

European MID Directive for Custody Transfer Measuring Instruments

Proven, certified technology for Fiscal & Custody transfer applications



European Metrology Directive



Legal metrology in Europe has undergone some major changes, including the Measuring Instruments Directive (MID). This new directive applies to Custody Transfer metering for liquids and gases and is applicable in all 27 EU-countries (plus Norway and Switzerland).

As high flow rate applications for gases (i.e. non-domestic) are exempted in the MID, each country may decide to let these fall under national regulation. For liquid applications, the scope of MID refers to the complete installation (called ‘measuring systems for liquids other than water’) and for gas application to the meter only.

Nationally approved meters and measuring systems, installed before 30 October 2006, are not affected by MID. They may be used until the end of their life time and are still subject to subsequent verification as regulated nationally. Modifications on these meters and measuring systems do not fall within the scope of MID. Modifications will be re-evaluated by the national metrology authority, resulting in an extension of the existing national approval or a new MID certificate.

MID Transition and Compliance

Transition period

The transition period for MID compliance is 10 years. Meters or measuring systems already type-approved by the national metrology authority before 30 October 2006 may be installed or used up until 30 October 2016. If, after 30 October 2006, a modification takes place on an already national type-approved meter or measuring system, the modification may lead to an extension of the existing national approval or to a new MID approval.

Newly designed meters and measuring systems

Meter and liquid measuring systems newly designed after 30 October 2006 will have to be submitted for type evaluation under the new MID Directive 2004/22/EC. The evaluation required on these new meters and systems will result in an EC type examination certificate with reference to the MID directive. Compliance with this directive is assumed when using the OIML recommendations OIML R117-1 (measuring systems for liquids other than water) and OIML R137-1 (for gas meter applications).



MID

Compliance Responsibility

There is a difference in responsibility between gas metering and liquid metering.

For Gas Metering

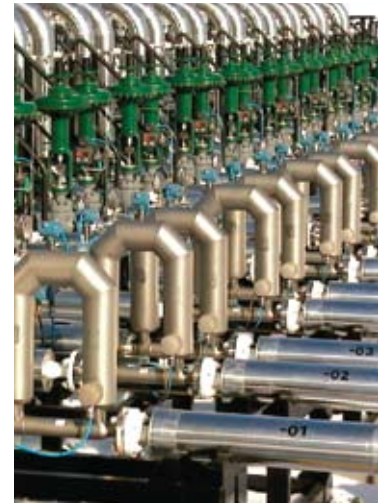
The responsibility resides with the manufacturer of the gas meter and, separately if applicable, with the manufacturer of the gas flow computer. The MID requirements apply only to the gas meter and gas flow computer and not to the installation. Therefore Emerson's Micro Motion® has already obtained a MID EC-Type Examination Certificate for its Coriolis meter as a gas meter.

For Liquid Metering

The responsibility resides with the party who accepts responsibility for the complete measuring system. The responsibility for MID compliance has therefore to be mutually agreed between the involved parties. The involved parties include, but are not limited to, end users, engineering contractors/system integrators, manufacturers of liquid meters and manufacturers of other components.

MID liquid measurement system for industrial applications are all unique and an EC examination certificate has to be obtained for each system.

One of the important considerations when installing a MID measuring system is the method of subsequent verification, as nationally regulated. This method may have an impact on the design of the measuring system and therefore an early involvement of the national inspection authority is recommended.



A Total Solution

Emerson Metering Skids...A Total Solution

Micro Motion Coriolis meters, from Emerson Process Management, are the first flow meters to obtain an MID EC-type examination certificate for gas meters and measuring systems for liquids, other than water.

Emerson delivers total measurement solutions to customers by offering metering skids including MID responsibility. In addition to Micro Motion Coriolis MID evaluation certificates also other relevant components of the measuring system, subject to MID certification, are covered. MID evaluation certificates are available for flow computers, temperature and pressure transmitters.

An EC type examination certificate has already been obtained from the Dutch metrology authority (NMI) for a "generic" designed measuring system for liquids. The EC type examination certificate includes Micro Motion Coriolis as well as flow computers, temperature and pressure transmitters.

This approval simplifies and streamlines order processing as MID certified products will be suitable for installation in any European country.

By proving significant customer benefits through cost savings on approval procedures and reduced commissioning times, Emerson is committed to ensuring that all of its products meet the latest industry standards.

Ideal Coriolis Measurement for Custody Transfer

Emerson's loading and unloading Coriolis measurement systems have been designed using Micro Motion ELITE® Coriolis sensors – the most accurate direct mass flow, volume flow, density, and temperature measurement of liquids, gases, and slurries, while exhibiting exceptionally low pressure drop, that are available today.

Micro Motion ELITE Coriolis meters are suitable and certified to be used in the most severe applications to handle harsh fluid temperatures, ambient temperatures, immunity to vibration and shock (Class M3) and immune to electromagnetic environments (Class E3). Micro Motion Coriolis meters are suitable to be used in systems with accuracy classes of:

- 0.3 for pipeline measurement
- 0.5 for loading - unloading applications
- 1.0 for liquefied gasses (e.g. LPG)
- 2.5 for cryogenic applications (e.g. LNG)

These Emerson metering skids provide customers with a plug and play solution for the toughest, most stringent measurement requirements and applications:

- Direct mass flow, volume flow, and density measurement for liquid metering; for gas metering direct mass flow measurement only
- Superior overall skid accuracy
- No requirement for filters, straight runs or special mounting
- No moving parts, no maintenance
- Reliable and cost effective design
- Small footprint

Manufacturing within a controlled environment, Emerson's Micro Motion Coriolis skids are produced with exact consistency using high quality construction materials and are supported to ensure superior after-sales operations. Count on Emerson for global resources and expertise, project and component delivery control, engineering responsibility for skid and superior service.



Compliance for Liquid Measuring Systems

In applications where Emerson delivers only the meter, the availability of a Micro Motion MID evaluation certificate for the meter will simplify the evaluation process of the complete measuring system. Other relevant components of the measuring system, which are also subject to MID certification, are flow computers, temperature transmitters, pressure transmitters and air eliminators. Emerson will provide the required custody transfer documentation to the responsible party after signing a confidentiality agreement.





Complete MID Consultation

For questions related to the MID evaluation process, certification and compliance or consultancy, contact your local sales representative or the MID experts in the European Flow Centre directly at MID-Micromotion@emerson.com

The European Flow Centre is equipped with a fully traceable state-of-the-art calibration facility, certified by the Dutch Metrological Institute (NMI). The system uncertainty is 0,03% and well suited for MID class 0.3 calibration.

MID verification is performed as determined during the EC type examination. The procedure for the initial verification, as agreed with the Dutch Metrological Institute (NMI) consists of:

- Water calibration of the meter at the manufacturer's facility
- On-site system evaluation of the zero flow and density
- Assessment concerning the involved equipment versus the type evaluated equipment
- Verification of required seals and marks
- Issuing the EC declaration of conformity for the whole measuring system (by the responsible party)

In case of a mass measurement application, no dynamic tests are required for the on-site system evaluation. This translates into savings on proving costs and a faster start-up process.

For volume and/or density applications on liquefied gases, dynamic tests on site are required.



Emerson Full MID authorized

The European Flow Centre received full authorization from Dutch Metrological Institute (NMI) to perform all MID related activities. (Module D status)

The MID authorization is valid for:

- Water calibration of the meter at the manufacturer's facility (step 1)
- Field verification on new installed Micro Motion gas meters (step 2)
- Field verification of new installed Micro Motion liquid measuring systems

For customers the MID-authorization will translate into a simplified and cost effective MID-certification process.

A guarantee that, in addition to the MID approved Micro Motion products and Nmi certified calibration facilities, all MID related quality procedures are in place and personnel is being well trained.

Approved Supplier Status

The European Flow Centre received the Approved Supplier status from the Dutch Metrological Institute (NMI), a unique achievement as Emerson is the first manufacturer being registered.

The Approved Supplier status is valid for new installed Micro Motion liquid measuring systems where the field verification (step 2) is done by NMI. As a result, the water calibration (step 1) can be performed at the European Flow Centre without the need for NMI witnessing.

ELITE High-Precision Mass Flow and Density Meters

The world's most accurate Coriolis flow meter is now even better. Micro Motion ELITE sensors improvements now offer Coriolis flow measurement capabilities never before thought possible, with technology to handle even wider ranging process challenges.



- Liquid accuracy: $\pm 0,05\%$ of flow rate
- Gas accuracy: $\pm 0,35\%$ of flow rate
- Liquid repeatability: $\pm 0,025\%$ of flow rate
- Gas repeatability: $\pm 0,20\%$ of flow rate
- Liquid density accuracy: $\pm 0,2 \text{ kg/m}^3$
- Wetted parts: 316L or 304L stainless steel or nickel alloy
- Temperature rating: -240 to 204°C
- Pressure rating: 100 bar (stainless steel); 190 bar (nickel alloy)

* General specifications only. MID approval for: Gas, Liquid, Density



ELITE High-Capacity Mass Flow and Density Meters

Emerson's Micro Motion ELITE® High Capacity Meters are the leading meters for precision flow and density measurement. ELITE meters offer the most accurate measurement available for virtually any process fluid, while exhibiting exceptionally low pressure drop.

The largest Micro Motion ELITE High Capacity Coriolis meter, the CMFHC3, is able to measure flows up to 2.550.000 kg/h, making it ideal for ship loading / unloading and pipeline transfers.

- Liquid accuracy: $\pm 0,10\%$ of flow rate
- Gas accuracy: $\pm 0,35\%$ of flow rate
- Liquid repeatability: $\pm 0,025\%$ of flow rate
- Gas repeatability: $\pm 0,20\%$ of flow rate
- Liquid density accuracy: $\pm 0,5 \text{ kg/m}^3$
- Wetted parts: 316L stainless steel
- Temperature rating: -240 to 204°C^*
- Pressure rating: 100 bar

* General specifications only. MID approval for: Gas, Liquid, Density



F-Series Compact and Drainable Mass Flow and Density Meters

Emerson's Micro Motion F-Series is the best drainable and compact Coriolis for high performance in process control, filling and batching applications.

- Mass flow accuracy: $\pm 0,10\%$ of flow rate
- Volume flow accuracy: $\pm 0,15\%$ of flow rate
- Gas flow accuracy: $\pm 0,50\%$ of flow rate
- Density accuracy: $\pm 1,0 \text{ kg/m}^3$
- Wetted parts: 316L SS or nickel alloy
- Temperature rating: $-100 \text{ to } 204^\circ \text{ C}^*$
- Pressure rating: 100 bar (stainless steel); 150 bar (nickel alloy)

* General specifications only. MID approval for Mass Liquid, Density Liquid and Volume Liquid



Series 2000 and 3000 Transmitters

The Micro Motion Series 2000 and 3000 transmitters offer great flexibility and adaptability depending on need. Transmitters are available for DIN rail mounting, integral mounting, local operator interface and more. They feature a simple 4-wire connection to the sensor for power and signal. Micro Motion transmitters eliminate the expense of running custom cables or providing a separate power source at the sensor offering greater flexibility and savings.

- Integral or remote mount versions
- Display and local operator interface
- Configurable I/O board (analog, frequency and discrete out/inputs)
- Multi- or single-variable measurement
- Digital communications
- Process variables for flow, density, and enhanced density

* General specifications only. MID approval for: Gas, Liquid, Density

Pressure Transmitter 3051S series

The Rosemount 3051S from Emerson is the first scalable device that provides a foundation for integrated pressure solutions. It allows you to customize performance, functionality, diagnostics, and connection systems for your application.

- Industry leading performance with 0.025% accuracy
- Industry's first installed 10-year stability
- Pressure range selectable from 2.1 bar up to 689 bar
- Advanced Diagnostics provide process insight
- Communication options 4-20 mA/HART® or FOUNDATION™ fieldbus protocol
- WirelessHART™ capabilities
- Safety certified to IEC 61508

The Rosemount pressure transmitter 3051S received an MID evaluation certificate TC7457



* General specifications only. MID approval for: Gas, Liquid

Temperature Transmitter 3144P series

Emerson continue to set the standard for temperature measurement with the Rosemount 3144P with FOUNDATION™ fieldbus Temperature Transmitter.

The multivariable dual-sensor input capability of the Rosemount 3144P allows it to accept simultaneous inputs from two sensors. You can use the Rosemount 3144P for differential, averaging or redundant temperature measurement. The transmitter also offers improved noise rejection. Transmitter Sensor Matching maximizes accuracy

- Sensor Drift Alert and Hot Backup® features
- Statistical Process Monitoring (SPM) and Thermocouple Diagnostics
- Communication options 4-20 mA/HART® or FOUNDATION™ fieldbus protocol
- Safety certified to IEC 61508

The Rosemount temperature transmitter 3144P received an MID evaluation certificate TC7458



* General specifications only. MID approval for: Gas, Liquid



MID

FloBoss S600 Panel-Mount Flow Computer

Emerson's FloBoss S600 from Remote Automation Solutions (Formerly the Flow Computer Division) is the market leading Fiscal/Custody transfer flow computer. A maximum-performance, panel-mounted instrument that ably handles six meter runs while performing other metering tasks.

In effect, it saves time and money by doing the work of six single-stream flow computers.

In both oil and gas applications, this flow computer is widely used in fiscal metering, custody transfer, batch loading, meter proving, multi-stream measurement, station monitoring/control and other applications that require high-performance measurement and control.

Key features/benefits

- Cost effective solutions by measuring and controlling up to six meter runs and two stations in a single machine, with an option of hot duty-standby
- Improved accuracy due to; Dual Pulse chronometry to level "A", 24 Bit A/D converters & 64 Bit double precision maths
- Simplified integration & Improved diagnostics due to Extensive Communication capabilities and inbuilt Web server
- Handle multiple types of applications, including liquid and gas in the same computer, saving on cost of additional equipment

The FloBoss S600 Flow Computer received an MID evaluation certificate TC7470 for liquid applications and an MID examination certificate T10152 for gas applications.

* General specifications only. MID approval for: Gas, Liquid



DL8000 based batch delivery controller

Emerson's DL8000 is the next generation of Preset Controllers, designed to resolve batch control requirements for liquid custody transfer applications.

DL8000 batch delivery controllers accurately set the amount of liquid to be delivered and loaded into a truck, railcar, or ship, and control the valves and pumps to load the liquid while monitoring critical circuits to ensure safe loading. These processes must all meet standards set by the MID

- Sequential blending up to four products and three products in ratio blending
- Measurement and control of injected additives
- Easily configurable for different liquids and for batch loading and reporting
- Digital valve control with automatic high flow rate recovery
- Multi Languages available for display
- Explosion-proof enclosure, ATEX approved
- Wide-ranging communications capability including Ethernet, EIA232 and EIA485



MID evaluation certificate for DanLoads DL8000 batch controller is pending

* General specifications only. MID approval for: Gas, Liquid



Interfacing to Non Emerson flow Computers

As Emerson is keen on providing customer solutions, non Emerson flow computers have also been included in Emerson's MID EC type examination certificate for liquid measuring systems.

Customer already using Omni or Contrec flow computers will benefit having a shorter learning curve for process operators.

Service engineers from Emerson have been trained for installation and configuration for seamless integration of Omni and Contrec flow computers into the Emerson Metering skids.

Omni 3000-6000

The Omni Flow Computer received an MID evaluation certificate TC7375

Contrec 1010

The Contrec Flow Computer received an MID evaluation certificate TC 7348

MID-Applications...why Micro Motion Coriolis

Whenever liquid product such as refined petroleum changes custody from one supplier or distributor to the next, it must be accurately measured and scrupulously accounted for. Customers and regulatory agencies alike have an interest in making sure that transactions are equitable.

What makes Emerson's Micro Motion Coriolis meter a "best practice" measurement choice for many custody transfer applications?

Accuracy

- High accuracy, repeatability and turn down ratios
- Accuracy not affected by product properties

Lower Installation Costs

- No special mounting
- No expensive straight run requirements
- No need for flow conditioning elements
- No need for flow strainers
- Compact installation, small footprint
- Reducing the number of primary devices, measures mass, density and temperature

Lower Cost of Ownership, No Maintenance

- Nothing to wear out or break, non intrusive design
- No need for periodic re-calibration
- No regular maintenance requirement, no spares on stock
- No moving parts to be damaged by entrained gas
- In-situ meter verification and diagnostics, a meter health check without removing the meter from the line or the need for a secondary reference

Emerson's Micro Motion Coriolis meters are field-proven and have been used in a range of custody transfer applications over many years. Customers value the benefits of Coriolis in new applications and as a replacement technology in applications where positive displacement or turbine meters were used.

Some of our recent applications for which an MID EC type examination certificate has been obtained are;

- Percentage alcohol measurement
- Bio Diesel
- Bunkering oil loading / unloading
- Methyl Ester truck loading
- Hydrogen gas measurement
- Ethanol measurement for terminal automation.





Micro Motion and Rosemount, divisions of Emerson Process Management, are known globally in over 85 countries for its quality and reliability. As part of the Emerson PlantWeb® digital plant architecture, Micro Motion and Rosemount products enable increased plant availability, decreased costs and enhanced safety. Emerson delivers application expertise, service and technical support not available elsewhere.



Benefit from the wide range of Micro Motion solutions available

- In-line meter verification of electronics and sensor – without the need for tools or down-time
- Exceptional measurement and operating performance in entrained gas conditions
- World-leading dedicated density measurement devices
- Solutions for high and extreme temperature applications
- Best-in-class compact and drainable Coriolis
- IEC 61508 safety-certified Coriolis for SIL-2 and SIL-3 applications

 WWW.micromotion.com

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