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

STANDARDS BRANCH - DIRECTION DES NORMES

NOTICE OF APPROVAL G - 69

OTTAWA December 23, 1970.

ROCKWELL TEMCORECTOR AND EMCORECTOR, TYPE "I"

This approval supersedes Circular SD-GA 144, dated Sept. 10, 1958 for the Emcorector Type "I" and Circular S-GA 255, dated March 25, 1963 for the Temcorector Type "I".

Apparatus

Static pressure ranges:-	
Bourdon elements:	0-10, 0-20, 0-50, 0-100, 0-200, 0-500, 0-1,200, 0-1,500 psig
Temperature range	-20°F to +140°F (Temcorector only)
Temperature measuring system: (Glycerine-water 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*
Proving circle capacity	10,100 and 1,000 cu. ft. per rev.

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

Description

The Temcorector and Emcorector Type I were originally housed in cases illustrated in Circulars SD-GA-144 and S-GA 255. The manufacturer now supplies these instruments in rectangular cases which may have screened air vents or be watertight.

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The Temcorector Type I is a volume correcting integrator equipped with a combination temperature and pressure indicating scale which may be observed through a window in the front of the case. It provides the following data:

(1) Registration of metered volume at line conditions.

(11) Registration of measured volume, corrected to designated base pressure and base temperature.

(111) An indication on the scale of the line pressure and the following gas temperature.

The device may be used with any suitable, compatible and approved diaphragm, rotary or turbine type gas meter on which it is 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 conditons, 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 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, pressures and temperatures. If no continuous record is available, the variations in pressure

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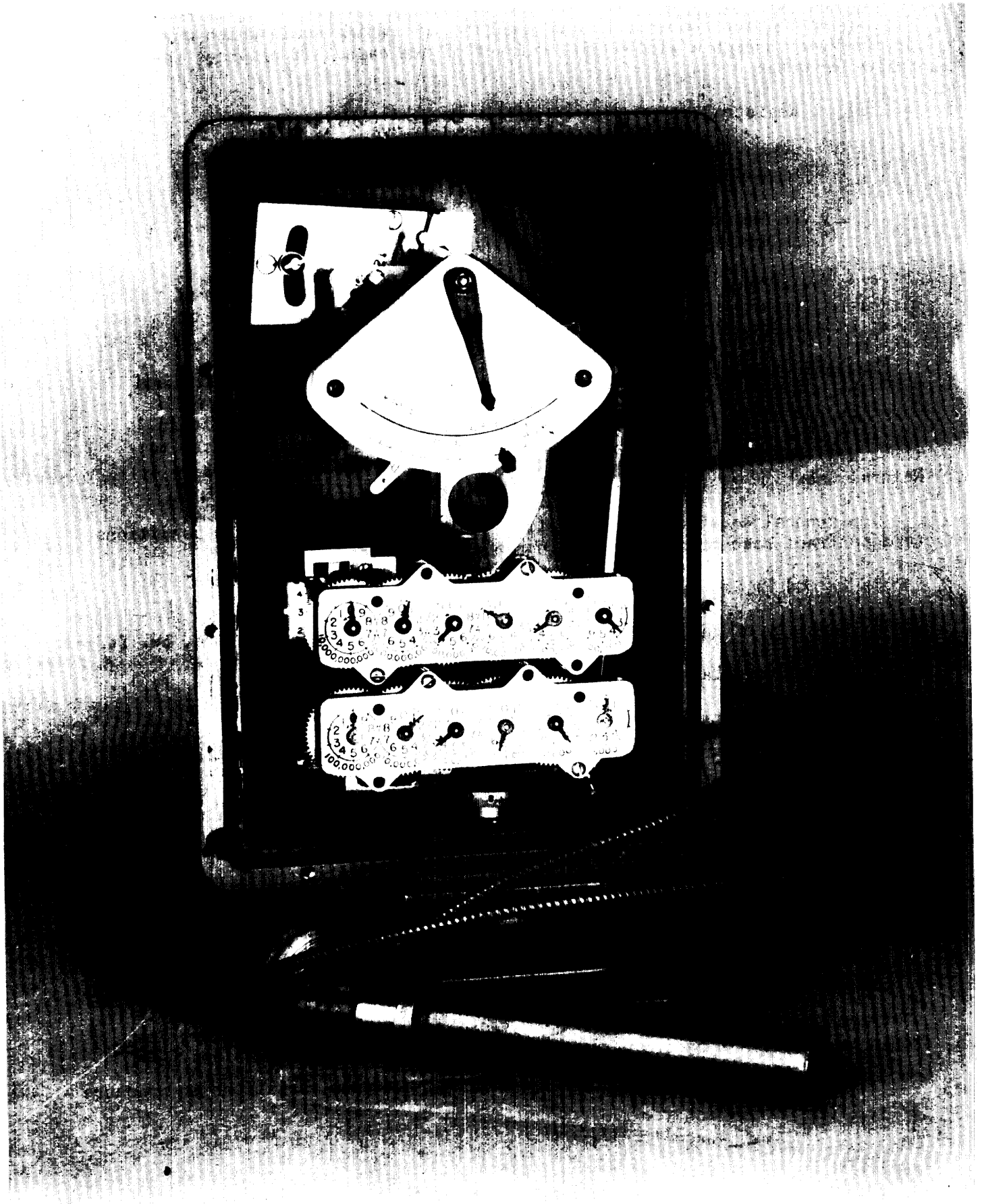

and temperature normally existing at the meter must not introduce an error greater than ±0.5% in the selected $(Fpv)^2$ factor used for correcting registered volume at base conditions.

The Temcorector Type I is designed to sense and indicate the line pressure and flowing temperature of the gas, and automatically and continuously apply the momentary pressure and temperature multipliers thus eliminating the need for weighted multipliers. This function is achieved through the employment of a cam type integrator which combines the corrective effects for pressure and temperature 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 indicating pointer.

2. Temperature measuring system which controls the position of the pivot point of the integrating knife and through a linkage connects to the temperature indicating pointer.

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.

In operation the output shaft of the gas meter drives the Temcorector, 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. At the same time the temperature system controls the position of the pivot point of the integrating knife which strikes the cam. The effective angle through which the knife travels is thus dependent on (a) the position of the cam, and (b) the position of the pivot point, i.e. pressure multiplier and temperature 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,

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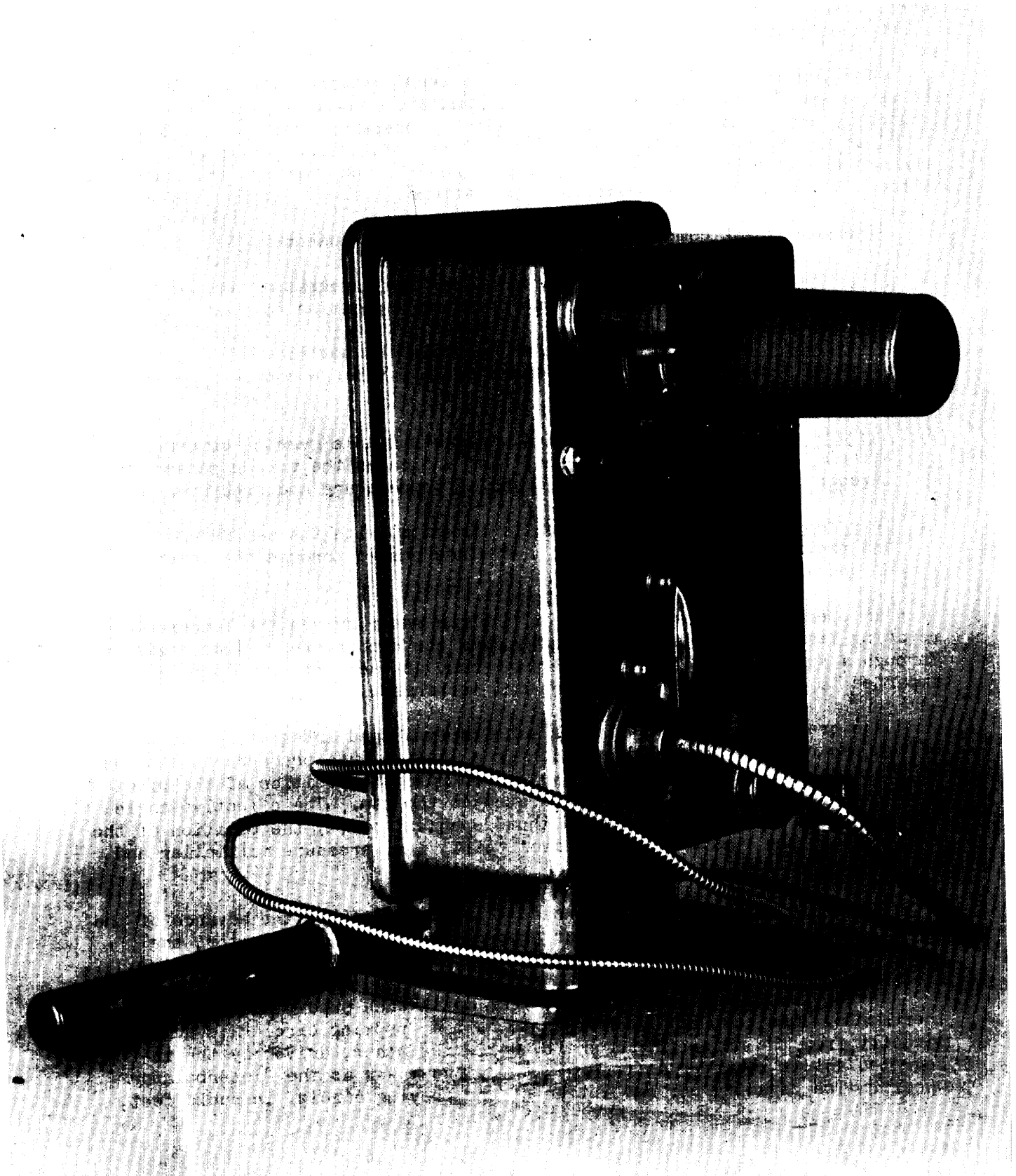

is marked on the nameplate and it is usually 1/10 of the capacity of the lowest digit of the uncorrected register. The capacity per revolution of the interpolator wheel is always 1/10 of the capacity of the lowest digit of the integrated volume register. The capacity of the last digit of cyclometer registers is marked on the nameplate by an appropriate number of zeros following the lowest digit.

The Temcorector Type I is primarily intended for use with gas meters of Rockwell manufacture.

When used with meters of other manufacture, appropriate adapters 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 Temcorector. These adaptors may also serve to match the direction of the meters output shaft rotation with the proving circle rotation on the Temcorector. Correct rotation of the latter is indicated by the increasing numerals on its scale. The correct rotation of the registers must always be verified.

The Emcorector Type I differs from the Temcorector I in that it has no temperature measuring system and accordingly the integrator corrects for pressure factor only.

It must be emphasized that the lack of the temperature measuring system does not permit proper solution of the equation

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

since the temperature multiplier, Tm, cannot be readily established.

For this reason the Emcorector Type I 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. Such record is required to ensure that sufficient information is available to properly establish the weighted average flowing gas temperature for the temperature multiplier, as well as provide the basis for proper evaluation of the supercompressibility factor, Fpv. The temperature multiplier must be applied separately to the readings of the integrated volume register.

It is recommended that a special reflective paint be used on the outside of the cases of these instruments when they are likely to be exposed to solar heating.

Each instrument shall have the following information marked on a nameplate: Manufacturer's name, Instrument's Type and Serial number, Pressure range, Base pressure, Applicable atmospheric pressure, and for Temcorectors I also Temperature range and Base temperature.

Approval granted to:

Rockwell Mfg. Company,
Guelph, Ontario.

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