



The Leader of RF  
and Sonic Level

For Assistance Call 1-800-527-6297  
Outside North America 1-215-674-1234

# Installation and Operating Instructions

Series 506-6900  
using 406-6000 Electronics  
for  
Water Dump on Oil/Water Separators

*(215) 674-1234 Outside North America  
1-800-527-6297 US and Canada  
<http://www.drexelbrook.com>  
e-mail: [Service@Drexelbrook.com](mailto:Service@Drexelbrook.com)*

AMETEK Drexelbrook makes no warranty of any kind with regard to the material contained in this manual, including, but not limited to, implied warranties or fitness for a particular purpose. Drexelbrook shall not be liable for errors contained herein or for incidental or consequential damages in connection with the performance or use of material.

Copyright 2000 AMETEK Drexelbrook

EDO # 2-95-246  
506-6900-LM

Series 506-6900  
using 406-6000 Electronics  
for  
Water Dump on Oil/Water Separators

 **AMETEK**<sup>®</sup>  
**DREXELBROOK**

*An ISO 9001 Certified Company*

205 Keith Valley Road Horsham, PA 19044

*US Sales* 800-553-9092

*24 Hour Service* 800-527-6297

*International* 215-674-1234

*Fax* 215-674-2731

*E-mail* [deinfo@drexelbrook.com](mailto:deinfo@drexelbrook.com)

*Web* [www.drexelbrook.com](http://www.drexelbrook.com)

# Table of Contents

- SECTION 1 INTRODUCTION**
  - 1.1 Dumpstar® Description ..... 1
  - 1.2 Models Available..... 1
  - 1.3 Specifications ..... 3
  
- SECTION 2 INSTALLATION**
  - 2.1 Unpacking ..... 4
  - 2.2 Mounting ..... 4
  - 2.3 Wiring ..... 5
  
- SECTION 3 OPERATION**
  - 3.1 Start-Up ..... 6
  - 3.2 Controls ..... 6
  - 3.3 Operating Notes ..... 7
  
- SECTION 4 TROUBLESHOOTING**
  - 4.1 Introduction ..... 8
  - 4.2 Testing the Unit ..... 8
  - 4.3 Testing the Relay Circuits ..... 9
  - 4.4 Testing the Sensing Element (Out of Separator) ..... 10
  
- SECTION 5 FACTORY AND FIELD SERVICE**
  - 5.1 Telephone Assistance ..... 11
  - 5.2 Equipment Return..... 11
  - 5.3 Field Service..... 11
  - 5.4 Customer Training ..... 11

## SECTION 1 - INTRODUCTION

The instructions in this manual are for the Dumpstar 506-6900-XXXX single point interface control for use in oil/water separation.

### 1.1 Dumpstar Description

The Drexelbrook 506-6900 point level controls include a 700 Series retractable sensing element and integral 406-6000 electronics for easy installation.

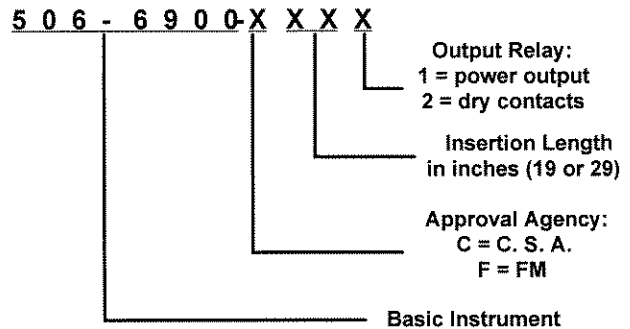
The 406-6000 electronic unit is a precision, RF (radio frequency), relay output instrument. It provides double-pole double-throw relay contact closure when the interface being measured reaches the sensing element in the separator. The relay contacts may be used to operate alarms, solenoid valves, or other low power devices. An alternate "dry contact" relay is available for low current use with programmable controllers (PLC's) and computers.

The Dumpstar Control features Cote-Shield™ design which enables the instrument to ignore the effects of build-up or coating of material on the sensing element when properly installed and applied.

The sensor portion (or probe) provides a change of RF impedance, indicating presence of water (conducting) or oil (insulating).

The Dumpstar control will sense the interface between oil and water only at the point where it is installed. The probe must be physically relocated to raise or lower the sensing/control point. Whether vertical, horizontal, or angle-mounted, the water level is sensed at the tip of the probe.

### 1.2 Model Numbering



# INTRODUCTION

## 1.2.1 Models Available

### A. 506-6900-X19X

(See Figure 1-1). The clearance that is required to install and withdraw is 42 inches from the face of the block valve.

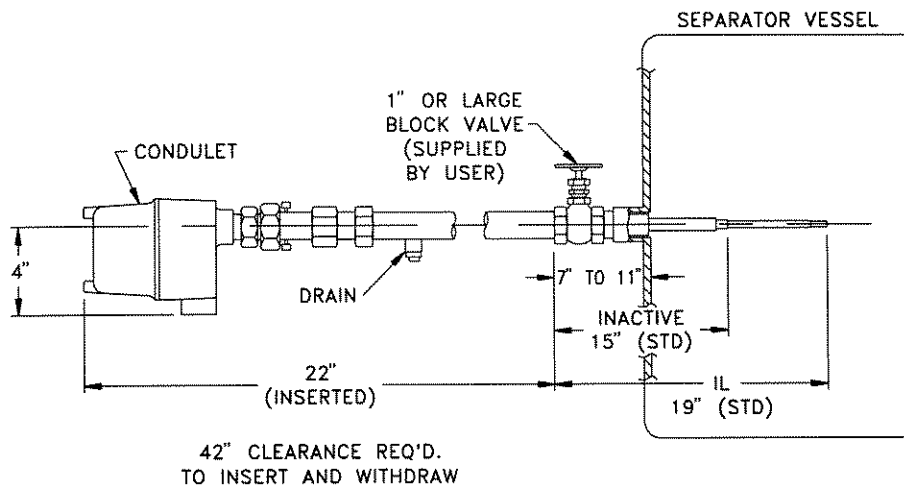
**Insertion Length (IL):** 19 inches less the length of the block valve and nipple.

**Inactive Section:** 15 inches less the length of the block valve and nipple.

**B. 506-6900-X29X** (See Figure 1-2). The clearance that is required to install and with draw is 52 inches from the face of the block valve.

**Insertion Length (IL):** 29 inches less the length of the block valve and nipple.

**Inactive Section:** 25 inches less the length of the block valve and nipple.

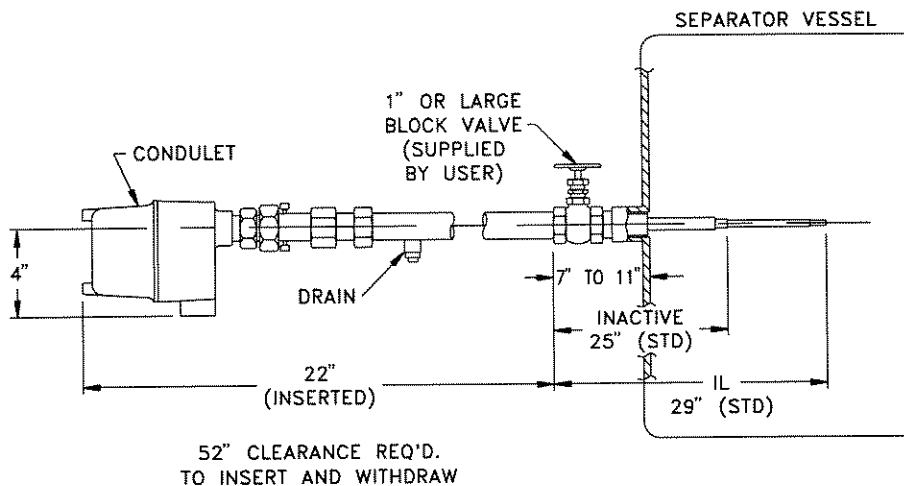


**Figure 1-1**  
**506-6900-X19X**  
**Point Level Control**

# SPECIFICATIONS

## 1.3 Specifications

- A. Power requirement: 95-130 Vac, 50/60 Hz, 1 watt
- B. Level Output: DPDT relay
- C. Time delay: Field adjustable 0-90 seconds
- D. Contact rating:
  - Type 1-5A Non-inductive, 3A inductive (28 Vdc or 120 Vac).
  - Type 2 - 1A Non-inductive (28 Vdc).
- E. Operating temperature:
  - Ambient: -40° to 140°F,
  - Process: 0-300°F
- F. Temperature Effect: 1/2"/100°F
- G. Sensitivity: 0.1"
- H. Process Pressure Rating: 150 PSIG (50 PSI maximum insertion or removal).
- I. RFI protection (Built-in):  
Less than 0.1" shift in operating point from 5W field @ 27, 150, or 450 Mhz at a distance of 5 feet from exposed output cable or power line.
- J. Fail-Safe: Low-Level Fail-Safe (LLFS).  
If power is lost, relay moves to "oil" position.
- K. Sensing Element Material of Construction: 316 SS and TFE insulation.
- L. Mounting Dimensions: 1" NPT. Maximum valve & nipple length is 11". (See Figure 2-1).
- M. Minimum valve I.D.: 7/8"
- N. Standard Housing meets the following classifications:
  - Nema 1 General Purpose
  - Nema 2 Drip tight
  - Nema 3 Weatherproof
  - Nema 4 Waterproof
  - Nema 5 Dust Tight
  - Nema 12 Industrial Use
- O. Explosionproof for:
  - Class I, Groups A, B, C, D, Div. 1 or 2, Class II, Groups E, F, G Div. 1 or 2.
- P. Approvals: C.S.A. or Factory Mutual (specify).



**Figure 1-2**  
**506-6900-X29X Point Level Control**

# INSTALLATION

## SECTION 2 - INSTALLATION

### 2.1 Unpacking

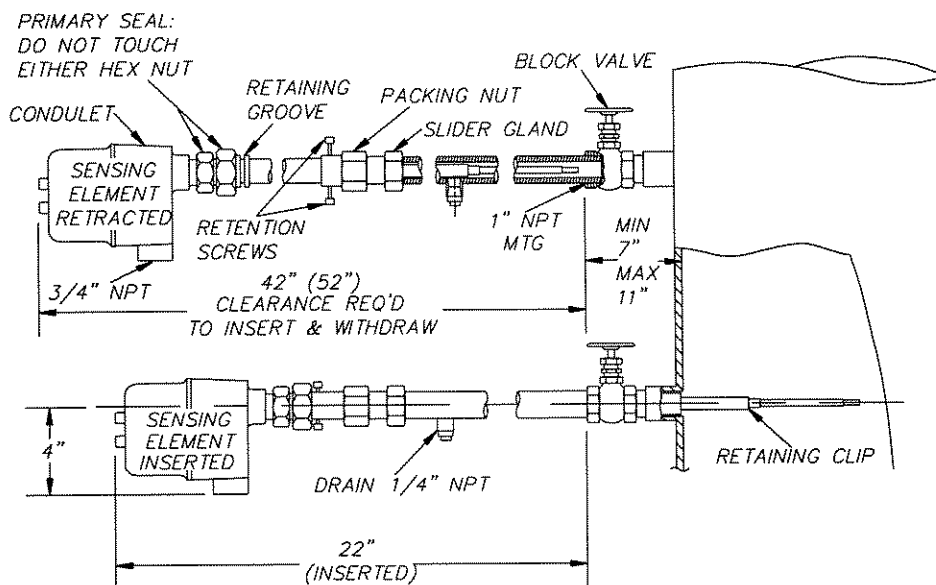
Carefully remove the contents of the shipping carton and check each item against the packing slips before destroying any packing materials. If there is any shortage or damage, report it immediately to the factory.

### 2.2 Mounting

The Dumpstar 506-6900 Series water dump control was designed for field mounting, but it should not be mounted in a location which features vibration, corrosive atmospheres, or any possibility of mechanical damage.

The actual mounting location depends on the placement of nozzles or openings in the vessel, and the level at which the oil/water interface is to be maintained. **Do Not** mount the sensing element through a valve and nozzle longer than 11 inches. To install the retractable Dumpstar control through a 1 inch block valve, follow the steps below. (See Figure 2-1).

- A. Back out the retention screws.
  - B. Loosen the packing nut at the slider gland so that the sensing element will slide out easily, and retract the sensing element until the blowout stop is reached.
- Note:** Do not touch either hex nut on the primary seal.
- C. Thread the sensing element into the block valve. (Minimum valve I.D. is 7/8").
  - D. Tighten the packing nut into the slider gland just enough so that the sensing element will still slide, but tight enough to prevent product leakage from the gland.
  - E. Do not stand directly behind the probe. Crack the block valve. If product leakage is observed, tighten packing nut slightly.
  - F. Insert the sensing element into the vessel, making sure that the retaining groove slides into the packing nut.



**Figure 2-1**  
**Mounting the Unit**



- G. Tighten the retention screws snugly into the retaining groove.
- H. Finally tighten the packing nut again to prevent any leakage.

Installation is complete.

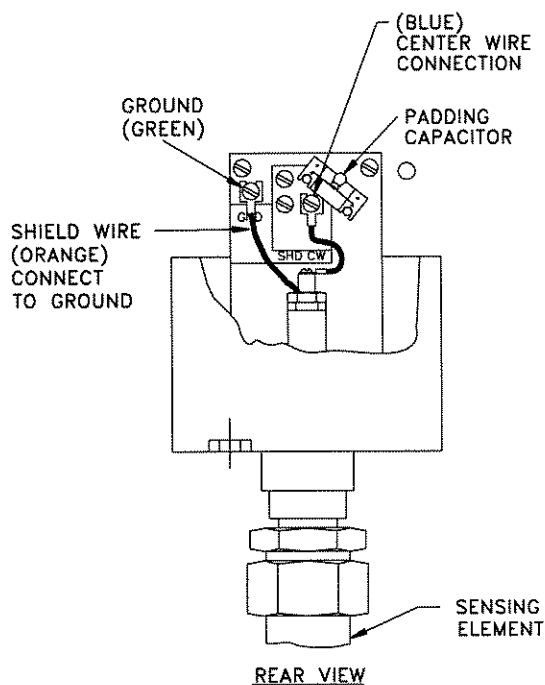
To retract the sensing element, follow the steps below:

**Note:** Before removing the level control, disconnect the connections to the input and relay terminal. Do not loosen primary seal.

- A. Standing clear of the instrument, back out the retention screws.
- B. Loosen the packing nut at the slider gland cautiously.

**Caution:** It is possible that vessel pressure can push the instrument out to the blowout stop.

- C. Withdraw the sensing element until contact is felt with the blowout stop.



**Figure 2-2**  
**Sensing Element Wiring**

- D. Close the block valve.

**Caution:** Flammable liquid can escape at this point. Do not perform this procedure near open flame or any ignition source.

- F. Back control out of the block valve threads and withdraw the unit.

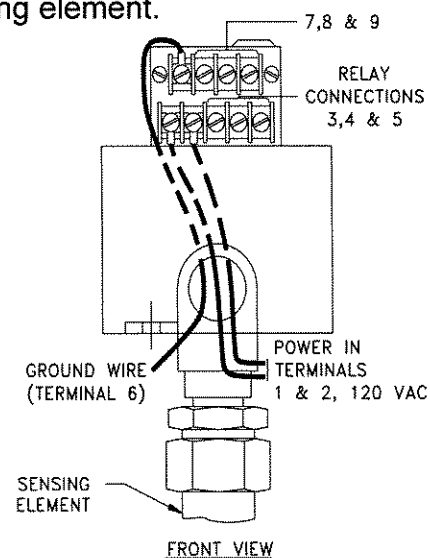
## 2.3 Wiring

### 2.3.1 Sensing Element Wiring

The sensing element connections to the integral electronics have been factory-wired. However, if it is necessary to check these connections, see Figure 2-2. All of the sensing element connections are made on the back of the electronic unit.

### 2.3.2 Power Wiring

All power connections are made to the terminal strips on the front of the electronic chassis. See Figure 2-3. Due to the low power consumption of the instrument (1 watt), the wiring need only follow local electrical codes. It is important to keep the power wiring separate from the sensing element connections in order to maintain the intrinsic safety of the sensing element.

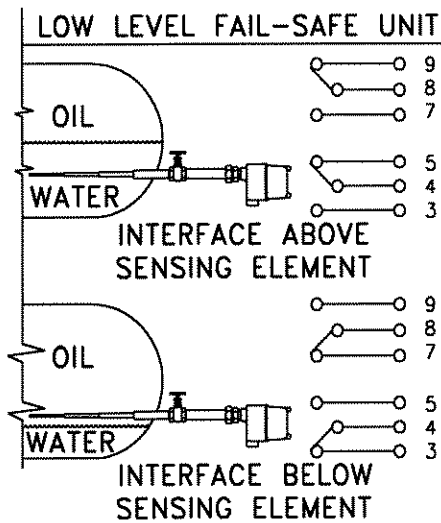


**Figure 2-3**  
**Power and Relay Wiring**

# OPERATION

## 2.3.3 Relay Wiring

The relays used in this control have double-pole double-throw contact closure. All relay connections are made to the terminal strips on the front of the electronic chassis. See Figure 2-3. The relay serves as a low power switch and does not provide power to activate motors or other heavy equipment (for non-inductive loads, see contact ratings in Section 1.2). Contact closures for Dumpstar are shown in Figure 2-4.



**Figure 2-4**  
**Relay Contact Chart for Dumpstar**

## SECTION 3 - OPERATION

This section contains the operation information for the 506-6900 point level control.

### 3.1 Start-up

Before applying power to the instrument, ensure that the output and power wiring is correct. See Section 2.3.2 and 2.3.3.

#### **WARNING: Units in Hazardous Areas:**

Before the explosionproof housing cover is removed to examine the instrument, the area must be checked and known to be non-hazardous. Replace the cover when finished checking the instrument.

The wiring connection from the explosionproof case must be equipped with an approved seal fitting.

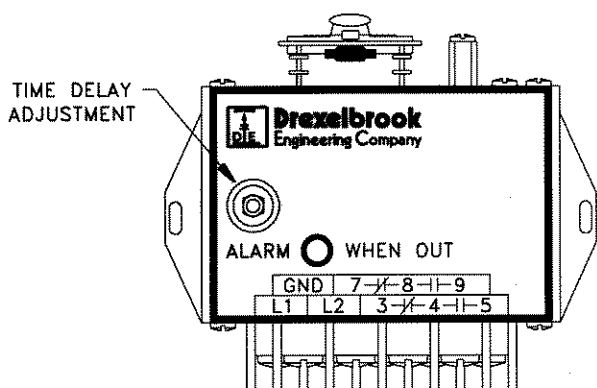
### 3.2 Controls

**Note:** The 506-6900 Dumpstar control is factory calibrated for oil/water interface applications. The level at which the Dumpstar switches on/off is not adjustable. Note that the LED indicates relay energized, or "water" (not alarm).

#### 3.2.1 Time Delay Adjustment

A 0-90 second time delay adjustment is a standard accessory with a Dumpstar control. The time delay adjustment is located on top of the instrument. Use a small screwdriver to adjust the time delay. See Figure 3-1. Time delay is used to help stop a "chattering" relay output due to waves in the interface.

The time delay causes the output to indicate low level as long as waves (H<sub>2</sub>O) continue to contact the sensing element. With a long time delay, the unit will stop indicating low level only after the bottom of the waves are completely above the sensing element. There is no delay on falling level.



**Figure 3-1**  
**Time Delay Adjustment**

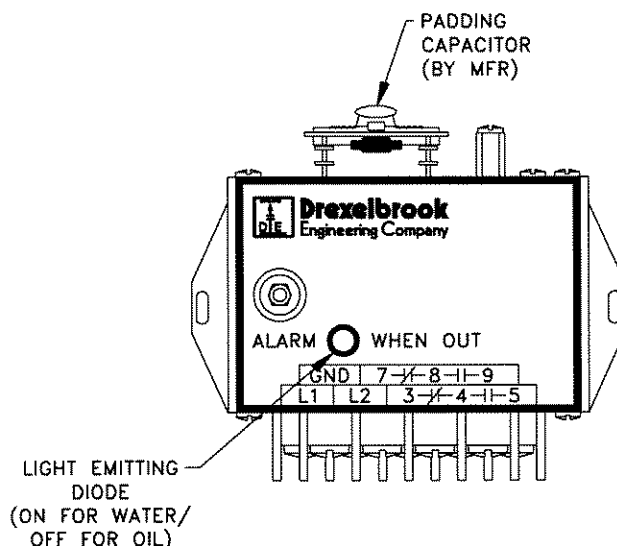
**3.3 Operating Notes**

The Dumpstar is shipped from the factory with a calibration that is sufficient for 90% of all oil/water interface applications. Its performance is optimal in highly conductive brines which produce emulsions that are slightly conductive.

It is possible that some produced waters or condensate in storage tanks have such low conductivity, that they appear to be emulsions and the output will correspond to "oil" at all times. In other cases, where the oil forms a thick, uniformly-insulating coating that the water phase cannot wash off, it is possible that the resistance probe-to-ground will be too high to signal "water".

In either case, a "padding capacitor" should be cut out to allow the Dumpstar to operate at higher resistance levels. See Figure 3-2.

**Caution:** When removing a padding capacitor, use care not to damage the "index capacitor" that is attached to the same terminals.



**Figure 3-2**  
**Location of Padding Capacitor**

# TROUBLESHOOTING

## SECTION 4 - TROUBLESHOOTING

### 4.1 Introduction

The Dumpstar level controls are designed to give years of unattended service. No periodic or scheduled maintenance is required. There are no specific recommended spare parts to be stocked by the user. However, it is best to keep a spare electronic unit on hand in the event of a component failure. Defective chassis should be returned to the factory for repair.

The following troubleshooting procedures should be followed in checking out your level control. If attempts to locate the difficulty fail, notify your local Drexelbrook representative, or call the factory direct and ask for the service department.

Before removing the instrument from service, determine whether the malfunction is due to a problem with the probe or the process conditions.

### 4.2 Testing the Unit

#### 4.2.1 Gross Function Test - All Units

A. If output indicates "oil" (low level - LED dark), short the probe to ground by placing a

wire between the screw in the center of the probe rod and ground. The instrument should reverse output.

B. If output indicates "water" (high level - LED bright), remove the wire, shown in Figure 4-1, from the center of the probe rod. Instrument should reverse output.

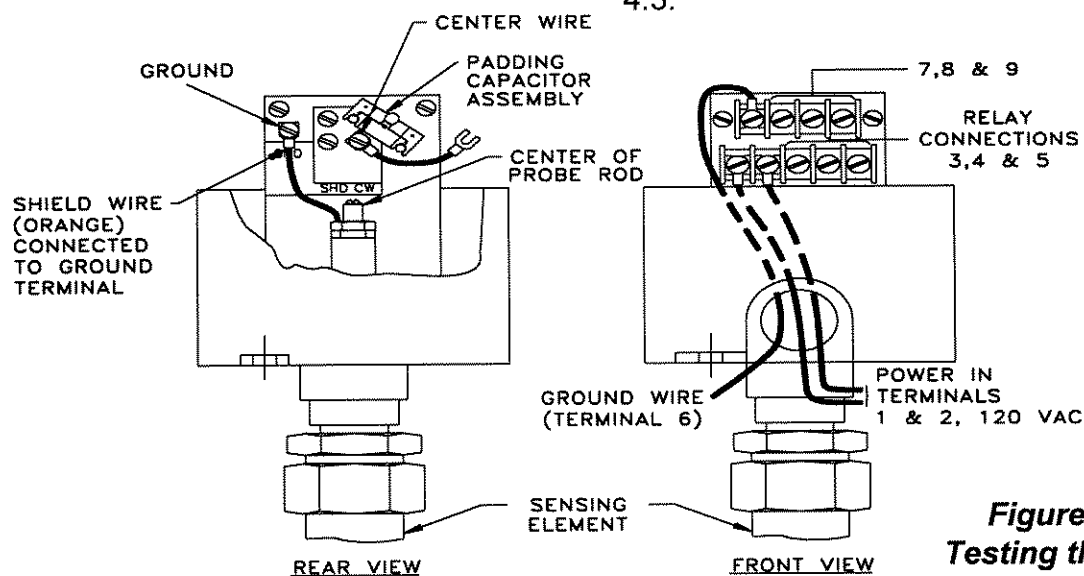
If the gross function test in step A or B is successful, investigate the probe further before pulling probe. Proceed with paragraph 4.2.2.

#### 4.2.2 Resistance Check - All Units with Padding Capacitor

Remove the wire from the center of the probe rod (Figure 4-1) and connect a variable resistor between the loose end of the wire and ground. Reduce the resistance to  $200 \Omega$ . The instrument should give a "water" indication (high level - LED bright).

Next, increase the resistance value to  $600 \Omega$ . The instrument should indicate "oil" (low level - LED dark).

If this test is successful, the instrument is functioning properly and it is necessary to check the process conditions (paragraph 4.2.3). If the instrument failed, proceed to paragraph 4.3.



**Figure 4-1**  
**Testing the Unit**

## 4.2.3 Resistance Check of In-Separator Liquids

Disconnect wire from the center of probe rod, connect an analog ohmmeter from center of probe rod to ground.

- A. If probe is in oil phase (check at probe drain tap) resistance reading must be greater than 500  $\Omega$ .
- B. With probe in water phase, resistance reading must be less than 250  $\Omega$ .

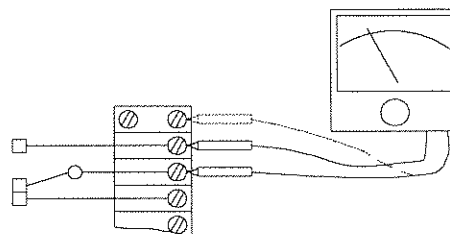
If conditions **A** and **B** are both met, and instrument switches at resistance specified in paragraph 4.2.2, the instrument must be performing properly. If incorrect indications have been documented, it is necessary to repeat steps 4.2.3A and 4.2.3B when the incorrect indication is actually occurring. Consult your Drexelbrook sales engineer if application produces more conductive oil. If water is not conductive enough at all times, remove padding capacitor (paragraph 3.3) and perform test per paragraph 4.2.4.

## 4.2.4 Resistance Check with Padding Capacitor Removed

If padding capacitor has been removed, disconnect wire at center of probe rod. Instrument should indicate "oil" (low level LED dark). Touch the loose end of the wire with finger. Instrument should indicate "water" (high level - LED bright). The in-separator liquid checks (paragraph 4.2.3) should produce "water" phase of 2500 or less, and "oil" phase of 20,000 or greater.

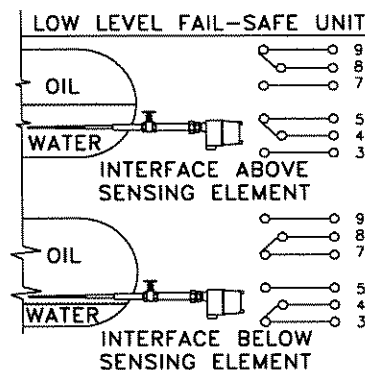
## 4.3 Testing the Relay Circuits

- A. The relay circuit consists of two sets of single-pole, double-throw relay contacts brought out to a terminal strip. When the instrument is functioning properly, one contact from each set will be open and the other contact in each set will be closed. Both sets will reverse when the level condition changes.
- B. Relay operation may generally be heard as an audible click when the background noise is not too high. Use the method shown in Figure 4-2 to determine if the relay contacts are switching.



**Figure 4-2**  
**Testing the Relay Circuits**

- C. Often, a malfunctioning unit can be traced to improper wiring of the relay terminals to an annunciator or other panel device. Check the wiring against the relay chart in Figure 4-3.



**Figure 4-3**  
**Relay Contact Chart**

# TROUBLESHOOTING

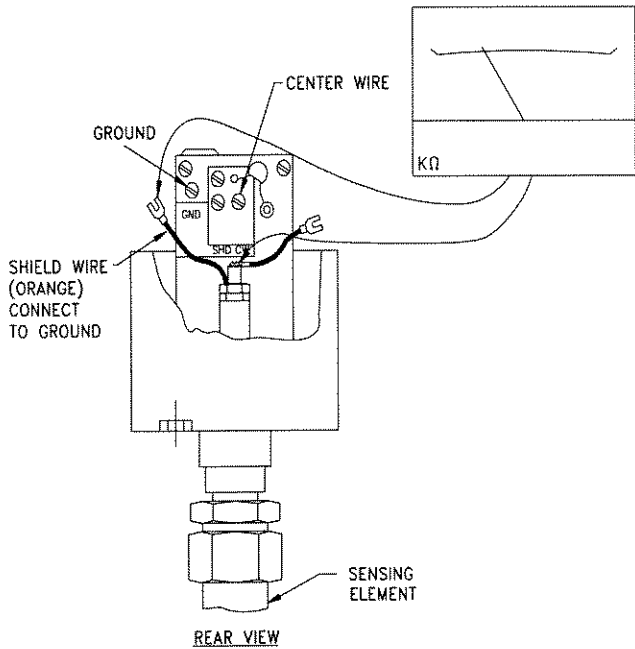
## 4.4 Testing the Cote-Shield Sensing Element (Out of Separator)

A. See Figure 4-4. Disconnect the center wire (CW) and ground (GND) wire from the electronic unit.

B. With an analog (non-digital) ohmmeter, measure the resistance between the sensing element terminals for the following values:

**Resistance, center wire of probe to shield wire \_\_\_\_\_**

C. With the sensing element in air and no coating, the resistance value should be 1 megohm or greater. If the reading is not above 1 megohm, consult the factory



**Figure 4-4**  
**Testing the Sensing Element**

**SECTION 5 - FACTORY AND FIELD SERVICE**

**5.1 Telephone Assistance**

If you are having difficulty with your Drexelbrook equipment, and attempts to solve the problem have failed, notify your local Drexelbrook representative, or call the factory direct and ask for the Service Department. Drexelbrook Engineering Company is located at 205 Keith Valley Road, Horsham, PA 19044. Service Department phone # is 1-800-527-6297. The factory telephone number is (215) 674-1234. To help us solve your problem quickly, please have as much of the following information as possible when you call:

Instrument Model: Dumpstar 506-6900  
P.O. # and Date: \_\_\_\_\_  
Application: \_\_\_\_\_  
Temperature: \_\_\_\_\_  
Pressure: \_\_\_\_\_  
Agitation: \_\_\_\_\_  
Brief description of the problem: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Checkout procedures that failed: \_\_\_\_\_  
\_\_\_\_\_

**5.2 Equipment Return**

**Do not** return equipment without first contacting the factory for a return authorization number. Any equipment being returned must include the following information:

Reason for return \_\_\_\_\_  
Authorization # \_\_\_\_\_  
Person to contact at your company \_\_\_\_\_  
\_\_\_\_\_  
"Ship To" address \_\_\_\_\_  
\_\_\_\_\_

If available, please include the original P.O. # and the original Drexelbrook # also. To keep the paperwork in order, you must include a purchase order with returned equipment, even though it may be coming back for warranty repair. You will not be charged if the equipment is covered under warranty. Please return your equipment with freight charges prepaid. We regret that we cannot accept collect shipments.

Drexelbrook frequently has exchange units available for quicker turn around of repair units. If you prefer your own unit to an exchange unit, please mark clearly on the return unit, "**Do Not Exchange**".

**5.3 Field Service**

Trained field service people are available on a time-plus-expense basis to assist in start-ups, diagnosing difficult application problems, or in-plant training of personnel. Contact the Service Department for further details.

**5.4 Customer Training**

Periodically, Drexelbrook instrument training seminars for customers are held at the factory. These sessions are guided by Drexelbrook engineers and specialists, and provide detailed information on all aspects of level measurement, including theory and practice of instrument operation. For more information about these valuable workshops, write to Drexelbrook Engineering, attn: Communications/Training Group, or call direct (215) 674-1234.

**AMETEK<sup>®</sup>**  
**DREXELBROOK**

*An ISO 9001 Certified Company*

205 Keith Valley Road Horsham, PA 19044

*US Sales* 800-553-9092

*24 Hour Service* 800-527-6297

*International* 215-674-1234

*Fax* 215-674-2731

*E-mail* [deinfo@drexelbrook.com](mailto:deinfo@drexelbrook.com)

*Web* [www.drexelbrook.com](http://www.drexelbrook.com)