Honeywell

TWM 1000
Electromagnetic Flow Converter
Technical Datasheet

34-VF-03-24
August 29th, 2008

Specification

The more than economical solution

The TWM1000 offers a broad range of performance with an outstanding price/performance ratio.

The TWM1000 has been developed for applications requiring an economical solution for the measuring task at a high technological level.

Highlights

- Quick and easy to install and operate
- Large, illuminated graphic display with intuitive operation
- Multiple user languages as standard
- Maintenance-free
- Outstanding price/performance ratio
- Extremely quick signal conversion

Industries

- Agriculture
- Heating, Ventilation & Air Conditioning
- Machinery
- Power Plants
- Water
- Wastewater

Applications

- Measuring homogeneous media
- Water distribution networks and spray-irrigation systems
- Water treatment
- Environmental technology

Figure 1 – TWM1000 Electromagnetic Flow Converter

1. Large, illuminated graphic display with intuitive operation
2. For AC and DC operation

Options and variants

Modular converter concept

Despite its somewhat different appearance, the TWM1000 has many of the same functions as its "big brother", the TWM9000.
The diagnostics function, conductivity measurement and simple menu navigation, to mention just a few.
This latest member of the transformer family also has a large number of fully-developed functions:

- various auxiliary power supply versions (AC, DC, AC/DC)
- HART as standard
- optional Ex version available

Compact design in various versions

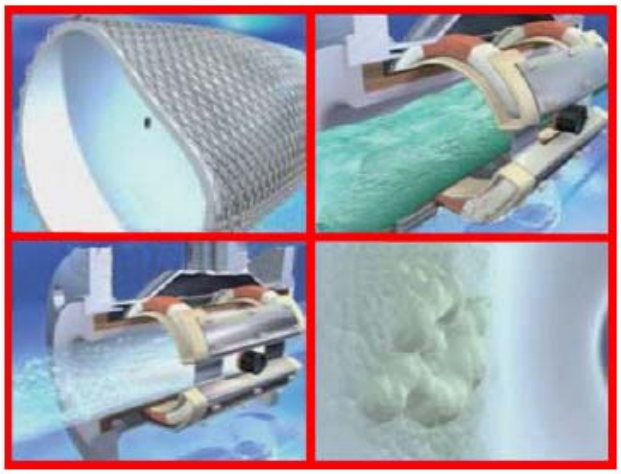
The TWM1000C in the 0° version is ideal for installation in vertical pipes.
The 45° version, on the other hand, allows draining of liquids when it is installed in horizontal pipes. The angled design also improves the readability of the display.
The backlit display provides excellent readability from long distances.
The 4 softkeys enable easy operation, start-up and parametrization.
Both housing versions can be rotated in 90° increments, allowing customer-specific installation positions.

Signal converter in wall version

With the TWM1000W, remote installation is possible in the case of temperature effects, vibration or difficult-to-reach locations.

A signal cable is used to connect the sensor and the converter for the purposes of power supply and signal processing.

The electronics can be used in all housing versions without reparametrization.



Diagnosis

The TWM1000 has been equipped with an extensive diagnostic tool for device function and application tests.

- Conductivity measurement
- Electrode error
- Process or ambient temperature too high

Technical data

Measuring system

Measurement principle	Faraday's law of induction
Function	Continuous measurement of current volume flow, flow velocity, conductivity, mass flow (at constant density), coil temperature of the measuring sensor
Modular construction	The measurement system consists of a measuring sensor and a signal converter
Signal converter	
Compact version (C)	TWM1000 C (0° & 45° version)
Remote version (W)	TWM1000 W
Measuring sensor	
VersaFlow Mag 100	TWM1000 C & W: DN10...150 / 3/8"…6"
VersaFlow Mag 1000	TWM1000 C & W: DN25...1200 / 1"…48"
VersaFlow Mag 4000	TWM1000 C: DN2.5...1200 / 1/10"…48"; TWM1000 W: DN 10...1200 / 3/8"…48";
VersaFlow Mag 2000	TWM1000 C: DN2.5...250 / 1/10"…12"; TWM1000 W: DN 10...250 / 3/8"…12"
VersaFlow Mag 3000	TWM1000 C: DN2.5...150 / 1/10"…6"; TWM1000 W: DN 10...150 / 3/8"…6"
Communication	
Outputs	Current (incl. HART®), pulse, frequency, status output and/or limit switch
Counter	2 internal counters with a max. of 8 counter places (e.g. for counting volume and/or mass units)
Verification	Integrated verification, diagnosis functions: flowmeter, empty pipe detection, stabilization
Display and user interface	
Graphic display	LC display, backlit white; size: 128x64 pixels, corresponds to 59x31 mm = 2.32"x1.22"
Display functions	2 measured value pages, 1 status page, 1 graphic page (measured values and depictions adjustable as required)
Units	Metric, British and US units selectable as required from lists for volume / mass flow and counting, flow speed, electrical conductivity, temperature
Language of display texts	English, French, German (others on request)
Operating elements	4 keys for operator control of the signal converter without opening the housing

Measuring accuracy

Maximum measuring error	±0.3% of the measured value ±1 mm/s, depending on the measuring sensor (see accuracy curves)
Repeatability	±0.1 %

Operating conditions

Temperature	
Process temperature	See also data sheet for the measuring sensor
Ambient temperature	-40…+65°C / -40…+149°F (ambient temperature 55°C / 131°F and higher: protect
	electronics against self-heating, because an increase in the electronics temperature in 10°C / 50°F steps leads to a corresponding reduction of the electronics' service life by a factor of two.)
Storage temperature	-50…+70°C / -58…+158°F
Electrical conductivity	
All media except for water	Min. 5 µS/cm (see also data sheet for the measuring transformer)
	Min. 20 µS/cm

Materials

Die-cast aluminium (polyurethane-coated)	Standard

Electrical connection

Voltage	Standard: 100…230 VAC (-15% / +10%), 50/60 Hz
	Option 1: 24 VDC (-55% / +30%)
	Option 2: 24VAC/DC (AC: -15% / +10%; DC: -25% / +30%)
Power consumption	Standard: 8 VA
	Option 1: 4 W
	Option 2: AC 8 VA; DC: 4 W
Signal cable	Only for remote versions
A: type DS 300	Max. length: 600 m / 1950 ft (depending on electrical conductivity and measuring sensor version)
Cable entries	Standard: M20 x 1.5
	Option: ½" NPT, PF ½

Outputs

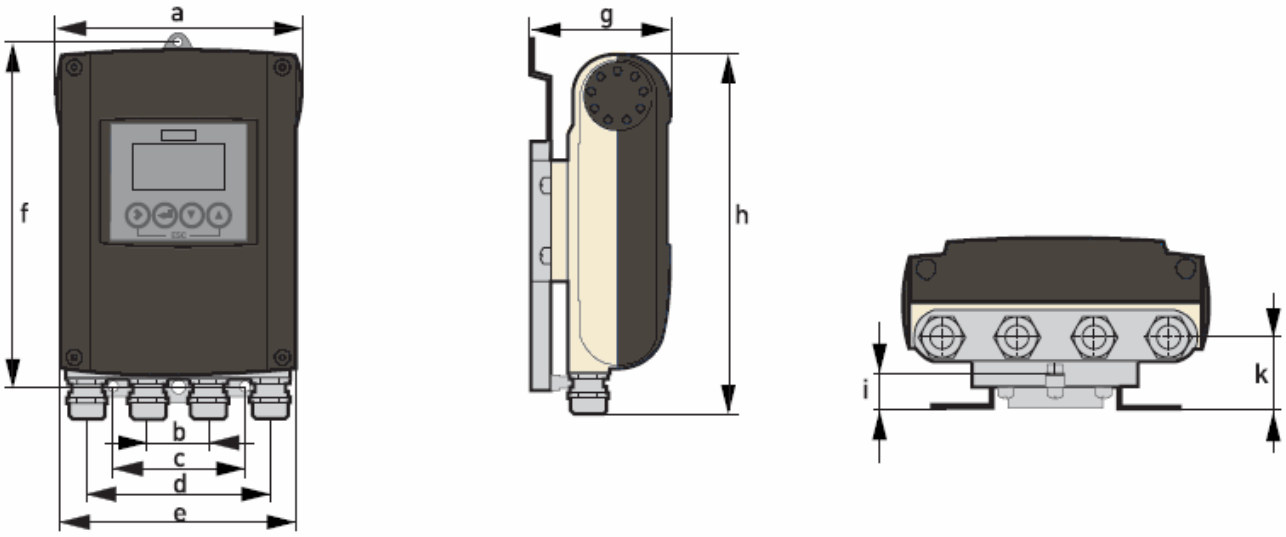
Current output		
Function	Measurement of volume and mass (at constant density), HART® communication	
Settings	Without HART®	With HART®
	Q = 0%: 0…15 mA	Q = 0%: 4…15 mA
	Q = 100%: 10…21.5 mA	Q = 100%: 10…21.5 mA
	Error identification: 0…22 mA	Error identification:
Operating data		
Active	$U_{int,nom}$ = 24 VDC I ≤ 22mA $R_L \leq 750\ \Omega$	
Passive	$U_{ext} \leq 32$ VDC I ≤ 22mA $U_0 \leq 2$ V at I = 22 mA	
Pulse or frequency output		
Function	Can be set as a pulse output (e.g.- for volume or mass counting) or frequency output	
Settings	For Q = 100%: 0.01...10000 pulses per second or pulses per unit volume	
	Pulse width: setting automatic, symmetric or fixed (0.05...2000 ms)manual	
Operating data		
Passive	$U_{ext} \leq 32$ VDC	
	100 Hz < $f_{max} \leq$ 10 kHz: I ≤ 20mA open: I ≤ 0.1 mA at U_{ext} = 5 V I ≤ 0.5mA at U_{ext} = 24 V I ≤ 0.7mA at U_{ext} = 32 V closed: $U_0 \leq 0.8$V at I = 1 mA $U_0 \leq 1.5$V at I = 10 mA $U_0 \leq 3.5$V at I = 100 mA f ≤ 1 kHz: $R_L \leq 10\ \Omega$ f ≤ 10 kHz: $R_L \leq 2\ \Omega$	

Status output / limit switch	
Function and settings	Settable as automatic measuring range change, indicator for direction of flow, overflow, error, operating point or empty pipe detection
	Valve control with activated dosing function
	Status and/or control: ON or OFF
Operating data	
Passive	$U_{ext} \leq 32$ VDC $I \leq 100$mA open: $I \leq 0.05$ mA at $U_{ext} = 32$ VDC closed: $U_0 \leq 0.2$V at I = 10 mA $U_0 \leq 2$V at I = 100 mA
Low-flow cutoff	
On	0...±9.999 m/s; 0...20.0%, settable in 0.1 % steps, separately for each current and pulse output
Off	0...±9.999 m/s; 0...19.0%, settable in 0.1 % steps, separately for each current and pulse output
Time constant	
Function	Can be set together for all flow indicators and outputs, or separately for: current, pulse and frequency output, and for limit switches and the 2 internal counters
Time setting	0…100 seconds, settable in 0.1 second steps

Hazardous areas	
Non-Ex	Standard
EEx - Zone 1/2	In preparation
SAA version Ex Zone 1/2	In preparation
TIIS - Zone 1/2	In preparation
Protection category to IEC 529 / EN 60529	
All versions	IP 66 / 67 (corresponds to NEMA 4X/6)

Dimensions and weights

Wall-mounted version



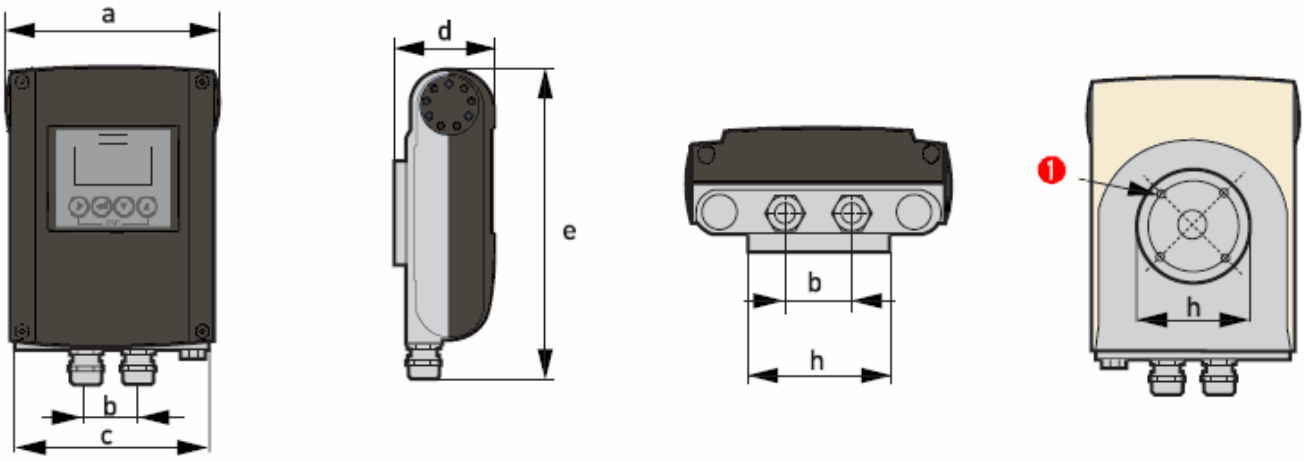
Dimensions and weight in mm and kg

	Dimensions [mm]										Weight [kg]
	a	b	c	d	e	f	g	h	i	k	
Wall-mounted version	161	40	87.2	120	155	241	95.2	257	19.3	39.7	Std: 1.9 Ex: 2.4

Dimensions and weight in inches and lbs

	Dimensions [inches]										Weight [lbs]
	a	b	c	d	e	f	g	h	i	k	
Wall-mounted version	6.34	1.57	3.43	4.72	6.10	9.49	3.75	10.12	0.76	1.56	Std: 4.2 Ex: 5.3

Compact 0° version



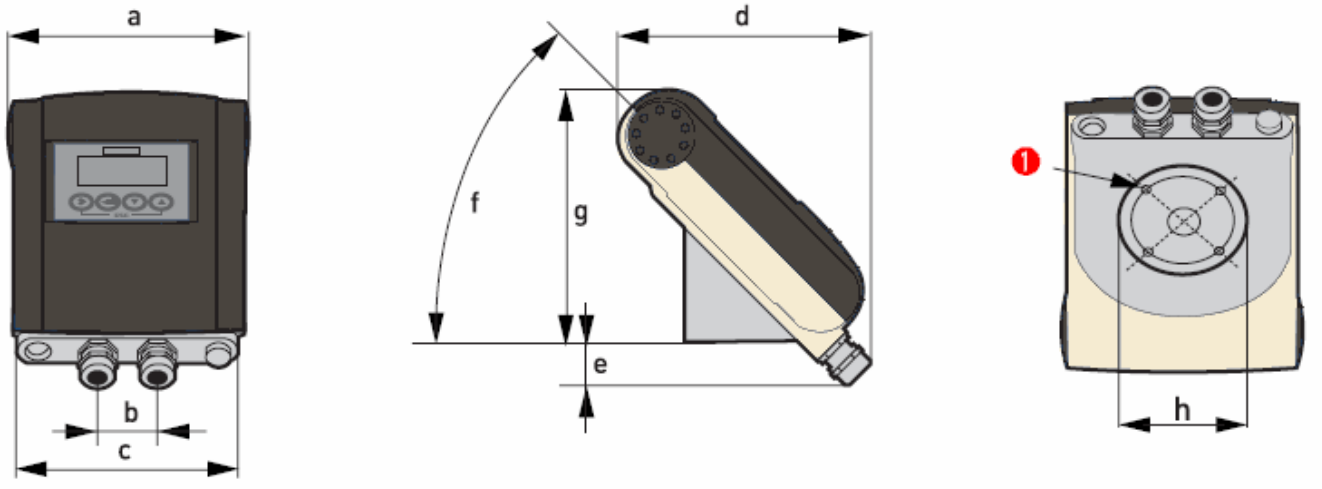
Dimensions and weight in mm and kg

	Dimensions [mm]								Weight [kg]
	a	b	c	d	e	f	g	h	
0° version	161	40	155	81.5	257	-	-	∅72	Std: 1.9 Ex: 2.4

Dimensions and weight in inches and lbs

	Dimensions [inches]								Weight [lbs]
	a	b	c	d	e	f	g	h	
0° version	6.34	1.57	6.1	3.21	10.12	-	-	∅2.83	Std: 4.2 Ex: 5.3

Compact 45° version



Dimensions and weight in mm and kg

	Dimensions [mm]								Weight [kg]
	a	b	c	d	e	f	g	h	
45° version	161	40	155	184	27.4	45°	186	∅72	Std: 2.1 Ex: 2.6

Dimensions and weight in inches and lbs

	Dimensions [inches]								Weight [lbs]
	a	b	c	d	e	f	g	h	
45° version	6.34	1.57	2.17	2.74	1.08	45°	7.32	∅2.83	Std: 4.2 Ex: 5.3

Flow tables

Flow rate in m/s and m^3/h

	$Q_{100\%}$ in m^3/h			
v [m/s]	**0.3**	**1**	**3**	**12**
DN [mm]	**Min. flow**	**Nominal flow**		**Max. flow**
2.5	0.01	0.02	0.05	0.21
4	0.01	0.05	0.14	0.54
6	0.03	0.10	0.31	1.22
10	0.08	0.28	0.85	3.39
15	0.19	0.64	1.91	7.63
20	0.34	1.13	3.39	13.57
25	0.53	1.77	5.30	21.21
32	0.87	2.90	8.69	34.74
40	1.36	4.52	13.57	54.29
50	2.12	7.07	21.21	84.82
65	3.58	11.95	35.84	143.35
80	5.43	18.10	54.29	217.15
100	8.48	28.27	84.82	339.29
125	13.25	44.18	132.54	530.15
150	19.09	63.62	190.85	763.40
200	33.93	113.10	339.30	1357.20
250	53.01	176.71	530.13	2120.52
300	76.34	254.47	763.41	3053.64
350	103.91	346.36	1039.08	4156.32
400	135.72	452.39	1357.17	5428.68
450	171.77	572.51	1717.65	6870.60
500	212.06	706.86	2120.58	8482.32
600	305.37	1017.90	3053.70	12214.80
700	415.62	1385.40	4156.20	16624.80
800	542.88	1809.60	5428.80	21715.20
900	687.06	2290.20	6870.60	27482.40
1000	848.22	2827.40	8482.20	33928.80
1200	1221.45	3421.20	12214.50	48858.00

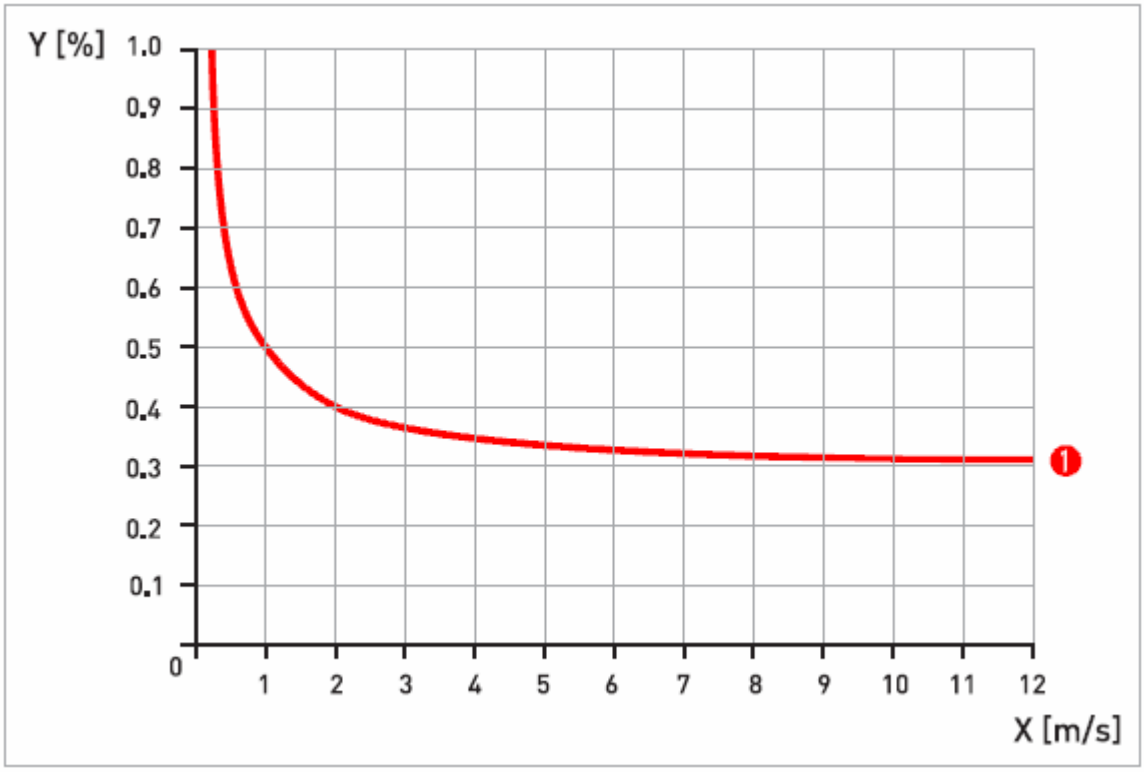
Flow rate in ft/s and gallons/min

	$Q_{100\%}$ in .US gallons/min			
v [ft/s]	**1**	**3.3**	**10**	**40**
DN [inch]	**Min. flow**	**Nominal flow**		**Max. flow**
1/10	0.02	0.09	0.23	0.93
1/8	0.06	0.22	0.60	2.39
1/4	0.13	0.44	1.34	5.38
3/8	0.37	1.23	3.73	14.94
1/2	0.84	2.82	8.40	33.61
3/4	1.49	4.98	14.94	59.76
1	2.33	7.79	23.34	93.36
1.25	3.82	12.77	38.24	152.97
1.5	5.98	19.90	59.75	239.02
2	9.34	31.13	93.37	373.47
2.5	15.78	52.61	159.79	631.16
3	23.90	79.69	239.02	956.09
4	37.35	124.47	373.46	1493.84
5	58.35	194.48	583.24	2334.17
6	84.03	279.97	840.29	3361.17
8	149.39	497.92	1493.29	5975.57
10	233.41	777.96	2334.09	9336.37
12	336.12	1120.29	3361.19	13444.77
14	457.59	1525.15	4574.93	18299.73
16	597.54	1991.60	5975.44	23901.76
18	756.26	2520.61	7562.58	30250.34
20	933.86	3112.56	9336.63	37346.53
24	1344.50	4481.22	13445.04	53780.15
28	1829.92	6099.12	18299.20	73196.79
32	2390.23	7966.64	23902.29	95609.15
36	3025.03	10082.42	30250.34	121001.37
40	3734.50	12447.09	37346.00	149384.01
48	5377.88	17924.47	53778.83	215115.30

Accuracy

Reference conditions

- Medium: water
- Temperature: 20°C / 68°F
- Pressure: 1 bar / 14.5 psi
- Inlet run: ≥ 5 DN



- X [m/s]: flow velocity
- Y [%]: deviation from the actual measured value (mv)

	DN [mm]	DN [inch]	Accuracy	Curve
VersaFlow Mag 1000 / 4000 / 2000 / 3000	10…1200	3/8…48	0.3% of mV +1 mm/s	1
VersaFlow Mag 100	10…150	3/8…6	0.4% of mV +1 mm/s	as 1 + 0.1%
VersaFlow Mag 2000 / 3000 / 4000	2.5…6	1/10…1/4		

Ordering Information

Contact your nearest Honeywell sales office, or

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

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The Honeywell Centre
155 Gordon Baker Rd.
North York, Ontario M2H 3N7
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Minato-ku, Tokyo, Japan 105-0023

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