

Twinning Project “Strengthening the capacities of the Bureau of Metrology for internal market integration”
Twinning ref. MK 12 IPA EC 01 16 TWL



A Project funded by the European Union and Implemented and led by CMI

MID

**MID MI-005
Approved**

**Annex MI005
and related standards**

Republic of Macedonia, Skopje, 21.6.2017



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DEFINITION

An instrument designed to measure continuously, memorise and display the quantity at metering conditions of liquid flowing through the measurement transducer in a closed, fully charged conduit.

Quantity is volume or mass



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CONFORMITY ASSESSMENT

The conformity assessment procedures referred to MID that the manufacturer can choose for measuring systems between are

B + F or B + D or H1 or G

The conformity will be shown by a **CE-mark**, which the manufacturer put on the measuring instrument under responsibility of the notified body.



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CONFORMITY ASSESSMENT

MID describes general performance requirements and evaluation-processes for the conformity of the measuring instrument.

In annex I are the service-conditions defined under which this MI satisfyingly should work.

Further specific requirements are in annex MI 005 and related harmonised standards and recommendations

It is necessary that the type and/or the measuring instruments comply with the requirements under declared rated operating conditions and under specified environmental disturbances.



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RELATED NORMATIVE DOCUMENTS

OIML R 117-1 : 2007/2014

Part 1: Metrological and technical requirements

Part 2: Metrological controls and performance tests

Part 3: Test report format

OIML R 118 : 1995 - Superseded by OIML R-117

OIML D 11 : 2013

**General requirements for measuring instruments -
Environmental conditions**

OIML R 81 : 1998

Dynamic measuring devices and systems for cryogenic liquids

+ Annex D : 2006



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RELATED GUIDES

WELMEC 7.2 : 2015 SW Guide

WELMEC 10.4 : 2006 Guide for Testing of Electronic Calculators with Conversion Function and Conversion Devices (Measuring Systems for Liquids other than Water)

WELMEC 10.5 : 2006

Guide for Common Application of Marking of Fuel Dispensers

WELMEC 10.6: 2006

Guide for Sealing of Fuel Dispensers (Measuring Systems for Liquids other than Water)

WELMEC 10.7: 2011

Guide on evaluating purely digital self-service devices for direct sales to the public

WELMEC 10.8: 2011

Guide for common application of MID MI-005 and OIML R 117-1, (R 81, R 80, R 139)

WELMEC 10.9: 2011, WELMEC 10.10: 2011



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WHAT IS THE MEASURING SYSTEM

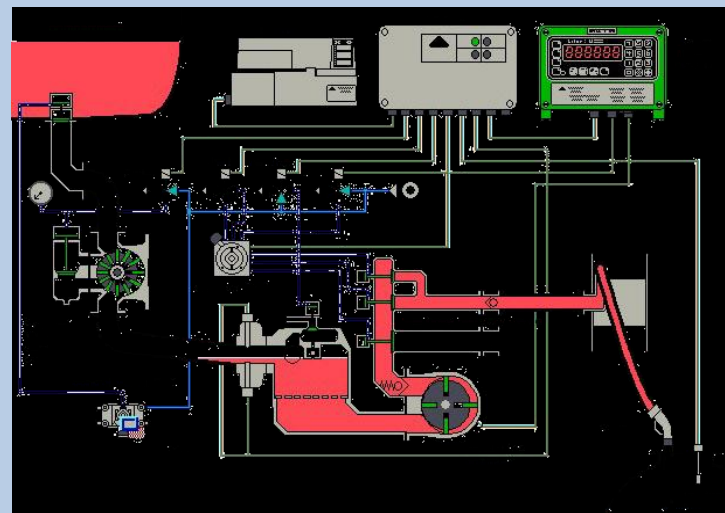
**A system that comprises the meter itself and all devices required to ensure correct measurement or intended to facilitate the measuring operations.
A meter by itself is not a measuring system!**

The smallest possible measuring system shall include:

- **meter**
- **transfer point**
- **hydraulic path with particular characteristics**

For correct operation, it is often necessary to add:

- **gas elimination device**
- **filter**
- **pump**
- **correction devices**



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TYPES OF MEASURING SYSTEMS

Interruptible and non-interruptible measuring system

- A measuring system is considered as interruptible/non-interruptible when the liquid flow can/cannot be stopped easily and rapidly.
- **Measuring systems for direct sales shall be interruptible**

Direct selling to the public

- the measurement result serves as the basis for the price to pay, and
- at least one of the parties involved in the transaction related to the measurement is a consumer, and
- all the parties in the transaction accept the measurement result obtained at that time and place

Self-service arrangement

- allows the customer to use a measuring system to obtain liquid without a second party intervention



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ACCURACY CLASSES

Accuracy Class	Types of Measuring system
0,3	Measuring systems on pipeline
0,5	All measuring systems if not differently stated elsewhere in this Table, in particular: <ul style="list-style-type: none">— fuel dispensers (not for liquefied gases),— measuring systems on road tankers for liquids of low viscosity (< 20 mPa.s)— measuring systems for (un)loading ships and rail and road tankers— measuring systems for milk— measuring systems for refueling aircraft



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ACCURACY CLASSES

Accuracy Class	Types of Measuring system
1,0	<p>Measuring systems for liquefied gases under pressure measured at a temperature equal to or above $-10\text{ }^{\circ}\text{C}$</p> <p>Measuring systems normally in class 0,3 or 0,5 but used for liquids</p> <ul style="list-style-type: none">— whose temperature is less than $-10\text{ }^{\circ}\text{C}$ or greater than $50\text{ }^{\circ}\text{C}$— whose dynamic viscosity is higher than $1\ 000\ \text{mPa}\cdot\text{s}$— whose maximum volumetric flowrate is not higher than $20\ \text{L/h}$
1,5	<p>Measuring systems for liquefied carbon dioxide</p> <p>Measuring systems for liquefied gases under pressure measured at a temperature below $-10\text{ }^{\circ}\text{C}$ (other than cryogenic liquids)</p>
2,5	<p>Measuring systems for cryogenic liquids (temperature below $-153\text{ }^{\circ}\text{C}$)</p>



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MAXIMUM PERMISSIBLE ERRORS

Accuracy Class	0,3	0,5	1,0	1,5	2,5
Measuring systems (A) (%)	0,3	0,5	1,0	1,5	2,5
Meters (B) (%)	0,2	0,3	0,6	1,0	1,5

It is applied for quantities equal to or greater than 2 litres the MPE on indications

For quantities less than two litres special conditions are applied.



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FLOW RATE RANGE

Specific measuring system	Characteristic of liquid	Minimum ratio of Q max : Q min
Fuel dispensers	Not Liquefied gases	10 : 1
Fuel dispensers	Liquefied gases	5 : 1
Measuring system	Cryogenic liquids	5 : 1
Measuring systems on pipeline and systems for loading ships	All liquids	Suitable for use
All other measuring systems	All liquids	4 : 1



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ACCURACY CLASSES FOR ASSOCIATED MEASURING SYSTEMS

Accuracy Class	0,3	0,5	1,0	1,5	2,5
Temperature	$\pm 0,3 \text{ }^{\circ}\text{C}$	$\pm 0,5 \text{ }^{\circ}\text{C}$			$\pm 1 \text{ }^{\circ}\text{C}$
Pressure	Less than 1 MPa: $\pm 50 \text{ kPa}$ From 1 to 4 MPa: $\pm 5 \%$ Over 4 MPa: $\pm 200 \text{ kPa}$				
Density	$\pm 1 \text{ kg/m}^3$	$\pm 2 \text{ kg/m}^3$			$\pm 5 \text{ kg/m}^3$



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REQUIREMENTS FOR THE TEST EQUIPMENT

For type approvals - assessment according to modul B (EC type certification, evaluation or part certificates)

Test equipment used to perform accuracy tests must have an extended uncertainty of measurement less than $1/5$ of the maximum permissible error

For initial verification - assessment according to modul F, D and G

Test equipment used to perform accuracy tests must have an extended uncertainty of measurement less than $1/3$ of the maximum permissible error



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MARKING

Each measuring system shall bear the following information:

- **type approval number,**
- **manufacturer's identification mark, trademark or name,**
- **designation selected by the manufacturer**
- **year of manufacture, serial number,**
- **characteristics like working conditions,**
- **accuracy class, and**
- **verification marks (conformity assessment).**

This information shall be put on one or several data plates on a part not likely to be removed in normal conditions of use.



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SEALING

Sealing should be provided on all parts of the measuring system which cannot be materially protected in any other way against operations liable to affect the measurement accuracy.

It must be prohibited to change parameters which participate in the determination of the results of measurement (parameters for correction and conversion in particular) by means of sealing devices.

Legally relevant software and measurement data shall be protected against changes.

The manufacturer shall specify where seals and markings have been applied.



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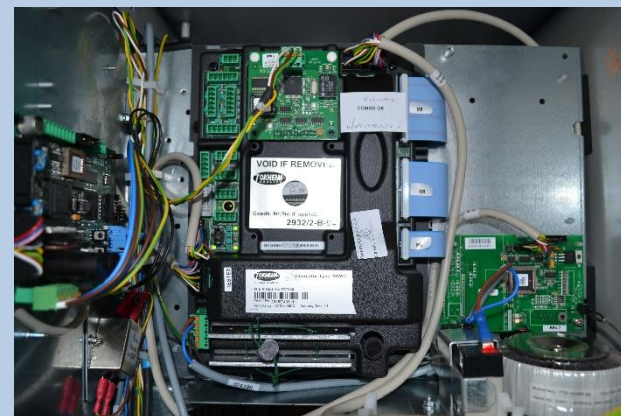
SEALING

Sealing may be carried out with metal, plastic or other suitable means as long as it is sufficiently durable and provides evidence of tampering.

The seals shall, in all cases, be easily accessible.

OIML R117-1 (2.20.2.1.3)

In case of direct selling to the public, the use of only a “password” is not allowed and the measuring system shall be provided with a mechanical sealing device, e.g. access cover protected switch or key switch.



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SEALING of Associated measuring sensors and mandatory printing

Associated measuring instruments sensors involved in the correction and/or conversion of volumes have to be sealed against unauthorized removal

it is not acceptable in case of direct selling to the public to enter manually into the calculator at the beginning of the measurement operation the nature of the measured liquid or its viscosity

This may be acceptable only in case of selling between professionals



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SEALING - EXAMPLES

There is a special table in the WELMEC guide 10.6, where metrological seal is required, for instance:

Gas separator against manipulation/opening and removal

Mechanical adjustment device against manipulation

Meter Sensor against removal - Either by means of a mechanical seal, electronic feature or the sealed identification on the data sheet)

Associated measuring instrument against (temporary) removal -

Sealing shall be by means of a mechanical seal

Electronic calculator and or Electronic Indicating Device (EID)

hardware against removal - Mechanical seal or sealed by the identification on the data sheet



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CERTIFICATES

The certificate or its annexes shall contain all relevant information for conformity evaluation and in-service control.

EC-type examination certificate can be issued according to **Module B (MID)** for the complete measuring system in the range specified by annex MI 005

Certificate of conformity – can be issued according to **Module F or G (MID)** for the complete measuring system in the range specified by annex MI 005

Evaluation certificate or Part certificate could be issued for specific part of measuring system



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CONFORMITY DECLARATION

A copy of the EU declaration of conformity shall be supplied with each measuring instrument that is placed on the market.

- 1. Instrument model/Instrument (product, type, batch or serial number):**
- 2. Name and address of the manufacturer and, where applicable, his authorised representative:**
- 3. This declaration of conformity is issued under the sole responsibility of the manufacturer.**
- 4. Object of the declaration (identification of instrument allowing traceability; it may, where necessary for the identification of the instrument, include an image):**
- 5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:**



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Thank you for your attention!

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