Department of consumer and corporate affairs / Ministère de la consommation et des corporations

STANDARDS BRANCH - DIRECTION DES NORMES

NOTICE OF APPROVAL G - 65

OTTAWA April 22, 1970.

CANADIAN METER COMPANY, SERIES CVM, ROTARY, POSITIVE DISPLACEMENT GAS METER

Apparatus

	Model 3.5M	Model 5.3M	Model 11M
Rated capacity, cu. ft. per hour	3,500	5,300	11,000
Swept volume per rev. of meter, cu. ft.	0.042	0.068	0.167
Capacity per revolution of meter output shaft, cu. ft.	10	10	100
Maximum working pressure, psi	125	125	125
Meter connections, flange	2"	3"	3"

Description

The CVM gas meter measures volume by rotary movement of four vanes in an annular chamber formed by two concentric cylinders. A rotating gate in the annular chamber permits the vanes to pass back from the outlet to the inner port and prevents the gas from bypassing the measuring chamber.

The meter comprises three basic assemblies:-

(i) Cast aluminum case with meter flanges and pressure tap holes. The case forms a hollow cylinder with one end permanently closed. The other end of the machined cylinder has a flanged connection.

(ii) A pre-assembled measuring cartridge fits into the meter case and is held in required position by a wedge and a locking bolt. Suitable gaskets, attached around the inlet and outlet ports of the cartridge, provide the seal between the cartridge and the corresponding ports in the meter case.

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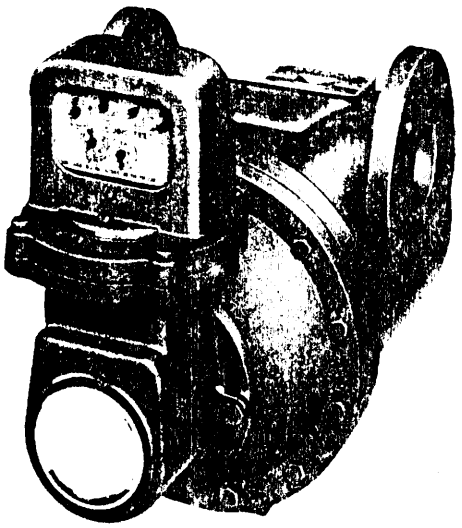
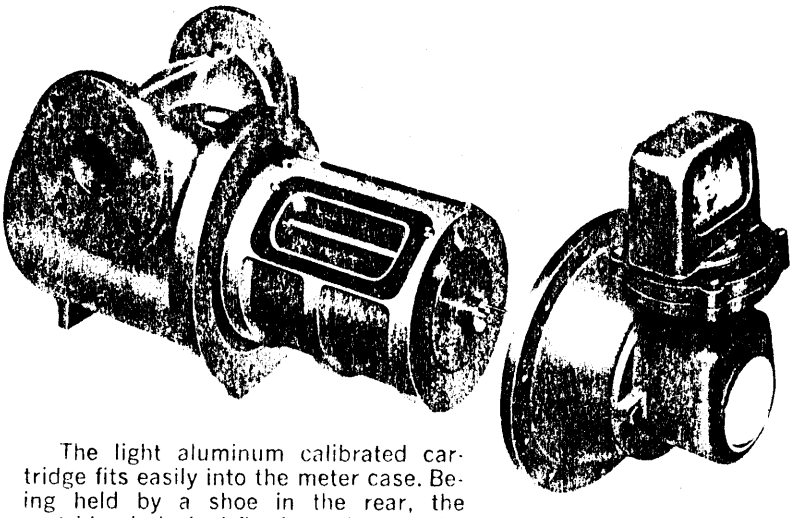
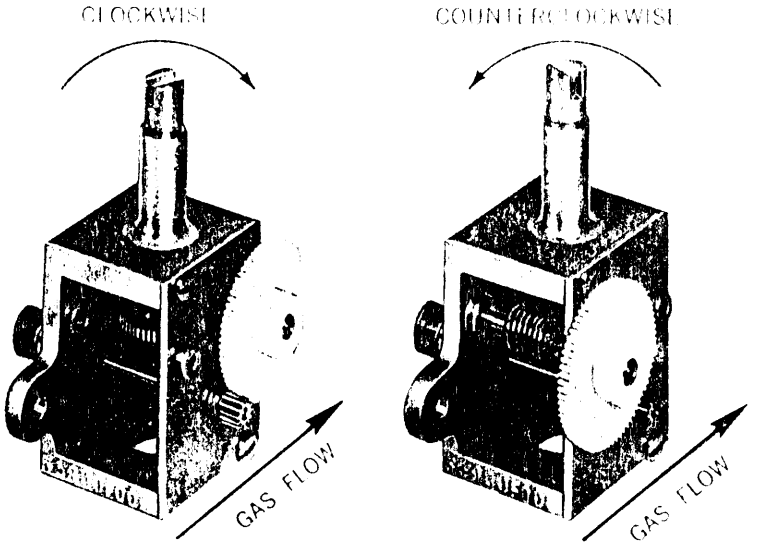




The light aluminum calibrated cartridge fits easily into the meter case. Being held by a shoe in the rear, the cartridge is locked firmly to the case by a single bolt in the front.

OUTPUT ROTATION CHANGE



The standard clockwise rotation of the meter wriggler can be changed in the field to counterclockwise rotation.

(iii) An end bell and register assembly contains a ring type, shielded magnetic drive, worm reduction gearing with suitable provision to change the direction of rotation of the output shaft, and a base plate which can accept a standard register or a volume correcting device.

The operation of the meter is explained in the sheet showing the 4-position diagram of the measuring elements.

The CVM meter measures gas volume at line conditions and when these fluctuate and billing volume refers to other than meter conditions, suitable and approved volume correcting devices shall be used to account for changes in volume caused by the effects of temperature and pressure. The pressure connection to the correcting device shall be taken from the fitting provided on the upstream side of the meter. The temperature probe may be located on the upstream or downstream side of the meter.

Note: The torque load of some volume correcting devices may adversely affect the rangeability of the meter.

The computation of the volume of a gas, at the contract temperature and pressure, which has been registered in cubic feet at line conditions is based on the ideal gas laws modified by a deviation factor available in the form of a Supercompressibility factor (Fpv), determined according to the A.G.A. Gas Measurement Committee Report No. 3, Orifice Metering of Natural Gas.

The general equation for converting the meter readings at line conditions to a contract base pressure and temperature is

$$Qs = Qd \quad Pm \quad Tm \quad (Fpv)^2$$

Qs = Quantity of gas at the contract base pressure and temperature, cu. ft.

Qd = Actual (displaced) gas passed at existing meter conditions, cu. ft.

Pm = Pressure multiplier

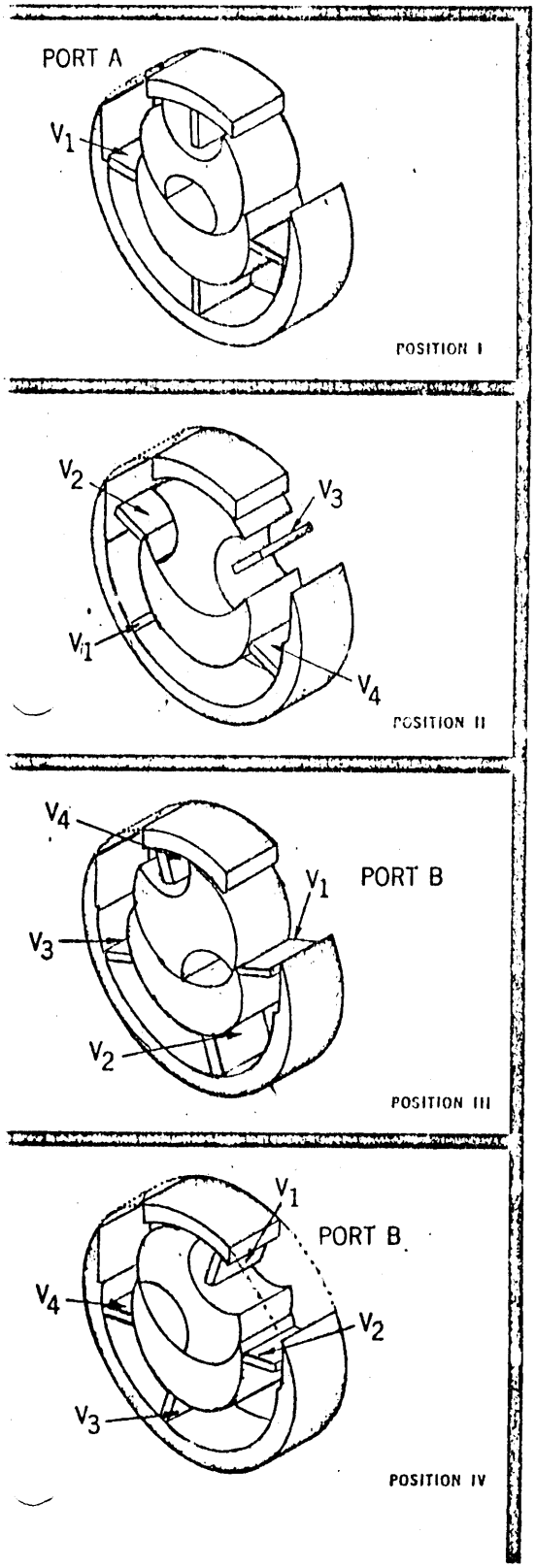
$$= \frac{\text{Weighted average existing gauge pressure + barometric pressure}}{\text{Absolute pressure base}}$$

Tm = Temperature multiplier

$$= \frac{\text{Temperature base + 460}}{\text{Weighted average flowing gas temperature + 460}}$$

Fpv = Supercompressibility factor based upon the weighted average gas pressure and temperature and the normal composition of the gas. The composition is represented by its specific gravity, its content of nitrogen and carbon dioxid and its calorific value as used in the derivation of Fpv values.

The selection of the weighted average supercompressibility factor, Fpv, should be based on a record of the flowing gas volumes, pressures and temperatures. If no continuous record is available, the variations in pressure and temperature normally existing in the line must not introduce an error greater than ±0.5% in the selected $(Fpv)^2$ factor.



MEASURING ELEMENTS OF THE CARTRIDGE

1 Annular Measuring Chamber. An annular measuring chamber is formed by two concentric cylinders.

2 Rotating Vanes. Constant volumes of flowing gas are measured, in the intervals between four freely rotating vanes.

3 Rotating Gate. The rotating gate occupies a minor portion of the annular chamber and has two functions. It permits the vanes to pass back from the outlet port to the inlet port and prevents the gas from bypassing the measuring chamber.

OPERATION

POSITION I

A demand for gas creates a differential pressure across the meter. Gas enters inlet port (A) and causes vane (V_1) to move downstream in the annular measuring chamber. This rotates the vane assembly and through timing gears rotates the gate. Vane (V_2) is shown in the gate recess.

POSITION II

Vane (V_2) has passed from the gate recess and now is being moved by differential pressure. Gas has entered the gate recess.

POSITION III

Vane (V_4) has passed through the gate. Vane (V_1) is approaching the outlet port (B). Note that a seal is being provided by a minimum of two vanes in the measurement chamber. The gate has a large area seal.

POSITION IV

Vane (V_1) is passing into the recess of the gate. Measured gas is flowing from outlet port (B).

All meters accepted for service shall be effectively sealed by the field inspector to ensure that no part of the measuring unit may be tampered with.

The CVM meter may be used for measurement of gas which flows in either direction through the meter, however the manufacturer regards the flow from left to right, when facing the register side of the meter, as the standard flow.

This rotary meter may be installed in either horizontal or vertical line and the piping should be arranged to prevent strains on the meter when direct support is not provided.

The CVM meters are not intended for measurement of volumes at flow rates below 4 percent of the meter rated capacity. The rated capacity indicates the maximum permissible flow rate through the meter at line conditions.

The manufacturer of this meter advertises the interchangeability feature of the measuring cartridge, however, this feature is not approved by this circular.

The nameplate on the meter shall include the following information:

(1) Maker's name

(11) Type or Model designation

(111) Serial number of the meter

(1V) Rated capacity of the meter, cu. ft. per hour

(v) Maximum working pressure, psi.

Approval granted to:

Canadian Meter Company,
Milton, Ont. and Edmonton, Alberta.

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