

# ***Oval Gear Meter COGEM-P Series Operating and maintenance instruction***



***Issue 001/06***

**Liquid measuring technology**



**vemm**   
**Messtechnik GmbH tec**

## Measuring principle and destination

Oval gear meters are measuring and control instruments used for acquiring and processing measured volume and flow values. They form the basis for realizing system solutions in automation tasks of liquids flowing in pipelines.

Oval gear meters are volume and flow measuring instruments that work according to the principle of positive displacement. Two meshing, involute toothed oval gears are caused to rotate by the flowing liquid and transport an exactly defined measuring chamber volume with each rotation of the oval gear. This rotation of the oval gear is transformed into pulses by means of magnets and can then be acquired electronically.

Oval gear meters are optimally tailored to the respective conditions of application by the **vemm tec** company, whereas later optimization for other applications is possible as well.

## Oval gear meters for industrial measurements

Oval gear meters can be used as industrial measuring instruments for liquid mediums to be measured with a viscosity of between 0.3mPa·s and 300,000mPa·s. The exact conditions of use for your oval gear meter are given on the type plate of the oval gear meter or the specification sheet attached to each oval gear meter. All data, such as viscosity and temperature ranges, flow etc. are indicated here as well. Before delivery each oval gear meter is checked on our test stand and adjusted in accordance with the envisaged application.

## Oval gear meters for measuring equipment for custody transfer

Oval gear meters are approved by the Physikalisch-Technische Bundesanstalt (PTB) for use in measuring equipment for custody transfer. Before installation they must be checked preliminarily on a test stand approved for these purposes by a Gauging office. The preliminary test error limits are taken down in a preliminary test certificate which is allocated to the instrument and attached to it when it is supplied. The temperature and viscosity ranges required by the PTB have to be complied with. Opening the instruments by persons not having the permission for repair and prior to calibration of the whole system by the respective Gauging office leads to the expiration of the preliminary test certificate of the Gauging office.

## Environmental and operating conditions

admissible temperature range (standard):  
gray cast iron design: -20.....+80 °C  
cast steel design: -25..... +80 °C  
stainless steel design: -40.....+80 °C

**Generally, the data given on the type plate or on the specification sheet are valid!**

admissible relative humidity: 100% at +30°C

(in case of oval gear meter completely filled with liquid)

degree of protection: IP 67

admissible mechanic vibrations and shocks:

Medium mechanic vibrations are admissible.

The following applies

amplitude of vibration	75µm
acceleration	1g
shocks	6 ms at 10g

The use on movable objects is admitted.

## Installation hints for installation of measuring equipment

In installations where the fluid to be metered is pumped, the suction line should be kept as short as possible. The pumps should be located below the liquid level. **Oval gear meters shall not be used immediately after reciprocating pumps, dosing machines etc. or in applications where the flow is suddenly interrupted by cut-off devices (e. g. undamped solenoid valves)!** In order to prevent pressure shocks in the line steady flow of the liquid has to be ensured. The oval gear meter must be installed in such a way that the fluid does not drain from the meter under no-flow conditions. The fluid to be metered must pass through the meter without bubbles. The measurement result will be affected by air or gas in the fluid and the oval gear meter can be damaged. By installing a gas separator closely upstream the meter it is possible to reduce air and gas in the fluid to an admissible minimum. In installations where the measured medium is supplied to the meter under natural flow or by gas or liquid pressure a gas separator is not necessary since the danger of gas in the fluid does not exist here. It has to be taken into account that there is a pressure loss across the oval gear meter depending on flowrate and viscosity of the measured medium. The oval gear meters are designed by vemm tec in such a way that the pressure loss is below 1 bar in case all technical data indicated on the type plate are complied with. The exact value is given on the specification sheet that is attached to each oval gear meter. If you do not know the value, vemm tec will be pleased to inform you considering your equipment data.

Oval gear meters can be damaged by solids in the fluid. That is why **basket type meter-protection strainers** should be fitted directly upstream the meter.

High-viscosity fluids often have to be heated in order to reach the low viscosity required for processing and measurement. In this case not only the pipeline, but also the oval gear meter has to be heated.

Before measurement begins the measured media in the oval gear meter must be raised to the required temperature.

### Important hints for installation of oval gear meters

Before installing the meter, the pipeline and the whole **plant** should be **thoroughly** cleaned from dirt, impurities as weld spatters, chips, dust etc. For this, instead of the meter a fitting piece must be installed in the pipeline and the plant must **be rinsed** several times. The **sealing caps** in the connecting flanges of the meter must **be removed** just immediately before installation.

Oval gear meters must be installed such that the head flange or **body cover is vertical**, irrespective of whether the pipe axis is horizontal, vertical or inclined. Thus it is reached that the **horizontal** position of the oval gear axis required for faultless function and accuracy of the meter is guaranteed. The **flow direction** indicated on the measuring unit casing has **to be observed** in any case. The meter has to be fitted tightly in the line and fixed with **few stress**. Support of the dead weight is recommended!

If the oval gear meters are used outside, they must be protected from rain and snow by a respective cover. For the electric connection attention has to be paid that an equipotential bonding conductor of at least 4 sq.mm CU is connected between the oval gear meter and the respective equipment (NAMUR switch amplifier).

Safety characteristics:

NAMUR signalling circuits for channel 1 and channel 2:

$U_i$ : 12.5 V	$P_i$ : 160 mW
$I_i$ : 60 mA	
$C_i$ : 1.12 $\mu$ F	$L_i$ : 24 $\mu$ H

Only NAMUR switch amplifiers with the following characteristics may be used for connection

$U_o < U_i$	$P_o < P_i$	$I_k < I_i$
$L_o > L_i$	$C_o > C_i$	

Capacitance per unit length  $C_k$  and inductance per unit length  $L_k$  of the connecting cable have to be taken into consideration here. The capacitance and inductance of the cable have to be added to  $C_i$  and  $L_i$ .

$C_o - C_i > l \cdot C_k$ ;  $L_o - L_i > l \cdot L_k$        $l =$  cable length

The switch amplifiers must provide a common supply voltage for channel 1 and channel 2.

### Putting into service and operation

Before putting into service an oval gear meter, its operation data (flowrate, viscosity, temperature, pressure, material qualities) have to be compared with those of the equipment. Application beyond the parameters determined for the meter is not permitted. In case of doubt get in touch with vemmtec.

The equipment has to be deaerated slowly and thoroughly, flooded and started throttledly. As soon as the function of the meter is shown on the indicator unit, the equipment has to be run throttledly until complete deairing of the pipeline is reached. Care should be taken to ensure that there will be no pressure shocks, strong pulsations and vibrations. Such irregularities have a negative effect on the result of measurement and might cause damage to the oval gear meter.

During putting into service attention has to be paid to a faultless operation of the meter (indication, running noise).

If clear irregularities occur, the flow has to be throttled. If the meter fails to operate (blocking of oval gears), the flow must be interrupted immediately, since otherwise the excessively rising feed pressure can cause damage to the meter.

Only after eliminating the cause of the fault (e. g. solids in the pipeline) and the damages possibly caused putting into operation may be repeated. If a bypass is existing, the equipment has to be put into operation via this. The flow should be released slowly via the meter. After this the liquid flow in the bypass should be gradually interrupted.

When putting into operation oval gear meters with volume presetting unit, the measuring equipment has to be started without using the control function of the volume presetting unit. For this the equipment must be cut off by an additional actuator and the actuator controlled by the volume presetting unit must be opened by presetting a respectively big volume. After that, the equipment has to be started via the additional actuator observing all abovementioned hints. Only in case of faultless and normal operation of the equipment, the control function of the volume presetting unit may be used.

### Pulse output

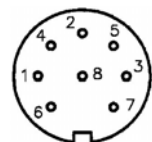
The pulse output is connected to a socket. NAMUR, PNP or NPN outputs are available.

For application in hazardous areas a blue data line (NAMUR) has to be used generally. The insulation check shall be carried out in the plant. When a two-channel pulse generator is used, only one connection to two-channel devices with a common Plus (+) is admissible. The two-channel pulse generator with connector must not be used at two connections physically separated from each other.

#### Pin assignment (8-pole flange socket):

##### 1. Pulse generator according to DIN EN60947-5/-6 (NAMUR)

Operating voltage range:	5.....12.5 VDC
Switching points on/off:	£1.2 mA / <sup>3</sup> 2.1 mA
Application in hazardous area:	Ex II 2G EEx ib IIC T4 X
EU prototype test certificate:	IBExU 04 ATEX 1067
Contact assignment:	
NAMUR:	contact 5 (1+)
	contact 7 (1 -)
	contact 4 (2+)
	contact 6 (2 -)

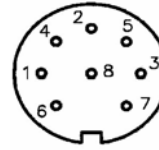


## 2. Pulse generator three-wire – PNP /NPN

Switching voltage: 5.....20VDC +/- %  
Switched current: 50 mA  
Degree of protection: IEC 60529 IP 67  
Application in hazardous area: No application in hazardous areas!

Contact assignment:

PNP/NPN:            contact 2 +Ub 1  
                         contact 3 signal 1  
                         contact 7 GND 1  
                         contact 8 +Ub 2  
                         contact 1 signal 2  
                         contact 6 GND 2



### Service Maintenance

Maintenance shall be carried out only by sufficiently trained personnel only.

**ATTENTION!** When releasing the casing cover or measuring chamber lid liquid drains from the meter. In case of aggressive or harmful as well as very hot or very cold measured media there is danger of cauterization, poisoning or burn.

If an oval gear meter is taken out of service for a longer time the meter has to be removed, cleaned thoroughly and in case of types of steel casting or gray cast iron to be conserved with non-corroding oil. The inlet and outlet boreholes must be closed by sealing caps.

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### Repair instructions

The user is not able to correct failures. The personnel should be duly instructed. Occurring failures have to be corrected by the after-sales service of the manufacturer or by the contractual workshops. In most cases the oval gear meter has to be readjusted (calibrated) after repair. In case of repair orders the failure has to be described (e.g. error limits not observed, oval gears blocked etc.)

#### **Attention!**

**Before dispatching the meters to be repaired must be rinsed and cleaned thoroughly by the user in order to exclude damage by drainage of aggressive media.**

### Warranty

The warranty period depends on the "General conditions for business" of the company vemm tec Messtechnik GmbH Babelsberg. It is 24 months. The place of execution is D-14482 Potsdam. Observe storage and transport rules!

### Storage and transport

The following instructions have to be observed: Oval gear meters should be transported in rigid cardboard boxes or other cases. Transport must be carried out with the care necessary for sensitive measuring instruments. The fitted transport instructions have to be observed. During transport and storage inlet and outlet openings of the measuring units have to be kept closed by sealing caps.

Non-corrosion-resistant measuring units are preserved before packing up by spraying the inside of the measuring unit with an anticorrosive agent. If it is stored for a period longer than 6 months, preservation has to be repeated. After that, connecting flanges have to be closed by sealing caps. In case of outdoor storage roofing has to be provided.

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