

DTI Series

Digital Tilt Indicators

Introduction

The Sherborne Sensors DTI Series is a family of five-digit, programmable digital panel meters, offering improved tilt measurement system versatility and performance. The series is designed to take an output from any Sherborne Sensors gravity referenced inclinometer, provide necessary trigonometric conversions, and display the output as an angle, with a resolution down to 0.001°. For seamless interface with a data acquisition system, two supplementary outputs, an analog voltage output and RS422/485 serial output are supplied. The enclosure is manufactured from recyclable and flame retardant (VO) materials, with front panel conformance to IP65: NEMA 4.

Supplied, powerful menu-driven software enables fast and flexible set-up from the front panel or via serial communications link. Built-in, comprehensive alarm functions for the DTI Series makes them particularly suitable for monitoring, switching and control functions. The hysteresis facility prevents noisy signals from switching alarms erroneously, with high and low deviations facilitating control around a set point. On and off delay times can be set with individual alarms, configured as latching or non-latching, depending on user requirements.


The DTI Series may be used with most Sherborne Sensors gravity-referenced inclinometers, as well as other manufacturers' products. An integral 12 VDC power supply is intended to provide excitation voltage for MEMS- based inclinometers. Bi-polar voltage supplied inclinometers may be also powered via Sherborne Sensors XT-0102 or XT-0103 series power supply modules.

Applications

- ❑ Can be implemented into simple, measurement-only applications, as well as those requiring digital communications, alarms, and mathematical functions
- ❑ Available either as an individual product, or as a fully calibrated measurement system, with inclinometer
- ❑ Suitable for use with Sherborne Sensors gravity referenced inclinometers, as well as other manufacturers' products.



Features

- ❑ Front panel conforms to IP65 (NEMA 4)
- ❑ Flat, slightly recessed display, together with high-brightness red LED's ensures maximum visibility in difficult lighting conditions
- ❑ Universal Power Input 90 – 265VAC, 50/60Hz allows world-wide installation
- ❑ Full set-up via front panel buttons through a simple, password protected menu
- ❑  Complies with European Electromagnetic Compatibility and Safety Directives
- ❑ Four software alarms and two alarm relays
- ❑ RS422/485 Interface
- ❑ Analog voltage output
- ❑ Advanced mathematical functions



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DTI SERIES SOFTWARE

All configuration parameters can be password protected and are preserved, in the event of a power failure.
The following software functions are available to Sherborne Sensors DTI Series users:

Advanced Mathematical Functions

The DTI series offers a number of advanced math functions, including:

- Maximum and Minimum (Peak/Valley) Memory
- Signal Averaging
- Square Root
- Auto Zero

The Auto Zero function is particularly useful for correcting sensor zero offset errors.

Software Alarms

Four software alarms are standard. A separate alarm menu is provided for each alarm, allowing for independent operation. The software allows the user to configure the following parameters for each alarm:

- Type (high, low or deviation)
- Set point value
- Deviation high and low
- On/off delay time
- On/off hysteresis value
- Output (none, Relay 1 or 2, or both)
- Latching or non-latching
- Alarm display message on/off
- Front panel set point edit on/off (alarms 1 and 2)
- Link set point on/off (alarms 3 and 4)

The set-up link function allows multiple alarms to track one adjustable set point value. Either all set point values can be password protected, or an operator can edit set points 1 and 2. The display can be set to flash a message whenever an alarm is active.

Alarm Relay Control

The DTI series is fitted with two alarm relays, which can be activated by any of the four software alarms. In addition, the AND function allows a relay to be set only when two or more software alarms are active. Relays are configurable to be energized or de-energized, (fail safe), in the alarm condition.

Digital Status Inputs

The DTI Series is provided with two digital inputs, which can be activated by external volt-free contacts. These can be programmed individually by the user to perform one or more of the following functions:

- Tare
- Auto Zero
- Display Hold
- Display Maximum
- Display Minimum
- Display Average
- Reset Maximum, Minimum and Average
- Alarm Disable
- Alarm Acknowledge
- Analog Output Hold
- Keyboard Lock
- Display Test

Function Buttons

Two buttons, located on the front panel, can be user-programmed to give operator level access to one or more of the following functions:

- Tare
- Auto Zero
- Display Hold
- Display Maximum
- Display Minimum
- Display Average
- Reset Maximum, Minimum and Average
- Display Test

Display

The software allows the user to configure the display. The decimal point position can be set to the required measurement resolution or switched to automatic, (auto-ranging), mode. A filter is available to damp fast-moving signals and leading zeros can be suppressed if required.

Password Protection

Instrument configuration can be protected via use of a user-defined password. In addition, editing of alarm set points, alarm acknowledging and resetting of maximum, minimum or average value memory can be individually protected from operator input.

Specifications

Accuracy

0.05% of reading (Typically 0.02%)

Display

Type: 14.2mm high brightness red LED Range: -19999 to 99999

Range: -19999 to 99999

Update Rate: 2 per second

A/D Converter

Dual slope integrating with auto zero

Conversion rate: 10 per second

Resolution: 16 bit + sign (1 μ V)

Common mode Rejection: >150dB

Series mode Rejection: >70dB (50 or 60Hz)

Inclinometer Supply

Isolated 0-12V Regulated Transducer Supply

Accuracy: \pm 0.05V (Typically 0.02V)

Temperature Drift: <100ppm/ $^{\circ}$ C

Output Ripple: <5mV

Output Current: 35mA maximum

Analog Output

Isolation: 500 VDC/peak ac

Ranges: User selectable 0-10V, 0-20mA or 4-20mA

Accuracy: 0.2% of Span (typically 0.1%)

Temperature drift: <100ppm/ $^{\circ}$ C

Output Ripple: <10mV

Response: 63% within 32ms, 99% within 100ms

Resolution: 0.05% of Span (5mV or 0.01mA)

Maximum Voltage Output: 11V @ 22mA

Maximum Current Output: 22mA @ 18V

Load: 0-900 Ohms (current output)

Programmable damping filter

Alarm Relay Outputs

Relays: 2 x Change over contacts - 1 Amp @ 250VAC, 5 Amp @ 30VDC

Serial Communications

Type: RS422/485 2 or 4 wire multidrop

Speed: 1200, 2400, 4800 or 9600 baud

Parity: Odd, even or none

Stop Bits: 1 or 2

Protocol: MODBUSTM (RTU or ASCII)

Isolation: 500 VDC/peak ac

Physical/Mechanical

Front Panel: Protection to IP65 (NEMA4)

Dimensions: Height 48mm (1.890 in.) x Width 96mm (3.780 in.) x Depth 173mm (6.811 in.)

Panel Cutout: 44mm (1.732 in.) x 92mm (3.622 in.)

Environmental

Temperature: +10 to +50 $^{\circ}$ C operating, -10 to +70 $^{\circ}$ C storage

Humidity: 0-95% RH non condensing

Supply Voltage

90 to 265 VAC, 50/60 Hz

Safety and EMC Certification

Safety: EN61010, IEC1010

Susceptibility: EN50082-2, EN50082-1

Emissions: EN50081-1

Ordering Information

Part No: DTI-0001-1

Typical Performance with Sherborne Sensors Servo Inclinometers (LSO, T435, T233/T235 series or similar)

Performance

Resolution: 0.001 $^{\circ}$

Accuracy: \pm 0.01% of reading \pm 2 counts of least significant digit up to 60 $^{\circ}$

Accuracy: \pm 0.1% of reading \pm 2 counts of least significant digit from 60 $^{\circ}$ to 89 $^{\circ}$

Polarity Indication: Displayed