Micro-Tech™ 3106
Impact Flowmeter Integrator
Operations & Service Manual
Micro-Tech 3106
Micro-Tech™ 3106 Impact Flow Meter Integrator

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Revision History

Revision A  March 2004  ECO 232  First Release
Revision B  March 2004  ECO  Added CSA/CE certification symbols. Added Appendix with engineering drawings. Indicated Analog Input/Output board type (B) is optional.
Revision C  October 2006  Technical Specification Correction (Fusing)
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About this Manual

This manual provides installation, operation, troubleshooting, and repair information for the Micro-Tech™ 3106 Impact Flow Meter Integrator manufactured by Thermo. The Integrator is a microcomputer driven instrument used for deriving rate and quantity of flowing material from signals representing the impact force (lbs.) of moving material.

By suitable processing of this input signal, the Integrator delivers visible and electrical output representing the rate of material movement and visible and electrical output representing total amount of material which has passed through the flow meter.

For remote indicating, these options are available:
1. Remote totalization.
2. Remote flow rate - current or frequency.
3. Communications.
4. Field Bus
5. Many automatic and check functions are available to the operator for calibration and maintenance.

Who Should Use this Manual?

The Micro-Tech 3106 Manual is a learning resource and reference for anyone concerned with the operation of the Integrator.

Organization of the Manual

This manual is organized into 5 chapters and 3 appendices.

Chapter 1: Introduction - provides a functional overview of the system.

Chapter 2: Installation - provides the steps and instructions necessary to install the equipment

Chapter 3: Operations - provides information on the operation of the equipment.

Chapter 4: Maintenance and Troubleshooting – provides information on any maintenance of the equipment and troubleshooting if appropriate.

Chapter 5: Service, Repair, and Replacement Part - details the procedures and references for requesting service, repair, and replacement parts.

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Documentation Conventions

The following conventions are used in this manual to help easily identify certain types of information:

- *Italic* is used to introduce new terms and for emphasis.
- *Italic/blue* type is used for references to other sections of the manual and serve as links in electronic documents.
- The names of setup, calibration displays, menu displays, and variables are shown in **CAPITALS**.
- The names of keys are shown in **BOLD CAPITALS**.

**Note:** Provides information of special importance to the reader.

- ☪ This symbol indicates a **HINT** in the text that may be of value but not necessary for operation.

Safety Messages

Instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations.

Please read the safety information before performing any operation preceded by this symbol. ☢

There are two levels of safety messages: warnings and cautions. The distinction between the two is as follows:

<table>
<thead>
<tr>
<th>☢ WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to observe could result in death or serious injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>☢ CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to observe may cause minor injury or damage the equipment</td>
</tr>
</tbody>
</table>
General Precaution

Do not install, operate, or perform any maintenance procedures until you have read the safety precautions presented.

![WARNING]

Users must follow all applicable safety procedures related to this product. High voltages and high temperatures are present within the system enclosure during normal operation.

Do not attempt to defeat safety interlocks provided with this product. There are no user serviceable parts inside the system enclosure. This product must be serviced only by authorized service Personnel.

Failure to comply with these warnings can result in exposure to high voltages or high temperatures, which can cause personal injury.

---

![WARNING]

Failure to follow safe installation and servicing procedures could result in death or serious injury.

- Make sure only qualified personnel perform installation and maintenance procedures in accordance with the instructions in this manual.
- Allow only qualified electricians to open and work in the electronics cabinet, power supply cabinet, control cabinet, or switch boxes.
- Covers over the electronics and rotating parts must always remain in place during normal operation. Remove only for maintenance, with the machine’s power OFF. Replace all covers before resuming operation.
- During maintenance, a safety tag (not supplied by the factory) is to be displayed in the ON/OFF switch areas instructing others not to operate the unit (ANSI:B157.1).
**WARNING**

High voltage that may be present on leads could cause electrical shock.

- All switches must be OFF when checking input AC electrical connections, removing or inserting printed circuit boards, or attaching voltmeters to the system.
- Use extreme caution when testing in, on, or around the electronics cabinet, PC boards, or modules. There are voltages in excess of 115 V or 230 V in these areas.

**WARNING**

Use only the procedures and new parts specifically referenced in this manual to ensure specification performance and certification compliance. Unauthorized procedures or parts can render the instrument dangerous to life, limb, or property.

**WARNING**

This machine should not be operated at more than the production rate stated on your Equipment Specification sheet or used in applications other than those stated in the original order.

### How to Get Help

**WARNING**

Unless you are directed to do so by an authorized service representative of Thermo, you should not attempt to perform any troubleshooting or maintenance procedures that are not described in this manual.

Failure to comply with these warnings can result in exposure to high voltages or high temperatures, which can cause personal injury.
CSA Certification – Certificate Numbers 1506639 and 1428908

The ‘C’ and ‘US’ indicators adjacent to the CSA Mark signify that the product has been evaluated to the applicable CSA and ANSI/UL Standards, for use in Canada and the U.S., respectively. This ‘US’ indicator includes products eligible to bear the ‘NRTL’ indicator. NRTL, i.e. National Recognized Testing Laboratory, is a designation granted by the U.S. Occupational Safety and Health Administration (OSHA) to laboratories, which have been recognized to perform certification to U.S. Standards.

Occupational Safety and Health Act (OSHA)

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

Thermo Warranty

The seller agrees, represents, and warrants that the equipment delivered hereunder shall be free from defects in material and workmanship. Such warranty shall not apply to accessories, parts, or material purchased by the seller unless they are manufactured pursuant to seller's design, but shall apply to the workmanship incorporated in the installation of such items in the complete equipment. To the extent purchased parts or accessories are covered by the manufacturer's warranty, seller shall extend such warranty to buyer.

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

Said warranty shall not apply if the equipment shall not have been operated and maintained in accordance with seller's written instructions applicable to such equipment, or if such equipment shall have been repaired or altered or modified without seller's approval; provided, however, that the foregoing limitation of warranty insofar as it relates to repairs, alterations, or modifications, shall not be applicable to routine preventive and corrective maintenance which normally occur in the operation of the equipment.
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Purchaser agrees to underwrite the cost of any labor required for replacement; including time, travel, and living expenses of a Thermofield Service Engineer at the closest factory base.

**THERMO ELECTRON CORPORATION**

501 90™ AVE. NW
MINNEAPOLIS, MN  55433
PHONE:  (800) 227-8891
FAX:  (763) 783-2525

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Though the information provided herein is believed to be accurate, be advised that the information contained herein is not a guarantee for satisfactory results. Specifically, this information is neither a warranty nor guarantee, expressed or implied, regarding performance, merchantability, fitness, or any other matter with respect to the products, and recommendation for use of the product/process information in conflict with any patent. Please note that Thermo reserves the right to change and/or improve the product design and specifications without notice.
Chapter 1
Introduction

This chapter provides information pertaining to the Micro-Tech 3106 to include system components, equipment inspection, site preparation, and installation. The Micro-Tech 3106 is designed for application on impact flow meters with LVDT measurement.

1.1 Inspection and Unpacking

The Micro-Tech 3106 Integrator has been properly packaged for shipment and storage, when necessary. Inspect all packages for damage before opening, as oftentimes the carrier may be responsible for shipping damage.

1.2 Storage

The Micro-Tech 3106 Integrator can be safely stored, with cover, latches secured and hole plugs installed, between -40° to +158° F (-40° to +70° C). The units should be protected against moisture.

1.3 Application

The Micro-Tech 3106 Filed Mount Integrator (Figure 1-1) or Panel Mount Integrator (Figure 1-2) is a microcomputer driven instrument used for deriving rate and quantity of flowing material from signals representing the impact force (lbs) of moving material.

By suitable processing of this input signal, the Integrator delivers visible and electrical output representing the rate of material movement and visible and electrical output representing total amount of material which has passed through the flow meter.

Figure 1-1: Micro-Tech 3106 Field Mount
Figure 1-2: Micro-Tech 3106 Panel Mount

For remote indicating, these options are available:

- Remote totalization
- Remote flow rate – current or frequency
- Communications
- Filed Bus
- Provisions for 4 programmable inputs, 4 programmable outputs, and 1 fault output
- An optional I/O board can be added
- Many automatic and check functions are available to the operator for calibration and maintenance

1.4 Micro-Tech 3106 Standard Features

The Model 3106 has many hardware and software features necessary for continuous weighing and outputting totalized weight and rate information. The main features are listed below.

- Menu driven scroll entries on a four line display
- Five LED status indicators
- Visible and electrical outputs representing total amount of material that has passed through the impact flow meter
- Automatic zero and span calibration
- Auto zero tracking
• Several software options that may be turned on by keyboard entry or by installing optional plug-in PC boards
• Optically coupled digital inputs and outputs
• Alarms and failure detection
• Communication standards: RS232C, RS485 networking multidrop, 20 mA current loop passive
• Allen-Bradley DF1, Modbus RTU

1.5 Integrator General Description

The Micro-Tech 3106 Integrator has been designed for impact sensors and is capable of performing all of the necessary measuring and control 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 3106 is easy and is performed from the keypad on the front of the device. The setup parameters may be divided into the following categories:

• Measuring
• Monitoring
• Printing
• Communication

1.5.1 Measuring Functions

The Micro-Tech 3106 Integrator receives the force signal from the impact sensor and converts the force signal into a numeric value with very high accuracy and resolution (more than 2,000,000 counts at full scale).

Rate is calculated as decrement or increment of weight in time. Total is computed on three individual registers: total, reset total, operator total.

The Integrator can perform automatic zero and span calibrations.

Analog (current) output signals can be generated to transmit rate to other control devices.

Displayed variables and analog outputs can be smoothes via damping filters, individually programmable.
1.5.2 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:

- Alarms for high and low flow rate

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

- Hardware failure
- Alarm cumulative
- Shut down cumulative

1.5.3 Print Functions

Periodical and under command prints can be obtained by connecting a serial printer to the Comm output on the motherboard or an optional communication board. Time and date are permanently stored in the battery-backed memory. The entire set up of the instrument can also be printed out.

1.5.4 Communication Functions

There are two types of standard communication functions. Each is discussed 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 3106 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 communication protocol may be selected and accessed through the communication terminals on the motherboard.

- Field Bus I/O – Allen-Bradley RIO or Profibus-DP I/O, or DeviceNet 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 3106 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.
1.6 Functional Description

This section describes technically, how the Micro-Tech 3106 performs each particular duty.

1.6.1 Measuring Functions

1.6.1.1 Instantaneous Flow Rate Calculation

The impact force measured by the DE10/DE20 over time is calculated to obtain instantaneous flow rate. This is multiplied by a suitable constant to obtain the value in engineering units (kg/h, ton/h, etc.). An adjustable damping filter is provided separately for displayed rate and current outputs.

1.6.1.2 Flow Totalization

Three totalizing memories are provided:

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

1.6.1.3 Zero and Span Automatic Calibrations

The flow meter is first zeroed then spanned using material. Zero Calibration is done with all equipment such as screw conveyors, rotary airlock feeders, bucket elevators, dust collection, etc., in the area of the DE10/DE20 sensor on/running with no material flowing.

Span calibration must be done at maximum expected flow rate of the system. Because all materials behave differently when they strike and then rebound off the impact plate, the Span Calibration must be done using a ‘material test’. This test is done by running material through the flow meter for a period of time (at least 5 minutes). The longer the material test the better the result will be. All of the material should be pre-weighted or post-weighted on a high accuracy static scale to obtain the actual weight of the material.

1.6.1.4 Auto Zero Tracking (AZT)

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

1. Waits for defined time until the next Zero Test (a solid “Z” displays)
2. Execution of a zero test (the “Z” flashes)
3. Performs automatic zero for the defined time
4. Continuously repeats above zero correction as long as feed rate remains below AZT preset value
The Zero Tracking function is limited to a maximum value of “MAX DEVIATION’ that is set as a percentage in the CAL DATA scroll.

If the new zero that was calculated by the auto-zero tracking function exceeds that value, an alarm is generated, and the new correction is not installed. The reference value for zero is set every time an Auto Zero or Manual Zero is performed.

1.6.2 Current Output Signals

The standard Micro-Tech 3106 is equipped with one current output signal (0-20mA/4-20mA) on the motherboard. An optional dual channel current output/analog input board is 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:

- Flow rate
- Off

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

1.6.3 Batch Control (Optional)

The Integrator, while calculating rate and totalization, may also do a batch control.

In this case, the Integrator operates during normal flow rate and activates the batch end output when the required quantity (set-point) is reached. A preset value may be entered to switch to a lower feed rate. When the totalized value equals the value of the quantity set minus preset, the controller switches to a lower rate set point (low rate set point) thus reducing the flow rate for a fine batching end.

The unit also allows the pre-ACT correction (or compensation of material before the flow meter) whose value has to be entered manually. The pre-feeder is stopped when the totalized value equals the batch set value minus the overflow correction value.

The batch START/STOP commands are provided either by the keypad or external signals (manual pushbutton or relay contact). The batch stop signal is used only as emergency to abort the batch cycle before its end. A delay time is provided between start command and actual start to compensate the difference in transport distance to the mixing point when several feeders are installed.
1.6.4 Indication System

The Integrator is equipped with an indication system. Indication can be in the form of one or all of the following:

- Status Indications
- Process Alarms
- Programming Errors
- Equipment Failures

If any of the controlled conditions takes place, it is signaled by the lighting of a LED on the front and by a digital output. Using the keyboard, you can view all the existing alarms and acknowledge them.

1.6.4.1 Status Indication

- Integrator ready to run material:
  - “Ready” LED is on
  - Power is on
  - No calibration running
  - Flow meter is calibrated
  - No active alarm defined to shutdown

1.6.4.2 Process Alarms

The following process conditions are monitored and may produce an alarm or shutdown. A delay time after the abnormal condition is detected may be set for each individual alarm.

- High flow rate
- Low flow rate
- Overflow totalizer
- AZT over limit
- Batch Deviation (if Batch control is installed)

Each alarm can be defined as:

- NONE – Ignore abnormal condition
- ALARM - Warning, pre-feeder/process continues to run
- SHUTDOWN – Trip, pre-feeder/process stops, “READY” LED is off
1.6.4.3 Programming Errors

Programming errors may occur only during programming or calibration as a consequence of entering data above or below the operating range of the Integrator. If data above or below the limits are entered, the system displays a warning message and the minimum/maximum limits are shown.

1.6.4.4 Equipment Failures

The unit has an internal diagnostic system which detects the following instrument failures:

- Clock calendar circuit failure
- Bad weight signal
- RAM failure
- ROM failure
- Power on
- Default constants installed at power on
- Power down during calibration
- Calibration time expired
- General-purpose external alarms
- Communication error
- BCD error
- Mathematical error

1.6.5 Print Function

Available print functions are:

- Print on command
- Print at pre-selected times of day (up to four)
- Print at pre-selected intervals of time
- Print set-up
- Print alarm
1.7 Symbols

Symbols used in this manual are described in Table 1-1.

Table 1-1: Symbol Identification

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Symbol]</td>
<td>ALTERNATING CURRENT</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>FRAME (GROUND) TERMINAL</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>EARTH (GROUND) TERMINAL</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>PROTECTIVE CONDUCTOR TERMINAL</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>CAUTION, RISK OF ELECTRIC SHOCK</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>CAUTION (REFER TO ACCOMPANYING DOCUMENTS)</td>
</tr>
</tbody>
</table>
1.8 Specifications

This section lists the specifications for the Micro-Tech 3106.

Field Mount

NEMA 4X (IP65), dust and watertight
Size: 17 x 13 x 7 inches
Material: Fiberglass reinforced polyester
2 position-mounting feet
Steel Chassis Providing EMI/RFI shielding

Panel Mount

Size: 12 x 4 x 7.5 inches
Material: Chromated 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: -40° to +158° F (-40° to +70° C)
Operating: +14° to +122° F (-10° to +50°C)

Relative Humidity
Up to 95%, non-condensing

Pollution Degree
2

Altitude
Up to 6,561 ft (2000 m)
Power Requirements

**Voltage Range**
Nominal voltage +10%, -15%

**Nominal Voltage**
115/230 VAC, selectable

**Nominal Frequency**
50/60 Hz

**Fusing**
400mA Slo-Blo, 115 VAC, Type T
200mA Slo-Blo, 230 VAC, Type T

**Power Consumption**
50 VA max

**Maximum Non-Destructive Input Voltage**
150/300 VAC for 1 minute

**Over Voltage Category**
Category II

**DC Power Supply**

**Auxiliary Power Supply Output (Alarm Contacts, etc.)**

- Output Voltage: 24 VDC
- Isolation: Yes – 500 volts
- Output Ripple: 1.0 V peak to peak typical
- Output Current: 600 mA Maximum

**Short Circuit Protection**

**AC Power Supply**

- EMI/RFI Protection
- 115/230 VAC, selectable (UL, CSA, VDE approved)
- 50/60 Hz transformer

**Force Sensor**

LVDT (Linear Variable Differential Transformer) with preamplifier. The preamplifier is excited by an 11 – 15 VDC signal provided by the Integrator.

The LVDT/preamplifier combination returns a frequency in the range of 100 to 2500 Hz

Maximum distance between the LVDT and the Integrator is 1000 feet (305 m)
Current Output

1 current output
Output Range: User selectable 0 – 20 mA or 4 – 20 mA, representing 0 to 100% variable.
Resistive Load: 800-ohm max, Loop

Analog I/O Board (B)

(2) High level inputs
Type: Differential voltage input (0 – 20 mA or 4 – 20 mA with internal resistor, jumper selectable)
Range: 0 – 5 V, or ±V, programmable
Maximum usable input voltage: 106% of full scale
Non-isolated
Maximum non-destructive input voltage: 12V peak
(2) Current Outputs
Optically isolated
Isolated Power source
Voltage output by adding an internal dropping resistor
Output range: User selectable 0 – 20 mA or 4 – 20 mA, representing 0 to 100% variable
Resistive load: 800 ohms maximum
Capacitive load: no limit

Standard Communication

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 232 C provides support for modem
Data Rate: 300 to 19200, operator selectable from the keyboard
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 max (RS-232C)
          4000 feet max (RS-485 and 20 mA)
Chapter 2
Installation

This chapter describes the Micro-Tech 3106 Impact Flow Meter Integrator installation procedure, hardware configuration, and initial programming. Initial programming is a machine directed procedure prompting the operator to enter required impact flow meter parameters. After all parameters have been entered, the Micro-Tech 3106 performs an unassisted zero and span calibration.

2.1 Safety Precautions

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not install, operate, or perform any maintenance procedures until you have read the safety precautions that follow.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instrument and door should always remain closed during operation, and only opened for maintenance procedures. Be sure to close the cover before resuming operation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>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. Incoming voltages must be checked with a voltmeter before being connected to the electronics.</td>
</tr>
</tbody>
</table>
WARNING

Extreme caution must be used in testing in, on, or around the electronics, PC boards, or modules. There are voltages in excess of 115 V or 230 V 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 Electron) 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. To adapt production rates or applications consult Thermo Electron products Customer Service for recommendations.

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.
2.2 Incoming Power

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verify that the input voltage is correct with an AC voltmeter before you connect it to the instrument.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth ground must be provided to the instrument. Do not use conduit to provide this ground.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A readily accessible disconnect device 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.</td>
</tr>
</tbody>
</table>

2.2.1 Critical Wiring Conditions

1. Ensure power is off at the mains
2. Do not route sensor and signal cables in the same conduit with power cables or any large source of electrical noise.
3. Earth ground all enclosures and conduits. A ground connection between all conduits is required.
4. Connect the shields ONLY where shown.
5. Check that all wires are tight in their connections.
6. Never use a “megger” to check the wiring.
7. A readily accessible disconnect device shall incorporated in the field wiring. This disconnect should be in easy reach of the operator and it must be marked as the disconnecting device for the equipment.
8. All conduits should enter the bottom of the enclosure. Do not run conduit through the top or sides of the enclosure.
2.3 Field Mount Installation

The Integrator should not be exposed to excessive vibration, heat, direct sunlight, or moisture. The ideal mounting location would be on a separate wall or beam in view of the DE10/DE20 sensor. Consult the factory in applications requiring a distance greater than 1000 feet between the sensor and the Integrator.

2.3.1 Mounting

Mount the Integrator to a rigid, flat, vertical surface using four mounting tabs provided on the back of the enclosure see Figure 2-1.

A flat mounting surface will prevent twisting and/or warping of the fiberglass enclosure when tightening the mounting fasteners (¼" or 6 mm fasteners are required).

Figure 2-1: Typical Micro-Tech 3106 Field Mount Installation
Figure 2-2: Electrical and Mounting Guidelines of the Micro-Tech 3106 (Field Mount)

⚠️ CAUTION

Refer to the field-wiring diagram as a guide if you do not have a specific wiring diagram for your system. Follow your local electrical codes and regulations for minimum wire size and routing.
2.3.2 Connecting Incoming Power – Field Mount

To connect the incoming power, use the following procedure.

**Note:** All units shipped from the factory are configured for 115 VAC. If you desired 230 VAC, make sure the power selector switch is set to 230 VAC (Section 2.5.1).

1. Loosen the screw latch mounted on the front chassis. Open the door (see Figure 2-3).
2. Route incoming power wiring through a conduit hole at the bottom right of the enclosure. Leave ample loose wiring (typically 8”) to facilitate removing the terminal connectors.
3. Wire safety ground terminal located on the side of the chassis.
4. Wire HOT to Terminal L on Power Input Terminal.
5. Wire NEUTRAL to Terminal N on Power Input Terminal.
6. 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”) to facilitate removing the terminal connectors.
7. 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”) to facilitate removing the terminal connectors.
8. Close the inside panel and tighten the screw to secure the cover.

**Figure 2-3: Field Mount Inside Front Panel**
2.4 Panel Mount Installation

The panel-mounted Integrator is suitable for mounting in a control panel. The control panel should not be exposed to excessive heat, moisture, or vibration. The front bezel, when properly seated forms a dust seal.

A two (2) inch clearance around the top and bottom of the Integrator is required for convection cooling. Additional clearances may be required if equipment mounted directly below generates excessive heat. Clearance in the back is necessary for wiring access and fuse replacement. Clearance on the side is necessary for inserting the chassis holding brackets from the back after insertion of the Integrator.

2.4.1 Mounting

Provide a cutout in the panel and insert the Integrator after removing the holding brackets see Figure 2-4. From the back, insert the holding brackets on both sides of the Integrator. Tighten the holding brackets to support the Integrator and form the dust seal.

Figure 2-4: Electrical and Mounting Guidelines Micro-Tech 3106 (Panel Mount)
Figure 2-5: Installation Micro-Tech 3106 (Panel Mount)
• See Figure 2-5 for panel cutout, outline, and mounting dimensions.
• The large rubber band shipped with the unit can be used to hold clamp brackets in place during installation.

Remove clamp brackets and slide chassis assembly through front of cut-out. Re-install clamp brackets into chassis and tighten threaded rods against the back of the panel until the unit is secure.

2.4.2 Connecting Incoming Power – Panel Mount

To connect incoming power for panel mount installation, use the following procedure:
• For input power, use 14 AWG standard wire
• Wire the safety ground terminal located on the right backside of the enclosure.
• Wire the HOT to terminal labeled 1 of Terminal L on the Power Input Terminal.
• Wire the NEUTRAL to the terminal labeled 2 of Terminal N on the Power Input Terminal.

Note: All units shipped from the factory are configured for 115 VAC. If 230 VAC is required, refer to Section 2.5.1.

2.5 Impact Flow Meter Integrator Configuration

The Micro-Tech 3106 is one of a family of products that is supported by a common hardware platform. Configuration of the hardware platform and additional circuit boards enable the hardware platform to be used for several discrete instruments.

Wire jumpers are installed at the factory for the instrument ordered and should not have to be reconfigured in the field.

Switches and removable jumpers are described in this section. The default position is noted in each description and, in most cases, is not changed.
2.5.1 Motherboard Configuration Jumpers and Switches

TO BE PERFORMED BY QUALIFIED SERVICE PERSONNEL ONLY

1. General Purpose Digital Inputs
Located on the motherboard are provisions for 5 programmable status inputs. The programmable inputs may be configured as normally open or normally closed. Inputs are designed for dry contacts. (Refer to Table 2-1 for configuration information.)
Figure 2-6: Micro-Tech Motherboard

- OP 26
- EPROM – U66
- EPROM – U58
- Lithium Battery
- Audit Trail
- Card Slots
  - Slot 3
  - Slot 2
  - Slot 1
- Slot 4 – Relay Output

Area of detail in Figure 2-7
Table 2-1: Programmable Input Choice

<table>
<thead>
<tr>
<th>General Purpose Alarm 1</th>
<th>Product # 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose Alarm2</td>
<td>Product # 5</td>
</tr>
<tr>
<td>General Purpose Alarm 3</td>
<td>Product # 6</td>
</tr>
<tr>
<td>Print</td>
<td>Product # 7</td>
</tr>
<tr>
<td>Reset Total</td>
<td>Product # 8</td>
</tr>
<tr>
<td>Reset Alarm</td>
<td>Product # 9</td>
</tr>
<tr>
<td>Auto Zero</td>
<td>Product # 10</td>
</tr>
<tr>
<td>Product # 1</td>
<td>Batch Stop Command *</td>
</tr>
<tr>
<td>Product # 2</td>
<td>Batch Start-Up Command *</td>
</tr>
<tr>
<td>Product # 3</td>
<td>* Only with Loadout Option</td>
</tr>
</tbody>
</table>

2. Digital Outputs

A relay output board (all dry contacts) and is plugged into slot 4 of the motherboard. One of the relay outputs is permanently assigned as the fault output and cannot be programmed to any other function. The other 3 relays can be programmed to one of the choices shown below in either a normally open or normally closed position.

There is an additional solid-state output (located on the motherboard), which can also be programmed to one of the functions shown below.

The programmable output choices are listed in Table 2-2.

Table 2-2: Programmable Output Choices

<table>
<thead>
<tr>
<th>Alarm Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shutdown Cumulative</td>
</tr>
<tr>
<td>Ready</td>
</tr>
<tr>
<td>Low Rate</td>
</tr>
<tr>
<td>High Rate</td>
</tr>
<tr>
<td>Totalization Pulse (Remote Counter)</td>
</tr>
<tr>
<td>Batch Preset Reach</td>
</tr>
<tr>
<td>Batch End</td>
</tr>
<tr>
<td>Air Purge</td>
</tr>
</tbody>
</table>

If more than five digital inputs and four digital outputs are required, an optional digital I/O is necessary.
2.5.2 Pulse Frequency Modulation (PFM) Board

The PFM board is located on the motherboard (slot 1, 2, or 3). This board accepts the unconditioned mass flow signal from the impact sensor. No configuration jumpers or switches are located on this board.
Table 2-3: Micro-Tech 3106 Motherboard Jumpers

<table>
<thead>
<tr>
<th>Jumper Location</th>
<th>Foil/Jumper</th>
<th>Default Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP1</td>
<td>Jumper A</td>
<td>Comm A=RS-485/20mA B=RS-232</td>
<td></td>
</tr>
<tr>
<td>OP2</td>
<td>Jumper A</td>
<td>Comm A=RS-485/20mA B=RS-232</td>
<td></td>
</tr>
<tr>
<td>OP3</td>
<td>Jumper A</td>
<td>Comm A=RS-485/20mA B=RS-232</td>
<td></td>
</tr>
<tr>
<td>OP10</td>
<td>Jumper A</td>
<td>Comm A = RS-485/232 B = 20 mA</td>
<td></td>
</tr>
<tr>
<td>OP11</td>
<td>Jumper A</td>
<td>Comm A = Terminated B = Not Terminated C = 20 mA</td>
<td></td>
</tr>
<tr>
<td>OP13</td>
<td>Jumper A</td>
<td>Comm A = Normal B = Multidrop</td>
<td></td>
</tr>
<tr>
<td>OP26</td>
<td>Jumper A</td>
<td>OIML Calibration Jumper A = Allows Cal B = Restricts Cal</td>
<td></td>
</tr>
</tbody>
</table>
Table 2-4: Terminal Wiring Configurations

<table>
<thead>
<tr>
<th>Micro-Tech 3000</th>
<th>TB2 Digital Input</th>
<th>TB3 COMM</th>
<th>TB12 PFM Board</th>
<th>TB5 Analog Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>+24 V</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td></td>
<td>7</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Shield</td>
<td>1</td>
<td>Shield</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Sig</td>
<td>In2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>Com</td>
<td>In3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Sig</td>
<td>In4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Com</td>
<td>In5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2-5: Relay Output Board

<table>
<thead>
<tr>
<th>Relay Output Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

*Relays Rated 33 VAC 0.5A - 70 VDC 0.5A
2.5.3  **Analog Output (Motherboard)**

A current output signal is available for customer use on motherboard Terminal Block 5. The rate, speed, or load parameters can be selected by the customer to be sent to a rate meter, recorder, or controller. The output range is adjustable from 0-20 mA, 4-20 mA, 20-0 mA, or 20-4 mA.

**Table 2-6: Motherboard Current Output - TB 5**

<table>
<thead>
<tr>
<th>Motherboard</th>
<th>Current Output #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB5</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>+</td>
</tr>
<tr>
<td>39</td>
<td>-</td>
</tr>
<tr>
<td>40</td>
<td>Shield</td>
</tr>
</tbody>
</table>

2.5.4  **Analog Input/Output Board (Option)**

The analog input/output board is available in two configuration described below. (A) has one current output only; whereas, (B) has two voltage inputs and two current outputs. No configuration switches or jumpers exist on the analog boards.

**Board type (A) One user definable 0-20/4-20 or 20-4/20-0 mA output.**

The rate function can be selected by the customer to be sent to a rate meter, recorder, or controller.

**Board type (B) Two +/- 5VDC differential inputs and two user definable 0-20/4-20 or 20-4/20-0 mA output**

**Inputs** – The functions that can be selected for each input are: None, Set Point (SP), Moisture Compensation

**Outputs** – The functions that can be selected for each output are: Off and Rate
Table 2-7: Analog (TB4) Input/Output Board

<table>
<thead>
<tr>
<th>Analog (TB4) In/Out Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
</tbody>
</table>

2.5.5 Communications Configuration (Motherboard) COMM 1

This section describes the setup procedure and hardware configuration for the communications from the motherboard. Use the following steps to configure the communications:

Select the jumper positions for the desired communication standard. Refer to Table 2-3 for jumper locations.

1. Wire to the Terminal Block 3 on the motherboard for the communication standard selected, RS-485, RS-232c, 20 mA current loop.
2. Refer to REC 3949, Chapter 3 for the remainder of the communication setup.

Table 2-7: Motherboard COMM 1 Communications Wiring Configuration - TB3 – RS-485

<table>
<thead>
<tr>
<th>Motherboard RS-485 Communications TB 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
</tr>
<tr>
<td>29</td>
</tr>
<tr>
<td>28</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>20</td>
</tr>
</tbody>
</table>

Maximum cable length 4000 ft
Use Beldon 9830 or equivalent
Table 2-8: Motherboard Wiring Configuration TB 3 – RS-232 Communications

<table>
<thead>
<tr>
<th>Motherboard RS-232 Communications TB 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Shield</td>
</tr>
<tr>
<td>23 CTS</td>
</tr>
<tr>
<td>24 Common</td>
</tr>
<tr>
<td>22 RxD</td>
</tr>
<tr>
<td>21 TxD</td>
</tr>
<tr>
<td>20 RTS</td>
</tr>
</tbody>
</table>

Maximum cable length 50 ft
Use Beldon 9538 or equivalent

Table 2-9: Motherboard Wiring Configuration TB 3 – 20mA Serial Communications

<table>
<thead>
<tr>
<th>Motherboard 20 mA Serial Communications TB 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Shield</td>
</tr>
<tr>
<td>26 +20 mA (out)</td>
</tr>
<tr>
<td>27 -20 mA (out)</td>
</tr>
<tr>
<td>28 +20 mA (in)</td>
</tr>
<tr>
<td>24 -20 mA (in)</td>
</tr>
</tbody>
</table>

Maximum cable length 4000 ft
Use Beldon 9829 or equivalent

Table 2-8: Mother Board Communication Jumper Settings

<table>
<thead>
<tr>
<th>JUMPERS</th>
<th>OP1</th>
<th>OP2</th>
<th>OP3</th>
<th>OP10</th>
<th>OP13</th>
<th>OP11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS-485</td>
<td>“A”</td>
<td>“A”</td>
<td>“A”</td>
<td>“A”</td>
<td>“A”</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“B” Multi-drop</td>
</tr>
<tr>
<td>RS-232</td>
<td>“B”</td>
<td>“B”</td>
<td>“B”</td>
<td>“A”</td>
<td>“A”</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“B” Not Terminated</td>
</tr>
<tr>
<td>20 mA</td>
<td>“A”</td>
<td>“A”</td>
<td>“A”</td>
<td>“B”</td>
<td>“A”</td>
<td>“C”</td>
</tr>
</tbody>
</table>

Default
2.6 Determining Installation Parameters

Following mechanical and electrical installation, it is necessary to record field data specific to your application into the Micro-Tech 3106 memory. The following setup procedure should be completed before calibration of your belt scale system. Refer to Chapter 3 of this manual for more details or assistance.

Before applying power to the flow meter system, it is necessary to complete the following statements. Refer to your System Data Sheet in the front of your flow meter manual.

2.6.1 Flow Meter Capacity

Determine the flow meter’s capacity in tons per hour and record the capacity below. (Example: 400.0)

_____________ (Tons Per Hour) Scale # 1
_____________ (Tons Per Hour) Scale # 2

2.7 Programming the Micro-Tech 3106 (Initial Setup)

When power is first applied to the instrument, the system steps the operator through menus and options that bring the system to a weighing state. Soft keys, numeric keys, and the scroll control keys are used to select choices. The RUN and MENU control keys are inactive during this procedure.

--- CAUTION ---

Verify 115/230 Volt selection is correct. Improper connection may result in damage to your Integrator.

The programming mode begins after cold start (See section 4.3.3). Information requested by the instructional screens should be entered before moving to the next screen. The flow meter is calibrated at the end of this procedure provided the correct information is entered. The alarm light flashes during the programming procedure and clears when calibration is complete.

The programming mode begins with the following instructional screens.

-- MEMORY ERASED --
Chose the language key to continue to

ESP USA
2.7.1 Language

The Micro-Tech 3106 is a dual language instrument. USA is always the first language. The standard configuration provides Spanish (ESP) as the second language. Other languages, such as German (GER), are available upon request (consult factory). Press the desired language.

Initial scale setup and calibration
Press down SCROLL.

Press the DOWN SCROLL key.

Press key under HELP for more information.
HELP

“HELP” is flashing

Press the HELP soft key.

Key with dot (soft key) performs action of word above it.
MORE RETURN

When RETURN is pressed, the user is returned to the previous screen. Pressing MORE advances the system to the next screen.

Press MORE

Use down SCROLL key to advance through the menus
MORE RETURN

Pressing MORE or RETURN reverts the screen back to previous screens in the series.

Press the DOWN SCROLL key.
2.7.2 Measure Units

Press SCROLL DOWN to accept the default unit, or CHOICES to scroll selections. Press ENTER to confirm your selection. Scroll down.

--- DISPLAY SCROLL 1 ---
Measure units
> English <

Default: ENGLISH
Choices: ENGLISH, METRIC, MIXED
If English, all units in English
If Metric, all units Metric
If Mixed, units may be a combination of English and Metric

Note: If the Measure units are changed from English to Metric (or vice versa) after the scale is calibrated, the span number changes but the calibration remains the same.

2.7.3 Totalization Units

The units to be used for Totalization are selected here. Press ENTER soft key to accept the default unit, or CHOICES soft key to scroll selections. Press ENTER to confirm your selection. Scroll down.

--- DISPLAY SCROLL 2 ---
Totalization Units
> Tons <

English/Mixed
Default: Tons
Choices: Tons, Ltons, Pounds

Metric
Default: tones
Choices: tones, kg

If Mixed
Default: Tons
Choices: Tons, Ltons, kg, Pounds, tonnes
2.7.4 Rate Units

The rate is displayed according to the units selected here. Press ENTER soft key to accept the default unit, or CHOICES soft key to scroll selections. Press ENTER to confirm your selection. Scroll down.

<table>
<thead>
<tr>
<th>English/Mixed</th>
<th>Metric</th>
<th>If Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: Tph</td>
<td>Default: kg/h</td>
<td>Default: Tph</td>
</tr>
<tr>
<td>Choice: Tph, L tph, Lb/mn, T/mm, LT/mm, Tph, kg/mn, t/mm, Lb/mm, t/mm, LT/mm, Percent %, Lb/h</td>
<td>Choice: t/h, kg/mn, t/mm, Lb/mm, t/mm, LT/mm, Percent kg/h, t/h</td>
<td></td>
</tr>
</tbody>
</table>

2.7.5 Max. Scale Capacity

The next entry is the scale capacity, which is the maximum rate at which the scale is allowed to work. This entry also defines the default number of decimal places that are used for displaying rate. Use numeric keys for entering the number, confirm with ENTER. Scroll down.

<table>
<thead>
<tr>
<th>-- SC DATA SCROLL 1 --</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. scale capacity</td>
</tr>
<tr>
<td>500.0 Tph</td>
</tr>
</tbody>
</table>

Default: 500.0
Min: 1
Max: 200000

2.7.6 Scale Divisions

When the Scale capacity is entered, the number of decimal places is also defined. If, for example, the User enters 500.0, this sets the "Scale Divisions" parameter to 0.1. Advancing to the next scroll, the User then sees first the Scale Division corresponding to the just entered Scale Capacity (in the example 0.1). If required, the User is able to alter the Scale Division to any of the available options.

The analog output is also defined by Max scale capacity. If the user enters 500.0 and the analog output is set for 4-20 mA, the analog output is 4 MA for 0 Tph flow rate and 20 mA for 500 Tph flow rate. Set the Max scale capacity 5% to 10% higher than the maximum expected flow rate.
If the Max scale capacity is changed after the Impact Flow Meter has been calibrated, the calibration will also be changed. A manual calibration change will be required to correct the calibration. See Section 3.9.2.2 Manual Span procedure.

Press the **ENTER** soft key to accept the default divisions, or the **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.

<table>
<thead>
<tr>
<th>-- SC DATA SCROLL 2 --</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale Divisions</td>
</tr>
<tr>
<td>&gt; 0.1 &lt;</td>
</tr>
<tr>
<td>CHOICE ENTER</td>
</tr>
</tbody>
</table>

**Default:** 0.1  
**Choice:** 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 0.01, 0.02, 0.05, 0.001, 0.002, 0.005

### 2.7.7 Quick Automatic Calibration of the Flow Meter

The flow meter is the first zeroed (3 seconds) and then calibrated using material.

```
- ZERO CAL -
Stop material flow, then
press START
START
```

When **START** is pressed, the following screen is displayed for 7 seconds.

<table>
<thead>
<tr>
<th>AUTO ZEROING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please wait ...</td>
</tr>
</tbody>
</table>
During Auto Zero, no material should be running through the flow meter.

When zero is reached, the system automatically displays the following screen:

```
AUTO ZERO COMPLETED
Zero # changed
New Zero # XXXXX
CONTINUE
```

The word “COMPLETE” is flashing. Press CONTINUE to proceed to the Span Calibration Menu.

### 2.7.7.1 Initial Span Calibration

Because all materials behave differently when the strike and then rebound off the impact plate of the flow meter, the span calibration must be done using the actual material in a “material test”. This test is done by running material through the flow meter for at least 5 minutes. The longer the test, the more accurate the result will be.

All of the material in the material test should be pre-weighed or post-weighed on a high accuracy static scale to obtain the actual weight of the test material. This actual weight is then entered into the integrator to complete the material test.

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

```
Press start soft key
then run material..
START ABORT
```

If unable to run a material test at this point press ABORT and the RUN menu displays. The “Ready” light is off, the flow meter is not calibrated. An un-calibrated flow rate displays if product is run over the impact plate, all totalizers display –0- and do not function. Enabling the Totalizers is explained later in this chapter.

To continue with the material test press Start and immediately run material over the impact plate. The following screen displays:

```
00000.0 Tons
0000.0 Tph
Press DONE to end
DONE
```
During the Auto Span procedure, the resolution of totals is 10 times higher than normal.

Wait until all of the material has passed over the scale, then press DONE.

At the end of the test, the system prompts the operator for the reference weight of the material run during the test:

Pressing DONE advances to the following screen:

![Screen](00000.0 Tons Enter reference weight : 00.0 Tons ENTER)

The operator must enter the actual weight of the material passed over the impact plate during the material test. Use the numeric keys to enter the actual weight and confirm with the ENTER key.

If either of the following – SETTING ERROR – screens display, a number has been entered or the actual/reference weight that the Integrator will not accept. One or more operating parameters of the Integrator are incorrect consult Thermo Electron.

![Screen](SETTING ERROR – max 45000000 min 500 RETURN)

![Screen](SETTING ERROR – max 35000.00 Tons min 0.10 Tons RETURN)

Press RETURN and the ENTER REFERENCE WEIGHT SCREEN displays again. A different number from the previous must be entered for the actual/reference weight and/or the operating parameter(s) must be corrected.

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

![Screen](SPAN # CHANGED New span # 000000 CONTINUE)
Press Continue advances to the following screen:

<table>
<thead>
<tr>
<th>SPAN CALIBRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add reference</td>
</tr>
<tr>
<td>Weight to totals ?</td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td>NO</td>
</tr>
</tbody>
</table>

If **YES** is pressed, the amount of material used for the test is added to the master, reset, and operator totals. If **NO** is pressed, the information is lost. The “Ready” light is on, the flow meter is only calibrated at the flow rate just run. Pressing **YES** or **NO** advances to the following screen.

<table>
<thead>
<tr>
<th>SCALE CALIBRATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press RUN to start or MENU for scrolls</td>
</tr>
</tbody>
</table>

**NOTE: Moisture compensation is inhibited during material calibration.**

This is done to make the check of the totalized quantity easier. The static scale provides the weight of the material including moisture. The weight of the water is removed immediately before adding to total at the end of the procedure so that the master, reset and operator’s totals are still correct.

If the Impact sensor is not connected or a failure is detected, the message is the following:

<table>
<thead>
<tr>
<th>SCALE NOT CALIBRATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press RUN to start or MENU for scrolls</td>
</tr>
</tbody>
</table>

If the Flow Meter is not calibrated, the failure must be corrected and a repeat span calibration/material test must be done. See Section 3.9.2 and Section 3.10.

After the Initial Zero and Span calibrations, the flow meter functions normally. Subsequent Zero and Span calibrations have slightly different processes. See Section 3.9.2 for details on subsequent calibration. If calibration is required for additional flow rates different than just run for Span, see Section 3.10.

If Abort was pressed before a Span Calibration/material test was done, the following steps will allow the totalizers to function and the “Ready” light will come on.
Press the **RUN** key for the run menu if not already there. Press the **MENU** key for **MAIN MENU 1**. Press the **SPAN CAL** key, then press the **MANUAL** key.

The following screen displays:

```
- MANUAL -
Rate  000.00  Tph
Span#  0000000
ENTER  EXIT  RUN
```

Write down the Span# in the display. Use the numeric keys to re-enter the same Span# and confirm with the enter key. Press the run key to return to the Run menu. The totalizers are now functioning; the “Ready” light is on. The displayed flow rate and totalizers are not yet calibrated. See Section 3.9.2.
Chapter 3
Operation

Your Thermo Impact Weighing System is capable of accurate weighing, provided it is installed, calibrated, operated, and maintained in complete accordance with the instructions contained in this manual and your DE10 or DE20 Impact Weigher Installation and Operation manual.

3.1 Overview

The Model 3106 Impact Flow Meter Integrator is a microcomputer-based instrument that accepts and conditions a weight signal and provides visual and electrical outputs for total weight and rate of flow. A stable sensor excitation voltage is produced by the Integrator.

Auto Zero Tracking enables the impact weighing system to automatically zero itself when material is not running over the impact plate. This is menu selectable. It is not recommended for most impact weighing applications and the factory default is “NO” Auto Zero Tracking. A flashing or constant “Z” will appear on the second line of the display to indicate this option is enabled.

Life expectancy of the RAM support battery is approximately ten years, if power is not applied. Under normal operation where power is on continuously, life expectancy will be much longer.

Errors may occur during initial calibration and their reason must be corrected during initial calibration. During normal operation, an alarm would most likely indicate a failure in the system or improper operation.

Figure 3-1: Impact Flow Meter Integrator
3.2 Front Panel

The front panel (Figure 3-1) contains the necessary indicators and keys to enable the operator to perform calibrations and required operations after the Integrator has been configured.

3.2.1 LED Indicators

The five red indicators show the status of the Integrator.

2. Span Calibration in progress.
3. Alarm pending.
4. Batch or Load Out running.
5. Ready (power on, no calibration running, flow meter is calibrated).

3.2.2 Keyboard

1. Run - Access the Run Menu and returns the Integrator to Run mode whenever pressed.
2. Menu - Permits entry to menus.
3. Up and Down arrow - scrolls up or down the selected menu.
4. Soft Keys - Select displayed function directly above the key. Moves cursor left and right during string editing.
5. Alpha/Numeric Keys 1 through 0 - Enter numerals and letters when string editing. Similar to telephone keys.
6. Decimal Point Key - Enters decimal point.
7. Clear Key - Removes wrong entries prior to pressing ENTER soft key.
8. Total - Displays Master total, Reset total and Operator total. Operator and Reset total may be reset.
9. Print - Starts printout. COMM option is required.
10. Start - Starts load out. Restart if interrupted.
11. Stop - Interrupts load out. Aborts load out if already interrupted.

Note: Start – Stop keys are only active with Load Out option.

3.2.3 Display

The four-line display indicates actual running information or displays menu entry information.
3.3 Menu Display

The Integrator is a menu driven machine that allows the operator to access all setup, text, and calibration parameters. Main Menu screens 1 through 6 can be accessed at any time by pressing the MENU key until the desired menu screen is displayed. Menu scrolls may be selected by pressing the soft key directly below the desired scroll, and then using the Up/Down scroll key.

If the Integrator is password protected, the appropriate password must be entered prior to making changes or calibrating. Menus may be viewed without entering a password, but no entries are allowed unless the password is entered.

Optional scrolls are only available if the available option has been installed. The following screens are activated by the MENU key.

- MAIN MENU 1 -
  Press MENU for more
  ZERO SPAN PROD
  CAL CAL SETUP

- MAIN MENU 2 -
  Press MENU for more
  SCALE CALIB
  DISPLAY DATA DATA

- MAIN MENU 3 -
  Press MENU for more
  PROT DIAG TEST

- MAIN MENU 4 -
  Press MENU for more
  I/O ALARMS LOAD
  DEFINE DEFINE OUT
3.4 Normal Power On

When the Integrator is powered on after initial programming, the RUN Menu is displayed unless the hardware configuration has been changed.

3.4.1 Hardware Configuration

If the hardware configuration detected at power on differs from the one recorded in memory, the following screen is displayed. This happens if a circuit board has been added or removed during power off, a circuit board has failed, or if a circuit board has come loose and is not pushed in all the way.

```
#1 000.00 Tons
Z  000.00 Tph

PROD

-SLOT # n CHANGED-
Acquire new
configuration ?
YES  NO
```

The screen displays after 10 seconds if the question is not answered. The Integrator assumes the answer is NO. “HW CONFIG. CHANGED” alarm is on and cannot be reset. The above screen displays each time the power is cycled.

If a circuit board is removed or added, and this is a permanent change in configuration, answer YES.
If a circuit board is removed and not replaced the Integrator cancels from memory the setup data of that board. If the same board is added again, the setup data has to be entered again.

If a circuit board is added, the Integrator acquires the new hardware configuration. Setup data for the new board must be entered.

**Note:** Check the setup configuration in the I/O DEFINE scroll if an I/O board is removed or added. I/O assignments change when the number of I/O boards change.

### 3.5 Run Menu

When the Integrator is normally powered on after initial programming, the Run Menu is displayed. The Run Menu can always be accessed by pressing the RUN key on the front panel at any time.

#### 3.5.1 Main Menu

<table>
<thead>
<tr>
<th>#1</th>
<th>000.00 Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>000.00 Tph</td>
</tr>
</tbody>
</table>

The Run Menu is made up of several screens that can be scrolled using the scroll UP and DOWN keys.

The first line always displays the product number followed by the Master Total, which is the number of tons totalized by the Integrator Flow Meter since installation.

The second line always displays the rate of product flow. A “Z” displays on the left side if the “Auto Zero Tracking” option is enabled and product flow is stopped. Then, the “Z” stops flashing, indicating the Integrator is averaging the sensor signal to accurately re-zero the flow meter. The product flow must stay off during the entire cycle otherwise auto zero is aborted.

The third line is by default blank. It can be programmed to show either the product name, or the date and time (if the optional COMM board is installed). The selection is made in the Display Menu. The fourth line displays the soft keys.

Changing the product number can be done local from the Integrator keypad or remote using a digital input module. See Section 3.10.3 Product Setup Scroll. Up to 99 different products can be selected using local, up to 10 different products can be selected using remote. When Remote is enabled, digital input assignments for each product are made in Main Menu 4 - I/O DEFINE. There are three general-purpose digital inputs available for use in selecting different products. Additional digital inputs are available by adding an optional DIO board. When the PROD key is pressed from the Run Menu, the following screen displays if the selection of the product is executed from remote.
Pressing the RETURN key returns the display to the Run Menu.

If the selection of the product is executed from local, the following screen is displayed:

```
In Remote Product Selection Mode:

RETURN
```

If NO is pressed the Run Menu is displayed.

If YES is pressed, the following screen displays:

```
Change the product number?

YES     NO
```

A different product number (1-99) can be entered by either typing in the product number followed by ENTER, or by using the NEXT key to scroll to the next product.

A product name can be entered by pressing the key below NAME. The following screen displays:

```
Prod. Number     1
No Name

ENTER NEXT NAME
```

Type in the product name by pressing the appropriate alphanumeric keys. Example: To type a “C”, press the “1” key four times. The keys under < and > may be used to scroll to the proper location of the product name. Press the ENTER key after the product name is typed. Then, press the RUN key to return to the Run Menu.
Note: The purpose of the different product numbers is to allow different products to be run through the flow meter. If different products have different bulk densities or size distribution the impact force on the impact plate will change thus changing calibration.

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

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

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

3.5.2 Reset Total

Press the scroll DOWN key to access the Reset Total Menu.

The Reset Total Menu is similar to the main Run Menu except Master Total has been replaced by Reset Total.

When the RESET key is pressed, the following screen is displayed:

```
RESET      000.00 Tons
Z          000.00 Tph
          
RESET

Do you wish to clear
RESET total?

YES    NO
```

Press “YES” to clear the Reset total. Press “NO” to skip clearing. Pressing either YES or NO returns to the Reset Total Menu.
### 3.5.3 Alarm Pending

The message ALARM displays in the right soft key if an alarm is pending. The alarm LED also is flashing.

The following menu is displayed after pressing the ALARM soft key.

<table>
<thead>
<tr>
<th>ALARM</th>
<th>NEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxxxxxxxxxxxxxxxxxxxxxx</td>
<td></td>
</tr>
<tr>
<td>MM–DD–YYYY   HH : MM</td>
<td></td>
</tr>
<tr>
<td>RESET   NEXT</td>
<td></td>
</tr>
</tbody>
</table>

The keyword “NEW” indicates an alarm that has not been acknowledged yet. When the operator presses the RESET key to clear the alarm, the alarm displays only if the reason that caused the alarm to occur is corrected. If the alarm is still pending, the keyword “ACK” is displayed instead of “NEW”.

The third line shows the date and time only if the optional COMM board is installed.

The NEXT key is used to scroll between the pending alarms. The string “xxxxxxxxxxxxxxxxxxxx” stands for one of the following alarm conditions.

<table>
<thead>
<tr>
<th>Table 3-1: Alarm Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock Fail</td>
</tr>
<tr>
<td>Bad Weight Signal</td>
</tr>
<tr>
<td>RAM Fail</td>
</tr>
<tr>
<td>ROM Fail</td>
</tr>
<tr>
<td>High Rate</td>
</tr>
<tr>
<td>Low Rate</td>
</tr>
<tr>
<td>Warm Start</td>
</tr>
<tr>
<td>Bad Weight Signal</td>
</tr>
<tr>
<td>RAM Fail</td>
</tr>
<tr>
<td>ROM Fail</td>
</tr>
<tr>
<td>High Rate</td>
</tr>
<tr>
<td>Low Rate</td>
</tr>
<tr>
<td>Warm Start</td>
</tr>
<tr>
<td>Power Down During Calibration</td>
</tr>
<tr>
<td>Calibrate Time Elapsed</td>
</tr>
</tbody>
</table>
### 3.6 Total Key

The TOTAL key accesses menus that contain detailed information for the three available totalizers: Reset, Operator, and Master.

Reset Total can be reset to -0- at will without a password. Operator Total can be reset to -0- at will, or may require a password depending if one is installed. Master Total cannot be reset to -0-.

---

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

---

Press the TOTAL key for access and scroll up or down to find the Reset Total screen. Pressing RUN returns to the Run Menu.

<table>
<thead>
<tr>
<th>RESET TOTAL</th>
<th>#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINCE</td>
<td>00-00-0000</td>
</tr>
<tr>
<td></td>
<td>000.00 Tons</td>
</tr>
<tr>
<td>RESET</td>
<td></td>
</tr>
</tbody>
</table>

The first line shows the totalizer type followed by the product number.

The second line is only displayed if the optional COMM board is installed, and indicates the last date when the Reset or Operator Total was reset.

<table>
<thead>
<tr>
<th>OPERATOR TOTAL</th>
<th>#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINCE</td>
<td>00-00-0000</td>
</tr>
<tr>
<td></td>
<td>0000.00 Tons</td>
</tr>
<tr>
<td>RESET</td>
<td></td>
</tr>
</tbody>
</table>

The RESET key allows the operator to reset the desired total. When the RESET key is pressed, the following screen is displayed.

<table>
<thead>
<tr>
<th>Do you wish to clear xxxxxx total?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
</tr>
<tr>
<td>NO</td>
</tr>
</tbody>
</table>

xxxxxxx can be RESET or OPERATOR. Press “YES” to clear the total. Press “NO” to skip resetting.
The next screen is very similar to the previous ones; only the Master Total is displayed instead of the Reset or Operator Total. The RESET key is not displayed here since the Master Total cannot be reset to -0-.

<table>
<thead>
<tr>
<th>MASTER TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINCE 00-00-0000</td>
</tr>
<tr>
<td>000.00 Tons</td>
</tr>
</tbody>
</table>

3.7 Print Key

See Serial COMM manual if COMM option is installed.

3.8 Start Stop Keys

Enabled only if Load Out option is installed. See REC 4030 for instructions and more information.

3.9 Calibration

Main Menu 1 contains the Calibration Menu and Product Selection Mode Menu. Main Menu 1 is selected by pressing the MENU key until Main Menu 1 displays. Desired calibration scrolls are selected by pressing the soft keys directly below the desired scroll.

- MAIN MENU 1 -
Press MENU for more
ZERO SPAN PROD
CAL CAL SETUP

3.9.1 Zero Calibration

During any Zero Calibration all equipment such as screw conveyors, rotary airlock feeders, bucket elevators, dust collection, etc. in the area of the DE10/DE20 sensor should be on/running with no material flowing.

1. The following screen displays when “ZERO CAL” is selected.

- ZERO CAL -
Stop material flow, then press START.
START EXIT MANUAL

Pressing the EXIT soft key returns the operator to Main Menu 1. Pressing MANUAL advances to Step 2 below. Pressing RUN at any time returns to the Run Menu.
When START is pressed, the following screen is displayed for 7 seconds.

```
AUTO ZEROING
Please wait
Rate:  000.0  Tph
Tot   000000  Tons
```

During Auto Zero, resolution of the total is ten times higher than normal. The word “COMPLETED” is flashing. Pressing ADV changes from Error % to Accumulated Weight. The percentage of error is related to max scale capacity. Pressing NO returns the screen to Main Menu 1 without changing the zero number.

```
AUTO ZERO COMPLETE
Error  0.00%
Change zero?
YES    NO    ADV
```

Pressing YES the zero number is changed and the next screen displays. ADV changes from “Old zero” to “Rate, to “Total”, and to “Error %”. Press MENU to repeat Auto Zero calibration. Press RUN to return to the Run Menu.

```
ZERO # CHANGED
New zero # 00000
Old zero # 00000
RUN    MENU    ADV
```


The Manual Zero procedure shows the zero constant and allows direct entry if known. Use the numeric keys to enter the new Zero# and the ENTER key to confirm the new number.

```
- MANUAL ZERO -
Rate  000.0  Tph
Zero # 00000
ENTER  EXIT  RUN
```

Password: Operator

Default:  40000
Min:  0
Max:  120000
3.9.2  Span Calibration Material Test

Span Calibration must be done at maximum expected flow rate of the system. Because all materials behave differently when they strike, and then rebound off, the impact plate of the Flow Meter, the Span Calibration must be done using the actual material in a “material test”. The test must conform to the following:

- The test must be at least 5 minutes long
- The flow rate must be constant/steady for the entire test.
- The test must be at least 200 counts of the 3106 Integrator.

A count is defined as 1 tenth of a unit of what is set in the Integrator totalizer. If the Integrator totalizer is set to pounds, one pound is .1 pound; if the totalizer is set to tons, one count is .1 ton, etc.

The longer the material test is run, the more accurate the flow meter will be. All of the material in the material test should be pre-weighed or post-weighed on a high accuracy static scale to obtain the actual weight of the test material. This actual weight is entered into the Integrator to complete the test.

Before any Span Calibration, Linearization in Main Menu 6 must be set to NO. Go to Main Menu 6 using the MENU control key. Press the LINEAR key. Press the scroll DOWN key and the following screen displays.

```
- LINEARIZATION -
Linearization
>no<
CHOICE ENTER
```

**Default:** NO

**Selections:** YES, NO

Use the CHOICE key to select NO if not already selected.

Press the RUN key to return to the Run Menu.
3.9.2.1 Automatic Span Calibration

1. Press the MENU key which brings up Main Menu 1.

2. Press the SPAN CAL key and the following screen displays.

   **SPAN CALIBRATION**
   Stop material flow, then press START.
   START MENU MANUAL

3. Pressing the MENU key returns the display to Main Menu 1.

4. Pressing the MANUAL key changes the display to the Manual Span procedure which is described in step 2.

5. Press START - totalization stops and the following screen displays.

   **Press START soft key then run material**
   START

6. Press START and immediately run material over the impact plate. The following screen displays.

   000.00 Tons
   000.00 Tph
   Press DONE to end
   DONE ABORT

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

Pressing ABORT returns the display to Main Menu 1.

Wait until all material has passed over the impact plate, then press DONE. The following screen displays.

   0000.00 Tons
   Ref. weight known?
   YES NO
When NO is selected, the system is notified that the reference (actual) weight of the material is not known. The Run Menu is displayed and MAT’L is flashing to remind the operator that the material test is incomplete.

<table>
<thead>
<tr>
<th>#1</th>
<th>000.00 Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>000.00 Tph</td>
</tr>
<tr>
<td>MAT’L</td>
<td>PROD</td>
</tr>
</tbody>
</table>

7. Press MAT’L when actual material weight is known.

8. If YES was answered to Ref. weight known?, or if the MAT’L key has been pressed when flashing the following screen displays.

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

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

```
- SETTING ERROR -
max    35000.00 Tons
min    0.10 Tons
RETURN
```

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

```
SPAN CAL COMPLETE
Error   000.00 %
Change span?
YES   NO   ADV
```
The word “COMPLETE” is flashing. Pressing ADV changes the screen from “Error %” to “Diff. X.XX Tons” to “XXXX.X PFM”. The “XXXX.X PFM” shows the average PFM signal acquired from the DE10/DE20 sensor during the material test. If NO is pressed the test information is lost and the display moves to “Add reference weight to totals?”.

If YES is pressed and the “SPAN # CHANGED” screen displays, the span constant has been updated and the test is finished.

If YES is pressed and the following - SETTING ERROR - screen displays, a number has been entered for the actual/reference weight that the Integrator will not accept. One or more operating parameters of the Integrator are incorrect consult Thermo Electron.

- SETTING ERROR -
max 45000000
min 500
RETURN

Press the RETURN soft key and return the display to the SPAN CAL. COMPLETE screen.

At the SPAN CAL. COMPLETE screen press NO. The test information is lost and the display moves to “Add reference weights to total?”.

SPAN # CHANGED
New span # 000000
Old span # 000000
RUN  MENU

Pressing RUN or MENU from the SPAN # CHANGED screen advances to the following screen.

SPAN CALIBRATION
Add reference
weight to totals
YES  NO

If YES is pressed, the amount of material used for the test is added to the Master, Reset, and Operator totals. If NO is pressed, the information is lost. Pressing YES or NO advances to the Run Menu or Main Menu 1 depending on which selection was made on the “SPAN# CHANGED” screen.
Note: Moisture compensation is inhibited during material calibration. This is done to make the check of the totalized quantity easier. The static scale provides the weight of the material, including moisture. The weight of the water is removed immediately before adding to totals at the end of the test so the material reset and operator’s totals remain correct.

3.9.2.2 Manual Span

The Manual Span procedure can be used to adjust the Span Calibration without doing a material test. A correction factor is calculated by dividing the actual tons per hour by the displayed tons per hour on the Integrator. The correction factor is multiplied by the current Span number to calculate a new Span number. See the following example:

3.9.2.2.1 Existing Span # = New Span #

In this example the existing 55 Tph calibration will change to 65 Tph.

Press the RUN key for the Run Menu if not already there. Press the MENU key for Main Menu 1. Press the SPAN CAL key, then press the MANUAL key. The following screen is displayed.

Default: 200000
Min: 500
Max: 45000000

The RUN key returns the display to the Run Menu; the EXIT key returns the display to Main Menu 1. Use the numeric keys to enter the new Span# and confirm with the ENTER key. If a number is entered for Span which the Integrator will not accept, the following screen is displayed. One or more operating parameters of the Integrator are incorrect consult Thermo Electron.

Password: Operator
Press RETURN to return to the “Manual Span” screen. A number for Manual Span between the min and max must be entered and the operating parameter(s) must be corrected.

After the Manual Span number has been successfully entered, it displays in the “Manual Span” screen. Press the EXIT key for Main Menu 1 or the RUN key for the Run Menu.

### 3.9.3 Product Setup

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

1. Press the RUN key for the Run Menu unless already there. Press the MENU key for Main Menu 1. Press the PROD SETUP key and the following screen is displayed.

```
ENTER PRODUCT SELECTION MODE:
EXIT LOCAL
```

2. Pressing the EXIT soft key returns the operator to Main Menu 1. Pressing the center soft key switches between Local and Remote. See Section 3.5.1 Main Run for more information on Product Selection.

### 3.10 Linearization

Linearization consists of determining and entering into the Integrator correction factors for various flow rates that may be expected. Accuracy of the flow meter will be improved using linearization especially if the flow rate varies downward from 100% for a significant amount of time during a material run. If the flow meter is expected to see multiple flow rates linearization is also recommended. One correction factor can be acquired or as many as five if necessary to improve accuracy. Correction factors can be acquired in ascending or descending flow rate order. The Integrator places them in correct order at the end of the linearization procedure. All correction factors are applied when Linearization is enabled in Main Menu 6.

Correction factors must be acquired at flow rates less than the Span flow rate.

Zero Calibration and Span Calibration at maximum expected flow rate must be done prior to Linearization. See Sections 3.10 and 3.9.2.

Because all materials behave differently when they strike, and then rebound off, the impact plate of the Flow Meter, the Span Calibration must be done using the actual material in a “material test”. The test must conform to the following:

- The test must be at least 5 minutes long.
- The flow rate must be constant/steady for the entire test.
- The test must be at least 200 counts on the 2106 Integrator.
A count is defined as 1 tenth of a unit of what is set in the Integrator totalizer. If the Integrator totalizer is set to pounds, one pound is .1 pound; if the totalizer is set to tons, one count is .1 ton, etc.

The longer the material test is run, the more accurate the flow meter will be. All of the material in the material test should be pre-weighed or post-weighed on a high accuracy static scale to obtain the actual weight of the test material. This actual weight is entered into the Integrator to complete the test.

Two methods of Linearization are available, multi point automatic or multi point manual.

### 3.10.1 Multi-point Automatic Linearization

1. Press the **RUN** key for the Run Menu if not already there. Press the **MENU** key repeatedly until Main Menu 6 is displayed.

Press the LINEAR key to access Linearization. Scroll DOWN and the following screen displays.

   ![Linearization Menu](image)

   **Default:** NO

   **Selections:** YES, NO

   Press **CHOICE** for selections, **ENTER** to confirm.

   Select **YES** and press **ENTER** to confirm.

2. Press the **MENU** key repeatedly until Main Menu 1 is displayed.

   ![Main Menu 1](image)
Press SPAN CAL key and the following screen is displayed.

```
SPAN CALIBRATION
Multi point linear
>no<
CHOICE ENTER DELETE
```

**Default:** NO

**Selections:** YES, NO

Press CHOICE for selections and ENTER to confirm. Press DELETE to delete any previously acquired factors and the following screen is displayed.

```
DELETE LINEARIZATION
FACTOR
X
ALL DELETE ABORT
```

If Linearization was done previously, then old and unwanted correction factors must be deleted. If re-doing a calibration, you need not erase that factor since the new correction factor replaces the old one. The X represents factors 1 thru 5. Scroll UP or DOWN to select factor.

Press ALL to delete all factors that have been entered automatically or manually and the following screen is displayed for 3 seconds.

```
FACTORS DELETED
```

Press DELETE from the “DELETE LINEARIZATION” screen to only delete the displayed factor and the following screen displays for 3 seconds.

```
FACTORS X DELETED
```
After the 3 seconds, the display returns to the “DELETE LINEARIZATION” screen. Press ABORT and the display returns to the following screen.

```plaintext
SPAN CALIBRATION
Multi point linear
>no<
CHOICE ENTER DELETE
```

Password: Service

3. Press the CHOICE key to select YES, press the ENTER key to confirm. Scroll DOWN and the following screen is displayed.

```plaintext
FACTOR # 1
Prepare to run under
20% of full scale
CONT. END NEXT
```

Password: Service

Default: Factor: 1

Selections: 1 under 20%, 2 under 40%, 3 under 60%, 4 under 80%, 5 under 100%

4. Press NEXT to select the factor # and percent of full flow closest to the flow rate to be corrected. It is not necessary to acquire Factors in any specific order. The percents shown are only a guideline; Factors can be put in at any flow rate desired less than the Span flow rate - 100%. The minimum number of Factors to Linearize is 1.

5. Press END to return to Main Menu 1.

After selecting the desired Factor, press CONT. The following screen is displayed.

```plaintext
Press START soft key then run material
START
```

Pressing START inhibits totalization and the following screen displays.

```plaintext
000.00 Tons
000.00 Tph
Press DONE to end
DONE ABORT ADV
```
During this procedure, display resolution of totals is 10 times higher than normal.

Pressing the ADV key will change the display from “XXX.XX Tph” to “XXXX.X PFM”.

Pressing the ABORT key will abort the test and return to Main Menu 1.

Wait until all the material has passed over the impact plate, then press DONE. The following screen is displayed.

If NO is pressed the reference (actual) weight of the material is unknown. The Run Menu is displayed where the MAT’L is flashing to remind the operator the material test is incomplete. Pressing the key below the flashing MAT’L or the YES key, the following screen is displayed.

If the operator does not respond with Abort or Reference Weight, the display will time out and return to Main Menu 1. The information acquired during the test is lost. If the ABORT key is pressed the test is aborted, the information acquired during the test is lost, and Main Menu 1 is displayed. The operator must enter the actual weight of the material passed over the impact plate during the material test. Use the numeric keys to enter the actual weight and confirm with the ENTER key. If a number is entered for actual weight which the Integrator will not accept, the following screen is displayed.
Press RETURN to return to the “Enter reference weight” screen. A number for actual weight between the min and max must be entered. After entering an actual weight between min and max, the following screen is displayed.

<table>
<thead>
<tr>
<th>FACTOR # 1 DONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error 00.00%</td>
</tr>
<tr>
<td>Accept Factor?</td>
</tr>
<tr>
<td>YES ABORT ADV</td>
</tr>
</tbody>
</table>

Pressing the ADV key will change the display from “Error 00.00%” to “Diff. 00.00 Tons”.

Pressing the ABORT key aborts the test and the “Add reference weight to totals?” screen is displayed.

If the YES key is pressed and the FACTOR # 1 ACQUIRED screen is displayed the correction factor is accepted (#1 in this case).

If the YES key is pressed and the following - SETTING ERROR - screen is displayed, a number has been entered for actual/reference weight that the Integrator will not accept. One or more operating parameters of the Integrator are incorrect consult Thermo Electron.

<table>
<thead>
<tr>
<th>- SETTING ERROR -</th>
</tr>
</thead>
<tbody>
<tr>
<td>max 1.500000</td>
</tr>
<tr>
<td>min 0.500000</td>
</tr>
<tr>
<td>RETURN</td>
</tr>
</tbody>
</table>

Press the RETURN soft key and return the display to the FACTOR # 1 DONE screen. At the FACTOR # 1 DONE screen press the ABORT soft key and the following screen is displayed.

<table>
<thead>
<tr>
<th>SPAN CALIBRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add reference</td>
</tr>
<tr>
<td>weight to totals?</td>
</tr>
<tr>
<td>YES NO</td>
</tr>
</tbody>
</table>

Press YES if you want to add the material weight used for the test to the Master, Reset, and Operator totals. Press NO and the material weight is lost. Pressing YES or NO returns the display to Main Menu 1.

<table>
<thead>
<tr>
<th>FACTOR # 1 ACQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go to next step?</td>
</tr>
<tr>
<td>YES NO</td>
</tr>
</tbody>
</table>
Press YES if more factors are required. Repeat for all factors. Press NO if no more factors are required. Pressing NO returns to the “Add Reference Weight To Totals?” screen.

From Main Menu 1 press the SPAN CAL key and the following screen is displayed.

<table>
<thead>
<tr>
<th>SPAN CALIBRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi point Linear</td>
</tr>
<tr>
<td>&gt;yes&lt;</td>
</tr>
<tr>
<td>CHOICE ENTER DELETE</td>
</tr>
</tbody>
</table>

Default: NO
Selections: YES, NO

Press the CHOICE key to select NO and confirm with ENTER. Press the RUN key to return to the Run Menu. The Impact Flow Meter is now Linearized and you can run material.

### 3.10.2 Multi-point Manual Linearization

If Linearization was done previously, then old and unwanted correction factors must be deleted. If re-doing a calibration, you need not erase that factor since the new correction factor replaces the old one. See section 3.11.1 on how to delete correction factors.

Stop all material flow to the impact plate. From the Run Menu scroll DOWN once to access the Reset Total Menu. Press the RESET key and clear the Reset total. Press the MENU repeatedly key until Main Menu 6 is displayed. Press the LINEAR key, scroll DOWN once, select YES and press the ENTER key to confirm. Scroll DOWN once and the following screen is displayed.

- LINEARIZATION 2A -

<table>
<thead>
<tr>
<th>FREQ</th>
<th>FACTOR 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.00000</td>
</tr>
</tbody>
</table>

Start material flow to the impact plate at the desired rate. Wait until material is flowing steady at that rate. Press the ACQ key and the ACQ displays from the display for 5 seconds while the Integrator acquires the average PFM frequency signal from the DE10/DE20. The average PFM frequency is then displayed. Press the RUN key to access the Reset Total Menu. Wait for all the material to pass over the impact plate. Record the total weight from the Integrator display. The correction factor is calculated using the reference (actual) weight and the displayed weight from the Integrator. See the following example:
Press the MENU key until Main Menu 6 is displayed. Press the LINEAR key, scroll DOWN once. YES should be selected if not, use the CHOICE key to select YES. Scroll DOWN to display the “FACTOR 1” screen which has the previously acquired frequency. Pressing the FACT/FREQ key enables the operator to toggle between Factor or PFM Frequency entry.

Press the FACT/FREQ key until FACT is displayed. Press the FACT key and FREQ is displayed, use the numeric keys to enter the correction factor and confirm with the ENTER key. The “FACTOR 1” screen should now have a PFM frequency and a correction factor displayed, see the following example:

<table>
<thead>
<tr>
<th>LINEARIZATION 2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQ     FACTOR 1</td>
</tr>
<tr>
<td>850.6     1.1818</td>
</tr>
<tr>
<td>ENTER    ACQ    FACT</td>
</tr>
</tbody>
</table>

After entering the correction factor number press the RUN key to return to the Reset Total Menu, scroll UP once to return to the Run Menu. The Flow Meter now will use the just entered correction factor(s) when Linearization is enabled in Main Menu 6.

If more correction factors are desired to get better accuracy from the Impact Flow Meter, follow the same procedure as above for factors 2-5.

Do not acquire PFM frequency or enter a correction number for FACTOR 6.

Notes about Zero and Span:

A stable Zero is essential to keeping the Flow Meter operating at its best possible accuracy for your installation. Once the DE10/DE20 has been zeroed, it should not shift by more than +/- .1%. If you suspect that the Zero has indeed shifted it can be checked for stability by running several Auto Zeros consecutively. Note each % change but do not change the Zero. If the % change is consistently under +/- .1% the Zero is good and should not be changed. If the Auto Zero shows a repeating change of +2% as an example, the Zero has shifted. If any repeating Zero shifts of more than +/- .1% are encountered, check the mechanical installation using the DE10 or DE20 INSTALLATION AND OPERATION MANUAL as a guide.

The Span Calibration can be checked occasionally with a “material test”. It might be possible to get better accuracy from the Span Cal at 100% flow rate after initial calibration. After running several material tests record the error after each test but do not change any Span Cal information. Only update the Span Cal if you have a repeating error. Use the Manual Span procedure to change the Span number if needed.

If your maximum flow rate increases by more than 5% after the previous Span Cal was done, a Span Cal adjustment may be necessary to maintain accuracy. Use Auto Span Cal with material test.

If you have 2 or more completely different flow rates for the same material use Span Calibration, for the higher flow rate and put in a Linearization correction factor for the lower flow rate(s).
3.11 Permanent Scroll Record Setup Scrolls

**MAIN MENU 1**

**ZERO SCROLL**
Zero #

**SPAN SCROLL**
Span #

**MAIN MENU 2**

**DISPLAY SCROLL**
1. Measure Units
2. Totalization Units
3. Rate Units
4. Language
5. Time
6. Date
7. Run Display, Line 3
8. Damping Display Rate

**SCALE DATA SCROLL**
1. Max. Scale Capacity
2. Scale Divisions
3. Zero Dead Band Range

**CALIBRATION DATA SCROLL**
1. Calibration Interval Days
2. Calibration Date
3. Auto Zero Tracking • Yes • No
3A. Auto Zero Tracking Range %
3B. Auto Zero Tracking Max. Dev. %
3C. Auto Zero Tracking Time secs
### MAIN MENU 3

#### PROTECTION SCROLL
1. Protection Level
   - None
   - Ltd
   - Prot

#### DIAGNOSTICS SCROLL
1. PFM Gross

<table>
<thead>
<tr>
<th>PFM Net</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2A. PFM Output Zero
2B. PFM Output Max Rate
3. Service Password
4. Operator Password
5. Software Version
6. Date
7. Time
8. Board Type Slot #1
9. Board Type Slot #2
10. Board Type Slot #3
11. Board Type Slot #4
12. Board Type Slot #5
13. Board Type Slot #6

### MAIN MENU 4

#### I/O DEFINE SCROLL
1. Current Output #1 Define
2. Current Output #2 Define

<table>
<thead>
<tr>
<th>Current Output #1 Range</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Output #2 Range</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1A. Current Output #1 Delay
1B. Current Output #2 Delay

<table>
<thead>
<tr>
<th>Current Output #1 Damping</th>
<th>sec</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Output #2 Damping</th>
<th>sec</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>


2. Analog Input #1 Definition

<table>
<thead>
<tr>
<th>Moisture Input Calibrate</th>
<th>%</th>
<th>mA</th>
</tr>
</thead>
</table>

2A. Moisture Input Calibrate

2B. Moisture Input Calibrate

3. Analog Input #2 Definition

4. Digital Input Define

<table>
<thead>
<tr>
<th>Physical Input Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Alarm #1</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>External Alarm #2</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>External Alarm #3</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Print</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Reset Totals</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Reset Alarms</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Auto Zero</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Batch Start</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Batch Stop</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Batch Standby</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #1</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #2</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #3</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #4</td>
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<tr>
<td>/</td>
</tr>
<tr>
<td>Product #5</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #6</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #7</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #8</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #9</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Product #10</td>
</tr>
<tr>
<td>/</td>
</tr>
</tbody>
</table>

5. Digital Output Define

<table>
<thead>
<tr>
<th>Physical Output Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm</td>
</tr>
<tr>
<td>/</td>
</tr>
<tr>
<td>Shutdown</td>
</tr>
<tr>
<td>/</td>
</tr>
</tbody>
</table>
Micro-Tech 3106

Ready /  
High Rate /  
Low Rate /  
Totalizer /  
Batch Preset /  
Batch End /  
Air Purge /  

6. Remote Counter Division  
7. Remote Counter Pulse  
8. Air Purge Interval  
9. Air Purge Duration  

ALARMS SCROLL  

1. Rate Alarm  
   • Yes  
   • No  

1A. Low Rate Set  % sec  
1B. High Rate Set  % sec  

2. Alarm Set As  
   • Alarm  
   • Shutdown  
   • None  

#1 Clock Fail  
#2 Bad Weight Signal  
#3 RAM Fail  
#4 ROM Fail  
#5 High Rate  
#6 Low Rate  
#7 Warm Start  
#8 Cold Start  
#9 P.D. During Calibration  
#10 Time Elapsed Calibration  
#11 Ext. Alarm #1  
#12 Ext. Alarm #2
| #13 | Ext. Alarm #3       |
| #14 | Overflow Totalizer |
| #15 | AZT Limit          |
| #16 | Batch Deviation    |
| #17 | (Blank)            |
| #18 | BCD Overflow       |
| #19 | Math Error         |
| #20 | Printer Error      |
| #21/26 | HW Conf. Change |
| #27 | AB R I/O Error     |
| #28 | PROFIBUS-DP Error  |

**LOAD OUT SCROLL**

1. Preset Weight
2. Pre Act Correction
2A. Pre Act Value
3. Start Delay
4. Coasting Time
5. Batch Deviation
6. Print Batch
7. Position Batch Num. X = Y =
8. Position Batch Quant. X = Y =
9. Position Batch Total X = Y =
### MAIN MENU 5

#### COMM A SCROLL

1. Baud Rate Port #1
2. Set Parity Port #1
3. Stop Bits Port #1
4. Word Length Port #1
5. Protocol Port #1
5A. Clear to Send #1
6. Address Port #1
7. Access Prot Port #1
8. Baud Rate Port #2
9. Set Parity Port #2
10. Stop Bits Port #2
11. Word Length Port #2
12. Protocol Port #2
12A. Clear to Send #2
13. Address Port #2
14. Access Prot Port #2

### PRINT SCROLL

1. Handshaking
2. End of Line
3. Delay End of Line
4. Form Feed
5. Print Interval
6. Print Time #1
7. Print Alarms
8. Totals Report Format
9A. Number of Strings
9B. Contents String #1
9C. Position String Number #1
9D. Contents String #2
9E. Position String #2
9F. Contents String #3
9G. Position String #3
9H. Position Oper. Total
9I. Position Reset Total
9J. Position Master Total
9K. Position Date
9L. Position Time
9M. Position Rate
9N. Position Avg. Rate
9P. Position Running

**MAIN MENU 6**

**AUDIT TRAIL SCROLL**
1. Audit Trails  • Yes  • No

**LINEARIZATION SCROLL**
1. Linearization  • Yes  • No
2A. Factor 1
2B. Factor 2
2C. Factor 3
2D. Factor 4
2E. Factor 5
2F. Factor 6
### 3.12 Calibration Report

<table>
<thead>
<tr>
<th>Date</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>By</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale Capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calib. Constant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero - As Found</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- As Left</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span - As Found</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- As Left</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.13 Permanent Field Record

**Flow Meter Location** ______________________________________

**Date** ___________________________________________________

1. Flow Meter Capacity ____________________ (Tons Per Hour)
Chapter 4
Maintenance

The maintenance information in this manual should meet your service needs. If problems occur requiring technical assistance, contact Thermo Electron.

4.1 Frequent Checkpoints

The Micro-Tech™ 3106 Integrator is a solid-state device, and as such, 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 that 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 does develop, check the following before proceeding to more specific troubleshooting procedures.

1. Check Power
   - Check that the two (2) Line Voltage Selector Switches are set to the correct line voltage (see Section 2.4.1).
   - Check the fuses.
   - Check that the power switch is ON and that power is supplied to the unit.

2. Check Connections
   - Check that all terminations are secure
   - Check that the Display Module and Keyboard connectors are firmly seated in their connectors.
   - Check that the Remote Counter and optional input/output modules are secure in their sockets.
   - Check that all Jumpers are in their correct position.
4.2 Troubleshooting

This unit has built-in troubleshooting capabilities. A number of possible problems are automatically detected and screen messages are displayed. Also, refer to the Diagnostics Test Scrolls in Main Menu 3.

4.2.1 Alarm Message

The ALARM message is assigned to the right hand soft key when an alarm is pending. The ALARM message and its LED flash at the same time. The following screen is displayed when the right hand soft key is pressed.

```
ALARM    NEW
xxxxxxxxxxxxxxxxxxxxxxxxxx
MM-DD-YY    HH:MM
RESET    NEXT
```

The keyword “NEW” indicates an alarm that has not been acknowledged yet. When the operator presses the RESET key to clear the alarm, the alarm displays only if the reason that caused the alarm to occur is corrected. If the alarm is still pending, the keyword “ACK” is displayed instead of “NEW”.

The third line shows the date and time only if the optional COMM board is installed.

The NEXT key is used to scroll between the pending alarms. The string “xxxxxxxxxxxxxxxxxxxxxxxxxx” stands for one of the following alarm conditions.

4.2.2 Alarms List

1. Clock Fail
   The system has detected a failure on the clock calendar circuit. This alarm only occurs if the optional COMM board is installed.
   - Check the COMM board to see if it is properly inserted.
   - Replace the COMM board.

2. Bad Weight Signal
   The system has detected an error on the PFM signal.
   - Check the sensor connections, both at the Integrator and at the DE10/DE20 sensor.
   - Check the DE10/DE20 sensor.

3. RAM Fail
   The system has detected an error on the RAM checksum during the internal periodical test. The RAM (Random Access Memory) is used to store variables and set up data.
   - Replace the CPU board.
4. ROM Fail
The system has detected an error on the ROM checksum during the internal periodical test. The ROM (Read Only Memory) is used to store the program.
   - Replace the CPU board.
5. High Rate
The rate has been detected to be higher than the maximum rate entered in the ALARM SET UP MENU.
6. Low Rate
The rate has been detected to be lower than the minimum rate entered in the ALARM SET UP MENU.
7. Warm Start
The Integrator has detected a power loss condition, or power was removed for an undefined period of time.
8. Cold Start
The Integrator has detected the loss of the set up data after power was removed. It needs to be set up and calibrated.
   - Replace either the motherboard or the battery.

NOTE: The message COLD START never displays on the screen. This is because a Cold Start forces a start up procedure to be executed, and the alarm itself is cleared after the set up is completed. However, the alarm LED and the digital output will be showing an alarm during the initial set up procedure.

9. Power Down During Calibration
When the system is powered off while a calibration sequence is in progress, the flow meter may not be properly calibrated.
   - Check calibration.
10. Calibration Time Elapsed
If a calibration check time period 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 of time.
   - Check calibration.
11. External Alarm 1
Digital inputs can be programmed to detect external alarm conditions such as emergency switches, max level switches or other. This alarm is associated to the external alarm 1.
   - Check external alarm #1.
12. External Alarm 2
   - Check external alarm #2.

13. External Alarm 3
   - Check external alarm #3.

14. Overflow Totalizer
   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 remote counter divider has been set too small.
   - Check the rate.
   - Check and eventually increase the remote counter divider.
   This message is also displayed if the Master Totalizer rolls over.

15. AZT Over limit
   The Auto Zero Tracking function has reached the maximum limit of tare allowed that will clear automatically. The zero may have shifted or the DE10/DE20 is not level.
   - Investigate and correct the zero shift.
   - Electronically level the DE10/DE20 sensor.

16. Batch Deviation
   This alarm is only visible if the optional Load Out board is installed. It is generated when a batch is run and the error detected at the end of the batch is higher than specified.
   - Check the parameters of the load out.
   - Adjust the percent value.

17. BCD Overflow
   This message is only displayed if the optional Digital or Load Out Digital (4 in/16 out) output board is installed. If the variable to be converted in the BCD format has more than 4 digits, the alarm is generated.
   - Check the size of variables and the BCD data setup.

18. Math Error
   A divide by zero or overflow error is encountered during internal calculations. This message indicates some abnormal dimensional parameter is entered in setup.
   - Check setup data.
19. Printer Error
This message is displayed if the system has data to print and the printer is disconnected or the paper feed is empty.

20. Hardware Configuration Changed
When a new board is installed or a board removed, this message displays. Refer to Section 3.5.1.

21. Allen Bradley Remote I/O Error
This message is displayed if communication is interrupted. The green LED on the A B R/O board will be flashing. The alarm does not come on if communication was never started.

22. PROFIBUS-DP Error
This message is only displayed if the optional PROFIBUS board is installed. The following two conditions activate the alarm.

A. If the Siemens SP 3 controller installed on the PROFIBUS interface board does not recognize any successful data transfer within the watchdog timer interval.

B. If the received data contains errors (value overlaps limits, register number does not exist, group number does not exist).

4.2.3 Micro-Tech Integrator Cold Start
It may sometimes be necessary to cold start the Micro Tech™ 2106 Integrator in event the software becomes corrupted. The option is available of installing the factory default constants or simply returning the Integrator to its previous running state. Steps required to cold start:

Press and hold in at the same time, the LEFT HAND ARROW key and the CLEAR key until the following screen displays:

Install Factory Defaults?

NO YES

Pressing NO returns the Integrator to the Run Menu.

If YES is pressed, the following screen displays

- MEMORY ERASED -
Choose the language key to continue to
ITA USA
When the above screen displays, all field entry data has been replaced by the factory default constants. Proceed to Initial Setup Procedure, Section 2.5.

**NOTE:** If the software corruption was catastrophic and the memory does not ease in the above steps, do the following:

Press and hold in the LEFT HAND ARROW key and CLEAR key. While holding in both keys, cycle line power. In the event the MEMORY ERASED screen does not appear, consult the factory.

### 4.2.4 Internal Test Procedure

From the Run Menu press the MENU key until Main Menu 3 displays. Press the TEST soft key then scroll DOWN twice and the following screen is displayed.

<table>
<thead>
<tr>
<th>- TEST SCROLL 2 -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal test of</td>
</tr>
<tr>
<td>microprocessor</td>
</tr>
<tr>
<td>START</td>
</tr>
</tbody>
</table>

Password: Service

When start is pressed, the following screens appear are displayed in sequence:

<table>
<thead>
<tr>
<th>- TEST SCROLL 2A -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing ROM</td>
</tr>
<tr>
<td>TEST PASSED</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>- TEST SCROLL 2B -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing RAM</td>
</tr>
<tr>
<td>TEST PASSED</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>- TEST SCROLL 2C -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing E2PROM</td>
</tr>
<tr>
<td>TEST PASSED</td>
</tr>
</tbody>
</table>

Only if Audit Trail Option is installed

The message "Test PASSED" is displayed if the test runs correctly. If something wrong is detected, then the message "Test FAILED" is displayed, and the soft key CONTINUE is shown. The operator has to press the key to go on to the next test.
Note: Test 2C requires a hardware jumper to be installed between serial in and serial out pins of the motherboard. Since the jumper is not normally in place, a “Test FAILED” message at the end of Test 2C is normally displayed.

If the internal test has failed, call Thermo Electron's Customer Service Department.

4.2.5 Sensor Excitation Signal

1. Measure DC volts across TB9, terminals 11 and 12 (or TB12, terminals 7 and 8 for panel mount unit). This voltage should be 11 to 15 volts.

2. To verify proper operation of the pre amplifier mounted on the DE10/DE20, measure DC volts across terminals 6 and 7. This voltage should be 0 to 2 volts, depending on where the LVDT core is located.

4.2.6 Resetting Master Total Procedure

Steps required to reset the master total or to reset remote counter overflow are given below:

1. If no password is installed
   A. Use the MENU key to select Main Menu 3
   B. Press the DIAG soft key and scroll down to the Service Password screen
   C. Type in a password (Example: 123) and press ENTER.
   D. Re enter the password and press ENTER.
   E. Select Main Menu 3.
   F. Press PROT scroll and press PROT soft key.
   G. Press the NONE soft key.
   H. Type in password 7832500 and press ENTER. The protection level should be Thermo Electron.
   I. Press the TOTAL key on the touch panel. Scroll UP or DOWN if needed to reach the Master Total screen.
   J. Press the RESET soft key and answer YES to REST MASTER TOTAL?
   K. Select Main Menu 3. Press the DIAG soft key and scroll DOWN to Service Password.
   L. Press ENTER twice, erasing the password installed in Step 3.
   M. Press the RUN key to return to normal operation.
2. If Password is already active
   A. Select Main Menu 3.
   B. Press the PROT scroll and press the PROT soft key.
   C. Press the NONE soft key.
   D. Type in password 7832500 and press ENTER. The protection level
      should be RAMSEY.
   E. Press the TOTAL key on the touch panel. Scroll up or down if needed
      to reach the Master Total screen.
   F. Press the RESET soft key and answer YES to Reset Master Total?
   G. Select Main Menu 3.
   H. Press the PROT scroll and choose the password level desired.

4. Remove a Forgotten Password

4.2.7 To Remove a Forgotten Password

1. Select Main Menu 3.
2. Press the PROTECT scroll and press the PROT soft key.
3. Press the NONE soft key.
4. Type in password 7832500 and press ENTER. The protection level should
   be RAMSEY.
5. Press NONE.
6. Select Main Menu 3.
7. Press the DIAG soft key and scroll down to Service Password.
8. Press ENTER twice. The display should respond with New Password
   Acquired.
9. Scroll down to Operator Password. Press ENTER twice. The display should
   respond with New Password Acquired.
10. Select main Menu 3. The PROT soft key should not appear, indicating all
    passwords have been erased. If PROT should appear, repeat Steps 1 through
    9.
11. See Manual Section 3.11 for entering new passwords.
4.3 Cleaning Instructions

The Micro Tech™ 3106 Integrator is a solid-state device, and as such, 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 that all wires, plugs, and integrated circuits are tight in their connectors. Also, keep the enclosure door tightly closed to prevent dirt infiltration.
Chapter 5
Service, Repair, and Replacement Parts

This chapter provides information about service, repair, and replacement parts for your Thermo product. It includes the telephone numbers for various departments at Thermo, the procedure for ordering replacement parts, a Return Material Authorization Form, and the parts list for the product are also included in this chapter.

The maintenance information in this manual is designed to meet your service needs. If you should encounter a problem that requires technical assistance, you may call Thermo Product Service at (763) 783-2605.

Thermo also provides on-site service technicians to assist customers with installation, setup, initial calibration, customer training, maintenance, and repair. Contact the Thermo Field Service department at the number given below for current rates and scheduling.

Thermo has repair centers located at the plant in Minneapolis, Minnesota. Products that need system checkout or repair can be returned to the plant with the Return Material Authorization (RMA) Form. Contact our Repair and Return department (763) 783-2728 to get an RMA number to use on the form.

Note: Have your machine model number and serial number available when you call.

<table>
<thead>
<tr>
<th>Service Description</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Switchboard</td>
<td>(763) 783-2500</td>
</tr>
<tr>
<td>FAX</td>
<td>(763) 783-1537</td>
</tr>
<tr>
<td>Service</td>
<td>(763) 783-2605</td>
</tr>
<tr>
<td></td>
<td>(763) 783-2605</td>
</tr>
<tr>
<td>Return Material Authorization &amp; Repair</td>
<td>(763) 783-2728</td>
</tr>
</tbody>
</table>
5.1 Parts Ordering Information

For the fastest service when ordering parts, telephone or FAX the Thermo Parts Department at the numbers given below. Your regional field service representative can also assist you with parts orders.

The recommended procedure for ordering parts is:

1. Determine the broken or faulty part.
2. Locate the part in the Parts List.
3. Find the part number(s) for the item(s) you need.
4. Before you contact Thermo for your parts, make sure you have the following information:
   - Machine model and serial number
   - Purchase Order number
   - Date Required
   - Preferred shipping method
   - Part number(s), description, and quantity needed.
   - Telephone or FAX:

Thermo Electron Corporation
Customer Service Department
501 90th Ave. NW
Minneapolis, MN  55433

FAX:  (763) 780-2525
Phone:  (763) 783-2500
Return Material Authorization and Repair:  (763) 783-2774
(This RMA Number Must Be Marked On All Paperwork And On Outside Of Package)

Req’d. By: ___________________________ Return, Freight Prepaid To: Thermo Electron Corporation

Date: ___________________________ 501 90th Avenue N.W.

Customer: ___________________________ Minneapolis, MN 55433

Contact: ___________________________

Phone: ___________________________

Area Code: ( )

Bill To Customer #: ___________________________ Ship ___________________________

Returned From: ___________________________ Return To: ___________________________

Description Of Material Being Returned:

__________________________________________________________________________

__________________________________________________________________________

Describe Equipment Malfunction Or Defect, If Any: Symptoms:

__________________________________________________________________________

__________________________________________________________________________

Minimum Charge

☐ Informed Customer of Service Requested:  ☐ Inspection Charge Per Item

☐ Repair & Return  ☐ P.O. No.: ___________________________

☐ Return for Credit  ☐ Original P.O. or Thermo Order: ___________________________

☐ Warranty Repair or Replacement  Serial: ___________________________

☐ Original P.O. #: ___________________________ Original: ___________________________

☐ Return Warranty/Exchange Unit  Shipped on Thermo Order No.: __________________

☐ Other: ___________________________

Disposition/Comments: (Thermo Electron Internal Use Only)

__________________________________________________________________________

__________________________________________________________________________
5.2 Replacement Parts

MICRO-TECH™ 3000 Model 3106 Impact Flow Meter Integrator

- Chassis Assembly, Panel Mount 049139
- Chassis Assembly, Field Mount 050105
- PCBA, Mother Board 051324
- PCBA, PFM Input 050831
  - PCBA, Analog Output (1 out) 049004
  - PCBA, Analog Output (2 in/2 out) 049003
- PCBA, DIO (4 in/16 out) 046841
- PCBA, DIO (16 in/4 out) 046844
- PCBA, Comm "A" Select one only 046853
- RS-232C
- RS-485, std. (point to point)
- RS-485, multi-drop
- 20 mA (digital) current loop
- PCBA, Allen-Bradley RI/O 055517
- PCBA, PROFIBUS-DP 056713
- PCBA, LED Assembly 046847
- PCBA, Display Assembly 046860
- PCBA, Touch Panel Model 2106 048422
- PCBA, Field Terminal Entry (Field Mount Only) 047572
- PCBA, Load Out DIO (4 in/16 out) 049475
- PCBA, Load Out DIO (16 in/4 out) 049476
- Fuse, Slo-Blo, 200mA (F1 220V) (Type T) 001366
- Fuse, Slo-Blo, 400mA (F1 110V) (Type T) 002443
- Fuse, Fast-Blo, 4.0 Amp (FT Board) (Type T) 037287
- Battery, Lithium, 3.0 V, 1.2 AH, 2/3 A 037188
- Transformer, Power 046863
- Module, Power Input 180-240 VAC 047646
- Module, Power Input 90-120 VAC 047575
- Module, Power Input 10-32 VDC 048162
- Module, Power Output 24-240 VAC 046814
- Module, Power Output 5-60 VDC 046815
5.3 Disposal of Hazardous Waste

Disposal of lithium batteries and soldered printed circuit boards must be in accordance with your local Hazardous Waste Policy.

As an alternative product supplied by Thermo may be returned freight pre-paid, for disposal. Contact the Repair Department for a Return Material Authorization Number before shipping any product for disposal.

5.3.1 Replacement of Lithium Battery

The Integrator volatile memory backup battery can be replaced without any special tools.

1. Record all configuration, setup, and calibration data before removing the battery. All information is lost when the battery is removed.

2. Turn the Integrator power off at the main.

3. Remove the battery from its compression socket.

4. Observe the polarity markings on the battery socket base before inserting the new battery. Battery Type=Lithium, 3V, 1.2AH, 2/3A, Thermo Electron Part Number 037188.

5. Insert battery.

6. Restore power to the Integrator.

7. Cold start the Integrator. See cold start procedure in Section 4.3.3.

8. Re enter all data recorded in Step 1.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED.</td>
</tr>
<tr>
<td>Replace only with same or equivalent type recommended by Thermo Electron. Dispose of used battery according to manufacturers instructions on the battery or return to Thermo Electron. See 5.3.</td>
</tr>
</tbody>
</table>
**********
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Appendix A
Digital Input/Output

The Micro-Tech 3106 has provisions for up to (24) total programmable digital inputs and (24) total programmable digital outputs.

Four programmable solid state inputs are accessed on the Motherboard (TB2). Three programmable isolated relay outputs and one non-programmable Micro-Tech hardware Fault isolated relay output are accessed on the Relay Output board. One programmable solid-state output is accessed on the Motherboard (TB1). Additional I/O up to the limit of (24) each can be added with optional Digital I/O board(s).

A.1. Mother Board Digital I/O

A.1.1. Inputs

1. (4) Programmable solid state (DC) inputs (Appendix Figure A-1)
   - Optically isolated
   - Powered by internal +24 V DIO supply, 6 mA maximum
   - Cable Length: 150 ohm maximum. (7500 ft of 20 AWG)

Appendix Figure A-1: General Purpose Digital Inputs

A.1.2. Outputs

1. (3) Programmable isolated relay outputs, one non-programmable hardware Fault isolated relay output, one programmable solid-state output (Appendix Figure A-2 and Appendix Figure A-3).
   - Isolated Relay Outputs
   - Solid state Output
Appendix Figure A-2: Isolated Relay Outputs

Appendix Figure A-3: Solid State Output
A.2. Digital Input/Output Board Configuration

In addition to the programmable digital inputs and outputs on the Mother board, optional Digital I/O (DIO) expansion boards can be added. Available boards are DIO input board 16 inputs/4 outputs, output board 16 outputs/4 inputs or 20 inputs/20 outputs by adding both boards.

Both DIO boards provide isolated contact closure inputs and 24 volt current sinking (default) or current sourcing (consult Factory) isolated outputs. The DIO input board connector J16 is a male 25 pin sub-miniature D connector and the DIO output board connector J15 is a female connector.

Internal or external 24 VDC power for the DIO boards is controlled by selectable jumpers OP1 and OP2 located on the lower right hand side of the DIO boards (Figure A/1-3). All inputs and outputs use the same selected power supply. See table below for jumper positions.

<table>
<thead>
<tr>
<th>JUMPERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWER SOURCE</strong></td>
</tr>
<tr>
<td>Internal</td>
</tr>
<tr>
<td>External</td>
</tr>
</tbody>
</table>

The isolated contact closure inputs are activated by completing the circuit from the input to the negative side of the 24 VDC supply. Approximately 6 mA of current flows out of each input during contact closure.

The outputs of the DIO boards use 2803 current sinking (default) type IC’s. The output IC’s are installed in sockets to allow replacing the output IC only, rather than the board if the IC is damaged.

The output IC’s can be replaced with 2981 type IC’s for current sourcing applications. Wire jumpers W1 thru W4 must be relocated for current sourcing (see Figure A/1-3). In most cases, it is recommended that the boards be returned to the factory for converting from current sinking (default) to current sourcing. See table below for jumper positions.

<table>
<thead>
<tr>
<th>JUMPERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CURRENT</strong></td>
</tr>
<tr>
<td>Sinking</td>
</tr>
<tr>
<td>Sourcing</td>
</tr>
</tbody>
</table>
Appendix Figure A-4: Digital Input/Output Boards
A.2.1. 16 In/4 Out DIO Board Specification (Figure A/1-4)

1. (16) Programmable inputs
   See Section 1.1.1 specifications.
2. (4) Programmable outputs
   See Section 1.1.2 specifications.
3. Connector
   25 pin D connector (male). Connector is interchangeable with a 20 or 22 pin subminiature D connector dimensionally complying with MIL-C-24308.
A.2.2. 4 In/16 Out DIO Board Specification (Figure A/1-4)

1. (4) Programmable inputs
   See Section 1.1.1 specifications.

2. (16) Programmable outputs
   See Section 1.1.2 specifications.

3. Connector
   25 pin D connector (female). Connector is interchangeable with a 20 or 22 pin subminiature D connector dimensionally complying with MIL-C-24308.

Figure 5-1: Digital Input/Output
A.1. BCD Input Option

Load sizes for load out or batching applications can be remotely entered by BCD. An optional Load Out input output board is required.

See Figure A/1-5 for wiring.
************
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Appendix B
Micro-Tech 3106 Menus

The Integrator is a menu driven machine that allows the operator to access all setup, test, and calibration parameters. Main Menu screens 1 through 6 can be accessed at anytime by pressing the MENU key until the desired menu screen is displayed. Menu scrolls may be selected by pressing the soft key directly below the desired scroll, and then using the Up/Down scroll key.

If the Integrator is password protected, the appropriate password must be entered prior to making changes or performing routine calibration. Menus may be viewed without entering a password, but no entries are allowed unless the password is entered.

Optional menu scrolls are only available if the available option has been installed. The following screens are activated by the MENU key.

- MAIN MENU 1 -
  Press MENU for more
  ZERO SPAN PROD
  CAL CAL SETUP

- MAIN MENU 2 -
  Press MENU for more
  SCALE CALIB
  DISPLY DATA DATA

- MAIN MENU 3 -
  Press MENU for more
  PROT DIAG TEST

- MAIN MENU 4 -
  Press MENU for more
  I/O ALARMS LOAD
  DEFINE DEFINE OUT
B.1. Main Menu 1

Main Menu 1 contains the Calibration Menu and Product Selection Mode Menu. Menu 1 is selected by pressing the MENU key until Main Menu 1 displays. Desired calibration scrolls are selected by pressing the soft keys directly below the desired scroll.

B.1.1. Zero Calibration

See Section 3.9.1

B.1.2. Span Calibration

See Section 3.9.2

B.1.3. Product Setup

See Section 3.9.3
B.2. Main Menu 2

Main Menu 2 contains the setup and configuration menus. Main Menu 2 is selected by pressing the MENU key until Main Menu 2 displays. Setup scrolls are selected by pressing the key directly below the desired scroll.

<table>
<thead>
<tr>
<th>- MAIN MENU 2 -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press MENU for more</td>
</tr>
<tr>
<td>SCALE</td>
</tr>
<tr>
<td>CALIB</td>
</tr>
<tr>
<td>DISPLY DATA</td>
</tr>
<tr>
<td>DATA</td>
</tr>
</tbody>
</table>

B.2.1. Display

Press the DISPLY soft key and the following screen displays.

- START OF SCROLL -
Use SCROLL keys to view selections.

Press the SCROLL DOWN key and the following screen displays

- DISPLAY SCROLL 1 -
Measure Units
> English <
CHOICE ENTER

Password: Service

1. Define Measure Units. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection

Default: ENGLISH
Selections: ENGLISH, METRIC, MIXED

If ENGLISH, all units in USA
If Metric, all units in Metric
If Mixed, units can be a combination of USA and Metric

Scroll DOWN and the following screen displays.
The units to be used for totalization are selected here. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

If ENGLISH: Default: Tons
Selections: Tons, LTons, Pounds

If METRIC: Default: tonnes
Selections: tonnes, kg

If MIXED: Default: tonnes
Selections: tonnes, Pounds, Tons, LTons, kg

Scroll DOWN and the following screen displays.

The units to be used for rate are selected here. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

If ENGLISH: Default: Tph
Selections: Tph, LTph, Lb/m, T/m, LT/m, percent %, Lb/h

If METRIC: Default: t/h
Selections: t/h, kg/m, t/m, percent %, kg/h

If MIXED: Default: t/h
Selections: Lb/h, Tph, LTph, kg/m, t/m, Lb/m, T/m, LT/m, percent %, kg/h, t/h
2. Defining the Language

The Micro-Tech™ 3106 is capable of displaying one of two different languages. English or (USA) and Italian (ITA) are the standard languages provided. Other languages, such as German (GER) and Spanish (ESP) are available upon request (consult factory).

Scroll DOWN and the following screen displays.

Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

```
- DISPLAY SCROLL 5 -
Language
>USA<
CHOICE ENTER
```

Default: USA
Selections: USA, ITA (Italian)

3. Setting Time and Date

This section applies only if the COMM board is installed. The user has to define the format for displaying and printing time and date.

Scroll DOWN and the following screen displays.

Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

```
- DISPLAY SCROLL 6 -
Time
>am/pm<
CHOICE ENTER
```

Default: am/pm
am/pm, 24h

Scroll DOWN and the following screen displays.
Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

- DISPLAY SCROLL 7 -
  
  Date
  >MM-DD-YYYY<
  CHOICE ENTER

If language is USA

Default: MM-DD-YYYY

If language other than USA

Default: DD-MM-YYYY

Selections: DD-MM-YYYY, MM-DD-YYYY, YYYY-MM-DD

4. Setting Line 3 of the Run Menu

The Run Menu can be configured to display any of the following on Line 3:

- Product (if COMM is installed)
- Date (if COMM is installed)
- Time (if COMM is installed)
- No Display (the default selection).

Scroll DOWN and the following screen displays.

Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

- DISPLAY SCROLL 8 -
  
  Run display line 3
  >No display<
  CHOICE ENTER

Password: Operator

Default: NO DISPLAY

Selections: NO DISPLAY, PRODUCT, DATE/TIME (only if COMM is installed)
5. Setting Damping for the Display Rate

The material flow displayed rate on the screen can be damped by entering an averaging time. This will average out/dampen variations in the flow rate making the display easier to read. This damping of the display rate does not affect the current out variable. The current out variable has a separate damping setting available thru Main Menu 4, I/O define.

Scroll DOWN and the following screen displays.

Use the numeric keys to enter the averaging/damping time in seconds, and confirm with the ENTER key.

<table>
<thead>
<tr>
<th>Default:</th>
<th>2 sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min:</td>
<td>0 sec</td>
</tr>
<tr>
<td>Max:</td>
<td>400 sec</td>
</tr>
</tbody>
</table>

Press the MENU key to return to Main Menu 2.

B.2.2. Scale Data

Press the SCALE DATA soft key and the following screen displays:

Press the scroll down key until each of the following screens display:

Password: Operator
1. Scale Capacity and Divisions

Scroll down and the following screen displays:

- SC DATA SCROLL 1 -
Max scale capacity
10 Tph
ENTER

- SC DATA SCROLL 2 -
Scale Divisions
>0.1<
CHOICE ENTER

- SC DATA SCROLL 6 -
Zero Dead-Band Range
2.0%
ENTER

Password: Service

Password: Service

Password: Service

2. Setting the Dead Band

The dead band is a percentage of the Max Scale Capacity (rate) below which the flow rate is ignored (if any) and a zero rate is forced. All totalizers except remote pulse totalizer are disabled when the flow rate is below the dead band threshold. Use the numeric keys to enter the dead band percentage and confirm with the ENTER key.

Default: 2%
Min: 0%
Max: 5%

Dead band is useful when the installation has severe vibrations and the zero is unstable. Zero unstable means zero repeats sometimes but drifts. Increasing the dead band percentage can make for a more accurate flow meter installation with the above conditions by ignoring the insignificant impact plate movements caused by vibrations.

Press **MENU** to return to Main Menu 2.
B.2.3. Calibration Data

The Cal Data scroll allows the operator to enter or set parameters which relate to the calibration of the Flow Meter.

Press the CALIB DATA soft key and the following screen displays.

Scroll DOWN and the following screen displays:

1. Entering Calibration Interval

If an optional COMM board is installed, the system can be programmed to prompt the operator when the next calibration is due. If this option is not desired, confirm the default 0 days interval, otherwise enter the number of days using the numeric keys. The calibration date displayed in Scroll 9 is automatically updated whenever a calibration is done. If a non-zero number is entered, an alarm displays after the time is elapsed. The alarm can only be cleared after a calibration check is done. Use the numeric keys to enter the calibration interval and confirm with the ENTER key.

Password: Operator

Default: 0 Days
Min: 0 Days
Max: 365 Days
2. Defining Auto Zero Tracking

A periodic auto zero procedure can be automatically executed by the system if the Auto Zero Tracking option is set to YES. If YES is selected, Auto Zero Tracking is enabled anytime the product flow has stopped and the rate falls below the range setting selected with CAL DATA SCROLL 3A.

Default: NO
Selections: NO, YES

Auto Zero Tracking is not recommended for most impact weighing applications. If you are going to use Auto Zero Tracking, contact Thermo Electron field service first.

The following scrolls are only visible if Auto Zero Tracking is enabled - set to YES on CAL DATA SCROLL 3.

Set AZT to YES and scroll DOWN the following screen displays. Define the range of action of the AZT with reference to Max. Scale Capacity (rate) using the numeric keys and confirm with the ENTER key. A flow rate greater than the range setting deactivates AZT.

Default: +/-4%
Min: +/-0%
Max: +/-10%
Scroll DOWN and the following screen displays.

-CAL DATA SCROLL 3B-  
Password: Service  
Auto zero tracking  
max dev +/- 4.0%  
ENTER

Define the maximum amount of zero error (with reference to Max. Scale Capacity) that AZT can automatically compensate. Use the numeric keys to enter the max dev and confirm with the ENTER key.  
Default: +/- 4%  
Min: +/- 0%  
Max: +/- 10%

Scroll DOWN and the following screen displays.

-CAL DATA SCROLL 3C-  
Password: Service  
Auto zero tracking  
time : 10 sec  
ENTER

Default: 10 sec  
Min: 1 sec  
Max: 60 sec

Define the time used for averaging the impact plate position in determining zero. The system zeros the flow meter averaging the impact plate position for the time defined, only after the flow rate has been permanently lower than the defined range for the same amount of time. Use numeric keys to enter auto zero tracking time and confirm with the ENTER key.
B.3. Main Menu 3

Main Menu 3 is used for protecting and un-protecting the system using passwords, and to perform diagnostic and test functions. The diagnostic functions can only be operated after removing all password protections and should only be used by experienced technical personnel. Most test functions are not password protected. Main Menu 3 is selected by pressing the MENU key until Main Menu 3 displays.

The PROTection menu only becomes visible after passwords have been defined (see the DIAGnostics menu)

B.3.1. Changing the Protection Level

The Micro-Tech™ 3106 has three protection levels to which specific passwords are related.

The protection levels and the passwords are defined using the following scheme:

<table>
<thead>
<tr>
<th>PROTECTION</th>
<th>PASSWORD</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>SERVICE</td>
<td>The system is totally un-protected; all data can be read or changed.</td>
</tr>
<tr>
<td>LIMITED</td>
<td>OPERATOR</td>
<td>Operator functions and data are unprotected. All setup and calibration data are protected except zero calibrate.</td>
</tr>
<tr>
<td>PROTECTED</td>
<td></td>
<td>The system is totally protected, process data can be read, no change allowed.</td>
</tr>
</tbody>
</table>

A SERVICE password is required to access the NONE level. An OPERATOR or a SERVICE password is required to access the LIMITED level.

Press the PROT soft key and the following screen displays.

Use the NONE key to access the NONE protection level. If the current level is not already NONE, the SERVICE password it required.

Use the LTD key to access the limited protection level. If the system is in level NONE, change is immediate. If it is in PROT level, the SERVICE or OPERATOR password is required. Use the PROT key to access the protected level. No password is required.
Default: NONE
Selections: NONE, LIMITED, PROTECTED
Password: from NONE to LTD or PROT: not required
from LTD to PROT: not required
from LTD to NONE: SERVICE
from PROT to NONE: SERVICE
from PROT to LTD: OPERATOR or SERVICE

Pressing the soft key gives entry into desired level. Going from a low level to a higher level forces the password entry.

1. 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 the operator tries to enter a variable or select a function which is password protected, and the password is installed, the following screen is displayed.

```
- SYSTEM PROTECTED -
P USING ENTER
PASSWORD __________
ENTER
```

The operator can enter either the OPERATOR or the SERVICE passwords. However, if the operator enters the OPERATOR password and the variable or function requires the SERVICE password instead, the access is denied and the following screen is displayed.

```
- SYSTEM PROTECTED -
P USING ENTER SERVICE
PASSWORD __________
ENTER
```

If the operator fails to enter the correct password, the following screen displays.
Pressing RETURN returns the program to the previous function. If the operator enters the correct password, the previous screen displays 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.

B.3.2. Diagnostics

Press the DIAG key from Main Menu 3 and the following screen displays.

- SYSTEM PROTECTED -
  INVALID PASSWORD
  ACCESS DENIED
  RETURN

Scroll DOWN and the following screen displays.

- START OF SCROLL -
  Use SCROLL keys to
  view selections.

Scroll DOWN and the following screen displays.

- DIAGNOST. SCROLL 1 -

 PFM gross  0000.0
 PFM net    0000.0

1. PFM Raw Data

Diagnostic Scroll 1 shows the raw data from the sensor and the net value after the zero constant has been subtracted. The allowable range of the PFM gross signal is from 70 to 2500 Hz.

Scroll DOWN and the following screen displays.

2. Change Passwords

- DIAGNOST.
  SCROLL 3 -
  Enter SERVICE
  password  ********
  ENTER

Default: No password
The password can be changed by entering a new one. The user can enter up to eight characters (numeric keys entries). The entered numbers are not echoed on the screen. Pressing just the ENTER key removes the password.

After the password has been entered, the system asks for confirmation. This prevents losing access control due to a typing mistake while entering passwords.

If the password entered the second time matches the first, the following screen confirms the entry.

```
-DIAGNOST. SCROLL 3-
Reenter SERVICE
password *******
Enter
```

If the two passwords do not match, the system does not accept the new password, and the following screen displays:

```
-DIAGNOST. SCROLL 3-
NEW PASSWORD
ACQUIRED
RETURN
```

Scroll DOWN and the OPERATOR password screen displays:

```
-DIAGNOST. SCROLL 3-
INVALID PASSWORD
RETURN
```

The OPERATOR password is double checked similarly to the SERVICE password.

It is strongly suggested to write down the password and preserve a copy in a safe place. If the password is forgotten, refer to Section 4.2.7.

```
-DIAGNOST. SCROLL 4-
Enter OPERATOR
password *******
Enter
```

Default: No password
Scroll down and the Software Version screen displays.

3. Display Software Version

```
- DIAGNOST.
SCROLL 5-
Software version:
00.00.00.00.
```

The software version is displayed for reference only.

Scroll down and the date screen displays:

4. Setup Date and Time

```
- DIAGNOST.
SCROLL 6-
Date DD-MM-YYYY
DAY DD
ENTER
```

Default: 00-00-0000
Min: 01-01-0000
Max: 12-31-2096

Password: Service

This section only applies if a COMM board is installed. The user can set the current date and time. A battery operated clock calendar then maintains time and date even if power is removed. Day, Month, and Year are entered in sequence using the numeric keys and confirm with ENTER.

Scroll DOWN and the time screen displays:

```
- DIAGNOST.
SCROLL 7-
Time 9:50a
HOURS: 9 am
ENTER AM/PM
```

Default: 00:00 01:00
Min: 00:00 01:00
Max: 23.59 12:59

- DIAGNOST.
Time is entered in a similar way. The AM/PM key is used when time is in the English mode. Hours and minutes are entered in sequence using the numeric keys and confirm with ENTER. See Display Scroll 7 in Main Menu 2.

Scroll DOWN and the hardware configuration screens appear as follows.

5. Check Hardware Configuration

The system automatically recognizes when optional boards are installed. The following scrolls are used to show the configuration. Remember that 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.

The following screen is displayed for each board installed is each slot.

<table>
<thead>
<tr>
<th>-DIAGNOST. SCROLL 8-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board type slot #1</td>
</tr>
<tr>
<td>BOARD TYPE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>-DIAGNOST. SCROLL 9-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board type slot #2</td>
</tr>
<tr>
<td>BOARD TYPE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>-DIAGNOST. SCROLL 10-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board type slot #3</td>
</tr>
<tr>
<td>BOARD TYPE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>-DIAGNOST. SCROLL 11-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board type slot #4</td>
</tr>
<tr>
<td>BOARD TYPE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>-DIAGNOST. SCROLL 12-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board type slot #5</td>
</tr>
<tr>
<td>BOARD TYPE</td>
</tr>
</tbody>
</table>
BOARD TYPE can be:

- **PFM BOARD**: Standard board which reads/excites LVDT
- **Dig I/O 16in/4out**: Optional digital input output board.
  - #16 Optocoupled digital Inputs
  - #4 Optocoupled digital outputs
- **Dig I/O 4in/16out**: Optional digital input output board.
  - #4 Optocoupled digital inputs
  - #16 Optocoupled digital outputs
- **Load Out 16in/4out**: Optional digital input output board dedicated to the Load Out.
  - #16 Optocoupled digital Inputs
  - #4 Optocoupled digital outputs
- **Load Out 4in/16out**: Optional digital input output board dedicated to the Load Out.
  - #4 Optocoupled digital inputs
  - #16 Optocoupled digital outputs
- **Analog I/O**: Optional analog input output board.
  - #2 Current outputs
  - #2 Voltage inputs
- **Current Out**: Optional current output board.
  - #1 Current output
- **Communication A**: Serial communication board (RS232, RS485)
- **Communication B**: AB RI/O board
  - PROFIBUS-DP
Scroll **DOWN** and the Last Span PFM screen displays:

```
- DIAGNOST. 
SCROLL 14- 
LAST SPAN PFM 
0000.0
```

This screen displays the last PFM acquired for the LAST span calibration.

### B.3.3. Tests

1. **Lamp Test**

From Main Menu 3 press the TEST soft key and the following screen displays.

```
- TEST SCROLL 1 - 
LAMP TEST 
START
```

Press START to begin Lamp Test of the Integrator. All LED's and digits of the display blink for a number of seconds.

2. **Self Test of the Integrator**

Scroll **DOWN** and the internal test screen displays.

```
- TEST SCROLL 2  
Internal test of microprocessor 
START
```

The system can perform some internal test functions, which can be used to detect malfunctions to the hardware devices.
After START is pressed, the following screens are displayed in sequence.

- TEST SCROLL 2A -
  Testing ROM
  TEST PASSED

- TEST SCROLL 2B -
  Testing ROM
  TEST PASSED

The message "Test PASSED" is displayed if the test runs correctly. If something wrong is detected, then the message "Test FAILED" is displayed, and the soft key CONTINUE is shown. The operator has to press CONTINUE to go on the next test.

**NOTE:** Test 2C requires a hardware jumper to be installed between serial in and serial out pins of the motherboard. Since the jumper is not normally in place, a "Test FAILED" message at the end of Test 2C is normally displayed.

3. Test Digital Inputs

The next screen is used to check the digital input circuitry. The display shows a 1 if the specific input is closed, 0 if open. If more digital I/O boards are installed, the NEXT soft key displays, allowing the operator to scroll between boards.

Scroll DOWN and the digital input test screen displays.

- TEST SCROLL 3 -
  Dig input test
  Slot #0: - - - - 0000

Slots are numbered 1 to 6; slot 0 is the motherboard. Inputs are shown from right to left. If a board has 16 inputs, two screens are used to show the first and the second half, the lower half is shown first.

4. Test Digital Outputs

This test 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 the operator to check inputs while outputs are still in the forced status.
Scroll DOWN and the digital output test screen displays.

- TEST SCROLL 4 -
  Dig output test
  Output #1: ON/OFF
  ENTER ON/OFF

To force an output, enter the desired number followed by ENTER. Then use the ON/OFF key to force it to the ON or OFF STATUS. After the output has been forced, the CLEAR soft key displays in the middle position. Slots are numbered 1 to 6; slot 0 is the motherboard.

WARNING
FORCING THE DIGITAL OUTPUTS MAY CAUSE MACHINERY TO START. AFTER THE USER TRIES TO FORCE AN OUTPUT, THE FOLLOWING MESSAGE WILL BE DISPLAYED.

WARNING
IF THE USER PRESSES CONTINUE, BE AWARE THE ACTION MAY CAUSE DAMAGE OR INJURY. IF THE USER PRESSES ABORT, THE SYSTEM WILL RETURN TO THE PREVIOUS SCROLL.

WARNING
EQUIPMENT MAY START
CONTINUE    ABORT
5. Test Current Outputs

This section only applies if a current output board is detected. The board can have one or two current output channels. Scroll down and the digital output test screen displays.

- TEST SCROLL 5 -
  Current output #1
  should be  4.0 mA
  ENTER CLEAR

Default:  4.0 mA
Min:     0.0 mA
Max:     20.0 mA

To force the output, use the numeric keypad to enter the desired number of milliamps and press ENTER.

If the board has two channels, the following screen is shown.

- TEST SCROLL 6 -
  Current output #2
  should be  4.0 mA
  ENTER CLEAR

Password: Service

Default:  4.0 mA
Min:     0.0 mA
Max:     20.0 mA

The factory default for Current Out Define in I/O DEFINE is set to >Rate<. The factory default for Current Out Range in I/O DEFINE is set to >4 20 mA<. If the Current Out Range is set to >0 20 mA< the Current Output default would be 0.0. If the Current Out Range is set to >20 4 mA< or >20 0 mA< the Current Output default would be 20.0 mA. With Current Out Define set to >Rate< the CLEAR key resets the Current Output to the default.

6. Test Current Inputs

Scroll DOWN and the following screen is displayed only if an analog input board is detected, and shows the status of each analog input channel.

- TEST SCROLL 7 -
  
  Voltage input
  #1 00.0 V
  #2 00.0 V
7. Test Communications A

Scroll DOWN. If a communication board is detected, the following screen is shown. The Port 2 soft key is only shown if two boards are detected.

```
- TEST SCROLL 8 -
Test communication A

PORT1 PORT2
```

By pressing the PORT1 or the PORT2 soft key, the test is initiated. 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.

**Note:** This test requires a hardwire jumper to be installed between terminals TB5-8 (RX) and TB 5-9 (TX) on the communication board.

8. Test Communications B

This test is similar to the previous one but works for the field bus version of the communication board.

Scroll DOWN and the Test Communication B screen displays.

```
- TEST SCROLL 9 -
Test communication B

START
```

9. Test BCD Input Board

If an optional load out board is detected, the following screen displays. The test is similar to the digital input test.

Scroll DOWN and the Test BCD Input Board screen displays.

```
- TEST SCROLL 10 -
BCD Input test

0000

ENTER CLEAR
```
10. Test BCD Output Board
The following test screen is displayed if an optional load out board is detected. Scroll DOWN and the BCD Output Test screen displays.

<table>
<thead>
<tr>
<th>- TEST SCROLL 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCD Output test</td>
</tr>
<tr>
<td>0000</td>
</tr>
<tr>
<td>ENTER CLEAR</td>
</tr>
</tbody>
</table>

Default: 0
Min: 0
Max: 9999 or 7999 if parity check enabled

11. Test the CPU Serial Line
Scroll DOWN and the Test CPU Serial Line screen displays.

<table>
<thead>
<tr>
<th>- TEST SCROLL 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test CPU serial line</td>
</tr>
<tr>
<td>START</td>
</tr>
</tbody>
</table>

If START is pressed, the Integrator performs a test of the serial line of the CPU board.

**Note:** The CPU serial line is not implemented in the current hardware; therefore, the normal response is TEST FAILED.
12. Test the Keyboard and Switches

Scroll DOWN and the Keyboard + Switches screen displays.

```
- TEST SCROLL 13 -
Keyboard + switches
Key
Switches  00000000
```

Press the RUN key twice to exit. All other keys including MENU are displayed but not executed.

**B.4. Main Menu 4**

Main Menu 4 is dedicated to the definition of the input output (I/O), alarms and, if the optional hardware exists, the load out controller (batch).

```
- MAIN MENU 4 -
Press MENU for more
I/O ALARMS LOAD
DEFINE DEFINE
OUT
```

**B.4.1. I/O Definitions**

The input output section of the system is fully configurable. All inputs and outputs are conventionally numbered and can be assigned to physical input and output terminals depending on the needs. The following section explains how to configure I/O. However, the standard configuration as provided by the factory is normally satisfactory.

1. Define Current Output

Press the I/O DEFINE soft key and the following screen displays.

```
- START OF SCROLL -
Use SCROLL keys to view selections.
```

Scroll DOWN and the I/O DEF SCROLL 1 screen displays.

```
- I/O DEF SCROLL 1 -
Current output define
#1: > Rate <
CHOICE ENTER NEXT
```
The standard factory supply is for one current output only, no current inputs. The following menu screens are shown to define it. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection. The NEXT key only displays if the optional 2-inputs/2 outputs board is installed and allows the operator to set up either of the outputs.

**Default:** RATE

**Selections:** RATE, OFF

If the selection of the previous screen is RATE, the operator can set up the range, delay and damping of the current output. The range is selectable between the standard 0 to 20 mA and 4 to 20 mA both in direct and reverse mode. Select 0 20 or 4 20 if an increase in current is desired for any increase in the process material flow. Select 20 0 or 20 4 if a decrease of current is desired for any increase of the variable. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

Scroll DOWN and the I/O DEF SCROLL 1A screen displays.

**Default:** 4-20 ma

**Selections:** 0-20 mA, 4-20 mA, 20-0 ma, 20-4 mA

Each current output can be delayed. This is typically needed in blending systems, to correct transport time differences. The delay is set in seconds.

Scroll DOWN and the I/O DEF SCROLL 1B screen displays.

**Default:** 10 sec

**Min:** 0 sec

**Max:** 300 sec
A damping factor can also be selected for each current channel. This damping only affects the current output, not the displayed flow rate, which has a separate damping factor, selectable in Main Menu 2, Display.

Scroll DOWN and the I/O DEF SCROLL 1C screen displays.

```
- I/O DEF SCROLL 1C -
Current out damping
#1: 2 sec
ENTER NEXT

Default: 2 sec
Min: 0 sec
Max: 400 sec
```

2. Define Analog Inputs

If the 2-inputs/2 outputs analog board is installed, the following screens are displayed. Analog inputs can be used for measuring the moisture of the material.

Moisture compensation is performed on the process material flow, 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 totals. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

Scroll DOWN and the I/O DEF SCROLL 2 screen displays.

```
- I/O DEF SCROLL 2 -
Analog input #1 def.
#1: > Off <
CHOICE ENTER CALIB

Default: OFF
Selections: OFF, MOISTURE
```

Scroll DOWN and the I/O DEF SCROLL 3 screen displays.

```
- I/O DEF SCROLL 3 -
Analog input #2 def.
#2: > Off <
CHOICE ENTER CALIB

Default: OFF
Selections: OFF, MOISTURE
```
A. Setup Moisture Compensation Input

If an analog input has been programmed for reading the moisture signal and CALIB key is pressed, the following screens appear. The user can calibrate the input signal by entering the equivalence between percent of moisture and mA on two points. Use the %Moist key to enter the percent of moisture, use the mA key to enter the corresponding number of mA, and confirm with ENTER.

Default: 0.0 %  0.0 mA
Min: 0.0 %  0.0 mA
Max: 20.0 % 10.0 mA

Do the same with the second input.

Default: 10.0 %  20.0 mA
Min: 1.0 %  5.0 mA
Max: 20.0 % 20.0 mA

3. Define Digital Inputs

Digital inputs can be programmed. The following screen shows one logical function per time, and allows the user to assign it to a physical input. The NEXT key scrolls between the logical functions. The NC/NO key selects the Normally Open (NO) or Normally Closed (NC) status of the input. Normally Open means the input is inactive when disconnected. To program a function, scroll with NEXT until the function is displayed, then enter the physical input number and confirm with ENTER. Scroll with NC/NO until the desired mode is displayed. By assigning a function to 0, the function is disabled.
The following table shows the available logical selections that can be assigned to any available physical input. Default inputs may be reassigned to any physical output if desired. External alarms 1, 2, and 3 can be assigned to logical functions not on the list.

Logical selections should not be reassigned after the physical inputs have been terminated.

<table>
<thead>
<tr>
<th>Selections</th>
<th>Default:</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>External alarm 1</td>
<td>0 NO</td>
<td>0 = function disabled</td>
</tr>
<tr>
<td>External alarm 2</td>
<td>0 NO</td>
<td></td>
</tr>
<tr>
<td>External alarm 3</td>
<td>0 NO</td>
<td></td>
</tr>
<tr>
<td>Print</td>
<td>0 NO</td>
<td>(Only if COMM installed)</td>
</tr>
<tr>
<td>Reset Totals</td>
<td>0 NO</td>
<td></td>
</tr>
<tr>
<td>Reset Alarms</td>
<td>0 NO</td>
<td></td>
</tr>
<tr>
<td>Product #1</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #2</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #3</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #4</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #5</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #6</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #7</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #8</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #9</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Product #10</td>
<td>0 NO</td>
<td>(Only if Product Select is Remote)</td>
</tr>
<tr>
<td>Auto Zero</td>
<td>0 NO</td>
<td>(Only if AZT enabled)</td>
</tr>
<tr>
<td>Batch Start</td>
<td>0 NO</td>
<td>(Only if Load Out installed)</td>
</tr>
<tr>
<td>Batch Stop</td>
<td>0 NO</td>
<td>(Only if Load Out installed)</td>
</tr>
<tr>
<td>Batch Standby</td>
<td>0 NO</td>
<td>(Only if Load Out installed)</td>
</tr>
</tbody>
</table>

**CAUTION**

Logical inputs return to the default if the Integrator is cold started.
Three assignable inputs are standard on the motherboard.

### MOTHER BOARD INPUTS

<table>
<thead>
<tr>
<th>PHYSICAL</th>
<th>INPUT NUMBER</th>
<th>ASSIGNED FUNCTION</th>
<th>FIELD MOUNT</th>
<th>PANEL MOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>TB8 13 &amp; 14</td>
<td>TB2 5 &amp; 7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>TB8 11 &amp; 12</td>
<td>TB2 8 &amp; 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>TB8 9 &amp; 10</td>
<td>TB2 9 &amp; 10</td>
<td></td>
</tr>
</tbody>
</table>

Additional assignable logical inputs from the above table can be selected by adding optional I/O boards. Available options are 4in/16out, 16in/4out, or 20in/20out by adding both boards.

### DIGITAL INPUT/OUTPUT BOARD INPUTS

<table>
<thead>
<tr>
<th>PHYSICAL</th>
<th>INPUT NUMBER</th>
<th>ASSIGNED FUNCTION</th>
<th>4IN/16OUT ONLY</th>
<th>16IN/4OUT ONLY</th>
<th>4IN/16OUT AND 16IN/4OUT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>J15 - 2</td>
<td>J16 - 17</td>
<td>J15-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>J15 - 15</td>
<td>J16 - 5</td>
<td>J15-15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>J15 - 3</td>
<td>J16 - 18</td>
<td>J15-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>J15 - 16</td>
<td>J16 - 6</td>
<td>J15-16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
<td>J16 - 19</td>
<td>J16-17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td></td>
<td>J16 - 7</td>
<td>J16-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>J16 - 20</td>
<td>J16-18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td></td>
<td>J16 - 8</td>
<td>J16-6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td></td>
<td>J16 - 21</td>
<td>J16-19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td></td>
<td>J16 - 9</td>
<td>J16-7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td></td>
<td>J16 - 22</td>
<td>J16-20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td></td>
<td>J16 - 10</td>
<td>J16-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td>J16 - 23</td>
<td>J16-21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td></td>
<td>J16 - 11</td>
<td>J16-9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
<td>J16 - 24</td>
<td>J16-22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td></td>
<td>J16 - 12</td>
<td>J16-10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
WARNING

Changing the definition of the digital inputs may cause machinery to start. After the user tries to change a definition, the following message is displayed.

WARNING

If the use presses continue, be aware the action may cause damage or injury. If the user presses abort, the system returns to the previous scroll.

4. Define Digital Outputs

Digital outputs can be programmed. The following screen shows one logical function per time, and allows the user to assign it to a physical output. The NEXT key scrolls between the logical functions. The NC/NO key selects the Normally Open (NO) or Normally Closed (NC) status of the output. Normally Open means the output is not energized in normal conditions. To program a function, scroll with NEXT until the function is displayed, then enter the number of the physical output and confirm with ENTER. Finally, scroll with NC/NO until the desired mode is displayed. By assigning a function to 0, the function is disabled.

The following table shows the available logical selections that may be assigned to any available physical output. Typical field wiring drawings and customer specific field wiring drawings show Ready defaulted to #1 NC, Alarm defaulted to #2 NC, and Totalizer (remote counter) defaulted to #3 NO. Default selections may be reassigned to any physical output if desired.

Logical selections should not be reassigned after the physical inputs have been terminated.

CAUTION

Logical outputs return to the default if the Integrator is cold started.
### Selections

<table>
<thead>
<tr>
<th>Selection</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm</td>
<td>2 NC</td>
</tr>
<tr>
<td>Shut down</td>
<td>0 NO</td>
</tr>
<tr>
<td>Ready</td>
<td>1 NC</td>
</tr>
<tr>
<td>High Rate</td>
<td>0 NO    (Only if Rate Alarm enabled)</td>
</tr>
<tr>
<td>Low Rate</td>
<td>0 NO    (Only if Rate Alarm enabled)</td>
</tr>
<tr>
<td>Totalizer</td>
<td>3 NO</td>
</tr>
<tr>
<td>Batch Preset</td>
<td>0 NO    (Only if Load Out installed)</td>
</tr>
<tr>
<td>Batch End</td>
<td>0 NO    (Only if Load Out installed)</td>
</tr>
<tr>
<td>Air Purge</td>
<td>0 NO</td>
</tr>
</tbody>
</table>

One non-assignable Fault output and three assignable outputs are standard on the motherboard.

### MOTHER BOARD OUTPUTS

<table>
<thead>
<tr>
<th>PHYSICAL OUTPUT NUMBER</th>
<th>ASSIGNED FUNCTION</th>
<th>FIELD MOUNT</th>
<th>PANEL MOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault Output</td>
<td></td>
<td>TB8 1 &amp; 2</td>
<td>TB2 15 &amp; 16</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>TB8 7 &amp; 8</td>
<td>TB2 12 &amp; 16</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>TB8 5 &amp; 6</td>
<td>TB2 13 &amp; 16</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>TB8 3 &amp; 4</td>
<td>TB2 14 &amp; 16</td>
</tr>
</tbody>
</table>
Additional assignable logical outputs from the above table can be selected by adding optional I/O boards. Available options are 4in/16out, 16in/4 out, or 20in/20out by adding both boards.

<table>
<thead>
<tr>
<th>PHYSICAL OUTPUT NUMBER</th>
<th>ASSIGNED FUNCTION</th>
<th>INSTALLED OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4IN/16OUT ONLY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>J15-17</td>
<td>J16 - 2</td>
</tr>
<tr>
<td>5</td>
<td>J15 - 5</td>
<td>J16 - 15</td>
</tr>
<tr>
<td>6</td>
<td>J15 - 18</td>
<td>J16 - 3</td>
</tr>
<tr>
<td>7</td>
<td>J15 - 6</td>
<td>J16 - 16</td>
</tr>
<tr>
<td>8</td>
<td>J15 - 19</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>J15 - 7</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>J15 - 20</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>J15 - 8</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>J15 - 21</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>J15 - 9</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>J15 - 22</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>J15 - 10</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>J15 - 23</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>J15 - 11</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>J15 - 24</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>J15 - 12</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Define Remote Totalizer Output

If the TOTALIZER output function is assigned to an output, the following screens allow the user to set up related parameters. Set the divider according to the maximum rate the flow meter will run. Use the numeric keys to enter the divider in totalization units and confirm with ENTER. One pulse is generated for each unit specified by the divider. The pulse frequency generated in normal conditions should not exceed 6 pulses per second. Higher frequencies are possible, however they do not improve accuracy.

```
Remote counter div.
1.0 Tons
ENTER
```

Default: 1
Min: 0.01
Max: 100

Use the numeric keys to enter the pulse width in seconds of the totalizer and confirm with ENTER. A higher pulse width limits the maximum frequency. The default 0.1 sec is recommended for pulse frequencies exceeding 12 pulses per second.
6. Define Air Purge Timing

If an output is assigned to the Air Purge function, then a time interval has to be defined here. Use the numeric keys to enter Air Purge Interval and Duration and confirm with ENTER.

- I/O DEF SCROLL 8 -
  Air purge interval
  120 sec
  ENTER

Default: 120 sec
Min: 0 sec
Max: 3600 sec

- I/O DEF SCROLL 9 -
  Air purge duration
  2 sec
  ENTER

Default: 2 sec
Min: 0 sec
Max: 30 sec
7. Define Load Out Output Data

If the optional Load Out output board (4 in/16 out) is installed, the operator can select the related variable. Press the CHOICE key to scroll selections. Press enter to confirm your selection.

**- I/O DEF SCROLL 10 -**

**Password: Service**

**BCD output variable**

> Off <

CHOICE ENTER

**Default:** OFF

**Selections:** OFF, RATE

**-I/O DEF SCROLL 10A-**

**Password: Service**

**BCD output polarity**

> Negative <

CHOICE ENTER

**Default:** NEGATIVE

**Selections:** NEGATIVE, POSITIVE

If the selection is Rate, the following screens allow the operator to define the polarity and the parity check of the BCD output. The polarity selection reverses the signals from NO to NC and vice versa. If a parity criterion is selected, the most significant bit of the BCD output is used for parity check. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.
Scroll DOWN and the I/O DEF SCROLL 10B screen displays. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

```
-I/O DEF SCROLL 10B-
BCD output parity
> no <
CHOICE ENTER
```

**Default:** NO  
**Selections:** NO, YES

8. Define BCD Input Data

If the optional Load Out input board (16 in/4 out) is installed, the following screens allow the operator to define the related variable and the polarity of the signals. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

```
-I/O DEF SCROLL 11-
BCD input variable
> Batch set point <
CHOICE ENTER
```

**Default:** NONE  
**Selections:** BATCH SET POINT, BATCH PRE-ACT

The next screen displays if the BCD input variable is set to Batch Set Point or Batch Pre Act. Scroll DOWN. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

```
-I/O DEF SCROLL 11A-
BCD input polarity
> Negative <
CHOICE ENTER
```

**Default:** NEGATIVE  
**Selections:** NEGATIVE, POSITIVE
B.4.2. Alarms Definitions

The alarms of the Micro Tech™ 2106 can be programmed. Process alarms such as low and high rate can be set to the desired range. In addition, all alarms can be defined to be:

**ALARM**
Generate a warning message when active.

**SHUT DOWN**
Generate a warning message and turn off the READY LED and output when active.

**NONE**
No action.

1. Define Rate Alarm

From Main Menu 4 press the ALARMS DEFINE soft key and the following screen displays.

```
- START OF SCROLL -
Use SCROLL keys to view selections.
```

Scroll DOWN and the ALARM SCROLL 1 screen displays. Press the CHOICE soft key to scroll selections. Press ENTER to confirm your selection.

```
- ALARM SCROLL 1 -
Rate alarm
> no <
CHOICE ENTER
```

Default: NO
Selections: NO, YES

Scroll DOWN and the ALARM SCROLL 1A screen appear.

```
- ALARM SCROLL 1 A-
Low rate set
10.0% 10 Tph 10 Sec
```

Password: Operator
If the selection in the previous screen was YES, enter the low and high set points for the alarm. Also, enter the desired delay time before the alarm is monitored. The UNITS key allows the user to specify the set points in engineering units. The % key selects set points in percent. The SET/DELAY switches between the set point and the delay time.

The SET/DELAY switches between the set point and the delay time.

```
ENTER SET/DELAY
UNITS/%
```

Password: Operator

Default: 10 % 10 sec
Min: 0 % 0 sec
Max: 103 % 90 sec

Scroll DOWN and the ALARM SCROLL 1B screen displays.

```
- ALARM SCROLL 1B -
High rate set
10.0% / 10 Tph 10 Sec
ENTER SET/DELAY
UNITS/%
```

Password: Operator

Default: 10 % 10 sec
Min: 0 % 0 sec
Max: 103 % 90 sec

**B.4.3. Setup Alarms Modes**

Scroll DOWN and the following message is displayed for three seconds:

```
- ALARM SCROLL 2 -
- ALARM DEFINITION -
Use NEXT key or enter alarm number
```

Password: Operator
After three seconds, the following screen is displayed. The user can use the
CHOICE soft key to select the desired mode between ALARM (just a warning
message), SHUT DOWN (warning plus fault output) and NONE (no action).
Confirm with ENTER. Use the NEXT key to scroll between alarms, or enter the
alarm number.

<table>
<thead>
<tr>
<th>ALARM NUMBER</th>
<th># 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock Fail</td>
<td></td>
</tr>
<tr>
<td>set as &gt; ALARM &lt;</td>
<td></td>
</tr>
<tr>
<td>CHOICE ENTER NEXT</td>
<td></td>
</tr>
</tbody>
</table>

**B.4.4.  Load Out**

The LOAD OUT menu only displays if the optional load out board is installed.
Load out is described in REC 4030, Load Out.

**B.5.  Main Menu 5**

Main Menu 5 is dedicated to the serial options. COMM A is used to set up the
serial line of the optional COMM A board. PRINT is used for setting up the
printer output. Main Menu 5 does not appear unless an optional COMM A board
is installed.

```
- MAIN MENU 5 -
Press MENU for more

COMM A PRINT
```

**B.5.1.  Communications A Scroll**

The communication board A has one serial channel, which can be configured
using jumpers as an RS232 or an RS485 channel. The serial channel can be used
for printing or for a serial communication with an intelligent device such as a
PLC or a PC. Two boards can be installed and programmed, typically one for
the printer and one for the supervisor.

The following screens define the communication parameters for the first and the
second channel. Press the COMM A soft key and the following screen displays.

```
- START OF SCROLL -
Use SCROLL keys to
view selections.
```
Scroll DOWN and the COMM A SCROLL 1 screen displays.

- COMM A SCROLL 1 -
  Baud Rate port #1
  > 9600 <
  CHOICE ENTER

Password: Service

Default: 9600
Selections 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600

Scroll DOWN and the COMM A SCROLL 2 screen displays.

- COMM A SCROLL 2 -
  Set parity port #1
  > no parity <
  CHOICE ENTER

Password: Service

Default: NO PARITY
Selections: EVEN PARITY, ODD PARITY, NO PARITY

Scroll DOWN and the COMM A SCROLL 3 screen displays.

- COMM A SCROLL 3 -
  Stop bits port #1
  > 1 <
  CHOICE ENTER

Password: Service

Default: 1 STOP BIT
Selections: STOP BIT, 2 STOP BITS

Scroll DOWN and the COMM A SCROLL 4 screen displays.

- COMM A SCROLL 4 -
  Wordlength port #1
  > 8 <
  CHOICE ENTER

Password: Service

Default: 8 BITS
Selections: 7 BITS, 8 BITS
Some commonly used protocols are implemented in the system. See Communication Protocols (REC 3913) for the details. Possible selections are:

PC-MASTER
Thermo Electron proprietary protocol: Multi Drop, Master Slave.

SIEMENS 3964R
A proprietary protocol of Siemens. Point to point, Multi Master.

ALLEN-BRADLEY DF1

MODBUS
A proprietary protocol of AEG. Multi Drop, Master Slave.

PRINTER
Not a protocol, selects printer output.

Scroll DOWN and the COMM A SCROLL 5 screen displays.

- COMM A SCROLL 5 -
  Protocol port #1
  > Printer <
  CHOICE ENTER

Default: PRINTER
Selections: PC-MASTER, SIEMENS 3964R, ALLEN-BRADLEY DF1, MODBUS, PRINTER

If the selected protocol is not PRINTER, the following screens define the ADDRESS of the device in the multi drop line, and the access permission from the remote supervisor. If the password protection level is NONE, the supervisor has full access to the Integrator. If the password protection level is LIMITED, the supervisor will only access those variables that are accessible with the OPERATOR password. If the password protection level is PROTECTED, the Integrator is read only to the supervisor.

Scroll DOWN and the COMM A SCROLL 5A screen displays.

- COMM A SCROLL 5A -
  Clear to send #1
  > Disabled <
  CHOICE ENTER

Default: DISABLED
Selections: DISABLED, ENABLED
Scroll DOWN and the COMM A SCROLL 6 screen displays.

<table>
<thead>
<tr>
<th>Address port #1</th>
<th>Default: 1</th>
<th>Min: 1</th>
<th>Max: 255</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Password: Service

Scroll DOWN and the COMM A SCROLL 7 screen displays.

<table>
<thead>
<tr>
<th>Access prot port #1</th>
<th>Default: NONE</th>
<th>Selections: NONE, LIMITED, PROTECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; none &lt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHOICE ENTER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Password: Service

If a second communication board is installed, the following screen displays.
These screens operate exactly as the ones dedicated to the communication board 1.

Scroll DOWN and the COMM A SCROLL 8 screen displays.

<table>
<thead>
<tr>
<th>Baud Rate port #2</th>
<th>Default: 9600</th>
<th>Selections: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 9600 &lt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHOICE ENTER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Password: Service
Scroll **DOWN** and the COMM A SCROLL 9 screen displays.

```
- COMM A SCROLL 9 -
  Set parity port #2
> no parity <
  CHOICE ENTER
```

**Default:** NO PARITY  
**Selections:** EVEN PARITY, ODD PARITY, NO PARITY

Scroll DOWN and the COMM A SCROLL 10 screen displays.

```
- COMM A SCROLL 10 -
  Stop bits port #2
> 1 <
  CHOICE ENTER
```

**Default:** 1 STOP BIT  
**Selections:** STOP BIT, 2 STOP BITS

Scroll DOWN and the COMM A SCROLL 11 screen displays.

```
- COMM A SCROLL 11 -
  Wordlength port #2
> 8 <
  CHOICE ENTER
```

**Default:** 8 BITS  
**Selections:** 7 BITS, 8 BITS
Scroll **DOWN** and the COMM A SCROLL 12 screen displays.

![COMM A SCROLL 12 Screen]

- **Protocol port #2**
  - **Printer**
- **CHOICE**
- **ENTER**

**Default:** PRINTER
**Selections:** PC-MASTER, SIEMENS 3964R, ALLEN-BRADLEY DF1, MODBUS, PRINTER

Scroll **DOWN** and the COMM A SCROLL 12A screen displays.

![COMM A SCROLL 12A Screen]

- **Clear to send #2**
  - **Disabled**
- **CHOICE**
- **ENTER**

**Default:** DISABLED
**Selections:** DISABLED, ENABLED

### B.5.2. Communication B (Field Bus)

Refer to Field Bus manual if this option is installed.

### B.5.3. Print

The Micro Tech™ 3106 has a fully programmable printer format. The following section explains how to program it according to the specific needs.

1. **Define Handshaking**

   The system can be configured to operate without any handshake (NONE), or using the Clear to Send signal (CTS) or the XON XOFF sequence. Refer to the instruction manual of the printer 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 if the printer is on line or not, or if paper is empty.
The most commonly used protocol is the CTS, which is a signal generated by the printer to indicate whether it is ready to receive data or not.

**PRINTER SCROLL 1**

**Handshaking**

> **none** <

Choice enter

**Password:** Service

Default: NONE
Selections: NONE, CTS, XON-XOFF

Different printers use different end of line patterns. Select the one you need for your printer.

Scroll DOWN and the PRINTER SCROLL 2 screen displays.

**PRINTER SCROLL 2**

**End of line**

> **CR** <

Choice enter

**Password:** Service

Default: CR
Selections: CR, LF, CR+LF

Some simple 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.

Scroll DOWN and the PRINTER SCROLL 3 screen displays.

**PRINTER SCROLL 3**

**Delay end of line**

0 sec

Choice enter

**Password:** Service

Default: 0 sec
Min: 0 sec
Max: 5 sec

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.
Scroll DOWN and the PRINTER SCROLL 4 screen displays.

```
- PRINTER SCROLL 4 -
Form feed
> no <
CHOICE ENTER
```

Default: NO
NO, YES

2. Periodical Printing

If you want to generate periodical printing, enter the number of minutes, hours, or days in the following screen. By entering 0, the periodical printing is prevented. Use the INTV key to switch from minutes to hours to days.

Scroll DOWN and the PRINTER SCROLL 5 screen displays.

```
- PRINTER SCROLL 5 -
Print interval 0 min
ENTER INTV
```

Default: 0 min
Min: 0 min, 0 hours, 0 days
Max: 59 min, 23 hours, 365 days

The system can print at specific times during the day. Enter the time you want to obtain the printing. Use the NEXT key to scroll between the print times (maximum 4). The ON/OFF key enables or disables the displayed print time.

Scroll DOWN and the PRINTER SCROLL 6 screen displays.

```
- PRINTER SCROLL 6 -
Print time #1
time: HH:MM
ENTER ON/OFF NEXT
```

Password: Service

<table>
<thead>
<tr>
<th>If 24 hours</th>
<th>If am/pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Min: 00:00</td>
<td>01:00</td>
</tr>
<tr>
<td>Max: 23:59</td>
<td>12:59</td>
</tr>
</tbody>
</table>
Scroll **DOWN** and the PRINTER SCROLL 7 screen displays.

```
- PRINTER SCROLL 7 -
Print alarms
> no <
CHOICE ENTER
```

Default: **NO**
Selections: **NO, YES**

Scroll **DOWN** and the PRINTER SCROLL 8 screen displays.

```
- PRINTER SCROLL 8 -
Total report format
> Default 1 <
CHOICE ENTER
```

Default: **DEFAULT 1**
Selections: **DEFAULT 1, DEFAULT 2**

### B.6. Main Menu 6

Main Menu 6 is dedicated to Audit Trail and Linearization.

```
- MAIN MENU 6 -
Press MENU for more
AUDIT
TRAIL LINEAR
```
B.6.1. Audit Trail

This menu is only displayed if the Audit Trails option is installed.

The Audit Trail function is a method for recording all changes in setup and calibration data. Any time the operator changes a value which affects weighing, the new parameter is recorded with time and date. All changes can be printed when required. Press the AUDIT TRAIL key and the AUDIT TRAILS 1 screen displays.

Default: NO
Selections: NO, YES

If the AUDIT TRAILS is YES, following screen displays for 3 seconds.

Time and date are shown only if an optional Communication board is installed. The user can scroll between events which are displayed in order of date and time. The user can also enter a number to display a specific event.
B.6.2. Linearization

Linearization is explained in Chapter 3, section 3.11 LINEARIZATION.

B.7. Print Key

If the optional COMM board is installed, the PRINT key enables the printer to print data. The following screen is displayed.

```
- PRINTER SCROLL -
Com #1 no data
Start print TOTALS
PRINT
```

The second line gives the status of the printer.

**NO DATA** Indicates the printer is idle, no data is being sent to the printer.

**IS RUNNING** The Integrator is sending data to the printer.

The third line indicates what kind of data is printed if the PRINT key is pressed. The UP and DOWN keys select between the following:

**TOTALS** Print totals.

**BATCH** Only if load out option is active, print load out information.

**SETUP** Print the setup data of the Integrator.

**TRAILS** If audit trails option is active, print audit trails data.

Print starts after the **PRINT** key is pressed.

The COM key allows the operator to select the printer incase more than one is installed.
Examples of data that can be printed:

**Printed TOTALS:**
TOTALS REPORT

<table>
<thead>
<tr>
<th>DATE</th>
<th>12-10-1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME</td>
<td>8:21a</td>
</tr>
<tr>
<td>MASTER TOTAL:</td>
<td>0.00 Tons</td>
</tr>
<tr>
<td>RESET TOTAL #1:</td>
<td>0.00 Tons</td>
</tr>
<tr>
<td>RESET TOTAL #2:</td>
<td>0.00 Tons</td>
</tr>
<tr>
<td>RESET TOTAL... RATE:</td>
<td>0.00 Tph</td>
</tr>
</tbody>
</table>

**Print BATCH:**
BATCH REPORT

<table>
<thead>
<tr>
<th>DATE</th>
<th>12-10-1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME</td>
<td>8:21a</td>
</tr>
<tr>
<td>PRODUCT NR:</td>
<td>XXXXXXXXXXXXX</td>
</tr>
<tr>
<td>BATCH NR:</td>
<td>XX</td>
</tr>
<tr>
<td>SET POINT:</td>
<td>0.00 Tons</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>0.00 Tons</td>
</tr>
</tbody>
</table>

**Print ALARM:**

12-10-1999 8:21a
Clock fail

**Print SETUP:**
INTEGRATOR SETUP
The Integrator prints out all data and setups.
Print **AUDIT TRAILS**: Optional

<table>
<thead>
<tr>
<th>TRAIL RECORD NR:</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE 12-10-1999</td>
<td>TIME 11:59p</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>Scale capacity</td>
</tr>
<tr>
<td>NEW</td>
<td>400.0</td>
</tr>
<tr>
<td>OLD</td>
<td>500.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRAIL RECORD NR:</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE 12-10-1999</td>
<td>TIME 11:31p</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>Span</td>
</tr>
<tr>
<td>NEW</td>
<td>250000</td>
</tr>
<tr>
<td>OLD</td>
<td>300000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRAIL RECORD NR:</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE 12-10-1999</td>
<td>TIME 11:53p</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>Div(3)</td>
</tr>
<tr>
<td>NEW</td>
<td>0.05</td>
</tr>
<tr>
<td>OLD</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Appendix C
Engineering Drawings

This appendix contains a list of the engineering drawings associated with the Micro-Tech 3106

- Field Wiring Diagram – 07361H-E001
- Serial Communication Specifications – 07361B-E0008
- Outline & Mounting, Field Mounting 3000 Series Integrator – 07361B-0001
- Outline & Mounting, Panel Mounting 3000 Series Integrator - 07361B-0002
Appendix D
Reader Comment Section

As the user of this document, you are important to us. Your comments and suggestions are always welcome and encouraged. Please make a copy of the comment form, and then take a moment to fill out the requested information. Finally, send the form to us by mail or FAX using the information shown on the form. Your input can help Thermo improve its documentation. Thank you!
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Minneapolis, MN  55433
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2. Did you find any incorrect or incomplete information? Please provide as much detail as possible.
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. Do you have any other suggestions for improvement of this manual?
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

4. OPTIONAL: Please describe your job, position, responsibilities, and plant location. Include your name and address, if you wish.
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

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