Installation and Operating Instructions

Series 502-302X
Z-tron Level Control
using 402-302X
Cote-Shield™ Electronics
Series 502-302X
Z-tron Level Control
using 402-302X
Cote-Shield™ Electronics
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CHAPTER 1
INTRODUCTION

1.1 System Description

This manual describes the Drexelbrook Z-tron™ Level Control Series 502-3000 with a 402-3020 or 402-3022 high sensitivity transmitter.

The Drexelbrook Z-tron Level Control 502-3000 is a precision RF (radio frequency) relay output level switch. It provides relay contact closure when material reaches a preset point in a vessel. The standard double-pole, double throw relay contacts may be used to operate alarms, solenoid valves, or other low power devices.

Cote-Shield™ action is designed into each unit and enables the instrument to ignore the effects of most build-up or material coatings on the sensing element, when properly installed and applied.

The Z-tron control is mounted so that the sensing element is in or near the material being measured. It provides a change in RF admittance indicating presence or absence of material. The sensor is comprised of a: center (measuring portion), and Cote-Shield™ portion. The Cote-Shield element guards against the transmission of RF current through most coatings on the sensing element (from the center measuring element to ground) until the level reaches the setpoint. The Cote-Shield element also prevents any change in RF current due to temperature effects on the sensing element.

1.2 Model Number

502-302X-001 Z-Tron Level Control

Electronic Unit Options:
0 - High Sensitivity
2 - High Sensitivity with
   0-90 Second Time Delay
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 immediately to the factory.

2.2 Mounting

The Z-tron Level Control is designed for field mounting. However, it should be mounted on the vessel so that vibration, corrosive atmospheres, and any possibility of mechanical damage is minimized.

For convenience at start-up, it is best to locate the Z-tron Level Control in a reasonably accessible location. It may be mounted either vertically or horizontally. See Figure 2-1.

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.

Figure 2-1
Mounting Through a Nozzle
Figure 2-2
Mounting Dimensions
2.2 Mounting (cont.)

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 Figures 2-1 and 2-3. Be sure to protect the insulation on the sensing element against cuts and scrapes during installation.

Figure 2-3
Z-tron Level Control
2.3 Wiring the Sensing Element

**WARNING**
If the Z-tron level control is placed in a hazardous area, caution must be taken before removing the explosionproof housing. In order to wire the unit, the area must be checked and known to be non-hazardous. When wiring is completed, the cover must be replaced and each conduit from the explosionproof case must be equipped with an approved seal fitting.

The sensing element connections to the integral electronics have been made at the factory. If it is necessary to rewire the sensing element to the electronics, see Figure 2-4 for proper connections.

*Figure 2-4*
*Wiring the Sensing Element*
2.4 Wiring the Electronic Unit

All power and relay connections are made to the terminal strips on the electronic chassis. Wiring connections should comply with NEC and local electrical codes.

The power connections are made to terminals 1, 2, and 6. See Figure 2-5.
2.5 Relay Connections

The Z-tron relay has double-pole, double-throw (DPDT) 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 side of the electronic chassis, as shown in Figure 2-7.

**Figure 2-6**
Relay Connections (with Power Connected)

**Figure 2-7**
Relay Contact Chart
SECTION 3
OPERATION

This section contains the start-up and operating information for the Z-tron level controls (402-3020 or 402-3022).

3.1 Start-up

Before applying power to the instrument, be sure that the input power is from a 120 vac, 50/60 Hz power source. Also check wiring connections as described in paragraphs 2.3 and 2.4.

**WARNING**

If the Z-tron level control is placed in a hazardous area, caution must be taken before removing the explosionproof housing. In order to calibrate the unit, the area must be checked and known to be non-hazardous. When calibration is completed, the cover must be replaced and each conduit from the explosionproof case must be equipped with an approved seal fitting.

3.2 Controls

There is a single adjustment located on top of the instrument (Figure 3-1) that controls the point at which the relay operates.

3.2.1 Setpoint Control

- A lighted LED indicates that the relay is energized.

- Each revolution of the control will change the operating point approximately 0.2 pF.

- Turning the adjustment clockwise will raise the level at which the relay operates and turning it counterclockwise will lower the level at which the relay operates (vertically-mounted sensing elements only).

**Figure 3-1**

*Setpoint Control*
3.2.2 Time Delay Control

The optional time delay adjustment is located on top of the instrument, across from the setpoint adjustment (Figure 3-2). It is used to help stop an oscillating relay output due to agitation or frothing in the vessel.

• The standard time delay is 0-90 seconds.

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

• On a High Level Failsafe unit, 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.

• Calibration of a Z-tron with time delay is explained in paragraph 4.5.

![TOP VIEW](image)

*Figure 3-2
Time Delay Control*
3.2.3 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 instrument failure.

• High Level Failsafe (HLFS) means the relay will de-energize under high level conditions, indicating high level upon loss of power.

• Low Level Failsafe (LLFS) means the relay will de-energize under low-level conditions, indicating low level upon loss of power.

• The instrument is supplied in the failsafe mode that is requested when the order is placed (HLFS, if not specified).

• The failsafe is field selectable by a slide switch, accessible through a hole in the side of the chassis. See Figure 3-3.

![Figure 3-3](image-url)

**Figure 3-3**

*Failsafe Adjustment*
SECTION 4
CALIBRATION

4.1 Types of Calibration

The following paragraphs outline different calibration procedures for the Z-tron Level Control (502-302X).

The high sensitivity 402-302X chassis is used primarily for low bulk density granulars and extra short length sensing elements used on insulating liquids. The 402-302X high sensitivity chassis is used on the above applications because the standard chassis 402-3XXX does not have enough sensitivity to perform reliably. The 402-302X is not recommended for use on conductive products.

There are three methods of calibrating the high sensitivity 402-302X electronic unit:

1. Horizontal calibration.
2. Vertical calibration.
3. Quick calibration.

Horizontal calibration and Vertical calibration involve moving tank level to establish proper calibration. These methods produce the most accurate and repeatable calibration.

The Quick calibration procedure does not require moving material to set calibration.

Calibration requires use of an insulated tool such as Drexelbrook part number 290-1-1. See Figure 4-1.

![Insulated Calibration Tool](image-url)
4.2 Calibration of Horizontal Sensing Elements

NOTE
All calibrations must be performed with the sensing element permanently installed in a tank. Calibration cannot be performed outside of the tank or in a bucket of material. This is because the RF energy seeks the nearest metal object and uses the tank wall as a return path to the electronic chassis.

WARNING
Do not turn any adjustment past its mechanical stops. Damage to the unit could occur.

• Use the insulated calibration tool (part number 290-1-1). See Figure 4-1.

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

—Horizontal Calibration
a. Begin with level well below the end of the sensing element.

b. Using the insulated tool supplied with the unit, turn the setpoint adjustment to the full counterclockwise (CCW) position.

c. Turn the adjustment slowly clockwise (CW) until the relay just operates. LED changes states. This is the tune point in air.

d. Mentally note the position of the adjustment tool pointer when at the tune point in air.
4.2 Calibration of Horizontal Sensing Elements (cont.)

- Increase the material level until it is well above the sensing element.

- Counting the number of turns, turn the adjustment slowly clockwise (CW) until the relay once again just operates or you come to the end of the adjustment travel. This is the tune point in material.

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

**CALIBRATION IS NOW COMPLETE.**

*Note*

For recalibration purposes, record half the number of turns that were counted (in step f. above) as “Preload,” (referred to in section 4.4).

*Note*

If less than ¼ turn of the adjustment is observed between the tune point in air and the tune point in material, please consult the factory at 1-800-527-6297.
Vertical Calibration is recommended for vertically-mounted Cote-Shield™ sensing elements.

**WARNING**
Do not turn any adjustment past its mechanical stops. Damage to the unit could occur.

• Use the insulated calibration tool (part number 290-1-1). See Figure 4-1.

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

—Vertical Calibration
a. Set the level to a point on the sensing element where control is desired. A minimum of 3 inches of covering on the sensing element is required. See Figure 4-4.

![Figure 4-4](image)

**Figure 4-4**
*Vertical Calibration*

b. Using the insulated tool supplied with the unit, start from the full counterclockwise (CCW) position and counting the number of turns, turn the setpoint adjustment clockwise (CW) until the relay just operates. Record the number of turns from full CCW position for recalibration.

CALIBRATION IS NOW COMPLETE.
4.4 Quick Calibration

Quick Calibration can be used for horizontally-mounted, bare metal, Cote-Shield™ sensing elements. In all cases, it is necessary to have the material level below the sensing element.

**WARNING**

Do not turn any adjustment past its mechanical stops. Damage to the unit could occur.

- Use the insulated calibration tool (part number 290-1-1). See Figure 4-1.

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

—Quick Calibration

a. For either HLFS or LLFS, begin with the sensing element in air. See Figure 4-5.

![Figure 4-5](image)

Quick Calibration, Sensing Element in Air

b. With the calibration adjustment in the full counterclockwise (CCW) position, turn slowly clockwise until the relay just operates—tune point in air. (LED will light in HLFS, and turn off in LLFS.)

c. Note the position of the adjustment tool pointer and turn the adjustment further CW the number of turns indicated in Table 4-1, Calibration Chart.
4.4 Quick Calibration (cont.)

<table>
<thead>
<tr>
<th>Material Being Measured</th>
<th>Number of Adjustment Turns Clockwise (CW) From Operate Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulating Liquids-Orgonics, Oil, Plastics</td>
<td>3 turns</td>
</tr>
<tr>
<td>Granular Above 50#/Ft³</td>
<td>3 turns</td>
</tr>
<tr>
<td>Granular Above 30-60#/Ft³</td>
<td>2 turns</td>
</tr>
<tr>
<td>Granular Above 25-50#/Ft³</td>
<td>1½ turns</td>
</tr>
<tr>
<td>Granular Above 20-40#/Ft³</td>
<td>1 turn</td>
</tr>
<tr>
<td>Granular Above 10-20#/Ft³</td>
<td>¾ turn</td>
</tr>
<tr>
<td>Granular Above 5-15#/Ft³</td>
<td>½ turn</td>
</tr>
</tbody>
</table>

CALIBRATION IS NOW COMPLETE.
4.5 Recalibration

If the amount of preloading was recorded at the time of initial calibration, it is possible to replace the instrument or check calibration without moving tank level.

—Recalibration of Horizontal Sensing Elements

a. Begin with level well below the end of the sensing element. See Figure 4-3.

b. Using the insulated tool supplied with the unit, turn the setpoint adjustment to the full counterclockwise (CCW) position.

c. Turn the adjustment slowly clockwise (CW) until the relay just operates. LED changes states (tune point in air.

d. Turn the adjustment further clockwise (CW) the amount of preload recorded in section 4.2, see NOTE.

—Recalibration of Vertical Sensing Elements

a. Turn the adjustment clockwise (CW), from the full CCW position, the amount of preload recorded in section 4.3(b).
4.6 Calibration of Time Delay Units

Standard time delay units are adjustable over the range of approximately 0-90 seconds.

—Calibration of Time Delay Units

a. Turn the time delay adjustment to the extreme counterclockwise (CCW) position (i.e. minimum time delay).

b. Proceed with appropriate calibration based on type of sensing element to calibrate operating point.

c. After the instrument is adjusted to the desired operating point, turn the time delay adjustment clockwise until the required delay is achieved. If the unit is in High Level Failsafe mode, the delay will occur with decreasing level. If the unit is in Low Level Failsafe Mode, the delay will be with increasing level.

With the material level well below the sensing element, you can observe the operation of the time delay by touching the center wire connection (blue) at the electronic unit.

CALIBRATION IS COMPLETE.
4.7 Adding a Padding Capacitor

The tuning range of the 402-302X transmitter is 0-8 pico-farads. Long insertion length sensing elements or sensing elements mounted in pipes or near metal objects may generate in excess of 8 pF resulting in the inability to find a tune point (the unit will always show alarm). Figure 4-6 shows the wiring for adding a padding capacitor.

The addition of an external padding capacitor will increase the tuning range of the unit. For example, adding a 10 pF capacitor will result in a 10-18 pF tuning range.

When a padding capacitor is required, a 10 pF NPO capacitor should be added to the terminals as shown in Figure 4-6. If the unit is still out of tuning range, add another 10 pF in parallel. If still unable to calibrate, contact the Factory Service department at 1-800-527-6297.

Figure 4-6
Padding Capacitor
The Z-tron 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 held up while the unit is returned to the factory for repair.

Use the following troubleshooting procedures to check out the Z-tron Level Control. If attempts to locate the difficulty fail, notify your local Drexelbrook representative, or call the Factory Technical Service direct at 1-800-527-6297.

You must be able to find a tune point with no sensing element hooked to the electronic unit.

Use the following steps to check out the electronic unit:

If the electronic unit has time delay, turn the delay pot to its full counterclockwise position (minimum delay).

If the electronic unit has a pad capacitor soldered to the two test points, remove one side of the pad capacitor. See Figure 4-6. (The following checkout procedure will not work if a pad capacitor is in place.)
5.1 Testing the Electronic Unit (cont.)

a. Disconnect ALL wires from the sensing element connection screws on the electronic chassis. See Figure 5-1.

b. Turn the operating point adjustment fully counterclockwise using an insulated tool.

c. Begin turning the operating point adjustment clockwise until the relay just changes states.

d. Rotate the tuning adjustment slowly back and forth about this point. Observe the travel required between relay energized and relay de-energized. The pointer should travel less than 1/4 turn to operate the relay. If so, the unit is working properly.

e. If you are unable to find a tuning point over the full travel of the setpoint adjustment, the unit has failed. Contact your local Drexelbrook representative or the Factory Technical Service Department at 1-800-527-6297.

5.2 Testing the Sensing Element

The following procedure is used to test the sensing element:

a. If the electronic unit is integrally-mounted, remove all wires leading from the sensing element to the electronic unit.

   If the sensing element is remotely-mounted, disconnect all three coax leads at the sensing element screws of the electronic unit.

b. On remote-mount systems, remove spark protector if present.

c. Use an analog ohmmeter* that is set to the R x 1K ohm scale. Measure the resistance between all three sensing element terminals. See Figure 5-2.

   Center wire to ground _________
   Center wire to shield _________
   Shield to ground _________

*Use an analog ohmmeter because the ohms/volt rating is lower and it therefore provides more current to measure the resistance. A digital meter does not measure resistance in the same way.
5.2 Testing the Sensing Element (cont.)

d. The high sensitivity 402-302X Z-tron is usually used to measure non-conductive, granular material. If this is the case, typical sensing element readings will be open circuit (infinite ohms).

A new sensing element that is clean and not coated or wet should read open circuit on all sensing element connections.

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 sensing element. In this case, the sensing element may be dried until the resistance has disappeared.

If your process material is semi-conducting, you may read some resistance between sensing element terminals. The lowest permissible resistance values are:

<table>
<thead>
<tr>
<th>Connection</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center wire to ground</td>
<td>1000 ohms</td>
</tr>
<tr>
<td>Center wire to shield</td>
<td>600 ohms</td>
</tr>
<tr>
<td>Shield to ground</td>
<td>300 ohms</td>
</tr>
</tbody>
</table>

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.

Do not use the high sensitivity 402-302X Z-tron on water-base or conductive products.
5.2 Testing the Sensing Element (cont.)

**Figure 5-2**
*Checking the Sensing Element*

**Remote Mount Teflon Sensing Element**

**Integral Mount Epoxy Sensing Element**

**Measure Sensing Element Resistance**
- Center - Ground
- Center - Shield
- Shield - Ground

**Analog Ohmmeter**

Disconnect Coax Cable.

Packing Gland Do Not Disturb.

To Center Conductor Blue Screw.

Red Screw, Shield Connection.

To Ground Screw.

Ground, Electronic Unit.

Remove Spark Protector.
5.2 Testing the Sensing Element (cont.)

![Diagram of Spark Protector Test]

**Correct Meter Readings**
- Center Conductor - Tab = 47 Ohms
- Center Conductor - Shield Wire = Open
- Center Conductor - Ground = Open
- Shield Wire - Ground Wire = Open
- Shield Wire - Tab = Open
- Tab to Ground = Open

Figure 5-3
Spark Protector Test
5.3 Testing the Coaxial Cable (Remote-mounted Systems only)

Troubleshoot the coaxial cable in a remote-mounted system using the following procedure.

**NOTE**

If there is water or other conductive material in the conduit, it could cause the instrument to fail. If this is the case, it may not be detected by the following test.

a. Disconnect all three wires at the electronic unit (center, shield, and ground). Disconnect all three wires at the sensing element conduit.

b. Measure resistance from center wire to cote-shield using an analog ohmeter set to R x 10K scale. Resistance should be infinity (open circuit).

c. Short sensing element and cote-shield terminals together at one end.

d. Measure resistance from probe to cote-shield terminals at other end. Resistance should be near zero ohms (short circuit).

e. Repeat steps b, c, and d for cote-shield and ground wires.

f. Repeat steps b, c, and d for cote-shield and ground wires.
5.4 Testing the Relay Circuits

Use 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, two pairs of contacts will be open with high or low level, and two pairs will be closed with high or low level. See Figure 5-4.

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 5-5 to determine if the relay contacts are switching.

d. 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 5-4.
## 5.5 Possible Problems and Causes

<table>
<thead>
<tr>
<th><strong>PROBLEM</strong></th>
<th><strong>POSSIBLE CAUSES</strong></th>
<th><strong>SOLUTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument indicates alarm at all times.</td>
<td>Severe coating build-up on sensing element (HLFS) &gt; ¾-inch.</td>
<td>Need longer Cote-Shield. See Figure 2-3. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>Shorted spark protector.</td>
<td>See Figure 5-5.</td>
</tr>
<tr>
<td></td>
<td>Sensing element never touches material (LLFS).</td>
<td>Need longer insertion length. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>Sensing element is one inch or closer to metal structure.</td>
<td>Add pad capacitor - Section 4.6.</td>
</tr>
<tr>
<td></td>
<td>Defect in electronic unit.</td>
<td>Section 5.1</td>
</tr>
<tr>
<td></td>
<td>Water in conduit.</td>
<td>Find source of moisture and correct.</td>
</tr>
<tr>
<td></td>
<td>Defect in sensing element.</td>
<td>Section 5.2</td>
</tr>
<tr>
<td></td>
<td>Loss of power.</td>
<td>Section 2.4</td>
</tr>
<tr>
<td></td>
<td>Improper wiring.</td>
<td>Section 2.4</td>
</tr>
<tr>
<td></td>
<td>Improper calibration.</td>
<td>Section 4</td>
</tr>
<tr>
<td>Instrument never indicates alarm.</td>
<td>Severe coating build-up on sensing element (LLFS) &gt; ¾-inch.</td>
<td>Need longer Cote-Shield. See Figure 2-3. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>Broken coax cable</td>
<td>Section 5.3</td>
</tr>
<tr>
<td></td>
<td>Sensing element not “seeing” material (HLFS).</td>
<td>Need longer insertion length. Consult factory.</td>
</tr>
<tr>
<td></td>
<td>Improper wiring.</td>
<td>Section 2.4</td>
</tr>
<tr>
<td></td>
<td>Improper calibration.</td>
<td>Section 4</td>
</tr>
<tr>
<td></td>
<td>Electronic malfunction.</td>
<td>Section 5.1</td>
</tr>
</tbody>
</table>
### 5.5 Possible Problems and Causes (cont.)

<table>
<thead>
<tr>
<th><strong>PROBLEM</strong></th>
<th><strong>POSSIBLE CAUSES</strong></th>
<th><strong>SOLUTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument can't be calibrated.</td>
<td>Improper wiring</td>
<td>Need longer insertion length or larger surface area.</td>
</tr>
<tr>
<td></td>
<td>Insufficient signal from sensing element.</td>
<td>Add pad capacitor - Section 4.6.</td>
</tr>
<tr>
<td></td>
<td>Setpoint is beyond the tuning range of the electronics.</td>
<td>Consult factory.</td>
</tr>
<tr>
<td></td>
<td>Electronic malfunction.</td>
<td>Section 5.1</td>
</tr>
<tr>
<td>Instrument gives a false alarm.</td>
<td>Improper calibration.</td>
<td>Section 4</td>
</tr>
<tr>
<td></td>
<td>Loose wiring.</td>
<td>Section 2.4</td>
</tr>
<tr>
<td></td>
<td>Water in Housing</td>
<td>Remove water.</td>
</tr>
<tr>
<td></td>
<td>Electronic malfunction.</td>
<td>Section 5.1</td>
</tr>
<tr>
<td>Instrument operates intermittently.</td>
<td>Improper calibration.</td>
<td>Section 4</td>
</tr>
<tr>
<td></td>
<td>Loose wiring.</td>
<td>Section 2.4</td>
</tr>
<tr>
<td></td>
<td>Water in conduit.</td>
<td>Remove water.</td>
</tr>
<tr>
<td></td>
<td>Electronic malfunction.</td>
<td>Section 5.1</td>
</tr>
</tbody>
</table>
5.6 Telephone Assistance

If you are having difficulty with your Drexelbrook equipment, and attempts to locate the problem have failed, notify your local Drexelbrook representative, or call the factory toll free 1-800-527-6297. Drexelbrook Engineering Company is located at 205 Keith Valley Road, Horsham, PA 19044.

To help us solve your problem quickly, please have as much of the following information as possible when you call:
Instrument Model # 502-302X Z-tron
P.O. #
Date
Insertion Length
Application
Material being measured
Temperature
Pressure
Agitation
Brief description of the problem
Checkout procedures that failed

5.7 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 in addition to the above.
Reason for Return
Return Authorization #
Person to contact at your company
“Ship To” address

If available, please also include the original P.O. number and the original Drexelbrook order number.

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 usually has exchange units available for faster turnaround of repair orders. If you prefer your own unit repaired rather than exchanged, please mark clearly on the return unit, “Do Not Exchange”.

Spare instruments are generally in factory stock. If the application is critical, a spare chassis should be kept on hand.
5.8 Field Service
Trained field servicemen 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.

5.9 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, attention: Communications/Training Group, or call direct (215) 674-1234.
SECTION 6 SPECIFICATIONS

—Power Requirements
95-145 Vac, 50-60 Hz
Power consumption, 3 watts

—Sensitivity
.02 pF

—Tuning Range
0-8 pF

—Fail-safe
Field selectable high-level fail-safe (HLFS) or low-level fail-safe (LLFS).

—Contact Ratings (DPDT)
250 Vac, 5A Resistive Load
30 Vdc, 5A Resistive Load
250 Vac, 2A Inductive Load
30 Vdc, 3A Inductive Load

—Electronic Unit Operating Temperature
-40°F to 140°F (-40°C to 60°C)

—Ambient Temperature Effect on Operating Point
1% per 54°F (30°C)

—Sensing Element Operating Temperature and Pressure
S.E. #700-206-101 Epoxy insulation
-40°F to 250°F (-40°C to 135°C)
200 psi pressure

S.E. #700-202-002 TFE insulation
-40°F to 300°F (-40°C to 149°C)
50 psi pressure

S.E. #700-201-005 TFE insulation
-40°F to 300°F (-40°C to 149°C)
50 psi pressure

S.E. #700-202-010 Sanitary design TFE insulation
-40°F to 250°F (-40°C to 135°C)
0 psi pressure

S.E. #700-1202-101 Perm-a-Seal™ insulation
-40°F to 450°F (-40°C to 232°C)
200 psi pressure
SECTION 6
SPECIFICATIONS (cont.)

—Spark Tolerance
  10 amp standard
  100 amp optional

—Housing
  5-inch integral explosionproof, standard
  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 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).