.9
large	19.5[1]	2.8[1]	2.5[1]	6.0[1]

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[1] Value for one of the 2 delivered rails
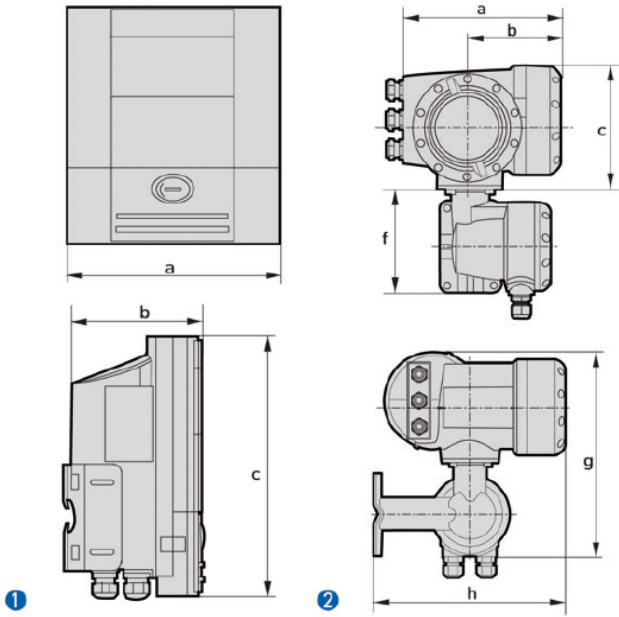
1) TWS9000 W
2) TWS9000 F

Version	Dimensions [mm]						Weight [kg]
	a	b	c	f	g	h	
TWS9000 W	198	138	299	-	-	-	2.4
TWS9000 F	202	120	155	141	296	277	5.7

Version	Dimensions [inches]						Weight [lbs]
	a	b	c	f	g	h	
TWS9000 W	7.8	5.4	11.8	-	-	-	5.3
TWS9000 F	7.75	4.75	6.1	5.5	11.6	10.9	12.6
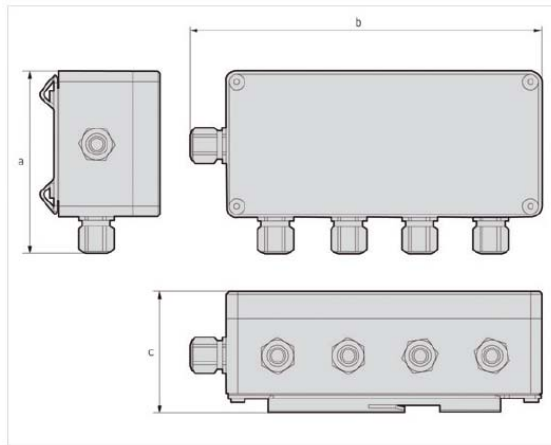
	Dimensions [mm]			Approx. weight (without cable/metal [kg]
	a	b	c	
Cable box	102	197	67	0.85

	Dimensions [inches]			Approx. weight (without cable/metal [kg]
	a	b	c	
Cable box	4.01	7.76	2.64	1.87

Ordering Information

Contact your nearest Honeywell sales office, or

In the U.S.:
Honeywell Process Solutions
Honeywell International
2500 West Union Hills Drive
Phoenix, AZ 85027 1-800-343-0228

In Canada:
The Honeywell Centre
155 Gordon Baker Rd.
North York, Ontario M2H 3N7
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In Latin America:
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1140 Brussels, Belgium

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Czech Republic

In the Middle East:
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Sheikh Faisal Building
Abu Dhabi, U. A. E.

In Asia:
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17 Changi Business Park Central 1
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Republic of Singapore

In the Pacific:
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