



TRANSDUCER DISPLAY INSTRUMENTS

No. TDTIE1 "DUAL" 4-1/2 DIGIT LED DISPLAY

**No. THTIE1 "HALF-DUAL" SINGLE 4-1/2 DIGIT
LED DISPLAY**

TABLE OF CONTENTS

TABLE OF CONTENTS	i
CERTIFICATION	ii
COPYRIGHT	ii
INSTALLATION & MAINTENANCE	ii
WARRANTY AND ASSISTANCE	ii
1.0 DESCRIPTION	1
1.1 Introduction	1
1.2 Features	1
1.3 Specifications	2
2.0 PRINCIPLES OF OPERATIONS	2
2.1 Modular Construction	2
2.2 Input Signal Connections	2
2.3 Input Transformer Board	3
2.4 Power Regulator and Interconnect Board	3
2.5 Display Module - A/D Board	3
2.6 Display Module - LED Display Board	3
2.7 Optional Hold Function (-H1)	3
3.0 INSTALLATION	4
3.1 Initial Inspection	4
3.2 Power Requirements	4
3.3 Instrument Mounting	4
3.4 Surge Protection	4
4.0 FIELD ADJUSTMENTS	4
4.1 Calibration	4
5.0 OPTIONAL -VD1 POWER SUPPLY	6
5.1 Introduction	6
5.2 Features	6
5.3 Specifications	6
5.4 Input Power Connections & Operation	6
APPENDIX	A1
Schematics	A2
Parts Placement and Bills of Materials	A4

CERTIFICATION

Bitronics, Inc. certifies that the calibration of its products are based on measurements using equipment whose calibration is traceable to the United States National Institute of Standards Technology (NIST).

COPYRIGHT

This Manual is copyrighted and all rights are reserved. The distribution and sale of this manual are intended for the use of the original purchaser or his agents. This document may not, in whole or part, be copied, photocopied, reproduced, translated or reduced to any electronic medium or machine-readable form without prior consent of Bitronics, Inc., except for use by the original purchaser.

INSTALLATION AND MAINTENANCE

Bitronics' products are designed for ease of installation and maintenance. As with any product of this nature, however, such installation and maintenance can present electrical hazards and should only be performed by properly trained and qualified personnel. If the equipment is used in a manner not specified by Bitronics, the protection provided by the equipment may be impaired.

WARRANTY AND ASSISTANCE

Products manufactured by Bitronics, Inc. are warranted against defects in materials and workmanship for a period of thirty-six (36) months from the date of their original shipment from the factory. Products repaired at the factory are likewise warranted for eighteen (18) months from the date the repaired product is shipped, or for the remainder of the product's original Warranty, whichever is greater. Obligation under this warranty is limited to repairing or replacing, at Bitronics' factory, any part or parts which Bitronics' examination shows to be defective. Warranties only apply to products subject to normal use and service. There are no warranties, obligations, liabilities for consequential damages, or other liabilities on the part of Bitronics except this Warranty covering the repair of defective materials. The warranties of merchantability and fitness for a particular purpose are expressly excluded.

For assistance, contact Bitronics at:

Telephone: (610) 865-2444
FAX: (610) 865-0340
Email: info@bitronics.com
Website: www.bitronics.com

Shipping:

BITRONICS, INC.
261 Brodhead Road
Bethlehem, PA 18017-8698
U.S.A.

1.0 DESCRIPTION

1.1 Introduction

The Bitronics Transducer Display instruments are designed for utility and industrial switchboard and panel-mount applications where reliable, precise measurements are required. Reliability, flexibility, and ease of maintenance characterize this family of proven instruments.

Transducer display meters are especially suited for use with external transducers which provide DC or slowly varying current or voltage signals. Models are available with one or two electrically isolated displays in a standard four-inch round housing. A unique feature is the modular design which permits easy field maintenance by simply unplugging and replacing active display modules without disconnecting any external wires.

All instruments are easily scaled to display any desired engineering or scientific units represented by the input signals. Watts, volts, amps, megawatts, megavars, frequency, flow, and many other units can be displayed. Labels for standard electrical quantities are available, consult factory for other units.

Utility and industrial applications frequently require the use of current or potential transformers. The Bitronics instruments can easily be calibrated to display in transformer primary units for any transformer ratios, even fractional ones.

1.2 Features

- * Field-changeable modular design for easy maintenance.
- * Rugged metal housing fits standard 4-inch round cutout.
- * 4-1/2 digit high efficiency LEDs for easy reading.
- * Optional Universal Power supply (-VD1) for use on 48Vdc, 125Vdc, and 115Vac systems.
- * Adjustable scaling eliminates the need for custom instruments or dials.
- * Electrical isolation of display modules allows use in current loops with other devices and SCADA inputs.
- * One or two channel models are available.

1.3 Specifications

Input Signals:	+/- 0 to 1.0mA DC nominal (Max. of +/-2mA), other inputs are available.
Signal Burden:	1k Ohm (2k Ohm with display module removed).
Display:	0000 to +/- 19999 with user-selected decimal.
Scaling:	Internal trim, one per module, accessible with front cover removed.
Accuracy:	Exceeds 0.25% Class (ANSI Std 460-1988).
Power Requirements:	115 Vac +/- 20%, 3 VA. (230 Vac & DC optional)
Operating Temperature:	-20C to 70C.
Weight:	2 pounds (.91 kilograms)

2.0 PRINCIPLES OF OPERATION

2.1 Modular Construction

The Bitronics Dual Transducer Display meter is composed of three major assemblies, the power supply and case tube assembly, and the upper and lower Display Modules. The "Half Dual" contains the same two power supplies as the Dual, but only one Display Module, and a single window faceplate. The Display Modules can be removed while the instrument is under power. Simply remove the four cover screws and pull out the module (a small pliers may be helpful).

2.2 Input Signal Connections

Connections are made to two four-position barrier strips on the back of the instrument. The two Signal inputs, the Power input, and the optional Hold input are all electrically isolated from each other.

Input signals for the upper and lower displays are connected to the top barrier strip, Pins 1,2 and 3,4 respectively. The input impedance for each channel is 1K-ohm, increasing to 2K-ohm if the Display Module for that channel is removed. Maximum input current is +/- 5mA DC.

Power is connected to the right most two positions of the lower barrier strip, Pins 7 and 8. The standard power supply requires 115Vac +/-20%, and draws 2.5VA. 230Vac is also available (DOVA1). Two optional Universal Power Supplies are available; -VD1 will run with DC voltages from 40 to 195V, and AC voltages from 30 to 140V. -VD1HR will run with DC voltages from 70 to 295V, and AC voltages from 55 to 210V.

An additional optional hold input is provided on pins 5 and 6 for freezing the displays. When a voltage of 80 to 280Vdc or 115Vac is applied from terminals 5 to 6, the displays will freeze their values. This option is available in combination with -VD1 options only.

2.3 Input Transformer Board

The Input Transformer Board solders to the terminal barrier strips, mounts the power transformer, and routes the input and power signals through ribbon cables to the Regulator and Interconnect Board. On meters equipped with the -VD1 option, this board contains the switch mode power supply and isolation transformer.

2.4 Power Regulator and Interconnect Board

Unregulated secondary power signals and input signals are routed to the Power Regulator and Interconnect Board. Each channel has a separate full wave bridge, low drop-out solid state regulator, and filter capacitors.

2.5 Display Module - A/D Board

The Display Module A/D Board contains the module interface connector, -5V power supply, A/D converter, reference, display driver, and drive transistors. The A/D is an integrating type, with approximately 3 conversions per second. A trim pot (accessible from the front of the instrument with the cover removed), and a High/Low range jumper on the back of the module, controls the full-scale adjustment. The A/D sends signal data to the display driver, along with overrange information. When an overrange occurs (a display value greater than +/- 19990) the display flashes 0000.

Display Modules may be removed and replaced while the instrument is under power. Simply remove the front cover screws and cover, and pull out the module by the small nylon strap at the top of the module. A calibrated module will be within 1% of its calibrated value if it is moved to another position, or to another instrument.

2.6 Display Module - LED Display Board

High efficiency red LEDs are used, with 4-1/2 digits and both + and - polarity indicators. A simple four position decimal point shunt block controls decimal point location. A hole in the upper left side of the display board provides access to the full-scale adjustment.

2.7 Optional Hold Function (-H1)

An optional hold input is provided on terminals 5 and 6 for freezing the displays. When a voltage of 80 to 280Vdc or 115Vac is applied across terminals 5 and 6, the displays will freeze their values. When a DC voltage is used to operate the Hold function, observe the polarity marked on the back of the unit. This option is available in combination with -VD1 options only.

3.0 INSTALLATION

3.1 Initial Inspection

Bitronics' instruments are carefully checked and "burned in" at the factory before shipment. Damages can occur, however, so please check the instrument for shipping damage as it is unpacked. Notify Bitronics immediately if damage has occurred, and save any damaged shipping containers.

3.2 Power Requirements

The DUAL and HALF DUAL meter is normally configured for 115V ac, 60Hz power. 230V ac, 50/60Hz is available when requested at the time of order. Power is connected to the two labeled terminals at the rear of the case as shown in Figure 2 found on page 5. Both terminals are electrically isolated from the meter case and from the electronic circuitry. Variations of the ac supply voltage of +/- 20% will not affect the performance of the instrument. The power supply and regulators provide constant dc power to the modules independent of variations in ac supply voltage over this range.

3.3 Instrument Mounting

The instrument may be mounted into a standard 4" panel opening as shown in Figure 2. Adapter plates are available for larger panel openings. Figure 3 shows the overall dimensions of the meter. **WARNING - DO NOT** overtighten the nuts on the mounting studs, **HAND** tighten with a standard nut driver, 12 inch-pounds is recommended, **MAXIMUM** torque is 15 inch-pounds.

4.0 FIELD ADJUSTMENTS

The TDTIE1 can display a maximum of 1.0000 for 1.0mA input. Values up to 1.9999 can be displayed upon request.

4.1 Calibration

If recalibration should be required, the following steps should be followed.

1. Remove the four cover screws, and remove the front cover and gasket.
2. Locate the GAIN trimpot, accessible through the hole in the upper left of each module.

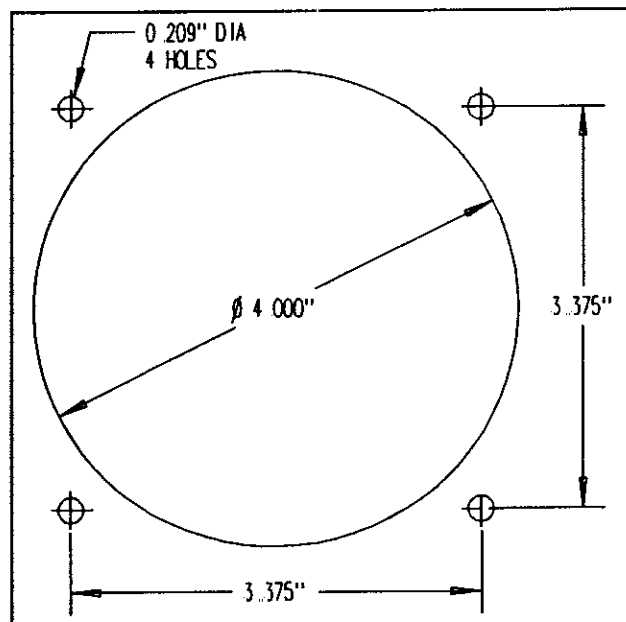


Figure 1 - Mounting Dimensions

3. Skip this step for 4-20mA units. If major calibration changes will be made, remove the module (it may be pulled out under power), and locate the jumper marked **RANGE** on the component side of the board. If the FULL SCALE (1mA) displayed value is to be (ignoring the decimal point) 2500 or less, put the **RANGE** jumper in the **L** position. If the FULL SCALE (1mA) displayed value is to be greater than 2500, put the **RANGE** jumper in the **H** position. Replace the module.
4. Insert a small screwdriver through the opening, and into the slot of the screw on the trimpot.
5. With the meter powered, AND WITH A PRECISION 1mA INPUT, rotate the screw clockwise to increase the measurement, or counter-clockwise to decrease the indicated measurement.
6. Locate the decimal point jumper block at the bottom center of each module, and move the shunt bar to activate the desired decimal point.
7. Replace gasket, front cover, and four cover screws.
8. Note that if a calibrated module is moved from its original position to another (or to another instrument), its calibration may change by as much as 1%.

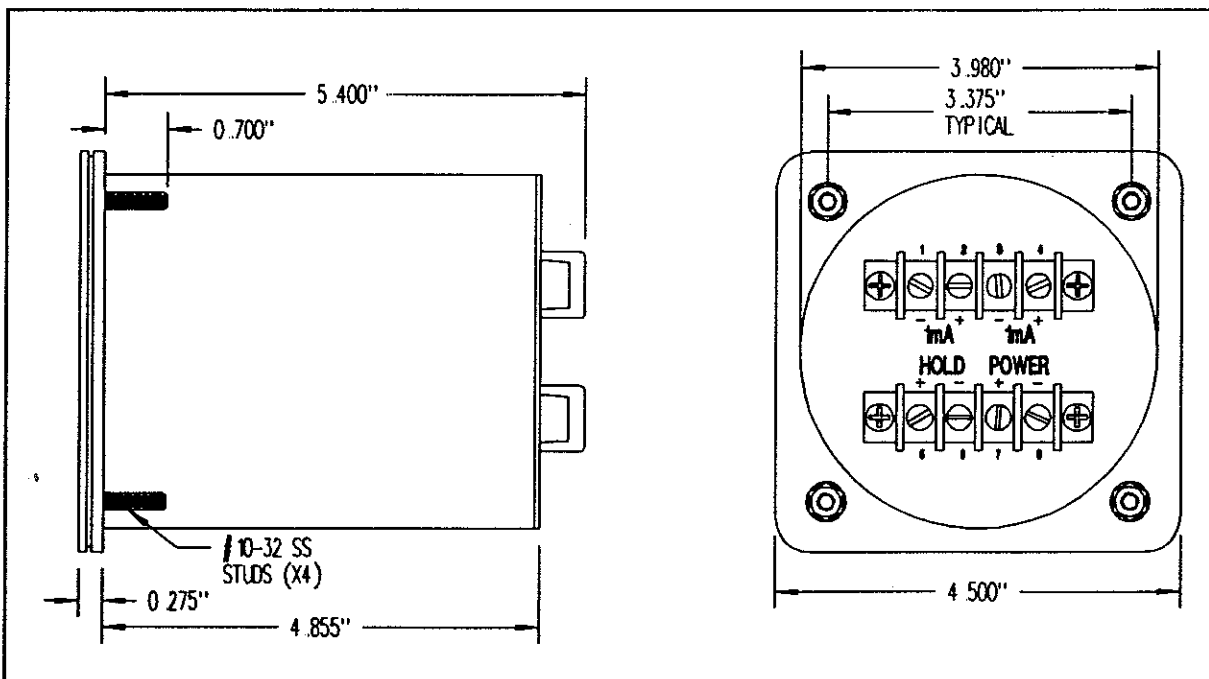


Figure 2 - TDTIE1 Outside Dimensions

5.0 OPTIONAL -VD1 UNIVERSAL POWER SUPPLY

5.1 Introduction

The -VD1 Universal Power Supply option for the TDTIE1 and THTIE1 is designed to allow operation of these instruments from standard backup power systems. No external equipment is needed, and the supply has been designed for use in the utility environment.

5.2 Features

- * For use on 48, 125Vdc, & 115Vac systems (125, 250Vdc, & 115Vac with -VD1HR).
- * Electrically isolated power inputs.
- * Under/over-voltage, over-current, and over-temperature shut off.
- * External MOV's and internal transient protection.
- * All electrolytic capacitors rated to 105 Deg C.

5.3 Specifications

Input Voltage: -VD1: 40 to 175Vdc, 55 to 140Vac.
 -VD1HR: 70 to 280Vdc, 55 to 210Vac.

Surge Suppression: Meets ANSI C37.9 Standards.

Operating Temp.: -20 to 70 Deg C.

Input Frequency: DC or 40 to 400Hz AC.

5.4 Input Power Connections & Circuit Operation

The universal power supply is a high-efficiency, high-frequency switching power supply with integrated under & over-voltage, over-temperature, and over-current protection. Power connections to the instrument are made directly to the rear panel of the instrument.

Power from the input terminals is conducted to a full-wave bridge rectifier and capacitor to convert ac power inputs to filtered-dc. Dc power inputs are unaffected by the bridge rectifier. Input polarities are marked for reference only. The dc voltage across the filter capacitor is alternately connected and disconnected to the isolation/power transformer at a rate of about 300kHz, by a pulse-width controller. A separate feedback winding on the power transformer provides a signal which is used by the controller to vary the time that the transformer is connected to the power source. This allows the supply to provide a constant output voltage over a wide range of input voltages and output loads.

