

Nederlands Meetinstituut

# Test certificate

Number **TC3446** Revision 0  
Project number: 204736  
Page 1 of 6

Issued by NMI Certin B.V.  
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3314 EG Dordrecht  
The Netherlands

In accordance with the applicable articles stated in the "Ijkregeling gasmeters"  
(Dutch regulations on gasmeters);  
the Regulations for ultrasonic gasmeters", "Fundamentele eisen van  
ultrasone gasmeters" issued by the Ministry of Economic Affairs

Applicant Daniel Europe Ltd  
Swinton Grange  
Malton, North Yorkshire  
ENGLAND  
YO17 6QR

Submitted **An indicating- and electronic gas-volume conversion device  
(EVCD)**

Manufacturer : Daniel  
Type : FloBoss S600

Characteristics Destined for gas volume conversion as a part of a turbine-, rotary- or  
ultrasonic gas flow meter.

Severity class : B (enclosed locations, having only low levels of  
vibration and shocks, ambient temperature  
between -10°C and +40°C)

Description and documentation In the Description TC3446 Revision 0 the remaining characteristics are  
stated.  
The EVCD is described in the Description no. TC3446 Revision 0 and  
recorded in the Documentation folder no. T3446-1, appertaining to this  
Test certificate.

Remarks 

- It shall be noticed that according to article 11, second paragraph, of the  
Ijkwet (Dutch Weights and Measures Law) a Type approval certificate  
shall be granted for the entire model of the gas meter.
- The software may be combined with software for liquid metering  
applications.

Dordrecht, April 9th, 2003  
NMI Certin B.V.

  
W.A.C.M. van Leeuwen  
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## 1 General information of the electronic gas volume conversion device

All features, mentioned or not mentioned, may not be in conflict with the legislation. The application described in this Test certificate is designed as an EVCD to convert the volume  $V$ , measured by the gasmeter at measurement conditions to a volume  $V_b$  at base conditions.

### 1.1 Essential parts

Part	Document	Remarks
Processor board P152.R4	T3446-5; T3446-6	Design: MOB/MPFJ/NMAM
I/O board 2-3-0600-002	T3446-3; T3446-4	Design: MOB/MPFJ/MSC/NMAM
Turbine Mezzanine board 2-3-0600-005	T3446-11; T3446-12	
Front panel board 2-3-0600-015	T3446-7; T3446-8	
Software	NMi_GTM_1v5	The software can be read as display item 68.1.

### 1.2 Essential characteristics

1.2.1 The conversion is performed according to the following formula as stated below, when using an absolute pressure transmitter:

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

When using a gauge transmitter the conversion is performed according to the formula:

$$V_b = V_c \times \frac{B + p}{p_b} \times \frac{273,15 + t_b}{273,15 + t} \times \frac{Z_b}{Z}$$

Parameter	Subject	Unity
$V_b$	volume at base conditions	$m^3$
$V$ or $V_c$	volume at measurement conditions (meter error corrected)	$m^3$
$p_{abs}$	absolute pressure at measurement conditions	bar
$p$	gauge pressure at measurement conditions	bar
$B$	atmospheric pressure	bar
$p_b$	absolute pressure at base conditions	bar
$t$	gas temperature at measurement conditions	$^{\circ}C$
$t_b$	temperature at base conditions	$^{\circ}C$
$Z_b$	compressibility factor at base conditions	-
$Z$	compressibility factor at measurement conditions	-



- 1.2.2 **Compressibility**  
The correction for the deviation from the ideal gas law is calculated by using the SGERG algorithm. The gas properties, which the used algorithm needs, either are programmed in the EVCD as fixed parameters or come as actual values from a gas chromatograph.
- 1.2.3 **Meter error correction**  
Meter error correction (see 6.2.4 on page 22 of the manual T3446-2) can only be applied if the gas meter produces at least 10 pulses per second at  $Q_{min}$ . Below  $Q_{min}$  no meter error correction is allowed. Above  $Q_{max}$  the correction is equal to the correction at  $Q_{max}$ .
- 1.2.4 **Impulse control**  
Impulse control is required if the EVCD also is used as a gas meter primary indicating device. If applied, the impulse trains, coming from the gas meter pulsers, are continuously checked. If the difference between the two channels is larger than the presettable parameter the error message "Bad pulse threshold" is presented. If one or both pulsers are disconnected, an accountable alarm is raised.
- 1.2.5 **Presentation of legal data**  
By pressing the menu key and the arrow keys, the display 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 4.1 up to and including 4.7 of the flow computer's manual.  
The energy totalizers are not part of the legal data.
- 1.2.6 **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 paragraph 4.8 of 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 pressing the view key the displays shows information about latched and actual alarms. New unacknowledged alarms cause one of the alarm LED's to flash red (in case of a system alarm yellow). This changes to solid red as soon as the alarm is acknowledged by pressing the Accept key. If the alarm is no longer present, after acknowledging and clearing, the LED will glow green and the counting in the main totalizers is continued.
- 1.2.7 **Software sealing**  
The security system allows up to 50 unique users. Each user is allocated two individual passwords; one is numeric for access to the S600; the other is alphanumeric for access to the PCSetup software. In addition, each user is allocated a security level between 0 (highest) and 9 (lowest).  
  
The highest level shall be reserved for Weights and Measures; the password for this level shall be considered as the Weights and Measures password.  
An event log showing all alterations can be printed.  
Only the verifying body shall know this password; in this one and only situation the criterion is met.

## 1.3

## Essential shapes

- 1.3.1 The nameplate contains at least, clearly legible, the information as mentioned in the Dutch regulations on gas meters.  
(In the neighbourhood of the totalizers an inscription shall state that the energy totalizers do not form a part of the legal data).  
If the EVCD also functions as a gas meter primary indicating device, the gas meter's serial number and year of manufactory shall also be part of the inscriptions.
- 1.3.2 Sealing: see chapter 2.
- 1.3.3 Mandatory devices  
The EVCD as whole consists of the following mandatory devices:
- pressure transmitter; see paragraph 1.4 Conditional parts;
  - temperature transmitter; see paragraph 1.4 Conditional parts.

## 1.4 Conditional parts

- 1.4.1 Housing  
The housing of the EVCD is made from steel and therefore has sufficient tensile strength. Metrological important parts are accessible only after inputting one or more seals, in the form of software codes.
- 1.4.2 Power supply  
The EVCD needs an external 24V dc (21-30V dc) power supply.  
The EVCD is provided with a rechargeable back up battery that secures all data after power failure.  
After power failure an alarm is raised.
- 1.4.3 Serial communication  
The EVCD is equipped with two RS232 serial communication ports. Use of the serial communication (when no gas chromatograph is connected) may not influence the working of the EVCD. In the normal situation the essential parameters needed for the conversion cannot be changed via these communication links.
- 1.4.4 Pressure transmitter  
The pressure transmitter is approved according to the regulations on gas meters and described in a Test certificate.  
The output signal of the pressure transmitter has to be a standard 4 – 20 mA signal.  
The pressure range is according to the concerning Testcertificate, apart from that the following restrictions are valid:
- $p_{\min} \geq 1/10 p_{\max}$
  - $12 \text{ bar} \leq p_{\text{abs}} \leq 120 \text{ bar}$ .



#### 1.4.5 Temperature transmitter

The temperature transmitter is approved according to the Dutch regulations on gas meters and described in a Test certificate.

The temperature transmitter is a Pt100 RTD or it has an output signal of 4 – 20 mA. The temperature range is according to the concerning Test certificate; apart from that the following restrictions are valid:

- the tested temperature range  $t$  of the EVCD is:  $-10^{\circ}\text{C} \leq t \leq +50^{\circ}\text{C}$ .
- for legal purposes, according to art. 75 sub h of the regulations on gas meters, the range  $t_{\min} \dots t_{\max}$  may not exceed  $50^{\circ}\text{C}$ .

#### 1.4.6 Gas chromatograph

The (optionally) used gas chromatograph is approved according to the regulations on gas meters and described in a Test certificate.

The communication between the EVCD and the gas chromatograph takes place through a RS232 serial interface.

If the connection between the EVCD and gas chromatograph is broken or if the gas chromatograph is defective, an accountable alarm is raised.

### 1.5 Conditional characteristics

#### 1.5.1 The gas meter volume impulses shall fulfil the following conditions:

- the maximum frequency of HF impulses shall not exceed 4 kHz at  $Q_{\max}$ .

#### 1.5.2 Programming

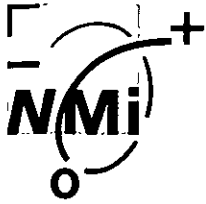
The parameters which are essential for the conversion can be changed only after entering the Weights & Measures password. During normal operation these parameters are in read only mode and not accessible without entering the Weights & Measures password.

### 1.6 Non-essential parts

#### 1.6.1 Digital, analogue and pulse outputs

## 2 Verification marks and seals

- 2.1 The Data plate on the front of the EVCD is sealed with a verification mark (sticker sealing). The enclosure is sealed with a seal (sticker sealing).



Performed tests on the electronic calculating and indicating device:

TEST	Part	TYPE	TEST REPORT	TEST HOUSE	REMARKS
Climate and EMC	Calculating and indicating device	FLOBOSS S600	Refer to project 204736.	NMi Certin B.V.	
Software (functionality)	Calculating and indicating device	FLOBOSS S600	Refer to project 204736.	NMi Certin B.V.	

File: Draft1-T3446R00E.doc