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Instructions For Proving Temperature Compensated Domestic Meters With Double Band Tangents

Description Of Domestic Meters With Double Band Temperature Compensated Tangents

The compensator illustrated below is the type designed for use in all domestic hardcase meters produced by American Meter. A stamping, F is soldered to the crank and carries the check rate adjusting screws. A stamping, G which is pivoted on stamping F, carries the stroke adjustment. The stroke adjustment screw is attached to the stamping G; lock nuts permit setting, and locking, the stroke adjustment.

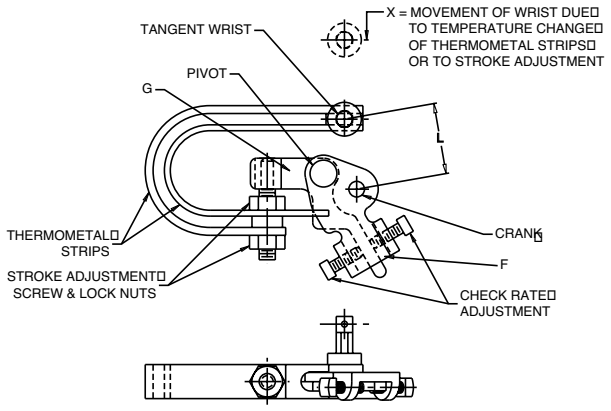
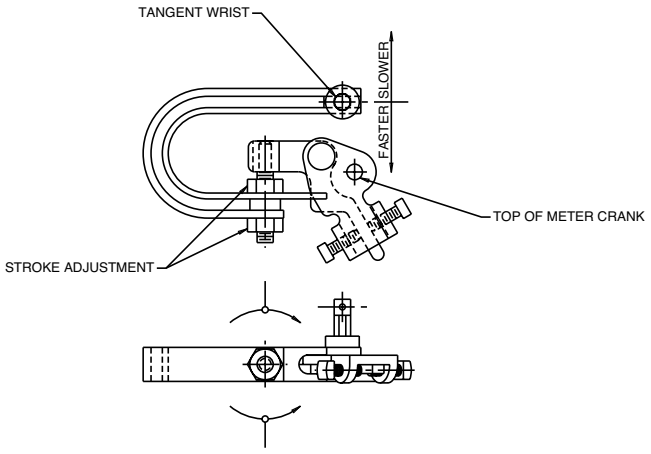


Figure 1- Temperature compensating tangent for domestic meters

The temperature compensating tangents of the domestic meters are each provided with two adjustments; one a stroke adjustment-affecting both the check rate and open rate proofs, the other a timing adjustment, which brings the check rate proof to the open rate proof. This last adjustment is a reverse of the procedure employed with the conventional tangent-but it conforms with the geometry of the device, and it facilitates its operation. These adjustments will be considered separately.

The stroke adjustment shown in the figure below consists of two lock nuts which may be adjusted to move the tangent wrist in relation to the crank. When the tangent wrist is moved away from the crank the diaphragm makes a greater stroke. The meter passes a larger volume of gas and the proof of the meter is raised.

Effect of Stroke Adjustment on Proof of Meter



Clockwise Change of Stroke Adjustment
Raises Both the Open and Check Rate Proofs

Figure 2- Counterclockwise Change Lowers Both Proofs

The effect is obtained by turning the locknuts clockwise as shown. The opposite occurs with counterclockwise adjustment. It should be noted that a change in the stroke adjustment affects the proof of the meter at all rates. The stroke adjustment is designed so that one turn will cause a change in proof of approximately 4.8%. The locknuts are hexagonal; therefore, turning the locknuts one flat will cause a change in proof of approximately 0.8% at both open and check rates.

The check rate adjustment shown in the figure below consists of two set screws which cause the tangent wrist to move about a pivot through the path as shown. The location of the pivot is designed to provide the adjustment effect illustrated. A check rate adjustment of one turn causes a change in proof of approximately one percent at the check rate. The effect of this adjustment decreases at increasing rates. The above results apply to domestic meters in the AC-175 through AC-630 style class.

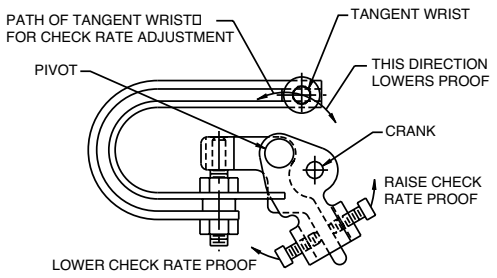


Figure 3- Check Rate Adjustment

Apparent Proof vs. Base Temperature Proof

It should be noted at this point on a temperature compensated meter calibrated to an actual base temperature proof of 100, the prover scale will not indicate a proof of 100 unless the prover (or meter) temperature is exactly at base temperature. If the prover (or meter) temperature is higher than base temperature, the meter will show an apparent proof of more than 100. If prover temperature is less than base temperature, the meter will show an apparent proof of less than 100. For instance, if the meter (or prover) temperature is 70° F. and base temperature is 60° F., the apparent meter proof as read on the prover scale will be 101.9 in order to have an actual base temperature proof of 100:

$$\frac{530 \text{ (absolute prover temperature)}}{520 \text{ (absolute base temperature)}} \times 100 = 101.9$$

If the temperature of the prover is reduced to 60° F., the apparent proof on the prover scale will be 100, the same as the actual base temperature proof.

To illustrate the operation, assume that the meter has an apparent proof of 105 percent at the open rate and 104 percent at the check rate, when tested at 77° F. It is desired that the base temperature proof of the meter be adjusted to 100.5 percent, at both rates, at the base temperature of 60° F.

From the table on page 3, for a room temperature of 77° F., it can be seen that the meter must be set to apparent proof of 103.3 percent for a 100.0 percent base temperature proof; consequently for the desired base temperature proof of 100.5 percent, the apparent proof must be set at 103.3+0.5=103.8 percent at both open and check rates.

The recommended adjustment procedure is to bring the check rate proof equal to the open rate proof by means of the check rate adjustment and then to bring both proofs to the desired value by means of the stroke adjustment. Following this procedure, increase the check rate adjustment from 104 percent to 105 percent. This requires an adjustment of one turn counterclockwise of the right-hand set screw (see figure 3). After the right-hand screw has been turned one turn counterclockwise, the left-hand screw should be tightened.

The stroke adjustment must be moved to lower both proofs from 105 percent to 103.8 percent. This is a change of 1.2 percent. It is therefore necessary to turn the stroke adjusting locknuts counterclockwise by 1.2/4.8=1/4 turn; or, using flats, by 1.2/0.8=1 1/2 flats, counterclockwise. This adjustment would be made by backing off the outer locknut (turning counterclockwise 1 1/2 flats) and tightening the inner locknut (see figure 2).

Table 1
Table Of Apparent Proofs In Percent As Read At Prover For Temperature Compensated Meter Having A Proof Of 100% At Base Temperature

Room Temp. °F.	60° F. Base	65° F. Base	70° F. Base	Room Temp. °F.	60° F. Base	65° F. Base	70° F. Base
60	100.00	99.00	98.10	81	104.00	103.00	102.10
61	100.20	99.20	98.30	82	104.20	103.20	102.30
62	100.40	99.40	98.50	83	104.40	103.40	102.50
63	100.60	99.60	98.70	84	104.60	103.60	102.60
64	100.80	99.80	98.90	85	104.80	103.80	102.80
65	101.00	100.00	99.10	86	105.00	104.00	103.00
66	101.20	100.20	99.20	87	105.20	104.20	103.20
67	101.30	100.40	99.40	88	105.40	104.40	103.40
68	101.50	100.60	99.60	89	105.60	104.60	103.60
69	101.70	100.80	99.80	90	105.80	104.80	103.80
70	101.90	101.00	100.00	91	106.00	105.00	104.00
71	102.10	101.10	100.20	92	106.20	105.10	104.20
72	102.30	101.30	100.40	93	106.30	105.30	104.30
73	102.50	101.50	100.60	94	106.50	105.50	104.50
74	102.70	101.70	100.80	95	106.70	105.70	104.70
75	102.90	101.90	100.90	96	106.90	105.90	104.90
76	103.10	102.10	101.10	97	107.10	106.10	105.10
77	103.30	102.30	101.30	98	107.30	106.30	105.30
78	103.50	102.50	101.50	99	107.50	106.50	105.50
79	103.70	102.70	101.70	100	107.70	106.70	105.70
80	103.80	102.90	101.90				

Note: For desired base temperature proofs other than 100 percent, add or subtract the difference desired to the tabulated proofs.
Example: For a desired base temperature proof of 100.5 percent at 66° F. base, assuming the proof room temperature at, say, 80° F., the apparent proof as read on prover scale should be 102.9 (80° F. room temperature, 65° F. base) plus 0.5 percent=103.4 percent.

When proving a meter, the meter must be calibrated to an apparent proof as indicated by prover temperature. (See Table 1). Tables are readily available showing desired apparent proofs for various base and prover temperatures. No calculations are necessary in the proving room.

Proving Temperature Compensated Meters

Temperature compensated meters may be proved on a conventional prover in the conventional manner.

It is recommended that the prover pressure be maintained at 1.5 inches of water. The badge rate of the AL-110-LPG, AL-175 and AC-250 Aluminumcase meters at 1.5 inches prover pressure is badge rate in cubic feet per hour of air. It is recommended that a check rate of 60 cubic feet per hour of air be used for these meters. Although the open rate of the AL-250 meter is 330 cfh and the AL-425 is 525 cfh at 1.5 inches, it is recommended that the AL-250 meter be calibrated at a badge rate of 250 cfh and the AL-425 meter at a badge rate of 425 cfh. The meter may be proved at any convenient constant room temperature. However, it is important that the meters and prover be stabilized at the room air temperature. The prover oil temperature should be within 1° F. of the room air temperature and the meter should remain in the prover room overnight in order to stabilize at the room air temperature.

Table 2
Table Of Proof Change Adjustments

Meter Size	Check rate Adjustment % per turn	Stroke Adjustment % per turn	% per flat
AL-175	1.00	4.8	0.8
AC-175	—	—	—
5B-225	1.00	4.8	0.8
AL-250	0.75	4.8	0.8
AC-250	1.00	4.8	0.8
AL-425	0.80	4.8	0.8
5B-1C	1.00	4.8	0.8
AL-110	1.00	4.8	0.8
AC-630	0.80	4.8	0.8

Temperature Compensating Conversion Kits

Kits are available for converting existing American meters of current design to temperature compensating meters

The kit consists of a temperature compensating tangent and the necessary washers, pins, etc.

Meters to be converted must be of current design and in good working order. Meters not of current design, especially meters having leather diaphragms, would have to be completely repaired and 3-convolution low temperature Duramic diaphragms installed.

An American Meter sales engineer should be consulted before a conversion program is undertaken.

Complete kits listed below are available through Erie Parts Service of American Meter Company.

44718K022 AL-425 2' Ft. w/ Crank Assembly
44718K023 AL-175 1' Ft. w/ Crank Assembly
44718K024 AL-175 1' Ft. w/ Crank Assembly
44718G023 AL-425 2' Ft. w/o Crank Assembly

Due to continuous development the information in this document is subject to change.

Caution:

Handling and Disposal

"As a knowledgeable user of American Meter's products, we are sure that you are aware that parts in the Company's meters and regulators contain or are coated with heavy metals such as cadmium, zinc, lead and chromium. Obviously, therefore, repair or refurbishment of this equipment should take into account the presence of these materials and should comply with all state and federal requirements concerning worker protection, proper disposal and safety, including protection against exposure to dust and fumes."

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