# EU-type examination certificate

Number **T10873** revision 2
Project number 2285983


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| Issued by | NMi Certin B.V.,<br>designated and notified by the Netherlands to perform tasks with respect to conformity modules mentioned in article 17 of Directive 2014/32/EU, after having established that the Measuring instrument meets the applicable requirements of Directive 2014/32/EU, to: |
| Manufacturer | Elster GmbH<br>Steinernstraβe 19<br>55252 Mainz-Kastel<br>Germany |
| Measuring instrument | An **electronic gas-volume conversion device (EVCD),** intended to be used for gas volume conversion as a sub-assembly (according to article 4 of the MID) of a gas meter. |

| | | |
|---|---|---|
| Type | : | EK205 |
| Manufacturer's mark or name | : | Elster |
| Conversion principle | : | T, PT or PTZ |
| Device type | : | 1 (complete system) |
| Ambient temperature range | : | –25 °C / +55 °C |
| Designed for | : | non-condensing humidity |
| Environment classes | : | M2 / E2 |

The intended location for the instrument is open.

Further properties are described in the annexes:
- Description T10873 revision 2;
- Documentation folder T10873-1.

| | |
|---|---|
| Valid until | 22 December 2026 |
| Remarks | This revision replaces the earlier versions, except for its documentation folder. |
| Issuing Authority | **NMi Certin B.V., Notified Body number 0122**<br>11 December 2018 |

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INSPECTION
RvA I 122

# 1 General information about the electronic gas-volume conversion device

All properties of the EVCD, whether mentioned or not, shall not be in conflict with the legislation.

The EVCD is a so-called type 1 device, with specific types of transducers for pressure and temperature (PTZ) or for temperature only (T).

The EVCD, type EK205 (T, PT or PTZ) can be connected with any gas meter which has a register and a pulse output with characteristics as described in paragraph 1.5.1.

## 1.1 Essential parts

The electronic gas volume conversion device is composed of the following parts:

| Part | Document | Remarks |
|---|---|---|
| CPU board | 10873/0-06 | Component lay-out<br>Essential parts list |
| pressure transmitter<br>Built in | 10873/0-05 | Manufacturer: Endress + Hauser GmbH. Type:CT30 |
| temperature transmitter | 10873/0-04 | Pt500 |

## 1.2 Essential characteristics

1.2.1 Software specification (refer to WELMEC 7.2):

- Software type P;
- Risk Class C;
- Extension L;

while extensions S, T and D are not applicable or excluded.

| Software version | Identification number (checksum) | Remarks |
|---|---|---|
| 1.02 | 3581 | - |
| 1.03 | 3454 | - |

Remark: The software version can be read on the display by using the menu buttons (see par. 3.10.2 of documentation 10873/0-03).

1.2.2 Conversion

The conversion is performed according to the following formula as stated below:

$$V_b = V_{mT} \times \frac{p_{abs}}{p_b} \times \frac{273{,}15 + t_b}{273{,}15 + t} \times \frac{Z_b}{Z}$$

| Symbol | Represented quantity | Unity |
|---|---|---|
| $V_b$ | volume at base conditions | $m^3$ |
| $V_{mT}$ | volume at measurement conditions | $m^3$ |
| $p_{abs}$ | absolute pressure at measurement conditions | bar |
| $p_b$ | absolute pressure at base conditions | bar |
| t | gas temperature at measurement conditions | °C |
| $t_b$ | temperature at base conditions | °C |
| $Z_b$ | compression factor at base conditions | - |
| Z | compression factor at measurement conditions | - |

If the conversion principle is only T, for $p_{abs}/p_b$ and $Z_b/Z$ fixed values are programmed.

1.2.3 Compression

The compression factor $Z_b/Z$ can be programmed in the EVCD as a fixed value or it can be calculated on the basis of the following algorithms:

- SGERG 91 (mol%$CO_2$, mol%$H_2$, $H_s$ and d) also known as SGERG 88;
- AGA8-G1 “Gross characterization method 1” (mol%$CO_2$, $H_2$, $H_s$ and d);
- AGA8-G2 “Gross characterization method 2” (mol%$N_2$, mol%$CO_2$ and d);
- AGA NX19 Herning & Wolowski (mol%$N_2$, mol%$CO_2$ and d);
- AGA NX19 Hbr (mol%$N_2$, mol%$CO_2$, $H_s$ and d);
- AGA8-92DC “Detailed characterization equation” *)

*) The algorithm AGA8-92DC can be applied in the pressure and temperature ranges as stated below:

| | $p_{min}$ [bar] | $p_{max}$ [bar] | $t_{min}$ [°C] | $t_{max}$ [°C] |
|---|---|---|---|---|
| Range-1 | 1 | 80 | -5 | 60 |
| Range-2 | 1 | 40 | -10 | 60 |
| Range-3 | 1 | 16 | -20 | 60 |
| Range-4 | 1 | 11 | -25 | 60 |
| Range-5 | 1 | 8 | -30 | 60 |

When using a fixed compression factor (T or PT conversion), the pressure and temperature range are limited such, that the error of the EVCD remains within the maximum permissible error limits.

1.2.4 Pressure range
The pressure ranges are:

| Type | pressure range p [bar] |
|---|---|
| CT30 | 0,7 $\leq p_{abs} \leq$ 2 |
| | 0,8 $\leq p_{abs} \leq$ 5 |
| | 0,8 $\leq p_{abs} \leq$ 6 |
| | 1,4 $\leq p_{abs} \leq$ 7 |
| | 2 $\leq p_{abs} \leq$ 10 |
| | 2,4 $\leq p_{abs} \leq$ 12 |
| | 4 $\leq p_{abs} \leq$ 20 |
| | 6 $\leq p_{abs} \leq$ 30 |
| | 8 $\leq p_{abs} \leq$ 40 |
| | 14 $\leq p_{abs} \leq$ 70 |
| | 16 $\leq p_{abs} \leq$ 80 |

See documentation no.10873/0-05 for a complete overview of the sensors.

1.2.5 Gas temperature range
The temperature range is: -30°C $\leq$ t $\leq$ +60°C, besides the temperature range has to be within the working range of the used algorithm for correcting the deviation from the ideal gas law.

1.2.6 Presentation of legal data
The legal data is presented via a special menu by pressing the arrows keys on the front panel.
The menu structure, keyboard, display and (alarm) indicators are described in Chapter 6 and 8 of the documentation no. 10873/0-07

1.2.7 Accountable alarms
The EVCD has to be programmed such, that accountable alarms will be generated if extreme values are measured by the EVCD or if otherwise a defect arises. Accountable alarms cause that the registration of the volume at base conditions will be stopped.

During the alarm the volume at measurement conditions will (besides the main totalizer) also be registrated in the alarm totalizer.

The alarm indication can be reset by using the keyboard or the configuration software ("reset alarm" button). However, it is not possible to clear an alarm as long as the cause of the alarm is still present (see paragraph 8 of the documentation no. 10873/0-07).

## 1.3 Essential shapes

1.3.1 Markings

The nameplate is bearing at least, good legible, the following information:
- CE marking including the supplementary metrological marking (M + last 2 digits of the year in which the instrument has been put into use);
- Notified Body identification number, following the supplementary metrological marking;
- EU-type examination certificate no. T10873;
- manufacturer's name, registered trade name or registered trade mark;
- manufacturer's postal address;
- serial number of the instrument and year of manufacture;
- ambient temperature range.

The following information is mentioned on the display:
- the gas temperature range;
- the gas pressure range;
- the base pressure; (if applicable)
- the base temperature;
- the compression algorithm; (if applicable)
- the gas properties; (if applicable)
- upper and lower limits of the transducers.

The following information is mentioned on in the manual:
- mechanical environment class;
- electromagnetic environment class.

An example of the markings is shown in document no. 10873/0-02.

1.3.2 Sealing: see chapter 2.

## 1.4 Conditional parts

1.4.1 Housing

The EVCD has a synthetic housing, which has sufficient tensile strength. For an example of the housing see documentation no. 10873/0-01.
Metrological important parts only are accessible after breaking one or more seals.

1.4.2 LCD board

This board is used for the presentation of legal data and (accountable) alarms.
See documentation no. 10873/0-06 for an example of the LCD-board.

1.4.3 Power supply

Battery power supply
The EVCD is powered by a lithium battery (3,6Vdc, 17Ah, D-size). The normal lifetime is 1825 days (±5 years) in average conditions. A low battery alarm is generated when 10% or less of the lifetime of the battery is remaining.

1.4.4 Serial communication
The EVCD is equipped with a serial (RS-232, RS-485) and optical communication port. Use of the serial communication may not influence the working of the EVCD. In the normal situation (also see paragraph 3.7 - 3.8 of document 10873/0-03) the essential parameters needed for the conversion cannot be changed via the communication ports.

## 1.5 Conditional characteristics

1.5.1 LF impulse input
The EVCD has an LF impulse input. The maximum frequency is not higher than 10 Hz, if the gas meter is running at $Q_{max}$. The minimum pulse length is 30 ms.

1.5.2 Programming

Change of metrological parameters is protected by a programming switch, password or key identification.
An exception are the un-converted and converted main totalizers, which only can be changed after the programming switch is set in the “on” position.
If the programming switch is set in the “off” position, parameters declared as protected can be changed after password or key-identification.

In the normal situation the programming switch always has to be set in the “off” position.

However, for synchronization purposes the $V_m$ and $V_b$ totalizers can be changed only once after installing the device, while using password identification. The changed totalizing values are stored in the measurement period archive which is accessible using the keyboard. Later changes of the totalizers are not possible without breaking a seal and putting the programming switch in the “on” position.

## 1.6 Non-essential parts

1.6.1 Alarm outputs

1.6.2 A customer switch

1.6.3 Pulse outputs

## 2 Seals

The following items are sealed:
- the nameplate with the housing; *)
- the CPU covering plate;
- the plate covering the access to the programming switch and the terminals of the pressure- and temperature transmitter.

*) Removal without destroying the nameplate shall not be possible, otherwise the nameplate shall be sealed to the housing.

An example of the sealing is presented in the document no. 10873/0-08

The contents of the audit trail will be displayed after pressing the key sequence:
**Serv. -> Archives -> Audit trail [ENTER]**