

## SmartLine® VersaFlow Coriolis 1000 CM56 Size 80 Titanium - Custody Transfer

## Model Selection Guide

- Secondary pressure containment around sensor
- Easily drained and easy to clean
- Excellent zero stability
- Low energy consumption, low operating and installation costs
- Rapid signal processing even with product and temperature changes and sudden changes in density
- Modular electronics concept: electronics and sensor easy to replace



### Instructions

Select the desired key number. The arrow to the right marks the selection available.  
Make the desired selections from Tables I through VIII using the column below the proper arrow. A dot (\*) denotes availability.

Table	I	II	III	IV	V	VI	VII	VIII
CM56 4	┌ └	┌─── └───	┌─── └───	┌ └	┌ └	┌─── └───	┌ └	┌─── └───

KEY NUMBER	Description	Selection Availability
CM56		CM56 ↓

### TABLE I

Sensor	Selection Availability
4	•

### TABLE II

Tube Material	Titanium	Selection Availability
Surface Finish	Standard Polished Ra 0.5 µm <b>See Note 2</b>	T _ _ _ • _ 0 _ _ • _ 1 _ _ •
Connection Size - Flanges	DN 80 PN 40 to DIN 2501 DN 80 PN 63 to DIN 2501 DN 80 PN 100 to DIN 2501 3" ANSI 150 lb 3" ANSI 300 lb 3" ANSI 600 lb 80 A JIS 10 K	_ _ F A • _ _ F B • _ _ F C <b>a</b> _ _ R D • _ _ R E • _ _ R F <b>a</b> _ _ Y G •
Hygienic and Aseptic Connectors **	DN 80 DIN 11864-2 Form A Sanitary Connector	_ _ F L •

### TABLE III

Sealing face	Description	Selection Availability
Standard (Type B1 for PN 40 and Type B2 for PN 63) EN 1092-1 Type C with tongue EN 1092-1 Type D with groove		0 • C <b>c</b> D <b>c</b>

### TABLE IV

Secondary Containment	Description	Selection Availability
All externals SS 304 L All externals SS 316 L All externals SS 304 L All externals SS 316 L All externals SS 316 L	No secondary pressure containment. Typical burst pressure > 100 bar No secondary pressure containment. Typical burst pressure > 100 bar Max Sec. Pressure containment 63 bar/913 psi (PED approved) <b>See Note 1</b> Max Sec. Pressure containment 63 bar/913 psi (PED approved) Max Sec. Pressure containment 100 bar/1450 psi (PED approved)	G _ • H _ • 0 _ • A _ • B _ •
Options	None Liquid/steam heating jacket-Ermeto 25 Max temp. 150°C/302°F Liquid/steam heating jacket-1" NPTF Max temp. 150°C/302°F Purge fittings-1/2" NPTF	_ 0 • _ 1 • _ 2 • _ 3 •

TABLE V

<b>Hazardous Area Approvals</b>	None ATEX EEx ib FM Class 1 Div 1/Div 2 CSA Class 1 Div 1/Div 2 (including CRN approval)/Dual Seal for liquids CSA Class 1 Div 1/Div 2 (including CRN approval)/Dual Seal for gases NEPSI EEx ib For Canada only - CRN Approved IEC Ex ib (T1-T6)	0 _ • 1 _ • 3 _ • 5 _ • 6 _ • 7 _ • C _ • R _ •
<b>Hygienic/Sanitary Approvals</b>	None	_ 0 •

TABLE VI

<b>Configuration</b>	Compact/integral mount Remote/field mount Alu Junction box Remote/field mount SS Junction box	0 ___ • 1 ___ • 2 ___ •
<b>Calibration</b>	5 point mass flow calibration +UKAS certificate 5 point mass flow calibration bi-directional +UKAS certificate 5 point volume flow calibration +UKAS certificate 5 point volume flow calibration bi-directional +UKAS certificate	_ D _ • _ 2 _ • _ E _ • _ 5 _ •
<b>Cleaning/Degreasing</b>	None Degreasing wetted parts plus certificate	_ _ 0 _ • _ _ 1 _ •
<b>Extended Options - Custody Transfer See Note 3</b>	Brazil Evaluation acc. MID 2004/22/EC Evaluation acc. OIML R117-1	For all other Custody Transfer Approvals, please contact Product Management _ _ _ 4 _ _ _ U _ _ _ Z •

TABLE VII

<b>No Selection</b>	None	V •
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TABLE VIII

<b>Converter type</b>	TWC 9000 Compact mount TWC 9000 Field mount	Requires a separate MSG# to be entered. Either CM91 MSG# 36-CM-16-22 or CM92 MSG# 36-CM-16-23	C • D •
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RESTRICTIONS		Available only with	Not available with	
Letter	Table	Selection	Table	Selection
a	IV	B _ , G _ , H _		
c	II	_ _ FA, _ _ FB, _ _ FC		

\*\* Process temperature limits for all models with hygienic connections is -20°C (-4°F) to 150°C (302°F)

**Secondary Containment Information + Polishing Information**

**Note 1**

**Secondary Containment Information**

The following information is provided to try to simplify the selection of the secondary containment /outer casing option

- G All externals SS 304/L No secondary pressure containment. Typical burst pressure > 100 bar
- H All externals SS 316/L No secondary pressure containment. Typical burst pressure > 100 bar
- O All externals SS 304/L Max Sec. Pressure containment 63 bar/913 psi (PED approved)
- A All externals SS 316/L Max Sec. Pressure containment 63 bar/913 psi (PED approved)
- B All externals SS 316/L Max Sec. Pressure containment 100 bar/1450 psi (PED approved)

**Notes:**

1. There are no longer any flange constraints for options G and H
2. You may now choose the required outer casing (option G and H) in combination with any process connection irrespective of the pressure rating.
3. Most applications do not require secondary containment, so the 304L (option G) may be used unless 316L is specifically requested.
4. The food and pharmaceutical industries require 316L materials in most cases so option H will be suitable here.
5. Options O, A and B are available for customers who still require PED approved secondary containment.
6. On Options O, A and B flanges with higher pressure ratings than the secondary pressure containment can not be ordered.

**Warning**

In the case of high pressure gases, gases kept as liquids at high pressures and/or where there is a danger of the measuring tube failing due to process conditions, e.g. with erosive or corrosive products, it is strongly recommended that a secondary pressure containment option is purchased. Where process pressures exceed the secondary containment pressure rating, an optional burst disc should be fitted. This is highly recommended for High pressure gases. Please consult factory.

**Note 2**

**Polishing Information**

1. To guarantee the surface finish of an CM Coriolis Meter, it is mandatory to order the polishing option as per the price list
2. This is also mandatory for a meter requested with hygienic approvals
3. For all other meters, the surface finish can not be guaranteed unless polishing is ordered as per 1.

### Note 3 - Custody Transfer (CT) Sensor

#### What is MID?

MID is the Measurement Instruments Directive 2004/22/EC which was introduced by the European Union in an attempt to harmonise the different standards for CT metering. MI-005 is the section of the directive that is applicable.

#### What is OIML R117-1?

OIML (Organisation Internationale de Metrologie Légale) R117-1 is the standard that was used for the performance tests. It is designed to be the primary standard in Europe and so assist pan-European business by replacing individual country approvals that would otherwise have to be applied for and tested against on an individual basis.

Although the original standard was written around volumetric measurement, R117-1 is the updated version and has taken the impact and usage of Coriolis flowmeters and measurement of mass into consideration. Primarily the standard tests for flow measurement accuracy using both petroleum and water, but it also requires testing for:

- EMC compatibility
- Environmental (high and low temperature) effects testing
- Robustness and integrity of hardware (sensor and converter) and software (converter).
- Password protection and mechanical locking to prevent tampering and adjustment of calibration parameters.

The Coriolis 200 has successfully passed the requirements of this approval.

#### Accuracy classes defined by OIML R117-1

The OIML R117-1 standard classifies applications according to five differing accuracy classes. However, when considering VersaFlow Coriolis meters, only four are of interest to us with typical processes:

##### Class 0.3

Measuring systems on pipelines, sometimes called the "pipeline transfer" standard, which is required for applications where flows are for long periods of time e.g. oil transfer between storage tanks or long distance pumping transfer.

##### Class 0.5

All other measuring systems (if not explicitly stated in another class) e.g. loading / unloading of ships, railcars and road tankers.

Also included here are milk measurement applications, and by extension, other food products.

Measuring systems for re-fuelling aircraft.

##### Class 1.0

Measuring systems for liquefied gases under pressure at a temperature equal to or above  $-10^{\circ}\text{C}$ .

Also, measuring systems that would normally be classes 0.3 or 0.5, but used for liquids where temperature is less than  $-10^{\circ}\text{C}$  or greater than  $+50^{\circ}\text{C}$

##### Class 1.5

Measuring systems for liquefied carbon dioxide.

And for liquefied gases under pressure at a temperature below  $-10^{\circ}\text{C}$ .

We have approval to accuracy class 0.3% - the highest standard described. This means that the measurement error is never more than  $\pm 0.3\%$  for either mass or volume flow over the flow range described for each system. The meter alone should achieve  $\pm 0.2\%$  accuracy during the approval test, in order to pass this category. By logical inclusion, if the meter is tested, approved and certified for class 0.3, then it is absolutely suitable for applications defined in the lower accuracy classes.

#### What is the difference between the "test report" and an "evaluation certificate" or "type approval"?

The NMI in the Netherlands tested VersaFlow Coriolis according to OIML R117-1 and issued a "Test Report". This describes exactly what tests were done and can be used by other test houses as part of an evaluation.

VersaFlow Coriolis was also evaluated according to Directive 2004/22/EC (MID) and an "Evaluation Report" was issued. This describes how VersaFlow Coriolis complies with the parts of MID Annex MI-005 relevant for flow meters. A "Type Approval" certificate is issued for a complete system that complies with the relevant Annex of the MID directive.

MID Annex MI-005 only permits "Type Approval" certificates to be issued for complete systems, which VersaFlow Coriolis on its own does not constitute.

#### How to obtain a "country specific approval" for outside the EU

You must submit the complete technical test file to the relevant agency in your country. Many will recognise already OIML R117-1 or have a reciprocal agreement with the NMI, and so the issuing of CT certificates may be a "paperwork" formality with no requirement to make actual flow tests.

There will normally be some sort of charge for this administration process, and this is the responsibility of the local sales company to pay. Mass Flow Product Management will not bear these costs.

If this is not the case, and actual flow tests are required, then we ask that you contact us for advice.

#### Fluids that are approved under OIML R117-1

Any hydrocarbon, aqueous based or solvent liquid.

Liquids can be mixtures including solid particles or water providing they are completely homogeneously mixed. Two-phase flow conditions are not included.

There must be no entrained air or gas in the liquid; indeed the standard specifically states that degassing equipment must be installed if this condition is suspected.

Liquified gases (e.g. propane, butane and ethane) are also included in the standard.

Gas flow applications, where the fluid is truly in its gaseous phase are not included.

#### Flow range limits

Accuracy class 0.3 defines a maximum turndown of 1:10 from the maximum flow rate specified in the evaluation certificate for for the meter size, whereas accuracy class 0.5

#### Process connections possible

These are limited to flanges only (with one exception described later). The flanges must normally be the same size as the measuring tube e.g. DN25 for T 25 or DN80 for T 80. DIN, ANSI or JIS pattern flanges are all allowed.

Oversized flanges e.g. DN 40 for T 25 or DN 100 for T 80 are not recommended, since the step change that occurs at the pipe <> meter flange joint creates flow turbulence that may cause measurement errors.

Different pressure rated flanges (within the overall tube and secondary containment rating) are possible, providing they are meter measuring tube sized.

Hygienic and aseptic connections that use a clamp and O ring are not allowed since these lack sufficient mechanical rigidity to ensure a stable long-term zero calibration position.

The one exception to this is the DIN 11864-2 hygienic flange that can be used, since this is secured using four bolts that provide a rigid and stable installation.

**Note 3 - Custody Transfer (CT) Sensor (Continued)**

Meter selection and sizing – fluid velocity

There will always be a natural tendency to select the smallest meter size possible in order to operate high up the turndown range and so reduce the measurement error. This can be problematic as this can give a high fluid velocity that in certain applications such as hydrocarbon flow measurement are not permitted. This problem is exacerbated with low density fluids (such as hydrocarbons or liquefied gases) that always give a volume flow greater than their equivalent mass flow. Please therefore always use the Optimass sizing software and confirm with your customer the velocity calculations are acceptable.

Signal converter options (See Signal Converter MSG for applicable restrictions).

Only the TWC9000 converter is included in the test report, in compact and remote versions. Not Available with CM90 or CM93

To comply with the requirements of OIML R117-1, it is necessary that 2-phase shifted pulse or frequency outputs are provided.

2 Pulse/Frequency IO modules must be provided and programmed with a phase shift to each other, and these must be available on terminals B&D or B&A to permit phaseshifting.

A limited number of options were tested for EMC effects and these are listed in the certificate.

The following output options are listed:

Modular I/O: 48C, 4AC, 4CC

Fixed I/O: 210, 220, 310, 320

This dual phase pulse is used in conjunction with CT approved batch counters accepting the same type of input. It is designed to prevent counting errors or pulse losses by requiring that each flow increment is represented by two pulses, both of which must be received within a certain period of time before the count is registered.

All power supply options are permitted.

**In case of further queries, please contact Product Management**