VERSAFLOW

Guidelines for the use of Coriolis Meters in Hazardous Areas

- 100 Series Twin Straight Tube Coriolis Mass Flowmeter
- 200 Series Twin Straight Tube Coriolis Mass Flowmeter
- 1000 Series Single Straight Tube Coriolis Mass Flowmeter
- TWC 9000 Mass Flow Converter

Honeywell

Explanation of Symbols Used

The follwing is a guide to the meaning of the symbols used in this handbook.The symbols fall into two types. The rectangular symbols with blue background draws the reader's attention to general points of information. The triangular symbols with yellow background draw the reader's attention to hazards or hazardous situations.

	**General Information**	Information is important to the installation/operation of the meter.
	**General Warning**	Risk of damage to the meter or installation.
	**EX - Hazardous Area Warning**	Instruction MUST be observed in order to comply with Hazardous Areas Certification.
	**High Voltage**	Risk of electric shock.
	**General Hazard**	Non specific hazard that could result in injury.
	**Hot Surface or High Temperature**	Risk of burning.
	**Heavy Item**	Risk of injury.

- Do not install, operate or maintain this device without reading, understanding and following the factory-supplied handbook. Failure to do so, may result in injury or damage.
- Read these instructions carefully before starting installation and save them for future reference.
- Observe all warnings and instructions marked on the device.
- You MUST only use a power supply that has a protective earth.
- Do not use the device with covers removed!
- You MUST follow the installation instructions in the handbook, paying particular attention to
    - Handling
    - Lifting
    - Supporting and fixing the meter
    - Cabling and connections.
- If the product does not operate normally, refer to the handbook or consult a qualified HONEYWELL service engineer. There are no operator-serviceable parts inside the product.

These terms may appear in this manual or on the instrument:

Warning statement: Identify conditions or practice that could result in injury or loss of life.

or

Caution statement: Identify conditions or practice that could result in damage to the instrument or other property.

Disclaimer:

- This document contains important information on the device. HONEYWELL attempts to be as accurate and up-to-date as possible but assumes no responsibility for errors or omissions. Nor does HONEYWELL make any commitment to update the information contained herein. This manual and all other documents are subject to change without prior notice.
- HONEYWELL will not be liable for any damage of any kind by using this device, including, but not limited to: direct; indirect; incidental; punitive and consequential damages.
- Any device purchased from HONEYWELL is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.
- HONEYWELL reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification and will not be liable in any way for possible consequences of such changes.

Product liability and Warranty

- Responsibility for suitability and intended use of this device rests solely with the user. Improper installation and operation of the device may lead to loss of warranty.
- In addition, the Terms and Conditions of Sale are applicable and are the basis for the purchase contract.
- If a device needs to be returned to HONEYWELL, please note the information given at the back of the Handbook. HONEYWELL regrets that they cannot repair or service a device unless accompanied by the completed form

This instrument has been developed and manufactured by:

HONEYWELL
512 Virginia Drive
Fort Washington
PA 19034
USA

For information, maintenance or service, please contact your nearest local HONEYWELL representative.

See www.honeywell.com/ps

WARNING

No changes may be made to the devices. Unauthorized changes might affect the explosion safety of the devices. Be sure to follow these instructions!

IMPORTANT

- The prescriptions, regulations and electrical data described in the EC type examination certificate MUST be obeyed.
- In addition to the general regulations for low-voltage installations (e.g.HD384) the regulations laid down in the standard for electrical installations in gas hazardous areas (e.g. EN 60079-14) or dust hazardous areas (e.g. EN 50 281-1-2) MUST be complied with.

- Installation, commissioning, utilization and maintenance must be carried out only by personnel trained in explosion safety.
- This manual must be read in conjunction with the VERSAFLOW Handbook.

1.1 General

The VERSAFLOW flowmeter systems consist of a mass flow sensor and a mass flow converter or a mass flow sensor and associated apparatus.

The separate mass flow sensor with a mass flow converter is identified as:

- VERSAFLOW 100 flow sensor with TWC 9000F flow converter; see PTB 08 ATEX 2013 X with PTB 08 ATEX 2015 X
- VERSAFLOW 200 flow sensor with TWC 9000F flow converter; see PTB 08 ATEX 2013 X with PTB 08 ATEX 2015 X
- VERSAFLOW 1000 flow sensor with TWC 9000F flow converter; see PTB 08 ATEX 2013 X with PTB 08 ATEX 2015 X

The separate flowmeter with associated apparatus is identified as:

- VERSAFLOW Coriolis 100M; see PTB 08 ATEX 2013 X
- VERSAFLOW Coriolis 200M; see PTB 08 ATEX 2013 X
- VERSAFLOW Coriolis 1000M; see PTB 08 ATEX 2013 X

The flowmeter in a compact configuration is identified as:

- VERSAFLOW Coriolis 100C (VERSAFLOW 100 + TWC 9000); see PTB 08 ATEX 2014 X
- VERSAFLOW Coriolis 200C (VERSAFLOW 100 + TWC 9000); see PTB 08 ATEX 2014 X
- VERSAFLOW Coriolis 1000C (VERSAFLOW 1000 + TWC 9000); see PTB 08 ATEX 2014 X

The output configuration of the TWC 9000 is described by the CG32.....XYZ number listed on the data label. See section 4 for a detailed description.

All types are intended for use in Zone 1 Category 2 areas. In addition certain versions of MFC300 have intrinsically safe signal outputs suitable for use in Category 1 areas.

1.2 TWC 9000F

The TWC 9000F has intrinsically safe connections to the mass flow sensor with either increased safety or intrinsically safe signal outputs. The signal output connection compartment can be configured with protection type Ex d or Ex e. The marking is as follows:

For Ex i outputs	
Ex d connection compartment	**Ex e connection compartment**
II 2(1) G Ex d [ia/ib] IIC T6	II 2(1) G Ex de [ia/ib] IIC T6
II 2(1) D Ex tD [iaD/ibD] A21 IP6x T80°C	II 2(1) D Ex tD [iaD/ibD] A21 IP6x T80°C
For non-Ex i outputs	
II 2 G Ex d [ib] IIC T6	II 2 G Ex de [ib] IIC T6
II 2 D Ex tD [ibD] A21 IP6x T80°C	II 2 D Ex tD [ibD] A21 IP6x T80°C

The output connections to the mass flow sensor have the following values:

Power Supply Circuit	Data Circuit
Uo = 16.5 V	Uo = 6 V
Io = 305 mA	Io = 38 mA
Po = 1.25 W	Po = 120 mW
Characteristic curve: linear	Characteristic curve: linear
Co = 230 nF	Co = 1.9 µF
Lo = 320 µH	Lo = 2 mH

For details of the signal output values, compare the table in section 4 with the CG32.....XYZ number listed on the data label.

1.3 VERSAFLOW CORIOLIS 100F / 100C / 100M

The VERSAFLOW CORIOLIS 100F / 100M mass flow sensor / mass flow meter is designed with intrinsically safe protection type. The marking for the VERSAFLOW CORIOLIS 100F / 100M for versions with or without heating jacket / insulation is as follows:

II 2 G Ex ib IIC T4....T1

II 2 D Ex ibD 21 T175°C

The input connections to the VERSAFLOW CORIOLIS 100M for use with associated apparatus have the following maximum values:

Power Supply Circuit	Data Circuit
Ui = 16.5V	Ui = 11.8V
Ii = 340mA	Ii = 40mA
Pi = 1.3W	Pi = 120mW
Ci = 35nF	Ci = 35nF
Li = 10uH	Li = 10uH

The marking for the compact VERSAFLOW CORIOLIS 100C is as follows:

For non-Ex i signal outputs without heating jacket / insulation	
Ex d connection compartment	Ex e connection compartment
II 2 G Ex d [ib] IIC T4....T1	II 2 G Ex de [ib] IIC T4....T1
II 2 D Ex tD A21 IP6x T185°C	II 2 D Ex tD A21 IP6x T185°C

For non-Ex i signal outputs with heating jacket / insulation	
Ex d connection compartment	Ex e connection compartment
II 2 G Ex d [ib] IIC T4....T1	II 2 G Ex de [ib] IIC T4....T1
II 2 D Ex tD A21 IP6x T195°C	II 2 D Ex tD A21 IP6x T195°C

For Ex i signal outputs without heating jacket / insulation	
Ex d connection compartment	Ex e connection compartment
II 2(1) G Ex d [ia/ib] IIC T4....T1	II 2(1) G Ex de [ia/ib] IIC T4....T1
II 2(1) D Ex tD [iaD] A21 IP6x T185°C	II 2(1) D Ex tD [iaD] A21 IP6x T185°C

For Ex i signal outputs with heating jacket / insulation	
Ex d connection compartment	Ex e connection compartment
II 2(1) G Ex d [ia/ib] IIC T4....T1	II 2(1) G Ex de [ia/ib] IIC T4....T1
II 2(1) D Ex tD [iaD] A21 IP6x T195°C	II 2(1) D Ex tD [iaD] A21 IP6x T195°C

1.4 VERSAFLOW CORIOLIS 200F / 200C / 200M

The VERSAFLOW CORIOLIS 200 / 200M mass flow sensors / mass flow meters are designed with intrinsically safe protection type. The marking for the VERSAFLOW CORIOLIS 200 / 200M is as follows:

II 2 G Ex ib IIC T6....T1

II 2 D Ex ibD 21 T165°C

The input connections to the VERSAFLOW CORIOLIS 200M for use with associated apparatus have the following maximum values:

Power Supply Circuit	Data Circuit
Ui = 16.5V	Ui = 11.8V
Ii = 340mA	Ii = 40mA
Pi = 1.3W	Pi = 120mW
Ci = 35nF	Ci = 35nF
Li = 10uH	Li = 10uH

The marking for the compact VERSAFLOW CORIOLIS 200C is as follows:

For non-Ex i signal outputs	
II 2 G Ex d [ib] IIC T6....T1	II 2 G Ex de [ib] IIC T6....T1
II 2 D Ex tD A21 IP6x T160°C	II 2 D Ex tD A21 IP6x T160°C

For Ex i signal outputs	
Ex d connection compartment	Ex e connection compartment
II 2(1) G Ex d [ia/ib] IIC T6....T1	II 2(1) G Ex de [ia/ib] IIC T6....T1
II 2(1) D Ex tD [iaD] A21 IP6x T160°C	II 2(1) D Ex tD [iaD] A21 IP6x T160°C

1.5 VERSAFLOW CORIOLIS 1000F / 1000C / 1000M

The VERSAFLOW CORIOLIS 1000F / 1000M mass flow sensors / mass flow meters are designed with intrinsically safe protection type. The marking for the VERSAFLOW CORIOLIS 1000F / 1000M is as follows:

No heating jacket / insulation	Heating jacket / insulation
II 2 G Ex ib IIC T6....T1	II 2 G Ex ib IIC T6....T1
II 2 D Ex ibD 21 T150°C	II 2 D Ex ibD 21 T165°C

The input connections to the VERSAFLOW CORIOLIS 1000M for use with associated apparatus have the following maximum values:

Power Supply Circuit	Data Circuit
Ui = 16.5V	Ui = 11.8V
Ii = 340mA	Ii = 40mA
Pi = 1.3W	Pi = 120mW
Ci = 35nF	Ci = 35nF
Li = 10uH	Li = 10uH

The marking for the compact VERSAFLOW CORIOLIS 1000C is as follows:

For non-Ex i signal outputs without heating jacket / insulation	
Ex d connection compartment	Ex e connection compartment
II 2 G Ex d [ib] IIC T6....T1	II 2 G Ex de [ib] IIC T6....T1
II 2 D Ex tD A21 IP6x T160°C	II 2 D Ex tD A21 IP6x T160°C

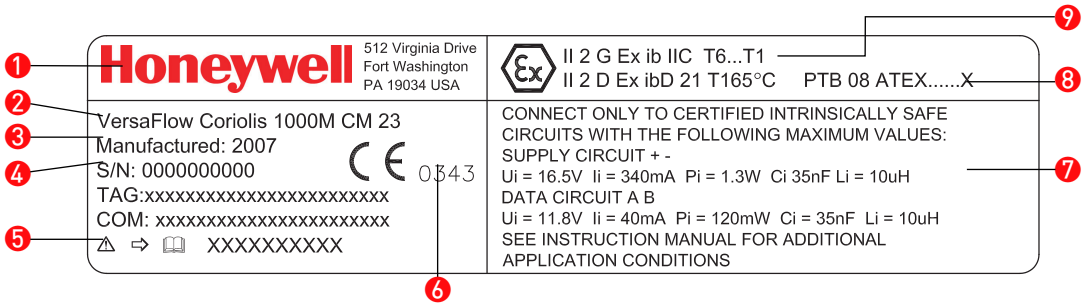
For non-Ex i signal outputs with heating jacket / insulation	
Ex d connection compartment	Ex e connection compartment
II 2 G Ex d [ib] IIC T6....T1	II 2 G Ex de [ib] IIC T6....T1
II 2 D Ex tD A21 IP6x T170°C	II 2 D Ex tD A21 IP6x T170°C

For Ex i signal outputs without heating jacket / insulation	
Ex d connection compartment	Ex e connection compartment
II 2(1) G Ex d [ia/ib] IIC T6....T1	II 2(1) G Ex de [ia/ib] IIC T6....T1
II 2(1) D Ex tD [iaD] A21 IP6x T160°C	II 2(1) D Ex tD [iaD] A21 IP6x T160°C

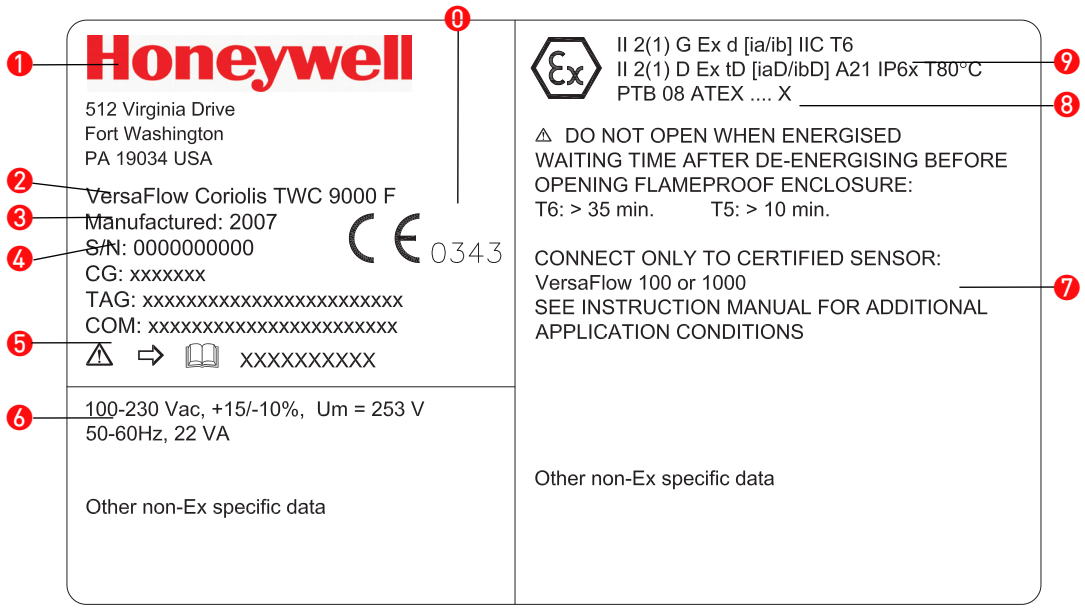
For Ex i signal outputs with heating jacket / insulation	
Ex d connection compartment	Ex e connection compartment
II 2(1) G Ex d [ia/ib] IIC T6....T1	II 2(1) G Ex de [ia/ib] IIC T6....T1
II 2(1) D Ex tD [iaD] A21 IP6x T170°C	II 2(1) D Ex tD [iaD] A21 IP6x T170°C

1.6 Data Plates

The data plate on the connection box of separate mass flow sensors typically contains the following information:



1. Company logo and address
2. Model/size
3. Year of Manufacture
4. Serial Number
5. Handbook Publication Number
6. Identification Number of the notified body, as required by Directive 94/95 EC, Annex IV
7. Ex Specific Requirements (example shown)
8. Certificate Number
9. Ex Marking (Example Shown)



1. Company Logo and Address
2. Model/size
3. Date of Manufacture
4. Serial Number
5. Handbook Publication Number
6. Power Supply Data
7. Ex Specific Requirements
8. Certificate Number
9. Ex Marking (Example Shown)
0. Identification Number of the notified body, as required by Directive 94/95 EC, Annex IV

2.1 General

Due to the influence of the media temperature, mass flow sensors and compact mass flow meters are not allocated to any fixed temperature class. For allocation regarding the non-insulated and heated/insulated versions, please refer to the tables below.

The temperature limits below apply under the following conditions:

- The flowmeter is installed and operated in accordance with the installation directions given in the Installation and Operating Instructions.
- The flowmeter is not heated up by any additional heat radiation (direct solar radiation, heat from adjacent plant parts) so causing it to operate above the permissible ambient temperature range.
- Insulation is not hindering free ventilation of the mass flow converter housing.

2.2 TWC 9000F

The TWC 9000F mass flow converter is suitable for temperature classes T6....T1 with a Max Surface Temperature T80 °C. w ith the following restictions on ambient temperature:

1 **Aluminium converter housing:**
   - I/O options listed in the table below: Tamb: - 40 °C...+65°C
   - I/O options not listed in the table below: Tamb - 40 °C...+60°C

2 **Stainless steel converter housing:**
   - Tamb: - 40 °C...+55 °C

IO Configuration (last three characters)	Designation
100	Basic IO
488, 4C8 to 4K8 688, 6C8 to 6K8 788, 7C8 to 7K8	Modular IO and Module Carrier with 1 module pulse / status or control in
888, 8C8 to 8K8 B88, BC8 to BK8 C88, CC8 to CK8	Modular IO and Module Carrier with 1 module pulse / status
D88 to DP8 E88 to EP8	Profibus PA or Foundation Fieldbus and Module Carrier with 1 module (all modules)
F80, FC0 to FK0	Profibus DP and Module Carrier with 1 module Pulse / Status or Control In
G88 to GP8	MODBUS IO and Module Carrier with 1 module (all modules)
GCC to GKC, GCE to GKC GCF to GKF HCC to HKC, HCE to HKC HCF to HKF	Modbus IO and Module Carrier with 2 module pulse / status or control in
200 300	Exi IO

2.3 VERSAFLOW CORIOLIS 100F / 100M / 100C

The VERSAFLOW CORIOLIS 100F / 100M / 100C is suitable for temperature classes T4....T1 according to the following tables:

VERSAFLOW CORIOLIS 100F / 100M with or without heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
65	89	T4	T130
	130	T3 – T1	T175

VERSAFLOW CORIOLIS 100C with aluminium converter housing and without heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
50	70	T4	T130
	130	T3 – T1	T185
60	60	T4 – T1	T125
65*	65	T4 - T1	T130

VERSAFLOW CORIOLIS 100C with stainless steel converter housing and without heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
50	70	T4	T130
	130	T3 – T1	T185
55	55	T4 – T1	T120

VERSAFLOW CORIOLIS 100C with aluminium converter housing and heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	65	T4	T130
	130	T3 – T1	T195
50	65	T4	T130
	100	T3 – T1	T165
60	60	T4 – T1	T125
65*	65	T4 – T1	T130

VERSAFLOW CORIOLIS 100C with stainless steel converter housing and heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	65	T4	T130
	120	T3 – T1	T185
50	65	T4	T130
	75	T3 – T1	T140
55	55	T4 – T1	T120

* Only for equipment configurations according to the table in section 2.2

The cable supplied by HONEYWELL is designed for a continuous working temperature of up to 105°C. Alternative cabling must be a heat-resistant type with a continuous minimum working temperature of 80°C.

2.4 OPTIMASS 200F / 200M / 200C

The OPTIMASS 200 / 200M / 200C are suitable for temperature classes T6....T1 according to the following tables:

VERSAFLOW CORIOLIS 200 / 200M with or without heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	65	T6	T80
	75	T5	T95
	110	T4	T130
	130	T1-3	T150
65	75	T5	T95
	110	T4	T130
	130	T1-3	T150

OPTIMASS 200C with aluminium converter housing, with or without heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	50	T6	T80
	65	T5	T95
	100	T4	T130
	130	T3 - T1	T160
50	65	T5	T95
	100	T4 - T1	T130
60	60	T4 - T1	T90
65*	65	T4 - T1	T95

OPTIMASS 200C with stainless steel converter housing, with or without heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	50	T6	T80
	65	T5	T95
	100	T4	T130
	120	T3 - T1	T150
50	65	T5	T95
	75	T4 - T1	T105
55	55	T5 - T1	T85

* Only for equipment configurations according to the table in section 2.2

The cable supplied by KROHNE is designed for a continuous working temperature of up to 105°C. Alternative cabling must be a heat-resistant type with a continuous working temperature of 80°C.

2.5 VERSAFLOW CORIOLIS 1000F / 1000M / 1000C

The VERSAFLOW CORIOLIS 1000F / 1000M / 1000C are suitable for temperature classes T6....T1 according to the following tables:

VERSAFLOW CORIOLIS 1000F / 1000M without heating jacket / insulation			
Mmbient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	70	T6	T80
	90	T5	T95
	130	T4	T130
	150	T3 – T1	T150
50	70	T6	T80
	85	T5	T95
	130	T4	T130
	150	T3 – T1	T150
65	85	T5	T95
	125	T4	T130
	150	T3 – T1	T150

VERSAFLOW CORIOLIS 1000F / 1000M with heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	65	T6	T80
	80	T5	T95
	115	T4	T130
	150	T3 – T1	T165
65	80	T5	T95
	115	T4	T130
	150	T3 – T1	T165

VERSAFLOW CORIOLIS 1000C with aluminium converter housing and without heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	55	T6	T80
	75	T5	T95
	120	T4	T130
	150	T3 – T1	T160
50	75	T5	T95
	115	T4	T130
	150	T3 – T1	T160
60	60	T4 – T1	T85
65*	65	T4 – T1	T90

VERSAFLOW CORIOLIS 1000C with aluminium converter housing and with heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	55	T6	T80
	70	T5	T95
	00	T4	T125
	145	T3 – T1	T170
50	70	T5	T95
	100	T4 – T1	T125
60	60	T4 – T1	T85
65*	65	T4 – T1	T90

VERSAFLOW CORIOLIS 100C with stainless steel converter housing and without heating jacket / insulation			
Ambient Temp. T_{amb}°C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	55	T6	T80
	75	T5	T95
	120	T4	T130
	150	T3 – T1	T160
50	75	T5	T95
	115	T4	T130
	135	T3 – T1	T145
55	55	T4 – T1	T80

VERSAFLOW CORIOLIS 100C with stainless steel converter housing and with heating jacket / insulation			
Ambient Temp. T_{amb} °C	Max. medium temp. T_m °C	Temperature Class	Max. Surface Temp. °C
40	55	T6	T80
	70	T5	T95
	100	T4	T125
	145	T3 – T1	T170
50	70	T5	T95
	75	T4 – T1	T100
55	55	T4 – T1	T80

* Only for equipment configurations according to the table in section 2.2

The cable supplied by HONEYWELL is designed for a continuous working temperature of up to 105°C. Alternative cabling must be a heat-resistant type with a minimum continuous working temperature of 80°C.

3.1 General

In the case of separate systems, the sensor and converter are connected using 4 core 2 pair cable with an overall shield. Each cable pair carries an intrinsically safe circuit (Power Supply Circuit and Data Circuit). The maximum length of the connecting cable for functional reasons is 300m, provided that the capacitance and inductance of the cable does not exceed the limits specified in section 3.2 below.

The requirements of EN 60079-14 should be adhered to when installing the flowmeter.

3.2 Cable Parameters

The following points need be to be followed when selecting the connecting cable for separated systems:

- The maximum permitted total capacitance and inductance for the connecting cable is :

  C_L = 195 nF

  L_L = 310 µH

- Cable supplied by Honeywell has the following parameters:

  $C_L' < 200pF/m$

  $L_L' < 0.7µH/m$

- The cable selected must have a temperature rating equal to or better than the maximum range of temperatures present in the installation taking into account temperature gradients on the flow sensors (see the notes in section 2).
- The cable must be capable of withstanding a test voltage of 1000V AC and have a minimum insulation thickness of 0.2mm, as per EN60079-14 clause 12.2.2.7.

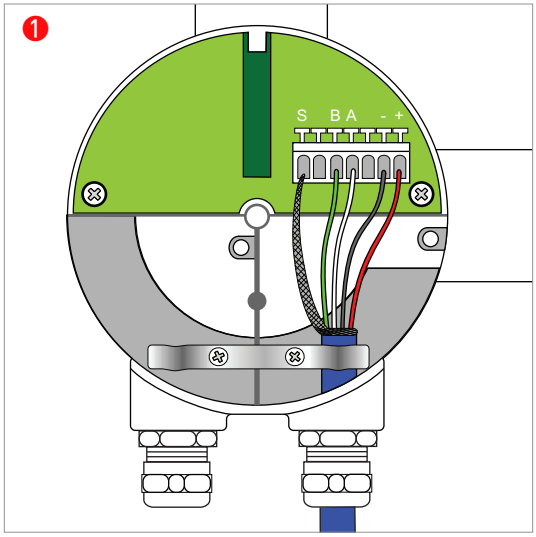
3.3 Equipotential bonding

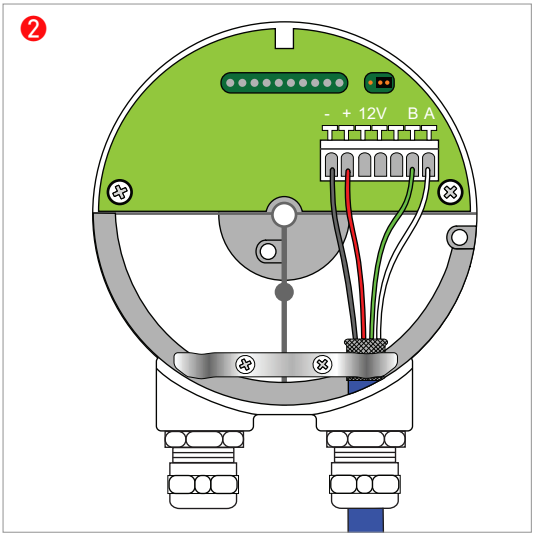
The TWC 9000F mass flow converter or VERSAFLOW xxx C mass flow meter must be included in the equipotential bonding system of the installation using the equipotential bonding terminal on the mass flow converter housing wall bracket or mass flow meter housing mounting stem respectively.

In separated systems the intrinsically safe power supply and data circuits are galvanically isolated from earth, therefore, an equilisation cable between the mass flow sensor and mass flow converter should not be used.

Where screened cable is used, the screen should only be earthed at the mass flow sensor end. In the special case of a screen being earthed at both ends of the system, a potential difference between the sensor and converter is not permitted. Refer to EN 60079-14 clause 12.2.2.3 for further requirements for cable screens.

3.4 Terminal Connections





1 TWC 9000F Mass flow converter junction box

2 VERSAFLOW Mass flow sensor junction box

TWC 9000F Mass flow converter junction box

The Power Supply Circuit is connected to terminals + and – and the Data Circuit is connected to terminals A and B. The other terminals should not be used.

VERSAFLOW Mass flow sensor junction box

The Power Supply Circuit is connected to terminals + and – and the Data Circuit is connected to terminals A and B. The other terminals should not be used. The jumper connection determines the termination resistor for the Data Circuit.

Screening:

Please see the illustrations above and refer to section 3.3.

4.1 General

- The TWC 9000F mass flow converter or VERSAFLOW xxx C mass flow meter must be included in the equipotential bonding system of the installation using the equipotential bonding terminal on the mass flow converter housing wall bracket or mass flow meter housing mounting stem respectively.
- The covers of the housing electronics compartment and the housing itself are provided with a "flameproof" thread. The f "flameproof" thread is a tight fit due to explosion proof requirements. Screw the cover on or off with care and never use excessive force!
- Keep the threads free of dirt and apply Teflon grease (eg. NONTRIBOS® type Li EP2). The grease will help to prevent the threads from locking due to corrosion
- To open the covers, remove the hexagonal "retention" lock using a No. 3 Allen key. After closing the covers, refit the "retention lock".

Electronics compartment:

- Allow the electronics to de-energize before opening the electronics compartment: T6: at least 35 min., T5: at least 10 min.

Terminal compartment:

- The terminal compartment can be opened in hazardous areas, for a short period of time (eg. to check wiring configuration) with the power supply connected, where:

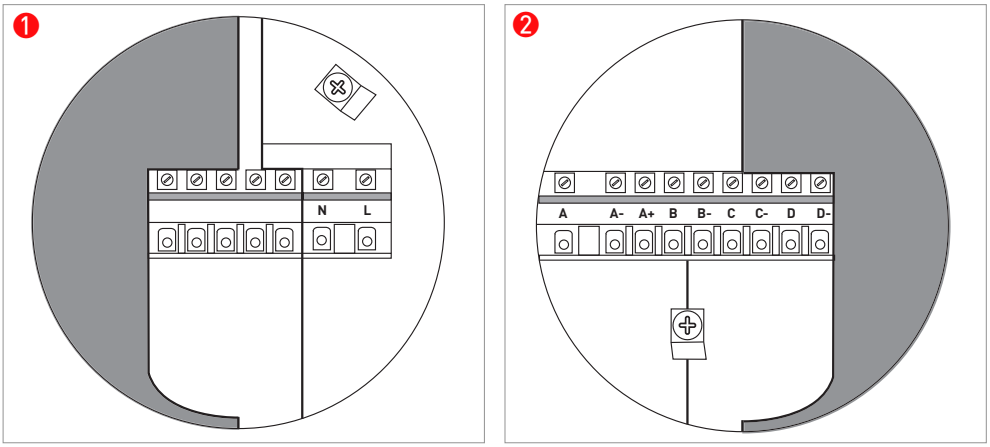
a) the terminal compartment has an ignition protection type “increased safety” (standard) and

b) the I/O circuits have an ignition protection type “intrinsic safety” and

c) the cover for the power supply terminals (L,N) is closed (see illustration)

Work on I/O terminals A-D can be carried out with the power supply connected, provided that the regulations on intrisically safe circuits are followed

As soon as the work has been completed, the cover must be replaced and the retention lock re-fitted.



1 Electrical Connections

2 I/O Connections

Terminal	Function, electrical data
L, N L+, L-	Connection for mains, always non-Ex i 100..230 VAC, +10%/-15%, 22 VA 12..24 V DC, +30%/-25%, 12 W 24 VAC, +10%/-15%, 22VA 24 VDC, +30%/-25%, 12W Um = 253 V
A, A-,A+ B, B- C, C- D, D-	Connection for signal I/Os (PELV circuits), non-Ex I or Ex I, are dependent on specific version of the MFC300 converter ordered. Consult the table with CG32 numbers below for details

The exact I/O-configuration for circuits A, B, C and D is order-specific and can be determined by the CG32 number shown on the converter - check the data on the back of the TWC 9000 electronic unit.

The CG32 number contains 10 characters of which the last three (XYZ) determine the I/O configuration (I/O circuits):

CG32	*	*	*	X	Y	Z
pos 1.. 4	5	6	7	8	9	10
				determine I/O circuits		

- Schematic overviews of the CG32 numbers can be found in paragraph 4.2 (non-Ex i signal I/O connections) and 4.3 (Ex i signal I/O connections). The overviews do not show all details. The exact connection diagram for a specific TWC 9000 converter can be found on the sticker inside the cover of the connection compartment.
- **For use in Gas Hazardous Areas:** The chosen cable glands must have the appropriate type of protection for the terminal compartment, that is increased safety (Ex e) or flameproof enclosure (Ex d). They MUST be suitable for the conditions of use and correctly installed.
- The flowmeter with an Ex e terminal compartment is supplied ex-factory with two Ex e certified cable glands and one Ex e stopping plug.
- The flowmeter with an Ex d terminal compartment is supplied ex-factory one Ex d stopping plug and two temporarily plugs. The two temporarily plugs – only for transport and storage – must be replaced by suitable Ex d certified glands, plugs or conduit accessories before the flowmeter is taken into service.
- Unused openings must be closed by suitable certified plugs
- The wiring of the compact flowmeter has to conform to the requirements specified in the relevant national or regional standard for electrical installations in hazardous areas, e.g. EN 60079-14. From this standard section 9 (Wiring systems) is valid for all types of protection. Section 10 (additional requirements for type of protection "d" – Flameproof enclosures), section 11 (additional requirements for type of protection "e" – Increased safety) and section 12 (additional requirements for type of protection "I" – Intrinsic safety) are valid for Ex e, Ex d or Ex i connection compartments respectively.
- Tighten terminal to a torque setting of 0.7 Nm
- The compact flowmeter must always be included in the equipotential bonding system of the hazardous area. This can be achieved internally – by means of the PE conductor of the mains system connected to the internal PE clamp – or externally – by means of a separate equipotential bonding conductor connected to the external PE clamp under the converter housing. A separate bonding conductor must have a cross sectional area of at least 4 mm^2.

4.2 Non-Ex i signal I/O connections

The following non-intrinsically safe signal inputs/outputs are available:

I/O PCB	Input/output functions, Un < 32 V DC, In < 100 mA Um = 253 V
Basic I/O	Current Output active and passive, with HART Status Output / Control Input Status Output Pulse / Status Output
Modular I/O	Current Output, active or passive, with HART Pulse / Status Output, active or passive, highC or Namur
Modular carrier with 1 or 2 I/O modules	Each module: 1 out of following 3 in/output functions: • Current Output, active or passive • Status / Pulse Output, active or passive, highC or Namur • Control Input, active or passive, highC or Namur
Profibus DP I/O	Profibus-DP, active
Fieldbus I/O	Profibus-PA or Foundation Fieldbus
RS485 Modbus	Modbus with or without termination

- The options separated with "/" are software selectable (can be changed by user)
- The options separated by "or" are hardware versions (must be ordered as such)
- All outputs are passive unless otherwise indicated
- HighC means High Current input/output, Namur means input/output to Namur recommendations

Overview of possible combinations, defined by the CG32 number					
Characters XYZ	**Name I/O circuits**	**Terminals A, A-**	**Terminals B, B-**	**Terminals C, C-**	**Terminals D, D-**
100	Basic I/O	CO CO (a) over A+	SO/CI	SO	PO/SO
488 to 4LL 588 to 5LL 688 to 6LL 788 to 6LL 888 to 8LL A88 to ALL B88 to BLL C88 to CLL	Modular I/O or Modular Carrier with 1 or 2 I/O Modules	Many combinations possible			
D88	Fieldbus I/O Profibus PA	n.c.	n.c.	PA	PA
D8A to DLL	Fieldbus I/O Profibus PA with Module Carrier with 1 or 2 I/O Modules	many combinations possible		PA	PA
E88	Fieldbus I/O Foundation Fieldbus	n.c	n.c	FF	FF
E8A to ELL	Fieldbus I/O Foundation Fieldbus with Module Carrier with 1 or 2 I/O Modules	many combina-tions possible		FF	FF
F00	Profibus DP I/O	n.c	DP(a)	DP(a)	DP(a)
F80 to FLO	Profibus DP I/O with 0 or 1 I/O	many combina-tions	DP(a)	DP(a)	DP(a)
G00 to GLL	RS485 Modbus	Many combinations possible		RS485	RS485
H00 to HLL	Modbus with 1 or 2 I/O modules				

- shorts for in/output functions: CO= current output, PO=Pulse Output, SO= Status Output, CI= Control Input, PA=Profibus PA, FF=Foundation Fieldbus, DP=Profibus DP; RS458= RS485 Modbus.
- all in/outputs are passive unless otherwise noted as active (a)
- n.c. = not connected.

4.3 Ex i signal I/O connections

Following intrinsically safe signal I/Os are available:

I/O PCB	I/O functions	
Ex i I/O	Current Output + HART communication Pulse / Status Output	Ex ia IIC Ui =30V, Ii = 100 mA, Pi = 1,0 W Ci = 10nF, Li = negligibly low
	Current Output, active + HART communication	Ex ia IIC Uo = 21 V, Io = 90 mA, Po = 0,5 W linear characteristic Co = 90 nF, Lo =2,0 mH Co = 110 nF, Lo =0,5 mH
Ex i Option	Current Output Pulse / Status Output / Control Input	Ex ia IIC Ui =30V, Ii = 100 mA, Pi = 1,0 W Ci = 10nF, Li = negligibly low
	Current Output, active	Ex ia IIC Uo = 21 V, Io = 90 mA, Po = 0,5 W linear characteristic Co = 90 nF, Lo = 2,0 mH Co = 110 nF, Lo = 0,5 mH
Fieldbus I/O	Profibus-PA Foundation Fieldbus	Ex ia IIC Ui = 24 V, Ii = 380 mA, Pi = 5,32 W Ci = 5 nF, Li = 10 µH suitable for connection to an intrinsically safe fieldbus in accordance with the FISCO-model

- The I/O circuits named Ex i I/O, Ex i Option are always in the Intrinsically safe (Ex ia) type of protection. The I/O circuits Fieldbus I/O Profibus PA and Fieldbus I/O Foundation Fieldbus can be in the Intrinsically safety type of protection.
- A maximum of 4 intrinsically safe (Ex ia) in/outputs are possible. All intrinsically safe circuits are galvanically insulated with respect to earth and each other. To avoid summation of voltages and currents, the wiring of these Ex ia circuits must be sufficiently separated, e.g. in line with the requirements of standard EN 60079-14, clause 12.2.
- The Ex ia signal in/outputs may only be connected to other Ex ia or ib certified device (e.g. intrinsically safe isolation amplifiers), even if such devices are installed in the non-hazardous area!
- Connection to a non-Ex i apparatus cancels the Ex ia properties of the flowmeter.
- Terminals L, N (or L+, L-) for mains connection are always non-intrinsically safe. To achieve the necessary spatial separation to EN 60079-11 between the non-Ex i and Ex i circuits, the mains terminals are provided with a semi-circular insulation cover with a "snap-in" lock. This cover MUST be closed before establishing the power supply to the converter.

Overview possible CG32 numbers with Ex ia in/outputs					
Characters XYZ	**Name I/O circuits**	**Terminals A, A-**	**Terminals B, B-**	**Terminals C, C-**	**Terminals D, D-**
200	Ex i I/O	n.c.	n.c.	CO (a)	PO/SO
300		n.c.	n.c.	CO	PO/SO
210	Ex i I/O with Ex i Option	CO (a)	PO/SO/CI	CO (a)	PO/SO
220		CO	PO/SO/CI	CO (a)	PO/SO
310		CO (a)	PO/SO/CI	CO	PO/SO
320		CO	PO/SO/CI	CO	PO/SO
D00	Fieldbus I/O Profibus PA	n.c.	n.c	PA	PA
D10	Fieldbus I/O Profibus PA with Ex i Option	CO (a)	PO/SO/CI	PA	PA
D20		CO	PO/SO/CI	PA	PA
E00	Fieldbus I/O Foundation Fieldbus	n.c.	n.c	FF	FF
E10	Fieldbus I/O Foundation Fieldbus withEx i Option	CO (a)	PO/SO/CI	FF	FF

- Abbreviations for in/output functions: CO= current output, PO=Pulse Output, SO= Status Output, CI= Control Input, PA=Profibus PA, FF=Foundation Fieldbus, DP=Profibus DP
- All in/outputs are passive unless otherwise noted as active (a)
- n.c. = not connected

5.1 Maintenance

The VERSAFLOW CORIOLIS flowmeters are maintenance free with respect to the flowmetering properties. Within the scope of periodic inspections required for electrical equipment installed in hazardous areas it is recommended to check the flameproof converter housing and covers for signs of damage or corrosion.

5.2 Replacement of mains fuse

Open the window cover. Press the two metal clips on each side of the display and pull the display unit forward. Move the display-unit sideward, out of the way. Loosen the two crosshead screws holding the electronic unit is place. Slide the electronic unit forward, with care. When the unit is almost completely removed from the housing, disconnect the long rectangular (10-pole) blue connector at the back-end of the unit. This connector is for the flow sensor circuits. Remove the unit from the housing.

The mains fuse is situated in a fuse holder at the back-end of the electronic unit. The specification must be as follows:

Fuse type: 5 x 20 mm (H) according to IEC 60127-2/V		
Power Supply:	**Time Lag:**	**HONEYWELL Part Number:**
12-24 VDC:	250V / 2A	5060200000
24 VAC/DC	250V / 2A	5060200000
100-230 VAC	250V / 0.8A	5080850000

5.3 Returning the device for service or repair

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems. Should you need to return a device for inspection or repair, please pay strict attention to the following points:

Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, HONEYWELL may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.

This means that HONEYWELL can only service this device if it is accompanied by the following certificate confirming that the device is safe to handle.

If the device has been operated with toxic, caustic, flammable or water polluting liquids, you are kindly requested:

To check and ensure, if necessary by rinsing or neutralizing, that all cavities in the device are free from dangerous substances.

To enclose a certificate with the device confirming that it is safe to handle and stating the product used.

We cannot service your device unless accompanied by a certificate.

The specimen shown in appendix 1 can be photocoppied and used and it is also available on the HONEYWELL website as a word file. Simply download and use the tabulator key to go from one fill-out field to the next. Please attach the form to the returned device

Appendix 1 Declaration of Cleanliness Certificate

Company: . . . . . .Address: . . . . . .

. . . . . .

Department: . . . . . .Name . . . . . .

Tel. No. . . . . .Fax No.: . . . . . .

The enclosed device

Type: . . . . . .

HONEYWELL Order No. or Series No.: . . . . . .

has been operated with the following liquid: . . . . . .

Because this liquid is ☐ water-hazardous ☐ toxic ☐ caustic ☐ flammable

we have ☐ checked that all cavities in the instrument are free from such substances /

☐ flushed out and neutralized all cavities in the device

We confirm that there is no risk to humans or environment through any residual liquid contained in this device.

Date: . . . . . .Signature: . . . . . .

Company stamp:

Honeywell Field Solutions
512 Virginia Drive
Fort Washington, PA 19034
www.honeywell.com/ps