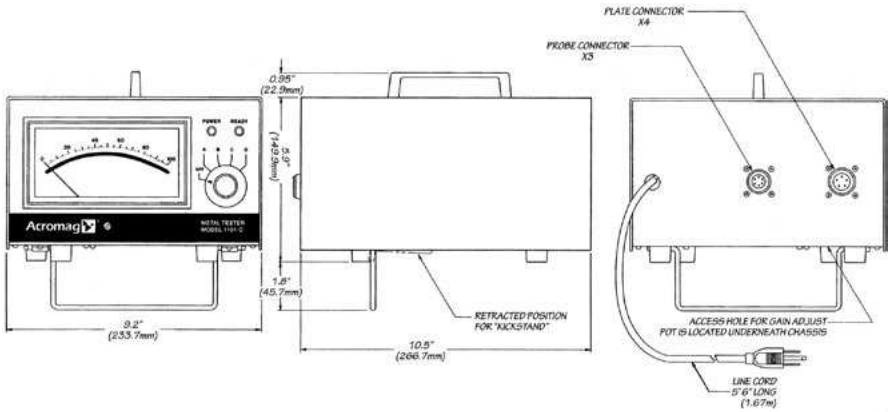
1100 Series Metal Tester

Model 1101-C Thermoelectric Alloy Sorter

Free Test Service



Non-destructive tester ◆ Seebeck Effect (thermocouple principle) ◆ Precision Magnetic Amplifiers

Description

Acromag's Model 1101-C Thermoelectric Metal Tester saves valuable time and helps prevent costly mistakes in mixed-up stock, parts, and heat-treat. It is a low-cost way to help sort expensive alloy scrap, verify precision machined parts in receiving inspection, and check welds. The 1101-C can also be used to detect the presence of insulated coatings on conductive materials.

The Metal Tester can test each part in less than 5 seconds. The hot probe will reach the required operating temperature in less than five minutes. It is a non-destructive test that can be used on precision bearing surfaces. Readings can be made on any size or shape object. Best results are obtained when clean, uncorroded and unplated surface finishes are used. Readings taken from dirty or rusted scrap may differ from readings on clean metal, but with care, the Metal Tester can still supply usable results.

The Acromag Metal Tester uses a high precision solid-state transistor reference temperature controlled probe. Drift is avoided by using a special magnetic amplifier which provides extremely stable and reliable results. .

Principles of Operation

The Acromag Metal Tester utilizes the same theory as a thermocouple, the Seebeck Effect. A thermocouple is formed by paired junctions of two different metals, and when one junction is at a higher temperature than the other, a small voltage is produced. The amount of voltage varies with type of metal and how it has been treated (e.g. rolling, drawing, annealing, etc.).

The tester creates a thermocouple junction on the specimen by means of copper electrodes. One electrode, the plate, is at room temperature. The other electrode, a probe, is heated to about 125°C. When the unknown metal specimen is placed on the copper plate and touched with the hot probe, a complete electric circuit with a small voltage is created. A magnetic amplifier drives a built-in voltmeter, which has several ranges for easier reading.

Key Features & Benefits

- Sorts alloy scrap
- Verifies parts in receiving
- Inspection for proper alloys
- Checks critical welds for location and material
- Detects presence of coatings on conductive alloys
- High-resolution meter:
  - Range A: 5mV full-scale
  - Range B: 1mV full-scale
  - Range C: -1mV full-scale
  - Range D: -5mV full-scale
- Easy-to-use
- Lightweight
- Stable readings
- Uses 115V AC, 60Hz wall outlet

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Bulletin #8400-534c

1100 Series Metal Tester

Operation

How to use Acromag Metal Tester

1. Attach the hot probe and cold plate to the connectors at the rear of the cabinet, and screw on firmly.
2. Plug the unit into a 115V AC, 60Hz power source. The unit uses only 30 Watts.
3. Rotate function switch from OFF to position B. The green "Power" LED should light up immediately showing the power is on.
4. After approximately five minutes, the yellow "Ready" led will start to flicker on and off. This means that the instrument is warmed-up and ready to use.
5. Place a clean metal specimen on the cold plate and gently place the hot probe on the specimen. Apply a moderate pressure of a few pounds.

   IMPORTANT: Do not strike or hit the specimen as this may flatten the hot probe's smooth round tip, which causes erratic readings and excessive wear.
6. Read the meter and record. If the meter reads upwards off-scale, change the function switch from B to A for the reading. If the meter reads downscale, switch from B to C for your reading. If the meter reads upwards off-scale, switch from C to D. In general, read specimens on the B and C ranges whenever possible. If readings are off-scale, read on A and D ranges.
7. Report readings as C-40, D-52, A-12, etc.
8. Readings differing by a value of ±1 or more are considered thermoelectrically different

Limitations

Just as metal identification by spark, chemical or magnetic test is not 100% effective; thermoelectric testing is not perfect either. Some alloys differ only slightly in one or two elements and the change in voltage on the tester may be too slight to produce a different reading. Some alloys have elements in them which may offset one another to produce nearly identical readings. Alloys of identical chemical makeup, but in different physical hardness structure, usually have different readings.

In spite of these limitations, Acromag's Metal Tester has proved a valuable aid to identify a wide variety of alloys, for hardness, etc. For example, distinctions have been made between such alloys as: monel, K-monel, 300-series stainless, 400-series stainless, cobalt base, Inconel, carbon steel, and many high temperature stellites, Hasteallys, and Nimonics.

Hints for Repeatable Readings

1. Hold the probe as shown in the photo. Rocking the probe changes reading slightly. Avoid striking or hitting the probe.
2. Clean metal specimens well. If necessary, clean the hot probe tip with very fine sandpaper and wipe with a clean dry cloth. Avoid cleaning the probe tip more often than needed as this hastens wear and replacement. Be sure to clean metal specimen well and wipe very clean. Failure to remove metal and dirt particles from the specimen causes them to imbed into the tip. This causes very erratic readings. It is then necessary to re-polish and clean the probe tip with fine sandpaper. Never use emery cloth.
3. It is necessary to clean the hot probe tip occasionally with very fine sandpaper. Then wipe clean. This removes normal surface oxides, and surface contamination picked up from metal specimens.
4. At least 25,000 measurements are practical before the hot probe needs rebuilding. With care, more than 100 thousand measurements are possible before complete probe reconditioning is necessary.
5. Some specimens, such as aluminum, may appear clean, but actually have surface oxides that cause false and erratic readings. Three preliminary readings within a one-inch circle of cleaned specimen should agree within two or three fine scale markings. If these readings do not agree, reclean the specimen and/or the probe tip.
6. Painted, anodized, passivated, and plated specimens must have protective coatings removed prior to testing. Otherwise, the instrument reads a mixture of the surface and underneath metal, and readings tend to drift erratically. Experimental tests of cleaned and non-cleaned specimens have determined the need for cleaning.

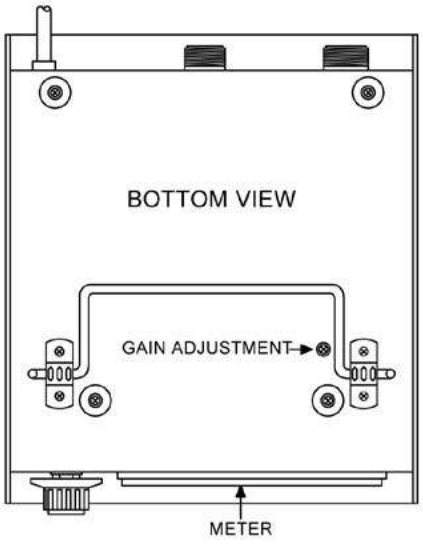
Free Test Specimen Service

Acromag offers a special testing to assist you in determining if an Acromag Metal Tester will solve your particular needs. Simply send a reasonable number of small specimens to the Acromag Sales Department. We will report the Metal Tester readings to you for evaluation. Specimen size and shape are not critical, but they should be smooth, and at least as large as a dime. Please identify each one clearly. If specimens are cut from larger pieces, avoid using heat. This sometimes causes localized heat treat which alters the Metal Tester readings.

Contact Acromag for a Return Material Authorization number and instructions to send in samples for testing.

Calibration Procedure

Acromag Model 1101-C Metal Testers have adjustable calibration to obtain a specific reading on a specific sample. This adjustment allows gain trim of several percent on the internal meter amplifier. To calibrate, turn instrument on and allow several minutes to warm up. Once the ready light begins cycling, the unit is ready to calibrate. One adjustment effects all ranges. Place the known specimen on the plate and apply the probe. Insert a small screwdriver through the hole and adjust the range potentiometer to give the desired reading. An adjustment of approximately 10 percent is possible.



Ordering Information

Models

1101-C
Thermoelectric metal tester , 115V AC, 60Hz
(includes cold plate and hot probe)

Accessories

1101 Plate
Replacement cold plate for metal tester

1101 Probe
Replacement hot probe for metal tester

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