MDT500 Multivariable Digital Transmitter

Advisory statements

Disclaimer

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Trademarks

LabVIEW®

LabVIEW® is a registered trademark of National Instruments.

Safety Symbols

Safety Symbols	Explaining the symbols
(Read Instruction Manual symbol)	This is the **Read Instruction Manual** symbol. This symbol indicates that you must read the instruction manual.
(Safety Alert symbol)	This is the **Safety Alert** symbol. This symbol indicates a WARNING. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.
DANGER	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates information essential for proper product installation, operation or maintenance.

Safety Information

Preventing injury

Failure to follow all instructions could result in injury:

- Read.
- Understand.
- Follow all safety warnings and instructions provided with this product.
- Meet or exceed your employer's safety practices.

⚠ DANGER

Fire or Explosion Hazard

This instrument is **not intrinsically safe**.

Do not use or service in areas that may contain flammable gas or vapors, combustible dusts or ignitable fibers where an unintended spark can cause a fire or explosion.

⚠ WARNING

Pressure Limits

Do not exceed the Pressure Limits listed in the Specifications section of this manual. Failure to operate within the specified pressure limit could result in death or serious injury.

⚠ CAUTION

Maximum Input Voltage

1. Do not exceed the Maximum Input Voltage listed under "Power Requirements" in the Specification section of this manual
2. Disconnect power before servicing.
3. Substitution of components may impair operation and safety.

Meriam Contact Information

Meriam Process Technologies		
Address	Meriam Process Technologies 10920 Madison Avenue Cleveland, Ohio 44102 USA	
Telephone	US customers: + 1-800-817-7849	
	International customers: + 1-216-281-1100	
Fax	US customers: + 1-216-281-0228	
	International customers: + 1-216-281-0228	
E-mail addresses	**Departments**	**E-mail addresses**
	Return Material Authorization / Service & Repair Department	returnforms@meriam.com
	Sales	sales@meriam.com
Website	www.meriam.com	
Local Meriam Representatives		
Find a local Meriam representative	To find a find local Meriam representative, use this map to find contact information: REP LOCATOR.	

Contents

Included with the MDT500

Contents

- RTD Probe
- USB cable
- CD-ROM
- A NIST traceable calibration certificate for model numbers:

Model	Calibration
ZMDT-X-X	purchased without an LFE will receive a multi-point pressure calibration.
ZMDT-X-X-MT	and LFE purchased as a system will receive a 3-point air flow calibration.

CD ROM Resources

Each MDT500 comes with a product CD ROM that includes the following resources:

- LabVIEW Drivers (VIs).
- Manual
- Meriam Setup Utility.
- Meriam Software Development Kit.
- USB Drivers.

Note: Please look at these resources when we refer to them in this manual.

NOTICE

USB Drivers on the CD

You must install USB drivers on the computer you use with the MDT500 before the MDT500 will function. You can find these drivers on the product CD or in the **Software Dev Kit** at www.meriam.com.

Interface Accessories

Part numbers for accessories

The following table lists part numbers for various accessories available to assist you in configuring or communicating with the MDT500.

Part Number	Description	Accessory Status
Z9A000003PN06	MDT500 Product CD ROM	Standard, all models
Z9P703	Male Adapter	Standard, LFE mounted model
ZA36894-3	Male Connector	Standard, LFE mounted model

Installation and Operation

Software Environment

The MDT500 is designed to be operated with a Windows computer and the Meriam Software Development Kit (SDK). This kit is provided to make it easier to integrate with your systems. The SDK includes libraries for calculating flow rate and for communicating with the device to take measurements and access configuration options. Example applications are provided as source code and as executables that implement key features of the Virtual Flow Instrument library.

Note: You can use the SDK as both a .NET Class Library and a LabVIEW VI Library. Read the Meriam_SDK_Overview.pdf and the Help file located in the SDK Documentation directory on the CD for details.
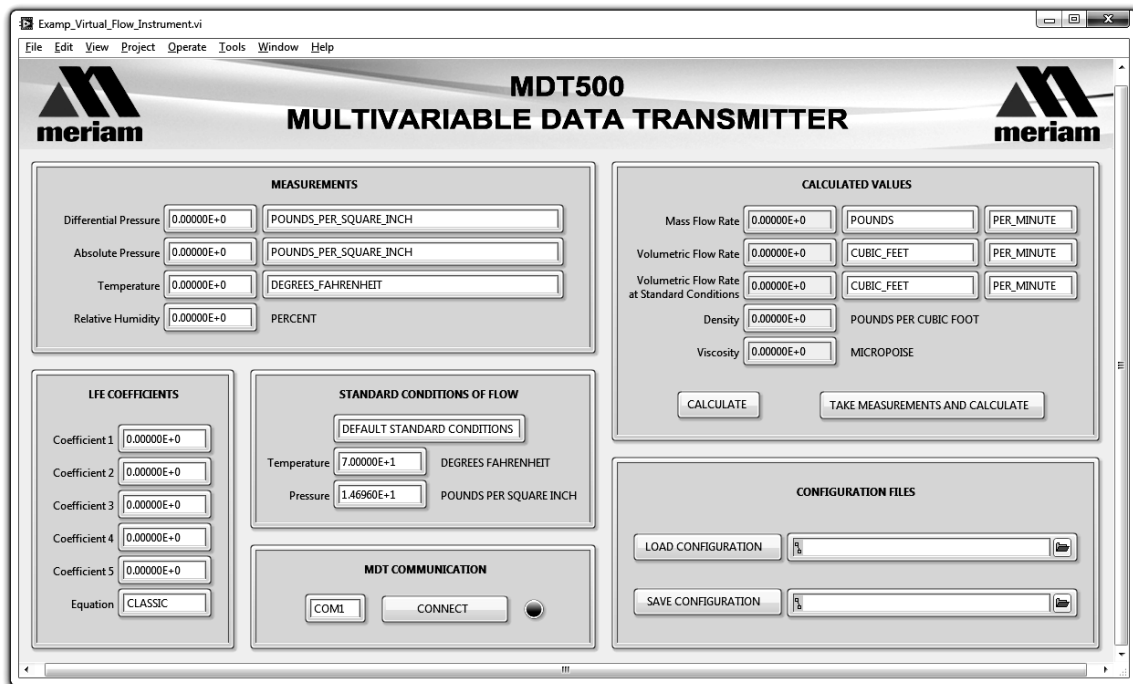
MDT and LFE Connections

NOTICE

Properly using the RTD Probe

1. Connect the supplied RTD Probe before you use the MDT500.
2. **Do not** allow the RTD probe sheath to directly contact line voltage. For example: 120 V ac.
3. Use with high power (500 mA) USB ports or powered USB hubs only.
4. Keep at least four inches from high-power, 3-phase cables.
5. Do not run in parallel with 3-phase power cables.
6. Cross existing AC power cables at right angle only when necessary for routing purposes.

50MC2 / 50MR2 Series LFE

50MC2 / 50MR2 SERIES
LAMINAR FLOW ELEMENTS
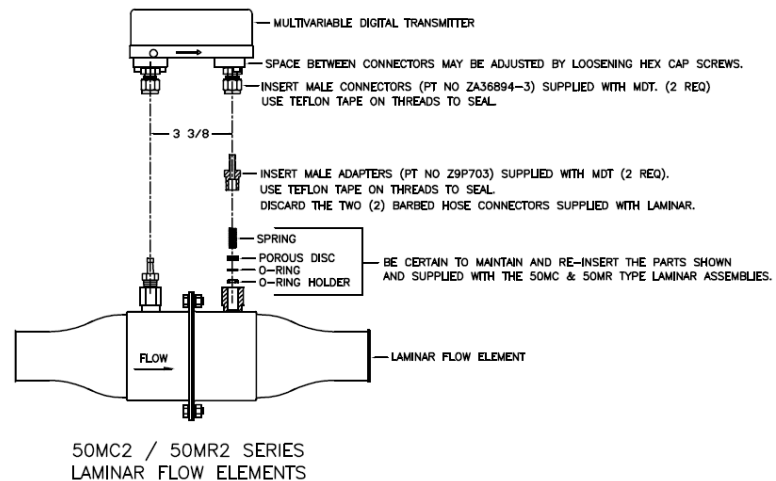
MDT and LFE Connections (continued)

50MK10, 50MJ10, 50MW20, 50MH10, 50MY15 Series LFE

MULTIVARIABLE DIGITAL TRANSMITTER

SPACE BETWEEN CONNECTORS MAY BE ADJUSTED BY LOOSENING HEX CAP SCREWS.

INSERT MALE CONNECTORS (PT NO ZA36894—3) SUPPLIED WITH MDT. (2 REQ) USE TEFLON TAPE ON THREADS TO SEAL.

3 1/8

INSERT MALE ADAPTERS (PT NO Z9P703) SUPPLIED WITH MDT (2 REQ). USE TEFLON TAPE ON THREADS TO SEAL.

FLOW

LAMINAR FLOW ELEMENT
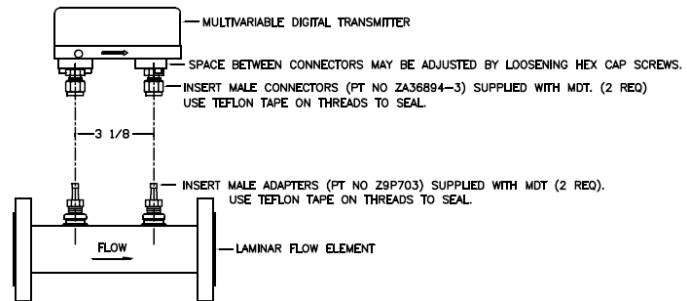
50MK10, 50MJ10, 50MW20, 50MH10, 50MY15
SERIES LAMINAR FLOW ELEMENTS

Zeroing the MDT500

Zeroing the Differential Pressure Sensor
Meriam recommends zeroing the MDT500 Differential Pressure Sensor before using it and periodically thereafter as needed.

Use the **MDT Config** example application included in the Meriam SDK to zero the sensor. (You can find this utility on the product CD or in the **Software Dev Kit** at www.meriam.com.)
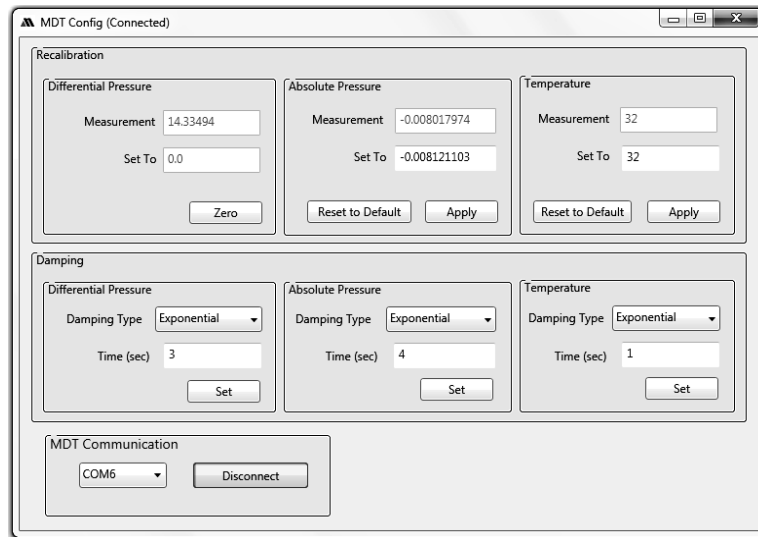
Unzip the MDT Config Executable from the CD
1. Unzip %InstallationDirectory%\Meriam\SDK\Examples\CSharp\ MDT Config Executable (You may have to unzip it to a location other than the Program Files or Program Files(x86) directory).
2. Launch **MDT Config.exe**.
3. Set the appropriate Com Port and click the Connect button.

Note: You can find the Com Port number of the MDT500 using Windows Device Manager\Ports. The MDT500 appears as *Meriam Product*.

4. Then click the Zero button in the Differential Pressure section.

NOTICE	Meriam recommends zeroing the MDT500 in its final mounting position to null any orientation effects due to local gravity.

Software Updates

Updating the firmware

Meriam periodically issues new operating firmware to improve MDT500 operation and features. You can upgrade all MDT500 units with new firmware using the **EI Reflash Utility** software included on the CD.

Install the Meriam Setup Utility

Follow these steps to install the Meriam Setup Utility.

1. Connect the MDT500 to the host PC.
2. Navigate to the Meriam Setup Utility directory and open **EI Reflash Utility.exe**.
3. Select COM Port and baud rate (115200).

   Note: You can find the Com Port number of the MDT500 using Windows Device Manager\Ports. The MDT500 appears as *Meriam Product.*

4. Click **Check Web** to download updates, then **Auto Update** to ensure the MDT500 has the latest firmware and features.

Service and Calibration

Overview

If you need to service an MDT500 or it requires recertification or re-calibration, please follow the instructions on this page and the next two pages.

Meriam Shipping and Receiving Policies

1. **Abandoned Material Policy:**

   Material is classified as abandoned after it has been in our possession for a period of 30 days after being quoted with no activity. In such cases, Meriam will notify you, at the last known contact point, that Meriam considers your material abandoned. And, in accordance with our policy, the material will be disposed of within ten business days. Meriam will not replace or provide credit for abandoned materials.

2. **Non-Hazardous Material Certification:**

   This is to certify that the equipment being returned with the serial number listed above is not known to be contaminated with any hazardous substance.

3. **Data Loss Agreement:**

   Meriam is not responsible for any loss, corruption or breach of data on any product during the Service & Repair process and it is my responsibility to appropriately backup my unit prior to having it serviced and repaired.

Returning for repairs

First — Request a Number

In the event that the MDT and LFE requires service and must be returned for repair, please contact Meriam using one of the methods listed in the following table to request a Return Material Authorization (RMA) number:

Method	Information
Website:	http://www.meriam.com/resources/service-repair-authorization/ Complete information online and submit the form.
Fax:	If you printed and completed the Service & Repair Authorization form, then fax it to:
	US Customers + 1-216-281-0228
	International customers + 1-216-281-0228
E-mail:	We need the following information in the email: • Look for the Model number & the Serial number to provide it. • Give a brief description of the problem. • Send the e-mail to: returnforms@meriam.com

Return Material Authorization

Do not send any unit for repair unless you contacted Meriam for a Return Material Authorization (RMA) number.

- **Important:** If you have not received this number and clearly marked it on the package being shipped back, we will return the unit at your expense.
- The Meriam Service & Repair Department will provide you with this number when you complete the website form, fax or e-mail your information.
- An RMA number must accompany all incoming packages to insure proper tracking, processing, and repair work.

Questions? Call Meriam

US Customers   + 1-800-817-7849

International customers   + 1-216-281-1100

Ship the box to

Meriam Process Technologies

10920 Madison Avenue

Cleveland, Ohio 44102

USA

Packing Instructions for the LFE and MDT

We recommend the following:

To lessen the possibility of shipping damage, we recommend that you detach the MDT500 from the LFE for shipping.

1. When returning the LFE, make sure you protect the LFE Matrix by covering up the open ends of the LFE.
2. Carefully detach the MDT500 from the LFE by loosening the 9/16" hex nuts on the two male connectors attached to the MDT to separate from the LFE (see Figure 1).
3. Package MDT with sufficient protective KEM pack or bubble wrap to protect against damage during shipping.
4. Package LFE with sufficient protective KEM pack or bubble wrap to protect against damage during shipping.
5. Place both packaged LFE and MDT into one container with additional KEM pack or bubble wrap.
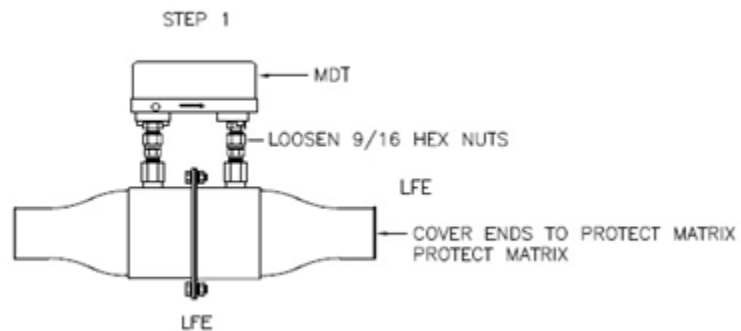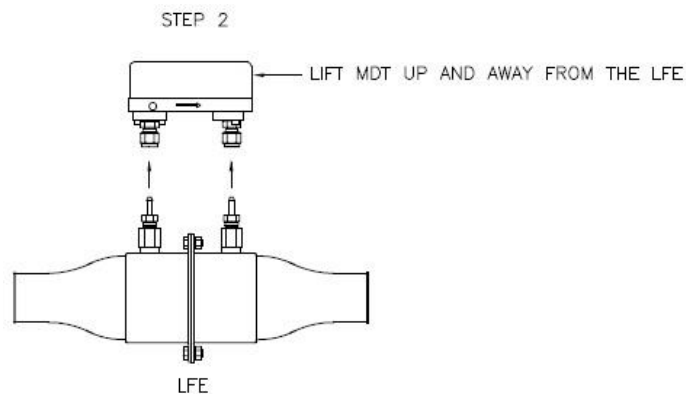
Figure 1—Loosen the hex nuts

STEP 1

MDT

LOOSEN 9/16 HEX NUTS

LFE

COVER ENDS TO PROTECT MATRIX
PROTECT MATRIX

LFE

Figure 2—Lift MDT away from LFE

STEP 2

LIFT MDT UP AND AWAY FROM THE LFE

LFE

Specifications

Overall Technical Specifications

Specifications and Certifications	Description
Media Compatibility	Clean, dry, non-corrosive gases only (brass, 316 SS, Viton, Silicon gel)
Software	
Supported Operating Systems	• Vista • Windows XP • Windows 7
Environment	.NET Framework 4.0
Software Development Kit (SDK)	• Example Programs with Source Code in LabVIEW® and C# • Supporting .NET (C# / VB)
Pressure Measurement	
Operating Temperature	−4 °F to 122 °F (−20 °C to 50 °C)
Pressure Update Rate	7 readings per second from both differential and absolute pressure sensors

Optional Pressure Ranges	• **Differential Sensor:**
	   o 12 inches water column at 20 °C.
	   o **NIST Traceable Accuracy:** ± 0.05 % of full scale including all effects of linearity, repeatability, hysteresis, and temperature (−20 °C to 50 °C)
	• **Absolute Sensor:**
	   o 38 psia
	   o 100 psia
	   o **NIST Traceable Accuracy:** ± 0.025 % of full scale including all effects of linearity, repeatability, hysteresis, and temperature (−20 °C to 50 °C)

Over Range Limits	• **Differential Sensor**:
	   o 2x range when pressurized on P1 (HI) side only;
	   o 150 psi when applied simultaneously to P1 (HI) & P2 (LO) sides
	• **Absolute Sensor:** 2x range

Media Compatibility	• **Differential Sensor:** Clean, dry, non-corrosive gases only (brass, 316 SS, Viton®, Silicon gel) • **Absolute Sensor:** Media compatible with 316 SS

Specifications (continued)

Resistance or Temperature Measurement

Resistance or Temperature Measurement	Description
NIST Traceable Accuracy	$\pm$ 1 °F including all effects of linearity, repeatability, hysteresis, and temperature with Pt100 Probe connected.
Operating Temperature	–4 °F to 122 °F (–20 °C to 50 °C)
Temperature Update Rate	14 readings per second
Temperature Sensor Specifications	<table><tr><td>**Specification**</td><td>**Description**</td></tr><tr><td>**Accuracy**</td><td>Class A Tolerance Class (per IEC 60751)</td></tr><tr><td>**Temperature Range**</td><td>58 °F to 482 °F (-50 °C to 250 °C) Connector is 185 °F (85 °C Max)</td></tr><tr><td>**Material**</td><td>316L stainless steel sheath and housing</td></tr><tr><td>**Temperature Probe**</td><td>Pt100 — 100 ohms at 0 °C, 0.00385 TCR (alpha)</td></tr><tr><td>**Probe Dimensions**</td><td>1/4" diameter, 6" long</td></tr><tr><td>**Connections**</td><td>5-meter-M12, molded cord set</td></tr></table>
Mechanical	• **P1 and P2 Pressure Ports:** 1⁄4" NPT (female) • **Flushing Ports:** 5/16 – 24 SAE/MS J1926 (316L SS plugs included)
Electrical / Communication	• **USB:** type B female connector • **Analog:** circular, locking connector for RTD probe
Power Requirements	**Computer USB:** high power (500 mA) USB port or USB hub **Note:** Computer USB ports and USB hubs with power adapters that are typically high power.

Specifications (continued)

Resistance or Temperature Measurement (continued)

Resistance or Temperature Measurement	Description
Enclosure	<table><tr><td>**Specification**</td><td>**Description**</td></tr><tr><td>**Protection**</td><td>IP40</td></tr><tr><td>**Dimensions (in./mm)**</td><td>• H x 2.6", W x 3.6", L x 5.6" • H x 66 mm, W x 91 mm, L x 142 mm</td></tr><tr><td>**Material**</td><td>Plastic (ABS)</td></tr><tr><td>**Weight**</td><td>• 1.5 lbs. • Hook-up fittings add 0.26 lbs. (0.118 kg)</td></tr></table>
Mounting	Laminar Flow Element mounting hardware provided.
Temperature Limits	<table><tr><td>**Specification**</td><td>**Description**</td></tr><tr><td>**Operating**</td><td>–4 °F to 122 °F (–20 °C to 50 °C)</td></tr><tr><td>**Storage**</td><td>–40 °F to 185 °F (–40 °C to 85 °C)</td></tr></table>
Humidity Limits	**Operating:** 5–95 % RH

Certifications: CE Markings

Compliant with European Directives

This product is compliant with the European directives:

Directive	Description
EN 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements. **Note 1:** For use only in a controlled emc environment, typically found in a test, measurement and calibration environment. **Note 2:** Classified as cat-1 (voltages not present or measured above 60 V dc)
IEC 61010	Safety requirements for electrical equipment for measurement, control and laboratory use. **Note 2:** Classified as CAT-1 (voltages not present or measured above 60 V dc)

Hazardous Material and Recycling Compliance

Compliant with European Directives

This product is compliant with the European directives:

Directive	Description
RoHS Directive 2011/65/EU	Reduction of Hazardous Substances
WEEE 2012/19/EU	Waste from Electrical and Electronic Equipment **Note:** The following marking indicates that you must not discard this electrical / electronic product in domestic household waste.

Spare Parts

Spare part numbers

Contact sales@meriam.com to purchase these parts or for more information about the following part numbers. Or see [Meriam Contact Information](#) page.

Part Number	Description
Z9P703	Adapter-Male-Machine – 1/4" Tube × 1/4"" MNPT Brass
ZA36894-3	Male Connector - 1/4" Tube × 1/4"" MNPT Brass
Z9P273	Cable, USB, Type "A" To Mini "B"
Z9P713	Cable, RTD-4 Pos Plug-Socket 5.0 M
Z9P521	Probe-RTD Sensor