Micro-Tech™ 3000
Model 3102/3202

Batch Controller

REC 4192 Rev B Part Number 074807 - English

Revision History

Revision Number	Date Released	ECO Number	Release Specifics
Revision A	July 2003		Manual First Released
Revision B	October 2006		Technical Specification Correction (fusing)

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About this Manual

This manual provides the information you need to install, operate, and maintain the *Micro-Tech 3102.*

Read this manual before working with the product. For personal and system safety, and for the best product performance, make sure you thoroughly understand the manual before installing or using this product.

Who Should Use this Manual

The *Micro-Tech 3102* manual is a learning resource and reference for anyone concerned with installing, operating, or maintaining *Ramsey Micro-Tech 3102*.

Read this manual before working with the system. For personal and system safety, and for the best product performance, make sure you thoroughly understand the manual before installing, operating, or maintaining this machine.

Organization of the Manual

This manual is organized into five chapters and six Appendixes.

Chapter 1: Introduction to the Micro-Tech 3102 gives an overview of the device's capabilities, describes its functions, and lists its technical specifications.

Chapter 2: Installing the Micro-Tech 3102 provides information about installing the *Batch Controller* including procedures for mounting, wiring, and configuring the *Micro-Tech 3102* system.

Chapter 3: Micro-Tech 3102 Operation provides an overview of the *Micro-Tech 3102* front panel, a description of how the menus operate, and information about setting up, calibrating, and operating the *Batch Controller*.

Chapter 4: Micro-Tech 3102 Maintenance provides an overview of standard maintenance associated with the *Mod. 3102*.

Chapter 5: Micro-Tech 3102 Replacement Parts- provides a list of replacement parts for the *Mod. 3102* and part ordering information.

Appendix A: Micro-Tech 3102 Menu gives an overview of the menus.

Appendix B: Cycle Sequence

Appendix C: Digital and Analog Input/Output

Appendix D: Optional Documentation

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 work as links on line and in pdf format.
- The names of setup, calibration displays, menu displays, and variables are shown in **FULL CAPITALS**.
- The names of keys on the front panel are shown in **BOLD CAPITALS**.

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:

WARNING

FAILURE TO OBSERVE COULD RESULT IN DEATH OR SERIOUS INJURY.

CAUTION

FAILURE TO OBSERVE MAY CAUSE MINOR INJURY OR DAMAGE THE EQUIPMENT

General Precaution

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

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 BOX.
- 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 FACOTRY) 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

KEEP HANDS AND CLOTHING AWAY FROM ALL MOVING OR ROTATING PARTS.

WARNING

DO NOT PLACE OR STORE OBJECTS OF ANY KIND ON THE MACHINE.

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.

Chapter 1
Introduction to the *Micro-Tech 3102*

This instruction manual contains information on the installation, operation, calibration, and maintenance of the *Micro-Tech ™3000 Model 3102* or *3202 Batch Controller*. The *Model 3102* is designed for noncommercial use and the *Model 3202* for higher accuracy and in cases where weights and measures approval is required. The manual refers to *Model 310*2 only as both operate the same.

1.1 Unpacking and Inspection

The *Micro-Tech 3102* has been properly packaged for shipment and storage, when necessary. Refer to the appropriate manual in the appendix section for unpacking procedures for optional equipment.

Inspect all packages for damage before opening; sometimes the carrier may be responsible for shipping damage. Refer to the appropriate manual in the appendix for inspection procedures for optional equipment.

1.2 Storage

The *Micro-Tech 3102* 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 Model 3102 /3202.Field Mount* and *Panel Mount* is a microprocessor based menu driven controller designed to accurately weigh and control the batching process of the selected recipe. In its maximum configuration, the controller accepts up to four scale inputs and forty components.

The *Micro-Tech 3102* interfaces with the batching system through digital and analog inputs and outputs. The batch controller can be expanded by installing optional plug-in circuit boards.

The following table shows the maximum expansion of the system.

Number of scales	4
Components	40
Digital Inputs	52
Digital Outputs	52
Analog Outputs	4
BCD Inputs	16 multiplexed (4 digits)
BCD Outputs	16 multiplexed (4 digits)
Recipes	100
Recipe Lines	500

1.4 Main Features

The *Micro-Tech 3102* (Figure 1-1) or panel mount (Figure 1-2) has many hardware anf software features necessary to control most any batching process. Other features are listed in specific sections of this manual.

- Menu driven scroll entries on a multiple line display
- Five LED status indicator
- Visible and electrical outputs representing load measurement
- Automatic zero and span calibration
- Auto zero tracking
- Several software options that may be turned on keypad entry or by installing optional plug-in PC boards
- Opto-coupled digital inputs and outputs
- Alarms and failure detection
- Communication standards :

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

RS485/RS422 For point-to-point multidrop 4 wire bidirectional communications, maximum 4000 ft (1200 m).

Current Loop For high immunity bidirectional asynchronous communications. Passive only.

- Allen-Bradley Remote I/O
- PROFIBUS-DP

Figure 1-1: ***Micro-Tech 3102/3202*** **Field Mount** ***Batch Controller***

Figure 1-2: ***Micro-Tech 3102/3202*** **Panel Mount** ***Batch Controller***

1.5 Configuration

The standard configuration of the *Batch Controller* includes the following:

- Single channel load cell input to a max of 6 load cells
- Single current output on Mother Board
- 5 programmable digital inputs
- 4 programmable outputs
- 1 fault output
- Serial communications on Mother Board
- Solid state output

- 4 digital inputs/16 digital outputs I/O board
- 2 circuit board expansion slots that can accommodate the following boards if needed.
  1. A/D board
  2. Premium A/D board
  3. Single channel current output board
  4. Dual channel current output board
  5. 16 digital inputs/4 digital outputs board
  6. 4 digital inputs/16 digital outputs board
  7. Serial communication board
  8. *Allen-Bradley remote I/O*
  9. *Profibus-DP* board
  10. *DeviceNet*

1.6 Monitoring Functions

The batch controller is supplied with an alarm and indication system. Indication can be in the form of :

- 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.

Through the keypad it is possible to call on the display all the existing alarms and acknowledge them.

1. Status Indications

- Controller on automatic: The “AUTO” LED is lighted.
- Controller on remote set-point: The “REM” LED is lighted, the relevant output is closed provided the controller is also on automatic mode. This output is used to indicate to external equipments that the controller can be remotely controlled.
- Feeder ready: The “RUN” LED will flash and the relevant output will close when all the conditions listed below become true:

  FEEDER NOT RUNNING

  NO FAILURE ALARM

  NO SHUT DOWN CONDITION

  NO CALIBRATE MODE

  CONTROLLER ON AUTOMATIC MODE
- Feeder running: When the feeder running input contact is closed. The “RUN” LED is lighted

2. Process Alarms

The following process conditions are monitored and may produce alarm or shut-down according to keypad selection. A delay time before the abnormal condition is monitored may be set for each individual alarm.

- High Load
- Low Load
- Bad Start Weight
- Stop Cycle
- End Cycle
- Abort Cycle
- Component Timeout

Each abnormal conditions may be set as:

- NONE: Neither alarm nor shut-down
- ALARM: Warning, the feeder continues to run.
- SHUT-DOWN: The feeder stops.

3. Programming Errors

Errors may occur only during programming or calibration as conseguence of entering data above or below the operating range of the feeder controller. If data above or below the limits are entered, the system will display a warning message and the minimum/maximum limits will be shown.

4. Equipment Failure

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

- Clock Calendar circuit failure
- Load Cell failure
- 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

1.7 Print Functions

Available print functions are:

- Print on command
- Print at preselected times of dey (up to four)
- Print a preselected intervals of time
- Print Set-Up
- Print alarms

1.8 Communications

1. Serial Communication

The communication protocol allows a remote intelligent device to read and eventually write the contents of the registers.

During the communication activity, the Mod.3102 always acts as a Slave, meaning it responds to a request from a Master device on the line, but never attempts to send messages out.

One electrical interface may be selected accessed through one communication port.

2. Field Bus I/O (OPTIONAL)

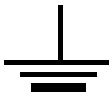
Allen-Bradley Remote or PROFIBUS DP I/O communication link board is typically used to transfer I/O images between a main PLC and remote devices (normally remote I/O racks – rack adapters) or to transfer (read and write blocks of data with intelligent remote devices (node adapters). The Mod.3102 in this 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.

1.9 Symbol Identification

Table 1-1 describes the symbols used in this manual and associated drawings.

Table 1-1: Symbol Identification

Symbol	**Description**
	ALTERNATING CURRENT
	EARTH (GROUND) TERMINAL
	PROTECTIVE CONDUCTOR TERMINAL
	CAUTION, RISK OF ELECTRIC SHOCK
	CAUTION (REFER TO ACCOMPANYING DOCUMENTS)

1.10 Technical Specifications

Enclosure

Field Mount

NEMA 4X (IP65), dust and watertight
17 x 13 x 7 inches
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: +14E to +122E F (-10E to +50E C)

Relative Humidity

Up to 95%, non-condensing

Pollution Degree

2

Altitude

Up to 6,561 ft (2000m)

Power Requirements

Voltage Range

Nominal voltage +10%, -15%

Nominal Voltage

115/230 VAC, selectable

Nominal Frequency

50/60 Hz

Fusing

400mA Slo-Blo, 110/120 VAC, Type T
200mA Slo-Blo 220/240 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

Load Cell (Weight)

Load cell input circuits

Number:	Up to six (6) 350-ohm load cells in parallel. Cable distance 200 ft or less (3000 ft with sense)
Sensitivity:	0.5mV/V to 3.5 mV/V (keyboard selectable)
Input Impedance:	100 k-ohm minimum
Maximum Usable Signal:	114% of 3mV/V
Displayed A/D counts	(3mV/V):112368
Isolation:	Non-isolated
Max non-destructive input voltage:	± 6 V relative to ground
Load Cell Cable Shield:	Connected to earth ground

Load Cell Excitation Power Supply

10 VDC ±10%, 220 mA

Minimum load impedance (operating) 58 ohms

Output short circuit, 1.5 A maximum

Excitation-Sense Circuitry

6 Wire System; cable distance over 200 ft. (not to exceed 3000 ft.).

Nominal input voltage:	±5 VDC (10 volts)
Input impedance:	100 k-ohm minimum
Jumper selectable:	Local or remote sense

Digital Input (on Motherboard)

4 High Frequency Input (DC).

Optocoupled

Internal Power supply for dry contact input.

Power Supply:	+24V external
Tec. Features:	24VDC, 6 mA
Minimum Current Level:	0,25 mA or less
Maximum Current Level:	3 mA or great
Cable Length:	2500 mt. cross section 1,5 mmsq (150 Ω Max.)

Digital Output (on Motherboard)

3 Configurable Digital Output; interface with TTL,CMOS, RELAY

1 Failure Digital Output (safe output)

"On" State Delay:	10ms
Tec. Features:	28 VDC, 100mA DC max.

With Power Supply or Instrument Error the contact is kept normally OFF

Input source Current

-2 mA nom. at 0 VDC

Max. non-destructive Input voltage

±50 peak, continuous

4 In/16 Out Digital I/O Board

1. (4) programmable inputs (See Appendix C specifications)
2. (16) programmable outputs (See Appendix C specifications)
3. Connector 25 pin D connector (female). Connector is intermateable with a 20 or 22 pin subminiature D connector dimensionally complying with MIL-C-24308.

Current Output

1 current output (on Motherboard)

Output range: User selectable 0 – 20 mA or 4-20 mA, representing 0 to 100% variable.

Resistive load: 800 ohm max. Loop

Capacitive load:No limit

Standard Communication (on Motherboard)

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:	110 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
Installing the *Micro-Tech 3102*

This chapter describes the *Batch Controller* installation procedure, hardware configuration, and initial programming. Initial programming is a machine directed procedure prompting the operator to enter required conveyor and belt scale parameters. After all parameters have been entered, the *Batch Controller* performs an unassisted zero and span calibration.

2.1 Safety Precautions

CAUTION

DO NOT INSTALL, OPERATE, OR PERFORM ANY MAINTENANCE PROCEDURES UNTIL YOU HAVE READ THE SAFETY PRECAUTIONS THAT FOLLOW.

CAUTION

DO NOT CONNECT POWER TO THE ELECTRONICS OR TURN ON THE UNIT UNTIL YOU HAVE READ AND UNDERSTOOD THIS ENTIRE MANUAL. THE PRECAUTIONS AND PROCEDURES PRESENTED IN THIS MANUAL MUST BE FOLLOWED CAREFULLY IN ORDER TO PREVENT EQUIPMENT DAMAGE AND PROTECT THE OPERATOR.

WARNING

THE *INSTRUMENT* DOOR SHOULD ALWAYS REMAIN CLOSED DURING OPERATION, AND ONLY OPENED FOR MAINTENANCE PROCEDURES. BE SURE TO CLOSE THE COVER BEFORE RESUMING OPERATION.

WARNING

ALL SWITCHES (SUCH AS CONTROL OR POWER) MUST BE **OFF** WHEN CHECKING INPUT **AC** ELECTRICAL CONNECTIONS, REMOVING OR INSERTING PRINTED CIRCUIT BOARDS, OR ATTACHING VOLT METERS TO THE SYSTEM.

INCOMING VOLTAGES MUST BE CHECKED WITH A VOLTMETER BEFORE BEING CONNECTED TO THE ELECTRONICS.

WARNING

EXTREME CAUTION MUST BE USED IN TESTING IN, ON, OR AROUND THE ELECTRONICS, **PC** BOARDS, OR MODULES. THERE ARE VOLTAGES IN EXCESS OF **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 SCIENTIFIC*) SHOULD BE DISPLAYED IN THE **ON/OFF** SWITCH AREAS AS A PRECAUTION INSTRUCTING OTHERS NOT TO OPERATE THE UNIT.

WARNING

ONLY QUALIFIED SERVICE TECHNICIANS SHOULD BE ALLOWED TO OPEN AND WORK IN THE ELECTRONICS, POWER SUPPLY, CONTROL, OR SWITCH BOXES.

WARNING

THIS EQUIPMENT SHOULD NOT BE OPERATED OR UTILIZED IN APPLICATIONS OTHER THAN THOSE STATED IN THE ORIGINAL ORDER.

TO ADAPT PRODUCTION RATES OR APPLICATIONS, CONSULT *THERMO SCIENTIFIC* 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

CAUTION

VERIFY THAT THE INPUT VOLTAGE IS CORRECT WITH AN AC VOLTMETER BEFORE YOU CONNECT IT TO THE *INSTRUMENT*.

CAUTION

EARTH GROUND MUST BE PROVIDED TO THE *INSTRUMENT*. DO NOT USE CONDUIT TO PROVIDE THIS GROUND.

CAUTION

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.

2.2.1 Critical Wiring Conditions

1. Ensure power is off at the mains
2. Do not route load cell 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 be 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 field mount *Batch Controller* should be mounted in a controlled environment not be exposed to excessive vibration, heat, or moisture, and protected from direct sunlight. The *Batch Controller* may be mounted up to 3,000 feet from the scale (Figure 2-1).

2.3.1 Mounting

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

Figure 2-1: Typical *Micro-Tech 3102/3202* Installation

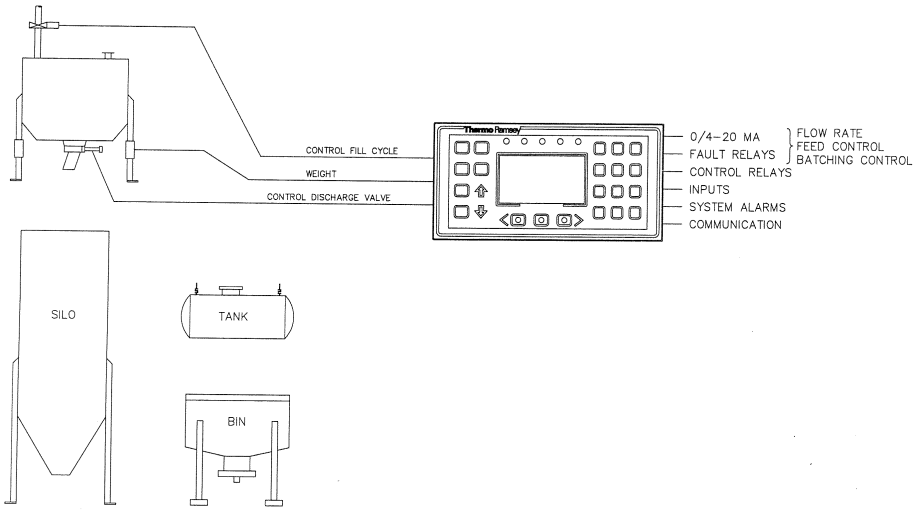
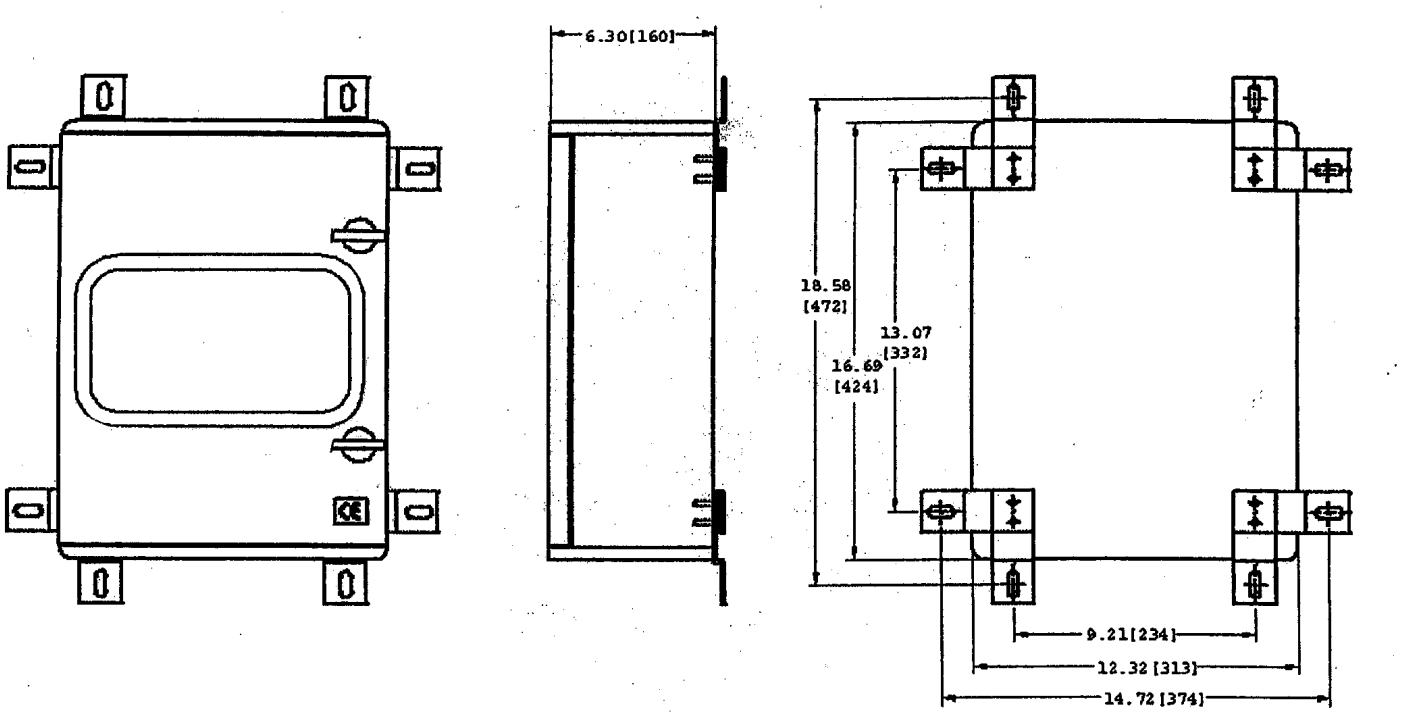


Figure 2-2: Electrical and Mounting Guidelines of the Micro-Tech Model 3102/3202 (Field Mount) ***Batch Controller***



CAUTION

REFER TO THE FILED WIRING DIAGRAM AS A GUIDE IF YOU DO NOT HAVE A SPECIFIC WIRING DIAGRAM FOR YOUR SYSTEM. FOLLOW YOUR LOCAL ELECTRICAL CODES AND REGUATIONS FOR MINIMUM WIRE SIZE AND ROUTING.

2.3.2 Connecting Incoming Power - Field Mount

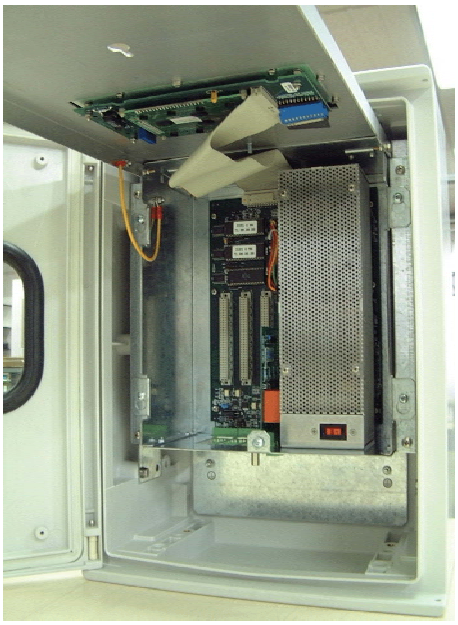
To connect the incoming power, use the following procedure.

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 then 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



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2.4 Panel Mount Installation

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

A two (2) inch clearance around the top and bottom of the *Batch Controller* 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 *Batch Controller*.

2.4.1 Mounting

Provide a cutout in the panel and insert the *Batch Controller* after removing the holding brackets. From the back, insert the holding brackets on both sides of the instrument. Tighten the holding brackets to support the *Batch Controller* and form the dust seal.

Figure 2-4: Electrical and Mounting Guidelines *Micro-Tech 3102* (Panel Mount)

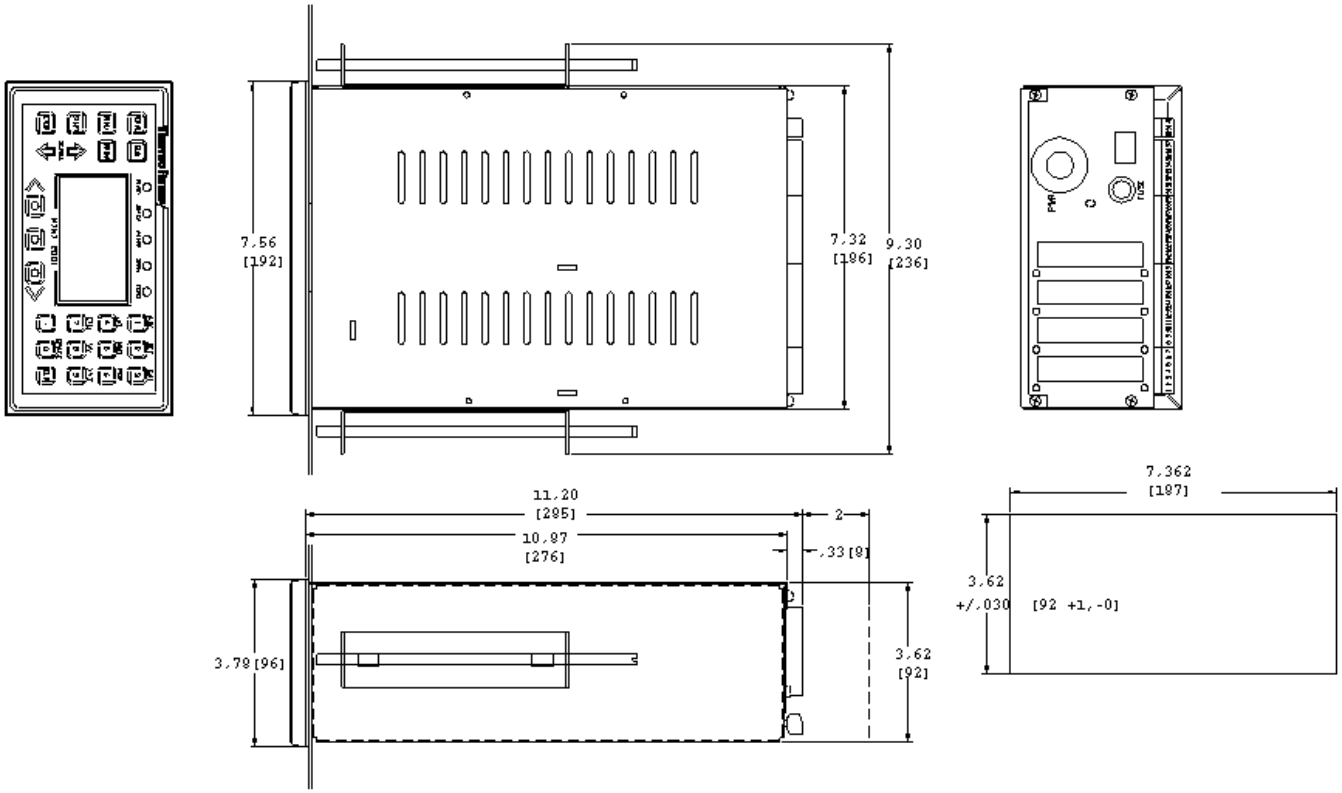

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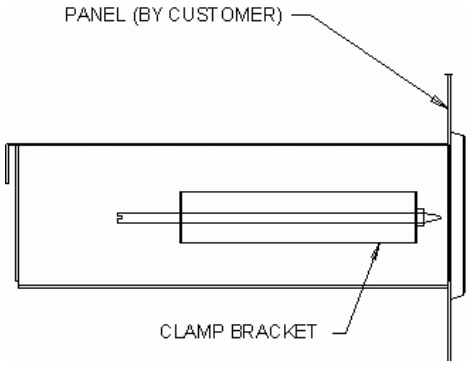
Figure 2-5: Installation *Micro-Tech Model 3102* (Panel Mount)



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- See Figure 2-4 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.

Note: All units shipped from the factory are configured for 115 VAC. If 230 VAC is desired, refer to *Section 2.5.1*, motherboard *configuration Jumpers and Switches*.

- 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.

2.5 *Batch Controller* Configuration

The *Micro-Tech 3102/3202* 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 Mother Board 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.On the Digital I/O (4 In/16 Out) board are available others N°4 digital input The programmable inputs may be configured as normally open or normally closed. Inputs are desigend for dry contacts.

Refer to **Table 2-1** for configuration information.

Figure 2-6: Micro-Tech Motherboard

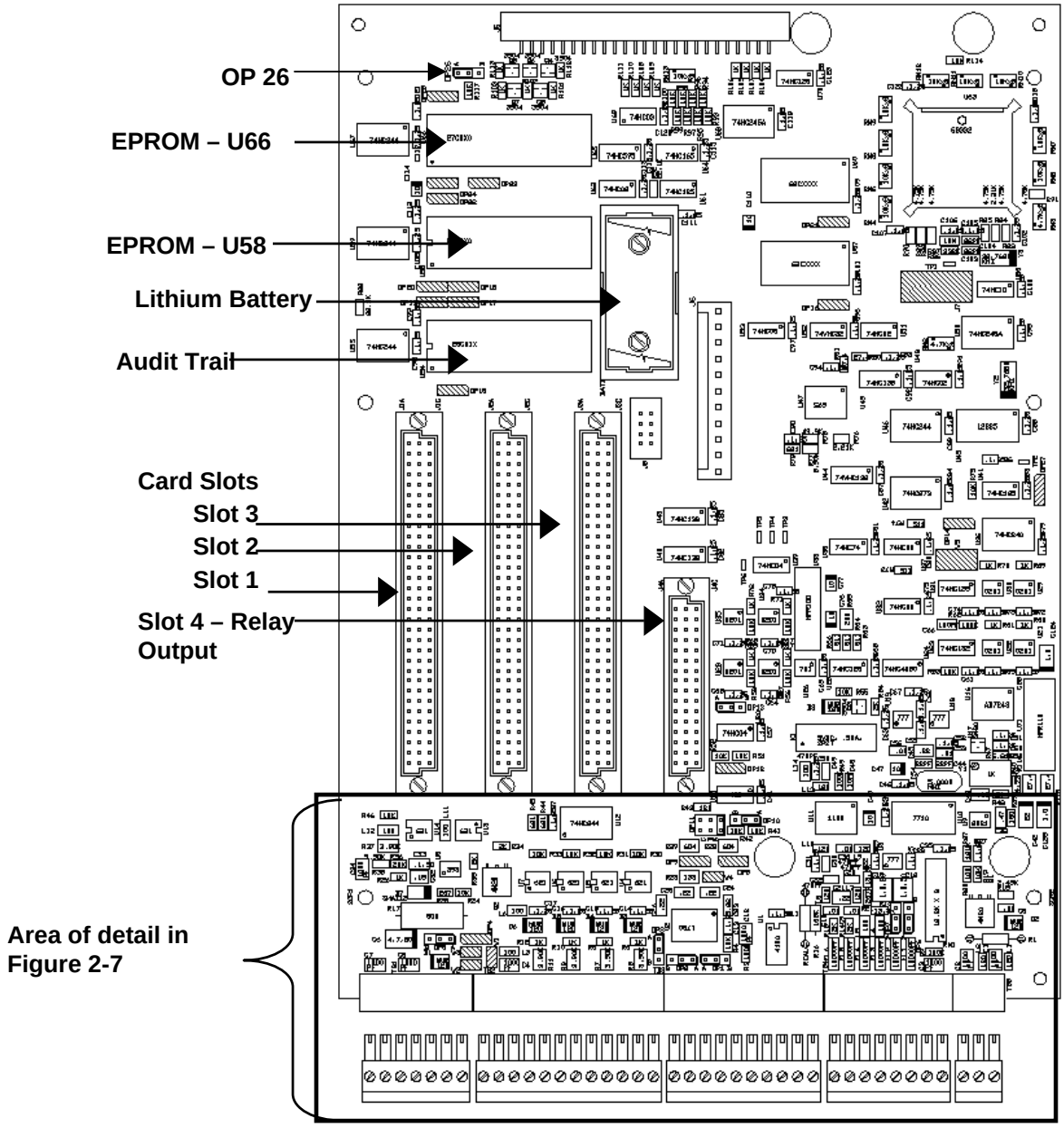

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Table 2-1: Programmable Input Choices

External Alarm 1	Abort S4
External Alarm 2	Charge interl.
External Alarm 3	Charge interl. S1
Reset Alarm	Charge interl. S2
Print rec	Charge interl. S3
Print comp	Charge interl. S4
Start/Set tare	Disch. Interl.
Start/Set tare S1	Disch. Interl. S1
Start/Set tare S2	Disch. Interl. S2
Start/Set tare S3	Disch. Interl. S3
Start/Set tare S4	Disch. Interl. S4
Stop/Reset tare	Disch. dev.
Stop/Reset tare S1	Disch. dev. S1
Stop/Reset tare S2	Disch. dev. S2
Stop/Reset tare S3	Disch. dev. S3
Stop/Reset tare S4	Disch. dev. S4
End cycle	Auto / Man
End cycle S1	Auto / Man S1
End cycle S2	Auto / Man S2
End cycle S3	Auto / Man S3
End cycle S4	Auto / Man S4
Abort	Go on
Abort S1	Reset alarms
Abort S2	Reset Tot r
Abort S3	Reset Tot c
	Remote cntrl (only if high level communication)

2. *Digital Outputs*

A relay output board (all dry contacts) and is plugged into slot 4 of the motherboard. One of the realy 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 mothrboard), which can also be programmed to one of the functions shown below. On the Digital I/O (4 In/16 Out) board are available others N°16 digital outputs (see Appendix C for specifications)

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

Table 2-2: Programmable Output Choices

Comp. 1	High rate S3
Comp. 2	High rate S4
Comp. 3	Low rate
Comp. 4	Low rate S1
Comp. 5	Low rate S2
Comp. 6	Low rate S3
Comp. 7	Low rate S4
Comp. 8	End charge
Comp. 9	End charge S1
.....	End charge S2
Comp. 40	End charge S3
Alarm	End charge S4
Shut down	End discharge
Ready	End discharge S1
High load	End discharge S2
High load S1	End discharge S3
High load S2	End discharge S4
High load S3	End cycle
High load S4	End cycle S1
Low load	End cycle S2
Low load S1	End cycle S3
Low load S2	End cycle S4
Low load S3	Need refill
Low load S4	Need refill S1
High rate	Need refill S2
High rate S1	Need refill S3
High rate S2	Need refill S4

Additional outputs can be selected by adding additional DIO boards.

2.5.2 A/D Jumpers – Load Cell Sense

Load cell sense is controlled by selectable jumpers OP6 and OP7 located on the motherboard (Figure 2-7). The jumpers should be in position "A" local sense if the distance is less than 200 feet between load cell and *Batch Controller*.
For distances greater than 200 feet and less than 3,000 feet, the jumper should be in position "B." A special 6-wire cable is required. Refer to the field-wiring diagram for jumper requirement in the scale junction box.

Table 2-3: Load Cell Jumper Settings

LOAD CELL JUMPERS			
Mode	OP6	OP7	
Less than 200 feet	"A"	"A"	**DEFAULT**
Greater than 200 feet	"B"	"B"	

Figure 2-7: Area of Detail

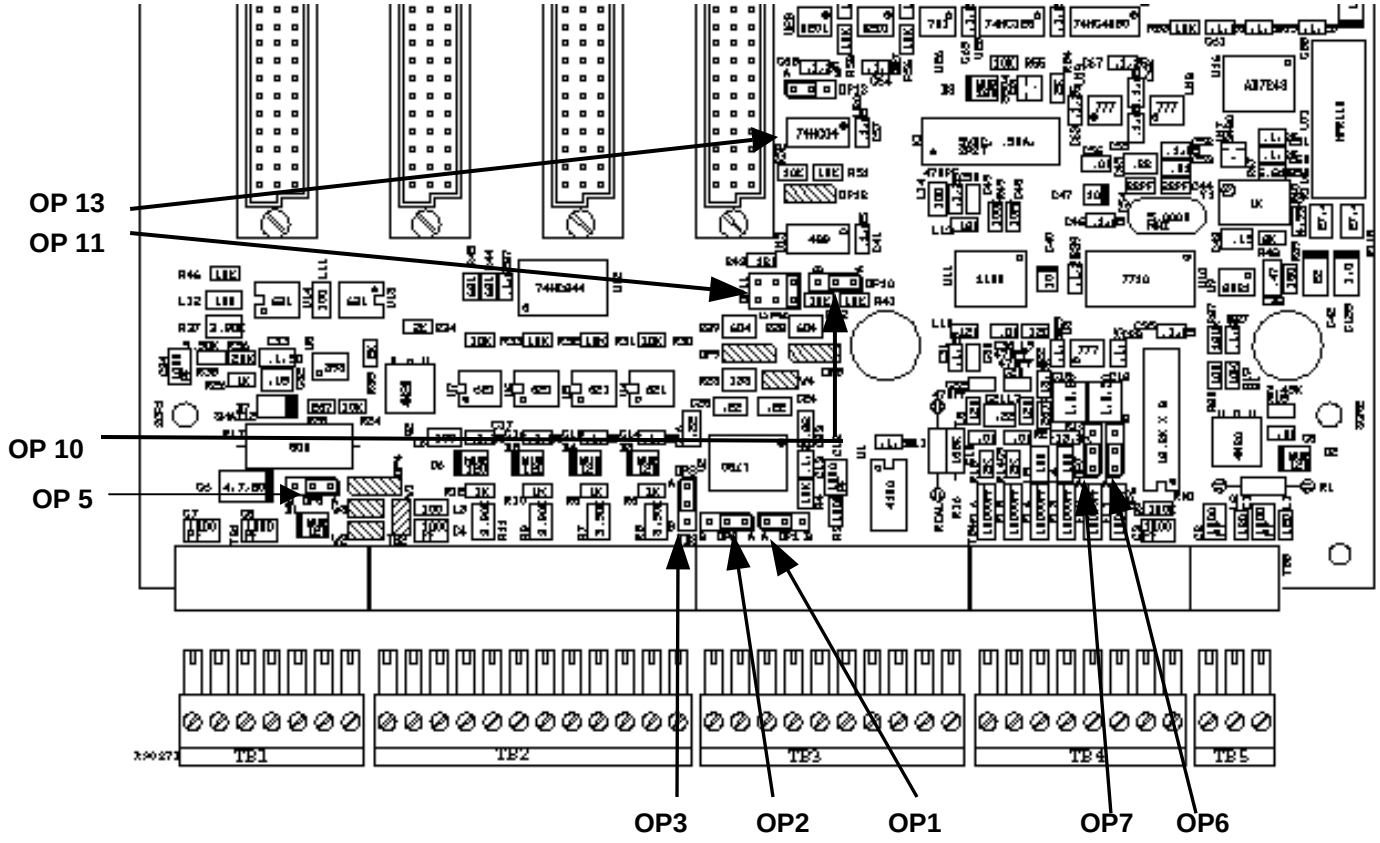


Table 2-4: Micro-Tech Motherboard Jumpers

Jumper Location	Foil/Jumper	Default Position	Description
OP1	Jumper	A	Comm A=RS-485/20mA B=RS-232
OP2	Jumper	A	Comm A=RS-485/20mA B=RS-232
OP3	Jumper	A	Comm A=RS-485/20mA B=RS-232
OP5	Jumper	A	SPU Contact Closure Input (Slow Speed)
OP6	Jumper	A	Sense Jumper A = Less than 200 ft B= Greater than 200 ft
OP7	Jumper	A	Sense Jumper A = Less than 200 ft B= Greater than 200 ft
OP10	Jumper	A	Comm A = RS-485/232 B = 20 mA
OP11	Jumper	A	Comm A = Terminated B = Not Terminated C = 20 mA
OP13	Jumper	A	Comm A = Normal B = Multidrop
OP26	Jumper	A	OIML Calibration Jumper A = Allows Cal B = Restricts Cal

Table 2-5: Terminal Wiring Configurations

TB1 Digital Input/Out

Input #1	Sig	2
	Com	1
		3
		4
Output #4	+ 24 VDC	5
	SIG	6
	COM	7

TB2 Digital Input

8	+24 V	
9		
10	Shield	
11		
12	Sig	In2
13	Com	
14	Sig	In3
15	Com	
16	Sig	In4
17	Com	
18	Sig	In5
19	Com	

TB3 COMM

See Table 2-8 Table 2-9 Table 2-10

TB4 Load cells

37	Shield
36	
32	+Exc
33	-Exc
34	+Sense
35	-Sense
30	+Sig
31	-Sig

TB5 Analog Out Motherboard

38	+
39	-
40	Shield

Table 2-6: Relay Output Board

Micro-Tech 3100 Relay Output Board		
1	NC	Relay K1 Fault Output
2	COM	
3	NO	
4	NC	Relay K2 Output #1
5	COM	
6	NO	
7	COM	Relay K3 Output #2
8	NO	
9	COM	Relay K4 Output #3
10	NO	

*Relays Rated 33VAC 0.5A – 70VDC 0.5A

2.5.3 Analog Output (Motherboard)

A current output signal is available for customer use on motherboard *Terminal Block 5*. The net weight, gross weight, or diff can be selected by the customer to be sent to a recorder, or controller. The output range is adjustable from 0-20 mA, 4-20 mA, 20-0 mA, or 20-4 mA.

Table 2-7: Motherboard Current Output - TB 5

Motherboard Current Output #1 TB5	
38	+
39	-
40	Shield

2.5.4 Analog Input/Output Board (Option)

The (option) 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 Gross Weight, Net Weight or Diff can be selected by the customer to be sent to a recorder, or controller.

Board type (B) Two user definable 0-20/4-20 or 20-4/20-0 mA output.

The Gross Weight, Net Weight or Diff can be selected by the customer to be sent to a recorder, or controller.

2.5.5 Communications Configuration (Motherboard) COMM

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 (see *Table 2-4 and 2-11*). Refer to Figure 2-7 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 2-8: Motherboard COMM 1 Communications Wiring Configuration - TB3 – RS-485

Motherboard RS-485 Communications TB 3	
25	Shield
29	-RX
28	+Rx
24	Common
21	+TX
20	-TX

Maximum cable length 4000 ft
Use Belden 9830 or equivalent

Table 2-9: Motherboard Wiring Configuration TB 3 – RS-232 Communications

Motherboard RS-232 Communications TB 3	
25	Shield
23	CTS
24	Common
22	RxD
21	TxD
20	RTS

Maximum cable length 50 ft
Use Belden 9538 or equivalent

Table 2-10: Motherboard Wiring Configuration TB 3 – 20mA Serial Communications

Motherboard 20 mA Serial Communications TB 3	
25	Shield
26	+20 mA (out)
27	-20 mA (out)
28	+20 mA (in)
24	-20 mA (in)

Maximum cable length 4000 ft
Use Belden 9829 or equivalent

Table 2-11: Mother Board Communication Jumper Settings

JUMPERS							
Mode	**OP1**	**OP2**	**OP3**	**OP10**	**OP13**	**OP11**	
RS-485	"A"	"A"	"A"	"A"	"A" Normal "B" Multi-drop	"A" Terminated 'B" Not Terminated	Default
RS-232	"B"	"B"	"B"	"A"	"A" Normal	"B" Not Terminated "A" Terminated	**Default**
20 mA	"A"	"A"	"A"	"B"	"A"	"C"	

2.6 Initial Setup Procedure

Following mechanical and electrical installation, it is necessary that you program field data that is specific to your application into the *Micro-Tech 3102 Batch Controller* memory. The following setup procedure should be completed before programming your static weight indicator. Refer to Chapter 3 of this manual for more details or assistance.

2.7 Programming the *Micro-Tech 3102 (Initial Setup)*

When power is first applied to the *Batch Controller*, 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. After successful initial programming and scale calibration, proceed to Main Menu 4, I/O Scroll setup.

CAUTION

VERIFY 115/230 VOLT SELECTION IS CORRECT. IMPROPER CONNECTION MAY RESULT IN DAMAGE TO YOUR *INSTRUMENT*.

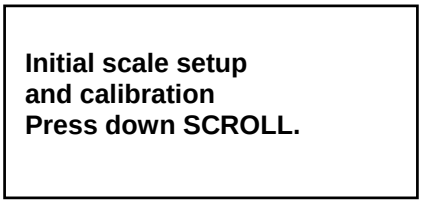
- When the unit is powered on the first time,some data must be entered before the unit can be operated. The user has to enter each parameter according to the plant specifications. During this procedure, the RUN and MENU keys are inactive.

2.7.1 Selecting the language

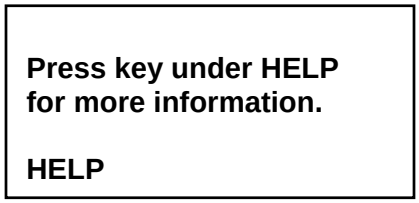
-- MEMORY ERASED --
Chose the language
key to continue to

ESP **USA**

The *Batch Controller* is a dual language instrument. USA is always the first language. The standard configuration profides *Spanish* (*ESP*) as the second language. Other languages, such as *German* (*GER*), are available upon request (consult factory). Press the **DOWN SCROLL** key

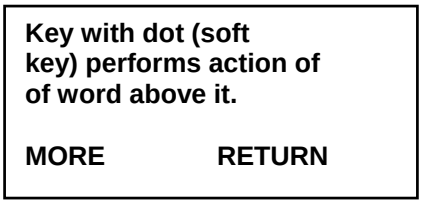


Press the **DOWN SCROLL** key.



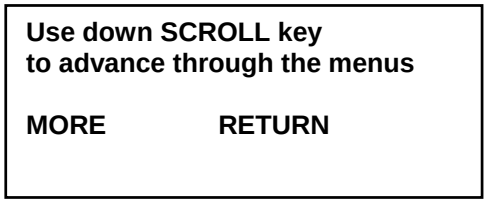
"HELP" is flashing

Press the **HELP** soft key.



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

Press **MORE**



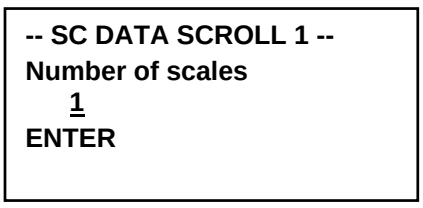
Pressing **MORE** or **RETURN** reverts the screen back to previous screens in the series. By pressing the **DOWN SCROLL** key, the system is enabled to proceed through the menus needed for system setup.

NOTE: Menus appearing during initial setup may operate differently in normal operation.

2.7.2Define the Number of Scales

The *Batch Controller* can control from one to four independent scales. The number of scales can be programmed according to the number of A/D are installed.

If is available only the A/D (on Motherboard) this scroll is not displayed



Default: 1
Min: 1
Max: The absolute maximum number of scales is 4. The actual maximum depend of the combination of A/D boards installed.

- Plant scale A/D 1channel
- Plant scale A/D 2channel
- Premium scale A/D 1channel

In cases where more scale are defined, it is necessary to define how these scales should be handled by the batch controller. This option can only be changed during the cold start procedure. The two ways to handle the scales in multi-scale mode is described in Appendix B.

```
-- SC DATA SCROLL 1A --
Mode to handle the scales
    > Single <
CHOICE              ENTER
```

Default: SINGLE
Selections: SINGLE, GROUP

2.7.3The SCALE Soft Key

The scale  soft key

There are many parameters that must be entered for each scale. If you have more than 1 scale, the SCALE soft keys is displayed. in the scroll position where data needs to be entered. This keys has double function, first it indicates which scale

the parameter is referring, for Example :  **1** indicates that you are entering a parameters for scale 1. Second, it allows you to change scales by pressing the soft key below the indication. The scale number changes.

In the manual, this key is indicated by SCALE #.

2.7.4 Measure Units

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

NOTE : Menus appearing during initial setup may operate differently in normal operation.

Measure units can be individually selected. The user must first decide if the English units will be used or the Metric ones, or combination of both.

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

CHOICE          ENTER
```

Default: ENGLISH (if USA language)
METRIC (if ESP language)

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

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

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.

2.7.5 Weight Units

The weights will be displayed according to the units selected here.

```
-- DISPLAY SCROLL 2 --
Weight Units
>  pounds  <
CHOICE   ENTER    SCALE #
```

English	Metric	If Mixed
Default: Pounds	**Default**: kg	**Default**: Pounds
Choice: Pounds Tons, LTons	**Choice**: kg Tonnes	**Choice**: kg,Tonnes, Pounds, Tons, LTons

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

2.7.6 Total Units

The totals are diaplayed according to the units selected here.

```
-- DISPLAY SCROLL 3 --
Total Units
>  Tons  <

CHOICE  ENTER  SCALE #
```

English	Metric	If Mixed
Default: Tons	**Default**: Tonnes	**Default**: Tons
Choices: Tons, Ltons, Pounds	**Choices**: Tonnes, kg Ltons, Pounds, Tonnes, kg	**Choices**: Tons,

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

2.7.7 Max Scale Capacity

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

```
-- SC DATA SCROLL 2 --
Max. scale capacity
      500.0 lbs
ENTER          SCALE #
```

Default: 500.0
Min: 1
Max: 1000000

2.7.8 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.

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.

```
-- SC DATA SCROLL 3 --
Scale Divisions
>       0.1      <
CHOICE  ENTER  SCALE #
```

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

2.7.9 Load Cells Number

Enter the number of load cells of your scale.

```
-- SC DATA SCROLL 5 --
# of load cells
      1
ENTER          SCALE #
```

Default: 1
Min: 1
Max: 6

2.7.10 Defining Load Cells Capacity

Enter the *load cell capacity* as it appears on the label placed on the load cell.

```
-- SC DATA SCROLL -6-
Load cell capacity
250.0   Lbs

ENTER          SCALE #
```

If **English** or **Mixed:**
Default: 250.0 Lbs
Min: 10 Lbs
Max: 500000 Lbs

If **Metric**
Default: 100 kg
Min: 5 kg
Max: 5000 kg

Enter the *load cell sensitivity* in mV/V as marked on the label of the load cell. *Thermo Scientific* load cells are normally 2.000 or 3.000 mV/V.

```
-- SC DATA SCROLL -7-
Load cell sens.
3.000   mV/V

ENTER          SCALE #
```

Default: 3.000 mV/V
Min: 0.500 mV/V
Max: 3.500 mV/V

Load cell resistance is entered on this screen. The resistance for the load cell has been recorded on the System Data Sheet in the front of your scale manual. (It is also stamped on the load cell cable.) Enter the ohms for the load cell. The number of scrolls depends on the number of load cells installed.

```
-- SC DATA SCROLL –8A-
Load cell #1
Res     350.000   Ohms

ENTER          SCALE #
```

Default: 350 Ohms
Min: 10 Ohms
Max: 2000 Ohms

- If # of Load Cells is more than 2:

```
-- SC DATA SCROLL –8B-
Load cell #2
Res     350.000   Ohms

ENTER          SCALE #
```

Some default and limits of load cell #1

- If # of Load Cells is more than 3:

```
-- SC DATA SCROLL –8C-
Load cell #3
Res      350.000   Ohms

ENTER          SCALE #
```

Some default and limits of load cell #1

- If # of Load Cells is more than 4:

```
-- SC DATA SCROLL –8D-
Load cell #4
Res      350.000   Ohms

ENTER          SCALE #
```

Some default and limits of load cell #1

- If # of Load Cells is more than 5:

```
-- SC DATA SCROLL –8E-
Load cell #5
Res      350.000   Ohms

ENTER          SCALE #
```

Some default and limits of load cell #1

- If # of Load Cells is 6:

```
-- SC DATA SCROLL –8F-
Load cell #6
Res      350.000   Ohms

ENTER          SCALE #
```

Some default and limits of load cell #1

2.7.11 Quick Automatic Calibration of the Scale (s)

The system performs a quick calibration of the scale (s). The scale is first zeroed (3 seconds) and than calibrated using the load cell capacity, sensitivity resistance just entered. During this time, the following screen is displayed :

```
CALIBRATION IN
PROGRESS
```

When calibration procedure is completed, the “SCALE CALIBRATE” or, in case the load cell is not connected or a failure is detected, “SCALE NOT CALIBRATED” message is displayed. At this point, the procedure is complete and the following message is displayed.

Press RUN to start or MENU for scrolls

The field data entered during this procedure enabled the Micro-Tech 3102 to perform an unassisted zero balance and span calibration. Assuming no mistakes were made, the scale is calibrated and is ready for use at this time.

NOTE :

The span number was calculated from the data that was entered during this initial calibration setup procedure. This span number is based on a perfect mechanical installation of the scale. Therefore, verify this by performing a span calibration procedure.

Chapter 3
Micro-Tech 3102 Operation

Your *Thermo Scientific Batch Controller* is capable of accurate weighing, provided it is installed, calibrated, operated, and maintained in complete accordance with the instructions contained in this manual.

3.1 Overview

Micro-Tech 3102/3202 Batch Controller is a microcomputer-based instrument that accepts and conditions weight signals and provides visual and electrical outputs for total weight . A stable 10-volt DC excitation voltage capable of exciting up to six 350 ohm strain gauge load cells is produced by the *Batch Controller*. Sense lead terminations are also provided for six wire load cell cables.

Auto Zero (AZ) Track enables the scale system to automatically zero itself during extended periods when the scale is empty. Auto Zero Track is menu selectable. The letter “Z” appears on the first line of the display indicating Auto Zero Track option is enable.

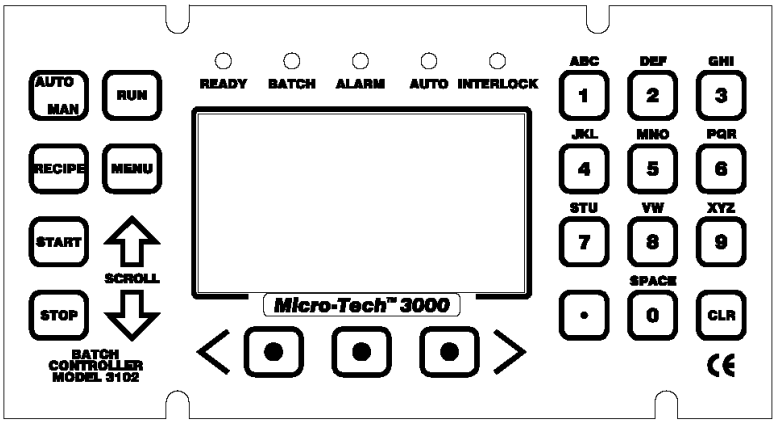
Life expectancy of the RAM support battery is approximately ten years, if power is not applied. Under normal operation where power is on continuously, life expectancy is much longer.

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

3.2 Front Panel

The front panel (Figure 3-1) contains the necessary status indicators and keys to enable the operator to perform calibrations and all required operations after the *Batch Controller* has been configured in Section 2.5.

Figure 3-1: Micro-Tech 3102 Front Panel



3.2.1 LED Status Indicators

The five red status indicators show the status of the *Batch Controller*.

INTERLOCK
ON indicates the cycle is waiting for an external signal to proceed, or STOP indicates it is waiting for a restart command. If a cycle is not running, this indicator stays off.

AUTO
AUTO indicator is ON when the instrument is in automatic.

ALARM
Alarm indication flashes if an alarm is pending, either the alarm is NEW or has been ACKNOLOWLEDGED.

BATCH
BATCH indicator is ON when a cycle is running. It also stays ON if the cycle is in stop condition.

READY
READY indicates the batch weigher is ready and a cycle can be started. It turns ON when the following conditions are satisfied :

- The batch weigher is calibrated (a span calibration has been executed).
- The batch weight indicator is in automatic.
- No shutdown conditions are active.
- The cycle is not running.

If more scales are defined, the status indication refers to the displayed scale.

3.2.2 LCD Graphic Display

The LCD graphic display indicates actual running information or displays menu entry information.

3.2.3 Keypad

The keypad is comprised of pad touch keys consisting of the following:

- **RUN** – gives access to the **RUN** menu and returns the *Batch Controller* to *Run* mode whenever pressed.
- **MENU** – gives access to the *Micro-Tech 3102* menus
- **UP/DOWN ARROW KEYS** – scrolls up or down in the selected menu.
- **SOFT KEYS** – selects the displayed function directly above the key. Also moves the cursor left and right during string editing.
- **ALPHL/NUMERIC KEYS 1 THROUGH 0** – used to enter letters and numerals when string editing. Similar to a telephone keypad.
- **DECIMAL POINT KEY** – enters a decimal point
- **CLEAR KEY** – removes incorrect entries prior to pressing **ENTER**.

- **TOTAL KEY** – accesses menus that contain detailed informations on the totalizer..
- **AUTO/MAN KEY** – switches batch controller from automatic to manual and back.
- **START**– interrupts load out. Aborts load out if already interrupted.
- **STOP**– stop keys are only active with Load Out option.

3.3 General Navigation

Navigating the menus is the same throughout the setup and operation of the *Micro-Tech 3102*. To follow are a few general guidelines to help in menu navigation.

- Press the **DOWN SCROLL** key to advance through the menus,
- **UP SCROLL** key to return to the previous item displayed on the screen,
- **RETURN** to go back to the previous menu,
- **CHOICES** soft key to view the choices for a selected menu option, and
- **ENTER** to confirm you menu selection

3.4 Menu Displays

The *Batch Controller* 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 **MENU** until the desired menu screen is displayed. Pressing the soft key directly below the desired scroll, and then using the **UP/DOWN** scroll key select menu scrolls.

If the *Batch Controller* 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.

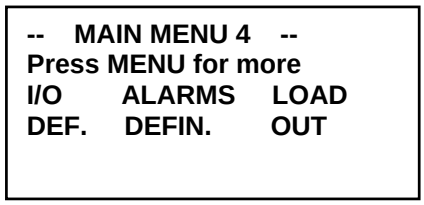
Optional menu scrolls are only available if the option has been installed. The MENU key activates the following screens.

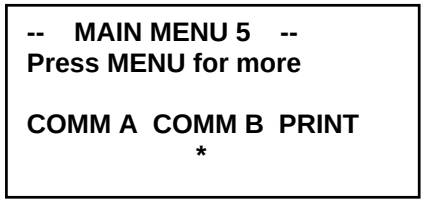
```
--  MAIN MENU 1  --
Press MENU for more
ZERO    SPAN
CAL     CAL
```

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

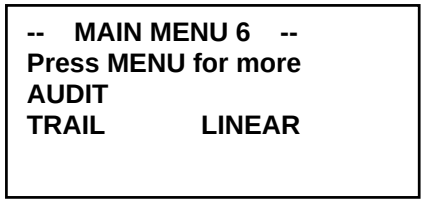
```
--  MAIN MENU 3  --
Press MENU for more

PROT      DIAG        TEST
```



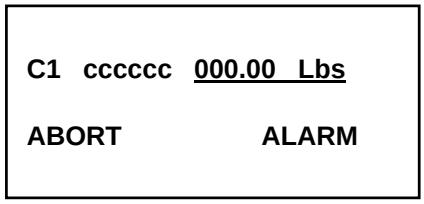


***Can be AB RIO or PRO DP**



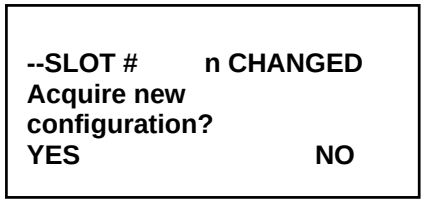
3.5 Normal Power On

When the *Batch Controller* is powered on after initial programming, the Run menu is displayed unless the hardware configuration has been changed.



3.6 Hardware Configuration

If the hardware configuration detected at power on differs from the one recorded in memory, the following screen displays. This only happens if a circuit board has been added or removed during power off, or a board has failed.



This screen disappears after 10 seconds if the question is not answered. The *Batch Controller* assumes the answer is **NO**. "HW CONFIG. CHANGED"

alarm is on and cannot be reset. The above screen appears each time power is cycled. If a board is removed or added, and this is a permanent change in configuration, answer **YES**.

1. A board is removed and is not replaced:

   The *Batch Controller* cancels from memory the setup data of the board that is removed. If the board is added again, the setup data for the board has to be entered again.

2. A board is added:

   The *Batch Controller* acquires the new hardware configuration. Setup data for the new board must be entered.

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

If **YES** is pressed, the alarm "HW CONFIG" is cleared.

If the reason for the message is not known, or if the change in configuration is temporary and the operator does not want to lose the original setup, answer **NO**.

1. A board is removed:
2. The *Batch Controller* resumes operation, retaining setup data of the board that was removed. All other boards continue working normally. No change occurs in the I/O Definition.
3. A board is added:
4. The *Batch Controller* resumes normal operation without recognizing the new board.

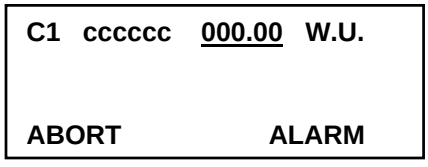
If **NO** is pressed, the "HW CONFIG CHANGED" alarm stays on.

3.7 Run Menu

When the *Batch Controller* 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.

The Run Menu is made up of four scrolls that can be scrolled during scroll DOWN and scroll UP keys. In the first scroll, all the informations about the cycle is collected. It appears as follow :

3.7.1 Main Run Scroll



Line 1: The component number and name are displayed with the actual weight on the scale. The weight could be net or gross weight depending on the phase of the cycle. If the cycle is not running, it is the gross weight.

Line 2: When the cycle is not running, it is blank. Otherwise, the component set-point is displayed.

Line 3: A message is displayed to indicate the phase of the cycle.

Line 4: ABORT key appears when the cycle is running. It allows the operator to abort the running cycle. ALARM key is displayed if an alarm is pending.

3.7.2 Recipe Scroll

The second scroll allows the operator to define which recipe must be executed or it is executing if the cycle is running. It appears as follows.

```
Recipe to run
_________rrrrrrrr

ENTER  SCALE#  NEXT
```

If the cycle is running, ENTER and NEXT key disappear because it is not possible to change the recipe number while it is running.

NEXT key can be used to scroll existing recipes.

3.7.3 Cycles Scroll

The third scroll allows the operator to define how many cycles should be executed. It appears as follows:

```
Cycles run _____________
Cycles to run ___________

ENTER              END C.
```

(or Cycle running _____)

(AUTO)

The number of executed cycles is displayed in the first line. The number of cycles to run is displayed in the second line. This value can be changed during a cycle. If at least one cycle remains to be executed, the END C. Key is displayed. The END C. Key disappears when pressed, stopping the cycle sequence. The running cycle is the last one.

Zero can be entered as cycles to run. In this case, the AUTO message appears instead of 0, AUTO REPEAT mode becomes active. After a START command, the recipe is repeated until END C. key is pressed.

3.7.4 Weight and Message Scroll

The fourth scroll appears as follows :

```
Net       0000.00  W.U.
(1)
(2)
PRINT  SCALE#  ALARM
```

(or Gross 0000.00 W.U.)

The first line displays the actual NET WEIGHT or GROSS WEIGHT if no tare weight has been acquired.

The second (1) and third (2) line are by default blank, but can be programmed to show:

- The tare weight
- The gross weight

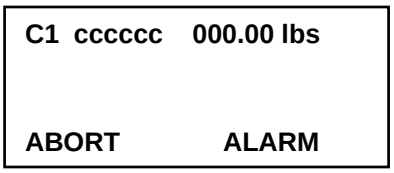
- Date and time
- A bar graph indicator

The **SCALE#** key allows the operator to switch between scales if more scales are selected

If an alarm is pending, **ALARMS** key is assigned to key F3.

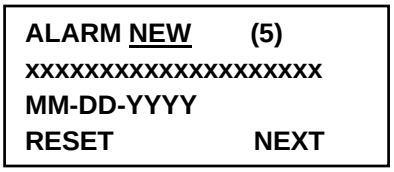
3.7.5 Alarm Pending

The message ALARM appears in the right soft key if an alarm is pending. The alarm status indicator is flashing.



"Flashing"

The following menu is displayed after pressing the ALARM soft key



The keyword "**NEW**"is indicating an alarm that has not been acknowledged yet. When the operator presses the **RESET** key to clear the alarm, the alarm disappears only if the reason that caused the alarm to occur does not exist any more. If the alarm is still pending, the keyword "**ACK**"is displayed instead of "**NEW**".

The third line shows date and time .

The NEXT key is used to scroll between the pending alarms. The string "xxxxxxxxxxxxxxxxxxx"represents one of the following alarm conditions.

Pressing RUN returns to the main RUN menu

1.	Clock Fail
2. through 6.	Load Cell Fail S#
7.	RAM Fail
8.	ROM Fail
9 through 13.	High Load S#
14 through 18.	Low Load S#
19.	Warm Start
20.	Cold Start
21.	P.D. Calibration
22 through 26.	Calib Time S#
27 through 29.	Ext. Alarm n
30 through 35.	HW Conf. Changed
36.	BCD Overflow
37.	Math Error
38.	Printer Error

39. Communication Error
40 through 44. Bad Start Weight S#
45 through 49. Stop Cycle S#
50 through 54. End Cycle S#
55 through 59. Abort Cycle S#
60 through 64. Comp. Time Out
65 through 69 Deviation S#
70. Allen-Bradley RI/O Error
71. PROFIBUS-DP Error

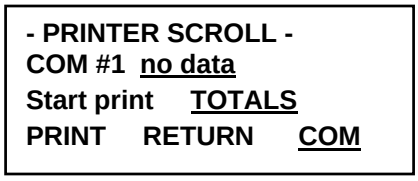
Refer to Chapter 4.0, Maintenance, for more information.

3.7.6 Print Key

The **PRINT** key is active if selected in COMM scroll.

The following screen is displayed:

When **PRINT** is pressed, the following screen displayed :.



Password : Not Required

The second line is the status of the printer :

NO DATA Indicates the printer is idle, no data is being sent to the printer.

IS RUNNING The system 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 :

TOTALS C. Print component totals (all scales if more scales are defined)

TOTALS R. Print recipe totals (all scales if more scales are defined)

SETUP Print the setup data of the instrument.

TRAILS If audit trails option is active, print audit trails data.

Print starts after the PRINT key is pressed.

The COM key allows printer selection if more than one printer is installed.

Examples of data that can be printed :

Print **TOTALS**, default :

COMPONEN TOTALS
DATE : 03-10-1998
TIME : 8:12a

C1 comp_name : 0.00 Tons

C2 comp_name: 0.00 Tons

……..

Cn comp_name 0.00 Tons

RECIPE TOTALS

DATE : 11-10-2002

TIME : 8:12a

R1 rec_name 0.00 Tons 0 cyc

R2 rec_name 0.00 Tons 0 cyc

……..

Rn rec_name 0.00 Tons 0 cyc

The batch report can be printed automatically at the end of a batch.

BATCH REPORT

RECIPE 1 rec_name
CYCLE 1/5
EX.TIME 1h 12'25" (max. 8 hours)

C1 comp_name 0.00 Tons

……..

Cn comp_name 0.00 Tons

0.00 Tons

Print **ALARM** :

11-10-2002 8:14a

Clock fail

Print **AUDIT TRAILS** :

When print AUDIT TRAILS command is given, enter the number of records to print. This allows printing of a portion of the recorded trails rather than all the recorded trails.

TRAIL RECORD NR. 1

DATE 11-10-2002 TIME 11:59p

VARIABLE scale cap

NEW 400.00

OLD 500.00

TRAIL RECORD NR. 2

DATE 11-11-2002 TIME 11:35p

VARIABLE span

NEW 250000
OLD 300000

3.8 COMMAND KEYS

Command keys define the batch weight indicators mode of operation, components and recipes.

3.8.1 AUTO/MAN Key

The AUTO/MAN key allows switching from manual to automatic and back..

Switching from auto to manual while the recipe is running causes the cycle to abort. A warning message is displayed.

```
Running cycle will be
aborted.
Press YES to confirm
YES          NO
```

The AUTO/MAN key is inhibited when remote AUTO/MAN is selected.

3.8.2 Recipe Key

The DATA key allows the operator to define components and recipes for each scale. After pressing RECIPE, the following scroll is displayed.

```
-       DATA SCROLL      -
COMP.                    REC.
DEFINE   TOTALS   DEFINE
```

1. Components Definition

   Choose COMP. DEFINE to define a new component or change an exixting one. The following scroll is displayed.

```
-      COMP. DEFINE      _
Component number
___   cccccc
ENTER  CHNG >   EDIT
```

The number of the first component is displayed along with the component name is defined. Use UP DOWN scroll keys to scroll between existing components or when entering component numbers.

A list of components is available to make the component definition easier.

The function key F3 meaning can be changed by pressing the CHNG > key.

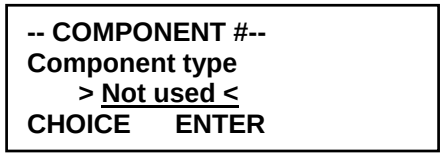
EDIT Edit the selected component data.

COPY Copy the data of the selected component in another one.

DELETE Delete a pre-defined component.

Press EDIT to approach the component data.

Define the component type.

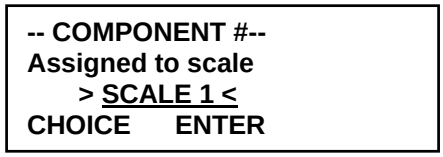


Password: SERVICE

Default: NOT USED

Selections: NOT USED, BATCH CHARGE, BATCH DISCH, DISCHARGE, REFILL, TIME BASED

Press the DOWN key if more scales are defined. The following scroll is displayed.

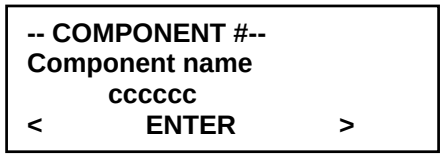


Password: OPERATOR

Default: SCALE 1

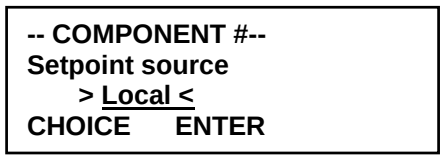
Selections: SCALE 1, SCALE 2, SCALE 3 (if defined), SCALE 4 (if defined)

Press the DOWN key. The following scroll is displayed. Enter the name of the component name in 6 alphanumeric digits.



Password: OPERATOR

Press the DOWN key. If a CHARGE BATCH or DISC. BATCH component and BCD optional input has been configured as setpoint, the following scroll is displayed.

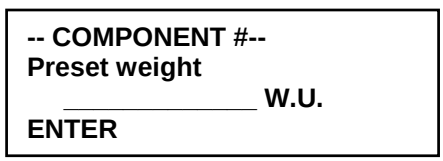


Password: OPERATOR

Default: LOCAL

Selections: LOCAL, BCD INPUT

The next scroll defines preset weight.



Password: OPERATOR

Default: 0 Min: 0 Max: Scale Capacity

Press the DOWN key if a CHARGE BATCH or DISC. BATCH component.

The next scroll is displayed. Enter the cut-off correction mode.

```
-- COMPONENT #--
Cut-off correction
     > Manual <
CHOICE     ENTER
```

Password: OPERATOR

Default: MANUAL
Selections: MANUAL, AUTOMATIC

If AUTOMATIC is selected, the following scroll shows the actual value of the correction. If MANUAL is selected, the cut-off can be entered in this scroll.

```
-- COMPONENT #--
Cut-off weight
     _____ T.U.
ENTER
```

Password: OPERATOR

Default: 0
Min: 0
Max: Scale Capacity

If AUTOMATIC was selected above, the following scroll is displayed. Enter the maximum cut-off correction.

```
-- COMPONENT #--
Cut-off max corr.
     _____ T.U.
ENTER
```

Password: OPERATOR

Default: 0
Min: 0
Max: Scale Capacity

Press the DOWN key. If a CHARGE BATCH or DISC. BATCH component was selected, the next scroll is displayed.

This defines the high and low rate outputs during high rate batch.

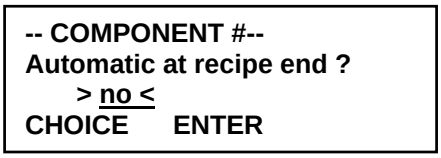
```
-- COMPONENT #--
High rate mode
     > High only <
CHOICE     ENTER
```

Password: OPERATOR

Default: HIGH ONLY
Selections: HIGH ONLY, HIGH + LOW

The next scroll defines if a component is to be automatically executed at the end

of all the recipes.Typical application is for the discharge component but a refill component can also be used. This avoid the need to define the end recipe component in all the memorized recipes because only one component can be defined as the end recipe component. If it has already been defined, the next scrolls are not displayed. They are not displayed in any case if the component is not a REFILL or DISCHARGE type.

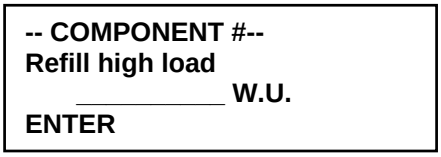


Password: OPERATOR

Default: NO
Selections: NO, YES

The following three scrolls are displayed only if a REFILL component has been defined as end recipe component.

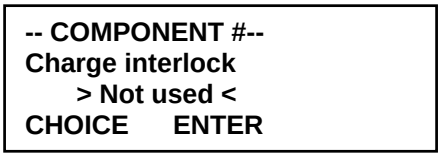
The first scroll defines the amount of material to refill.



Password: OPERATOR

Default: 0
Min: 0
Max: 10000

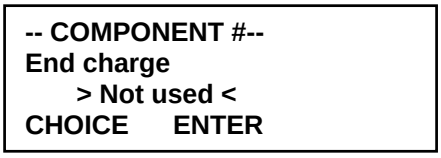
The second scroll defines how to handle the CHARGE INTERLOCK input



Password: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

And the third scroll defines how to handle the END CHARGE output.



Password: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

The following two scrolls are displayed only if a DISCHARGE components has been defined as end recipe component. They define how to handle the DISCHARGE INTERLOCK input and the END DISCHARGE output.

Password: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

```
-- COMPONENT #--
End discharge
     > Not used <
CHOICE     ENTER
```

Password: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

Press the DOWN key. The following scroll is displayed. It defines the delay at the start before activating the component.

```
-- COMPONENT #--
Start delay
          _____ sec
ENTER
```

Password: OPERATOR

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

Press the DOWN key. The following scroll is displayed. Enter the stabilization delay.

```
-- COMPONENT #--
Stabilization delay
          _____ sec
ENTER
```

Password: OPERATOR

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

Press the DOWN key. The following scroll is displayed. Enter the maximum time for component activation.

```
-- COMPONENT #--
Charge timeout
          _____ sec
ENTER
```

Password: OPERATOR

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

Component definition is now complete. Pressing the DOWN key returns to the

first component scroll. Pressing RUN returns the batch weigher to the RUN mode.

3.8.3 Total Key

The TOTAL key accesses menus which contain detailed information on the totalizers. There are two sets of totalizers: totals for recipe and totals for component. In the first menu, one of them must be chosen.

```
     -- TOTALS MENU--
Choose total regs
COMP.              RECIPE
TOTALS             TOTALS
```

If COMP. TOTALS key is pressed, the following scroll is displayed.

```
COMP. #  cccccc
Total   0000.00   T.U.
Last    0000.00   W.U.
  ENTER   EXIT   RESET
```

First line displays the component number and name.

Second line displays the cumulative total.

Third line displays the amount of material batched out in the last cycle.

This information is cleared at the start of new cycle. The third line is empty if the weight value is zero.

Press UP/DOWN keys to scroll through the components or enter the component number.

Press RESET key to reset the displayed total registers. The following scroll is displayed.

```
Only the total of the component
or all ?

ALL          COMP          EXIT
```

Press ALL to clear all the totals. Press COMP to clear the component register only.

If RECIPE TOTALS key is pressed, the following scroll is displayed.

```
R# rrrrrrrr   0000  Cyc
Total     0000.00  T.U.
Last      0000.00  W.U.
ENTER       EXIT       RESET
```

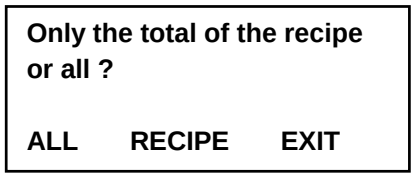
First line displays the recipe number, recipe name and the number of cycles.

Second line displays the cumulative total.

Third line displays the amount of material batched out in the last cycle. The third line is empty if the weight value is zero.

Press UP/DOWN keys to scroll through the recipes or enter the recipe number.

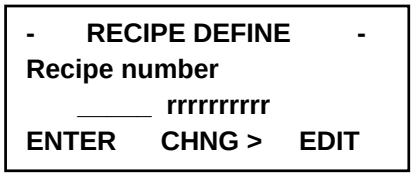
Press RESET key to reset the total registers. The following scroll is displayed.



Press ALL to clear all the totals. Press RECIPE to clear the register of that recipe only.

3.8.4 Recipes Definition

Choose RECIPE DEFINE to define a new recipe or change an existing one. The following scroll is displayed.



Recipe number and name (if defined) is displayed. Use UP/DOWN keys to scroll existing recipes or enter a recipe number directly.

A series of recipes is available to make the recipes definition easier. The meaning of the function key F3 can be changed by pressing the CHNG > key be:

EDIT Edit the selected recipe

COPY Copy the selected recipe in another one. Number of the destination recipe is required.

DELETE Delete the recipe

VERIFY Check if the recipe is correct.

PRINT Print the recipe.

Example :

PRINT RECIPE
DATE: 12-20-1998
TIME: 8:03a
RECIPE 10 – rec_name

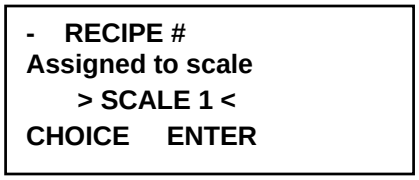
C1 comp_name
SET 10.0 Tons
DEV 1.0%
LABEL 0
C2 comp_name
SET 30.0 Tons
DEV 1.0%

LABEL 0

Press EDIT to approach the recipe data. The following scroll is displayed. Enter the name of the recipe in 8 alphanumeric digits.

Protection: OPERATOR

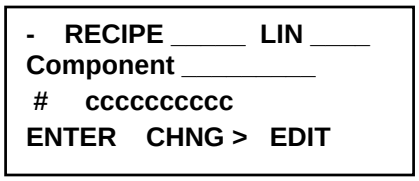
Press DOWN key if more scales are defined. The following scroll is displayed. It defines the scale membership.



Protection: OPERATOR

Default : SCALE 1
Selections : SCALE 1, SCALE 2, SCALE 3 (if defined), SCALE 4 (if defined)

Press DOWN key. The following scroll is displayed. Enter the component.



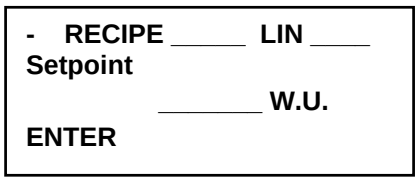
Protection: OPERATOR

Default: 0 sec
Min: 1 sec
Max: Number of defined components

Use UP/DOWN keys to scroll through the recipe lines. Press EDIT if you want to display the line's data, EXIT to come back to (2). Component 0 means end recipe. In this case, EDIT key is substituted by EXIT key. Press it to come back to pint(2). Other functions of the F3 key are :

DELETE Delete the current line
INS/CP Insert a line between the actual and the next one. The new line is equal to the actual one, so this command can also be used as COPY command. If used in the last recipe line, it adds a new line to the recipe.

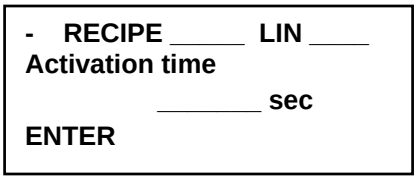
If EDIT key pressed a series of scrolls are displayed. They are different, depending upon the component type.
The following scroll is displayed only if the component is a CHARGE BATCH or DISCH. BATCH type and if the set-point source has been defined as LOCAL (if active BCD input option).



Protection: OPERATOR

Default: 0 sec
Min: 0 sec
Max: Number of defined components

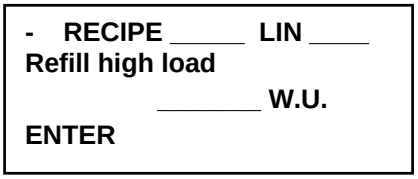
The next scroll is displayed if the component is a TIME BASED type.



Protection: OPERATOR

Default: 0 sec
Min: 0 sec
Max: Number of defined components

The following scrolls are displayed only if the component type is REFILL. It defines the weight set-point for refill.



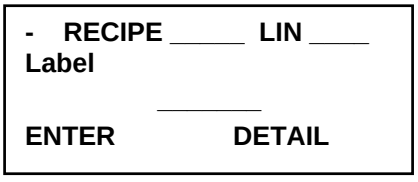
Protection: OPERATOR

Default: 0 sec
Min: 0 sec
Max: 10000

In the next scroll, the batching label should be defined. The label gives information on how the instrument should handle that batch phase. The operator enters a number that is obtained by adding a constant number for each option he/she wants to activate. The table below summarizes all the possibilities.

OPTION	*POSSIBLE SELECTION*	*CONSTANT NUMBER*
Refill Mode (1)	Auto	0
	Forced	2
Charge/Disch. Interlock	None	0
	Pulse	4
	Stable	8
End Charge/Disch.	None	0
	Pulse	16
	Stable	32
Restart Batch if neg err (2)	No	0
	Yes	64

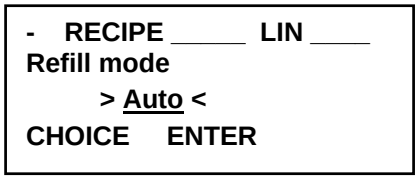
(1) Only for REFILL type components.
(2) Only for BATCH CHARGE or BATCH DISCH. components



Protection: OPERATOR

Default: 0 sec
Min: 0 sec
Max: 32767

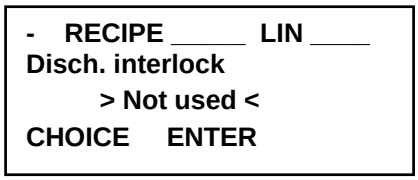
Pressing the DETAIL key makes it possible to select the batch options without entering the label. The label number is computed automatically by the instrument.
The following scrolls are displayed in this case.
Only for REFILL type components, it defines how to refill function works. If FORCED, a refill starts independently by the actual weight on the scale. If AUTO, the refill cycle starts each time before doing a DISCH BATCH component if the set-point of this component is higher than the actual weight on the scale.



Protection: OPERATOR

Default: AUTO
Selections:: AUTO, FORCED

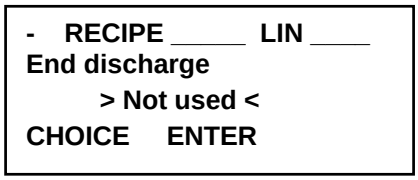
The next two scrolls are diaplayed only if component is BATCH DISCHARGE or DISCHARGE type.
The first scroll defines how to check the DISCHARGE INTERLOCK input.



Protection: OPERATOR

Default: NOT USED
Selections:: NOT USED, PULSE, STABLE

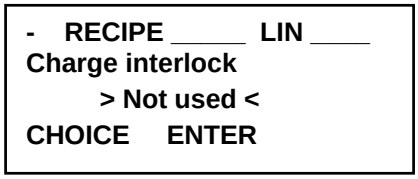
The second scroll defines how to handle the END DISCHARGE output.



Protection: OPERATOR

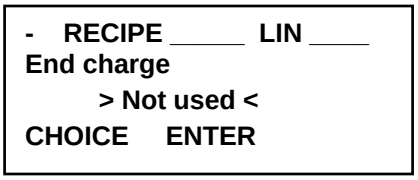
Default: NOT USED
Selections:: NOT USED, PULSE, STABLE

The next three scrolls are displayed only if a component is BATCH CHARGE or REFILL type.
The first scroll defines how to check the CHARGE INTERLOCK input.



Protection: OPERATOR

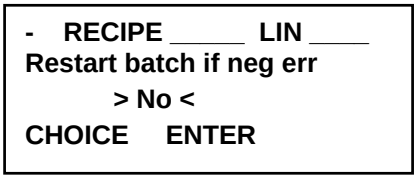
Default: NOT USED
Selections:: NOT USED, PULSE, STABLE
The second scroll defines how to handle the END CHARGE output.



Protection: OPERATOR

Default: NOT USED
Selections:: NOT USED, PULSE, STABLE

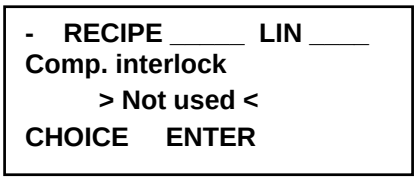
The third scroll enables the instrument to restart the batch, reactivating the component, if at the end of the stabilization time, the net weight is below the component set-point.



Protection: OPERATOR

Default: NO
Selections:: NO, YES

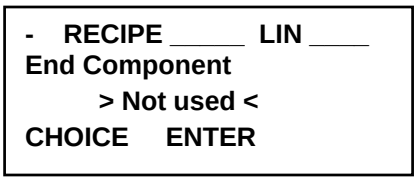
The next two scrolls are displayed only if the component is a TIME BASED type.
The first one defines how to check the COMPONENT INTERLOCK input.



Protection: OPERATOR

Default: NOT USED
Selections:: NOT USED, PULSE, STABLE

The second scroll defines how to handle the END COMP. output.



Protection: OPERATOR

Default: NOT USED
Selections:: NOT USED, PULSE, STABLE
NOTE: “Charge Interlock” and “Charge End” outputs are used as “Comp. Interlock”and “End Comp.”in case of time based components.

3.8.5 START Key

START key has a double function. If the instrument is in AUTOMATIC, it starts a batch cycle.

If the instrument is in MANUAL,it can be used to acquire the tare weight (SET TARE).

If more than one scale is defined, both the functions are inherent only to the displayed scale.

3.8.6 STOP Key

STOP key has a double function. If the instrument is in AUTOMATIC, it stops the batch cycle.

Stopping a cycle means temporaily suspending the cycle, a suspended cycle can be restarted and terminated with a start command or aborted with an abort command.

If the instrument is in MANUAL, the STOP key can be used to clear the tare weight (RESET TARE).

If more than one scale is defined, both the functions are inherent only to the displayed scale.

3.8.7 The MENUS

The setup data of the Micro-Tech 3000 are collected into menus which are accessed using **MENU** key. Once the **MENU** key has been pressed, use the scroll keys to select the menu that you need.

3.9 Calibration

MAIN MENU 1 contains the **CALIBRATION** menu. **MENU 1** is selected by pressing **MENU** 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
CAL       CAL
```

3.9.1 Zero Calibration Scroll

The Zero Calibration is implemented as a machine directed procedure

1. **Auto Zero**

   If only one scale defined :

```
--      ZERO CAL      --
Empty scale, then
press START
START   SCALE #   MANUAL
```

Password: Operator

The scale must be kept empty during auto zero. A complete zeroing procedure requires 10 seconds, but can be reduced by pressing END in the next scroll.

Indication S# in the following scrolls will appear only if more than one scale is defined. # represents the active scale number.

When **START** is pressed, the following screen is displayed :

```
S#   AUTO ZEROING
Time remaining      0000
Gross:          000.0   W.U.
END         ABORT
```

During *Auto Zero*, weight resolution is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test.

When zero is reached or END is pressed, the system displays the following screen :

```
S# AUTO ZERO COMPLETE
Error              ±000.00%
Change zero?
YES         NO
```

The word COMPLETE is flashing. The percentage of error is related to the scale capacity.

If **YES** is pressed, the next screen is shown :

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

The old and new zero constants are shown in A/D counts.

2. Manual Zero

The *Manual Zero* procedure allows the operator to directly enter the zero constant if known.

```
--      MANUAL ZERO     --
Gross              000.0 W.U.
Zero    #          00000
ENTER     SCALE #     ADV
```

Password: Operator

Default: 40000
Min: 0
Max: 120000

3.9.2 Span Calibration Scroll

The span calibration can be done in two different ways : R-CAL or Test Weights. The system allows the operator to select which one of the two methods to be used for normal calibration and calibration's check. The selection is made in **CAL DATA SCROLL 1**.The Auto Span procedure requires 10 seconds.

3.9.2.1 Automatic Span Calibration With R-CAL

1. Starting an R-Cal Calibration

The following screen displays

```
    AUTO SPAN R CAL
Empty scale, then
press START
START   SCALE #    MANUAL
```

Password: Operator

When **START** is pressed, the Rcal relay energizes. A half second delay occurs after START for the weight to stabilize.

NOTE : The operator must be insure that the scale is empty before pressing start.

2. Executing the Span Calibration

Indication S# in the following scrolls appears only if more than one scale is defined. # represents the active scale number.

After START is pressed, the following screen is displayed :

(1) Entry point when REPEAT is pressed (see below).

```
 S#   AUTOSPANNING
Time remaining   0000
Gross          000.0  W.U.

END      ABORT
```

During Auto Span, the weight resolution is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test. The END key can be used to conclude the function in less time.

3. Record the Material Factor

This part of the procedure is only executed if a span calibration with test weights was done before, and if R-CAL has not been factored yet.

It is very important to understand that **when this procedure is executed, the system will not alter the span**. The system assumes the span is set correctly based on a test weight calibration. The system acquires the R-CAL FACTOR factoring. R-CAL to the test weight span calibration. Subsequent R-CAL calibration is factored to the test weights.

CAUTION
SPAN SHOULD ONLY BE CHANGED BASED ON A TEST WEIGHT CALIBRATION

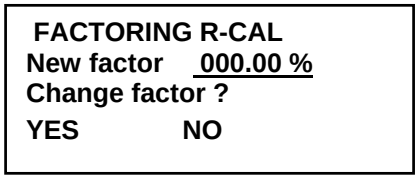
```
S# AUTO SPAN COMPLETE
Error   +/- 00.00 %
Unfactored Calcon

EXIT    FACTOR    REPEAT
```

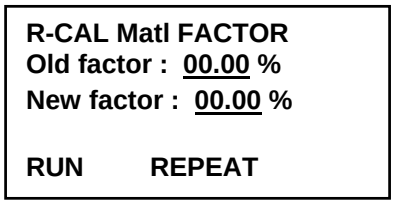
The word “COMPLETE” is flashing.

If EXIT is pressed, the system acknowledges that the R-CAL factor is not used. The effect of this is that the system does not ask for a factor any more for this calibration method unless a manual span entry is done. By pressing EXIT, the operator tells the system that he does not want to use material factors, but wants to use the test results for changing the span number.

After EXIT is pressed, go to point (2) below. If REPEAT is pressed, go to (1) above. If FACTOR is pressed, the following screen is displayed :



If NO is pressed, the old factor is preserved, go to point (2) below. If YES is pressed, the following screen is displayed :



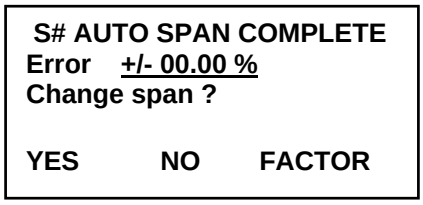
Can be R-CAL, TEST WEIGHTS,

The REPEAT key return the operator (1) above. Pressing RUN ends the procedure. After this point is reached, the system does not proceed to the next section.

4. Recording the New Span

The system calculates the new span.

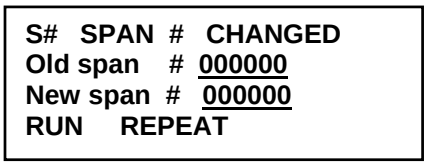
(2)



The word “COMPLETE” is flashing.

FACTOR key is displayed only if an autospan with test weight has been previously executed.

If YES is pressed, the following screen is displayed :



REPEAT moves back to (1) above, and calibration restarts.

If NO is pressed, the following screen is displayed :

```
S#   SPAN  #   UNCHANGED
Old span    #  000000
New span  #   000000
RUN     REPEAT
```

Note the Old span and the New span are shown equally. This is because no change to the span has been done.

If FACTOR is pressed, the RCal factor is computed. The following screen is displayed :

```
S#   FACTOR ACQUIRING
New fact   000000  %
Change factor ?
YES          NO
```

NO moves back to point (2.) above.

YES acquires new factor. If pressed, the following screen is displayed :

```
S#   FACTOR  CHANGED
Old fact      000000  %
New fact     000000  %
RUN     REPEAT
```

5. Ending an Auto Span Procedure with R-CAL

Press RUN. The Rcal relay is de-energized and the display is locked for 3 seconds.

3.9.2.2 Automatic Span Calibration With Test Weights

1. Starting a Test Weights Calibration

```
     AUTO SPAN Weights
Apply Weights then
press START.
START    SCALE#   MANUAL
```

Password: Operator

The operator must apply the test weights on scale before pressing START.

When START is pressed, the span function begin.

2. Executing the Span Calibration

Indication S# in the following scrolls appear only if more than one scale is

defined. # represents the active scale number.

After START is pressed, the following screen is displayed

(1) Entry point when REPEAT is pressed (see below).

```
 S#   AUTOSPANNING
Time remaining   0000
Gross        000.0  W.U.

END      ABORT
```

During Auto Span, the weight resolution is 10 times higher than normal. The entire function takes 60 seconds to be completed, remaining time is displayed in line 2. The END key can be used to conclude the function in less time.

3. Recording the New Span

The system calculates the new span based on the result of the test performed with the selected method :

```
 S#  AUTOSPAN COMPLETE
Error   +/- 00.00 %
Change span ?
YES         NO
```

The word “COMPLETE” is flashing.

If YES is pressed, the following screen is displayed :

(2)

```
S#   SPAN  #   CHANGED
Old span    #  000000
New span  #   000000
RUN    REPEAT   FACTOR
```

FACTOR key is displayed only if an autospan with R-Cal has been previously executed.
REPEAT moves back to (1) above, and calibration restarts.
If NO is pressed, the following screen is displayed :

```
S#   SPAN  # UNCHANGED
Old span    #  000000
New span  #   000000
RUN    REPEAT
```

Note the Old span and the New span are shown equally. This is because no change to the span has been done.

If FACTOR is pressed, the R-cal factor is computed. The following screen is displayed :

```
S#   RCAL FACTORING
New fact   000000  %
Change factor ?
YES         NO
```

NO moves back to (2) above.

YES acquires new factor. If pressed, the following screen is displayed :

```
S#  FACTOR  CHANGED
Old fact     000000  %
New fact     000000  %
RUN    REPEAT
```

3.9.2.3 Manual Span

If the span constant is known, the manual span procedure allows the operator to manually change span.

NOTE. If the span is manually entered, the R-cal factor is set to INVALID.

```
    MANUAL SPAN
Gross        000.0   W.U.
Span  #  0000000

ENTER    SCALE #    EXIT
```

Password: Operator

Default: 1166667
Min: 500000
Max: 45000000

The RUN keys return to Run Menu.

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Chapter 4
Micro-Tech 3102 Maintenance

The maintenance information in this manual should meet your service needs. If problems occur requiring technical assistance, please call (763) 783-2500.

Thermo Scientific has a repair center located at our plant in Minneapolis, Minnesota. Contact our Repair Representative at (763) 783-2774 for assistance. To expedite your service request, please have your machine model and serial number available.

4.1 Frequent Checkpoints

The *Micro-Tech 3102 Batch Controller* is a solid-state device and should require very little maintenance. The front panel can be wiped clean with a damp cloth, and if necessary, a mild detergent (never use abrasive cleaners, especially on the display window).

As a preventative measure, check to ensure all wires, plugs, and integrated circuits are tight in their connectors. Also, keep the enclosure door tightly closed to prevent dirt infiltration.

More often than not, a quick visual inspection leads to the source of trouble. If a problem develops, check the following before proceeding to more specific troubleshooting procedures:

- Check Power
    1. Check the Line Voltage Selector Switches are set to the correct line voltage
    2. Check the fuse
    3. Check that the power switch in ON and that power is supplied to the unit.
- Check Connections
    1. Check that all terminations are secure.
    2. Check to ensure the Display Module and Keyboard connectors are firmly seated in their connectors.
    3. 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**.

4.3 Alarm Messages

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**
xxxxxxxxxxxxxxxxxxxxx	
MM-DD-YYYY	**HH:MM**
RESET	**NEXT**

- **NEW** indicates an alarm that has not yet been acknowledged. When the operator presses **RESET** to clear the alarm, the alarm disappears only if the treason that caused the alarm to occur does not exist any more. If the alarm is still pending, **ACK** is displayed instead of **NEW**.
- **NEXT** is used to scroll between the pending alarms.
- XXXXXXXXXXXXXXXXX represents one of the conditions listed in *Section.4.3.1*.

4.3.1 Alarms List

1 - Clock Fail

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

- Go to the **DIAGNOSTICS** screen and re-enter the date and time.
- Check the battery
- Replace the motherboard.

2/6 - Load Cell Fail S#

S# identifies the scale if more scale are defined. The system has detected an error on the load cell signal.

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

7 - RAM Fail

The system has detected an error on the *RAM* (*Random Access Memory*) checksum during the internal periodic test. The *RAM* is used to store variables and set up data.

- Replace the motherboard.

8 - ROM Fail

The system has detected a failure on the *ROM* (*Read Only Memory*) *checksum* during the internal periodic test. The *ROM* is used to store the program.

- Replace the mother board

9/13 – High Load S#

S# identifies the scale if more than one scale is defined. The high load limit has been reached.

14/18 – Low Load S#

S# identifies the scale if more scales are defined. The low load limit has been reached.

19 - Warm Start

The system has detected a power loss condition, or power was removed for an undefined period.

20 - Cold Start

- The system has detected the loss of the set up data after power was removed. The instrument needs to be setup and calibrated.
- Replace the motherboard

21 – P.D. Calibration

When the system is powered off while a calibration sequence is in progress, the scale may not be properly calibrated.

- Check calibration

22/26 – Calib. Time S#

S# identifies the scale if more than one scale are defined. 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

27/29 - Ext. Alarm n

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 #n.

- Check External alarm #n.

30/35 - HW Conf. Changed

When a new board is installed or an old board removed, this message displays.

36 – BCD Overflow

This message is only displayed if the optional BCD 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 variable and the BCD data setup.

37 - 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

38 - Printer Error

This message is displayed if the system has data to print and the printer is disconnected or the paper feed is empty.

39 - Communication Error

Indicates a time out or handshake error is detected during a data transfer on the COMM line.

- Check the COMM line connections.
- Check the COMM line setup data.

40/44 – Bad Start Weight S#

A cycle has started but the weight on the scale is over the threshold of “zero start batch set” weight in case of charge batch or below the threshold if in case of discharge batch. The instrument executes this control only if the first component of the recipe is a “charge batch” component.

45/49 – Stop Cycle S#

This alarm is generated when a cycle is suspended. There can be Three causes:

1. After stop command from keyboard, contact or serial line.

2. Following a shutdown condition

3. A stop condition has been detected by the instrument during the batch phase.

50/54 – End Cycle S#

An END CYCLE command has been given from the keyboard, contact or serial line.

55/59 – Abort Cycle S#

A cycle has been aborted. There can be two causes:

1. After an abort command from the keyboard, contact or serial line.

2. An abort condition has been detected by the instrument during the batch phase.

60/64 – Comp. Time Out

The component is taking more than maximum time to complete its batch.

An interlock input is missing or a stop condition has occurred.

65/69 – Deviation S#

The maximum deviation limit for the component has been exceeded.

70 – Allen-Bradley Remote I/O COMM Error

This message is displayed if communication is interrupted. The green LED on the A_B R I/O board will be flashing. The alarm does not come on if communication has never started.

71 – PROFIBUS-DP COMM Error

This messages in *only* displayed if the optional Profibus board is installed. The following two conditions activate the alarm.

The *Siemens SPC3 Controller* installed on the *Profibus* interface board does not recognize any successful data transfer within the watchdog timer interval.

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

4.4 Micro-Tech 3102 Cold Start

It may be necessary to cold start the *Batch Controller* in the event memory becomes corrupted. You have the option of installing the factory default constants or simply returning the Micro-Tech to its previous running state.

Steps required to cold start are:

Press and hold at the same time the **`LEFT HAND ARROW`** and the **`CLEAR`** keys until the following screen displays.

```
Install Factory
Defaults?

NO              YES
```

No, Returns to Run Mode

Yes, the following screen displays:

```
-- MEMORY ERASED --
Choose the language
key to continue to
ESP             USA
```

When this screen displays, all field entry data has been replaced by the factory default constants. Proceed to *Section 2.7*and follow the *Initial Setup* procedures.

Note: If the software corruption was catastrophic and the memory *will not* erase do the following:

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

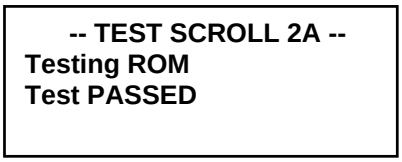
4.5 Internal Test Procedure

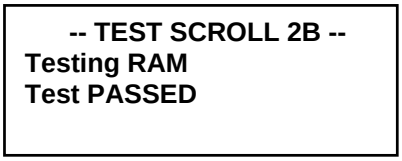
Pressing **`START`** on the screen (located in **MAIN MENU 3**) initiates a self-test of the internal processor. The following screen displays:

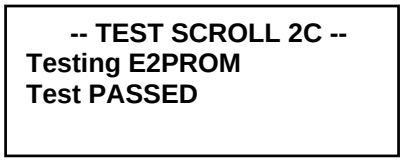
```
   -- TEST SCROLL 2 --
Internal test of
 microprocessor.
START
```

Password: Service

Press **START**, the following screens display in sequence:







The message "Test PASSED" is displayed if the test runs correctly. If something wrong is detected, the message "Test FAILED" is displayed and the soft key **CONTINUE** is shown. Press **CONTINUE** and move to the next test.

If the internal test has failed, call *Thermo Scientific* Customer Service.

4.6 Load Cell Excitation and Signal Voltage

1. Measure excitation voltage across terminal 21 negative and 20 positive in the scale junction box. This should be 10 VDC ± 5%.
2. If the excitation voltage is incorrect then measure the excitation voltage in the *Batch Controller* across terminal TB4-33 negative and the TB4-32 positive. This should be 10 VDC ± 5%.
3. Measure DC millivolt signal voltage across terminal 31 positive and 32 negative in the scale junction box. This should be within 0-30 millivolts DC (3 mV/V load cell).
4. Measure DC millivolt signal voltage across terminal TB4-30 positive and TB4-31 negative in the *Batch Controllerr*. This should be the same as Step 3 above.
5. The millivolt output is in direct relation to weight applied. As weight is increased, output should increase.

4.7 Resetting Master Total

Use the following steps to reset the *Master Total* or the *Remote Counter Overflow*.

4.7.1 No Password Installed

1. If there is no password installed, select **MAIN MENU 3**
2. Press **DIAG** soft key and scroll down to the **SRVICE PASSWORD** screen.
3. Type in a password (example: 123) and press **ENTER**
4. Re-enter the password and press **ENTER**

5. Select **MAIN MENU 3**
6. Select **PROT** scroll, press **PROT**
7. Press **NONE**
8. Enter the password 7832500 and press **ENTER**. The protection level should be RAMSEY.
9. Press **TOTAL;** scroll up or down if needed to reach the **MASTER TOTAL** screen.
10. Press **RESET** and select **YES** to "Reset Master Total?"
11. Select **MAIN MENU 3**. Press **DIAG** and scroll to **SERVICE PASSWORD**.
12. Press **ENTER** twice, erasing the password installed in Step 3.
13. Press **RUN** to return to normal operation.

4.7.2 Active Password

1. Select **MAIN MENU 3**
2. Select **PROT** scroll, press **PROT**
3. Press **NONE**
4. Enter the password 7832500 and press **ENTER**. The protection level should be RAMSEY.
5. Press **TOTAL;** scroll up or down if needed to reach the **MASTER TOTAL** screen.
6. Press **RESET** and select **YES** to "Reset Master Total?"
7. Select **MAIN MENU 3**
8. Press **PROT** and choose the password level desired.

4.8 Removing a Forgotten Password

Use the following steps to remove a forgotten password from *Instrument* memory.

1. Select **MAIN MENU 3**
2. Select the **PROTECT** scroll and press **PROT**
3. Press **NONE**
4. Enter the password 7832500 and press **ENTER**. The protection level should be RAMSEY.
5. Press **NONE**
6. Select **MAIN MENU 3**
7. Press **DIAG** and scroll 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** does appear, repeat Steps 1 through 9.
11. See Section for entering new passwords.

4.9 Lithium Battery Replacement

The Micro-Tech volatile memory backup battery can be replaced without any special tools.

WARNING
DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED.

Replace only with same or equivalent type recommended by *Thermo Scientific*. Dispose of used battery according to manufactures instruction on battery or return to *Thermo Scientific*. (Refer to *Section 4.10.)*

1. Record *all* configuration, setup, and calibration data before removing battery. All information is lost when the battery is removed.
2. Turn the *Micro-Tech* power off at the mains.
3. Remove the battery from its compression socket.
4. Observe the polarity markings on the battery socket base before inserting the new battery. The lithium battery is .3V, 1.2 AH, 2/3 A, *Thermo Scientific* part number 037188.
5. Insert battery
6. Restore power to the *Micro-Tech.*
7. Cold start the *Micro-Tech*. See *Section 4.4* for cold start procedures.
8. Re-enter all data recorded in Step 1.

4.10 Disposal of Hazardous Waste

Disposal of Lithium batteries and soldered print circuit boards should be in accordance with your local Hazardous Waste Policy.

As an alternative, you may return product supplied by *Thermo Scientific*, freight prepaid for disposal. Contact *Thermo Scientific* Repair Department for a Return Authorization Number before shipping any product for disposal.

4.11 Cleaning Instructions

The *Micro-Tech 3102* is a solid-state device requiring 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 all wires, plugs, and integrated circuits are tight in their connectors. Keep the enclosure door tightly closed to prevent dirt infiltration.

Chapter 5
Micro-Tech 3102 Replacement Parts

This section gives information on how to order replaceable parts for your *Batch Controller* and includes drawings with corresponding parts lists to enable you to identify parts quickly and accurately.

5.1 Order Information

For faster service when ordering parts, fax or telephone Products Parts Department. Your regional field service representative will also be happy to assist you with parts orders, but his normal scheduling time may delay shipment of your parts order.

The recommended procedure for order parts is as follows:

1. Determine the broken or faulty part(s).
2. Locate the part(s) in the parts list given.
3. Find the part number(s) for the item(s) needed and determine the quantity you require.
4. Fax or telephone:

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

   Customers A through M - (763) 783-2775
   Customers N through Z - (763) 783-2773
   Repair and Returns - (763) 783-2774
   Fax: - (763) 783-2525

   Normal Customer Service hours are 8:00 a.m. to 4:30 p.m., Central time.

5. With your order, list the following information:

- Machine model and serial number
- Purchase order number
- Date required
- Method of shipment preferred
- List of parts, including part number, description and quantity

Your parts order will be handled as expeditiously as possible.

ThermoFisher
SCIENTIFIC

501 90th Avenue N.W. Minneapolis MN 763-783-2500

Return Material Authorization
RMA No. : -

(This RMA Number Must Be Marked On All Paperwork And On Outside Of Package)

Req'd. By: _____
Date: _____
Customer Contact: _____
Phone: ( ) _____
Area Code

Return, Freight Prepaid To:
Thermo Fisher Scientific
501 90th Avenue N.W.
Minneapolis, MN 55433

Bill To Customer # : _____ Ship To # : _____

Returned From: _____

Return To: _____

Description Of Material Being Returned: _____

Describe Equipment Malfunction Or Defect, If Any; Symptoms: _____

Minimum Charge
☐ Informed Customer of ☐ _____ Inspection Charge Per Item

Service Requested:
☐ Repair & Return ☐ Estimate Required P.O. No.: _____
☐ Return for Credit ☐ Original P.O. or Thermo Order No.: _____

☐ Warranty Repair or Replacement Serial No: _____
Original P.O. # _____ Original Order/Job # _____
☐ Return Warranty/Exchange Unit Shipped on Thermo Order No.: _____
☐ Other: _____

Disposition/Comments: (Thermo Fisher Scientific Internal Use Only) _____

REC-G-118 Rev. C

ThermoFisher SCIENTIFIC

501 90th Avenue NW Minneapolis, MN 55433
(763) 783-2500 Fax (763) 780-1537

Foreign Customer Repair Authorization

Please complete the following regarding equipment that will be returned for repair

Contact Name: _____ Telephone 011- _____ _____
(country code) (telephone number)

Company Name: _____

Fax011- _____ - _____ E-mail _____
(country code) (fax number)

Billing Address: _____

_____

_____

Purchase Order No.(**required**): _____

Equipment Type: _____ Serial No. _____

Description of problem: _____

Shipping Method (Please check one option):

☐ Thermo Fisher Scientific sends good direct to customer. Thermo Fisher Scientific determines shipping method and carrier. Charges will be prepaid by Thermo Fisher Scientific and customer will be invoiced for charges. Truck and/or air freight will always be utilized unless customer arranges shipment

☐ Thermo Fisher Scientific sends goods to customer's designated freight forwarder. Charges for inland freight to U.S. port will be prepaid by Thermo Fisher Scientific and customer will be invoiced for charges.

Shipping Address: _____ Freight forwarder? ☐ Yes ☐ No

_____

_____

_____

Atn: _____ Telephone _____

Copies of shipping documents should be sent to the following individual via e-mail or fax. Originals will be sent to the billing address above via regular mail

Contact Name: _____

Fax 011 _____ - _____ E-mail: _____
(country code) (telephone number)

Important Notice:
Shipment requests will be processed according to this document, which must be fully completed prior to issuance of a Return Material Authorization (RMA) number. Shipping documents will be sent as requested to the individual above upon shipment of goods from Thermo Fisher Scientific plant in Minneapolis, MN. Thereafter, Thermo Fisher Scientific bears no responsibility for charges associated with customs clearance or warehouse charges due to customer failure to liberate goods from customs.

This completed form should be faxed to: Attn: Customer Service fax (763) 780-1537

REC-G-154A

5.1.1Parts List

Table 5-1: Parts List

EQUIPMENT	PART NUMBER
Chassis Assembly, Panel Mount	073285
Chassis Assembly, Field Mount	073279
PCBA, MOTHERBOARD	073283
PCBA, Display Assembly	073281
Touch Panel	
Bezel Assembly	073289
Fuse, Slo-Blo, 200mA (F1 230V) (Type T)	001366
Fuse, Slo-Blo, 400mA (F1 115V) (Type T)	002443
Prom, U54, MT-3000 Audit Trail	073300
Battery, Lithium, 3.0 V, 1.2 AH, 2/3 A.	037188
Program Disk	068137
Power Module	073280

Table 5-2: Optional *Plugin* Boards

EQUIPMENT	PART NUMBER
PCBA, Analog Output (1 out)	071637
PCBA Analog Output (2 in/2 out)	071636
PCBA, DIO (4 in/16 out)	046841
PCBA, DIO (16 in/4 out)	046844
PCBA, COMM "A" Select one only	068053
RS-232C	
RS-485, std. (point to point)	
RS-485, multi-drop	
20 mA (digital) current loop	
PCBA, Load Out DIO (4 in/16 out)	049475
PCBA, Load Out DIO (16 in/4 out)	049476
PCBA, Allen-Bradley RI/O	055517
PCBA, PROFIBUS-DP	056713
PCBA DeviceNet	068147
Field Marshall PCA	058842
DeviceNet PCBA	067097
Relay Output Board	073284

Appendix A
Micro-Tech 3102/3202 Menus

The *Batch Controller* 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 any time by pressing **MENU** key until the desired screen is displayed.

Pressing the **SOFT KEY** directly below the desired scroll and then using the **UP/DOWN,** arrow scroll key selects the **MENU** scrolls.

If the *Batch Controller* 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.

A.1. Menu Displays

Optional menu scrolls are only available if the option has been installed. Pressing menu activates the following screens:

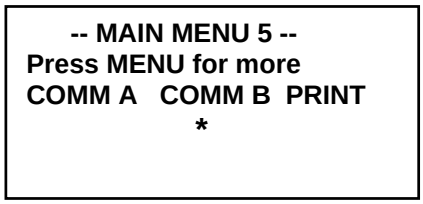
```
    -- MAIN MENU 1 --
Press MENU for more
ZERO   SPAN
CAL    CAL
```

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

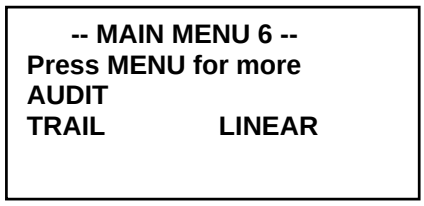
```
    -- MAIN MENU 3 --
Press MENU for more

PROT     DIAG     TEST
```

```
    -- MAIN MENU 4 --
Press MENU for more
I/O                  ALAMS
DEFINE         DEFINE
```



*** Can be AB RIO or PRO DP**



A.2. Common Key Functions

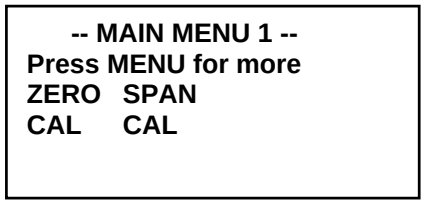
The following functions are common from all scrolls at all times and the use of these keys is not repeated for each procedure:

- **Run** – pressing **RUN** return the *Batch Controller* to the **RUN** menu
- **Exit** – exit appears at the bottom of some screens as a soft key option. Pressing exit moves you back a menu.

A.3. MAIN Menu 1 – Calibration Menu

MAIN MENU 1 contains the **CALIBRATION MENU**. **MENU 1** is selected by pressing **MENU** until **MAIN MENU 1** displays. Desired **CALIBRATION** scrolls are selected by pressing the **SOFT** keys directly below the desired scroll. Calibration scrolls consist of the following:

- *Zero Calibration*
- *Span Calibration*

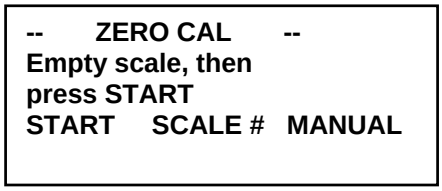


A.3.1. Zero Calibration Scroll

The Zero Calibration is implemented as a machine directed procedure.

Auto Zero

If only one scale defined :



Password: Operator

The scale must be kept empty during auto zero. A complete zeroing procedure requires 10 seconds, but can be reduced by pressing END in the next scroll.
Indication S# in the following scrolls will appear only if more than one scale is defined. # represents the active scale number.

When **START** is pressed, the following screen is displayed :

```
S# AUTO ZEROING
Time remaining      0000
Gross           000.0   W.U.
END       ABORT
```

During *Auto Zero*, weight resolution is ten times higher than normal. The number of seconds in Line 2 corresponds to the time remaining for completing the test.
When zero is reached or END is pressed, the system displays the following screen :

```
S# AUTO ZERO COMPLETE
Error           ±000.00%
Change zero?
YES       NO
```

The word **COMPLETE** is flashing. The percentage of error is related to the scale capacity.

If **YES** is pressed , the next screen is shown :

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

If **NO** is pressed, the next screen is shown :

```
S#  ZERO # UNCHANGED
New zero        #00000
Old zero        #00000
RUN       MENU
```

The zero constants are shown in A/D counts.

A.3.1.1 Manual Zero

The *Manual Zero* procedure allows the operator to directly enter the zero constant if known.

```
--      MANUAL ZERO     --
Gross           000.0 W.U.
Zero    #       00000
ENTER     SCALE #    EXIT
```

Password: Operator

Default: 40000
Min: 0
Max: 120000

A.3.2. Span Calibration

The span calibration can be done in two different ways : R-Cal or Test Weights. The system allows the operator to select which one of the two methods to be used for normal calibration and calibration's check. The selection is made in **CAL DATA SCROLL 1.** The Auto Span procedure require 10 seconds.

A.3.2.1 Automatic Span Calibration With R-Cal

Use the following steps to begin an *R-Cal Calibration*:

1. **Starting an R-Cal Calibration**

```
     AUTO SPAN R CAL
Empty scale, then
press START
START    SCALE #   MANUAL
```

Password: Operator

When **START** is pressed, the Rcal relay energizes. A half second delay occurs after **START** for the weight to stabilize.

Note: The operator must insure that the scale is empty before pressing **START**.

2. **Executing the Span Calibration**

Indication S# in the following scrolls appears only if more than one scale is defined. # represent the active scale number.

Whichever method is used to start automatic span calibration, after **START** is pressed, the follwing screen is displayed :

(1) Entry point when **REPEAT** is pressed (see belw).

```
S# AUTOSPANNING
Time remaining      0000
Gross           000.0  W.U.
END       ABORT
```

During Auto Span, the weight resolution is 10 time higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test. The END key can be used to conclude the function in less time.

entire function takes 60 seconds to be completed, remaining time is displayed in line 2. The END key can be used to conclude the function in less time.

3. Record the Material Factor

This part of the procedure is only executed if a calibration with test weights was done before, and if R-CAL has not been factored yet.

It is very important to understand that **when this procedure is executed, the system will not alter the span**. The system assumes the span is set correctly based on a test weight calibration. The system acquires the R-CAL Factor. The factored R-CAL can then be used to check the span between test weight calibrations.

CAUTION

SPAN SHOULD ONLY BE CHANGED BASED ON A TEST WEIGHT CALIBRATION

AUTO SPAN COMPLETE
Error +/- 00.00%
Unfactored Calcon
EXIT FACTOR REPEAT

The word COMPLETE is flashing.

If EXIT is pressed, the system acknowledges that the R-CAL factor is not used. The effect of this is that the system does not ask for a factor any more for this calibration method unless a manual span entry is done. By pressing EXIT, the operator tells the system that he does not want to use material factors, but wants to use the test results for changing the span number.

After EXIT is pressed, go to point (1) above. If FACTOR is pressed, the following screen is displayed :

FACTORING R-CAL
New Factor : 000.00 %
Change factor ?
YES NO

If NO is pressed, the old factor is preserved, go to point (2) below. If YES is pressed, the following screen is displayed :

R-CAL Matl FACTOR
Old factor : 00.00 %
New factor : 00.00 %
RUN REPEAT

Can be R-CAL or TEST WEIGHTS

The REPEAT key returns the operator to (1) above. Pressing RUN ends the procedure.

After this point is reached, the system does not proceed to the next section.

4. Recording the New Span

The system calculates the new span

(2)

```
S#  AUTO SPAN COMPLETE
Error     +/- 00.00%
Change span ?
YES         NO
```

The word “COMPLETE” is flashing.

If YES is pressed, the following screen is displayed :

```
S#   SPAN#   CHANGED
Old span  #      000000
New span         000000
RUN       REPEAT
```

REPEAT moves back to (1) above, and calibration restarts.

If NO is pressed, the following screen is displayed :

```
S#   SPAN#   UNCHANGED
Old span  #      000000
New span         000000
RUN       REPEAT
```

Note the Old span and the New span are shown equally. This is because no change to the span has been done.

If FACTOR is pressed, the R-CAL factor is computed. The following screen is displayed:

```
S#    FACTOR ACQUIRING
New fact         000000 %
Change factor ?
YES       NO
```

NO moves back to point (2) above.

YES acquires the new factor. If pressed, the following screen is displayed :

```
S#  FACTOR CHANGED
Old fact  #       000000 %
New fact          000000 %
RUN       REPEAT
```

5. Ending an Auto Span Procedure with R-CAL

Press RUN. The R-Cal relay is de-energized and the display is locked for 3 seconds.

A.3.2.2 Automatic Span Calibration With Test Weights

1. Starting Span Calibration With Test Weights

```
    AUTOSPAN Weights
Apply Weights, then
press START
START   SCALE #   MANUAL
```

Password: Operator

The operator must apply the test weights on the scale before pressing start.

When **START** is pressed, the span function begins.

2. Executing the Span Calibration

Indication S# in the following scrolls appear only if more than one scale is defined. # represents the active scale number.

Whichever method has been used to start automatic span calibration, after START is pressed, the following screen is displayed :

(1) Entry point when **REPEAT** is pressed (see below)

```
S# AUTOSPANNING
Time remaining      0000
Gross           000.0  W.U.
END       ABORT
```

During Auto Span, the weight resolution is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test. The END key can be used to conclude the function in less time.

3. Recording the New Span

The system calculates the new span based on the result of the test performed with the selected method :

```
S# AUTOSPAN COMPLETE
Error   +/- 000.00%
Change span?
YES       NO
```

The word COMPLETE is flashing.

If YES is pressed, the following screen is displayed :

(2)

```
S#   SPAN # CHANGED
Old span  #     000000
New span  #     000000
RUN      REPEAT   FACTOR
```

FACTOR key is displayed only if an autospan with R-Cal has been previously executed.

REPEAT moves back (1) above, and calibration restarts.

If **NO** is pressed, the following screen is displayed :

```
S#   SPAN# UNCHANGED
Old span  #     000000
New span  #     000000
RUN      REPEAT
```

Note the Old span and the New span are shown equally. This is because no change to the span has been done.

If **FACTOR** is pressed, the RCAL factor is computed. The following screen is displayed :

```
S#   RCAL  FACTOR
New fact        000000 %
Change factor ?
YES      NO
```

NO moves back to (2) above.

YES acquires new factor. If pressed, the following screen is displayed :

```
S#  FACTOR CHANGED
Old fact  #     000000 %
New fact        000000 %
RUN      REPEAT
```

A.3.2.3 Manual Span

If the span constant is known, the manual span procedure allows the operator to manually change span.

NOTE : If the span is manually entered, the RCAL factor is set to INVALID.

```
--      MANUAL SPAN     --
Gross           000.0 W.U.
Span   #       0000000
ENTER     SCALE #   EXIT
```

Password: Operator

Default : 1166667
Min : 5000000
Max : 45000000

The RUN key return to Run Menu.

A.4. Main Menu 2 – Setup and Configuration Menus

MAIN MENU 2 contains the **SETUP AND CONFIGURATION MENUS**. **MENU 2** is selected by pressing **MENU** until **MAIN MENU 2** displays. Desired **SETUP AND CONFIGURAITON** scrolls are selected by pressing the **SOFT** keys directly below the desired scroll. Scrolls for **MAIN MENU 2** consist of the following:

- *Display*
- *Scale Data*
- *Calibration Data*

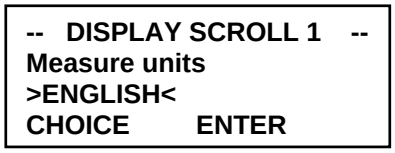
A.4.1. Display

The Display scroll sets up the parameters for how the information at the *Batch Controller* interface will display.

A.4.1.1 Measure Units

Measure units can be individually selected. The operator must first decide if the English or Metric units will be used, or a combination of both will be used..

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

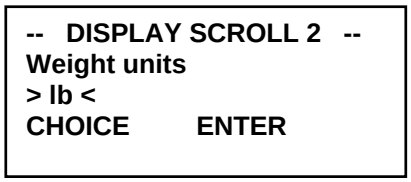


Password: Service

Default: ENGLISH In other language Default : METRIC
Choices: ENGLISH, METRIC, MIXED

The weights are 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.



Password: Service

Default: English = POUNDS
Choices: PERC%, POUNDS, TONS, LTONS

Default: Metric = KG
Choices: PERC%, KG, TONNES

Default: Mixed = POUNDS
Choices: PERC%, KG, TONNES, POUNDS, TONS, LTONS

The weights are 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.

```
-- DISPLAY SCROLL 3 --
Total units
>tons<
CHOICE        ENTER
```

Password: Service

Default: English = TONS
Choices: PERC%, TONS, LTONS, POUNDS

Default: Metric = TONNES
Choices: TONNES, KG

Default: Mixed = TONS
Choices: TONS, LTONS, POUNDS, TONNES, KG

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

A.4.1.2 Language

The Mod.3102 is a dual language instrument. English (ENG or USA) is always the first language, the second can be one from the following list.

Press **DOWN SCROLL** key.

```
-- DISPLAY SCROLL 4 --
Language
>USA<
CHOICE        ENTER
```

Password: Operator

Default: USA
Choices: USA, ENG, (ESP), FRA, GER, DUT, ITA

A.4.1.3 Time and Data Mode

The operator defines the format for displaying and printing time and date.

```
-- DISPLAY SCROLL 5 --
Time
>am/pm <
CHOICE        ENTER
```

Password: Service

If USA or English : **Default** : am/pm
If other language : **Default** : 24 h
Selection : am/pm, 24 h

```
-- DISPLAY SCROLL 6 --
Date
>MM-DD-YYYY<
CHOICE        ENTER
```

Password: Service

If USA : **Default** : MM-DD-YYYY
If other language : **Default** : DD-MM-YYYY
Selection : DD-MM-YYYY, MM-DD-YYYY, YYYY-MM-DD

A.4.1.4 Line 2 and 3 of the RUN Menu

The RUN MENU can be configured to display on line 2 and/or 3 either tare, gross, peak, master total, reset total, date and time and graphic indication of the net weight..

```
-- DISPLAY SCROLL 7 --
Run display line 2
> No Display <
CHOICE ENTER SCALE#
```

Password: Operator

Default: NO DISPLAY
Choices: NO DISPLAY, GROSS, TARE, DATE/TIME, BARGRAPH

```
-- DISPLAY SCROLL 8 --
Run display line 3
>No Display<
CHOICE ENTER SCALE#
```

Password: Operator

Default: NO DISPLAY
Choices: NO DISPLAY, GROSS, TARE, DATE/TIME, BARGRAPH

A.4.1.5 Damping Factors for the Display

The process variable when displayed on the screen can be damped by a programmable factor, to filter out variations that can be introduced by mechanical vibrations. To tune a damping filter, enter the number of seconds corresponding to the desired time constant. If, for example, 10 seconds is entered, the process variable reaches the stability after a step change in 10 seconds.

```
-- DISPLAY SCROLL 9 --
Display weight
Damping __sec
ENTER SCALE#
```

Password: Operator

Default : 0sec
Min : 0sec
Max : 16sec

A.4.1.6 Enable ALTERNATE Function on RUN Scroll

The ALTERNATE function allows skipping automatically from one scale to the next without without pressing the SCALE # key in the RUN scroll. Time interval in seconds can be entered in this scroll. 0 disables this function..

```
-- DISPLAY SCROLL 10 -
-Alternate scales in
RUN ____sec
ENTER
```

Password: Operator

Default : 0sec (Function disabled)
Min : 0sec
Max : 60sec

A.4.2. Scale Data Scroll

Scale data defines the specific parameters of the scale.

A.4.2.1 Number and Type of Scales

The *Batch Controller* can control from one to four independent scales. The number of scales that can be programmed according to the number of A/D are installed.

```
-- SC DATA SCROLL 1 --
Number of scales
___
ENTER
```

Password: Service

Default: 1
Min: 1
Max: The Absolute number of scale is 4. The actual maximum depend of the combination of A/D boards installed

- Plant scale A/D 1 channel
- Plant scale A/D 2 channel
- Premium scale A/D 1 channel

Normally, more scales are defined and it is necessary to define how these scales should be handled by the batch controller.

This option can only be changed during the cold start procedure. Mode is only didplayed here. The two ways to handle the scales in multi scale mode is described in the “Appendix B”.

```
-- SC DATA SCROLL 1A --
Mode to handle the scales
> Single <
```

A.4.2.2 Scale Capacity and Divisions

The next entry is the scale capacity, which is the maximum capacity of the scale. This entry also defines the default number of decimal places that are used for display weight values. Use numeric keys for entering the number, confirm **ENTER**. Scroll down.

```
-- SC DATA SCROLL 2 --
Max. scale capacity
500.0 lbs
ENTER SCALE #
```

Default: 500.0
Min: 1
Max: 100000

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

```
-- SC DATA SCROLL 3 --
Scale divisions
>0.1<
CHOICE  ENTER  SCALE #
```

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

The next entry is the set of start batch. This value is used for different purposes:

- As a reference to end the discharge phases
- To generate the BAD START WEIGHT alarm if at the start of new cycle the weight on the scale is above this value and the first component to batch is a charge batch type.
- To generate the BAD START WEIGHT alarm if at the start of new cycle the weight on the scale is below this value and the first component to batch is a discharge batch type.

```
-- SC DATA SCROLL 4 --
Zero – start batch
set   0.0 lbs
ENTER            SCALE #
```

Default: 0.0
Min: 0.0

Max: Scale Capacity

A.4.2.3 Number of Load Cells of Your Scale

Enter the number of load cells of your scale.

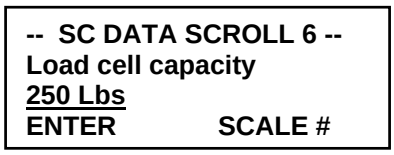
```
-- SC DATA SCROLL 5 --
#  of load cell
   1
ENTER            SCALE #
```

Password: Service

Default: 1
Min: 1
Max: 6

A.4.2.4 Defining the Load Cell(s)

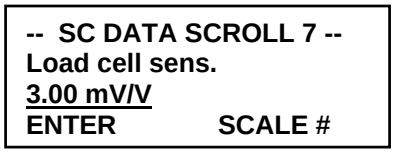
Enter the load cell capacity as it appears on the label placed on the load cell.



Password: Service

English/Mixed		**Metric**	
Default:	250.0 Lbs	**Default:**	100 kg
Min:	1 Lbs	**Min:**	10 kg
Max:	15000 Lbs	**Max:**	15000 kg

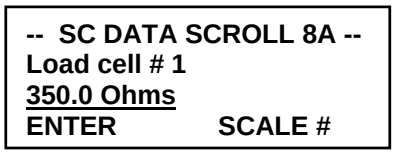
Enter the load cell sensitivity in mV/V as marked on the label of the load cell. *Thermo Scientific* load cells are normally 2.000 or 3.000 mV/V.



Password: Service

Default: 3.0 mV/V
Min: 0.500 mV/V
Max: 3.500 mV/V

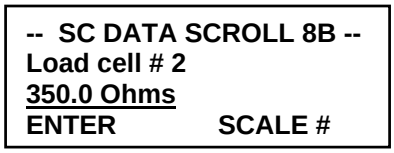
The resistance of the bridge of each load cell has to be entered here. The number of scroll depends on the number of load cells specified per each scale.



Password: Service

Default: 350 Ohms
Min: 10 Ohms
Max: 1000 Ohms

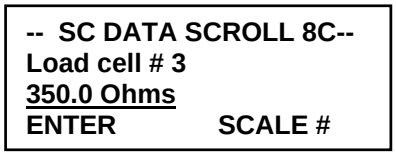
If # of Load Cells is 2 or more :



Password: Service

Same default and limits of load cell #1

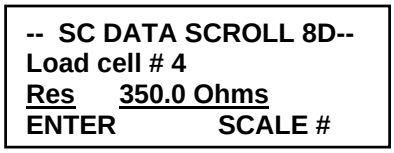
If # of Load Cells is 3 or more :



Password: Service

Same default and limits of load cell #1

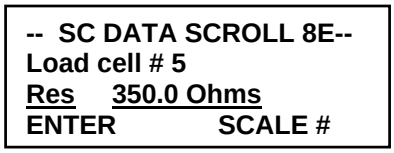
If # of Load Cells is 4 or more :



Password: Service

Same default and limits of load cell #1

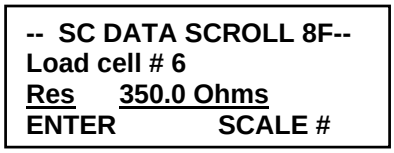
If # of Load Cells is 5 or more :



Password: Service

Same default and limits of load cell #1

If # of Load Cells is 6 :

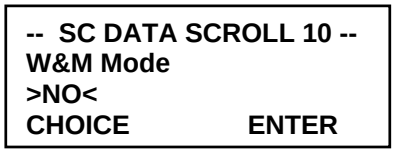


Password: Service

Same default and limits of load cell #1

A.4.2.5 Selecting a W&M Mode

This scroll only appears if the Micro-tech Model 3202 Static Weight Indicator is used in an approved scale. The selection details specific requirements of local Weight & Measure offices in certain countries



Password: Service

Default: No
Selections: No, OIML

A.4.2.6 Maximum Number of Components and Recipes

The next two scrolls defines the maximum number of components of the system and the maximum number of recipes. The only purpose of entering these values is to simplify the use of the scrolls when data for recipes and components are displayed and entered.

-- SC DATA SCROLL 10 -- Max components 11 ENTER	Password: Operator

Default: 11
Min: 1
Min: 40

-- SC DATA SCROLL 11 -- Max recipes 10 ENTER	Password: Operator

Default: 10
Min: 1
Min: 100

A.4.3. Calibration Data Scroll

The CAL DATA Scroll allows the operator to set parameters which relate to the calibration of the scale.

A.4.3.1 Calibration Mode

Select which simulated method of automatic calibration is to normally by used. The select method is the only one displayed in the calibration section MENU 1.

-- CAL DATA SCROLL 1 -- Calibration mode: < R-CAL< CHOICE ENTER SCALE#	Password: Operator

Default: R-CAL
Choice: R-CAL, WEIGHTS,

DETAILING THE R-CAL PARAMETERS

This section only applies if R-CAL mode was selected as the preferred method. Enter the resistance in Ohms of the R-CAL resistor installed in your batch controller. If no changes have been made after the batch controller has left *Thermo Scientific*, the default value applies.

-- CAL DATA SCROLL 3 -- R-Cal selected res 165000 ohms ENTER SCALE #	Password: Service

Default: 165000 Ohms
Min: 10 Ohms
Max: 1000000 Ohms

The system calculates the CALCON (Calibration Constant) based on the mechanical and electrical parameters entered in the Scale Data Scroll.

This menu is for reference only.

```
-- CAL DATA SCROLL 4 --
R-Cal constant
_______ lbs
                SCALE #
```

The R-Cal factor can be computed during the autospan function and it is used to make equal the result of two span methods.

```
-- CAL DATA SCROLL 5 --
R-Cal factor
      %
ENTER    +/-    SCALE #
```

A.4.3.2 Detailing the Test Weight Parameters

This section only applies if TEST WEIGHTS mode was selected as the preferred method. Enter the weight of the test weights that you are going to use for calibration.

```
-- CAL DATA SCROLL 2 --
Total test weight on scale
        0.000 lbs
ENTER          SCALE #
```

Password: Service

If ENGLISH or MIXED

Default: 0.000 Lbs
Min: 0.000 Lbs
Max: 500.000 Lbs

If METRIC

Default: 0.000 kg
Min: 0.000 kg
Max: 500.000 kg

A.4.3.3 Calibration Interval

The system can be programmed to prompt the operator when a certain amount of time has passed since the last calibration. If you do not want to use this option, confirm the default 0 days interval, otherwise enter the number of days. The calibration date displayed in Scroll 7 is automatically updated whenever a calibration is performed. If a non zero value is entered, an alarm appears after the time is elapsed. The alarm can only be cleared after a calibration check is executed.

```
-- CAL DATA SCROLL 6 --
Calibration interval
     Days
ENTER
```

Password: Operator

Default: 0 Days (function disabled)
Min: 0 Days
Max: 365 Days

This scroll displays the date of the last calibration and the expected date of the next one, based on the entry in the previous screen.

```
-- CAL DATA SCROLL 7 --
Calibration date
Last  MM-DD-YYYY
Nest  MM-DD-YYYY   SCALE#
```

A.5. 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 protection, and should only be used by experienced technical personnel. Most test functions are not password protected.

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

The **PROTECTION** menu only becomes visible after passwords have been defined (see the **DIAGNOSTICS** Menu).

A.5.1. Changing the Protection Level

The *Micro-Tech 3102* has three protection levels to which specific passwords are related.

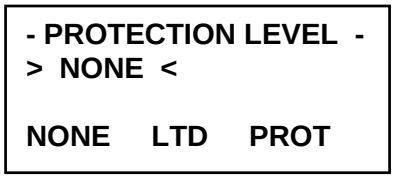
Appendix Table A-1: Password Protection Levels

Protection	Password	Status
NONE	SERVICE	The system is completely unprotected; all data can be read or changed.
LIMITED	OPERATOR	Operator functions and data are unprotected. All setup and calibration data are protected except zero calibrate.
PROTECTED		The system is totally protected, process data can be read, no change allowed.

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

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

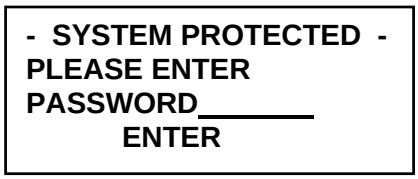


Default:	NONE	
Selections:	NONE, LIMITED, PROTECTED	
Password:	from NONE to LTD or PROT:	not required
	from LTD to PROT:	not required
	from LTD to NONE:	SERVICE
	from PROT to NONE:	SERVICE
	from PROT to LTD:	OPERATOR or SERVICE

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

A.5.1.1 Online 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.



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.

If the operator fails to enter the correct password, the following screen displays.

```
- SYSTEM PROTECTED -
INVALID PASSWORD
ACCESS DENIED
        RETURN
```

Pressing **RETURN** returns the program to the previous function. If the operator enters the correct password, the previous screen appears and access is allowed.

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

A.5.2. Diagnostics

A.5.2.1 A/D Raw Data

Diagnostic Scroll 1 shows the raw data from the A/D converter of the *Integrator* (A/D gross) and the net value after the zero constant has been subtracted. The range of the A/D converter is from 0 to 262140 numbers.

```
-DIAGNOST. SCROLL 1-
A/D gross  00000
A/D net    0000
                SCALE #
```

A.5.2.2 Readout Load Cell mV

The system displays the mV output of the load cell. The reading must be positive and must increase when the load increases.

```
-DIAGNOST. SCROLL 2-
Weight on load cell
0.000 mV
 CALIB          SCALE #
```

Password: Service

If **CALIB** is pressed, the next two scrolls are displayed and can be used to fine-tune the readout of mV/V.

```
-DIAGNOST. SCROLL 2A
Loadcell output zero
15  A/D counts
ENTER          SCALE #
```

Password: Service

Default: 15
Min: 0
Max: 10000

```
-DIAGNOST. SCROLL 2B
Loadcell output span
3497
ENTER          SCALE #
```

Password: Service

Default: 3497
Min: 0
Max: 30000

A.5.2.3 Change Passwords

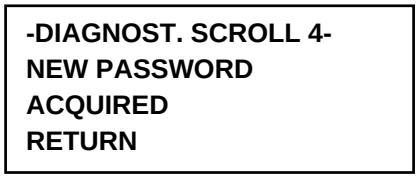
Change the password by entering a new one. The user can enter up to eight characters (numeric keys entries). The entered numbers are not echoed on the screen. Pressing just the **ENTER** key removes the password.

Password: Service

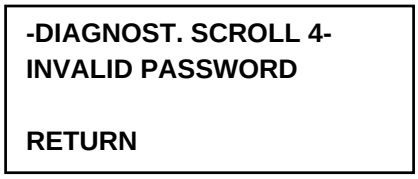
Default: No password

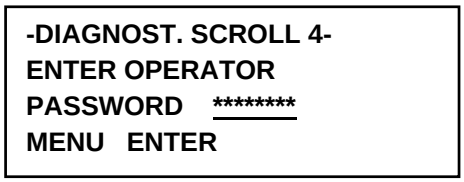
After the password has been entered, the system asks for confirmation. This prevents losing access control due to a typing mistake while entering passwords.

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



If the two passwords do not match, the system does not accept the new password.





Password: Operator

Default: No password

The OPERATOR password is double checked similarly to the service one.

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 4.8 to remove a forgotten password.

A.5.2.4 Display Software Version

The software version is displayed for reference only.

```
-DIAGNOST. SCROLL 5-
Main software
version:
72.XX.XX.XX
```

A.5.2.5 Setup Date and Time

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.

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

Password: SERVICE

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

Time is entered in a similar way. The AM/PM key is used when time is in the English mode. See **DISPLAY SCROLL 7 IN MAIN MENU 2**.

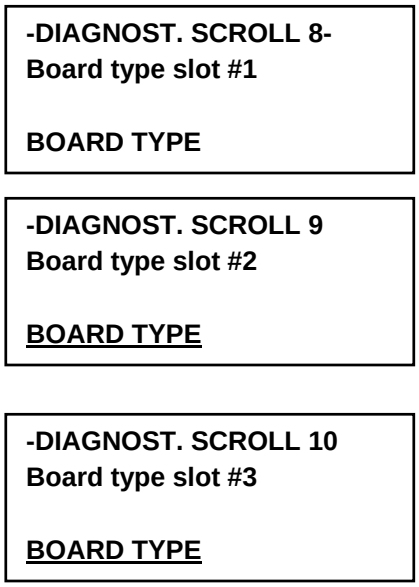
```
-DIAGNOST. SCROLL 7-
Time:    HH:MM
HOURS:  HH
ENTER   AM/PM
```

	24-hour	**am/pm**
Default:	00.00	01.00
Min:	00.00	01.00
Max:	23:59	12:59

A.5.2.6 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 in each slot.



Appendix Table A-2: List of Optional Plug-in Board Types

- Dig I/O 16in/4out	Optional digital input output board. - #16 Optocoupled Digital Inputs - #4 Optocoupled digital outputs
- Dig I/O 16out/4in	Optional digital input output board. - #4 Optocoupled Digital Inputs - #16 Optocoupled digital outputs
- Load Out 16in/4in	Optional digital input output board dedicated to the Load Out. - #16 Optocoupled digital inputs - #4 Optocoupled digital inputs
- Load Out 16out/4in	Optional digital input output board dedicated to the Load Out. - #4 Optocoupled digital inputs - #16 Optocoupled digital inputs
- Current Out	Optional current output board. - #1 Current output
- Communication A	Serial communication board (RS232, RS485)
- Communication B	Allen-Bradley Remote I/O PROFIBUS-DP

A.5.3. Tests

A.5.3.1 Lamp Test

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

```
- TEST SCROLL 1   -
LAMP TEST

START
```

A.5.3.2 Self Test of the Unit

The system can perform some internal test functions, which can be used to detect malfunctions to the hardware devices.

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

Password: Service

After **START** is pressed, the following screens are displayed in sequence.

```
 TEST SCROLL 2A  -
Testing  ROM
Test PASSED
```

```
 TEST SCROLL 2B  -
Testing  RAM
Test PASSED
```

```
 TEST SCROLL 2C  -
Testing  E2Prom
Test PASSED
```

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.

A.5.3.3 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 appears, allowing the operator to scroll between boards. Slots are numbered 1-3; slot 0 is the motherboard.

```
- TEST SCROLL 3   -
Dig input test
Slot#0      ----000--
NEXT
```

'Digit' (displayed instead of 'slot#') identifies the four Digitizer's inputs. Inputs are shown from left to right. If a board has 16 inputs, two screens are used to show the first and the second half, the lower half is shown first.

A.5.3.4 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.

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

Password: Service

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 appears in the middle position.

Slots are numbered 1-3; slot 0 is the motherboard.

WARNING

FORCING THE DIGITAL OUTPUTS MAY CAUSE MACHINERY TO START. AFTER THE USER TRIES TO FOURCE AN OUTPUT, THE FOLLOWING MESSAGE DISPLAYS.

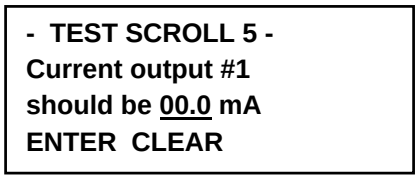
```
WARNING
EQUIPMENT MAY START

CONTINUE     ABORT
```

WARNING

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

A.5.3.5 Test Current Outputs



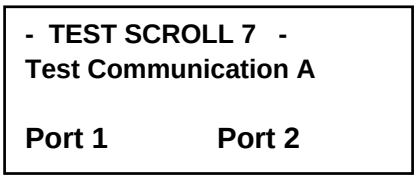
Password: Service

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

To force the output, enter the desired number of milliamps and press **ENTER**. Press **CLEAR** to free the mA channel. Press **NEXT** key to pass to the next current output channel.

A.5.3.6 Test Communication A

The following screen allows checking the installed serial lines using a loop back type test. The maximum line number is 2; Transmit must be tied to receive for this test. "**Port 1**" is standard and "**Port 2**" is shown only if optional Comm boards are detected.



Password: Service

By pressing the **PORT 1** or the **PORT 2** 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.

A.5.3.7 Test RS232

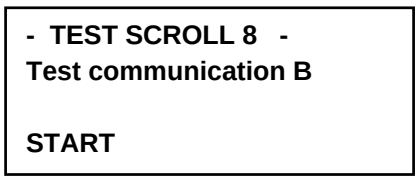
To test RS232 the test requires a hardware jumper to be installed between terminals TB3-22 (RX) and TB3-21 (TX).

A.5.3.8 Test RS485

To test the RS485 the test requires a hardware jumper to be installed between terminals TB3-21 and TB3-28 to TB3-20 and TB3-29.

A.5.3.9 Test Communication B

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



Password: Service

A.5.3.10 Test BCD Input Board

If an optional 16In/4Out load out board is detected, the following screen appears. The test is similar to the digital input test.

```
- TEST SCROLL 9  -
BCD Input test
      0000
```

A.5.3.11 Test BCD Output Board

If an optional 16 Out/4 In load out board is detected, the following screen appears.

```
- TEST SCROLL 10  -
BCD Output test
     0000
ENTER            CLEAR
```

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

The force the outputs, enter a number followed by **ENTER** . The **CLEAR** key appears indicating the output is being forced to a value. Pressing **CLEAR** frees the output.

A.5.3.12 Weight Simulation Function

The following scrolls are inherent to the weight simulation function. This function allows the operator to simulate a weight trend during the batch phases. The first scroll allows enabling the function.

```
- TEST SCROLL 11 -
Weight simulation
      NO
CHOICE   ENTER
```

Password: Service

Default: NO
Selections: NO, YES

The second scroll defines the speed of increasing and decreasing of the weight during the charge and discharge phases at high speed. The weight variation during the low speed batch phases is automatically determined by the instrument at 50% of the entered value. This value is weight per second.

```
- TEST SCROLL 11A -
High speed sim rate
(W/SEC) _______ W.U.
ENTER
```

Password: Service

Default: 1.0
Min: Scale Division

Max: Scale Capacity / 100

A.5.3.13 Test the Keyboard and Switches

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

Use the **RUN** key to end the keyboard test. After **RUN** is pressed, all the keys are executed.

A.6. Main Menu 4

The following section defines the input output (I/O), alarms and optionally of the load out batch..

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

A.6.1. I/O Definition

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.

A.6.1.1 Define Current Outputs

The following menus are shown for configuring the current output(s). Use the **CHOICE** key to change the variable and the **ENTER** key to confirm. The **NEXT** key allows the operator to set up to four (4) current outputs if installed.

```
- I/O DEF SCROLL 1 -
Current Output define
#1 > Net  <
CHOICES  ENTER  NEXT
```

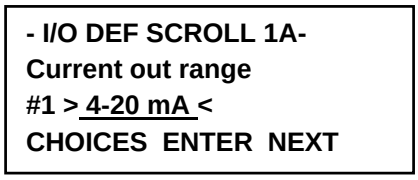
Password: Service

Default: NONE,
Selections: NONE, NET, GROSS, DIFF

Or, if more than one scale is defined :

Selections: NONE,
NET S1, GROSS S1, DIFF S1 (2 Scales)
NET S2, GROSS S2, DIFF S2 (2 Scales)
NET S3, GROSS S3, DIFF S3 (3 Scales)
NET S4, GROSS S4, DIFF S4 (4 Scales)

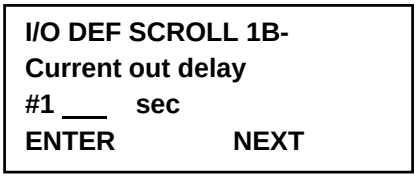
If the selection of the previous screen is not **NONE**, the operator can set up the range, delay and damping of the current output. The range is selectable between the standard 0 to 20 mA and 4 to 20 mA both in direct and reverse mode. Select 0-20 or 4-20 if an increase in current is desired for any increase of the variable. Select 20-0 or 20-4 if a decrease of current is desired for any increase of the variable.



Password: Service

Default: 4-20 mA,
Selections: 0-20 mA, 4-20 mA, 20-0 mA, 20-4 mA

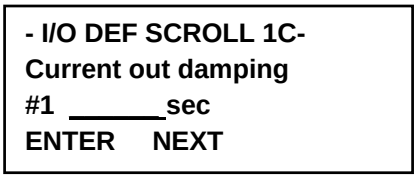
Each current output can be delayed.



Password: Service

Default: 4 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 variable, which has a separate damping factor, selectable in Main Menu 2, Display.



Password: Operator

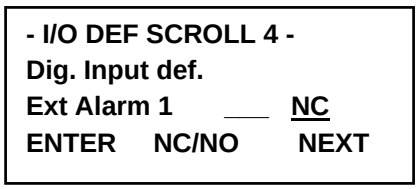
Default: 2 sec,
Min: 0 sec
Max: 16 sec

UP and **DOWN** arrows move between range, delay and damping. **NEXT** moves to the next current output.

A.6.1.2 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**; finally scroll with **NC/NO** until the desired mode is displayed. By assigning a function to 0, the function is disabled.



Password: Service

The following table shows the available logical selections that can be assigned to any available physical input. Typical field wiring drawings show input wired to the DEFAULT physical input as listed in the table below.
Default selection can be assigned to any physical input if desired. External alarms 1, 2 and 3 can be assigned to logical functions not on the selection list. Logical selections should not be reassigned after the physical inputs have been wired.

CAUTION

LOGICAL INPUTS RETURN TO THE DEFAULT IF THE *INSTRUMENT* IS COLD STARTED.

Appendix Table A-3: Available Logical Selections

Selections:	Default:	
External alarm 1	0 NO	(0 = function disabled)
External alarm 2	0 NO	
External alarm 3	0 NO	
Print rtot	0 NO	
Print ctot	0 NC	
Start/Set tare	1 NO	
Start/Set tare S1	0 NO	(Only if more than 1 scale installed)
Start/Set tare S2	0 NO	(Only if more than 2 scales installed)
Start/Set tare S3	0 NO	(Only if more than 3 scales installed)
Start/Set tare S4	0 NO	(Only if more than 4 scales installed)
Stop/Reset tare	2 NO	
Stop/Reset Tare S1	0 NO	(Only if more than 1 scale installed)
Stop/Reset Tare S2	0 NO	(Only if more than 2 scales installed)
Stop/Reset Tare S3	0 NO	(Only if more than 3 scales installed)
Stop/Reset Tare S4	0 NO	(Only if more than 4 scales installed)

End cycle	4 NO	
End cycle S1	0 NO	(Only if more than 1 scale installed)
End cycle S2	0 NO	(Only if more than 2 scales installed)
End cycle S3	0 NO	(Only if more than 3 scales installed)
End cycle S4	0 NO	(Only if more than 4 scales installed)
Abort	3 NO	
Abort S1	0 NO	(Only if more than 1 scale installed)
Abort S2	0 NO	(Only if more than 2 scales installed)
Abort S3	0 NO	(Only if more than 3 scales installed)
Abort S4	0 NO	(Only if more than 4 scales installed)
Charge interl.	6 NO	
Charge interl. S1	0 NO	(Only if more than 1 scale installed)
Charge interl. S2	0 NO	(Only if more than 2 scales installed)
Charge interl. S3	0 NO	(Only if more than 3 scales installed)
Charge interl. S4	0 NO	(Only if more than 4 scales installed)
Disch. interl.	7 NO	
Disch. interl. S1	0 NO	(Only if more than 1 scale installed)
Disch. interl. S2	0 NO	(Only if more than 2 scales installed)
Disch. interl. S3	0 NO	(Only if more than 3 scales installed)
Disch. interl. S4	0 NC	(Only if more than 4 scales installed)
Disch. dev.	5 NO	
Disch. dev. S1	0 NO	(Only if more than 1 scale installed)
Disch. dev. S2	0 NO	(Only if more than 2 scales installed)
Disch. dev. S3	0 NO	(Only if more than 3 scales installed)
Disch. dev. S4	0 NO	(Only if more than 4 scales installed)
Auto/Man	8 NO	
Auto/Man S1	0 NO	(Only if more than 1 scale installed)
Auto/Man S2	0 NO	(Only if more than 2 scales installed)
Auto/Man S3	0 NO	(Only if more than 3 scales installed)
Auto/Man S4	0 NO	(Only if more than 4 scales installed)
Reset alarms	1 NO	

Reset rtot	0 NO	
Reset ctot	0 NO	
Remote cntrl	0 NO	(only if high level communication)

Appendix Table A-4: Mother Board Inputs

PHYSICAL INPUT NUMBER	ASSIGNED FUNCTION		
2		TB2-12	TB2-13
3		TB2-14	TB2-15
4		TB2-16	TB2-17
5		TB2-18	TB2-19

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

Appendix Table A-5: Digital Input/Output Board Inputs

		INSTALLED BOARDS		
PHYSICAL INPUT NUMBER	ASSIGNED FUNCTION	4IN/16OUT ONLY	16IN/4OUT ONLY	4IN/16OUT AND 16IN/4OUT
6		J15 - 2	J16 - 17	J15 – 2
7		J15 - 15	J16 - 5	J15 - 15
8		J15 - 3	J16 - 18	J15 – 3
9		J15 - 16	J16 - 6	J15 - 16
10			J16 - 19	J16 - 17
11			J16 - 7	J16 – 5
12			J16 - 20	J16 - 18
13			J16 - 8	J16 – 6
14			J16 - 21	J16 - 19
15			J16 - 9	J16 – 7
16			J16 - 22	J16 - 20
17			J16 - 10	J16 – 8
18			J16 - 23	J16 - 21
19			J16 - 11	J16 – 9
20			J16 - 24	J16 - 22
21			J16 - 12	J16 - 10
22				J16 - 23
23				J16 - 11
24				J16 - 24
25				J16 - 12

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
EQUIPMENT MAY START
CONTINUE ABORT

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.

A.6.1.3 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.

- I/O DEF SCROLL 5 -
Dig. Output def.
Alarm: ____ NC
ENTER NC/NO NEXT

Password: Service

The following table shows the available logical selections that can be assigned to any available physical output. Typical field wiring drawings and customer specific field wiring drawings show outputs wired to the DEFAULT physical output as listed in the table below. Default selections can be reassigned to any physical output if desired. Logical selections should not be reassigned after the physical outputs have been wired.

CAUTION

LOGICAL SELECTIONS RETURN TO THE DEFAULT IF THE *INSTRUMENT* IS COLD STARTED.

Appendix Table A-6: Available Logical Assignment

Selections	Default	
Comp. 1	9 NO	(Only if comp. 1 defined)
Comp. 2	10 NO	(Only if comp. 2 defined)
Comp. 3	11 NO	(Only if comp. 3 defined)
Comp. 4	12 NO	(Only if comp. 4 defined)
Comp. 5	13 NO	(Only if comp. 5 defined)
Comp. 6	14 NO	(Only if comp. 6 defined)
Comp. 7	15 NO	(Only if comp. 7 defined)
Comp. 8	16 NO	(Only if comp. 8 defined)
Comp. 9	17 NO	(Only if comp. 9 defined)
……..	…….	…….
Comp. 40	0 NO	(Only if comp. 40 defined)
Shut down	2 NC	
Ready	3 NO	
High load	0 NO	(Only if high load option enabled)
High load S1	0 NO	(Only if more than 1 scale installed)
High load S2	0 NO	(Only if more than 1 scale installed)
High load S3	0 NO	(Only if more than 2 scales installed)
High load S4	0 NO	(Only if more than 3 scales installed)
Low load	0 NO	(Only if low load option installed))
Low load S1	0 NO	(Only if more than 1 scale installed)
Low load S2	0 NO	(Only if more than 1 scale installed)
Low load S3	0 NO	(Only if more than 2 scales installed)
Low load S4	0 NO	(Only if more than 3 scales installed)
H rate	4 NO	
H rate S1	0 NO	(Only if more than 1 scale installed)
H rate S2	0 NO	(Only if more than 1 scale installed)
H rate S3	0 NO	(Only if more than 2 scales installed)
H rate S4	0 NO	(Only if more than 3 scales installed)
L rate	5 NO	

L rate S1	0 NO	(Only if more than 1 scale installed)
L rate S2	0 NO	(Only if more than 1 scale installed)
L rate S3	0 NO	(Only if more than 2 scales installed)
L rate S4	0 NO	(Only if more than 3 scales installed)
Charge end	6 NO	
Charge end S1	0 NO	(Only if more than 1 scale installed)
Charge end S2	0 NO	(Only if more than 1 scale installed)
Charge end S3	0 NO	(Only if more than 2 scales installed)
Charge end S4	0 NO	(Only if more than 3 scales installed)
Disch. end	7 NO	
Disch end S1	0 NO	(Only if more than 1 scale installed)
Disch end S2	0 NO	(Only if more than 1 scale installed)
Disch end S3	0 NO	(Only if more than 2 scales installed)
Disch end S4	0 NO	(Only if more than 3 scales installed)
Cycle end	8 NO	
Cycle end S1	0 NO	(Only if more than 1 scale installed)
Cycle end S2	0 NO	(Only if more than 1 scale installed)
Cycle end S3	0 NO	(Only if more than 2 scales installed)
Cycle end S4	0 NO	(Only if more than 3 scales installed)
Need refill	0 NO	
Need ref S1	0 NO	(Only if more than 1 scale installed)
Need ref S2	0 NO	(Only if more than 1 scale installed)
Need ref S3	0 NO	(Only if more than 2 scales installed)
Need ref S4	0 NO	(Only if more than 3 scales installed)

There are 5 outputs, 4 assignable and 1 non-assignable Fault output standard on the motherboard.

Appendix Table A-7: Relay Board and Motherboard Outputs

PHYSICAL OUTPUT NUMBER	RELAY ASSIGNED FUNCTION	RELAY BOARD		
		NC	COM	NO
FAULT	FAULT	1	2	3
1		4	5	6
2			7	8
3			9	10

PHYSICAL OUTPUT NUMBER	SOLID STATE ASSIGNED FUNCTION	Mother Board Terminals	
4	_____	TB1-5	Power
		TB1-6	Signal
		TB1-7	COM

Additional assignable logical selections from the above table can be selected by adding I/O boards. Available are 4in/16out or 16in/4out (option) by adding both boards.

Appendix Table A-7: Digital Input/Output Board Outputs

		INSTALLED OPTIONS		
PHYSICAL OUTPUT NUMBER	ASSIGNED FUNCTION	4IN/16OUT ONLY	16IN/4OUT ONLY	4IN/16OUT AND 16IN/4OUT
5		J15-17	J16 - 2	J16 - 2
6		J15 - 5	J16 - 15	J16 - 15
7		J15 - 18	J16 - 3	J16 - 3
8		J15 - 6	J16 - 16	J16 - 16
9		J15 - 19		J15 - 17
10		J15 - 7		J15 - 5
11		J15 - 20		J15 - 18
12		J15 - 8		J15 - 6
13		J15 - 21		J15 – 19
14		J15 - 9		J15 – 7
15		J15 - 22		J15 – 20
16		J15 - 10		J15 – 8
17		J15 - 23		J15 – 21
18		J15 - 11		J15 – 9
19		J15 - 24		J15 – 22
20		J15 - 12		J15 – 10
21				J15 – 23
22				J15 – 11
23				J15 – 24
24				J15 – 12

WARNING

CHANGING THE DEFINITION OF THE DIGITAL OUTPUTS MAY CAUSE MACHINERY TO START AFTER THE USER TRIES TO CHANGE A DEFINITION. THE FOLLOWING MESSAGE IS DISPLAYED.

WARNING
EQUIPMENT MAY START
CONTINUE ABORT

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

A.6.1.4 Define BCD Output Data

If an optional load out board is installed, the user can select the related BCD variable.

- I/O DEF SCROLL 6 -
BCD Output variable
> Net <
CHOICES ENTER

Password: Service

Default: NONE
Selections: NONE, NET, GROSS, DIFF

Or, if more than one scales are enabled :

Selections: NONE,
NET S1, GROSS S1, DIFF S1, (2 scale)
NET S2, GROSS S2, DIFF S2, (2 scale)
NET S3, GROSS S3, DIFF S3, (3 scale)
NET S4, GROSS S4, DIFF S4, (4 scale)

If a selection other than **NONE** is made, the following screens allow the user 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.

- I/O DEF SCROLL 6A-
BCD Output polarity
> Positive <
CHOICES ENTER

Password: Service

Default: NEGATIVE
Selections: POSITIVE, NEGATIVE

- I/O DEF SCROLL 6B- **BCD Output parity** **> Yes <** **CHOICES ENTER**	**Password: Service**

Default: NO
Selections: NO, YES

A.6.1.5 Define BCD Input Data

If a optional load out input board is installed, the operator can select the related variable..

I/O DEF SCROLL 7 - **BCD input variable** **> Thresholds <** **CHOICES ENTER**	**Password: Service**

Default: NONE
Selections: NONE, RECIPE (R), CYCLE (C), SET POINT (S), R+C, R+C+S

If a selection other than NONE is made, the following screen allows the operator to define the polarity of the BCD input. The polarity selection reverses the signals from NO to NC and vice versa.

- I/O DEF SCROLL 7A- **BCD input polarity** **> Positive <** **CHOICES ENTER**	**Password: Service**

Default: NEGATIVE
Selections: POSITIVE, NEGATIVE

A.6.2. Alarms Definition

The alarms of the Micro-Tech 3102 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**-When an alarm occurs, the front panel ALARM status indicator illuminates. An ALARM message flashes in the lower, right hand RUN display. Pressing ALARM displays the alarm.

- Pressing RESET clears the alarm message if the alarm parameter has cleared. If the alarm parameter has not cleared, the message "ACK" appears when RESET is pressed. When the alarm parameter clears, the alarm indication clears.

  Pressing RUN at any time returns the operator to the RUN menu.

  Alarms can be automatically printed if the print option is enabled.

- **SHUT DOWN** The alarm handler operates as above except the READY status indicator goes off a the same time as the ALARM status indicator comes on.

  In the I/O definition scroll, alarm and ready can be assigned to N/C or N/O physical outputs. The output activates and deactivates at the same time as the front panel status indicators.
- **NONE** Alarm is deactivated.

A.6.2.1 Define High and Low Load Alarm

```
- ALARM  SCROLL 1 -
High load alarrm
> NO <
CHOICE  ENTER   SCALE #
```

Password: Operator

Default: NO
Selections: YES, NO

If the selection in the previous screen was YES, enter the high load set points for the alarm.

The **UNITS** key allows the operator to specify the set points in engineering units. The **% key** selects set points in percent referring to scale capacity

```
- ALARM  SCROLL 1A -
High load set
_______ %
ENTER   UNITS   SCALE #
```

Password: Operator

Default: 100%
Min: 0 %
Max: 105 %

Enter the desired delay time before the alarm is monitored.

```
- ALARM  SCROLL 1B -
High load delay
_______ s
ENTER             SCALE #
```

Password: Operator

Default: 2 sec
Min: 0 sec
Max: 90 sec

Use the **CHOICE** key to turn on or off the low load alarm.Confirm with **ENTER**.

```
- ALARM  SCROLL 1 -
Low load alarm
> no <
CHOICE  ENTER   SCALE #
```

Password: Operator

Default: NO
Selections: YES, NO

If the selection in the previous screen was YES, enter the low load set points for the alarm.

The UNITS key allows the operator to specify the set points in engineering units. The % key selects set points in percent referenced to scale capacity.

```
- ALARM  SCROLL 1A -
Low load set
          _________ %
ENTER   UNIT   SCALE #
```

Password: Operator

Default: 10 %
Min: 0 %
Max: 105%

Enter the desired delay time before the alarm is monitored.

```
- ALARM  SCROLL 2B -
Low load delay
          _________ s
ENTER           SCALE #
```

Password: Operator

Default: 2 s
Min: 0 s
Max: 90 s

A.6.2.2 Setup Alarm Modes

The following message is displayed for 3 seconds.

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

After 3 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.

```
- ALARM  NUMBER # _____
  Clock Fail
Set as    >_ALARM <
  CHOICE  ENTER   NEXT
```

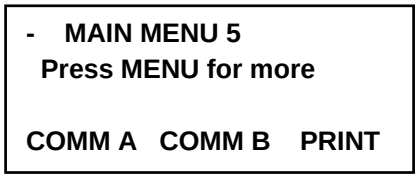
Password: Service

A.6.3. Alarm List

1	CLOCK FAIL
2-6	LOAD CELL FAIL S#
7	RAM FAIL
8	ROM FAIL
9-13	HIGH LOAD S#
14-18	LOW LOAD S#
19	WARM START
20	COLD START
21	POWER DOWN DURING CALIBRATION
22-26	CALIB TIME S#
27-29	EXTERNAL ALARM n
30-35	HW CONF. CHANGED
36	BCD OVERFLOW
37	MATH ERROR
38	PRINTER ERROR
39	COMMUNICATION ERROR
40-44	BAD START WEIGHT S#
45-49	STOP CYCLE S#
50-54	END CYCLE S#
55-59	ABORT CYCLE S#
60-64	COMP. TIME OUT
65-69	DEVIATION S#
70	ALLEN-BRADLEY RI/O ERROR
71	PROFIBUS-DP ERROR

A.7. MAIN MENU 5

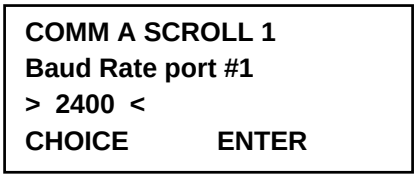
Main Menu 5 is dedicated to the serial communication on the motherboard and for optional board communication. **COMM A** is used to set up the serial line and **PRINT** for setting up the printer output.COMM B is used for the optional communication B (fieldbus) board.



A.7.1. Communication A Scroll

The *MT 3102* 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. An additional COMM A board can be installed and programmed, typically one for the printer and one for networking.

The following screens define the communication parameters for the first and the second channel.

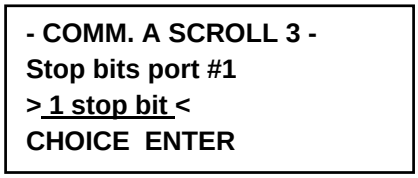


Password: Service

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

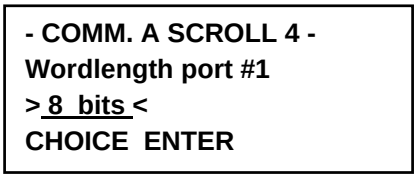
Password: Service

Default: NO
Selections: NO,EVEN, ODD



Password: Service

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



Password: Service

Default: 8 BITS
Selections: 7 BITS, 8 BITS

Some commonly used protocols are implemented in the system. See Communication Protocols, REC 3949, for the details. Possible selections are:

- *PC-MASTER -Thermo Scientific* proprietary protocol: Multi Drop, Master Slave.
- *SIEMENS 3964R* - A proprietary protocol of Siemens. Point to point, Multi Master.
- *ALLEN BRADLEY DF1* - A proprietary protocol of Allen Bradley. Multi Drop, Master Slave.

- *MODBUS* - A proprietary protocol of AEG. Multi Drop, Master Slave.
- *PRINTER* - Not a protocol, selects printer output.

```
-COMM. A SCROLL  5 -
Protocol port #1
> PC MASTER <
CHOICE  ENTER
```

Password: Service

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

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

```
-COMM. A SCROLL 6 -
Baud rate port #2
> 2400  <
CHOICE  ENTER
```

Password: Service

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

```
-COMM. A SCROLL 7 -
Parity port #2
   > NO <
CHOICE      ENTER
```

Password: Service

Default: NO
Selections: NO, EVEN, ODD

```
-COMM. A SCROLL 8 -
Stop bits port #2
> 1 stop bit <
CHOICE  ENTER
```

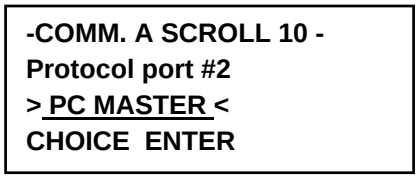
Password: Service

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

```
- COMM. A SCROLL 9-
Wordlength port #2
> 8  bits <
CHOICE  ENTER
```

Password: Service

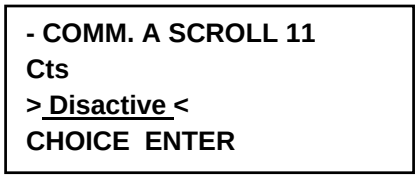
Default: 8 BITS
Selections: 7 BITS, 8 BITS



Password: Service

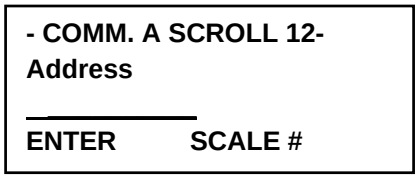
Default: PRINTER
Selections: PC MASTER, SIEMENS 3964R, ALLEN BRADLEY DF1, MODBUS, PRINTER

If the selected protocol is not PRINTER on one of two lines, the following screens define the use of the CTS handshake signal, the ADDRESS of the device in the multi drop line, and the access permission from the remote supervisor. If NONE is selected, the supervisor has full access to the device. If LIMITED is selected, the supervisor can only access those variables that are accessible with the OPERATOR password. If PROTECTED is selected, the unit can only be read by the supervisor.



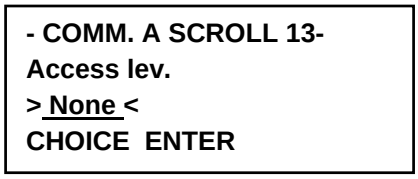
Password: Service

Default: DISACTIVE
Selections: DISACTIVE, ACTIVE



Password: Service

Default: 1, 2 for scale 2, 3 for scale 3, 4 for scale 4
Min: 1
Max: 255



Password: Service

Default: NONE
Selections: NONE, LIMITED, PROTECTED

A.7.2. Communication B (Field Bus)

Refer to the Field Bus manual if this option is installed.

A.7.3. Print

The *Micro-Tech 3102* 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 a handshake (NONE), or using the Clear to Send signal (CTS) or the XON-XOFF sequence. Refer to the printer instruction manual to define which selection is required. The selection NONE is only used for testing purposes. It is not recommended for normal use. If NONE is selected, the system is not able to recognize if the printer is on line or not, or if the 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.

```
-PRINTER SCROLL 2 -
End of line
> CR + LF <
CHOICE  ENTER
```

Password: Service

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

Some printers cannot accept characters while they are printing. In some cases, the handshake is not well controlled by the printer, so a delay at end of line is helpful.

```
-PRINTER SCROLL 3 -
Delay end of line
_____ sec
ENTER
```

Password: Service

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

It is possible to define if at the end of the report a FORM FEED character must be sent to the printer. This character is used by most printers to move paper at the end of the page. If NO is selected, a normal END OF LINE character(s) is (are) printed at the end of the report.

PRINTER SCROLL 4 - **Form Feed** **> NO <** **CHOICE ENTER**	**Password: Service**

Default: NO
Selections: NO, YES

A.7.3.1 Optional Reports

By selecting YES in the following screen, the system is instructed to print a batch report at the end of a recipe execution.

PRINTER SCROLL 5 - **Print batch** **> NO <** **CHOICE ENTER**	**Password: Service**

Default: NO
Selections: NO, YES

By selecting YES in the following screen, the system is instructed to print one line each time a new alarm condition occurs. The alarm is printed as follows :

xx-xx-xxxx yy:yyz

kkkkkkkkkkkkkkkkkkkk

Where:

xx-xx-xxxx	Day, Month, Year, printed according to the local format as defined in Main Menu 2 -
yy:yyz	Hour, Minutes, am/pm printed according to the local format as defined in Main Menu 2 -
kkkkkkkkkkkkkkkkkkkk	Alarm message, same message appearing on the screen

For example:

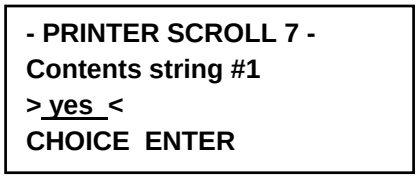
01-22-1998 8:14a

Clock Fail

- PRINTER SCROLL 6 - **Print alarms** **> No <** **CHOICE ENTER**	**Password: Operator**

Default: NO
Selections: YES, NO

Define if you want to add a heading string in your report. String can be used to add the Customer name as well as other information that you want to include in the print format.

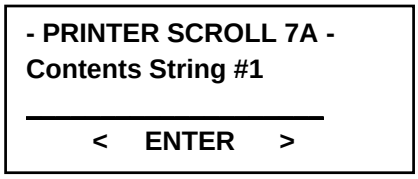


Password: Operator

Default: NO.
Selections: NO, YES

If you selected YES, next scroll is displayed.

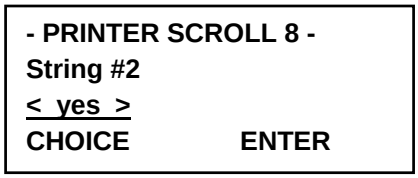
Use the alphanumeric keypad to enter the string (20 digits). Press the numeric key corresponding to the letter that you want to type. All the times you press a new key, cursor moves to the right on place. If you need to use two times the same key (example for double letters), move the cursor right using the arrow keys (left and right soft keys).



Password: Operator

Default: = =

Define if you want to add a second heading string in your report.

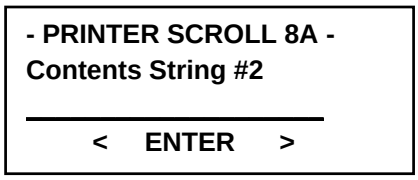


Password: Operator

Default: NO

Selections: YES, NO

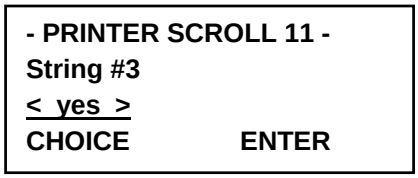
If you selected YES, next scrolls are displayed.



Password: Operator

Default: = =

There is a third string. If only scale is defined, it is a third heading string exactly as the previous two. If more scale is defined, it may be used to define a scale identifier. String definition is different for each scale and it is used as scale heading.



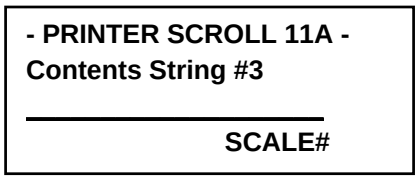
Password: Operator

Default: NO

Selections: YES, NO

If you selected YES, the next scroll is displayed.

SCALE# key allows the operator to select the scale.



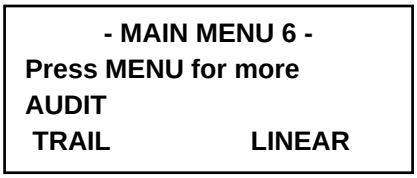
Password: Operator

Default: = =

If 1 scale is defined only or if more scales, when numeric or alphanumeric key is pressed, ENTER and ARROWS keys in the fourth line of the display.

A.8. MAIN MENU 6

Main Menu 6 is dedicated to Audit Trails and Linearization.



A.8.1. Audit Trails

This menu is only displayed if the Audit Trails option is installed.

The Audit Trails function is a method for recording all changes in setup data for creating a permanent record of the history of the scale. This is a specific requiorement of the W&M in USA for approved scales, and is an alternative to the European method, which is to seal the unit. Instead of preventing change of parameters, the Audit Trails method allows changes but keeps track of them. All the time the operator changes a value which affects weighing, the new parameter is recorded with time and date. Also, tracking of same functions or events is kept.

A list of recorded variables and functions is reported below.

All changes can be printed when required.

Entering in the menu, the following screen appears for a short time (3 seconds)

- AUDIT TRAILS -
Use scroll keys or enter trail number

After 3 seconds, the next screen is shown:

TRAIL EVENT No. 000
hh:mm mm-dd-yyyy
ss nnnnnn = vvvvvv/O (ld)
ss nnnnnn = vvvvvv/N (ew)

hh:mm	Time of change
mm-dd-yyyy	Date of change, the format may vary depending on the Countr Country.
ss	Identifies the scale (only if more scales are defined)
nnnnnn	Parameter's name
vvvvvv	Parametr's value, before change (old) and after change (new).

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.

Audit Trails Variables and Functions List

Parameter's Name	***Meaning***
w unit	Weight unit
t unit	Total unit
damp w	Damping weight
s cap	Scale capacity
s div	Scale division
Ic sen	Load cell sensitivity
lc cap	Load cell capacity
lc nr	Load cells number
lc r1	Load cell 1 resistance
……	……
lc r6	Load cell 6 resistance
test w	Test weights for WTS span calib.
rcal r	Rcal resistance for Rcal span calib.
line 1	Linearization factor 1 (0-10%)

……	…….
line 10	Linearization factor (90-100%)
span	Span
zero	Zero
Function's Name	***Meaning***
Autozero	Autozero function has been executed
Autospan Rcal	Autospan with Rcal method has been excecuted
Autospan WTS	Autospan with test weight method has been executed
Cold Start	All instrument data has been lost

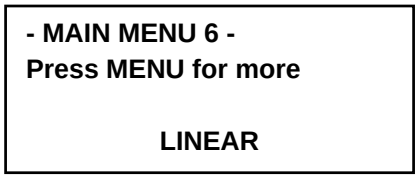
A.8.2. Linearization

Manual linearization can be accomplished by applying a known test weight(s) or loading the bin with pre-weighed material and calculation the scale error. Pressing the ACQuire soft key display the scale weight for the applied known weight. The operator can ten enter in a correction factor. Up to five correction factors can be installed in any order and will be internally sorted by scale loading.

Linearization must first enable in Main Menu 6 before any menu screens will appear.

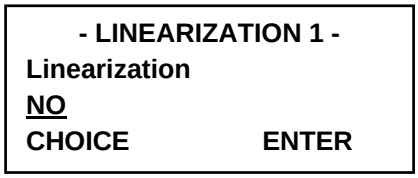
NOTE: Prior to performing a manual linearization, the scale should be properly zeroed.

1. Press the **MENU** key repeatedly until Main Menu 6 appears.



Press **LINEAR** soft key to access the Linearization scroll. The following screen appears.

Press **CHOICE** for selections, **YES** to enable, or **NO** to disable linearization. Once enabled, no linearization is done until the operator manually enters the linearization factors.



Password: Service

Default: NO
Selections: YES, NO

NO turns off linearization and sets all factors to 1.00. **YES** turn on linearization.

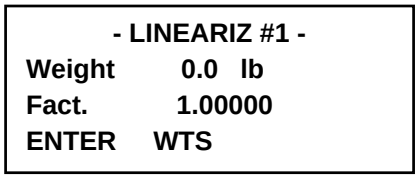
2. Set linearization to **NO** and return to the **RUN** screen.
3. Apply bin loading at the points to be linearized. Record the indicated weight for each point.
4. Calculate the correction factor for each point using the following formula :

Correction Factor = Actual or reference weight / Displayed weight

5. Enter linearization factors

Once the factors have been computed, they must be entered. Press the **MENU** key repeatedly until the **LINEAR** soft key is displayed. Press this soft key and then **DOWN ARROW**. Set linearize to **YES**, press **ENTER**. Press the **DOWN ARROW** key to LINEARIZ #1.

Type in the first weight recorded in Step 4 and press **ENTER**



If ENGLISH or MIXED

Default: 0.0 lbs
Min: 0.0 lbs
Max: 500.0 lbs

If METRIC

Default: 0.0 lbs
Min: 0.0 lbs
Max: 226.8 lbs

Type in the first factor calculated in Step 4 and press **ENTER**

If you enter 1.000 (default value), the load will not be corrected in that portion of the range. A number lower than 1.000 will reduce the span, while a number larger than 1.000 will increase the span.

Default: 1.000000
Min: 0.000000
Max: 1.500000

Press the **DOWN ARROW**. Repeat Step 5 for all remaining calculated factors.

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Appendix B
Micro-Tech 3102 Cycle Sequence

B.1. Overview

Purpose of this document is to give to the user an overview of all the elements inherent to the batch and a guide to understand and solve all the situation that could happen during a cycle.

Moreover, this document can be useful also for who is doing the first initialization of the system. The order on which the arguments are explained is the logical order on which the user has to approach the configuration of the instrument.

The Mod.3102 is an instrument able to handle a whole till four scales. In its maximum configuration it can handle 4 scales and 40 components.

In the following sections will be considered the functioning with a single scale, for multiscale mode refers section 7.

Interface with the system is done through programmable digital and analog inputs and outputs.

The instrument can be expanded, installing optional boards in order to fit in the best way the system characteristics.

The following table sums up the maximum dotation of the instrument:

Scales number	4
Components	40
Digital inputs	52
Digital outputs	52
Analog outputs	4
BCD inputs	16 multiplexed (4 digits)
BCD outputs	16 multiplexed (4 digits)
Recipes	100
Recipes lines	500

B.2. Definition of the components

All the elements of the system, handled by the instrument by means of digital output, that determine, when activated, a variation of weight on the scale are considered components by the instrument.

That means that also discharge and refill devices are components.

Each component we want to use in your system should be previously defined, that means that a series of data should be entered to tell to the instrument how to handle them.

These data are briefly listed below:

Name

It is a 6 digit alphanumerical string of identification of the component.

Type

Is the main characteristic of the component, from this selection depends the sequence to start when the component is met in the running recipe.

The component types are : CHARGE BATCH, DISCHARGE BATCH, DISCHARGE REFILL and TIME BASED, they are explained in detail in the next sections. By default the type selection is NOT USED, *a component is defined only when the component type has been selected*. A following data are not displayed before this operation.

Next data are different in basis of the type of component selected:

CHARGE BATCH AND DISCHARGE BATCH COMPONENT

Setpoint source

In case the system is provided by a BCD input, it is possible to define if the component setpoints should be manually entered in the recipe (LOCAL) or read from an external preset (BCB INP)

Preset

Define the amount of material to be dosed at low rate

Cut off mode

Define how to handle the queue of material after component deactivation. Choices are:

MANUAL, the amount of material is manually entered

AUTO, the queue is computed by the instrument with subsequent approach method.

Cut off value

Is the amount of material of the queue

Cut off max corr

If cut off mode is AUTO, is the maximum value that the queue can reach.

Start delay

It is a delay before the activation of the component

Stabilization time

It is a delay at the end of the component batch before totals are updated.

Max component time

Is the maximum time for component batch

DISCHARGE COMPONENT

Automatic at recipe end ?

Defines if this component should be executed automatically at the end of each recipe. This has the same effect to define the component in all the recipes, but it is surely more practice.

Naturally, it is possible to define only one component, if you select YES here, this scroll will not appear in other component definitions.

Discharge interlock

Only if is the end batch component (see above)

Defines if the instrument must wait for the discharge interlock input before to start the discharge and, in this case, if this input should stay fix for all the batch or not.

End discharge

Only if it is the end batch component (see above).

Defines if at the end of the batch the end discharge output must be activated and, in this case, if should be steady or simply a pulse.

Start delay

It is a delay before the activation of the component.

Stabilization time

It is a delay at the end of the component batch.

Max component time

Is the maximum time for the component batch.

REFILL COMPONENT

Automatic at recipe end ?

Defines if this component should be executed automatically at the end of each recipe. This has the same effect to define the component in all the recipes, but it is surely more practice.

Naturally, it is possible to define only one component, if you select YES here, this scroll will not appear in other component definitions.

High refill setpoint

Only if it is the end batch component (see above)

Defines the amount of material to refill

Charge interlock

Only if it is the end batch component (see above).

Defines if the instrument must wait for the charge interlock input before to start the refill and, in this case, if this input should stay fix for all the batch or not.

End charge

Only if it is the end batch component (see above).

Defines if at the end of the batch the end charge output must be activated and , in this case, if it should be steady or simply a pulse.

Start delay

It is a delay before the activation of the component.

Stabilization time

It is a delay at the end of the component batch.

Max component time

Is the maximum time for the component batch.

TIME BASED

Start delay

It is a delay before the activation of the component.

Stabilization time

It is a delay a the end of the component batch

Max component time

Is the maximum time for the component batch

The instrument is able to handle up to 40 components.

In SCALE DATA menu is possible to define the max number of components required by the system. Its purpose is to avoid to display and print data of never used components.

The last operation we have to do to complete the components definitions is to assign them an output, this operation will be explained in section B.4 “Definition of the I/O”.

B.2.1 Charge Batch Component

A CHARGE BATCH component is a component from which a defined amount of material is extract into the scale. The extraction procedure takes place in two phases, the first at high rate and second at low rate. In the second phase the rate of extraction decreases to allow a best accuracy. The PRESET value defined in the component data determines when the low rate phase should start.

The accuracy is checked at the end of the batch, if the difference between the setpoint and the quantity of material extracted is higher then a defined value an alarm is generated.

B.2.2 Discharge Batch Component

A DISCHARGE BATCH component is a component that when active causes a loss of material from the scale. The amount of material to exctract from the scale is defined in the recipe. Also in this case the extraction procedure takes place in two phases, the first at high rate and a second at low rate. In the second phase the rate of extraction decreases to allow a best accuracy. The PRESET value defined in the component data determines when the low rate phase should start.

The accuracy is checked at the end of the batch, if the difference between the setpoint and the quantity of material extracted is higher then a defined value an alarm is generated.

B.2.3 Discharge Component

A DISCHARGE component is used to empty the scale, the component will stay active until the weight on the scale reach the zero weight value. The discharge is all the same rate and there is not deviation check at its end.

Zero weight value is defined in the SCALE DATA scroll.

B.2.4 Refill Component

A REFILL component is used to refill the scale. It is normally used in recipe in which there are DISCHARGE BATCH components. When a REFILL component is defined in a recipe, the instrument asks for its mode of operation. There are two possibilities:

FORCE, when encountered in the recipe, the component is activated if the weight in the scale is lower then a defined threshold of weight. Material will drop into the scale until the threshold has been reached.

AUTO, before a discharge batch cycle the instrument checks if there is enough material into the scale. If not, the REFILL component is activated until the refill threshold has been reached. So the refill is automatically started only if necessary.

In any case the refill is done at a fixed rate and there is not deviation check at its end.

B.2.5 Time Based Component

The time based are components activated for a defined period. They do not have a weight set point to reach but only a time to be activate.

This kind of component can be used for example to have a mixer running in between two components.

B.3. Definition of the recipe

When all the components you need have been defined, you can precede defining a recipe. Still pressing the RECIPE key we can accede to the RECIPE DEFINITION scroll.

A recipe is composed by a series of data, the first two are:

Recipe name

It is a 8 digit alphanumerical string of identification of the recipe.

The other data are organized in recipe lines. A line contains all informations regarding a single batch phase. When a recipe is started, the instrument reads and executes line per line all the recipe, each line should contain a component number and all the parameters that instrument needs for its handling. In detail the data for line are:

Component number

Enter the component to be activated in this phase of the recipe.

Then, in basis of the type of selected component:

CHARGE BATCH COMPONENT

Set point

Defines the amount of material to batch out. Only if set point source selection in component definition is LOCAL.

Max deviation

Defines the maximum deviation between the set point and the amount of material batch out.

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge	- not used	-	0
	- pulse	-	16
	- steady	-	32
Restart batch if neg err.	- yes	-	40
	- no	-	0

Charge interlock

Defines if the instrument must wait for the charge interlock input before to start the batch and, in this case, if this input should stay fix for all the batch or not.

End charge

Defines if at the end of the batch the end charge output must be activated and, in this case, if it should be steady or simply a pulse.

Restart batch if negative error

At the end of the batch, after stabilization time, if batched weight is less then the set point, the batch can be restarted until the set point is reached.

DISCHARGE BATCH COMPONENT

Set point

Defines the amount of material to batch out. Only if set point source selection in component definition is LOCAL.

Max deviation

Defines the maximum deviation between the set point and the amount of material batch out.

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge	- not used	-	0
	- pulse	-	16
	- steady	-	32
Restart batch if neg err.	- yes	-	40
	- no	-	0

Discharge interlock

Defines if the instrument must wait for the discharge interlock input before to start the batch end, in this case, if this input should stay fix for all the batch or not.

End discharge

Defines if at the end of the batch the end charge output must be activated and, in this case, if it should be steady or simply a pulse.

Restart batch if negative error

At the end of the batch, after stabilization time, if batched weight is less then the set point, the batch can be restarted until the set point is reached.

DISCHARGE COMPONENT

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge	- not used	-	0
	- pulse	-	16
	- steady	-	32

Discharge interlock

Defines if the instrument must wait for the discharge interlock input before to start the batch and, in this case, if this input should stay fix for all the batch or not.

End discharge

Defines if at the end of the batch the end charge output must be activate and, in this case, if it should be steady or simply a pulse.

REFILL COMPONENT

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Refill mode	- auto	-	0
	- forced	-	2
Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge .	- not used	-	0
	- pulse	-	16
	- steady	-	32

Refill mode

Define if the refill should be executed at this point of the recipe (FORCED) or if the instrument should check the weight into the scale before start a batch discharge component and only in this case, if necessary, to execute the refill (AUTO).

High refill setpoint

Defnes the amount of material to refill.

Charge interlock

Defines if the instrument must wait for the charge interlock input before to start the batch and, in this case, if this input should stay fix for all the batch or not.

End charge

Defines if at the end of the batch the end charge output must be actived and, in this case, if it should be steady or simply a pulse.

TIME BASED COMPONENT

Activation time

Defines the time of activation of the component.

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge .	- not used	-	0
	- pulse	-	16
	- steady	-	32

Comp.interlock

Defines if the instrument must wait for the component interlock input (charge interlock is used in this case) before to start the batch end, in this case, if this input should stay fix for all the batch or not.

End comp.

Defines if at the end of the batch the end component output (charge interlock is used in this case) must be activated and, in this case, if it should be steady or simply a pulse.

A recipe can be composed by the number of line you need, the recipe end is identified by inputting 0 as component number, message “RECIPE END” will be displayed in this case.

The instrument is able to store till 100 recipes for a total of 500 lines.

In SCALE DATA menu is possible to define the max number of recipe required by the system. Its purpose is to avoid to display and print data of never used recipes.

B.3.1 Recipe Verify

Once a recipe has been written, it can be verified using a function implemented in the software of the instrument.

This function can be manually activated by keyboard but it is also automatically executed by the instrument when it receives a start command. While in the first case the instrument gives indication to the user about the problem encountered and the recipe line where the problem has been detected, in the second the user will get only a BAD RECIPE message and the cycle will be aborted.

Detected anomalies are:

Total over max

The sum of the set point (for discharge batch component set points is considered negative).

Suggested action

Check component set points in the recipe lines and scale data value in SCALE DATA scroll.

Check "Zero – start batch set in SCALE DATA scroll.

Total under zero

The sum of set points (for discharge batch component set point is considered negative) of the component is negative.

Suggested action

Check component set points in the recipe lines.

Check "Zero – start batch set in SCALE DATA scroll.

Recipe empty

The recipe is empty. Component number 0 has been defined in the first line of the recipe.

Suggested action

Check recipe number.

B.4. Definition of the I/O

Through the inputs and outputs the instrument commands and controls the different phases of the cycle.

In the next sections, all the digital and analog inputs and outputs available on the instrument and inherent to the batch sequence will be summarized.

B.4.1 Digital Inputs

Start/Set tare

Start command, see Section 6.2 "START COMMAND".

Stop/Reset tare

Stop command, see Section 6.3 "STOP COMMAND".

Abort

Abort command, see Section 6.4 "ABORT COMMAND"

End cycle

Start command, see Section 5.5, “END CYCLE COMMAND”.

Charge interlock

This input enables the instrument to begin a charge phase. How the instrument should check this input is defined in recipe for each line.

Discharge interlock

This signal enables the instrument to start a discharge phase. How the instrument must check this input is defined in recipe for each line.

Discharge device

This input indicates to the instrument that the discharge device is off for discharge gate is closed. It is tested continuously during the charge phases, if it becomes open the batch will be stopped. It is not tested during discharge phases.

If the instrument finds it open when the charge interlock signal comes, the batch is stopped. At the restart both the signal must be present.

Auto/Man

Switch the instrument from automatic to manual and back. Pass in manual during a cycle will cause an abort.

Reset Comp. tot

Clear the total register for all the components.

Reset Rec. tot

Clear the total register for all the recipes

Print Comp. tot

Print the total register for all the components.

Print Rec. tot

Print the total register for all the recipes.

Remote cntrl

When close, it disables the keyboard and the command digital inputs (start, stop, end cycle and abort). It could be used when the instrument is connected to a supervisor or PLC that takes control above it.

NOTE: It is possible to assign the same physical input to two different logical functions. So, for example, the charge interlock and discharge interlock can be assigned to the same input.

B.4.2 Digital Outputs

Component 1 – Component 40

It is the component activation, for charge and discharge batch components it works together with the high rate and low rate outputs. In these cases it uses also as common signal to read the external setpoint of the component if the BCD input option is installed and in the recipe has been defined that the setpoint should be read from BCD input.

High rate

It is activated during the high rate phase of a charge or discharge batch.

Low rate

It is activated during the low rate phase of a charge or discharge batch. If specified in the recipe, it is activated during the low rate phase of a charge or discharge batch. If specified in the recipe, it is activated also during the high rate phase.

Charge end

End charge signal. In the recipe for each line it is specified how the instrument should handle this output at the end of charge batch or refill phase.

Discharge end

End discharge signal. In the recipe for each line it is specified how the instrument should handle this output at the end of a discharge or discharge batch phase.

Cycles end

The output is activated at the end of the last cycle, it will be deactivated at the next start.

End recipe

The output is activated at the end of the recipe, it will be deactivated when a new cycle start or a new start command is given.

Ready

It is on when all following conditions are true:

- Instrument has been calibrated
- No calibration function is running
- No shut down conditions is present
- Instrument is in AUTO
- Cycle is not running

Alarms

On when an alarm is active, becomes off when the alarm is acknowledged.

Shutdown

On when an alarm is active, becomes off when the alarm is acknowledged and the cause of the shutdown returns normal.

Need refill

It is activated during execution of a refill phase if time out component alarm is generated. It indicates that the bin from which the material is token to refill is empty. The output can be connected to the STOP input to generate a stop condition in order to give the time to change the bin. The output is turned off at the restart or at the end of the refill.

NOTE: It is possible to assign the same physical output to two different logical functions. So, for example, the charge end and discharge end can be assigned to the same output.

B.4.3 Current Outputs

Current outputs are generally used to transfer weight values to remote indicators. The transferred value can be: the net weight, the gross weight and difference between the setpoint and the net weight that is the amount of material needing to complete the batch.

This last possibility has meaning only during a batch, it will stay to 0 if the cycle is not running.

B.4.4 BCD Input

Optionally the expansion board Digital Inputs 16in/4out can be used to read data from external presets in BCD format.

The BCD input can be used to read the recipe to execute, the number of cycles and the set point of the component.

The value is read as an integer value on 4 digits and multiplied for the scale division to obtain the same format of the scale.

The polarity can be selected between POSITIVE nd NEGATIVE.

The 4 outputs present on the board are used to select the value to read, see the following table:

Out# 1	*Out# 2*	*Out# 3*	*Out# 4*	*Variable*
OFF	OFF	OFF	OFF	Not reading
ON	OFF	OFF	OFF	Reading cycles and recipe
OFF	ON	OFF	OFF	Reading component set point
OFF	OFF	ON	OFF	Not used

The code stay active for 0.5 seconds then BCD input is read.

B.4.5 BCD Output

Optionally the expansion board Digital Output 16out/4in can be used to transmit data in BCD format.

The BCD output can be used to transmit the net (NET) or gross (GROSS) weight and the remaining weight to complete the batch (DIFF).

The value is transmitted as an integer value on 4 digits, obtained dividing the value for the scale division. If the result overcomes the maximum value, an alarm is generated.

The polarity can be selected between POSITIVE and NEGATIVE.

The parity bit can be enabled, in this case the output data will be on 3 digits and half, the range will change from 9999/0 to 7999/0.

The variable to be transmit can be selected by keyboard, selecting AUTO it is possible to use the 4 inputs present on the board for this purpose, see the following table:

In# 1	*In# 2*	*In# 3*	*In# 4*	*Variable to send*
OPEN	OPEN	OPEN	OPEN	Not used
CLOSE	OPEN	OPEN	OPEN	Net weight
OPEN	CLOSE	OPEN	OPEN	Gross weight
CLOSE	CLOSE	OPEN	OPEN	Diff weight

The refresh time for the BCD output is 200 mSec, the selection code must stay active at least for the same time.

B.5. The Run Scroll

In the RUN scroll it is possible to define the recipe to be executed, the number of cycles and to get all the information about the running cycle.

B.5.1 Select the Recipe

In the second RUN scroll the number and name of the selected recipe is displayed. If the cycle is not running it is also possible to change this selection. When the cycle is running it is not allows.

B.5.2 Define the Cycles Number

In the third RUN scroll it is possible to define the number of cycles to be executed from the next start that is the number of time the selected recipe should be repeated. This value can be changed also if a cycle is running.Entering 0 enables the AUTOREPEAT mode, the 0 value will be substitute by the “AUTO” message. In this way, when a start is given, the selected recipe will be executed until an END CYCLE or ABORT command, see section 5 “THE COMMANDS”.The END CYCLE command can be give in this scroll by pressing the END C. key (F3).

B.5.3 Status of the Cycle

In the first RUN scroll the user has the possibility to see the actual state of the cycle while the cycle is running. Available information are:

Line 1 :

C10 cccccc 0000.0 kg

___ _____ _____

Actual weight on thescale

Component’s name

Component’s number

The weight on the right will be the net weight during a batch charge or a batch discharge and the gross weight during a refill, a discharge and at the end of the batch.

Line 2 :

Setpoint 0000.0 kg

_____

The component’s setpoint

This line will be empty at the end of the batch.
If a time based component is active, following message will be displayed:

Time 0.0 s

The remaining time to complete the different phases of the component (start delay, activation and stabilization) will be displayed.

Line 3 :
In this line is displayed a message that indicates the actual status of the batch or the action that the instrument is executing.
Follows a complete list of the message that can appear on line 3:

End cycle
Last cycle has been completed, now it is not running.
Start cycle
Received a START command
CB – Wait ch. Interl.
Charge Batch – waiting for the charge interlock.
CB Start delay
Charge Batch – waiting for the delay at the start.
CB – High rate charge
Charge Batch – charging at high rate.
CB – Low rate charge
Charge Batch – charging at low rate.
CB – End batch delay
Charge Batch – charge ended, waiting for stabilization delay.
R – Wait ch. Interl.
Refill – waiting for change interlock.
R – Start delay
Refill – waiting for the delay at the start
R – Refilling
Refill – refilling
R – End refill delay
Refill – refill ended, waiting for stabilization time.
AR – Wait ch. Interl.
Auto Refill – waiting for charge interlock.
AR – Start delay
Auto Refill – waiting for the delay at the start.
AR – Refilling
Auto Refill – refilling
AR – End refill delay
Auto Refill – refill ended, waiting for stabilization time.
DB – Wait dch. Interl.
Discharge Batch – waiting for discharge interlock.
DB – Start delay
Discharge Batch – waiting for start delay.
DB – High rate disch.
Discharge Batch – high rate discharging.
DB – Low rate disch.
Discharge Baqtch – low rate discharging.
DB – End disch. delay
Discharge Batch – discharge end, waiting for stabilization time.
D – Wait dch. Interl.
Discharge – waiting for discharge interlock.

D – Start delay
Discharge – waiting for start delay.
D – Discharging
Discharge – discharging.
D – End disch. delay
Discharge – discharge end, waiting for stabilization time.
T – Wait interl.
Time based – waiting for component interlock.
T – Start delay
Time based – waiting for start delay.
T – Activation
Time based – component activation.
T – End delay
Time based – activation end, waiting for stabilization time.
End recipe line
Recipe line execution end.
Next recipe line
Go to the next recipe line.
The following messages appear when the cycle is stopped, they give information about the cause. In this case the second part of the message (after "-") will flash.
STOP – Stop command
A stop command has been received.
STOP – Disch. device
The discharge device opened during a charge cycle.
STOP – Charge interlock
The charge interlock opened during a charge cycle while in recipe it was defined as STABLE.
STOP – Disch. interlock
The discharge interlock opened during a discharge cycle while in recipe it was defined as STABLE.
STOP – Shut down active
A shut down condition has became active.
STOP – Power down
The power supply turned off while the cycle was running.
The following messages appear when the cycle is aborted, they give information about the cause. In this case the second part of the message (after "-") will flash also.
The ABORT message will stay on the display until the next start. In this way it is always possible to see for which reason the last cycle has been interrupted.
ABORT – Abort command
An abort command has been received.
ABORT – Bad recipe
A start has been received but the selected recipe is not correct.
ABORT – Bad cycles
The number of cycles read from the external device is not valid.
ABORT – Bad setpoint
The set point read from the external device is not valid.
ABORT – Manual
The instrument has been switched in manual while the cycle was running.

Line 4 :

During the batch, F1 key is assigned to the ABORT function, pressing it will interrupt the cycle.

F2 key is assigned to AUTO/MANUAL function, it allows to switch the instrument from MANUAL to AUTO and back. If you try to set the instrument in MANUAL during a batch, a confirmation scroll will be displayed because of this operation will cause the abort of the running cycle.

B.5.4 The Weight Indicator

The fourth RUN scroll can be usefull when the scale is used as weight indicator. In the first line the NET or GROSS weight is displayed. In the second and third line can be displayed one of the following : tare weight, a bargraph indicator, date and time.

In fourth line the PRINT key allows to active the print outs while the ALARM key, it appears flashing if an alarm is pending, allows to acknowledge and reset the active alarms.

B.6. The Commands

The commands can be give to the instrument in three ways : by keyboard, by contact and by serial line. The action engaged by the instrument when it receives one of this commands depends by the situation.

B.6.1 Start Command

It is the command used to start a cycle but depends from the instrument condition.

If instrument is in manual :

Execute a set tare

If cycle is not running:

Start the execution of the selected recipe for the selected number of cycles.

If cycle is running but has been suspended (stop condition):

Restart the cycle from the point at which it had been suspended.

The command is ignore if the instrument is in automatic but one of the following condition is not true:

- The ABORT contact or STOP contact are on.
- A shut down condition is present.
- The scale has not been calibrated.
- A calibration is running.

B.6.2 Stop Command

The STOP command suspends temporarily the execution of a cycle. The cycle can be restarted later or definitively aborted.

When a cycle is suspended, all the digital outputs inherent the cycle (components, charge end ….) are turned off, the STOP CYCLE alarm is asserted when the command is executed.

The STOP command is ignored if a cycle is not running while a RESET TARE is executed if the instrument is in manual.

A STOP command can be indirectly activated if during a cycle one of the following circumstances happens:

- Charge/discharge interlocks opens during the batch when it was selected as STABLE.

- Discharge device input opens during a charge phase.

- A generic SHUT DOWN occurs. Note that all the alarms can be selected as SHUT DOWN, so all the alarm conditions are able to suspends the cycle.

- The instrument turns off during a cycle.

During the stop, the timer used to check the component max time and the running time (for the end recipe report) continue to be updated.

B.6.3 Abort Command

The ABORT command interrupts definitively the running cycle., all the digital outputs inherent the cycle (components, charge end …) are turned off and the ABORT CYCLE alarm is asserted.

The ABORT command is ignored if a cycle is not running.

An ABORT command can be indirectly activated if during a cycle one of the following circumstances happens:

- The instrument has been forced in MANUAL.
- The selected recipe is not correct.
- The values read from the external presets (recipe, cycles or set point) are not valid.

An ABORT command can be manually given through keyboard. In this case a confirmation message will be displayed.

Do you really want to abort the batch ?	
YES	**NO**

YES should be pressed to confirm the command.

B.6.4 End Cycle Command

The END CYCLE command interrupts the sequence of cycles, the current cycle is completed but after it no others cycle are executed independently by the number of cycle to execute. The END CYCLE alarm is asserted.

The END CYCLE commands has no effect if the sequence of cycles, the current cycles is completed but after it no other cycle are executed independently by the number of cycle to execute.

The END CYCLE command has no effect if the running cycle is already the last of the series and it ignored if a cycle is not running.

B.6.5 AUTO / MANUAL

Auto/Manual is not properly a command but it is important because switching is in manual during a cycle its acts an ABORT, and when in manual it changes function to the START and STOP commands.

A key on the front panel allows to switch from AUTO to MANUAL. If this key is pressed during a cycle, a warning message is displayed

WARNING
It will abort the running cycle.
Press YES to confirm
YES NO

Pressing YES the cycle is aborted and the instrument turns in manual, NO cancels the action. If the MANUAL command is given in the same conditions through input contact, the commutation, thus the abort of the cycle, is immediate.

When the instrument is in MANUAL, the ready led stays OFF to indicate that cycle can not be started.

A led in the front panel is lights when the instruments is in AUTO.

B.7. The Sequence

Are here briefly resumed all the operations executed by the instrument from the start to the end of the cycle.

All the sequence is then automatically repeated if more cycles are set.

B.7.1 After the Start

1. Clear end cycle output
2. Increase cycle number.
3. If recipe number from external device
    A. Read external recipe number
    B. Check recipe number is valid, if not -> **ABORT – BAD RECIPE**
4. Verify recipe, if error -> **ABORT – BAD RECIPE**
5. If cycles number from external device
    A. Read cycles number
    B. Check cycles number is valid, if not -> **ABORT – BAD CYCLES**
6. Clear component totals, “last register”.

B.7.2 Execute the Recipe Line

1. Set max time timer for component execution.

2. Read the recipe line to be executed and check the component type to see what kind of action to execute.

The Charge Batch

1. Deactivate outputs: END CHARGE and END CYCLE.
2. Wait for charge interlock, in this phase interlock led will be on.
3. Check discharge device, if it is open -> **STOP – DISCH. DEVICE**

4. If set point should be read from external device
   A. Read set point
   B. Check if set point is valid, if it is less then zero or higher then scale capacity -> **ABORT – BAD SET POINT**
5. Check weigh on the scale if higher then zero weight **NOT ZERO** alarm.
6. Wait component start delay

   In this phase, charge interlock must stay on if selected as STABLE, otherwise -> **STOP – CHARGE INTERLOCK** and check discharge device input, it also must stay closed during this period, otherwise -> **STOP – DISCH. DEVICE**.
7. Set tare
8. Activate high rate charge. High rate output and component output are activated if HIGH+LOW is selected as high rate mode in the component data. During all this phase discharge device and charge interlock (if selected as stable) are tested.
9. When preset threshold (set – preset) is reached active low rate batch, only low rate output and component output are active. Same as above for change interlock and discharge device.
10. When end threshold (set – queue) is reached, end batch.
    A. Deactivate low rate output and component output.
11. Wait stabilization time.
12. Activate end charge output.
13. Update component total register
14. Correct cut off weight.
15. Check component deviation, if higher then max, **MAX DEVIATION** alarm
16. End recipe line, go to section 6-3

The Discharge Batch

1. Deactivate outputs: END DISCHARGE and END CYCLE
2. If a refill component has been encountered in the previous lines of the recipe and it was set as AUTO, check weight on the scale. If it is below the component set point, execute an auto refill function.
3. Wait for discharge interlock, in this phase interlock led will be on.
4. If set point should be read from external device
   A. Read set point
   B. Check if set point is valid, if it is less then zero or higher then scale capacity-> **ABORT – BAD SET POINT**
5. Wait component start delay.

   In this phase, discharge interlock must stay on if selected as STABLE, otherwise-> **STOP – DISCH. INTERLOCK**

6. Set tare
7. Activate high rate discharge. High rate output and component output are activated. Low rate output is also activated if HIGH+LOW is selected as high rate mode in the component data. During all this phase discharge interlock (if selected as stable) is tested.
8. When preset threshold (set – preset) is reached active low rate batch, only low rate output and component output are active. Same as above for discharge interlock.
9. When end threshold (set – queue) is reached, end batch.

   Deactivate low rate output and component output.
10. Wait for stabilization time.
11. Activate end discharge output.
12. Update component total registers
13. Correct cut off weight.
14. Check component deviation, if higher then max, **MAX DEVIATION** alarm.
15. End recipe line, go to Section 6.3.

The Refill and Autorefill

1. Deactivate outputs: END CHARGE and END CYCLE.
2. Wait for charge interlock, in this phase interlock led will be on.
3. Check discharge device, if it is open -> **STOP – DISCH. DEVICE**
4. If set point should be read from external device.
   A. Read set point
   B. Check if set point is valid, if it is less then zero or higher then scale capacity-> **ABORT – BAD SET POINT**
5. Check weigh on the scale if higher than zero weight **NOT ZERO** alarm.
6. Wait component start delay.

   In this phase, charge interlock must stay on if selected as STABLE, otherwise -> **STOP – CHARGE INTERLOCK** and check discharge device input, it also must stay closed during this period, otherwise -> **STOP – DISCH. DEVICE**.
7. Reset tare
8. Activate high rate charge. High rate output and component output are activated. Low rate output is also activated if HIGH+LOW is selected as high rate mode in the component data. During all this phase discharge device and charge interlock (if selected as stable) are tested.
9. When end threshold (set) is reached, end charge.

   Deactivate high rate, low rate and component outputs.
10. Wait for stabilization time.

11. Update component total registers.
12. Activate end charge output.
13. End recipe line, go to Section 6.3. If it was an autorefill, repeat recipe line.

The Discharge

1. Deactivate outputs: END DISCHARGE and END CYCLE.
2. Wait for discharge interlock, in this phase interlock led will be on.
3. Wait component start delay.

   In this phase, discharge interlock must stay on if selected as STABLE, otherwise -> **STOP – CHARGE INTERLOCK**.
4. Reset tare
5. Activate high rate discharge. High rate output and component output are activated. Low rate output is also activated if HIGH+LOW is selected as high rate mode in the component data. During all this phase discharge interlock (if selected as stable) is tested.
6. When the zero weight value is reached, end discharge.

   Deactivate high rate, low rate and component outputs.
7. Wait for stabilization time.
8. Update component total register.
9. Activate end discharge output.
10. End recipe line, go to Section 6.3

The Time Based Batch

1. Deactivate outputs: END CHARGE and END CYCLE.
2. Wait for component (charge) interlock, in this phase interlock led will be on.
3. Wait component start delay.

   In this phase, charge interlock must stay on if selected as STABLE, otherwise -> **STOP – CHARGE INTERLOCK**.
4. Set tare
5. Activate component output.
6. After the activation time defined in the recipe, component outputs is deactivated.
7. Wait for stabilization time.
8. Update component total registers.
9. Activate end charge output.
10. End recipe line, go to Section 6.3

B.7.3 End Recipe Line and Recipe End

1. Reset tare
2. Check if there are other lines in recipe or there are no more lines

   but a component has been defined as end batch component. In these case repeat all the procedure from Section 6.3, otherwise go ahead.
3. Check
4. Update recipe total registers.
5. Print recipe if automatic batch print enabled.
6. Check if there are other cycles to be executed, if yes repeat all the procedure from Section 6.2, otherwise go ahead.
7. Set end cycles output, the sequence is finished, waits for another start command.

B.8. Multiscales

How already said in the overwiew, the Mod.3102 is able to handle till 4 scales. When more then 1 scale is active, it can handle these scale in two different ways.

In the first, called SCALE MODE, it considers to have four independent scales, each one with an own set of commands (start, stop, auto/man…), a recipe to be execute, a number of cycles etc… In few word is the same as to have four single scale instruments in one hardware.

In the second way, called GROUP MODE, it considers each scale as a part of a group. Each scale will have a set of inputs and outputs to interacts with own portion of the system but the set of commands, recipe, the number of cycles etc…will be unique for all the scales.

The main difference is that in SCALE MODE you will create recipes containing only components of the scale on which the recipe will be executed and it is possible to run simultaneously the four scales with four different recipes.

In GROUP mode the recipe can contain all the component, independently by the scale and only one recipe can be executed at time.

In the next two sections the differences in the setup instrument when it operates in multiscale mode will be listed separately for the two modes.

Definition of the component

In the component definition should selected the membership scale. This independently by the component type.

Definition of the recipe

Also for the recipe should be specified the membership scale.

Recipe verify

A new anomaly can be detected executing the recipe verify function if the component in the recipe do not belong to the same scale at which belongs the recipe. The message will be: “Scale error”.

Definition of the I/O – Digital inputs and outputs
Digital inputs and outputs listed below must be defined for each scale active, the message will be completed by the S# indication to indicate the scale number:

Inputs:

Start/Set tare s#
Stop/Reset tare s#
Abort s#
End cycle s#
Charge interlock s#
Discharge interlock s#
Discharge device s#
Auto/Man s#
Go on s#

Outputs:
High rate s#
Low rate s#
Charge end s#
Discharge end s#
Cycles end s#
Need ref s#

Ready, Alarm and Shutdown outputs are cumulative. So, for exemple, the ready output will turn on only if all the scales are ready.
Definition of the I/O – Current outputs
Same selections are available for all the scales.
Definition of the I/O – BCD input
Same selections are available for all the scales. If in AUTO mode, this is the table of selection:

Out #1	*Out #2*	*Out #3*	*Out #4*	*Variable*
OFF	OFF	OFF	OFF	Not reading
ON	OFF	OFF	OFF	Cycles and recipe scale #1
OFF	ON	OFF	OFF	Component set point scale #1
OFF	ON	OFF	OFF	Not used
OFF	OFF	ON	OFF	Not reading
ON	OFF	ON	OFF	Cycles and recipe scale #2
OFF	ON	ON	OFF	Component set point scale #2
ON	ON	ON	OFF	Not used
OFF	OFF	OFF	OFF	Not reading
ON	OFF	OFF	OFF	Cycles and recipe scale #3
OFF	ON	OFF	OFF	Component set point scale #3
ON	ON	OFF	OFF	Not used
OFF	OFF	ON	OFF	Not reading
ON	OFF	ON	OFF	Cycles and recipe scale #4
OFF	ON	ON	OFF	Component set point scale #4
ON	ON	ON	OFF	Not used

Definition of the I/O – BCD output
Same selections are available for all the scales. If in AUTO mode, this is the table of selections:

In #1	*In #2*	*In #3*	*In #4*	*Variable to send*
OPEN	OPEN	OPEN	OPEN	Not used
CLOSE	OPEN	OPEN	OPEN	Net scale #1
OPEN	CLOSE	OPEN	OPEN	Gross scale #1
CLOSE	CLOSE	OPEN	OPEN	Diff scale #1
OPEN	OPEN	CLOSE	OPEN	Not used
CLOSE	OPEN	CLOSE	OPEN	Net scale #2
OPEN	CLOSE	CLOSE	OPEN	Gross scale #2
CLOSE	CLOSE	CLOSE	OPEN	Diff scale #2
OPEN	OPEN	OPEN	CLOSE	Not used
CLOSE	OPEN	OPEN	CLOSE	Net scale #3
OPEN	CLOSE	OPEN	CLOSE	Gross scale #3
CLOSE	CLOSE	OPEN	CLOSE	Diff scale #3
OPEN	OPEN	CLOSE	CLOSE	Not used
CLOSE	OPEN	CLOSE	CLOSE	Net scale #4
OPEN	CLOSE	CLOSE	CLOSE	Gross scale #4
CLOSE	CLOSE	CLOSE	CLOSE	Diff scale #4

The RUN scroll
The SCALE# key (it allows to switch the displayed scale) will compare in all the RUN scrolls. Using it will be possible to define recipe and cycles number and control the batching phases of all the active scales.

The commands
Each scale has an own series of digital input commands.
If the commands are given by keyboard, they will be executed only by the scale actually displayed, the other scale will not be affected.

Same for the LEDS, they refers only to the displayed scale.

B.8.1 Multiscales – Group Mode

Definition of the component
In the component definition should selected the membership scale. This independently by the component type.

Definition of the recipe
No differences.

Definition of the I/O – Digital inputs and outputs
Digital inputs and outputs listed below must be defined for each active scale, the message will be completed by the S# indication to indicate the scale number:

Inputs :
Charge interlock s#

Discharge interlock s#
Discharge device s#

Outputs :
High rate s#
Low rate s#
Charge end s#
Discharge end s#
Ready, Alarm and Shutdown outputs are cumulative. So, for example, the ready output will turn on only if all the scales are ready.

Definition of the I/O – Current outputs
Same selections are available for all the scales.

Definition of the I/O – BCD input and output
Same selections are available for all the scales. If in AUTO mode, this is the table of selection .

Out #1	*Out #2*	*Out #3*	*Out #4*	*Variable*
OFF	OFF	OFF	OFF	Not reading
ON	OFF	OFF	OFF	Cycles and recipe scale #1
OFF	ON	OFF	OFF	Component set point scale #1
OFF	ON	OFF	OFF	Not used
OFF	OFF	ON	OFF	Not reading
ON	OFF	ON	OFF	Cycles and recipe scale #2
OFF	ON	ON	OFF	Component set point scale #2
ON	ON	ON	OFF	Not used
OFF	OFF	OFF	OFF	Not reading
ON	OFF	OFF	OFF	Cycles and recipe scale #3
OFF	ON	OFF	OFF	Component set point scale #3
ON	ON	OFF	OFF	Not used
OFF	OFF	ON	OFF	Not reading
ON	OFF	ON	OFF	Cycles and recipe scale #4
OFF	ON	ON	OFF	Component set point scale #4
ON	ON	ON	OFF	Not used

Definition of the I/O – BCD input and output
Same selections are available for all the scales. If in AUTO mode, this is the table of selection :

In #1	*In #2*	*In #3*	*In #4*	*Variable to send*
OPEN	OPEN	OPEN	OPEN	Not used
CLOSE	OPEN	OPEN	OPEN	Net scale #1
OPEN	CLOSE	OPEN	OPEN	Gross scale #1
CLOSE	CLOSE	OPEN	OPEN	Diff scale #1
OPEN	OPEN	CLOSE	OPEN	Not used
CLOSE	OPEN	CLOSE	OPEN	Net scale #2

OPEN	CLOSE	CLOSE	OPEN	Gross scale #2
CLOSE	CLOSE	CLOSE	OPEN	Diff scale #2
OPEN	OPEN	OPEN	CLOSE	Not used
CLOSE	OPEN	OPEN	CLOSE	Net scale #3
OPEN	CLOSE	OPEN	CLOSE	Gross scale #3
CLOSE	CLOSE	OPEN	CLOSE	Diff scale #3
OPEN	OPEN	CLOSE	CLOSE	Not used
CLOSE	OPEN	CLOSE	CLOSE	Net scale #4
OPEN	CLOSE	CLOSE	CLOSE	Gross scale #4
CLOSE	CLOSE	CLOSE	CLOSE	Diff scale #4

The RUN scroll
The SCALE# key (it allows to switch the displayed scale) will compare in the first RUN scroll, where the batch phases are displayed.

A new message can compare in the third line . “Batch completed”

It is displayed when a scale has completed its batch and it is waiting for the others finish theirs before to give the end cycle.

The commands
The set commands is unique. When a start is given, all the scales will start.

Same for set tare, reset tare , abort, stop, end cycle and auto/man commands. Also if the stop comes from an external condition on one of the scales (ex. Discharge device open), all the scales will go in stop.

The sequence
When a cycle is started, each scale scrolls the recipe looking for an own component. When a scale finds an own component it executes that recipe line and then restart to looking for until all the recipe lines containing its components have been executed.
During recipe execution each scale works independently be the others. Each sort of synchronism should be optained by using the inputs and outputs that each scale has got (charge and discharge interlocks, charge and discharge end outputs).
Only when a recipe has completed its batch, it locks to the other and it waits until they complete their batch. At this point the ccycle will end.

B.9 Troubleshooting

Anomalies and problems during a cycle can be signaled by the instrument by means of messages displayed in the RUN scroll menu or alarms

B.9.1 Status Messages (RUN Scroll)

Message	Cause	Suggested action
STOP – Stop command	A stop command has been received.	Check stop input is used. If in "multiscale – group mode" the stop command can arrive for an other scale that has gone in stop for un external condition, check the other scales.
STOP – Disch. device	The discharge device opened during a charge cycle.	Check disc. device input.
STOP – Charge interlock	The charge interlock opened during a charge cycle while in recipe it was defines as STABLE.	Check charge int.input. Check if charge interl. mode defined correctly in recipe
STOP – Disch. interlock	The discharge interlock opened during a discharge cycle while in recipe it was defined as STABLE	Check discharge int.input Check if discharge interl. mode defined correctly in recipe
STOP – Shut down active	A shut down condition has became active.	Check in alarm scroll what alarm has generated the stop condition.
STOP – Power down	The power supply turned off while the cycle was running	Check power supply connection
ABORT – Abort command	An abort command has been received.	Check abort input is used. If "multiscale – group mode" the abort command can arrive for an other scale that has aborted for an external condition, check the other scales.
ABORT – Bad recipe	A start has been received but the selected recipe is not correct.	Check recipe number in run scroll. Check recipe data.
ABORT – Bad cycles	The number of cycles read from the external device is not valid.	Check ext. preset value connections and setup, polarity can be wrong.
ABORT – Bad setpoint	The setpoint read from the external device is not valid.	Check ext. preset value connections and setup, polarity can be wrong.
ABORT - Manual	The instrument has been switched in manual while the cycle was running.	Check manual input is used.

B.9.2 Alarms

Alarms	Cause	Suggested action
Not zero	A the start of a recipe, the weight in the scale was over the “zero weight” value entered in setup.	Check zero weight value in scale data scroll.
Stop cycle	A stop command or a stop condition has been detected.	Check all the stop conditions Verify stop input if used.
Abort cycle	An abort alarm or an abort condition has been detected.	Check all the abort conditions Verify abort input if used.
End cycles	An end cycle command has been given.	Verify end cycle input if used
Deviation	The max deviation limit for the component has been overcome.	Check max deviation limit in recipe. Check queue value in component definition.
Comp. time out	The active component is taking more then the max time to complete the batch.	Check max component time in component’s table. The batch can be suspended or waiting for an external input.

Appendix C
Digital and Analog Input/Output

The Batch Controller has provision for up to 24 programmable digital input and 24 programmable digital outputs. Located on Mother Board are 5 programmable inputs, four programmable outputs and one non-programmable Micro-Tech hardware fault output.

Additional I/O are located on DIO Board (4In/16Out) and OPTION on DIO Board (16In/4Out).

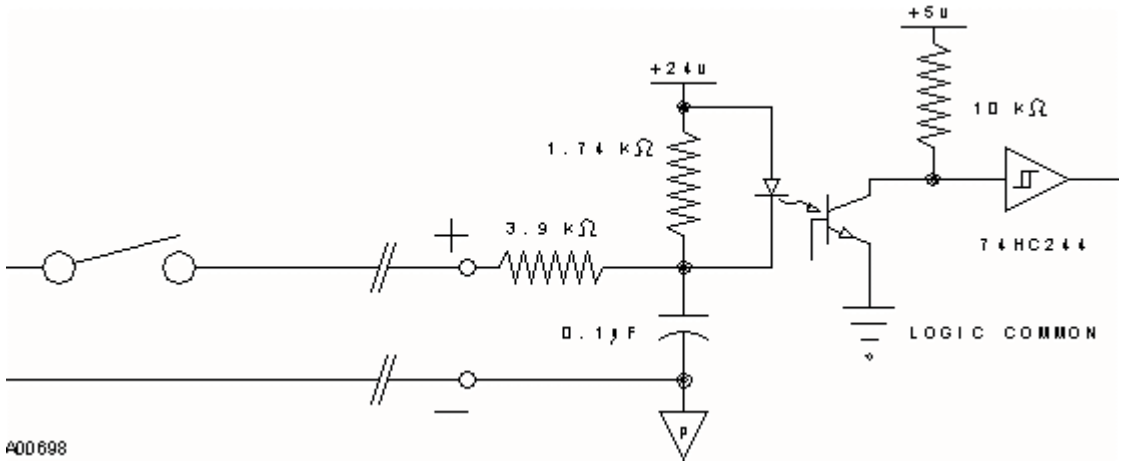
C.1 Mother Board Digital I/O

C.1.1 Digital Inputs

Five (5) programmable digital (DC) inputs (Appendix Figure C-1)

- Optically isolated
- Powered by internal 24 V DC supply, 5 mA
- Cable Length: 150 ohm maximum (7500 ft of 20 AWG)

Appendix Figure C-1: General Purpose Digital Inputs

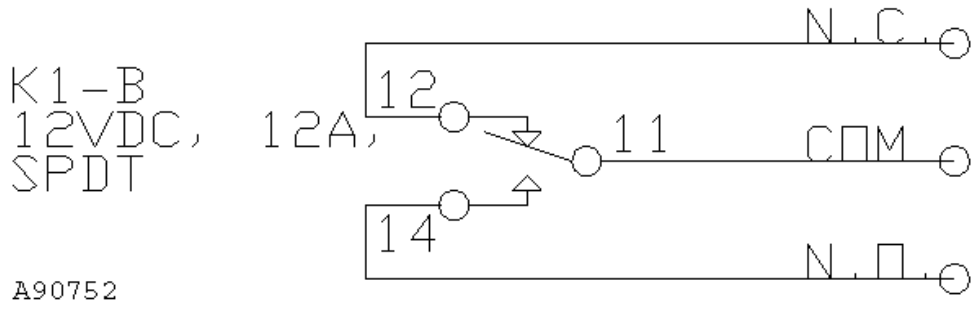


C.1.2 Digital Outputs

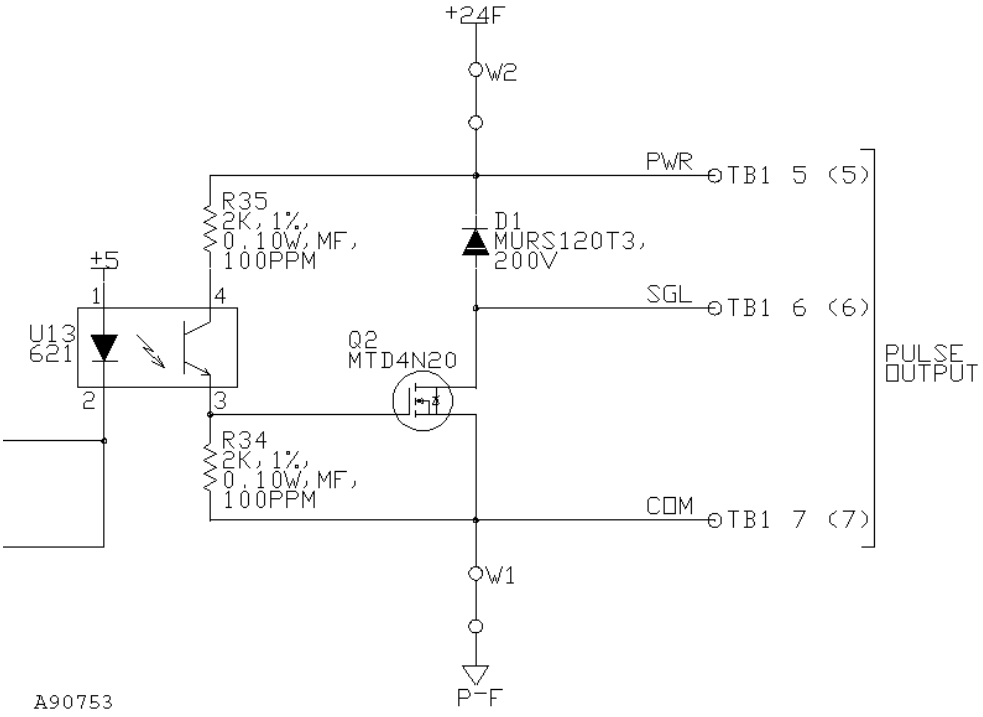
Four (4) programmable, and one (1) non-programmable failure, outputs (Appendix Figure C-2).

- Isolated Relay Outputs
- Solid state Output

Appendix Figure C-2: Isolated Relay Outputs



Appendix Figure C-3: Solid State Output



C.2 Digital Input/Output Board Configuration

In addition to the programmable digital inputs and outputs on the motherboard, Digital I/O (DIO) expansion boards can be added. Available boards are DIO input board (OPTION) 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 coursing (consult Factory) isolated outputs. The DIO input board connector J16 is male 25 pin sub-miniature D Connector and the DIO output board connector J15 is a female connector.

Selectable jumpers OP1 and OP2 located on the lower right hand side of the DIO boards control internal or external 24 VDC power for the DIO boards. All inputs and outputs use the same selected power supply.

Appendix Table C-1: DIO Board Jumper Settings (OP1/OP2)

DIO BOARD JUMPER SETTINGS		
POWER SOURCE	OP1	OP2
INTERNAL	“A”	“A:
EXTERNAL	“B”	“B”

The isolated contact closure inputs are activated by completing the circuit from the input to the negative side of the 24 VDC supply. Approximately 5 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 through W4 must be relocated for current sourcing. In most cases, it is recommended the boards be returned to the factory for converting from current sinking (default) to current sourcing.

Appendix Table C-2: DIO Board Jumper Settings for Current Sourcing

JUMPERS				
CURRENT	W1	W2	W3	W4
Sinking (default)	“Yes”	“No”	“Yes”	“No”
Sourcing	“No”	“Yes”	“No”	“Yes”

C.2.1 16 In/4 Out DIO Board Specifications (OPTION)

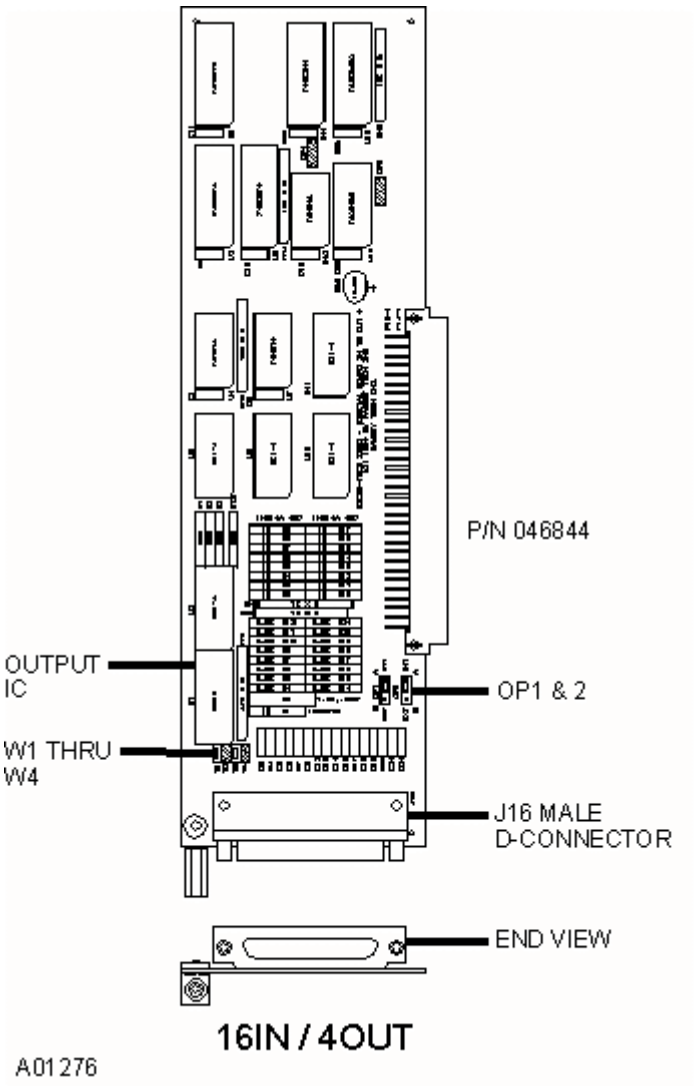
- (16) Programmable inputs
  - Optically isolated
  - Powered by internal +24V DIO supply, 6 mA maximum
  - Cable length: 150 ohm maximum (7500 ft 0f 20 AWG)
- (4) Programmable outputs
  - Able to drive TTL, CMOS, or relay solenoids
  - Current sinking socketed drivers
  - +24 VDC internal supply, 100 mA DC maximum output
- Connector

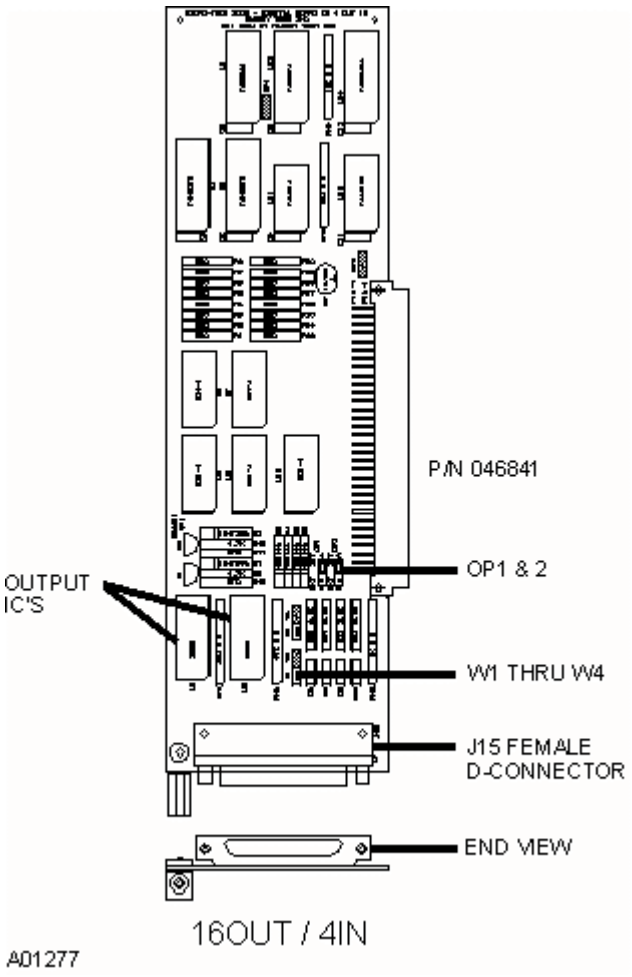
  25 pin D connector (male). Connector is interchangeable with a 20 or 22 pin subminiature D connector dimensionally complying with MIL-C-24308.

C.2.2 4 In/16 Out DIO Board Specifications

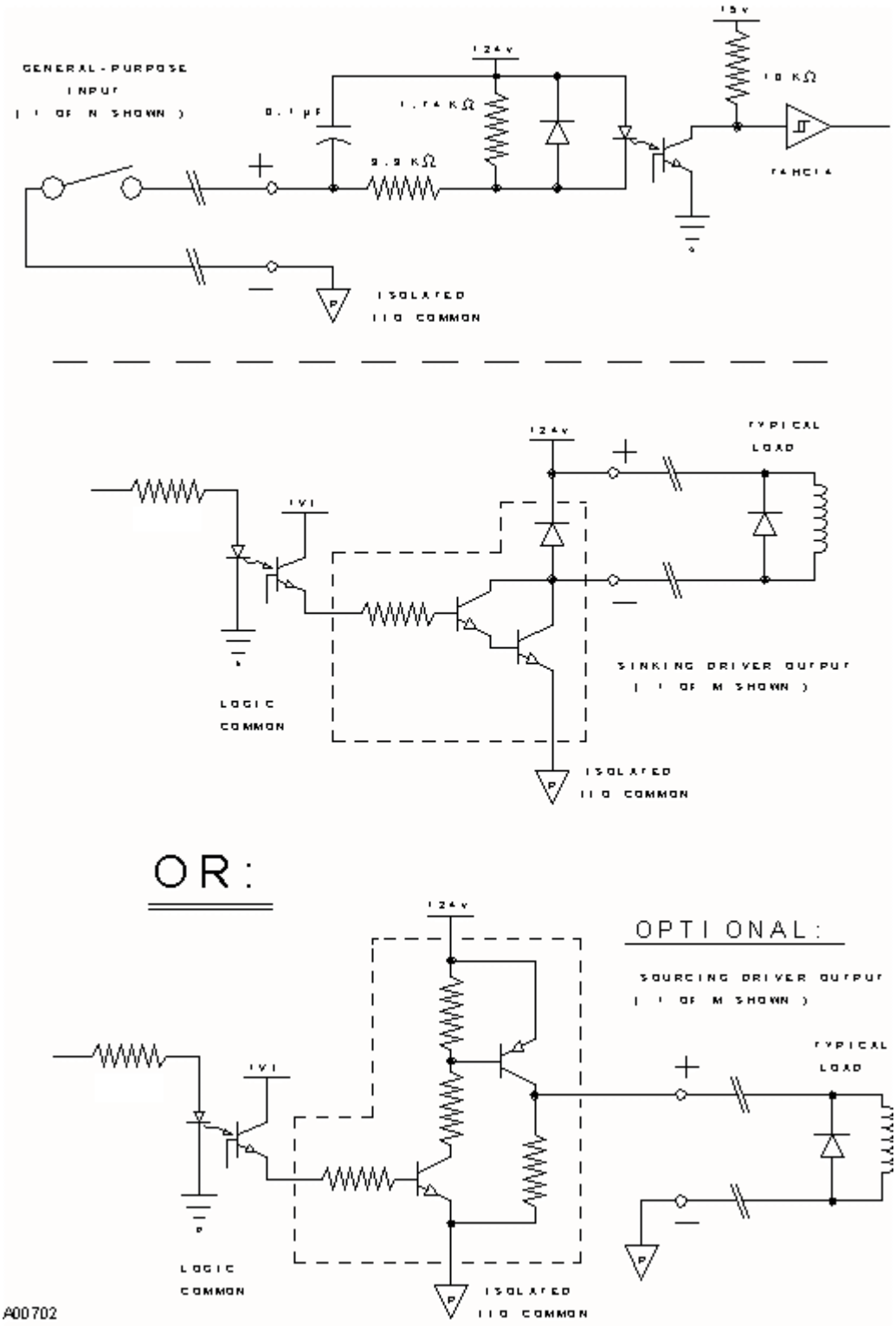
- (4) Programmable inputs
  - Optically isolated
  - Powered by internal +24V DIO supply, 6 mA maximum
  - Cable length: 150 ohm maximum (7500 ft of 20 AWG)
- (16) Programmable outputs
  - Able to drive TTL, CMOS, or relay solenoids
  - Current sinking socketed drivers
  - +24 VDC internal supply, 100 mA DC maximum output
- Connector

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


P/N 046844
OUTPUT IC
OP1 & 2
W1 THRU W4
J16 MALE D-CONNECTOR
END VIEW
16IN / 4OUT
A01276


P/N 046841
OUTPUT
IC'S
OP1 & 2
W1 THRU W4
J15 FEMALE
D-CONNECTOR
END VIEW
16OUT / 4IN
A01277

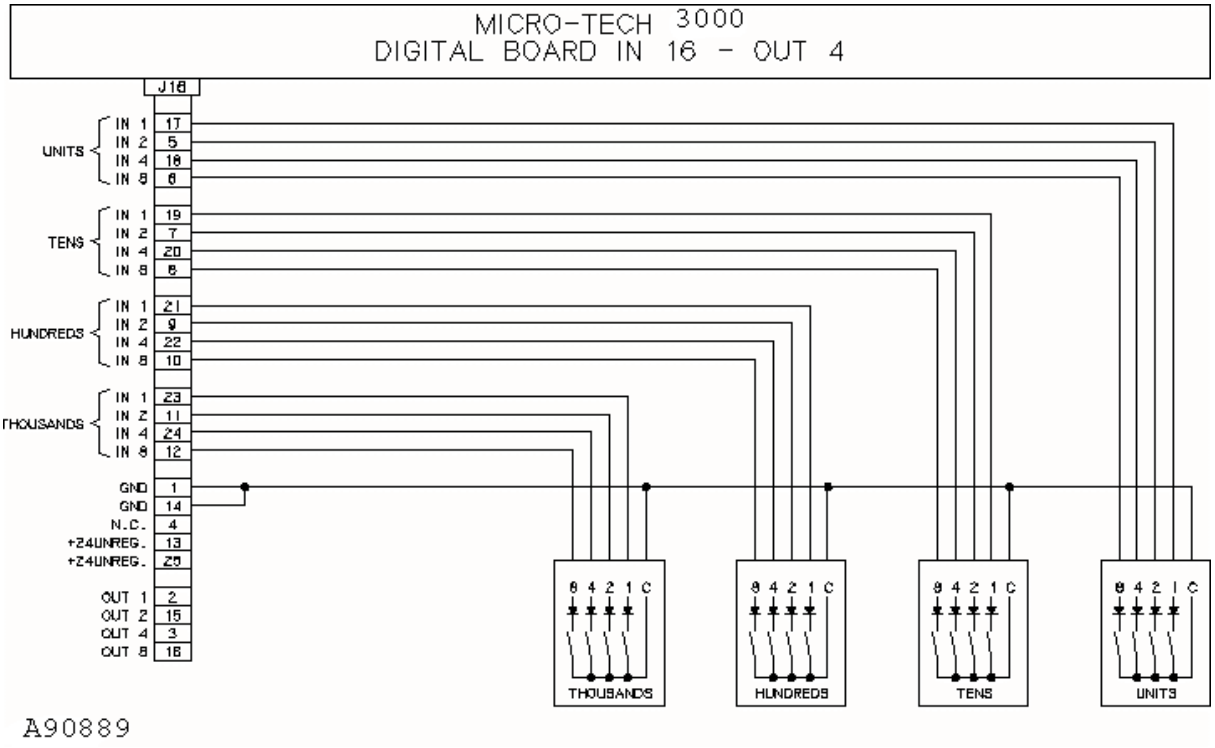
Appendix Figure C-4: Digital Inputs/Outputs



C.3 BCD Input Option

BCD can remotely enter load sizes for load out or batching applications. An optional Load Out input board is required. See Appendix Figure C-5 for wiring instructions.

Appendix Figure C-5: BCD Input Option Wiring



C.4 Analog I/O Boards

The analog I/O board is available in two configurations described below. *Type A* (option) has one current output only, whereas, *Type B* has two voltage inputs and two current outputs. The Micro-Tech 3100 can support up to four analog inputs and four analog outputs.

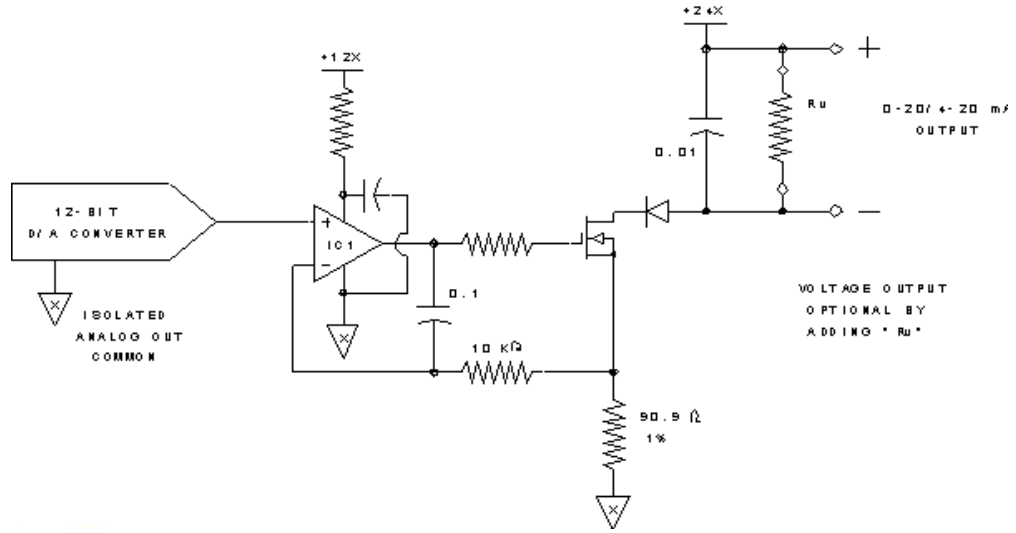
Type A: Current Output Board is a user definable 0-24/4-20 or 20-4/20-0 mA output (*Appendix figure C-7*).

Net Weight, Gross Weight, Diff

Optically isolated
Isolated power source
Voltage output by adding an internal dropping resistor

Output range:	User selectable 0-20mA or 4-20 mA, representing 0 to 100% variable.
Resistive load:	800 ohms max.
Capacitive load:	No limit
Field wiring:	Connections are made to the terminal strip on bottom edge of the analog board. Note that connector is removable for ease of termination.

Appendix Figure C-6: Current Output



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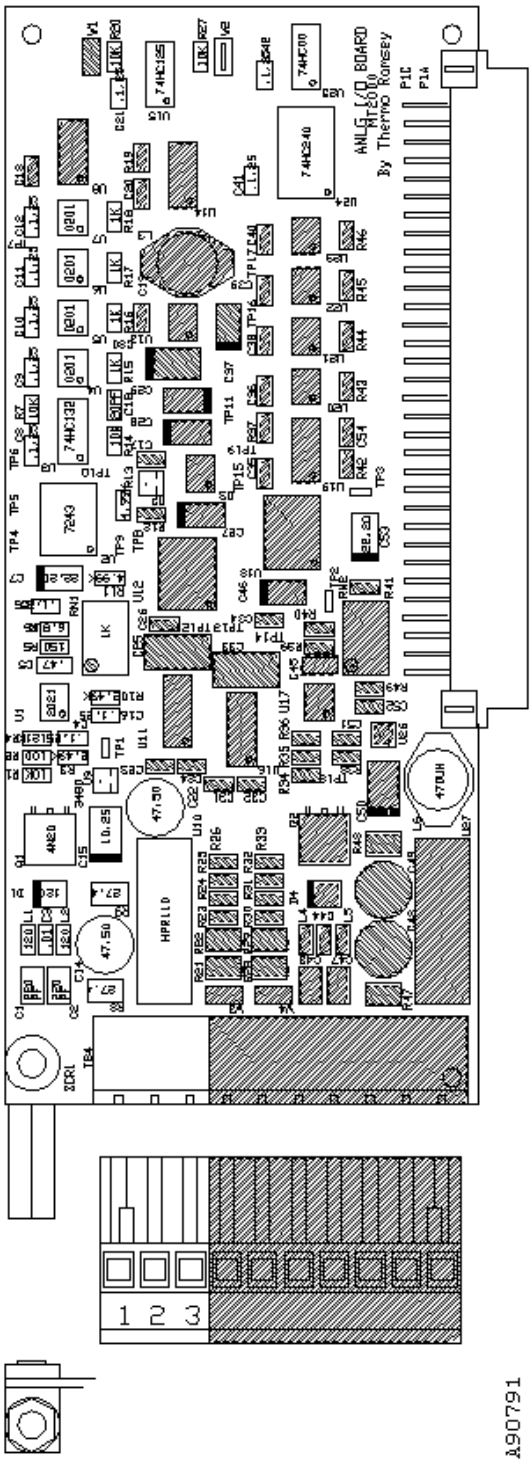
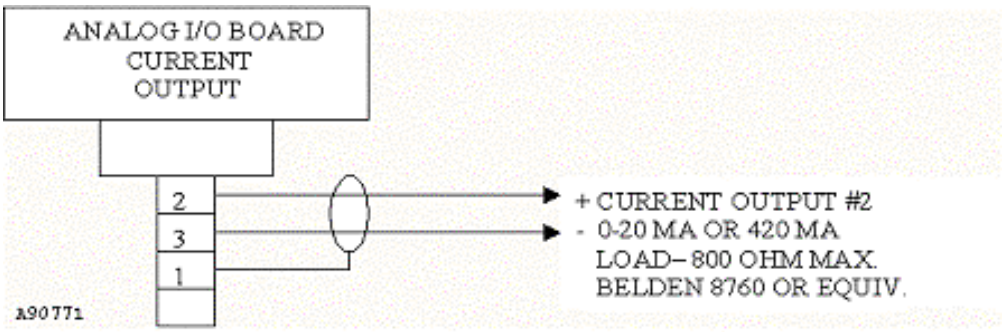
Appendix Figure C-7: Current Output PC Board (Type A)



Appendix Figure C-8: Current Output Board Wiring Diagram (Type A)



Type B: Analog Input/Output board has two ±5 VDC differential inputs (Appendix Figure C-9*)* and two user definable 0-20/4-20 or 20-4/20-0 mA outputs (Appendix Figure C-6*).*

Inputs

-

-

Outputs

None (Default)

Net Weight

Gross Weight

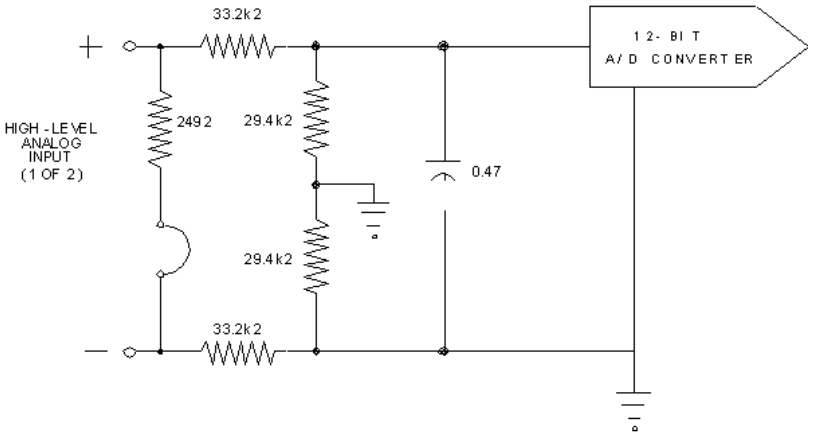
Diff.

Analog inputs are +/-5 VDC. Jumpers W3 and/or W4 are used to select 240 ohm impedance for 0-20/4-20 mA inputs (see *Appendix Figure C-10*).

Type:	Differential voltage input (0-20 mA or 4-20 mA with internal resistor, jumper selectable)
Range:	0-5 volt, or ±5 volt, programmable
Input impedance:	100 k nominal (differential)
Maximum usable input voltage:	106% of full scale
Non-isolated	
Max. non-destructive input voltage:	12 V peak

Field wiring: Connections are made to the terminal strip on bottom edge of the analog board. Note that connector is removable for ease of termination.

Appendix Figure C-9: Analog Input



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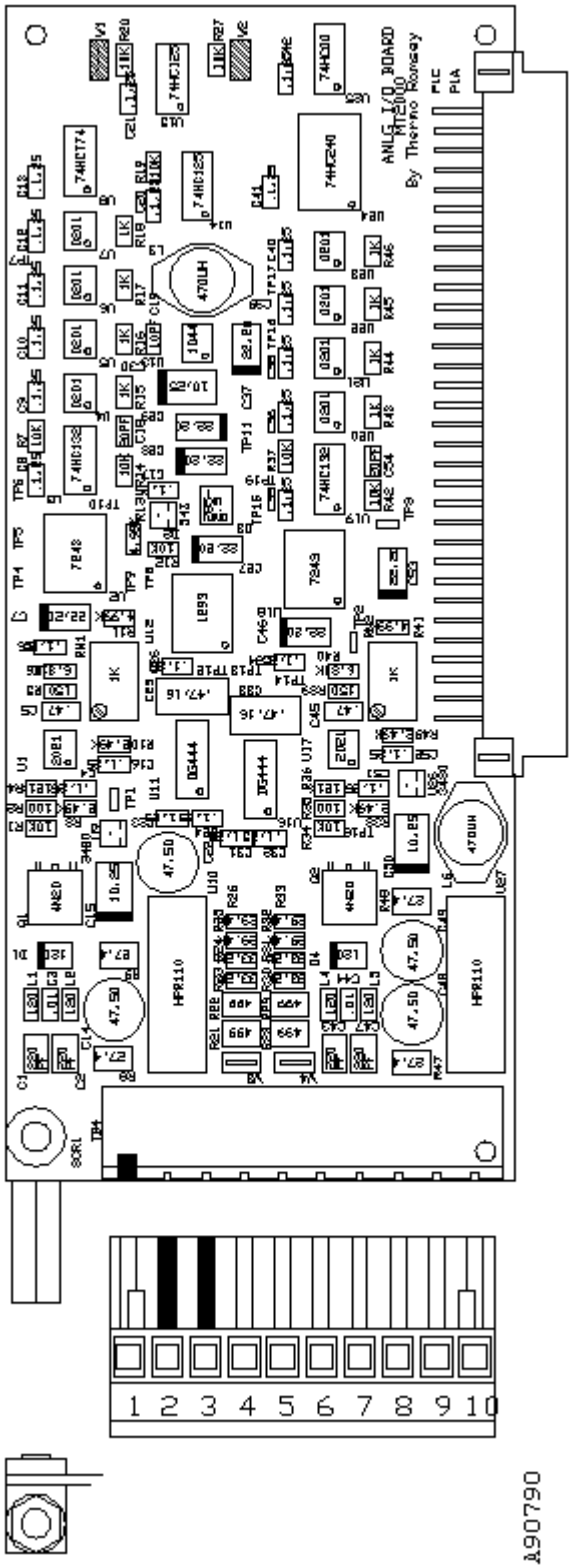
2 current outputs (see Appendix Figure C-6). Same as described in Type A board

Appendix Figure C-10: Analog I/O PC Board (Type B)



C.5 Communications Options

The following table gives references for specific communications options.

Appendix Table B-3: Communications Options Reference

Part Number	Reference Manual	REC Number
068053	Standard Comm A Board	REC 3949
055517	Allen Bradley RIO	REC 4012
056713	Profibus-DP	REC 4063
068147	DeviceNet	REC 4150

C.5.1 Standard Comm A Board

Refer to *REC 3949* if the optional communication board is installed.

C.5.2 Allen-Bradley Remote I/O

Refer to *Allen-Bradley Remote I/O, REC 4012* if this option is installed.

C.5.3 Profibus-DP

Refer to *Profibus-DP, REC 4063* if this option is installed.

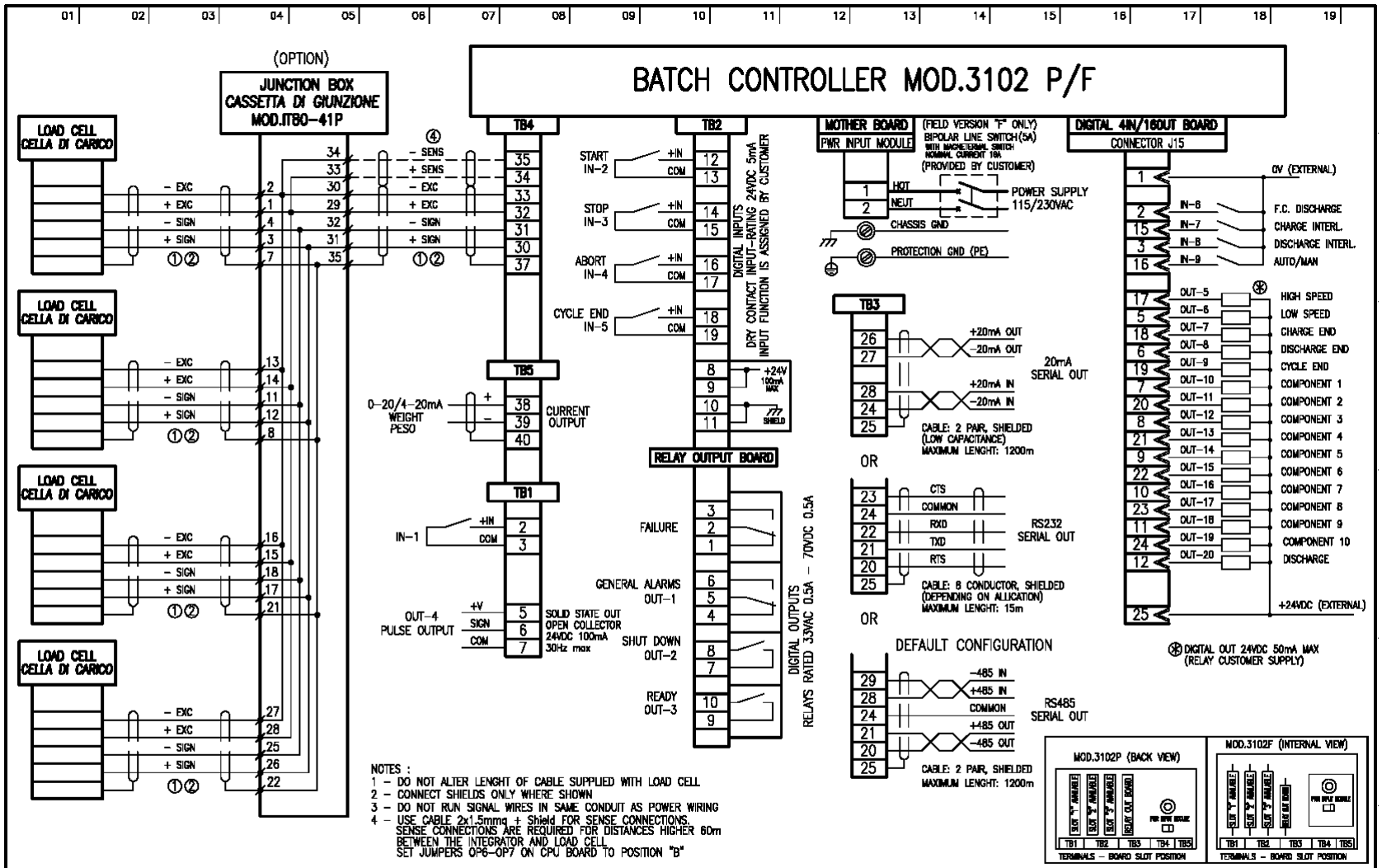
C.5.4 DeviceNet

Refer to *REC 4150* if this option is installed.

Appendix D
Optional Documentation

This appendix contains references to documents that may be useful for installation and operation of your *Micro-Tech 3102*.

- *- Serial Communications Manual Micro-Tech 3000*
- *- Allen-Bradley Remote I/O Manual Micro-Tech 3000*
- *- PROFIBUS-DP Slave Protocol Micro-Tech 3000*
- *- DeviceNet Comm Manual MT 3000*



REV.	DESCRIZIONE / DESCRIPTION	DATA / DATE	COMP / BY	VISTO / CHECK
B	MODIFIED	12-11-2003	D.C.	
A	ISSUED	9-7-2003	D.C.	

CLIENTE / CUSTOMER

DATA / DATE

FILE N° MT-0003102-E001B

TITOLO / TITLE

BATCH CONTROLLER MOD.3102 P/F

WIRING DIAGRAM

SCHEMA INTERCONN. MORSETTIERE

Thermo ELECTRON CORPORATION
Thermo Ramsey Italia S.r.l. - Strada Rivoltana Km6/7 Rodano (MI)

DISEGNO N° / DRAWING N°	FOGLIO / SHEET	CONTINUA / CONT.D ON
MT-0003102-E001B	001	—