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# Installation and Operating Instructions

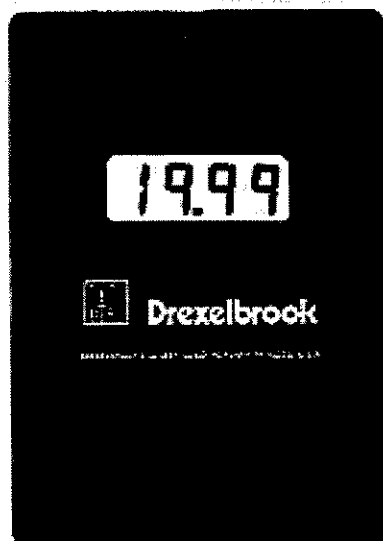
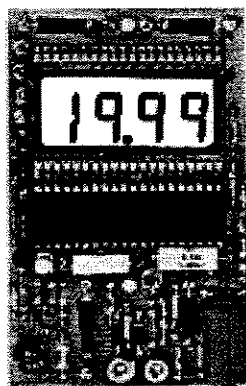
Series 370-3000  
Digital Loop Meter

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## Series 370-3000 Digital Loop Meter



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# Table of Contents

- SECTION 1 INTRODUCTION ..... 1**
  - 1.1 Product Description ..... 1
  - 1.2 Models Available ..... 1
  
- SECTION 2 SPECIFICATIONS ..... 2**
  
- SECTION 3 INSTALLATION ..... 3**
  - 3.1 Unpacking ..... 3
  - 3.2 Mounting the Meter ..... 3
  - 3.3 Wiring the Meter ..... 4
  
- SECTION 4 CALIBRATION/OPERATION ..... 5**
  - 4.1 Start-up ..... 5
  - 4.2 Zero and Span Controls ..... 5
  - 4.3 Adjustable Decimal Point ..... 5
  - 4.4 Calibration Procedures ..... 5
  
- SECTION 5 TROUBLESHOOTING ..... 7**
  
- SECTION 6 FACTORY AND FIELD SERVICE ASSISTANCE ..... 8**
  - 6.1 Telephone Assistance ..... 8
  - 6.2 Equipment Return ..... 8
  - 6.3 Field Service ..... 8
  - 6.4 Customer Training ..... 8



## 1.0 Introduction

The instructions in this manual are for the Drexelbrook DLM3000™ Digital Loop Meter. See Figure 1-1.

### 1.1 Product Description

The Drexelbrook DLM3000 meter provides a liquid crystal, digital display of a 4-20 mA, two-wire loop current. No separate line-power connections are needed, since the meter receives its power directly from the current loop.

The DLM3000 meter is available in a variety of standard Drexelbrook transmitter housings: 4" x 6"; 6" x 8"; 10" x 12"; and 14" x 16." The low voltage drop (1.6 volts at 20 mA) makes it ideal for replacing older, less accurate analog indicators.

### 1.2 Models Available

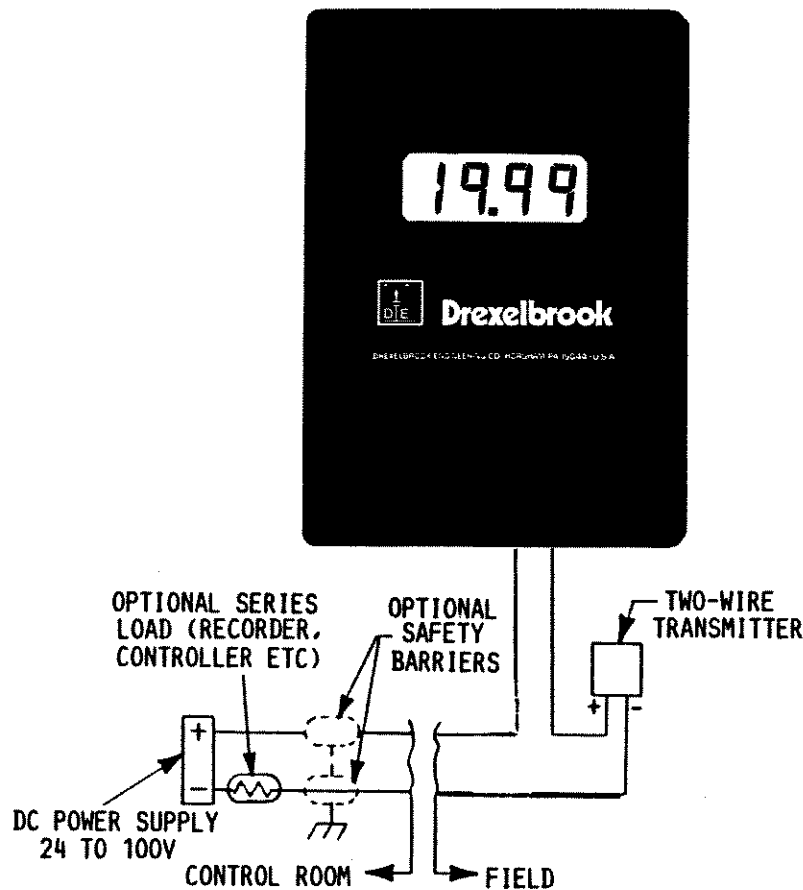
370-3000-1: 4-20 mA<sub>dc</sub> unit, chassis only.

370-3000-4: Same as above in explosionproof case.

401-8110-7: Same as above in Nema 4X case.

370-3030-1: Meter retrofit kit for replacing Drexelbrook analog meters in the field.

370-3020-0: Panel mount unit.



**Figure 1-1**  
**DLM3000™ Digital Loop Meter**

# ***Specifications***

## **2.0 Specifications**

- A. **Measuring Range:** 3.5 mA to 21 mA std.
- B. **Accuracy:**  $\pm .1\%$  of full scale.
- C. **Voltage drop:** max 1.6 volts @ 20 mA.
- D. **Operating Temperature:** -30F to 140F.
- E. **Temperature Effect:** 100 PPM/C.
- F. **Linearity:**  $\pm 2$  counts.
- G. **Overrange Protection:** 200 mA normal.  
1000 mA reverse polarity.
- H. **Digits:** 3 1/2 (1999 max full scale).
- I. **Digit Size:** .5" high.



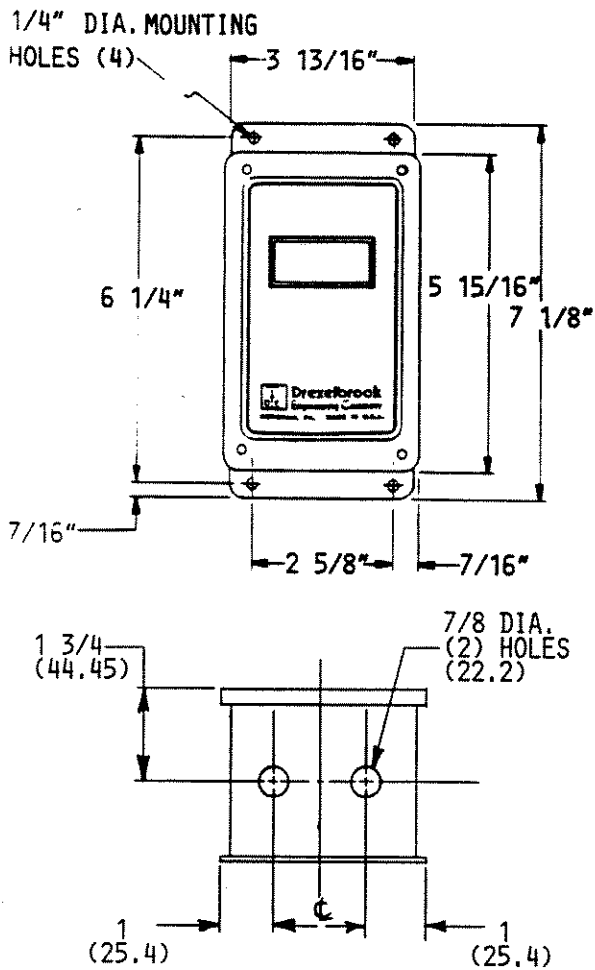
## 3.0 Installation

### 3.1 Unpacking

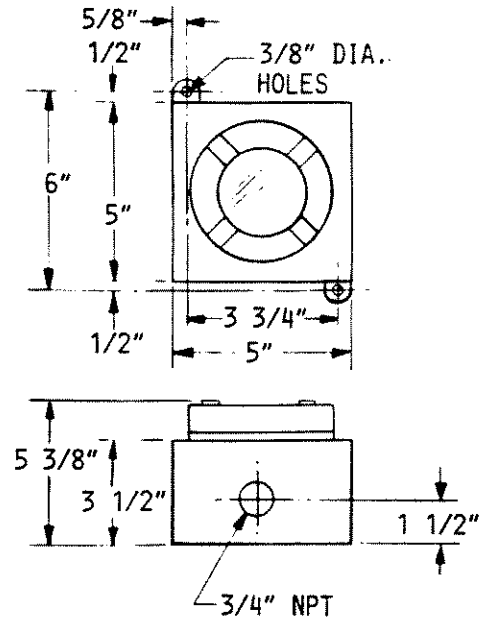
Carefully remove the contents of the shipping carton and check each item against the packing list before destroying any packing materials. If there is any shortage or damage, report it to the factory immediately.

### 3.2 Mounting the Meter

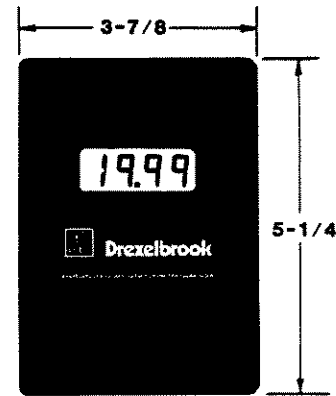
The DLM3000 is normally mounted in a Drexelbrook-supplied enclosure. It is available in a variety of transmitter case options, as well as in its own case, or as a chassis only. See Figures 3-1, 3-2, 3-3, 3-4, and 3-5 for mounting dimensions.



**Figure 3-1**  
Mounting dimensions of meter in general-purpose or Nema 4X case

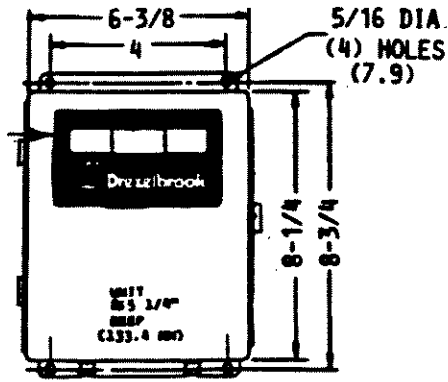


**Figure 3-2**  
Mounting dimensions of meter in explosionproof case

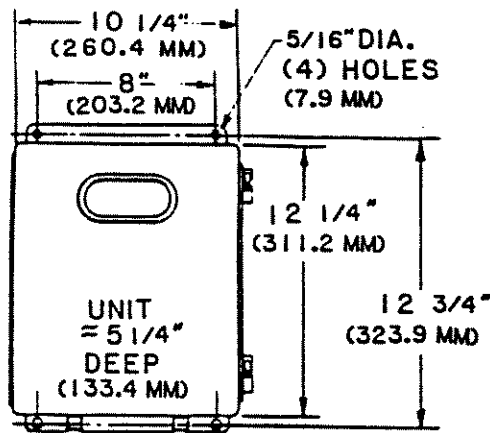


**Figure 3-3**  
Mounting dimensions of meter in bezel for panel mount

# Installation



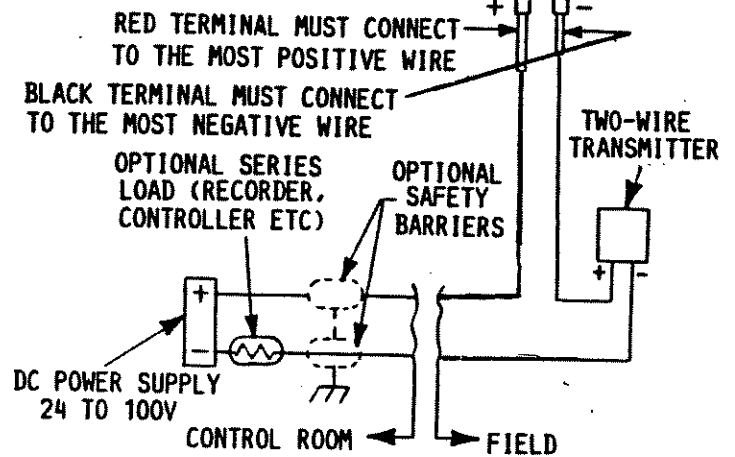
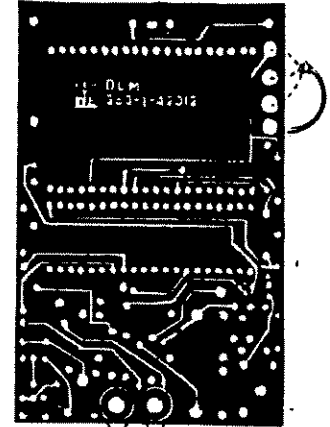
**Figure 3-4**  
Mounting dimensions of meter in 6"x8" transmitter case



**Figure 3-5**  
Mounting dimensions of meter in 10"x12" transmitter case

## 3.3 Wiring the Meter

The only wiring required for the DLM3000 is the current loop series connections. Polarity must be observed, as shown in Figure 3-6, for the unit to operate properly. Reversing the polarity will not damage the unit, but the meter will not operate.



**Figure 3-6**  
Meter wiring connections

**Warning:** Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2.

**Advertissment:** Risque D'explosion - La substitution de coimposants puet rendre ce materiel inacceptable pour les emplacements de Classe I, Division 2.

**Warning:** Explosion Hazard - Do not disconnect equipment unless power has been switched off, or the area is known to be non-hazardous.

**Advertissment:** Risque D'explosion - Avant de deconnecter l'equipment, couper le courant ou s'assurer que l'emplacement est designe non dangereux.

## 4.0 Calibration/Operation

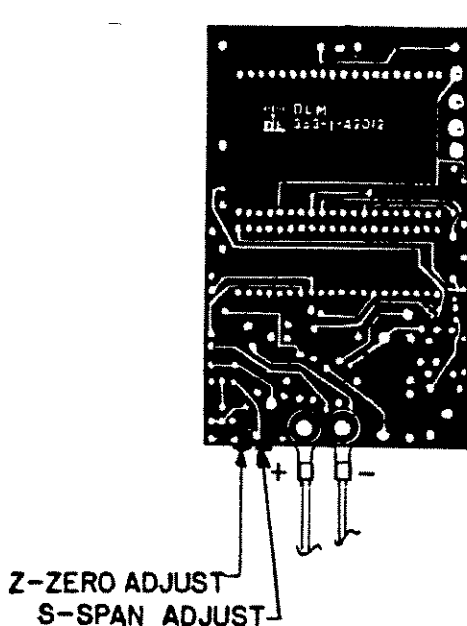
### 4.1 Start-up

Be sure the meter is wired correctly so that it will operate properly. See Section 3.3.

### 4.2 Zero and Span Controls

There are two controls on the meter circuit board, zero and span. See Figure 4-1. The zero control provides adjustment of the minimum calibration point, and the span control provides adjustment of the full scale reading point. These controls are normally set at the factory for 4-20 mA = 0-100%.

SELECT DECIMAL POINT POSITION  
WITH PIN PLUG SELECTOR - 1 OF 3 POSITIONS  
(SELECT LEFT MOST D.P. WITH LOWEST PLUG POSITION)



**Figure 4-1**  
*Meter zero and span adjustments and decimal point selector*

### 4.3 Adjustable Decimal Point

Unless otherwise specified, the DLM3000 meter is supplied with the decimal point set between the 3rd and 4th digits (e.g. 100.0). The decimal point can be adjusted by plugging the decimal point selector into any one of three positions. As the jumper pin is moved down, the decimal point moves one position to the left. See Figure 4-1.

## 4.4 Calibration Procedures

The meter is normally factory calibrated to display 0 to 100% over a 4-20 mA range. To recalibrate in the field, use one of the following procedures.

### 4.4.1 Calibration for Zero-Based Display

The meter can be calibrated to indicate current in terms of engineering units, or percent. When the calibration display uses zero to correspond to the minimum loop value, the calibration procedure simply involves setting the zero control to produce a reading of 000 at the 4.00 mA loop current; and at 20 mA loop current adjusting the span control to produce the desired display reading (maximum of 1999).

For example, to calibrate 0-650 gallons equal to 4-20 mA.

A. With a minimum current of 4 mA, use a small screwdriver to adjust the zero control until you get a 00.0 reading on the LCD screen. See Figure 4-1.

B. With a maximum current of 20 mA, adjust the span control until you get a 650 reading on the LCD screen.

Zero-based calibration is complete.

### 4.4.2 Calibration for Non-Zero-Based Display

The meter can also be calibrated to provide a display which shows a non-zero value corresponding to the minimum loop current. For example, 4 mA = 400 gallons. When calibrating a non-zero value use the following procedure.

A. Determine the delta (or span) of the two calibration point numbers (minimum and maximum). For example 400 → 1999. The delta (or span) = 1999 - 400 = 1599.

# Calibration/Operation

- B. With a minimum current of 4 mA, use small screwdriver to adjust zero control until you get a 00.0 reading on the LCD display.
- C. With a maximum current of 20 mA, adjust the span control until you get a reading of 1599 on the LCD as per the example.
- D. Return to minimum current of 4 mA. Meter should read "00.0." Adjust zero control until you get a reading of 400. Meter is now calibrated for 4 mA = 400; 20 mA = 1999.

## Note

If calibration procedure does not result in desired meter display, consult factory at 1-800-527-6297.

## 5.0 Troubleshooting

The DLM3000 meters are designed to give years of unattended service. No periodic or scheduled maintenance is required.

If a problem should occur with the operation of the digital loop meter, use the following procedure for troubleshooting.

**A.** Be sure the wiring connections are correct. See Section 3.3. If the polarity is reversed, the meter will not operate and the display will be blank.

**B.** Check the loop current to be sure it is within the required range (3.5 mA to 21 mA). See Figure 5-1.

**C.** Check the voltage drop between the (+) and (-) terminals to be sure it is  $1.4 \pm .2$  volts with 20 mA in the loop.

**D.** Be sure the meter was calibrated correctly. (See Section 4.0).

**E.** Check to see if the signal loop operates correctly when the meter is shorted out.

If attempts to locate the difficulty fail, notify your local factory representative, or call the factory direct and ask for the service department.

# Service

## 6.0 Factory and Field Service Assistance

### 6.1 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 direct and ask for the service department. Drexelbrook Engineering Company is located at 205 Keith Valley Road, Horsham, PA 19044. The toll-free telephone number is 1-800-527-6297. To help us solve your problem quickly, please have as much of the following information as possible when you call:

Instrument Model # \_\_\_\_\_

Probe Model # \_\_\_\_\_

P.O. # \_\_\_\_\_

& Date \_\_\_\_\_

Cable Length \_\_\_\_\_

Application \_\_\_\_\_

Material being measured \_\_\_\_\_

Temperature \_\_\_\_\_

Pressure \_\_\_\_\_

Agitation \_\_\_\_\_

Brief description of the problem \_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

### 6.2 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 in addition to the above.

Reason for return \_\_\_\_\_

Return Authorization # \_\_\_\_\_

Person to contact at your company \_\_\_\_\_

"Ship To" address \_\_\_\_\_

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.

### 6.3 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.

### 6.4 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.

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

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 turn-around of repair

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