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Issued by NMI Certin B.V.,

In accordance with – WELMEC guide 8.8 “General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments under the MID”.
– EN 12405-1_2005+A2_2010 “Gas meters - Conversion devices - Part 1: Volume conversion”

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Measuring Instrument An **electronic volume conversion device for use as part of a Gas Custody Transfer Measurement installation.**

Type : Auditflow V7.2
Conversion principle : PTZ
Device type : 2
Mechanical environment class : M2 and M3
Electromagnetic environment class : E2
Temperature range ambient : -10 °C ... +55 °C
Humidity environment class : Condensing

Further properties are described in

- Description number number TC8174 revision 0 ;
- Documentation folder number TC8174-2.

Issuing Authority **NMI Certin B.V.**
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Head Certification Board

1 General information about the electronic gas-volume conversion device

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

This Evaluation Certificate is the positive result of the applied voluntary, modular approach, for a component of a measuring instrument, as described in WELMEC guide 8.8. The complete measuring instrument must be covered by an EC type-examination certificate.

This Evaluation Certificate describes an electronic calculating device intended for processing the signals from one up to four volume or mass input signals, depending on the system configuration. The calculating device is capable of handling Foundation Fieldbus signals, double impulse signals representing volume or mass measurements from meters for custody transfer purposes, and MODBUS and Ethernet communication.

The EVCD is a so-called type 2 device, with external separate transducers for pressure and temperature (PTZ). One up to ten volume or mass input signals can be handled.



example



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1.1 Essential parts

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

part	identification	Documentation
Unit HFC302		
Main board	GLL1400 Rev0 E0, also referred to as EDS252	8174-1, -4
H1 and expansion board	GLL1401 Rev0 E0, also referred to as EDS253	8174-2, -4
RS232 driver and filter board	GLL1402 Rev0 E0, also referred to as EDS255	8174-3, -4
Software version	V.2.1.5; checksum 0x765E	-
Unit DF 53-FC		
Power supply impedance for fieldbus (4ports)	GLL1399 Rev0 E0, also referred to as EDS84	8174-5, -6
Unit DF77		
2 x 5 Pulse inputs	GLL1303 Rev4 E0 also referred to as EDS49 R3	8174-7, -8
Software version	v.3.2; checksum 06326207	-
Unit DF11		
2 Groups of 8 24Vdc isolated inputs	GLL1217R1E2	8174-9, -10
Unit DF25		
2 Groups of 4 relay outputs	GLL1179R2E1	8174-11, -12
Unit DF56		
Power Supply for Backplane 20-30VDC	GLL1279R3E1	8174-13, -14
Unit DF60		
Power Supply for fieldbus 20-30VDC	GLL1278R1E5	8174-15, -16

1.2 Essential characteristics

1.2.1 Software specification (refer to WELMEC guide 7.2, issue 5):

- Software type P;
- Risk Class C;
- Extensions L, T, S and D apply.
- Extensions U does not apply.

Software version identification: 2.

Remark: The software version can be read on the screen of a remote computer that acts as an indicating device; see the manual on page 10.6.

1.2.2 Calculation of flow rates and flow totals from input impulses, representing Mass or Volume. This may include linearization of the Flow Meter and / or Dual Pulse Integrity to Level A or B to ISO 6551 / IP 252/76.

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

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

Symbol	Represented quantity	Unit
V_b	volume at base conditions	m ³
V	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	-

1.2.4 Compression
 The correction for the deviation from the ideal gas law is calculated by using the the AGA 8-DC92 algorithm. The gas properties, with the used algorithm needs, either are programmed in the EVCD as fixed parameters or come as actual values from a gas chromatograph, either via RS232c, RS485 or Ethernet data connections. If the connection between the EVCD and the gas chromatograph is broken or if the gas chromatograph is defective, the EVCD raises an alarm. 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.

1.2.5 Other calculation methods
 Energy calculation on the basis of AGA5.

1.2.6 Pressure transducer
 Any pressure transducer may be used provided the following conditions are met:

- For the pressure transducer an Evaluation certificate must be issued by a Notified Body responsible for type examination;
- the output signal should be according to the Foundation Fieldbus protocol;
- the pressure range is according to the concerning Evaluation certificate, besides the following restrictions are valid:
 - the pressure range has to be within the working range of the used algorithm for correcting the deviation from the ideal gas law.

Note: if a gauge pressure transducer is used the constant value for the atmospheric pressure is indicated on the name plate or can be made visible on the display.

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1.2.7 Temperature transducer

Any temperature transducer may be used provided the following conditions are met:

- For the temperature transducer an Evaluation certificate must be issued by a Notified Body responsible for type examination;
- the output signal should be according to the Foundation Fieldbus protocol;
- the temperature range has to be within the working range of the used algorithm for correcting the deviation from the ideal gas law.

1.2.8 Presentation of legal data

After selecting the GKD configuration block, the remote computer that acts as an indicating device will indicate the relevant data as above mentioned in paragraph 1.2.1.

The menu structure, keyboard, display and (alarm) indicators are further described in chapter 11 of the manual.

The energy totalizers are not part of the legal data.

1.2.9 Accountable alarms

The EVCD has to be configured such that an accountable alarm will be generated when a system alarm arises (failures in the flow computer itself) and also if extreme values are measured by the EVCD or the measurement transmitters. An accountable alarm will be generated as well if otherwise then described above (e.g. by the impulse control, if applicable) a defect arises (input alarms). See the flow computer's manual.

Accountable alarms cause the registration of the volume at measurement conditions and the volume at base conditions in the main totalizers to stop, while the registration of the volume at measurement conditions is continued in alarm totalizers.

By selecting the alarm configuration blocks the displays shows information about latched and actual alarms.

Apart from registration in the main totalizer, during the alarm the volume at measurement conditions will also be registered in the alarm totalizer.

The alarm indication cannot be reset. It is not possible to clear an alarm as long as the cause of the alarm is still present.

1.2.10 Software security

Though the HFC302 can be sealed with a sealed switch, software sealing is possible as well. Other modules have only the possible of software sealing.

The change in the configuration with audit trail and access restriction uses an access level and Password in the FCT block, represented as:

Authorized Person Level (AP): This is the only access level that allows changing the parameter SEALED_CONDITION to "sealed", specifically reserved for the Notified Body responsible for the validation of the measurement system. Another exclusive attribution of this access level is the firmware download. Besides, this level allows unrestricted access to the configuration, including configuration download. Only one login configured for Authorized Person Level is allowed, and only this level of access can configure the corresponding password.

At the moment that other levels get access the status automatically changes from "sealed" to "not sealed".



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HFC302 supports 30 login's and associated configuration for each login, as: a string for identification (FCT.USER_NAME_x), access level (FCT.LOGIN_LEVEL) and password (FCT.PASSWORD and FCT.PASSWORD2).

HFC302 supports double password mechanism; it means that it is possible to have two passwords associated to one login. The basic idea is to have two representatives (one representative of supplier and one representative of buyer) to log in.

- 1.1.1.1 All Weights & Measures items and parameters shall be secured by the AP level.
- 1.1.1.2 Any changes to Weight & Measures parameters appear in the event log.
- 1.1.2 Custody Transfer parameters
The Custody Transfer parameters and the mandatory settings are given in paragraph 1.5 of this Evaluation certificate.
- 1.2 **Essential Shapes**
 - 1.2.1 Connection of the calculating device to one or more viewable screens on external computers, which act as indicating device, using the program SYSCON and/or the program HFC view and/or other dedicated programs.
Only one computer can gather data from the calculating device. The calculating device recognizes that computer by the computer's hard disk number.
The computers and the programs are beyond the scope of this Evaluation Certificate.
 - 1.2.2 A printing device can be connected to an external computer, which on its turn is connected to the calculating device via an Ethernet connection.
The computer and the printer are beyond the scope of this report.
 - 1.2.3 The flow computer has a flag on a new batch or report. After printing, the flag is removed, resulting in the reprint to be indicated as such.
 - 1.2.4 EMC measures.

Volume signal cables and Foundation Fieldbus cables are shielded; the shields are connected to the cabinet ground strips.
The power supply modules DF56 and DF60 inside the cabinet are grounded inside the cabinet to ground strips.
 - 1.2.5 Inscriptions.
At least the inscription TC8174 is mentioned on the data plate.
 - 1.2.6 The unit of indication is liter or m³ for volume and kg or ton for mass. Remark: liters should always be combined with kg's and m³ 's should be combined with tons.
 - 1.2.7 The minimum measured quantity is inscribed on the calculating and indicating device or on a separate plate in the direct vicinity of the display.
 - 1.2.8 In installations where more than one measurement transducer is applied, an identification of the connected measurement transducer shall also be applied onto the calculating and indicating device.
 - 1.2.9 Seals
See chapter 3 of this description.



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1.3 Conditional Parts

1.3.1 Digital in- and outputs

The calculating device is equipped with several in- and outputs. As an example, the in- and outputs may be applied for: receiving and/or transmitting alarm conditions, controlling valves, reading valve-positions, receiving/transmitting batch-start/stop signals, etc.

1.4 Conditional Characteristics

1.4.1 Use in a network

AuditFlow communicates using MODBUS client/server implementation. Because of that method, no need for making a distinction between the use within open networks and the use within closed networks exists, because it is always necessary to define the link between a unique pair of master slave addresses. The Auditflow V7.2 address is protected by a seal.

This is not totally under the control of the Auditflow V7.2 supplier. However correct design of the network should guarantee that the above described link between the unique pair of master slave address is realized in a proper way.

1.4.2 Custody Transfer parameters

The configuration of Custody Transfer parameters of the calculating device must comply with what is given below. At the time of initial verification it shall be clear which parameters must be considered as Weights & Measures parameters. The highest security level, being the Authorized Person (AP) = level, protects these parameters.

The password necessary to change Weights & Measures parameters shall only be known to bodies that are accredited for changing and approving of Weights & Measures parameters.

Each parameter has a specific block reference and name.

parameter block and name	description	setting
HC – IO_TYPE_Rn (n = 1 ... 14)	Select the module type for rack n.	1)
TEMP-MODE BLK	Measured temperature or manually input temperature.	1)
TEMP-CHANNEL	Rack number and slot number.	1)
TEMP-SENSOR CONNECTION_n (n = 0 ... 7)	Temperature sensor connection	1)
TEMP-SENSOR TYPE_N (n = 0 ... 7)	Temperature sensor type	Pt100
AI-MODE BLK	Measured value or manually input value.	1)
AI-SIMULATE	Simulation option	disable
AI-XD_SCALE	Transducer scale values	1)
AI-OUT_SCALE	Output scale values	1)
HI_HI_LIM (various parameters)	Maximum high limit	1)



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parameter block and name	description	setting
LO_LO_LIM (various parameters)	Maximum low limit	1)
FCT-authorization and sealed condition	See the manual.	1)
FCT-UNITS	Units for various parameters.	Metric units, depending on the application.
FCT-LOGIN LEVEL	See the manual.	1)
FCT-PASSWORD	See the manual.	1)
FCT-PASSWORD2	See the manual.	1)
FCT-HFCVIEW_VSN	Serial number of the hard disk where the HFCView is installed. Only the HFCView executed in this computer will communicate with the HFC302.	Correct serial number.
GKD-Base temperature	volume conversion method base temperature	Correct reference temperature.
GKD-Base pressure	volume conversion method base pressure	Correct reference pressure.
GKD-Calculation of heating value, relative density and isentropic coefficient (product P1 ... P20)		Correct settings, according to the application.
GKD-Gas composition (product P1 ... P20)	Pre-programmed or user composes gas composition.	Correct settings, according to the application.
Product 1 ... Product 20	User defined gas compositions.	Correct gas compositions, according to the application.
PIP-Dual pulse		on
PIP-Phase difference	Phase difference in dual pulses	1)

1) This value shall be specified and motivated by the manufacturer or the user.

1.5 Conditional Shapes

1.5.1 Presentation on the ticket

If the ticket gives information for more than one meter at a time the meter identification shall be on the display.



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2 Conditions for Approval

- 2.1 If the electronic volume conversion device is applied in a measuring system:
 - 2.1.1 The electronic volume conversion device must be constructed in accordance with the Description and Documentation Folder appertaining to this Evaluation certificate.
 - 2.1.2 The seals shall be applied as described in chapter 3.
- 2.2 Third parties are not allowed to use this document and the companion documentation folder without written permission of the owner of this document.
- 2.3 The electronic volume conversion device shall be constructed in accordance to the description and documentation folder that appertains to this Evaluation certificate.

3 Seals

- 3.1 The HFC302 can be sealed with a hardware seal.
- 3.2 After all settings have been set correctly and secured, the cabinet can be sealed with a hardware seal.