

Micro-Tech™ 9109 Correlator User Manual

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Revision History

Revision Number	Date Released	Eco Number	Details of the Release
Rev A	September 2013	3363	First release of the newly created <i>Micro-Tech 9109 Correlator User Manual</i> .
Rev B	November 2013	3403	Corrections.
Rev C	March 2014	3449	Added section in Chapter 2 “Setting Up Correlator Parameters”.
Rev D	July 2014	3488	Added notes requiring use of certified bushings for openings.

Occupational Safety and Health Act (OSHA)

The Occupational Safety and Health Act clearly places the burden of compliance on the user of the equipment and the act is generalized to the extent that determination of compliance is a judgment decision on the part of the local inspection. Hence, Thermo Fisher Scientific will not be responsible for meeting the full requirements of OSHA in respect to the equipment supplied or for any penalty assessed for failure to meet the requirements, in respect to the equipment supplied, as interpreted by an authorized inspector. Thermo Fisher Scientific will use their best efforts to remedy such violation at a reasonable cost to the buyer.

Safety in Transportation and Handling

The Micro-Tech is an integral part of your plant and when transporting, handling, and installing the unit, your own plant safety instructions must be applied. Because your Micro-Tech and associated systems are tailored to application requirements, it is impossible to be precise about product mass/weight. If precise values are required, the shipping crate will be marked with the overall shipping mass of the product and this may be used as a reasonable guideline.

Safe Practices During Use, Maintenance, and Repair

This manual contains details, as appropriate, including the appropriate tools. However, because of its importance, the warning contained in the installation section is repeated here.

TO GUARANTEE PERSONAL SAFETY, CARE MUST BE TAKEN WHEN WORKING ON OR AROUND THE MICRO-TECH. AS WITH ALL SUCH DEVICES THE MAIN SUPPLIES (ELECTRICAL AND OTHER) TO THE SYSTEM MUST BE LOCKED OFF WHEN PERFORMING REPAIR OR MAINTENANCE WORK. AFTER DISCONNECTING, SWITCH OFF AND LOCK THE ELECTRICAL SUPPLY.

Training Needs of Users

We offer all customers full training for operations and maintenance staff.

Low Voltage Directives

All of the recommendations for LVD apply to the prevention of electrical shock. If access to the electronics enclosure is required, the incoming AC power supply should be isolated remotely and locked-off. Access to the electronics enclosure by untrained personnel is not recommended.

Circuit Breaker

The Micro-Tech should be permanently connected to its AC supply. Please ensure that when installing the Micro-Tech, a switch or circuit breaker is used and is positioned close to the Micro-Tech in easy reach of the operator. The switch or circuit breaker shall be marked as the disconnecting device for the Micro-Tech.

DO NOT install the Micro-Tech in a position that makes it hard to use the AC mains isolator.

Thermo Fisher Scientific Warranty

The seller agrees, represents, and warrants that the equipment delivered hereunder shall be free from defects in material and workmanship. Such warranty shall not apply to accessories, parts, or material purchased by the seller unless they are manufactured pursuant to seller's design, but shall apply to the workmanship incorporated in the

installation of such items in the complete equipment. To the extent, purchased parts or accessories are covered by the manufacturer's warranty; seller shall extend such warranty to buyer.

Seller's obligation under said warranty is conditioned upon the return of the defective equipment, transportation charges prepaid, to the seller's factory in Minneapolis, Minnesota, and the submission of reasonable proof to seller prior to return of the equipment that the defect is due to a matter embraced within seller's warranty hereunder. Any such defect in material and workmanship shall be presented to seller as soon as such alleged errors or defects are discovered by purchaser and seller is given opportunity to investigate and correct alleged errors or defects and in all cases, buyer must have notified seller thereof within one (1) year after delivery, or one (1) year after installation if the installation was accomplished by the seller.

Said warranty shall not apply if the equipment shall not have been operated and maintained in accordance with seller's written instructions applicable to such equipment, or if such equipment shall have been repaired or altered or modified without seller's approval; provided, however, that the foregoing limitation of warranty insofar as it relates to repairs, alterations, or modifications, shall not be applicable to routine preventive and corrective maintenance which normally occur in the operation of the equipment.

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About This Manual

This manual tells you how to install, operate, and troubleshoot the Micro-Tech. If you encounter a technical term or unit of measure that you do not recognize in the manual or in the Micro-Tech screens themselves, please consult the glossary at the end of the manual.

Conventions

The following conventions are used in this manual.

The names of Micro-Tech buttons, functions, and so on are shown using initial upper-case letters—for example, Menu, Run, Edit, Choice, Tons, and so forth.

Italics are used in the text for emphasis.



NOTE. Provides information of special importance. ▲



HINT. Indicates a hint about understanding or operating the Micro-Tech. ▲

Safety Precautions

Listed below are the safety messages for your Micro-Tech and its associated system. Please read all safety messages *very carefully*, because this information is important—for your own personal safety and the safety of others.



WARNING. Failure to observe could result in death or serious injury. ▲



CAUTION. Failure to observe may cause minor injury or damage to the equipment. ▲

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Chapter 1

Introduction

This manual provides the information you need to install, operate, and troubleshoot the Micro-Tech. Please read the entire manual before working with your Micro-Tech. For personal and system safety, and for the best product performance, make sure you thoroughly understand the manual before installing or using your Micro-Tech.

Unpacking the Micro-Tech

The Micro-Tech has been properly packaged for shipment at the factory. Please inspect all packages for damage *before* opening the shipping package, because the carrier is likely responsible for any damage. Once removed from the package, the Micro-Tech can be safely stored with its cover and latches secured and with the hole plugs installed. During storage, do not expose the Micro-Tech to moisture or to temperatures outside the range of -22 to $+158^{\circ}\text{F}$ (-30° to $+70^{\circ}\text{C}$).

Overview of the Micro-Tech

The Micro-Tech 9000 Field Mount Integrator (Figure 1-1) or Panel Mount Integrator (Figure 1-2) is a bus-based microcomputer driven instrument.

By suitable processing of input signals, the Integrator delivers visible and electrical output representing the rate of material movement, or other factors specific to the model.

The Micro-Tech has provisions for four outputs on the digital output board, plus one DC output from the mother board—making a total of five, one of which can be defined as a Fault output. In addition, many automatic and check functions are available to monitor its calibration functions and maintenance schedule.

There are two models of Micro-Tech: the field-mounted version (figure 1–1) and the panel-mounted version (figure 1–2). For the panel-mounted version, provide a cut-out (see figure 1–2 for dimensions) in the panel and, after removing the holding brackets and installing the gasket, insert the Micro-Tech.

Introduction

Overview of the Micro-Tech

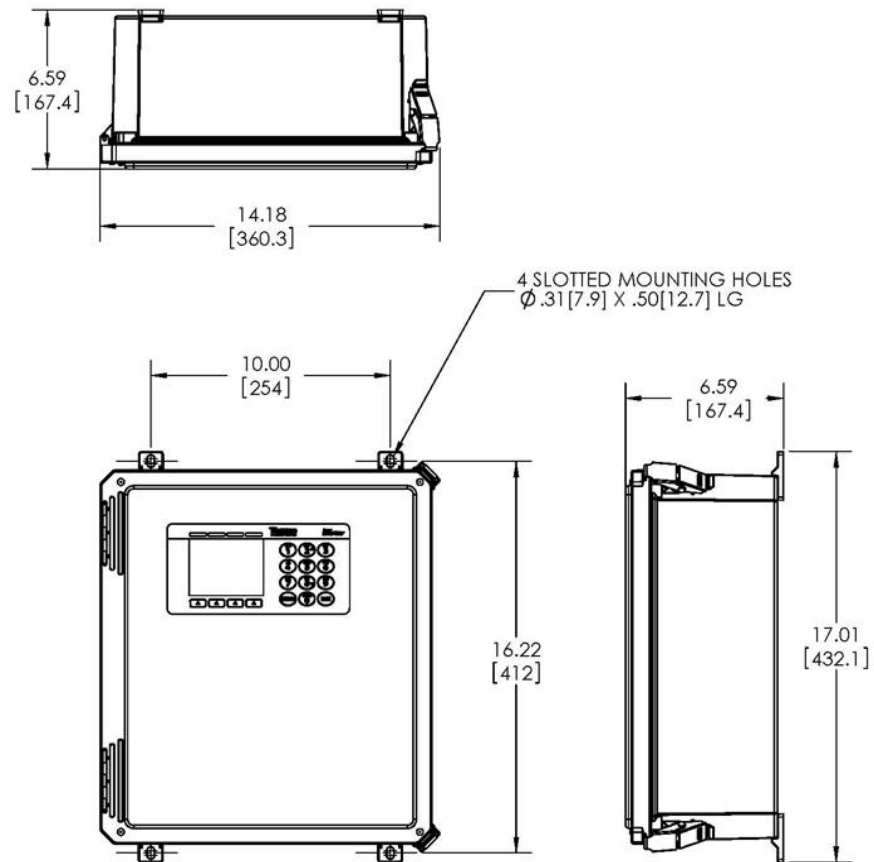


Figure 1–1. Field-Mounted Version of the Micro-Tech

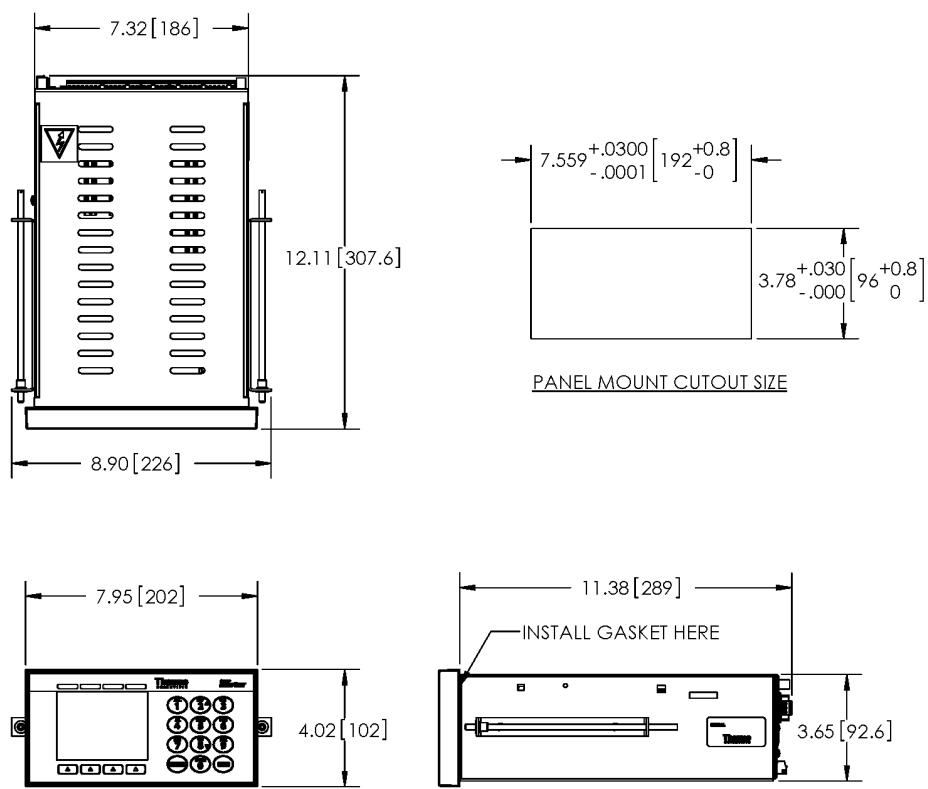














Figure 1–2. Panel-Mounted Version of the Micro-Tech









Important Safety Information

Please read the following warnings and cautions before installing, operating, or maintaining the Micro-Tech.

General Safety Precautions

-  **CAUTION.** Do not install, operate, or perform any maintenance procedures until you have read all the safety precautions listed below. ▲
-  **CAUTION.** Do not connect power to the electronics or turn on the unit until you have read and understood this entire manual. The precautions and procedures presented in this manual must be followed carefully in order to prevent equipment damage and protect the operator from possible injury. ▲
-  **CAUTION.** For North America locations a certified Nema 4/4X bushing must be used for openings. For other locations see your local Electrical Authorities. ▲
-  **WARNING.** Covers over the electronics should always remain in place during operation. They should be removed only for maintenance procedures with the machine's power OFF. Be sure to replace all covers before resuming operation. ▲
-  **WARNING.** All switches (such as control or power) must be OFF when checking input AC electrical connections, removing or inserting printed circuit boards, or attaching voltmeters to the system. ▲
-  **WARNING.** Incoming voltages must be checked with a voltmeter before being connected to the electronics. ▲
-  **WARNING.** Extreme caution must be used in testing in, on, or around the electronics, PC boards, or modules. There are voltages in excess of 115V or 230V in these areas. Avoid high voltage and static electricity around the printed circuit boards. ▲
-  **WARNING.** Maintenance procedures should be performed only by qualified service personnel and in accordance with procedures/instructions given in this manual. ▲
-  **WARNING.** During maintenance, a safety tag (not supplied by Thermo Fisher Scientific) should be displayed in the ON/OFF switch areas as a precaution instructing others not to operate the unit. ▲
-  **WARNING.** Only qualified service technicians should be allowed to open and work in the electronics, power supply, control, or switch boxes. ▲
-  **WARNING.** This equipment should not be operated or utilized in applications other than those stated in the original order. ▲
-  **WARNING.** All panels covering the electronics must be in place and tight before wash down procedures. Damage to the electronics could result from water, moisture, or contamination in the electronics housing. ▲

Incoming Power Safety

-  Please read the following warnings and cautions, when working with incoming power to the Micro-Tech or its associated systems.
-  **CAUTION.** Do not connect power until you have read and understood this entire section. Improper connection may result in damage to your Micro-Tech. ▲
-  **WARNING.** All wiring must be in accordance with standards (IEC, EN) national and local codes (NEC, VDE, and so forth) outline provisions, for safely installing electrical equipment. Installation must comply with specifications regarding wire types, conductor sizes, branch circuit protection, and disconnect devices. Failure to do so may result in personal injury and/or equipment damage. ▲
-  **WARNING.** Ground impedance must conform to the requirements of national and local industrial safety regulations and/or electrical codes. The integrity of all ground connections should be periodically checked. For installations within a cabinet, a single safety ground-point or ground bus-bar connected directly to building steel should be used. All circuits including the AC input ground conductor should be grounded independently and directly to this point/bar. Grounding all enclosures and conduits is strongly recommended. ▲
-  **CAUTION.** Verify that the input voltage is correct with an AC voltmeter before you connect it to the Micro-Tech. ▲
-  **CAUTION.** Earth ground must be provided to the Micro-Tech. Do not use conduit to provide this ground. ▲
-  **CAUTION.** A readily accessible disconnect device (maximum 20 amp) must be incorporated in the field wiring. This disconnect device should be within easy reach of the operator and must be marked as the disconnecting device for the equipment. ▲
-  **EMC Instructions**
The Micro-Tech may cause radio interference if used in a residential or domestic environment. The installer is required to take measures to prevent interference, in addition to the essential requirements for CE compliance provided in this manual, if necessary.

Hardware Installation

This section tells you how to complete the hardware installation for your Micro-Tech. Please go to the appropriate section, depending on which model of Micro-Tech you purchased (field-mounted or panel-mounted).

Important Wiring and Safety Information

Before installing the Micro-Tech, please read the following important safety information about wiring up the Micro-Tech.

- Ensure power is OFF at the main disconnect.
- Do not route load-cell and signal cables in the same conduit with power cables or any large source of electrical noise.
- Earth ground all instrument chassis' and conduits. A ground connection between all conduits is required.
- Connect the shields *only* where shown.
- Check that all wires are tight in their connections.
- Never use a “megger” to check the wiring.
- A readily accessible disconnect device must be incorporated in the field wiring. This disconnect should be within easy reach of the operator and must be marked as the disconnecting device for the Micro-Tech and associated equipment.
- All conduits should enter the bottom of the enclosure. Do not run conduit through the top or sides of the enclosure.

Installing the Field Model

The integrator should not be exposed to excessive vibration, heat, direct sunlight, or moisture. The ideal mounting location would be on a separate wall or beam in view of the device being monitored. Refer to system wiring diagram for the maximum allowed distance from the monitored device to the Micro-Tech.

Mounting

Mount the Micro-Tech to a rigid, flat, vertical surface using four mounting holes provided on the back of the enclosure. Care should be taken to ensure the mounting surface is flat, so as not to twist or warp the fiberglass enclosure when tightening the mounting bolts.

Connecting the Incoming Power Supply

To connect the incoming power, use the following procedure. Please note that all units shipped from the factory are configured for 100 to 240 VAC.

1. A customer-supplied 2 Amp 250 VAC normal-blow fuse must be connected in the “Hot” power lead between the AC Mains and the Micro-Tech “AC Power Input” terminal block.
2. Unlatch and open the enclosure door.
3. Route incoming power wiring through a conduit hole at the bottom right of the enclosure. For North America locations a certified Nema 4/4X bushing must be used for openings. For other locations see your local Electrical Authorities. Leave ample loose wiring (typically 8 inches / 20 cm) to facilitate removing the terminal connectors.
4. Locate the wiring panel (see figure 1-4 below), which lies on the underside of the electronics enclosure. The wire-safety ground-terminal is located on the enclosure back panel.
5. Wire HOT to Terminal H on the AC PWR IN terminal.
6. Wire NEUTRAL to Terminal N on the AC PWR IN terminal.
7. If additional I/O is required at the line voltages, these wires should be routed through a conduit hole on the bottom right of the enclosure. Leave ample loose wiring (typically 8 inches / 20 cm) to facilitate removing the terminal connectors.
8. In the case of sourcing power for the AC outputs/inputs from the Micro-Tech, source the power from the AUX PWR OUT terminal.
9. All additional field wiring operation at voltages less than 30 V must be located on the left bottom of the enclosure. Leave ample loose wiring (typically 8 inches / 20 cm) to facilitate removing the terminal connectors.
10. Close and latch the enclosure door.

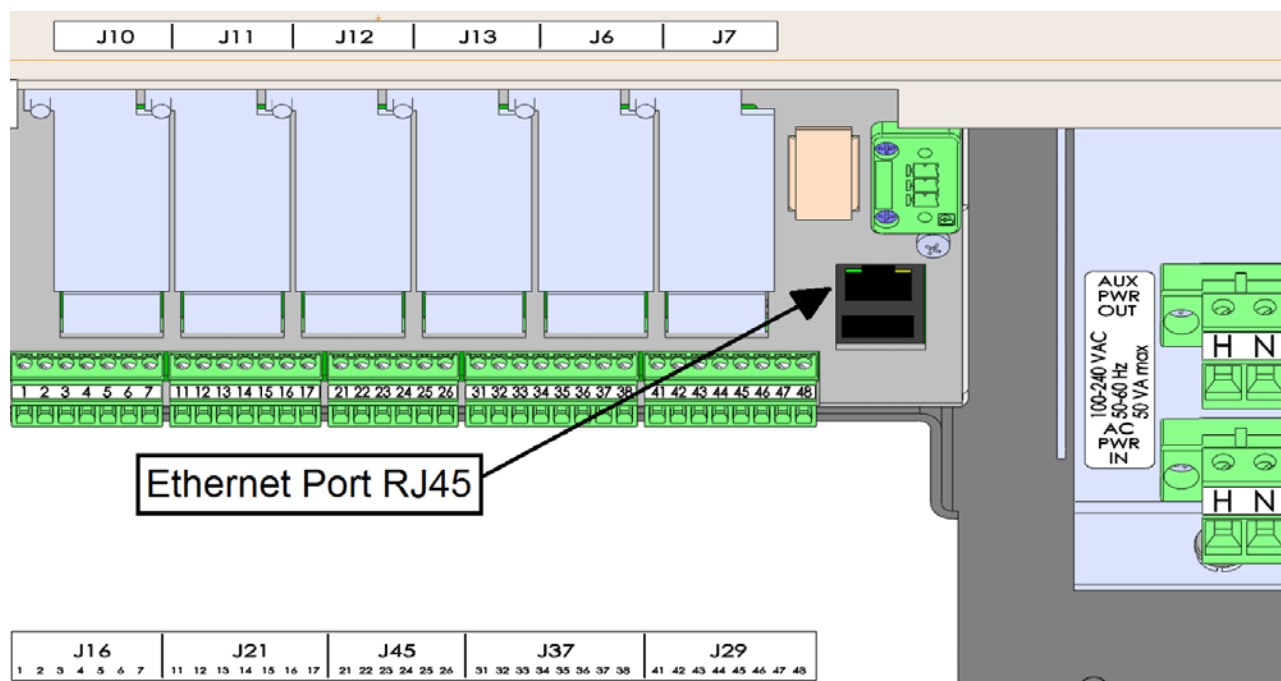


Figure 1–3. Connectors on Underside of Enclosure

Installing the Panel Model

This model of the Micro-Tech is designed to be mounted in an instrument panel. The instrument panel should not be exposed to excessive vibration, heat, or moisture. The front bezel, when properly seated, forms a dust seal. A 2 inch (50 mm) clearance around the top and bottom of the Micro-Tech is required for convection cooling. Additional clearances may be required if other equipment mounted directly below the Micro-Tech generates excessive heat. A 2-3 inch (50-75mm) clearance in the back is necessary for wiring access and fuse replacement. A 1 inch (25mm) clearance on each side is necessary for inserting the chassis-holding brackets from the back after inserting the Micro-Tech.

Mounting

Provide a cut-out (see figure 1-2 for dimensions) in the panel and, after removing the holding brackets, and installing the gasket, insert the Micro-Tech. From the back, insert the holding brackets on both sides of the Micro-Tech. Tighten the holding brackets to support the Micro-Tech and form a dust seal.

Connecting the Incoming Power Supply

To connect the incoming power to the Micro-Tech, use the following procedure. Please note that all units are 24VDC *only*.

1. For input power, use 16 AWG / 1.5 mmsq standard wires.
2. Wire the safety ground to the terminal labeled “E” on the Power Input Terminal.
3. Wire the +24VDC to the terminal labeled “+” on the Power Input Terminal.
4. Wire the 24VDC Common to the terminal labeled “-” on the Power Input Terminal.

Configuring Jumpers and Switches

In most instances, your Micro-Tech is shipped to you from the factory with all the needed jumpers installed and the switches set in the correct positions for your particular installation and application. As a result, you should not need to connect any jumpers or set any switches but, if you do, all the appropriate settings are shown in the specific model reference manual.

Micro-Tech Features

The following sections give you a quick overview of the Micro-Tech’s features, functions, and capabilities.

Standard Features

The Micro-Tech has many hardware and software features. The standard features of the Micro-Tech are listed below.

- Menu-driven scroll entries on a four line display.
- Four LED status indicators.
- Audit trail.
- Automatic zero and span calibration.
- Auto zero tracking (where applicable)
- Several software options that may be turned on by keypad entry or by installing optional plug-in PC boards.
- Optically coupled digital inputs and outputs.
- Alarms and failure detection.

- Communication standards such as RS232C, RS485, and networking multi-drop.
- Allen-Bradley DF1 and Modbus RTU.
- Ethernet/IP and Modbus/TCP

Inputs and Outputs

The standard Micro-Tech configuration is as follows. For more information about the Micro-Tech's communication protocols, see the specific model reference manual.

- USB port.
- Two serial communication ports.
- Two Digital Inputs on motherboard
- One DC output from the mother board (J29).
- Ethernet TCP/IP.
- Four circuit board expansion slots that can accommodate the following boards, if needed.
 - Three programmable digital inputs on plug-in card.
 - Four programmable digital outputs on a plug-in card.
 - Single channel current output board
 - Dual channel current output, analog input board (2 analog in and 2 analog out)
 - 8 digital inputs/8 digital outputs board
 - Serial communication board
 - Profibus-DP board

Micro-Tech Menus and Functions

Each Micro-Tech has been designed for a specific application and is capable of performing all of the necessary measuring functions. All of the required functions are resident in the software of the microprocessor. Optional functions are automatically turned on when the relevant hardware is installed, or after the operator has selected them through the keypad. Setup of the Micro-Tech is easy and is performed from the keypad on the front of the device. The setup parameters may be divided into the following main groups.

- Menu 1: Calibration
- Menu 2: Set-up
- Menus 3–6: Options set-up

Monitoring Functions

The Integrator includes internal diagnostics that generate alarms in case of hardware failures or programming errors.

Alarms are visible on the display and can be acknowledged and reset through the keypad, digital input, or serial line. Alarms can be delayed to avoid intervention in case of short time peaks. Each individual alarm can be programmed to operate as alarm, shut down, or none. Two LED's indicate the cumulative status of alarms and shut down. Digital outputs are also provided for the following:

- Hardware failure
- Alarm cumulative
- Shut down cumulative

Print Functions

Timed or command prints can be obtained by connecting a serial printer to the Comm output on the motherboard, or an optional communication board. Data may also be downloaded to a USB memory device. Time and date are permanently stored in the battery-backed memory. The Micro-Tech Set-Up, Totals, Zero results, and Audit Trail of the instrument can be printed.

Communication Functions

There are two communication ports on the Motherboard. Comm A is RS232C/RS-485 (jumper selectable), isolated. Comm B is RS-485 only, non-isolated. One additional communication board may be installed. For detailed descriptions of communication protocols, see the specific model reference manual.

There are three types of standard communication functions, as described below.

- **Serial Communications**
The communication protocol allows a remote intelligent device to read the contents of the registers and write to some registers. During the communication activity, the Micro-Tech always acts as a Slave, meaning it responds to a request from a Master device on the line, but never attempts to send messages out. One electrical interface may be selected and accessed through one communication port.


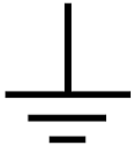



- **Field Bus I/O**
Profibus-DP I/O communication protocol board is typically used to transfer I/O images between a main PLC and the remote devices (normally remote I/O racks—rack adapters) or to transfer (read and write blocks of data with intelligent remote devices (node adapters), the Micro-Tech in this case. The Remote I/O is a typical master/slave communication where the main PLC is the master or scanner and the remote devices are slaves or adapters.

- **Ethernet Port**
The Micro-Tech has a built-in Ethernet port. Communications protocols Ethernet/IP and Modbus/TCP can be used. The Micro-Tech is a slave device only, and cannot initiate messages.

Symbol Identification

Here are the details of the symbols used on the Micro-Tech.

Table 1–1. Symbol Identification

Symbol	Description
	Alternating current
	Earth (ground) TERMINAL
	PROTECTIVE CONDUCTOR TERMINAL
	Caution, risk of electric shock
	Caution (refer to accompanying documents)

Standards Applied

Conformity with the Low Voltage (LVD) Directive and Electromagnetic Compatibility (EMC) Directive has been demonstrated using harmonized European Norm (EN) standards published in the Official Journal of the European Communities, and International (IEC) applicable standard used in North America.

The Micro-Tech™ 9000 series comply with the EN and IEC standards listed below, when properly installed in accordance with this and other relevant manuals.

- CAN/CSA-C22.2 No.61010.1-04
Safety Requirements for Electrical Equipment for Measurement,

Control, and Laboratory Use.
Part 1: General Requirements.

- UL 6101-1(2nd Edition)
Safety Requirements for Electrical Equipment for Measurement,
Control, and Laboratory Use.
Part 1: General Requirements.
- UL 60950-1
Information Technology Equipment—Safety
Part 1: General Requirements.
- IEC/EN 61010-1:2001
Safety requirements for electrical equipment for Measurement,
Control, and laboratory use.
Part 1: General requirements.

The Micro-Tech™ 9000 series has been tested with the EN and IEC standards listed below.

- IEC/EN 61326-1
Electrical equipment for measurement, control and laboratory use—
EMC requirements.
Part 1: General requirements
- EN 55011
Limits and methods of measurement of radio disturbance
characteristics of industrial, scientific and medical (ISM) radio-
frequency equipment.
- EN 55022
Information technology equipment. Radio disturbance
characteristics. Limits and methods of measurement.

The Micro-Tech™ 9000 series complies with the following EN directives.

- 2006/95/CE—Low Voltage Directive.
- 2004/108/CE—EMC Directive.

Specifications

Here is a table showing the relevant technical specifications for the Micro-Tech.

Table 1–2. Micro-Tech Technical Specifications

Description	Specification
Field Mount Enclosure	NEMA 4X, IP66, dust and watertight, 17.01 [432] x 14.18 [360] x 6.59 [167] inches, Fiberglass reinforced polyester. Steel chassis providing EMI/RFI shielding.
Panel Mount Enclosure	Size: 12.11 [308] x 4 [102] x 7.95 [202] inches. Material: Zinc-plated mild steel.
Environmental Conditions Mounting	Should be mounted as close to the measuring device as possible without being exposed to excessive heat or moisture. Field Mount suitable for outdoor mounting.
Temperature (Ambient)	Storage: -22° to +158° F (-30° to +70° C). Operating: -4° to +140° F (-20° to +60° C).
Relative Humidity	Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% humidity at 40°C.
Pollution Degree	Level 2 per IEC 61010-1
Altitude	Up to 6,561 ft (2000m)
Installation Category	2
Shock	15G peak for 11ms duration (±1.0 ms)
Vibration	0.006 in./0.152 mm displacement, 1G peak
Emission Limitation	According to IEC/EN 61326-1, Class A
Noise Immunity	According to IEC/EN 61326-1, Industrial Environmental
Nominal Voltage	Field Mount: 100-240 VAC. Panel Mount: 24VDC +10%,-15% (user supplied).
Nominal Frequency	Field Mount: 50-60 Hz. Panel Mount: DC only.
Fusing	250VAC, 2A fast acting, on motherboard
Power Consumption	50 VA max.
Maximum Non-Destructive Input Voltage	Field Mount: 265 VAC. Panel Mount: 28VDC.
DC Power Supply Required for Panel Mount	Output voltage: 24 VDC. Isolation: No. Output current: 2A minimum, short circuit protected.
Processor	Coldfire MCF5234 32-bit microprocessor 2 MB Flash memory 128K NVRam

Description	Specification
	2 Integrated UARTs and Ethernet communication peripherals.
Removable Storage	USB flash driver port
RAM Battery	Life expectancy of the RAM support battery is a minimum of 10 years, if power is not applied. Under normal operation where power is on continuously, life expectancy is much longer.
Inputs #1, #2	Optically isolated. Powered by + 24VDC supply. Built-in current source for dry contact use. (Gold plated recommended)
Frequency range	Voltage/current type sensor: 0.25 to 2.0 kHz. Contact closure type sensor: 0.25 to 30 Hz. Low threshold: +1.3 VDC min. High threshold: +2.2 VDC max.
Low or High Pulse Duration	Voltage/current type sensor: 200 us min. Contact closure type sensor: 15 ms min.
Hysteresis	0.8 VDC minimum.
Input impedance	10 k-ohm typical, 500 ohm minimum.
Input source current	-2 mA nom. at 0 VDC.
Max. non-destructive input voltage	±28 peak, continuous.
Digital Output (Output #5)	Able to drive TTL, CMOS, or relay solenoids. Current sinking driver. +24 VDC internal supply, 100mA DC maximum.
Standard Communication Serial Interface UART 0	RS-232C provides support for modem. RS-485; 2 and 4 wire multi-drop. Data rate: 110 to 19200 bits/second, operator selectable from the keypad. Data format: Asynchronous, bit-serial, selectable parity, data length, and stop bits. Optical isolation: 250 VRMS max. Input Voltage: ±30 Vdc max. (RS-232C) ±15/-10 Vdc max. (RS-485). Cable length: RS-232C, 50ft [15m] max; RS-485, 4000 ft [1219m] max.
Standard Communication Serial Interface UART 2 (For use with Thermo Fisher Scientific equipment only.)	RS-485; 2 and 4 wire multi-drop in RS- 485. Data rate: 110 to 19200 bits/second, operator selectable from the keypad. Data Format: Asynchronous, bit-serial, selectable parity, data length, and stop bits. Isolation: Non-Isolated. Cable Length: 4000ft [1219m] max.
Ethernet Communication	Physical: 100baseT, RJ45 Ethernet port Embedded Web server Supported Protocols: Modbus TCP, Ethernet IP.

Chapter 2 Set-Up

This chapter tells you how to start up your Micro-Tech, initialize its software, and get your Micro-Tech and its associated conveying system up and running. Once the software is initialized, you will do the initial zero and span calibrations of the system. Your Micro-Tech is then ready to go into operation.

Using the Console

There are four major parts to the Micro-Tech console, as follows.

- Display screen
- Keypad
- Soft keys
- Status LEDs

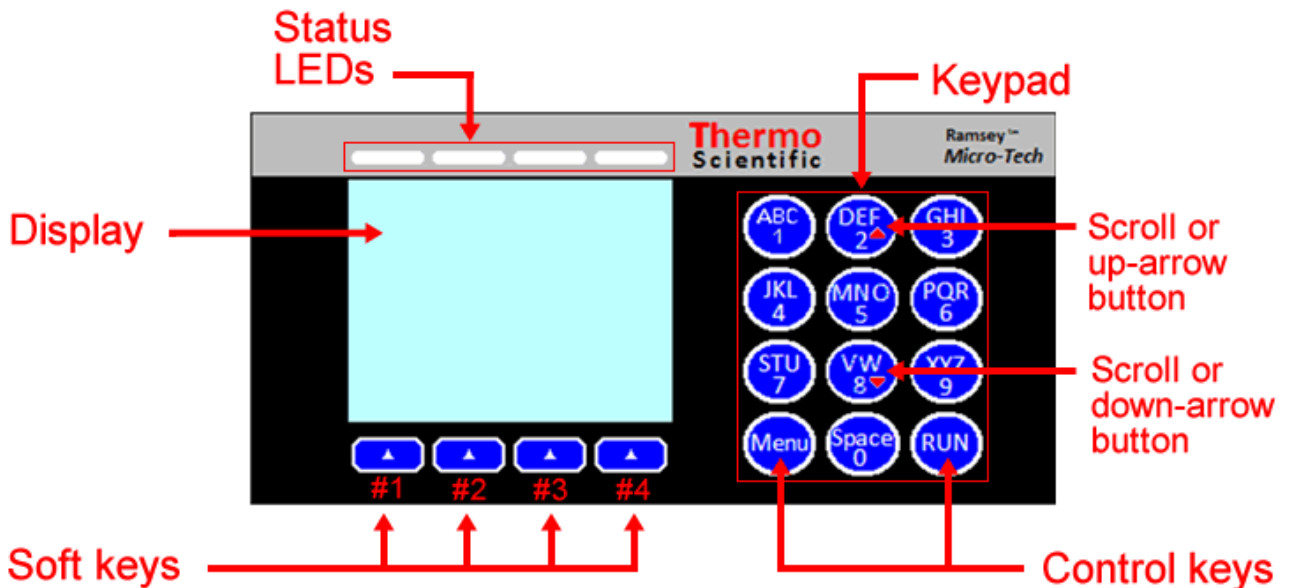


Figure 2–1. Main Features of the Micro-Tech Console

Display Screen This displays the built-in Micro-Tech menus as well as any entries you make using the keypad. The display also shows the current functions (such as Edit, Enter, and Clear) that are assigned to the four Micro-Tech soft keys situated below the display.

Keypad The keypad allows you to scroll through the Micro-Tech menus, enter numbers and letters into the Micro-Tech's menus, and control the operation of the Micro-Tech using the Run button. As you will already have noticed—similar to the keys on a cell phone—the Micro-Tech's number keys have multiple uses. All are context sensitive, meaning, for example, that when the Micro-Tech is displaying a *menu*, the number "8" key operates as a down-arrow key, but when the Micro-Tech is expecting you to enter a number, it operates as an "8" key. Similarly, in the print menu, when you are naming your output, repeatedly pressing the "8" key brings up, in succession, the letters *V* and *W*.

- **Arrow Keys**
The up-arrow and down-arrow keys allow you to scroll through the Micro-Tech menu screens—up and down as well as left and right in some menus.
- **Control Keys**
The Micro-Tech has two control keys—the Menu button and the Run button. Once the Micro-Tech is up and running, pressing the Menu button brings up the menu screens. Pressing the Run button returns the Micro-Tech to its normal operating mode.

Soft Key Buttons The four blue keys below the display screen are "soft keys," that is, they have different functions depending on which menu you are using. The soft keys are assigned to various menu-selection and data-entry functions—such as Edit, Clear, Reset, Totals, and so forth.

Prod (Product) soft key – Used to select a different Product number. See section "Product Set-up" for further details.

Status LEDs

The four status indicators show the status of the Correlator.

BATCH

The Batch LED is lit when in a batching cycle. This option requires a Load-Out expansion board (eight in/out) to be installed.

CALIB (Calibration)

When this LED is lit the integrator is in Calibration mode and totalizing is stopped.

ALARM

Alarm indication flashes if an alarm is pending, either the alarm is new or has been acknowledged.

READY

Ready indication turns on if the scale is calibrated (zero and span calibration complete) and no shutdown conditions are active.

If more than one product is defined, the Ready indication refers to the displayed product.

Measuring Functions

The Micro-Tech 9109 Integrator receives the signals from the sensors and generates visual measurement data for the display and electrical output signals representing flow rate, velocity, or concentration.

The principal velocity processing technique is based on correlation. Rate is calculated by combining concentration and velocity of material. Total is computed on three individual registers: total, reset total, operator total.

Analog (current) output signals or communications can be used to transmit rate, velocity or concentration to other control devices.

Displayed variables and analog outputs can be smoothed via damping filters, individually programmable.

Determining Installation Parameters

Before applying power to the Model 9109, complete the following information. Refer to the information provided to you by Thermo Fisher Scientific sales or engineering during the quote process or during order processing.

Diameter of sensors

Determine the diameter of the sensors and record below

Estimated minimum and maximum velocity

Determine the minimum and maximum velocity for your system and record it below

Estimated minimum and maximum concentration

Determine the minimum and maximum concentration for your system and record it below.

Initializing the Software

This section gives you step-by-step instructions to guide you through the software-initialization process.



NOTE. You *must* complete the entire software initialization and scale-calibration procedure before putting the Micro-Tech into operation. ▲

Overview

There are five steps in the software initialization process, as follows.

- Enter the correct date and *exact* current time.

- Choose appropriate language for the display.
- Choose the appropriate units of measure (standard tons, long tons, metric tons, and on).
- Enter the installation parameters recorded above.
- Performing an initial zero and span calibration

Cold-Starting the Micro-Tech

The first time you power up the Micro-Tech, you are doing what is known as a “cold-start.” Once the Micro-Tech is up and running, you can use the cold-start procedure (described below) to—in computer terms—“reboot” the Micro-Tech. In other words, when you do a cold start, the Micro-Tech’s RAM memory is erased and everything is returned to its initial start-up state. As a result, cold-starts are used, for example, to restore all the Micro-Tech settings from a previously made back-up flash drive.

To cold-start the Micro-Tech, do the following.

1. Turn on the Micro-Tech’s power switch while *simultaneously* pressing and holding soft-key #1 and the Run button.
2. The Micro-Tech starts up, and the Alarm LED will light to indicate that the Micro-Tech has not yet been initialized or calibrated. After a brief delay the Default screen appears, as shown in the section below.

Setting the Date

You are now ready to set the current date and time. (In the following example we are going to set the date to May 21, 2013.)

READY	BATCH	ALARM	CALIB
Install Factory Defaults?			
NO	YES		

1. Make sure the material flow has stopped.
2. Press the Yes button and the date screen appears.

READY	BATCH	ALARM	CALIB
Exact date? - Date 01 - <u>01</u> - 2012 DAY <u>1</u>			
EDIT			

3. Press the Edit button. (The Micro-Tech clears the Day entry field leaving just the underline.)
4. Use the keypad to enter the correct day. Remember to enter *two* numbers for day. If you make a mistake, press the Clear button. (We entered 21 for day, as shown below.)

READY	BATCH	ALARM	CALIB
Exact date? - Date 01 - <u>01</u> - 2012 DAY <u>21</u>			
EDIT			



NOTE. The Micro-Tech displays the date in the month-day-year format, and requires two numbers in the month and day fields and four numbers in the year field (MM-DD-YYYY). In addition, the Micro-Tech will *not* display the correct date in the Date line until you have completed the entire process. You can change the date and time formats later, if you would like to use a different one. ▲

5. Press the Enter button. Follow steps 3 and 4 above to enter the correct month and year.

6. Press the Enter button. The display should now look something like this. (You may have to repeatedly press the Edit and Enter buttons on start up, scrolling through the fields again, to get to this screen.) Either way, make sure this screen is displayed before proceeding.

READY	BATCH	ALARM	CALIB
Exact date? - Date 05 - 21 - <u>2013</u> YEAR <u>2013</u>			
EDIT			

7. You are now ready to enter the correct time, as described below.

Setting the Time

In the following example we are going to set the time to 2:09 p.m. To set the correct time, do the following.

1. Press the down-arrow button. The display should currently look like this.

READY	BATCH	ALARM	CALIB
Exact time? - Time <u>12</u> :00 am			
EDIT	AM/PM		

2. Press the Edit button. (The Micro-Tech clears the hour entry field leaving just the underline.)
3. Use the keypad to enter the correct hour. Remember to enter *two* numbers for hour.
4. Press the Enter button.
5. Press the *down-arrow button* to move to the minute field.

READY	BATCH	ALARM	CALIB
Exact time? - Time 2: <u>00</u> am			
EDIT	AM/PM		

6. Press the Edit button. (The Micro-Tech clears the minute entry field leaving just the underline.)
7. Use the keypad to enter the correct minutes. Remember to enter *two* numbers for minutes.
8. Press the Enter button.
9. Press the “AM/PM” button to toggle the setting to “PM.” Your screen should now look something like this.

READY	BATCH	ALARM	CALIB
Exact time? - Time 2: <u>09</u> pm			
EDIT	AM/PM		

- The time is now set. Press the *down-arrow button* to bring up the USB screen. The Micro-Tech pauses for about 10 seconds, while it checks for the presence of a flash drive in the USB port. (If you were rebooting the Micro-Tech to restore your previously saved settings, this is where you would insert the back-up flash drive into the USB port.)

READY	BATCH	ALARM	CALIB
Wait... Check USB present			
ABORT			

Choosing a Language

The default language shown in the Micro-Tech display is English. You can, however, choose other languages.

- The Micro-Tech display should currently look like this.

READY	BATCH	ALARM	CALIB
- MEMORY ERASED - Select language ENTER to continue > ENGLISH <			
CHOICE	ENTER		CLEAR



NOTE. Ignore the “Memory Erased” message. The date and time you already entered have been retained. ▲

- To select the current language, press the Enter button and the scale set-up screen appears.
- To choose another language, repeatedly press the Choice button until the language you want is displayed, then press the Enter button.

4. The Micro-Tech display should currently look like this.

READY	BATCH	ALARM	CALIB
Initial scale setup and calibration Press down SCROLL			

- The Micro-Tech menus are also known as the Micro-Tech “scrolls.” Please go to figure 3–1 and note that the Micro-Tech keypad contains an up-scroll button and a down-scroll button, which are also known as the up-arrow and down-arrow buttons. Thus, the notation in the display saying “Press down SCROLL,” is a cue to press the down-arrow (or down-scroll) button, as described the next step.
- Press the down-arrow button (or Scroll button) and the “Display Scroll 1” screen appears.

Selecting English/Metric Units

This menu allows you to choose what units of measurement the Micro-Tech uses when displaying its results. The Micro-Tech can display information using the following units of measurement.

- Standard English units—such as pounds, standard tons, and long tons.
- Metric units—such as kilograms and tonnes.
- Both English *and* metric units. (The “Mixed” option.)

1. The Micro-Tech display should currently look like this.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 1 - Measure Units > <u>English</u> <			
CHOICE			

2. The default selection for Measure Units depends on which language was selected initially.
3. To choose a different selection (English, Metric, Mixed), repeatedly press the Choice button until the choice you want is displayed, then press the Enter button.
4. Press the down-arrow button to bring up the totalization units screen.
5. In pages 2-10 through 2-12, do the following.
 - Follow the “English” headings, if you are using English units.
 - Follow the “Metric” headings, if you are using metric units.

Setting the Totalization Units

This menu allows you to choose the totalization units used by the Micro-Tech. Clearly, which totalization units are available in this menu depends on the choices you made in previous menus (English, Metric, Mixed).

English Totalization Units

The Micro-Tech display should currently look like this, if you chose English units.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 2 - Totalization Units > Tons <			
CHOICE			

1. Tons is the default value.

2. To choose long tons or pounds, repeatedly press the Choice button until the unit you want is displayed, then press the Enter button.
3. Press the down-arrow button to bring up the Rate units screen (go to page 2-11).

Metric Totalization Units The Micro-Tech display should currently look like this, if you chose metric units.

READY	BAYCH	ALARM	CALIB
- DISPLAY SCROLL 2 -			
Totalization Units			
> t <			
CHOICE			

1. Metric tonnes (“t”) is the default value.
2. To choose kilograms (“kg”) press the Choice button, then press the Enter button.
3. Press the down-arrow button to bring up the Rate units screen (see the next section).

Setting the Rate Units

This menu allows you to choose the rate units used by the Micro-Tech. Clearly, which rate units are available in this menu depends on the choices you made in previous menus (English, Metric, Mixed).

English Rate Units

The Micro-Tech display should currently look like this, if you chose English units.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 3 -			
Rate Units			
> Tph <			
CHOICE			

1. Standard U.S. tons (equivalent to British “short tons”) per hour (“Tph”) is the default value.

2. Repeatedly press the Choice button to select other rate units (shown below), then press the Enter button.
 - “LTph”—Long tons per hour
 - “Lb/mn”—Pounds per minute
 - “T/mn”—Standard tons per minute
 - “LT/mn”—Long tons per minute
 - “percent %”
 - “Lb/h”—Pounds per hour

Metric Rate Units

The Micro-Tech display should currently look like this, if you chose metric units.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 3 -			
Rate Units			
> t/h <			
CHOICE			

1. Metric tonnes per hour (“t/h”) is the default value.

2. Repeatedly press the Choice button to select other rate units (shown below), then press the Enter button.
 - “kg/mn”—Kilograms per minute
 - “t/mn”—Metric tonnes per minute
 - “percent %”
 - “kg/h”—Kilograms per hour

Mixed Rate Units

The Micro-Tech display should currently look like this, if you chose mixed units.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 3 -			
Rate Units			
> t/h <			
CHOICE			

1. Metric tonnes per hour (“t/h”) is the default value.
2. Repeatedly press the Choice button to select other rate units (shown below), then press the Enter button.
 - “Lb/h”—Pounds per hour
 - “Tph”—Standard tons per hour
 - “LTph”—Long tons per hour
 - “kg/mn”—Kilograms per minute
 - “t/mn”—Metric tonnes per minute
 - “Lb/mn”—Pounds per minute
 - “T/mn—Standard tons per minute
 - “LT/min”—Long tons per minute
 - “percent %”
 - “kg/h”—Kilograms per hour

Setting the Weight Units

This menu allows you to select the specific units of measure that are displayed by the Micro-Tech when reporting the concentration. Clearly, which units of measure are available in this menu depends on the choice you made in previous topic (“Selecting English/Metric Units”).

English Weight Units

The Micro-Tech display should currently look like this, if you chose English units.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 4 - Weight Units > Pounds <			
CHOICE			

1. Pounds is the default value..
2. Press the down-arrow button to bring up the length units screen (go to page 2-10)

Metric Weight Units

The Micro-Tech display should currently look like this, if you chose metric units.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 4 - Weight Units > kg <			
CHOICE			

1. Kilograms (“kg”) is the default value.
2. Press the down-arrow button to bring up the length units screen (see the next section).

Setting the Length Units

This menu allows you to choose the units used by the Micro-Tech for length and speed. Clearly, which length units are available in this menu depends on the choices you made in previous menus (English, Metric, Mixed).

English Length Units

The Micro-Tech display should currently look like this, if you chose English units.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 5 -			
Length Units			
> Feet <			
CHOICE			

1. Feet is the default value.
2. As no other choices are available, press the down-arrow button to continue.

Metric Length Units

The Micro-Tech display should currently look like this, if you chose metric units.

READY	BATCH	ALARM	CALIB
- DISPLAY SCROLL 5 -			
Length Units			
> meters <			
CHOICE			

1. Meters is the default value.
2. As no other choices are available, press the down-arrow button to continue.

Entering the Maximum Scale Capacity

This menu allows you to enter the maximum scale capacity of the particular scale you are using in your facility. Please note that the maximum scale capacity is expressed as a *Rate*— for example, tons per hour (Tph), tonnes per hour (t/h), and so on. In other words, do *not* enter the maximum weight the scale can be loaded with, because the Micro-Tech is looking for a rate.

The Micro-Tech display should look something like this, depending on the choices you made in the menus above.

READY	BATCH	ALARM	CALIB
- SC DATA SCROLL 1 -			
Max. scale capacity			
<u>10.0</u> Tph			
EDIT			

1. To enter the maximum capacity of your particular scale, press the Edit button and use the keypad to enter the appropriate value, using the decimal point, if needed. In addition, please note the following.
 - If you need to enter a value such as 1234.5 Tph, soft key 3 allows you to enter the decimal point. (See screen shot below.)

- There cannot be more than three numerals after the decimal. (Thus, 12.345 is allowed but not 12.3456, which will be truncated to three decimal places.)
- Whatever value you enter cannot contain more than *seven* characters, not including the decimal point.
- The maximum rate (that is, the scale capacity) cannot exceed 200,000 units of measure.

2. We entered 500.0 Tph, as shown below.

READY	BATCH	ALARM	CALIB
- SC DATA SCROLL 3 -			
Max. scale capacity			
<u>500.0</u> Tph			
ENTER		.	CLEAR

3. Press the Enter key.

4. Press the down-arrow key to bring up the scale-divisions screen.

Entering the Scale Divisions

This menu allows you to tell the Micro-Tech how to report the quantity of material that crosses the scale in one hour. For example, if 175 tons cross the scale in an hour and you want the results reported to *one* decimal place (that is, to the nearest 200 lbs.), you would choose a scale division of 0.1. As a result, hourly rates would be reported as—for example—174.8 Tph (tons per hour).

Please note that the choice of division has no bearing on the accuracy of the underlying numbers, and that if your control system contains a PLC (programmable logic controller), you may need to choose a smaller (or larger) scale division.

The Micro-Tech display should look something like this.

READY	BATCH	ALARM	CALIB
- SC DATA SCROLL 2 -			
Scale divisions			
> 0.1 <			
CHOICE			

1. The Micro-Tech displays an appropriate scale division depending on the value you entered in the “Maximum Scale Capacity” menu. Possible scale divisions are 50, 20, 10, 5, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, and 0.001.
2. To choose the appropriate scale division, press the Choice button until the division you want is displayed, then press the Enter button.
3. When finished press the down-arrow key to begin calibration.

Entering Concentration Parameters

Enter the maximum Concentration for your system

READY	BATCH	ALARM	CALIB
- SC DATA SCROLL 3 -			
Max Concentration			
100.000 lb/ft3			
EDIT			

Enter the concentration sensor diameter.

READY	BATCH	ALARM	CALIB
- SC DATA SCROLL 4 -			
Conc. sensor			
diameter _____ in			
EDIT			

Entering Velocity Parameters

Enter the maximum velocity of material flow for your system

READY	BATCH	ALARM	CALIB
- SC DATA SCROLL 5 -			
Max Velocity			
_____ FPM			
EDIT			

Enter the minimum velocity of material flow for your system

READY	BATCH	ALARM	CALIB
- SC DATA SCROLL 6 -			
Min Velocity			
_____ FPM			
EDIT			

Enter the Velocity sensor spacing.

READY	BATCH	ALARM	CALIB
- SC DATA SCROLL 7 -			
Velocity sensor			
spacing 0.315 in			
EDIT			

Quick Automatic Calibration of the Correlator

The Correlator is first zeroed then calibrated using material. During auto zero no material should be running through the flowmeter.

Initial Zero Calibration

Your display should look like this

READY	BATCH	ALARM	CALIB
ZERO CAL Stop Material Flow, then press START			
START			

1. Make sure the material flow has completely stopped. Then press the start soft key, and the following screen is display.

READY	BATCH	ALARM	CALIB
AUTO ZEROING Please Wait			

2. After running for roughly 30 seconds, the following screen appears. Your Zero number of course will be different.

READY	BATCH	ALARM	CALIB
AUTO ZERO COMPLETED			
ZERO # CHANGED			
New Zero # 15095			
CONTINUE			

3. Press CONTINUE.

Initial Span Calibration The span calibration must be done using the actual material in a “material test”. This test is done by running material through the correlator for a period of time (at least five minutes). Generally, the longer the test, the more accurate the results will be. All of the material in the material test should be pre-weighed or post-weighed on a high accuracy static scale to obtain the actual weight of the test material. This actual weight is then entered to complete the test.

After initial Zero Calibrate is complete and CONTINUE has been pressed, the following screen appears:

READY	BATCH	ALARM	CALIB
Press start softkey			
then run material			
START		ABORT	

If unable or choose not to do a material test at this point press ABORT and the Run Screen appears. The “Ready” light is off, the flow meter is not calibrated. An uncalibrated flow rate will appear in the display if product is run through the sensors, all totalizers display -0- and do not function.

To continue with the material test press the START soft key and immediately run material through the sensors. The following screen appears.

READY	BATCH	ALARM	CALIB
9.91 Tons 159.04 Tph press DONE to end			
DONE			

During the automatic span calibration, the resolution of total is 10 times higher than normal.

Wait until all of the material has passed through the sensor area, then press DONE.

At the end of the test, the system prompts you for the reference weight of the material run during the test.

READY	BATCH	ALARM	CALIB
50.91 Tons Enter reference weight 0.00 Tons			
EDIT		ABORT	

The operator must enter the actual weight of the material that passed through the Correlator during the material test. Use the numeric keys to enter the actual weight and confirm with the ENTER key.

After the reference weight has been successfully entered, the “Ready” light is on and the following screen is displayed:

READY	BATCH	ALARM	CALIB
SPAN # CHANGED			
New Span # 1456277			
CONTINUE			



NOTE: An option to Change the span (yes or no) is not present during the cold start calibration since this is the first span number the system will acquire.

Press CONTINUE and the following screen appears:

READY	BATCH	ALARM	CALIB
SPAN CALIBRATION			
Add reference			
weight to totals?			
YES	NO		

If YES is pressed, the amount of material used for the test is added to the master, reset and operator totals. If NO is pressed, the information is lost. The “Ready” light is on.

Pressing YES or NO advances to the following screen.

READY	BATCH	ALARM	CALIB
SCALE CALIBRATED			
Press RUN to Start			
or MENU for Scrolls			

In case the sensors are not connected or a failure is detected, the following message is displayed:

READY	BATCH	ALARM	CALIB
SCALE NOT CALIBRATED			
Press RUN to Start			
or MENU for Scrolls			



NOTE: Moisture compensation is inhibited during material calibration. This is done to make the check of the totalized quantity easier. The static scale provides the weight of the material including moisture. The weight of the water is removed immediately before adding to total at the end of the procedure so that the master, reset, and operators totals are still correct.

If the sensors are not connected or a failure is detected, the Flow Meter is not calibrated and the following screen is displayed:

READY	BATCH	ALARM	CALIB
SCALE NOT CALIBRATED			
Press RUN to Start			
or MENU for Scrolls			

If the Flow Meter is not calibrated, the failure must be corrected and a repeat span calibration/material test must be done, see section “Calibrating the Micro-Tech” and section “Troubleshooting”.

Continue with the following steps, finishing with the "Calibrating the Micro-Tech" section to setup the initial correlator parameters and perform the initial material calibration for your Flow Meter. This is a *very important* step, because the flow meter will not give accurate readings until this has been done.



NOTE. You *must* setup the initial correlator parameters and perform an initial material calibration before operating your flow meter. ▲

Running the Micro-Tech

To run the Micro-Tech, do the following.

1. Make sure the Micro-Tech is powered up.
2. Make sure the Run screen (see below) is currently being displayed.
3. Begin material flow through the sensor area.

Run Screen

The screen below is known as the Run screen. Line 1 of the display always displays the totalized load. Also displayed on this line is the product number.

Line 2 of the display displays the Rate of material flow.

Lines 3 of the display are by default blank, but can be selected to show:

No Display, Velocity, Concentration, product, Date/Time

Run Screen

READY	BATCH	ALARM	CALIB
#1			
0.0 Tons			
0.0 Tph			
	PROD		

Figure 2–2. Run Screen

Calibrating the Micro-Tech

Depending on your particular application, the Micro-Tech should be calibrated on a daily, weekly, monthly, or other regularly scheduled basis. You should run the zero calibration routine often to ensure that the accuracy of the system is optimized.

Setting Up Correlator Parameters

The Correlation length and sampling frequency must be set to allow the correlator time to correlate the minimum speed. As an example, if the maximum delay time was set for 7 seconds and it took 8 seconds for the material to move from sensor S1 to S2, the correlator would restart its sweeps every 7 seconds and would not correlate or display speed.

Max Delay time is calculated by:

$$\text{Max Delay [sec]} = \frac{\text{Correlation length [kByte]}}{\text{Sampling frequency [kHz]}}$$

Example: With a 3.5 K correlation length and a 0.5 kHz Sample Frequency, the max delay between DK sensors S1 and S2 is 7 seconds.

$$\text{Max Delay [sec]} = \frac{3.5 \text{ [kByte]}}{0.5 \text{ [kHz]}} = 7 \text{ [sec]}$$

Minimum Speed is calculated by:

$$\text{Minimum Speed} \left[\frac{ft}{min} \right] = \frac{\text{Sampling frequency [kHz]}}{\text{Correlation length [kByte]}} * 60 \left[\frac{sec}{min} \right] * \frac{0.315[in]}{12 \left[\frac{in}{ft} \right]}$$

Example: With a 3.5 K correlation length and a 0.5 kHz Sample Frequency, the minimum speed is 0.225 FPM.

$$\text{Minimum Speed} \left[\frac{ft}{min} \right] = \frac{0.5 \text{ [kHz]}}{3.5 \text{ [kByte]}} * 60 \left[\frac{sec}{min} \right] * \frac{0.315[in]}{12 \left[\frac{in}{ft} \right]} = 0.225 \left[\frac{ft}{min} \right]$$

Setting the parameters too low causes the speed update time to be extremely slow.

$$Velocity\ Update\ Time\ [sec] = \frac{Correlation\ length\ [kByte]}{Sampling\ frequency\ [kHz]} * Correlator\ Averaging$$

Example: With a 3.5 K correlation length, a 0.5 kHz Sample Frequency, and a correlator averaging of 1, the velocity update time is 7 seconds. Moving the correlator averaging to 4 would cause the velocity update time to be 28 seconds.

$$Velocity\ Update\ Time\ [sec] = \frac{3.5\ [kByte]}{0.5\ [kHz]} * 1 = 7\ [sec]$$

$$Velocity\ Update\ Time\ [sec] = \frac{3.5\ [kByte]}{0.5\ [kHz]} * 4 = 28\ [sec]$$

Table 2–1. Typical Speed Related Correlator Setup Parameters

Speeds	CORREL. SCROLL 2 Correlation Length [kByte]	CORREL. SCROLL 3 Sampling Frequency [kHz]	CORREL. SCROLL 7 Correlation Averaging
Speeds Less than 50 FPM	3.5 Default 3.5	0.5 – 10 Default 5	1, 2, 4 Default 2
Speeds More than 50 FPM Less than 200 FPM	3.5 – 2.0 Default 2.0	5 – 50 Default 6	4, 8 Default 4
Speeds More than 200 FPM Less than 1000 FPM	3.0 – 1.0 Default 1.0	10 -100 Default 40	4, 8 Default 4
Speeds More than 1000 FPM Less than 100000 FPM	1.0 Default 1.0	10 – 100 Default 80	4, 8 Default 4

1. Make sure the Run screen (see figure 3–2) is currently being displayed.
2. Press the Menu button repeatedly until the “Main Menu 7” screen appears.

READY	BATCH	ALARM	CALIB
MAIN MENU 7 Press MENU for more			
CORR			

3. Press the CORR soft-key to access the correlator scrolls.
4. Based on the Min and Max speed of your system, enter the values shown in **Table 2-1** into the appropriate scrolls.
5. The correlator parameters are now setup. Next, complete the following section “Doing a Material Span Calibration” before operating your flowmeter.

Doing a Material Span Calibration

Span Calibration must be done at maximum expected flow rate of the system. The Span Calibration must be done using the actual material in a “material test”. The test must conform to the following:

- The test must be at least 5 minutes long

The longer the material test is run, the more accurate the flow meter will be. All of the material in the material test should be pre-weighed or post-weighed on a high accuracy static scale to obtain the actual weight of the test material. This actual weight is entered into the Integrator to complete the test. Before any Span Calibration, Linearization in Main Menu 6 must be set to NO.

1. Make sure the Run screen (see figure 2-2) is currently being displayed.
2. Press the Menu button and the “Main Menu 1” screen appears.

READY	BATCH	ALARM	CALIB
<p>MAIN MENU 1</p> <p>Press MENU for more</p>			
ZERO CAL	SPAN CAL	SETUP	

3. Press the Span Calibration button and the following screen appears.

READY	BATCH	ALARM	CALIB
<p>AUTO SPAN R Cal</p> <p>Stop material flow, then press START</p>			
START	EXIT	MANUAL	

4. After your material flow has come to a stop. Press the start button this stops totalization and the next screen appears

READY	BATCH	ALARM	CALIB
<p>Press start softkey</p> <p>then run material</p>			
START			

5. Press start and immediately start running material.

READY	BATCH	ALARM	CALIB
9.91 Tons 159.04 Tph press DONE to end			
DONE			

During the Auto Span procedure, the resolution of total is 10 times higher than normal.

Pressing ABORT returns the display to Main Menu 1.

Wait until all material has passed through the sensors, then press DONE. The following screen displays

READY	BATCH	ALARM	CALIB
9.91 Tons Ref. Weight known?			
YES	NO		

When NO is selected, the system is notified that the reference (actual) weight of the material is not known. The Run Screen is displayed and MAT'L is shown flashing to remind the operator that the material test is incomplete.

READY	BATCH	ALARM	CALIB
#1 95.0 Tons 450.0 Tph			
MAT'L	PROD		

(The numbering below is continued from the previous page.)

6. Press MAT'L when actual material weight is known.
7. If YES was answered to Ref. weight known?, or if the MAT'L key has been pressed when flashing the following screen displays.

READY	BATCH	ALARM	CALIB
50.91 Tons			
Enter reference weight			
0.00 Tons			
DONE			

If ABORT is pressed, the information acquired during the test is lost and the system goes back to Main Menu 1.

The operator must enter the actual weight of the material that passed through the sensors during the material test. Use the numeric keys to enter the actual weight and confirm with the ENTER key. If a number is entered for actual weight which the Integrator will not accept, the following screen is displayed.

READY	BATCH	ALARM	CALIB
- SETTING ERROR -			
max	35000	Tons	
min	0.1	Tons	
RETURN			

Press RETURN to return to the “Enter reference weight” screen. A number for actual weight between the min and max must be entered. After entering an actual weight between min and max, the following screen is displayed.

READY	BATCH	ALARM	CALIB
SPAN CAL. COMPLETE Error 0.15% Change span?			
YES	NO	ADV	

Pressing the ADV key changes the screen from “Error %” to “Diff. X.XX Tons” to “XXXX.X PFM”. The “XXXX.X PFM” shows the average PFM signal acquired from the DC13 sensor during the material test.

8. Press the Yes button to set the span.

READY	BATCH	ALARM	CALIB
SPAN # CHANGED New span # 2000000 Old span # 1999800			
RUN	MENU		

9. Press the Menu button (in the display not the keypad) to return the Micro-Tech to the Main Menu 1. Press the RUN button to return to the run screen.

(The numbering below is continued from page 2-29.)

8. If the No button is pressed (this should be done after the initial calibration as subsequent calibrations are for repeatability.) The following screen is shown.

READY	BATCH	ALARM	CALIB
SPAN # UNCHANGED			
New span #		1999800	
Old span #		1999800	
RUN	MENU		

9. Press the Menu soft key in the display to return the Micro-Tech to Main Menu 1. Press the Run Key at this point to return to Run mode.

10. Run several span calibrations to assess the repeatability of the readings.

Press RUN or MENU and the following screen appears:

READY	BATCH	ALARM	CALIB
SPAN CALIBRATION			
Add reference			
weight to totals?			
YES	NO		

If YES is pressed, the amount of material used for the test is added to the master, reset and operator totals. If NO is pressed, the information is lost.



NOTE. The moisture compensation option is inhibited during material calibration. This is done to make the check of the totalized quantity easier. The static scale provides the weight of the material, including moisture. The weight of the water is removed immediately before adding to total at the end of the procedure so the master, reset, and operator's totals remain correct.

Manual Span Calibration

Follow this procedure to do a manual calibration of the Model 9109 following initial setup:

1. Place the DC13 on a dry, clean surface and fill with your material.
2. Empty the DC13 and weigh the sample (lbs or kg).

Divide the resulting weight by the volume of your DC13 (see Table below) and calculate the actual concentration.

3. Connect the empty DC13 to the Micro-Tech 9109 and position it on a dry, clean surface.
4. Run the Zero Calibration procedure if you haven't already done so.
5. Fill the DC13 with the previously weighed material sample.
6. At MAIN MENU 1
7. Select SPAN CAL

READY	BATCH	ALARM	CALIB
MAIN MENU 1 Press MENU for more			
ZERO CAL	SPAN CAL	SETUP	

8. Select MANUAL

Calculate the value of the Span Number using the following formula:

$$New\ Span\ Number = \frac{Actual\ Concentration}{Displayed\ Concentration}$$

9. Use the numeric keys to change the old span number to the new calculated span number and press ENTER.

The displayed concentration should now be the same as your calculated weight per volume number. The DK 13 is an absolute velocity measurement and does not require calibration.

Install both sensors in your process. The equipment is now ready to provide you with accurate measurement.

Table 2–2. Volume Table

Diameter mm	Volume m ³	Diameter Inches	Volume ft ³
15	0.0000457	0.6	0.001616
20	0.0000813	0.75	0.002873
25	0.0001271	1.0	0.004490
32	0.0002082	1.25	0.007356
40	0.0003254	1.5	0.011490
50	0.0005085	2.0	0.017960
65	0.0008594	2.5	0.030350
80	0.0014576	3.0	0.051480
100	0.0020341	4.0	0.071840
125	0.0031784	5.0	0.11224
150	0.0045769	6.0	0.161631
200	0.0081367	8.0	0.287645

Product Setup

Product Setup scroll consists of one screen for local or remote product selection.

Press the RUN key to display the Run Screen unless already there. Press the MENU key for Main Menu 1. In local mode, product selection can be entered through the keypad. In remote mode, up to 99 products can be selected. (Password: Operator)

Physical digital input assignments for each product are made in the I/O DEFINE scroll after remote has been enabled. There are two general-purpose digital inputs available on the motherboard. Additional digital inputs are available by adding an optional DIO board. Press the SETUP key and the following screen is displayed.

READY	BATCH	ALARM	CALIB
ENTER PRODUCT SELECTION MODE:			
EXIT	LOCAL		

Pressing the EXIT soft key returns the operator to Main Menu 1. Pressing the second soft key switches between Local and Remote.

Changing Product Number

Make sure integrator is at the run screen. Figure 2–2. **Run Screen** By pressing soft key 2 “PROD” if the selection of the product is executed from local, the following screen is displayed:

READY	BATCH	ALARM	CALIB
CHANGE THE PRODUCT NUMBER?			
YES	NO		

If NO is pressed the Run Screen is displayed.

If YES is pressed, the following screen displays:

READY	BATCH	ALARM	CALIB
PROD. NUMBER <u>1</u> NO NAME			
EDIT	EXIT	NAME	

A different product number (1-99) can be entered by pressing the EDIT soft key.

To change the name of the product, press the NAME soft key. Type the product name by pressing the appropriate alphanumeric keys. Example: To type a “C”, press the “1” key four times. The soft keys labeled < and > may be used to scroll to the proper location of the product name. Press the ENTER key after the product name is typed. Then, press the RUN key to return to the Run Screen.

READY	BATCH	ALARM	CALIB
NO NAME		1	

ENTER	<	>	CLEAR



NOTE: The purpose of the different product numbers is to allow different products to be run through the flow meter.

Each product can have its own Span Calibration, Linearization, and Zero if required to make the flowmeter more accurate with these products. Each product must be initially calibrated when it is first run through the flow meter.

The Integrator then saves the calibration information. When the product number is selected again, the Integrator is already correctly calibrated. Max Scale Capacity is not affected by selecting a new/different product.

The Zero calibration should not change after selecting a new product. If Zero has changed, either the mechanical installation has changed or the electronic calibration has changed.

NOTE: The Operator and Reset Totals are stored according to product number.

Chapter 3

Maintenance and Troubleshooting

The maintenance information in this manual should meet your service needs. If problems occur requiring technical assistance, please call 1-800-445-3503 or the local Thermo contact listed in Chapter 4. Thermo Scientific has a repair center located at our plant in Minneapolis, Minnesota. Contact one of our technical representatives at 1-800-445-3503 for assistance or the local Thermo contact listed in Chapter 4. To expedite your service request, please have your Micro-Tech model, serial number.

Critical Checkpoints

The Micro-Tech is a solid-state device and should require very little maintenance. The front panel can be wiped clean with a damp cloth, and if necessary, a mild detergent (never use abrasive cleaners, especially on the display window). As a preventative measure, check to ensure all wires, plugs, and integrated circuits are tight in their connectors. Also, keep the enclosure door tightly closed to prevent dirt infiltration. More often than not, a quick visual inspection leads to the source of trouble. If a problem develops, check the following before proceeding to more specific troubleshooting procedures.

- Check Power
- Check the fuse.
- Check that the power switch is ON and that power is supplied to the unit.
- Check Connections
- Check that all terminations are secure.
- Check to ensure the display, module, and keypad connectors are firmly seated in their connectors.
- Check that all jumpers are in their correct position.

Frequently Asked Questions

Here is a list of frequently-asked questions (FAQs) to help you resolve common problems and concerns about operating, calibrating, and maintaining your system.

Question	Answer												
How often should the zero and span be calibrated?	<p>As a general rule, if you make or receive payments based upon the weight readings from your system, the system should be zeroed daily and the span checked weekly.</p> <ul style="list-style-type: none">• Your system is only as good as the repeatability of your error on repeated zero calibrations.• The span should never change drastically, if the zero is properly maintained. <p>If an external contractor is responsible for maintaining your system, he or she will establish an appropriate schedule for testing your system's zero and span.</p>												
How often should I check the mechanical installation of the system?	<p>The system should only need daily preventive-maintenance checks for material build up in critical areas, such as in the sensor areas. The exception to this is, when changes are made to the system area.</p>												
Why do I need to see repeatability during calibrations?	<p>The repeatability of a conveying system is important for the accuracy of the system. If the system cannot repeat tests within the system's percentage of accuracy, then you should investigate why the system is not repeating within the appropriate tolerances.</p>												
Every time I complete a zero or span test and get a percentage of error, do I say "Yes" each time to change the zero or span?	<p>The only time you should change zero or span is on the initial, start-up test. Press the "Yes" button to change the span. In any subsequent test, even when there is an error, press the "No" button—as any additional tests are for repeatability, which is a maintenance feature of calibrations.</p>												
What kind of information is available from the digital output?	<p>The programmable outputs are as follows.</p> <table><tbody><tr><td>Alarm cumulative</td><td>Fault</td></tr><tr><td>Shutdown cumulative</td><td></td></tr><tr><td>Ready</td><td></td></tr><tr><td>Totalizer</td><td></td></tr><tr><td>Air purge</td><td></td></tr><tr><td>Custom 1-7</td><td></td></tr></tbody></table>	Alarm cumulative	Fault	Shutdown cumulative		Ready		Totalizer		Air purge		Custom 1-7	
Alarm cumulative	Fault												
Shutdown cumulative													
Ready													
Totalizer													
Air purge													
Custom 1-7													

Chapter 4

Service, Repair, and Replacement Parts

Listed below is information about how to get help servicing, repairing, and obtaining replacement parts for your Micro-Tech. In addition, Thermo Fisher Scientific provides experienced, on-site service technicians who can assist you with installing, setting up, calibrating, maintaining, and repairing your Micro-Tech. They can also help you train your operators and solve virtually any Micro-Tech-related problem.

Overview

For a detailed list of the spare parts available for your Micro-Tech, please see the Parts List in table 4-1 on page 4-4.

Before returning the Micro-Tech or any other equipment to Thermo Fisher Scientific, you must contact your nearest Thermo Fisher Scientific office for a Return Material Authorization (RMA) number, which will authorize you to make the return. In addition, you will need to complete the appropriate RMA Form, Product Information Sheet, and Hazard Declaration Form, before returning anything to Thermo Fisher Scientific.

For more information about contacting Thermo Fisher Scientific, see page 4-2.

RMA

The Return Material Authorization (RMA) form you will need before returning your Micro-Tech to Thermo Fisher Scientific.

Getting Ready to Order

The quickest way to get the parts you need for your Micro-Tech is to do the following.

1. Identify the broken or faulty parts.
2. See whether the part is shown in table 4–1, which lists parts that may need to be replaced. Note the part number from the table. If the part is not listed in the table, contact Thermo Fisher Scientific directly (as described in the following pages).
3. Before you contact Thermo Fisher Scientific for commonly needed parts, make sure you have the following information ready.
 - Your Micro-Tech model number and serial number.
 - Your company's purchase order (PO) number. Please note that a *hard copy* of your PO is required before parts can be sent. In addition, your PO must reflect the current and correct prices for all parts ordered. So, please email or fax us your PO to expedite the process.
 - The date the parts are needed.
 - Your preferred shipping method.
 - A list of all the part numbers—together with descriptions and the quantities needed.
4. Then contact Thermo Fisher Scientific by email, fax, or telephone—as described on the following page.



WARNING. Major repairs and/or modifications to your Micro-Tech *must* be performed by Thermo Fisher Scientific personnel. ▲

Contacting Thermo Fisher Scientific

Please verify and write down your Micro-Tech model number and serial number *before* contacting us. Things will go a lot more quickly and efficiently once we know this information.

North America

1-800-445-3503

1-763-783-2525

service.bulk.us@thermofisher.com

parts.bulk.us@thermofisher.com

Brazil

+55-11-2367-2192

+55-11-2367-2192 fax

Germany

+49 (0) 208-824930

+49 (0) 208-852310 fax

service.oberhausen@thermofisher.com

Chile

+56 2 2378 5080

+56 2 2370 1082 fax

Italy

+39 02-959514-1

+39 02-953200-15 fax

service.bulk.emea@thermofisher.com

China

+86 10-8419-3588

+86 10-8419-3580 fax

Spain

+34 91-484-5965

+34 91-484-3597 fax

India

+91-22-4157-8800

+91-22-4157-8801 fax

United Kingdom

+44 (0) 1452-337800

+44 (0) 1452-415156 fax

Mexico

+52 55 1253 9410

+52 55 1253 9424 fax

Australia

+61 (0) 8 8208-8200

+61 (0) 8 8234-3772 fax

service.auadl@thermofisher.com

South Africa

+27 (0) 11-609-3101

+27 (0) 11-609-3110 fax

Parts List

Here is the parts list for your Micro-Tech.

Table 4–1. Micro-Tech Parts List

Description	Part Number
PCBA,MOTHERBOARD,MT9109	127657
DISPLAY,LCD,6 DIGIT,QVGA,MT9000	100775
PCBA,HMI BOARD,MT9000	100802
CONN,PWR,3POS,3.81MM,HDR,M	100781
POWER SUPPLY,SGL, 24V, 3.2A	100755
CABLE,USB,M/F,2.0,1.6FT,PNL MT	100792
PCBA, ANALOG I/O BOARD, MT9000	102949
PCBA, 4-20MA OUTPUT BD, 1 CH, MT9000	100744
PCBA, DC INPUT BD, MT9K	100785
PCBA, OPTO-22 INPUT, MT9000	102999
PCBA, OPTO-22 OUTPUT BD, MT9000	103003
PCBA, RELAY OUTPUT BD, MT9000	102479
PCBA, COMM BOARD, MT2K/9K	102942
PCBA,PROFIBUS BD,MT2000/MT9000	102936
PCBA, DIO, 8IN / 8OUT	103017
PCBA, PFM INPUT BD MT2000/9000	101019
PCBA,CORRELATOR BD,MT2K/9K	102939
MODULE,POWER,IN,140VAC, G4- 5	038014
MODULE,POWER,IN,280VAC, G4- 5	050480
MODULE,POWER,IN, 32VDC, G4- 5	044551
MODULE,POWER,OUT,240VAC, G4- 5	037289
MODULE,POWER,OUT, 60VDC, G4- 5	039669
MODULE,POWER,OUT,DRY,N/O,G4- 5	044552
FUSE,FAST-BLOW,2A,250V,5X20MM	103190
DRIVE,FLASH,USB 2,4GB,BRANDED	112183

Appendix A Additional Installation Information

Door Label

Here is a copy of a typical Door Label for the Micro-Tech.

ZERO# <input style="width: 80px; height: 15px;" type="text"/> SPAN# <input style="width: 80px; height: 15px;" type="text"/>	MICRO TECH CORRELATOR	MODEL # <input style="width: 80px; height: 15px; text-align: center;" type="text" value="9109"/>																																																																																				
<hr/> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <h3>DISPLAY SCROLL</h3> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 5%;">1</td><td style="width: 85%;">MEASURE UNITS</td><td style="width: 10%;"><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>2</td><td>TOTALIZATION UNITS</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>3</td><td>RATE UNITS</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>4</td><td>WEIGHT UNITS</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>5</td><td>LENGTH UNITS</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>6</td><td>LANGUAGE</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>9</td><td>RUN DISPLAY LINE 3</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>10</td><td>DISPLAY RATE DAMPING</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>11</td><td>DISPLAY CONC DAMPING</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>12</td><td>DISPLAY VEL. DAMPING</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> </table> </div> <div style="width: 45%;"> <h3>ALARMS</h3> <table style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">RATE ALARM</td></tr> <tr><td style="width: 5%;">1A</td><td style="width: 85%;">LO RATE SET POINT</td><td style="width: 10%;"><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>1B</td><td>HIGH RATE SET POINT</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td colspan="2" style="text-align: center;">CONCENT. ALARM</td></tr> <tr><td>2A</td><td>LOW LOAD SET POINT</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>2B</td><td>HIGH LOAD SET POINT</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td colspan="2" style="text-align: center;">VELOCITY ALARM</td></tr> <tr><td>3A</td><td>LOW SPEED SET POINT</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> <tr><td>3B</td><td>HIGH SPEED SET POINT</td><td><input style="width: 80px; height: 15px;" type="text"/></td></tr> </table> </div> </div>			1	MEASURE UNITS	<input style="width: 80px; height: 15px;" type="text"/>	2	TOTALIZATION UNITS	<input style="width: 80px; height: 15px;" type="text"/>	3	RATE UNITS	<input style="width: 80px; height: 15px;" type="text"/>	4	WEIGHT UNITS	<input style="width: 80px; height: 15px;" type="text"/>	5	LENGTH UNITS	<input style="width: 80px; height: 15px;" type="text"/>	6	LANGUAGE	<input style="width: 80px; height: 15px;" type="text"/>	9	RUN DISPLAY LINE 3	<input style="width: 80px; height: 15px;" type="text"/>	10	DISPLAY RATE DAMPING	<input style="width: 80px; height: 15px;" type="text"/>	11	DISPLAY CONC DAMPING	<input style="width: 80px; height: 15px;" type="text"/>	12	DISPLAY VEL. DAMPING	<input style="width: 80px; height: 15px;" type="text"/>	RATE ALARM		1A	LO RATE SET POINT	<input style="width: 80px; height: 15px;" type="text"/>	1B	HIGH RATE SET POINT	<input style="width: 80px; height: 15px;" type="text"/>	CONCENT. ALARM		2A	LOW LOAD SET POINT	<input style="width: 80px; height: 15px;" type="text"/>	2B	HIGH LOAD SET POINT	<input style="width: 80px; height: 15px;" type="text"/>	VELOCITY ALARM		3A	LOW SPEED SET POINT	<input style="width: 80px; height: 15px;" type="text"/>	3B	HIGH SPEED SET POINT	<input style="width: 80px; height: 15px;" type="text"/>																														
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Motherboard Terminal Block Definitions

The terminal-block definitions for the motherboard are shown below.

J16	J21	J45	J37	J29
1 2 3 4 5 6 7	11 12 13 14 15 16 17	21 22 23 24 25 26	31 32 33 34 35 36 37 38	41 42 43 44 45 46 47 48
LOADCELL 1 NOT USED	LOADCELL 2 NOT USED	COMM B	COMM A	SPU and PULSE OUT

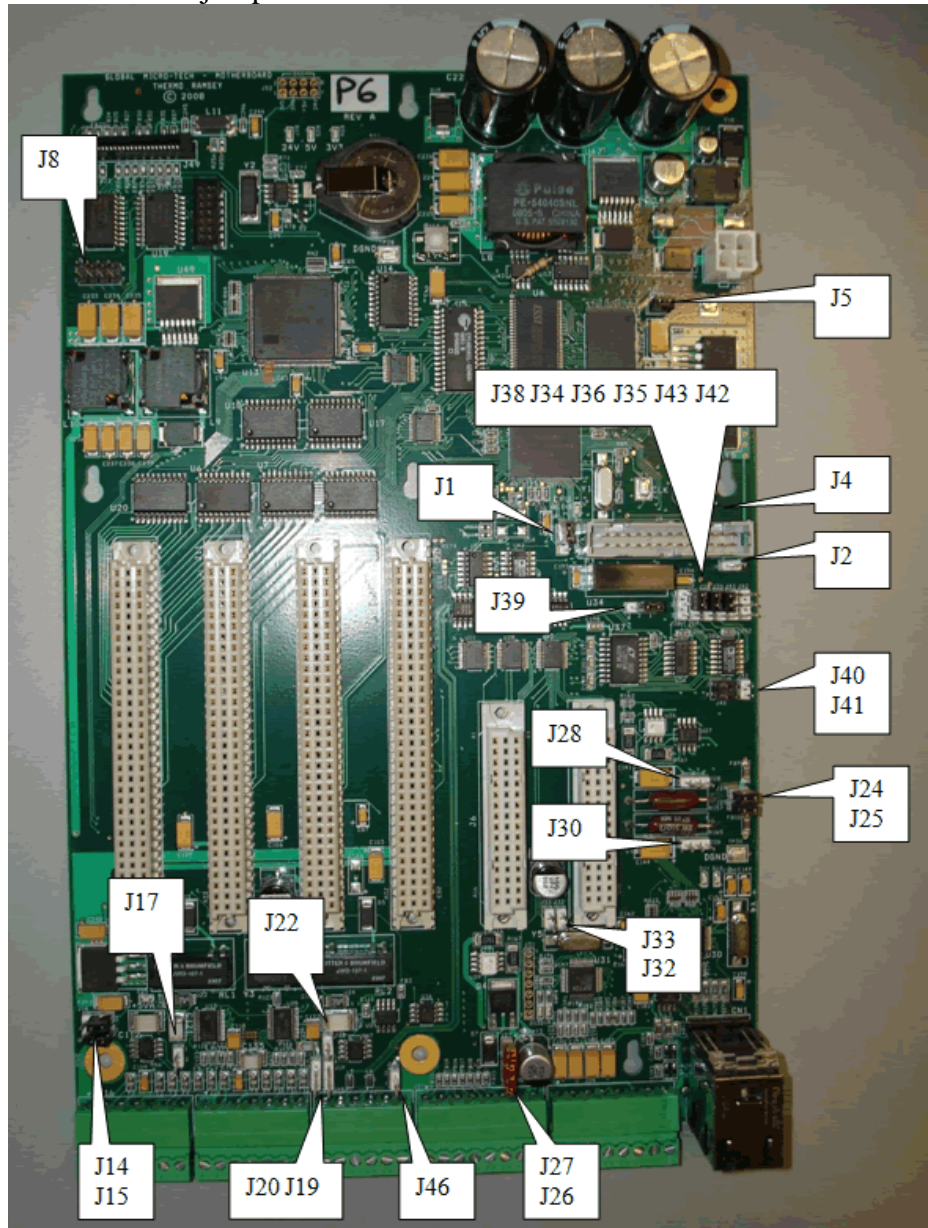
J45	COMM B (Non-isolated RS-485)
21	RS-485 Z TX -
22	RS-485 Y TX +
23	RS-485 A RX +
24	RS-485 B RX -
25	COMMON
26	SHIELD (EARTH)

J37	COMM A (Isolated RS-485/232)
31	RTS/-485 OUT
32	TXD/+485 OUT
33	RXD
34	+485 IN
35	-485 IN
36	CTS/DCO
37	UART GND (ISOLATED)
38	SHIELD (EARTH)

J29	Inputs #1 & #2 and Output #5
41	+24VDC
42	SIGNAL 1 (SPU)
43	COMMON
44	SHEILD (EARTH)
45	SIGNAL 2 (SPU)
46	24VDC POWER
47	OUTPUT #5 (24V) (OPEN-DRAIN)
48	COMMON

Motherboard Jumper Locations

Here are the jumper locations the Micro-Tech motherboard.



Motherboard Jumper Settings

Here are the jumper settings for the Micro-Tech motherboard.

Load-Cell Interrupt Selection Jumper (Not applicable for Model 9109)

Jumper	Jumper Settings	Default										
J8	<table border="1"> <thead> <tr> <th>Jumper Setting</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Pins 1-2</td> <td>Load Cell IRQ 1</td> </tr> <tr> <td>Pins 3-4</td> <td>Load Cell IRQ 2</td> </tr> <tr> <td>Pins 5-6</td> <td>Load Cell IRQ 3</td> </tr> <tr> <td>Pins 7-8</td> <td>Load Cell IRQ 4</td> </tr> </tbody> </table>	Jumper Setting	Description	Pins 1-2	Load Cell IRQ 1	Pins 3-4	Load Cell IRQ 2	Pins 5-6	Load Cell IRQ 3	Pins 7-8	Load Cell IRQ 4	J8 Not Installed
	Jumper Setting	Description										
	Pins 1-2	Load Cell IRQ 1										
	Pins 3-4	Load Cell IRQ 2										
	Pins 5-6	Load Cell IRQ 3										
Pins 7-8	Load Cell IRQ 4											

Load-Cell Sense Selection Jumpers (Not applicable for Model 9109)

Jumper	Jumper Settings	Default								
J14 J15	<table border="1"> <thead> <tr> <th>Jumper Setting</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Pins 1-2</td> <td>Local Sense Channel 1</td> </tr> <tr> <td>Pins 2-3</td> <td>Remote Sense Channel 1</td> </tr> <tr> <td>Not Installed</td> <td>Remote Sense Channel 1</td> </tr> </tbody> </table>	Jumper Setting	Description	Pins 1-2	Local Sense Channel 1	Pins 2-3	Remote Sense Channel 1	Not Installed	Remote Sense Channel 1	J14 1-2 Installed J15 1-2 Installed
	Jumper Setting	Description								
	Pins 1-2	Local Sense Channel 1								
	Pins 2-3	Remote Sense Channel 1								
Not Installed	Remote Sense Channel 1									
J17	Optional R-CAL resistor Channel 1	Not Installed								
J19 J20	<table border="1"> <thead> <tr> <th>Jumper Setting</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Pins 1-2</td> <td>Local Sense Channel 2</td> </tr> <tr> <td>Pins 2-3</td> <td>Remote Sense Channel 2</td> </tr> <tr> <td>Not Installed</td> <td>Remote Sense Channel 2</td> </tr> </tbody> </table>	Jumper Setting	Description	Pins 1-2	Local Sense Channel 2	Pins 2-3	Remote Sense Channel 2	Not Installed	Remote Sense Channel 2	J19 1-2 Installed J20 1-2 Installed
	Jumper Setting	Description								
	Pins 1-2	Local Sense Channel 2								
	Pins 2-3	Remote Sense Channel 2								
Not Installed	Remote Sense Channel 2									
J22	Optional R-CAL resistor Channel 2	J22 Not Installed								

Speed-Input and Output #5 Jumpers (Not applicable for Model 9109)

Jumper	Jumper Settings	Default
J24 J25	Speed input 1	
	Jumper Setting	Description
	Installed	Local 24V Power
	Not Installed	Remote Power
J26 J27	Speed input 2 & Output #5	
	Jumper Setting	Description
	Installed	Local 24V Power
	Not Installed	Remote Power
J28 J30	J28 Speed input 1 cutoff, J30 Speed input 2 cutoff	
	Jumper Setting	Description
	Pins 1-2	Speed Input Cut-off 13kHz
	Pins 2-3	Speed Input Cut-off 425 Hz
	Not Installed	Speed Input Cut-off 13kHz

UART Configuration Jumpers

Jumper	Jumper Settings	Default
J34	COMM A, (UART 0)	
	Jumper Setting	Description
	Pins 1-2	RS-485 Normal Operation
	Pins 2-3	RS-485 Multi-Drop Operation
J35 J36 J39	COMM A, (UART 0)	
	Jumper Setting	Description
	Pins 1-2	RS-232 Mode
	Pins 2-3	RS-485 Mode
	Not Installed	RS-232 Mode

Additional Installation Information
 Motherboard Jumper Settings

J38	COMM A, (UART 0)		J38 Installed 1-2
	Jumper Setting	Description	
	Pins 1-2	RS-485 Receive → U0RXD	
	Pins 2-3	RS-485 Receive → U0CTS	
J40	COMM A Termination, (UART 0)		J40 Installed 3-4
	Jumper Setting	Description	
	Pins 1-2	Enable RS-485 Termination	
	Pins 3-4	Disable RS-485 Termination	
	Not Installed	Disable RS-485 Termination	
J41	COMM A Termination, (UART 0)		J41 Installed
	Jumper Setting	Description	
	Pins1-2	Enable RS-485 Termination	
J42 J43	COMM A Termination, (UART 0)		J42 Installed 1-2 J43 Installed 1-2
	Jumper Setting	Description	
	Pins1-2	1.2kΩ termination enable	
	Pins 2-3	600Ω Bias Enabled	
	Not Installed	No additional termination	

UART Configuration Jumpers (continued)

Jumper	Jumper Settings		Default
J46	COMM B Termination, (UART 2)		J46 Not Installed
	Jumper Setting	Description	
	Installed	120Ω termination	

Programmable Digital Inputs/Outputs

The Micro-Tech has provision for up to 21 programmable digital inputs and 21 programmable digital outputs. Motherboard I/O includes two digital inputs and one digital pulse output. Optional I/O includes three programmable inputs and four programmable outputs. Optional DIO boards can be added, if additional I/O is required.

- Digital Inputs
 - Two (2) (DC) inputs on the motherboard. (See the Specifications in chapter 1.)
 - Three (3) programmable dry-contact inputs on the optional DC Input Board, or three (3) programmable opto-22 inputs modules on the optional Opto22 Input Board.
 - Eight (8) programmable inputs on the optional Digital I/O 8in/8out Board. Two of these boards may be installed for a total of sixteen (16) inputs.

- Digital Outputs
 - One (1) Digital Pulse Output on the motherboard. (See the Specifications in chapter 1.)
 - Four (4) programmable relay outputs on the optional Relay Output Board, or four (4) programmable opto-22 output modules on the optional Opto22 Output Board.
 - Eight (8) programmable outputs on the optional Digital I/O 8in/8out Board. Two of these boards may be installed for a total of sixteen (16) outputs.

Digital Input Expansion Boards

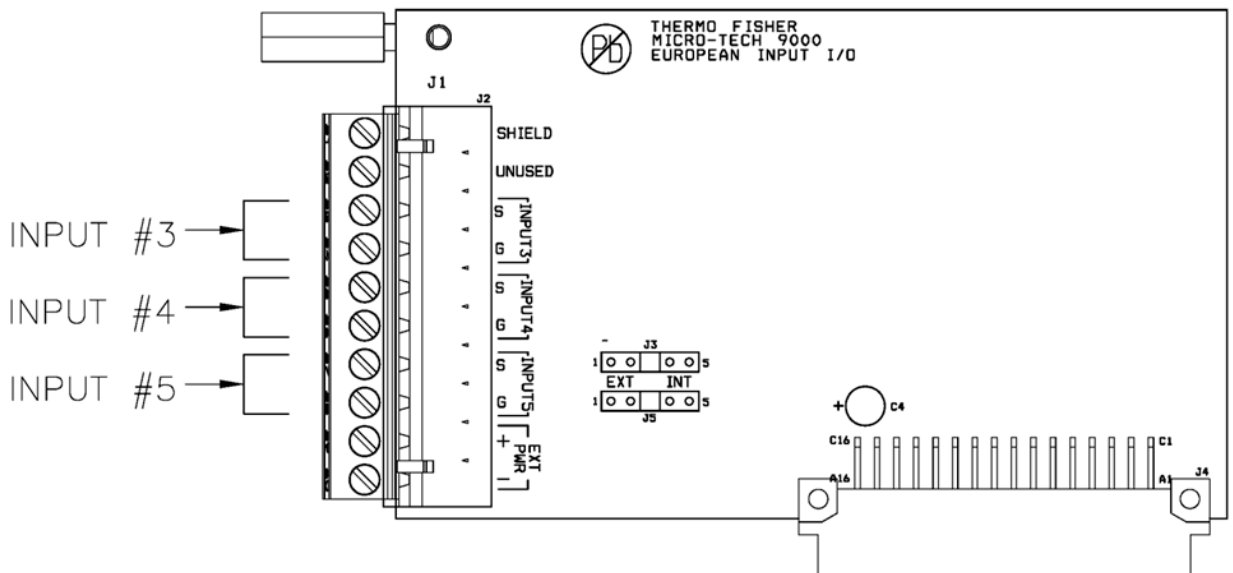
The board options are as follows.

- DC Input Board
- or
- Opto-22 Input Board

Install in expansion slot J6 on the motherboard. Use UL 1015 wire, 16AWG / 1 sq.mm or smaller.

DC Input Board

This is an optional board with three inputs (inputs #3–5).
Type: Current sourcing to common ground. Designed for dry-contact input. Rated: 24VDC, 5mA typical. Input function is assigned by user.



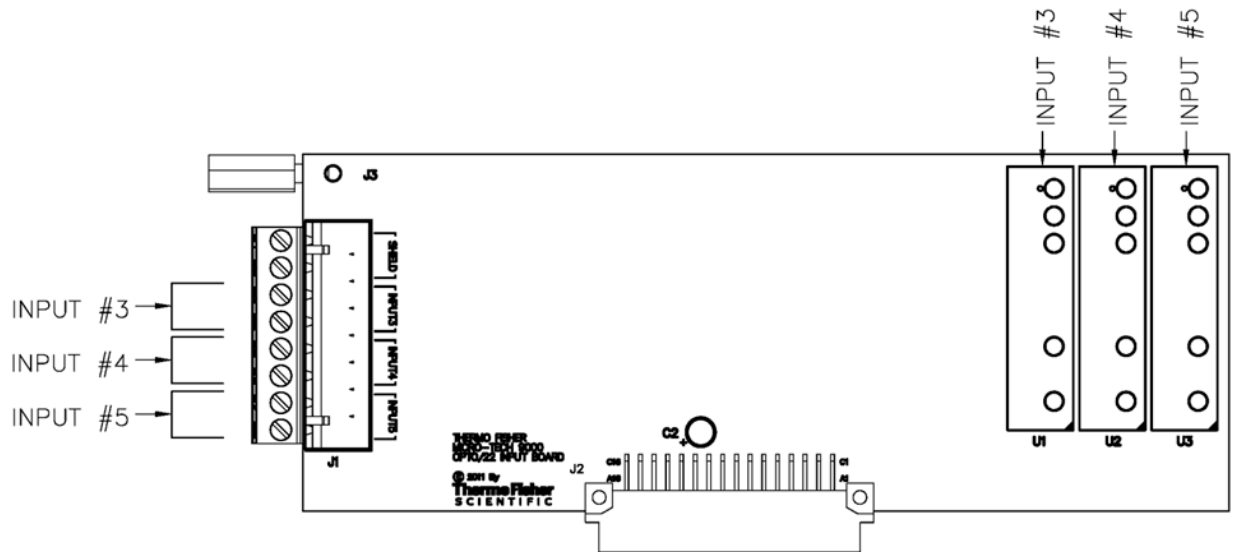
Part number = 100785

Opto22 Input Board

This is an optional board with three inputs (inputs #3–5). The module options are as follows.

- 240VAC In Module (G4IAC5A)
 - Input voltage range: 180-280 VAC or VDC.
 - Input current at maximum line: 5mA.
- 120VAC In Module (G4IAC5)
 - Input voltage range: 90-140 VAC or VDC.
 - Input current at maximum line: 5mA.
- 32VDC In Module (G4IDC5)
 - Input voltage range: 10-32VDC; 12-32VAC.
 - Input current at maximum line: 25mA.

Install in slots U1–U3 on the input board.



Part number = 102999

Digital Output Expansion Boards

The board options are as follows.

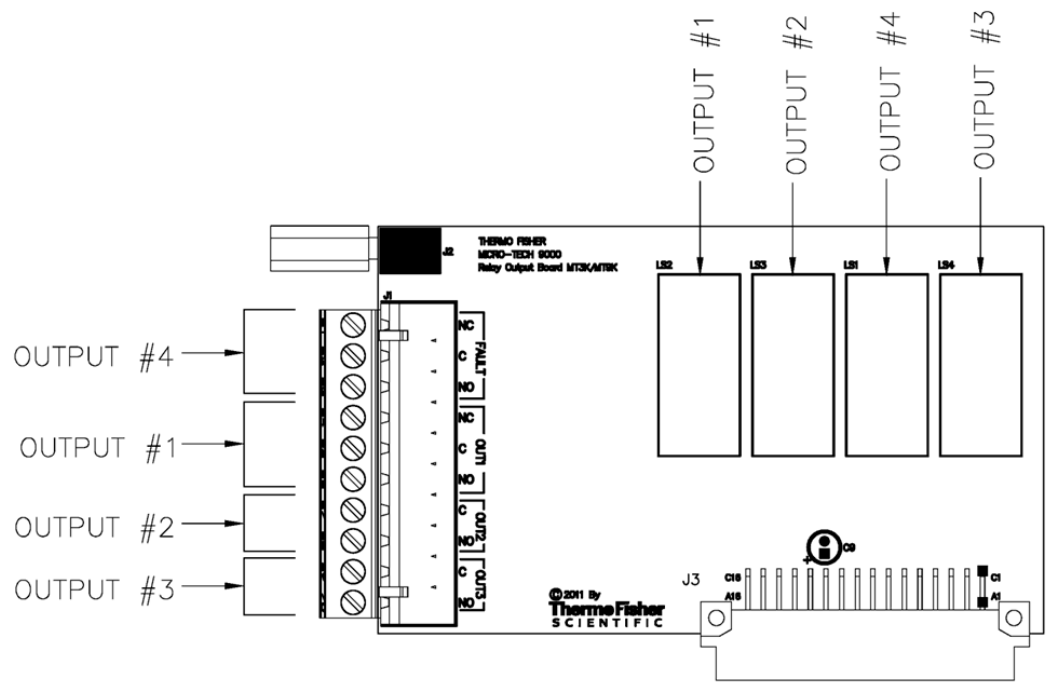
- Relay Output Board
- or
- Opto-22 Output Board

Install in expansion slot J7 on the motherboard. Use UL 1015 wire, 16AWG / 1 sq.mm or smaller.

Relay Output Board

This is an optional board.

- Four (4) outputs (outputs #1–4)
- Panel version
 - Rated: 33 VAC at 2A. Fusing requirement: 3A.
 - Rated: 70 VDC at 0.5A. Fusing requirement: 1A.
- Field version
 - Rated: 240 VAC at 3A. Fusing requirement: 5A.
 - Rated: 70 VDC at 0.5A. Fusing requirement 1A.

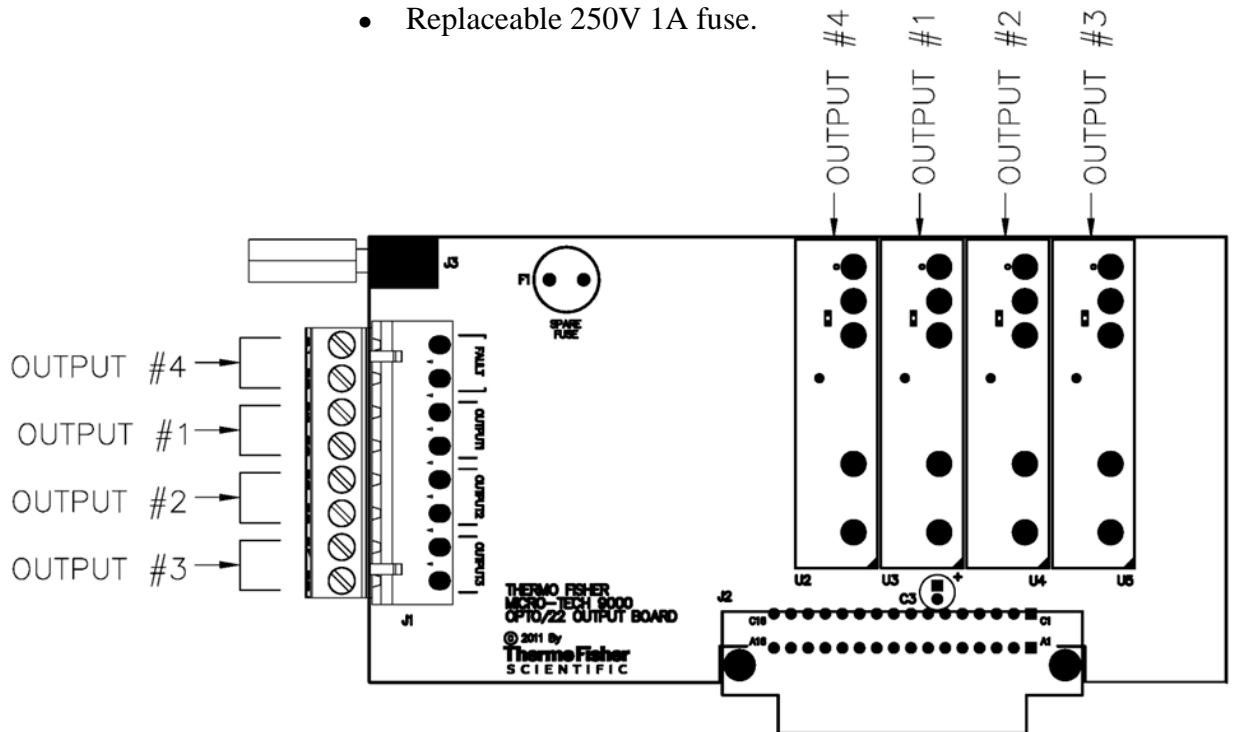


Part number = 102479

Opto22 Output Board

This is an optional board. There are four (4) outputs (outputs #1–4). Modules are installed in slots U2–U5 on the output board. One spare fuse is located on the output board. The module options are as follows.

- 240VAC Out Module, G4OAC5A.
 - Output voltage range: 24-280 VAC.
 - 2A at 50°C ambient.
 - Replaceable 250V 4A fuse.
- 60VDC Out Module, G4ODC5.
 - Output voltage range: 5-60 VDC.
 - 2A at 50°C ambient.
 - Replaceable 250V 4A fuse.
- Dry (Reed) Out Module, G4ODC5R.
 - Contact rating: 10 VA.
 - Maximum switching voltage: 100VDC, 130VAC.
 - Maximum switching current: 0.5A.
 - Replaceable 250V 1A fuse.



Part number = 103003

DIO 8in/8out Board

This is an optional board with eight (8) inputs (inputs #6–13) and eight (8) outputs (outputs #6–13). Install in one of the motherboard expansion slots J10–J13. Up to two boards may be installed for a total of 16 inputs/16 outputs.

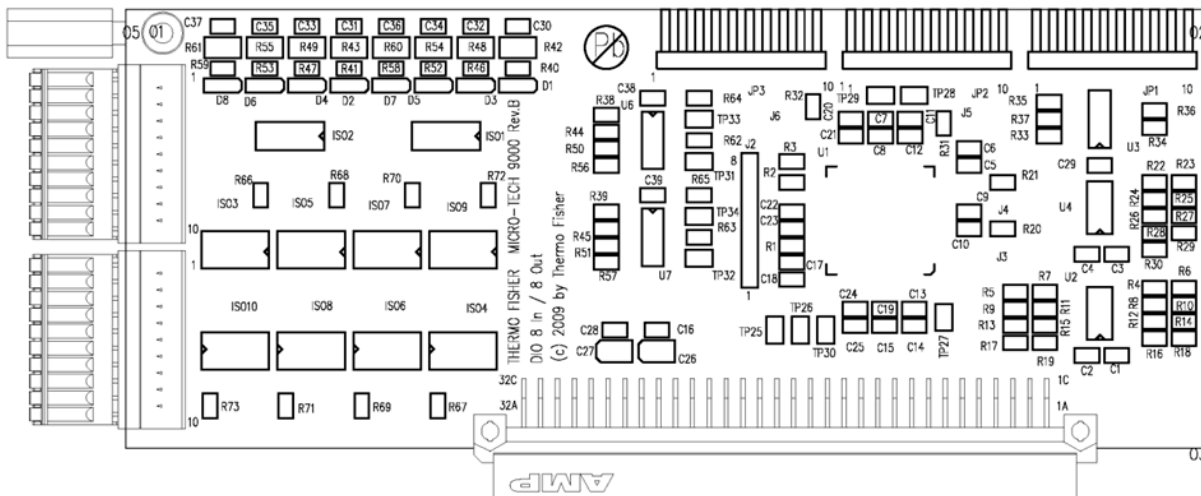
The DIO board provides isolated contact closure inputs and 24-volt current sinking or current sourcing isolated outputs. Output current must be limited to 80 mA maximum, continuous.

The inputs and outputs are powered by an external 24 VDC power source.

The isolated contact closure inputs are activated by completing the circuit from the input to the negative side of the 24 VDC supply. Approximately 12 mA of current flows out of each input during contact closure.

Output current sinking or sourcing is selectable thru a menu screen. Inputs are always current sourcing.

Board Diagram



Part number = 103017

Analog I/O Boards

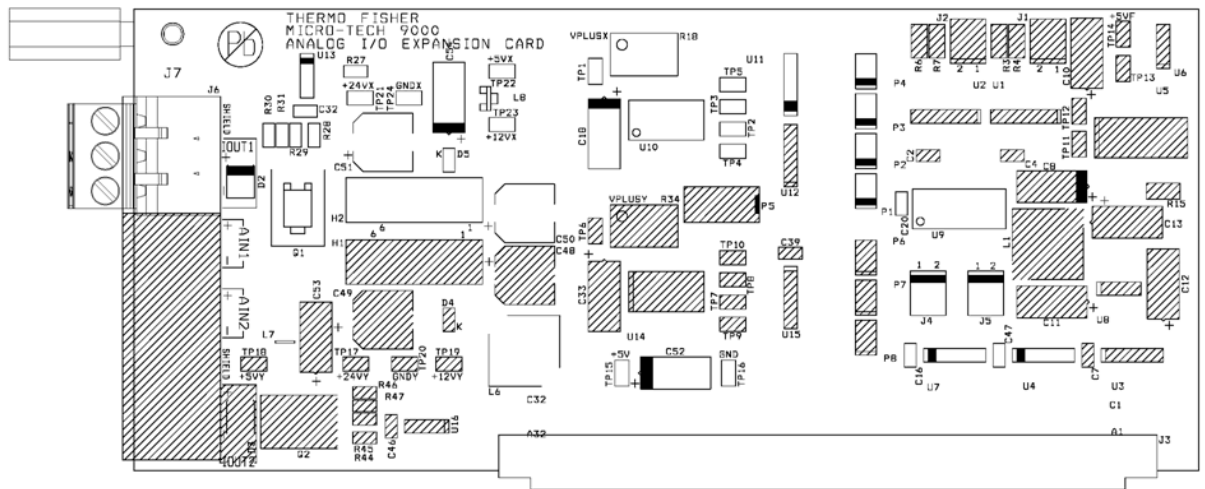
The analog I/O board is available in two configurations described below. Type A has one current output only, whereas, Type B has two voltage inputs and two current outputs. The Micro-Tech can support up to two analog inputs and four analog outputs.

Type A: 4–20mA Output Board

This is an optional board. Install in one of the motherboard expansion slots J10–J13. Single channel high-level current output.

- Output
 - Rate
 - Velocity
 - Concentration
- Optically isolated
- Isolated power source
- Voltage output by adding an internal dropping resistor
- Output range (mA)
 - 0 to 20 mA
 - +4 to 20 mA
 - +20 to 4 mA
 - +20 to 0 mA
- Resistive load: 800 ohms max.
- Capacitive load: No limit
- Field wiring: Connections are made to the terminal strip on end of the 4-20mA Output Board. Note that connector is removable for ease of termination.

Board Diagram



Part number = 100744

Type B: Analog I/O Board

This is an optional board. Install in one of the motherboard expansion slots J10–J13.

- Inputs
 - Moisture compensation
- Outputs
 - Rate
 - Velocity
 - Concentration

High-Level Inputs (Two Channels)

Only 1 input is available on the Micro-Tech 9109

Differential voltage.

- Input Range (Volts)
 - 0 to +5 V
 - +1 to +5 V
 - -5 to +5 V

Current (Requires Jumper Selection)

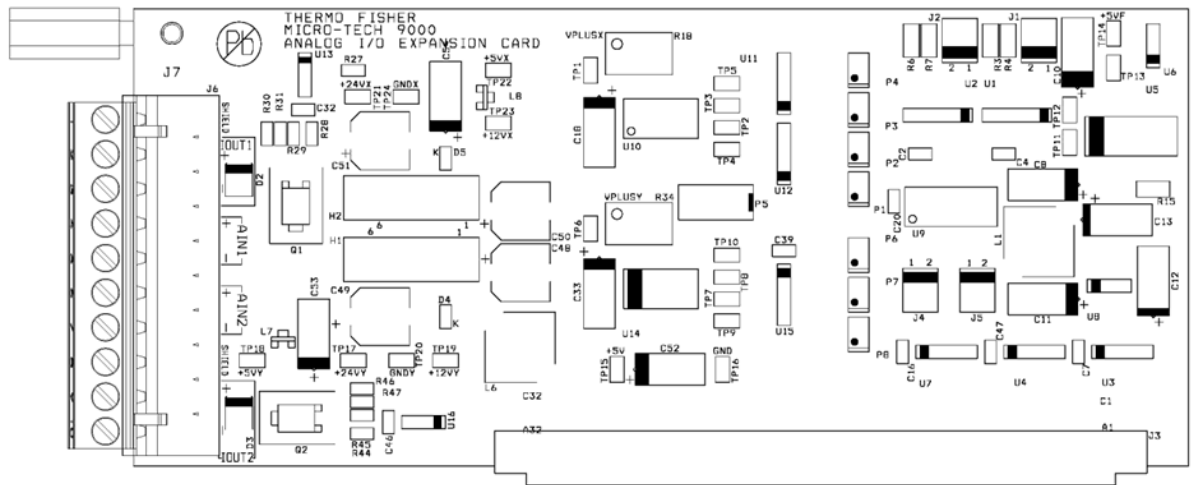
- Input Range (mA)
 - 0 to +20 mA
 - +4 to 20 mA
- Converted Display (Volts)
 - 0 to +5 V
 - +1 to +5 V
- Jumpers J1 and/or J2 are used to select 250 ohm resistance for the Current inputs.
- Input impedance: 100 k nominal (differential)
- Maximum usable input voltage: 106% of full scale
- Non-isolated voltage
- Max. non-destructive input voltage: 12V peak

Current Outputs (Two Channels)

Here are the specifications.

- Optically isolated
- Isolated power source
- Output Range (mA)
 - 0 to 20 mA
 - +4 to 20 mA
- Voltage output by adding an internal dropping resistor.
- Resistive load: 800 ohms max.
- Capacitive load: No limit
- Field wiring: Connections are made to the terminal strip on end of the Analog I/O Board. Note that connector is removable for ease of termination.

Board Diagram



Part number = 102949

Communication Board

This is an optional board. Installed in one of the motherboard expansion slots J10–J13.

Serial Interface

- Type: Conforms to RS-232C, RS-485/422, and 20 mA standards; supports 2 and 4 wire multi-drop in RS-485. 20 mA loop is passive ONLY.
- Interfacing: RS-485 supports 2-wire or 4-wire multi-drop networking; RS-232C provides support for modem.
- Data rate: 300 to 19200, operator selectable from the keypad.
- Data format: Asynchronous, bit-serial, selectable parity, data length, and stop bits.
- Optical isolation, 250 Vrms max.
- Input voltage: ± 30 Vdc max. (RS-232C)
- +15/-10 Vdc max. (RS-485)
- Cable length: 50 feet maximum (RS-232C)
- 4000 feet maximum (RS-485 and 20 mA)

For more information see Model 9109 Reference Manual.

Installation

1. Select the jumper positions on the COMM board for the desired communication standard. Below is a table which summarizes the jumper positions for selection of the electrical interface. The jumper locations are shown below.

Jumpers						
Mode	OP1	OP2	OP3	OP4	OP5	OP6
RS-232	"A"	"A"	"A"	"A"	"A"	"B"
RS-485*	"B"	"A"	"B"	"B"	"MDP"	"TRM"
20 mA	"B"	"B"	"A"	"A"	"A"	"C"

* Default

"MDP"

For RS-485 *only*

OP5

"A" Normal

"B" Multi-drop

"TRM"

For RS-485 *only*

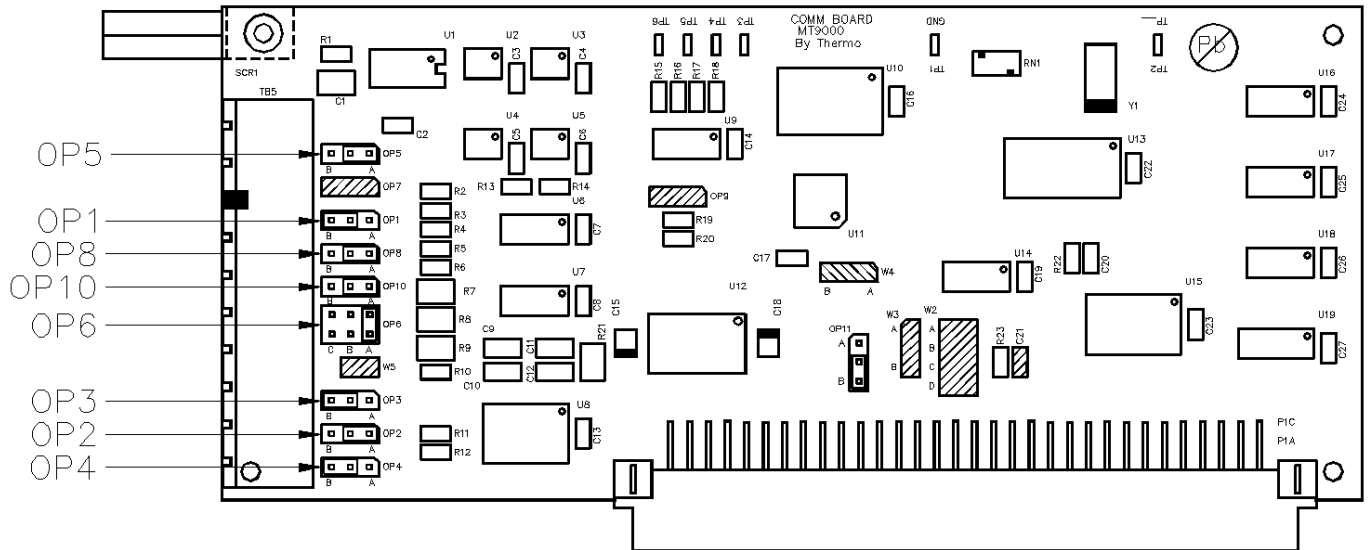
OP6

"A" Terminated

"B" Not terminated

2. Open the Micro-Tech wall mount enclosure and turn power off at the mains, or remove panel mount enclosure from the panel and remove top cover allowing access to the motherboard.
3. Remove the field mating connector. Wire the connector per the supplied field-wiring diagram at the end of the manual.
4. Remove the hex head mounting screw from the connector end of the COMM board.
5. Insert the COMM board in any available expansion slot on the motherboard.

Board Diagram



Part number = 102942

Profibus-DP Board

This is an optional board. Install in one of the motherboard expansion slots J10–J13. No hardware configuration jumpers or switches are present on the Profibus-DP board.

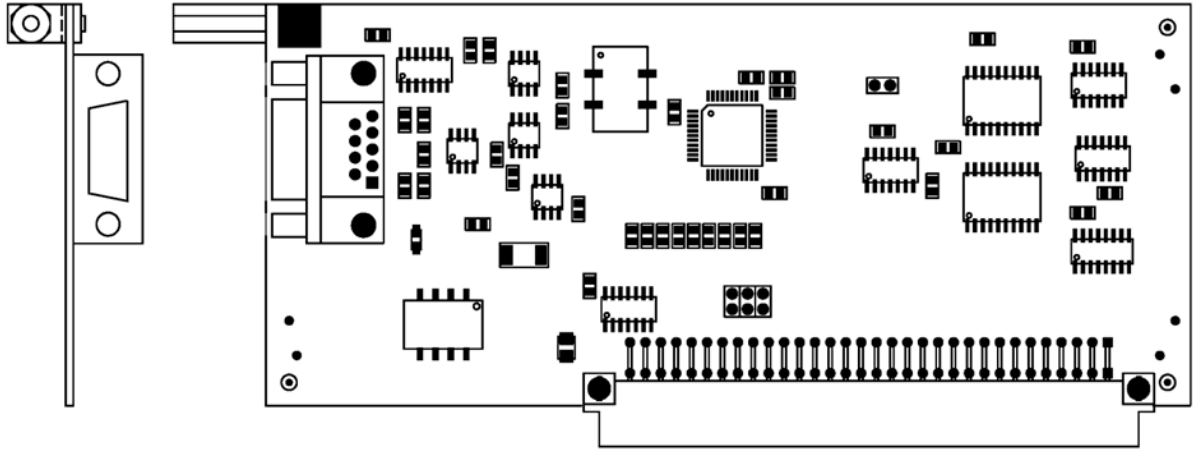
Profibus is a typical master/slave communication where the main PLC is the master or scanner, and the Micro-Tech device is a slave. The connection is EIA RS 485 through a 2-wire twinax Siemens cable.

Profibus-DP is the performance-optimized version specifically dedicated to time-critical communication between automation systems and distributed peripherals. It is typically used to transfer I/O images between a main PLC and remote devices (sensors, actuators, transmitters, etc.). In this case, it will be used to transfer (read and write) blocks of data.

The Profibus-DP interface board contains the Siemens SPC3 Profibus-DP controller ASIC. The SPC3 controller is an integrated circuit provided by Siemens that handles the interface between the Micro-Tech slave and the master.

See REC 4372 for details about the Profibus-DP option card.

Board Diagram

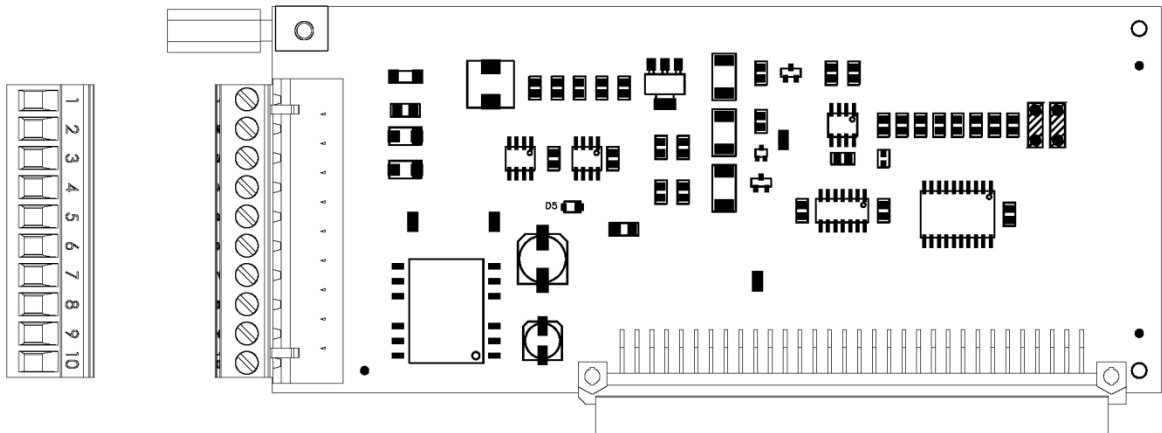


Part number = 102936

PFM Board

The PFM (Pulse Frequency Modulation) board can be installed into any of the 4 expansion slots on the Mother Board. This board accepts the unconditioned/raw mass flow PFM signal from the DC13 sensor. No configuration jumpers or switches are located on this board.

Board Diagram

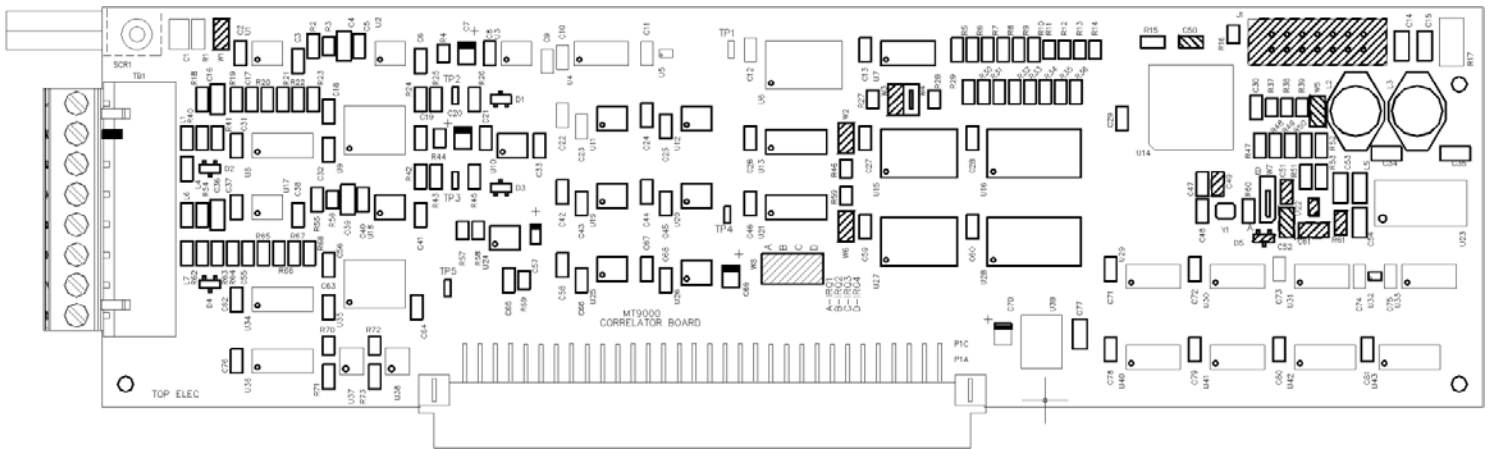


Part number = 101019

Correlator Board

The Correlator board can be installed into any of the 4 expansion slots on the Mother Board. This board accepts the velocity signal from the DK13 sensor. No configuration jumpers or switches are located on this board.

Board Diagram



Part number = 102939

Appendix B

DC13 / DK13 Sensors

The DC 13 and DK 13 are sensors used in a correlator system for the measurement of bulk solids flowing through pneumatic lines. This system can be applied to most pneumatic conveying systems, which have typical solids loading of five pounds of solids to every pound of conveying gas.

System Description

Each complete system is composed of two independent sensors and a single transmitter (Figure B-1). The DK 13 velocity sensor and the DC 13 concentration sensor operates using capacitance technology and are designed for direct installation into the process using ANSI Tongue and Groove, or DIN flanges.

These sensors are available non-hazardous or hazardous area configurations and in various sizes from 0.5 in (15mm) to 8 in (200mm) nominal ID. Three parameters are measured and output by the 9109 system: solids, concentration, mean solids velocity, and solids mass flow.

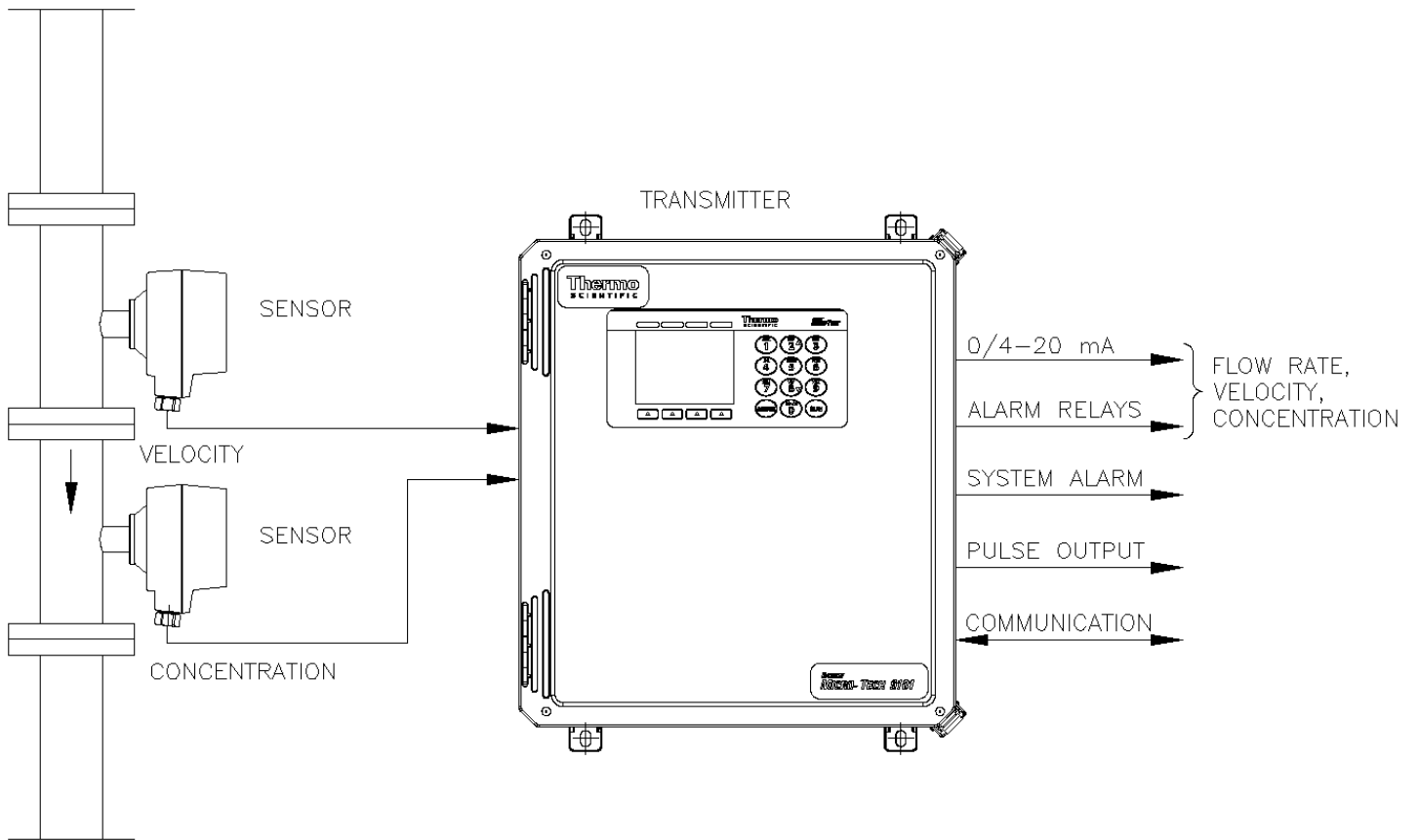


Figure B-1. Micro-Tech 9109 System

The DK 13 contains two capacitance sensors and the DC 13 contains a single capacitance sensor (Figure B- 2)

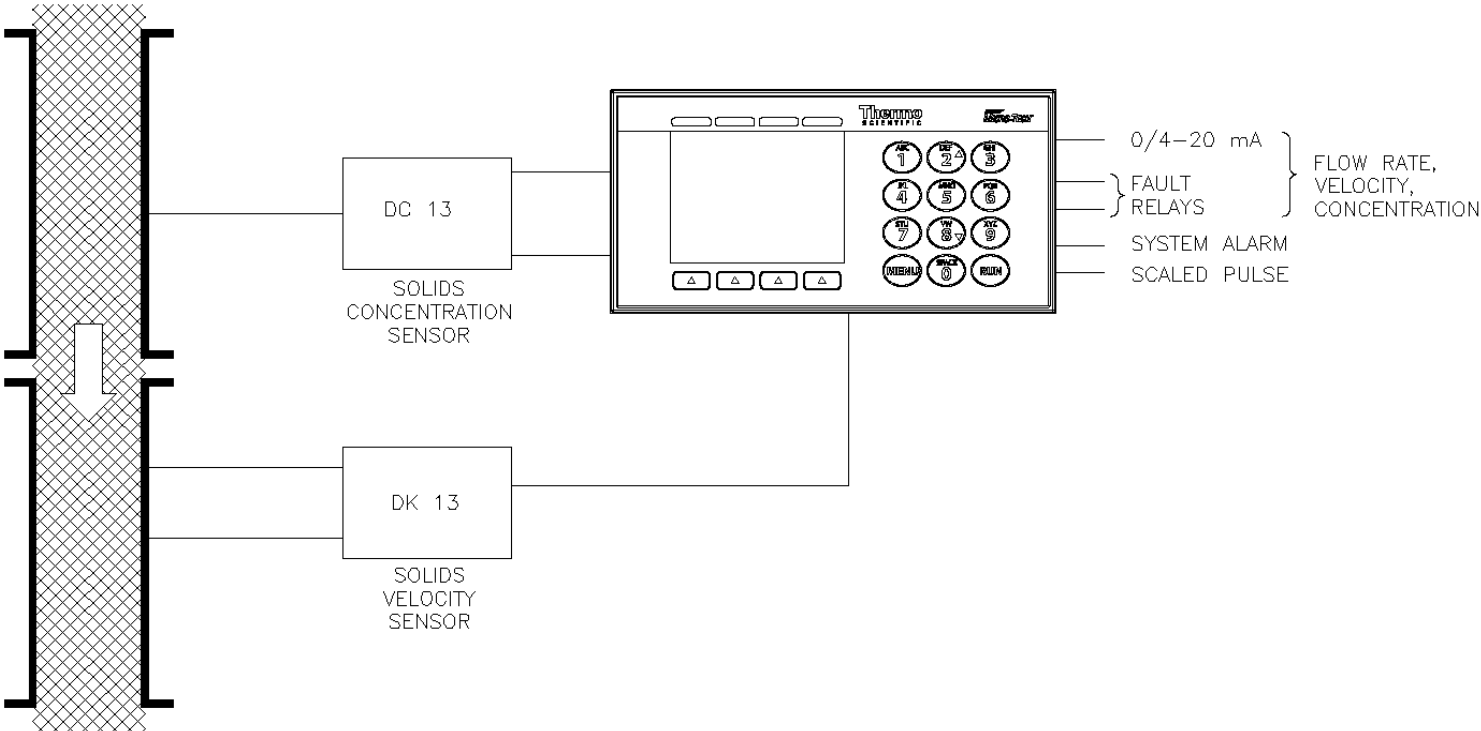
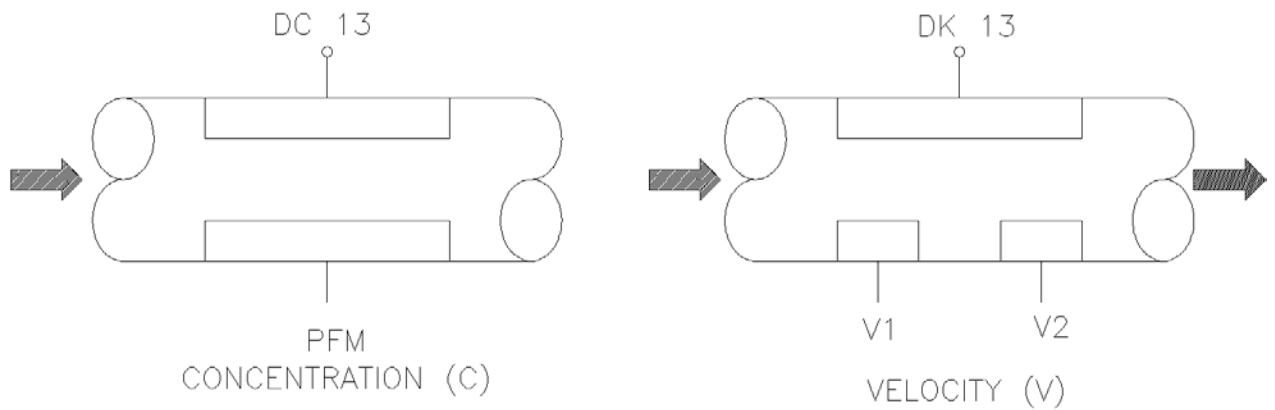


Figure B–2. Capacitance Sensors

**DK 13, DC 13
 Capacitance
 Sensors**

Particles in two phase, flowing streams, such as solid particles in a carrier gas, statistically exhibit fluctuations in their concentration and orientation to each other. The Model 9109 system evaluates the particle velocities and concentration in order to calculate mass flow. By knowing density, velocity, and concentration of the solids, mass flow can be calculated (Appendix Figure B-3).



$$\text{MASS FLOW} = C \times V \times A$$

A = CROSS SECTION OF TUBE

Figure B-3 Calculate Mass Flow

The DK 13 velocity sensor is comprised of two capacitance sensors configured such that the stream of particles passes by sensor number 1 first. The second sensor is oriented a known distance away from sensor number 1.

Ideally, if the particle distribution in the stream did not change, sensor 2 would generate the exact signal as sensor number 1. The only difference between the two signals would be a function of time (T). This corresponds to the time it took the particles to travel the distance (d) between sensor 1 and 2.

In real applications, the orientations of the particles change as they pass through the sensor, colliding with the sensor walls and each other.

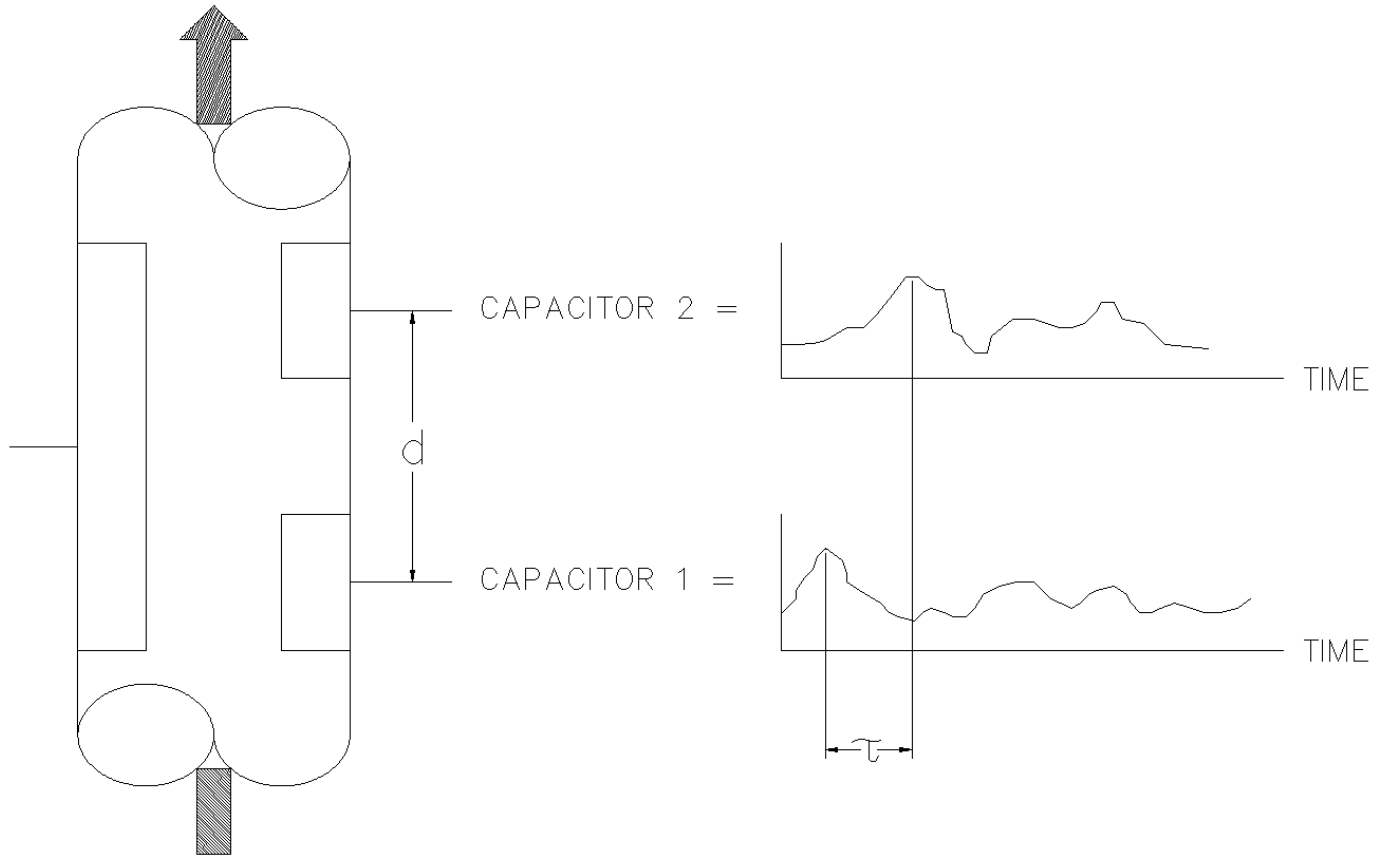


Figure B-4 Flow Direction

The Model 9109 velocity transmitter correlates these two signals from the sensor and finds the closest similarity between them. From this cross-correlation function, the Model 9109 Correlator determines the transit time. By knowing the distance (d) between the two sensors and the transit time, the 9109 Correlator calculates the mean solids velocity.

The DC 13 concentration sensor also employs the capacitive measuring principle. Although visibly similar to the DK 13 velocity sensor, it has only one capacitance sensor.

The change in capacitance (in relation to an empty sensor) is proportional to the solids concentration. The capacitance measurement yields a voltage, which is changed to a frequency signal and transmitted to the 9109 Correlator.

DK 13 Velocity Sensor

The DK 13 sensor consists of an inner liner made of a woven epoxy resin to which the electrodes of the capacitance sensor are mounted. The counter electrode, slightly more than one quarter of the diameter, runs the entire length of the liner. The electrodes are fixed at a distance of 0.315 in (8mm) apart (Appendix Figure B-5).

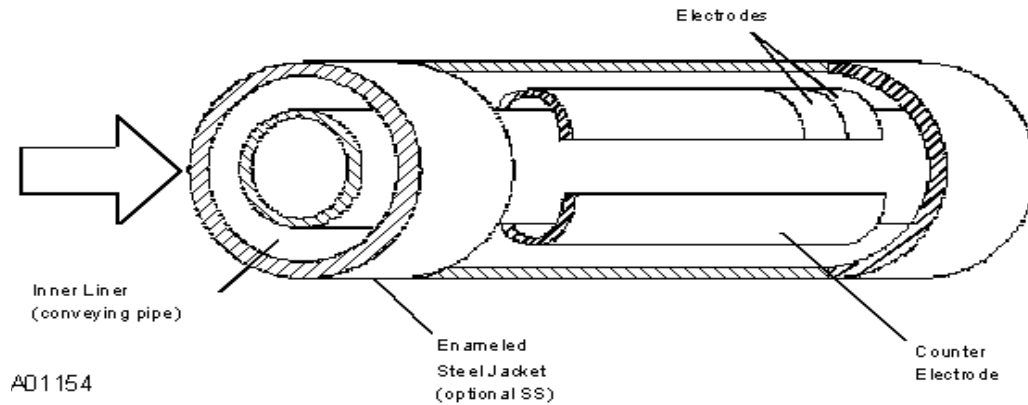


Figure B-5 DK 13 Velocity Sensor

DC 13 Concentration Sensor

The DC 13 Sensor has the same dimensions, materials of construction and external appearance as the DK 13. The main difference is the plate configuration of the capacitor.

In the DC 13, there is only one pair of electrodes, which run the length of the sensor (Appendix Figure B-6). The signal produced by the DC 13 is a pulsed frequency output connected to the 9109 Correlator transmitter using a two-wire cable. Internal adjustments are not required on the DC 13 sensor during calibration.

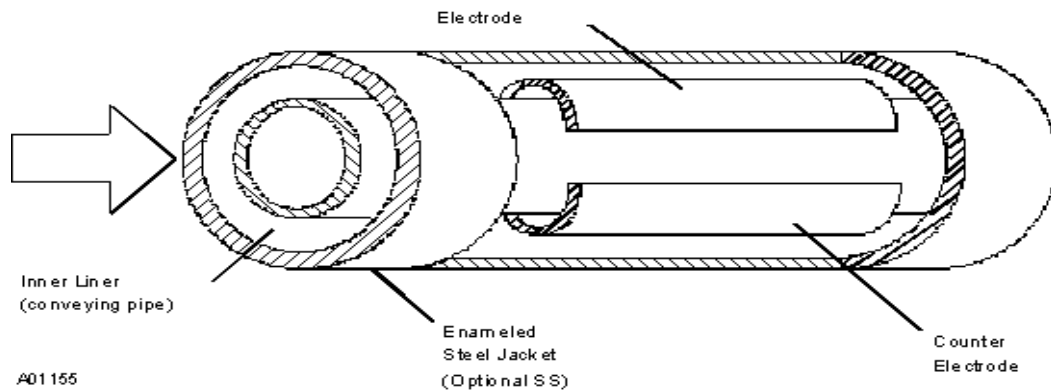


Figure B-6 DC 13 Concentration Sensor

DK 13 Sensor Specifications

Here are the technical specifications for the DK 13 Sensor

Description	Specification
Material	Tube: Steel, painted (stainless steel optional) Electronics Housing: Cast Aluminum (hazardous Class I optional) Fittings: Flanges, ANSI, tongue and groove or DIN Installed height (H) as per dimension table
Environmental	Permissible temperature range: In measuring tube <300° F Ambient temperature -4° to +140° F Storage temperature -40° to +165° F
Voltage Supply	Must be specified when ordering system Alternating Voltage 10 V, 115 V, 220 V, 230 V, +15 to - 10%, 50/60 Hz Direct Voltage 24 V (non-hazardous housings only) Power Consumption Maximum 4.5 VA
Outputs	2 x ±10 V, protected against short circuit
Sensitivity	1:10
Empty pipe capacitance	Approximately 30 pF
Capacitance in full pipe	Depends on solids
Bandwidth of output signal	Up to 5 kHz
Solids loading	Minimum 3 to 1 lb/lb (Mass ration solids/gas)
Signal transmission cable	3 wire shielded 25 ohms per wire max resistance 2000 ft maximum length
Installation position	Vertical, with material flow downward if possible
Upstream distance	20 diameters of straight pipe is required
Downstream distance	10 diameters of straight pipe is required
Signal Outputs	±1V to ±15V

DC 13 Sensor Specifications

Here are the technical specifications for the DC 13 Sensor

Description	Specification
Material	Tube: Steel, painted (stainless steel optional) Electronics Housing : Cast aluminum (hazardous Class I optional) Fittings: Flanges, ANSI, tongue and groove or DIN Nominal pressure and installed height (H)
Environmental	Permissible temperature range: In measuring tube <300° F Ambient temperature -4° to +140° F Storage temperature -40° to +165° F
Voltage Supply	Must be specified when ordering system Alternating voltage 10 V, 115 V, 220 V, 230 V, +15 to – 10 %, 50/60 Hz Direct Voltage 24 V (non-hazardous housings only) Power Consumption Maximum 4.5 VA
Outputs	Basic current of approximately 4.4 mA superimposed by pulses of approximately 6.2 mA. Pulse duration 100 US ±5%
Frequency	56 to 2600 Hz
Solids loading	Minimum 3 to 1 lb/lb (mass ratio solids/gas mass)
Sensitivity	1024 Hz (of two-phase-flow)
Response Value	<10 - 3 <4 x 10 – 3
Empty pipe capacitance	Approximately 0.73 pF
Response Time	<1 second
Signal Transmission Cable	2 wire, shielded 25 ohms per wire max resistance 2000 ft max length
Installation position	Vertical with material flow downward if possible
Upstream Length	20 diameters of straight pipe required
Downstream Length	10 diameters of straight pipe required
Signal Outputs	+14.6V, I Max +35mA



NOTE. Please compare local nominal voltage and ordered options with data on the labels before connecting the system.

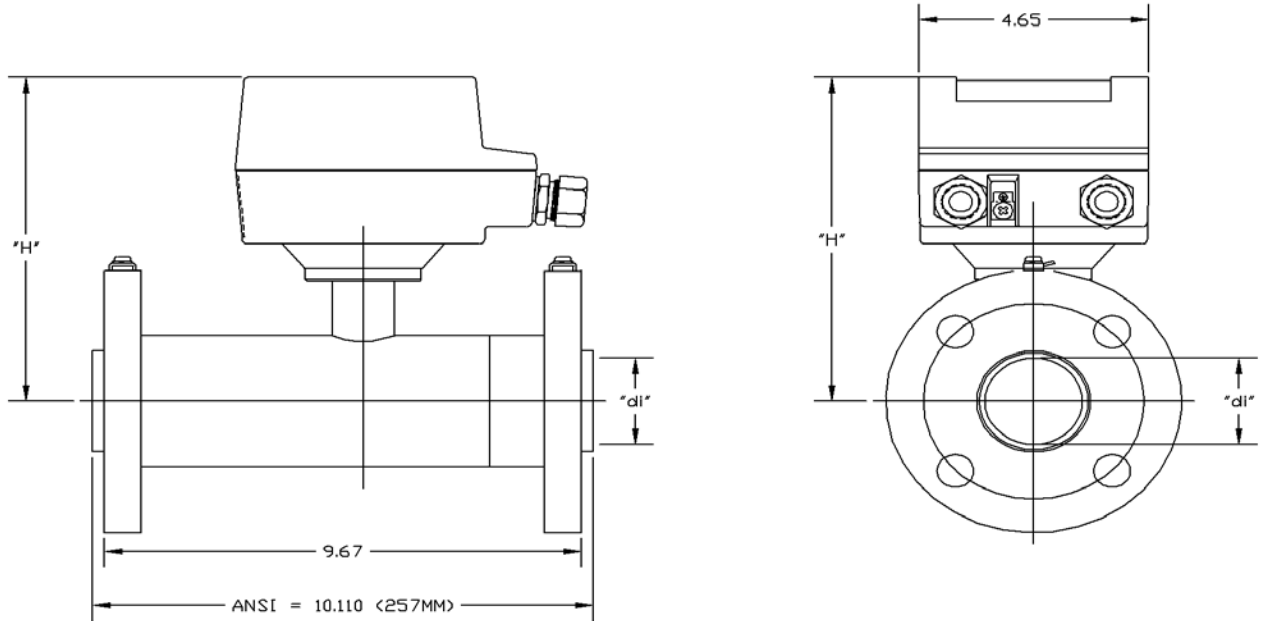


Figure B-7 Typical DK 13 and DC 13 Dimensions (Non-Hazardous)

DC13 / DK13 Sensors
DC 13 Sensor Specifications

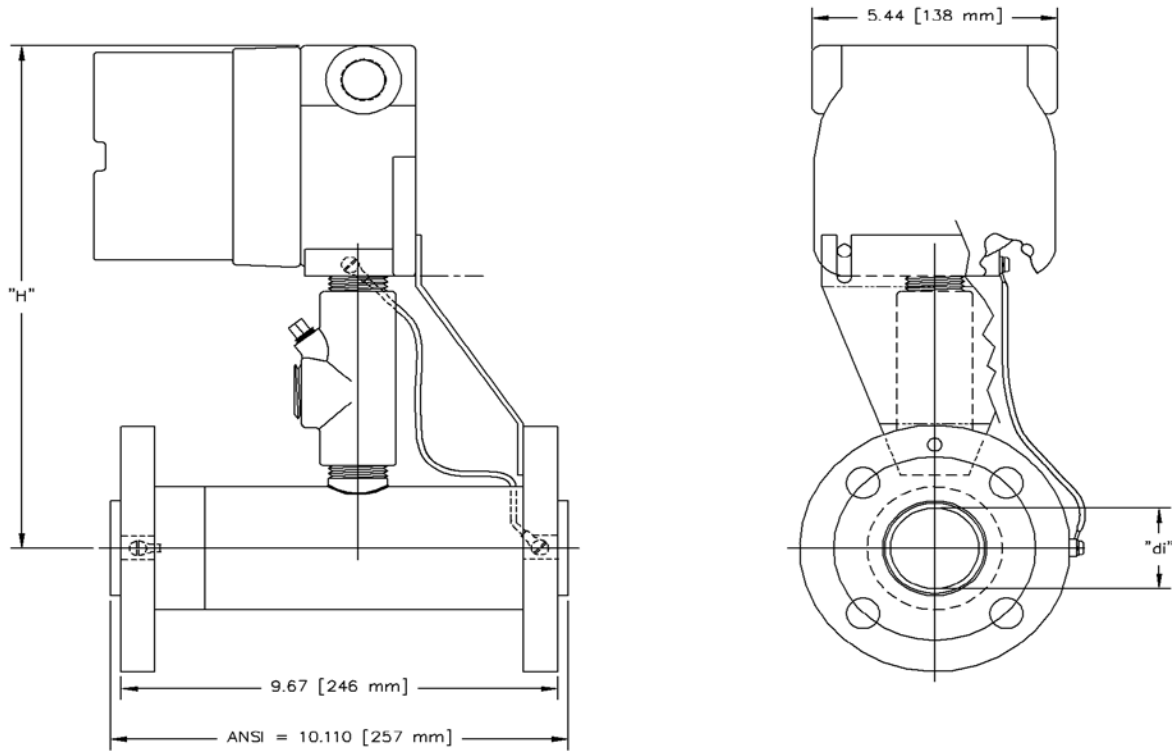


Figure B-8 Typical DK 13 and DC 13 Dimensions (Hazardous)

General Installation Guidelines

Installation procedures should be a combination of the end user's best engineering practices in compliance with local codes and the manufacturer's recommendations. To achieve maximum performance within the parameters designed into the system, certain precautions should be observed.

1. Care should be taken to avoid ingress of moisture through the conduit. Drip loops or conduit runs which slope down from instrument enclosures are suggested, in conjunction with sealing of conduit entries.
2. Ensure adequate grounding for proper instrumentation operation. This is accomplished by connecting the third wire power ground when wiring the system. The sensor housing ground should be connected to the adjacent flange-grounding lug.
3. Process line size should be the same as the sensor mounting size to minimize sensor liner wear during operation.
4. A vertical installation is preferred, with the process flow down to eliminate re-circulation of material (vertical installation with upward flow) and to eliminate settling of solids in the sensors when the process is not running (horizontal installation).
5. Minimize vibration by rigidly securing the process pipeline as close to the sensors as possible.
6. To maintain proper sensor-to-process pipeline alignment, a flange mounting kit is available. Ensure proper alignment to avoid excessive sensor wear.

Sensor Mounting

The DK 13 and DC 13 sensors are mounted as shown in Figure B-9. Vertical mounting is recommended, with the process flowing downwards during normal flow.

This also allows solids to drop out of the measuring sensors during a no flow condition, preventing false zero point measurements. The orientation of the sensor with conduit entries facing down prevents ingress of moisture into the electronics housing.

The recommended inlet and outlet straight pipe runs are shown in Figure B-9 whenever sensor must be mounted between on-straight pipe runs.

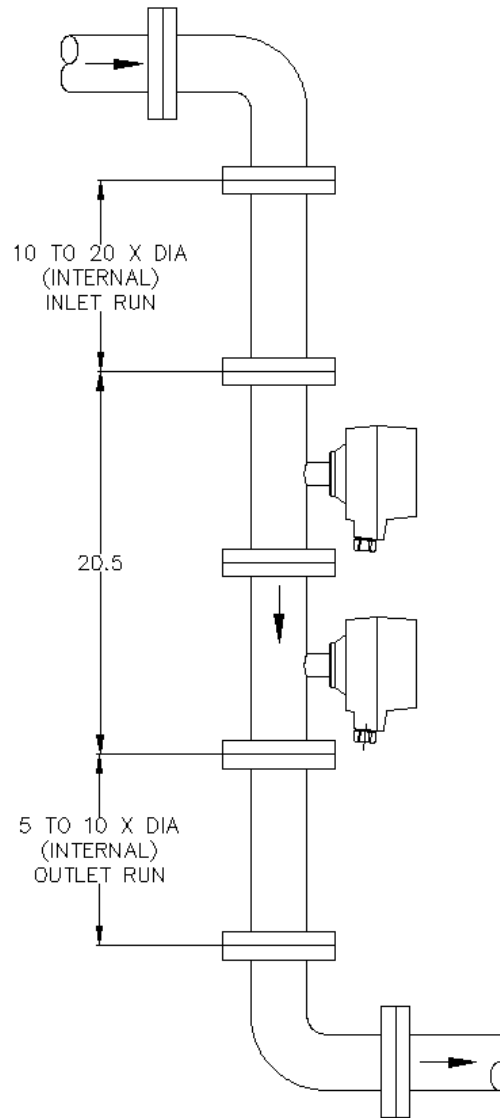


Figure B-9 Vertical Sensor Mounting

Sensor Wiring

All wiring of the Micro-Tech 9109 system should be made in accordance with local codes. Sensors include 1/2" NPT conduit entries on non-hazardous units and 3/4" NPT on Hazardous units. The following recommendations are for conduit installation:

1. Fish wires through conduit to sensor housing.
2. Remove conduit adapter from cable entry and slide back over wires.
3. Fish wires through rubber seal fitting into electronic enclosure.
4. Connect wires to terminals according to wiring diagrams.
5. Reattach conduit adapters and tighten to activate seals.
6. Connect and tighten conduit into adapter while holding conduit adapter.



WARNING. The Micro-Tech 9109 system contains electronic components that are susceptible to damage by static electricity. Proper handling procedures must be observed during the removal, installation, or other handling of internal boards or devices.



NOTE. This system is not unique in its content of ESD (Electrostatic Discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, CMOS, etc). Experience has proven that even small amounts of static electricity can damage or destroy these devices. Damaged components, even though they appear to function properly, exhibit early failure.

When wiring or working with internal components, a static discharge wristband, or other appropriate static discharge device should be worn.

Power input and signal output wiring should be installed through separate conduit entries. Wiring blocks are located inside the housing with captive barrier screw terminals.



NOTE. For proper system operation, connect a wire between each housing external grounding lug and the sensor flange-grounding lug.

1. Loosen four housing cover screws or unscrew Class I cover.
2. Remove housing cover; locate terminal blocks on PC board.
3. Wire according to Figure B-10 tighten terminal screws.



NOTE. DK 13 requires 3-conductor shielded cable for signal output; the DC 13 requires 2- conductor shielded cable.

4. Install housing cover and tighten screws.

Sensor Calibration

Sensors are factory calibrated for PFM output. Any further calibration is performed through the Micro-Tech 9109.

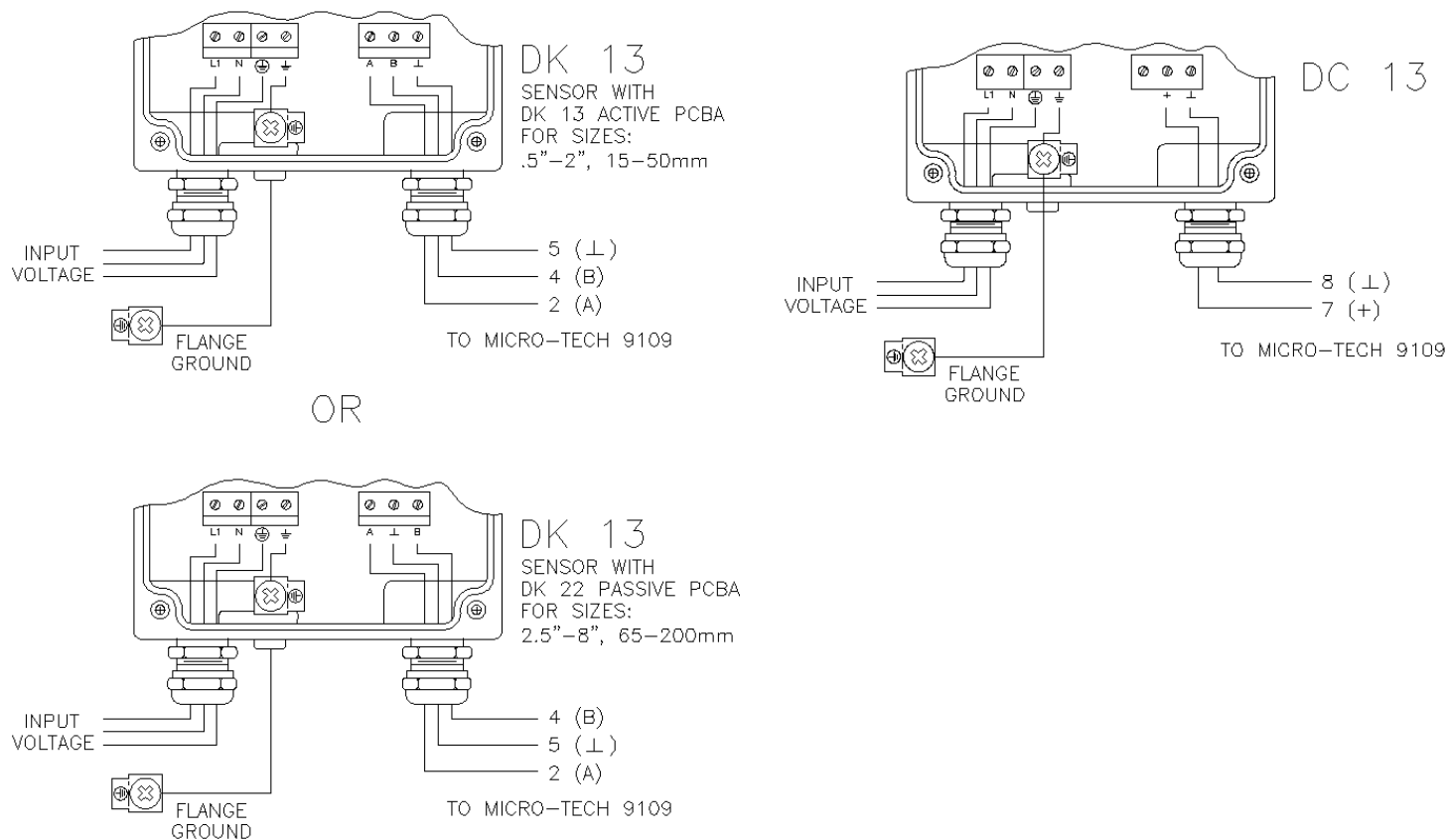


Figure B-10 Sensor Wiring

Glossary

A/D channel Analog/Digital channel. An electronic sub-unit on the Micro-Tech motherboard that handles the load-cell(s) input. Your Micro-Tech motherboard is equipped with two A/D channels, but the dual A/D printed-circuit-board assembly can be ordered as an option.

AZT Auto zero-tracking.

Console The main operating panel of the Micro-Tech including the display, keypad, arrow buttons, and soft keys.

DIO A digital-input/output board.

display In the console, the small square screen that displays Micro-Tech results, menus, and so forth.

kg Kilogram.

Mixed units A menu choice that allows the Micro-Tech to display a mixture of English and metric units.

mV/V Millivolts per volt. A measure of the sensitivity of a load cell.

pcba Printed-circuit board assembly.

Scroll When used as a noun (for example, when the word appears in the Micro-Tech display), it means “menu.” When used as a verb (for example, “Scroll down to...”), it means press the up- or down-arrow button to move to one of the Micro-Tech menus.

Soft key One of the four buttons at the bottom of the Micro-Tech display that allows you to access various context-sensitive Micro-Tech commands—such as Edit, Enter, Continue, and so forth.

Standard (US) ton Equivalent to 2,000 lbs.

Ton Standard (2,000# or 2,000 lb.).

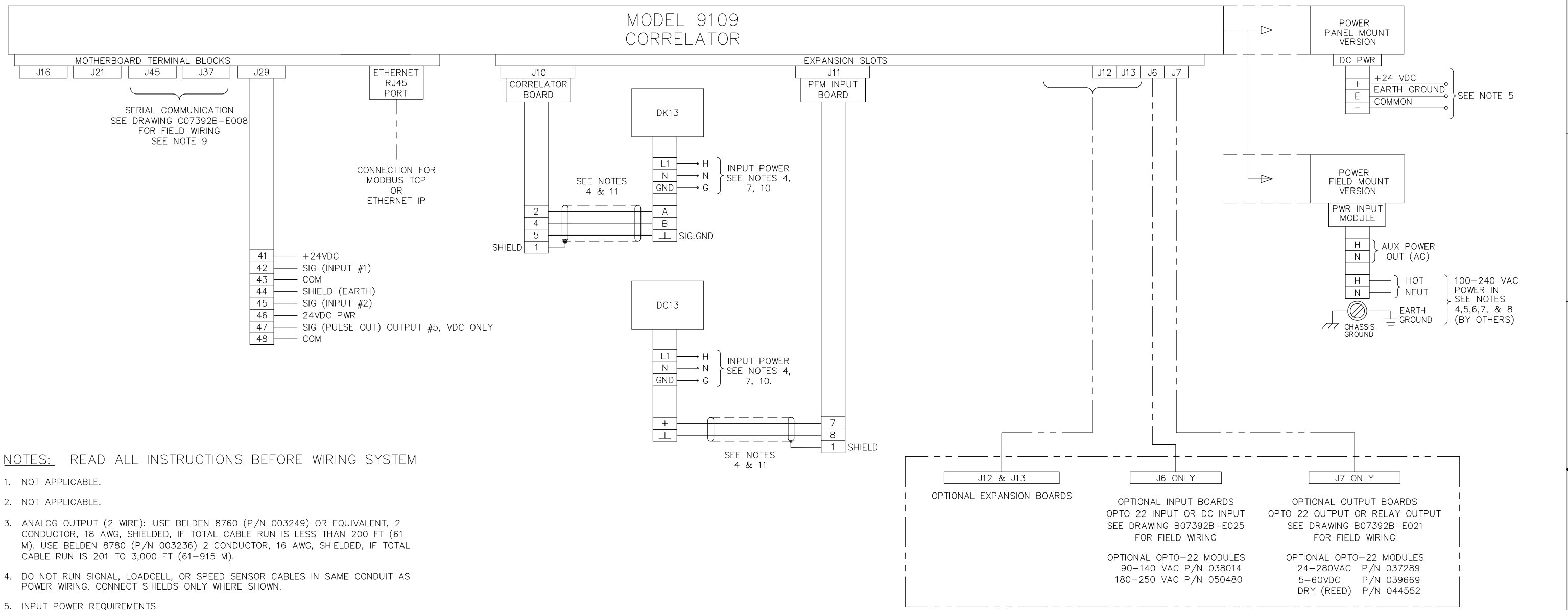
tonne The “metric tonne” equivalent to 1,000 kg.

PFM (Pulse Frequency Modulation) Board The PFM board is located on the motherboard (Any of the 4 expansion slots). This board accepts the unconditioned mass flow signal from the impact sensor. No configuration jumpers or switches are located on this board.

Attached Drawings

The following information is appended to the manual to help you install and maintain your Micro-Tech.

Description	Document
Field-Wiring Diagrams	
Micro-Tech 9109	D07392B-E035
Analog I/O Board	B07392B-E003
8-In/8-Out Digital Board	B07392B-E005
Serial Communication	C07392B-E008
Siemens Profibus Board	C07392B-E011
Communication Board	C07392B-E017
Notes—Micro-Tech 9000	C07392B-E018
Digital Output Boards	C07392B-E021
Anybus Comm for Device Net	B07392B-E022
Digital Input Boards	B07392B-E025
4–20mA Out Board	B07392B-E026



NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

- NOT APPLICABLE.
- NOT APPLICABLE.
- ANALOG OUTPUT (2 WIRE): USE BELDEN 8760 (P/N 003249) OR EQUIVALENT, 2 CONDUCTOR, 18 AWG, SHIELDED, IF TOTAL CABLE RUN IS LESS THAN 200 FT (61 M). USE BELDEN 8780 (P/N 003236) 2 CONDUCTOR, 16 AWG, SHIELDED, IF TOTAL CABLE RUN IS 201 TO 3,000 FT (61-915 M).
- DO NOT RUN SIGNAL, LOADCELL, OR SPEED SENSOR CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
- INPUT POWER REQUIREMENTS
FIELD MOUNT VERSION: 100-240 VAC, 1/2 AMP 50 VA, 50-60HZ
PANEL MOUNT VERSION: 24VDC, 2 AMP REQUIRED, FUSE AT 3A
- EARTH GROUND ALL ELECTRICAL ENCLOSURES.
- ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING EXCEPT AS NOTED IS BY OTHERS. FOR INPUT POWER USE 14 AWG STRANDED WIRE.
- A READILY ACCESSIBLE DISCONNECT DEVICE (MAXIMUM 20 AMP) SHALL BE INCORPORATED IN THE FIELD WIRING. THIS DISCONNECT DEVICE SHOULD BE IN EASY REACH OF THE OPERATOR AND IT MUST BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT.
- SELECTION OF SERIAL COMMUNICATION (RS-232 OR RS-485) IS DETERMINED BY COMM JUMPER OPTIONS. REFER TO OPERATING & SERVICE MANUAL FOR CONFIGURATION INSTRUCTIONS.
- DC13/DK13 INPUT POWER REQUIREMENTS (FACTORY SET AT 120 VAC) FOR DC13/DK13 VOLTAGE CHANGE, SEE MANUAL.
A. 110 VAC +10%/-15% 1/2 AMP 50 VA, 50/60 HZ
B. 120 VAC +10%/-15% 1/2 AMP 50 VA, 50/60 HZ
C. 220 VAC +10%/-15% 1/4 AMP 50 VA, 50/60 HZ
D. 240 VAC +10%/-15% 1/4 AMP 50 VA, 50/60 HZ
- DIGITAL INPUTS AND OUTPUTS:
USE BELDEN 8760 (P/N 003249) OR EQUIVALENT, 2 CONDUCTOR, 18 AWG SHIELDED CABLE.
USE BELDEN 8772 (P/N 002346) OR EQUIVALENT, 3 CONDUCTOR, 20 AWG SHIELDED CABLE.
MAXIMUM DC13/DK13 SIGNAL CABLE LENGTH IS 2000 FT(600M).
MAXIMUM 9109 INPUTS/OUTPUTS SIGNAL CABLE LENGTH IS 400 FT(122M).

**MODEL 9109 CORRELATOR
DIGITAL INPUTS AND OUTPUTS**

REQUIRED DIGITAL INPUTS AND OUTPUTS
INPUT: NONE
OUTPUT: NONE

AVAILABLE DIGITAL INPUT AND OUTPUT ASSIGNMENT CHOICES
MOTHERBOARD TERMINAL BLOCK J29 - (INPUTS #1, #2 AND OUTPUT #5)
EXPANSION SLOT J6 - OPTIONAL INPUT BOARD (INPUTS #3, #4, #5)
EXPANSION SLOT J7 - OPTIONAL OUTPUT BOARD (OUTPUTS #1, #2, #3, #4)

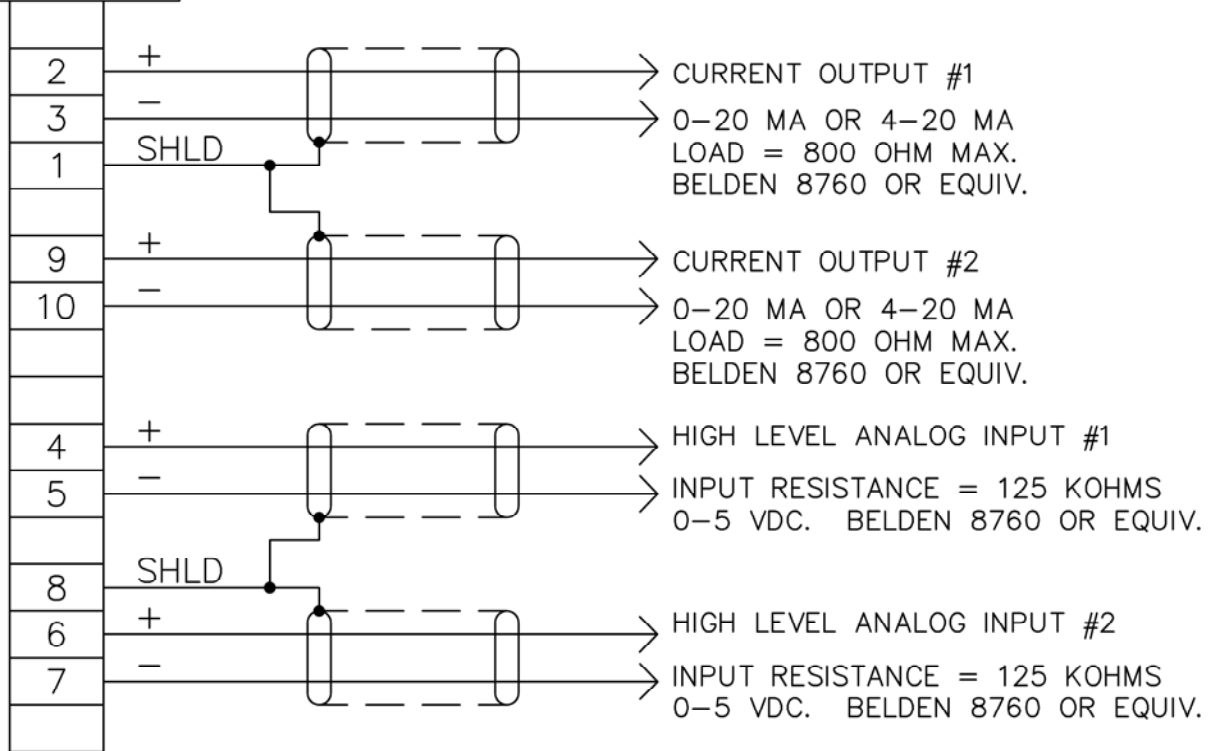
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REV	ECO NO	DESCRIPTION	DATE	BY	APPD

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES	SCALE JOB NO	<small>This document is confidential and is the property of Thermo Fisher Scientific. It may not be copied or reproduced in any way without the expressed written consent of Thermo Fisher Scientific. This document use is an unpublished work of Thermo Fisher Scientific. Thermo Fisher Scientific intends to and is maintaining the work as confidential information. Thermo Fisher Scientific also may seek to protect this work as an unpublished copyright. In the event of either inadvertent or deliberate publication, Thermo Fisher Scientific intends to enforce its right to this work under the copyright law as a published work. Those having access to this work may not copy, use or disclose the information in this work unless expressly authorized by Thermo Fisher Scientific.</small>
UNLESS SPECIFIED OTHERWISE DIMENSIONS ARE IN INCHES AND (mm)	ENG DATE 11/7/12	
x.x [x] ±.06 ±1.5 mm	DWN DATE 11/7/12	
x.xx [x.x] ±.03 ±.5 mm	PEP DATE 11/7/12	
x.xxx [x.xx] ±.01 ±.3 mm	CHK DATE 11/7/12	
FRACT ±1/16 ±N/A	MFM DATE 11/7/12	
ANGLES ±1/2° ±1/2°		<p>FIELD WIRING DIAGRAM MICRO-TECH 9109</p>
NEXT ASS'Y		
CUST ORDER NO		
CUSTOMER LOCATION		
USER LOCATION		
PART NO	DRAWING NUMBER	REV
	D 07392B-E035	B

INTEGRATOR
MICRO-TECH 9000

ANALOG I/O
BOARD



ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
------	---------	-----	-------------	-------------

NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

- DO NOT RUN ANALOG SIGNAL CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
- ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING, EXCEPT AS NOTED, IS THE RESPONSIBILITY OF THE CUSTOMER.
- INSTALL IN ONE OF THE EXPANSION SLOTS J10 TO J13.
- CONNECT SHIELDS ONLY AS SHOWN.
CABLE TYPE: BELDEN 8760 OR EQUIVALENT.

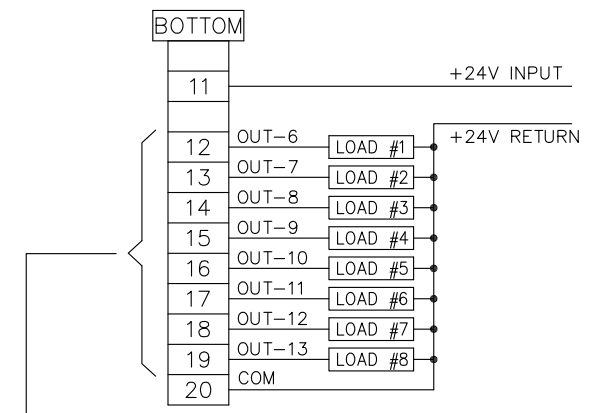
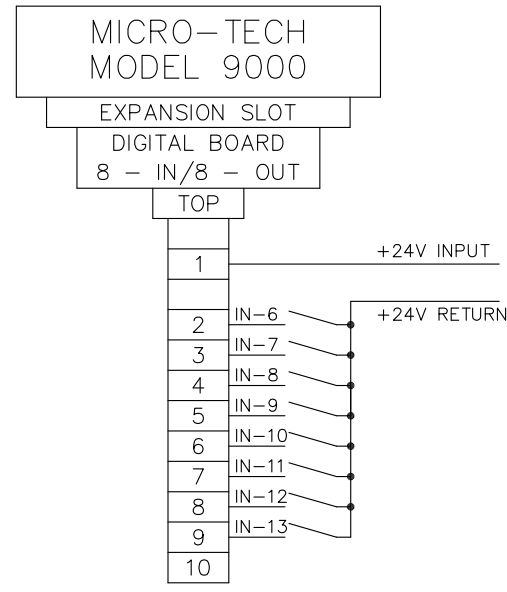
CADD DATABASE: AUTOCAD

DO NOT SCALE DWG REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		SCALE N/A		<small>This document is confidential and is the property of Thermo Fisher Scientific. It may not be copied or reproduced in any way without the expressed written consent of Thermo Fisher Scientific. This document also is an unpublished work of Thermo Fisher Scientific. Thermo Fisher Scientific intends to and is maintaining the work as confidential information. Thermo Fisher Scientific also may seek to protect this work as an unpublished copyright. In the event of either inadvertent or deliberate publication, Thermo Fisher Scientific intends to enforce its right to this work under the copyright laws as a published work. Those having access to this work may not copy, use or disclose the information in this work unless expressly authorized by Thermo Fisher Scientific.</small>	
TOLERANCE UNLESS SPECIFIED OTHERWISE		ENG	DATE		
X	± .1 ± 3 mm	MFM	8/26/11		
.X	± .06 ± 1.5 mm	DWN	DATE		
.XX	± .03 ± .76 mm	MFM	8/28/11		
.XXX	± .010 ± .254 mm	CHK	DATE		
FRACT.	± 1/16 ± N/A	MFM	8/26/22		
ANGLES	± 1/2° ± 1/2°				
NEXT ASS'Y				<h1>Thermo Fisher</h1> <h2>SCIENTIFIC</h2> <p>FIELD WIRING DIAGRAM ANALOG INPUT/OUTPUT BOARD MICRO-TECH 9000</p>	
CUST ORDER NO					
CUSTOMER LOCATION					
USER LOCATION				PART NO	
DATE				DRAWING NUMBER	
BY APPD				REV	
				B07392B-E003	
				A	

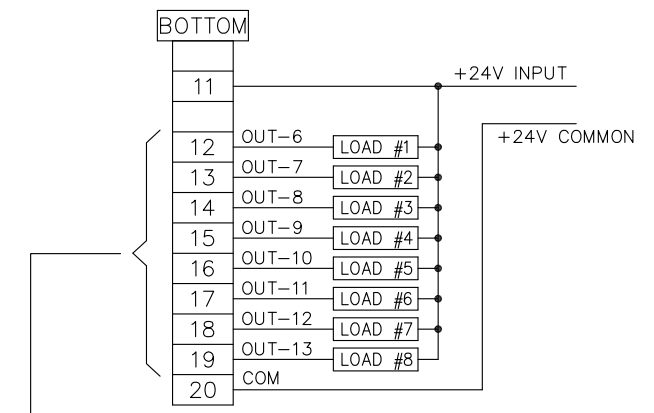
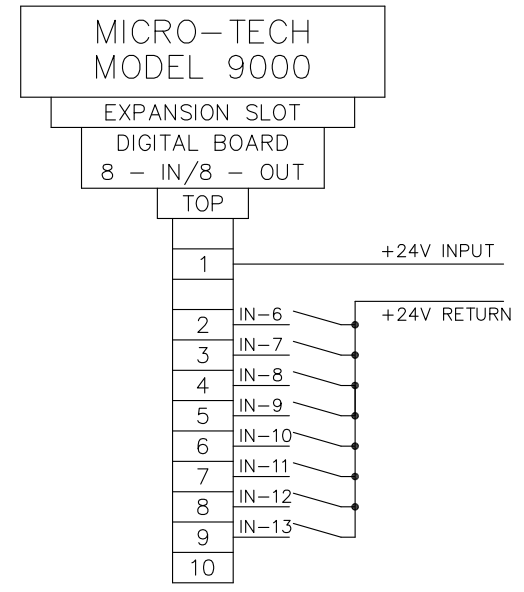
A	2959	RELEASED	6/6/12	PEP	MFM
REV	ECO NO	MICRO	DESCRIPTION	DATE	BY APPD

Derived From C07361B-E003

©2011 by Thermo Fisher Scientific



OUTPUTS
CONFIGURED
FOR CURRENT
SOURCING
PNP(SOURCE)



OUTPUTS
CONFIGURED
FOR CURRENT
SINKING
NPN(SINK)

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
<p>NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM</p> <p>1. ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING, EXCEPT AS NOTED, IS THE RESPONSIBILITY OF THE CUSTOMER.</p> <p>2. INSTALL IN ONE OF THE MOTHERBOARD EXPANSION SLOTS, J10 TO J13.</p>				
CADD DATABASE: AUTOCAD				
DO NOT SCALE DWG REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		SCALE N/A JOB NO		<p>This document is confidential and is the property of Thermo Fisher Scientific. It may not be copied or reproduced in any way without the expressed written consent of Thermo Fisher Scientific. This document also is an unpublished work of Thermo Fisher Scientific. Thermo Fisher Scientific intends to and is maintaining the work as confidential information. Thermo Fisher Scientific also may seek to protect this work as an unpublished copyright. In the event of either inadvertent or deliberate publication, Thermo Fisher Scientific intends to enforce its right to this work under the copyright laws as a published work. Those having access to this work may not copy, use or disclose the information in this work unless expressly authorized by Thermo Fisher Scientific.</p> <p>Thermo Fisher SCIENTIFIC</p> <p>FIELD WIRING DIAGRAM 8-IN/8-OUT DIGITAL BOARD MICRO-TECH 9000</p>
TOLERANCE UNLESS SPECIFIED OTHERWISE		ENG MFM	DATE 8/26/11	
X ± .1 ± .3 mm		DWN MFM	DATE 8/26/11	
.XX ± .06 ± .15 mm		CHK MFM	DATE 8/26/11	
.XXX ± .03 ± .76 mm				
FRACT. ± .010 ± .254 mm				
ANGLES ± 1/16 ± N/A				
± 1/2° ± 1/2°				
NEXT ASS'Y				
CUST ORDER NO				
CUSTOMER LOCATION				
USER LOCATION				
PART NO		DRAWING NUMBER		REV
		C07392B-E005		B

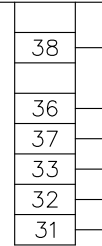
B	3322	ADDED PNP(SOURCE) & NPN(SINK)	4/22/13	PEP	DCS
A	2959	RELEASED	6/6/12	RAE	DCS
REV	ECO NO	MICRO	DESCRIPTION	DATE	BY APPD

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
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INTEGRATOR
MODEL 9000

COMMUNICATION A

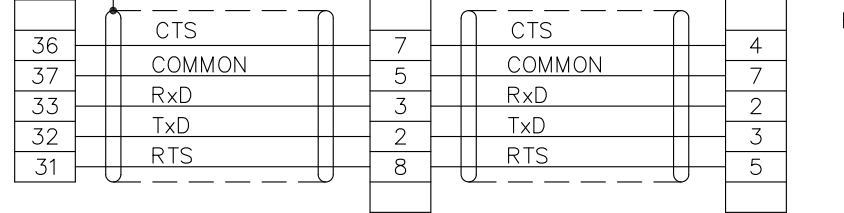
J37



RS-232
STANDARD
9 PIN
CONNECTOR

OR

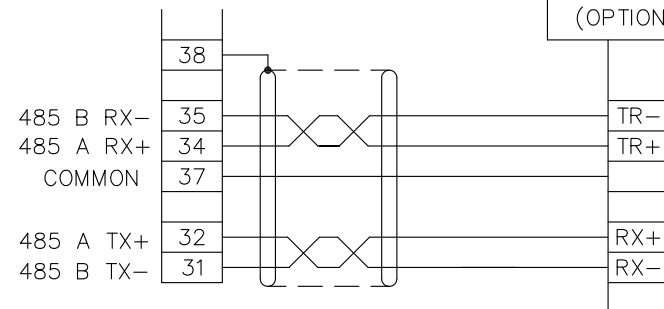
RS-232
STANDARD
25 PIN
CONNECTOR



RS-232 SERIAL OUTPUT
CABLE: 8 CONDUCTOR, SHIELDED,
(DEPENDING ON APPLICATION)
MAXIMUM LENGTH: 50 FT
BELDEN 9538 OR EQUIVALENT
(SEE INSTRUCTION MANUAL)

OR

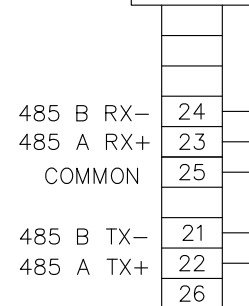
RS-485
REMOTE
DEVICE
(OPTIONAL)



RS-485 SERIAL OUTPUT
MAXIMUM LENGTH: 4000 FT
BELDEN 9830 OR EQUIVALENT
(SEE INSTRUCTION MANUAL)

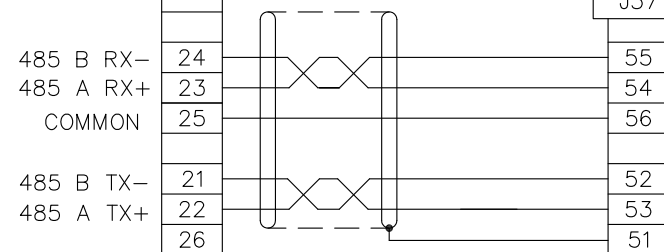
COMMUNICATION B

J45



RS-485
REMOTE
DIGITIZER
(ONLY)

J37



RS-485 SERIAL OUTPUT
MAXIMUM LENGTH: 4000 FT
BELDEN 9830 OR EQUIVALENT
(SEE INSTRUCTION MANUAL)

NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

- DO NOT RUN COMMUNICATION WIRING IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
- ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING, EXCEPT AS NOTED, IS THE RESPONSIBILITY OF THE CUSTOMER.
- SELECTION OF SERIAL COMMUNICATION (20ma, RS-232, OR RS-485) IS DETERMINED BY COMM JUMPER OPTIONS. REFER TO OPERATING & SERVICE MANUAL FOR CONFIGURATION INSTRUCTIONS. FACTORY SET FOR 20ma/RS-485.

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG	SCALE	N/A
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES	JOB NO	
UNLESS SPECIFIED OTHERWISE DIMENSIONS ARE IN INCHES AND [mm]	ENG	MFM
	DATE	8/26/11
	DWN	RAE
	DATE	8/26/11
	CHK	MFM
	DATE	8/26/11

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SCIENTIFIC

FIELD WIRING DIAGRAM
SERIAL COMMUNICATION
MICRO-TECH 9000

REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
C	3459		CORRECTED DIGITIZER TERMINALS AND SHIELD	4/2/14	PEP	PEP
B	3403		CORRECTED POLARITIES ON TERMINAL DESCRIPTIONS.	11/18/13	PEP	MFM
A	2959		RELEASED	6/6/12	RAE	MFM

NEXT ASS'Y	
CUST ORDER NO	
CUSTOMER LOCATION	
USER LOCATION	

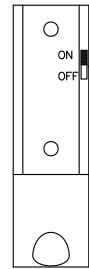
PART NO	DRAWING NUMBER	REV
	C07392B-E008	C

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
1	102936	1 EA	PCBA,PROFIBUS BD,MT2000/MT9000	D07392A-E010
2	057415	1 EA	CABLE,SHLD, STD,"PROFIBUS"	6XV1830-OAH10
3	057416	1 EA	CONN,HSG,"D","PROFIBUS",SWIVEL	
4	048501	1 EA	LABEL,PCBA,COMM BD,M-T 2000	B07257B-Y001-03

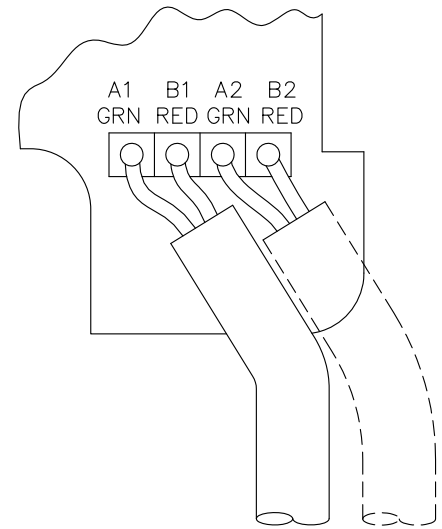
INTEGRATOR
MICRO-TECH
9000 SERIES

PROFIBUS

9 PIN "D" CONNECTOR, FEMALE



SWITCH, RESISTOR TERMINATION
"ON" IF WIRING ENDS HERE
"OFF" IF WIRING LOOPS IN, OUT



NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

- DO NOT RUN PROFIBUS CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
- ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING, EXCEPT AS NOTED, IS THE RESPONSIBILITY OF THE CUSTOMER.
- CONNECT SHIELDS ONLY AS SHOWN. CABLE TYPE: SIEMENS 6XV1830-OAH10
- INSTALL IN ONE OF THE EXPANSION SLOTS J10 TO J13.

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		SCALE N/A	JOB NO
TOLERANCE UNLESS SPECIFIED OTHERWISE	ENG MFM	DATE 8/26/11	
.X ± .1 ± 3 mm	DWN MFM	DATE 8/26/11	
.XX ± .06 ± 1.5 mm	CHK MFM	DATE 8/26/11	
.XXX ± .03 ± 76 mm			
.XXX ± .010 ± 254 mm			
FRACT. ± 1/16 ± N/A			
ANGLES ± 1/2° ± 1/2°			
NEXT ASS'Y			
CUST ORDER NO			
CUSTOMER LOCATION			
USER LOCATION			

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ThermoFisher SCIENTIFIC

FIELD WIRING DIAGRAM
SIEMENS PROFIBUS BOARD
MICRO-TECH 9000

PART NO	DRAWING NUMBER	REV
	C 07392B-E011	A

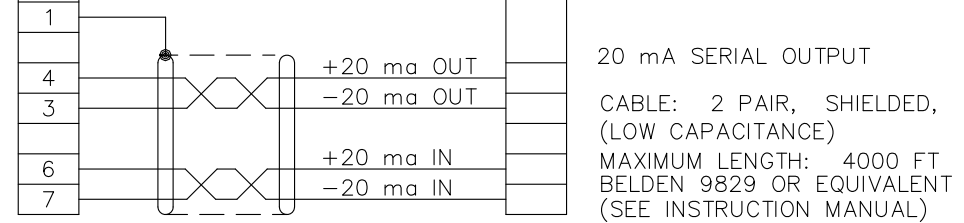
A	2959	RELEASED	6/6/12	PEP	MFM
REV	ECO NO	MICRO	DATE	BY	APPD

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
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INTEGRATOR
MICRO-TECH
9000 SERIES

COMM
BOARD
(OPTIONAL)

20 MA.
REMOTE
DEVICE
(OPTIONAL)

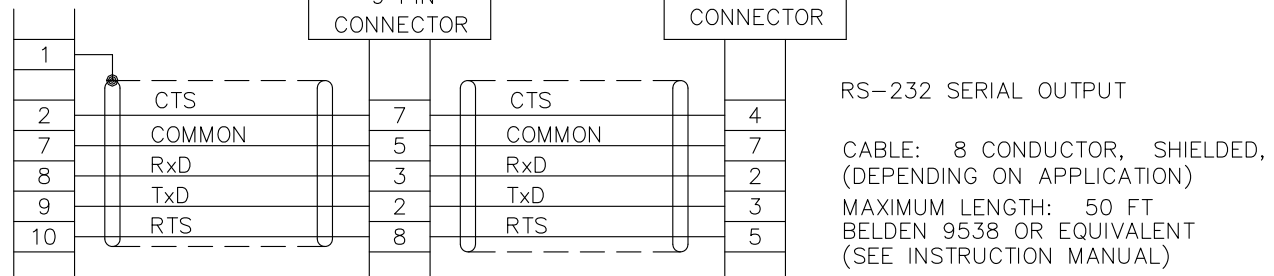


OR

RS-232
STANDARD
9 PIN
CONNECTOR

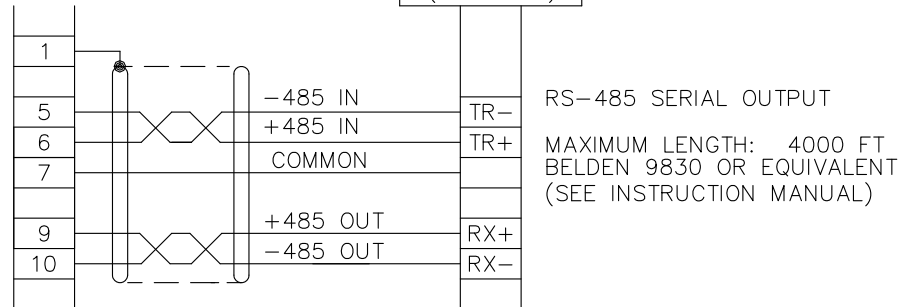
OR

RS-232
STANDARD
25 PIN
CONNECTOR



OR

RS-485
REMOTE
DEVICE
(OPTIONAL)



CADD DATABASE: AUTOCAD

DO NOT SCALE DWG		SCALE N/A	
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		JOB NO	
TOLERANCE	UNLESS SPECIFIED OTHERWISE	ENG MFM	DATE 8/26/11
X	± .1 ± 3 mm	DWN MFM	DATE 8/26/11
.XX	± .06 ± 1.5 mm	CHK MFM	DATE 8/26/11
.XXX	± .03 ± .76 mm		
FRACT.	± .010 ± .254 mm		
ANGLES	± 1/16 ± N/A		
	± 1/2 ± 1/2		
NEXT ASS'Y			
CUST ORDER NO			
CUSTOMER LOCATION			
USER LOCATION			

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ThermoFisher SCIENTIFIC

FIELD WIRING DRAWING
COMMUNICATION BOARD
MICRO-TECH 9000

PART NO	DRAWING NUMBER	REV
	C07392B-E017	A

A	2959	RELEASED	6/6/12	PEP	MFM
REV	ECO NO	MICRO	DESCRIPTION	DATE	BY APPD

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
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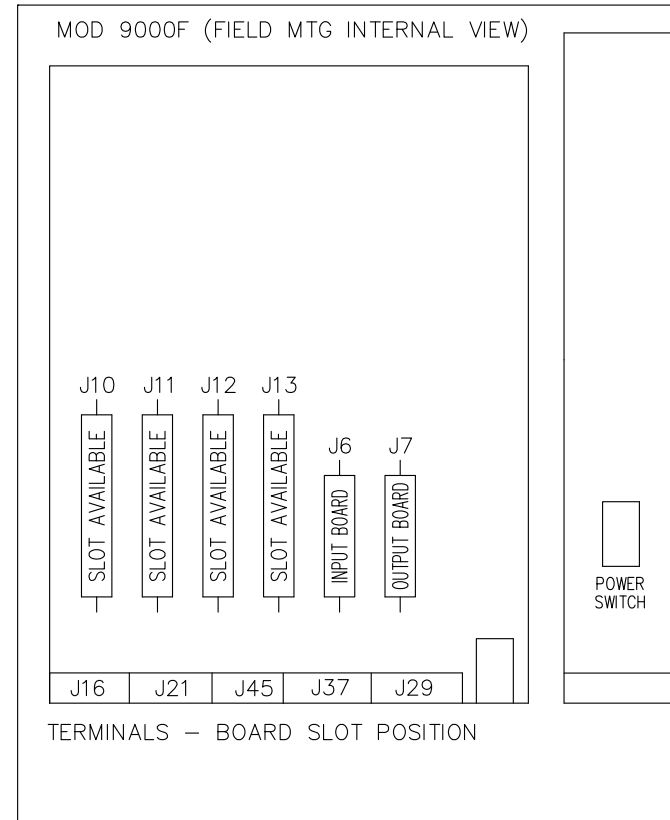
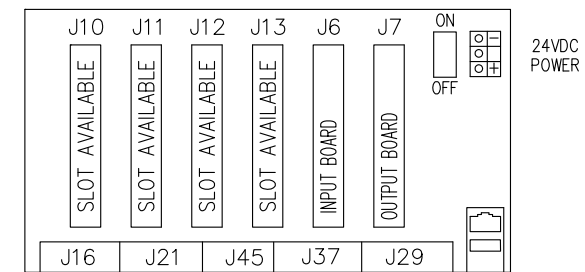
NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

- DO NOT ALTER LENGTH OF CABLE SUPPLIED WITH LOADCELL.
- USE BELDEN 8407 OR EQUIVALENT, 4 CONDUCTOR, 16 AWG, SHIELDED IF TOTAL LENGTH IS 200 FEET OR LESS.

USE BELDEN 9260 OR EQUIVALENT, 6 CONDUCTOR, 20 AWG, SHIELDED IF TOTAL LENGTH IS 201 TO 3,000 FEET. SENSE CONNECTIONS ARE REQUIRED IF TOTAL LENGTH IS OVER 200 FEET.
- SPEED SENSOR CABLE 60-12C - THE 60-12C DOES NOT REQUIRE EXTERNAL POWER. USE BELDEN 8760 OR EQUIVALENT, 2 CONDUCTOR, 18 AWG, SHIELDED IF TOTAL IS 200 FEET OR LESS. USE BELDEN 8780, 2 CONDUCTOR, 16 AWG, SHIELDED IF TOTAL LENGTH IS 201 TO 3,000 FEET.

SPEED SENSOR 60-12F - USE BELDEN 8772 OR EQUIVALENT, 3 CONDUCTOR, 20 AWG, SHIELDED. MAXIMUM DISTANCE IS 200 FEET.
- DO NOT RUN SIGNAL, LOADCELL, OR SPEED SENSOR CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
- INPUT POWER REQUIREMENTS
FIELD MOUNT 100 TO 240 VAC, 50-60HZ, 1/2 AMP
PANEL MOUNT 24VDC, +10%, -15% (USER SUPPLIED), (50VA MAXIMUM LOAD)
- EARTH GROUND ALL ELECTRICAL ENCLOSURES.
- ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING, EXCEPT AS NOTED, IS THE RESPONSIBILITY OF THE CUSTOMER. FOR INPUT POWER USE 14 AWG STRANDED WIRE.
- CONNECT SHIELDS ONLY AS SHOWN.
CABLE TYPE: BELDEN 8760 OR EQUIVALENT.
- FOR FIELD MOUNT VERSION ONLY: AN EXTERNAL BIPOLAR LINK SWITCH (CSA-UL) MUST BE PROVIDED AT INSTALLATION TIME (115 VAC OR 230 VDC, 5A) WITH MAGNETHERMAL SWITCH NOMINAL CURRENT 16 AMP. MAX DISTANCE FORM INSTRUMENT 5 FT [1.5 M]. THIS DISCONNECT DEVICE SHOULD BE IN EASY REACH OF THE OPERATOR AND IT MUST BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT.

MOD 9000P (PANEL MTG BACK VIEW)



CADD DATABASE: AUTOCAD

DO NOT SCALE DWG		SCALE N/A	
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		JOB NO	
TOLERANCE	UNLESS SPECIFIED OTHERWISE	ENG MFM	DATE 8/26/11
X	± .06	DWN MFM	DATE 8/26/11
.XX	± .03	CHK MFM	DATE 8/26/11
.XXX	± .010		
FRACT.	± 1/16		
ANGLES	± 1/2°		

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SCIENTIFIC

FIELD WIRING DIAGRAM
NOTES
MICRO-TECH 9000

REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
B	3013		CORRECTED FIELD MNT VOLTS AND FREQUENCY	9/21/12	PEP	TMN
A	2959		RELEASED	6/6/12	PEP	MFM

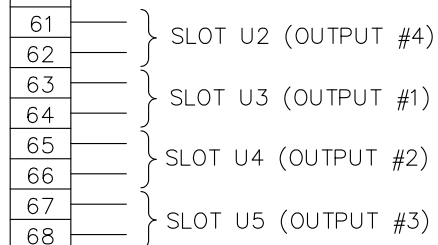
NEXT ASS'Y	
CUST ORDER NO	
CUSTOMER LOCATION	
USER LOCATION	

PART NO	DRAWING NUMBER	REV
	C07392B-E018	B

INTEGRATOR
MICRO-TECH 9000

J7

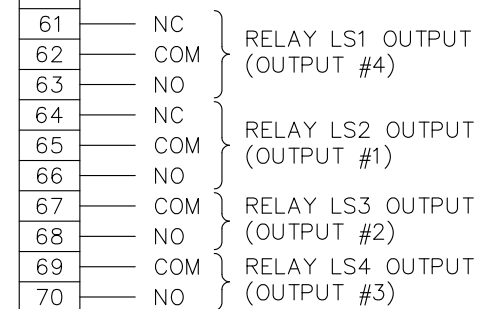
OPTO22
OUTPUT BOARD



INTEGRATOR
MICRO-TECH 9000

J7

RELAY OUTPUT
BOARD



OPTO-22 MODULES
24-280VAC P/N 037289
5-60VDC P/N 039669
DRY (REED) P/N 044552

RELAYS RATED:
PANEL VERSION:
33 VAC AT 2 AMP
70 VDC AT .5 AMP

FIELD VERSION:
240 VAC AT 3 AMP
70 VDC AT .5 AMP

NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

- DO NOT RUN SIGNAL, LOADCELL OR SPEED SENSOR CABLES IN SAME CONDUIT AS ALARM WIRING.
- ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING, EXCEPT AS NOTED, IS THE RESPONSIBILITY OF THE CUSTOMER.
- OUTPUT FUNCTIONS ASSIGNED BY USER, SEE O & S MANUAL.
- INSTALL IN SLOT J7.
- USE UL 1015 WIRE, 16 AWG [1 SQ.mm] OR SMALLER.
- WHEN SOURCING POWER FOR THE AC OUTPUTS/INPUTS FROM THE MICRO-TECH, SOURCE THE POWER FROM THE AUXILLARY POWER OUT (AUX PWR OUT) TERMINAL.

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG		SCALE N/A	
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		JOB NO	
TOLERANCE UNLESS SPECIFIED	OTHERWISE	ENG MFM	DATE 8/26/11
X ± .1	± .3 mm	DWN MFM	DATE 8/26/11
.XX ± .06	± .5 mm	CHK MFM	DATE 8/26/11
.XX ± .03	± .76 mm		
.XXX ± .010	± .254 mm		
FRACT. ± 1/16	± N/A		
ANGLES ± 1/2°	± 1/2°		

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FIELD WIRING DIAGRAM
DIGITAL OUTPUT BOARDS
MICRO-TECH 9000

REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
B	3027		ADDED NOTES 5 & 6	11/6/12	PEP	TMN
A	2959		RELEASED	6/6/12	RAE	MFM

NEXT ASS'Y	
CUST ORDER NO	
CUSTOMER LOCATION	
USER LOCATION	

PART NO	DRAWING NUMBER	REV
	C07392B-E021	B

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
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MICRO-TECH
MODEL 9000 SERIES

ANYBUS 7001 DEVICENET

J37

32
33
37
31
36
38

SUB NETWORK CONN

1	+5V OUT
2	RS232 Rx
3	RS232 Tx
4	NC
5	SIGNAL GND
6	RS422 RX+
7	RS422 RX-
8	RS485+/RS422 Tx+
9	RS485-/RS422 Tx-

CASING - PE

DEVICENET CONNECTOR

1	V-
2	CAN L
3	SHIELD
4	CAN H
5	V+
POWER	
1	+24VDC
2	GND
PC CONNECTOR	
1	GND
2	GND
3	RS232 Rx
4	RS232 Tx



CADD DATABASE: AUTOCAD

DO NOT SCALE DWG REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		SCALE N/A	
TOLERANCE UNLESS SPECIFIED OTHERWISE		ENG	DATE
X	± .1 ± 3 mm	MFM	4/10/12
.X	± .06 ± 1.5 mm	DWN	DATE
.XX	± .03 ± .76 mm	RAE	4/10/12
.XXX	± .010 ± .254 mm	CHK	DATE
FRACT.	± 1/16 ± N/A	MFM	4/10/12
ANGLES	± 1/2° ± 1/2°		
NEXT ASS'Y			
CUST ORDER NO			
CUSTOMER LOCATION			
USER LOCATION			

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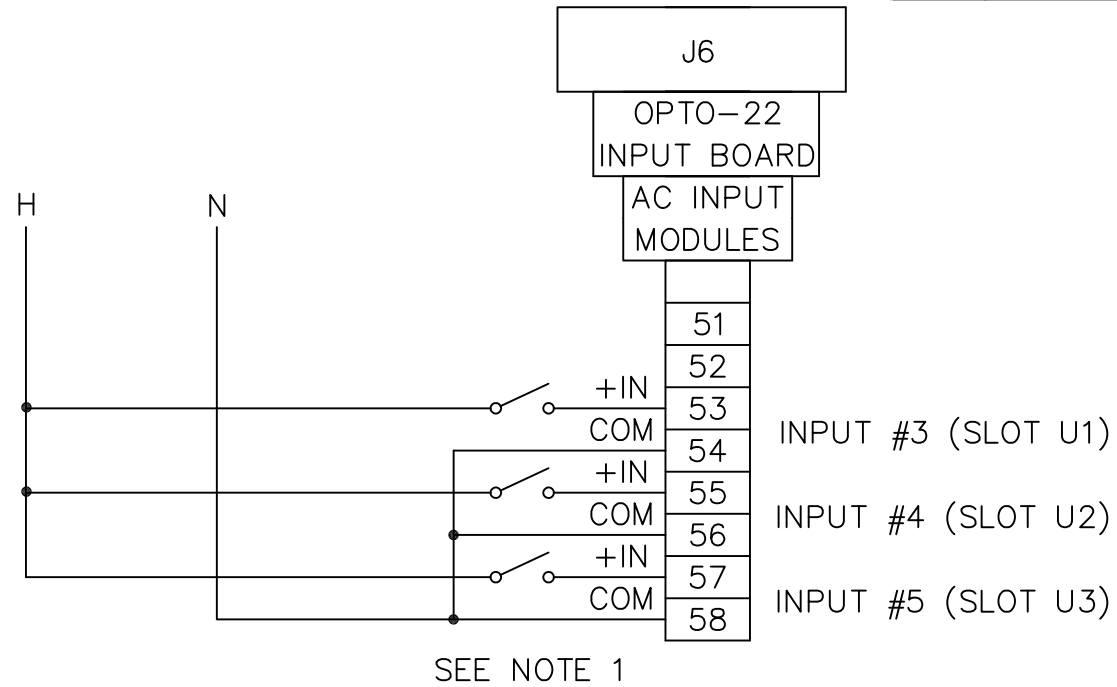
Thermo Fisher SCIENTIFIC

FIELD WIRING DIAGRAM
ANYBUS COMMUNICATOR
FOR DEVICE NET
MICRO-TECH 9000

A	2959	RELEASED	6/6/12	RAE	MFM
REV	ECO NO	MICRO	DESCRIPTION	DATE	BY APPD

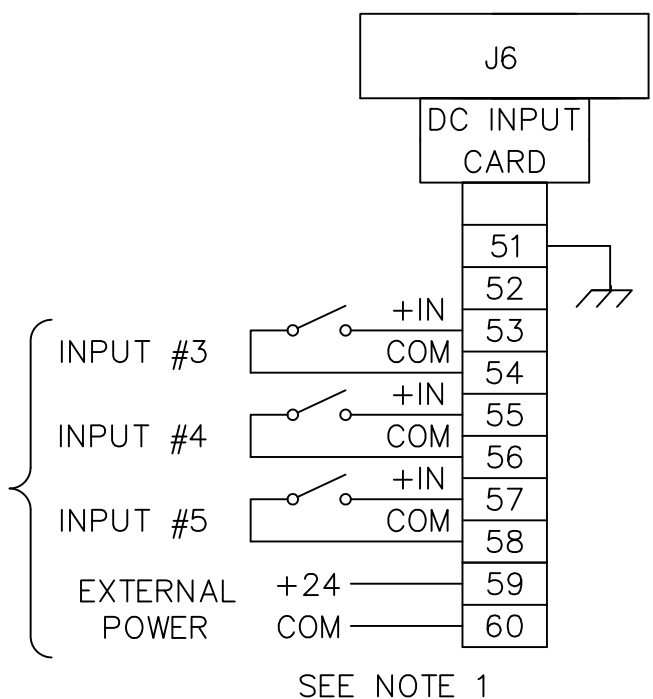
PART NO	DRAWING NUMBER	REV
	B07392B-E022	A

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
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- NOTES:
- USE UL 1015 WIRE, 16AWG [1 SQ.mm] OR SMALLER.
 - WHEN SOURCING POWER FOR THE AC OUTPUTS/INPUTS FROM THE MICRO-TECH, SOURCE THE POWER FROM THE AUXILLARY POWER OUT (AUX PWR OUT) TERMINAL.

OR



DIGITAL INPUTS
 TYPE: CURRENT SOURCING TO COMMON GROUND:
 DESIGNED FOR DRY CONTACT INPUT.
 RATING: 24 VDC, 5 mA TYPICAL
 INPUT FUNCTION IS ASSIGNED BY
 USER; SEE OPERATOR MANUAL

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		SCALE N/A	
UNLESS SPECIFIED OTHERWISE		ENG	DATE
X	± .1 ± 3 mm	MFM	8/26/11
.X	± .06 ± 1.5 mm	DWN	DATE
.XX	± .03 ± .76 mm	MFM	8/26/11
.XXX	± .010 ± .254 mm	CHK	DATE
FRACT.	± 1/16 ± N/A	MFM	8/26/11
ANGLES	± 1/2° ± 1/2°		

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FIELD WIRING DIAGRAM
 DC INPUT & OPTO-22 INPUT BOARDS
 MICRO-TECH 9000

NEXT ASS'Y	
CUST ORDER NO	
CUSTOMER LOCATION	
USER LOCATION	

PART NO	DRAWING NUMBER	REV
	B07392B-E025	B

REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
B	3027		ADDED NOTE 2. ADD SLOT NAME FOR OPTO22 BD	11/6/12	PEP	MFM
A	2959		RELEASED	6/6/12	RAE	MFM

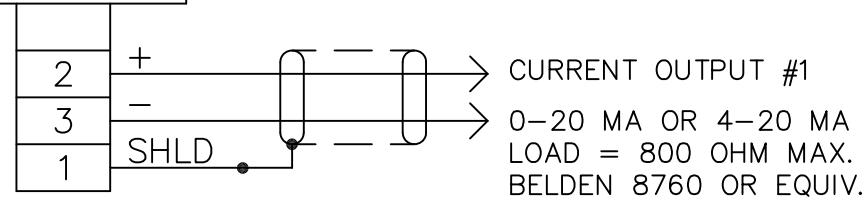
Derived From B07361B-E006

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MICRO-TECH
9000

MOTHERBOARD EXPANSION SLOTS

4-20mA OUT
BOARD



ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC
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NOTES:

- DO NOT RUN ANALOG SIGNAL CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
- ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING, EXCEPT AS NOTED, IS THE RESPONSIBILITY OF THE CUSTOMER.
- INSTALL IN ONE OF THE MOTHERBOARD EXPANSION SLOTS J10-J13.
- CABLE TYPE: USE BELDEN 8760 OR EQUIVALENT

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES		SCALE N/A	
UNLESS SPECIFIED OTHERWISE		ENG	DATE
X	± .1 ± 3 mm	MFM	8/26/11
.X	± .06 ± 1.5 mm	DWN	DATE
.XX	± .03 ± .76 mm	MFM	8/26/11
.XXX	± .010 ± .254 mm	CHK	DATE
FRACT.	± 1/16 ± N/A	MFM	8/26/11
ANGLES	± 1/2° ± 1/2°		

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FIELD WIRING DIAGRAM
4-20mA OUT BOARD
MICRO-TECH 9000

NEXT ASS'Y	
CUST ORDER NO	
CUSTOMER LOCATION	
USER LOCATION	

PART NO	DRAWING NUMBER	REV
	B07392B-E026	B

REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
B	3027		ADDED NOTES.	11/7/12	PEP	MFM
A	2959		RELEASED	6/6/12	RAE	MFM

Derived From B07361B-E006

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