

# Western Instruments

Established 1965

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## Operating Instructions October, 2014

WA-14  
w/Energize Button

WA-12  
w/Energize Button

WA-10  
w/Energize Button

WA-8  
w/Energize Button



# WA-Series

## Magnetizing Coils

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WA-Series Coils are operated from either 115 VAC or 230 VAC Power, which also can be either 50 or 60 Hertz. These Coils induce an AC Magnetic Field, at the specified power frequency, in the ferrous material being tested. WA-Series Coils may be ordered with a Foot Switch or an Intermittent Energize Button, and in either case will induce an AC Magnetic Field into the part being tested. These Coils conduct electricity in a circular fashion, which induces a Longitudinal Magnetic field in a workpiece orientated axially through the Coil. This equipment should be utilized within the parameters set by the operational specifications within this guide.

## Description

- 1. Coil Housing** – The Coil Housing is cast from a durable Urethane Rubber, which protects the Aluminum Wire Core. This Robust encapsulant is resistant to cracking and disbonding due to age or high/low temperatures, and is suitable for Dry or Wet Method media. Cast into the top inside portion of the Coil Housing are 2 nonferrous bars, which are used to mount the Aluminum Control Panel Housing. Standard Coil sizes are 8" (203mm), 10" (254mm), 12" (305mm) or 14" (356mm) Inside Diameter and are selected depending on the size of the Work Piece to be inspected, however their operation and maintenance are identical.
- 2. Control Panel Housing** – The Control Housing for WA-Series Coils, used to house the Solid State Electronic Control and Internal Wiring, is securely fastened to the molded coil housing with 4 custom internal aluminum fasteners. The Housing is of a Welded Aluminum Construction, and the Base of the Coil has a Foot molded into the housing to prevent rolling. Mounted to the top of the Control Housing is an anodized aluminum Panel which is used for mounting the Solid Start Activation Switch.

The entire Control Panel Housing assembly acts as a heat sink to dissipate heat from the Solid Start Activation Switch which increases the duty cycle. Operators should not be alarmed when the Control Panel or Housing becomes warm to the touch. Exposure to Bath (Carrier) fluids should be minimized, as they will cause failure to seals or other components mounted to the Control Panel.

- 3. Control Options** – As stated in the literature, WA-Series Coils are available with either a Foot Switch or Western's exclusive Energize Button. The details for each particular Switch function is as follows

- Energize Button* – Activates the Solid State Module which electronically activates the specified voltage.
- Foot Switch* – like the Energize Button, the Foot Switch activates the Solid State Electrical Switch (Module) while depressed.



WA-Series Coil with Energize Button, on Control Housing.

WA-Series Control Housing, with Foot Switch (not Shown)



When either activation system is activated, there is a ½ Watt control signal sent to the Module (semiconductors) sealed in the Output Module. The Output Module connected to a receptacle plug on the reverse side of the Control Panel, and supplies the necessary power to the encapsulated Coil.

If the Coil fails to turn on when the Energize button (or Foot Switch) is depressed, check the following items in this order; AC Mains Power, Power Plug, Power Cord, connection of the Output Module, and lastly the switch via the internal connections, if these connections are all fine, replace the Output Module. The solid state Output Module switches the line power to the internal wire Coil.

**4. Duty Cycle** – The Duty Cycle (maximum duration) for periodic operation is set to avoid overheating of the Internal Aluminum Wire Coil. Warm (or hot) Coil Wires have an increased resistance, and will reduce the overall Ampere Turn output of the Coil.

WA-Series Models should not be activated, using the Energize Button (or Foot Switch) for more than 10 seconds at a time. The activation time should be followed by an equal or longer cool down (or off) cycle. This 50% duty cycle is set to protect the Wire Coil and the Control Components from overheating.

If the unit is used for extended periods of time, with short periods of activation, the operator should be mindful of the temperature of the Coil and Control housing. If the operator has any concern about the actual or planned operation of the Coil, Western Instruments or the Distributor should be consulted.

**5. Field Characteristics** – WA-Series Coils induce a Longitudinal Field in a Work Piece positioned though the Centerline of the Coil. A transverse Field may be introduced, if the Work Piece is short enough, by placing it perpendicular and inside the Coil's inside surface. WA-Series Coils are designed to comply with specifications requiring an Active AC Field.

AC Magnetic Fields are sensitive to surface defects due to the 'Skin Effect' as the field travels over the surface. The Inspection Media (Dry or Wet) has a tendency to migrate toward interruptions (or defects) in the field. The direction and intensity of an AC Field, by it's nature, alternates causing high particle mobility, so defects tend to be revealed immediately.

## **6. Operation**

### **AC Operation**

An AC Field can be used during an Active Field Inspection, and will detect surface breaking defects only. The Operator should not attempt an AC Residual Field Inspection as the Coil's Output Module (Solid State Switch) is designed to stop current flow when the sine wave crosses the zero point. Thus no residual field is induced.

Operators may attempt to demagnetize a workpiece using an AC Field, however it will only demagnetize the surface of the part. Such a demagnetization is acceptable for very small parts, however it will only demagnetize the surface of larger parts. If a larger part is attempted to be demagnetized using an AC Field, only the surface (skin) of the workpiece will be demagnetized. Over a short period of time, the field within the workpiece, will again creep through to the surface.

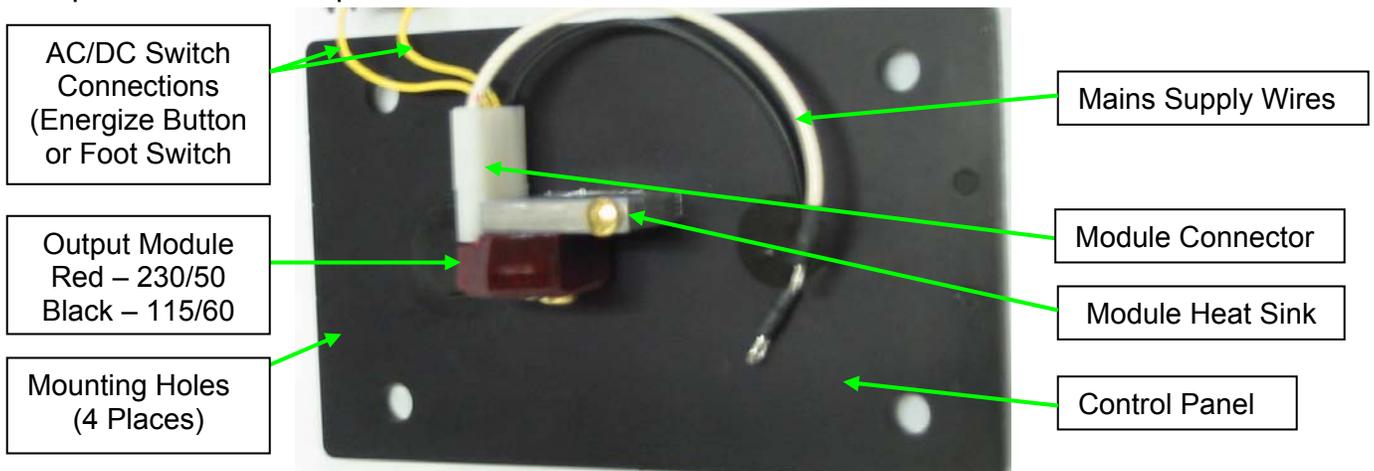
The Duty Cycle of a WA-Series Coil 50%, which means the unit can be operated for extended periods of time without overheating the Core. This time should not exceed 30 Seconds, followed by a 1 to 2 minute cool down cycle. However, any AC Coil is typically used with short shots which are just as effective than a prolonged activation. The only reason to activate a Coil for more than 3 or 4 seconds at a time is to encourage particle migration, longer cycles will not increase the field induced into the workpiece.

**7. Maintenance:** After extended use, WA-Series Coils should be cleaned with a mild soap solution. The unit should be visually inspected regularly for any damage that could cause harm to the operator, or the material being inspected. Special attention should be paid to; the controls (switches) and most importantly the power cord (cable) assembly. Any potential problems to these assemblies must be reported to the distributor or Western Instruments for instructions on corrective action.

Other than routine maintenance, the operator can expect a longer service life. Depending on the Industry or in-house specification utilized, and the type of service (field or shop) the output of the Coil should be tested at regular intervals (yearly), so a Compliance Sticker (Decal) can be attached. This will notify all parties concerned that the field produced by the Coil meets the published figures within this manual, and to insure there is no reduction in the performance of the unit. However, the customer's Quality Manual or a Reference Specification may require more frequent Testing.

The distributor or Western Instruments should be contacted for any specific instructions on maintenance, due to the specific environment of operation. Repairs, that need to be carried out on the product, should be performed by a qualified service organization or Western Instruments.

Throughout this manual, various internal control parts are referred to. Below is a guide to specific control components;



### Wiring

W-Series 230 Volt Models, are designated by a “K” placed after the Serial Number and the Model number (eg. WA-10K), are shipped without an AC Power Plug as there is no international standardization. When installing an appropriately sized AC Power Plug onto the AWG 18-3 Power Cord, the following is the identity of the 3 Color Coded Conductors;

- Green – Ground
- White - Neutral
- Black – Live

The power outlet (Mains) shall be fully grounded, with 3 terminals, one which is a Ground (Earth). Care must be taken to insure the proper installation of an AC Power Plug, and if there is any question, contact your distributor or Western Instruments. If an AC Plug is not installed before use, any warranty is void.

**Warranty:** Western Instruments warrants all WP-Series Coils against defects in materials and workmanship for a period of 1 year from receipt by the end user. Consumable items are warranted against defects in materials and workmanship for 30 days from receipt by the end user. If Western Instruments receives notice of such defects during the warranty period, Western Instruments will either, at its option, repair, replace, or condemn products that prove to be defective.

Any warranty is void if the unit has been modified in any way, mistreated, or if it has been repaired by an unqualified individual or agency. The end user agrees that any equipment's disposition, when returned for warranty work, is at the full discretion of Western Instruments as to whether a claim is under warranty or due to misuse. Western Instruments warranty shall overlook normal wear, however does not include operation outside the environmental specification of the product.

Any warranty work is FOB western Instruments, and any returned units shall include a written description, by the end user, of the fault. Western Instruments makes no other warranty, either expressed or implied, with respect to this product. Western Instruments specifically disclaimer any liability arising from the use of this equipment. For the correct use of Western Instruments WA-Series Coils, refer to the Operating Instructions, furthermore we recommend formal training by qualified personnel. Western Instruments highly recommends the end user exercises all possible safety precautions, including the use of protective equipment, while operating this or other industrial equipment.

### Specifications:

Model: WP-Series;

60 Hz – WA-8, WA-10, WA-12, WA-14.

50 Hz – WA-8K, WA-10K, WA-12K, WA-14K.

Voltage: 115 VAC - 60 Hz (230 VAC/ 60 Hz Optional).  
230 VAC - 50 Hz (Nominal).

Current: 60 Hz Models– WA-8@10 Amps, WA-10@13 Amps, WA-12@16Amps, WA-14@18 Amps  
50 Hz Models – WA-8K@6 Amps, WA-10K @7 Amps, WA-12@9 Amps, WA-14K @ 11 Amps.

Capacity: WA-8, WA-10, WA-12, WA-14 – 4,000 Amp Turns AC.  
WA-8K, WA-10K, WA-12K, WA-14K – 4,000 Amp Turns AC..

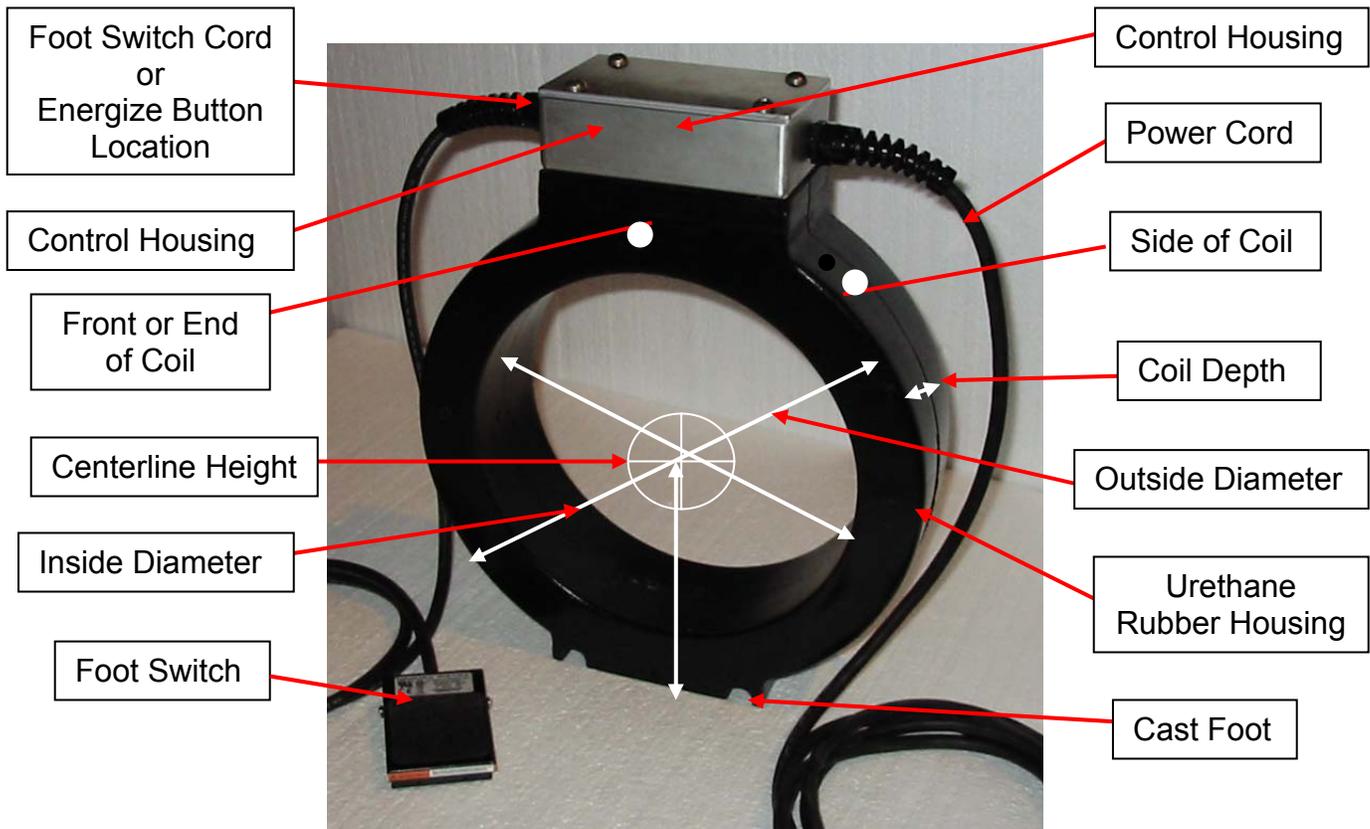
ID Size: WA-8 – 8” (203mm), WA-10 – 10” (254mm), WA-12 - 12” (305mm), WA-14 (356mm).

Depth: All Coils are 3 5/8” (22mm) Wide.

Weight: WA-8 - 14 pounds (6.8kg), WA-10 - 16 pounds (7.7kg), WA-12 - 18 pounds (8.6kg),  
WA-14 - 22 pounds (10.5kg).



# WA-Series Coil Nomenclature



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