Installation and Operating Instructions

Series 502-3000

Ztron™ Level Control

using 402-3000 Electronics

• 502-3000
• 502-3200
• 502-3300
• 502-3400
• 502-3500
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Series 502-3000
Ztron™ Level Control
using 402-3000 Electronics

- 502-3000
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- 502-3500
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SECTION 1
INTRODUCTION

The instructions in this manual are for the Drexelbrook Ztron™ Series Point Level Control with a 402-3000 electronic unit (also referred to as MKII Ztron).

The label on top of the electronic unit identifies the model number of the Ztron level control:

402-3000 402-3302 402-3020 (refer to 402-302X-LM)
402-3002 402-3400 402-3022 (refer to 402-302X-LM)
402-3200 402-3402
402-3202 402-3500
402-3300 402-3502

If there is no model number on the top label of the electronic unit, it is a 402-2000 type Ztron and the instructions are included in the 402-2000-LM Instruction Manual. Contact Drexelbrook’s Service Department at 1-800-527-6297 for a 402-2000-LM.

1.1 System Description

The Drexelbrook Ztron Level Control (Figure 1-1) includes a 402-3000 series electronic unit and a 700 series sensing element. Cote-Shield™ action is designed into all Ztron level controls (except 502-3X0X-918) and enables the instrument to ignore the effect of build-up or material coating on the sensing element.

The 402-3000 electronic unit:

• provides double-pole double-throw dry relay contact closure when material reaches a specific point on the sensor. The relay contacts may be used to operate alarms, solenoid valves, or other low power devices.

• provides an optional 0-90 second time delay for agitated vessels.

The 700-series sensing element:

• is mounted on the tank or in the process.

• provides a change in RF admittance indicating presence or absence of material.

• with remote-mounted electronics, the change in RF admittance at the sensing element is transmitted to the electronic unit through a Drexelbrook 380 Series coaxial cable.
**Introduction**

Figure 1-1

*Integral Ztron Control with Cote Shield™*

1.2 Model Number

```
5 0 2 - 3 X X X - X X
```

**Input Power:**
- 0 - 120 Vac with relay
- 2 - 24 Vdc with relay
- 3 - 220 Vac with relay
- 4 - 24 Vdc isolated
- 5 - 12 Vdc isolated

**Sensitivity:**
- 0 - Standard Sensitivity
- 2 - High Sensitivity

**Electronic Unit Options:**
- 0 - Standard Electronic Unit
- 1 - Fixed Time Delay
- 2 - 0-90 Second Time Delay

**Mounting:**
- 0 - Remote
- 9 - Integral

**Sensing Element:**
*Various*
SECTION 2
INSTALLATION

2.1 Unpacking

Carefully remove the contents of the shipping carton and check each item against the packing list before destroying any packing materials. If there is any shortage or damage, report it to the factory at 1-800-527-6297 (US and Canada) or 1-215-674-1234 (International).

2.2 Mounting the Level Control

The 502-3000 Ztron Level Control is available with the electronic unit and sensing element as a single integral assembly or connected by a coaxial cable in the remote configuration. Extended sensing element lengths and special mountings can be provided to fit specific applications.

- The Ztron Level Control is designed for industrial applications, but it should be mounted in a location as free as possible from vibration, corrosive atmospheres, or any possibility of mechanical damage.

- For convenience when adjusting, place the electronic unit in a reasonably accessible location. Ambient temperature should be between -40°F and 145°F (-40°C to 63°C).

- It may be mounted either vertically or horizontally. See Figures 2-1 and 2-2.

**NOTE**

The 502-3000-918 model is designed for vertical-mount only.

- Avoid mounting closer than 1 inch to any tank structure. Material bridging from structure to sensing element can cause false alarms. Close proximity to tank structure also increases the sensing element’s standing capacitance.

- The actual mounting location often depends on the placement of nozzles or openings into the vessel. Do *not* mount the instrument through a nozzle which exceeds the cote-shield element on the sensing element. See Figure 2-1.

- Protect the insulation on the sensing element against cuts and scrapes during installation.

Figures 2-3 and 2-4 provide the typical mounting dimensions for the integral and remote units respectively.
Figure 2-1
Ztron Level Control
Mounting Recommendations

GOOD
BEST
WALL BUILD-UP DOES NOT EXTEND PAST FIRST INSULATOR
COTE-SHIELD MUST EXTEND THROUGH NOZZLE AND WALL BUILD-UP
NOZZLE TOO LONG and COTE-SHIELD TOO SHORT
FACTORY SUPPLIED EXTENDED COTE-SHIELD EXTENDS THROUGH NOZZLE AND WALL BUILD-UP
NOZZLE REMOVED
GOOD
WRONG
GOOD
Figure 2-2
Ztron Level Control Installation Guidelines
Figure 2-3
Mounting Dimensions
Integral Ztron Level Control
Figure 2-4
Mounting Dimensions
Remote Ztron Level Control
2.3 Power Wiring

**CAUTION**
Do not open the enclosure cover or make/break any electrical connections without first disconnecting electrical power at the source. Ensure that the wiring, electrical fittings and conduit connections conform to the electrical codes for the specific location and hazard level.

The 502-3000 Ztron level control is not approved for use in a hazardous location.

Refer to Figures 2-5 through 2-9 for the appropriate power wiring drawing and use the following procedure to wire the Ztron level control:

a. Ensure that all power to the wiring is off.

b. Remove the cover.

c. The power connections are made to terminals 1, 2, and 3 on the electronic chassis as shown in Figures 2-5 through 2-9, using 12-28 gauge wire. The Ztron level control requires at least 1 watt of power (up to 5 watts).

d. The alarm relays are wired as shown in Figure 2-10.

e. Review Checklist:
   • Wiring correct.
   • Input voltage matches instrument label.
   • Proper output connections.

f. Replace the cover prior to restoring power if in hazardous area.

g. Turn power on.
Figure 2-5
Wiring the 502-300X (120 Vac)
Electronic Unit
Figure 2-6
Wiring the 502-320X (24 Vdc)
Electronic Unit
Figure 2-7
Wiring the 502-330X (240 Vac)
Electronic Unit
Figure 2-8
Wiring the 502-340X (24 Vdc Isolated) Electronic Unit
Figure 2-9
Wiring the 502-350X (12 Vdc Isolated)
Electronic Unit
2.4 Wiring the Relays

Refer to Figure 2-10 for the relay contact wiring. The Ztron relay has double-pole, double-throw (DPDT) dry contacts. The relay serves as a switch and does not provide the power to operate an annunciator or other equipment. All relay connections are made to the terminal strip on the electronic unit.

N.C. = Normally Closed

N.O. = Normally Open

**Figure 2-10**

Wiring the Relays

**HIGH LEVEL FAIL-SAFE**

**LED ON**

TANK EMPTY

**HIGH LEVEL FAIL-SAFE**

**LED OFF**

(ALARM)

TANK FULL

**LOW LEVEL FAIL-SAFE**

**LED OFF**

(ALARM)

TANK EMPTY

**LOW LEVEL FAIL-SAFE**

**LED ON**

TANK FULL

**HIGH LEVEL FAIL-SAFE**

Level Below Sensing Element

**HIGH LEVEL FAIL-SAFE**

Level Above Sensing Element

**LOW LEVEL FAIL-SAFE**

Level Below Sensing Element

**LOW LEVEL FAIL-SAFE**

Level Above Sensing Element
2.5 Wiring the Sensing Element (Integral)

If the Ztron level control has the electronic unit mounted in the same housing as the sensing element (integral mount), the sensing element is prewired at the factory, as shown in Figure 2-11. All of the sensing element connections are made to the foil side of the circuit board. The shield wire (orange) and the center wire (blue) are twisted.

*Figure 2-11*
Sensing Element Wiring
Integral Mount
2.5.1 Spark Protector for Integral Units

Applications involving insulating granulars and insulating liquids may require extra spark protection against static discharge that can damage the electronic unit. If required, a heavy duty spark protector is available as an option and will be prewired at the factory with integrally mounted Ztron level controls. Figure 2-12 shows an integral Ztron control wired with optional spark protector (377-1-24).

Figure 2-12
Ztron Level Control
Integral Unit with Spark Protection
2.6 Wiring the Sensing Element (Remote)

If the Ztron electronic unit is mounted remotely from the sensing element, the cable connections from the sensing element to the electronic unit are made to the individual terminals on the side opposite the terminal strips. See Figure 2-13.

**NOTE**

It is important that the sensing element cable is mechanically separated from the power wiring.

When installing remote-mount electronics, you must use the Drexelbrook supplied coaxial cable. See Figure 2-14. The cable can be a maximum of 25 feet (7.62 meters). Termination kits are available to shorten the cable if necessary.

*Figure 2-13*
Sensing Element Wiring
Remote Mount
2.6 Wiring the Sensing Element (cont.)

Following are recommendations for wiring the sensing elements.

**CAUTION**
When pulling the cable through the conduit, do not use pulling lubricant. Pulling lubricant changes the electrical characteristics of the cable.

- The remote-mount sensing element cable connections are made to the sensing element after it has been installed in the vessel, with the conduit attached.

- For two-terminal sensing elements, the shield wire is not used at the sensing element end and must be taped so that it cannot short circuit. Always terminate and use the outer-shield pigtail wire at the electronic unit end.

- Do not coil up excess interconnecting coaxial cable. Coiled coaxial cable acts as an antenna to pick up noise. Termination kits are available from the factory to shorten the cable.

- No adjustment of the instrument is required to compensate for cable length.
2.6.1 Spark Protector

Measurement of insulating granulars and insulating liquids may require extra spark protection against static discharge that can damage the electronic unit. If required, a heavy duty spark protector can be shipped as an option and must be mounted in the sensing element conduit when wiring the instrument.

If spark protection is supplied, use the following instructions for installing the spark protector in the sensing element conduit. See Figure 2-12 or 2-15.

a. Attach the mounting link on the spark protector to the sensing element center connection screw.

b. Connect the green wire from the spark protector to the conduit ground screw.

c. Feed the cable into the conduit.

d. Connect the cable center wire (CW blue) to the spark protector and the cable ground wire (gnd green) to the conduit ground screw.

e. Connect the shield wire (SH red) to the Cote-Shield terminal.

NOTE
For sensing elements that do not have shield connections, tape the shield wire at the conduit so that it does not short circuit.

Figure 2-15
Spark Protection
Remote Mount
This section describes the operating switches of the Ztron level control. Remove the dome lid and use a small screwdriver to set the operating controls.

3.1 Setpoint Control

There is a single operating point adjustment used to control the level at which the relay operates. See Figure 3-1.

**NOTE**
This adjustment is a 35-turn potentiometer and does not have a mechanical stop. A small click can be heard when the adjustment has been turned fully in either direction.

- Turning the setpoint adjustment clockwise raises the level at which the relay operates.
- Turning the setpoint counterclockwise lowers the level at which the relay operates.
- The LED (on) indicates that the relay is energized.

---

**Figure 3-1**
*Ztron Operating Controls and LED*

---

1High level failsafe when shipped unless specified otherwise when ordered.
3.2 Time Delay Control (optional)

The time delay adjustment (available as an option 402-3X02) is located on top of the instrument, as shown in Figure 3-1. It is used to help stop an oscillating relay output due to agitation or waves in the vessel.

**NOTE**
This adjustment is a 270° (¾ turn) potentiometer. Do not turn it beyond its mechanical stops or damage to unit may occur.

Using a small screwdriver and turning in the clockwise direction, the time delay adjustment is set from 0 to 90 seconds.

- The delay applies only to recovery from the alarm condition.

- With High Level Failsafe, the delay will be effective only on falling level. The output will indicate high level as long as waves continue to touch the sensing element. The unit will stop indicating high level only after the delay time has passed, with no further contact between the sensing element and the material being measured.

- With low level failsafe, the relay will not change state when level is rising until the timer has timed out.
3.3 Failsafe Selector

Failsafe describes the level condition which causes the output relay to de-energize and the condition of the relay upon loss of power or most component failures.

- The failsafe is field selectable by changing the position of the connector located on the instrument circuit board. See Figure 3-2.
- High Level Failsafe (HLFS) means the relay will de-energize when level is high, indicating high level upon loss of power. (N.O. contacts open/N.C. contacts closed)
- Low Level Failsafe (LLFS) means the relay will de-energize when level is low, indicating low level upon loss of power. (N.O. contacts open/N.C. contacts closed)
- The instrument is supplied in the failsafe mode that is requested when the order is placed (HLFS, if not specified).

3.4 Start-up

Before applying power to the instrument, be sure that the power wiring is correct. See Section 2.3.
SECTION 4
CALIBRATION

This section contains the calibration information for the Ztron Level Control.

CAUTION

Do not open the enclosure cover or make/break any electrical connections without first disconnecting electrical power at the source. Ensure that the wiring, electrical fittings and conduit connections conform to the electrical codes for the specific location and hazard level.

The 502-3000 Ztron level control is not approved for use in a hazardous location.

4.1 Calibration in Conducting Material

All Ztron controls (except for model 502-3000-918) are factory set to switch in water-based conducting materials (setpoint adjustment is set to full clockwise position). No calibration adjustment is necessary.

If, over time, a calibration adjustment is required in a conducting material, use a small screwdriver to turn the setpoint adjustment to the full clockwise (CW) position. No other adjustment is necessary.

See section 4.3 for calibration of 502-3000-918 controls.

4.2 Calibration in Insulating Material (Horizontal Mount)

Use the following procedure:

a) Be sure the material level is well below the sensing element. See Figure 4-1.
4.2 Calibration in Insulating Material (Horizontal Mount) (cont.)

Figure 4-1
Level Below Horizontal Sensing Element

b) Turn the setpoint adjustment to the full counterclockwise (CCW) position.

NOTES
This adjustment does not have a mechanical stop. A small click can be heard when the adjustment has been turned fully in either direction.

The LED (on) indicates that the relay is energized or in normal condition (not alarm).

c) Turn setpoint adjustment slowly clockwise (CW) until the relay just operates. (LED changes states).

d) Increase the material level until it is well above the sensing element. See Figure 4-2. (LED changes states.)

Figure 4-2
Level Above Horizontal Sensing Element
4.2 Calibration in Insulating Material (Horizontal Mount) (cont.)

e) Mentally note the position of the screwdriver.

f) Counting the number of turns, turn the setpoint adjustment slowly clockwise (CW) until the relay once again just operates, or you come to the end of the adjustment travel.

   **NOTE**

   If less than one turn of the adjustment was observed between the sensing element covered and uncovered, the sensor is not generating enough signal. Consult the factory for further options.

   g) Turn the adjustment back counterclockwise (CCW) one half the number of turns that were counted.

   h) Record number of turns and save for future calibration reference

   Calibration is now complete.

4.3 Calibration in Insulating Material (Vertical Mount) and 502-3000-918 in Conducting Materials

   **NOTES**

   This adjustment does not have a mechanical stop. A small click can be heard when the adjustment has been turned fully in either direction.

   The LED (on) indicates that the relay is energized or in normal condition (not alarm).

   a) Set the level to a point on the active section of the sensing element where control is desired (3 inches [76.2 mm] of coverage minimum). See Figure 4-3.
4.3 Calibration in
Insulating Material
(Vertical Ztron) and
502-3000-918 in
Conducting Materials

b) Start from the full counterclockwise (CCW) position. Turn the setpoint adjustment clockwise (CW) until the relay just operates (LED changes states).

**NOTE**
If the dielectric constant or conductivity of the material changes, the point of operation may change. Consult factory.

Calibration is now complete.
SECTION 5
TROUBLESHOOTING

5.1 Introduction

The Ztron Level Control is a solid-state device with no moving parts other than its relays, and requires no maintenance or adjustments. The units are designed to give years of unattended service.

A spare electronic chassis is recommended for every 10 units so that, in case of a failed unit, a critical application will not be delayed while the unit is returned to the factory for repair.

Use the following troubleshooting procedures to check out the Ztron Level Control. If attempts to locate the difficulty fail, notify your local Drexelbrook representative, or call the factory direct at 1-800-527-6297 (US and Canada) or 1-215-674-1234 (International).

5.2 Testing the Electronic Unit

Use the following procedure to troubleshoot the Ztron electronic unit:

a. See Figure 5-1. Disconnect the sensing element wires from the instrument by removing the blue wire from the center terminal and the orange (or red) wire from the shield terminal. Leave the power connected.

b. Starting with the setpoint adjustment in the extreme counterclockwise (CCW) position, turn the screwdriver clockwise (CW) until the relay just operates.

c. Rotate the setpoint adjustment back and forth about this point, observing the travel of the screwdriver between the relay pull-in and relay drop-out. If the instrument is working properly, the screwdriver should travel less than ¼ turn to operate the relay.
5.3 Testing the Sensing Element

**NOTE**
The sensing element is intrinsically safe. Therefore, when using this product, it is recommended that all service activity comply with appropriate guidelines.

The following procedure is used to test the sensing element:

a. Remove all wires leading from the sensing element to the electronic unit.

b. Remove spark protector if present.

c. Use an analog ohmmeter that is set to the R x 1K ohm scale. Measure the resistances between each pair of sensing element terminals. See Figure 5-1.
   - Center wire to ground __________ohms
   - Center wire to shield __________ohms
   - Shield to ground __________ohms

d. A new sensing element that is clean and not coated or wet should look like an open circuit on all sensing element tests.

e. If the sensing element is clean and dry, and shows resistance between terminals of less than 10K ohms, it is possible that moisture has soaked into the packing gland of the sensing element. In this case, the sensing element may need to be dried until the resistance increases to its maximum value.

---

1An analog ohmmeter has a lower ohms/volt rating and provides more current to measure the resistance than a digital ohmmeter.
5.3 Testing the Sensing Element (cont.)

f. If the process material is conductive, you may read some resistance between sensing element terminals. The lowest permissible resistance values are:
   - Center wire to ground: 1000 ohms.
   - Center wire to shield: 600 ohms.
   - Shield to ground: 300 ohms.

g. A resistance reading of less than 10 ohms on any sensing element terminal is usually due to a metal-to-metal short circuit. Check that the sensing element is not touching any vessel structure.

Figure 5-1
Checking the Sensing Element
5.4 Testing the Coaxial Cable

**NOTE**

Water or other conductive material in the conduit can change the electrical properties of the coax cable and cause the system to perform poorly. Moisture in the conduit may not be detected by the following test. Inspect the coax and associated conduit for trapped water.

a. Disconnect all three spade lugs of the coaxial cable at the electronic unit.

b. Disconnect all three spade lugs of the coaxial cable at the sensing element.

c. Check for short circuits. Using an ohmmeter, measure between two of the coaxial cable conductors. Repeat for all three conductors. All readings should show an open circuit, (infinite resistance).

If resistance is measured, the coax cable insulation is punctured or damaged.

d. Check for continuity of each conductor. Short out two of the coaxial cable conductors. Using an ohmmeter, measure between two of the coaxial cable conductors. Repeat for all three conductors. All readings should show less <1 ohm resistance.

If no continuity is measured, check for corroded spade lug connections. Try reterminating spade lugs. Coax is defective if continuity is still not measured.
5.5 Testing the Relay Circuits

Using an ohmmeter, perform the following steps to check out the relay circuits:

a. The relay circuits consist of double-pole double-throw relay contacts brought out to terminal strips. When the relays are operating properly, one pair of contacts will be open with high or low level, and one pair will be closed with high or low level. Refer to Figures 2-10 and 5-2.

   ![Figure 5-2](image)

   **Figure 5-2**

   *Relay Circuit Operation*

b. Relay operation may generally be heard as an audible click when the background noise is not too high. Use one of the methods shown in Figure 5-3 to determine if the relay contacts are switching.

c. Difficulty in calibration can often 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 2-10.

   ![Figure 5-3](image)

   **Figure 5-3**

   *Relay Circuit Troubleshooting*
5.6 Testing the Spark Protector

Refer to Figure 5-4 to test the spark protector.

**Figure 5-4**

*Testing the Spark Protector*
## 5.7 Possible Problems and Causes

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Instrument indicates alarm at all times.</td>
<td>a. Severe coating build-up on sensing element (HLFS).</td>
<td>a. Need longer Cote-Shield. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>b. Sensing element not “seeing” material (LLFS) due to fill angle.</td>
<td>b. Need longer insertion length. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>c. Defect in sensing element.</td>
<td>c. See section 5.3.</td>
</tr>
<tr>
<td></td>
<td>d. Loss of power.</td>
<td>d. Check power wiring. See Figure 2-4.</td>
</tr>
<tr>
<td></td>
<td>e. Improper relay wiring.</td>
<td>e. See section 2.4.</td>
</tr>
<tr>
<td></td>
<td>g. Electronic unit malfunction.</td>
<td>g. See section 5.2.</td>
</tr>
<tr>
<td></td>
<td>h. Shorted sensor.</td>
<td>h. See section 5.3.</td>
</tr>
<tr>
<td></td>
<td>i. Shorted coax.</td>
<td>i. See section 5.4.</td>
</tr>
<tr>
<td></td>
<td>j. Water in housing or conduit.</td>
<td>j. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>b. Sensing element not “seeing” material (HLFS) due to fill angle.</td>
<td>b. Need longer insertion length. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>c. Improper wiring.</td>
<td>c. See section 2.</td>
</tr>
<tr>
<td></td>
<td>e. Electronic unit malfunction.</td>
<td>e. See section 5.2.</td>
</tr>
<tr>
<td></td>
<td>f. Open coax.</td>
<td>f. See section 5.4.</td>
</tr>
<tr>
<td>3. Instrument can’t be calibrated.</td>
<td>a. Improper wiring.</td>
<td>a. See section 2.</td>
</tr>
<tr>
<td></td>
<td>b. Insufficient signal from sensing element.</td>
<td>b. Need longer insertion length. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>c. Setpoint is beyond the tuning range of the electronics.</td>
<td>c. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>d. Electronic unit malfunction.</td>
<td>d. See section 5.2.</td>
</tr>
<tr>
<td></td>
<td>e. Sensor covered with conducting material.</td>
<td>e. See section 5.2.</td>
</tr>
<tr>
<td></td>
<td>f. Shorted sensor or coax.</td>
<td>f. See section 5.4.</td>
</tr>
<tr>
<td></td>
<td>b. Loose wiring.</td>
<td>b. See section 2.</td>
</tr>
<tr>
<td></td>
<td>c. Electronic unit malfunction.</td>
<td>c. See section 5.2.</td>
</tr>
<tr>
<td></td>
<td>d. Time delay required.</td>
<td>d. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>e. Intermittent short of sensor or coax.</td>
<td>e. See sections 5.3 and 5.4.</td>
</tr>
<tr>
<td></td>
<td>b. Loose wiring.</td>
<td>b. See section 2.</td>
</tr>
<tr>
<td></td>
<td>c. Electronic unit malfunction.</td>
<td>c. See section 5.2.</td>
</tr>
<tr>
<td></td>
<td>d. Dielectric (k) of material is too low.</td>
<td>d. Need high sensitivity unit. Consult factory.</td>
</tr>
</tbody>
</table>
5.8 Factory Assistance

If you are experiencing difficulty with your Drexelbrook equipment and attempts to locate the problem have failed:
- contact your local Drexelbrook representative,
- call the Service department toll-free at 1-800-527-6297 (in US and Canada) or 1-215-674-1234 (International),
- fax the following information to the Service department at 1-215-443-5117.

Please provide the following information:

Instrument Model Number ___________________________
Sensing Element Model Number and Length ___________
Coax Cable Length (remote systems)___________________
Original Purchase Order Number _________________
Material being measured _____________________________
Temperature _________________________________
Pressure ______________________________________
Agitation______________________________________
Brief description of the problem ________________________
Checkout procedures that have failed ________________

5.9 Equipment Return

In order to provide the best service, any equipment being returned for repair or credit must be preapproved by the factory.

In many applications, sensing elements are exposed to hazardous materials.
- OSHA mandates that our employees be informed and protected from hazardous chemicals.
- Material Safety Data Sheets (MSDS) listing the hazardous materials that the sensing element has been exposed to must accompany any repair.
- It is your responsibility to fully disclose all chemicals and decontaminate the sensing element.
5.9 Equipment Return (cont.)

To obtain a return authorization (RA#), contact the Service department at 1-800-527-6297 (US and Canada) or 1-215-674-1234 (International). Please provide the following information:

Model Number of Return Equipment ____________________

Serial Number ____________________

Original Purchase Order Number ____________________

Process Materials that equipment has been exposed to ____________________

MSDS sheets for any hazardous materials

Billing Address ____________________

Shipping Address ____________________

Purchase Order Number for Repairs ____________________

*Please include a purchase order even if the repair is under warranty. If repair is covered under warranty, you will not be charged.*

Ship equipment freight prepaid to:
AMETEK Drexelbrook
205 Keith Valley Road
Horsham, PA 19044
COD shipments will not be accepted.

5.10 Field Service

Trained field service personnel are available on a time-plus-expense basis to assist in start-ups, diagnosing difficult application problems, or in-plant training of personnel. Preventative Maintenance and Calibration Certification service contracts are also available to maintain plant efficiency. Contact the Service department for further information.

5.11 Customer Training

Instrument Training Seminars for customers are conducted at the factory. These sessions, guided by Drexelbrook engineers and specialists, provide detailed information on all aspects of level measurement, including theory and practice of instrument operation. Contact the Training Department for further information.
SECTIONS 6
SPECIFICATIONS

Power Requirements:
AC Units:
95-145 Vac (402-3000), 50/60 Hz, 5 watts
215-265 Vac (402-3300), 50/60 Hz, 5 watts maximum

DC Units:
24 Vdc Unit (402-3200): 19-29 Vdc input, 3W maximum
24 Vdc Isolated Unit (402-3400): 17-32 Vdc input, 3W maximum
12 Vdc Isolated Unit (402-3500): 9-16 Vdc input, 3W maximum

Sensitivity:
.3pF or less

Load Resistance:
Center to Ground, 1500 ohms
Center to Shield, 750 ohms
Shield to Ground, 750 ohms

Failsafe:
Field adjustable to either High-Level Fail-Safe (HLFS)
or Low-Level Fail-Safe (LLFS)

Output:
DPDT relay closure

Ambient Temperature:
-40°F to 145°F (-40°C to 60°C)

Temperature Effect:
.3pF/50°F

Line Voltage Effect:
.2pF/20V @ 120 Vac

Contact Rating:
5A @ 250 Vac non-inductive
3A @ 250 Vac inductive
5A @ 30 Vdc
Stability:
.1pF/6 mo. max. shift

Spark Protection:
10 amp

Mounting:
¾-inch NPT standard
1½-inch sanitary clamp (502-3000-903)

Insertion Length:
18 inches (457.2 mm) or 36 inches (914.4 mm) (standard)

Housing:
The standard explosionproof housing meets the following classifications:
- Nema 1  General-Purpose
- Nema 2  Drip-Tight
- Nema 3  Weather-Resistant
- Nema 4  Waterproof
- Nema 5  Dust-Tight
- Nema 12 Industrial Use

FM approved (housing only) for Class I, Groups A, B, C, and D (Div. 1 or 2) and
Class II, Groups E, F, and G, (Div. 1 or 2).

Time Delay:
0-90 seconds available as an option

Sensing Element:

<table>
<thead>
<tr>
<th>System Model Number</th>
<th>Sensing Model Number</th>
<th>Process Temperature and Pressure</th>
<th>Process Wetted Parts</th>
<th>Center Rod O.D.</th>
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</thead>
<tbody>
<tr>
<td>502-3000 700-901</td>
<td>206-101</td>
<td>250°F @ 200 psi</td>
<td>316 SS and Epoxy</td>
<td>¾ inch</td>
</tr>
<tr>
<td>-002</td>
<td>202-2</td>
<td>300°F @ 50 psi</td>
<td>316 SS and TFE</td>
<td>¾ inch</td>
</tr>
<tr>
<td>-001</td>
<td>202-2</td>
<td>300°F @ 50 psi</td>
<td>316 SS and TFE</td>
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<tr>
<td>-007</td>
<td>1202-2</td>
<td>450°F @ 200 psi</td>
<td>316 SS and T1</td>
<td>¾ inch</td>
</tr>
<tr>
<td>-007</td>
<td>1202-2</td>
<td>450°F @ 200 psi</td>
<td>316 SS and T1</td>
<td>¾ inch</td>
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<tr>
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<td>200°F @ 450 psi</td>
<td>316 SS and TFE</td>
<td>¼ inch</td>
</tr>
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<tr>
<td>-021</td>
<td>1202-1</td>
<td>450°F @ 200 psi</td>
<td>316 SS and T1</td>
<td>¾ inch</td>
</tr>
</tbody>
</table>

1Maximum temperature of 145° for liquid service.