



Instruments and Software for the Corrosion Engineer
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MAN140

Model IA Potential Meter

Reference Manual Part # 4107





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IA Potential Meter

The IA Potential Meter is used primarily for measuring the DC “structure-to-electrolyte” potentials associated with various buried or submerged structures such as cables, pipes, tanks, ship hulls, ship ballast tanks, water tanks, etc. The meter may be used to measure actual potentials on the 0-2 volt scale or as a “go/no-go” indicator using color bands. A copper/copper-sulfate reference electrode is attached to the base of the meter to facilitate the “structure-to-electrolyte” readings.

“Go/No-Go” Interpretation:

Since the accepted protection criterion associated with cathodically-protected structures is a minimum structure-to-soil voltage value of 0.85Volts versus a copper/copper sulfate electrode, meter readings larger than 0.85V (green area on the scale) would represent a properly protected structure (a “Go” situation), while meter readings smaller than 0.85V (red area on the scale) would indicate a structure that is not protected to a high enough degree, which would be a “No-Go” situation. It should be noted, however, that the 0.85V criterion refers to the polarized potential, or the “instant-off” potential, rather than the “ON” potential (CP current ON) which would include any IR drop occurring in the soil. Consequently, the CP current should be interrupted for the reading in order to verify that the true polarized potential is above (larger than) 0.85V.

The input resistance of the IA Potential Meter is 10 mega-ohms (10 million ohms). Therefore, all readings taken should be quite accurate except where the reference electrode is in extremely high-resistive soils such as dry sand, gravel or on top of dry paving.

An AC rejection filter is built into the amplifier module to reject power system AC potentials as high as 35 AC volts. Operation may be affected by very high frequency pickup when the meter is used close to radio and television broadcasting stations, walkie-talkies, etc.

Operation

1. Properly prepare the copper/copper sulfate reference electrode ahead of time.
2. Connect the **BLACK** test lead to the banana jack on the meter and to the structure.
3. Remove the orange protective cap from the electrode.
4. Make good electrical contact between the soil and the reference electrode (wetting the soil with water when necessary).
5. Depress the **READ** button on the meter’s base.
6. Release the **READ** button after the reading has been taken.



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Battery Test

In order to check the voltage of the internal battery, follow these steps:

1. Depress **BOTH** of the push buttons on the meter's base.
(Note: The meter should not be connected to a structure or other source of potential when the internal battery is being tested.)
2. Replace the internal battery if the pointer stops below the battery arc line on the scale.

Current is drawn only while the Push-to-Read button is depressed and the drain is only around 0.5 to 0.6 milliamperes. The battery should have an operational life practically as long as its shelf life (normally, one year).

Battery Replacement

To gain access to the internal battery, follow these steps:

1. Remove the three (3) screws located within the rim of the instrument case.
2. Carefully remove (lift out) the complete assembly.

To facilitate battery replacement, the case may be separated from the meter/amplifier/battery assembly by unplugging the connector on the end of the wiring harness. If the potential meter will be used in temperatures down to 32°F or below, use a 9V or equivalent battery. If the meter fails to function properly after replacing the battery, refer to the Trouble-Shooting Suggestions below.

Calibration

M. C. Miller Co., Inc. certifies that the IA Meter meets or exceeds all published specifications and has been calibrated using standards whose accuracy is traceable to the National Institute of Standards and Technology (NIST) within the limitations of the institute's calibration services, or have been derived from accepted values or natural physical contents, or have been derived by ratio or self calibration techniques.

Under normal use, the IA should be calibrated annually to ensure the accuracy of its readings. Only the qualified technicians at M. C. Miller Co., Inc. should do this annual calibration. Contact MCM for annual calibration service information at:

sales@mcmiller.com.



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Trouble-Shooting Suggestions

- Push **BOTH** buttons firmly. The pointer should deflect to the battery test sector or beyond. If the pointer does not deflect at all, check the battery and the battery connector to make sure that the full battery voltage is reaching the points where the battery connector wire is attached to the amplifier circuit board. Replace the battery if the deflection is below the test sector on the scale.
- Push the **READ** push button with nothing connected to the meter. The pointer should remain on zero (0), although it may jump slightly when the button is first depressed. If the pointer drifts appreciably from **ZERO (0)** with no input, the amplifier P.C. board should be replaced.
- Connect a source of known voltage (preferably 2 volts DC) to the IA Potential Meter. The **POSITIVE** input is the brass female insert on the bottom of the meter. The **NEGATIVE** lead is the **BLACK** banana jack. Push the **READ** button. The pointer should show the correct voltage $\pm 2\%$ of full scale. If no reading is obtained, check the electrical continuity of the test leads. Also, check to insure that the nut inside of the orange meter case is tight.
- If the pointer appears to be “frozen” in place or hangs up at some point on the scale, the meter’s movement may have to be replaced.
- If the case of the meter’s movement is cracked or broken, or if the glass is pushed in or broken, it is often possible to install a new case, provided that the pointer or the meter’s suspension is not damaged. The removal of the meter’s movement is easily accomplished by removing the screws that secure the meter’s movement to the meter’s orange case.
- When reassembling, ensure that the connector is correctly matched to the pins on the printed circuit board with the **YELLOW** wire next to the **NEGATIVE** terminal.
- All replacement parts and services should be obtained from MCM.