

## VersaFlow Ultrasonic clamp-on Flowmeter Technical Datasheet

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### Specification

#### Clamp-on technology

HONEYWELL'S VERSAFLOW stands for continuity and long term reliability. Flow measurement can be done anywhere and startup 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
- Petrochemical
- Power Plants
- Water
- Oil & Gas
- Semi-conductor
- Food & Beverage
- 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. 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. 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
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### Ultrasonic flow sensor VERSAFLOW

#### Versions

VERSAFLOW - small (DN15...DN100 / ½"...4")	Standard
VERSAFLOW - medium (DN50...DN400 / 2...16")	Standard
VERSAFLOW - large (DN200...DN4000 / 8...160")	Standard
VERSAFLOW - small (ext. temp. DN15...DN100 / ½"...4")	Option
VERSAFLOW - medium (ext. temp. DN50...DN400 / 2...16")	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
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#### Electric signal level

Ex-I, intrinsically safe circuits, floating	Standard
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#### Process temperature

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

**Sensor cable length**

5 m / 15 t	Standard
10 m / 30ft	Option
20 m / 0ft	Option
30 m / 90ft	Option

**Recommended mounting areas**

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 <sup>1</sup>
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**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 1, zone 2	Option
FM - Class I DIV 1, DIV 2	Option
CSA - / Class I DIV 1, DIV 2	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

<sup>1</sup> 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
<b>Connection Active:</b>	
Basic/Modular IO	$I \leq 22 \text{ mA} / R_L \leq 1 \text{ k}\Omega$
Ex-I I/O	$I \leq 22 \text{ mA} / R_L \leq 470 \Omega$
	$U_O = 21 \text{ V} / I_O = 90 \text{ mA}$
	$P_O = 0.5 \text{ W}$
	$C_O = 90 \text{ nF} / L_O = 2 \text{ mH}$
<b>Connection Passive:</b>	
Basic/Modular IO	$L \leq 22 \text{ mA} / U \leq 32 \text{ VDC}$
Ex-I I/O	$I \leq 22 \text{ mA}$
	$U_i = 30 \text{ V} / I_i = 100 \text{ mA}$
	$P_i = 1 \text{ W}$
	$C_i = 10 \text{ nF} / L_i \sim 0 \text{ mH}$

**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
<b>Connection Active:</b>	
Basic IO	On request
Ex-I I/O	On request
<b>Connection Passive:</b>	
Basic IO	$f \leq 10 \text{ kHz}; I \leq 20 \text{ mA}$
	$f \leq 10 \text{ Hz}; I \leq 100 \text{ mA}$
	$U \leq 32 \text{ VDC} / I \leq 100 \text{ mA}$
Ex-I I/O	Acc. EN 60947-5-6
	$U_i = 30 \text{ V} / I_i = 100 \text{ mA}$
	$P_i = 1 \text{ W}$
	$C_i = 10 \text{ nF} / L_i \sim 0 \text{ mH}$
<b>Connection NAMUR:</b>	
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
<b>Connection Active:</b>	
Basic IO	$I_{nom} 16 \text{ mA} / U_{nom} 24 \text{ VDC}$
Ex-I I/O	Acc. EN 60947-5-6
<b>Connection Passive:</b>	
Basic IO	$U \leq 32 \text{ VDC}$
	$U_{on} \sim 19 \text{ VDC} / U_{off} < 2.5 \text{ VDC}$
Ex-I I/O	On request
<b>Connection NAMUR:</b>	
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
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### 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	$I \leq 22\text{mA} / R_L \leq 1 \text{ k}\Omega$
Ex-i: Active	$I \leq 22\text{mA} / R_L \leq 470 \text{ }\Omega$
	$U_O = 21 \text{ V} / I_0 = 90\text{mA}$
	$P_O = 0.5\text{W}$
	$C_O = 90\text{nF} / L_O = 2\text{mH}$
Basic/ Modular IO: Passive	$I \leq 22\text{mA} / U \leq 32\text{VDC}$
Ex-i: Passive	$I \leq 22\text{mA}$
	$U_i = 30\text{V} / I_i = 100\text{mA}$
	$P_i = 1\text{W}$
	$C_i = 10\text{nF} / L_i \sim 0\text{mH}$

### 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
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	$f \leq 10\text{kHz} : I \leq 20\text{mA}$
	$f \leq 10\text{Hz} : I \leq 100\text{mA}$
	$U \leq 32 \text{ VDC} / I \leq 100\text{mA}$
Passive	$U_i = 30\text{V} / I_i = 100\text{mA}$
	$P_i = 1\text{W}$
	$C_i = 10\text{nF} / L_i \sim 0\text{mH}$
Active	$U_{\text{nom}} = 24\text{VDC} / I < 1 \text{ mA}$
	$U_O = 1.5 \text{ V at } 10\text{mA}$
Namur (acc. 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	$I_{\text{nom}} = 16\text{mA} / U_{\text{nom}} = 24\text{VDC}$
Basic/ Modular IO: Passive	$U \leq 32\text{VDC}$
	$U_{\text{on}} > 19\text{VDC} / U_{\text{off}} < 2.5\text{VDC}$
Namur (acc. to EN 60947-5-6)	Active

**I/O module combination possibilities**

Communications	Basic I/O	Ex-I I/O <sup>1</sup>	Modular I/O <sup>2</sup>
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**Current Input**

Active/passive	Standard	optional	On request
HART	Standard	optional	On request

**Pulse and status output**

Active	On request	On request	optional
Passive	Standard	optional	optional
Namur (acc. To EN 60947-5-6)	On request	On request	optional

**Control Input**

Active	On request	On request	optional
Passive	Standard	optional	optional
Namur (acc. To EN 60947-5-6)	On request	On request	optional

**Foundation Fieldbus**

Foundation Fieldbus (pending)	On request	optional	optional
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**Protection**

Ex-d/e	optional	optional	optional
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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/O-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/O-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/O-module combination then becomes B-B-B.
- Suppose you require a converter with 2 active pulse/status outputs. The I/O-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	

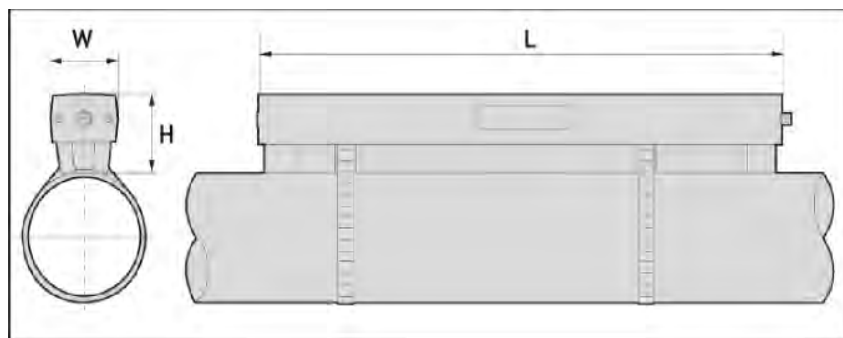
3	0	0
	1	
	2	

D	0	0
	1	
	2	

E	0	0
	1	
	2	

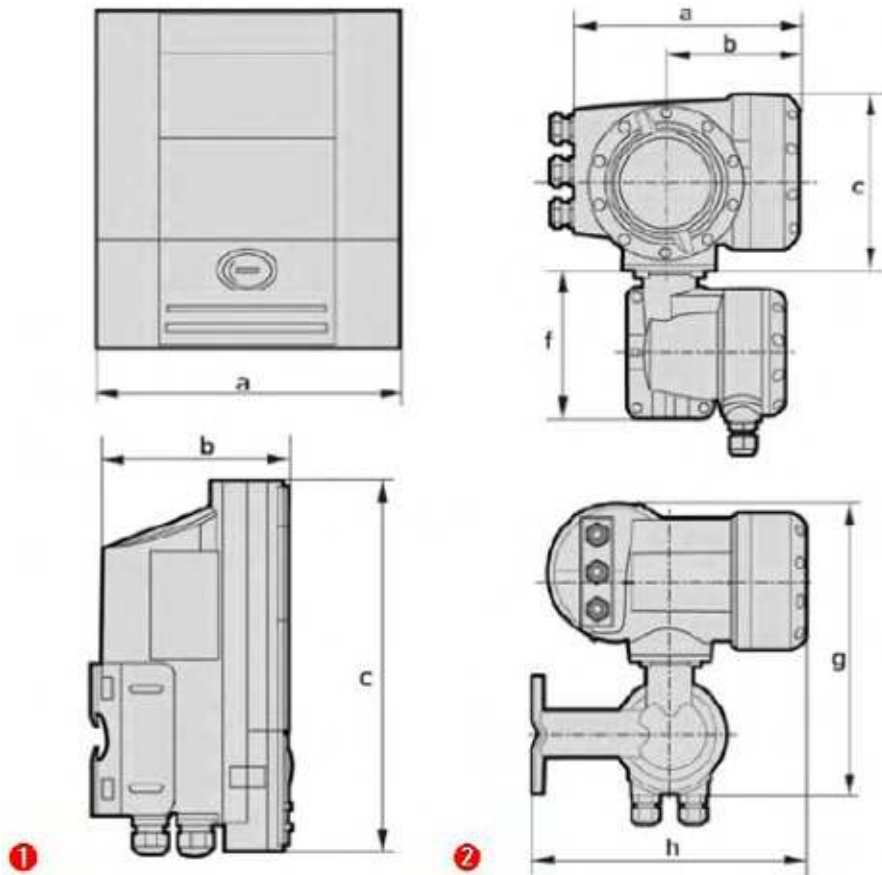
Modular I/O								
1	2	3	1	2	3	1	2	3
4	8	8	8	8	8	D	8	8
	A	B		B	8		A	8
		A			B			A
		C			C			C
		G			G			K
	C	8		C	8		C	8
		C			C			C
		G			G			K
	G	8		G	8		K	8
		G			G			K
6	8	8	C	8	8	E	8	8
	A	8		B	8		A	8
		A			B			A
		E			E			C
		K			K			K
	E	8		E	8		C	8
		E			E			C
		K			K			K
	K	8		H	8		K	8
		K			H			K
7	8	8	C	8	8	F	8	0
	A	8		B	8		A	
		A			B			B
		F			F			C
		H			H			D
	F	8		F	8			E
		F			F			F
		H			H			G
	H	8		H	8			H
		H			H			K

**Dimensions and weights**



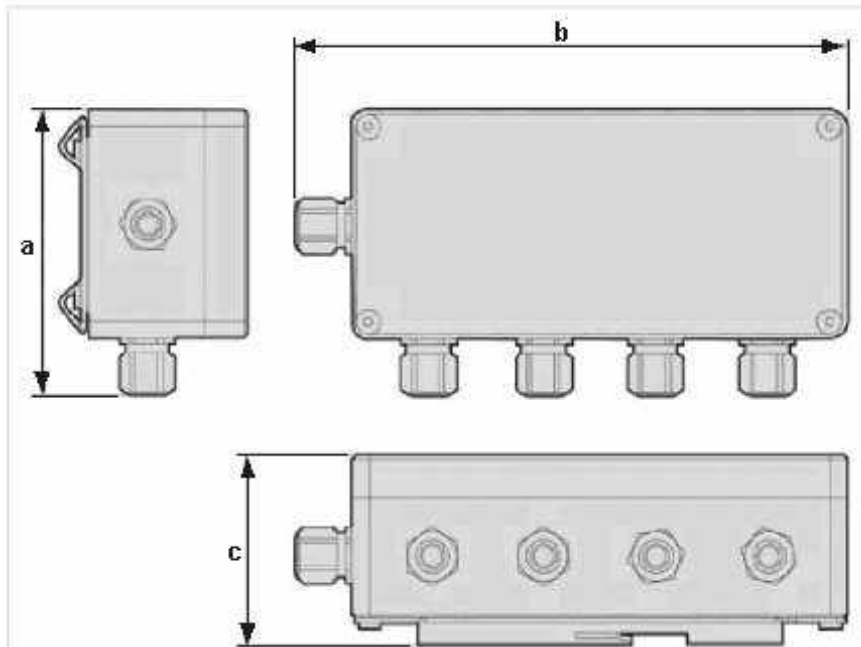
Version	Dimensions [mm]			Approx. weight (without cable / strip)
	L	H	W	[kg]
small	496.3	71	63.1	2.7
medium	826.3	71	63.1	3.6
large	496.3 <sup>1</sup>	71 <sup>1</sup>	63.1 <sup>1</sup>	2.7 <sup>1</sup>
Version	Dimensions [inches]			Approx. weight (without cable / strip)
	L	H	W	[lbs]
small	19.5	2.8	2.5	6.0
medium	32.5	2.8	2.5	7.9
large	19.5 <sup>1</sup>	2.8 <sup>1</sup>	2.5 <sup>1</sup>	6.0 <sup>1</sup>

<sup>1</sup>Value for one of the 2 delivered rails



- 1) TWS9000 W
- 2) TWS9000 F

Version	Dimensions						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						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 [lbs])
	a	b	c	
Cable box	4.01	7.76	2.64	1.87