



## Certificate of Conformity No 511-00460

<i>Object</i>	VESCOM NG (Venturi type model)
<i>Applicant</i>	<b>FIMIGAS S.p.A.</b> Via Goldoni, 3 20063 Cernusco sul Naviglio (MI) Italy
<i>Requirements</i>	Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - ISO 5167-1 Part 1: General principles and requirements - ISO 5167-2 Part 2: Orifice plates ISO 5167, second edition 01.03.2003  Orifice Metering of natural gas and other related hydrocarbon fluids - AGA Report No. 3 AGA3, third edition, August 1992, 2 <sup>nd</sup> printing, June 2003
<i>Confirmation</i>	This conformity certificate confirms that the VESCOM NG's (Venturi type model) flow calculation for orifice plates corresponds to the mentioned standards above. (Measurement report No. 135-11062 and 135-11147)
<i>Date of Test</i>	02. to 10.11.2009

CH-3003 Bern-Wabern, November 10, 2009

For the Test

Mario Clausen

Certification Body METAS-Cert  
No. 1259

Jürg Ramseyer, Head of METAS-Cert



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### 1. Type designation

Volume conversion device VESCOM NG (Venturi type model).

### 2. Description of the Type

The VESCOM NG (Venturi type model) is a volume conversion device. In operation, the device has to be connected to a orifice plate with specifications according to ISO 5167-2 or AGA3. The VESCOM NG converts the flow rate calculated according to ISO 5167-1 and ISO 5167-2 or AGA3 into the flow rate at base conditions. The flow rate is calculated by means of the measured pressure difference over the orifice plate at measurement conditions.

#### 2.1 Design

The volume conversion device VESCOM NG (Venturi type model) is made up of a processor board, a case, a LC display, control keys and several external sensors (temperature, pressure, difference pressure) connected to the device. The power is supplied either by an external power supply or an internal battery (by a failure of the external power supply). The access to the calibration parameters by means of a button is protected by a seal.

#### 2.2 Transducers

A platinum thermometer resistor of the type Pt100 serves as a temperature sensor. It is connected to the volume conversion device by means of a cable with a maximum length of 100 m containing four wires. The following temperature sensors are used:

Manufacturer	Type
Endress + Hauser Sigestherm S.r.l.	TSPT-9047FAX TPR100
TERMICS S.r.l.	TR PT100

The absolute pressure transducer is a single crystal silicon resonant absolute pressure transducer. The pressure transducer is mounted outside of the case. It is connected to the volume conversion device by means of a cable with a maximum length of 100 m containing two wires. The following pressure transducers are used:

Manufacturer	Type
Yokogawa Electric Corporation	EJX310A
Rosemount, Emerson Process Management GmbH	3051 CA

Up to three difference pressure transducer can be connected to the VESCOM NG (Venturi type model). They are connected to the volume conversion device by means of a cable with a maximum length of 100 m containing two wires.

The following difference pressure transducers are used:

Yokogawa Electric Corporation	EJX110A
Rosemount, Emerson Process Management GmbH	3051 CD



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### 2.3 Flow calculations

The flow calculation methods permit to determine the flow rate using orifice plates which are inserted in a conduit running full. The following methods are implemented in the VESCOM NG (Venturi type model):

- 1) ISO 5167-1 and ISO 5167-2
- 2) AGA3

### 2.4 Compressibility factors

The compressibility factors permit to take into account the deviations from the ideal gas law. The following methods can be used for the calculation of the K-factor (inverted compressibility factor ratio):

- 1) K-factor as fixed value ( $K=1$  or  $K \neq 1$ )
- 2) AGA-NX19 mod.
- 3) ISO12213-3: SGERG-88
- 4) ISO12213-2: AGA 8-DC92

## 3. Technical data

### 3.1 Rated operating conditions

#### 3.1.1 Measurand

The volume conversion device calculates the volume ( $m^3$ ) at base conditions by using the measured difference pressure generated by the orifice plate and the measured pressure and temperature from the gas.

#### 3.1.2 Measuring range

##### Pressure transducers

Following absolute pressure ranges are used:

$p_{max}$	8.0	24.0	80.0	bar
$p_{min}$	2.0	6.0	20.0	bar

##### Pt100 temperature sensor

The temperature sensor is suitable for temperature measurements in the range from  $-40\text{ °C}$  up to  $+80\text{ °C}$ . However, the measuring range of this instrument is limited from  $-10\text{ °C}$  up to  $+50\text{ °C}$ .

##### Difference pressure transducers

Following difference pressure ranges are used:

$\Delta p_{max}$	50	100	150	200	500	600	mbar
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##### Orifice plates

The orifice plates have to be manufactured according the ISO 5167-2 or the AGA3 specifications.

Upstream internal pipe diameter D: 50 – 1000 mm

Diameter ratio  $\beta$ : 0.10 – 0.75 ( $\beta = d/D$ , d = diameter of orifice)

CH-3003 Bern-Wabern, November 13, 2009