Micro-Tech™ 9101/9201 Integrator Reference Manual

REC 4281 Rev J
Part Number 127336—English

Thermo
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Revision History

Revision Number	Date Released	Eco Number	Details of the Release
Rev A	May 2012	2959	First release of the newly created *Micro-Tech 9101 Integrator/ 9105 Feeder Controller Reference Manual.*
Rev B	September 2012	3004	Updates.
Rev C	January 2013	3027	Corrections.
Rev D	February 2013	3044	On field wiring drawing, add “VDC ONLY” for motherboard pulse output.
Rev E	May 2013	3322	Corrected error on motherboard jumpers & Dual plant A/D jumpers. Removed 9105 information. Added 9201 information.
Rev F	September 2013	3363	Corrections.
Rev G	November 2013	3403	Corrections. Added descriptions to menu tables.
Rev H	May 2014	3459	New Software version 140.00.03.00. Rearranged and Aligned data tables. Added USB Print File naming section.
Rev J	July 2014	3488	New Software version 140.00.03.01. Corrections.

Software Version: 140.00.03.01

For future reference, write your belt-scale code below.

Micro-Tech belt-scale code = _______

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Important Safety Notices about Using the Micro-Tech

Please note carefully the following safety warnings and notices.

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.

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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, Tph (standard U.S. tons per hour), 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 scale 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°F (–30° to +70°C).

Overview of the Micro-Tech

The Micro-Tech Integrator is a microcomputer-driven instrument used for deriving rate and quantity of flowing material from signals representing the weight of a segment of moving material and its velocity. By processing, these two input signals, the Micro-Tech delivers visible and electrical outputs representing the rate of material movement as well as visible and electrical outputs representing the total amount of material that has passed the weighbridge.

For remote indicating, four options are available, as follows.

- Remote totalization.
- Remote flow rate, belt loading, or belt speed.
- Communications.
- Field Bus.

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.

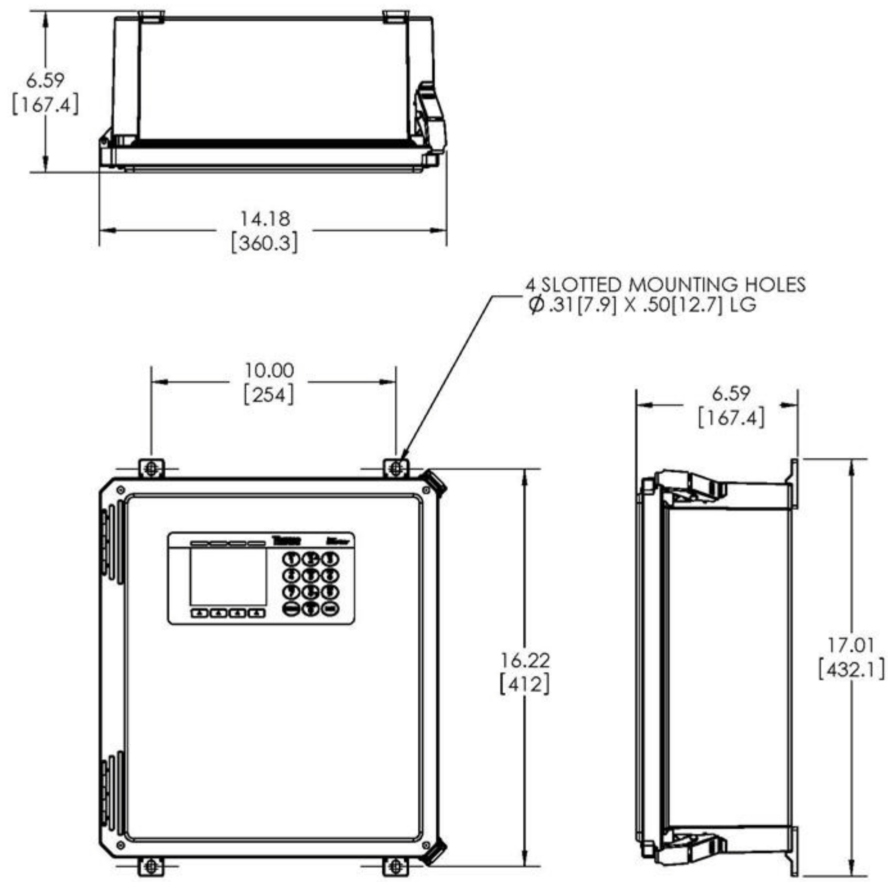


Figure 1–1. Field-Mounted Version of the Micro-Tech

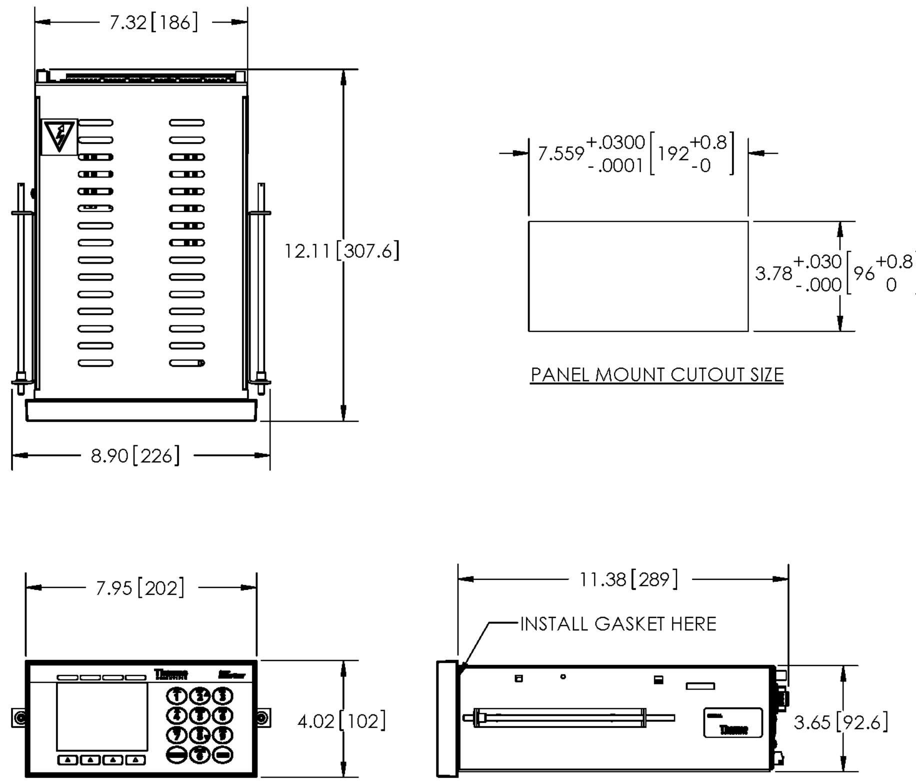


Figure 1–2. Panel-Mounted Version of the Micro-Tech

Important Safety Information

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

General Safety Precautions

Please read the following general safety precautions before installing, operating, or maintaining the Micro-Tech.

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. Hands and clothing must be kept away from all moving or rotating parts. ▲

CAUTION. 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 integrator. ▲

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 integrator. ▲

CAUTION. Earth ground must be provided to the integrator. 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.

Conformity of the Micro-Tech with CE/EMC requirements does not guarantee an entire machine or installation complies with CE/EMC requirements.

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 enclosures 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 Micro-Tech should be mounted in a controlled environment and protected (shielded) from direct sunlight, and should not be exposed to excessive vibration, heat, or moisture. It may be mounted up to 3,000 ft (914 m) from the scale. The figure below shows a typical installation.

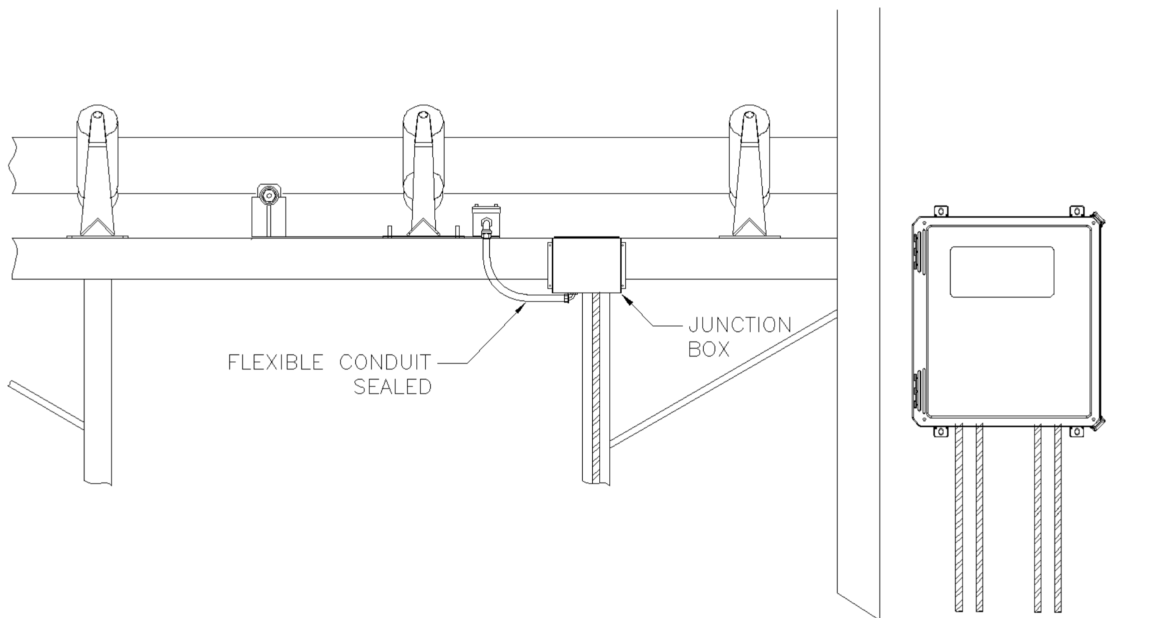


Figure 1–3. A Typical 9101 Field-Mounted Installation

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 integrator, 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.

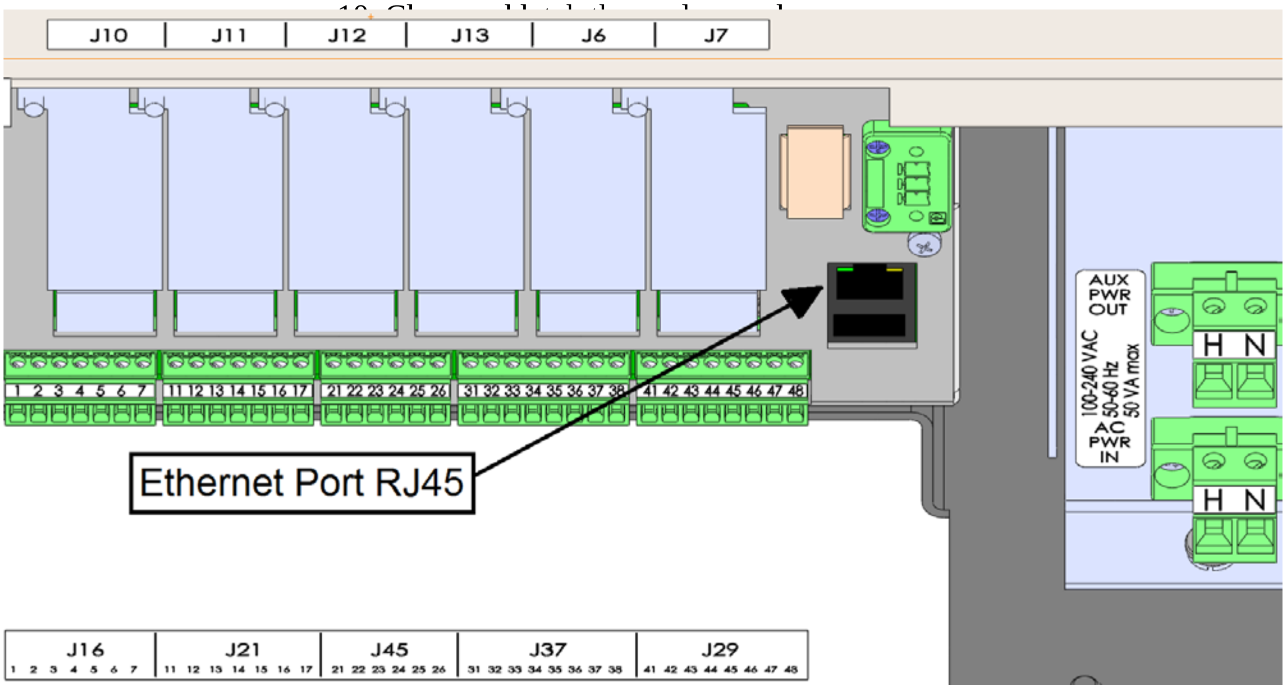


Figure 1–4. Connectors on Underside of Enclosure

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 two-inch 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 Appendix A.

NOTE. Setting jumpers and switches on the Micro-Tech motherboard must be performed *only* by qualified service personnel. ▲

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 Integrator has many hardware and software features necessary for continuous weighing and outputting totalized weight and rate information. The standard features of the Micro-Tech are listed below.

- Menu-driven scroll entries on a four line display.
- Four LED status indicators.
- Visible and electrical outputs representing rate or load of the material movement.
- Visible and electrical output representing total amount of material that has passed the weighbridge.
- Audit trail.
- Automatic zero and span calibration.
- Auto zero tracking.
- 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 Appendix C.

- Two load-cell inputs (J16, J21) on a Model 9101 or one load-cell input (J9) on a Model 9201, to a max of 6 load cells.
- USB port.
- Two serial communication ports.

- Two speed-sensor inputs.
- 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 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
  - Dual Plant Load Cell A/D board
  - Profibus-DP board

Micro-Tech Menus and Functions

The Micro-Tech has been designed for belt scales 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

Measuring Functions

The Integrator can be directly connected to six 350 ohm load cells and receives the signal of a speed sensor in order to calculate belt speed, belt loading, and feed rate.

Rate is integrated in time to calculate the amount of material conveyed by the belt (total), and is displayed in three individual registers: total, reset total, operator total. The Integrator can perform automatic zero and span calibrations. When the belt is running and the rate is below a certain percentage, the Integrator can perform auto zero tracking, to minimize the error of zero due to material and dust. Analog (current) output signals or communications can be used to transmit rate, speed or belt loading to other control devices. Displayed variables and analog outputs can be smoothed via damping filters, individually programmable.

Monitoring Functions

The Integrator includes internal diagnostics that generate alarms in case of hardware failures or programming errors. The following process alarms are also provided.

- Belt slip.
- Alarms for high and low flow rate, speed, and load.

Digital outputs are also provided for the following.

- Hardware failure
- Alarm cumulative

Alarms are visible on the display and can be acknowledged and reset through 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 ignored. Two LEDs indicate the cumulative status of alarms and shut down.

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 integrator 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 Appendix C.

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.

Overview of Capabilities

This section describes technically, how the Micro-Tech performs each particular duty.

Instantaneous Flow-Rate Calculation

The signal measured by the load cell(s), which represents the weight per unit length of the belt (lbs/ft), is multiplied by the signal measured by the speed transmitter, which represents the belt speed (ft/min). The result of this operation is the instantaneous flow rate (lbs/ft x ft/min = lbs/min) that is then multiplied by suitable constant to obtain the value in the required engineering units (kg/h, ton/h, etc.). An adjustable damping filter is provided separately for displayed rate and current outputs.

Flow Totalization

The total is accumulated by multiplying weight per unit length times the incremental length and totalizing the result in engineering units. Three totalizing memories are provided, as follows.

- The first memory (Master Total) is not re-settable to guarantee the data is not lost because of unwanted reset.
- The second and third memories (Reset and Operator Total) are re-settable by the operator and are normally used for shift or daily totalization.

Automatic Zero and Span Calibrations

Zero and span calibrations are based on belt length defined by a number of belt revolutions. To calculate the exact number of revolutions, the instrument counts the pulses delivered by the speed transmitter (one pulse represents a specific belt length).

When the required number of pulses is reached, the instrument ends the calibration test, and compares the actual totalized value to the theoretical one (0 for zero calibration), and calculates the calibration error.

- Electronic Calibration (R-Cal)
  Allows the user to perform the calibration without the need for applying test weights or test chains on the weighbridge. It is performed by unbalancing the load-cell bridge using a precision resistor. The calibration constant is calculated based on the load cell and the scale data.

- Test Weight Calibration
  Requires the positioning of test weights on the weighbridge.

- Chain Calibration
  Requires the application of calibrated chains on the belt. This method is the nearest to actual operating conditions.

- Material Test
  Allows you to run material of known weight over the scale to check the accuracy of your scale. Alternatively, you can run material over the scale, then have it re-weighed by another reference scale.

Auto Zero Tracking

Auto zero tracking (AZT) enables the belt scale system to automatically zero itself during extended periods when the conveyor belt is running empty. AZT does not actually change the Zero Number but applies a factor to the Zero Number. AZT is menu selectable because some installations may not need this option. A "Z" displays on the second line of the display to indicate the selection of this option.

Under a preset minimum flow rate when enabled, the instrument makes subsequent automatic zero calibrations with the following sequence.

1. Waits for one-half time of the test duration (a solid "Z" displays).

2. Execution of a zero test (the "Z" flashes).

3. Performs automatic zero for one test duration.

4. Continuously repeats above zero calibration as long as the feed rate remains below AZT preset value. The Zero Tracking function is limited to a maximum value of Deviation that is set as a percent of full scale in the Setup scroll. If the new zero calculated by auto zero-tracking function exceeds that value, an alarm is generated and the new zero is not installed. The Zero Reference value for AZT is set initially at the first zero calibration after cold start. An alarm is generated when new zeros deviate too far from the Zero Reference value. The Zero Reference value must be reset to clear these deviation alarms.

Optional Signal Outputs

An optional current output signal (0-20/4-20/20-0/20-4 mA) and an optional dual channel current output/analog input board are available. The choice of the signal type is made through the keypad. Each current output may be programmed via the keypad to deliver one of the following signals

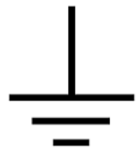
- Flow rate
- Belt loading
- Belt speed

Each output has its own adjustable damping and programmable time or length delay.

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 load cells 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.

Description	Specification
Processor	Coldfire MCF5234 32-bit microprocessor 2 MB Flash memory 128K NVRam 2 Integrated UARTs and Ethernet communication peripherals.
Display/HMI	16 keys membrane keypad 4 multi-color LEDs 320 x 240 pixel monochrome backlit LCD display QVGA resolution with an aspect ratio of 4:3 Support of non-western character sets (such as Russian, Chinese, and so forth)
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.
Speed Inputs (Inputs #1, #2)	Optically isolated. Powered by + 24VDC supply. Built-in current source for dry contact use. (Gold plated contacts 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.
Minimum required for scale use	1000 pulse/minute at nominal belt speed.
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

Description	Specification
	[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
Initializing the Micro-Tech

This chapter tells you how to start up your Micro-Tech, initialize its software, and get your Micro-Tech and its associated scale up and running. As part of the initialization process you will perform a belt-length test and, once this is done, do the initial zero and span calibrations of the scale. Your Micro-Tech is then ready to go into operation.

Overview

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

- Determine the correct “belt-scale code” of the conveyor scale the Micro-Tech is working with.
- Acquire some basic conveyor and scale information—such as idler spacing, conveyor angle, and so forth.
- Determine the exact belt length of the conveyor.
- Enter your belt-scale code and other conveyor and scale parameters into the Micro-Tech to initialize the software.
- Complete the initial scale (zero and span) calibrations.

Determining the Belt-Scale Code

It is critical that you know the *correct* belt-scale code of the conveyor and scale the Micro-Tech is working with, for the following reasons.

- The scale may produce inaccurate and unreliable results if you use the wrong belt-scale code.
- The Micro-Tech software uses a belt-scale code that is *specific* to each particular system, and this belt-scale code must be entered during the software initialization process.
- Knowing the correct belt-scale code will *minimize* the amount of time and effort needed to set up the Micro-Tech.
- Non-pivoting scales have far fewer required set-up parameters than pivoting scales. As a result, if you have a *non-pivoting scale* (with a belt-scale code of 49, for example), there are only 11 required parameters. In contrast, if you have a *pivoting* scale (with a belt-scale code of 1, for example), there are 18 required parameters. So, knowing your belt-scale code in advance will make the whole set-up process go more smoothly.

The Quick and Easy Route

The quickest and easiest way to determine the belt-scale code of the scale the Micro-Tech is working with, is to look at the Micro-Tech "System Data Sheet" or "Door Label."

- System Data Sheet

  A System Data Sheet is supplied with the product documentation that accompanied your unit. See Appendix A for an example of a typical System Data Sheet.

- Door Label

  A Door Label is supplied with every Micro-Tech. For panel-mounted versions of the Micro-Tech, the Door Label is in the product documentation that accompanied your unit. For field-mounted versions, the Door Label is glued inside the main door of the enclosure. See Appendix A for an example of a typical Door Label.

If your System Data Sheet and/or Door Label is lost or defaced, **Table A–1** in Appendix A lists the belt-scale codes for a variety of commonly used conveyor and scale set-ups.

Once you know your belt-scale code, write it in the space below. You will need this information later when you initialize the Micro-Tech software.

Belt-Scale Code ___________

HINT. Write the belt-scale code inside the front cover of this manual for future reference. ▲

Acquiring Basic System Data

Now that you know the correct belt-scale code of the scale you are using, you are ready to collect some additional data about the type of conveyor and scale you are using at your particular facility. You will need this information when you initialize the Micro-Tech software, and can save time and effort by gathering this conveyor data *now* rather than later.

Scale Type Determines Parameters Needed

The type of scale and conveyor you have installed at your facility determines the number and type of parameters you need to enter when initializing the Micro-Tech software. As a general rule, non-pivoting scales have fewer required parameters than pivoting scales. Clearly, we cannot list every single scale configuration in this manual, so we will restrict ourselves to showing you two examples to give you a feel for how the belt-scale code works and how it determines what parameters you need to know when initializing the software.

- If you have a *non-pivoting* scale—Go to the next page.
- If you have a *pivoting** scale—Go to page 2-4.

(* Also known as a lever-ratio, pivot point, or trunion scale.)

Non-Pivoting Scales

Here is a list of belt-scale codes for non-pivoting scales. (For a complete list of belt-scale codes, see **Table A–1** in Appendix A.)

- Non-pivoting belt-scale codes*: 43–53, 60, 214, 215.

  (* Please note that this is not an exhaustive list, because newer or custom scales are not listed.)

We suggest you print or photocopy this page and insert the required data into the table below. Doing so will save you considerable time when you come to initialize the Micro-Tech software.

Table 2–1. Initialization Data Sheet (Non-Pivoting)

Parameter*	**Details of Your Particular System**	**Defaults from Table A–1, or other**
Number of weigh idlers		4
Number of load cells		4
Idler spacing (inches)		48
Conveyor angle (degrees)		0
Load-cell capacity (lbs.)		250
Load-cell sensitivity (mV/V)		3.0
Load-cell resistance #1 thru #4 (ohms)		350
Belt length (feet)		—
Time for one belt revolution (seconds)		—
Number of revolutions for test		>3
Time to complete test revolutions (seconds)		—

* The example above, including the defaults, is for belt-scale code 49. Your weighing system will, most likely, have a slightly *different* list of required parameters and defaults.

NOTE. For more information about the parameters listed above, please see pages 2-5 through 2-10. ▲

The Next Step

You are now ready to measure the belt speed of your conveyor system. Go to page 2-10.

Pivoting Scales

Here is a list of belt-scale codes for pivoting scales. (For a complete list of belt-scale codes, see **Table A–1** in Appendix A.)

- Pivoting belt-scale codes*: 0–42, 54–59.

  (* Please note that this is not an exhaustive list, because newer or custom scales are not listed.)

We suggest you print or photocopy this page and insert the required data into the table below. Doing so will save you considerable time when you come to initialize the Micro-Tech software.

Table 2–2. Initialization Data Sheet (Pivoting)

Parameter*	Details of Your Particular System	Defaults from Table A–1, or other
Pivot-to-load cell distance (inches)		32
Number of weight idlers		1
Pivot-to-first-idler distance (inches)		24
Pivot-to-test weight height (inches)		0
Pivot-to-test weight length (inches)		24
Pivot-to-carriage height (inches)		6.5
Roller-to-carriage height (inches)		6.5
Number of load cells		1
Idler spacing (inches)		36
Conveyor angle (degrees)		0
Load-cell capacity (lbs.)		250
Load-cell sensitivity (mV/V)		3.0
Load-cell resistance, #1 (ohms)		350
Type of speed input		—
Belt length (feet)		—
Time for one belt revolution (seconds)		—
Number of revolutions for test		>3
Time to complete test revolutions (seconds)		—

* The example above, including the defaults, is for belt-scale code 1. Your weighing system will, most likely, have a slightly *different* list of required parameters and defaults.

NOTE. For more information about the parameters listed above, please see pages 2-5 through 2-10. ▲

Pivot-to-Load-Cell Distance

Measure the distance from the pivot to the load cell, and enter the result in **Table 2–1** or **Table 2–2**.

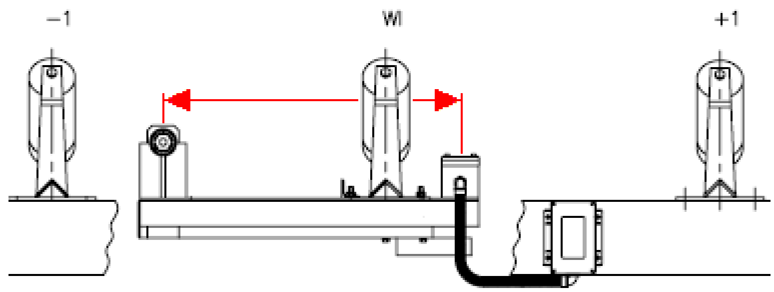


Figure 2–1. Pivot-to-Load-Cell Distance

Number of Weight Idlers

Count the number of weight idlers and enter the result in **Table 2–1** or **Table 2–2**.

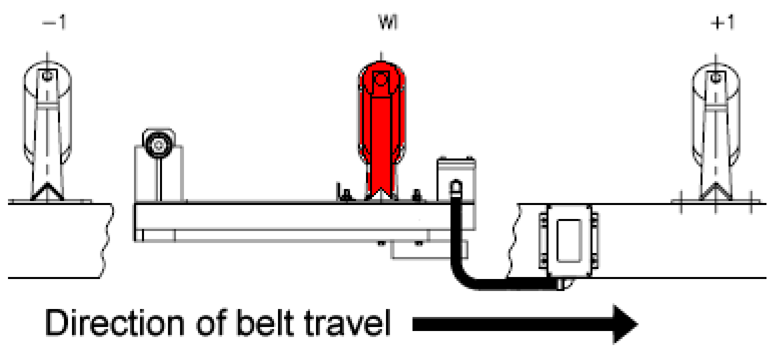


Figure 2–2. Number of Weight Idlers

Pivot-to-First-Idler Distance

Measure the distance between the pivot and the first idler, and enter the result in **Table 2–1** or **Table 2–2**. Please note, there may be subsequent (that is, additional) idlers.

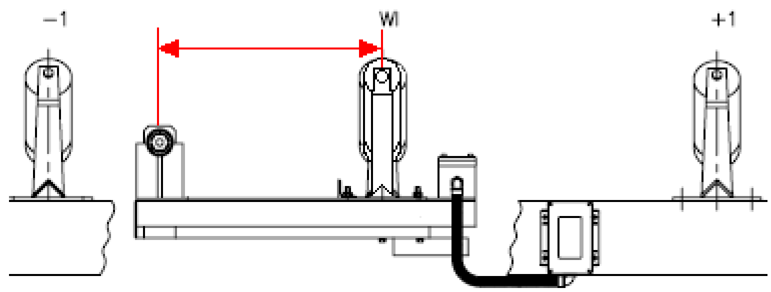


Figure 2–3. Pivot-to-First-Idler Distance

Pivot-to-Test-Weight Height

If the static-weight option is installed, measure the height from the pivot to the test weight, and enter the result in **Table 2–1** or **Table 2–2**. If the test weight is below the pivot, the value is negative. If this option is *not* available, leave at the default value.

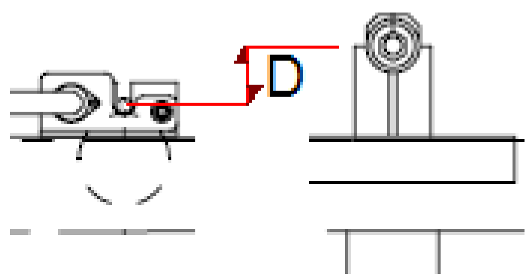


Figure 2–4. Pivot-to-Test-Weight Height

Pivot-to-Test-Weight Length

If the static-weight option is installed, measure the length from the pivot to the test weight, and enter the result in **Table 2–1** or **Table 2–2**. If this option is *not* available, leave at the default value.

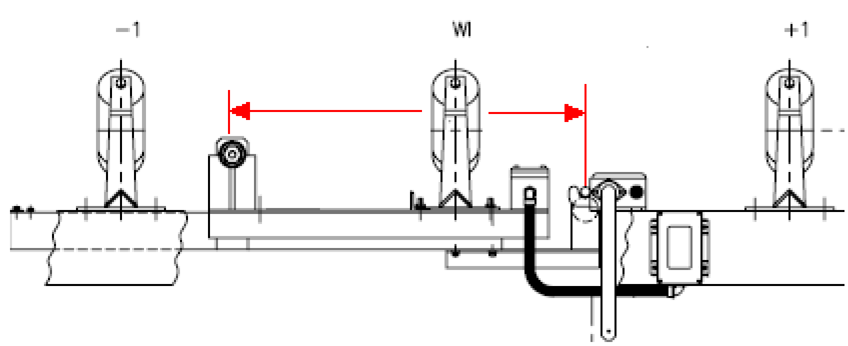


Figure 2–5. Pivot-to-Test-Weight Length

Pivot-to-Carriage Height

If the static-weight option is installed, measure the height from the pivot to the carriage, and enter the result in **Table 2–1** or **Table 2–2**. If this option is *not* available, leave at the default value.

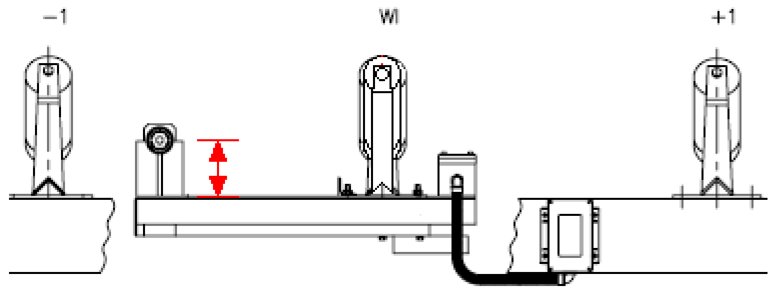


Figure 2–6. Pivot-to-Carriage Height

Roller-to-Stringer Height

If the static-weight option is installed, measure the height from the carry roller to the conveyor stringer, and enter the result in **Table 2–1** or **Table 2–2**. If this option is *not* available, leave at the default value.

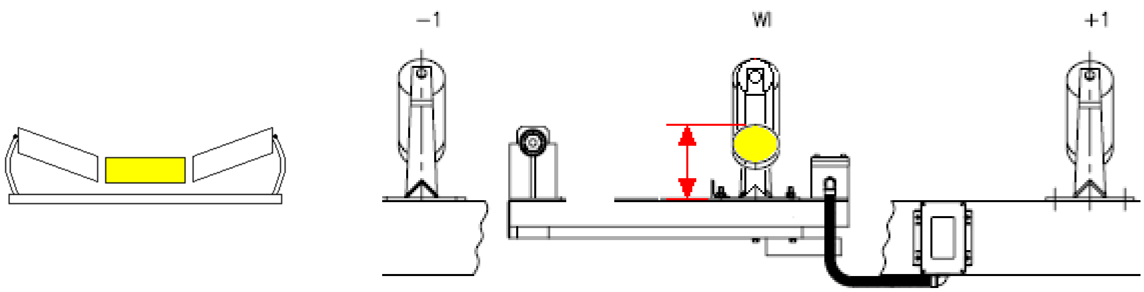


Figure 2–7. Roller-to-Stringer Height

Number of Load Cells

Determine the number of load cells, and enter the result in **Table 2–1** or **Table 2–2**.

Idler Spacing

Measure the idler spacing, which should all be evenly spaced, and enter the result in **Table 2–1** or **Table 2–2**.

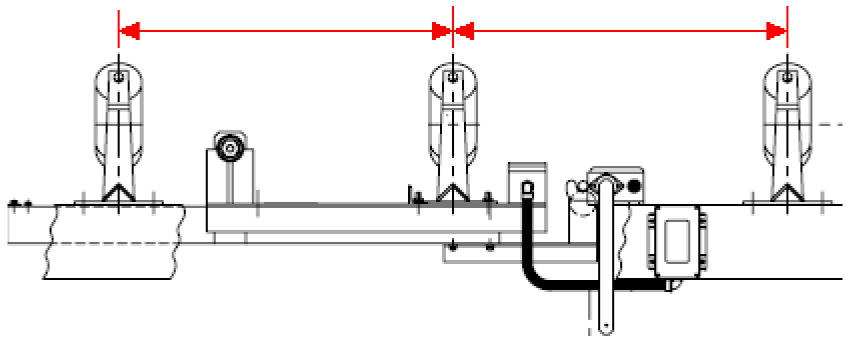


Figure 2–8. Idler Spacing

Conveyor Angle

Measure the angle of the conveyor (in degrees) and enter the result in **Table 2–1** or **Table 2–2**. An easy way to arrive at a measurement in degrees for angle Ø, is to measure the length AC, divide by length AB, and look up the cosine.

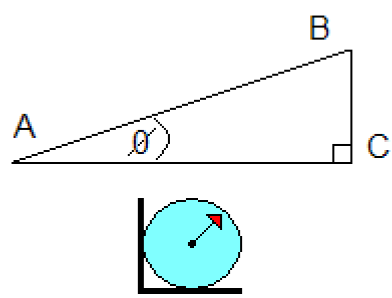


Figure 2–9. Conveyor Angle

If the conveyor slopes up, the angle is positive, meaning the conveyor has a positive incline. If the conveyor slopes down, the angle is negative, meaning the conveyor has a negative incline. The appropriate sign (+ or –) for the incline must be entered in the appropriate Micro-Tech menu (see page 2-31).

Load Cell Capacity, Sensitivity, and Resistance

All Thermo Fisher load cells have the capacity, sensitivity, and resistance marked (as shown below) on the end of the cable. In case the label is not present please refer to the data sheet supplied with the load cell. Enter the capacity, sensitivity, and resistance in **Table 2–1** or **Table 2–2**.

Figure 2–10. Location of Load-Cell Data

Speed Input

The Speed Input parameter tells the Micro-Tech whether your conveyor system is equipped with one (or, in some special instances, two*) optional speed sensors. An optional speed sensor feeds very precise conveyor speed readings to the Micro-Tech. If you did *not* order an optional speed sensor, enter "simulated" in **Table 2–1** or **Table 2–2**.

* Two speed inputs, typically, are used in systems equipped with two scales.

In summary, your choices for speed input are as follows.

- Single—Your conveyor is equipped with one speed sensor.
- Two—You have two scales, each equipped with a speed sensor.
- Simulated—There is no speed sensor attached to your conveyor. Note, however, that a conveyor-run digital input is required for the simulated option to work.

Test Duration

You are now going to measure how long it takes for the belt in your conveyor system to make *one* revolution at maximum speed. You will use this information to verify that the scale's zero and span can be properly set during the approximately six minutes it takes the Micro-Tech to complete the zero-calibration procedure and span calibration procedure.

The take-home message here is that, for the scale's zero & span to be accurate, the zero and span calibration procedures must fulfill the following requirements.

- The belt *must* make at least three complete revolutions.
- The test *must* have a total running time of six (or more) minutes.

To help you work through the necessary calculations, here is a real-life example.

Example

We have just finished installing a 56ft-long conveyor at our facility that has a belt length of 120 feet—that is, if the belt was removed from the system, cut and laid out flat, it would extend to 120 feet. Next, we need to know how long it takes for the belt to make precisely *one* revolution when running at maximum speed.

1. To do this, we drew a prominent chalk line across the belt directly above the load cell, and timed (to the nearest second) how long it took for the belt to make exactly *one* revolution. We discovered it took precisely 1 minute and 15 seconds. Thus,

   —Time for completing one revolution = 75 seconds.

2. Six minutes contain 360 seconds (6 x 60 seconds). So the number of revolutions the belt makes in 360 seconds is 4.80 (360/75).

   —Number of belt revolutions made in 6 minutes = 4.80

   —Revs rounded up to the nearest whole number = 5

(If this number is less than 3, you *must* lengthen the time of the test so that the belt completes the required minimum of *three* complete revolutions.)

3. Because one belt revolution takes 75 seconds to complete, it takes 375 seconds (5 x 75) to complete the required test revolutions. Thus,

   —Time to complete the test revolutions = 375 seconds

4. In summary, the data we have collected so far is as follows.

   —Belt length = 120 feet

   —Time for one belt revolution = 75 seconds

   —Number of revolutions needed for test = 5

   —Time to complete the five test revolutions = 375 seconds

5. Now it's your turn to collect your own data and enter it into **Table 2–1** or **Table 2–2**.

Manually Determine Test Duration

You are now going to collect data from your own particular conveyor system to determine the Test Duration. Here's how.

1. Using a 100 ft tape measure, measure the length of the belt to the nearest 0.1 feet. Enter the result for "Belt Length" in your "Initialization Data Summary," **Table 2–1** or **Table 2–2**.

2. When the belt is stationary, draw a chalk line across the belt.

3. Start the belt and wait until it is running at *maximum* speed.

4. Use the chalk mark to time *one* complete revolution of the belt. Enter the result (in seconds) in **Table 2–1** or **Table 2–2**.

5. Calculate (to at least one decimal place) the number of revolutions the belt makes in six minutes—as described in the example above. Round up the number of revolutions to the next whole number. Enter

the result, “Number of revolutions for test,” in **Table 2–1** or **Table 2–2**.

6. Multiply “Number of revolutions for test” by the time taken (in seconds) for one revolution. Enter the result, “Time to complete test revolutions,” in **Table 2–1** or **Table 2–2**.

The Next Steps

You are now going to familiarize yourself with the Micro-Tech’s console, and use it to enter into the Micro-Tech all the data you entered in **Table 2–1** or **Table 2–2**.

Using the Console

Please see page 3-1 of the manual to familiarize yourself with the Micro-Tech’s console and how to use it.

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. There are no shortcuts! ▲

Overview

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

- Enter the correct date and *exact* current time.
- Choose the appropriate language for the display.

- Choose the appropriate units of measure (standard tons, long tons, metric tons, and on).

- Enter the correct belt-scale code for your particular scale.

- Enter the parameters you recorded in your “Initialization Data Summary” table above (**Table 2–1** or **Table 2–2**).

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.

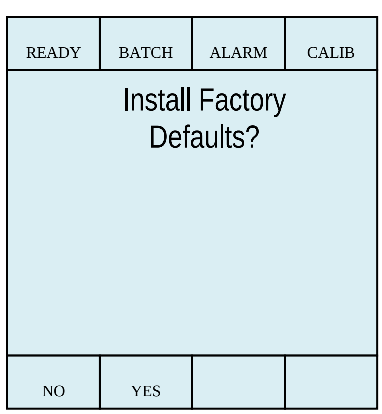
To cold-start the Micro-Tech, do the following.

1. Turn on the Micro-Tech’s power switch while *simultaneously* pressing and holding soft-key #1 and the Run button. (See **Figure 3–1** for the location of these buttons.)

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.

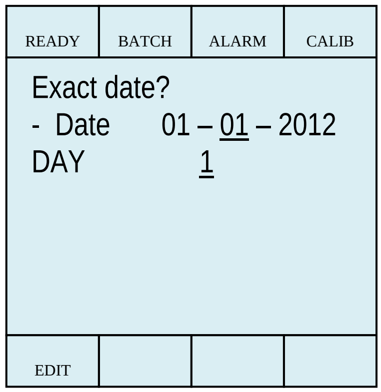
Setting the Date

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.)



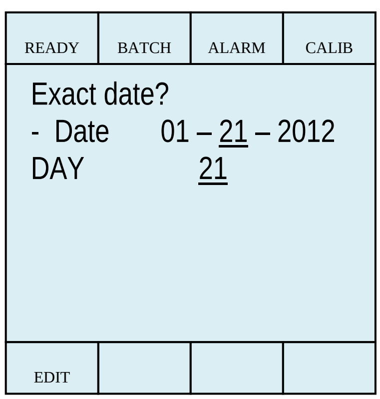
1. Make sure the conveyor is empty and running at maximum speed.

2. Press the Yes button and the date screen appears.



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.)



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.

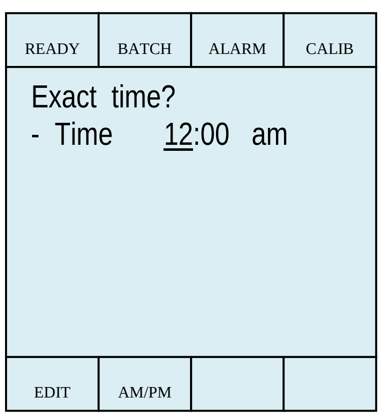
6. Press the Enter button. The display should now look something like this. (You may have to repeatedly press the Edit and Enter buttons on start up, scrolling through the fields again, to get to this screen.) Either way, make sure this screen is displayed before proceeding.

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 (see **Figure 3–1**). The display should currently look like this.

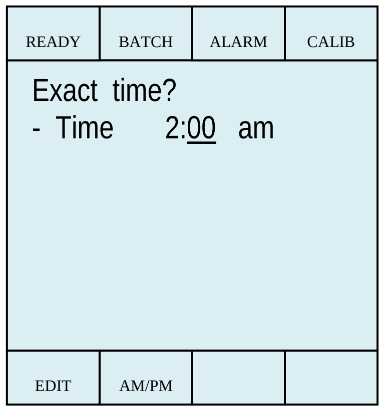


2. Press the Edit button. (The Micro-Tech clears the hour entry field leaving just the underline.)

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.

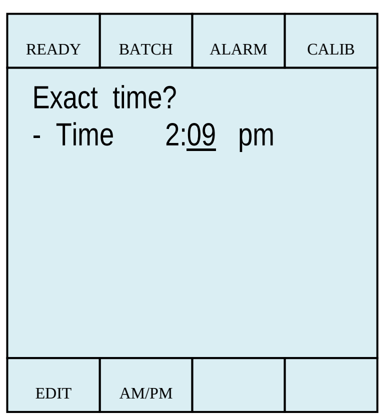


6. Press the Edit button. (The Micro-Tech clears the minute entry field leaving just the underline.)

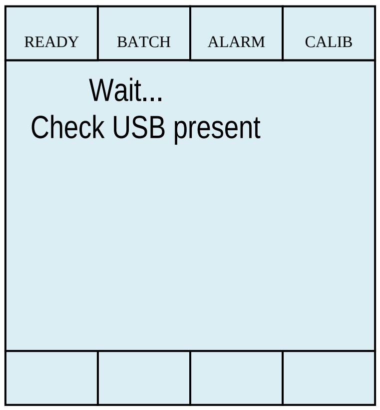
7. Use the keypad to enter the correct minutes. Remember to enter *two* numbers for minutes.

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.



10. 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.)

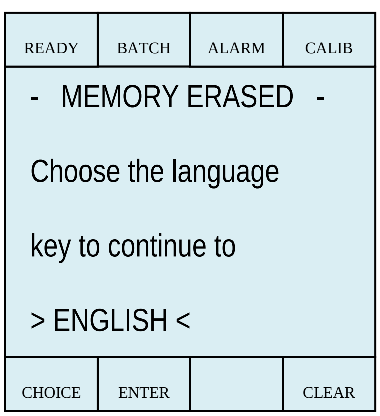


11. After waiting briefly, press the down-arrow button to bring up the language screen.

Choosing a Language

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

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



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

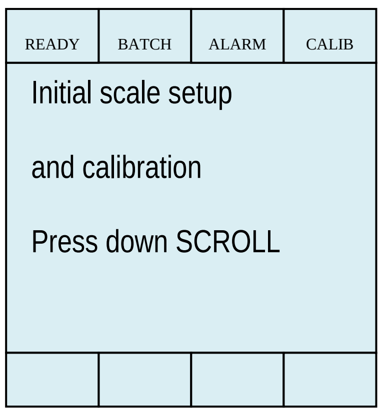
2. To select the current language, press the Enter button and the scale set-up screen appears.

3. To choose another language, repeatedly press the Choice button until the language you want is displayed, then press the Enter button.

Entering Scale Data

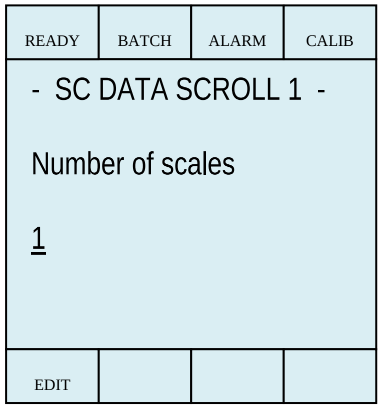
This menu allows you to enter the number of load cells and A/D (analog/digital) channels you are using with your Micro-Tech. The default value for the Micro-Tech is determined by the belt-scale code.

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

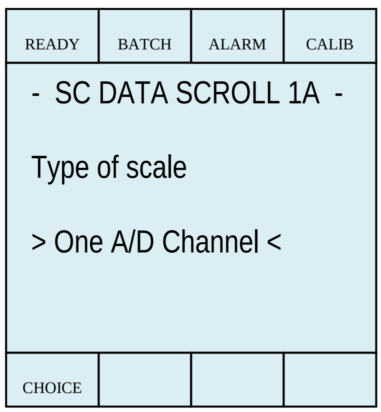


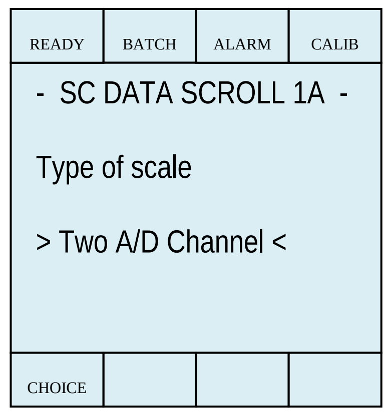
2. The Micro-Tech menus are also known as the Micro-Tech “scrolls.” Please go to **Figure 3–1** and note that the Micro-Tech keypad contains an up-scroll button and a down-scroll button, which are also known as the up-arrow and down-arrow buttons. Thus, the notation in the display saying “Press down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

3. Press the down-arrow button (or Scroll button) and the “Scale Data Scroll 1” screen appears.



4. Press the down-arrow button and the "A/D Channel" screen appears.





The default value is "One" A/D channel. However, if your system has two load cells, choose the "Two" A/D channels option. Review the system-specific wiring diagram to determine the number of load cells on your scale. (The "Type of scale" scroll is not available on a model 9201 Micro-Tech.)

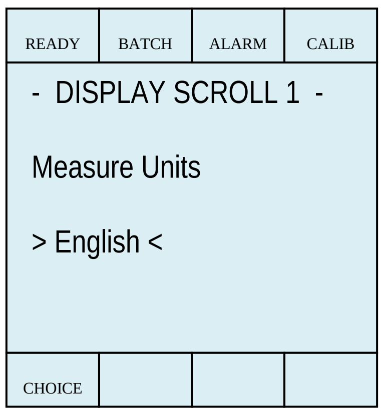
5. Press the down-arrow button to bring up the units menu.

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.



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 2-20 through 2-24, do the following.
   - Follow the “English” headings, if you are using English units.
   - Follow the “Metric” headings, if you are using metric units.

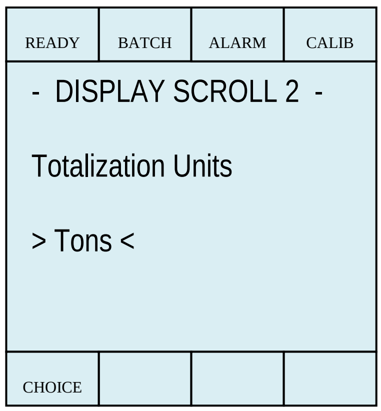
- Go to page 2-24, if you are using mixed units.

Setting the Totalization Units

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

English Totalization Units

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



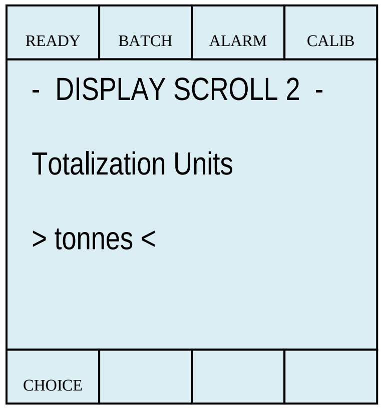
1. Tons (the standard U.S. ton, 2,000 lbs—also known as the British “short ton”) is the default value.

2. To choose long tons (“LTons” 2,240 lbs) or pounds (“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 length units screen (go to page 2-22)

Metric Totalization Units

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



1. Metric tonnes (1,000 kg) is the default value.

2. To choose kilograms (“kg”), press the Choice button (“kg” is displayed), then press the Enter button.

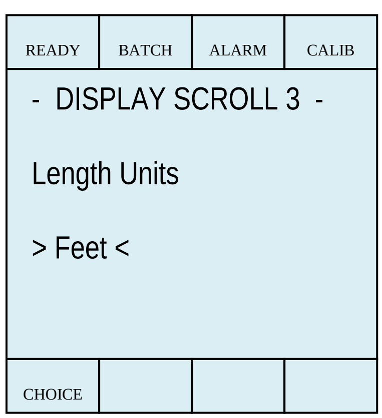
3. Press the down-arrow button to bring up the length units screen (see the next section).

Setting the Length Units

This menu allows you to choose the length units used by the Micro-Tech. 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.

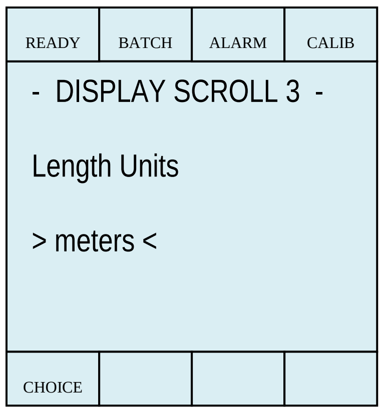


1. Feet is the default value.

2. As no other choices are available, press the down-arrow button to bring up the rate units screen (go to page 2-23).

Metric Length Units

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



1. Meters is the default value.

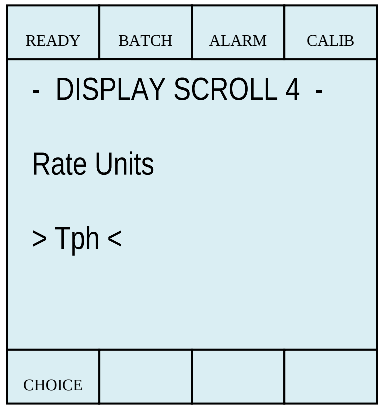
2. As no other choices are available, press the down-arrow button to bring up the rate units screen (see the next section).

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.



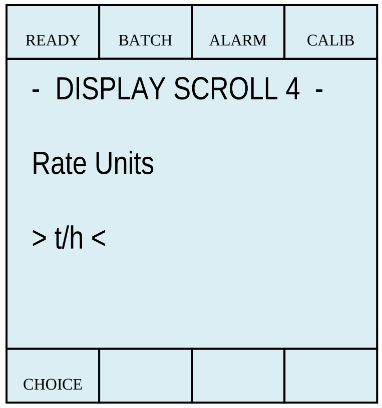
1. Standard U.S. tons (equivalent to British “short tons”) per hour (“Tph”) is the default value.

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/hr”—Pounds per hour

3. Press the down-arrow button to bring up the load-cell units screen (go to page 2-25).

Metric Rate Units

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



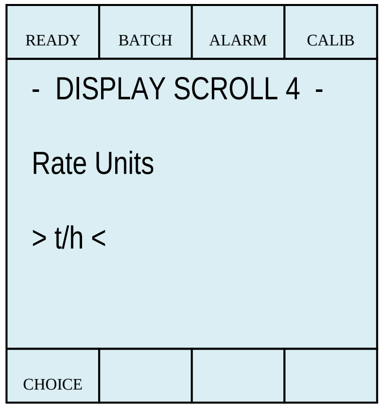
1. Metric tonnes per hour (“t/h”) is the default value.

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

3. Press the down-arrow button to bring up the load-cell units screen (go to page 2-25).

Mixed Rate Units

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



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

3. Press the down-arrow button to bring up the load-cell units screen (see the next section).

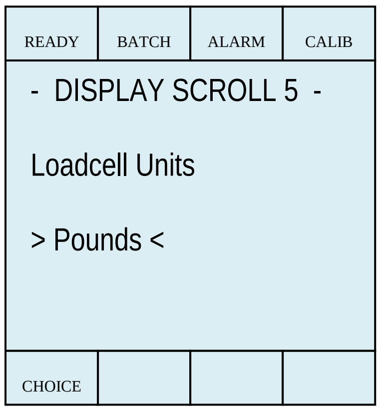
Setting the Load-Cell Units

As a general rule, when setting the load-cell units, use the following as a guide.

- If you are using English units, select pounds.
- If you are using metric units, select kg.

The only choices in this menu are to use either pounds or kilograms.

The Micro-Tech display should look something like this.



1. Accept the default value (“Pounds” or “kg”).

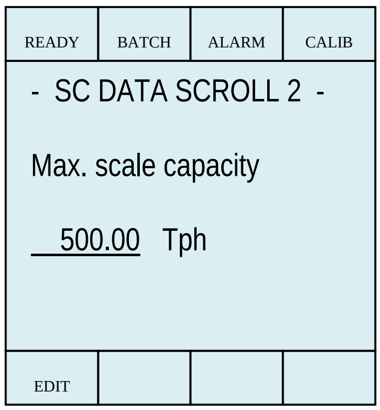
2. To choose a different load-cell unit (for example because you are using a custom load cell in your particular application), press the Choice button, then press the Enter button.

3. Press the down-arrow button to bring up the maximum scale-capacity screen (see the next section).

Entering the Maximum Scale Capacity

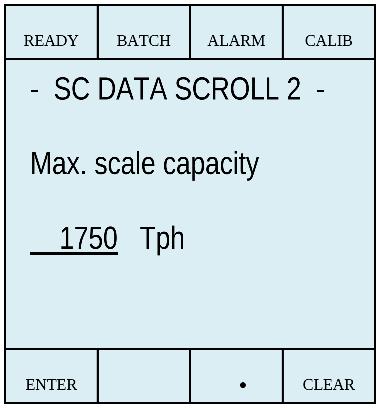
This menu allows you to enter the maximum scale capacity of the particular scale you are using in your facility. Please note that the maximum scale capacity is expressed as a *rate*—for example, tons per hour (Tph), tonnes per hour (t/h), and so on. In other words, do *not* enter the maximum weight the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



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 tons per hour, 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, including the decimal point.
   - The maximum rate (that is, the scale capacity) cannot exceed 200,000 units of measure.

2. We entered 1,750 tons per hour (Tph), as shown below.



3. Press the Enter key.

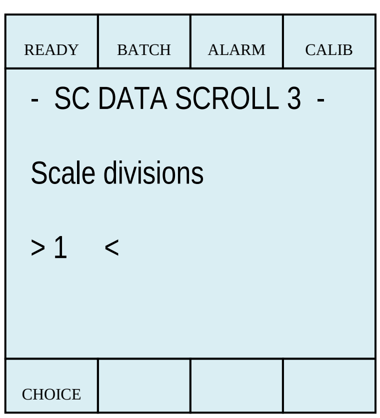
4. Press the down-arrow key to bring up the scale-divisions screen.

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 1,750 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—1742.8 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.



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, and 0.01.

2. To choose the appropriate scale division, press the Choice button until the division you want is displayed, then press the Enter button.

3. Press the down-arrow key to bring up the belt-scale-code screen.

Entering the Belt-Scale Code

This menu requires you enter the *belt-scale code* for the particular scale you are using in your facility. The current weigh-bridge configurations offered by Thermo Fisher Scientific as well as the necessary belt-scale codes, are listed in **Table A–1** in Appendix A. In addition, your specific weigh-bridge configuration should be listed on the “Scale Data Sheet” and the “Door Label” that accompanied your Micro-Tech.

The Micro-Tech display should look like this.

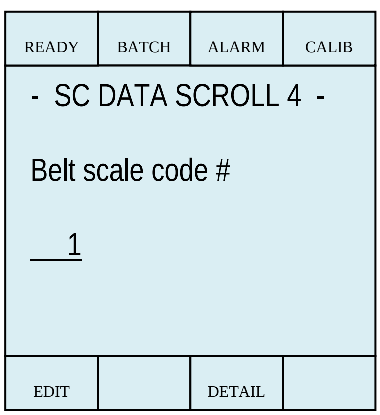


Figure 2–11. Belt-Scale-Code Entry Screen

NOTE. You *absolutely must* enter the correct belt-scale code in this menu for the Micro-Tech to work properly with your particular weighing system. This is the most critical step in the entire set-up process! ▲

1. To enter the correct belt-scale code, press the Edit button and use the keypad to enter the appropriate value.

2. Press the Enter button to return to the belt-scale-code entry screen.

Entering the Appropriate Conveyor Data

Depending on which belt-scale code you selected, the Micro-Tech will now display a list of the conveyor and scale parameters it needs to know to work properly with your particular system. You should already have entered the needed values in **Table 2–1** or **Table 2–2**.

The basic idea here is to press the Details button, then repeatedly press the down-arrow button, which allows you to scroll through a list of parameters to make quite sure they are correct.

NOTE. You *must* check the conveyor values suggested by the Micro-Tech. If there is a mismatch between the suggested values and the *actual* values for your particular conveyor system, you *must* enter the correct values into the Micro-Tech. Incorrect parameters in these menus may lead to inaccurate weight readings when the Micro-Tech is put into operation. ▲

To check the parameters, do the following.

1. The first thing to do is to locate the Micro-Tech's System Data Sheet (see Appendix A for an example of what this looks like) and grab your filled-in copy of **Table 2–1** or **Table 2–2**. Make sure you have these in front of you, as you work through the following Micro-Tech set-up menus.

2. Make sure the screen shown in **Figure 2–11** above is currently being displayed.

3. Press the Details button, and the first parameter appears. Your list of parameters will, most likely be different, from the ones shown below. These are just *examples* of a typical set-up menu, and are here to show you how the process works. The general outline is the same for all systems, but the specifics may be different.

Pivot-to-Load-Cell Distance

The pivot-to-load cell distance is explained in **Figure 2–1**. Check the value. Press the down-arrow button to move on.

Number of Weigh Idlers

Check the value, then press the down-arrow button to move on.

Pivot-to-First-Idler Distance

The pivot-to-first-idler distance is explained in **Figure 2–3**. Check the value. Press the down-arrow button to move on.

Pivot-to-Test-Weight Height

The pivot-to-test-weight height is explained in **Figure 2–4**. Check the value. Press the down-arrow button to move on.

Pivot-to-Test-Weight Length

The pivot-to-test-weight length is explained in **Figure 2–5**. Check the value. Press the down-arrow button to move on.

Pivot-to-Carriage Height

The pivot-to-carriage height is explained in **Figure 2–6**. Check the value. Press the down-arrow button to move on.

Roller-to-Stringer Height

The roller-to-stringer height is explained in **Figure 2–7**. Check the value. Press the down-arrow button to move on.

Number of Load Cells

Check the value, then press the down-arrow button to move on.

Idler Spacing

The idler spacing is explained in **Figure 2–8**. Check the value. Press the down-arrow button to move on.

Conveyor Angle

The conveyor angle is explained in **Figure 2–9**. The default value is zero degrees, meaning your conveyor runs in the horizontal position.

1. If the conveyor runs at an incline, (positive or negative), press the Edit button.
2. Use the keypad to enter the correct angle. (The default is a *positive* incline.)
3. To enter a negative incline, press the “+/–” button to display a negative sign in front of the number.
4. Press the Enter button.
5. Press the down-arrow button to move on.

Load Cell Capacity, Sensitivity, and Resistance

Every load cell has a cord to which is attached a label that displays the capacity, sensitivity, and resistance of the load cell. Please refer to **Figure 2–10** for information about locating this label. You must enter the resistance separately for each load cell.

Setting the Speed Input

For more information about speed inputs, see page 2-10. Your choices in this menu are as follows.

- Single—Your conveyor is equipped with one speed sensor.
- Two—You have two conveyors, each equipped with a speed sensor.
- Simulated—There is no speed sensor attached to your conveyor(s).

Establish Test Duration

To start entering the data the Micro-Tech needs to establish the test duration for your scale, do the following.

1. Use the arrow buttons to navigate to the Test Duration screen, which looks like this.

READY	BATCH	ALARM	CALIB
- CAL DATA SCROLL 11 -			
Nr. of test duration			
> 1 <			
CHOICE			

Nr. = Number.

The zero test can be either “long” or “short.” You should *always* use the long test when initializing the Micro-Tech. The long and short tests are assigned the following code numbers.

- Long-duration test = 1
- Short-duration test = 2

2. To accept the long-duration test (code = 1), press the down-arrow button and the following screen appears.

READY	BATCH	ALARM	CALIB
- CAL DATA SCROLL 12 -			
Establish test duration			
ACQ		MANUAL	

3. Press the Manual button and the following screen appears.

READY	BATCH	ALARM	CALIB
Start belt. Press CONTINUE when belt is at maximum speed			
ABORT	CONTINUE		

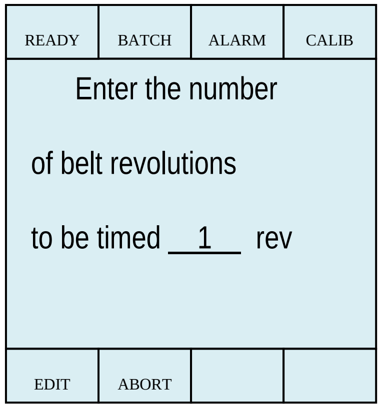
NOTE. The belt must be running *empty* and at maximum speed during the procedure to establish the appropriate test time. Pressing the Abort button at any time returns you to the “Establish Test Duration” screen. ▲

4. Start the belt and, when it is running at maximum speed, press the Continue button. The following screen appears. (The default value is 200 feet.)

READY	BATCH	ALARM	CALIB
Ent. len. of one belt revolution Length __200__ ft			
EDIT	ABORT		

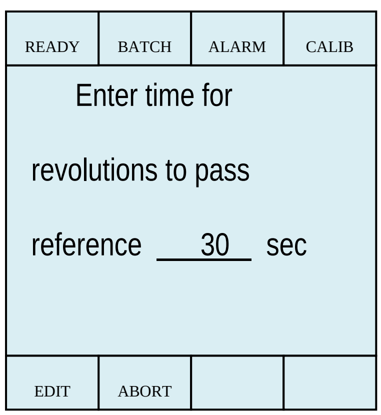
5. Press the Edit button and use the keypad to enter the length of the belt. (We entered 120 feet, as described in our example on page 2-11)

6. Press the Enter button and the following screen appears.



7. Press the Edit button. Use the keypad to enter the number you calculated earlier (and entered in **Table 2–1** or **Table 2–2**) for the "Number of revolutions for test." (We entered 5 revolutions, as described in our example on page 2-11.)

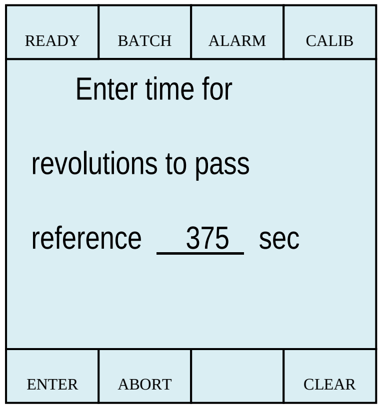
8. Press the Enter button and the following screen appears. (The default value is 30 seconds.)



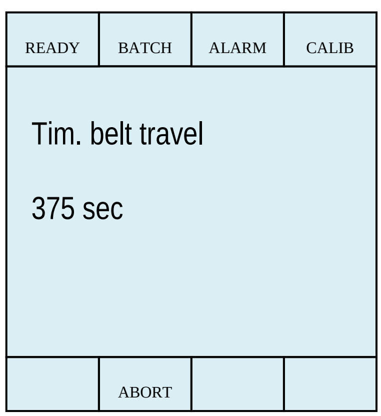
9. Press the Edit button. Use the keypad to enter the number you calculated earlier (and entered in **Table 2–1** or **Table 2–2**) for the

"Time to complete test revolutions." (We entered 375 seconds, as described in our example on page 2-11.)

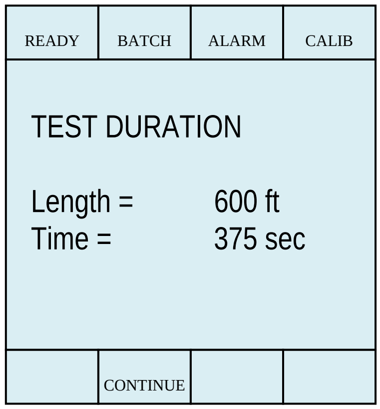
10. Your screen should now look something like this.



11. Press the Enter button and the following screen appears. The time display will start counting down to zero. The Micro-Tech is now performing the initial zero calibration—as shown by the Calibration LED, which comes on.

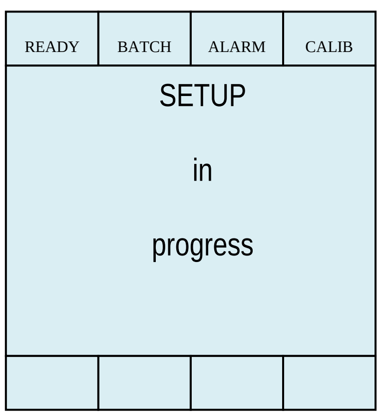


12. When the count-down reaches zero, the following screen appears, telling you how many feet of belt in total was tested, and the time (in seconds) it took to complete the test. (The data in your screen will, of course, be different.)

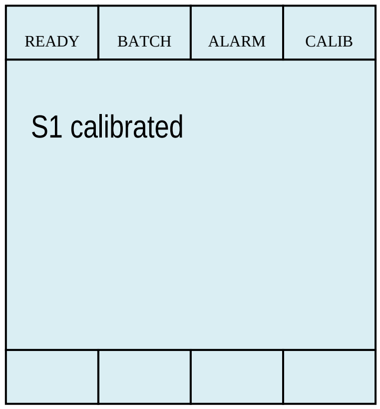


(In our example, belt length =120 ft. So, 600 feet [120 x 5] were tested during five revolutions of the belt.)

13. Press the Continue button and the following screen appears. The Micro-Tech is now setting the appropriate span number for the scale.

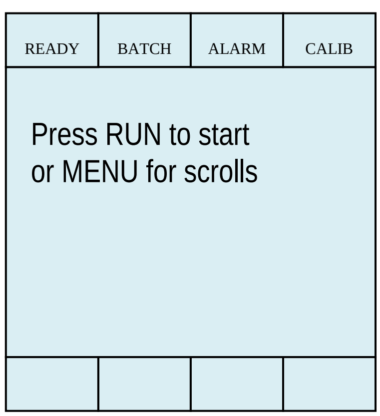


14. When the span number has been set, the following screen appears briefly in the display. Notice that the red “Alarm” LED in the console goes off and the green “Ready” LED comes on.

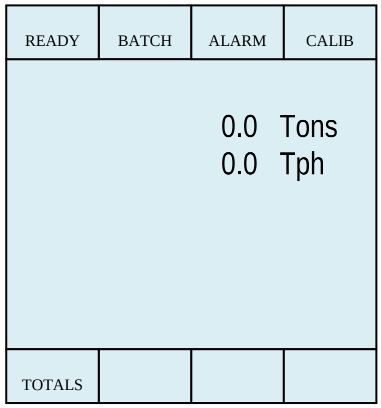


If you get an “S1 not calibrated” message, check all the numbers you entered in your Initialization Data Summary table (**Table 2–1** or **Table 2–2**). Then go back to the “Entering the Appropriate Conveyor Data” section above (see page 2-29) and carefully re-enter all the data into the Micro-Tech. If the calibration fails again, check the load cell (or cells) are working and sending signals to the Micro-Tech.

15. After a brief pause, the following screen appears.



16. Press the Run button and the Micro-Tech Run screen appears, which looks like this.



The Next Step

The next step is to go to the “Calibrating the Micro-Tech” section on page 3-5 to perform the initial zero and span calibrations for your scale. This is a *very important* step, because the scale will not give accurate readings until these calibrations are done.

NOTE. You *must* perform an initial zero and span calibration before operating your scale. ▲

Chapter 3
Operation

Overview

This chapter describes the Micro-Tech console and tells you how to operate and calibrate the Micro-Tech on a day-to-day basis.

Using the Console

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

- Display screen
- Keypad
- Soft keys
- Status LEDs

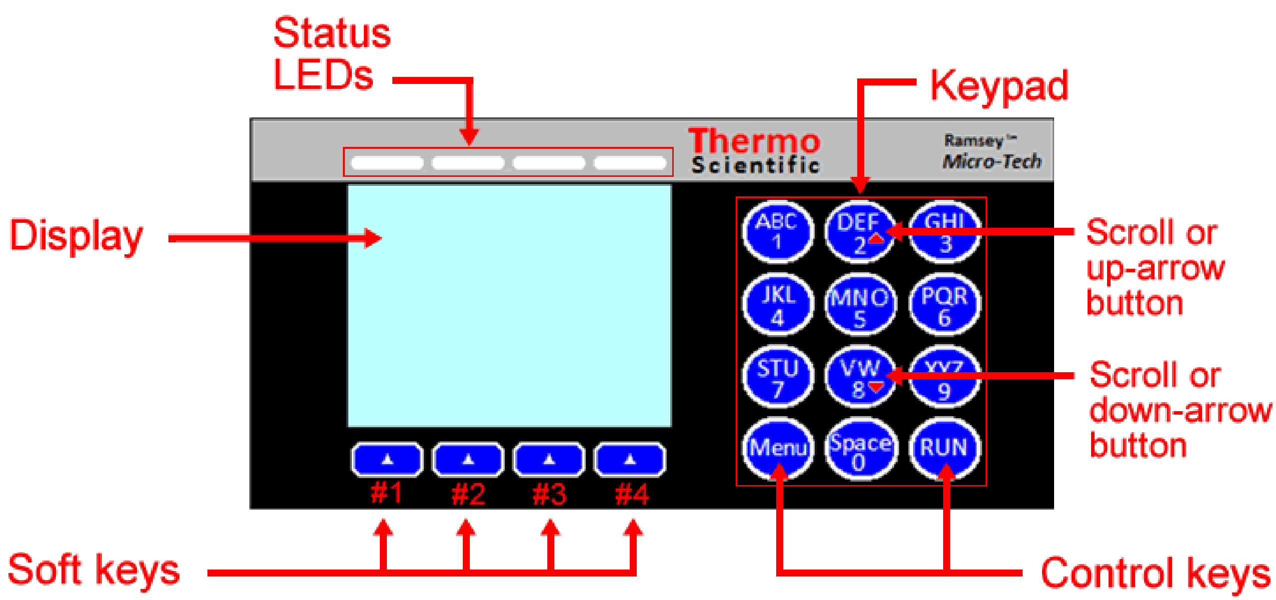


Figure 3–1. Main Features of the Micro-Tech Console

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.

Status LEDs

The status LEDs above the display, when lighted, alert you to the fact that the Micro-Tech is currently in either the Ready, Batch, Alarm, or Calibration mode.

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. Start the conveyor running and begin loading it up.

Run Screen

The screen below is known as the Run screen. it shows the total tons (Tons) that have crossed the scale since the values were last reset, as well as the tons per hour (Tph) of material that is currently running over the scale.

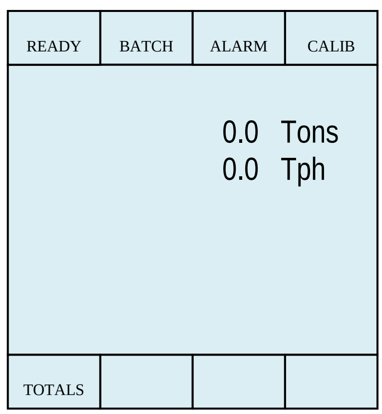
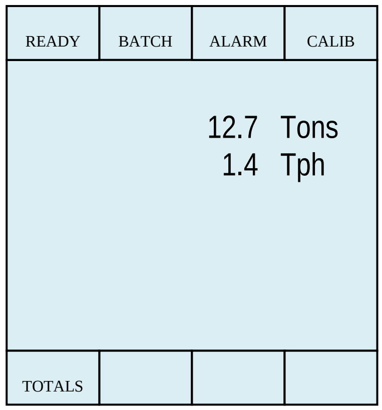


Figure 3–2. Run Screen

Viewing the Totals

The Micro-Tech continuously monitors your scale and continuously updates the figures for total tons (Tons) and tons per hour (Tph). So, after operating the scale for a while, the display should look something like this. (Your totals will be different, and your units of measurement may be different, because, for example, you chose metric units when setting up the Micro-Tech.)



Resetting the Totals

There are three totals, as follows.

- Master Total
  This works like the odometer on a vehicle, and records the total amount of weight that has crossed the scale since the Micro-Tech was first put into operation. And, like a vehicle's odometer, it can be used to decide when scheduled maintenance is due on the conveyor and/or scale. The Master total can *only* be reset by the system administrator at your facility, or by a Thermo Fisher Scientific service technician.

- Reset Total
  This total can be reset.

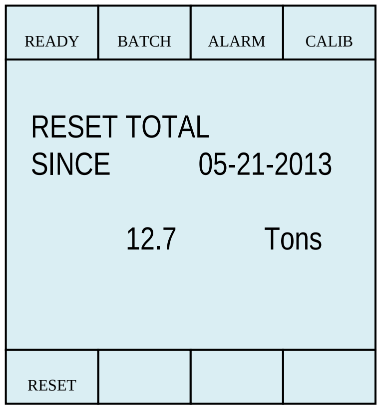
- Operator Total
  This is a second resettable total and records the total for an individual operator, if you have set up this feature.

Resetting the Reset and Operator Totals

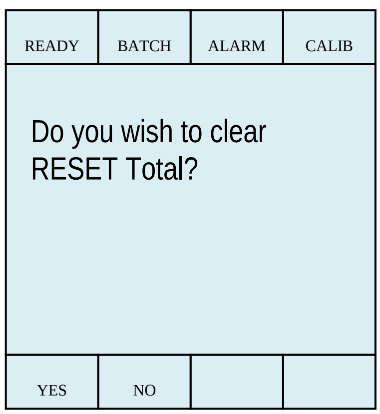
The Reset and Operator totals can be reset by doing the following.

1. Make sure the Run screen (see **Figure 3–2**) is currently being displayed.

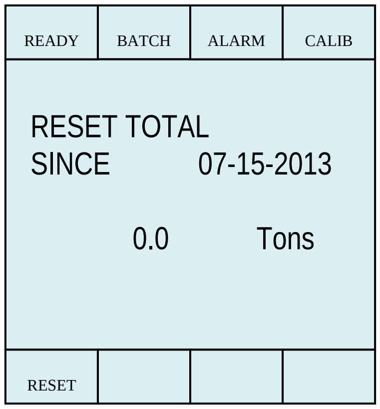
2. Press the Totals button and the reset screen appears.



3. Press the Reset button and the confirmation screen appears.



4. Press the Yes button. The total is cleared and today’s date (which in our example is July 15, 2013) appears as the reset date.



5. To return the Micro-Tech to the operating mode, press the Run button.

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 scale is optimized.

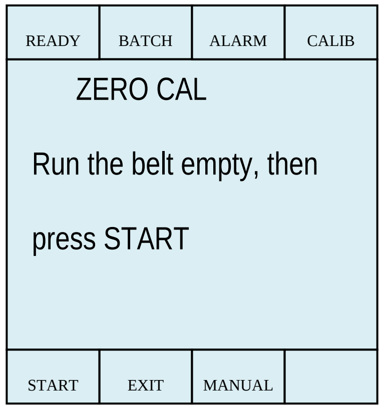
Doing a Zero Calibration

To run a zero calibration on your scale, do the following.

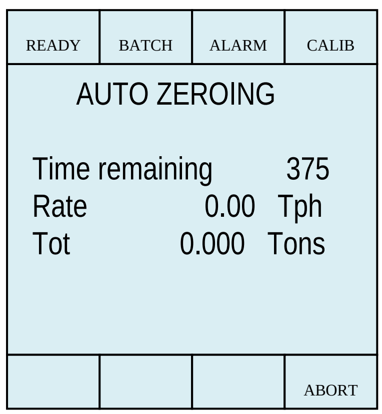
1. Make sure the Run screen (see **Figure 3–2**) is currently being displayed.

2. Press the Menu button and the “Main Menu 1” screen appears.

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

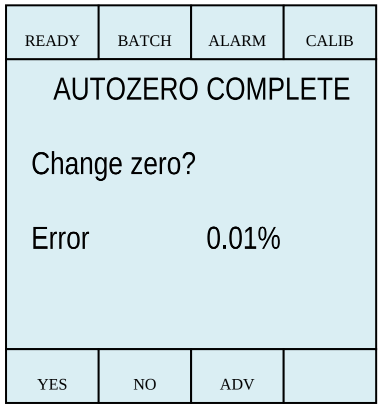


4. Make sure the belt is running empty and at maximum speed, then press the Start button. The count-down screen appears. (The data in your screen will, of course, be different.)



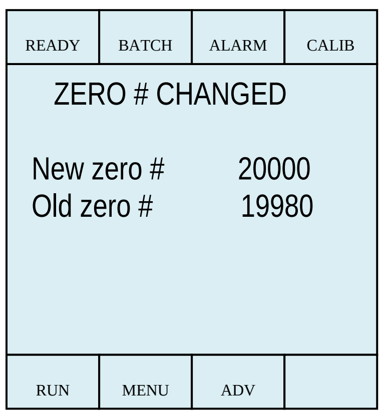
NOTE. The number of seconds shown in “Time remaining” is calculated based on the current speed-sensor pulse frequency, and estimates the time remaining for a complete test. ▲

5. The calibration time (in seconds) that you established during the Micro-Tech cold-start procedure, will start counting down. When the counter reaches zero, the calibration is complete and the change-zero screen appears.



In our example, the display shows that the newly established zero is just 0.01% different from the previous zero, meaning that both zeros are essentially the same and the scale is performing consistently. However, as there has been a small amount of drift, we decide to reset the zero to the newly established zero point.

6. Press the Yes button to accept the new zero, and the zero-changed screen appears.



7. Press the Run soft key in the display to return the Micro-Tech to the Run mode.

8. Run several zero calibrations to assess the repeatability of the readings.

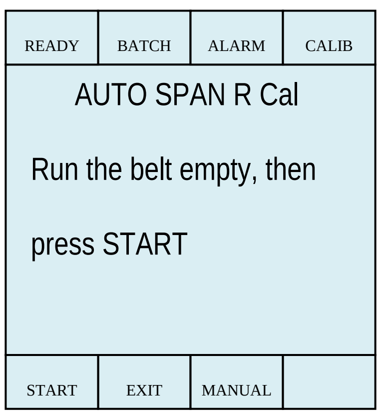
Doing an R-Cal Span Calibration

To perform an R-Cal span calibration for your scale, do the following.

1. Make sure the Run screen (see **Figure 3–2**) is currently being displayed.

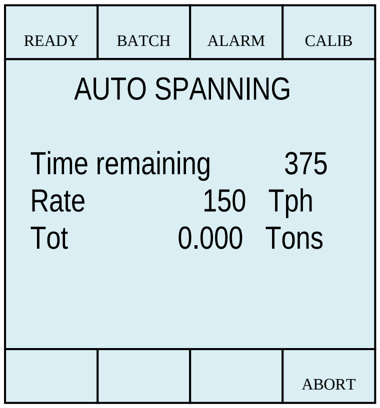
2. Press the Menu button and the "Main Menu 1" screen appears.

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



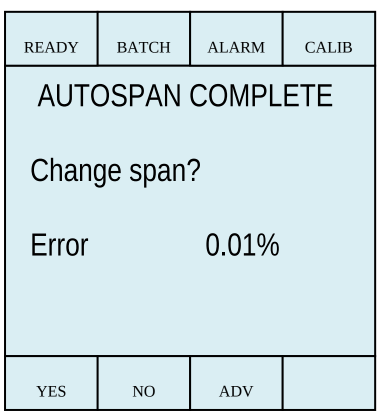
If the R-Cal auto-span option (shown above) is *not* displayed, go to page B-5 to change the span calibration method. (For additional information about the Calibration menu, go to page B-22.)

4. Make sure the belt is running empty at maximum speed, then press the Start button. The count-down screen appears. (The data in your screen will, of course, be different.)



NOTE. The number of seconds shown in “Time remaining” is calculated based on the current speed-sensor pulse frequency, and estimates the time remaining for a complete test. ▲

5. The calibration time (in seconds) that you established during the Micro-Tech cold-start procedure, will start counting down. When the counter reaches zero, the calibration is complete and the change-span screen appears.



Performing an R-Cal For the First Time During Initialization

If you are performing an R-Cal for the *first time* as part of the Micro-Tech initialization process, make sure that the R-Cal error is less than 0.75%. (If the error is greater than 0.75%, there may be a problem. See the manual's the troubleshooting section on page 4-1 for additional help.)

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

6. Press the Yes button to set the span.

7. Press the Run button (in the display not the keypad) to return the Micro-Tech to the Run mode. Congratulations! You are now ready to put your Micro-Tech into operation.

Performing Any Subsequent R-Cal

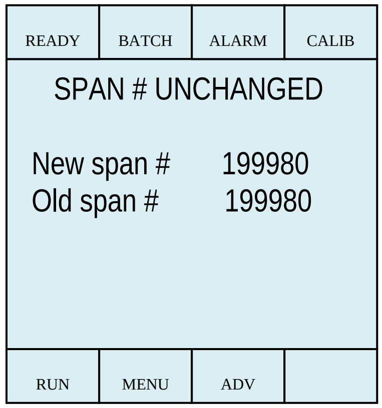
Once you have initialized your Micro-Tech and are doing an R-Cal as part of your weekly, daily, or other routing testing, proceed as follows.

In the example screen above, the display shows that the established span is just 0.01% different from the previous span, meaning that both spans are essentially the same and the scale is performing consistently. This error is below the critical threshold error of 0.5% (or 0.25% for a Model 9201 integrator). As a result, the span should *not* be changed. Record the span results for future reference.

However, if the error is greater than 0.5% (0.25% for Model 9201 integrator), there may be a problem—see the manual's troubleshooting section in the following chapter for additional help. Record the span results for future reference.

(The numbering below is continued from page 3-8.)

6. This is important! Press the No button (that is, *do not change* the span) and the following screen appears. (Your numbers will, of course, be different.)



7. Press the Run soft key in the display to return the Micro-Tech to the Run mode.

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

Chapter 4
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 5. 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 5. To expedite your service request, please have your Micro-Tech model, serial number, and belt-scale code available.

Critical Checkpoints

The Micro-Tech Integrator 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 scale.

Question	Answer
What is the best way to calibrate my scale?	The best way to calibrate your scale is to use the "Material Calibration" method. (For details, see page B-13.) If, for whatever reason, you cannot perform a Material Calibration on your scale, you can run a number of "simulated-calibration" tests. For example, all Micro-Techs can be calibrated using the "R-Cal" procedure, but you must have purchased the optional equipment allowing you to run these simulated tests.
How often should the zero and span be calibrated?	As a general rule, if you make or receive payments based upon the weight readings from your scale, the scale should be zeroed daily and the span checked weekly. • Your scale 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. If an external contractor is responsible for maintaining your scale, he or she will establish an appropriate schedule for testing your scale's zero and span.
How often should I check the mechanical installation of the scale?	The scale should only need daily preventive-maintenance checks for material build up in critical areas, such as under the weigh idlers. The exception to this is, when changes are made to the scale area—for example, when the belt or idlers are replaced. The scale area includes not only the weighbridge, but also the idlers that are shimmed with scale. • A 10-20-1 scale system's scale area includes +3 to -3 of scale. • A 10-14-4 scale area includes +5 to –5. Any maintenance in this area should be realigned, shimmed, and spaced to the proper specifications. If in doubt, please contact Thermo Fisher Scientific for the correct specifications.
Why do I need to see repeatability during calibrations?	The repeatability of a scale is important for the accuracy of the scale. If the scale cannot repeat tests within the scale's percentage of accuracy, then you should investigate why the scale is not repeating within the appropriate tolerances.
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?	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.

Question	Answer
Can I put a 100 lb. weight on the weighbridge and see a reading of 100 lbs. in the Run screen?	The short answer is “No,” because a weight is not a rate. The signal delivered by the load cell or cells, which represents the weight per unit length of the belt (lbs./ft), is multiplied by the signal delivered by the speed sensor, which represents the belt speed (ft/min). The result of this operation is the instantaneous flow rate (lbs./ft x ft/min = lbs./min), which is then multiplied by a suitable constant to obtain the value in the required engineering units (kg/h, Tph, and so on). An adjustable damping filter is provided separately for the displayed rate and current outputs.
What kind of information is available from the digital output?	The programmable outputs are as follows. • Alarm cumulative • Shutdown cumulative • Ready • High load • Low load • High rate • Low rate • High speed • Low speed • Totalization pulse (remote counter) • Print ready • Load weights • Out of range • Deviation alarms

Load-Cell Problems

This topic helps you solve problems with the load-cell circuitry, and is divided into three sections that deal with the following components. Please check which kind your particular system has before proceeding.

- Four-wire load cell—with *no* field sense leads.
- Four-wire load cell—with field sense leads.
- Six-wire load cell—with field sense leads.

Overview

A load-cell signal failure is usually caused by one of the following.

- Failed load cell
- Bad or incorrect wiring
- Failed A/D converter

The troubleshooting procedures detailed below consists of four simple checks, as follows.

- Verify excitation/sense voltages.
- Verify proper sense jumper settings.
- Verify load cell mV signal at the Micro-Tech is within range.
- Verify load cell mV signal at the junction box is within range.

The Micro-Tech has a Diagnostics menu to help you troubleshoot the load cells. Go to “Main Menu 3—Diagnostics.” Two menus pertain to load-cell troubleshooting, as follows.

- A/D Gross and A/D Net (Diagnostic Scroll 1)
- Weight on Load Cell (Diagnostic Scroll 2)
  This is a digital representation of the mV signal coming from the load cell. The Micro-Tech maximum A/D is equal to 103,009 at 30 mV. Weight at the load cell can be calculated using either A/D counts or mV input. Refer to the figure below.

$$\frac{\text{measured DC mV}}{\text{exc. Volts * LC mV/V}} * \text{Total load cell capacity} = \text{Weight at the load cell}$$

3 mV/V	$\frac{\text{A/D Gross}}{103009} * \text{Total load cell capacity} = \text{Weight at the load cell}$
2 mV/V	$\frac{\text{A/D Gross}}{68673} * \text{Total load cell capacity} = \text{Weight at the load cell}$
1.8 mV/V	$\frac{\text{A/D Gross}}{61806} * \text{Total load cell capacity} = \text{Weight at the load cell}$

The following sections contain detailed wiring diagrams for the load-cell set-ups listed below to help you troubleshoot your particular system.

- Four-wire load cell—with *no* field sense leads.
- Four-wire load cell—with field sense leads.
- Six-wire load cell—with field sense leads.

Four-Wire Load-Cell, No Sense Leads

Please refer to the figure below for more information about four-wire load cells with *no* field sense leads. Model 9101 Sense Jumpers shown below. See "Appendix A – Premium A/D Jumper Locations" for Model 9201 jumper locations.

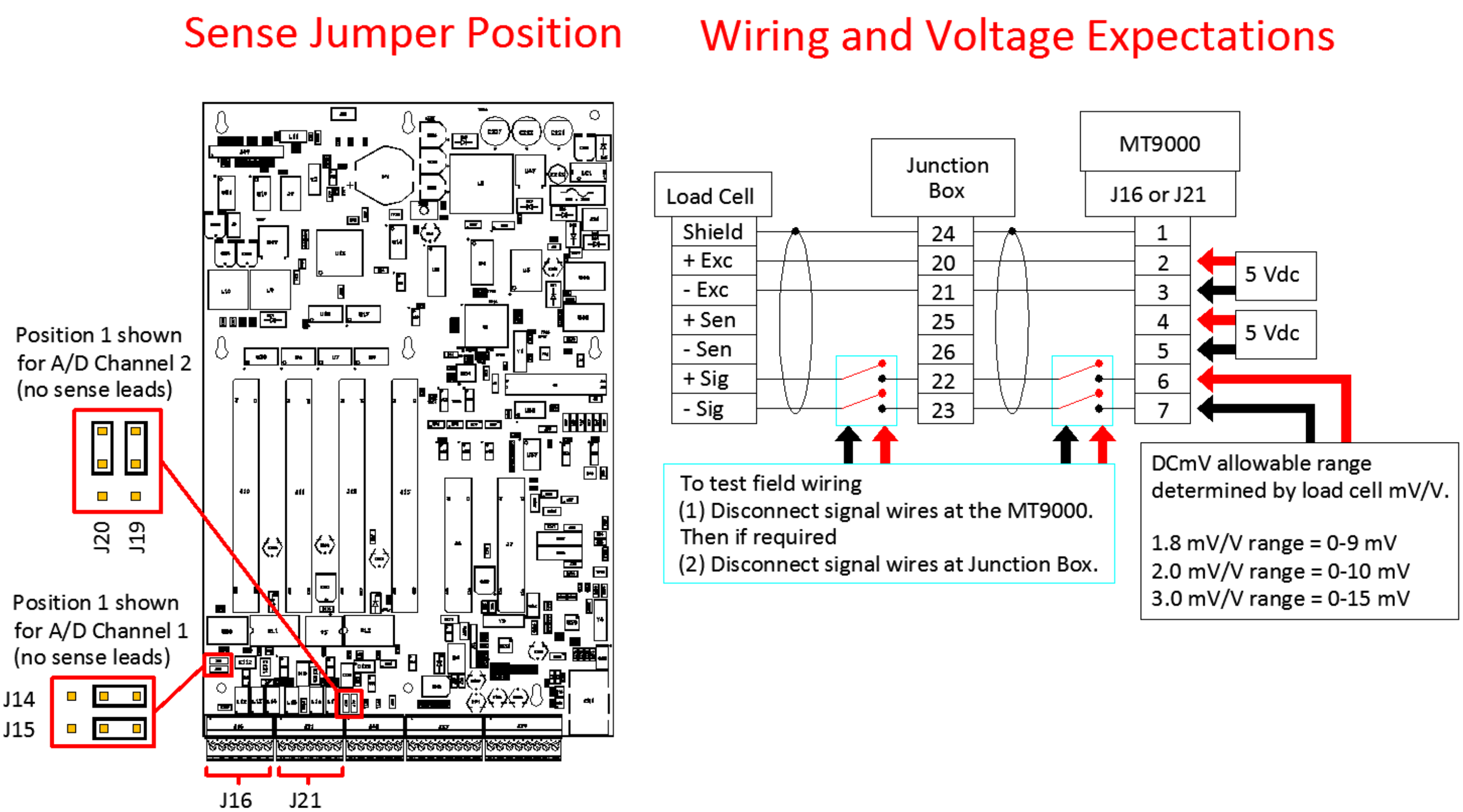


Figure 4–1. Four-Wire Load-Cell, No Sense Leads

Four Wire Load-Cell, With Sense Leads

Please refer to the figure below for more information about four-wire load cells *with* field sense leads. Model 9101 Sense Jumpers shown below. See “Appendix A – Premium A/D Jumper Locations” for Model 9201 jumper locations.

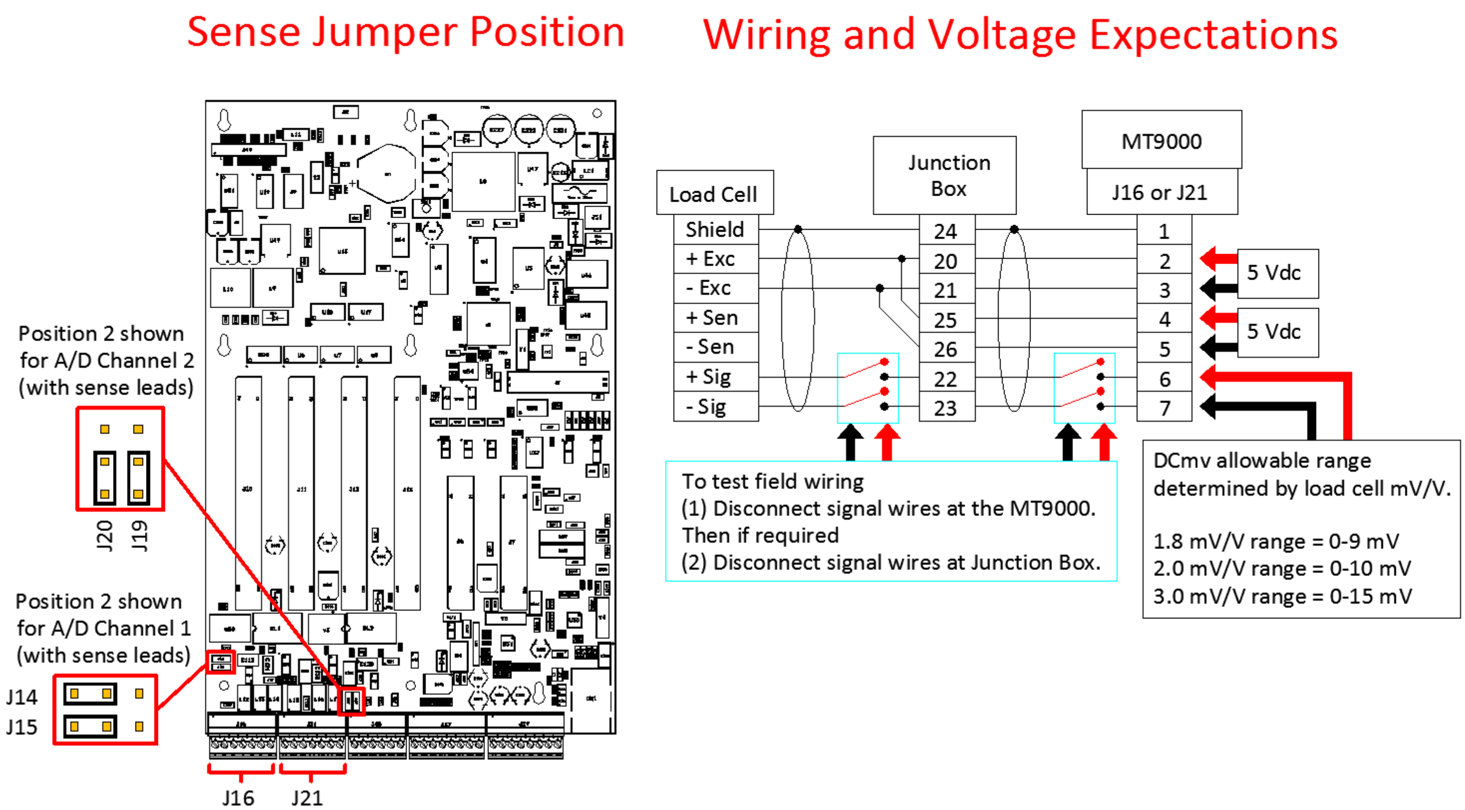


Figure 4–2. Four-Wire Load-Cell, with Sense Leads

Six-Wire Load-Cell With Sense Leads

Please refer to the instructions and figure below, when troubleshooting six-wire load cells *with* field sense leads. Model 9101 Sense Jumpers shown below. See “Appendix A – Premium A/D Jumper Locations” for Model 9201 jumper locations.

1. Verify load-cell excitation voltage. Is excitation voltage (terminals 2 and 3 of J16 and/or J21) 5VDC?
   - If NO—Disconnect all load-cell wires and recheck. If excitation voltage is now good, check load cell and field wiring.
   - If YES—Proceed to verify load cell sense voltage (see step 2).

2. Verify load-cell sense voltage. Is sense voltage (terminals 4 and 5 of J16 and/or J21) 5VDC?
   - If NO—Verify proper position of sense jumpers (see page A-28).
   - If YES—Proceed to verify load cell mV output (see step 3).

3. Verify load-cell mV output(s). Is load-cell mV output within range of mV/V at MT9000 (terminals 6 and 7 of J16 and/or J21)?
   - If NO—Disconnect load-cell signal wires. Recheck mV at the disconnected wires. If still outside mV/V range, proceed to verify load-cell mV output at junction box.
   - If YES—Load-cell circuitry is good.

4. Verify load-cell mV output at junction box. Disconnect load-cell signal wires from junction box. (terminals 22 and 23). Is load cell mV output within range of mV/V?
   - If NO—Replace load cell.
   - If YES—Load-cell circuitry is good.

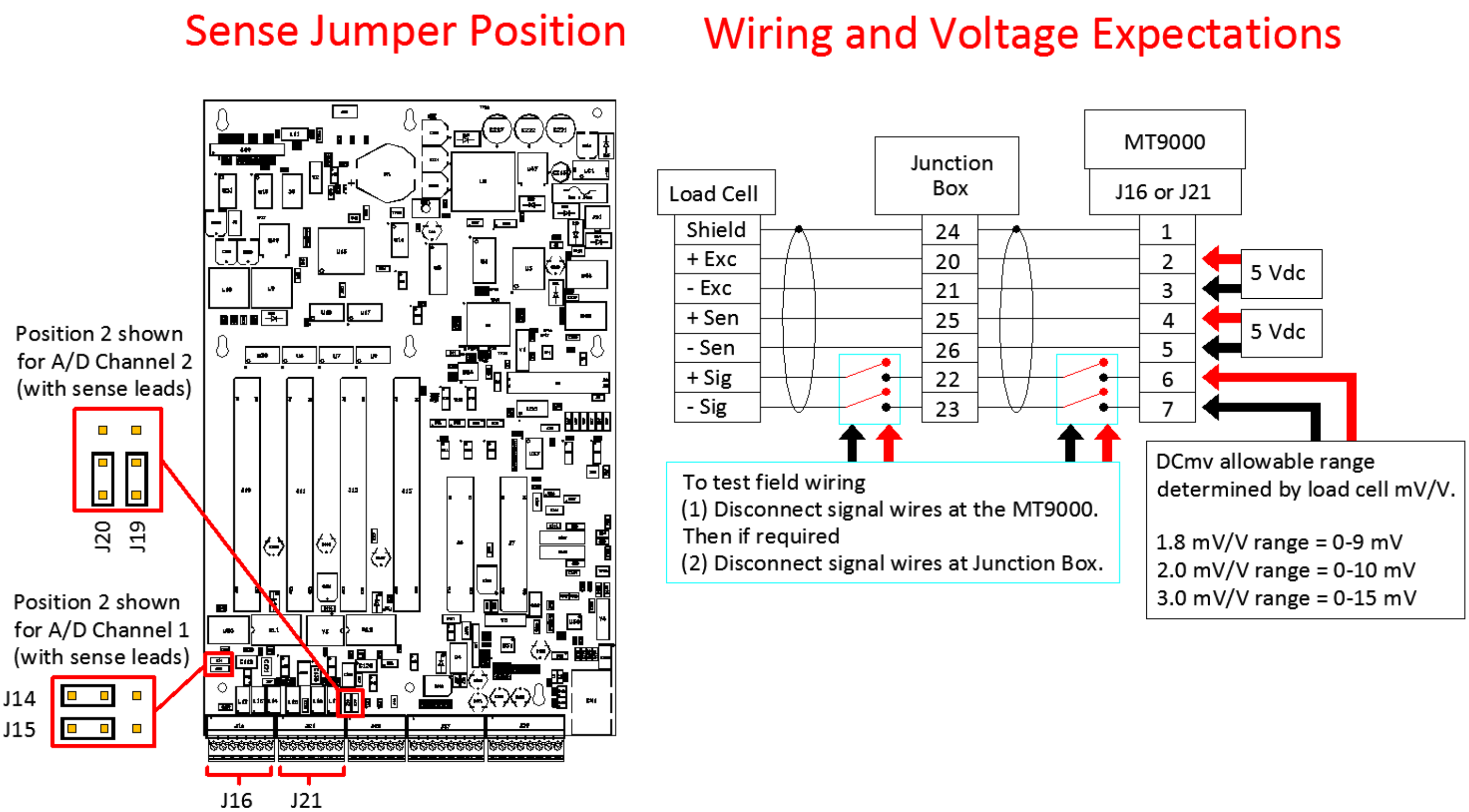


Figure 4–3. Six Wire Load-Cell, with Sense Leads

Analog Input/Output Problems

This section helps you troubleshoot the Micro-Tech's analog input/output circuitry. There are two types of optional analog output printed-circuit board assemblies, as follows.

- Populated (dual out and dual in)

- Unpopulated (single out).

The troubleshooting procedures are the same for each but the wiring is different. For this reason, both types (populated and unpopulated) are presented side-by-side below.

Overview

The troubleshooting procedures consist of two sub-sections that deal with the following. (Please be sure to follow the correct one.)

- Analog (current) output(s)
- Analog (voltage) inputs

An analog signal failure could be caused by the following.

- Failed analog board
- Bad or incorrect wiring
- Remote device failure
- CPU board failure

The troubleshooting procedures listed below consist of three simple checks, as follows.

- Source voltage confirmation.
- Verify output directly from the Micro-Tech's optional printed-circuit board assembly.
- Verify analog circuit loop.

Both analog inputs and outputs are defined in "Main Menu 4," as follows.

- Analog output (IO Define Scroll 1)
- Analog input (IO Define Scroll 2).

In addition, an analog output can be forced to a specific value in "Main Menu 3," as follows.

- Test Scroll 5A (analog output #1).

- Test Scroll 5B (analog output #2).
- The analog inputs can be viewed in “Main Menu 3—Test Scroll 7.”

Procedure

Here is the procedure for troubleshooting the Micro-Tech’s analog input/output boards.

1. Confirm the DC mA voltage source.
   - If GOOD—Proceed to “Confirm analog output” (see step 2). A dual analog output board has individual power sources.
   - If BAD—Replace either the analog board or the CPU board.

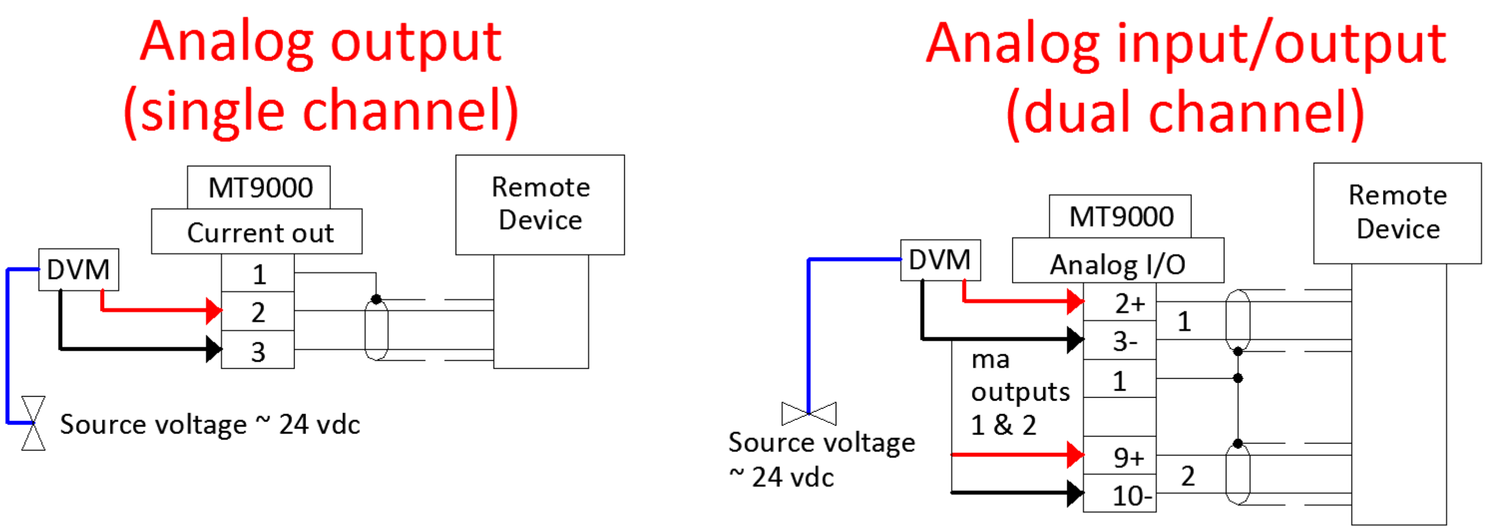


Figure 4–4. Analog Troubleshooting—Confirm Voltage

2. Confirm analog output. Disconnect remote device(s).
   - If GOOD—Proceed to “Confirm analog loop” (see step 3)
   - If BAD—Replace analog board.

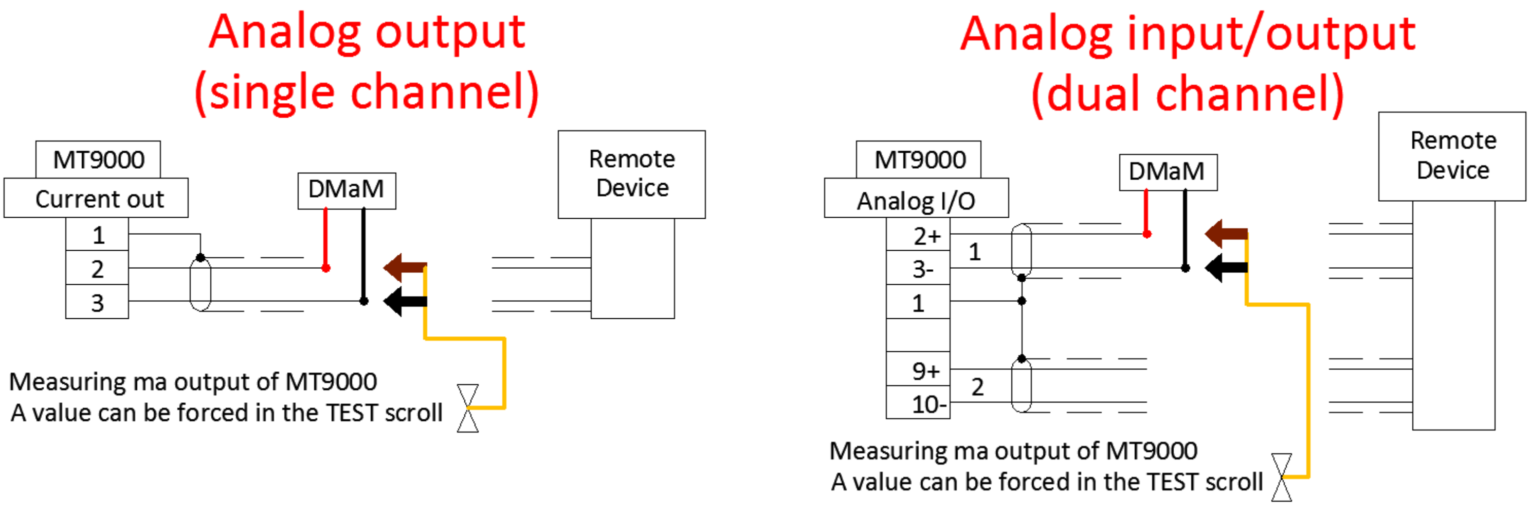


Figure 4–5. Analog Troubleshooting—Confirm Output

3. Confirm analog loop.
   - If GOOD—Analog board is performing as expected.
   - If BAD—A problem exist in either with the field wiring or in the remote device.

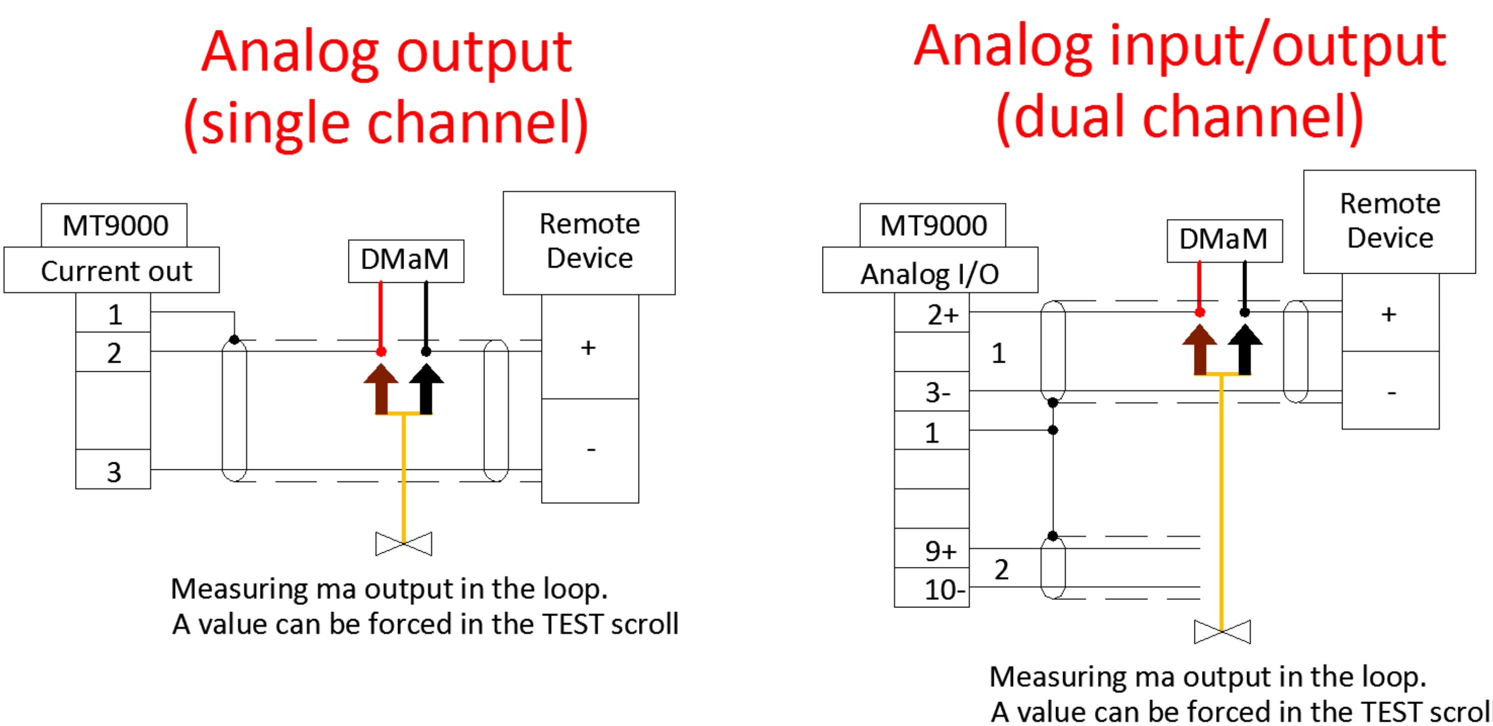


Figure 4–6. Analog Troubleshooting—Confirm Loop

4. Define analog input(s) in “Main Menu 4—IO Define Scroll 2” for Input #1) and “Scroll 3” for Input #2.

5. Verify voltage input. Measure input signal, 1-5vdc representing 0-100%.
   - If GOOD—Replace analog input/output board.
   - If BAD—Verify input jumpers J1 and/or J2, If correct, proceed to “Verify output of source device” (step 6).

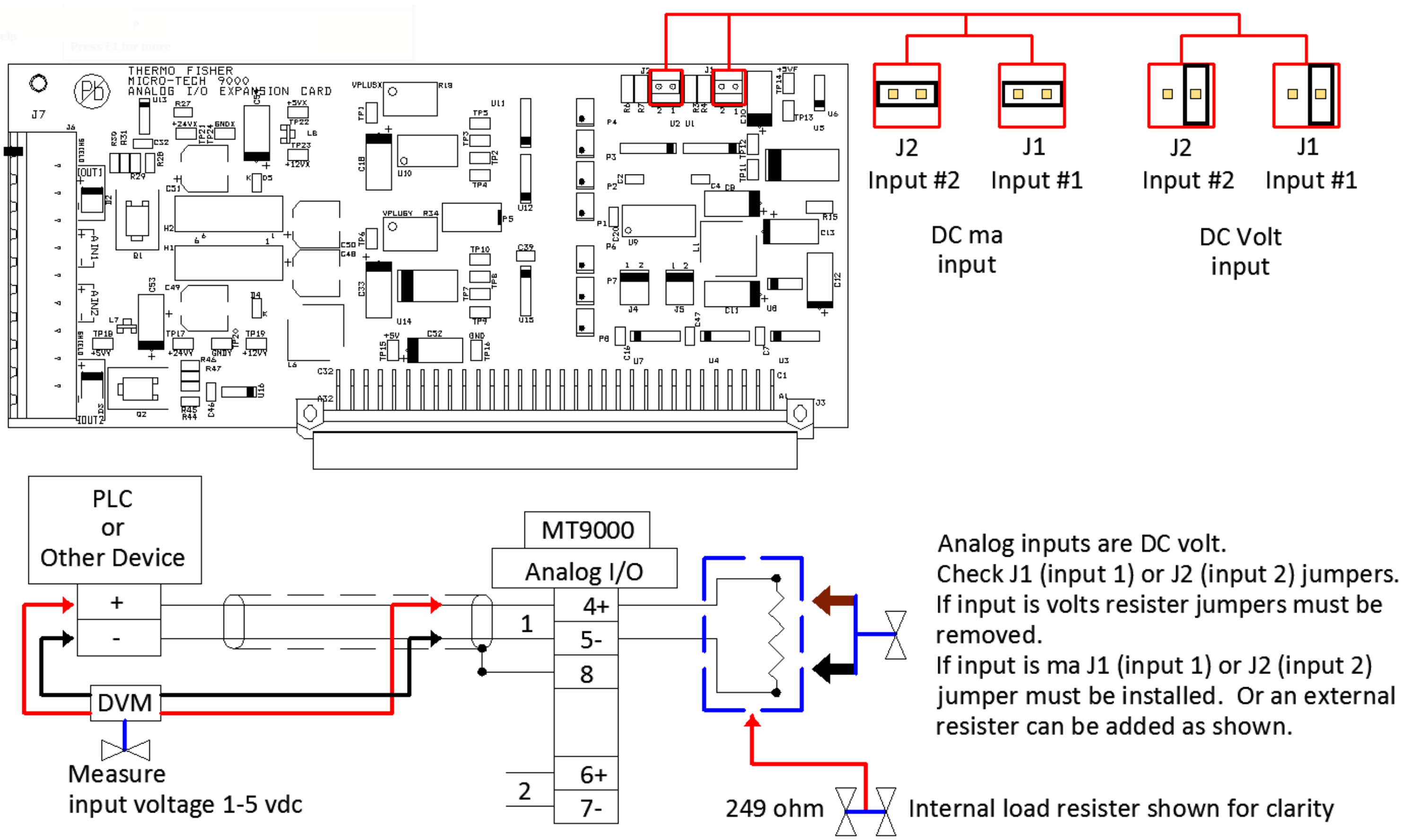


Figure 4–7. Analog Troubleshooting—Verify Input

6. Verify output of source device. Disconnect field wires and measure mA (volt) output of remote device.
   - If GOOD—Proceed to “Verify mA loop” (see step 7).

- If BAD—Verify field wiring, Remote device failure.

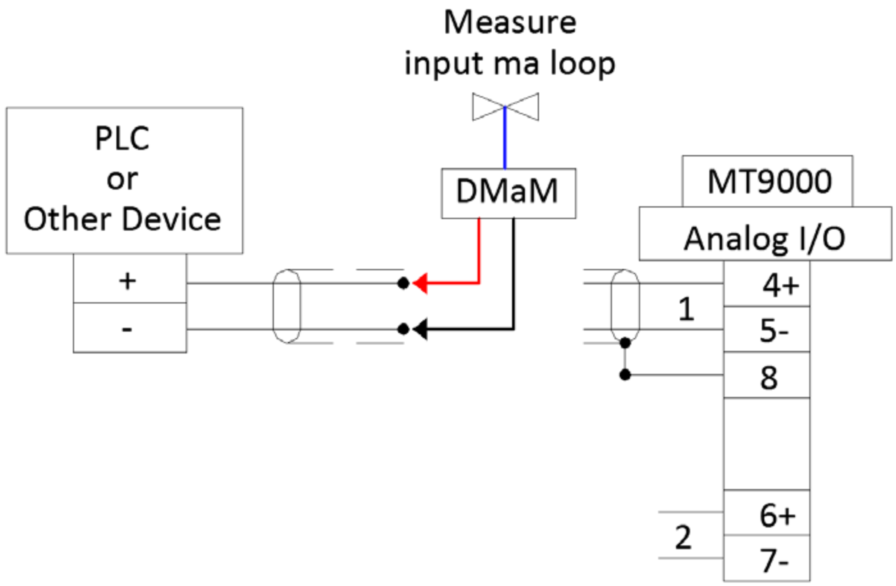


Figure 4–8. Analog Troubleshooting—Verify Source Output

7. Verify mA loop circuit. Place mA meter in series with analog loop.
   - If GOOD—Input circuit is good.
   - If BAD—Replace analog output board.

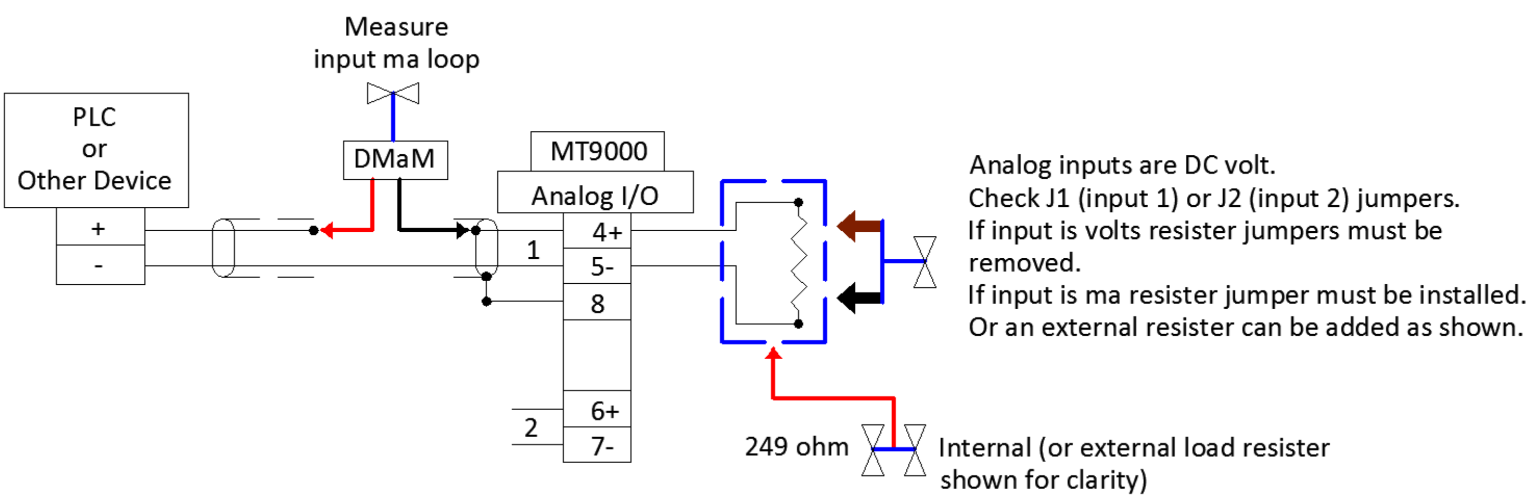


Figure 4–9. Analog Troubleshooting—Verify mA Loop

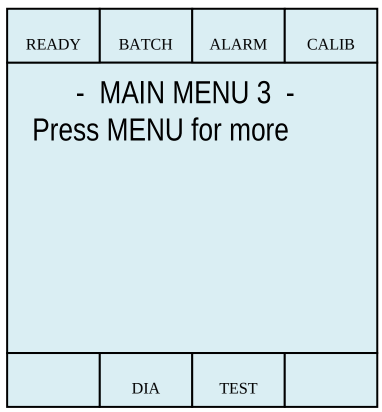
Opto22 Problems

This topic helps you solve problems with the Opto22 output and input modules. The digital outputs (J7) can be either AC or DC or a combination of both. Please note that the proper voltage Opto22 must be used. AC source voltage requires an AC Opto22 module, and a DC source requires a DC Opto22 module. The digital outputs are controlled by the Micro-Tech. The LED indicator on the Opto22 module indicates what the integrator is forcing—that is, Off (the LED is off) or On (the LED is on).

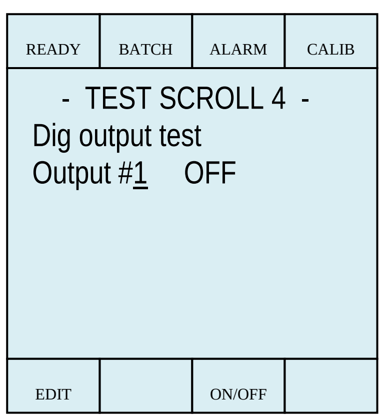
Navigating to the Digital Output Test Screen

Here is the procedure to force a digital output.

1. From the Run screen, press the Menu button three times to navigate to the “Main Menu 3” screen.



2. Press the Test button, then press the down-arrow button until the Digital Output Test screen appears.



Note: The On/Off button allows you to turn the output on or off.

3. Select the appropriate output by pressing the Edit button. Use the keypad to enter the output number, which must range from 0 to 21. A caution screen may appear, which you can ignore. Press the Continue button, and the following screen appears warning you that these changes are about to be activated and the equipment may start.

4. Press the Continue button.

Test Procedure for the Output Module

Here is the procedure to follow to test the Opto22 output module.

1. Verify the source voltage (AC or DC). Measure the source voltage.
   - If GOOD—Proceed to “Verify the output voltage” (see step 2).
   - If BAD—Supply correct voltage to digital output circuit.

2. Verify the output voltage (AC or DC). Force the selected output closed. Measure the output voltage.
   - If GOOD—Digital output circuitry is functioning as expected.
   - If BAD—Proceed to “Ohm Opto22 fuse” (see step 3).

3. Ohm Opto22 fuse. Remove and ohm the Opto22 4-amp fuse.

- If GOOD—Proceed to “View Opto LED” (see step 4).
- If BAD—Replace fuse.

4. View Opto22 LED. By forcing the output open and closed, does the LED indicate the appropriate logic condition?
   - If GOOD—Replace the Opto22 output module.
   - If BAD—Replace either the Opto22 output module or the Micro-Tech CPU board.

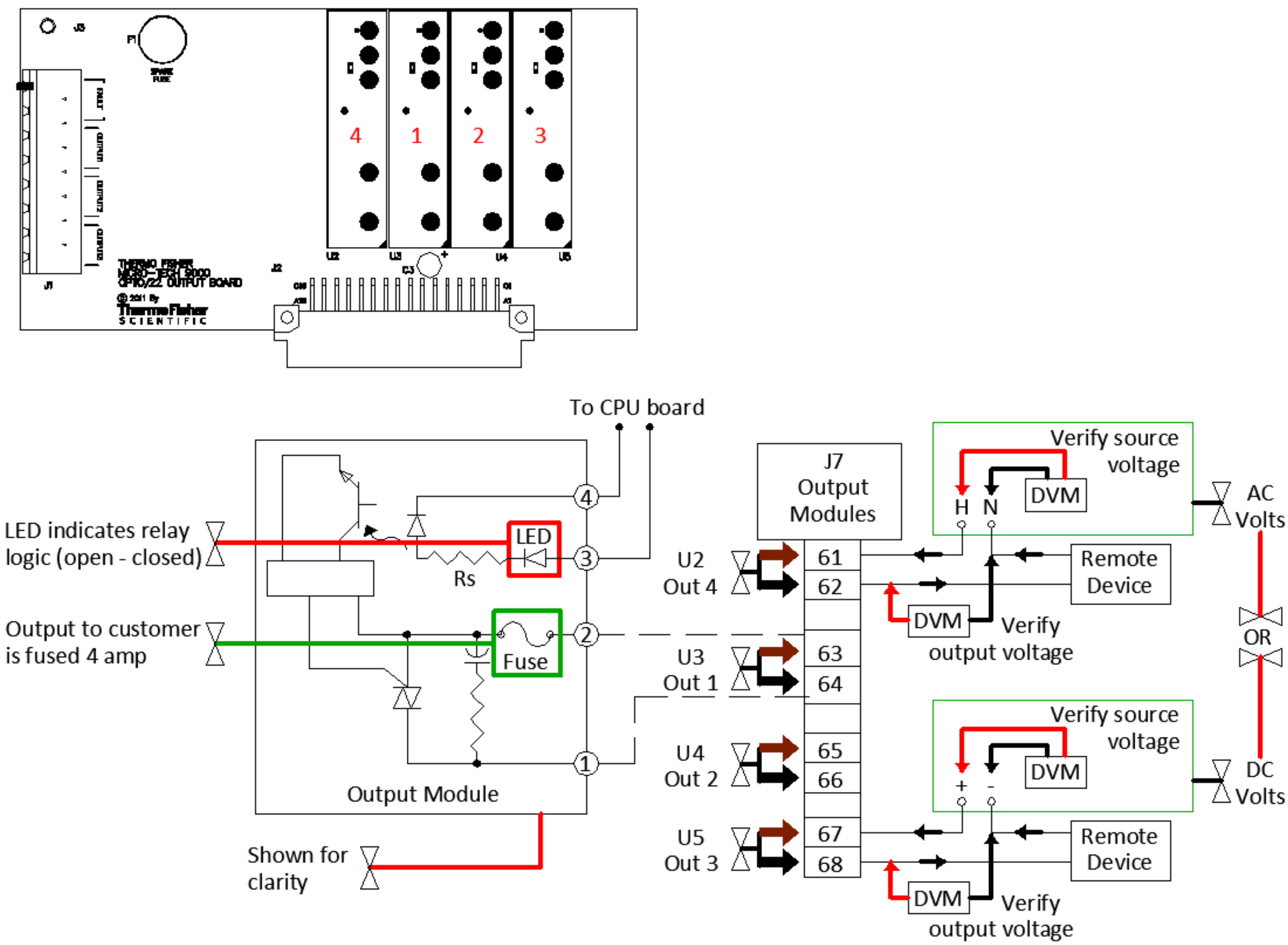
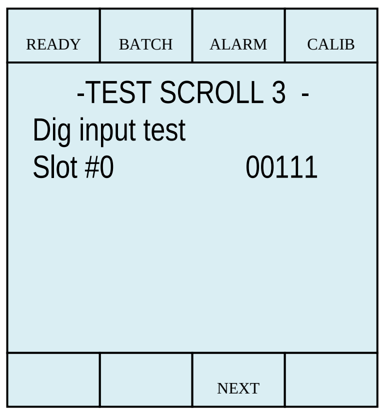


Figure 4–10. Opto22 Troubleshooting—Output Module

Test Procedure for the Input Module

Here is the procedure to follow to test the Opto22 input module.

1. Follow steps 1–2 in the “Navigating to the Test Output Screen” section to display the “Digital Input Test” screen shown below.



The screen indicates input status—that is, 0 = open, 1= closed. The display reads right to left, that is from Inputs 1 through to Input 5. If your Micro-Tech is equipped with an optional digital input/output board, press the Next button to display Inputs 6–21. In addition, note that Inputs 1 and 2 are reserved for the speed input.

2. Voltage input. Measure source voltage input.
   - If GOOD—Proceed to “View Opto LED” (see step 3).
   - If BAD—Apply appropriate voltage to input terminals.

3. View Opto LED. With input voltage supplied, LED should be lit.
   - If GOOD—Replace either the Opto22 input module or the Micro-Tech CPU board.
   - If BAD—Replace the Opto22 input module.

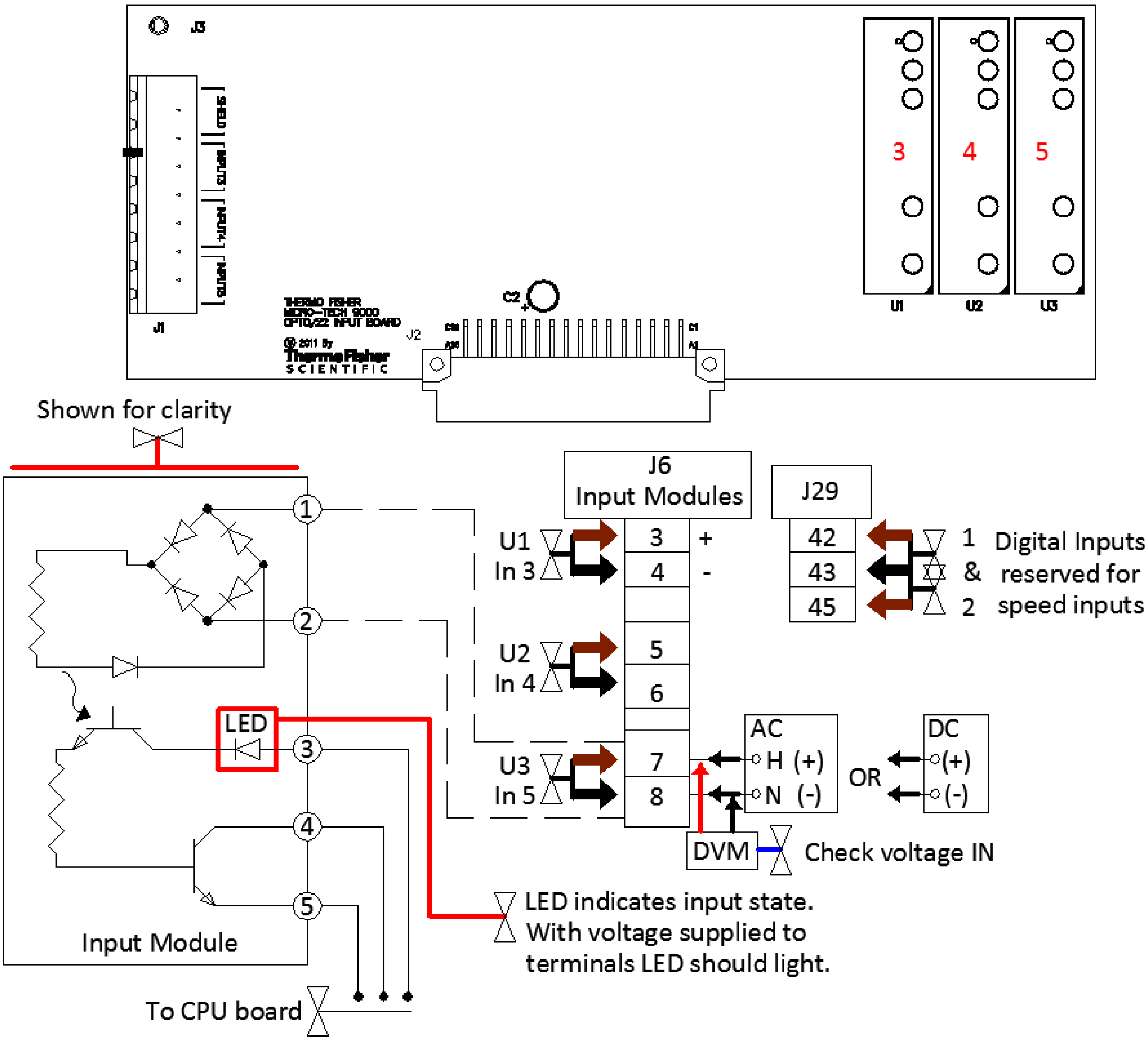
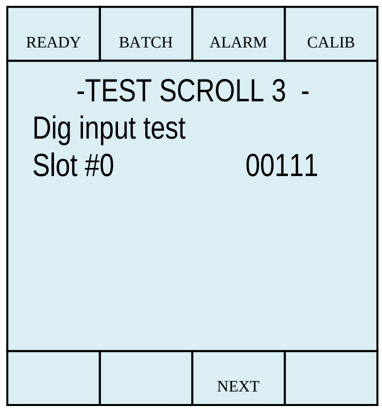


Figure 4–11. Opto22 Troubleshooting—Input Module

Test Procedure for Eight In/Out Digital Board

Here is the procedure to follow to test the optional eight in/out digital (DIO) board.

1. Follow steps 1–2 in the “Navigating to the Test Output Screen” section on page 4-12 to display the “Digital Input Test” screen shown below.



2. Monitor the open collector Inputs 6–13.

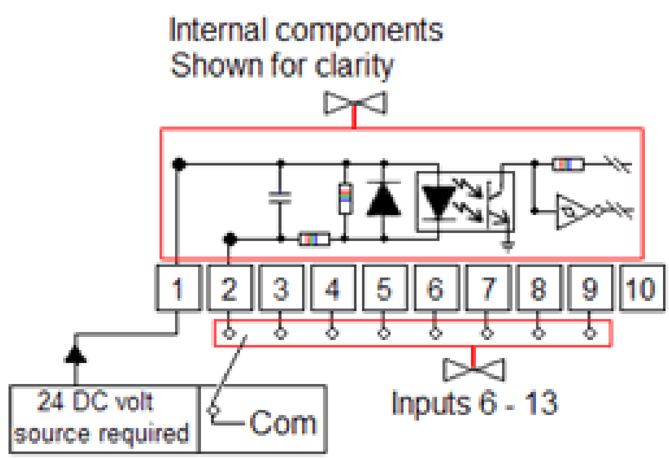


Figure 4–12. DIO Troubleshooting—Inputs 6–13

3. Outputs—Sourcing. Force the output number open/closed.

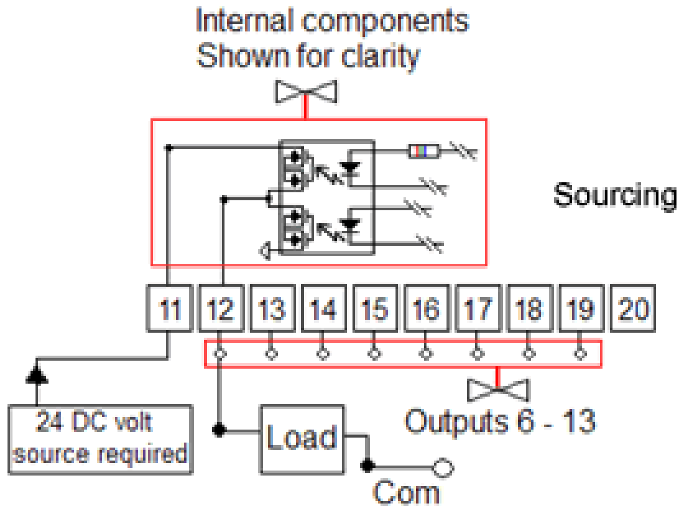


Figure 4–13. DIO Troubleshooting—Sourcing

4. Outputs—Sinking.

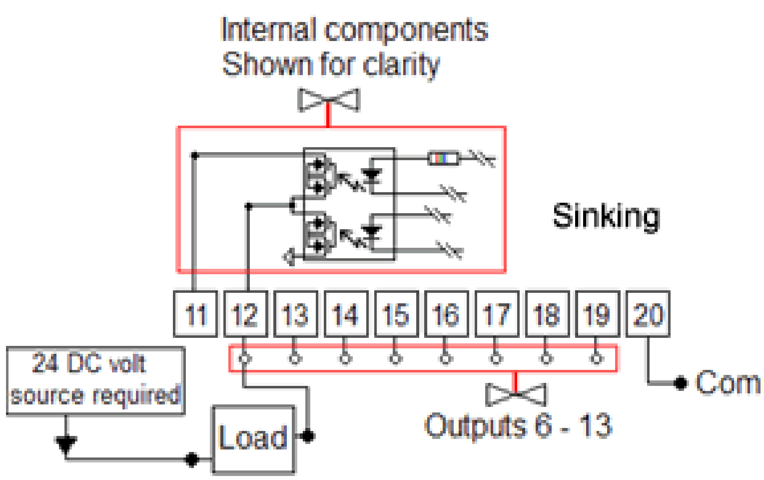
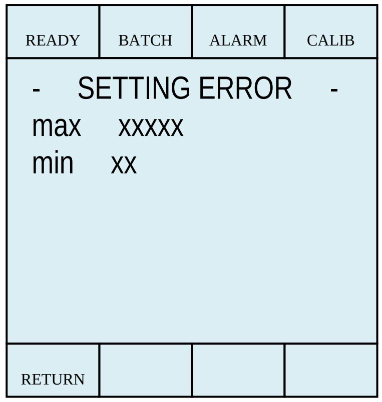


Figure 4–14. DIO Troubleshooting—Sinking

On-Screen Warnings

This section explains the Micro-Tech's on-screen warnings.

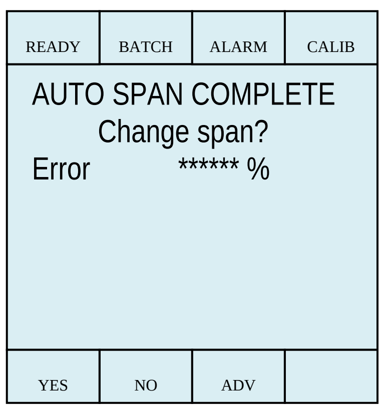
Setting Error



The edited parameter is outside allowable limits.

1. Press the Return button to back step to the previous screen.

Span Out-of-Range Error



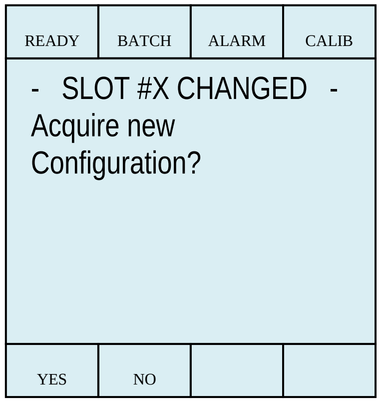
Asterisks indicate an out-of-range span calculation.

1. Verify a load was applied to scale. Verify your set-up data.

2. Press the No button.

3. If you press the Yes button, a setting error-message is displayed.

Slot #X Change

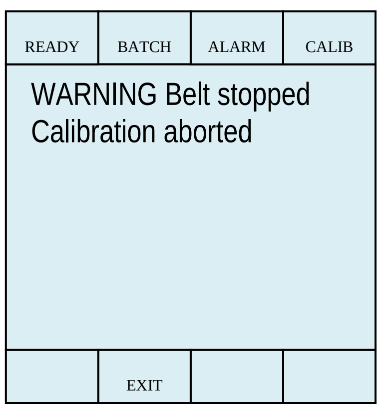


If an optional printed-circuit board assembly is installed or removed on power up, the Micro-Tech will recognize the change and request a reconfigure. This message is only available for a limited time. If the Micro-Tech is not reconfigured, the option installed will not function.

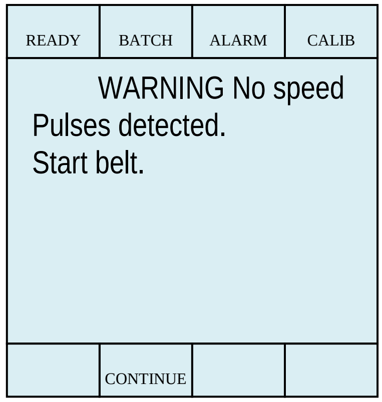
No Speed Pulses

The “No Speed Pulses” warning can occur during a number of procedures, as described below.

- While Doing a Zero or Span Calibration



- While Measuring the Belt Length.



The Micro-Tech senses no speed-input signal.

1. Verify the speed sensor is rotating, there is no slippage, and the Micro-Tech is receiving a proper input signal. If you are running the Micro-Tech in the Simulated mode, verify the conveyor's run contact is providing input to the Micro-Tech.

2. Press the Continue button.

During certain set-up procedures, the user-configured safety interlocks may be affected by changing certain parameters, such as the digital input/output configurations.

Chapter 5
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 5–1** on page 5-3.

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 5-2.

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 5–1**, 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 serial number and belt-scale code.
- 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 5–1. Micro-Tech Parts List

Description	Part Number
PCBA,MOTHERBOARD,MT9101	100754
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, PLANT A/D BD, MT9000	102450
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,PREMIUM A/D BD,MT-9000	100766
PCBA,PROFIBUS BD,MT2000/MT9000	102936
PCBA, DIO, 8IN / 8OUT	103017
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

System Data Sheet

The following page shows a copy of a typical System Data Sheet for the Micro-Tech.

SYSTEM DATA SHEET

Thermo Fisher SCIENTIFIC

501 90th Avenue N.W. - Minneapolis, Mn 55433 763-783-2500

BELT SCALE SYSTEM

SCALE: 10-20-1 / INTEGRATOR: 9101

CUSTOMER:
END USER:
P.O. NO.:
FILE / C NO.:

- CONVEYOR DATA -		- - SCALE DATA - -	
CONVEYOR NO.:		WEIGH SPAN:	FEET
EQUIPMENT NO.:		TARE LOAD:	LBS
PRODUCT:		NET LOAD:	LBS
CAPACITY:	TPH	GROSS LOAD:	LBS
BELT SPEED:	FPM	LOAD CELL :	
SPU PULLEY DIA.:	INCH	BELT LOADING:	LB/FT
BELT WIDTH:	INCH	SCALE CODE#:	
IDLER SPACE:	INCH	PIVOT TO LC:	INCH
TROUGH ANGLE:	DEGREES	WEIGH IDLER #:	
		PIVOT TO IDLER:	INCH
		NEXT:	INCH

INSTRUMENT DATA		CALIBRATION DATA	
INTEGRATOR: **9101**		LOAD CELL SENS.:	mV/V
INTEGRATOR S/N: ________________		LOAD CELL #1:	OHMS
PULSE OUTPUT:	TONS	- #1 S/N:	
CURRENT OUTPUT:	mA	LOAD CELL #2:	OHMS
OTHER:		- #2 S/N:	
R-CAL RESISTOR:		LOAD CELL #3:	OHMS
DIGITIZER:		- #3 S/N:	
DIGITIZER S/N:		LOAD CELL #4:	OHMS
SPEED SENSOR:		- #4 S/N:	

Door Label

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

ZERO#
SPAN#

MICRO TECH INTEGRATOR

MODEL #

DISPLAY SCROLL

1	MEASURE UNITS
2	TOTALIZATION UNITS
3	LENGTH UNITS
4	RATE UNITS
5	LOADCELL UNITS
6	LANGUAGE
9	RUN DISPLAY
10	DAMPING DISPLAY
14	LOAD CELL FAIL DELAY

SCALE DATA SCROLL

1	NO. OF SCALES
1A	TYPE OF SCALE
1B	LOAD CELL(S) CONNECTED TO CHANNEL
2	SCALE CAPACITY
3	SCALE DIVISIONS
4	SCALE CODE #
4A	PIVOT TO LOADCELL
4B	# OF WEIGH IDLERS
4C	PIVOT/ 1ST IDLER
4D	PIVOT/ 2ND IDLER
4I	PIVOT/TEST WT HGT
4L	PIVOT/TEST WT LGT
4M	PIVOT TO CARR. HGT.
4N	ROLL TO CARR. HGT.
4O	# OF LOAD CELLS
5	IDLER SPACING
6	CONV. ANGLE
7	LOAD CELL CAP.
8	LOAD CELL SENS.
9A	LOAD CELL #1 RES.
9B	LOAD CELL #2 RES.
10	SPEED INPUT — ACT ☐ SIM ☐
11	ZERO DB RANGE
12	W & M MODES
13	LOAD CELL BALANCE

I/O DEFINE SCROLL

1	CURRENT OUT #1 DEFINE
	CURRENT OUT #2 DEFINE
1A	CURRENT OUT #1 RANGE
	CURRENT OUT #2 RANGE
1B	CURRENT OUT #1 DELAY
	CURRENT OUT #2 DELAY

1C	CURRENT OUT #1 DAMPING
	CURRENT OUT #2 DAMPING
6	REMOTE COUNTER DIV.
7	RMT CTR PULSE WIDTH

ALARMS

RATE ALARM

1A	LO RATE SET POINT
1B	HIGH RATE SET POINT

LOAD ALARM

2A	LOW LOAD SET POINT
2B	HIGH LOAD SET POINT

SPEED ALARM

3A	LOW SPEED SET POINT
3B	HIGH SPEED SET POINT

CALIB. DATA SCROLL

1	CALIB. MODE
2	R-CAL: RESISTOR (OHMS)
3	R-CAL: CAL-CON
4	CHAIN: WEIGHT (LBS/FT)
5	CHAIN: CAL-CON
6	TEST WEIGHTS (LBS)
7	WEIGHT: CAL-CON
8	CALIB. INTERVAL
9	CALIB. DATE
10	R-CAL: MAT'L FACTOR
	CHAIN: MAT'L FACTOR
	WEIGHT: MAT'L FACTOR
11	NO. OF TEST DURATION
12	TEST DURATION: FULL ☐ PART. ☐ MAN. ☐
	BELT LENGTH
	NUMBER OF REVS.
	TEST TIME
13	AUTO ZERO TRACK — YES ☐ NO ☐
14	AZ TRACK RANGE
15	AZT STEP
16	AZ TRACK MAX. DEV.
17	AZT WARM TIME
19	MAX. BELT SPEED
21	ZERO REFERENCE
22	CENTER OF ZERO
23	CENTER OF ZERO RANGE

Thermo SCIENTIFIC

(122831-A)

PROJECT FILE NO. ____________

Belt-Scale Codes

Here are the belt-scale codes for all Thermo Fisher Scientific scales (also known as “weigh-bridges”) manufactured by Thermo Fisher Scientific as of May 2012.

Table A–1. List of Belt-Scale Codes

An explanation of the abbreviations used in the table’s header (such as LA, LB, and so on, which relate to the conveyor measurements you made in the “Acquiring Basic System Data” section of the manual on page 2-3) are shown at the end of the table. Also listed at the end of the table are the units of measure for the numbers shown in the table below.

Belt Scale Code	Scale Model	Belt Width	Calibr. Kit	# Load Cells	# Idlers	LA	LB1	LB2	LB3	LB4	LB5	LB6	LC	LD	LE	LF	LG	mV/V
1	10-20-1	18-36	50-34	1	1	32	24	0	0	0	0	0	24	36	0	6.5	6.5	3
2	10-20-1	42-72	50-34	1	1	32	22.75	0	0	0	0	0	22.75	36	0	6.5	7	3
3	10-20-1	24-36	50-34	2	1	32	24	0	0	0	0	0	24	36	0	6.5	6.5	3
4	10-20-1	42-84	50-34	2	1	32	22.75	0	0	0	0	0	22.75	36	0	6.5	7	3
5	10-20-2		50-34	1	2	36	18	18	0	0	0	0	18	36	0	6.5	7	3
6	10-20-2		50-34	1	2	48	24	24	0	0	0	0	24	48	0	6.5	7	3
7	10-20-1	18-36	50-30	1	1	32	24	0	0	0	0	0	38	36	4.5	6.5	6.5	3
8	10-20-1	42-72	50-30	1	1	32	22.75	0	0	0	0	0	38	36	4.5	6.5	7	3
9	10-20-2LC	24-36	50-30	2	1	32	24	0	0	0	0	0	42.5	36	4.5	6.5	6.5	3
10	10-20-2LC	42-84	50-30	2	1	32	22.75	0	0	0	0	0	42.5	36	4.5	6.5	7	3
11	10-22	18-36	50-30	1	2	62	54	18	0	0	0	0	38	36	4.75	6.5	6.5	3
12	10-22	18-36	50-30	1	2	71	63	21	0	0	0	0	42	42	4.75	6.5	6.5	3
13	10-22	18-36	50-30	1	2	80	72	24	0	0	0	0	48	48	4.75	6.5	6.5	3
14	10-22	42-48	50-30	1	2	62	52.75	16.75	0	0	0	0	36	36	4.75	6.5	7	3
15	10-22	42-48	50-30	1	2	71	61.75	19.75	0	0	0	0	42	42	4.75	6.5	7	3
16	10-22	42-48	50-30	1	2	80	70.75	22.75	0	0	0	0	48	48	4.75	6.5	7	3
17	10-22	18-36	50-30	1	2	62	54	18	0	0	0	0	68	36	4.5	6.5	6.5	3
18	10-22	18-36	50-30	1	2	71	63	21	0	0	0	0	77	42	4.5	6.5	6.5	3
19	10-22	18-36	50-30	1	2	80	72	24	0	0	0	0	86	48	4.5	6.5	6.5	3
20	10-22	42-48	50-30	1	2	62	52.75	16.75	0	0	0	0	68	36	4.5	6.5	7	3
21	10-22	42-48	50-30	1	2	71	61.75	19.75	0	0	0	0	77	42	4.5	6.5	7	3
22	10-22	42-48	50-30	1	2	80	70.75	22.75	0	0	0	0	86	48	4.5	6.5	7	3
23	10-22	18-36	50-34	1	2	62	64	18	0	0	0	0	54	36	0	6.5	6.5	3
24	10-22	18-36	50-34	1	2	71	63	21	0	0	0	0	63	42	0	6.5	6.5	3
25	10-22	18-36	50-34	1	2	80	72	24	0	0	0	0	84	48	0	6.5	6.5	3
26	10-22	42-48	50-34	1	2	62	52.75	16.75	0	0	0	0	66	36	0	6.5	7	3
27	10-22	42-48	50-34	1	2	71	61.75	19.75	0	0	0	0	75	42	0	6.5	7	3
28	10-22	42-48	50-34	1	2	80	70.75	22.75	0	0	0	0	84	48	0	6.5	7	3
29	10-20-WF		BAR	1	1	32	24	0	0	0	0	0	24	30	-2	4	4	3
30	10-20-WF		BAR	1	1	32	22.75	0	0	0	0	0	22.75	30	-2	4	4	3
31	10-20-WF		BAR	1	1	32	24	0	0	0	0	0	36	30	2	4	4	3
32	10-20-WF		BAR	1	1	32	22.75	0	0	0	0	0	36	30	2	4	4	3
33	10-17-2		50-17	2	2	64	54	18	0	0	0	0	36	36	-4.75	6.5	7	3
34	10-17-2		50-17	2	2	76	63	21	0	0	0	0	42	42	-4.75	6.5	7	3

Belt Scale Code	Scale Model	Belt Width	Calibr. Kit	# Load Cells	# Idlers	LA	LB1	LB2	LB3	LB4	LB5	LB6	LC	LD	LE	LF	LG	mV/V
35	10-17-2		50-17	2	2	88	72	24	0	0	0	0	48	48	-4.75	6.5	7	3
36	10-17-2		50-17	2	2	76	63	23.62	0	0	0	0	43.31	39.37	-4.75	6.5	7	3
37	10-17-2		50-17	2	2	88	72	24.75	0	0	0	0	48.38	47.24	-4.75	6.5	7	3
38	10-17-4		50-17	2	4	64	54	18	54	18	0	0	36	36	0	0	0	3
39	10-17-4		50-17	2	4	76	63	21	63	21	0	0	42	42	0	0	0	3
40	10-17-4		50-17	2	4	88	72	24	72	24	0	0	48	48	0	0	0	3
41	10-17-4		50-17	2	4	66	63	23.62	63	23.62	0	0	43.31	39.37	0	0	0	3
42	10-17-4		50-17	2	4	88	72	24.75	72	24.75	0	0	48.31	47.24	0	0	0	3
43	10-14-3		50-14	4	3	0	0	0	0	0	0	0	0	36	0	0	0	3
44	10-14-3		50-14	4	3	0	0	0	0	0	0	0	0	42	0	0	0	3
45	10-14-3		50-14	4	3	0	0	0	0	0	0	0	0	48	0	0	0	3
46																		
47	10-14-4		50-14	4	4	0	0	0	0	0	0	0	0	36	0	0	0	3
48	10-14-4		50-14	4	4	0	0	0	0	0	0	0	0	42	0	0	0	3
49	10-14-4		50-14	4	4	0	0	0	0	0	0	0	0	48	0	0	0	3
50	10-14-4		50-14	4	4	0	0	0	0	0	0	0	0	54	0	0	0	3
51	10-14-4		50-14	4	4	0	0	0	0	0	0	0	0	39.37	0	0	0	3
52	10-14-4		50-14	4	4	0	0	0	0	0	0	0	0	47.24	0	0	0	3
53	10-30		50-30	1	1	0	0	0	0	0	0	0	0	36	0	0	0	1.8
54	10-11	18-42	WTS	1	1	55.50	48	0	0	0	0	0	40	36	6.5	6.5	6.5	3
55	10-11	48-72	WTS	1	1	56.50	48	0	0	0	0	0	40	36	7	7	7	3
56	10-12		WTS	1	2	66	48	48	0	0	0	0	40	36	7	7	7	3
57	10-17-2D		50-17	2	2	40	24	24	0	0	0	0	24	48	0	6.5	7	3
58	10-17-2D		50-17	2	2	34	21	21	0	0	0	0	21	42	0	6.5	7	3
59	10-17-2D		50-17	2	2	28	18	18	0	0	0	0	18	36	0	6.5	7	3
60																		
101				1	1	32	24	0	0	0	0	0	40	36	-4.5	6.5	7	3
102				1	2	68	24	60	0	0	0	0	76	36	-4.5	6.5	7	3
103				1	1	32	24	0	0	0	0	0	24	36	1.5	3.5	4.3	3
104																		
105				1	2	56	18	48	0	0	0	0	64	30	-4.5	6.5	7	3
106				1	2	68	24	60	0	0	0	0	76	36	-4.5	6.5	7	3
107				1	2	74	24	66	0	0	0	0	82	42	-4.5	6.5	7	3
108				1	2	80	24	72	0	0	0	0	88	48	-4.5	6.5	7	3
109																		
110				1	2	70.87	23.62	62.99	0	0	0	0	78.74	39.37	-4.5	6.5	7	3
111				1	2	78.74	23.62	70.87	0	0	0	0	86.61	47.24	-4.5	6.5	7	3
112				1	2	90.55	23.62	82.68	0	0	0	0	98.43	59.06	-4.5	6.5	7	3
113																		
114				2	2	60.5	16.5	49.5	0	0	0	0	71.5	33	-4.5	6.5	7	3
115				2	2	66	18	54	0	0	0	0	78	36	-4.5	6.5	7	3
116				2	2	73.31	20	60	0	0	0	0	86.62	40	-4.5	6.5	7	3
117				2	2	77	21	63	0	0	0	0	91	42	-4.5	6.5	7	3
118				2	2	88	24	72	0	0	0	0	104	48	-4.5	6.5	7	3
119				2	2	99	27	81	0	0	0	0	117	54	-4.5	6.5	7	3

Belt Scale Code	Scale Model	Belt Width	Calibr. Kit	# Load Cells	# Idlers	LA	LB1	LB2	LB3	LB4	LB5	LB6	LC	LD	LE	LF	LG	mV/V
120				2	2	110	30	90	0	0	0	0	130	60	-4.5	6.5	7	3
121																		
122																		
123				2	2	72.17	19.69	59.06	0	0	0	0	85.28	39.37	-4.5	6.5	7	3
124				2	2	86.61	23.62	70.87	0	0	0	0	102.36	47.24	-4.5	6.5	7	3
125																		
126																		
127																		
128																		
129																		
130				2	4	58.12	16.5	49.5	16.5	49.5	0	0	58.12	33	-4.5	6.5	7	3
131				2	4	64.12	18	54	18	54	0	0	64.12	36	-4.5	6.5	7	3
132				2	4	72.12	20	60	20	60	0	0	72.12	40	-4.5	6.5	7	3
133				2	4	76.12	21	63	21	63	0	0	76.12	42	-4.5	6.5	7	3
134				2	4	88.12	24	72	24	72	0	0	88.12	48	-4.5	6.5	7	3
135				2	4	100.12	27	81	27	81	0	0	100.1	54	-4.5	6.5	7	3
136				2	4	112.12	30	90	30	90	0	0	112.1	60	-4.5	6.5	7	3
137																		
138																		
139				2	4	70.87	19.69	59.06	19.69	59.06	0	0	70.87	39.37	-4.5	6.5	7	3
140				2	4	86.61	23.62	70.87	23.62	70.87	0	0	86.61	47.24	-4.5	6.5	7	3
201				1	1	31.89	24.02	0	0	0	0	0	24.02	39.37	-16.81	6.38	4.92	3
202				1	1	31.89	24.02	0	0	0	0	0	24.02	39.37	-16.81	4.41	4.92	3
203				1	1	31.89	24.02	0	0	0	0	0	24.02	19.69	-16.81	6.38	4.92	3
204				1	1	31.89	24.02	0	0	0	0	0	24.02	19.69	-16.81	4.41	4.92	3
205				2	1	31.89	24.02	0	0	0	0	0	24.02	39.37	-16.81	6.38	4.92	3
206				2	1	31.89	24.02	0	0	0	0	0	24.02	39.37	-16.81	4.41	4.92	3
207				1	2	31.89	24.02	24.02	0	0	0	0	24.02	39.37	-16.81	6.38	4.92	3
208				2	2	31.89	24.02	24.02	0	0	0	0	24.02	39.37	-16.81	6.38	4.92	3
209				1	1	0	0	0	0	0	0	0	0	39.37	0	0	0	2
210				1	1	0	0	0	0	0	0	0	0	23.62	0	0	0	2
211				2	1	0	0	0	0	0	0	0	0	47.24	0	0	0	2
212				4	4	0	0	0	0	0	0	0	0	39.37	0	0	0	2
213				4	3	0	0	0	0	0	0	0	0	39.37	0	0	0	2
214	10-101R-1		50-30	1	1	0	0	0	0	0	0	0	0	39.37	0	0	0	2
215	10-101R-2		50-30	2	1	0	0	0	0	0	0	0	0	39.37	0	0	0	2
301				1	1	39.37	31.50	0	0	0	0	0	25.59	39.37	-6.42	5.43	5.31	3
302				1	1	39.37	31.50	0	0	0	0	0	25.59	47.24	-6.42	5.43	5.31	3
303				1	1	39.37	31.50	0	0	0	0	0	25.59	39.37	-8.39	7.40	6.30	3

Belt Scale Code	Scale Model	Belt Width	Calibr. Kit	# Load Cells	# Idlers	LA	LB1	LB2	LB3	LB4	LB5	LB6	LC	LD	LE	LF	LG	mV/V
304				1	1	39.37	31.50	0	0	0	0	0	25.59	47.24	-8.39	7.40	6.30	3
305				2	1	39.37	31.50	0	0	0	0	0	25.59	39.37	-8.39	7.40	7.72	3
306				2	1	39.37	31.50	0	0	0	0	0	25.59	47.24	-8.39	7.40	7.72	3
307				1	2	39.37	31.50	31.50	0	0	0	0	46.46	39.37	0	0	0	3
308				1	2	39.37	31.50	31.50	0	0	0	0	46.46	47.24	0	0	0	3
309				1	2	39.37	31.50	31.50	0	0	0	0	46.46	39.37	0	0	0	3
310				1	2	39.37	31.50	31.50	0	0	0	0	46.46	47.24	0	0	0	3
311				2	2	39.37	31.50	31.50	0	0	0	0	46.46	39.37	0	0	0	3
312				2	2	39.37	31.50	31.50	0	0	0	0	46.46	47.24	0	0	0	3
313				4	4	0	0	0	0	0	0	0	0	39.37	0	0	0	3
314				1	1	0	0	0	0	0	0	0	0	39.37	0	0	0	2
315				2	1	0	0	0	0	0	0	0	0	39.37	0	0	0	2
401				1	2	49.21	29.53	68.90	0	0	0	0	49.21	39.37	4.06	4.17	4.72	3
402				2	2	49.21	29.53	68.90	0	0	0	0	49.21	39.37	4.06	4.17	4.72	3
403				1	1	39.37	29.53	29.53	0	0	0	0	29.53	39.37	4.06	4.17	4.72	3
404																		
405				2	1	0	0	0	0	0	0	0	0	39.37	0	0	0	2
406				4	2	0	0	0	0	0	0	0	0	39.37	0	0	0	3
407				4	3	0	0	0	0	0	0	0	0	47.24	0	0	0	3
408				4	4	0	0	0	0	0	0	0	0	39.37	0	0	0	3
409				4	6	0	0	0	0	0	0	0	0	39.37	0	0	0	3
410				1	1	0	0	0	0	0	0	0	0	39.37	0	0	0	2
501				1	1	31.50	23.62	0	0	0	0	0	23.62	39.37	0	0	0	3
502				1	1	31.50	22.64	0	0	0	0	0	22.64	39.37	0	0	0	3
503				1	2	43.31	23.62	23.62	0	0	0	0	23.62	39.37	0	0	0	3
504				2	4	70.87	19.69	59.06	19.69	59.06	0	0	0	39.37	0	0	0	3
505				4	4	0	0	0	0	0	0	0	0	39.37	0	0	0	3
601				1	1	0	0	0	0	0	0	0	0	39.37	0	0	0	2
602				1	1	31.89	24.02	0	0	0	0	0	24.02	39.37	0	0	0	3
603				2	1	31.89	24.02	0	0	0	0	0	24.02	39.37	0	0	0	3
604				1	1	23.62	17.72	0	0	0	0	0	17.72	39.37	0	0	0	3
605				1	2	39.37	19.69	19.69	0	0	0	0	19.69	39.37	0	0	0	3
606				2	2	39.37	19.69	19.69	0	0	0	0	19.69	39.37	0	0	0	3
607				1	2	39.37	19.69	19.69	0	0	0	0	19.69	39.37	0	0	0	3
608				2	4	66.93	59.06	19.69	59.06	19.69	0	0	72.83	39.37	0	0	0	3
609				4	4	0	0	0	0	0	0	0	0	39.37	0	0	0	3
610				4	5	0	0	0	0	0	0	0	0	39.37	0	0	0	3
611				4	6	0	0	0	0	0	0	0	0	39.37	0	0	0	3

See next page for additional information

List of Abbreviations and Units of Measure Used in the Table

Abbreviation	Explanation	Unit of Measure	For more information, see the following figures
Belt width	—	inches	—
LA	Pivot-to-load-cell distance	inches	**Figure 2–1**
LB	Pivot-to-*n*-idler distance (where *n* = 1st, 2nd, 3rd, ...n idler)	inches	**Figure 2–3**
LC	Pivot-to-test-weight length	inches	**Figure 2–5**
LD	Idler spacing	inches	**Figure 2–8**
LE	Pivot-to-test-weight height	inches	**Figure 2–4**
LF	Pivot-to-carriage height	inches	**Figure 2–6**
LG	Roller-to-stringer height	inches	**Figure 2–7**
mV/V	Load-cell sensitivity	millivolts/volt	**Figure 2–10**

Establishing Belt-Length-Test Duration

This procedure calibrates the belt to the system and establishes a test duration for all the simulated calibrations. A test duration can be acquired or entered manually. Acquiring a test duration is described below. Manual entry of the test duration is described on page 2-32.

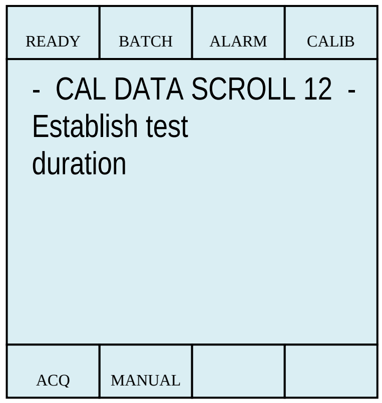
Acquire Test Duration

There are two methods to acquire the test duration—the Full and Partial methods. The Partial (belt-length measurement) method allows you to acquire the test duration without measuring the entire length of the belt. This method, however, should *only* be used when the belt length exceeds 1,000 feet. In addition, using the Partial method may be less accurate than using the Full method. Zero and span calibrations are the most accurate when using complete passes of the belt.

Partial Belt-Length Method

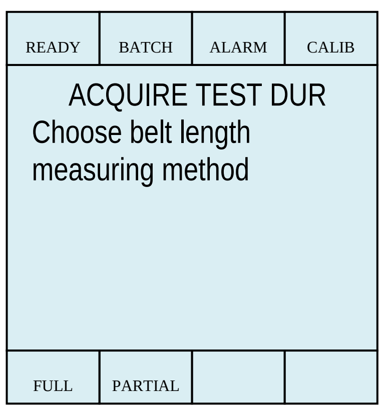
The partial belt-length method should *only* be used if the belt is longer than 1,000 feet.

Pressing the Abort button at anytime returns you to the "Cal Data Scroll 12" screen shown below.



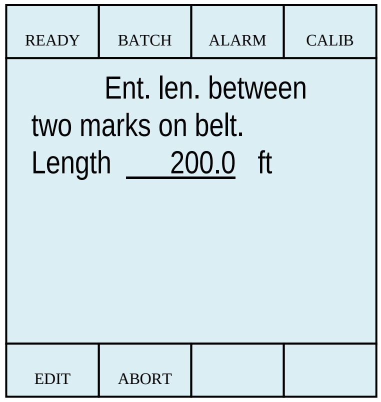
To use the partial belt-length method, do the following.

1. Press the Acquire button and the following screen appears.



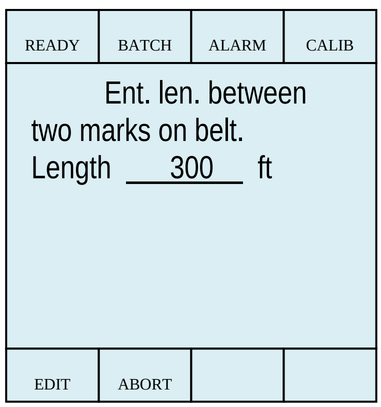
2. Mark and measure a section of the belt. The section you mark must be longer than 200 feet.

3. Press the Partial button and the following screen appears.

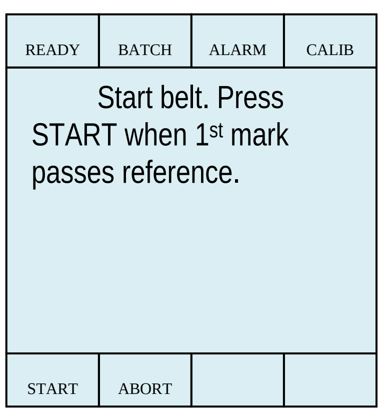


4. Press the Edit button and use the keypad to enter the actual length of the section you marked. (The default value is 200 feet.)

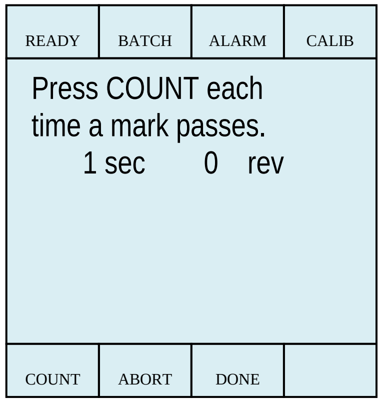
5. Press the Enter button. (We entered 300 feet.)



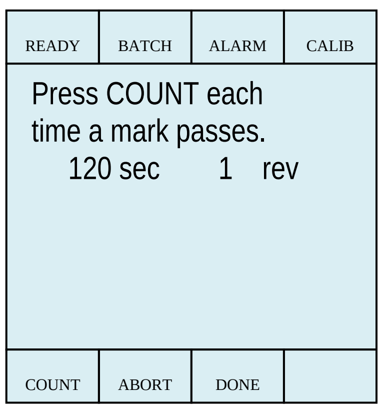
6. Press the Start button.



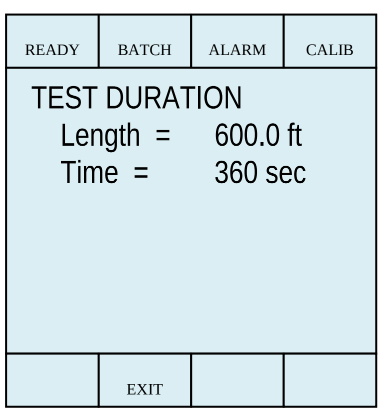
7. Press the Count button each time a reference mark passes.



8. Continue to press the Count button when a mark passes, until the following two conditions are met.
    - The belt has made at least *three* complete revolutions.
    - The total running time of the test exceeds *six* minutes.



9. After the last revolution has been counted, press the Done button.



Full Belt-Length Method

Use this method for belts that are shorter than 1,000 feet. In addition, note that pressing the Abort button at anytime returns you to the "Cal Data Scroll 12" screen shown below.

READY	BATCH	ALARM	CALIB
- CAL DATA SCROLL 12 - Establish test duration			
ACQ	MANUAL		

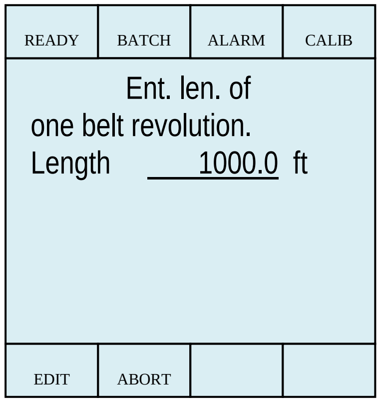
To use the full belt-length method, do the following.

1. Make a chalk mark on the belt.

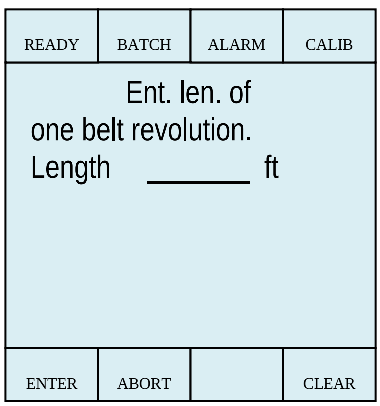
2. Press the Acquire button and the following screen appears.

READY	BATCH	ALARM	CALIB
ACQUIRE TEST DUR Choose belt length measurement method			
FULL	PARTIAL		

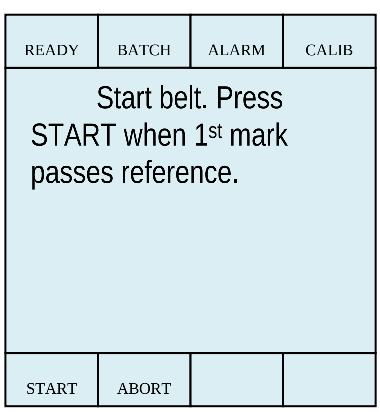
3. Press the Full button.



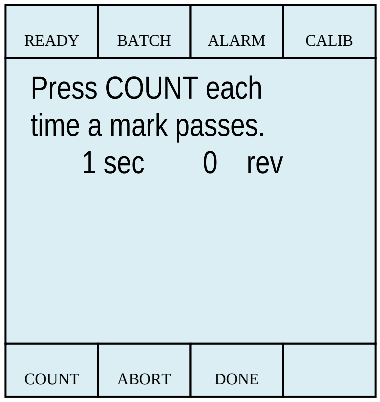
4. Press the Edit button and use the keypad to enter the entire length of the belt. Then press the Enter button.



5. Press the Start button.

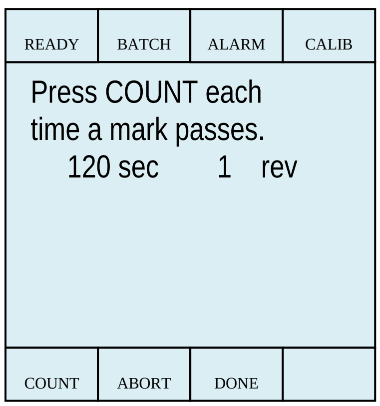


6. Press the Count button each time the reference mark passes.

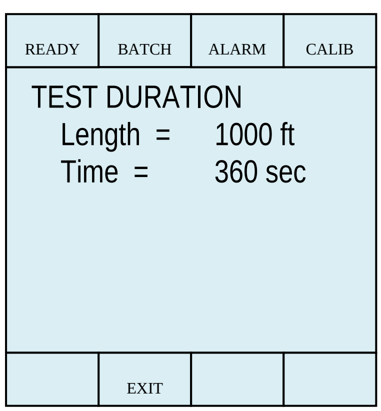


7. Continue to press the Count button when the mark passes, until the following two conditions are met.

   - The belt has made at least *three* complete revolutions.
   - The total running time of the test exceeds *six* minutes.



8. After the last revolution is counted, press the Done button.



Material Factoring

When the possibility exists that multiple calibration methods are available, one must be selected to achieve a span number. All other calibration methods should be material factored to the proven span number.

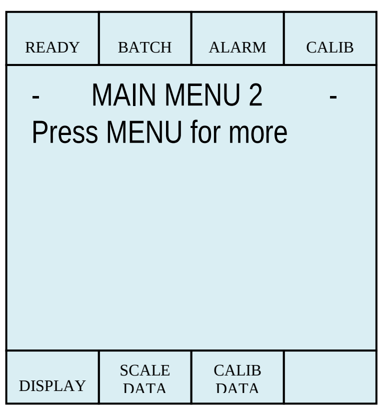
Calibration Method	Availability
R-Cal	Built-in
Static weights	Optional item
Test chain	Optional item
Other	Material Factoring—pre- or post-weighed material. (User supplied.)

Since all Micro-Tech models are equipped with R-Cal, this example will assume an R-Cal span #. It then will factor the static weights to the R-Cal span number. Other factoring is similar and not shown.

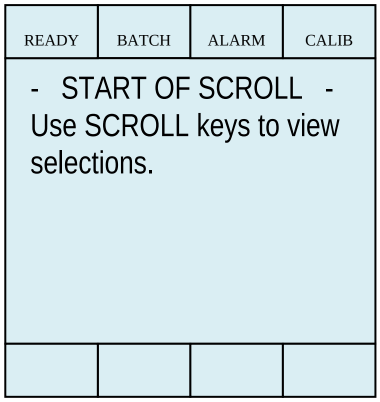
Reset Weight Factor

To reset the existing weight material factor, do the following.

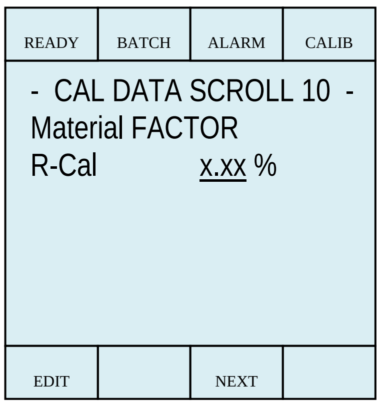
1. Press the Menu button twice to bring up “Main Menu 2.”



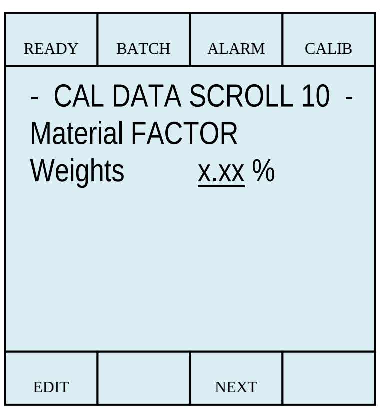
2. Press the Calibration Data button and the following screen appears.



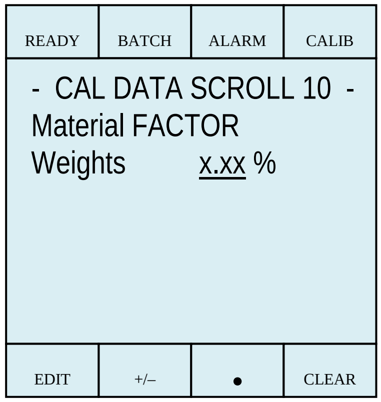
3. Press the down-arrow button repeatedly until the “Cal Data Scroll 10” screen appears.



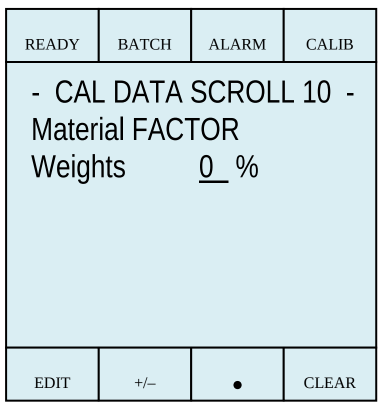
4. Press the Next button and the Weights screen appears.



5. Press the Edit button.



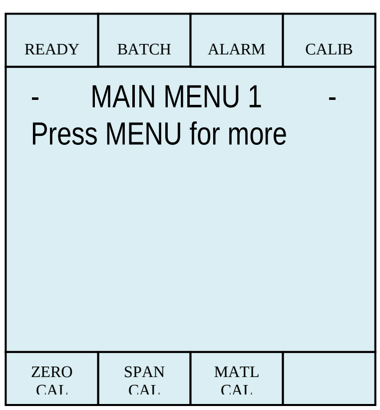
6. Use the keypad to enter a zero value (0) for Weights. Then press the Enter button. Your screen will now look like this.



Static Weight

The auto-span procedure determines the percent static-weight span-error.

1. Press the Menu button to bring up the “Main Menu 1” screen.



2. Press Span button and the following screen appears.

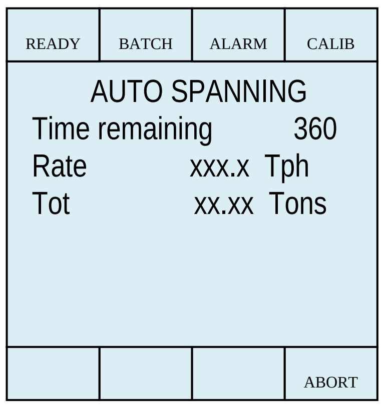
Auto Span

The auto-span procedure determines the percent of scale weight span error.

1. Add your test weight to the conveyor.

2. Press the Start button and the following screen appears.

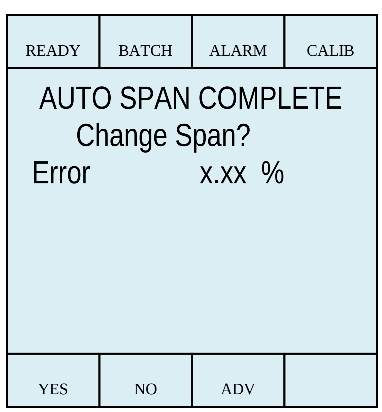
3. Make sure the belt is running empty, then press the Start button. The following Auto Spanning screen appears.



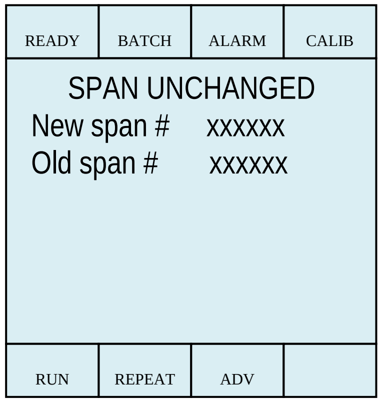
4. When the Auto Span procedure is completed, the span percent-error is displayed.

Record Results

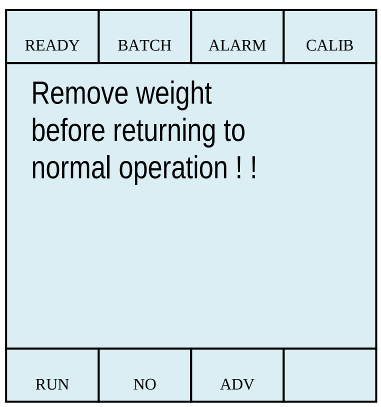
Record the results and note whether the error is positive or negative.



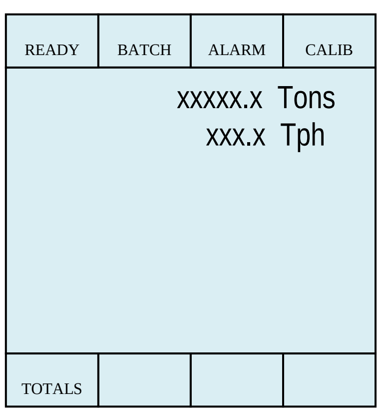
1. Press the No button (meaning you *do not* want to change the span), and the following screen appears.



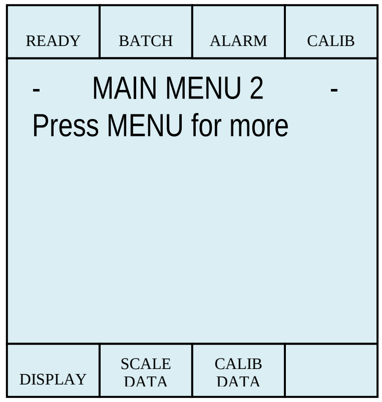
2. Press the Run button and the following screen appears.



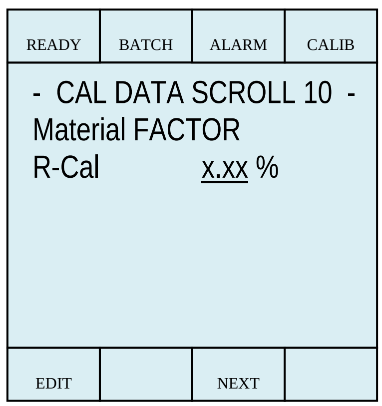
3. Press the Run button and the Micro-Tech Run screen reappears, as shown below.



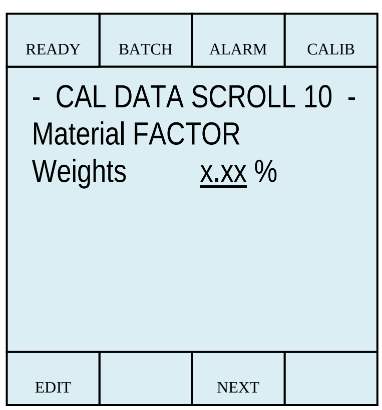
4. Press the Menu button twice to bring up the “Main Menu 2” screen.



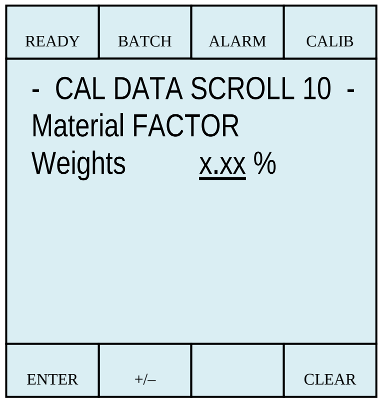
5. Press the down-arrow button and the Material Factor screen appears.



6. Press the Next button and the Weights screen appears.



7. Press the Edit button and use the keypad to enter the weight error. Then press the Edit button. The error you entered is displayed in the screen below.



8. Press the Run button and the Micro-Tech Run screen reappears, as shown below.

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	LOADCELL 2	COMM B	COMM A	SPU and PULSE OUT

J16	Load Cell 1
1	SHIELD (EARTH)
2	+ EXCITATION
3	– EXCITATION
4	+ SENSE
5	– SENSE
6	+ SIGNAL
7	– SIGNAL

J21	Load Cell 2
11	SHIELD (EARTH)
12	+ EXCITATION
13	– EXCITATION
14	+ SENSE
15	– SENSE
16	+ SIGNAL
17	– SIGNAL

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	Speed signal (SPU) input 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

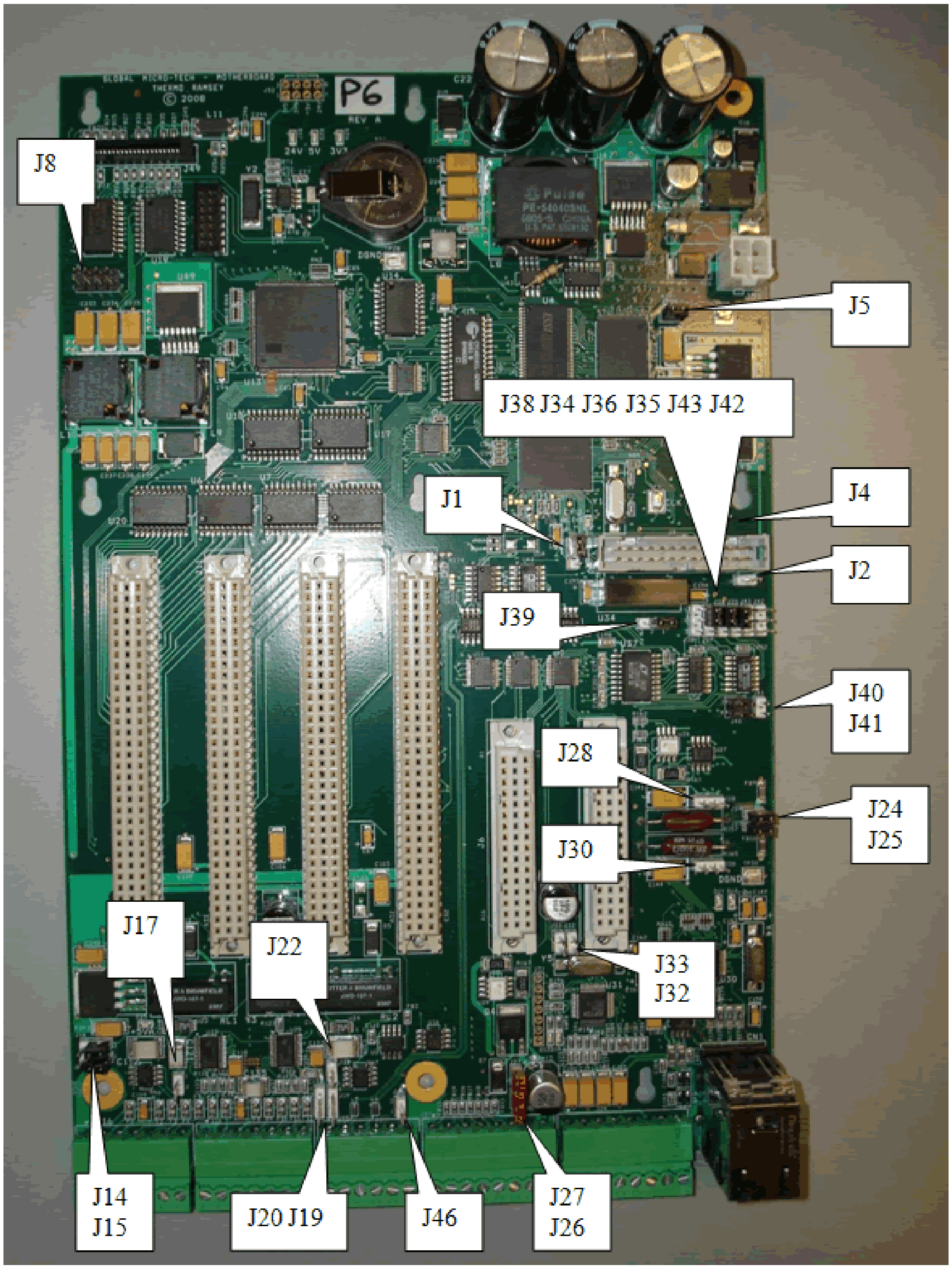
Premium A/D Terminal Block Definitions

The terminal block definitions for the Premium A/D Board are shown below. (Model 9201 Micro-Tech only.)

J9	Premium A/D Load Cell
1	Shield (Earth GND)
2	Signal COM
3	+ Excitation (+5v)
4	- Excitation (-5v)
5	+ Excitation Sense
6	- Excitation Sense
7	+ Load Cell Signal
8	- Load Cell Signal

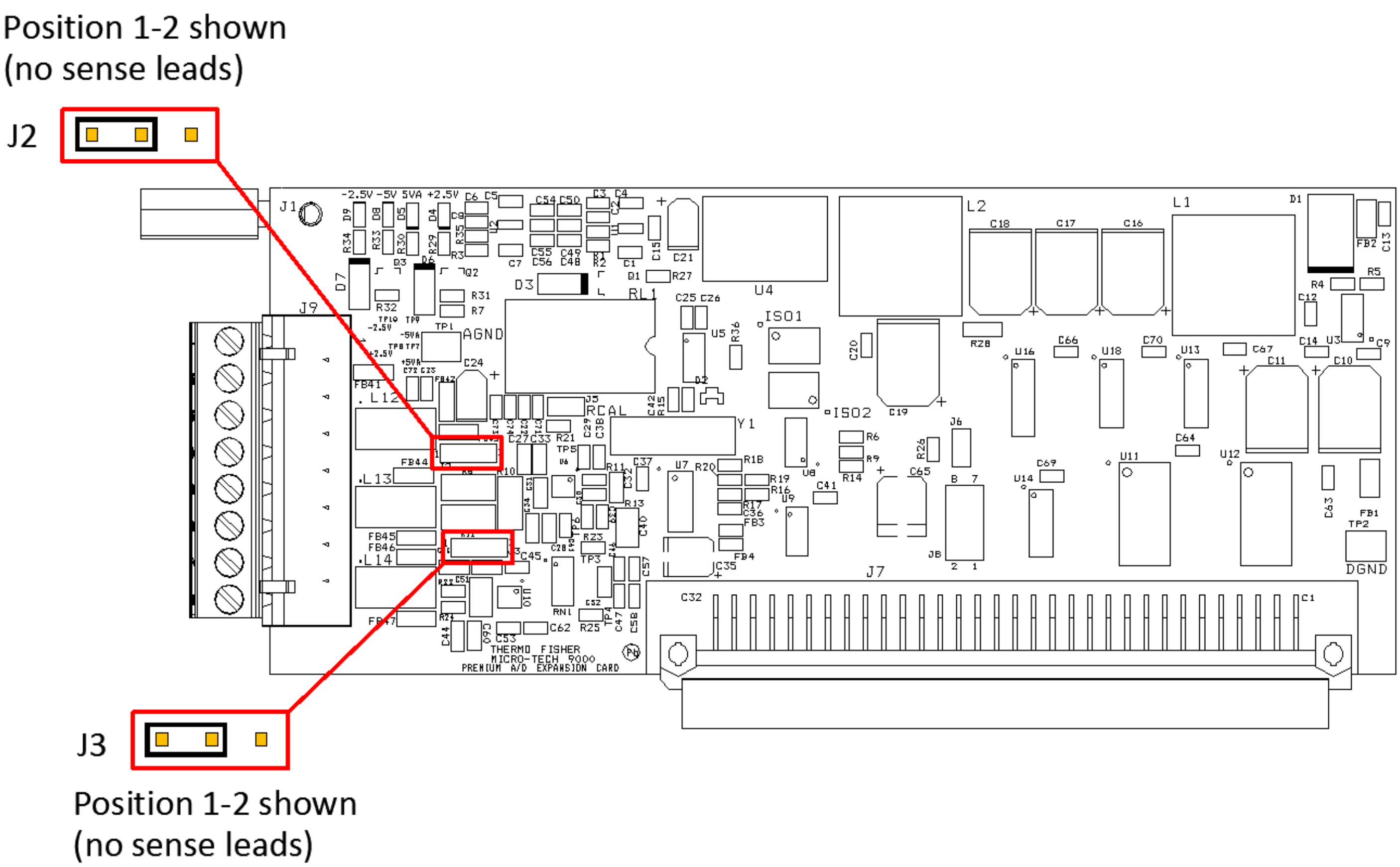
Motherboard Jumper Locations

Here are the jumper locations the Micro-Tech motherboard.



Premium A/D Jumper Locations

Here are the Load Cell jumper locations of the Premium A/D board (Model 9201 Micro-Tech only.)



Motherboard Jumper Settings

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

Processor Configuration Jumpers

<table>
<tr><th>Jumper</th><th>Jumper Settings</th><th>Default</th></tr>
<tr><td>J1</td><td><table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Pins 1-2</td><td>JTAG TAP Controller Enabled</td></tr><tr><td>Pins 2-3</td><td>Background Debug Module (BDM) Enabled</td></tr><tr><td>Not Installed</td><td>JTAG TAP Controller Enabled</td></tr></table></td><td>J1 Installed 2-3
(This jumper position must not be altered by either the user or by field service personnel.)</td></tr>
<tr><td>J2</td><td><table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Installed</td><td>Core voltage applied to pin 25 of BDM/JTAG header</td></tr></table></td><td>J2 Not Installed
(This jumper position must not be altered by either the user or by field service personnel.)</td></tr>
<tr><td>J4</td><td><table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Installed</td><td>Pull-down on TCLK_PSTCLK</td></tr></table></td><td>J4 Not Installed
(This jumper position must not be altered by either the user or by field service personnel.)</td></tr>
<tr><td>J5</td><td><table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Installed</td><td>Enable bootloader program/erase</td></tr></table></td><td>J5 Not Installed
(This jumper position must not be altered by either the user or by field service personnel.)</td></tr>
</table>

Load-Cell Interrupt Selection Jumper

<table>
<tr><th>Jumper</th><th>Jumper Settings</th><th>Default</th></tr>
<tr><td>J8</td><td><table><tr><td>Jumper Setting</td><td>Description</td></tr><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></table></td><td>J8 Not Installed</td></tr>
</table>

Load-Cell Sense Selection Jumpers

<table>
<tr><th>Jumper</th><th>Jumper Settings</th><th>Default</th></tr>
<tr><td>J14
J15</td><td><table><tr><td>Jumper Setting</td><td>Description</td></tr><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></table></td><td>J14 1-2 Installed
J15 1-2 Installed</td></tr>
<tr><td>J17</td><td>Optional R-CAL resistor Channel 1</td><td>Not Installed</td></tr>
<tr><td>J19
J20</td><td><table><tr><td>Jumper Setting</td><td>Description</td></tr><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></table></td><td>J19 1-2 Installed
J20 1-2 Installed</td></tr>
<tr><td>J22</td><td>Optional R-CAL resistor Channel 2</td><td>J22 Not Installed</td></tr>
</table>

Speed-Input and Output #5 Jumpers

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

UART Configuration Jumpers

<table>
<tr><th>Jumper</th><th>Jumper Settings</th><th>Default</th></tr>
<tr><td>J34</td><td>COMM A, (UART 0)<table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Pins 1-2</td><td>RS-485 Normal Operation</td></tr><tr><td>Pins 2-3</td><td>RS-485 Multi-Drop Operation</td></tr></table></td><td>J34 Installed 1-2</td></tr>
<tr><td>J35
J36
J39</td><td>COMM A, (UART 0)<table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Pins 1-2</td><td>RS-232 Mode</td></tr><tr><td>Pins 2-3</td><td>RS-485 Mode</td></tr><tr><td>Not Installed</td><td>RS-232 Mode</td></tr></table></td><td>J35 Installed Pins 1-2
J36 Installed Pins 1-2
J39 Installed Pins 1-2</td></tr>
<tr><td>J38</td><td>COMM A, (UART 0)<table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Pins 1-2</td><td>RS-485 Receive → U0RXD</td></tr><tr><td>Pins 2-3</td><td>RS-485 Receive → U0CTS</td></tr></table></td><td>J38 Installed 1-2</td></tr>
<tr><td>J40</td><td>COMM A Termination, (UART 0)<table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Pins 1-2</td><td>Enable RS-485 Termination</td></tr><tr><td>Pins 3-4</td><td>Disable RS-485 Termination</td></tr><tr><td>Not Installed</td><td>Disable RS-485 Termination</td></tr></table></td><td>J40 Installed 3-4</td></tr>
<tr><td>J41</td><td>COMM A Termination, (UART 0)<table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Pins1-2</td><td>Enable RS-485 Termination</td></tr></table></td><td>J41 Installed</td></tr>
<tr><td>J42
J43</td><td>COMM A Termination, (UART 0)<table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Pins1-2</td><td>1.2kΩ termination enable</td></tr><tr><td>Pins 2-3</td><td>600Ω Bias Enabled</td></tr><tr><td>Not Installed</td><td>No additional termination</td></tr></table></td><td>J42 Installed 1-2
J43 Installed 1-2</td></tr>
</table>

UART Configuration Jumpers (continued)

<table>
<tr><th>Jumper</th><th>Jumper Settings</th><th>Default</th></tr>
<tr><td>J46</td><td>COMM B Termination, (UART 2)<table><tr><td>Jumper Setting</td><td>Description</td></tr><tr><td>Installed</td><td>120Ω termination</td></tr></table></td><td>J46 Not Installed</td></tr>
</table>

Premium A/D Jumper Settings

Here are the jumper settings for the Premium A/D board. (Model 9201 Micro-Tech only.)

Premium A/D Board Load-Cell Excitation Sense

<table>
<tr><th>Jumper</th><th colspan="2">Jumper Settings</th><th>Default</th></tr>
<tr><td rowspan="5">J2
J3</td><td colspan="2"></td><td rowspan="5">J2 1-2 Installed
J3 1-2 Installed</td></tr>
<tr><td>Jumper Setting</td><td>Description</td></tr>
<tr><td>Pins 1-2</td><td>Local sensing (4-wire LC)</td></tr>
<tr><td>Pins 2-3</td><td>Remote sensing (6-wire LC)</td></tr>
<tr><td>Not Installed</td><td>Remote sensing (6-wire LC)</td></tr>
</table>

A/D Jumpers—Load-Cell Sense

Load-cell sense is controlled by selectable jumpers (J14 and J15 for channel 1, and J19 and J20 for channel 2) located on the motherboard and by jumpers (J2 and J3) on the Premium A/D Board. The jumpers should be in position “1-2” local sense, if the distance is less than 200 feet between the load cell and the Micro-Tech. For distances greater than 200 feet and less than 3,000 feet, the jumper should be in position “2-3” and a special 6-wire cable is required. Refer to the field wiring diagram that is appended to this manual, for jumper requirement in the scale junction box.

Load-Cell Specifications

Table A–2. Motherboard Load-Cell Technical Specifications (Model 9101)

Load Cell Excitation Power Supply	5 VDC ±10%, 90 mA, minimum load impedance (58 ohms). Output short circuit, 0.5 A maximum.
Load Cell Load cell input circuits (2 each)	Number: Up to six (6) 350-ohm load cells in parallel. Cable distance: 200ft [61m] or less without sense, or 3000ft [914m] with sense. Sensitivity: 0.5mV/V to 3.5 mV/V (keypad selectable). Input Impedance: 1M-ohm minimum. Maximum Usable Signal: 114% of 3mV/V. Internal A/D counts: (3mV/V): 6,440,000. Isolation: Non-isolated. Max non-destructive input voltage: ± 6 V relative to ground. Load Cell Cable Shield: Connected to earth ground.
Load Cell Excitation-Sense Circuitry (2 each)	4 wire system: cable distance not exceed 200ft [61m]. 6 wire system: cable distance not to exceed 3000ft [914m]. Nominal input voltage: 5 VDC. Input impedance: 100 k-ohm minimum. Jumper selectable: Local or remote sense.

Table A–3. Premium A/D Board Load-Cell Technical Specifications (Model 9201)

Load Cell Excitation Power Supply	±5 VDC ±5%, 180 mA, minimum load impedance (58 ohms).
	Output short circuit, 0.5 A maximum.
Load Cell	Number: Up to six (6) 350-ohm load cells in parallel. Cable distance: 200ft [61m] or less without sense, or 3000ft [914m] with sense.
	Sensitivity: 0.5mV/V to 3.5 mV/V (keypad selectable).
Load cell input circuit	Input Impedance: 1M-ohm minimum.
	Maximum Usable Signal: 114% of 3mV/V.
	Internal A/D counts: (3mV/V): 7,341,000.
	Isolation: Non-isolated.
	Max non-destructive input voltage: ± 6 V relative to ground.
	Load Cell Cable Shield: Connected to earth ground.
Load Cell	4 wire system: cable distance not exceed 200ft [61m].
	6 wire system: cable distance not to exceed 3000ft [914m].
Excitation-Sense Circuitry	Nominal input voltage: ±5 VDC.
	Input impedance: 100 k-ohm minimum.
	Jumper selectable: Local or remote sense.

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 speed 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) speed (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

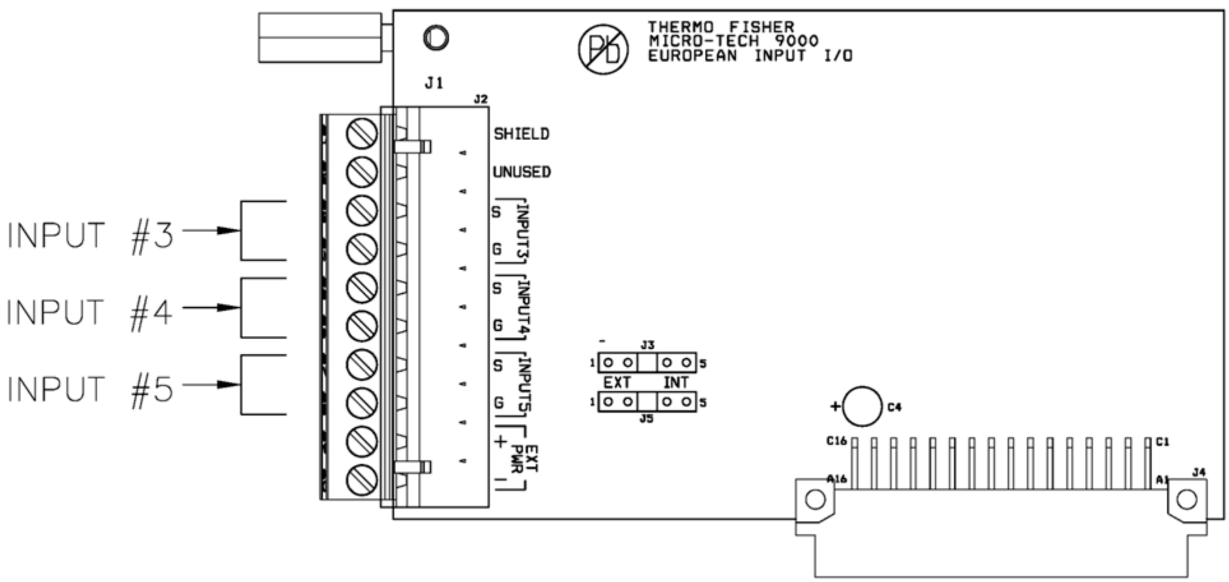
or

- 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

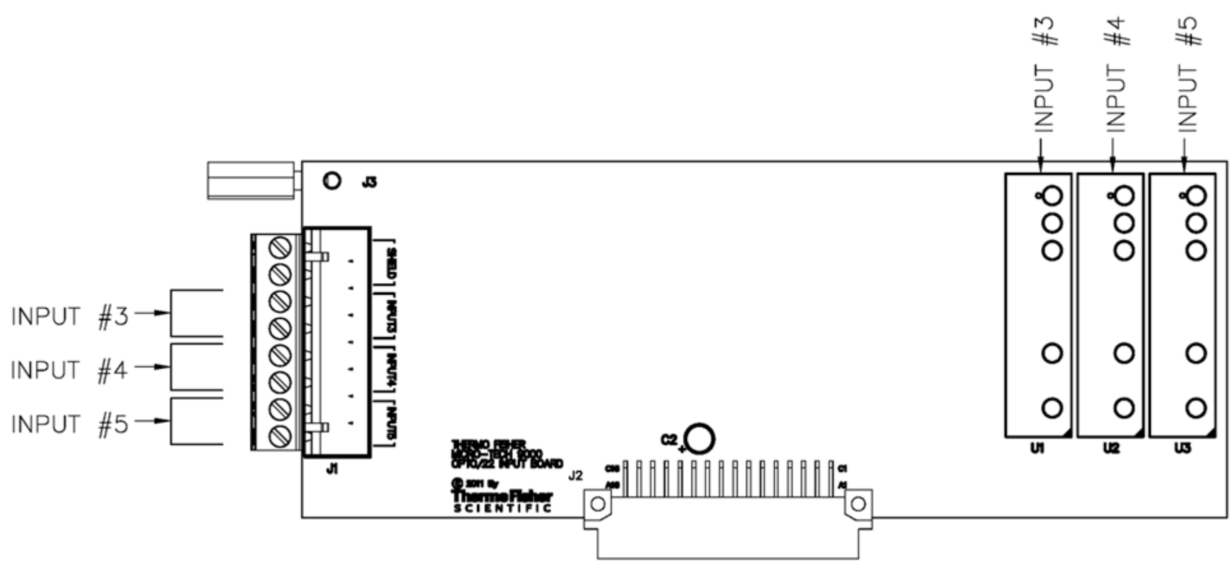
This is an optional board with three inputs (inputs #3–5). The module options are as follows.

- 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

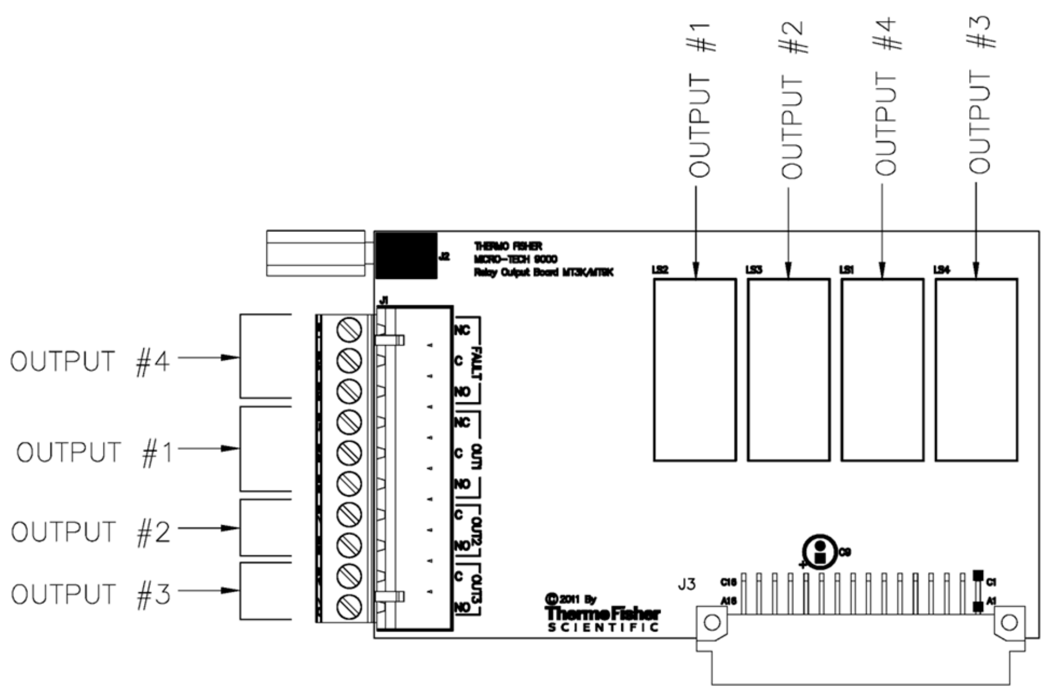
- Opto-22 Output Board

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.

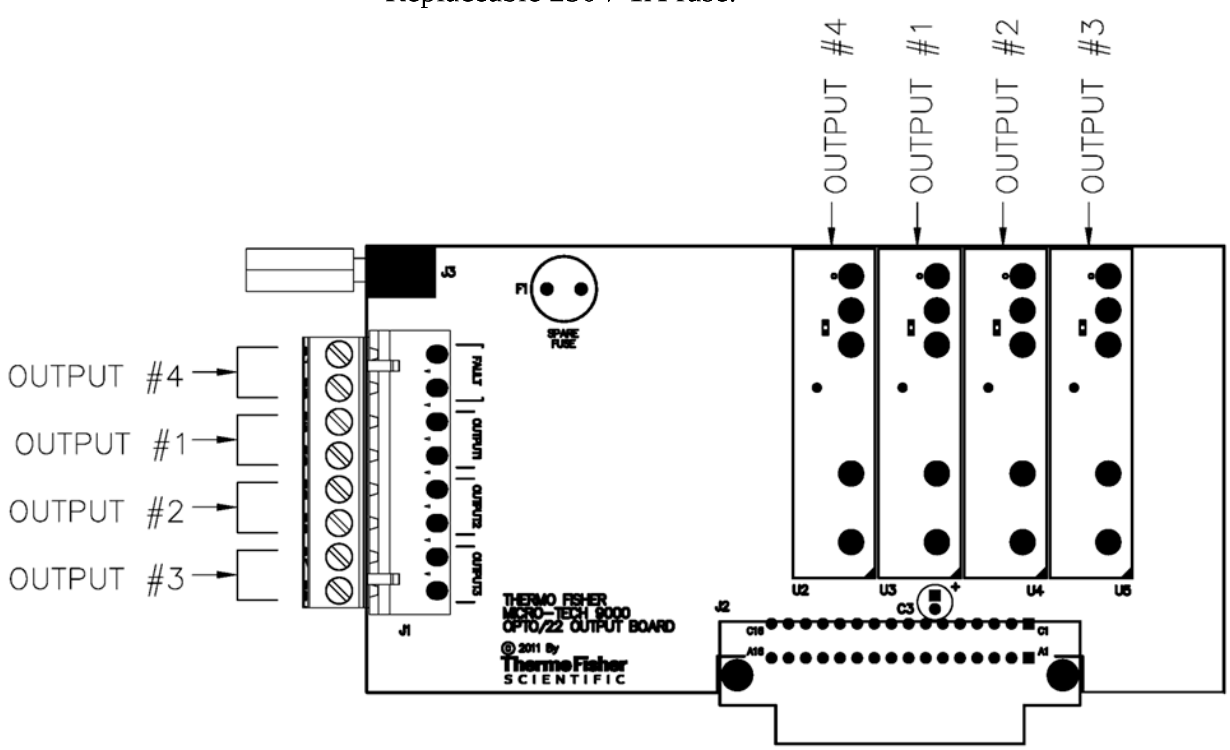


Part number = 102479

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.

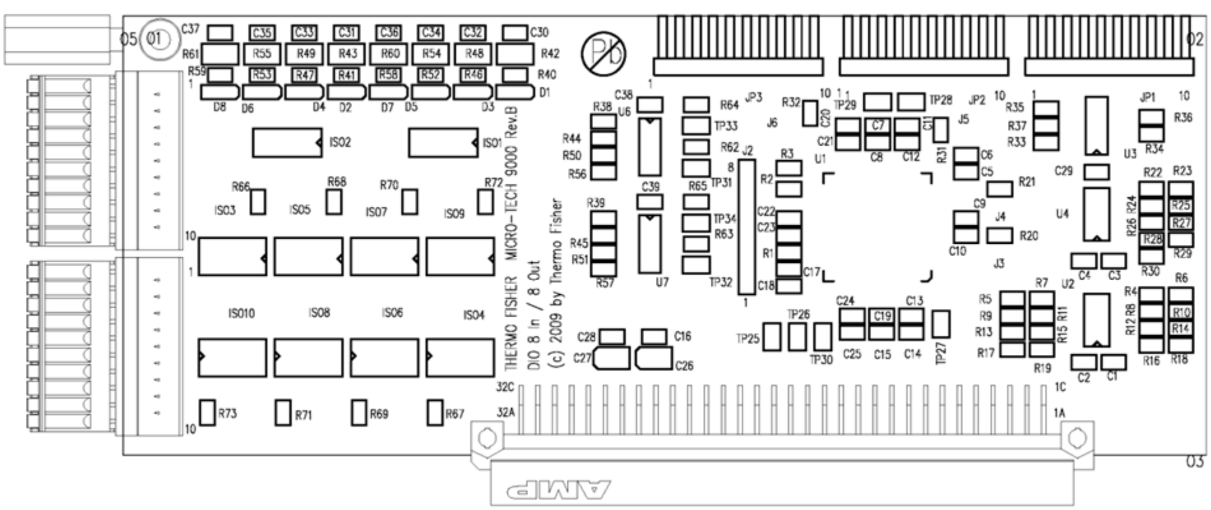
The DIO board provides isolated contact closure inputs and 24-volt current sinking or current sourcing isolated outputs. Output current must be limited to 80 mA maximum, continuous.

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 four analog inputs and four analog outputs.

Type A: 4–20mA Output Board

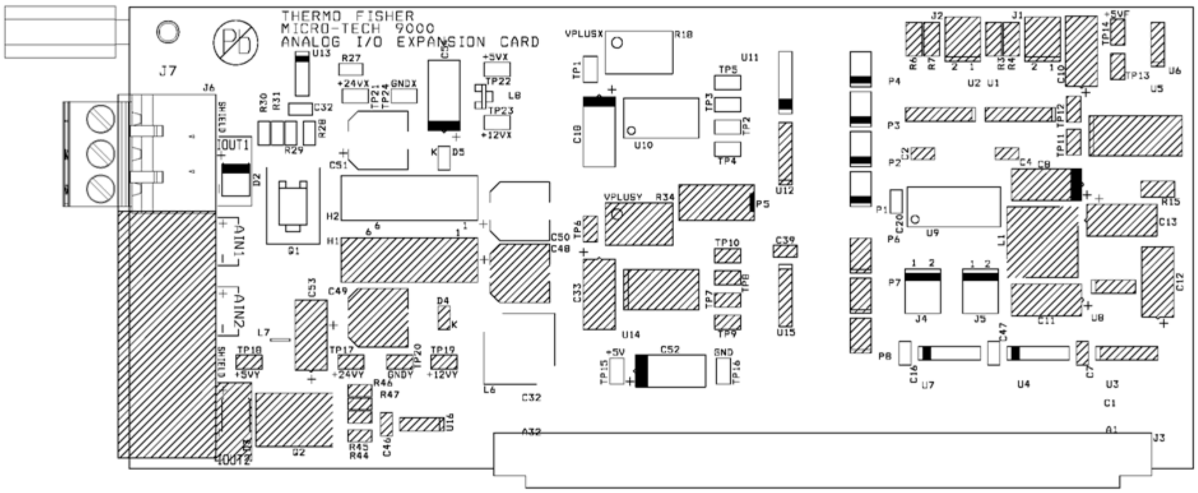
This is an optional board. Install in one of the motherboard expansion slots J10–J13. Single channel high-level current output.

- Outputs
  - Rate
  - Speed
  - Load
- 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
  - Incline compensation
  - Moisture compensation
- Outputs
  - Rate
  - Speed
  - Load

High-Level Inputs (Two Channels)

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

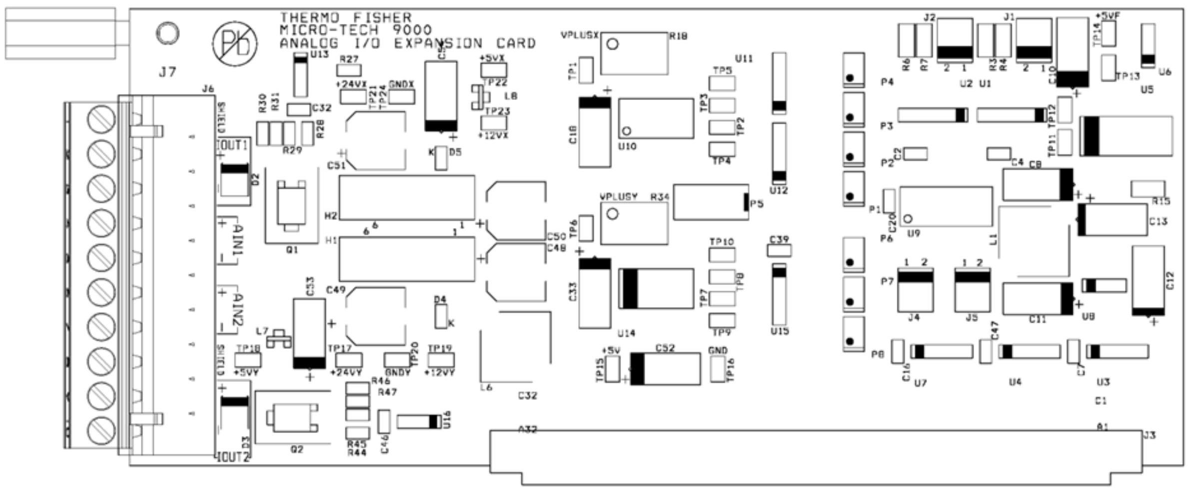
Current Outputs (Two Channels)

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

Dual-Plant Load-Cell A/D Board

This is an optional board. Install in one of the motherboard expansion slots J10–J13. For use with model 9101 only.

Each load-cell channel provides its own buffer amplifiers for driving the A/D converter IC's differential reference voltage from the excitation sense voltage resistive divider. The load-cell signals are individually filtered then connected directly to the differential signal input of the A/D converter. Each load-cell also has an individual R-Cal relay and individual R-Cal resistor.

"Channel 1," top connector has jumpers J14 and J15 that allow selection of either external excitation sense (6-wire LC hook-up) or internal excitation sense (4-wire LC hook-up).

"Channel 2," bottom connector has jumpers J19 and J20 that allow selection of either external excitation sense (6-wire LC hook-up) or internal excitation sense (4-wire LC hook-up).

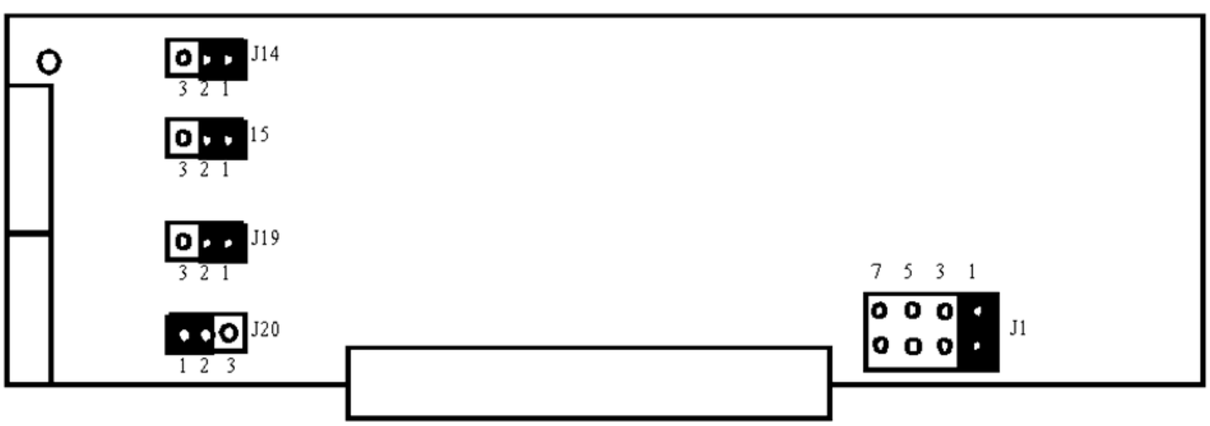
One of four different interrupt channels can be selected from J1 jumper. J1 is board interrupt 1-2 this is a factory installed jumper, do not move.

Load-Cell Sense Jumper Defaults

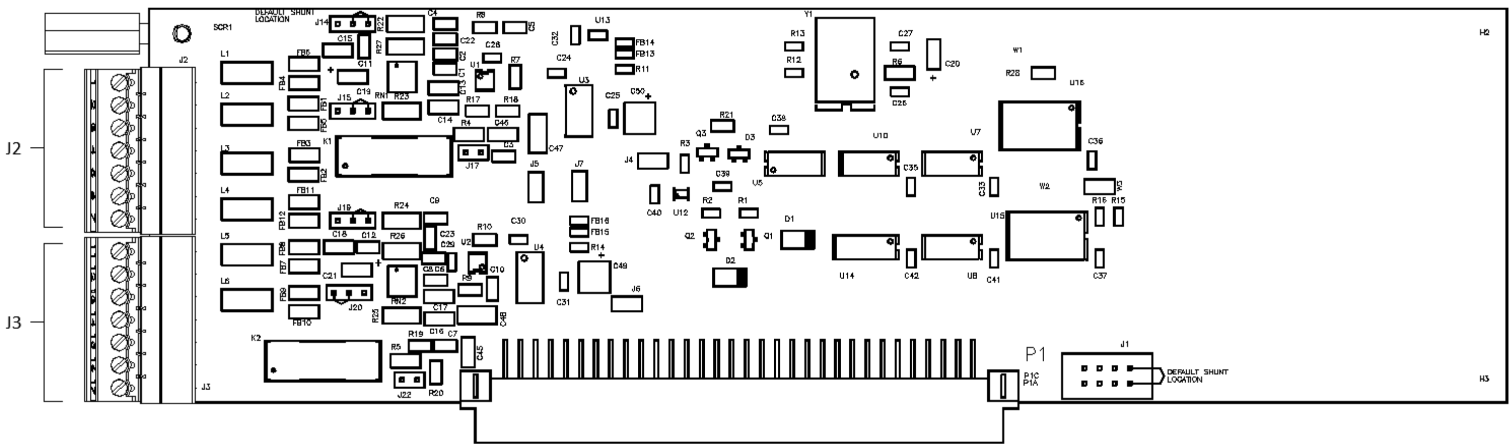
Jumper	Four-Wire Load-Cell (internal sense)	Six-Wire Load-Cell (external sense)
J14	1-2	2-3
J15	1-2	2-3
J19	1-2	2-3
J20	1-2	2-3

Factory option jumpers W2 and W3 allow the A/D converters to operate at either 10 conversions per second or at 80 conversions per second, which may be useful for "loss-in-weight" applications. The standard board is hard-wired for 10 conversions per second. Altering the W2/W3 option jumpers allows software selection of the desired conversion rate, so do *not* change.

Jumper Locations



Board Diagram



Part number = 102450

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 “Appendix C—Communication Protocols.”

Installation

To install the COMM board(s), do the following.

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”	“TRM”
For RS-485 *only*	For RS-485 *only*
OP5	OP6
“A” Normal	“A” Terminated
“B” Multi-drop	“B” Not terminated

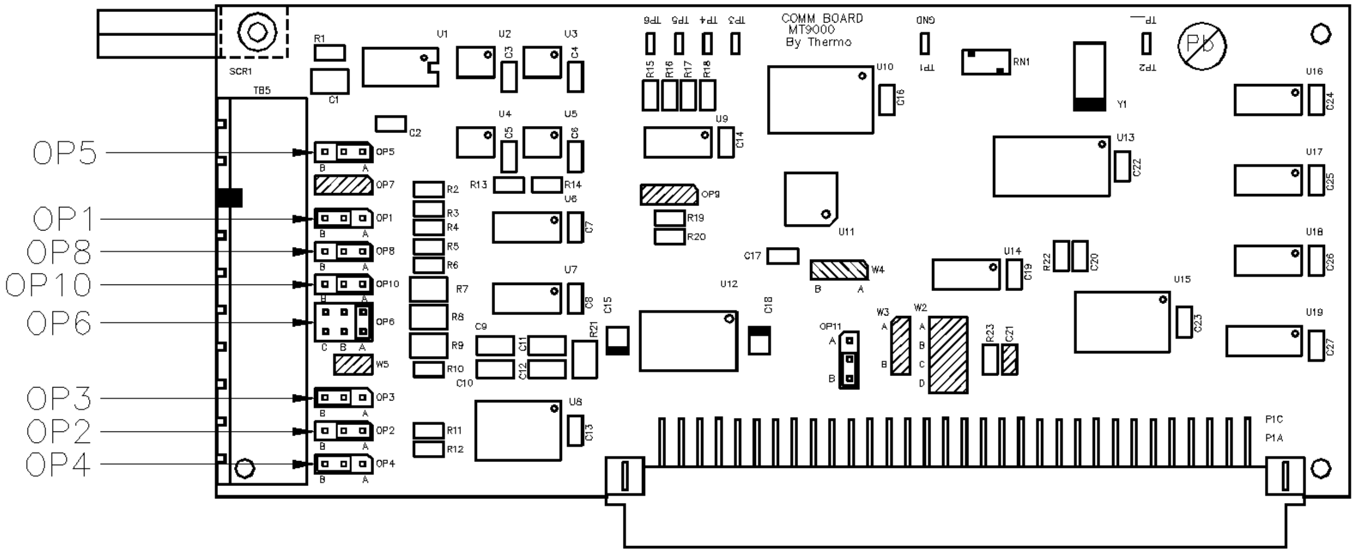
2. Open the Micro-Tech wall mount enclosure and turn power off at the mains, or remove panel mount enclosure from the panel and remove top cover allowing access to the motherboard.

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.

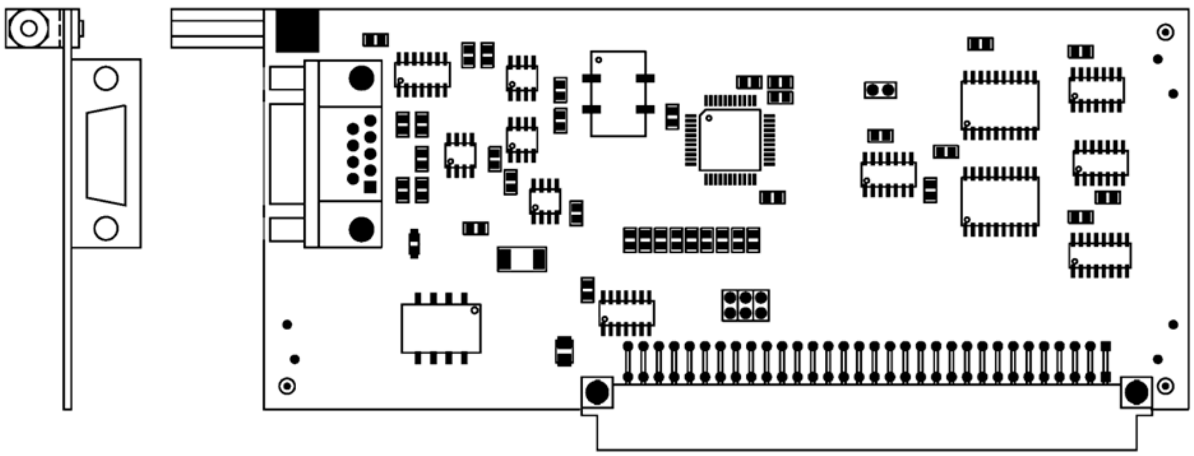
Profibus is a typical master/slave communication where the main PLC is the master or scanner, and the Micro-Tech device is a slave. The connection is EIA RS 485 through a 2-wire twinax Siemens cable.

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 page C-59 for details about the Profibus-DP option card.

Board Diagram



Part number = 102936

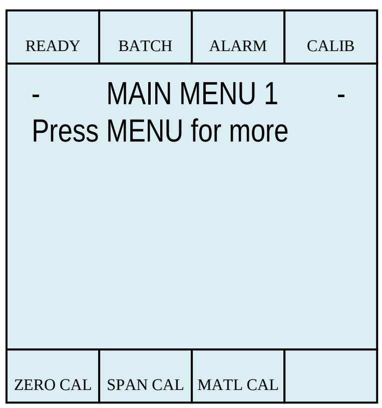
Appendix B
Micro-Tech Menu Details

Values are shown in bold in each table and throughout Appendix B are the Micro-Tech default values.

Overview

Here is a brief overview of the functions available in the Micro-Tech's six main-menu screens. Each time you press the Menu button, the next menu screen appears.

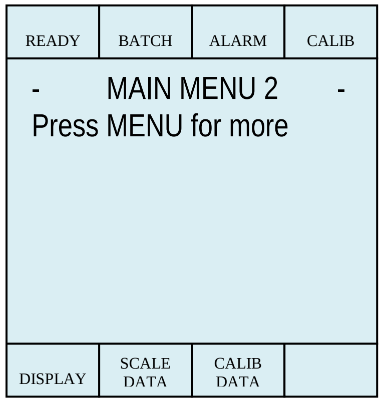
1. To start your overview, press the Menu button to bring up the "Main Menu 1" screen.



This screen contains the following functions.

- ZERO Calibration—Performs a zero calibration on your scale.
- SPAN Calibration—Performs a span calibration on your scale.
- MATERIAL Calibration—Allows you to calibrate your scale using materials of known weight.

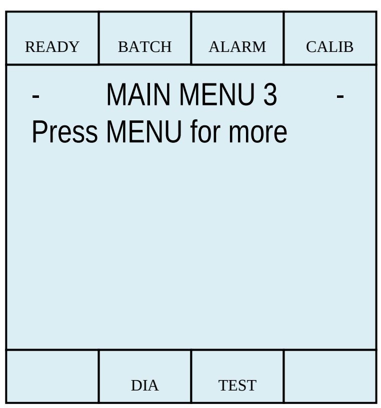
2. Press the Menu button to bring up the “Main Menu 2” screen.



This screen contains the following functions.

- DISPLAY—Allows you to adjust the values displayed in the Run screen.
- SCALE Data—Allows you to set lever ratio and load-cell parameters.
- CALIBRATION Data—Allows you to choose which calibration method to use, and set up material factors and auto zero-tracking (AZT).

3. Press the Menu button to bring up the “Main Menu 3” screen.

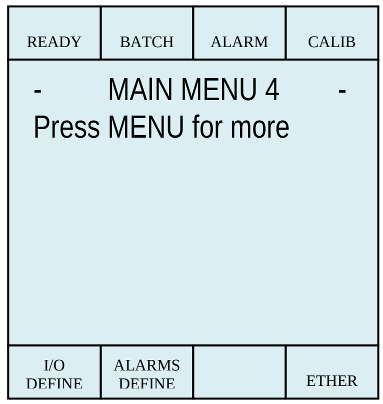


This screen contains the following functions.

- DIAGNOSTICS Function—Allows you to view the speed signals, load-cell signals, and which version of the Micro-Tech software you are currently using.

- TEST Function—Tests the display, keypad, and the Micro-Tech's inputs/outputs to make sure they are working properly.

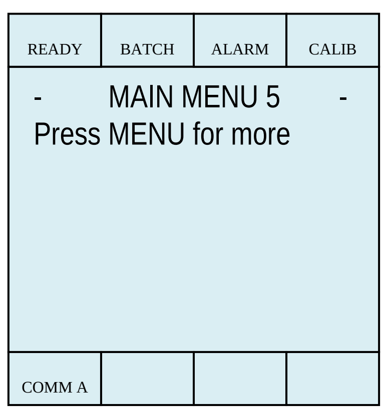
4. Press the Menu button to bring up the "Main Menu 4" screen.



This screen contains the following functions.

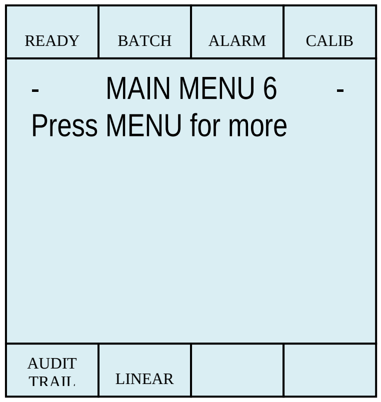
- I/O—(Inputs/Outputs) Allows you to define parameters for the Micro-Tech's digital and analog inputs/outputs.
- ALARMS—Allows you to define how alarms are generated.
- ETHERNET—Allows you to set the Micro-Tech's EtherNet communication parameters.

5. Press the Menu button to bring up the "Main Menu 5" screen.



- COMM A—This allows you to set the communication parameters for the COM A port on the Micro-Tech motherboard.
- Other communication parameters for option boards.

6. Press the Menu button to bring up the “Main Menu 6” screen.



This screen contains the following functions.

- AUDIT Trail—Allow you to capture changes to the Micro-Tech settings and to record the details of all Micro-Tech calibrations.
- LINEARIZATION—Applies a factor to the span settings at multiple flow rates.

Please see the following sections for more information about all Micro-Tech menus and functions.

Main Menu 1

This section lists the technical details for all parameters and functions in the Micro-Tech's "Main Menu 1" that have not been covered elsewhere in the manual.

Zero Calibration

For detailed step-by-step instructions about doing a zero calibration on your scale, see the "Doing a Zero Calibration" section on page 3-5.

The zero number is a digital representation of the tare load on the scale. The tare load consists of the scale carriage, idler(s), and the section of belt within the weigh area. The zero number displays the load-cell signal (mVDC) in digital form.

Here is the Zero Calibration menu table.

Parameter	Selection	Description
ZERO CAL Run belt empty, then press START	START, EXIT, MANUAL	
AUTO ZEROING Time remaining Rate Tot	ABORT	
AUTOZERO COMPLETE XXXX Change Zero?	YES, NO, ADV XXXX = Error%, Total	
ZERO # CHANGED New zero # XXXX	RUN, MENU, ADV XXXX = Old zero #, Rate, Total, Error	
MANUAL ZERO Rate Zero # XXXXX	EDIT, EXIT, ADV	(Password: Operator)
MANUAL ZERO AZ Dev	EXIT, ADV	AZ Dev - Shows the difference between the new zero number and the Zero

Parameter	Selection	Description
Total AZ %		Reference number. Total AZ % - Shows the total deviation of the new zero number from the Zero Reference value.
MANUAL ZERO AZT # AZT %	EXIT, ADV	Note: This screen is only available when Auto zero tracking is turned on under MAIN MENU 2, CALIB DATA. AZT # - Shows the adjustment to the Zero Number. AZT % - Shows the total deviation of the AZT correction factor from the Zero Reference value.

Span Calibration

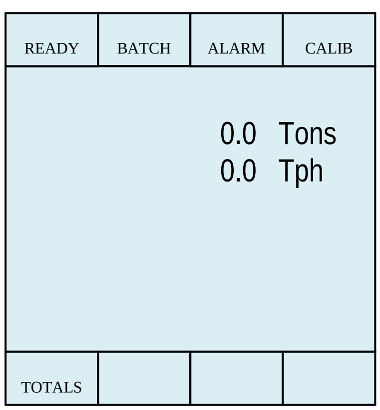
The Micro-Tech has three calibration methods, as follows.

- The electronic R-Cal method. (See page 3-7 for details.)
- Static-weights method. (See below.)
- Test-chain method. (See below.)

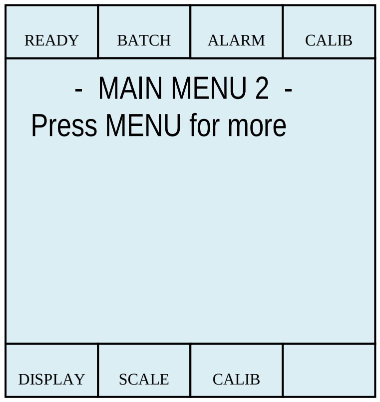
Changing the Calibration Method

To change the calibration method, do the following.

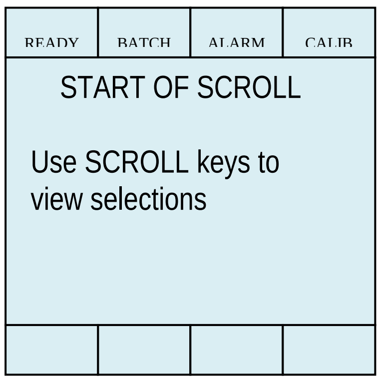
1. Make sure the Micro-Tech Run screen is currently being displayed.



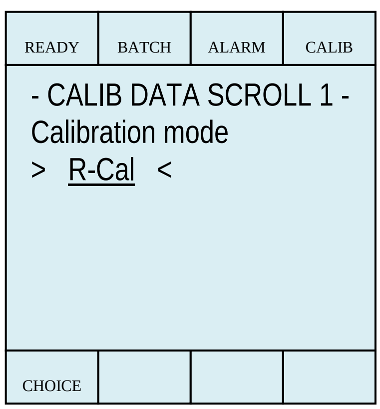
2. Press the Menu button twice to bring up “Main Menu 2.”



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



4. Press the down-arrow button to bring up the Calibration Data screen.



5. Press the Choice button repeatedly until the method you want to use appears in the screen, as shown below.

READY	BATCH	ALARM	CALIB
- CALIB DATA SCROLL 1 - Calibration mode > Chain <			
CHOICE	ENTER		

READY	BATCH	ALARM	CALIB
- CALIB DATA SCROLL 1 - Calibration mode > Weights <			
CHOICE	ENTER		

6. Press the Enter button to save the appropriate choice.

7. Press the down-arrow button, and the Micro-Tech displays an additional data-entry screen. Which screen is displayed depends on which calibration (R-Cal, weights, or chain) method you chose above. Please refer to the appropriate screen below..

R-Cal Method

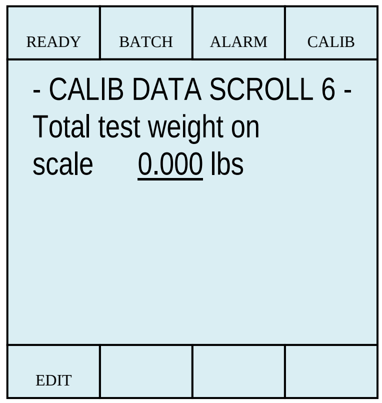
READY	BATCH	ALARM	CALIB
- CALIB DATA SCROLL 2 - R-Cal selected Res 165000 Ohms			
EDIT			

Test-Chain Method

READY	BATCH	ALARM	CALIB
- CALIB DATA SCROLL 4 - Chain select. weight 0.000 Lb/Ft			
EDIT			

Note that test chains have the weight per foot stamped on the link at the end of the chain. Press the Edit button and use the keypad to enter the appropriate value.

Static-Weights Method



Add up the total weight you added to the scale, press the Edit button, and use the keypad to enter the appropriate value.

Span Calibration Instructions

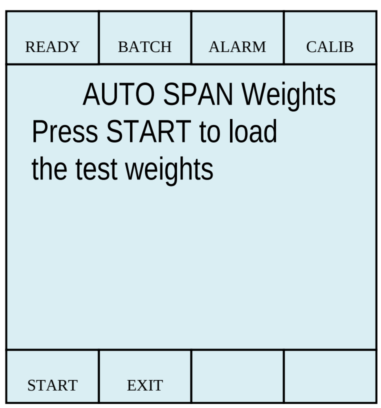
R-Cal Span Calibration is described in “Chapter 3 – Operation” (see page 3-7). Chain and Weights Span Calibrations follow a similar procedure to R-Cal and can be performed by following the screen instructions. In addition, the following instructions should be noted:

1. Make sure the calibration method is set to the appropriate method (weights or chains) as described above.

2. Make sure the conveyor belt is *stopped* before applying the weights or chains.

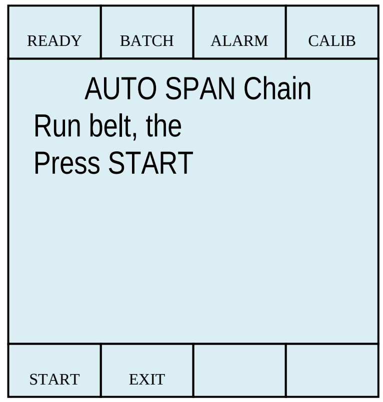
CAUTION. *Do not* apply weights or chains until instructed to do so by the Micro-Tech. ▲

3. When using the weight calibration procedure, if you selected “Load WTS” in the “I/O Definition Menu” (see page B-38), the following screen appears.



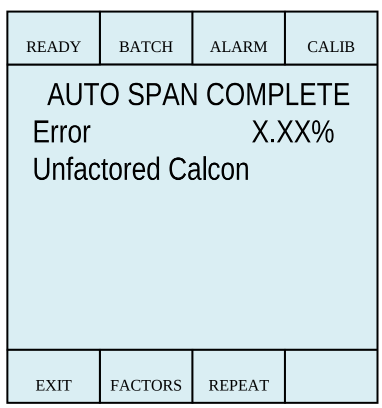
With the “Load WTS” option selected, the test weights are automatically loaded after you press the Start button. Wait for the test weights to be loaded, before proceeding to the next step.

4. When using the chain calibration procedure, after applying the chain, the following screen appears.



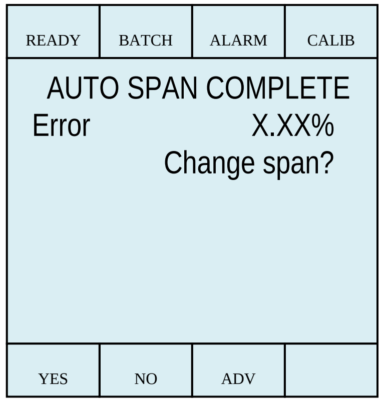
After starting the belt, make sure the chain placement is proper before proceeding by pressing the Start button.

5. Using R-Cal, Chain, or Weights, after the Span Calibration has been executed the following screen will display if a material calibration has been done before and the current simulated load method has no material factor installed.

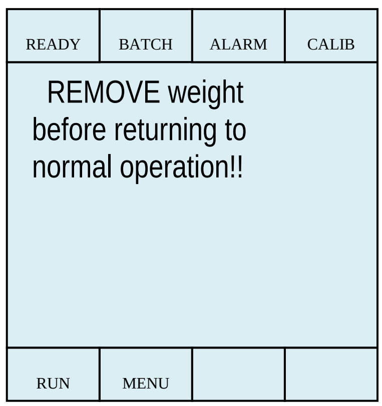


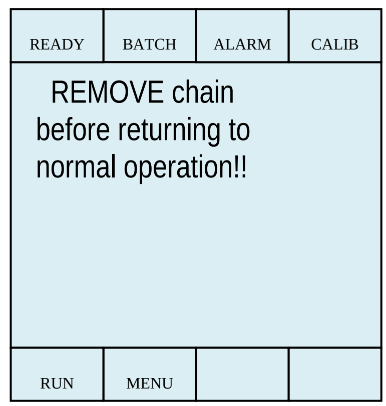
Ignore this screen and press Exit. Automatic Material Factoring should *not* be used. If you want to use the manual Material Factoring procedure, see page A-12.

6. Using Chains or Weights, if the Error is below the critical threshold of 0.50% (0.25% for Model 9201 integrator) press No when the integrator asks if the span should be changed. If the Error is greater than 0.50% there may be a problem. Press No and see the troubleshooting section for additional help.



7. Using Chains or Weights, when the Span Calibration is complete, be sure to remove the Chain or Weights before returning to normal operation.





Span Calibration Menu

Here is the Span Calibration menu table.

Parameter	Selection	Description
AUTO SPAN R Cal Run belt empty, then press START	START, EXIT, MANUAL	
AUTO SPANNING Time remaining Rate Tot	ABORT	
AUTOSPAN COMPLETE XXXX Change Span?	YES, NO, ADV XXXX = Error, Total, Calcon, Mat'l fact*	*Only present when a Material Factor is installed for the current simulated load method.
SPAN # CHANGED XXXX New span #	RUN, REPEAT, ADV XXXX = Old span #, Error, Total, Calcon, Mat'l fact*	*Only present when a Material Factor is installed for the current simulated load method.
SPAN UNCHANGED XXXX New span #	RUN, REPEAT, ADV XXXX = Old span #, Error, Total, Calcon, Mat'l fact*	*Only present when a Material Factor is installed for the current simulated load method.
AUTO SPAN Chain Press Start to begin Chain calibration	START, EXIT, MANUAL	
AUTO SPAN Chain Apply chain then press START	START, EXIT	
AUTO SPAN Chain Run belt, then press START	START, EXIT	
Remove Chains before returning to normal operation!	RUN, MENU	
AUTO SPAN Weights	START, EXIT, MANUAL	

Parameter	Selection	Description
Press Start to begin Weight calibration		
AUTO SPAN Weights Apply weights then press START	START, EXIT	
AUTO SPAN Weights Press START to load the test weights	START, EXIT	Note: Only available if LOAD WTS output was selected in I/O Definition Scroll.
AUTO SPAN Weights Run belt, then press START	START, EXIT	
Remove Weight before returning to normal operation!	RUN, MENU	
AUTOSPAN COMPLETE Error % Unfactored Calcon	EXIT, FACTOR, REPEAT	Note: Only available if material calibration is done before and the current simulated load method has no material factor installed.
XXXX Matl FACTOR New factor ____% Change factor?	YES, NO, ADV XXXX = R-CAL, CHAINS, WTS	Note: Only available if material calibration is done before and the current simulated load method has no material factor installed.
XXXX Matl FACTOR Old factor % New factor %	RUN, MENU, REPEAT XXXX = R-CAL, CHAINS, WTS	Note: Only available if material calibration is done before and the current simulated load method has no material factor installed.
MANUAL SPAN Rate Span #	EDIT, EXIT	

Material Calibration

Doing a material calibration allows you to check the accuracy of your particular scale. You can do a material calibration in one of two ways, as follows.

- Run material of known weight across your scale and compare the result with the actual, known weight.

  or

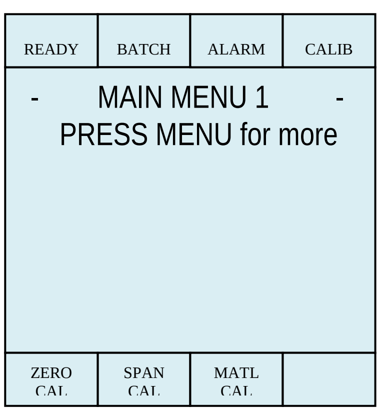
- Run some material across your scale, note the weight, then transport the material to another reference scale for re-weighing.

NOTE. Perform zero and span calibrations prior to Material Testing. ▲

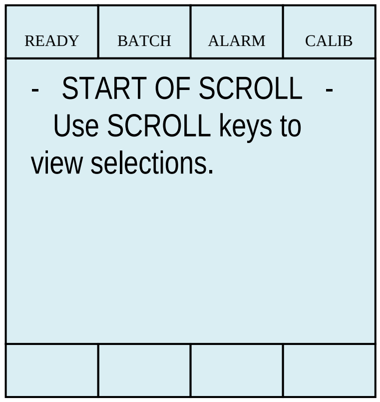
Material testing requires sufficient material to run without interruption continually for the required tonnage and time of 6 minutes and 400 counts or 10 minutes, 1,000 Tons (accuracy dependent). Material should be weighed pre/post material test on a scale proved to within 0.1%.

We are going to run material that we have verified weighs exactly 1,200.00 tons on an independent reference scale.

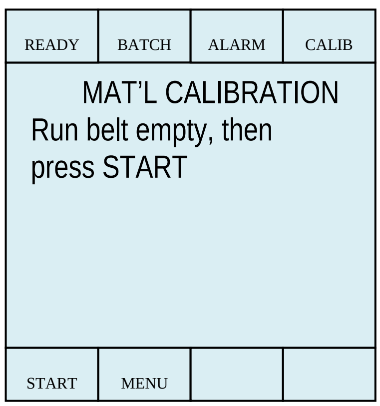
1. In the Run screen, press the Menu button and “Main Menu 1” screen appears.



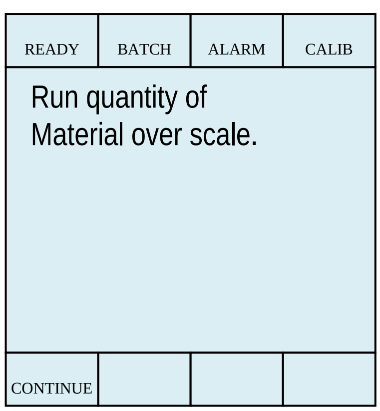
2. Press the Material Calibration button and the following screen appears.



3. Press the down-arrow button and the Start screen appears.

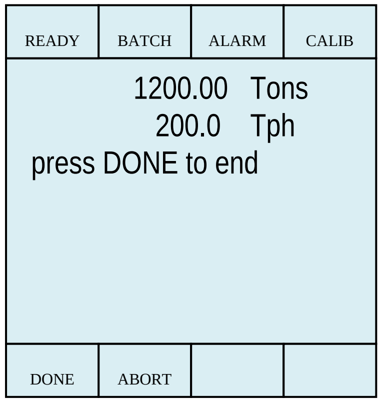


4. Make sure that the belt is running empty, then press the Start button.

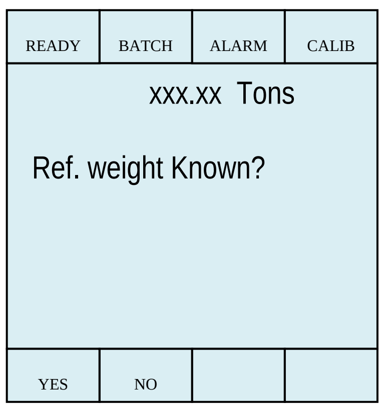


5. Run your chosen quantity of material over belt. (We ran 1,200.00 tons.)

6. When you have finished running your material over the belt, press the Continue button. The Run screen appears. (Your figures will, of course, be different.)

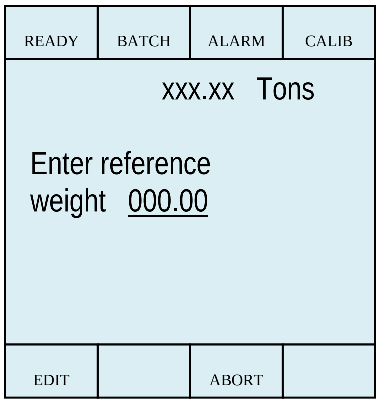


7. When you have completed the test, press the Done button and the following screen appears.

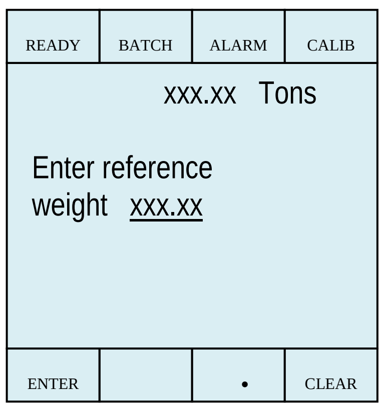


8. Press the No button (meaning your reference weight is *unknown*) and the Run screen reappears.

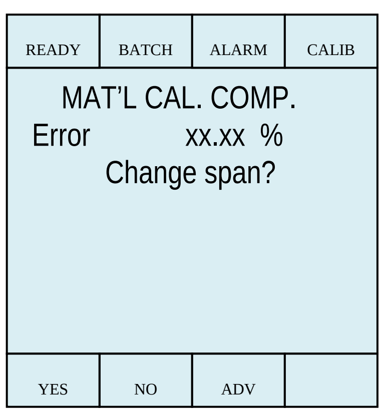
9. When you know the exact weight of the material you ran, press the Material button to return to the “Enter Reference Weight” screen shown below.



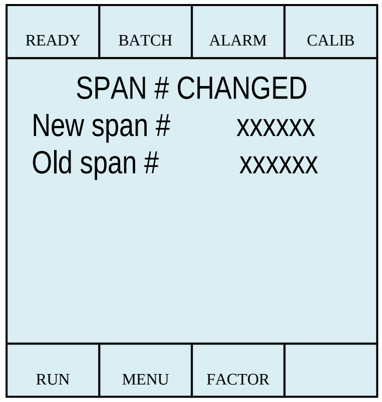
10. Press the Edit button and use the keypad to enter the exact reference weight.



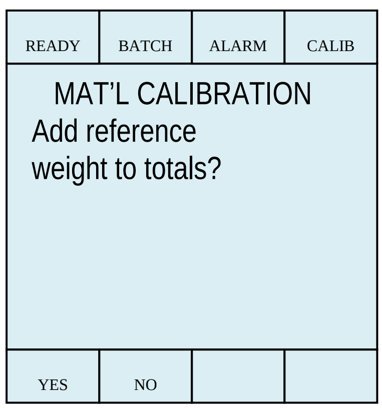
11. Press the Enter button and the following screen appears.



12. Press the Yes button to calculate the new span number, and the following screen appears. (If you press the Advance button, the Micro-Tech displays the difference from the previous setting.)



13. Press the Run button to return to the Material Calibration screen shown below. (If you press the Factor button, the Micro-Tech uses a simulated calibration to populate the parameters in the Material Factor function.)



14. Press the No button and the Run screen reappears.

Here is the Material Calibration menu table.

Parameter	Selection	Description
MAT'L CALIBRATION 3 points linear.	no, yes	This scroll is only available when Linearization scroll 1 is set to Yes.
MAT'L CALIBRATION	START, MENU	

Parameter	Selection	Description
Run belt empty, then press START		
Run quantity of material over scale.	CONTINUE	
X.XX Tons X.XX Tph press DONE to end	DONE, ABORT	
X.XX Tons Ref. weight known?	YES, NO	
XXX.XX Tons Enter reference weight _____ Tons	EDIT, ABORT	
MAT'L CAL. COMP. XXXX Change span ?	YES, NO, ADV XXXX = Error %, Diff. Total	
SPAN # CHANGED New span # Old span #	RUN, MENU, FACTOR*	*This option is only available if a simulated Auto Span calibration has been completed beforehand.
MAT'L CALIBRATION Automatic correction to Material Factors	RCAL*, WTS*, CHAIN*	*Each option is only available if a Auto Span calibration has been completed beforehand with that simulated method.
XXXX Matl FACTOR ZZZZ % Change factor?	YES, NO, ADV XXXX = R-CAL, WTS, CHAINS ZZZZ = New factor, Old factor	
XXXX Matl FACTOR Old factor % New factor %	RUN, MENU, FACTOR XXXX = R-CAL, WTS, CHAINS	
MAT'L CALIBRATION Add reference weight to totals?	YES, NO	

Main Menu 2

This section lists the technical details for all parameters and functions in the Micro-Tech's "Main Menu 2" screen.

Display Menu

Here is the Display menu table.

No.	Parameter	Selection	Description
1	Measure Units	English, Mixed, Metric	If English is selected, all units are in English. If metric is selected, all units are in metric. If mixed is selected, units may be a combination of English and metric. (Password: Service.)
2	Totalization Units	Tons, LTons, Pounds, Kg, tonnes	(Password: Service.)
3	Length Units	Feet, meters	Selects unit of measurement. Belt length, Idler spacing, Scale lever ratios, static weight measurements. (Password: Service.)
4	Rate Units	Tph, LTph, kg/mn, t/mn, Lb/mn, T/mn, LT/mn, percent%, kg/h, t/h, Lb/h	(Password: Operator.)
5	Loadcell Units	Pounds, kg,	
6	Speed Units	FPM, m/s, m/mn	
7	Language	ENGLISH, ITALIANO, DUTCH, DEUTSCH, ESPANOL, FRENCH, PORTUGUES	(Password: Operator.)
8	Time	am/pm, 24h	(Password: Service.)
9	Date	MM-DD-YYYY, YYYY-MM-DD, DD-MM-YYYY	(Password: Service.)
10	Run display line 3	No display, Speed, Load, Date/Time	Optional Run Screen display line 3. (Password: Operator.)

No.	Parameter	Selection	Description
11	Damping Display RATE	2 (0-400 sec)	When process variables are displayed on the screen, they can be damped by a programmable factor to filter out variations that can be introduced by mechanical vibrations. To tune a damping filter, enter the number of seconds corresponding to the desired time constant. For example, if 10 seconds is entered, the process variable will reach stability after a step change in 10 seconds. These damping factors only affect the display, not the current output variable. (Password: Operator.)
12	Damping Display LOAD	2 (0-400 sec)	" Scroll available depending on DISPLAY SCROLL 10 (Run Display, Line 3) setting.
13	Damping Displ. SPEED	2 (0-400 sec)	" Scroll available depending on DISPLAY SCROLL 10 (Run Display, Line 3) setting.
14	L.C. Fail Time Delay	2 (2-90 sec)	This timer starts when a load cell signal fail alarm has been generated and after the timer has elapsed the software forces a load cell critical failure alarm. (Password: Service.)

Scale Data Menu

Here is the Scale Data menu table.

No.	Parameter	Selection	Description
1	Number of scales	1, 2	The Micro-Tech has the capability of supporting dual scales with purchase of Dual Scale Option. This scroll is not applicable to the 9201.
1A	Type of scale	One A/D Channel, Two A/D Channel, Four A/D Channel*	Number of load cell input A/D channels being used. *Available only when Dual A/D Board is installed. This scroll is not applicable to the 9201.
1B	Load cell/s conn. to	Channel 1 (J16), Channel 2 (J21)	Scroll 1B is only present when One A/D Channel is selected for Scroll 1A This scroll is not applicable to the 9201.
2	Max Scale Capacity	500 Tph (1 – 200000)	Max Scale Capacity. Operating range 25 to 100%. Scales the analog ma output (Rate and Load).

No.	Parameter	Selection	Description
			Scale capacity is the maximum rate (maximum mass flow) at which the scale is allowed to work. This entry also defines the default number of decimal places that are used for displaying rate. (Password: Service.)
3	Scale divisions	1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, 50, 20, 10, 5, 2	
4	Belt scale code #	1*	Enter code for Thermo Scientific scale models for default values entered in. Detail scrolls 4A-4O are dependent on the belt scale code and on the number of weigh idlers selected. *Reference table F.2 for other belt scale code options.
4A	Pivot to load cell distance	32.00* (0-10000 in)	On a pivoting scale, measurement from pivot to load cell centerline. Note: Scale code dependent. *Default value for Belt Scale code #1 shown.
4B	# of weigh idlers	1* (1-6)	Number of Idlers mounted on the scale carriage. *Default value for Belt Scale code #1 shown.
4C	Pivot to 1st idler distance	24.00* (0-5000 in)	On a pivoting scale, measurement from pivot to 1st idler centerline. Note: Scale code dependent. *Default value for Belt Scale code #1 shown.
4D	Pivot to 2nd idler distance	16.75* (0-5000 in)	On a pivoting scale, measurement from pivot to 2nd idler centerline. Note: Scale code dependent. Multi idler scale. *Default value for Belt Scale code #14 shown.
4E	Pivot to 3rd idler distance		On a pivoting scale, measurement from pivot to 3rd idler centerline. Note: Scale code dependent. Multi idler scale.
4F	Pivot to 4th idler distance		On a pivoting scale, measurement from pivot to 4th idler centerline. Note: Scale code dependent. Multi idler scale.
4G	Pivot to 5th idler distance		On a pivoting scale, measurement from pivot to 5th idler centerline. Note: Scale code dependent. Multi idler scale.
4H	Pivot to 6th idler distance		On a pivoting scale, measurement from pivot to 6th idler centerline. Note: Scale code dependent. Multi idler scale.

No.	Parameter	Selection	Description
4I	Pivot to test-weight height	0.00* (-20 - 20 in)	On a pivoting scale with Model 50-30 static weight, measurement from pivot to test weight height. Note: Scale code dependent. Note: Default value for Belt Scale code #1 shown.
4J			not used
4K			not used
4L	Pivot to test-weight length	24.00* (0-10000 in)	On a pivoting scale with Model 50-30 static weight, measurement from pivot to test weight length centerline. Note: Scale code dependent. Default value for Belt Scale code #1 shown.
4M	Pivot to carriage height	6.50* (0-10 in)	On a pivoting scale with Model 50-30 static weight, measurement from pivot to carriage height. Note: Scale code dependent. *Default value for Belt Scale code #1 shown.
4N	Roll to carriage height	6.50* (0-20 in)	On a pivoting scale with Model 50-30 static weight, measurement from carry roll to carriage height centerline. Note: Scale code dependent. *Default value for Belt Scale code #1 shown.
4O	# of load cells	2* (1-6)	Quantity of load cells wired to the Micro-Tech. Default value for Belt Scale code #1 shown. The number of load cells is automatically fixed to a value of 2 when Two A/D Channel is selected for scroll 1A Type of scale. The number of load cells is automatically fixed to a value of 4 when Four A/D Channel is selected for scroll 1A Type of scale.
5	Idler spacing	36* (2-999 in)	Spacing of “Scale Area” idlers. *Default value for Belt Scale code #1 shown.
6	Conveyor angle Degrees	0 (-35 - +35)	Incline of conveyor. A 10-44 (incline compensator) can be installed for measurement of changing conveyor inclines.
7	Load cell capacity	250 (1-50000 lb)	Rated capacity of a single load cell. On multiple load cell scales each load cell will be of equal size. Input ONLY capacity of one.
8	Load cell sens.	3.000 mV/V (0.5-3.5)	Load cell mv/v rating. Refer to label at end of load cell cable or the applications data sheet from Thermo.
9A	Load cell #1 res.	350.000 Ohms (10-2000)	Signal bridge resistance of load cell #1.

No.	Parameter	Selection	Description
9B	Load cell #2 res.	350.000 Ohms (10-2000)	Signal bridge resistance of load cell #2. Note: Scale model dependent.
9C	Load cell #3 res.	350.000 Ohms (10-2000)	Signal bridge resistance of load cell #3. Note: Scale model dependent.
9D	Load cell #4 res.	350.000 Ohms (10-2000)	Signal bridge resistance of load cell #4. Note: Scale model dependent.
9E	Load cell #5 res.	350.000 Ohms (10-2000)	Signal bridge resistance of load cell #5. Note: Scale model dependent.
9F	Load cell #6 res.	350.000 Ohms (10-2000)	Signal bridge resistance of load cell #6. Note: Scale model dependent.
10	Speed input	Single, dual, simulated	Informs the Micro-Tech where the speed input is physically wired (or not wired, in the case of simulated).
11	Zero dead-band range	0.0 % (0-5%)	Low level threshold where Rate and Totalization are stopped.
12	W&M mode	NONE, NTEP, OIML	Weights & Measures Mode
13	Load-cell balance	100 (1-100 %)	

Calibration Data Menu

Here is the Calibration Data menu table.

No.	Parameter	Selection	Description
1	Calibration mode	R-Cal, Chain, Weights	Selecting simulated calibration mode
2	R-Cal selected Res	165000 Ohms (10-1,000,000)	Ohms value of calibration resister
3	R-Cal constant		Calculated (or factored) accumulated weight at end of simulated Rcal calibration
4	Chain select. weight	0.000 lb/ft (0.0 - 1000)	Stamped weight per length of calibration chain(s).
5	Chain cal constant		Calculated (or factored) accumulated weight at end of simulated Chain calibration

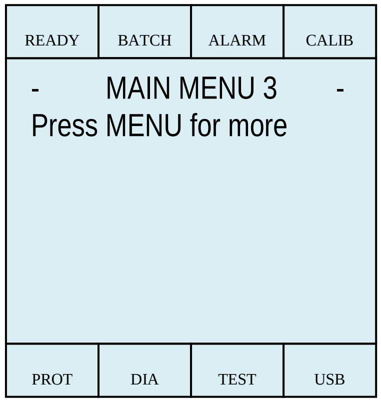
No.	Parameter	Selection	Description
6	Total test weight on scale	0.000* lbs	Stamped weight of calibration weight(s). Stamped at each handle end. *Maximum is load cell size multiplied by number of load cells.
7	Weight Cal constant		Calculated (or factored) accumulated weight at end of simulated static weight calibration
8	Calibration interval	0 days (0 - 365)	The system can be programmed to prompt you when the next calibration is due. If you do not want this option, confirm the default 0 days interval; otherwise enter the number of days. If a non-zero value is entered, an alarm appears after the time is elapsed. The alarm can only be cleared after a calibration check is executed.
9	Calibration date Last Next		This scroll displays the date of the last calibration and the expected date of the next one, based on the entry in the previous screen.
10	Material FACTOR R-CAL	0.00% (-99.99 - 99.99)	Correction factor for Rcal calibration when span is derived from other calibration standard
	Material FACTOR CHAINS	0.00% (-99.99 - 99.99)	Correction factor for Chain calibration when span is derived from other calibration standard
	Material FACTOR WEIGHT	0.00% (-99.99 - 99.99)	Correction factor for Static Weights calibration when span is derived from other calibration standard
11	Nr. of test duration	1, 2	Either a full length (1) or a shorter time test duration (2)
12	Establish test duration	ACQ, MANUAL	
	ACQUIRE TEST DUR Choose belt length measurement method.	FULL, PARTIAL	
	Ent. len. of one belt revolution.	(1 - 30,000 ft)	Measured length of entire belt length
	Ent. len. between two marks on belt.	(1 - 10,000 ft)	
	Enter the number of belt revolutions to be timed	(1 - 100 rev)	Required belt revolutions to achieve minimum test time

No.	Parameter	Selection	Description
	Enter time for revolutions to pass reference	(10 - 16200 sec)	Time required for minimum number of revolutions (seconds).
13	Auto Zero tracking	no, yes	
14	Auto zero tracking range +/-	4.0% (0-10)	The AZT sequence starts automatically when the flow rate is below this percentage of the max scale capacity.
15	Auto zero tracking step +/-	0.02% (0.01 – 10)	
16	Auto zero tracking max dev. +/-	4.0% (0-10); (0-2)* (0-5)**	*NTEP W&M mode. **NTEP W&M mode when print AUTO ZERO is enabled under the PRINT scroll. Generates an alarm when the change from the Zero Reference value to the value of zero with new factor applied exceeds the max deviation.
17	Auto zero tracking Warm Time	1.0 (0-160 min)	
18	Auto zero tracking Test duration	1-L, 1-S	Only available when Nr. of test duration is set at 2.
19	Max. speed capacity	600.0 (1 - 2000 FPM)	
20	Auto Zero max dev.	2% (0-2%)	This scroll is only available when NTEP W&M mode is selected. Generates an alarm when the change from the Zero Reference value to the new zero value exceeds the max deviation.
21	Zero Reference	INVALID (0 - 120000)	The base value for Autozero max deviation and Autozero Track max deviation. This value must be re-set to clear a Autozero or Autozero Track max deviation alarm.

No.	Parameter	Selection	Description
22	Zero Ready	no, yes	The Zero Ready feature provides visible indication of when the scale is not loaded, has a valid zero calibration, and is ready to run material. This feature is a requirement for all NTEP scales. The indication is shown on the display when the belt loading remains under 0.12% of full scale belt loading for a period of time equivalent to one belt revolution. The indicator is the green ZERO LED above the display. The function can be activated only after a complete scale calibration. A Zero Ready digital output is also available, it is active when the green ZERO LED is displayed. When W&M Mode is set to NTEP, the Zero Ready scroll defaults to “Yes”. When W&M Mode is set to OIML or NONE, the Zero Ready scroll defaults to “No”. Whenever the Zero Ready scroll setting is changed an Audit Trail event is generated. (Password: Service.)

Main Menu 3

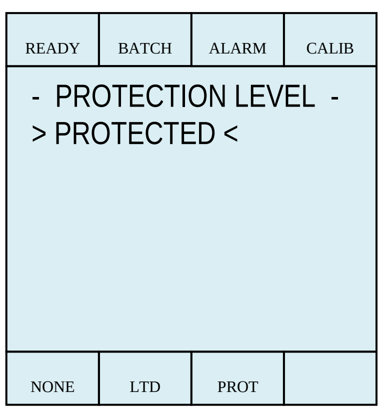
This section lists the technical details for all parameters and functions in the Micro-Tech's "Main Menu 3" screen.



Protection Menu

The password-protection menu allows you to protect and unprotect the system using passwords. Diagnostic functions can only be operated after removing all password protection. The Protection button only appears if you have already created a password in the Diagnostic Menu. There are two passwords, Service and Operator. There are three protection levels with specific related passwords.

Press the Protection button and the following screen appears.



Protection choices = None (the default), Limited, or Protected.

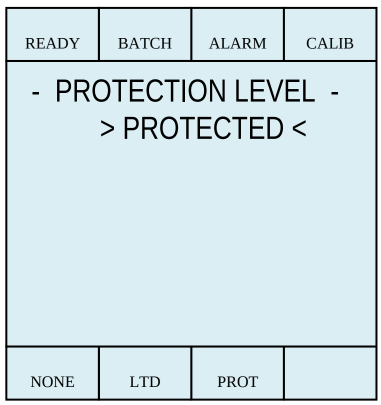
Increasing the protection level does not require a password. A Service password is required to access the None level of protection. An Operator or a Service password is required to access the Limited level of protection. (A Service password supersedes an Operator password.)

Change the protection level by selecting the desired level, as described below.

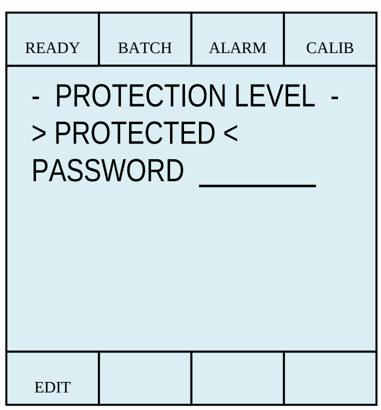
Decreasing the Protection Level

Decreasing the protection level requires a password.

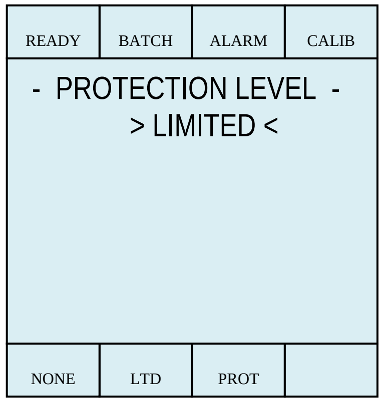
1. Begin by selecting a protection level lower than the current. Press the Limited soft-key.



2. The display will prompt for a password. Press the Edit key to enter the password. Press Enter when complete.

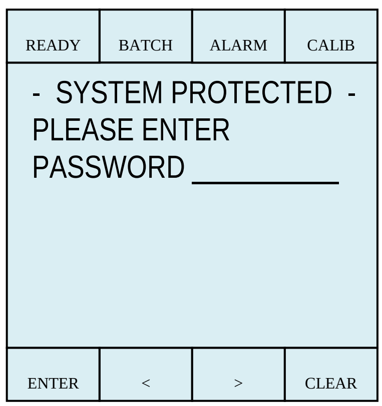


3. The protection level has now changed from Protected to Limited.

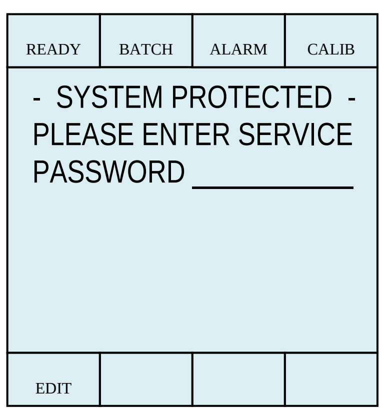


On-Line Procedure for Changing Protection Level

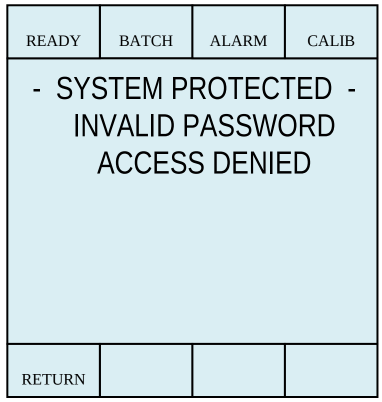
The protection level can be temporarily changed by entering a password “on the fly” during normal operation. When you try to enter a variable or select a function that is password protected, and the password is installed, the following screen is displayed.



You can enter either the Operator or the Service password. However, if you enter the Operator password and the variable or function requires the Service password instead, access is denied and the following screen is displayed.



If you do not enter the correct password, the following screen appears.



Pressing RETURN returns the system to the previous function. If you enter the correct password, the previous screen appears and access is allowed.

When the protection level is changed using the on line procedure, the system automatically returns to protected status if no keyboard entries are made within 60 seconds.

Protection Menu Table

Here is the Protection menu table.

Parameter	Selection	Description
PROTECTION LEVEL	NONE, LIMITED, PROTECTED	The PROT menu is activated when a Service or Operator password is entered. Sets protection level. Required to enter the password in order to decrease the protection level. NONE – The system is completely unprotected; all data can be read or changed. LIMITED – Operator functions and data are protected. All setup and calibration data are protected except zero calibrate. PROTECTED – The system is totally protected; process data can be read, but no changes are allowed.

Diagnostics Menu

Here is the Diagnostic menu table.

No.	Parameter	Selection	Description
1	A/D gross 1 A/D gross 2* A/D gross 3** A/D gross 4** A/D net	0 - 131070	Digital representation of gross load at the load cell. *Available only when Type of scale set to Two A/D Channel. **Available only when Type of scale set to Four A/D Channel. Digital representation of “material” load at the load cell. (gross – zero No.)
2	Weight on load cell #1-J16____mV #2-J21____mV[1] #3-J1_____mV[2] #4-J2_____mV[2] #J9_____mV[3]		Gross load at load cell. Presented in mvdc format. Note: After A/D conversion. [1]Available only when Type of scale set to Two A/D Channel. [2]Available only when Type of scale set to Four A/D Channel. [3]Model 9201.
2A	Loadcell output zero	15 A/D counts (0 - 10000)	Fine adjust of load cell mv/v zero set. Factory adjusted. Not to be changed in the field
2B	Loadcell output span	(0 - 30000)	Fine adjust of load cell mv/v span set. Factory adjusted. Not to be changed in the field
3	Prescale___ #1_____ pls/min	1 (0 - 100)	A divider to bring the speed pulses to within a range of 1500-2500 pulses per minute. Incoming speed pulses (after prescale) per minute
3A	Test duration total pulses	(1 - 1,000,000)	Total number of speed pulses during a test duration (calibration time). Not applicable for simulated speed.
3B	Test duration total length	(1 - 100,000 ft)	Test duration total belt length. Not applicable for simulated speed.
4	Enter SERVICE password		Enter Service password to enable protection. Up to eight characters long. It is strongly recommended you write down the password and keep a copy in a safe place. To remove a password, just press EDIT and then ENTER. (Password: Service.)
5	Enter OPERATOR password		Enter Operator password to enable protection. Up to eight characters long. It is strongly recommended you write down

No.	Parameter	Selection	Description
			the password and keep a copy in a safe place. To remove a password, just press EDIT and then ENTER. (Password: Operator.)
6	Software version		Current software and rev installed in the Micro-Tech
7	Date DAY MONTH YEAR		Enter the date. A battery operated clock calendar maintains time and date even if power is removed. (Password: Service.)
8	Time		Enter the time. A battery operated clock calendar maintains time and date even if power is removed. (Password: Service.)
9	Board type slot #1	Analog I/O, Current Out, 8I 8O SRC, 8I 8O SYN, PROFIBUS DP, Communication A, AD BOARD #2 channels	Defines option pcba in bus slot #1. The system automatically recognizes when optional boards are installed. When a board is acknowledged, the related information stays in memory even if the board is removed, until the operator deletes it by responding YES to the message shown at power on.
10	Board type slot #2	“	Defines option pcba in bus slot #2. “
11	Board type slot #3	“	Defines option pcba in bus slot #3. “
12	Board type slot #4	“	Defines option pcba in bus slot #4. “
13	Force cold start	ENTER	
	ATTENTION ARE YOU SURE ?	YES, RETURN	Confirm cold start Press yes, otherwise press return
15	Back Light Level		
16	Max Load lb/ft		

Test Menu

Here is the Test menu table.

No.	Parameter	Selection	Description
1	LAMP TEST	START	Keypad LED’s blink on and off.
2	Internal test of microprocessor	START	Testing ROM, RAM, and E2PROM.

No.	Parameter	Selection	Description
			The message Test PASSED is displayed if the test runs correctly. If something wrong is detected, the message Test FAILED is displayed, and the soft key CONTINUE is shown. You must press the key to go on to the next test. (Password: Service.)
2A	Testing ROM	PASSED, FAILED	
2B	Testing RAM	PASSED, FAILED	
2C	Testing E2PROM	PASSED, FAILED	
3	Dig input test	Slot #0 : ---0001- Slot #1: 00000000 Slot #2: 00000000 Slot #3: 00000000 Slot #4: 00000000	Shows the status of each digital input. Slots are numbered 1 to 4. Slot 0 is the motherboard. Inputs are shown from left to right. (Password: Service.)
4	Dig output test Output #___ ___	(1-13) (OFF, ON)	Output range based on number of DIO 8in/8out boards installed. Shows the status of each digital output and allows the operator to force the output for testing purposes. The output, when forced, stays on until the CLEAR soft key is pressed or the Run Menu is entered. If an output is forced and the scroll key is used for reaching some other menu, the output stays in the forced status until RUN is pressed. This allows you to check inputs while outputs are still in the forced status. NOTE. Forcing the digital outputs may cause machinery to start.
5A	Current output #1 should be ____	4.00 mA (4-20) (0-20) (20-0) (20-4)	This scroll is only available when a current output board is installed. To force the output, use the numeric keys to enter the desired number of mill amperes. Press ENTER to confirm. Press CLEAR to free the mA channel. (Password: Service.)
5B	Current output #2 should be ____	4.00 mA (4-20) (0-20) (20-0) (20-4)	“
5C	Current output #3 should be ____	4.00 mA (4-20) (0-20) (20-0) (20-4)	“

No.	Parameter	Selection	Description
5D	Current output #4 should be ____	4.00 mA (4-20) (0-20) (20-0) (20-4)	“
6	Volts input 1	#1 -0.00 V #2 -0.00 V	This scroll is only available when an analog I/O board is installed. It shows the status of each analog input channel.
7	Volts input 2	#3 -0.00 V #4 -0.00 V	“
8	Test communication A	PORT1, PORT2*	*Only available when COMM board is installed. A test pattern is sent out on the TX output and read on the RX input. If the test fails, the message Test Failed is shown; otherwise, the message TEST PASSED is displayed. (Password: Service.)
9	Test communication B ____ Kb Wait Prm		This scroll only displays when the Profibus board is installed.
10			
11			
12			
13	Keyboard test		Press keys. Hit RUN key twice quickly to exit.

USB Menu

The USB menu allows you to download all the Micro-Tech settings to a flash drive to back them up and, in the event of a system failure, easily restore them from the flash drive. You can also print to the flash drive.

Be sure to only use the USB stick that is provided with the Micro-Tech. If using another USB stick with the Micro-Tech, please note it *must* have a capacity of 1GB or less, and *must* be properly formatted as described below before being used with the Micro-Tech.

Formatting a USB Device

Due to limitations in the FTDI VNC1L USB Controller IC, the USB devices used with the Micro-Tech must be formatted with 512-byte data sectors. The default sector-size applied when a USB device is formatted in Microsoft Windows, is not necessarily 512 bytes, so a special procedure is required.

1. Plug a blank USB device into a PC running Windows.

NOTE. If the USB device contains any data, this data will be lost as a result of formatting. ▲

2. Carefully note the drive letter assigned by Windows to the USB device—for example, “E:\” or “I:\” or similar.

3. Open a DOS command-line window and type in the following commands.

   format x: /fs:fat16 /a:512   (Press the Enter key)

   where *x* is the actual drive letter assigned to the USB device.

4. Answer Yes to any warnings about erasing all data on the device.

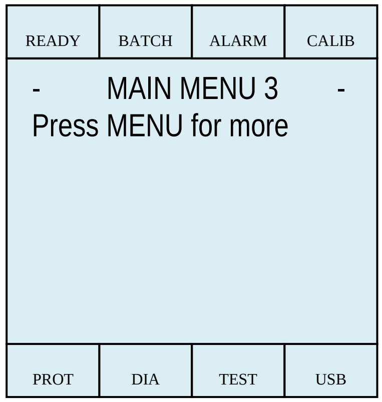
5. When complete, the PC will prompt you for a volume name. (You can enter any 11-character name.)

6. Remove the USB device from the PC. The USB device is now ready for use with your Micro-Tech.

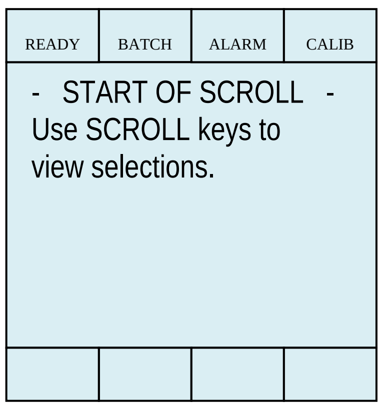
NOTE. The maximum capacity of the USB device that can be used in the Micro-Tech, is 1 GB. Higher capacity devices (> 1GB) require special partitioning tools to enable formatting with 512-byte sectors. ▲

Uploading and Downloading Micro-Tech Settings

You must have inserted a flash drive into the Micro-Tech's USB port to use this menu.



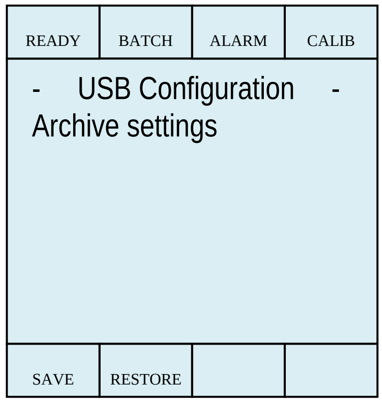
1. Press the USB button and the following screen appears.



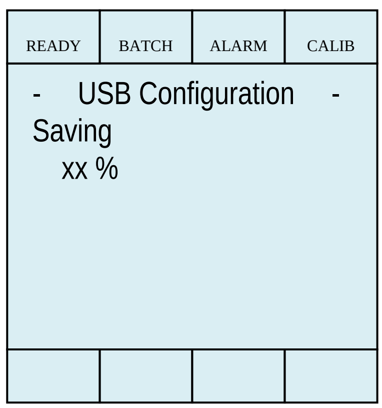
2. Press the down-arrow button and the "USB configuration" screen appears.

Saving to a USB Flash Drive

To save the Micro-Tech's settings to a flash drive, do the following.



1. Press the Save button and the following screens displays the progress of the save operation.



Restoring Micro-Tech Settings from a USB Flash Drive

READY	BATCH	ALARM	CALIB
- USB Configuration - Archive settings			
SAVE	RESTORE		

NOTE. Be careful using the Restore procedure, because all your current settings will be overwritten. ▲

2. Press the Restore button and the following screens displays the progress of the restore operation.

READY	BATCH	ALARM	CALIB
- USB Configuration - Restoring xx %			

Printing to a USB Flash Drive

Please see the Print Menu section on page B-50.

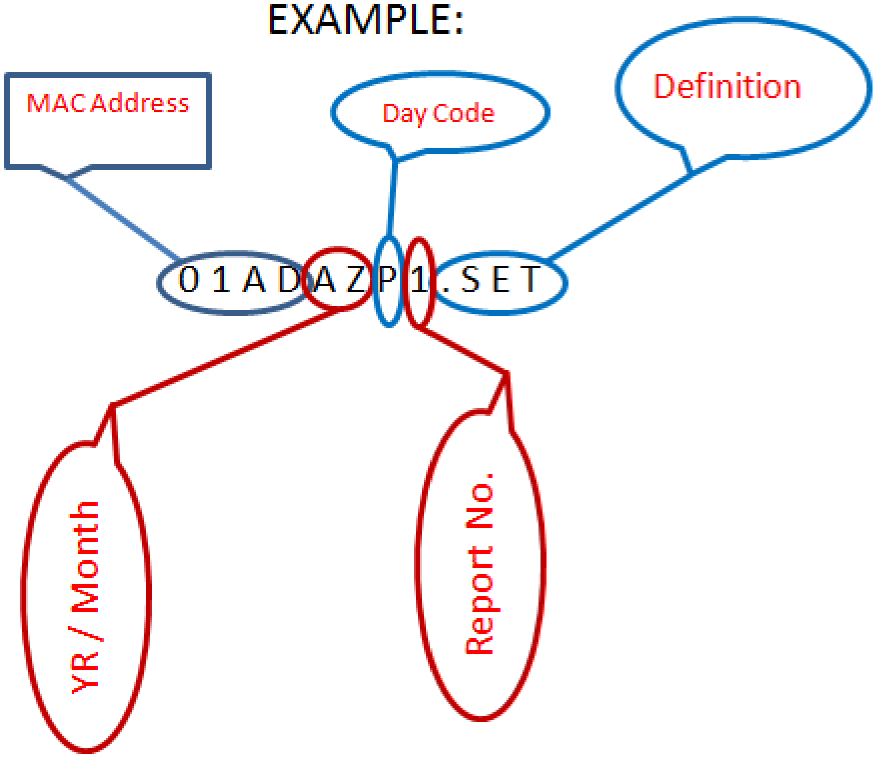
USB Print File Naming

This section describes the file naming convention used when printing a report to a USB stick. The printed reports are saved as text files to the USB stick. They can be opened with a text editor, like Notepad or other similar program. The Micro-Tech saves the print reports with an 8 dot 3 filename. Example: 01ADAZP1.SET

The filename is defined as follows:

USB File Name		
Location In File Name	Definition	COMMENTS
First 4	Last 4 of unique Mac Address	Can Be found on the Motherboard or in the Ethernet Menu
Next 2	Year Month Code	See Year/Month Table
Next 1	Day Code	See Day Code Table
Last 1	Report number	Report number for the day - 1-9, A-Z

EXAMPLE:



USB file naming Extension	
CODE	DEFINITION
AUD	Audit Trails
BAH	Batch Total
TOT	Total Report
TTn	Total Report - n is scale number
SET	Setup
ATZ	Auto Zero
AZn	Auto Zero - n is scale number
AZT	Auto Zero Tracking
ATn	Auto Zero Tracking - n is scale number

Year/Month Code Table									
CODE	MONTH - YEAR	CODE	MONTH - YEAR	CODE	MONTH - YEAR	CODE	MONTH - YEAR	CODE	MONTH - YEAR
AA	Jan-2012	BA	Mar-2014	CA	May-2016	DA	Jul-2018	EA	Sep-2020
AB	Feb-2012	BB	Apr-2014	CB	Jun-2016	DB	Aug-2018	EB	Oct-2020
AC	Mar-2012	BC	May-2014	CC	Jul-2016	DC	Sep-2018	EC	Nov-2020
AD	Apr-2012	BD	Jun-2014	CD	Aug-2016	DD	Oct-2018	ED	Dec-2020

Year/Month Code Table									
CODE	MONTH - YEAR	CODE	MONTH - YEAR	CODE	MONTH - YEAR	CODE	MONTH - YEAR	CODE	MONTH - YEAR
AE	May-2012	BE	Jul-2014	CE	Sep-2016	DE	Nov-2018	EE	Jan-2021
AF	Jun-2012	BF	Aug-2014	CF	Oct-2016	DF	Dec-2018	EF	Feb-2021
AG	Jul-2012	BG	Sep-2014	CG	Nov-2016	DG	Jan-2019	EG	Mar-2021
AH	Aug-2012	BH	Oct-2014	CH	Dec-2016	DH	Feb-2019	EH	Apr-2021
AI	Sep-2012	BI	Nov-2014	CI	Jan-2017	DI	Mar-2019	EI	May-2021
AJ	Oct-2012	BJ	Dec-2014	CJ	Feb-2017	DJ	Apr-2019	EJ	Jun-2021
AK	Nov-2012	BK	Jan-2015	CK	Mar-2017	DK	May-2019	EK	Jul-2021
AL	Dec-2012	BL	Feb-2015	CL	Apr-2017	DL	Jun-2019	EL	Aug-2021
AM	Jan-2013	BM	Mar-2015	CM	May-2017	DM	Jul-2019	EM	Sep-2021
AN	Feb-2013	BN	Apr-2015	CN	Jun-2017	DN	Aug-2019	EN	Oct-2021
AO	Mar-2013	BO	May-2015	CO	Jul-2017	DO	Sep-2019	EO	Nov-2021
AP	Apr-2013	BP	Jun-2015	CP	Aug-2017	DP	Oct-2019	EP	Dec-2021
AQ	May-2013	BQ	Jul-2015	CQ	Sep-2017	DQ	Nov-2019	EQ	Jan-2022
AR	Jun-2013	BR	Aug-2015	CR	Oct-2017	DR	Dec-2019	ER	Feb-2022
AS	Jul-2013	BS	Sep-2015	CS	Nov-2017	DS	Jan-2020	ES	Mar-2022
AT	Aug-2013	BT	Oct-2015	CT	Dec-2017	DT	Feb-2020	ET	Apr-2022
AU	Sep-2013	BU	Nov-2015	CU	Jan-2018	DU	Mar-2020	EU	May-2022
AV	Oct-2013	BV	Dec-2015	CV	Feb-2018	DV	Apr-2020	EV	Jun-2022
AW	Nov-2013	BW	Jan-2016	CW	Mar-2018	DW	May-2020	EW	Jul-2022
AX	Dec-2013	BX	Feb-2016	CX	Apr-2018	DX	Jun-2020	EX	Aug-2022
AY	Jan-2014	BY	Mar-2016	CY	May-2018	DY	Jul-2020	EY	Sep-2022
AZ	Feb-2014	BZ	Apr-2016	CZ	Jun-2018	DZ	Aug-2020	EZ	Oct-2022

Day Code Table					
CODE	DAY	CODE	DAY	CODE	DAY
1	1	C	12	N	23
2	2	D	13	O	24
3	3	E	14	P	25
4	4	F	15	Q	26
5	5	G	16	R	27
6	6	H	17	S	28
7	7	I	18	T	29
8	8	J	19	U	30
9	9	K	20	V	31
A	10	L	21	-	-
B	11	M	22	-	-

Main Menu 4

This section lists the technical details for all parameters and functions in the Micro-Tech's "Main Menu 4" screen.

Input/Output Define Menu

Here is the Input/Output Define menu table.

No.	Parameter	Selection	Description
1	Current output define #1 #2 #3 #4	Rate, off, load, speed	This scroll is only available when a I-Out card or a 2I/2O card is installed.
1A	Current out range #1 #2 #3 #4	4-20 mA, 20-0 mA, 20-4 mA, 0-20mA	
1B	Current out delay #1 ___ #2 ___ #3 ___ #4 ___	(0-300 sec) (0-10,000 ft)	
1C	Current out Damping #1 #2 #3 #4	(0-400 sec)	

No.	Parameter	Selection	Description
2	Analog input #1 def.	Off, Inclin., moisture	This scroll is only available a 2I/2O card is installed. Angle compensation dynamically adjusts span when conveyor inclination changes. Moisture compensation is performed on the belt loading, and affects both rate and totals. Only during material calibration with material is moisture compensation suspended, so that the totalized quantity can be directly compared to the weight obtained on a static scale. The moisture compensation is executed before adding to total. Use the CHOICE key to select the action of the analog input, use ENTER to confirm. Press the CALIB softkey to calibrate.
2A	Conveyor low posit. Moisture calib. Low	0.00 Degrees, (-35 - 35) 0.0 %M = 0.00 V (0 - 40%, 0 - 2.5 V)	With your incline sensor installed correctly, set the conveyor to its lowest position. Then enter the angle of the conveyor in this scroll. Enter the percent moisture and corresponding moisture sensor voltage for the low moisture point into this scroll.
2B	Conveyor high posit. Moisture calib. Hi	Degrees, (-35 - 35) 5.0 %M = 5.00 V (1-40%, 1-5 V)	With your incline sensor installed correctly, set the conveyor to its highest position. Then enter the angle of the conveyor in this scroll. Enter the percent moisture and corresponding moisture sensor voltage for the high moisture point into this scroll.

No.	Parameter	Selection		Description
3	Analog input #2 def.	Off, Inclin., moisture		“
3A	“	“		
3B	“	“		
4	Analog input #3 def.	Off, Inclin., moisture		“
4A	“	“		
4B	“	“		
5	Analog input #4 def.	Off, Inclin., moisture		“
5A	“	“		
5B	“	“		
6	Dig. Input def.	Ext alarm 1	0 NO	The NC/NO key selects the Normally Open (NE) or Normally Closed (NC) status of the input. By assigning a function to 0, the function is disabled. *The “CommA Scroll 5” (Protocol port #1) must be set to Printer, or a COMM board must be installed for this option to be shown.
		Ext alarm 2	0 NO	
		Ext alarm 3	0 NO	
		Print*	0 NO	
		Belt running	0 NC	
		Reset total	0 NO	
		Reset alarm	0 NO	
		Auto zero	0 NO	
		Clip detect	0 NO	
7	Dig. output def.	Alarms	0 NC	The NC/NO key selects the Normally Open (NO) or Normally Closed (NC) status of the input. By assigning a function to 0, the function is disabled.
		Shut down	0 NC	
		Ready	0 NO	
		High load[1]	0 NO	

No.	Parameter	Selection		Description
		Low load[1]	0 NO	[1]Only available if load alarm is defined in ALARMS DEFINE scroll. [2]Only available if rate alarm is defined in ALARMS DEFINE scroll. [3]Only available if speed alarm is defined in ALARMS DEFINE scroll. [4]Only available when NTEP is selected for W&M mode. [5]Only available if Loadout card installed.
		High rate[2]	0 NO	
		Low rate[2]	0 NO	
		High speed[3]	0 NO	
		Low speed[3]	0 NO	
		Totalizer	0 NO	
		Print ready[4]	0 NO	
		Load WTS	0 NO	
		Dev. Alarms[4]	0 NC	
		Out of range[4]	0 NO	
		Zero Ready	0 NO	
		Fault	4 NC	
		Batch[5]	0 NO	
8	Remote counter pulse div.	1 ton (0.01 - 100)		Note: Only present when Totalizer output is defined.
9	Remote counter pulse width	0.100 sec (0.005 - 1)		Note: Only present when Totalizer output is defined.
10	Type board 1 8in8out	Source, Sink		
11	Type board 2 8in8out	Source, Sink		
12	Clip detect mode	Manual, Auto		
13	Clip detect length	1.0 ft (0.5-10)		

Alarm Definitions Menu

The Alarm key is displayed on “Soft Key #3” in the Run screen when an alarm is pending. The Alarm message and its LED flash at the same time.

- New—Indicates an alarm that has not yet been acknowledged. When you press the Reset button to clear the alarm, the alarm disappears only if the trigger for the alarm does not exist any longer. If the alarm is still pending, an Acknowledge (ACQ) button is displayed instead of the New button.

- The Next button is used to scroll between pending alarms.

Alarms List

Here is a list of alarms.

1. Clock Fail

The system has detected a failure on the clock calendar circuit.

- Go to the Diagnostics menu and re-enter the date and time.
- Check the battery.
- Replace the motherboard.

2. Load Cell Fail

The system has detected an error on the load-cell signal.

- Check the load-cell connections.
- Check the load-cell(s).

3. RAM Fail

The system has detected an error on the RAM (random-access memory) checksum during the internal periodic test. The RAM is used to store variables and set up data.

- Replace the motherboard.

4. ROM Fail

The system has detected a failure on the ROM (read-only memory) checksum during the internal periodic test. The ROM is used to store the program.

- Replace the motherboard.

Here is the Alarms Define menu table

No.	Parameter	Selection	Description
1	Rate alarm	no, yes	Sets an alarm based on a percentage of the Scale Capacity Value.
1A	Low rate set ___ ___	10% (0 - 105%) 10 sec (0 - 90sec) 50.0 Tph (0 - 525 Tph)	
1B	High rate set ___ ___	100% (0 - 150%) 10 sec (0 - 90sec) 500.0 Tph (0 - 750 Tph)	
2	Load alarm	no, yes	Sets an alarm based on a percentage of the internally computed Belt Load Capacity.
2A	Low load set ___ ___	10% (0 - 105%) 10 sec (0 - 90 sec) 2.8 Lb/Ft (0 - 29.2 Lb/Ft)	
2B	High load set ___ ___	100% (0 - 200%) 10 sec (0 - 90 sec) 27.8 Lb/Ft (0 - 55.6 Lb/Ft)	
3	Speed alarm	no, yes	Sets an alarm based on a percentage of the Belt Speed Capacity.
3A	Low speed set ___ ___	10% (0 - 105%) 10 sec (0 - 90 sec) 60 FPM (0 - 630 FPM)	

No.	Parameter	Selection	Description
3B	High speed set ___ ___	100% (0 - 150%) 10 sec (0 - 90 sec) 600 FPM (0 - 900 FPM)	

Alarm Number

Alarm Number	Description	Selection	Description
#1	Clock Fail	ALARM, SHUT DOWN, AUTO RES., NONE	The system has detected a failure on the clock calendar circuit. Go to the Diagnostics menu and re-enter the date and time. Check the battery. Replace the motherboard.
#3	Signal cell fail S1	ALARM, SHUT DOWN, AUTO RES., NONE	
#4	Signal cell fail S2	ALARM, SHUT DOWN, AUTO RES., NONE	
#7	RAM fail	ALARM, SHUT DOWN, AUTO RES., NONE	The system has detected an error on the RAM (Random Access Memory) checksum during the internal periodic test. The RAM is used to store variables and set up data. Replace the motherboard.
#8	ROM fail	ALARM, SHUT DOWN, AUTO RES., NONE	The system has detected an error on the ROM (Read Only Memory) checksum during the internal periodic test. The ROM is used to store the program. Replace the motherboard.
#10	High load	ALARM, SHUT DOWN, AUTO RES., NONE	Only present when Load alarm is set to Yes.
#13	Low load	ALARM, SHUT DOWN, AUTO RES., NONE	Only present when Load alarm is set to Yes.
#16	High rate	ALARM, SHUT DOWN, AUTO RES., NONE	Only present when Rate alarm is set to Yes.
#19	Low rate	ALARM, SHUT DOWN, AUTO RES., NONE	Only present when Rate alarm is set to Yes.
#22	High speed	ALARM, SHUT DOWN, AUTO RES., NONE	Only present when Speed alarm is set to Yes.
#25	Low speed	ALARM, SHUT DOWN, AUTO RES., NONE	Only present when Speed alarm is set to Yes.

Alarm Number	Description	Selection	Description
#28	Warm start	NONE, ALARM, SHUT DOWN, AUTO RES.	The system has detected a power loss condition, or power was removed for an undefined period.
#29	Cold start	ALARM, SHUT DOWN, AUTO RES., NONE	The system has detected the loss of the setup data after power was removed. The instrument needs to be setup and calibrated. Replace either the motherboard or the battery.
#30	Pwd during calib.	ALARM, SHUT DOWN, AUTO RES., NONE	The system was powered off while a calibration sequence was in progress. This means the scale may not be properly calibrated. Check calibration.
#31	Cal time elapsed	ALARM, SHUT DOWN, AUTO RES., NONE	If a calibration check time is entered and the time expires, this alarm occurs. The purpose is to remind the operator that the calibration has not been checked for a considerably long period.
#37	Overflow Totalizer	ALARM, SHUT DOWN, AUTO RES., NONE	Only present when the Totalizer Output is defined under I/O Define scroll. This message indicates the output pulse generator for the remote mechanical totalizer has reached an overflow condition. The rate may be too high or the pulse divider has been set to small. Check the rate. Check and eventually increase the pulse divider.
#40	AZT over limit	ALARM, SHUT DOWN, AUTO RES., NONE	
#53	Math error	ALARM, SHUT DOWN, AUTO RES., NONE	A divide by zero or overflow error was encountered during internal calculations. This message indicates some abnormal dimensional parameter has been entered in setup. Check setup data.
#54	Printer error	ALARM, SHUT DOWN, AUTO RES., NONE	Only present when Printer is selected for Protocol port #1, or a COMM board is installed. This message is displayed if the system has data to print

Alarm Number	Description	Selection	Description
			and the printer is disconnected or paper is empty.
#55	Communication error	ALARM, SHUT DOWN, AUTO RES., NONE	Not present when Printer is selected for Protocol port #1. This alarm indicates a time out or handshake error is detected during a data transfer on the COMM line.
#57	PROFIB comm. error	ALARM, SHUT DOWN, AUTO RES., NONE	This scroll is only available if the optional Profibus board is installed. The following two conditions activate the alarm. The Siemens SPC3 Controller installed on the Profibus interface board does not recognize any successful data transfer within the watchdog timer interval. The received data contains errors (value overlaps limits, register number does not exist, group number does not exist).
#64	Load cell imbalance	NONE, ALARM, SHUT DOWN, AUTO RES.	
#66	Auto Zero Limit	ALARM, SHUT DOWN, AUTO RES., NONE	
#69	AZT step over limit	ALARM, SHUT DOWN, AUTO RES., NONE	

Ethernet Settings Menu

Here is the Ethernet menu table.

No.	Parameter	Selection	Description
1	IP address	192 168 1 2 (0 - 255)	
2	Mask address	255 255 255 0 (0 - 255)	
3	Gateway address	192 168 1 1 (0 - 255)	
4			
5			
6	Mac Address	00-17-27-XX-XX-XX	
7	Variables Selection	Not damped, damped, displayed	

Main Menu 5

This section lists the technical details for all parameters and functions in the Micro-Tech's "Main Menu 5" screen.

Communications Menu

The motherboard has one serial channel that can be configured using jumpers as an RS-232 or an RS-485 channel. The serial channel can be used for printing or for serial communication with an intelligent device such as a PLC or a PC. An additional expansion COMM board can also be installed and programmed. Typically one COMM for the printer and one for the supervisor.

Communications Menu Table

Here is the Communications menu table.

No.	Parameter	Selection	Description
1	Baud rate port #1	9600, 19200, 110, 150, 300, 600, 1200, 2400, 4800	
2	Set parity port #1	No Parity, even parity, odd parity	
3	Stop bits port #1	1, 2	

No.	Parameter	Selection	Description
4	Word length port #1	8, 7	
5	Protocol port #1	Modbus*, Siemens 3964R*, Allen Bradley DF1*, Printer	*These options are only available when Printer is selected from Protocol port #2.
5A	Clear to send #1	Disabled, enabled	Note: This scroll is not available when Printer is selected for Protocol port #1.
6	Address port #1	1 (1 - 255)	Note: This scroll is not available when Printer is selected for Protocol port #1.
7	Acces prot port #1	None, limited, protected	Note: This scroll is not available when Printer is selected for Protocol port #1.
8	Baud Rate port #2	9600, 19200, 110, 150, 300, 600, 1200, 2400, 4800	Note: Only available when COMM board is installed.
9	Set parity port #2	No Parity, even parity, odd parity	Note: Only available when COMM board is installed.
10	Stop bits port #2	1, 2	Note: Only available when COMM board is installed.
11	Word length port #2	8, 7	Note: Only available when COMM board is installed.
12	Protocol port #2	Printer, Modbus*, Siemens*, A/B DF1*	Note: This scroll is only available when COMM board is installed. *These options are only available when Printer is selected from Protocol port #1
12A	Clear to send #2	Disabled, Enabled	Note: This scroll is not available when Printer is selected for Protocol port #2.
13	Address port #2	1 (1 - 255)	Note: This scroll is not available when Printer is selected for Protocol port #2.
14	Acces prot port #2	none, limited, protected	Note: This scroll is not available when Printer is selected for Protocol port #2.
15	Half duplex delay	0 msec (0 - 50 msec)	Note: This scroll is only available when a protocol other than Printer is selected for either Protocol port #1 or Protocol port #2.

No.	Parameter	Selection	Description
16	Variables selection	Not damped, damped, displayed	Note: This scroll is only available when a protocol other than Printer is selected for either Protocol port #1 or Protocol port #2. "Not damped" shows the raw value without any damping, without the scale division applied. "Damped" applies the damping constant from the appropriate scroll in the Display menu, without the scale division applied. "Displayed" shows the values as they would be shown on the Micro-Tech display with the scale division applied.

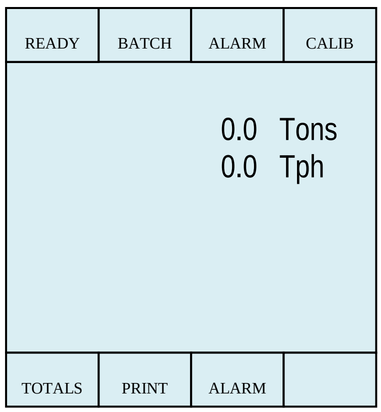
Profibus Menu

Here is the Profibus menu table.

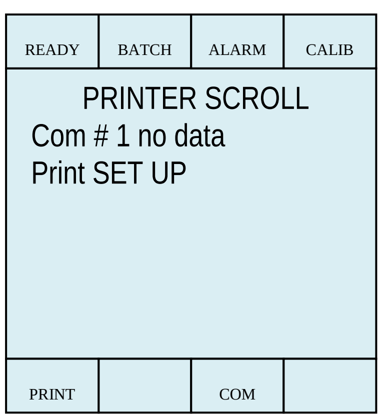
No.	Parameter	Selection
1	Address	1 (1-126)
2	Read buffer dim ___ words	48 (5-48)
3	Write buffer dim ___ words	48 (5-48)
4	Variables selection	not damped, damped, displayed

Print Menu

This section tells you how to use the Micro-Tech’s print function.



1. In the Run screen (shown above), press the Print button. (For this to work, you must have already set the communications parameters for the printer.) If the Micro-Tech detects a USB flash drive, the COM button is displayed, as shown below.



2. Press the down-arrow button to access the appropriate printer options.

READY	BATCH	ALARM	CALIB
PRINTER SCROLL			
USB no data			
Print SET UP			
PRINT		COM	

- Set Up—Prints all the current Micro-Tech settings.
- Auto Zero—Prints each auto-zero calibration as it occurs.
- Totals—Prints Master, Operator, and Reset totals.
- Trails—Prints out Audit Trails.

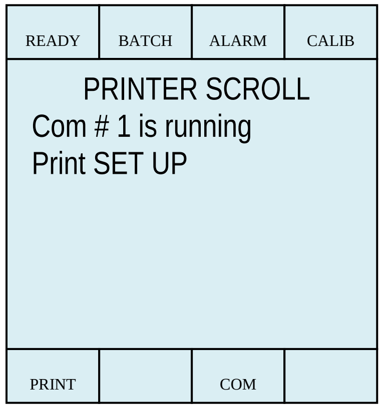
READY	BATCH	ALARM	CALIB
- PRINT AUDIT TRAILS -			
Number of records			
to print xxx			
EDIT	MORE	EXIT	

  - Press the Edit button to select the number of trails to print.
  - Press the More button to access more records.

3. Press the Print button to print the records you selected.

READY	BATCH	ALARM	CALIB
- PRINT AUDIT TRAILS -			
Number of records			
to print xxx			
EDIT	PRINT	EXIT	

4. The display shows a “running” message (shown below) while the records are being printed.



Here is the Print menu table.

No.	Parameter	Selection	Description
1	Handshaking	none, xon-xoff, CTS	Refer to the printer instruction manual to define which selection is required. The selection None is only used for testing purposes. It is not recommended for normal use. If None is selected, the system is not able to recognize whether or not the printer is on-line, or if the paper is empty. The most commonly used protocol is CTS, which is a signal generated by the printer to indicate whether it is ready to receive data. (Password: Service.)
2	End of line	CR+LF, CR, LF	Different printers use different end of line patterns. Select the one you need for your printer. (Password: Service.)
3	Delay end of line	0 (0 - 5 sec)	Some printers cannot accept characters while they are printing. In some cases, the handshake is not well controlled by the printer, so a delay at end of line is helpful. (Password: Service.)
4	Form Feed	no, yes	A form feed character can be sent to the printer after each report to force the printer to eject the paper. If NO is selected, a normal End of Line character(s) is printed at the end of the report. (Password: Service.)
5	Print interval	0 (0-59 min) 0 (0-23 hours) 0 (0-365 days)	This feature repeatedly prints a Total report to the serial printer at the specified time interval.

No.	Parameter	Selection	Description
6	Print time #1 time ___	OFF, time	Press ON/OFF soft key to enter print time. Prints a Total report to the serial printer at the specified time every day.
	Print time #2 time ___	OFF, time	“
	Print time #3 time ___	OFF, time	“
	Print time #4 time ___	OFF, time	“
7	Print alarms	no, yes	
7A	Print AUTO ZERO	no, yes	
7B	Print AZT	no, yes	
8	Total report format	default 1, default 2, user defined	
9A	Number of strings	1 (1-3)	This scroll is only available when user defined is selected for Total report format.
9B	Contents string #1	String 1	
9C	Position string #1 X = ___ Y= ___	1 (0-24) 1 (1-80)	
9D	Contents string #2	String 2	
9E	Position string #2 X = ___ Y= ___	2 (0-24) 1 (1-80)	
9F	Contents string #3	String 3	
9G	Position string #3 X = ___ Y= ___	3 (0-24) 1 (1-80)	
9H	Position oper. Total X = ___ Y= ___	4 (0-24) 1 (1-80)	
9I	Position reset total X = ___ Y= ___	5 (0-24) 1 (1-80)	
9J	Position mast. total X = ___ Y= ___	6 (0-24) 1 (1-80)	
9K	Position date X = ___ Y= ___	7 (0-24) 1 (1-80)	
9L	Position time X = ___ Y= ___	8 (0-24) 1 (1-80)	
9M	Position rate X = ___ Y= ___	9 (0-24) 1 (1-80)	

Main Menu 6

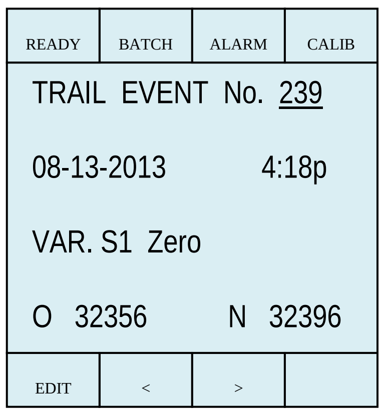
This section lists the technical details for all parameters and functions in the Micro-Tech's "Main Menu 6" screen.

Audit Trail Menu

Press the AUDIT TRAIL soft key on Main Menu 6 to access the function.

The Audit Trails function is a method for recording all changes in setup and calibration data. Any time you change a value that affects weighing, the new parameter is recorded with time and date of the change. All changes can be printed when required.

To view Audit Trails press the Edit button and, using the keypad, enter the trail number (from 1 to 999) that you want to view. Then press the Enter button.



Linearization Menu

Here are the technical specifications for the Linearization menu. The Linearization function is not normally used with conveyor-belt scales. In case of extreme instances where calibration at multiple flow rates may be required, please consult a Thermo Fisher Scientific technical representative.

Here is the Linearization menu table.

No.	Parameter	Selection	Description
1	Linearization	no, yes	Note: No linearization is done until you perform an Auto Multipoint material calibration or manually enter the linearization factors. (Password: Service.)
	LINEARIZ. #1 Load ______ Fact. ________	 0.00 Lb/Ft 1.000000 (0-1.5)	This scroll is for flow rate under 20%. Enter a Factor and a Load. If you enter 0.000000 for the factor, the rate is not corrected in that portion of the range. A factor lower than 1.000 reduces the span, while a factor larger than 1.000 increases the span. The ACQ key automatically acquires the Load at the present flow rate. (Password: Service.)
	LINEARIZ. #2 Load ______ Fact. ________	 0.00 Lb/Ft 1.000000 (0-1.5)	This scroll is for flow rate under 40%. "
	LINEARIZ. #3 Load ______ Fact. ________	 0.00 Lb/Ft 1.000000 (0-1.5)	This scroll is for flow rate under 60%. "
	LINEARIZ. #4 Load ______ Fact. ________	 0.00 Lb/Ft 1.000000 (0-1.5)	This scroll is for flow rate under 80%. "
	LINEARIZ. #5 Load ______ Fact. ________	 0.00 Lb/Ft 1.000000 (0-1.5)	This scroll is for flow rate under 100%. "

Appendix C
Communication Protocols

There are two communication ports on the Micro-Tech motherboard. Comm A is a RS232C/RS-485 (jumper selectable), isolated. Comm B is a RS-485 only, non-isolated.

- RS423/RS232C—For point-to-point asynchronous bidirectional communications, maximum 50 feet (15 m). Modem capability.

- RS485/RS422—For point-to-point or multi-drop 4-wire bi-directional communications, maximum 4,000 feet (1,200 m).

One additional communication board may be installed, as described later in this appendix.

Comm Jumper Configurations

The table below shows the Comm jumper configurations on the motherboard.

Motherboard Comm Jumper Configuration									
MODE		J39	J34	J35	J36	J38	J40	J42	J43
RS-232		1-2	1-2	1-2	1-2	1-2	3-4	1-2	1-2
RS-485									
4-wire		2-3	1-2	2-3	2-3	1-2	3-4	1-2	1-2
2-wire		2-3	2-3	2-3	2-3	1-2	3-4	1-2	1-2
multi-drop			2-3						
Transmit with hardware hand shake		2-3		2-3	2-3	2-3	3-4	1-2	1-2
RCV terminated with 120 ohms							1-2		
pull-aside enable								2-3	2-3

Wire to the J37 terminal block on the motherboard for the communication standard selected—RS-485 or RS-232C.

Built-In Protocols

When a COMM line is set up for communication (not for a printer), the system is able to send and receive data to and from another device connected to the COMM line. The COMM option comes with the following software communication protocols already built in.

- Modbus—An AEG proprietary protocol, multi-drop. The COMM option only contains a subset of the protocol, as specified in this manual.
- Allen-Bradley—A proprietary protocol, multi-drop. The COMM option only contains a subset of the protocol in the PLC-5 version of it, as specified in this manual.
- 3964R—A Siemens proprietary protocol, single point.

The hardware can be configured (through jumpers on the mother board) to one of the standards as listed in the previous paragraph. However, only the RS485/RS422 standard allows multi-drop communications. RS232C can only be used in point-to-point mode. This does not prevent the use of a protocol and only prevents physically connecting the Micro-Tech to more than one device.

NOTE. The communication protocols have been implemented and tested, as described in this document or in other referenced documents. It is the intention of Thermo Fisher Scientific to provide all the necessary information, and help the user to connect the instrument to other compatible devices. However, because most of the protocols are specific to other manufacturers, Thermo Fisher Scientific declines any responsibility for any malfunction that may occur when connecting the instrument to devices of other manufacturers, unless tested and approved by Thermo Fisher Scientific. ▲

Protocol Rules

The communication protocol allows a remote intelligent device to read and eventually write information from and to the Micro-Tech. For convenience, the information is organized in a set of registers, which are listed in this appendix.

During the communication activity, the Micro-Tech always acts as Slave, meaning it responds to a request from a Master device on the line, but never attempts to send messages out. The following rules apply.

- The Micro-Tech responds only if the message is completely received.
- The Micro-Tech reads the message and looks for the address, which is contained into an address byte in the query package. The message is then processed only if the address matches the one specified in the set-up data of the Micro-Tech, otherwise it is ignored.
- When the system receives a message, the integrity of the message is checked. An answer-back message is prepared, if the message is formally correct.
- When a message containing a variable to be written in memory is received, the system checks the correctness of the message and, if it is correct, immediately sends the answer-back message. This does not always mean the data is written in memory. The system first checks the register number (which must correspond to a valid address of a variable), then the minimum and maximum limits, and then the password. If data can be accepted, it is stored in memory and the success flag is set to 0 (no error). If not, it is set to 1. To know if the last variables sent have been stored, the Master checks (reads) the success flag contained in a read-only register.

The following procedure applies to the Host.

- Sends data to the Micro-Tech.
- Waits at least 100 ms.
- Reads the success flag. It should be 0.

Some data is read only, some is read/write, and some is write only.

NOTE. In all cases, the maximum number of words the system can transfer is limited to 41 per time. Requests of registers in excess of 41 are considered errors and do not generate an answer. ▲

Printer

When a COMM line is set up for printing, the system prints out data in different ways, depending on the set-up. Print menus become visible, which allow the user to define when and in which format the data is printed.

- Periodical printouts at predefined intervals, as well as at predefined times of day, or on command are possible.

- The format of the printouts is selectable between a number of predefined formats, plus a fully programmable user-defined format. In this particular case, the user is able to easily format the printout to fit into any pre-printed ticket or form, without the need of special software.

Master/Slave Interactions

The communication protocol allows a remote intelligent device to read and eventually write the contents of the registers, as listed in this section. During the communication activity, the Micro-Tech always acts as Slave, meaning that it will respond to a request from a Master device on the line, but never attempts to send messages out.

The instrument responds only if the message is completely received. The instrument reads the message and looks for the address, which is contained in an address byte in the query package. The message is then processed only if the address contained in the message matches the address specified in the set-up data of the instrument. When the system receives a message, the integrity of it is checked, and an answer message is prepared, if Yes.

The Master must respect a 100 ms interval time between two messages. If a message is sent before 100 ms have passed since the previous one, it is lost. (The data is received by an interrupt routine, while it is processed in a task that is executed each 100 ms.)

If the Master sends variables to be written in memory, the system checks the correctness of the message, and immediately sends an answer message, if it is correct. This does not necessarily mean that the data is written in memory. The system first checks the address, which must correspond to a valid address of a variable, then the minimum and maximum limits are checked, and then the password. If data can be accepted, the success flag is set to 0 (no error), if not, it is set to 1. The Master needs to check the success flag (contained into a read-only register), to know if the last variables sent have been stored or not.

The procedure is as follows.

- Send the data to the Micro-Tech.
- Wait 100 ms.
- Read the success flag, should be 0.

Some data is read only, some is read write, some is write only.

NOTE. The maximum number of words the system can transfer is 41 per time. Requests of registers in excess of 41 are treated as errors and do not generate an answer. ▲

Register Definitions

The following registers can be accessed through a serial line link using one of the available communication protocols. The tables below list the registers.

Parameter/Term	Definition
Register	A conventional name assigned to the Data.
Type	The type can be one of the following. • RO—The register can be read but cannot be written. • RW—The register can be read or written. Write is allowed if the instrument is in the specified protection level at the moment the write message is received. • WO—The register can only be written. Write is subject to protection control.
Low limit	The minimum acceptable value for the variable. Lower values are considered as errors.
High limit	The maximum acceptable value for the variable. Higher values are considered as errors.
Refresh time	The time between two updates of the variable in the instrument's memory.
Protection	The minimum protection level which must be in place to allow access to the variable, as follows. • always – available • limited – available if limited or service • service – available if service only
Format	The register format can be one of the following. • char—An ASCII string • integer—16 bits IEEE integer (1 word) • long—32 bits IEEE long integer (2 words) • float—32 bits IEEE float (2 words) • double—64 bits IEEE double precision float (4 words)

Type, Limits, and Format of Registers

This section defines the type, limits, and format of registers.

NOTE. The actual address of each register is defined differently for each protocol, as explained in the following sections. ▲

Table C–1. Type, Limits, and Format of Registers

Register Name	Multi Scale	Read/ Write	Low Limit	High Limit	Refresh Time [ms]	Protection	Format	Length
Success_Flag	Common	R				none	Integer	1
Display	Common	R	0	0	100	none	Char	80
Status LED	Common	R	0	0	100		Integer	1
Status	Scale Specific	R	0	0	100		Integer	4
Alarms	Common	R	0	0	100		Integer	6
I/O	Common	R	0	0	100		Integer	12
Number Of trials	Common	RW	0	32767		limited	Integer	1
Command	Scale Specific	W	0	10000000	100	none	Long	2
Last Key Pressed	Common	W	0	32767			Integer	1
Model ID	Common	R	0	100			Integer	1
Batch Number	Scale Specific	RW	0	999	100	limited	Integer	1
Batch Deviation	Scale Specific	RW	0	100		limited	Integer	1
AZ Deviation	Scale Specific	R	0	10000000		none	Long	2
Zero Number	Scale Specific	R	0	100		none	Long	2
Zero Reference	Scale Specific	R	0	120000		Service	Long	2
Set/Res Out #	Common	W	0	Installed Output Number			Integer	1
Set/Res Out #	Common	W	0				Integer	1
Set/Res Out #	Common	W	0				Integer	1
Set/Res Out #	Common	W	0				Integer	1
Set/Res Out #	Common	W	0				Integer	1
Span Number	Scale Specific	R	0	100		none	Float	2
Scale Capacity	Scale Specific	RW	1	200,000		Service	Float	2
Speed Capacity	Scale Specific	RW	0.1	2000		Service	Float	2
Load Cell Capacity	Scale Specific	RW	1	50000		Service	Float	2
Rate	Scale Specific	R	0	0	100		Float	2
Load	Scale Specific	R	0	0	100		Float	2
Speed	Scale Specific	R	0	0	100		Float	2
Master Total	Scale Specific	R	0	0	100	none	Float	2
Reset Total	Scale Specific	RW	0	0	100	none	Float	2
Operator Total	Scale Specific	RW	0	0	100	limited	Float	2
Batch Total	Scale Specific	RW	0	0	100	limited	Float	2
Batch Setpoint	Scale Specific	RW	0	10000		limited	Float	2
Batch Preset	Scale Specific	RW	0	10000		limited	Float	2

Register Name	Multi Scale	Read/ Write	Low Limit	High Limit	Refresh Time [ms]	Protection	Format	Length
Batch Preact	Scale Specific	RW	0	10000		limited	Float	2
AZT Correction	Scale Specific	R	0	0		none	Float	2
Auto Zero Max Dev	Scale Specific	RW	0	50		Service	Float	2
Total AZ %	Scale Specific	R	0	0		none	Float	2
AZT step limit	Scale Specific	RW	0	10		none	Float	2
Belt Warm	Scale Specific	RW	0	160		none	Float	2
High Rate Set	Scale Specific	RW	0	150		limited	Float	2
Low Rate Set	Scale Specific	RW	0	105		limited	Float	2
High Speed Set	Scale Specific	RW	0	200		limited	Float	2
Low Speed Set	Scale Specific	RW	0	105		limited	Float	2
High Load Set	Scale Specific	RW	0	150		limited	Float	2
Low Load Set	Scale Specific	RW	0	105		limited	Float	2
Cal Error	Scale Specific	R	0	0		none	Float	2
Master Total Double	Scale Specific	R	0	0		none	Double	4
Reset Total Double	Scale Specific	R	0	0		none	Double	4
Operator Total Double	Scale Specific	R	0	0		limited	Double	4
Batch Total Double	Scale Specific	R	0	0		limited	Double	4

Description of Registers

This section tells you more about each of the registers (such as the status, alarm, or speed registers) listed above.

Register Name	Description
Success_Flag	Set to 0 after a message has been received and properly processed. If a message is correctly received but cannot be processed because password protection or size error, this flag is set to 1. The user may read this register after a write message to ensure the data has been accepted.
Display	Contains the messages actually shown on the display of the instrument in form of an ASCII string. See Display Table.
Status LED	See Status Table on page C-11.
Status	See Status Table on page C-11.
Alarms	See Alarm Table on page C-13.
I/O	See I/O Table on page C-15..
Number Of trials	The number of audit trails to print. Entered or downloaded by the user. An integer value 1 to 999.

Register Name	Description
Command	See Command Table on page C-19.
Last Key Pressed	
Model ID	
Batch Number	The number of the currently running load out or the number of the last finished one. The integrator automatically increments the batch number when a new batch is started.
Batch Deviation	The maximum acceptable deviation from the batch set point. Usually entered by the user.
AZ Deviation	The current value of auto-zero deviation.
Zero Number	Indicate the zero in use in the scale.
Zero Reference	The current value of the zero reference.
Set/Res Out #	It is a variable that allows the master to directly handle the spare digital outputs of the Micro-Tech. There are 5 registers in the write group so the master has the capability to Set or Reset up to a maximum of five outputs simultaneously. The least significant byte of the word is used to select the number of the physical output. The most significant byte is used to set/reset the output; set the first bit to 1 for “ON”, and to 0 for “OFF”. If the content of this byte is 0, the command is ignored. **WARNING** : The Micro-Tech <u>does not control</u> if the output the master is setting/resetting is a spare or not; if the master tries to change the state of a not-spare output, <u>a conflict could happen</u>.
Set/Res Out #	
Set/Res Out #	
Set/Res Out #	
Set/Res Out #	
Span Number	Indicate the span in use in the scale.
Scale Capacity	The scale capacity of the scale. Entered by the user at first start up, should never be altered.
Speed Capacity	The speed capacity of the integrator. Entered or acquired at first start up, should never be altered.
Load Cell Capacity	The load-cell capacity of the integrator. Entered at first start up, should never be altered.
Rate	The instantaneous rate in engineering units as currently displayed on the Run screen.
Load	The instantaneous belt load in engineering units.
Speed	The instantaneous belt speed in engineering units.
Master Total	The current value of the master totalizer of the Micro-Tech.
Reset Total	The current value of the reset totalizer of the Micro-Tech. Reset total can be zeroed by writing zero to this register.
Operator Total	The current value of the operator totalizer of the Micro-Tech. Operator total can be zeroed by writing zero to this register.
Batch Total	The current contents of the Load Out totalizer. Usually read at end of batch to check the result of the Load Out. This register is automatically cleared when a new batch is started.
Batch Setpoint	The set point for the current or the next batch (Load Out). Usually entered or downloaded by the user. The value is updated only when a batch is started.
Batch Preset	The pre-set point for the current or the next batch (load out). Set by the user. Defines when the rate is lowered to increase batch accuracy.
Batch Preact	The set point of the pre-act for the current or the next Load Out. Entered or

Register Name	Description
	downloaded by the user (if in Manual mode) or calculated by the integrator. Defines when the Load Out has to stop to compensate the queue of material from the loading point to the scale.
AZT Correction	The AZT function accurately tracks the zero of the scale, by calculating an additional zero constant. The portion of zero due to AZT is not incorporated in the zero constant, but is shown separately.
Auto Zero Max Dev	The current value of auto zero maximum deviation.
Total AZ %	The current value of total auto-zero %.
AZT step limit	The current value of auto zero-tracking step.
Belt Warm	The current value of belt warm-up time.
High Rate Set	The set point for the alarm of high rate in percent of the Scale Capacity value. Entered or downloaded by the user.
Low Rate Set	The set point for the alarm of low rate in percent of the Scale Capacity value. Entered or downloaded by the user.
High Speed Set	The set point for the alarm of high speed in percent of the Belt Speed Capacity value. Entered or downloaded by the user.
Low Speed Set	The set point for the alarm of low speed in percent of the Belt Speed Capacity value. Entered or downloaded by the user.
High Load Set	The set point for the alarm of high belt loading in percent of the Belt Load Capacity value. Entered or downloaded by the user.
Low Load Set	The set point for the alarm of low belt loading in percent of the Belt Load Capacity value. Entered or downloaded by the user.
Cal Error	Indicates in percent, the zero or span error computed at the end of a remote calibration function. The master can evaluate it before accepting the result of a remote “autozero” or “autospan”.
Master Total Double	The current value of the master totalizer of the Micro-Tech. (In double precision float format.)
Reset Total Double	The current value of the reset totalizer of the integrator. (In double precision float format.)
Operator Total Double	The current value of the operator totalizer of the integrator. (In double precision float format.)
Batch Total Double	

Display Table

Display	Hex	Hex	Description
Display (1)	2DH	20H	Characters 1 and 2 from left of first row
display (2)	4DH	45H	
display (3)	4EH	55H	
display (4)	20H	4DH	
display (5)	41H	49H	
display (6)	4EH	20H	
display (10)			characters 19 and 20 from left of first row

Display	Hex	Hex	Description
display (11)			characters 1 and 2 from left of second row
display (20)			characters 19 and 20 from left of second row
display (21)			characters 1 and 2 from left of third row
display (30)			characters 19 and 20 from left of third row
display (31)			characters 1 and 2 from left of fourth row
display (38)	4CH	20H	
display (39)	20H	20H	
display (40)	20H	20H	characters 19 and 20 from left of fourth row

Bit Definitions

Status Bits

Register	Bit	Description
Status LED	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Zero Ready; Label: ZERO LED #4 Green; (Applies to the currently displayed scale)
	3	Zero & Span Calibration; Label: CALIB LED #4 Red; (Applies to the currently displayed scale)
	2	Alarm; Label: ALARM LED #3 Red; (Active if any scale has an alarm)
	1	Batch; Label: BATCH LED #2 Green; (Applies to the currently displayed scale)
	0	Ready; Label: READY LED #1 Green; (Applies to the currently displayed scale)
Status(1)	15	Cumulative Shut Down
	14	Cumulative Alarm
	13	Calibration Running
	12	Not Used

Register	Bit	Description
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Flag High Load
	6	Flag Low Load
	5	Flag High Rate
	4	Flag Low Rate
	3	Flag High Speed
	2	Flag Low Speed
	1	Not Used
	0	Not Used
Status (2)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	See Other Table
	2	See Other Table
	1	See Other Table
	0	See Other Table
Status (3)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
Status (4)	15	Not Used
	14	Not Used
	13	Not Used

Register	Bit	Description
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used

Status 2 Bits 3 - 0				
Description	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Batch Not Running	0	0	0	0
Not Used	0	0	0	1
Batch Is Running At High Rate	0	0	1	0
Batch Is Running At Low Rate	0	0	1	1
Batch Is going To Start (Wait)/Batch Is In start Delay Time	0	1	0	0
Batch Is In Coast	0	1	0	1
Batch Hold (Suspended) at High Rate	1	0	1	0
Batch Hold (Suspended) at Low Rate	1	0	1	1
Batch Hold (Suspended) at Coast	1	1	0	1

Alarm Bits

Register	Bit	Description
Alarm (1)	15	Clock Fail
	14	Not Used
	13	SIGNAL Cell Fail 1 - (Scale 1/Channel 1)
	12	SIGNAL Cell Fail 2 - (Scale 2/Channel 2)
	11	SIGNAL Cell Fail 3 - (Channel 3)
	10	SIGNAL Cell Fail 4 - (Channel 4)
	9	RAM fail
	8	ROM fail
	7	Speed Sensor Error
	6	HIGH LOAD
	5	High Load Scale # 1
	4	High Load Scale # 2
	3	LOW LOAD
	2	Low Load Scale # 1

Register	Bit	Description
	1	Low Load Scale # 2
	0	HIGH RATE
Alarm (2)	15	High Rate Scale # 1
	14	High Rate Scale # 2
	13	LOW RATE
	12	Low Rate Scale # 1
	11	Low Rate Scale # 2
	10	HIGH SPEED
	9	High Speed Scale # 1
	8	High Speed Scale # 2
	7	LOW SPEED
	6	Low Speed Scale #1
	5	Low Speed Scale #2
	4	Warm Start
	3	Cold Start
	2	Power During Calibration
	1	Calibration Time Elapsed (Single Scale)
	0	Calibration Time Elapsed Scale # 1
Alarm (3)	15	Calibration Time Elapsed Scale # 2
	14	External Alarm 1
	13	External Alarm 2
	12	External Alarm 3
	11	OVERFLOW TOTALIZER
	10	Overflow Totalizer Scale #1
	9	Overflow Totalizer Scale #2
	8	AZT OVER LIMIT
	7	AZT Over Limit Scale #1
	6	AZT Over Limit Scale #2
	5	BATCH DEVIATION
	4	Batch Deviation Scale #1
	3	Batch Deviation Scale #2
	2	HW configuration Changed Slot 1
	1	HW configuration Changed Slot 2
	0	HW configuration Changed Slot 3
Alarm (4)	15	HW configuration Changed Slot 4
	14	Not Used
	13	Not Used
	12	Not Used
	11	Math Error
	10	Printer Error
	9	Communication Error
	8	Not Used
	7	Profibus Error
	6	ZERO LIMIT
	5	Zero Limit Scale #1
	4	Zero Limit Scale #2
	3	AZT OVER LIMIT STEP

Register	Bit	Description
	2	AZT Over Limit Step Scale #1
	1	AZT Over Limit Step Scale #2
	0	Multiple Load Cells Imbalance Alarm
Alarm (5)	15	A/D Shutdown
	14	A/D Shutdown Channel 1
	13	A/D Shutdown Channel 2
	12	A/D Shutdown Channel 3
	11	A/D Shutdown Channel 4
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
Alarm (6)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used

I/O Bits

Register	Bit	Description
I/O (1)	15	Not Used
	14	Not Used
	13	Not Used
	12	Input 5 - Digital Input Board

Register	Bit	Description
	11	Input 4 - Digital Input Board
	10	Input 3 - Digital Input Board
	9	Input 2 - Digital Input Motherboard (Speed Input 2)
	8	Input 1 - Digital Input Motherboard (Speed Input 1)
	7	Input 8 - Digital 8In/8Out Board #1
	6	Input 7 - Digital 8In/8Out Board #1
	5	Input 6 - Digital 8In/8Out Board #1
	4	Input 5 - Digital 8In/8Out Board #1
	3	Input 4 - Digital 8In/8Out Board #1
	2	Input 3 - Digital 8In/8Out Board #1
	1	Input 2 - Digital 8In/8Out Board #1
	0	Input 1 - Digital 8In/8Out Board #1
I/O (2)	15	Input 8 - Digital 8In/8Out Board #2
	14	Input 7 - Digital 8In/8Out Board #2
	13	Input 6 - Digital 8In/8Out Board #2
	12	Input 5 - Digital 8In/8Out Board #2
	11	Input 4 - Digital 8In/8Out Board #2
	10	Input 3 - Digital 8In/8Out Board #2
	9	Input 2 - Digital 8In/8Out Board #2
	8	Input 1 - Digital 8In/8Out Board #2
	7	Not Used
	6	Output 5 - Motherboard Output
	5	Output 4 - Digital Input Board
	4	Output 3 - Digital Input Board
	3	Output 2 - Digital Input Board
	2	Output 1 - Digital Input Board
	1	Not Used
	0	Not Used
I/O (3)	15	Output 8 - Digital 8In/8Out Board #1
	14	Output 7 - Digital 8In/8Out Board #1
	13	Output 6 - Digital 8In/8Out Board #1
	12	Output 5 - Digital 8In/8Out Board #1
	11	Output 4 - Digital 8In/8Out Board #1
	10	Output 3 - Digital 8In/8Out Board #1
	9	Output 2 - Digital 8In/8Out Board #1
	8	Output 1 - Digital 8In/8Out Board #1
	7	Output 8 - Digital 8In/8Out Board #2
	6	Output 7 - Digital 8In/8Out Board #2
	5	Output 6 - Digital 8In/8Out Board #2
	4	Output 5 - Digital 8In/8Out Board #2
	3	Output 4 - Digital 8In/8Out Board #2
	2	Output 3 - Digital 8In/8Out Board #2
	1	Output 2 - Digital 8In/8Out Board #2
	0	Output 1 - Digital 8In/8Out Board #2
I/O (4)	15	Not Used
	14	Not Used
	13	Not Used

Register	Bit	Description
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
I/O (5)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
I/O (6)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
I/O (7)	15	Not Used
	14	Not Used

Register	Bit	Description
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
I/O (8)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
I/O (9)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
I/O (10)	15	Not Used

Register	Bit	Description
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
I/O (11)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used
I/O (12)	15	Not Used
	14	Not Used
	13	Not Used
	12	Not Used
	11	Not Used
	10	Not Used
	9	Not Used
	8	Not Used
	7	Not Used
	6	Not Used
	5	Not Used
	4	Not Used
	3	Not Used
	2	Not Used
	1	Not Used
	0	Not Used

Command

Command Word					
Command Value			Description	Action	Condition
Int	Bit	Hex			
8192	13	2000	Print Setup		Serial Communication Set to Print
4096	12	1000	Print Trails		Serial Communication Set to Print
2048	11	800	Print totals		Serial Communication Set to Print
1024	10	400	Reset operator total (1024)	Reset “Operator Total” Totalizer	Always available
512	9	200	Reset short-term total (512)	Reset “Reset Total” Totalizer	Always available
256	8	100	Remote start R-Cal (256)	Start the auto-span function with R-CAL method. The R-Cal is automatically connected by the instrument at the beginning of the function and disconnected at its end; this operation needs a delay of 0.5 seconds. In case a R-Cal remote calibration is aborted, the calibration running flags will turn off after this delay. See bit Confirm “Zero/Span” to save the calibration.	speed signal
128	7	80	Remote start chain cal (128)	Start the auto-span function with CHAINS method. See bit Confirm “Zero/Span” to save the calibration.	speed signal
64	6	40	Remote start weights cal (64)	Start the auto-span function with WTS method. An output of the Micro-Tech can be programmed to automatically load the test weights. This adds a 10 second delay at the beginning and at the end of the calibration function. In case a WTS remote calibration is aborted, the calibration running flags will turn off after this time. See bit Confirm “Zero/Span” to save the calibration.	speed signal
32	5	20	Remote start zero (32)	Start the auto-zero function. See bit Confirm “Zero/Span” to save the calibration.	speed signal

Command Word					
Command Value			Description	Action	Condition
Int	Bit	Hex			
16	4	10	Remote Acq Calibration (16)	At the end of the calibration functions (to determine the end check the “Calibration Running” in the Status 1 register), after verifiying the Error (Calibration Error registers in Block 0), this command tells the Micro-Tech to save the new Zero or new Span (according to which calibration function has been performed). If this command is sent during a remote calibration, it aborts the running function.	speed signal
8	3	8	Batch Standby (8)	Temporarily stops a Batch (Load Out) sequence. Batch can resume if a Start command is sent later.	Batch Enabled
4	2	4	Batch Abort (4)	Stops the Batch (Load Out) sequence.	Batch Enabled
2	1	2	Batch Start (2)	Start the Batch (Load Out) sequence.	Batch Enabled
1	0	1	Acknowledge Alarms (1)	Reset the pending alarms if these have been previously acknowledged.	Alarm Active

Siemens 3964R

This section provides details about the Siemens 3964R protocol.

Description

Two communication modes are provided, as follows

- FETCH
  The Host asks the slave unit for registers.
- SEND
  The Host sends registers to the slave.

The choice between requesting or sending data is made using a specific code inside the message. Here are four examples.

Example 1: Host (PLC) Sends Data to Micro-Tech

The Host (PLC) sends data to the Slave (Micro-Tech), as shown in the table below.

Host (PLC)			Slave (Micro-Tech)	
STX	02H	→		
		←	DLE	10H
		→		
HEADER HI	00H			
HEADER LO	00H			
COMMAND HI	41H			
COMMAND LO	44H			
DESTINATION DB	XXH			
BYTE COUNT HI	00H			
BYTECOUNT LO	XXH			
no CF	FFH			
all CPUs	FFH			
DATA MSB				
. . .				
DATA LSB				
DLE	10H			
ETX	03H			
BCC	XXH			
		→		
		←	DLE	10H
		←	STX	02H
DLE	10H	→		
		←	HEADER HI	00H
			HEADER LO	00H
			NOT USED	00H
			NUMBER ERROR	00H
			DLE	10H
			ETX	03H
			BCC	XXH

Host (PLC)			Slave (Micro-Tech)	
DLE	10H	→		

Example 2: Host (PC or PLC) Asks for Data from Micro-Tech

Host (PLC)			Slave (Micro-Tech)	
STX		→		
		←	DLE	10H
		→		
HEADER HI	00H			
HEADER LO	00H			
COMMAND HI	45H			
COMMAND LO	44H			
DESTINATION DB	00H			
DESTINATION DW	XXH			
BYTE COUNT HI	00H			
BYTE COUNT LO	XXH			
no CF	FFH			
all CPUs	FFH			
DLE	10H			
ETX	03H			
BCC	XXH			
		→		
		←	DLE	10H
		←	STX	02H
DLE	10H	→	HEADER HI	00H
			HEADER LO	00H
			NOT USED	00H
			NUMBER ERROR	XXH
			DATA LSB	
			MAX 127BYTES	
			DATA MSB	
			DLE	10H
			ETX	03H

Host (PLC)			Slave (Micro-Tech)	
			BCC	XXH
DLE	10H	→		

Example 3: Host Wants to Write Batch Setpoint

Set batch = 100 Tons

Host (PLC)			Slave (Micro-Tech)	
	02H	→		
		←		10H
	00H			
	00H			
	41H			
	44H			
	00H			
	6CH			
	00H			
	02H			
	FFH			
	FFH			
	42H			
	C8H			
	00H			
	00H			
	10H			
	03H			
	F2H	→		
		←		10H
		←		02H
	10H	→		
		←		00H
				00H
				00H
				00H

Host (PLC)			Slave (Micro-Tech)	
				10H
				03H
				13H
	10H	→		

Example 4: Host Wants to Receive Batch Setpoint

Batch setpoint = 100 Tons

Host (PLC)			Slave (Micro-Tech)	
	02H	→		
		←		10H
	00H	→		
	00H			
	45H			
	44H			
	00H			
	6CH			
	00H			
	02H			
	FFH			
	FFH			
	10H			
	03H			
	7CH	→		
		←		10H
		←		02H
	10H	→		
		←		00H
				00H
				00H
				00H
				42H
				C8H

Host (PLC)			Slave (Micro-Tech)	
				00H
				00H
				10H
				03H
				99H
	10H	→		

Register Mapping

The table below provides more details about the Siemens 3964R registers for the Model 9101/9201.

Register	Address	Notes
success_flag	20 H	0 successful, 1 failed.
display (1)	21 H	
display (2)	22 H	
display (3)	23 H	
display (4)	24 H	
display (5)	25 H	
display (6)	26 H	
display (7)	27 H	
display (8)	28 H	
display (9)	29 H	
display (10)	2A H	
display (11)	2B H	
display (12)	2C H	
display (13)	2D H	
display (14)	2E H	
display (15)	2F H	
display (16)	30 H	
display (17)	31 H	
display (18)	32 H	
display (19)	33 H	
display (20)	34 H	

Register	Address	Notes
display (21)	35 H	
display (22)	36 H	
display (23)	37 H	
display (24)	38 H	
display (25)	39 H	
display (26)	3A H	
display (27)	3B H	
display (28)	3C H	
display (29)	3D H	
display (30)	3E H	
display (31)	3F H	
display (32)	40 H	
display (33)	41 H	
display (34)	42 H	
display (35)	43 H	
display (36)	44 H	
display (37)	45 H	
display (38)	46 H	
display (39)	47 H	
display (40)	48 H	
leds	49 H	
status (1)	4A H	
status (2)	4B H	
alarm_status (1)	4C H	
alarm_status (2)	4D H	
alarm_status (3)	4E H	
i_o (1)	4F H	
i_o (2)	50 H	
i_o (3)	51 H	
i_o (4)	52 H	
i_o (5)	53 H	
i_o (6)	54 H	
i_o (7)	55 H	
i_o (8)	56 H	

Register	Address	Notes
i_o (9)	57 H	
i_o (10)	58 H	
i_o (11)	59 H	
i_o (12)	5A H	
commands	5B H	
batch_number	5C H	Load Out option required
batch_deviation	5D H	Load Out option required
rate (1)	5E H	
rate (2)	5F H	
load (1)	60 H	
load (2)	61 H	
speed (1)	62 H	
speed (2)	63 H	
master_total (1)	64 H	
master_total (2)	65 H	
reset_total (1)	66 H	
reset_total (2)	67 H	
operator_total (1)	68 H	
operator_total (2)	69 H	
batch_total (1)	6A H	Load Out option required
batch_total (2)	6B H	Load Out option required
batch_set_point (1)	6C H	Load Out option required
batch_set_point (2)	6D H	Load Out option required
batch_pre_set (1)	6E H	Load Out option required
batch_pre_set (2)	6F H	Load Out option required
batch_pre_act (1)	70 H	Load Out option required
batch_pre_act (2)	71 H	Load Out option required
scale_capacity (1)	72 H	
scale_capacity (2)	73 H	
speed_capacity (1)	74 H	
speed_capacity (2)	75 H	
load_cell_capacity (1)	76 H	
load_cell_capacity (2)	77 H	
high_rate_set (1)	78 H	

Register	Address	Notes
high_rate_set (2)	79 H	
low_rate_set (1)	7A H	
low_rate_set (2)	7B H	
high_speed_set (1)	7C H	
high_speed_set (2)	7D H	
low_speed_set (1)	7E H	
low_speed_set (2)	7F H	
high_load_set (1)	80 H	
high_load_set (2)	81 H	
low_load_set (1)	82 H	
low_load_set (2)	83 H	
reg_set_point_1 (1)	84 H	
reg_set_point_1 (2)	85 H	
reg_set_point_2 (1)	86 H	
reg_set_point_2 (2)	87 H	
dsp_set_point_1 (1)	88 H	
dsp_set_point_1 (2)	89 H	
dsp_set_point_2 (1)	8A H	
dsp_set_point_2 (2)	8B H	
ctr_deviation_1 (1)	8C H	
ctr_deviation_1 (2)	8D H	
ctr_deviation_2 (1)	8E H	
ctr_deviation_2 (2)	8F H	
hi_pos_dev_1 (1)	90 H	
hi_pos_dev_1 (2)	91 H	
cal_error (1)	92 H	
cal_error (2)	93 H	
span (1)	94 H	
span (2)	95 H	
zero (1)	96 H	
zero (2)	97 H	
azt correction (1)	98 H	
azt correction (2)	99 H	
Zero Reference (1)	9A H	

Register	Address	Notes
Zero Reference (2)	9B H	
Auto zero max dev. (1)	9C H	
Auto zero max dev. (2)	9D H	
Total AZ % (1)	9E H	
Total AZ % (2)	9F H	
AZ Dev (1)	A0 H	
AZ Dev (2)	A1 H	
AZT step (1)	A2 H	
AZT step (2)	A3 H	
Belt warm up time (1)	A4 H	
Belt warm up time (2)	A5 H	

Modbus

This section provides details about the Modbus protocol.

Description

Only a subset of the protocol has been implemented, as shown in the examples below.

Example 1: Message of Data Query from Host (PC or PLC) to Micro-Tech (code 03H)

Query	
address	xxx
function	03H
add hi	xxx
add lo	xxx
n data hi	xxx
n data lo	xxx
crc16 lo	xxx
crc16 hi	xxx

Response Message	
address	xxx
function	03H
byte count	xxx
data MSB	xxx
. . .	xxx
data LSB	xxx
crc16 lo	xxx
crc16 hi	xxx

Example 2: Host Wants to Receive the Batch Setpoint

Set point = 100.0 Tons

Address of Slave (Micro-Tech) = 01

Host (PLC)			Slave (Micro-Tech)	
Address	01H	→		
Function	03H			
Add HI	00H			
Add LO	6CH			
N Data HI	00H			
N Data LO	02H			
crc	04H			
crc	16H	→		
		←	Address	01H
			Function	03H
			Byte count	04H
			Data MSB	00H
			Data	00H
			Data	42H
			Data LSB	C8H
			crc	CBH
		←	crc	05H

Example 3: Message of Data Sending from Host (PC or PLC) to Micro-Tech (code 10H)

Query	
address	xxx
function	10H
add hi	xxx
add lo	xxx
n data hi	xxx
n data lo	xxx
n bytes	xxx
data MSB	xxx
. . .	xxx
data LSB	xxx
crc16 lo	xxx
crc16 hi	xxx

Response Message	
address	xxx
function	10H
add hi	xxx
add lo	xxx
n data hi	xxx
n data lo	xxx
crc16 lo	xxx
crc16 hi	xxx

Example 4: Host Wants to Write the Batch Setpoint

Batch setpoint = 100.0 Tons

Address of Micro-Tech (Slave) = 1

Host (PLC)			Slave (Micro-Tech)	
	01H	→		

Host (PLC)			Slave (Micro-Tech)	
	10H			
	00H			
	6CH			
	00H			
	02H			
	04H			
	00H			
	00H			
	42H			
	C8H			
	C4H			
	E4H	→		
		←		01H
				10H
				00H
				6CH
				00H
				02H
				81H
		←		D5H

Example 5: Message of Sending (only one word) from Host (PC or PLC) to Micro-Tech (code 06H)

Query	
address	xxx
function	06H
add hi	xxx
add lo	xxx
value hi	xxx
value lo	xxx
crc16 lo	xxx
crc16 hi	xxx

Response Message	
address	xxx
function	06H
add hi	xxx
add lo	xxx
value hi	xxx
value lo	xxx
crc16 lo	xxx
crc16 hi	xxx

Example 6: Host Wants to Write the Batch Number

Batch number = 0

Address of Micro-Tech (Slave) = 1

Host (PLC)			Slave (Micro-Tech)	
	01H	→		
	06H			
	00H			
	5CH			
	00H			
	00H			
	49H			
	D8H	→		
		←		01H
				06H
				00H
				5CH
				00H
				00H
				49H
		←		D8H

Register Mapping

The table below provides more details about the Modbus registers.

Register Name	Comments	Register Start Number	OffSet
Success_Flag	Both	1	0
Display	Both	2	2
Status LED	Both	82	162
Status	Scale 1	83	164
Alarms	Both	87	172
I/O	Both	93	184
Number Of trials	Both	105	208
Command	Scale 1	106	210
Last Key Pressed	Both	108	214
Model ID	Both	109	216
Batch Number	Scale 1	110	218
Batch Deviation	Scale 1	111	220
AZ Deviation	Scale 1	112	222
Zero Number	Scale 1	114	226
Zero Reference	Scale 1	116	230
Free Space	Scale 1	118	234
Free Space	Scale 1	119	236
Free Space	Scale 1	120	238
Free Space	Scale 1	121	240
Free Space	Scale 1	122	242
Free Space	Scale 1	123	244
Free Space	Scale 1	124	246
Free Space	Scale 1	125	248
Free Space	Scale 1	126	250
Free Space	Scale 1	127	252
Span Number	Scale 1	128	254
Scale Capacity	Scale 1	130	258
Speed Capacity	Scale 1	132	262
Load Cell Capacity	Scale 1	134	266
Rate	Scale 1	136	270
Load	Scale 1	138	274
Speed	Scale 1	140	278
Master Total	Scale 1, Single Float Information	142	282
Reset Total	Scale 1, Single Float Information	144	286
Operator Total	Scale 1, Single Float Information	146	290
Batch Total	Scale 1, Single Float Information	148	294
Batch Setpoint	Scale 1	150	298
Batch Preset	Scale 1	152	302
Batch Preact	Scale 1	154	306
AZT Correction	Scale 1	156	310
Auto Zero Max Dev	Scale 1	158	314
Total AZ %	Scale 1	160	318
AZT step limit	Scale 1	162	322

Register Name	Comments	Register Start Number	OffSet
Belt Warm	Scale 1	164	326
High Rate Set	Scale 1	166	330
Low Rate Set	Scale 1	168	334
High Speed Set	Scale 1	170	338
Low Speed Set	Scale 1	172	342
High Load Set	Scale 1	174	346
Low Load Set	Scale 1	176	350
Cal Error	Scale 1	178	354
Master Total Double	Scale 1, Double Float Information	180	358
Reset Total Double	Scale 1, Double Float Information	184	366
Operator Total Double	Scale 1, Double Float Information	188	374
Batch Total Double	Scale 1, Double Float Information	192	382
Free Space	Scale 1	196	390
Free Space	Scale 1	198	394
Free Space	Scale 1	200	398
Free Space	Scale 1	202	402
Free Space	Scale 1	204	406
Free Space	Scale 1	206	410
Free Space	Scale 1	208	414
Free Space	Scale 1	210	418
Free Space	Scale 1	212	422
Free Space	Scale 1	214	426
Status	Scale 2	216	430
Command	Scale 2	220	438
Batch Number	Scale 2	222	442
Batch Deviation	Scale 2	223	444
AZ Deviation	Scale 2	224	446
Zero Number	Scale 2	226	450
Zero Reference	Scale 2	228	454
Free Space	Scale 2	230	458
Free Space	Scale 2	231	460
Free Space	Scale 2	232	462
Free Space	Scale 2	233	464
Free Space	Scale 2	234	466
Free Space	Scale 2	235	468
Free Space	Scale 2	236	470
Free Space	Scale 2	237	472
Free Space	Scale 2	238	474
Free Space	Scale 2	239	476
Span Number	Scale 2	240	478
Scale Capacity	Scale 2	242	482
Speed Capacity	Scale 2	244	486
Load Cell Capacity	Scale 2	246	490
Rate	Scale 2	248	494
Load	Scale 2	250	498
Speed	Scale 2	252	502
Master Total	Scale 2 Single Float Information	254	506

Register Name	Comments	Register Start Number	OffSet
Reset Total	Scale 2 Single Float Information	256	510
Operator Total	Scale 2 Single Float Information	258	514
Batch Total	Scale 2 Single Float Information	260	518
Batch Setpoint	Scale 2	262	522
Batch Preset	Scale 2	264	526
Batch Preact	Scale 2	266	530
AZT Correction	Scale 2	268	534
Auto Zero Max Dev	Scale 2	270	538
Total AZ %	Scale 2	272	542
AZT step limit	Scale 2	274	546
Belt Warm	Scale 2	276	550
High Rate Set	Scale 2	278	554
Low Rate Set	Scale 2	280	558
High Speed Set	Scale 2	282	562
Low Speed Set	Scale 2	284	566
High Load Set	Scale 2	286	570
Low Load Set	Scale 2	288	574
Cal Error	Scale 2	290	578
Master Total Double	Scale 2 Double Float Information	292	582
Reset Total Double	Scale 2 Double Float Information	296	590
Operator Total Double	Scale 2 Double Float Information	300	598
Batch Total Double	Scale 2 Double Float Information	304	606
Free Space	Scale 2	308	614
Free Space	Scale 2	310	618
Free Space	Scale 2	312	622
Free Space	Scale 2	314	626
Free Space	Scale 2	316	630
Free Space	Scale 2	318	634
Free Space	Scale 2	320	638
Free Space	Scale 2	322	642
Free Space	Scale 2	324	646
Free Space	Scale 2	326	650

Allen-Bradley DF1

This section provides details about the Allen-Bradley DF1 protocol.

Description

The DF1 is a proprietary protocol of Allen-Bradley. The protocol has been implemented according to Allen-Bradley's "Reference Manual—Data

Highway/Data Highway Plus Protocol and Command Set," publication 1770–6.5, dated 16 September 1991.

NOTE. Only a subset of the protocol has been implemented. The commands used to read or write the registers are as follows. Typed read (code 68H) and typed write (67H). ▲

Here are some examples showing how the protocol is used.

Example 1: Connect Message

This message must be sent from the Host to Micro-Tech (Slave) before a request of sending data can be performed.

Host (PLC)			Slave (Micro-Tech)	
DLE	10H	→		
SOH	01H			
ADDRESS OF SLAVE				
DLE	10H			
STX	02H			
ADDRESS OF SLAVE				
ADDRESS OF HOST				
COMMAND	0FH			
STS	00H			
TMS	xxH			
TMS	xxH			
FNC	68H			
PACKET OFFSET (LOW)				
PACKET OFFSET (HIGH)				
TOTAL TRANS (LOW)				
TOTAL TRANS (HIGH)				
ADDRESS OF DATA (FIRST BYTE)				
ADDRESS OF DATA (SECOND BYTE)				
ADDRESS OF DATA (THIRD BYTE)				
ADDRESS OF DATA (FOURTH BYTE)				

Host (PLC)			Slave (Micro-Tech)	
SIZE OF DATA IN ELEMENTS (LOW)				
SIZE OF DATA IN ELEMENTS (HIGH)				
DLE	10H			
ETX	03H			
BCC		→		
		←	DL	10H
			ACK	06H

Example 2: The Host (PLC) Asks for Data from the Micro-Tech

This message is sent from the Host to the Micro-Tech to request a certain number of data.

Host (PLC)			Slave (Micro-Tech)	
DLE	10H	→		
ENQ	05H			
ADDRESS SLAVE				
BCC		→		
			DLE	10H
			STX	02H
			ADDRESS HOST	
			ADDRESS SLAVE	
			4FH (COMMAND)	
			STS	00H
			TMS	xxH
			TMS	xxH
			TYPE DATA PARAMETER	
			DATA LSB MSB	
			. . .	
			DATA LSB MSB	
			DLE	10H
			ETX	03H
		←	BCC	

Host (PLC)			Slave (Micro-Tech)	
DLE	10H	→		
ACK	06H	→		

Example 3: The Host Sends Data to the Micro-Tech

This message is used by the Host to download registers to the Micro-Tech.

Host (PLC)			Slave (Micro-Tech)	
DLE	10H	→		
SOH				
ADDRESS OF SLAVE				
DLE				
STX				
ADDRESS SLAVE				
ADDRESS HOST				
COMMAND	0FH			
STS	00H			
TMS	xxH			
TMS	xxH			
FNC	67H			
PACKET OFFSET (LOW)				
PACKET OFFSET (HIGH)				
TOTAL TRANS (LOW)				
TOTAL TRANS (HIGH)				
ADDRESS OF DATA (FIRST BYTE)				
ADDRESS OF DATA (SECOND BYTE)				
ADDRESS OF DATA (THIRD BYTE)				
ADDRESS OF DATA (FOURTH BYTE)				
TYPE DATA PARAMETER				
DATA LSB MSB				
. . .				
DATA LSB MSB				

Host (PLC)			Slave (Micro-Tech)	
DLE	10H			
ETX	03H			
BCC		→		
		←	DLE	10H
		←	ACK	06H

Example 4: The Host (PLC) Asks the Micro-Tech if Data Were Received OK

Host (PLC)			Slave (Micro-Tech)	
DLE	10H	→		
ENQ	05H			
ADDRESS OF SLAVE				
BCC		→		
		←	DLE	10H
			STX	02H
			ADDRESS OF HOST	
			ADDRESS OF SLAVE	
			4FH (COMMAND)	
			STS	00H
			TMS	xxH
			TMS	xxH
			DLE	10H
			EYX	03H
			BCC	
DLE	10H	→		
ACK	06H	→		

- If the message is *incorrectly* received, the Micro-Tech does not respond.
- The character 10H is doubled (sent two times), but it is computed once only in the BCC.

Example 5: The Host Asks the Micro-Tech to Send Back the Batch Setpoint

Setpoint = 200.5

Address of Slave = 01

Address of Host = 02

Host (PLC)			Slave (Micro-Tech)	
	10H	→		
	01H			
	01H			
	10H			
	02H			
	01H			
	02H			
	0FH			
	00H			
	00H			
	00H			
	68H			
	00H			
	00H			
	01H			
	00H			
	07H			
	00H			
	08H			
	17H			
	01H			
	00H			
	10H			
	03H			
	08H			
	17H			
	01H			
	00H			

Host (PLC)			Slave (Micro-Tech)	
	10H			
	03H			
	6DH	→		
		←		10H
		←		06H
	10H	→		
	05H			
	01H	→		
	FFH	→		
		←		10H
				02H
				02H
				01H
				4FH
				00H
				00H
				00H
				99H
				09H
				06H
				94H
				08H
				00H
				80H
				48H
				04H
				10H
				03H
		←		5FH
	10H	→		
	06H	→		

Example 6: The Host Sends the Batch Setpoint to the Micro-Tech

Batch setpoint = 200.5 Tons

Address of Slave = 01

Address of Host = 02+

Host (PLC)			Slave (Micro-Tech)	
	10H	→		
	01H			
	01H			
	10H			
	02H			
	01H			
	02H			
	0FH			
	00H			
	00H			
	00H			
	67H			
	00H			
	00H			
	01H			
	00H			
	07H			
	00H			
	08H			
	07H			
	99H			
	09H			
	06H			
	94H			
	08H			
	00H			
	80H			
	48H			
	43H			

Host (PLC)			Slave (Micro-Tech)	
	10H			
	03H			
	20H	→		
		←		10H
		←		06H
	10H	→		
	05H	→		
	01H			
	FFH	→		
		←		10H
				02H
				02H
				01H
				4FH
				00H
				00H
				00H
				10H
				03H
		←		AEH
	10H	→		
	06H	→		

Register Mapping

The table below provides more details about the Allen-Bradley DF1 registers for Model 9101/9201.

Register	Address	Note
success_flag	N7:0	0 successful, 1 failed.
display (1)	N7:1	
display (2)	N7:2	
display (3)	N7:3	

Register	Address	Note
display (4)	N7:4	
display (5)	N7:5	
display (6)	N7:6	
display (7)	N7:7	
display (8)	N7:8	
display (9)	N7:9	
display (10)	N7:10	
display (11)	N7:11	
display (12)	N7:12	
display (13)	N7:13	
display (14)	N7:14	
display (15)	N7:15	
display (16)	N7:16	
display (17)	N7:17	
display (18)	N7:18	
display (19)	N7:19	
display (20)	N7:20	
display (21)	N7:21	
display (22)	N7:22	
display (23)	N7:23	
display (24)	N7:24	
display (25)	N7:25	
display (26)	N7:26	
display (27)	N7:27	
display (28)	N7:28	
display (29)	N7:29	
display (30)	N7:30	
display (31)	N7:31	
display (32)	N7:32	
display (33)	N7:33	
display (34)	N7:34	
display (35)	N7:35	
display (36)	N7:36	
display (37)	N7:37	

Register	Address	Note
display (38)	N7:38	
display (39)	N7:39	
display (40)	N7:40	
leds	N7:41	
status (1)	N7:42	
status (2)	N7:43	
alarm_status (1)	N7:44	
alarm_status (2)	N7:45	
alarm_status (3)	N7:46	
i_o (1)	N7:47	
i_o (2)	N7:48	
i_o (3)	N7:49	
i_o (4)	N7:50	
i_o (5)	N7:51	
i_o (6)	N7:52	
i_o (7)	N7:53	
i_o (8)	N7:54	
i_o (9)	N7:55	
i_o (10)	N7:56	
i_o (11)	N7:57	
i_o (12)	N7:58	
commands	N7:59	
batch_number	N7:60	Load Out option required
batch_deviation	N7:61	Load Out option required
rate	F8:0	
load	F8:1	
speed	F8:2	
master_total	F8:3	
reset_total	F8:4	
operator_total	F8:5	
scale_capacity	F8:10	
speed_capacity	F8:11	
load_cell_capacity	F8:12	
high_rate_set	F8:13	

Register	Address	Note
low_rate_set	F8:14	
high_speed_set	F8:15	
low_speed_set	F8:16	
high_load_set	F8:17	
low_load_set	F8:18	
cal_error	F8:19	

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. If the Micro-Tech loses power, the Ethernet communication will take roughly 30 seconds to respond after power is restored.

Ethernet/IP

EtherNet/IP uses Ethernet physical layer network infrastructure. EtherNet/IP can be easily confused as a simple combination of Ethernet and the Internet Protocol. Instead, it is an industrial application layer protocol used for communication between industrial control systems PLCs and their components, such as a programmable logic controller or an I/O system. The "IP" in EtherNet/IP, is not an abbreviation for "Internet Protocol" but instead stands for "Industrial Protocol."

Embedded Web Server

This is a future implementation and only simple data are available. The Micro-Tech will respond with a static home page, when the address "http://192.168.1.2" is entered in your browser window, as shown below.

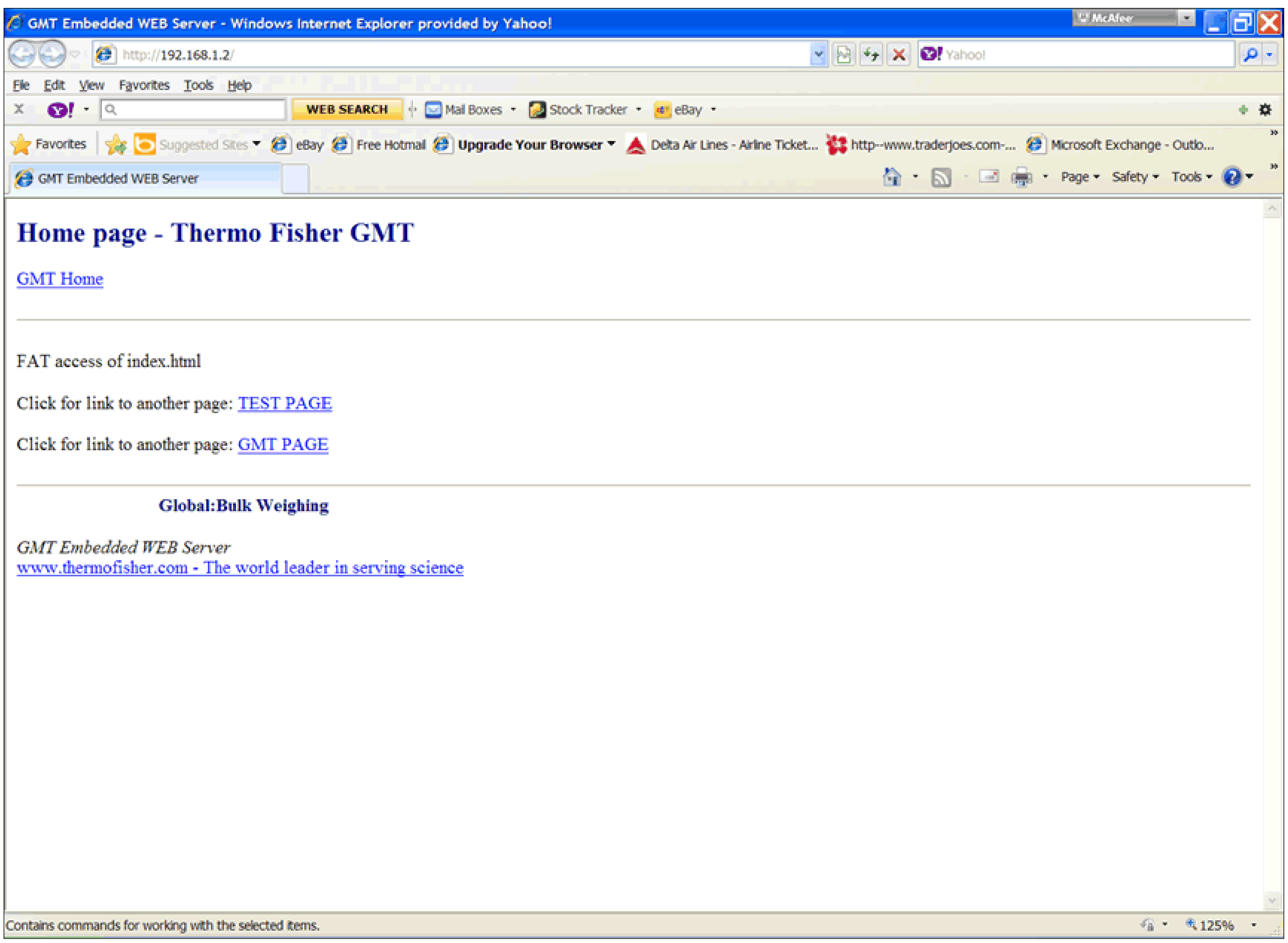


Figure C–1. Thermo Fisher Static Home Page

1. Press the “Test Page” link and the following window appears.

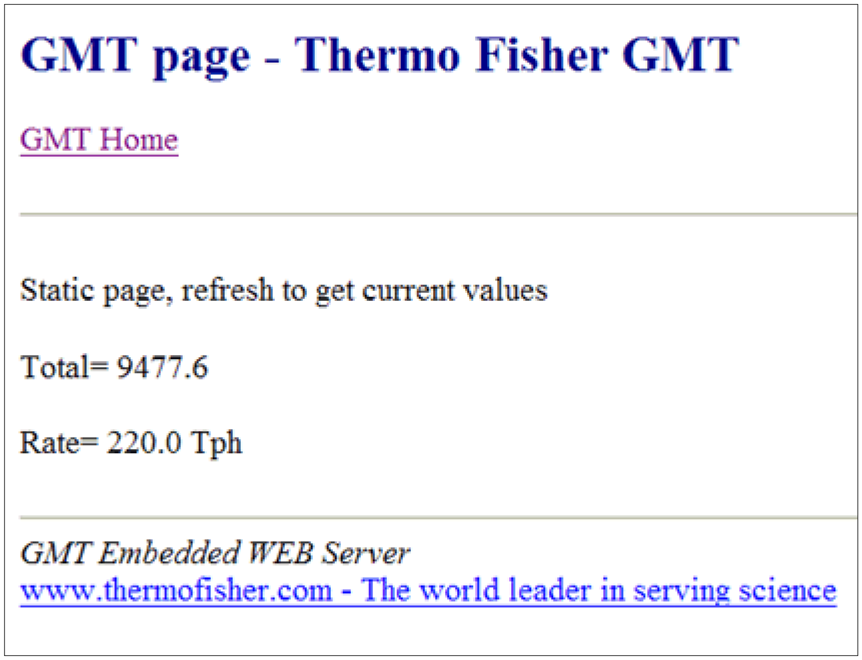


Figure C–2. Thermo Fisher Test Page Example

IP Address

To enter the IP address in the Micro-Tech, do the following.

1. Press the Menu key until “Main Menu 4” appears in the display.
2. Press the Ether button.
3. Press the down-arrow button. The following default settings are displayed.

IP address	=	92.168.1.2
Mask address	=	255.255.255.0
Gateway address	=	192.168.1.1 (which is the usual address of the PLC or PC requesting data.)

Controller Tag Listing Example

Here is the controller tag listing for the PLC.

Name	Data Type
Rate	REAL
Load	REAL
Master_Total	REAL
Speed	REAL
Reset_Total	REAL
Operator_Total	REAL
Batch_Total	REAL
⊞ RX	SINT[200]
Batch_Setpoint	REAL
Batch_Preset	REAL
Batch_Preact	REAL
High_Rate_Set	REAL
Low_Rate_Set	REAL
High_Speed_Set	REAL
Low_Speed_Set	REAL
High_Load_Set	REAL
Low_Load_Set	REAL
Calibr_Error	REAL
⊞ TMR_1	TIMER
⊞ WS_1:C	AB:ETHERNET_MODULE:C:0
⊞ WS_1:I	AB:ETHERNET_MODULE_INT_308 Bytes:I:0
⊞ WS_1:O	AB:ETHERNET_MODULE_INT_120 Bytes:O:0

Ladder Diagram Example

The ladder diagram for the PLC is shown on the following page

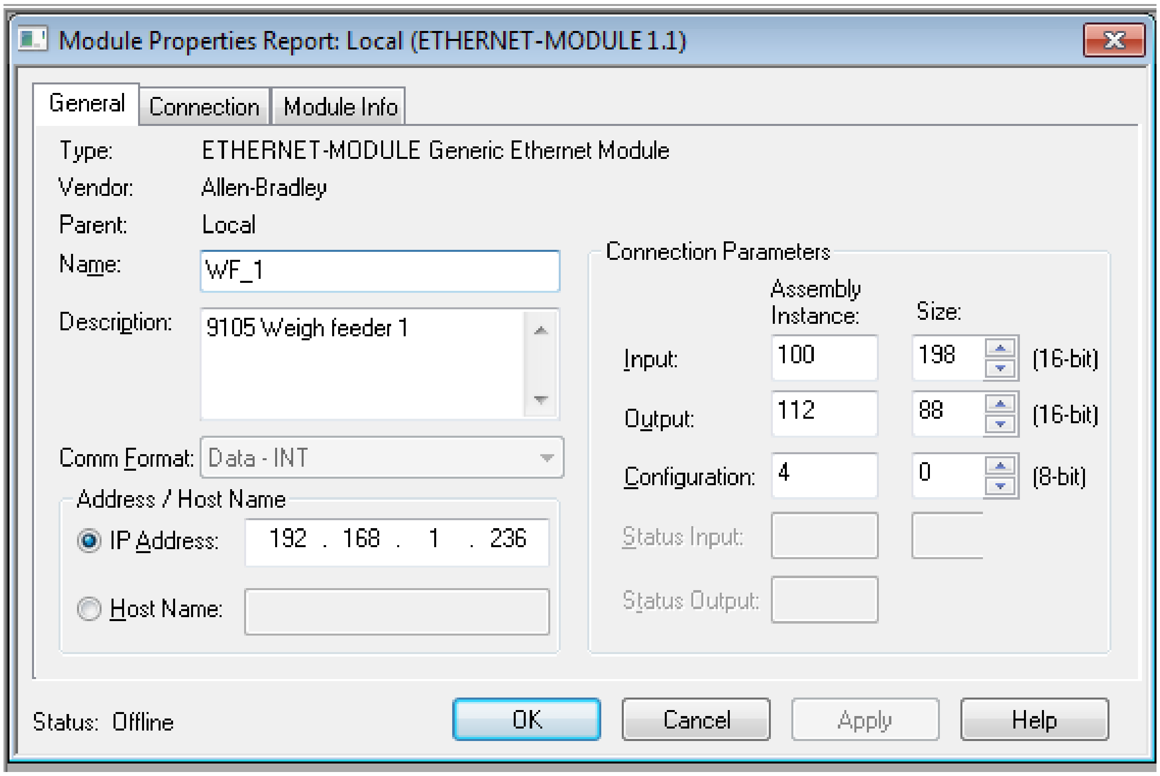
Ladder Diagram

Ethernet Module Properties Example

An example of the Ethernet Module Properties information is shown below.

General Tab Example

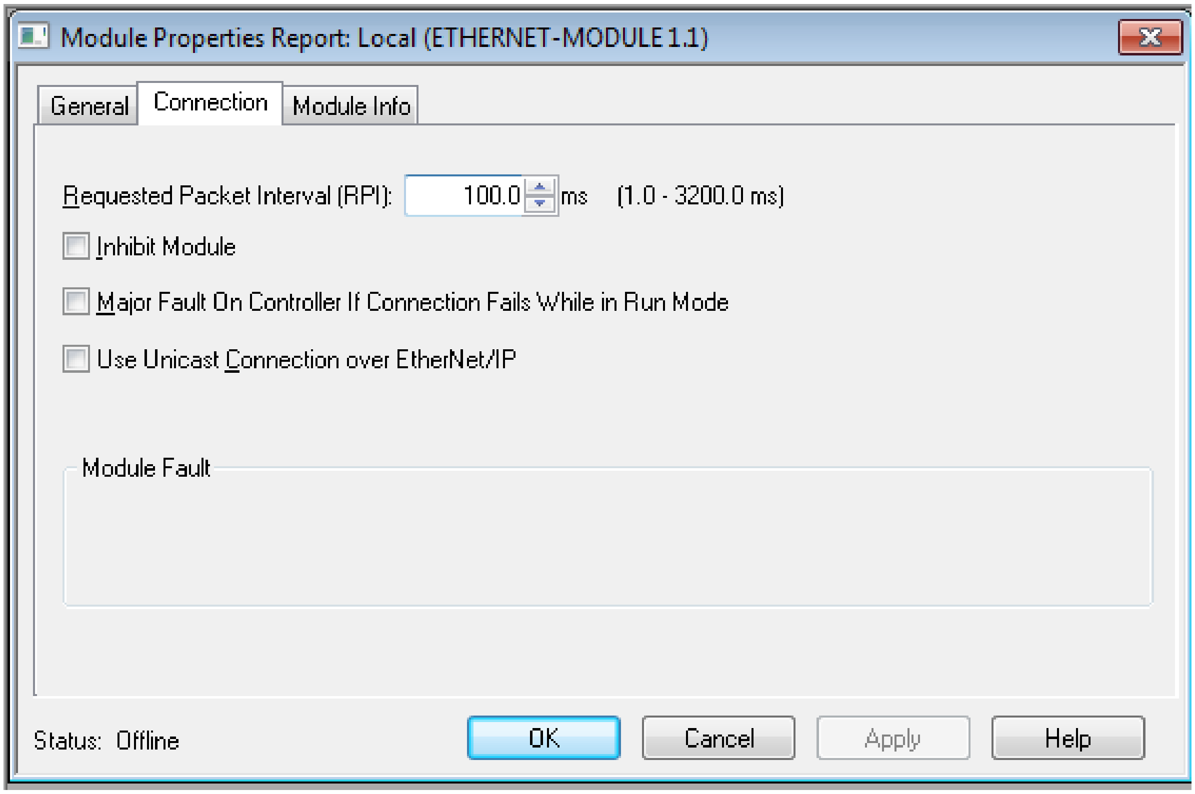
Below is an example of the information in the General Tab. The information for your specific model Micro-tech will be different.



Connection Tab

On the Connection Tab (shown in the graphic below) the Requested Packet Interval (RPI) must be set to 100ms minimum.

NOTE. The Requested Packet Interval (RPI) must be set to 100ms minimum. ▲



Read/Write Registers

The following tables show the read and write data.

Ethernet IP - Data Table

Configuration Parameters

Type	Parameter	Value	Remark
Reading data (Input)	Service Type	Read Assembly (CntrlLlogix - Compact Logix)	May be different
	Service Code	E (hex)	
	Class	4 (hex)	
	Attribute	3 (hex)	
	Instance	64 (hex) - 100 (dec)	
	Length Size	D2 (hex) - 210 (dec)	According data Table

Read Data Table

Register Name	Comments	Register Start Number	OffSet
Success_Flag	Both	0	0
Status LED	BOTH	1	2
Status	Scale 1	2	4
Alarms	BOTH	6	12
I/O	BOTH	12	24
Number Of trials	BOTH	24	48
Model ID	BOTH	25	50
Batch Number	Scale 1	26	52
Batch Deviation	Scale 1	27	54
AZ Deviation	Scale 1	28	56
Zero Number	Scale 1	30	60
Zero Reference	Scale 1	32	64
Free Space	Scale 1	34	68
Free Space	Scale 1	35	70
Free Space	Scale 1	36	72
Free Space	Scale 1	37	74
Free Space	Scale 1	38	76
Free Space	Scale 1	39	78
Free Space	Scale 1	40	80
Free Space	Scale 1	41	82
Free Space	Scale 1	42	84
Free Space	Scale 1	43	86
Span Number	Scale 1	44	88
Scale Capacity	Scale 1	46	92
Speed Capacity	Scale 1	48	96
Load Cell Capacity	Scale 1	50	100

Register Name	Comments	Register Start Number	OffSet
Rate	Scale 1	52	104
Load	Scale 1	54	108
Speed	Scale 1	56	112
Master Total	Scale 1, Single Float Information	58	116
Reset Total	Scale 1, Single Float Information	60	120
Operator Total	Scale 1, Single Float Information	62	124
Batch Total	Scale 1, Single Float Information	64	128
Batch Setpoint	Scale 1	66	132
Batch Preset	Scale 1	68	136
Batch Preact	Scale 1	70	140
AZT Correction	Scale 1	72	144
Auto Zero Max Dev	Scale 1	74	148
Total AZ %	Scale 1	76	152
AZT step limit	Scale 1	78	156
Belt Warm	Scale 1	80	160
High Rate Set	Scale 1	82	164
Low Rate Set	Scale 1	84	168
High Speed Set	Scale 1	86	172
Low Speed Set	Scale 1	88	176
High Load Set	Scale 1	90	180
Low Load Set	Scale 1	92	184
Cal Error	Scale 1	94	188
Free Space	Scale 1	96	192
Free Space	Scale 1	98	196
Free Space	Scale 1	100	200
Free Space	Scale 1	102	204
Free Space	Scale 1	104	208
Free Space	Scale 1	106	212
Free Space	Scale 1	108	216
Free Space	Scale 1	110	220
Free Space	Scale 1	112	224
Free Space	Scale 1	114	228
Scale 2			
Status	Scale 2	116	232
Batch Number	Scale 2	120	240
Batch Deviation	Scale 2	121	242
AZ Deviation	Scale 2	122	244
Zero Number	Scale 2	124	248
Zero Reference	Scale 2	126	252
Free Space	Scale 2	128	256
Free Space	Scale 2	129	258
Free Space	Scale 2	130	260
Free Space	Scale 2	131	262
Free Space	Scale 2	132	264
Free Space	Scale 2	133	266
Free Space	Scale 2	134	268

Register Name	Comments	Register Start Number	OffSet
Free Space	Scale 2	135	270
Free Space	Scale 2	136	272
Free Space	Scale 2	137	274
Span Number	Scale 2	138	276
Scale Capacity	Scale 2	140	280
Speed Capacity	Scale 2	142	284
Load Cell Capacity	Scale 2	144	288
Rate	Scale 2	146	292
Load	Scale 2	148	296
Speed	Scale 2	150	300
Master Total	Scale 2, Single Float Information	152	304
Reset Total	Scale 2, Single Float Information	154	308
Operator Total	Scale 2, Single Float Information	156	312
Batch Total	Scale 2, Single Float Information	158	316
Batch Setpoint	Scale 2	160	320
Batch Preset	Scale 2	162	324
Batch Preact	Scale 2	164	328
AZT Correction	Scale 2	166	332
Auto Zero Max Dev	Scale 2	168	336
Total AZ %	Scale 2	170	340
AZT step limit	Scale 2	172	344
Belt Warm	Scale 2	174	348
High Rate Set	Scale 2	176	352
Low Rate Set	Scale 2	178	356
High Speed Set	Scale 2	180	360
Low Speed Set	Scale 2	182	364
High Load Set	Scale 2	184	368
Low Load Set	Scale 2	186	372
Cal Error	Scale 2	188	376
Free Space	Scale 2	190	380
Free Space	Scale 2	192	384
Free Space	Scale 2	194	388
Free Space	Scale 2	196	392
Free Space	Scale 2	198	396
Free Space	Scale 2	200	400
Free Space	Scale 2	202	404
Free Space	Scale 2	204	408
Free Space	Scale 2	206	412
Free Space	Scale 2	208	416

Configuration Parameters

Type	Parameter	Value	Remark
Writing data (Output)	Service Type	Write Assembly (Cntrl Logix - Compact Logix)	May be different
	Service Code	10 (hex)	
	Class	4 (hex)	
	Attribute	3 (hex)	
	Instance	70 (hex) - 112 (dec)	
	Length Size	82 (hex) - 130 (dec)	According data Table

Write Data Table

Register Name	Comments	Register Start Number	OffSet
Number Of trials	BOTH	0	0
Command	Scale 1	1	2
Last Key Pressed	BOTH	3	6
Batch Number	Scale 1	4	8
Batch Deviation	Scale 1	5	10
Free Space	Scale 1	6	12
Free Space	Scale 1	7	14
Free Space	Scale 1	8	16
Free Space	Scale 1	9	18
Free Space	Scale 1	10	20
Free Space	Scale 1	11	22
Free Space	Scale 1	12	24
Free Space	Scale 1	13	26
Free Space	Scale 1	14	28
Free Space	Scale 1	15	30
Scale Capacity	Scale 1	16	32
Speed Capacity	Scale 1	18	36
Load Cell Capacity	Scale 1	20	40
Batch Setpoint	Scale 1	22	44
Batch Preset	Scale 1	24	48
Batch Preact	Scale 1	26	52
Auto Zero Max Dev	Scale 1	28	56
AZT step limit	Scale 1	30	60
Belt Warm	Scale 1	32	64
High Rate Set	Scale 1	34	68
Low Rate Set	Scale 1	36	72
High Speed Set	Scale 1	38	76
Low Speed Set	Scale 1	40	80
High Load Set	Scale 1	42	84
Low Load Set	Scale 1	44	88

Register Name	Comments	Register Start Number	OffSet
Free Space	Scale 1	46	92
Free Space	Scale 1	48	96
Free Space	Scale 1	50	100
Free Space	Scale 1	52	104
Free Space	Scale 1	54	108
Free Space	Scale 1	56	112
Free Space	Scale 1	58	116
Free Space	Scale 1	60	120
Free Space	Scale 1	62	124
Free Space	Scale 1	64	128
Scale 2			
Command	Scale 2	66	132
Batch Number	Scale 2	68	136
Batch Deviation	Scale 2	69	138
Free Space	Scale 2	70	140
Free Space	Scale 2	71	142
Free Space	Scale 2	72	144
Free Space	Scale 2	73	146
Free Space	Scale 2	74	148
Free Space	Scale 2	75	150
Free Space	Scale 2	76	152
Free Space	Scale 2	77	154
Free Space	Scale 2	78	156
Free Space	Scale 2	79	158
Scale Capacity	Scale 2	80	160
Speed Capacity	Scale 2	82	164
Load Cell Capacity	Scale 2	84	168
Batch Setpoint	Scale 2	86	172
Batch Preset	Scale 2	88	176
Batch Preact	Scale 2	90	180
Auto Zero Max Dev	Scale 2	92	184
AZT step limit	Scale 2	94	188
Belt Warm	Scale 2	96	192
High Rate Set	Scale 2	98	196
Low Rate Set	Scale 2	100	200
High Speed Set	Scale 2	102	204
Low Speed Set	Scale 2	104	208
High Load Set	Scale 2	106	212
Low Load Set	Scale 2	108	216
Free Space	Scale 2	110	220
Free Space	Scale 2	112	224
Free Space	Scale 2	114	228
Free Space	Scale 2	116	232
Free Space	Scale 2	118	236
Free Space	Scale 2	120	240
Free Space	Scale 2	122	244

Register Name	Comments	Register Start Number	OffSet
Free Space	Scale 2	124	248
Free Space	Scale 2	126	252
Free Space	Scale 2	128	256

PLC 5 Data Tables

Scale 1 Table

	N10:X	F11:X	N12:X	F13:X
0	Success_Flag	Span Number	Number Of trials	Scale Capacity
1	Status_LED	Scale Capacity	Command	Speed Capacity
2	Status	Speed Capacity	Command	Load Cell Capacity
3	Status	Load Cell Capacity	Last Key Pressed	Batch Setpoint
4	Status	Rate	Batch Number	Batch Preset
5	Status	Load	Batch Deviation	Batch Preact
6	Alarms	Speed	FREE SPACE	Auto Zero Max Dev
7	Alarms	Master Total	FREE SPACE	AZT step limit
8	Alarms	Reset Total	FREE SPACE	Belt Warm
9	Alarms	Operator Total	FREE SPACE	High Rate Set
10	Alarms	Batch Total	FREE SPACE	Low Rate Set
11	Alarms	Batch Setpoint	FREE SPACE	High Speed Set
12	I/O	Batch Preset	FREE SPACE	Low Speed Set
13	I/O	Batch Preact	FREE SPACE	High Load Set
14	I/O	AZT Correction	FREE SPACE	Low Load Set
15	I/O	Auto Zero Max Dev	FREE SPACE	FREE SPACE
16	I/O	Total AZ %	NOT USED	FREE SPACE
17	I/O	AZT step limit	NOT USED	FREE SPACE
18	I/O	Belt Warm	NOT USED	FREE SPACE
19	I/O	High Rate Set	NOT USED	FREE SPACE
20	I/O	Low Rate Set	NOT USED	FREE SPACE
21	I/O	High Speed Set	NOT USED	FREE SPACE
22	I/O	Low Speed Set	NOT USED	FREE SPACE
23	I/O	High Load Set	NOT USED	FREE SPACE
24	Number Of Trials	Low Load Set	NOT USED	FREE SPACE
25	Model ID	Cal Error	NOT USED	NOT USED
26	Batch Number	FREE SPACE	NOT USED	NOT USED
27	Batch Deviation	FREE SPACE	NOT USED	NOT USED
28	AZ Deviation	FREE SPACE	NOT USED	NOT USED
29	AZ Deviation	FREE SPACE	NOT USED	NOT USED
30	Zero Number	FREE SPACE	NOT USED	NOT USED

	N10:X	F11:X	N12:X	F13:X
31	Zero Number	FREE SPACE	NOT USED	NOT USED
32	Zero Reference	FREE SPACE	NOT USED	NOT USED
33	Zero Reference	FREE SPACE	NOT USED	NOT USED
34	FREE SPACE	FREE SPACE	NOT USED	NOT USED
35	FREE SPACE	FREE SPACE	NOT USED	NOT USED
36	FREE SPACE	NOT USED	NOT USED	NOT USED
37	FREE SPACE	NOT USED	NOT USED	NOT USED
38	FREE SPACE	NOT USED	NOT USED	NOT USED
39	FREE SPACE	NOT USED	NOT USED	NOT USED
40	FREE SPACE	NOT USED	NOT USED	NOT USED
41	FREE SPACE	NOT USED	NOT USED	NOT USED
42	FREE SPACE	NOT USED	NOT USED	NOT USED
43	FREE SPACE	NOT USED	NOT USED	NOT USED

Scale 2 Table

	N20:X	F21:X	N22:X	F23:X
0	Status	Span Number	Command	Scale Capacity
1	Status	Scale Capacity	Command	Speed Capacity
2	Status	Speed Capacity	Batch Number	Load Cell Capacity
3	Status	Load Cell Capacity	Batch Deviation	Batch Setpoint
4	Batch Number	Rate	FREE SPACE	Batch Preset
5	Batch Deviation	Load	FREE SPACE	Batch Preact
6	AZ Deviation	Speed	FREE SPACE	Auto Zero Max Dev
7	AZ Deviation	Master Total	FREE SPACE	AZT step limit
8	Zero Number	Reset Total	FREE SPACE	Belt Warm
9	Zero Number	Operator Total	FREE SPACE	High Rate Set
10	Zero Reference	Batch Total	FREE SPACE	Low Rate Set
11	Zero Reference	Batch Setpoint	FREE SPACE	High Speed Set
12	Free Space	Batch Preset	FREE SPACE	Low Speed Set
13	Free Space	Batch Preact	FREE SPACE	High Load Set
14	Free Space	AZT Correction	NOT USED	Low Load Set
15	Free Space	Auto Zero Max Dev	NOT USED	FREE SPACE
16	Free Space	Total AZ %	NOT USED	FREE SPACE
17	Free Space	AZT step limit	NOT USED	FREE SPACE
18	Free Space	Belt Warm	NOT USED	FREE SPACE
19	Free Space	High Rate Set	NOT USED	FREE SPACE
20	Free Space	Low Rate Set	NOT USED	FREE SPACE
21	Free Space	High Speed Set	NOT USED	FREE SPACE
22	NOT USED	Low Speed Set	NOT USED	FREE SPACE
23	NOT USED	High Load Set	NOT USED	FREE SPACE

	N20:X	F21:X	N22:X	F23:X
24	NOT USED	Low Load Set	NOT USED	FREE SPACE
25	NOT USED	Cal Error	NOT USED	NOT USED
26	NOT USED	FREE SPACE	NOT USED	NOT USED
27	NOT USED	FREE SPACE	NOT USED	NOT USED
28	NOT USED	FREE SPACE	NOT USED	NOT USED
29	NOT USED	FREE SPACE	NOT USED	NOT USED
30	NOT USED	FREE SPACE	NOT USED	NOT USED
31	NOT USED	FREE SPACE	NOT USED	NOT USED
32	NOT USED	FREE SPACE	NOT USED	NOT USED
33	NOT USED	FREE SPACE	NOT USED	NOT USED
34	NOT USED	FREE SPACE	NOT USED	NOT USED
35	NOT USED	FREE SPACE	NOT USED	NOT USED
36	NOT USED	NOT USED	NOT USED	NOT USED
37	NOT USED	NOT USED	NOT USED	NOT USED

Modbus TCP/IP

This is a Modbus variant used for communications over TCP/IP networks, connecting over port 502. It does not require a checksum calculation as lower layers already provide checksum protection. Each device intended to communicate using Modbus is given a unique address. In serial and MB+ networks only, the node assigned as the Master may initiate a command, but on Ethernet, any device can send out a Modbus command, although usually only one master device does so. A Modbus command contains the Modbus address of the device it is intended for. Only the intended device will act on the command, even though other devices might receive it (an exception is specific broadcastable commands sent to node 0 which are acted on but not acknowledged). All Modbus commands contain checking information, ensuring that a command arrives undamaged. The basic Modbus commands can instruct an RTU to change a value in one of its registers, control or read an I/O port, as well as commanding the device to send back one or more values contained in its registers.

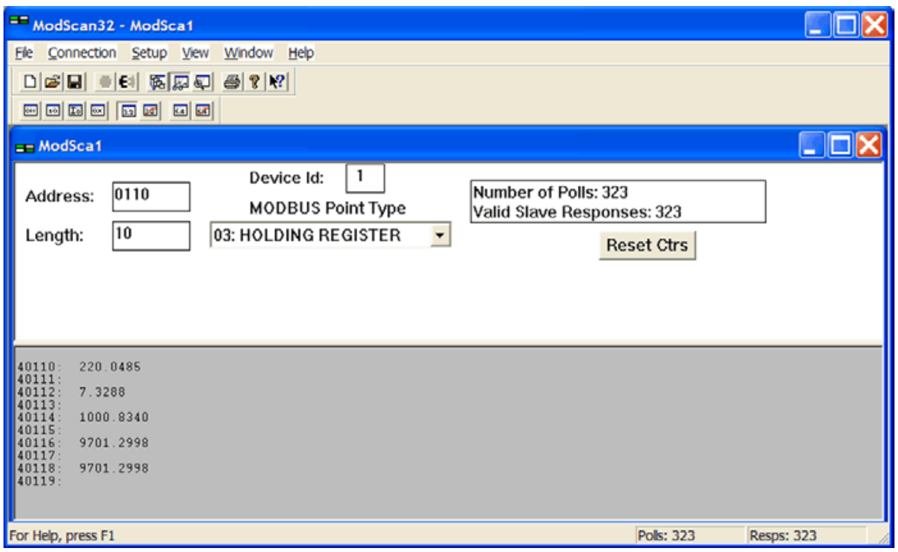


Figure C–3. Modbus Screen

Register Mapping

The Register Mapping of Modbus TCP/IP is the same as that of Modbus RTU. See page C-32.

Profibus-DP Protocol

The PROFIBUS is one of the main standardized communication systems. All its characteristics, rules and technical information are defined in the PROFIBUS DIN normative.

There are three main variations of PROFIBUS corresponding to the intended application: PROFIBUS-FMS, PROFIBUS-DP and PROFIBUS-PA.

The Micro-Tech variation is PROFIBUS-DP.

Profibus DP

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.

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 cable.

Data Transfer

The interface between the master and slaves is structured in parameterization, configuration, and data transfer phase. In the parameterization and configuration phases, each slave compares its real configuration with the configuration data received from the master. When verifying the configuration, device type, format and length of information have to be identical. This guarantees a protection against a configuration fault. Maximum number of data that is possible to transfer in this phase at one time is limited to 246 bytes (123 words).

Besides the configuration, check to avoid erroneous configurations, the slave uses the watch dog control to detect failures on the bus. If a slave recognizes no successful data transfer with the master within the watch dog control interval, it generates an alarm condition.

Installation

The PROFIBUS-DP interface board (Optional) is a plug-in board that can be installed in one of the motherboard expansion slots J10-J13 and that handles the interface between the Micro-Tech (slave) and the master.

No hardware configuration jumpers or switches are present on the PROFIBUS-DP board.

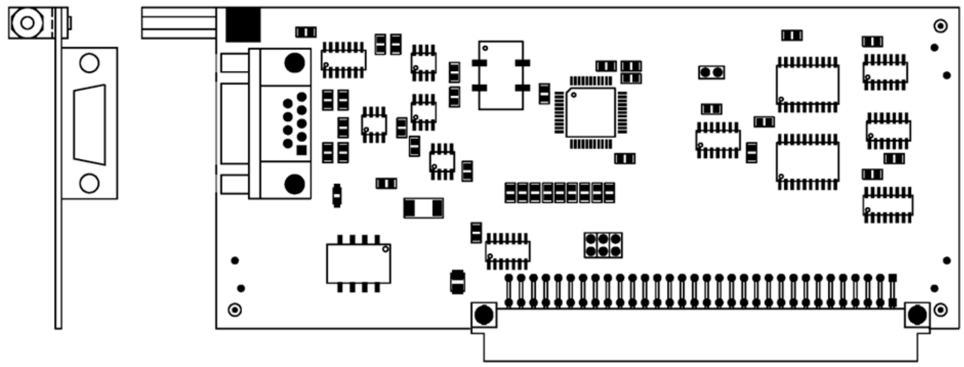


Figure C–4. Profibus-DP Interface Board

Wiring

Different types of cables are available on the market when assembling PROFIBUS networks.

Standard Siemens PROFIBUS LAN cable number 6XV1 830-0AH10 is available from Thermo Scientific, part number 057415.
Consult the Siemens PROFIBUS network manual for additional information relevant to wiring and available auxiliary devices (like a repeater).

The table below indicates the maximum cable segment length admitted according to the communication speed.

Table C–2. Maximum Cable Length of a Segment

Transmission Rate	Maximum Cable Length of a Segment (in mt.)
9.6 to 93.75 Kbps	1000
187.50 Kbps	800
500.00 Kbps	400
1.50 Mbps	200
3.0 to 12.00 Mbps	100

The bus connector should be rated for the max allowed speed of the Profibus (12 Mb) and should contain a termination resistor that can be switched on or off. Bus connector is available from Thermo Ramsey, part number 057416.

Bus Connector

The table below shown the pin-out of the 9 pin Sub-D us connector.

Table C–3. Bus Connector

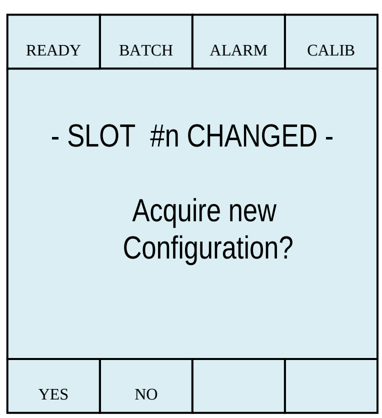
Pin	Signal	Cable
1	Chassis Ground	Shield
2	Not Used	-
3	RxD/TxD – Data Line B	RED wire
4	Not Used	-
5	Data Ground	-
6	+5VDC (100mA Max)	-
7	Not Used	-
8	RxD/TxD – Data Line A	GREEN wire
9	Not Used	-

Connect the green and red cable wires to the screw terminal block located in the connector, and insure that the shield is making metal to metal contact with the connector guide. The two pairs of terminals for signal wires A and B are identical.

NOTE. The same wires (green or red) must always be connected to the same terminal A or B in all bus terminals and with all bus connections, and be uniform throughout the segment

Set-Up

After installing the board in one of the free slots (please see the Reference Manual of the Micro-tech for details) the following screen appears:

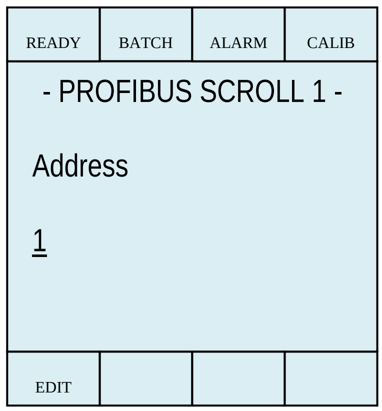


If the question is not answered, the screen disappears after ten seconds, and the Micro-Tech assumes the answer is NO. HW (hardware) alarm is on and cannot be reset. The screen will appear each time power is cycled if the question is not answered.

Answer YES because this is a hardware configuration change. Set-up data must now be entered.

Slave address

Through the new PROFIB menu, which can be found on Main Menu 5, it is possible to assign the slave address:

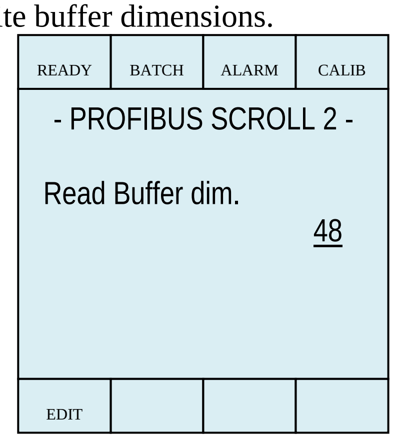


The limits of values that can be set are the following:

Default: 1
Min: 1
Max: 126
(Password: Service.)

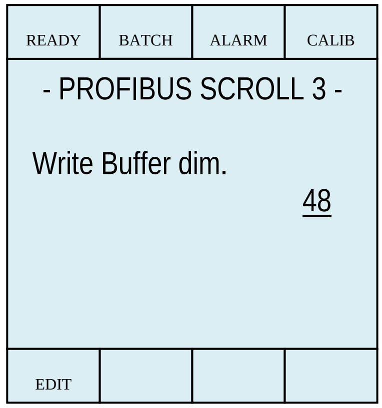
Buffer Dimension

In the next two scrolls, the operator can define independently the read and write buffer dimensions.



The limits of values that can be set are the following:

Default: 48
Min: 5
Max: 48
(Password: Service.)

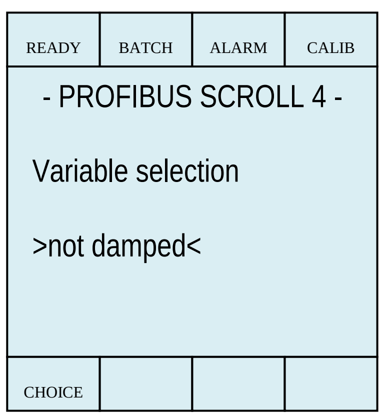


The limits of values that can be set are the following:

Default: 48
Min: 5
Max: 48
(Password: Service.)

Variable Selection

The operator can define how to receive the data from the Micro-tech. Raw (not damped), damped, or in the same way that the data is displayed:



Default: not damped
Selection: not damped, damped, displayed

Communication

The PROFIBUS interface allows a remote intelligent device to read and write data from and to the Micro-Tech.

During the communication activity, the Micro-Tech will always act as a slave, meaning it will respond to a request from a master device on the line, but will never attempt to send messages out.

Timings

The Micro-Tech updates almost all its basic variables (e.g.; load, weight, rate, totals) every 100 milliseconds. With the same frequency the Micro-Tech updates the read buffer. If the master performs more communications in this period, it will receive the same data more times.

The write request is interpreted by the Micro-Tech in polling with a period of 100 milliseconds.

Error Management

Errors in the communication are managed in the Micro-Tech.

A specific alarm is generated whenever one or both of the following conditions become true:

- The SPC3 controller installed on the PROFIBUS board does not recognize successful data transfer within the watch dog control interval.
- The received data contains errors (value overlaps limits, register number does not exist, group number does not exist); in this case the Micro-Tech activates an *Expanded Diagnostics* request to the master. Details of this diagnostic can be found at DIAGNOSTIC DATA paragraph.

Details on how to define and manage the generated alarm can be found in starting on B-42.

Data Organization

Data are organized in registers collected in several block, some of them are "Read only" (RO) while others are "Write Only" (WO) block. Blocks are identified by a number as below:

Table C–4. Data Organization

Block Type	Identification Number	Description of Data	Reference Page
Read	0	Status, Alarms, I/O, Dynamic data	C-72
	1	Batch (Load Out)	C-72
	2	Sets and Thresholds	C-73
Write	100	Commands	C-73
	101	Batch (Load Out)	C-74
	102	Sets and Thresholds	C-74

Read Operations

In the PROFIBUS protocol, the master continuously reads data from the slave. Since the Micro-Tech has a large number of registers that can be sent to the master, as previously said registers are collected in blocks. Therefore, the master should have the possibility to tell the Micro-Tech which block and which register of the block it needs to read. This is performed by a write operation as described in the next chapter.

After the Micro-Tech receives and interprets this write request, it starts to fill the read buffer with the requested data.

The Micro-Tech will remember which registers have been required the last time and it will continue to update the read buffer with their actual values.

What the Master receives after a read operation is a buffer of data having the following structure:

Table C–5. Read Buffer

	ID	Register	Data Type	Offset	Remark
HEADER	1	Block Identifier	Integer	1	Identification Number of Block Type (0,1,2,3)
	2	1st Register	Integer	2	Number of the first register within the block
	3	N° of Registers	Integer	3	Numbers of register to read within the block
	4	Stamp	Integer	4	See explanation below
DATA	5	Data #1	May vary	5	Value of the first register
	….	………..		….	
	n	Data #n	May vary	….	Value of the last register

After power on, the Micro-Tech starts to update the read buffer with the register of the read block 0 (scale 1).

Write Operations

The write operation simply consists in sending to the Micro-Tech the values to write in the registers together with indications to identify what registers have to be written.
The write telegram is composed of two parts, Header and Data.

Table C–6. Write Package

	ID	Register	Data Type	Offset	Description
HEADER	1	Block Identifier	Integer	1	See #1
	2	1st Register	Integer	2	See #2
	3	N° of Registers	Integer	3	See #3
	4	Stamp	Integer	4	See #4
DATA	5	Data #1	May vary	5	Value of the first register
	….	………..		….	
	n	Data #n	May vary	….	Value of the last register

Header

#1 –BLOCK IDENTIFIER
This register identifies which block of data the master wants to write.

The Micro-Tech can also handle two or more independent scales so it keeps in memory more copies for each group. The block identifier register is also used to determine which scale the data refers to.

- The first byte (MSB) is used to identify the scale number.
- The second byte (LSB) identifies the block number according to the description of Data Organization Table.

15							8	7							0
SN	SN	SN	SN	SN	SN	SN	SN	GN	GN	GN	GN	GN	GN	GN	GN

SN = Scale number: 00 → Scale 1
01 → Scale 2
02 → Scale 3
03 → Scale 4

GN = Block Number e.g See **Table C–4**

Example:

258 (hex0102) = Scale 2, Block 2 → Read "*Set and Thresholds*" of *Scale 2*

101 (hex0065) = Scale 1, Block 101 → Write “*Batch*” data of *Scale 1*,

#2 –FIRST REGISTER NUMBER

Registers in the groups are numbered from 0 to n, and the master has the possibility to write only a portion of the registers composing the group. This parameter specifies the first register to write; 0 means the first register of the group.

#3 –NUMBER OF REGISTERS

This parameter specifies the number of register to write.

#4 –STAMP

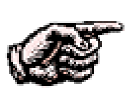
In the PROFIBUS protocol, data is transmitted continuously, so the same telegram is sent by the master to the slave several times. To avoid the slave interpreting the same data continuously (it would create problems; for example, with the commands), the element called “*stamp*” is used. The slave interprets received data only if the stamp is different from the stamp received in the previous telegram. The master has only to change the stamp value when it creates a new telegram. The stamp of the last interpreted telegram is re-transmitted by the Micro-Tech in the read buffer.

Data

The Data section contains the data to write in the order MSB – LSB (Most Significant Bit – Least Significant Bit).

When the Micro-Tech processes the package, before writing the received data in the registers, it checks that all the parameters are correct (example: Block identifiers refers to an existing block).

The data to write does not overlap specified maximum and minimum limits (each writeable register has its own maximum and minimum limit according to the Type, Limits, Format Table, **Table C–1**); If it detects errors, the write operation fails and a DIAGNOSTICS message will be activated.



REMARK: In a write operation, if the block identifier refers to a read block (0,1,2,3) only the header of the telegram is interpreted. The data are ignored.

Diagnostic Data

The master system has the possibility to detect a communication error condition by checking the diagnostics. In case of an error, the Micro-Tech will activate the request for diagnostic acquisition, indicating the expanded device related diagnostics data is present.

When the master requires the diagnostics, it receives:

Table C–7. Composition of the Diagnostics Data

Byte	Bit Position								Diagnostic Data
	7	6	5	4	3	2	1	0	
0									StatStatus1
1									StatStatus2
2									StatStatus3
3									Master Add
4									Ident NumberHigh
5									Ident NumberLow
6	0	0	0	0	0	0	1	0	Ext Diag - Header
7	0	0	0	0	GE	RE	LE	CE	Ext Diag - Data

GE Group Error: Invalid group identifier, the group does not exists

RE Register number Error: The number of requested register is wrong.

LE Limits Error: A write operation has been performed but the value to write overlaps the limits.

CE Coherency Error: The master has tried to write or read partially a variable composed by more registers (e.g., only one word of a floating variable).

The individual bits in **Table C–7** have the following meaning:

Bit 7: *Diag.Master_Lock*

The DP-Slave has been parameterized from another master. This bit is set by the DP-Master (class 1), if the address in octet 4 is different from 255 and different from the own address. The DP-Slave sets this bit to zero.

Bit 6: *Diag.Prm_Fault*

This bit is set by the DP-Slave if the last parameter frame was faulty (e.g., wrong length, wrong Ident_Number, invalid parameters).

Bit 5: *Diag.Invalid_Slave_Response*

This bit is set by the DP-Master as soon as receiving a not plausible response from an addressed DP-Slave. The DP-Slave sets this bit to zero.

Bit 4: *Diag.Not_Supported*

This bit is set by the DP-Slave as soon as a function is requested, which is not supported from this DP-Slave.

Bit 3: *Diag.Ext_Diag*

This bit is set by the DP-Slave. It indicates a diagnostic entry exists in the slave specific diagnostic area (Ext_Diag_Data) if the bit is set to one. If the bit is set to zero, a status message can exist in the slave specific diagnostic area (Ext_Diag_Data). The meaning of this status message depends on the application and will not be fixed in this standard.

Bit 2: *Diag.Cfg_Fault*

This bit is set by the DP-Slave as soon as the last received configuration data from the DP-Master are different from these which the DP-Slave has determined.

Bit 1: *Diag.Station_Not_Ready*

This bit is set by the DP-Slave if the DP-Slave is not yet ready for data transfer.

Bit 0: *Diag.Station_Non_Existent*

This bit is set by the DP-Master if the respective DP-Slave cannot be reached over the line. If this bit is set, the diagnostic bits contain the state of the last diagnostic message or the initial value. The DP-Slave sets this bit to zero.

Register Mapping

This section contains the Profibus Register Mapping for the Micro-Tech.

Block 0

Block “0” is the *Read block* that contains all the registers relevant to the *Status, Alarms, I/O and Dynamic data*. It is the default group the Micro-Tech sends to the master for a read request if the master does not change request.

Table C–8. READ BLOCK 0: Status, Alarms, I/O, Dynamic data

Register Name	Offset Start
Status LED	5
Status	6
Alarms	10
I/O	16
Model ID	28
Zero Number	29
Span Number	31
Rate	33
Load	35
Speed	37
Master Total	39
Reset Total	41
Operator Total	43
Cal Error	45

Block 1

Block “1” is the *Read block* that contains all the registers relevant to the *Batch (Load out)* function.

Table C–9. READ BLOCK 1: Batch (Load out) function

Register Name	Offset start
Batch Number	5
Batch Deviation	6
Batch Total	7
Batch Setpoint	9
Batch Preset	11
Batch Preact	13

Block 2 Block "2" is the *Read block* that contains all the registers relevant to *Sets and Thresholds*.

Table C–10. READ BLOCK 2: Sets and Thresholds

Register Start	Offset Start
Number Of trials	5
Zero Reference	6
AZ Deviation	7
Scale Capacity	9
Speed Capacity	11
Load Cell Capacity	13
AZT Correction	15
Auto Zero Max Dev	17
Total AZ %	19
AZT step limit	21
Belt Warm	23
High Rate Set	25
Low Rate Set	27
High Speed Set	29
Low Speed Set	31
High Load Set	33
Low Load Set	35

Block 100 Block "100" is the *Write block* that is used to drive (set-reset) outputs as well as to send *Commands* to the Micro-Tech.

Table C–11. WRITE BLOCK 100: Commands

Register Name	Offset Start
Commands	5
Last Key Pressed	7
Set/Res Out #	8
Set/Res Out #	9
Set/Res Out #	10
Set/Res Out #	11
Set/Res Out #	12

Block 101 Block "101" is the *Write block* used to manage the registers relevant to the *Batch (Load out)* function.

Table C–12. WRITE BLOCK 101: Batch (Load out)

Register Name	Offset Word
Batch Number	5
Batch Deviation	6
Batch Set	7
Batch Preset	9
Batch Preact	11

Block 102 Block "102" is the *Write block* used to manage the registers relevant to *Sets and Thresholds*.

Table C–13. WRITE BLOCK 102: Sets and Thresholds

Register Name	Offset Start
Number Of trials	5
Scale Capacity	6
Speed Capacity	8
Load Cell Capacity	10
Auto Zero Max Dev	12
AZT step limit	14
Belt Warm	16
High Rate Set	18
Low Rate Set	20
High Speed Set	22
Low Speed Set	24
High Load Set	26
Low Load Set	28

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.

Belt-scale code This code describes your exact belt-scale set-up and allows the Micro-Tech to set the relevant menu defaults for you. Please write down your belt-scale code before contacting Thermo Fisher Scientific for help.

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.

kg/h Kilograms per hour.

kg/min Kilograms per minute.

Lb/hr Pounds per hour.

Lb/mn Pounds per minute.

Lt/min Long tons per minute.

LTons The “long ton,” equivalent to 2,240 lbs.

LTph Long tons per hour.

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.

PEIC Periodic-error-integrating control.

PID Proportional, integral, derivative control.

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.

t/hr Metric tons per hour.

t/min Metric tons per minute.

T/mn Standard US tons/minute.

Ton Standard (2,000# or 2,000 lb.) tons per hour.

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

Tph Tons per hour.

Totalizer The Totalizer shows the total tons accumulated by the Micro-Tech.

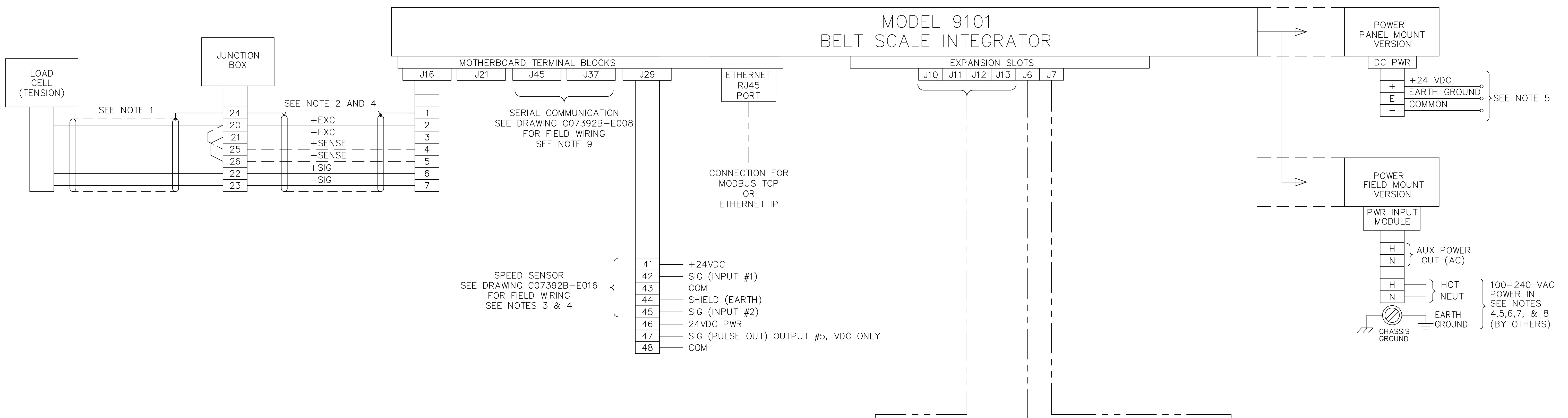
Weigh-bridge Another name for a scale.

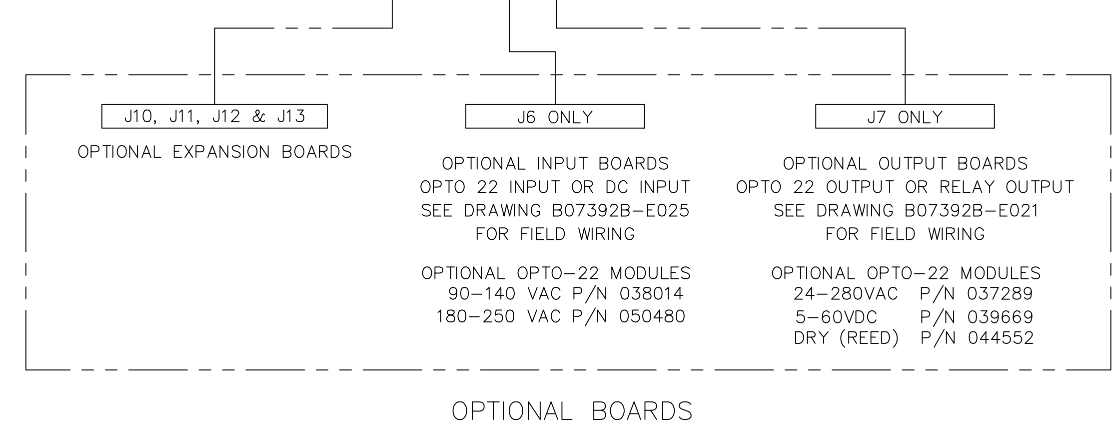
Attached Drawings

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

Description	Document
Field-Wiring Diagrams	
Micro-Tech 9101	D07392B-E020
Micro-Tech 9201	D07392B-E034
Analog I/O Board	B07392B-E003
8-In/8-Out Digital Board	B07392B-E005
Serial Communication	C07392B-E008
Siemens Profibus Board	C07392B-E011
Speed Sensors	C07392B-E016
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
Dual Plant LC A/D Board	B07392B-E027
Premium A/D Board	B07392B-E028

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC





OPTIONAL BOARDS

NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

1. DO NOT ALTER LENGTH OF CABLE SUPPLIED WITH LOADCELL.
2. IF TOTAL CABLE LENGTH IS LESS THAN 200 FT (61 M), USE BELDEN 8407 (P/N 003727) OR EQUIVALENT, 4 CONDUCTOR, 16 AWG SHIELDED.

   IF TOTAL LENGTH IS 201−3,000 FT (61−915 M), USE BELDEN 9260 (P/N 011416) OR EQUIVALENT, 6 CONDUCTOR, 20 AWG SHIELDED. SET JUMPERS ON MOTHER BOARD FOR REMOTE SENSE − PIN 2−3. (J14 & J15 FOR A/D CHANNEL #1)
3. SPEED SENSOR AND 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).

   SPEED SENSOR (3 WIRE): USE BELDEN 8772 (P/N 002346) OR EQUIVALENT, 3 CONDUCTOR, 20 AWG, SHIELDED, MAXIMUM TOTAL CABLE RUN IS 200 FT (61 M).
4. DO NOT RUN SIGNAL, LOADCELL, OR SPEED SENSOR CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
5. 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
6. EARTH GROUND ALL ELECTRICAL ENCLOSURES.
7. 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.
8. 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.
9. SELECTION OF SERIAL COMMUNICATION (RS−232 OR RS−485) IS DETERMINED BY COMM JUMPER OPTIONS. REFER TO OPERATING & SERVICE MANUAL FOR CONFIGURATION INSTRUCTIONS.

MODEL 9101 BELT SCALE INTEGRATOR DIGITAL INPUTS AND OUTPUTS

REQUIRED DIGITAL INPUTS AND OUTPUTS
INPUT: NONE
OUTPUT: NONE

AVAILABLE DIGITAL INPUT AND OUTPUT ASSIGNMENT CHOICES
MOTHERBOARD TERMINAL BLOCK J29 − (INPUT #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)

CADD DATABASE: AUTOCAD

REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
C	3322		UPDATED FORMAT TO MATCH OTHER MODELS	5/9/13	PEP	TMN
B	3044		ADD "VDC ONLY" TO MOTHERBOARD PULSE OUT	2/28/13	PEP	TMN
A	2959		RELEASED	6/6/12	MFM	MFM

DO NOT SCALE DWG
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES
SCALE
JOB NO

UNLESS SPECIFIED OTHERWISE TOLERANCE					
.X	± .1	± 3 mm	ENG	PEP	DATE 11/7/12
.X	± .06	± 1.5 mm	DWN	PEP	DATE 11/7/12
.XX	± .03	± .76 mm	CHK	MFM	DATE 11/7/12
.XXX	± .010	± .254 mm			
FRACT.	± 1/16	± N/A			
ANGLES	± 1/2°	± 1/2°			

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

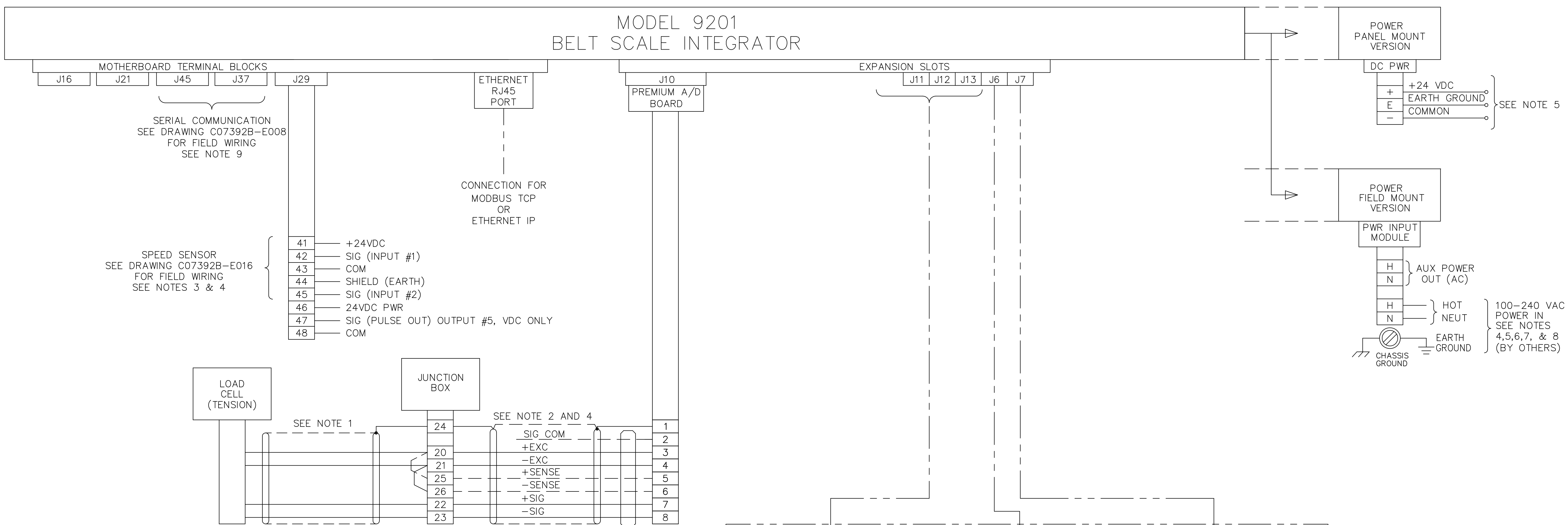
Thermo Fisher SCIENTIFIC

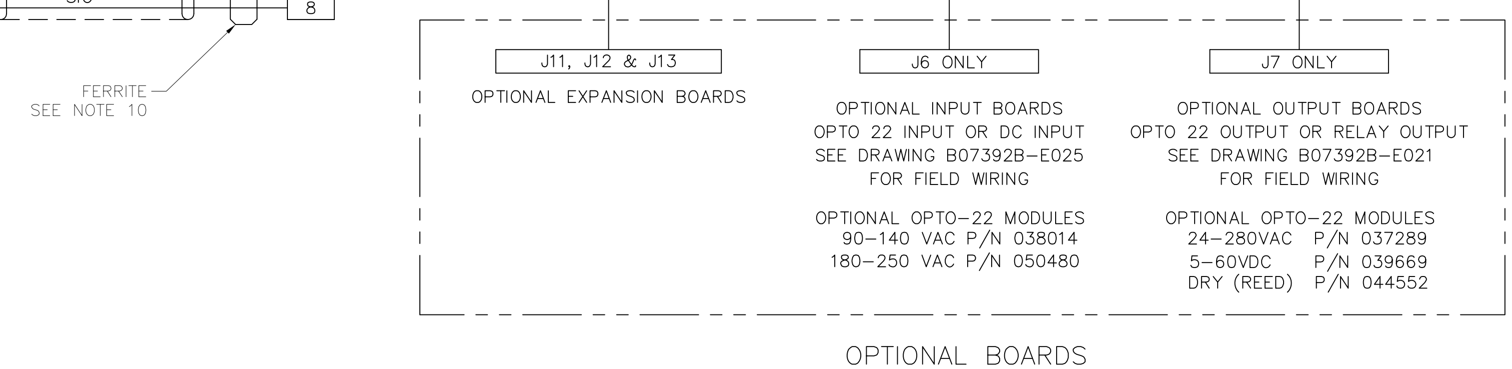
FIELD WIRING DIAGRAM
MICRO−TECH 9101

PART NO	DRAWING NUMBER	REV
	D 07392B−E020	C

Derived From

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC





NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

1. DO NOT ALTER LENGTH OF CABLE SUPPLIED WITH LOADCELL.
2. IF TOTAL CABLE LENGTH IS LESS THAN 200 FT (61 M), USE BELDEN 8407 (P/N 003727) OR EQUIVALENT, 4 CONDUCTOR, 16 AWG SHIELDED.

   IF TOTAL LENGTH IS 201-3,000 FT (61-915 M), USE BELDEN 9260 (P/N 011416) OR EQUIVALENT, 6 CONDUCTOR, 20 AWG SHIELDED. SET JUMPERS ON MOTHER BOARD FOR REMOTE SENSE - PIN 2-3. (J14 & J15 FOR A/D CHANNEL #1)
3. SPEED SENSOR AND 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).

   SPEED SENSOR (3 WIRE): USE BELDEN 8772 (P/N 002346) OR EQUIVALENT, 3 CONDUCTOR, 20 AWG, SHIELDED, MAXIMUM TOTAL CABLE RUN IS 200 FT (61 M).
4. DO NOT RUN SIGNAL, LOADCELL, OR SPEED SENSOR CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
5. 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
6. EARTH GROUND ALL ELECTRICAL ENCLOSURES.
7. 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.
8. 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.
9. SELECTION OF SERIAL COMMUNICATION (RS-232 OR RS-485) IS DETERMINED BY COMM JUMPER OPTIONS. REFER TO OPERATING & SERVICE MANUAL FOR CONFIGURATION INSTRUCTIONS.
10. USE FERRITE SUPPLIED WITH THE MICRO-TECH. SHIELD WIRE DOES NOT GO THRU THE FERRITE.

MODEL 9201 BELT SCALE INTEGRATOR DIGITAL INPUTS AND OUTPUTS

REQUIRED DIGITAL INPUTS AND OUTPUTS
INPUT: NONE
OUTPUT: NONE

AVAILABLE DIGITAL INPUT AND OUTPUT ASSIGNMENT CHOICES
MOTHERBOARD TERMINAL BLOCK J29 - (INPUT #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)

CADD DATABASE: AUTOCAD

REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
A	3322		RELEASED	4/19/13	PEP	MFM

DO NOT SCALE DWG — SCALE
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES — JOB NO

TOLERANCE UNLESS	SPECIFIED	OTHERWISE
.X	± .1	± 3 mm
.X	± .06	± 1.5 mm
.XX	± .03	± .76 mm
.XXX	± .010	± .254 mm
FRACT.	± 1/16	± N/A
ANGLES	± 1/2°	± 1/2°

		DATE
ENG	PEP	11/7/12
DWN	PEP	11/7/12
CHK	MFM	11/7/12

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

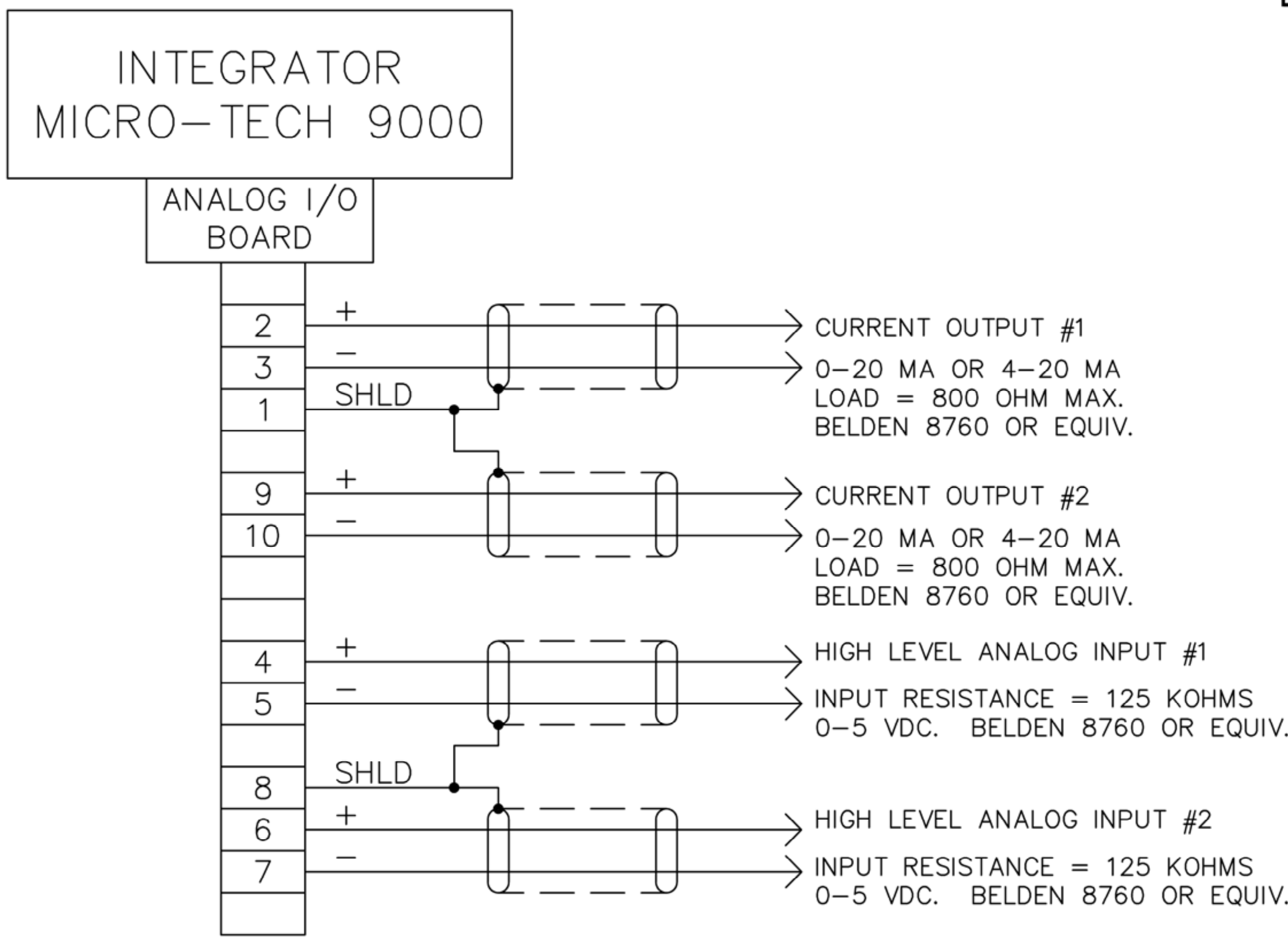
Thermo Fisher SCIENTIFIC

FIELD WIRING DIAGRAM
MICRO-TECH 9201

PART NO	DRAWING NUMBER	REV
	D 07392B-E034	A

Derived From

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC



NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

1. DO NOT RUN ANALOG SIGNAL CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
2. 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.
3. INSTALL IN ONE OF THE EXPANSION SLOTS J10 TO J13.
4. 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 JOB NO			
TOLERANCE UNLESS SPECIFIED OTHERWISE			ENG MFM	DATE 8/26/11
.X	± .1	± 3 mm	DWN MFM	DATE 8/28/11
.X	± .06	± 1.5 mm	CHK MFM	DATE 8/26/22
.XX	± .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				

ThermoFisher
SCIENTIFIC

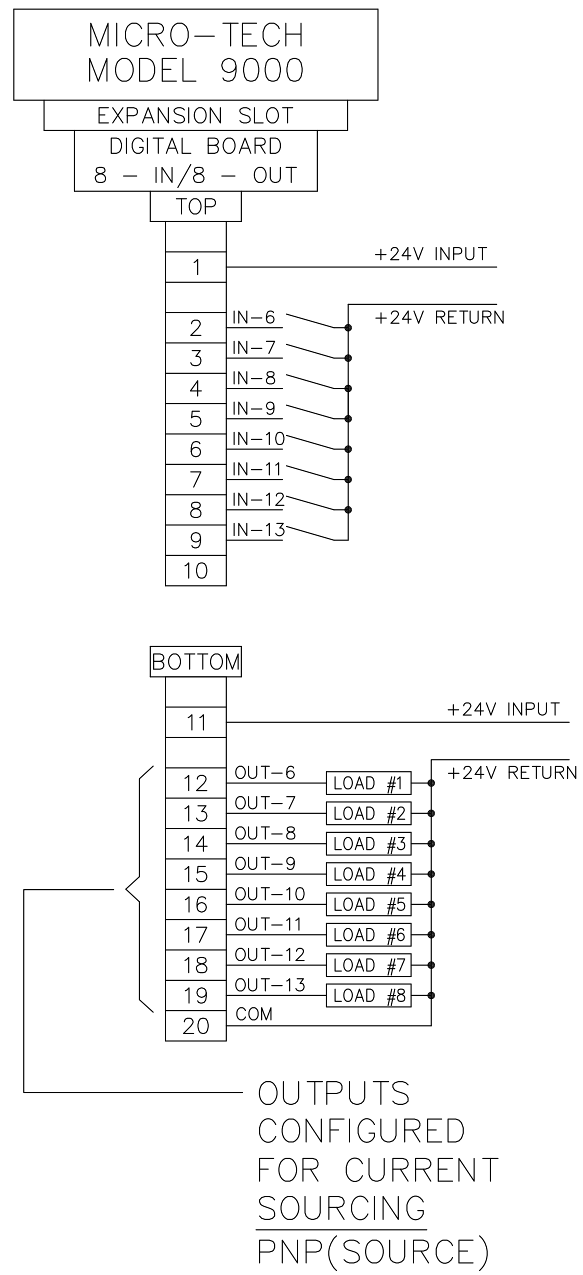
FIELD WIRING DIAGRAM
ANALOG INPUT/OUTPUT BOARD
MICRO–TECH 9000

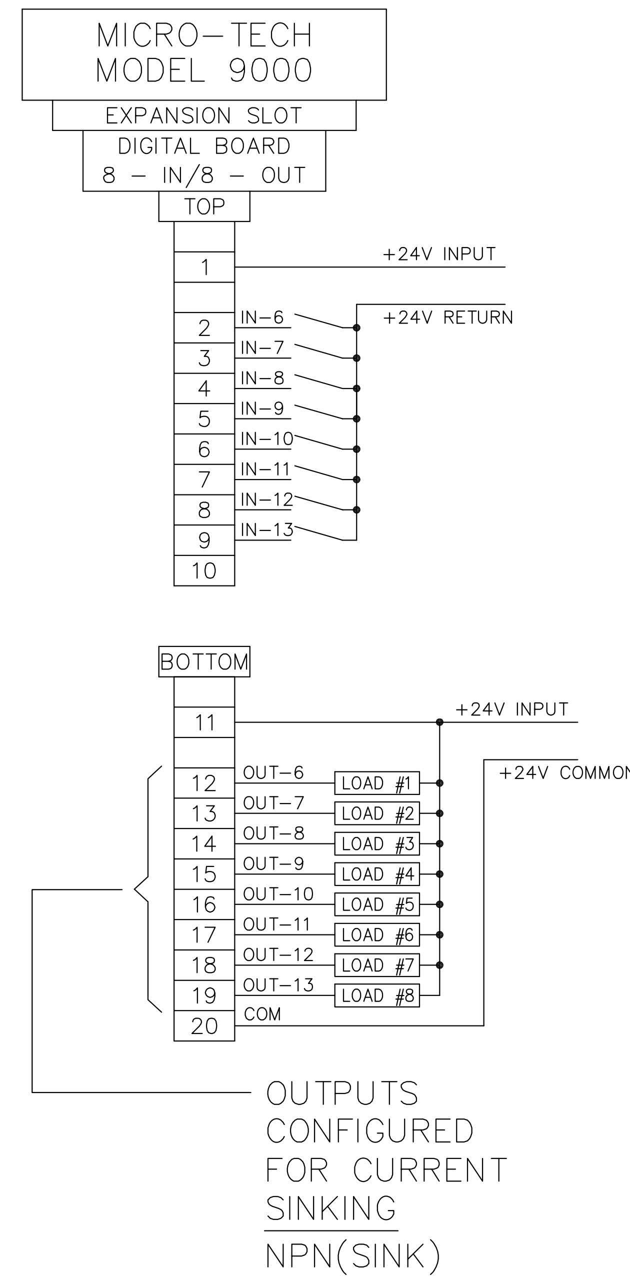
PART NO	DRAWING NUMBER	REV
	B07392B–E003	A

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

Derived From C07361B–E003

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC





NOTES: ***READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM***

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.
2. INSTALL IN ONE OF THE MOTHERBOARD 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
.X	± .1	± 3 mm
.X	± .06	±1.5 mm
.XX	± .03	±.76 mm
.XXX	± .010	±.254 mm
FRACT.	± 1/16	± N/A
ANGLES	± 1/2°	± 1/2°

		DATE
ENG	MFM	8/26/11
DWN	MFM	8/26/11
CHK	MFM	8/26/11

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

Thermo Fisher SCIENTIFIC

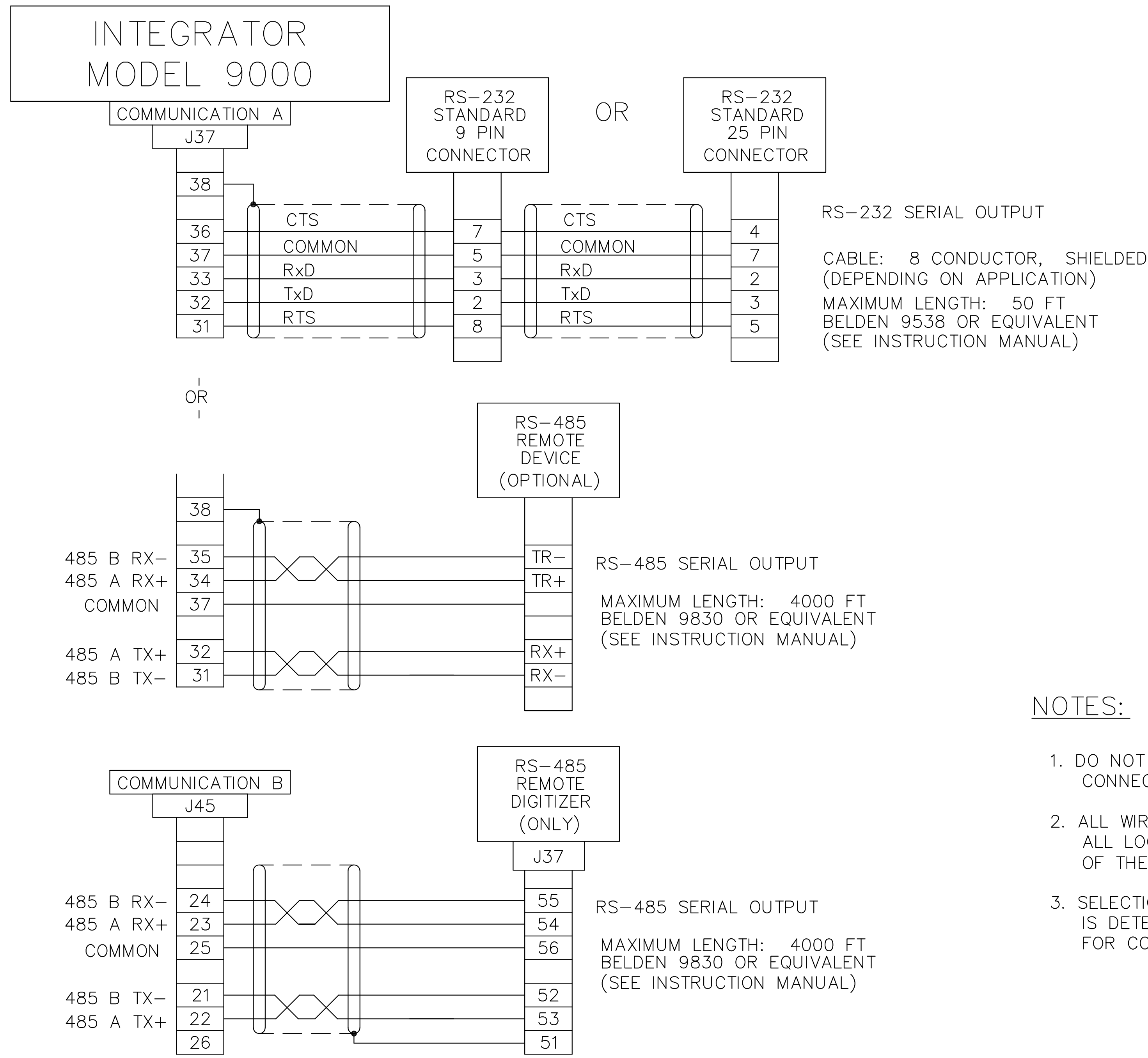
FIELD WIRING DIAGRAM
8-IN/8-OUT DIGITAL BOARD
MICRO-TECH 9000

PART NO	DRAWING NUMBER	REV
	C 07392B-E005	B

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

Derived From 07361B-E005

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC



NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

1. DO NOT RUN COMMUNICATION WIRING IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
2. 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.
3. 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 REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES	SCALE N/A		
	JOB NO		
TOLERANCE UNLESS SPECIFIED OTHERWISE DIMENSIONS ARE IN INCHES AND [mm] X.X [X] ± .06 ± 1.5 mm X.XX [X.X] ± .03 ± .8 mm X.XXX [X.XX] ± .01 ± .3 mm FRACT. ± 1/16 ± N/A ANGLES ± 1/2° ± 1/2°	ENG MFM	DATE 8/26/11	
	DWN RAE	DATE 8/26/11	
	CHK MFM	DATE 8/26/11	
NEXT ASS'Y			
CUST ORDER NO			
CUSTOMER LOCATION			
USER LOCATION			

ThermoFisher SCIENTIFIC

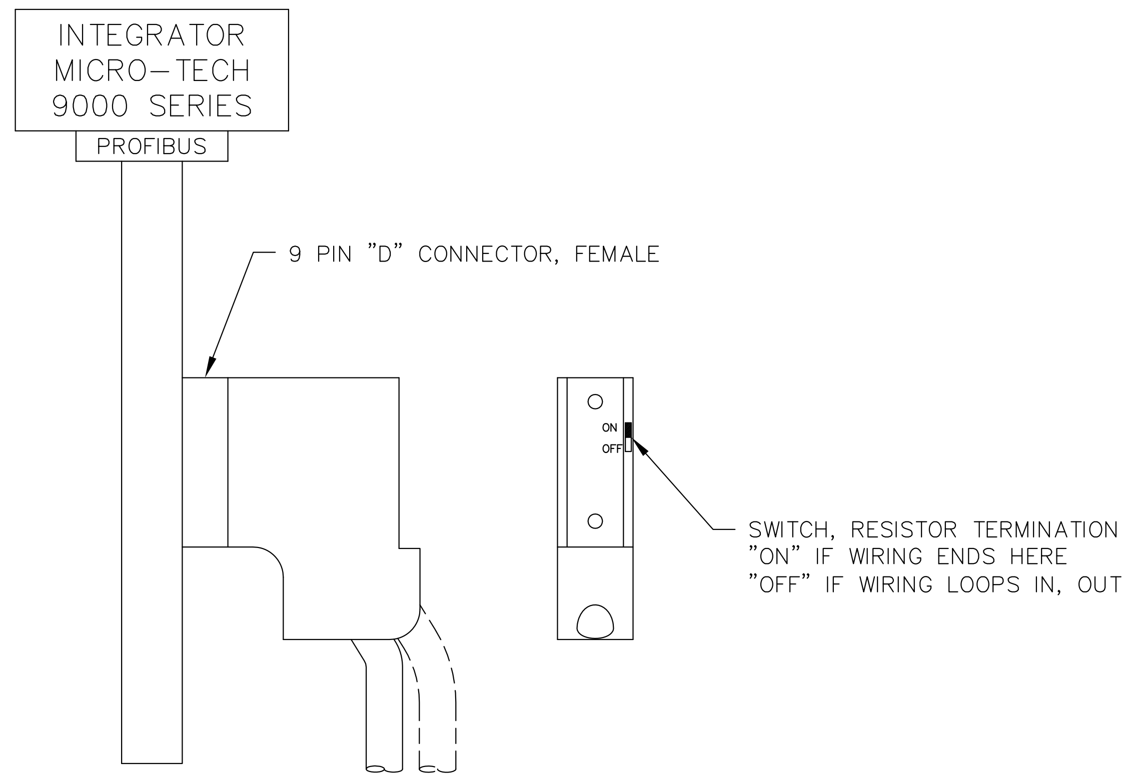
FIELD WIRING DIAGRAM
SERIAL COMMUNICATION
MICRO-TECH 9000

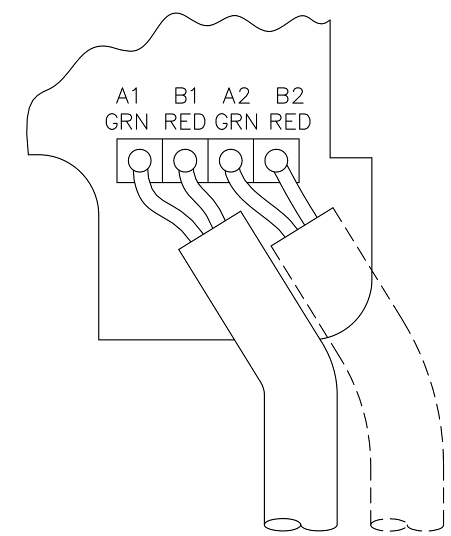
PART NO	DRAWING NUMBER	REV
	C 07392B-E008	C

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

Derived From

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





NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

1. DO NOT RUN PROFIBUS CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
2. 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.
3. CONNECT SHIELDS ONLY AS SHOWN. CABLE TYPE: SIEMENS 6XV1830-OAH10
4. 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
.X	±	.1	± 3 mm
.X	±	.06	±1.5 mm
.XX	±	.03	±.76 mm
.XXX	±	.010	±.254 mm
FRACT.	±	1/16	± N/A
ANGLES	±	1/2°	± 1/2°

ENG	MFM	DATE 8/26/11
DWN	MFM	DATE 8/26/11
CHK	MFM	DATE 8/26/11

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

Thermo Fisher SCIENTIFIC

FIELD WIRING DIAGRAM
SIEMENS PROFIBUS BOARD
MICRO-TECH 9000

PART NO	DRAWING NUMBER	REV
	C 07392B-E011	A

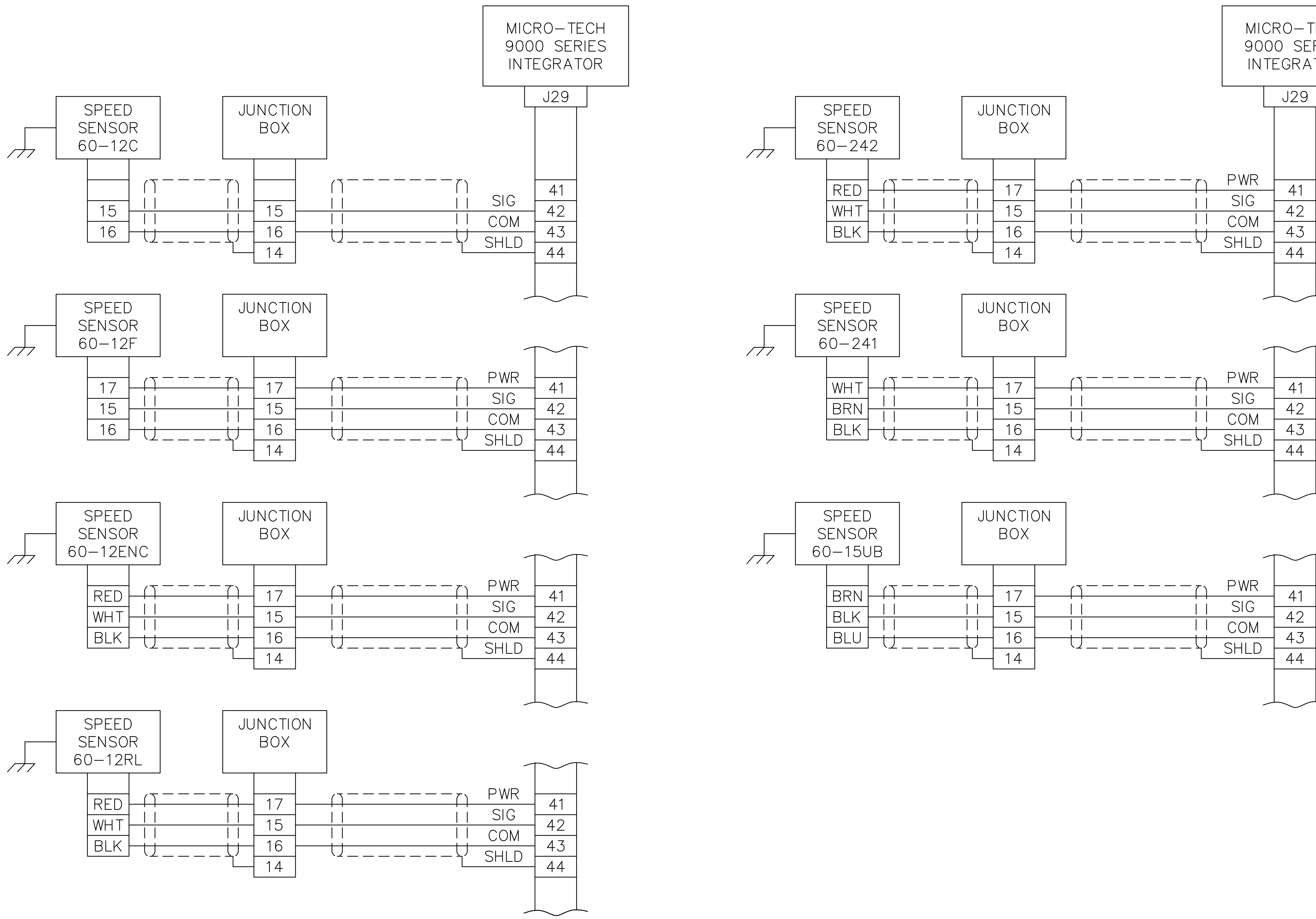
REV	ECO NO	MICRO	DESCRIPTION	DATE	BY / APPD
A	2959		RELEASED	6/6/12	PEP / MFM

Derived From C07361B-E011

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC

⚠ WARNING

INCORRECT WIRING WILL PERMANENTLY DAMAGE INSTRUMENT & VOID WARRANTY



NOTES:

1. 2 WIRE SPEED SENSOR: 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).

   3 WIRE SPEED SENSOR: USE BELDEN 8772 (P/N 002346) OR EQUIVALENT, 3 CONDUCTOR, 20 AWG, SHIELDED, MAXIMUM TOTAL CABLE RUN IS 200 FT (61 M).

2. REFER TO 60-12C WIRING FOR 61-12C SPEED SENSORS.

CADD DATABASE: AUTOCAD

REV	ECO NO	MICRO	DESCRIPTION	DATE	BY / APPD
C	3044		CORRECTED 60-15UB WIRE COLORS	2/28/13	PEP / KIM
B	2985		ADDED NOTE AND WARNING FOR 60-12F WIRING	1/10/12	KIM / KIM
A	2959		RELEASED	6/6/12	KIM / MFM

DO NOT SCALE DWG — REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES

SCALE

JOB NO

TOLERANCE UNLESS SPECIFIED OTHERWISE			
.X	±	.1	± 3 mm
.XX	±	.06	±1.5 mm
.XX	±	.03	±.76 mm
.XXX	±	.010	±.254 mm
FRACT.	±	1/16	± N/A
ANGLES	±	1/2°	± 1/2°

		DATE
ENG	MFM	9/14/11
DWN	KIM	9/14/11
CHK	MFM	6/6/12

NEXT ASS'Y

CUST ORDER NO

CUSTOMER LOCATION

USER LOCATION

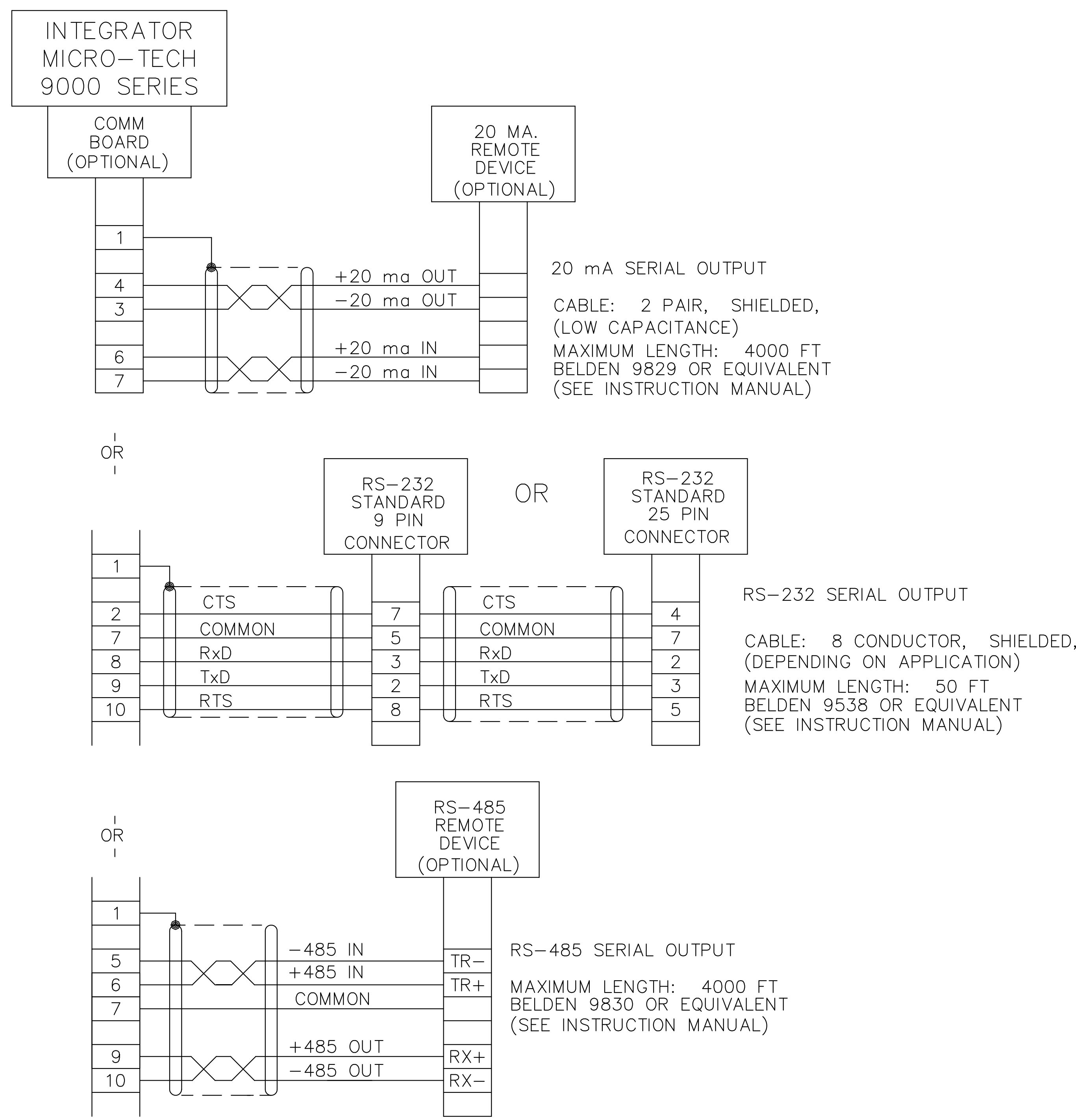
Thermo Fisher SCIENTIFIC

FIELD WIRING DIAGRAM
SPEED SENSORS
MICRO-TECH 9000

PART NO	DRAWING NUMBER	REV
	C 07392B-E016	C

Derived From

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC



CADD DATABASE: AUTOCAD

DO NOT SCALE DWG
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES

SCALE N/A
JOB NO

UNLESS SPECIFIED	TOLERANCE	OTHERWISE
.X	± .1	± 3 mm
.XX	± .06	± 1.5 mm
.XX	± .03	± .76 mm
.XXX	± .010	± .254 mm
FRACT.	± 1/16	± N/A
ANGLES	± 1/2°	± 1/2°

ENG	MFM	DATE 8/26/11
DWN	MFM	DATE 8/26/11
CHK	MFM	DATE 8/26/11

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

ThermoFisher SCIENTIFIC

FIELD WIRING DRAWING
COMMUNICATION BOARD
MICRO-TECH 9000

PART NO	DRAWING NUMBER	REV
	C 07392B-E017	A

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

Derived From C07361B-Y001_12

6 5 4 3 2 1

D C B A

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC

NOTES: READ ALL INSTRUCTIONS BEFORE WIRING SYSTEM

1. DO NOT ALTER LENGTH OF CABLE SUPPLIED WITH LOADCELL.
2. 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.
3. 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.

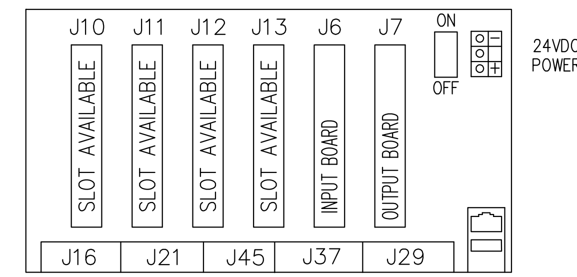
   SPEED SENSOR 60–12F – USE BELDEN 8772 OR EQUIVALENT, 3 CONDUCTOR, 20 AWG, SHIELDED. MAXIMUM DISTANCE IS 200 FEET.
4. DO NOT RUN SIGNAL, LOADCELL, OR SPEED SENSOR CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
5. INPUT POWER REQUIREMENTS

   FIELD MOUNT 100 TO 240 VAC, 50–60HZ, 1/2 AMP

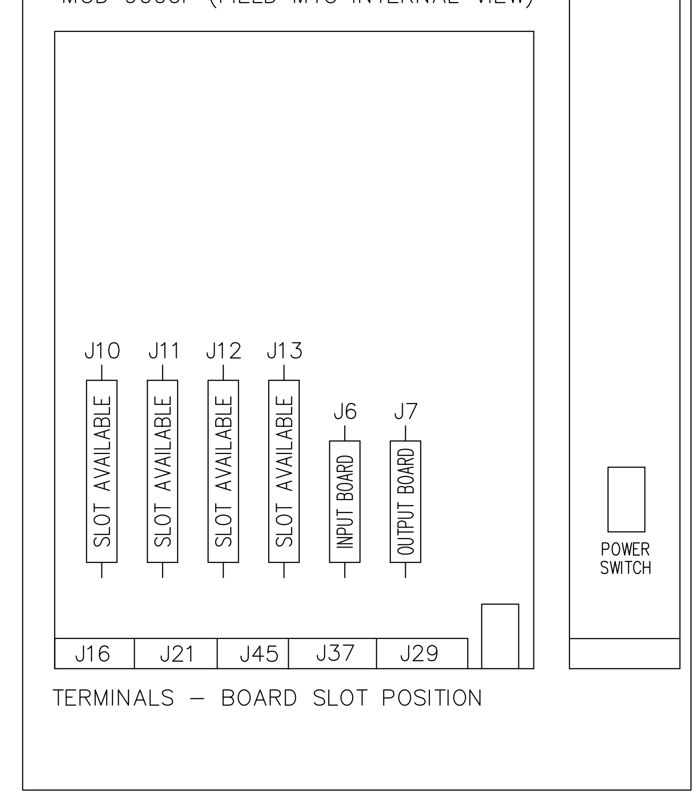
   PANEL MOUNT 24VDC, +10%, –15% (USER SUPPLIED), (50VA MAXIMUM LOAD)
6. EARTH GROUND ALL ELECTRICAL ENCLOSURES.
7. ALL WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES. ALL WIRING, EXCEPT AS NOTED, IS THE RESPONSIBILITY OF THE CUSTOMER. FOR INPUT POWER USE 14 AWG STRANDED WIRE.
8. CONNECT SHIELDS ONLY AS SHOWN.

   CABLE TYPE: BELDEN 8760 OR EQUIVALENT.
9. 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)



MOD 9000F (FIELD MTG INTERNAL VIEW)



TERMINALS – BOARD SLOT POSITION

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
.X	± .06	± 1.5 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°		
NEXT ASS'Y				
CUST ORDER NO				
CUSTOMER LOCATION				
USER LOCATION				

ThermoFisher SCIENTIFIC

FIELD WIRING DIAGRAM
NOTES
MICRO–TECH 9000

PART NO	DRAWING NUMBER	REV
	C 07392B–E018	B

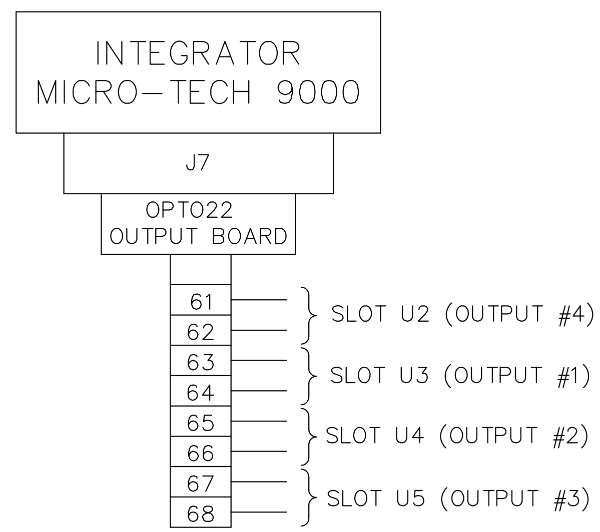
REV	ECO NO	MICRO	DESCRIPTION	DATE	BY	APPD
B	3013		CORRECTED FIELD MNT VOLTS AND FREQUENCY	9/21/12	PEP	TMN
A	2959		RELEASED	6/6/12	PEP	MFM

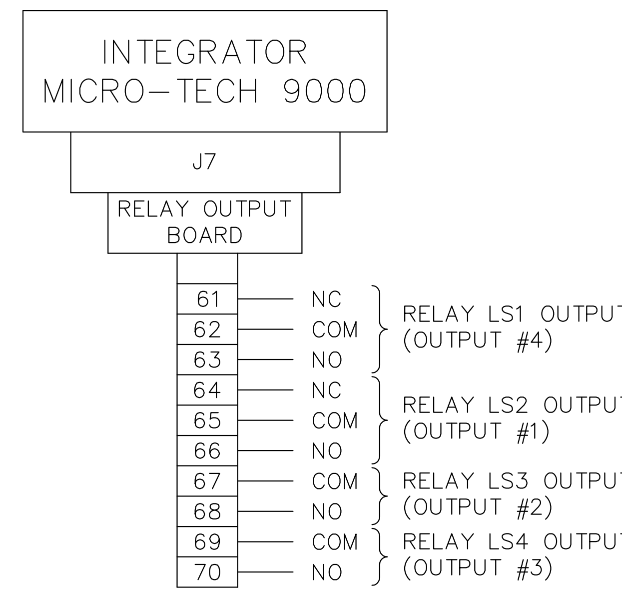
Derived From D07361B–Y001_01

6 5 4 3 2 1

D C B A

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC





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

1. DO NOT RUN SIGNAL, LOADCELL OR SPEED SENSOR CABLES IN SAME CONDUIT AS ALARM WIRING.
2. 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.
3. OUTPUT FUNCTIONS ASSIGNED BY USER, SEE O & S MANUAL.
4. INSTALL IN SLOT J7.
5. USE UL 1015 WIRE, 16 AWG [1 SQ.mm] OR SMALLER.
6. 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

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

DO NOT SCALE DWG
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES
SCALE N/A
JOB NO

TOLERANCE UNLESS SPECIFIED OTHERWISE			
X	± .1	± 3 mm	
.X	± .06	± 1.5 mm	
.XX	± .03	± .76 mm	
.XXX	± .010	± .254 mm	
FRACT.	± 1/16	± N/A	
ANGLES	± 1/2°	± 1/2°	

ENG	MFM	DATE 8/26/11
DWN	MFM	DATE 8/26/11
CHK	MFM	DATE 8/26/11

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

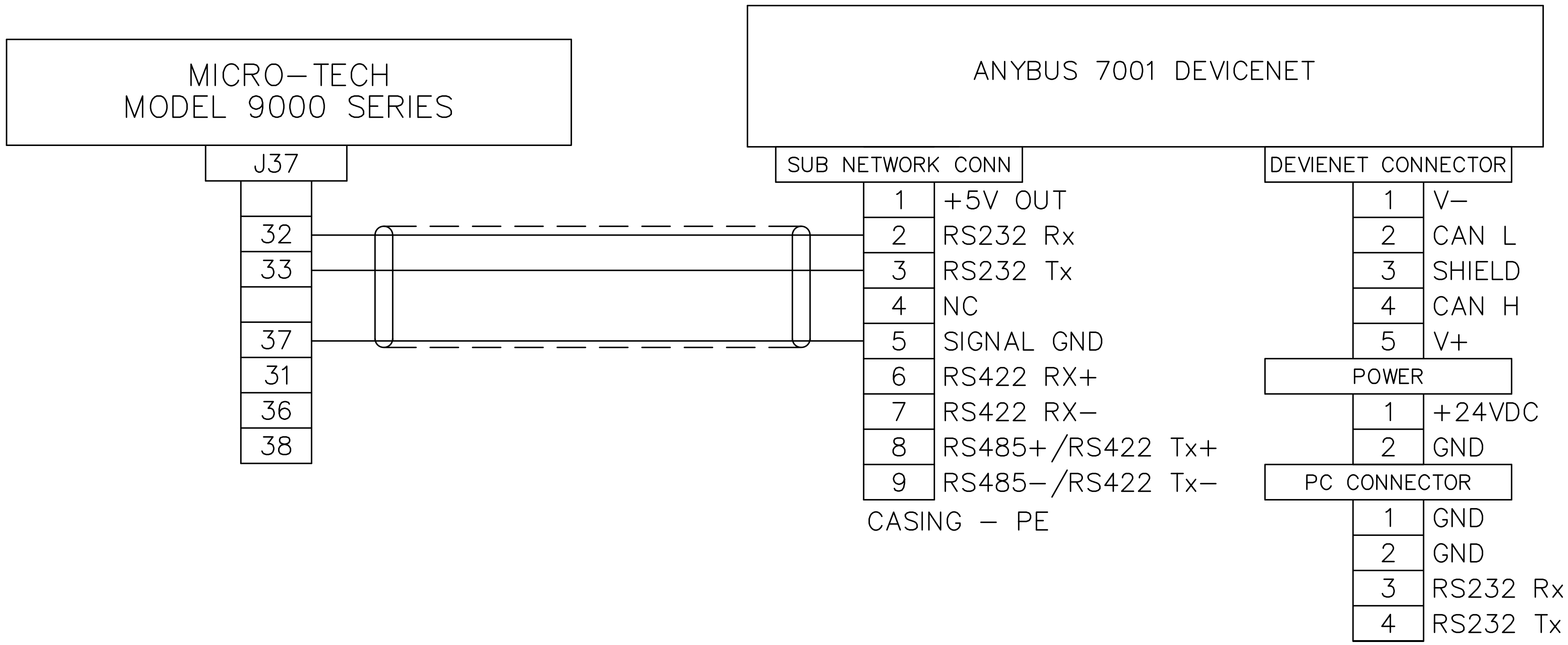
Thermo Fisher SCIENTIFIC

FIELD WIRING DIAGRAM
DIGITAL OUTPUT BOARDS
MICRO-TECH 9000

PART NO	DRAWING NUMBER	REV
	C 07392B-E021	B

Derived From B07361B-Y001_06

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC



CADD DATABASE: AUTOCAD

DO NOT SCALE DWG
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES

SCALE N/A

JOB NO

TOLERANCE UNLESS SPECIFIED		OTHERWISE
X	± .1	± 3 mm
.X	± .06	± 1.5 mm
.XX	± .03	± .76 mm
.XXX	± .010	± .254 mm
FRACT.	± 1/16	± N/A
ANGLES	± 1/2°	± 1/2°

		DATE
ENG	MFM	4/10/12
DWN	RAE	4/10/12
CHK	MFM	4/10/12

NEXT ASS'Y

CUST ORDER NO

CUSTOMER LOCATION

USER LOCATION

ThermoFisher SCIENTIFIC

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

PART NO	DRAWING NUMBER	REV
	B07392B-E022	A

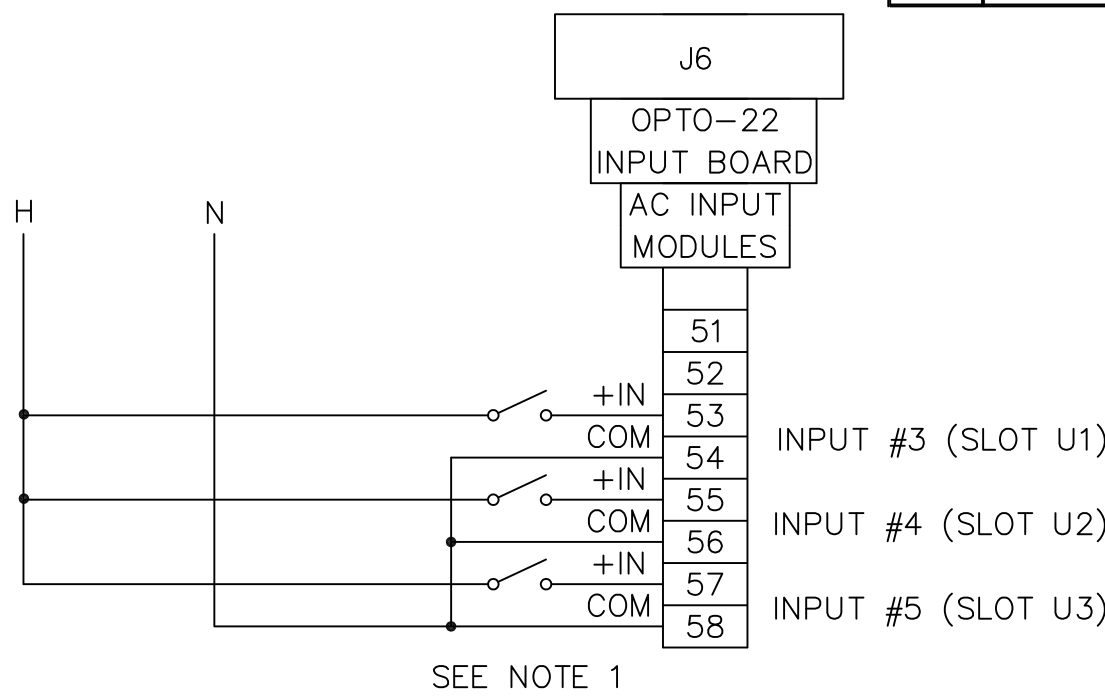
REV	ECO NO	MICRO	DESCRIPTION	DATE	BY / APPD
A	2959		RELEASED	6/6/12	RAE / MFM

Derived From B07361B-Y001 13

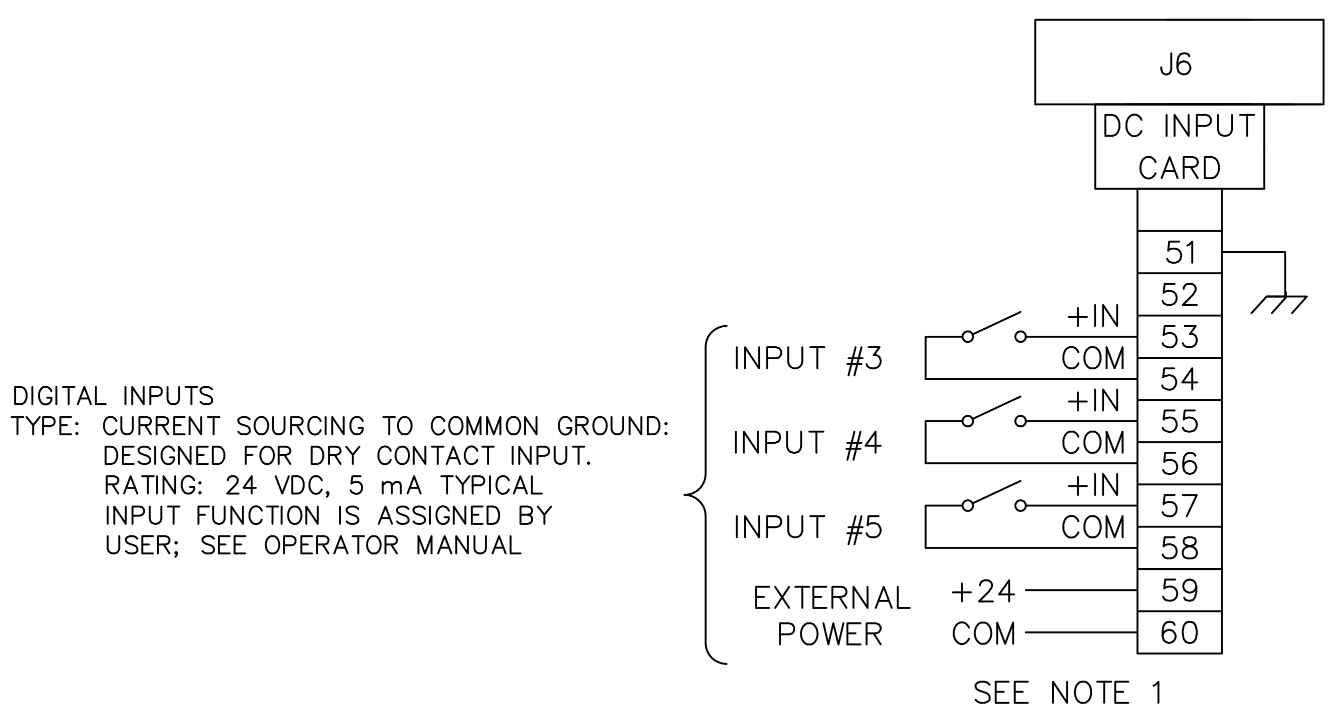
4 3 2 1

B A

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC



OR



NOTES:
1. USE UL 1015 WIRE, 16AWG [1 SQ.mm] OR SMALLER.
2. 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
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES

SCALE N/A
JOB NO

TOLERANCE UNLESS	SPECIFIED	OTHERWISE
.X	± .1	± 3 mm
.X	± .06	± 1.5 mm
.XX	± .03	± .76 mm
.XXX	± .010	± .254 mm
FRACT.	± 1/16	± N/A
ANGLES	± 1/2°	± 1/2°

ENG	MFM	DATE 8/26/11
DWN	MFM	DATE 8/26/11
CHK	MFM	DATE 8/26/11

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

ThermoFisher SCIENTIFIC

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

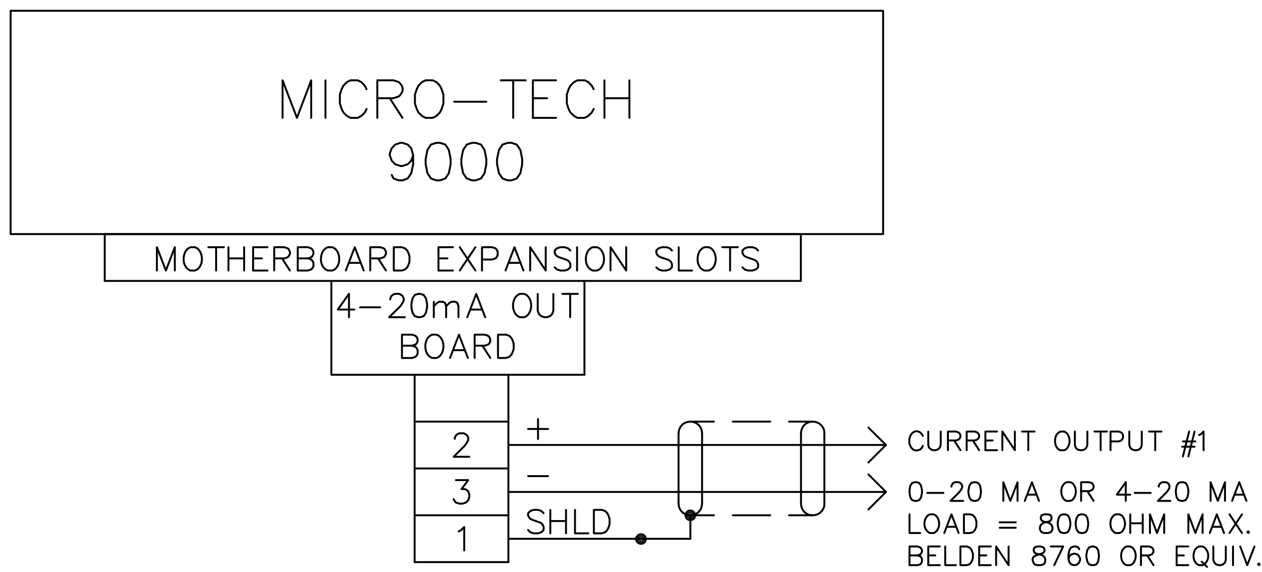
PART NO	DRAWING NUMBER	REV
	B07392B-E025	B

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

B A 4 3 2 1

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC



NOTES:

1. DO NOT RUN ANALOG SIGNAL CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.
2. 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.
3. INSTALL IN ONE OF THE MOTHERBOARD EXPANSION SLOTS J10-J13.
4. CABLE TYPE: USE BELDEN 8760 OR EQUIVALENT

CADD DATABASE: AUTOCAD

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

DO NOT SCALE DWG
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES

SCALE N/A
JOB NO

TOLERANCE UNLESS SPECIFIED OTHERWISE

.X	± .1	± 3 mm
.X	± .06	± 1.5 mm
.XX	± .03	± .76 mm
.XXX	± .010	± .254 mm
FRACT.	± 1/16	± N/A
ANGLES	± 1/2°	± 1/2°

		DATE
ENG	MFM	8/26/11
DWN	MFM	8/26/11
CHK	MFM	8/26/11

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

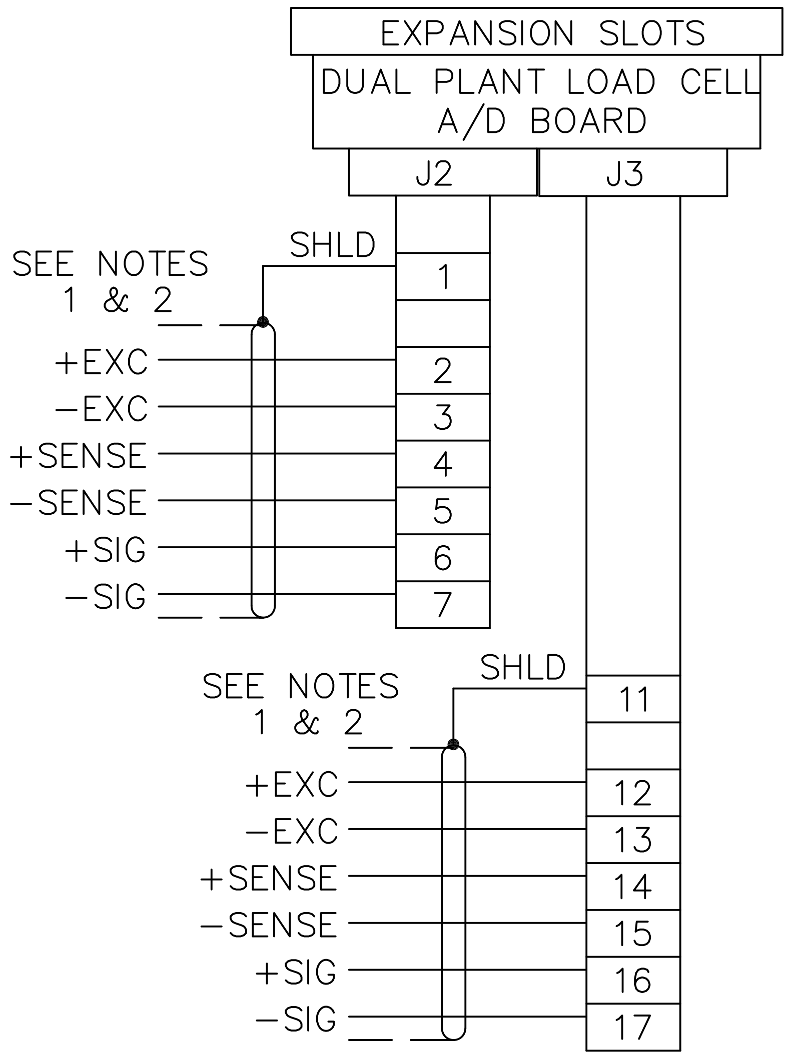
Thermo Fisher SCIENTIFIC

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

PART NO	DRAWING NUMBER	REV
	B07392B-E026	B

Derived From B07361B-E006

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC



NOTES:

1. USE BELDEN 8407 (P/N 003727) OR EQUIVALENT, 4 CONDUCTOR, 16 AWG, SHIELDED, IF TOTAL CABLE RUN IS LESS THAN 200 FT (61 M). USE BELDEN 9260 (P/N 011416) OR EQUIVALENT, 6 CONDUCTOR, 20 AWG, SHIELDED, IF TOTAL CABLE IS 200 TO 3,000 FT (61–915 M). SENSE CONNECTIONS ARE REQUIRED IF TOTAL LENGTH IS OVER 200 FEET. INSTALL JUMPERS IN JUNCTION BOX AS SHOWN,
OR IF USING 4 CONDUCTOR CABLE JUMPER TB1 2 TO 4 AND TB1 3 TO 5.
OR IF USING 4 CONDUCTOR CABLE JUMPER TB2 12 TO 14 AND TB2 13 TO 15.

2. DO NOT RUN SIGNAL, LOADCELL, OR SPEED SENSOR CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES

SCALE N/A
JOB NO

TOLERANCE UNLESS SPECIFIED OTHERWISE		
.X	± .1	± 3 mm
.X	± .06	± 1.5 mm
.XX	± .03	± .76 mm
.XXX	± .010	± .254 mm
FRACT.	± 1/16	± N/A
ANGLES	± 1/2°	± 1/2°

		DATE
ENG	MFM	8/26/11
DWN	MFM	8/26/11
CHK	MFM	8/26/11

NEXT ASS'Y
CUST ORDER NO
CUSTOMER LOCATION
USER LOCATION

ThermoFisher SCIENTIFIC

FIELD WIRING DIAGRAM
DUAL PLANT LOAD CELL A/D BOARD
MICRO–TECH 9000

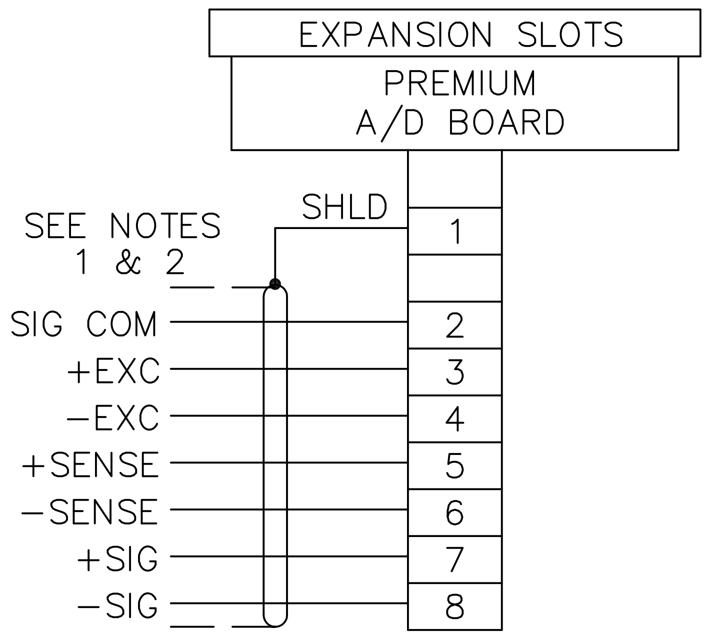
PART NO	DRAWING NUMBER	REV
	B07392B–E027	A

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

Derived From B07361B–E006

B A 4 3 2 1

ITEM	PART NO	QTY	DESCRIPTION	DWG NO/SPEC



NOTES:

1. USE BELDEN 8407 (P/N 003727) OR EQUIVALENT, 4 CONDUCTOR, 16 AWG, SHIELDED, IF TOTAL CABLE RUN IS LESS THAN 200 FT (61 M). USE BELDEN 9260 (P/N 011416) OR EQUIVALENT, 6 CONDUCTOR, 20 AWG, SHIELDED, IF TOTAL CABLE IS 200 TO 3,000 FT (61–915 M). SENSE CONNECTIONS ARE REQUIRED IF TOTAL LENGTH IS OVER 200 FEET. INSTALL JUMPERS IN JUNCTION BOX AS SHOWN, OR IF USING 4 CONDUCTOR CABLE JUMPER J9 3 TO 5 AND J9 4 TO 6.

2. DO NOT RUN SIGNAL, LOADCELL, OR SPEED SENSOR CABLES IN SAME CONDUIT AS POWER WIRING. CONNECT SHIELDS ONLY WHERE SHOWN.

B

CADD DATABASE: AUTOCAD

DO NOT SCALE DWG
REMOVE ALL BURRS AND UNNECESSARY SHARP EDGES

SCALE N/A

JOB NO

TOLERANCE UNLESS SPECIFIED		OTHERWISE
X	± .1	± 3 mm
.X	± .06	± 1.5 mm
.XX	± .03	± .76 mm
.XXX	± .010	± .254 mm
FRACT.	± 1/16	± N/A
ANGLES	± 1/2°	± 1/2°

		DATE
ENG	MFM	8/26/11
DWN	MFM	8/26/11
CHK	MFM	8/26/11

NEXT ASS'Y

CUST ORDER NO

CUSTOMER LOCATION

USER LOCATION

ThermoFisher SCIENTIFIC

FIELD WIRING DIAGRAM
PREMIUM A/D BOARD
MICRO–TECH 9000

A

PART NO	DRAWING NUMBER	REV
	B07392B–E028	A

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

Derived From B07361B–E006

4 3 2 1