

# **WS-Series**

## **Operating Instructions**

### **Pulse DC End Area Coils**

#### **Drilco® Style**

WS-Series Coils are operated from either 115 VAC or 230 VAC Power, which is either 50 or 60 Hertz. These Coils induce a Strong DC Magnetic Field, at the specified AC Voltage and Frequency Input, in the ferrous material being tested. The strong DC Pulse from WS-Series Coils induces the DC Field into a workpiece. These Coils conduct electricity in a circular fashion, which induces a Residual 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 non-ferrous 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.

**Control Panel Housing** – The Control Housing for WS-Series Coils, is used to mount the Solid State Electronic Controls, and is securely fastened to the molded coil housing with custom internal aluminum fasteners. The Control Housing is of a Welded Aluminum Construction, and fitted with an anodized aluminum Control Panel which is used for mounting the Coil’s On off Switch and Energize Button.

The entire Control Panel Housing assembly acts as a heat sink to dissipate heat from the electrical / electronic controls 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.

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

WS-Series Models should not be activated, using the Energize Button for more than 5 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.

**3. Field Characteristics** – WS-Series Coils are considered a Full Wave DC device as they induce a strong Residual Magnetic 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 annulus. WP-Series Coils are designed to comply with specifications requiring Residual or Active Fields.

Full Wave DC Coils induce a Residual Magnetic field that penetrates the work piece more deeply, however these residual fields are still sensitive to surface defects. When inspecting with a Residual Field, inspection media tends to adhere to the entire target area of the work piece, due to the reduced particle mobility. The operator may need to adjust the way the inspection media is put onto the workpiece. Media application at right angles to the field is beneficial. Furthermore the amount of inspection media placed on the surface of the workpiece may need to be adjusted. An excess may make an indication unclear and not enough media may not fully cause an indication to be made visible. The intensity of a DC Field, by its nature, is fixed but the Coil does Pulse the field providing some stimulus for the particles to migrate to defects.

#### 4. Operation

With the Coil placed on the Work Piece, such as a threaded end of a pipe, or if the Work Piece is small it can be held within the inside of the coil. If held and if it is short enough to be rotated within the coil, a longitudinal or transverse field can be induced into the Work Piece. Application of particles, depending on the specification and skill of the operator, are applied while the Coil is Energized or after the field is set-up in the Work Piece. Active Field Inspection requires less skill by the operator in the application of the particles. With Residual Field Inspection there is no particle migration and greater skill and care must be taken in the application of the inspection media.



The residual Field Induced by a WS-Series Coil can be measured at the end of workpiece with a simple Pocket Magnetometer. There is typically no Field escaping from a smooth surface so the end must be used. A Hall Effect Magnetometer can be placed at the root of the thread to measure escaping Flux. While a Hall Effect Magnetometer will measure such a magnetic Field from Tong Marks or Marks in the Slip area, but seasoned inspectors will use a Pie Gauge or Castrol Strips for prove up, but a simple Pocket Magnetometer at the end will indicate enough field

**5. Maintenance:** After extended use, WS-Series Coil Housing (Urethane Encapsulant) should be cleaned with a mild soap solution. The Control Housing and Control Panel should only be wiped down with a damp cloth of the same 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 control switches/boots; and 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.

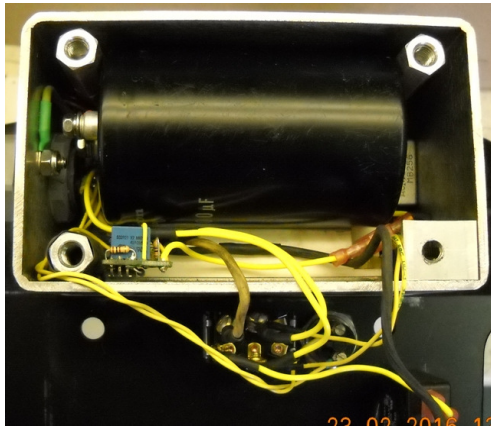
Other than routine maintenance, the operator can expect a long service life. Depending on the Industry or in-house specification utilized, and the type of service (field or shop) the Coil output should be Verified at regular intervals (yearly). Furthermore, during this verification (calibration) the field produced by the coil should be tested to ensure there is no reduction in the performance of the unit. However, the customer's Quality Manual or a Reference Specification may require more frequent Calibrations.

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;

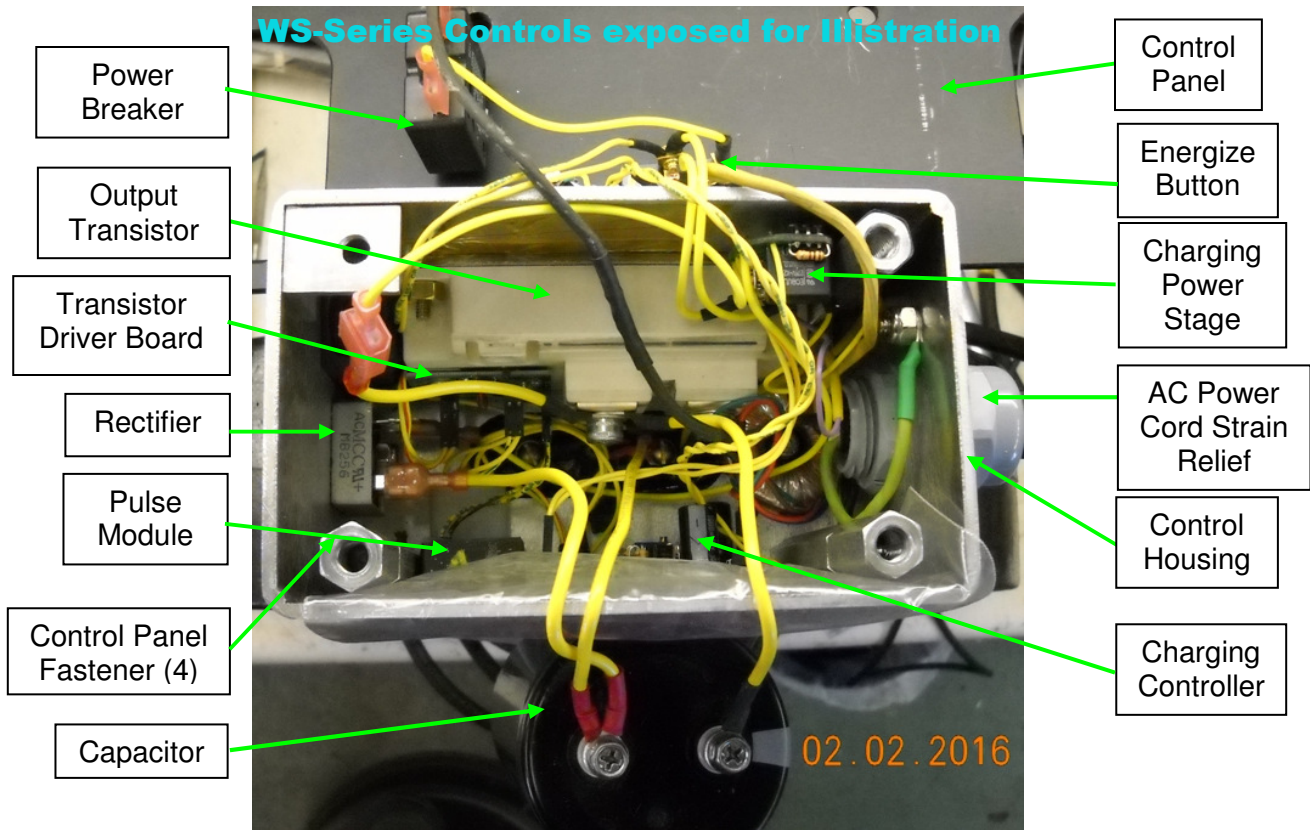
**Attention: Operators should not remove the Control Panel or loosen / tighten fasteners on Control Box**



The Control Panel should only be removed by qualified personnel. When reinstalling the Control Panel to the Control Housing, extra care must be taken to manage the wiring harness, so individual wires are not pinched (or shorted) between the Panel and Housing.

Do not loosen any fasteners on the outside of the Control Housing. Qualified Personnel are those Technicians (or Engineers) who can do PCB Diagnosis and Board Level Repairs. It doesn't mean someone who is good at fixing things, or can use a soldering iron. The WS-Series Controls are complex and have a lot of stored energy

**Warning; The Capacitor stores enough Energy to cause injury**



**Wiring**

W-Series 230 Volt Models, are designated by a "K" placed after the Serial Number and the Model number (e.g. WC-6K), are shipped without an AC Power Plug as there is no international standardization. When installing an AC Power Plug onto the AWG 16-3 Power Cord (SOOW), the following is the identity of the 3 Color Coded Conductors;

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

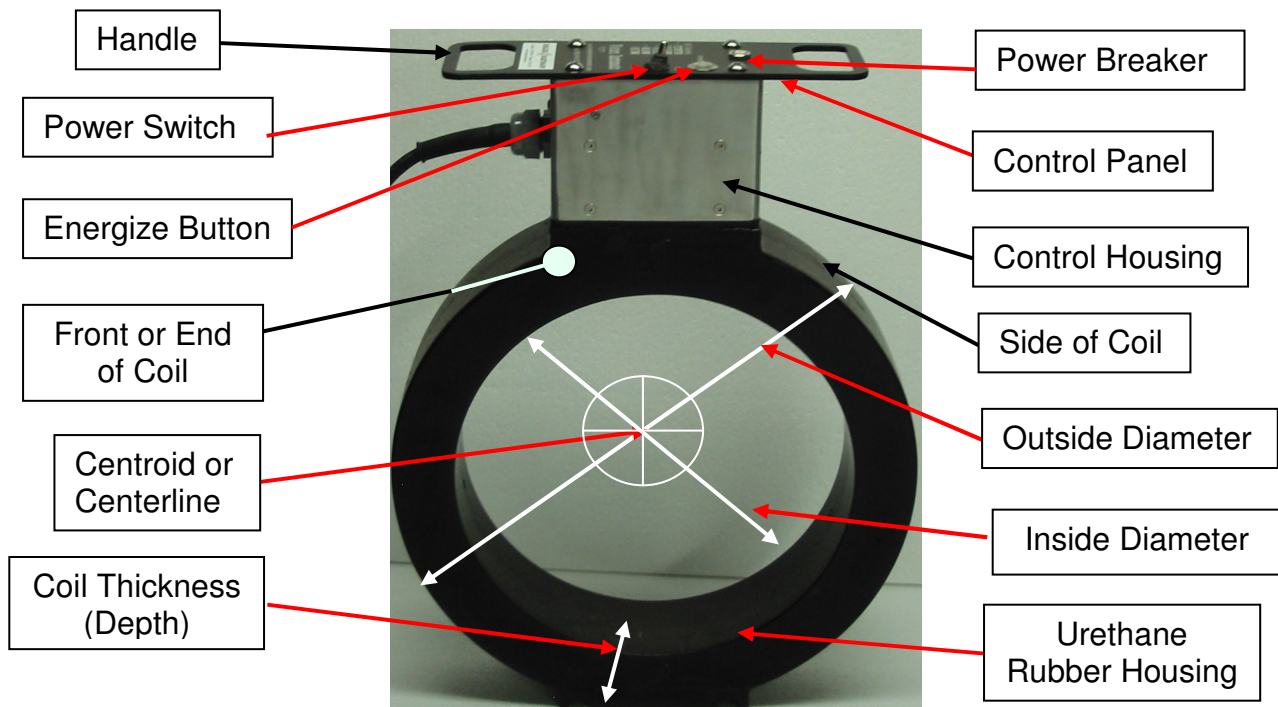
The power outlet (Mains) shall be fully grounded, with 3 terminals, one which is a Ground (Earth). Care must be taken to insure the proper installation of an AC Power Plug, and if there is any question, contact your distributor or Western Instruments. If an AC Plug is not installed before use, any warranty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

**Warranty:** Western Instruments warrants all WS-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 disclaims any liability arising from the use of this equipment. For the correct use of Western Instruments WS-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.

## WS-Series Coil Nomenclature



## Specifications:

Model: WS-Series;

60 Hz – WS-8, WS-10, WS -12, WS-14

50 Hz – WS-8K, WS-10K, WS -12K, WS-14K

Voltage: 115 VAC - 60 Hz

230 VAC - 50 Hz (Nominal).

Current: 60 Hz Models– WS-8, WS-10, WS-12, WS-14 - 15 Amps (Inrush Current)

50 Hz Models – WS-8K, WS-10K, WS-12K, WS-14K - 15 Amps (Inrush Current).

Capacity: 115kVAC x 60Hz

WS-8 – 21,000 Amp Turns DC, 1,100 Gauss at Centroid.

WS-10 – 18,000 Amp Turns DC, 750 Gauss at Centroid.

WS-12 – 17,000 Amp Turns DC, 600 Gauss at Centroid.

WS-14 – 16,000 Amp Turns DC, 450 Gauss at Centroid.

230VAC x 50Hz

WS-8K – 21,000 Amp Turns DC, 1125 Gauss at Centroid.

WS-10K – 18,000 Amp Turns DC, 800 Gauss at Centroid.

WS-12K – 17,000 Amp Turns DC, 620 Gauss at Centroid.

WS-14K – 16,000 Amp Turns DC, 470 Gauss at Centroid.

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

Depth: All Coils are 3 5/8” (92mm) Deep.

Weight: WS-8 - 14 pounds (6.4kg), WS-10 - 15 pounds (7.0kg), WS-12 - 17 pounds (7.7kg),  
WS-14 - 19 pounds (8.5kg).