

Western Instruments

Established 1965

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Operating Instructions

July, 2008



WD-Series

DC Magnetizing Coils

Western Instruments

Established 1965

WD-Series Coils are operated from 115 VAC or 230 VAC Power, which is inverted and induces a DC Magnetic Field in the ferrous material being tested. As the unit conducts electricity in a circular fashion, it induces a Longitudinal Magnetic field in a Central Conductor. This device 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 7 nonferrous connecting rods, which are used to mount the Aluminum Control Panel Housing. Standard Coil sizes are 8 ½”, 10 ½”, 14” or 16” 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 Panel Housing is used to mount the Solid State Electronic Controls of all WD-Series Coils. It is designed to protect the Control Components from damage due to the riggers of field or shop use. The reverse (or underside) of the Control panel acts as the mounting plate for all of the Control Components, while the top side is where all the operator controls are located. As indicated in promotional literature, the Variable Power Supply (WDV-Series) is equipped with adjustable amperage which is variable from 0 to 10,000 Ampere Turns output.

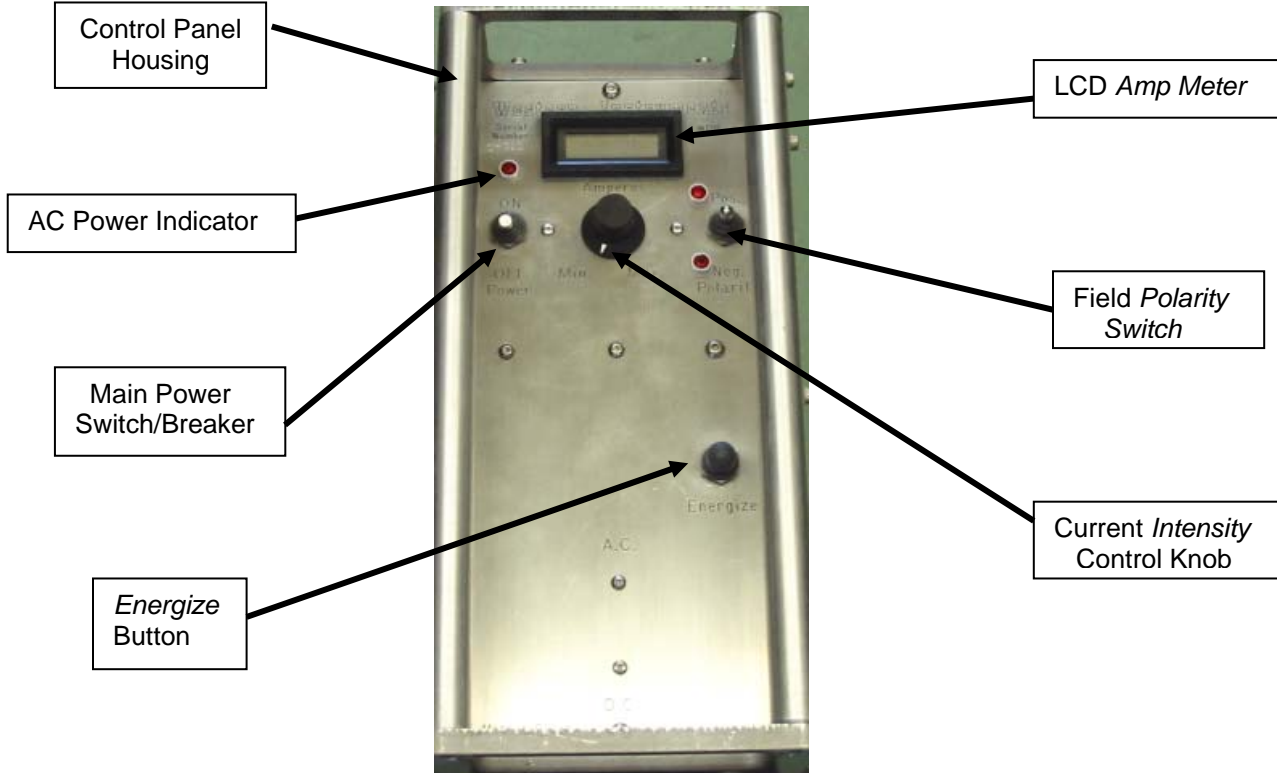
Variable Power Supply (WDV Coils)

The Control Panel Housing used in the WDV Coils is slightly taller than that on the WDP Coils. The WDV panel is equipped with the following control components;

- a) Power On/Off**, controls the AC power to the Coil's Control Components. This switch is a 15 Amp Breaker, that will kick out if the current draw exceeds 15 Amps. The red indicator shows the operator that the AC power is turned on.
- b) Intensity Current Control Knob** allows the operator to control and monitor the amperage to the coil. The Amp Meter may not be completely linear, with respect to the knob position while the unit is not activated, but will indicate the actual current when the coil is energized. The Amperage, with respect to the knob position, is always indicated whenever the Main Power Switch is activated. The scale engraved on the control panel is not calibrated and is only used as a reference point for the operator.
- c) Calibrated LCD Amp Meter** is 3 digits, and also indicates if the applied field is positive (+) or negative (-).
- d) +/- Field Polarity Switch** requires the operator to pause between positive and negative fields, as the existing field in the coil needs to collapse prior the opposite polarity being applied. The Field direction is switched from positive to negative to demagnetize a work piece or to enhance a residual magnetic field.

e) Push Button *Energize* switch is located adjacent to the Polarity Switch, and while depressed allows current to flow through the coil.

Do not press the Energize Push Button when changing the Field Polarity Switch.



Note: These Operating Instructions also apply to Separate Power Supplies provided as retrofits to other manufacturers Coil Assemblies. Western Instruments makes no claims or warranties when used with other manufactures Coils.

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

WDV Models should not be activated, using the Field Activation Switch, for more than 2 minutes 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 Core and Control Components from overheating. WD-Series Coils may be equipped with an optional Thermo-Protection Switch (Automatically resetting), bonded to the wire core, which opens when the core temperature exceeds the preset threshold. 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 housing. If the operator has any concern about the actual or planned operation of the Coil, Western Instruments or the Distributor should be consulted. No matter if the Coil is equipped the Thermo-Protection Switch or not, duty cycles must be observed.

4. Field Characteristics – WD-Series Coils are classified as DC units are designed to 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. WD-Series Coils are designed to

comply with specifications requiring Residual or Active Fields.

AC Option is designed to convert the Output Field from DC to AC. When configured to operate in *AC Mode*, the output of the coil is a minimum of 3000-Ampere Turns, but is size and input voltage dependent. The AC Option is only available where coils have been specifically manufactured with its capability.

Pulsed Power Supply Option is simply equipped with the Main Power Switch/Breaker (15 Amps) with an LED power indicator. The Power Switch/Breaker controls the AC power to the Coil's Control Components. This switch will kick out if the current draw exceeds 15 Amps. The red LED indicates, to the operator, that the AC power is turned on and the Coil is producing a Pulsing Magnetic Field. The Power Supply (WDP) produces a Spike DC Field, which is shaped, and its duration set, to aid particle mobility during inspection.

DO NOT PRESS THE ENERGIZE BUTTON WHEN CHANGING THE FIELD POLARITY SWITCH.

5. Operation

The Coil is either 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 during (Active Field) or after the field is set-up in the Work Piece (Residual Field). Active Field Inspection requires less skill by the operator in the application of the particles, while in Residual Field Inspection there is no particle migration and greater skill and care must be taken in media application.

WDV Models are placed over the Work Piece, setting of the Field Intensity by the operator with the Current Control Knob, and followed by energizing the coil (a "Shot") with the Push Button Energizing Switch. A positive or negative field is induced, followed by an Active or Residual Field Inspection.

To Demagnetize the Work Piece;

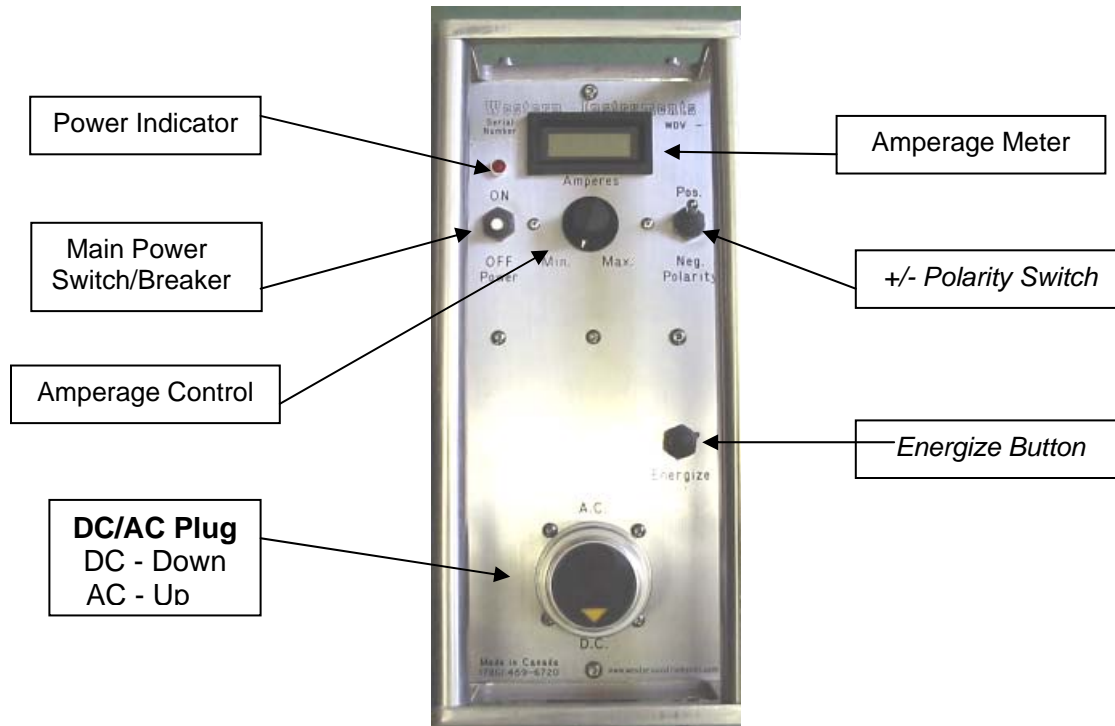
1. The operator places the coil back over the work piece and reduces the Current Control Knob by approximately 20% from the magnetization current selection.
2. The operator must then reverse the field to the opposite polarity (direction) from the magnetization shot.
3. The operator then presses the Energize Button for a short duration.
4. The Current Control Knob is again reduced by approximately 20%, the field is reversed, and then the coil is again Energized for a short duration.
5. Steps 1 through 3 are repeated until the final shot at 0 amps.

The number of demag shots may be decreased or increased depending on; the amount of field induced during magnetization; the size; and the magnetic permeability of the Work Piece. 5 reversing cycles is an absolute minimum, but should rarely exceed 10 cycles. Operator experience will dictate the number of reversing cycles.

Operators should not try to be too quick in their reversing cycles, as reversing the field and energizing too quickly may result in damage to the controls

AC Option (Optional)

The following illustrations of the control panel should be reviewed before reading further;



Plug. The dual position plug is required for the operator to select either DC Mode (normal operation) or AC Mode. For DC operation the Yellow arrow on the plug will point down. For AC the Yellow Arrow will point up.

Do not attempt to change Plug positions with the *Main Power Switch/Breaker* turned on!

When the operator has finished testing the workpiece, he normally performs a reversing DC Demag Cycle as described above. When he is finished, and the work piece has a low residual field, he can fully demagnetize the workpiece by placing the coil in AC Mode.

Changing Mode (AC to DC or DC to AC) is achieved by first turning off the Main Power Switch/Breaker, and unplugging the Power Cord from the Mains Supply (115 or 230 VAC). Then change the Plug Position. After the Plug is in the corresponding position and fully tightened down, the Main Power Cord can then be connected to the Mains Supply, followed by the *Main Power Switch/Breaker*. When the operator wants the Coil to be activated, he simply presses the *Energize* Button.

The Duty Cycle of the unit while in AC mode is 75%, which means the unit can be operated for extended periods of time without overheating the Core. This time should not exceed 5 minutes on, followed by a 2 ½ minute cool down cycle.

To convert the coil back to DC Mode, first turn off the *Main Power Switch/Breaker*, and unplug the Power Cord from the Mains Supply (115 or 230 VAC). Then change the Plug Position to DC Mode. After the Plug is in the DC position, the Main Power Cord can then be connected to the Mains Supply. The unit is then operated as a standard WDV-Series Coil.

Caution: The energy flowing through the internal Coil, in either AC or DC Modes, produces a great amount of stored energy, taking just under one second to dissipate after the power has been turned off.

6. Maintenance: After extended use, WD-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; control switches/boots; Current Control Knob; and the power cord (cable). 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 amp meter assembly should be calibrated at regular intervals. Furthermore, during calibration the field produced by the coil should be tested to ensure there is no reduction in the performance of the unit.

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 an authorized service depot or Western Instruments.

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 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.

Calibration

WD-Series Coils should have their Amperage Meter Calibrated annually or after control repairs have been made (power cords and plugs are not considered “Controls”). However, the customer’s Quality Manual or a Reference Specification may require more frequent Calibrations. North American customers can have calibrations made at an Authorized Service Centre. International customers may not have a Service Centre located in their region, so a qualified company must be found. A company that repairs Industrial Electrical Controls should have the necessary expertise to perform a calibration. If Western Instruments is provided appropriate documentation, the Calibration Procedure can be provided to such a company.

Warranty: Western Instruments warrants all WD-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 unauthorized 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 WD-Series Coils, refer to the Operating Instructions, furthermore we recommend instructional training to IPIA qualifications. 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: WDV-Series;

60 Hz Models – WDV-8, WDV-10, WDV-14, WDV-16, WDV-25

50 Hz Models – WDV-8K, WDV-10K, WDV-14K, WDV-16K, WDV-25K.

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

*WDV-16 and 25 are 230V (50 or 60Hz) only.

Current: 60 Hz Models– WDV-8 and WDV-10, 0 to 13 Amps, WDV-14, 0 to 15 Amps

WDV-16, 0 to 18 Amps, WDV-25, 0 to 26 Amps.

50 Hz Models – WDV-8K and WDV-10K, 0 to 7 Amps, WDV-14K, 0 to 8 Amps

WDV-16, 0 to 10 Amps, WDV-25, 0 to 14 Amps.

Capacity: WDV-8 and WDV-10, 0 to 11,000 Amp Turns, WDV-14, 0 to 14,000 Amp Turns

WDV-16, 0 to 16,000 Amp Turns, WDV-25, 0 to 25,000 Amp Turns.

*With the AC Option, the output for all models is over 4000 Amp Turns.

ID Size: 8 ½ (219mm), 10 ½" (270mm), 14" (355mm), 16" (406mm), & 25" (535mm)

Weight: WDV-8, 40 Pounds (18kg), WDV-10, 45 Pounds (21kg), WDV-14, 60 Pounds (27kg),

WDV-16, 110 Pounds (50kg), & WDV-25, 175 Pounds (80kg).



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