CPT-01

Quantometer for secondary measurements

CPT Quantometers have been designed in order to provide our customers with reliable and inexpensive measuring instruments for secondary flow measurements. Our great experience in designing and manufacturing of turbine and rotary gas meters resulted in the development of industrial quantometers.

Taking into account our customers' demands we created the instrument with excellent metrological characteristics and operating performance close to performances of the turbine gas meters designed for custody transfer measurements. Other advantages of the CPT Quantometers are as follows: high quality, easy maintenance, wide range of external devices that can co-operate with the quantometers, e.g. volume correctors, data loggers, data transmission systems. Due to that the CPT Quantometers are well accepted by our domestic and foreign customers.



The basic components of the CPT Quantometer are as follows:

- pressure resistant meter body (1)
- inlet flow straightener (2)
- measuring cartridge with the turbine wheel (3)
- magnetic coupling as the transferring element between measuring cartridge and the index head (4)

pressure rating:
PN16, PN20, ANSI150

nominal diameter:
DN50 up to DN200

meter casing: aluminium or steel (DN200)

flow: 6 to 1600 m³/h

rangeability:
up to 1:30
(depending on the meter)

temperature range: gas temperature: -20°C to +60°C ambient temperature: -25°C to +70°C

 operating position: horizontal or vertical

 $\begin{array}{l} \mbox{measurement accuracy:} \\ Q_t \div Q_{max} < \pm 1,5\% \\ Q_{min} \div Q_t < \pm 3,0\% \end{array}$

allowed medias: see Table 3



Dimensions and weight

Overall dimensions and weights of the Quantometers





Table 1: Specification of the CPT-01 Quantometers.

| DN | G | Max flow Q _{max} | Pressure loss at | Minimum flow Q _{min} | | | LF pulse rate | HF1,2 pulse rate | HF3 pulse |
|--|------|---------------------------------|---------------------|-------------------------------|------|------|----------------------|----------------------|-----------------|
| | | | Q _{max} | 1:10 | 1:20 | 1:30 | | | rate |
| mm | | m³/h | mbar | m³/h | m³/h | m³/h | pulse/m ³ | pulse/m ³ | dm ³ |
| 40 | 40 | 65 | 2,5 | 6 | - | - | 10 | 2610 | 94830 |
| 40 | 65 | 100 | 5,0 | 10 | - | - | 10 | 2610 | 94830 |
| 50 | 40 | 65 | 2,5 | 6 | - | - | 10 | 2610 | 94830 |
| 50 | 65 | 100 | 5,0 | 10 | - | - | 10 | 2610 | 94830 |
| 65 | 65 | 100 | 1,6 | 10 | 8 | - | 10 | 1081 | 42560 |
| 05 | 100 | 160 | 3,8 | 16 | 8 | - | 1 | 1081 | 42560 |
| 80 10 | 100 | 160 | 3,7 | 16 | 8 | - | | 1081 | 42560 |
| | 160 | 250 | 5,4 | 25 | 13 | 8 | 1 | 844 | 30650 |
| | 250 | 400 | 11,4 | 40 | 20 | 13 | | 470 | 17060 |
| | 160 | 250 | 3,7 | - | 13 | 8 | 1 | 692 | 16780 |
| 100 | 250 | 400 | 4,2 | - | 20 | 13 | | 692 | 16780 |
| | 400 | 650 | 8,8 | - | 32 | 20 | | 401 | 9720 |
| | 400 | 650 | 2,4 | - | 32 | 20 | | 227 | 6870 |
| 150 | 650 | 1000 | 6,4 | - | 50 | 32 | 1 | 227 | 6870 |
| | 1000 | 1600 | 16,0 | - | 80 | 50 | 0,1 | 129 | 3910 |
| | 650 | 1000 | 2,0 | - | 50 | 32 | 1 | 114 | 3110 |
| 200* | 1000 | 1600 | 6,0 | - | 80 | 50 | 0.1 | 116 | 3170 |
| | 1600 | 2500 | 15,0 | - | 130 | 80 | 0,1 | 67 | 2025 |
| QUANTOMETERS WITH THREADED CONNECTIONS | | | | | | | | | |
| 1 1/2" | 40 | 65 | 2,5 | 6 | - | - | 10 | 2610 | 94830 |
| 1 /2 | 65 | 100 | 5,0 | 10 | - | - | 10 | 2610 | 94830 |
| 2" | 40 | 65 | 2,5 | 6 | - | - | 10 | 2610 | 94830 |
| 2 | 65 | 100 | 5,0 | 10 | - | - | 10 | 2610 | 94830 |

All quantometers' casings are made of aluminium apart from DN200. Contact your local representative or the producer to get more information about the products.

Table 2: Dimensions and weights of the CPT-01 Quantometers.

| DN | Α | В | С | D | E | F | G | н | J | k* | Thread | L | Weight |
|--|-----|-----|----|----|-----|-----|-----|-----|-----|-------|--------|-----|--------|
| mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | | | mm | kg |
| 50 | 100 | 65 | 18 | 32 | 158 | 74 | 199 | 252 | 78 | 4M16 | - | 200 | 3,6 |
| 65 | 120 | 80 | 21 | 38 | 170 | 86 | 211 | 278 | 90 | 8M16 | - | 220 | 5,1 |
| 80 | 120 | 80 | 21 | 38 | 170 | 86 | 211 | 278 | 90 | 8M16 | - | 220 | 5,3 |
| 100 | 150 | 100 | 29 | 53 | 185 | 100 | 225 | 305 | 105 | 8M16 | - | 250 | 7,4 |
| 150 | 180 | 127 | 50 | 76 | 210 | 125 | 243 | 351 | 130 | 8M16 | - | 300 | 11,6 |
| 200 | 200 | 146 | 56 | 83 | 225 | 140 | 272 | 407 | 145 | 12M20 | - | 320 | 48,5 |
| QUANTOMETERS WITH THREADED CONNECTIONS | | | | | | | | | | | | | |
| 40 | 160 | 95 | 48 | 62 | 158 | 74 | 199 | 252 | 78 | - | G 1½" | - | 5,0 |
| 50 | 160 | 95 | 48 | 62 | 158 | 74 | 199 | 252 | 78 | - | G 2″ | - | 5,0 |

k* - amount of stud bolts necessary for mounting the wafer-type quantometers Contact your local representative or the producer to get more information about the products.



- As an option the meters can be provided with maximum 8 pulse transmitters
- 2 off LFK low frequency reed contact pulse sensor
- 2 off LFI low frequency inductive pulse sensor (NAMUR)
- 2 off HF inductive pulse sensors in the index head (NAMUR)
- 1 off HF inductive pulse sensors in the meter body (NAMUR)
- AFK anti-fraud reed contact (available as an option)
- Electrical outputs Amphenol TUCHEL
- Index housing made of aluminium what perfectly protects index head against accidental damages
- Index housing may be provided with two separate sockets
- 1 pressure measurement tap
- 3-way valve recommended for making connecions with pressure sensor of EVC



Optional index heads



Index head with encoder (option)



Index head with mechanical output (option)





Pressure loss

Pressure drop during the gas flow through the quantometers is determined for air at atmospheric conditions. Maximum value of the Δp_{max} pressure drop for every CPT-01 Quantometer is given in table 1. This value was established during tests carried out at Q_{max} with air ($\rho = 1,2$ kg/m³ density). At real conditions Δp_{rz} pressure drop may be calculated with the following formula:

$$\Delta p_{rz} = \frac{\rho}{\rho_0} \cdot \frac{p_a + p}{p_a} \cdot \left(\frac{Q_{rz}}{Q_{max}}\right) \cdot \Delta p_{max} \ [mbar]$$

Definitions:

 ρ - gas density according to table 3 [kg/m³]

 ρ_0 - air density, 1,2kg/m³

p - atmospheric conditions

p - overpressure of the gas measured before quantometer

 Δp_{max} - maximum pressure drop [mbar]

 ΔQ_{max} - maximum flow of the quantometer (according to table 2) [m³/h]

 Q_{r_2} - flow at real conditions [m³/h]

Table 3: Physical properties of the most popular gases that may be measured by CPT-01 Quantometer. Density at 101,325kPa and 20°C.

| Gas | Chemical symbol (formula) | Density p [kg/m³] | Density related to air | Execution |
|-----------------|---------------------------------|----------------------|---------------------------|--------------|
| Argon | Ar | 1,66 | 1,38 | Standard IIB |
| Butane | C ₄ H ₁₀ | 2,53 | 2,10 | Standard IIB |
| Carbon dioxide | CO ₂ | 1,84 | 1,16 | Standard IIB |
| Carbon monoxide | СО | 1,16 | 0,97 | Standard IIB |
| Ethane | C ₂ H ₆ | 1,27 | 1,06 | Standard IIB |
| Ethylene | C ₂ H ₄ | 1,17 | 0,98 | Standard IIB |
| Helium | Не | 0,17 | 0,14 | Standard IIB |
| Methane | CH ₄ | 0,67 | 0,55 | Standard IIB |
| Natural gas | - | ~0,75 | ~0,63 | Standard IIB |
| Nitrogen | N ₂ | 1,16 | 0,97 | Standard IIB |
| Propane | C ₃ H ₈ | 1,87 | 1,56 | Standard IIB |
| Acetylene | C ₂ H ₂ | 1,09 | 0,91 | Special IIC |
| Hydrogen | H ₂ | 0,08 | 0,07 | Special IIC |
| Air | - | 1,2 | 1,00 | Standard IIB |

Description of pulse sensor connections





| Connection lead no | Socket 1 pulse sensor | Socket 2 pulse sensor |
|-----------------------|--------------------------|--------------------------|
| 1 - 4 | LFK 1 (standard) | LFK 2 |
| 2 - 5 | LFI 1 | LFI 2 |
| 3 - 6 | HF1 or AFK | HF2 |



Pulse sensor pin numbering of the HF3 pulse transmitter's socket installed in the body. The sockets match the TUCHEL plug No C091 31D004 100 2







Installation and operation recomendations

- Meters should be shipped in their original package to the place of installation.
- Meters have to be handled with care and protected against falls, direct influence of rain, snow or high humidity.
- The measured gas should be clean, dry and free from solid impurities.
- It is recommended that the upstream pipe installation is to be equipped with a filter (10 micron).
- Prior to putting into operation in new installations, it is recommended to install a temporary top hat filter.
- Prior to installation the upstream and downstream pipe flanges should be aligned properly.
- Flange gaskets are to be installed so as not to disturb the gas flow.
- The gas flow should be in accordance with the arrow placed on the meter body.
- The piping should be executed so as to avoid unnecessary stresses acting on the meter.
- When used outdoors the meter should be protected against direct weather influence.
- When starting the gas flow through the installation, the valves should be opened slowly to ensure a gradual increase of pressure.
- It is required to install the quantometer after a 5D upstream pipe lenght and before 3D downstream pipe lenght.

ATTENTION! If valves are opened abruptly or pressure increase takes place in a short time it may happen that the measurement cartridge or the turbine wheel get damaged.

ALWAYS REMEMBER TO START UP THE METERS IN A PROPER WAY!

For more information, contact your local sales representative



COMMON S.A. ul. Aleksandrowska 67/93 91-205 Łódź Polska Tel. +48 42 253 66 00 Fax. +48 42 253 66 99 www.common.pl

