Measuring Instruments Directive (MID)

MID/EN14154

Short Overview
STARTING POSITION

Approval vs. Type examination

In the past, **country specific approvals** were needed to sell measuring instruments in EU

For the future, only **one type examination certificate** acc. the new **Measuring Instrument Directive (MID)** for the EU
MEASURING INSTRUMENT DIRECTIVE

Facts & Figures

Scope includes...

- water meters (MI-001)
- gas meters (MI-002)
- electricity meters (MI-003)
- heat energy meters (MI-004)
- etc.

Needed for measuring instruments, where levying of consumption takes place within the EU

All these measuring instruments are covered by the EU directive 2004 / 22 / EC

Measuring instruments acc. MID calls from now...

- «Product name» with CE Conformity (MID)

Declaration of CE conformity
Goal

The main goal for the definition and introduction of the new measuring instrument directive was the **reduction of trade barriers** within the European countries.

Validation period

Instruments approved before 30\textsuperscript{th} October 2006 may continue to be sold for up to 10 years.

- **Country specific approvals**
- **Overlapping period**: 10 years
- **Type examination acc. MID**: New meters have to comply as from 30\textsuperscript{th} October 2006
Harmonized norms and certification EU members under the MID

Austria  Poland
Belgium  Portugal
Bulgaria  Slovenia
Cyprus  Slovakia
Denmark  Spain
Estonia  Sweden
France  United Kingdom
Finland  The Netherlands
Germany  Switzerland
Greece  (Bilateral Agreements)
Hungary
Italy
Ireland
Latvia
Lithuania
Luxemborg
Malta
What is required of the manufacturer?

- All new meters require an approval of the instrument (Type examination certificate (CH-MI004-07003-00))
- Audit of the production plant before instrument can be sold
- Must issue a conformity declaration
- Instrument must be marked in accordance with the directive
The MID Certification does away with the following:

- PTB Type approvals
- EEC approval
- Local European certification (country specific)
Marking of measuring instruments according to MID

- CE - Marking
- Number of the certified calibration centre
- Manufacturer Serial Number
- Metrology – Identification and manufacture year

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M 08 0102
Markings MI - 001 Cold Water Meters
Markings MI-001 Consumption Meters

- Unit of measurement: cubic metre
- Numerical value of $Q_3$
- Ratio $Q_3 / Q_1$, preceded by “R”
- Ratio $Q_2 / Q_1$, where it differs from 1.6 (during transition period)
- Maximum admissible pressure if it differs from 10 bar (1 MPa)
- Direction of flow
- Letter V or H, if the meter can only be operated in the vertical or horizontal position
- Temperature class, where it differs from T30
- Pressure loss class, where it differs from DP 63
- Classes on sensitivity to irregularities in velocity field
Markings  MI-001

- Name or trademark of the manufacturer
- Year of manufacture (first 2 digits) and serial number
- Pattern approval sign according to European regulations
- Climatic and mechanical environment severity level
- EMC Class
- Output signals for ancillary devices (type/levels) if any
Main changes ISO to MID – MI-001

- Definition of flow rate points
  - The MID has mean comprehensive changes to the terminology and points which were commonly used to refer to its flow rate range
  - New definitions for flow rate points:
    - \( Q_1 \) ... Minimum flow rate analogue to \( Q_{\text{min}} \)
    - \( Q_2 \) ... Transitional flow rate analogue to \( Q_{t} \)
    - \( Q_3 \) ... Nominal flow rate analogue to \( Q_{n} \)
    - \( Q_4 \) ... Maximum flow rate analogue to \( Q_{\text{max}} \)
    - \( R \) ... Measuring range analogue to class

Also the relationship between the points has been newly defined

- \( Q_2/Q_1 = 1.6 \)
- \( Q_4/Q_3 = 1.25 \) analogue to \( Q_{\text{max}}/Q_{n} = 2 \)
- \( Q_3/Q_1 = R \) ... acc. to a normed chart analogue to \( Q_{n}/Q_{\text{min}} \)
Main changes ISO to MID – MI-001

The MID has mean comprehensive changes to the terminology and points which were commonly used to refer to its FLOWRATE RANGE

New definitions for flowrate points

\[ Q_1 \quad \text{...Minimum flowrate} \quad \text{analog to} \quad Q_{\text{min}} \]
\[ Q_2 \quad \text{...Transitional flowrate} \quad \text{analog to} \quad Q_t \]
\[ Q_3 \quad \text{...Nominal (Continuous) flowrate} \quad \text{analog to} \quad Q_n \]
\[ Q_4 \quad \text{...Maximum flowrate} \quad \text{analog to} \quad Q_{\text{max}} \]

Also the relationship between the points has been newly defined

\[ Q_2 / Q_1 = 1.6 \]
\[ Q_4 / Q_3 = 1.25 \quad \text{analog to} \quad Q_{\text{max}} / Q_n = 2 \]
\[ Q_3 / Q_1 \quad \text{...according to a normed R...} \quad \text{analog to} \quad Q_n / Q_{\text{min}} \quad \text{...z.B. 1:100 (Cl. C)} \]
Dimensioning of $Q_1 - Q_4$

**ISO Norm**  Metrological Class C, 1:100

$Q_{\text{min}}$ $Q_t$ $Q_n$ $Q_{\text{max}}$

$Q_{\text{max}} = 2 Q_n$

**New according to MID**  Measuring range R160 (Similar to 1:100)

$Q_1$ $Q_2$ $Q_3$ $Q_4$

$Q_4 = 1.25 Q_3$
Maximum Permissible Error (MPE)

\[
\varepsilon(\%) = \begin{cases} 
+3 & \text{Heated water} \\
0 & \text{Cold water} \\
-3 & \text{Heated water} \\
-5 & \text{Cold water}
\end{cases}
\]
Overview of changes ISO to MID MI-001

Old terms

<table>
<thead>
<tr>
<th>$Q_{\text{min}}$</th>
<th>$Q_1$</th>
<th>$Q_n$</th>
<th>$Q_{\text{max}}$</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>[l/h]</td>
<td>[l/h]</td>
<td>[m³/h]</td>
<td>[m³/h]</td>
<td>[1:x]</td>
</tr>
<tr>
<td>15</td>
<td>24</td>
<td>1.5</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>25</td>
<td>40</td>
<td>2.5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>35</td>
<td>58</td>
<td>3.5</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>60</td>
<td>96</td>
<td>6</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>100</td>
<td>160</td>
<td>10</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

New terms (according to MID)

<table>
<thead>
<tr>
<th>$Q_1$</th>
<th>$Q_2$</th>
<th>$Q_3$</th>
<th>$Q_4$</th>
<th>$R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>[l/h]</td>
<td>[l/h]</td>
<td>[m³/h]</td>
<td>[m³/h]</td>
<td>[-]</td>
</tr>
<tr>
<td>15.6</td>
<td>25</td>
<td>2.5</td>
<td>3</td>
<td>160</td>
</tr>
<tr>
<td>25</td>
<td>40</td>
<td>4</td>
<td>5</td>
<td>160</td>
</tr>
<tr>
<td>39</td>
<td>58</td>
<td>6.3</td>
<td>7.8</td>
<td>160</td>
</tr>
<tr>
<td>62.5</td>
<td>100</td>
<td>10</td>
<td>12.5</td>
<td>160</td>
</tr>
<tr>
<td>100</td>
<td>160</td>
<td>16</td>
<td>20</td>
<td>160</td>
</tr>
</tbody>
</table>

Example

A cold water meter $Q_n$ 2.5 Class C will be classified as follows according to MID:

$Q_1 = 25 \text{ l/h}; Q_2 = 40 \text{ l/h}; Q_3 = 4 \text{ m}^3/\text{h}; Q_4 = 5 \text{ m}^3/\text{h}; $ Measuring range $R = Q_3 / Q_1 = 160$

Attention

On paper the meter seems to have a more dynamic measuring range! The meter stays the same!
Permanent Flow Q3
The numerical value for the permanent flowrate Q3 in m³/h is selected from the row R5 according to ISO 3.

<table>
<thead>
<tr>
<th>$Q_3$</th>
<th>1,6</th>
<th>2,5</th>
<th>4</th>
<th>6,3</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>16</td>
<td>25</td>
<td>40</td>
<td>63</td>
</tr>
<tr>
<td>100</td>
<td>160</td>
<td>250</td>
<td>400</td>
<td>630</td>
</tr>
<tr>
<td>1000</td>
<td>1600</td>
<td>2500</td>
<td>4000</td>
<td>6300</td>
</tr>
</tbody>
</table>

Measuring Range
The permanent flowrate range is defined with the $Q_3 / Q_1$ relationship. The values are selected from R10 form the ISO 3 table.

<table>
<thead>
<tr>
<th>$Q_3$</th>
<th>$Q_1$</th>
<th>$Q_2$</th>
<th>$Q_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>12,5</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>100</td>
<td>125</td>
<td>160</td>
<td>200</td>
</tr>
<tr>
<td>1000</td>
<td>1250</td>
<td>1600</td>
<td>2000</td>
</tr>
</tbody>
</table>
Schematic of Conformity Assessment

**Application Choice of Module**

**Module D**
- Quality Assurances of production process
  - QM Documentation
    - Technical documentation
  - Certification audit of QM system
  - QM Certificate
  - Declaration of conformity
  - Marking CE M XX 1259
  - Surveillance audit

**Module B**
- Type Examinations
  - Technical documentation
  - Choice of examination
  - Examinations and tests
  - EC Type examination certificate

GWF ha both Module D and Module B for MID certified meters

**Legend**
- MID Module
- Notified Body
- Manufacturer