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

STANDARDS BRANCH - DIRECTION DES NORMES

NOTICE OF APPROVAL

G - 70

OTTAWA December 22, 1970

ROCKWELL EMCORECTOR TYPE T

This approval supersedes Circular SD-GA-32, dated March 18, 1953

Apparatus

Static pressure ranges	
(i) Stacked capsular or Bourdon elements	0-10, 0-20, 0-50, 0-100 and 0-200 psig
(ii) Helical Bourdon elements	0-500, 0-1,200 and 0-1,500 psig
Temperature ranges	0°F to +150°F and -20°F to +130°F
Temperature measuring system (mercury fill)	Case compensated with armoured capillary up to 6 feet in length
Volume registers	6-digit cyclometer-type counters or 6-dial clock-type registers*
Volume cycling	1,000, 10,000 or 100,000 cu. ft. per cycle
Proving circle capacity	10,100 or 1,000 cu. ft. per rev.
Chart size	12 inch, circular
Chart rotation	Counter-clockwise, 24 hours, 7 days or 31** days per rev.

* The information on these registers is contained in the approval circular G-22-1, re-issued August 14, 1968.

** This rotational period may produce a "painted" chart record.

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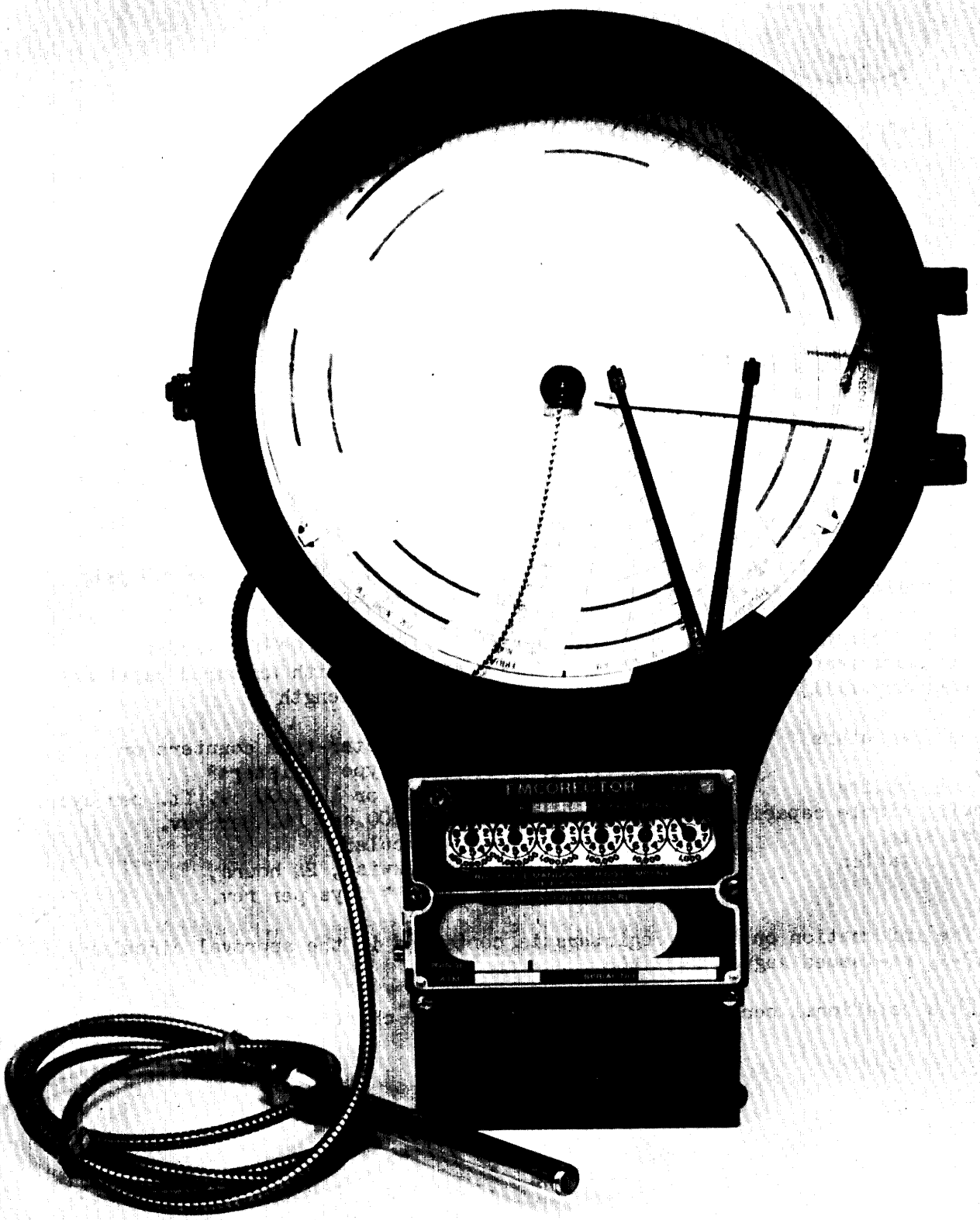

Description

The Emcorector Type T combines, in a single case, a volume correcting integrator with a chart recorder and provides the following data:

(I) Registration of metered volume at line conditions.

(II) Registration of measured volume, corrected to designated base pressure.

(III) Chart record of line pressure against time.

(IV) Incremental line volume cycling on the outer edge of the chart.

(V) Emcorectors Type T may also include a temperature measuring system and provide a chart record of the flowing gas temperature. In such cases the temperature system is not linked up with the integrator.

This device may be used with any suitable, compatible and approved diaphragm, rotary or turbine type gas meter on which it may be mounted in place of a standard register.

The computation of the volume of 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

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

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

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

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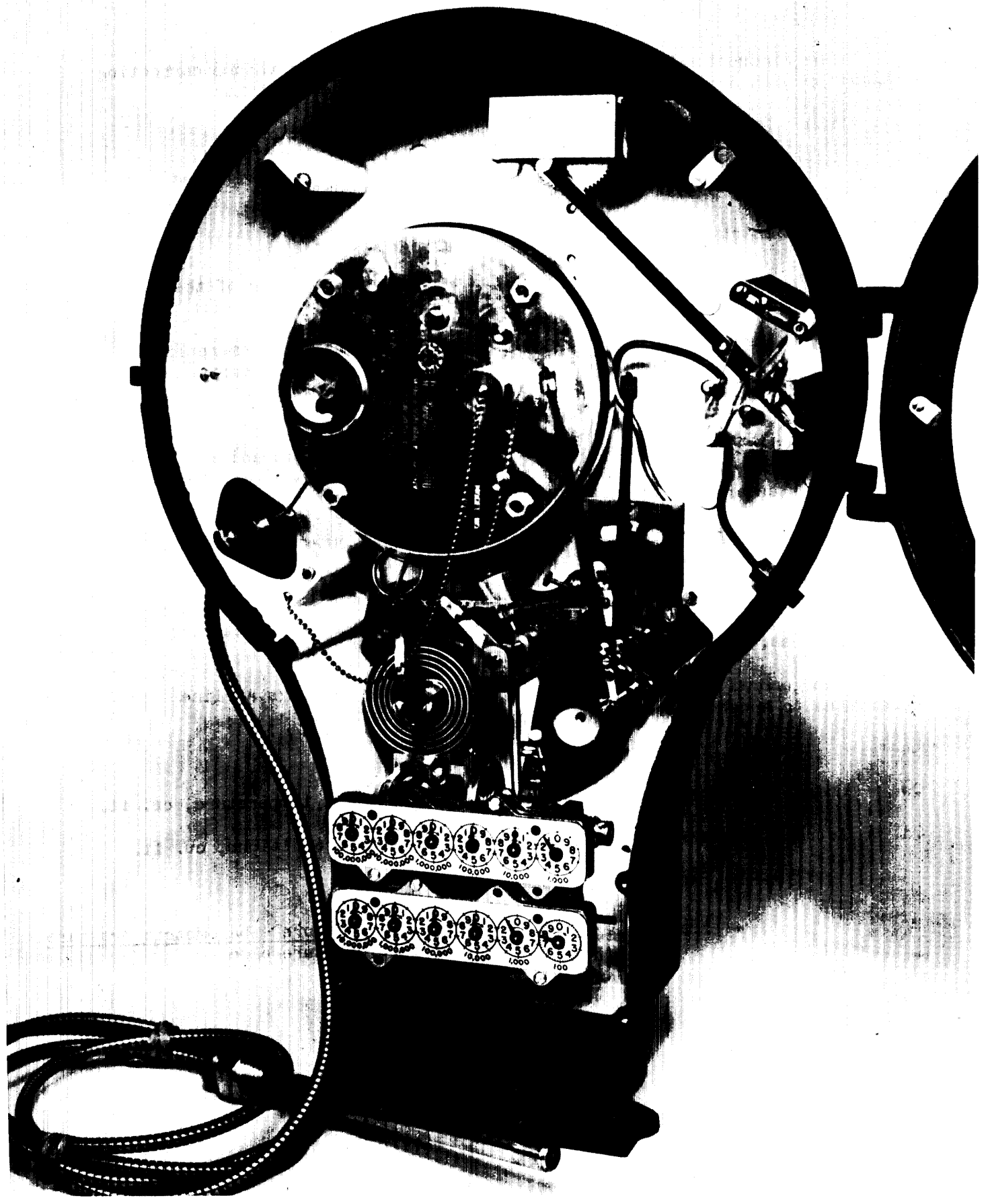

Tm = Temperature multiplier

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

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 dioxide 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, pressure and temperatures. If no continuous record is available, the variations in pressure and temperature normally existing at the meter must not introduce an error greater than ±0.5% in the selected $(Fpv)^2$ factor used for correcting registered volume at base conditions.

The Emcorector Type T is designed to sense and record on a circular chart the line pressure and flowing temperature of the gas, and automatically and continuously apply the momentary pressure multiplier thus eliminating the need for a weighted multiplier. This function is achieved through the employment of a cam type integrator which introduces corrective effects for pressure variations.

The instrument comprises the following main components:

1. Pressure measuring system which positions the integrating cam and through a linkage connects to the pressure recording pen.

2. Temperature measuring system which connects to the temperature recording pen.

3. Uncorrected volume register which through suitable gearing connects directly to the meter output shaft and indicates the volume passed through the meter at line conditions of temperature and pressure.

4. Integrated volume register which is linked up with the cam integrator and provides the indication of the volume passed through the meter at declared base conditions.

5. Volume recording pen which, through suitable gearing and shaft assembly connects to the meter output shaft and records volume increments on the outer edge of the chart.

In operation the output shaft of the gas meter drives the Emcorector, rotating its proving circle and advancing the uncorrected volume register.

Through a suitable gear and crank arrangement an oscillating motion is imparted to the knife of the integrating mechanism.

The pressure element positions a suitably shaped integrating cam to effect the required volume correction from line to base pressure conditions. The effective angle through which the knife travels is dependent on the position of the cam, i.e. pressure multiplier.

The angle through which the knife travels determines the advance of the integrated volume register, and for properly calibrated integrator, the registered volume is always at base conditions.

The device is equipped with two test dials each subdivided into 100 increments. One test dial, referred to as the "proving circle" is driven directly from the meter output shaft, while the other, driven by the integrated volume register is referred to by the maker as the "interpolator wheel". The capacity per revolution of the proving circle, in cubic feet, is marked on the nameplate and it is usually 1/10 of the capacity of the lowest digit of the uncorrected register. The capacity per revolution of the interpolator wheel is always 1/10 of the capacity of the lowest digit of the integrated volume register. The capacity of the last digit of cyclometer registers is marked on the nameplate by an appropriate number of zeros following the lowest digit.

The Emcorector Type T is primarily intended for use with gas meters of Rockwell manufacture. When used with meters of other manufacture, appropriate adaptors may be required to match the capacity per revolution of the output shaft on the meter to the capacity of the proving circle on the Emcorector. These adaptors may also serve to match the direction of the meters output shaft rotation with the proving circle rotation on the Emcorector. The correct rotation of the latter is indicated by the increasing numerals on its scale. The correct rotation of the registers must always be verified.

It must be emphasized that the Emcorector Type T does not integrate the temperature multiplier, Tm, in the solution of the equation

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

and this multiplier must be applied separately to the readings of the integrated volume register.

Proper evaluation of the temperature multiplier requires the knowledge of the weighted average flowing gas temperature and for this reason the Emcorector Type T is approved for billing purposes only when used in conjunction with approved temperature recorders and when a satisfactory record can show the rate of flow through the meter against time.

It is recommended that a special reflective paint be used on the outside of the case when the instrument is likely to be exposed to solar heating.

Each instrument shall have the following information marked on a nameplate:

Manufacturer's name, Instrument's Type designation, Serial number, Pressure range, Base pressure, Applicable atmospheric pressure, and temperature range when the temperature measuring system is included.

Approval granted to:

Rockwell Manufacturing Company,
Guelph,
Ontario.

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Ref: SL-100-771D