

MAGNETIC PARTICLE INSPECTION

Y1-AC YOKE

OPERATING INSTRUCTIONS



The Y-1 Yoke is an articulated leg magnetic yoke, which provides a portable means of creating magnetic fields for the detection of surface indications.

The unit consists of a core of micro coated laminated C3 Steel - iron with energy efficient magnetizing coils. These components are housed in an isolated shell, which also anchors the power cable and the operating switch. Each leg is connected to the core and has two moveable joints permitting a contouring to fit various part geometry's. The 115v yoke is equipped with a ten-foot line cable having a standard three prong-grounding plug. The 230v version has a line cord without a plug for final integration in the customer's many locations.

Y-1 Electrical Connections

MX P/N	Voltage	Hz.	Amperes
623502	110 / 120 Volt	60 Hz.	2.2 Ampere
623503	220 / 240 Volt	50 / 60 Hz.	1.6 Ampere

Refer to the MAGNAFLUX data plate on the yoke for correct line voltages and frequency.

Caution: The Y-1 Yoke may overheat if energized for a long period. Indication of unit overheating is if the unit becomes too warm to hold comfortably. Normal operation is intermittent. The Y-1 Yoke is rated for a 50% duty cycle, with a maximum on time of 80 seconds.

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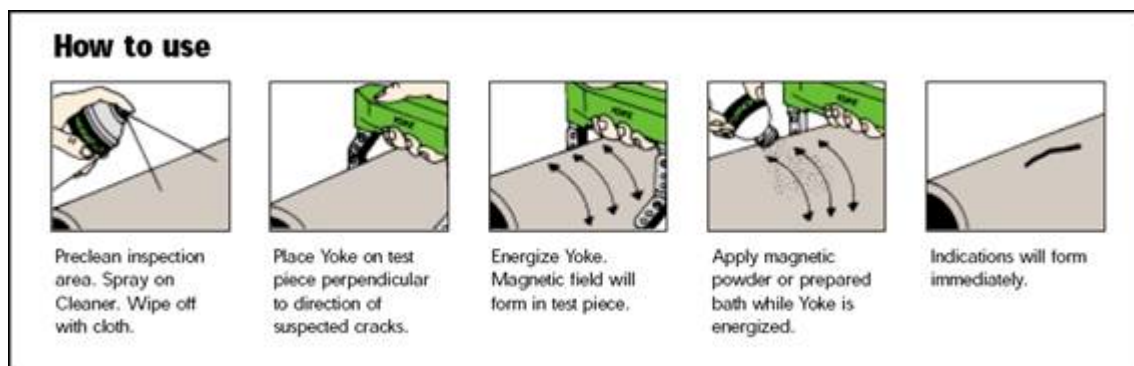
Principle of Operation

With the yoke connected to a suitable source of alternating current, depressing the switch creates an intense magnetic field between the legs of the unit. When applied to ferromagnetic materials, indications or similar surface discontinuities occur across the magnetic field causing leakage fields. These leakage fields indicate the presence of indications when magnetic particles are dusted on the surface.

Depending upon the degree of contact with the test surface, magnetic yokes have a characteristic leakage field around each leg that becomes visible in the presence of magnetic particles and that tends to obscure indications in the immediate vicinity. This area will increase in size on rough surfaces, which results in poor contact between the legs of the yoke and the area tested. For this reason, the best indications will be those mid way between the legs where the magnetic field forms a regular pattern.

The effective magnetic field of a yoke is best described as a multiplicity of invisible lines of force extending across the gap between the legs. When the yoke is applied to a steel plate, the magnetic flux is closed and the magnetic field enters the plate making its passage between the legs of the yoke at and very near the surface. A surface indication across this field cuts the magnetic circuit; the two sides of the indication become opposite poles of a magnet, and a leakage field will occur in the air above the magnetic particles. The magnetic particles are attracted by this leakage field and mark its location.

The magnetic field generated by an AC yoke does not penetrate deep enough to reliably detect subsurface discontinuities. If subsurface discontinuities detection is required, contact Magnaflux (send email to ndt@magnaflux.com or call 847-657-5300) for recommendations.



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Operation:

The legs of the yoke are positioned and placed against a part or area to be tested (the more intimate the contact the better the results). The legs of the yoke are positioned at right angles to the direction of suspected indications. Depress the switch. As an example, when testing for longitudinal surface indications in a weld, the yoke legs should be positioned, so that the yoke legs straddle the weld. If the direction of a possible defect is unknown, two inspections should be done in the area, turning the yoke approximately 90 degrees for the second inspection.

Using the powder spray bulb, dust the area between the legs of the yoke lightly with Magnaflux dry powder (#1 Gray, #2 Yellow, #3A Black or #8A Red), while energizing the yoke. Current should remain “on” (continuous method) during inspection time. This process is then repeated until the entire area of the part is inspected.

The selection of powder color or the use of fluorescent powders is dictated by the desire to create a contrast between the part being inspected and the powder. The use of Magnaflux WCP-2, White Contrast Paint offers excellent opportunities to assist inspections. WCP-2 creates a thin, fast drying, white contrast area on the part you are checking for indications.

Materials to use with the Y-1 Yoke:

- Because of its portability, the MAGNAVIS® “dry method” powders (MAGNAVIS® #1 Gray, #2 Yellow, #3A Black and #8A Red) are generally used with yokes, especially with A.C. Operation. Dry powder is particularly good for application to rough or unfinished surfaces such as forgings or castings.
- The “wet method” materials such as the MAGNAVIS® 7HF Black, (Pre-mixed and packaged in aerosol cans) has greater sensitivity for locating fine indications.
- For extremely sensitive detection, MAGNAGLO® Wet Method - Fluorescent Magnetic Particles are available. 14A Aqua-Glo (14A Powder + Water Based Medium) and 14AM (14A Powder + Carrier II Oil) are available.
- When using Fluorescent particles, an Ultraviolet Black light (ZB-12 Hands Free Black Light or the ZB-100F – Fan-Cooled Black Light) must be used to detect indications.

Interpretation:

After an indication has formed, it must be correctly “interpreted” or “identified”. Size, shape, appearance, location and direction of the indication, as well as knowledge of the history of the part all assist the experienced inspector in correct interpretation.



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Evaluation

The most important part of the inspection is the decision as to whether a part with a known discontinuity is acceptable, can be repaired, or must be rejected. This depends on how the discontinuity affects the serviceability of the part. Many parts with indications are acceptable.

Demagnetization

Demagnetization may be done in two principle ways.

1. Either the part is held within an alternating magnetic field while exciting current is gradually reduced to zero value, for example when using a variable voltage power supply, or the part is slowly withdrawn from the field which in effect accomplishes the same result.
2. In cases where demagnetization is necessary, our Y-1 yoke may be used to obtain a satisfactory level of demagnetization. As applied to yoke operation, the second method described above is approximated by placing the part across the poles while the current is flowing and slowly withdrawing it from the field to a distance of at least eighteen inches before turning off the magnetizing current.

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