

# Western Instruments

Established 1965

## Operating Instructions

May, 2005



# WC-9UW

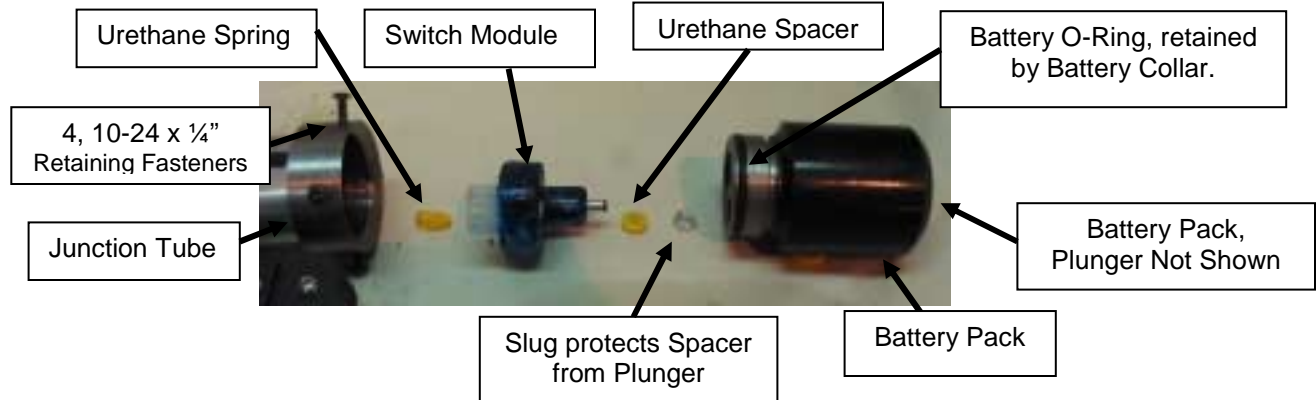
## Underwater Cordless DC Yoke

The WC-9UW allows the Operator to induce a Pulsing DC inspection field (125Hz) into the ferrous material being tested. The unit is tested to Pressures of 75 PSI (150 below sea level) for extended periods. The device should be utilized within the parameters set by the operational specifications within this guide.



## 1. Switch System

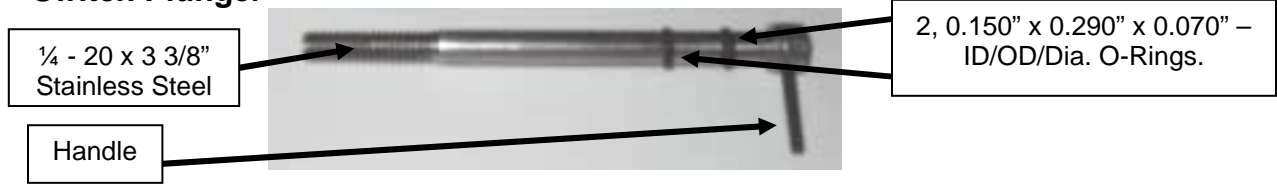
The WC-9UW is activated by means of the Module Switch Plunger Assembly. A small, sealed, WC-Series Switch is mounted on the special Switching Module, which pulses the 13.2 DC Battery Voltage as it delivers it to the coil encapsulated in the Yoke housing. To activate this switch, the operator simply rotates the Switch Plunger approximately 1/4 turn.



When installing the Battery Pack, after charging, fit the Switching Module into the connector at the bottom of the Junction Tube. Ensure the Urethane Spring is positioned in the bottom of the Junction Tube, and line up the Connectors in the bottom of the Junction Tube and on the Switching Module. Then Carefully slide the Battery Pack into the Junction Tube, *feeling* the mating connectors together. After the Battery Pack is in place, simply hand tighten the 4, 10-24 x 1/4" fasteners to retain the Battery Pack to the Junction Tube. Press the Switch Plunger into the Battery Pack, until it stops against the threads cast inside the Pack housing. Carefully rotate the Plunger until the handle is about 3/8" from the end of the Battery Pack housing. Place the

WC-9UW on steel. Then slowly turn the Plunger down until the Yoke activates, then back of the plunger at least ½ turn. The unit is now ready for inspection.

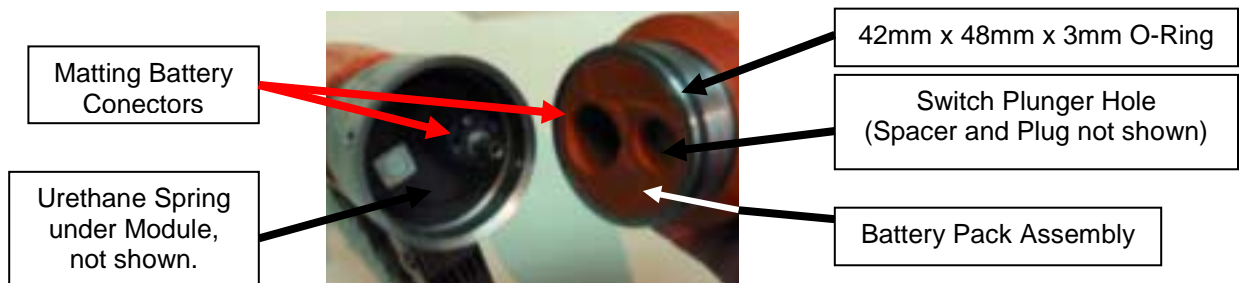
### Switch Plunger



2. **Integral 13.2 Volt Battery Pack** The 13.2 VDC Nickel Metal Hydride Battery Pack has been specially manufactured for the WC-9UW Yoke, and no attempt should be made to replace or operate this unit with one manufactured by others, as it will void it's Class 1, Division II status, and could cause it to fail at pressure. When operating the WC-9UW in a Hazardous Environment, the unit must be removed to a *Safe Area*, for battery Testing or Charging. A Safe Area is defined as an environment where no risk of explosion exists (e.g. Facility Offices).

### Battery Pack Assembly

When installing the Battery Pack, after charging, cleaning, or maintenance, fit the Switching Module into the connector in the bottom of the Junction Tube. Ensure the Urethane Spring is positioned in the bottom of the Junction Tube, and line up the Connectors in the bottom of the Junction Tube and on the Switching Module. Carefully slide the Battery Pack into the Junction Tube, *feeling* the mating connectors together. Install the retaining fasteners, followed by the Plunger Assembly.



### Battery Testing

The Battery is tested with the WC-9UW Battery Voltage Meter. The meter is equipped with a load resistor, so a true measure of the Battery Voltage can be attained. To test the Battery Voltage, insert the Battery Voltage Meter into the connector cast into the Battery Pack. The Battery Meter provides a general reading of the Voltage, but also provides the operator with a general indication of the Battery Capacity or an indication of how much longer the unit



**Battery Meter measuring Battery under load.**



**Inserting Meter into Battery Plug**

may be used for. The WC-9UW will lift 50 pounds with as little as 11 Volts, as indicated by the Battery Meter. As the Battery Meter is equipped with a Load Resistor, which simulates the energy draw for the WC-9UW, it should only be connected for a very short time. If the Battery Meter is left on the Battery Pack, it will drain a fully charged battery is about 2 hours.

### **Battery Charging**

Western Instruments 1.5 Amp Hour Battery Pack should only be charged with the Charger supplied by Western Instruments. Batteries should not be left on charge indefinitely, however, Western Instruments' *Smart Charger* will not typically damage a Battery Assembly if it left charging the Battery for more than the specified time. Batteries should not be stored when at a low charge state, with 14 hours required to fully charge the Battery Pack. The operator plugs the Charger's 13.2-Volt Connector into the Receptacle on the Battery Pack, and should note if the Red *Charging* LED comes on.

Do not attempt to charge the Battery Pack with any other type of charger. Specifically, any type of 'fast' charger may cause the cells in the pack to emit hydrogen, and will drastically shorten their capacity and life. The charger provided is designed to automatically reduce it's current to a 'trickle' after the pack is fully charged. Furthermore, the Green *Charged* LED will glow when the battery pack is fully charged.



Note: WC-9UW and WC-9UWK Yokes are identical, with the only difference being the charger voltage.

The battery condition can be tested with the WC-9UW *Battery Voltage Meter* as outlined above. The WC-9UW will lift 50 Pounds (22.7Kg) with as little as 11 Volts of power left in the battery. Battery Duration Tests are routinely

performed by Western Instruments to test Product Performance, however are far more demanding than typical field inspections, as units are typically not activated on a continuous basis (see *Operational Parameters*). The lift capabilities of the WC-9UW can be easily confirmed with 5 Pull Test Bars, of 10 Pounds (4.54Kg) each, such as 5 of Western Instruments' W-PT®, fastened together.

### **Battery Removal**

When the Battery Pack needs to be removed, for cleaning or charging, remove The Switch Plunger, followed by all 4 of the 10-24 retaining fasteners. Carefully slide the Battery Pack out of the Junction Tube, immediately drying and cleaning all components.

### **Extended Duty Kit**

The *Extended Duty Kit*, simply consists of an Extra Battery Pack. Follow the above instructions, substituting the extra Battery for the spent one.

- 3. Operational Parameters** – The Operational Parameters or Duty Cycle for the operation is set to avoid damage to the internal coil or the Output Module, and must be observed.

**Pulsed DC Operation:** It is recommended that the operator does not keep the Yoke on for more than 2 minutes at a time. This activation time should be followed by an equal time off. This 50% duty cycle is set not to protect the Coil or the Electronic Module, but is imposed to avoid rapid draining of the Battery Pack. A fully charged Battery Pack will last 2 hours under continuous activation, which equates to approximately an 8 hour shift of 'maintenance' inspection (as per Western Instruments' Battery Duration Tests). The battery condition can be tested with either of the WC-9's Battery Voltage Indicators as outlined above.

Typical operation is 5 - 15 seconds on, while applying inspection media, followed by 5 - 15 seconds off repositioning the Yoke to the target area. If the Yoke is used for prolonged periods of time such as 2 to 3 hours of continuous cycling, as outline above, the Yoke will get warm. If the WC-9 is used in this manner the operator must provide time for a sufficient cooling period, or components in the Electronic Control Module may fail.

- 4. Field Characteristics**

**Pulsing DC Field** – The Pulsed DC (125 Hz) Magnetic Field is stronger than an AC Field and tends to penetrate the workpiece more deeply, however DC is still sensitive to surface defects. Inspection media tends to adhere to the entire target area of the workpiece, due to the reduced particle mobility. Dry Particles may need to be 'blown off' to fully reveal an indication, while Wet method requires more careful application of the bath. The intensity of a DC Field, by it's nature, is fixed but the Yoke does Pulse the field providing some stimulus for the particles to migrate to defects.

It must be noted that there is no demagnetization provision on the WC-9UW, so parts will have some residual field in them after inspection. The workpiece can be tested with a Magnetic Field Indicator, such as the W-Series W-FI®, to measure the residual magnet field.

## **5. Operation:**

Position the Pole Pieces (Feet) on the work piece. The area between the pole pieces is your target area, which also extends laterally out, approximately 1.5" (38mm), from either edge of the pole pieces. The Field will expose defects that are transverse to the centerline between the Pole Pieces. The Pole Pieces should be positioned so that as much of their contact surfaces as possible, are on the work piece. The Yoke is then energized, by pressing Push Button Switch, and Magnetic particles are applied. Dry Method Particles are dusted between the Pole Pieces and over the target area, while Wet Method Particles are sprayed in a similar manner.

The Target Area is then inspected visually for a collection of Particles around defects. A Black Light is used to aid visual inspection when Fluorescent Particles are used. Indications found with Dry Powder will tend to form immediately, and will take slightly longer with Wet Method Particles. If the typical direction of defects is not known, rotate the Yoke through 90° and repeat the inspection of the target area.

The WC-9 produces a standard amount of Field Blow as other DC Yokes. Field Blow is a collection of Inspection Media between the Pole Pieces, transverse to the centerline between the Pole Pieces, and may cause a masking of indications. Field Blow can be minimized by extending the Pole Pieces farther apart, If work piece configuration does not permit extending Pole Pieces, reduce the contact area of the Pole Pieces on the workpiece. Follow the Operational Parameters outlined in these instructions

## **6. Maintenance – While performing maintenance, or cleaning, the Yoke should be disconnected from any power source, with safe industrial practices employed.**

After use the Yoke should be fully disassembled and cleaned with a mild soap solution, and dried immediately. Drying can be accomplished rapidly by heating the disassembled Yoke "Frame" (cast housing and articulating legs only) in an oven below 150°F (70°C). The unit should be visually inspected for any damage that could cause harm to the operator, or the material being inspected. Included in the WC-9UW Kit is a supply of *LPS 3 Heavy Duty Rust Inhibitor*, and after the unit has been cleaned and dried, the Pole Pieces need to be coated to avoid rust. Furthermore, the Junction Tube, Battery Collar, and Switch Plunger (all steel parts) should also be inhibited to avoid corrosion.

All Electrical Connections; inside the Yoke's Junction Tube; on the Battery Pack; and both ends of Switching Module also need to be cleaned after every

use. However, rather than applying inhibitor, cover them with the Dielectric Grease included in the WC-9UW Kit. Any potential problems to these assemblies must be reported to the Distributor or Western Instruments for instructions on corrective action.

Special attention should be employed to the sealing surface on the inside of the Yokes Junction Tube, and the O-Ring seal on the Battery Pack and Switch Plunger. These are the primary seal of the system, and must be free of rust, dirt, and any foreign matter. A supply of O-Rings (42mm x 48mm x 3mm –ID/OD/Dia.) are included in the WC-9UW Kit, and should be changed frequently. The fit of the Sealing System should be reasonably tight however, if there is a “loose fit”, report the problem to the distributor or Western Instruments for instructions on corrective action. Do not operate the unit in hazardous environments when the Battery Pack is not fully assembled.

Whether industrial specifications are being observed or not, the Yoke should be tested periodically, using certified Pull Test Bar(s) such as the W-Series W-PT®, to ensure it continues to lift the specified amount of weight. If the unit fails such a test, first inspect the Pole Pieces to ensure they fully contact the test weight. If the unit continues to fail, contact the Distributor or Western Instruments for instructions on corrective action.

- 7. Warranty** – Western Instruments warrants this product, against defects in materials and workmanship for a period of 3 months 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. Due to the nature of the Underwater operational environment for this product, excessive corrosion is considered misuse. Consumable items, such as Batteries, are warranted for 30 days from the date of shipment.

Any warranty is void if the unit has been modified in any way, 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 general specification outlined in these instructions. All 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 the product, refer to the Operating Instructions, furthermore we recommend instructional training to CGSB, ASNT, or other regulatory authority qualifications.

**Western Instruments highly recommends the end user exercise all possible safety precautions, including use of protective equipment, while operating this or other industrial equipment.**

**Specifications:**

Model: WC-9UW  
Battery Voltage: 13.2VDC  
Current Draw: 0.5 Amps @ 13.2 Volts DC  
Charger Voltage: 115VAC or 230VAC Adapter (K)  
Capacity: 50 Pounds (22.7 Kg)  
Pole Spacing: 0 – 11" (0 – 280mm)  
Weight: 7.8 Pounds (3.5 Kg)



7952 Nieman Road, Lenexa, KS 66214-1560 USA  
Phone: 913-685-0675, Fax: 913-685-1125  
[www.ndtsupply.com](http://www.ndtsupply.com), [sales@ndtsupply.com](mailto:sales@ndtsupply.com)