MAX

DIGITAL WEIGHT INDICATOR

TECHNICAL MANUAL

WESTERN SCALE CO. LTD.

MAX DIGITAL WEIGHT INDICATOR
TECHNICAL MANUAL

SOFTWARE RELEASE 5.03, 04/2011

Published by: **Western Scale Co. Limited.**

Western Scale Co. Limited
1670 Kingsway Avenue
Port Coquitlam, B.C.
CANADA
V3C 3Y9

Tel: (604) 941-3474
Fax: (604) 941-4020

info@westernscale.ca
www.westernscale.ca

FOR TECHNICAL SUPPORT REGARDING THIS PRODUCT, PLEASE CALL YOUR AUTHORIZED WESTERN DEALER:

TABLE OF CONTENTS

INTRODUCTION

The MAX digital weight indicator has been specifically designed for mobile weighing applications. Multiple power inputs, a versatile display, and a weather-proof enclosure allow for efficient and trouble-free scale operation in any location. Sophisticated filtering algorithms and display modes offer the best solution available for vibration issues and dynamic applications such as livestock weighing.

Built from the ground up with battery-friendly components, the MAX incorporates Western's unique PowerMAX operating platform that intelligently identifies when to supply or conserve power resources. This industry leading power efficiency stretches battery life to over 500 hours! Designed with the durability, functionality, and versatility expected from Western, the MAX is truly *engineered for the diversity of the weighing industry.*

The following information is for the exclusive use of **WESTERN** Dealers and Customers.

Safety

Installation, configuration, and servicing are only to be done by qualified Scale Service Technicians as authorized by Western.

Power must be disconnected before servicing the unit. Disconnection from the line voltage is done by disconnecting the mains plug.

This equipment must be connected to a socket-outlet with a protective earthing connection. The socket outlet shall be installed near the equipment, and shall be easily accessible.

This equipment is intended for connection to multiple RATED VOLTAGES or FREQUENCIES. The switchover to the corresponding voltage is done automatically by the equipment.

CAUTION! HIGH VOLTAGES are present inside the MAX indicator enclosure.

Scale Service Technicians handling MAX PCBs must observe proper electrostatic discharge (ESD) handling procedures.

ATTENTION! Unauthorized installation and service of this unit may void the warranty.

Features

Mobile & Versatile

- Large LCD display
- Easy to read in low light and direct light conditions
- Weather-proof, stainless steel enclosure suitable for outdoor use
- MENU key accesses tickets and macro functions

Multiple Power Inputs

- Direct AC Power
- 4 “D” cell alkaline batteries (Up to 500 hours)
- 12 Volt input terminal for car batteries and power adapters

Easy to Use & Service

- Flashlight style battery compartments
- Easy to navigate software menu and calibration
- Calibrate to any test weight value
- Terminal wiring

Advanced Capabilities & Quality

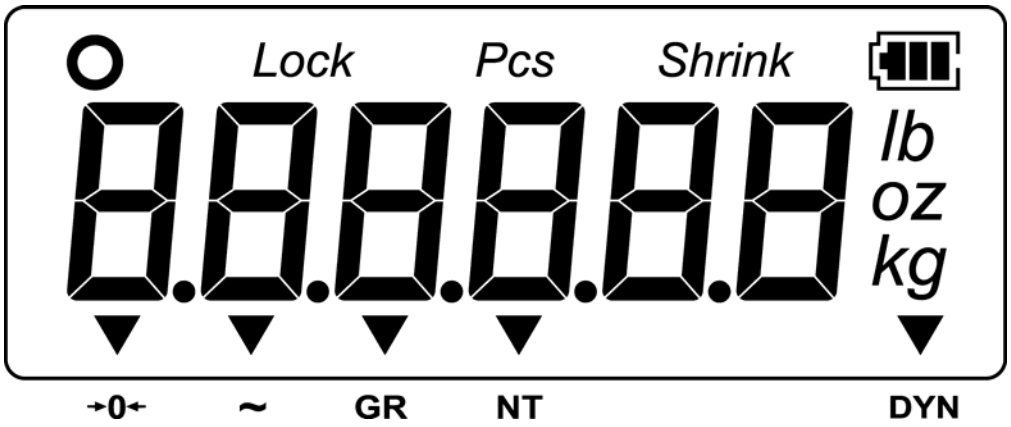
- DYNArrest digital filtering system for fast and stable dynamic weighing
- MACRO II Ticket System for customized scale tickets
- *Made In Canada with 2 Year Warranty.*

Specifications

Excitation:	5 VDC, Up to 4 x 350 Ω load cells (8 x 700 Ω)
Analog Input Range:	0 - 39 mV
Resolution:	1 million (Internal counts) 10,000d Class III / IIIL (NTEP); 10,000d Class III; 20,000d Class IIIHD (M. Can.)
Measurement Speed:	10 - 80 weight samples/sec. (Automatic)
Power:	Battery: 4 "D" cell alkaline batteries AC Input: 90 - 240 VAC DC Input: 12 VDC Consumption: 500 mW (Rated 5W)
Display:	6 digit, 7 segment, LCD display with backlight 1-1/8th inch digits (29 mm)
Communications:	Full duplex RS-232 serial port Configurable data format Selectable output strings & tickets
Temperature Range:	14°F to 104°F / -10°C to 40°C
Approvals:	NTEP & Measurement Canada Approved

DISPLAY & ANNUNCIATORS

The MAX uses a Liquid Crystal Display (LCD) with an LED backlight. HTN technology gives the display better contrast over wider viewing angles. LCD arrow and display annunciators communicate scale status and mode information to the user.



MAX Display

Weight Display

- 6 digits (7 segments each). Up to 3 decimal points.
- Negative weights are indicated by a minus sign (-) on the far left character.

Arrow Annunciators

CENTRE ZERO: The scale is within **±0.2** graduations of **TRUE ZERO**.

MOTION: The scale is **in motion**.

GROSS: The scale is in GROSS weighing mode.

NET: The scale is in NET weighing mode (a tare weight is stored).

DYNAMIC: The scale is weighing in DYNAMIC mode (if enabled).

Display Annunciators

lb	Scale is weighing in **POUNDS**.
oz	Scale is weighing in **OUNCES**.
kg	Scale is weighing in **KILOGRAMS**.
g	Scale is weighing in **GRAMS**.
O	The weight on the scale is **STABLE**.
Lock	The averaged scale weight has been **LOCKED** on the display (only if dynamic weighing is enabled).
Pcs	The indicator is displaying a **PIECE COUNT**. Not available at this time.
Shrink	The indicator is displaying a **SHRINKAGE** weight.

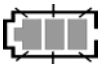
Indicates that the **BATTERY IS IN USE** & **BATTERY LIFE**

3 segments = Full battery life

2 segments = Med battery life

1 segment = Low battery

0 segments = Change batteries as soon as possible

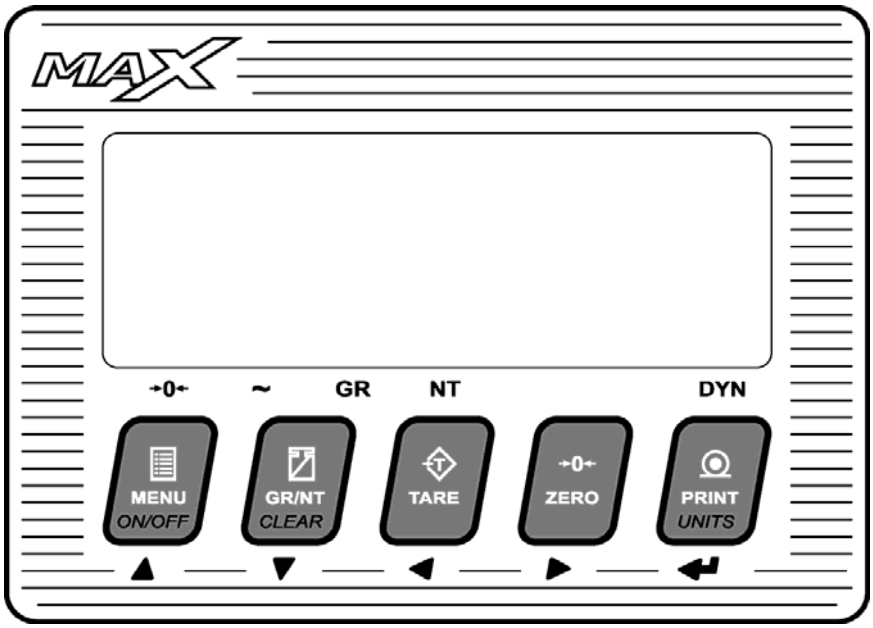


Flashing = Batteries are too low for indicator to run

Some annunciators may not function the same way in Remote Display Mode. For more information, see page 30.

KEYPAD & SCALE FUNCTIONS

The MAX indicator utilizes 5 keys for operator interfacing. To maximize indicator functionality, some keys perform multiple functions.



MAX Keypad

Press the key: **MENU** - Cycles through the USER MENU to access additional Scale Tickets and functions (See page 32).

Press & hold the key (2 sec): **POWER** - Turns the indicator ON and OFF

Press the key: **GR/NT** - Toggles between GROSS and NET weighing modes if a tare value is stored.

Press & hold the key (2 sec): **CLEAR** - Clears any previously acquired tare values. When used in Legal for Trade applications, tares can only be cleared when GROSS weight is at no load.

Clears Peak Hold (locked weight) values when Peak Hold function is enabled.

Press the key: **TARE** - Acquires a tare value from weight on the scale (Container, Box, etc.).

The indicator will not tare if:

- Scale weight is in MOTION;
- Scale weight is zero, negative or over capacity;

"Err 2" *is briefly displayed when one of these tare errors occurs.*

Press & hold the key (2 sec): **CLOCK** – Display / Set the time and date. For more information, see Time & Date (Page 15).

The TARE button may be disabled in Calibration Mode by Qualified Technicians.

In Canadian Legal for Trade applications, previous tare weights must be cleared before a new tare weight can be acquired.

ZERO: Sets the weight display to ZERO.

The indicator will not zero if:

- Scale weight exceeds the allowed ZERO RANGE
- Scale weight is in MOTION or over capacity;

"Err 4" *is briefly displayed when one of these zero errors occurs.*

Press the key: **PRINT** - Transmits a scale ticket or data string.

NOTE: If multiple tickets are programmed, Ticket 1 is always assigned to the PRINT key.

Press & hold the key (2 sec): **UNITS** - Toggles between Primary, Secondary and Tertiary Weighing Units (if enabled).

Alternate Units may be selected or disabled in Calibration Mode by Qualified Technicians.

Press & hold the key (3 sec): **TICKET EDITOR** - Enters the Ticket Editor (when enabled). Create and edit scale tickets (Page 25).

INSTALLATION

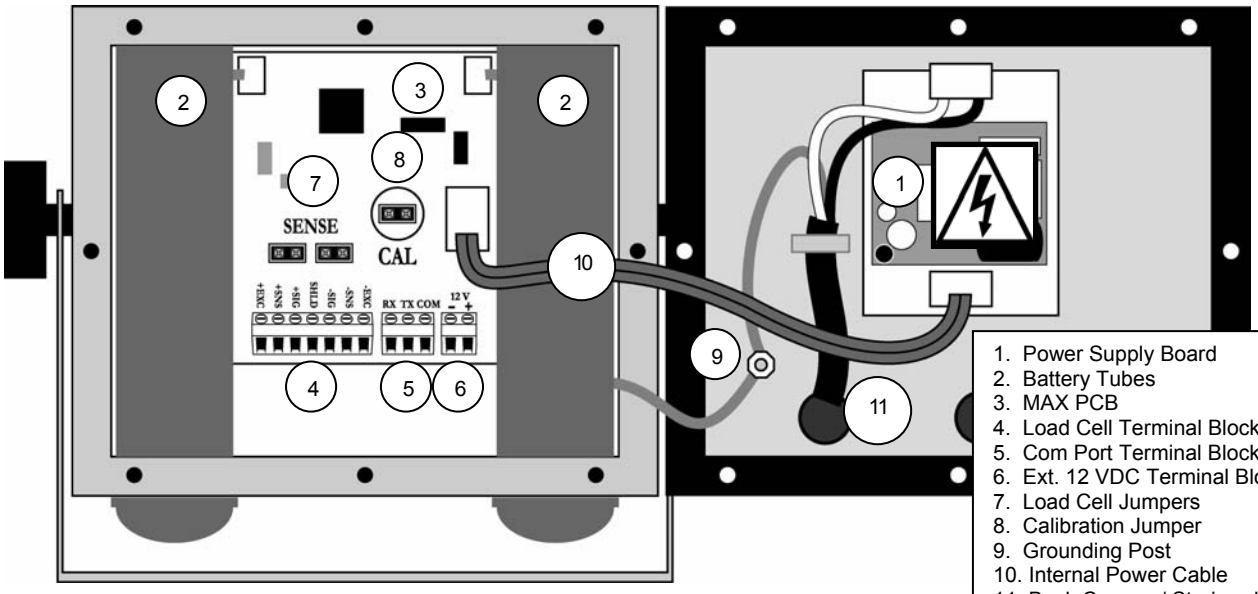
Pre-Installation

It is always good practice to verify that your Western MAX indicator is complete and undamaged upon receipt.

- Check over packaging for any signs of damage.
- Remove the MAX from protective packaging and check for damage.
- Verify that the box includes the MAX indicator complete with:
    - User Manual;
    - Mounting bracket and thumb screws;
    - Note: Batteries not included.

Opening the MAX Enclosure

1. Make sure the unit is disconnected from power.
2. Remove the screws from the back of the enclosure.
3. Lift the back cover away from the enclosure. Be sure to observe proper ESD procedures when handling PCBs.



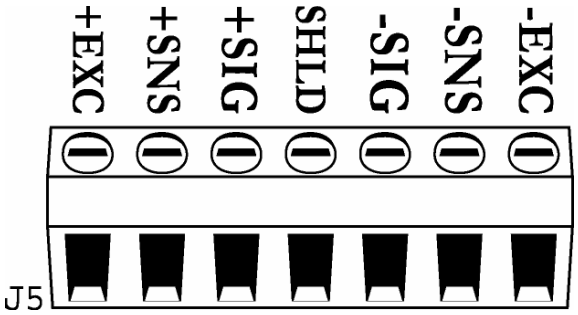
CAUTION! HIGH VOLTAGE! Only trained personnel should access any internal wiring and/or components.

Load Cell Wiring

1. Ensure the unit is not plugged in or powered on.

2. Run the cable from the load cell or junction box through the strain-relief and wire to the Load Cell Terminal Block (J5). See table below:

LOAD CELL TERMINAL (J5)	LOAD CELL WIRE
+EXC	Positive Excitation
+SNS	Positive Sense
+SIG	Positive Signal
SHLD	Shield Wire
-SIG	Negative Signal
-SNS	Negative Sense
-EXC	Negative Excitation

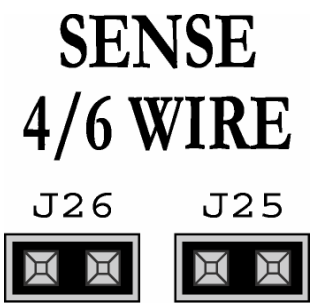


Load Cell Terminal Block

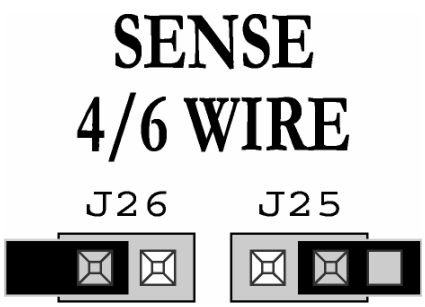
Load Cell Jumpers

4 or 6 wire load cells may be connected to the MAX. When using 4 wire load cells (No SENSE wires), the pins on JP1 and JP2 must be jumpered. For 6 wire load cells, remove the jumpers. See illustration below:

4 wire load cell – Jumpers ON



6 wire load cell – Jumpers OFF

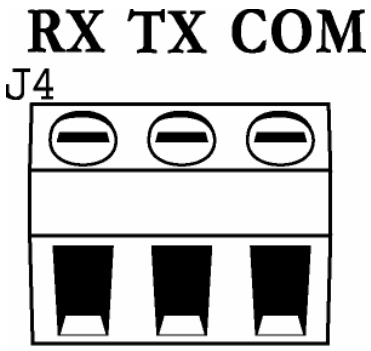


Communications Wiring (RS 232)

The MAX features 1 serial port (Com1) to connect to peripheral devices such as a printer, remote display or PC.

1. Ensure the MAX and the communicating device (printer, etc.) are disconnected from power.

2. Run communication cable through the strain-relief and wire to the COM1 Terminal. See table below:



MAX Com Port Terminal Block

COM1 TERMINAL (J4)		COMMUNICATING DEVICE
RX	←	TX
TX	→	RX
COM	↔	SIG GND, or COM

Default Communications Settings (Com1):

- **9600 Baud**
- **No Parity**
- **8 Data Bits**
- **1 Stop Bit**
- **No Hardware Handshaking**
- **Continuous Transmit (WESTERN)**

Default Communications Format:

Western DF1500 Data String

<STX><P><W><W><W><W><W><W><W><S><U><U><S><M><M><S><ST><CR><LF>

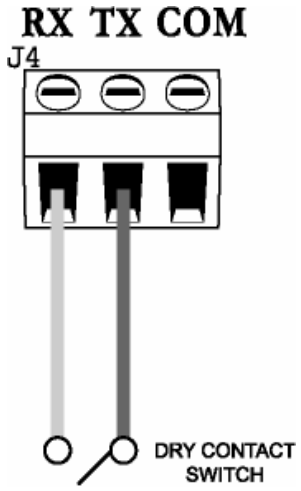
STX: Start of Text (ASCII 02)
P: Polarity (- or Spc)
W: Weight Character (# or Spc)
S: Space (ASCII 32)
U: Units Characters (KG or LB)
M: Mode Characters (GR or NT)
ST: Status Character (Spc, O, M, or -)
CR: Carriage Return (ASCII 13)
LF: Line Feed (ASCII 10)

Qualified Technicians can adjust communications settings in Calibration Mode Parameter Sub-block 5.x (See page 22).

Remote Switch Wiring

If the COM port is not needed for communications, it can be used for remote input control (CLEAR, TARE, or ZERO) using a push button switch.

1. Ensure the unit is disconnected from power.
2. Run a 2 conductor cable through the strain-relief, connecting one conductor to the TX terminal and one conductor to the RX terminal on the COM Port Terminal Block (J4).
3. Use a dry contact, push-to-make switch to short TX and RX together.
4. Enable the Remote Switch Function in Calibration Mode (P5.2).



ATTENTION! DO NOT supply any external voltage to the remote switch terminal! A contact closure is all that is required.

AC Power

1. Connect the AC power cord from the indicator into a power outlet. Once plugged in, the "12V" diagnostic LED on the MAX PCB should illuminate.
2. Installers must take proper steps to prevent noise, static, or other power problems.

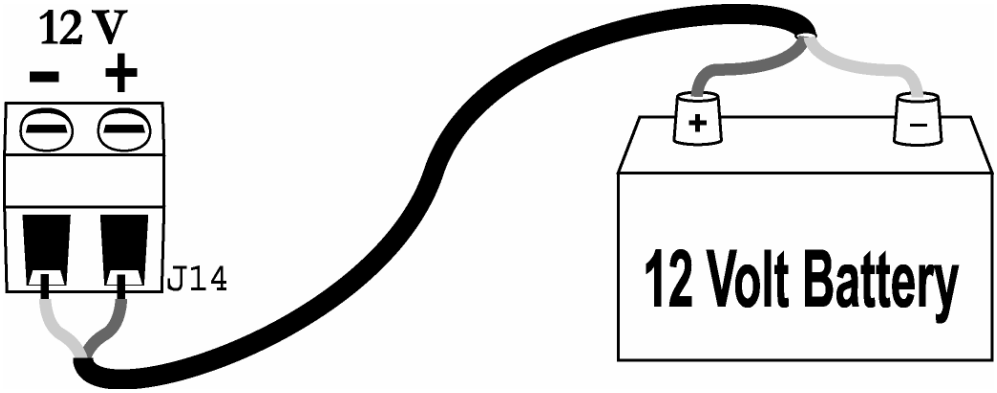
CAUTION! HIGH VOLTAGE! Only trained personnel should attempt any internal AC wiring!

ATTENTION! In noisy industrial environments, power-conditioning filters are a requirement to ensure a fail-safe operation under all conditions. Indicators should not share AC power with electrical motors and switchgear. Consult the site engineer for clean AC power.

External 12 Volt Wiring

The MAX indicator can be wired for power directly to an external 12 volt power source. Once power is applied through this terminal, the "12V" diagnostic LED on the MAX PCB should illuminate. See table below:

MAX 12V POWER TERMINAL (J14)	12 VOLT SUPPLY OR BATTERY
+	+
–	–



Examples of external 12 Volt power sources are:

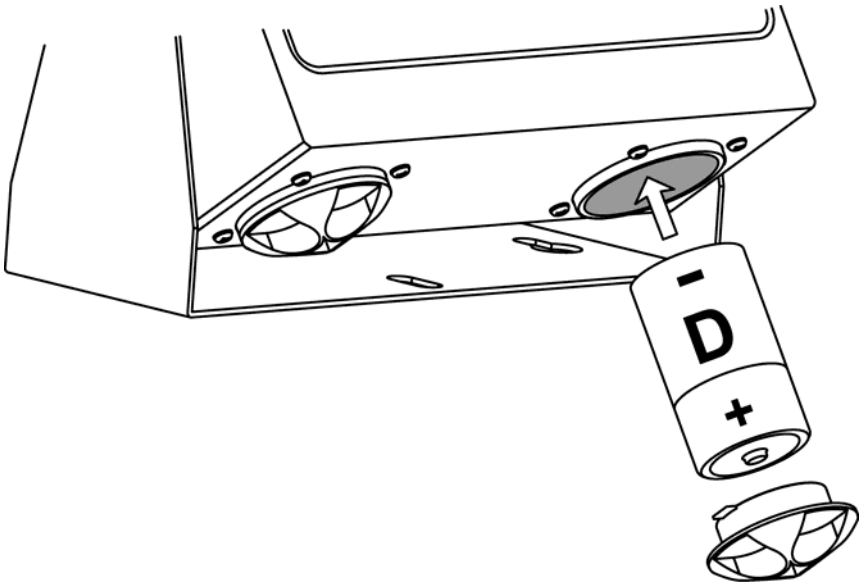
- Batteries (such as a car battery)
- AC power adapter (recommended 12 VDC, 500mA - fused)
- Solar Panel Systems (please call factory for information)

Loading Internal Batteries

1. To open the battery compartments, turn compartment caps 90 degrees counter clockwise.

2. Insert 2 “D” cell alkaline batteries in each compartment, checking for correct polarity.

3. Replace battery compartment caps and turn 90 degrees clockwise to lock the compartment closed.



PowerMAX Power Management System

In addition to managing the power allocated to the LED backlight and scale sampling, the PowerMAX system automatically detects and prioritizes available power sources to conserve batteries.

- If AC power is plugged in, it is the primary source with no draw on the external 12 VDC power or the internal batteries.

- With no AC power, the external 12 VDC power is utilized with no draw on the internal batteries.

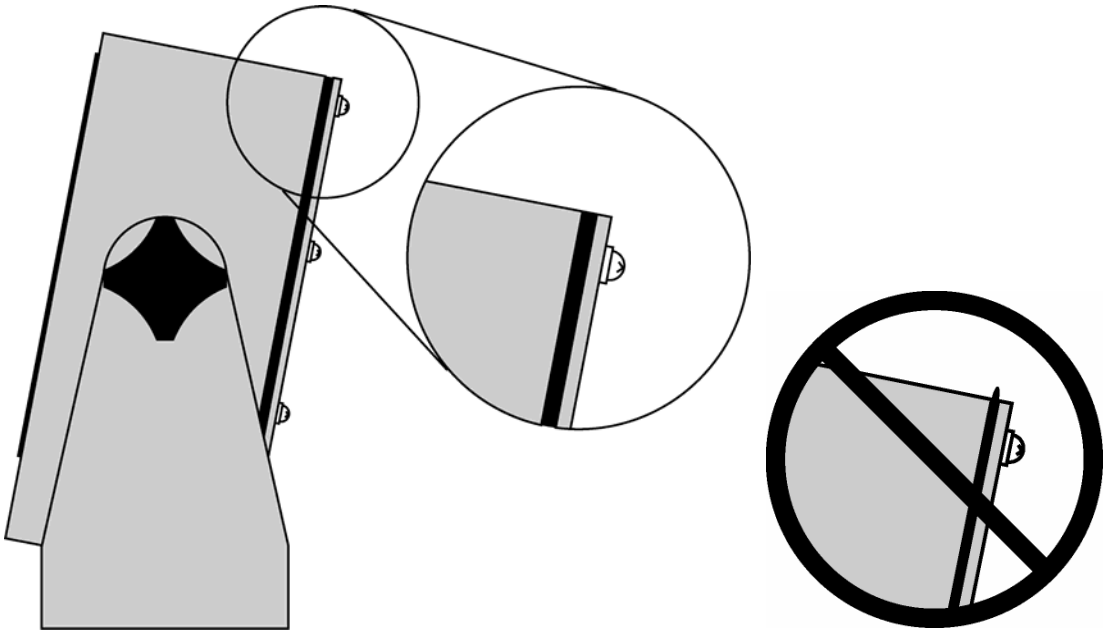
- If AC and external 12 VDC power sources are not available, the internal batteries are used.

Closing the MAX Enclosure

1. Once wiring is completed, replace the back cover over the main enclosure.

2. Re-install the back cover screws being careful not to over-tighten.

3. Observe the back cover gasket is providing a good seal.



Warning! Over-tightened screws may compress and deform the back cover gasket, resulting in gasket failure.

Mounting Instructions

1. The MAX can be mounted to horizontal or vertical surfaces using the mounting bracket.

2. Ensure that mounting structures (walls, posts, etc.) will bear the weight of the indicator (Approx. 3 kg / 7 lb with batteries).

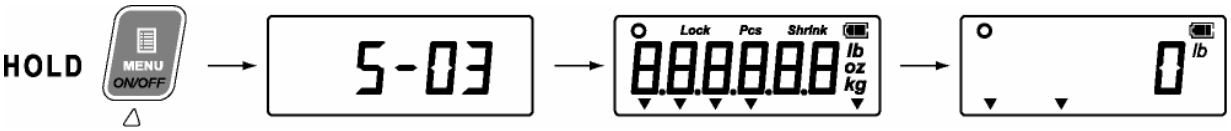
3. Use proper hardware, including wall anchors where necessary, when mounting the bracket and indicator.

START-UP

1. Ensure the AC power cord is plugged into a power outlet or that external 12 volt or battery power is being applied.

2. Press and hold the **ON/OFF** key.

3. The indicator will perform a short start-up sequence including the software version number and a display segment test before entering Weighing Mode (displaying the scale weight).



TIME & DATE

1. From Weighing Mode, press and hold the **TARE** key until “CLOC” is displayed, followed by the time.
    - If 12 Hour Clock is selected, the time will appear HH.MM.A/P
    - If 24 Hour Clock is selected, the time will appear HH.MM
2. Adjust the time using the **LEFT** & **RIGHT ARROW** keys to select digits and the **UP** & **DOWN ARROW** keys to alter digits.
3. Press **ENTER** to confirm and the date will be displayed
    - If International Date is selected, the date will appear DD.MM.YY
    - If US Date is selected, the date will appear MM.DD.YY
4. Adjust the date using the **LEFT** & **RIGHT ARROW** keys to select digits and the **UP** & **DOWN ARROW** keys to alter digits.
5. Press ENTER to confirm and return to Weighing Mode.

Time & Date must first be enabled in Calibration Mode (P9.5). Time and date format is also selected from this parameter.

If the MAX is disconnected from AC power or another power source, batteries must be installed for the clock to keep time.

CALIBRATION MODE

Calibration Keys

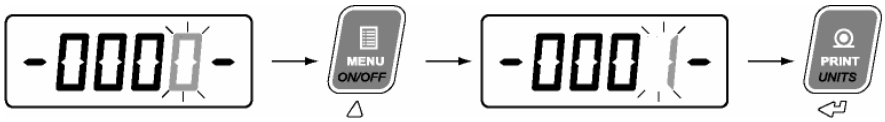
UP **DOWN** **LEFT** **RIGHT** **ENTER**

Entering Calibration Mode

With Electronic Seal (Default)

1. Press and hold the **LEFT** and **RIGHT ARROW** keys together. "**CAL**" is displayed, followed by "**PASS**" for password.

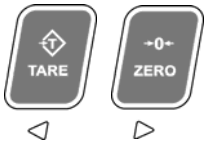
2. Key in the 4 digit password. The factory default password is "**0001**".
   - Use the **LEFT** & **RIGHT ARROW** keys to select the digit. The selected digit will flash.
   - Use the **UP** & **DOWN ARROW** keys to increase and decrease the value of the digit.
   - Press the **ENTER** key when done.



3. Calibration Mode is indicated with a blinking "C". If the password is incorrect the display will read "**FAIL**" and return to normal Weighing Mode.

With Physical Seal

1. Open the MAX enclosure and place a jumper on the CAL pins (J30).
2. Press the **LEFT** and **RIGHT ARROW** keys together.
3. Calibration Mode is indicated with a blinking "C".



The MAX supports both electronic (default) and physical sealing. Physical sealing must be set-up in Calibration Mode. For more information on sealing and the electronic audit trail, see page 29.

Navigating Calibration Parameters

1. Use the **UP** and **DOWN ARROW** keys to navigate the Parameter List. Calibration Parameters are displayed by the letter "P" preceding the parameter number (Ex. "**P1.0, P1.1, P1.2 …**").

2. Holding down the **UP** or **DOWN ARROW** key for more than 1 second will scroll through the Calibration Sub-blocks for quicker navigation. (Ex. "**P1.0, P2.0, P3.0 ...**").

3. Press the **ENTER** key to select the parameter for editing.

If no parameter is selected after 6 seconds, the display returns to the scale weight with the blinking "C" on the left-hand side.

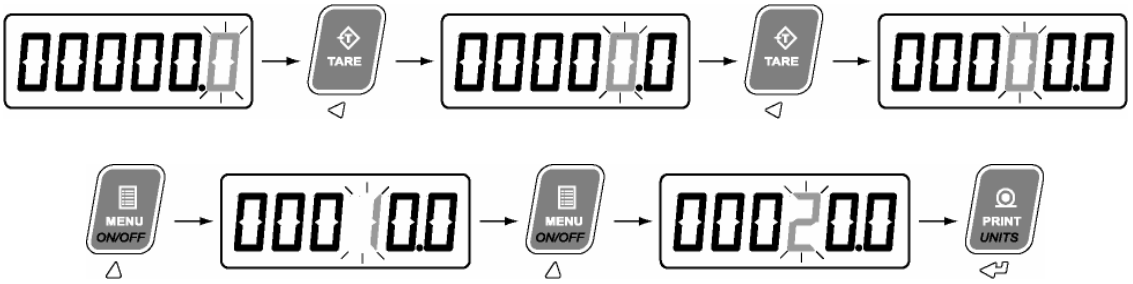
Editing Calibration Parameters

1. Use the **UP** and **DOWN ARROW** keys to edit the parameter value.

2. Press **ENTER** to confirm the parameter value.

To edit a numeric value (Ex. Weight), use the **LEFT** and **RIGHT ARROW** keys to select the digit and the **UP** and **DOWN ARROW** keys to alter the digit's value. Press the **ENTER** key when done.

Example: Enter 20.0 (Note: Decimal point is determined by P1.2)



Exit & Save Calibration

1. Press the **LEFT** and **RIGHT ARROW** keys together.

2. The indicator will exit Calibration Mode and return to Weighing Mode. All calibration information is saved.

CALIBRATION PARAMETERS

Scale Calibration Sub-block 1.x

Parameter	Value	Description
P1.0 Graduations	**1d <** 2d 5d 10d 20d 50d 100d	Select scale graduations (d). Setting this parameter to 10d, 20d or 50d will result in 2 leading zeros at ZERO (00). Setting to 100D will result in 3 zeros at ZERO (000).
P1.1 Decimals	**0 <** 0.0 0.00 0.000 00.0000	Select decimal places (Up to **3**). 4 decimal places are used when calibrating in kilograms for use in grams.
P1.2 Deadload Scale	**E SCL**	Displays "**E SCL**" to empty scale. Once the scale is empty, press **ENTER** to calibrate deadload value (Scale zero calibration).
P1.3 Calibrate Scale	**SPAn** **005000 <**	Displays "**SPAn**". Place test weight on the scale. Enter the test weight value using the **ARROW** keys. Press **ENTER** to start calibration.
P1.4 Scale Capacity	**005000 <** 0 to 999999	Enter the Scale Capacity using **ARROW** keys. Press **ENTER** to select.
P1.5 Overload	**0d <** 1d 2d 2PC (2%)	Selects the number of divisions that will display over scale capacity before an overload condition occurs (display blanks to 'EEEEEE'). Choose between 0, 1, 2 divisions or 2% of scale capacity.
P1.6 Calibrated Units (Primary Units)	**1 = kg <** 2 = lb	Selects the Primary scale units used for calibrating the scale.
P1.7 Power ON Units	**1 = kg <** 2 = lb 3 = oz 4 = g	Selects the default units that the scale powers up to.
P1.8 Alternate Units 1	0 = Disabled 1 = kg **2 = lb <** 3 = oz 4 = g	Selects alternate unit of measurement 1. Setting to 0 disables alternate unit of measurement 1.
P1.9 Alternate Units 2	**0 = Disabled <** 1 = kg 2 = lb 3 = oz 4 = g	Selects alternate unit of measurement 2. Setting to 0 disables alternate unit of measurement 2.

Factory default values are **bold <**.

Zero and Motion Settings Sub-block 2.x

Parameter	Value	Description
P2.0 Pushbutton Zero Range	**2PC (2%) <** 10PC (10%) 90PC (90%)	Selects the range (from zero to capacity) within which the scale can be zeroed. LFT must be 2%. Example: Scale can be zeroed within ± 2% of calibrated zero. This range will also affect other zero methods (IZSM, poll mode, remote switch & remote display)
P2.1 AZSM Zero Tracking	OFF **0.5d <** 1d 2d 3d	Automatic Zero Setting Mechanism. Selects the zero tracking range specified in +/- displayed divisions. The scale must be within the Zero Range (P2.0) for AZSM to activate. Example: Automatically zeros the scale within ± 0.5d of calibrated zero.
P2.2 Power Up ZERO IZSM	**0 = Disabled <** 1 = Enabled	Initial Zero Setting Mechanism. When enabled, the scale will automatically zero on power up (Based on the value of P2.0).
P2.3 Scale Motion	OFF 1d **2d <** 3d 5d 10d	Selects the Scale Motion band in displayed divisions. This determines the scale's sensitivity to motion. A change in weight must be greater than this amount to turn the Motion annunciator ON.
P2.4 Motion Timer	**4 <** Range: 1 - 20	Selects the time (in ¼ second intervals) the Motion annunciator will remain ON after the scale weight stabilizes within tolerance. Example: For a motion time of 1 second, set this value to 4.
P2.5 Blank Display on Motion	**0 = Disabled <** 1 = Enabled	When enabled, the display blanks when motion is detected.

Factory default values are **bold <**.

HINT: Use the **LEFT ARROW** key to exit a parameter without changing its value. LEFT ARROW will also back out of the Parameter List and return the display to *scale weight with the blinking "C".*

Tare Settings Sub-block 3.x

Parameter	Value	Description
P3.0 Regulatory	**0 = NONE <** 1 = CANADA 2 = NTEP ** This parameter has changed ** Older Versions (5-00 & earlier): 0 = NTEP 1 = CANADA 2 = NONE <	Sets how the TARE function operates based on regulatory agency. **NONE:** Allows a tare weight to be acquired at any positive weight (>0). Tares can be cleared at any time. New tares may be acquired even if a previous tare weight is present. **CANADA:** Allows a tare weight to be acquired at any positive weight (>0). Tares can only be cleared when GROSS weight is at no load. Previous tare weights must be cleared before a new tare weight can be acquired. **NTEP:** Allows a tare weight to be acquired at any positive weight (>0). Tares can only be cleared when GROSS weight is at no load. New tares may be acquired even if a previous tare weight is present.
P3.1 Lockout Tare	**0 = Disabled <** 1 = Enabled	Locks out the **TARE** key. The Operator cannot tare the scale.
P3.2 Auto Tare	**0 = Disabled <** 1 = Enabled	Automatically tares the scale when the weight is greater than 5 displayed divisions, there is no motion, and the scale is in GROSS mode.
P3.3 Auto Clear	**0 = Disabled <** 1 = Enabled	Automatically clears tare values when the scale is at GROSS zero.

Factory default values are **bold <**.

Scale Filtering Settings Sub-block 4.x

Parameter	Value	Description
P4.0 **Filter Preset**	1 = Light **2 = Medium <** 3 = Heavy 4 = Animal 1 5 = Animal 2 6 = Animal 3	Adjusts filter parameters **P4.1 to P4.4** to a preset value. Use this to quickly find a starting point for scale filtering. If required, fine tune the filtering by adjusting P4.1 to P4.4 individually.
P4.1 **Filter Frequency**	0.5 Hz 1 Hz **3 Hz <**	Frequency in Hertz of the front end digital filter. A lower frequency will make the scale more immune to vibrations, but will also slow down the response time of the display.
P4.2 **A/D Averaging**	5 10 **50 <** 75 100	Selects the number of A/D conversions that are averaged to obtain a displayed reading. A higher number gives a more accurate display by reducing noisy readings, but slows down the settling rate of the display.
P4.3 **A/D Averaging Cut-Out Threshold**	**2d <** 4d 8d 12d 14d 18d	Sets the weight change threshold in displayed divisions where the A/D averaging is suspended. This will make the display more responsive to weight changes above the cut-out threshold.
P4.4 **A/D Averaging Cut-Out Sensitivity**	2 **5 <** 8 10 12 15	Specifies the number of consecutive A/D samples above the Cut-Out Threshold before A/D Averaging is suspended.
P4.5 **Display Update Rate**	**0 <** 0.25 0.5 0.75 1	Configures how often the display is updated in seconds. If set to 0 the display updates at full speed.

Factory default values are **bold <**.

Serial Communications Sub-block 5.x

Parameter	Value	Description
P5.0 Baud Rate COM1	1200 2400 4800 **9600 <** 19200	Transmission speed (baud rate) for COM1.
P5.1 Data Format COM1	**8-non <** 7-Evn 7-Odd	Data bits and Parity for COM1. 8-Non = 8 Data bits, No parity 7-Evn = 7 Data bits, Even parity 7-Odd = 7 Data bits, Odd parity
P5.2 Output Mode COM1	**0 <** 1 2 3 4 5 6 7 8 9	Controls the operation of the COM1 port: **0 = Continuous data string (Stream Mode) <** 1 = On Print. Press **PRINT** key to output data string. 2 = Ticket Mode (See Note 1) 3 = Poll Mode (See Note 2) 4 = Continuous - No motion. 5 = Remote Display Mode (See Note 3) 6 = Remote Switch ZERO (See Note 4) 7 = Remote Switch PRINT * Unavailable on MAX 8 = Remote Switch CLEAR 9 = Remote Switch TARE Note 1: Only 1 port (COM1 or COM2) can be a used as a printer port. Note 2: The indicator replies with a data string to the following Poll commands: **'?'** Poll for weight **'K'** units kg **'Z'** ZERO **'L'** units lb **'T'** TARE **'O'** units oz **'C'** CLEAR **'g'** units g Note 3: COM1 only - In Remote Display Mode, the MAX receives and displays continuous weights from another indicator. Poll Commands (ZERO, TARE, CLEAR, UNITS, PRINT) can be sent from the keypad. Remote Display Mode supports Western DF2000 and DF1500 strings only. After setting this option, exit Cal Mode then **re-start the indicator**. See page 30. Note 4: The COM port acts as a remote switch input. Connect a pushbutton switch across TX and RX of the COM port. After setting this option, exit Cal Mode then **re-start the indicator**. See page 11.

Factory default values are **bold <**.

Serial Communications Sub-block 5.x (Continued)

Parameter	Value	Description
P5.3 Data String Emulation COM1	**0 = Western DF1500 <** 1 = Toledo 2 = Toledo w/ checksum 3 = Toledo w/ checksum & leading zeros 4 = RiceLake / Condec 5 = Transcell 6 = Cardinal SB400 7 = Cardinal SB200 8 = SMA 9 = A&D 4323 10 = Ohaus CW11 11 = Fairbanks R2500 12 = Weightronix WI125 13 = Transmit value in ACC5	Data String emulations for COM1: Western DF1500 format (19 characters): **<STX>PWWWWWWW_UU_MM_S<CR><LF>** <STX> = Start of Text character (ASCII 02) P = Polarity: '-' for negative or 'space' for positive. W = Weight: 7 characters incl. decimal. UU = Units: 'KG', 'LB', 'OZ', ' G' _ = Space (ASCII 32) MM = Mode: "GR" or "NT" S = Status: 'M' for motion, 'O' for scale over, or 'space' for valid <CR> = Carriage Return (ASCII 13) <LF> = Line Feed (ASCII 10)
P5.4 Stream Delay COM1	0 sec **0.25 sec <** 0.5 sec 0.75 sec 1 sec	Inserts a delay between serial transmissions (in seconds). 0 = No delay.
P5.5 Auto Print Threshold	**000000 <** Example: 000000 = No Auto Print 000010 = Auto Prints >= 10	Enter the minimum weight that must be exceeded before the Auto Print function activates. The weight must fall below this threshold before another Auto Print will be performed. Use the **ARROW** keys to edit the value, followed by the **ENTER** key.

Factory default values are **bold <**.

Product Specific Functions Sub-block 6.x

Parameter	Value	Description
P6.0 Backlight	**0 = AUTO <** 1 = Always ON 2 = Always OFF	Controls the backlight of the LCD display. For optimal battery life AUTO or OFF is recommended.
P6.1 Backlight Duration	2 sec **5 sec <** 10 sec 20 sec	Selects the number of seconds the backlight remains turned ON after scale motion is detected.
P6.2 PowerMAX Power Management System	**0 = Normal <** 1 = PowerMAX 2 = AUTO OFF	Normal: The Indicator is always ON. PowerMAX: The indicator automatically reduces power consumption on inactivity, and restores power when scale activity is detected. Prolongs battery life by more than 2X. AUTO OFF: If there is no scale activity for the set period of time (6.3), the indicator automatically powers off.
P6.3 AUTO OFF Timer	5 min **10 min <** 15 min 20 min	If 6.2 is set to AUTO OFF, the indicator will power down after no scale activity for this amount of time.
P6.4 Animal Averaging Sampling Time	**OFF <** 1 sec 2 sec 3 sec 4 sec 5 sec 10 sec	Animal averaging time. When enabled, auto averaging will operate for the specified time by pressing the PRINT button in normal weigh mode. The weight is then locked on the display.
P6.5 Animal Averaging Display Time	**5 <** Range: 0 to 10	Locks the displayed average value for a certain period of time (in seconds). If 0, the display will remain locked until the PRINT key is pressed.
P6.6 Shrinkage	**0 = Disabled <** 1 = Enabled	Sets shrinkage in percent. See “Livestock Shrinkage” in the User Menu section, page 33.

Factory default values are **bold <**.

Ticket Formatting Sub-block 7.x

Parameter	Value	Description
P7.0 Enable Ticket Editor	**0 = Disabled <** 1 = Enabled	Enables access to the Ticket Editor. Once enabled, access the Ticket Editor in Weighing Mode by holding the PRINT key for 3 seconds. This parameter remains enabled until the indicator power is cycled. The indicator supports 5 tickets (numbered 1 to 5). Ticket 1 is always assigned to the PRINT key. Tickets 2-5 are called from the MENU key. A simple factory ticket (time, date, gross, tare, net) is included as Ticket 1. Please see the MACRO II Ticket Programming Manual for more information on creating tickets.
P7.1 Delete Single Ticket	**del 0 <** Range: 0 - 5	Select a ticket (1 to 5) to delete. Enter 0 to exit if a ticket is not to be deleted.
P7.2 Delete All Tickets	**PASSWORD**	Delete ***ALL*** tickets. All ticket memory is erased. Calibration password is required.
P7.3 Print Lockout Threshold	**000010 <**	Enter a weight, used in conjunction with the C36 Ticket Control Code, to prevent multiple prints of the same weight transaction. Usually used with accumulation programs to prevent counting the same transaction twice. The scale must go below this threshold before another print function can be performed. Use the **ARROW** keys to edit the value, followed by the **ENTER** key. If the weight does not go below the threshold, the next scale ticket/function is aborted at C36. Please see Control Code C36 in the MACRO II Ticket Programming Manual for more information.

Factory default values are **bold <**.

Additional Scale Functions Sub-block 8.x

Parameter	Value	Description
P8.0 **Peak Hold**	**0 = Disabled <** 1 = Enabled 2 = No Motion	Enables the Peak Hold function. The maximum weight is captured and displayed until the **CLEAR** key is pressed. When set to 2 (No Motion), peak weights are only captured when there is no motion on the scale. Note: The LOCK annunciator is activated when the Peak Hold weight is displayed.
P8.1 **Peak Hold Threshold**	**000000 <**	Enter the minimum weight that must be exceeded before the Peak Hold function activates. Also, the weight must fall below this threshold before Peak Hold will activate again. Use the **ARROW** keys to edit the value, followed by the **ENTER** key.
P8.2 **Peak Hold Auto-Clear**	**0 = Disabled <** 1 = Enabled	Automatically clears the Peak Hold display when the scale weight drops below the Peak Hold Threshold (P8.1).
P8.3 **Peak Hold Timer**	**0 <** Range: 0 - 20 (0 to 5 sec)	Delays Peak Hold activation by the selected amount of time (in 0.25 second intervals). Useful for lifting applications where there is a strong initial force that may cause an exaggerated Peak Hold display. Example: For a delay of 1 second, set this value to 4.

Factory default values are **bold <**.

Scale Diagnostics Sub-block 9.x

Parameter	Value	Description
P9.0 AD Raw Counts	**'A'XXXXX**	Displays the AD converter raw counts for diagnostic purposes. The left most digit will have a blinking "A" to indicate raw counts mode. Press any key to exit.
P9.1 SPAN Edit	**XXXXXX**	Displays the scale's calibration "span" factor. Use the **ARROW** keys to edit the value, followed by the **ENTER** key.
P9.2 Software Version & Display Test	N/A	Displays the indicator software version and cycles through the display segments. Press any key to exit.
P9.3 Password Display/Edit	-0001-	Display/change the calibration PASSWORD.
P9.4 Factory Reset	**PASSWORD**	Reset all parameters back to factory values. Calibration password is required.
P9.5 Time & Date	**OFF <** 1 2 3 4	Sets the time & date display format: OFF = No clock (for maximum battery conservation) 1 = 12 hour clock, International date (DD/MM/YY) 2 = 12 hour clock, US date (MM/DD/YY) 3 = 24 hour clock, International date (DD/MM/YY) 4 = 24 hour clock, US date (MM/DD/YY)
P9.6 Transmit Calibration Data	N/A	Transmits Calibration data out COM1. Capture this data as a text file in HyperTerminal, or upload it directly to another MAX indicator. The indicator will read "**rEAdY**". Press **ENTER** to begin or any other key to abort. The display will show the upload byte count as it is transmitting. The message "**dOnE**" will be displayed when complete.
P9.7 Receive Calibration Data	N/A	Receives Calibration data in COM1. Send this data as a text file in HyperTerminal, or download it directly from another MAX indicator. If using HyperTerminal, insert a character delay of 20 milliseconds. The indicator will read "**rEAdY**" and wait to receive. Press any key to abort. The display will show the download byte count as it is receiving. The message "**dOnE**" will be displayed when complete. Exit Cal Mode and re-start the indicator.
P9.8 Battery Status	**X.XX**	Displays the battery status in volts. Batteries must be replaced when lower than 5.00 Volts. Press any key to exit.
P9.9 Physical Seal	**OFF <** ON	Enables the physical sealing of the indicator. See page 29.

Factory default values are **bold <**.

QUICK SCALE CALIBRATION

This example covers the DEADLOAD & SPAN of a 5,000 lb x 1 lb floor scale.

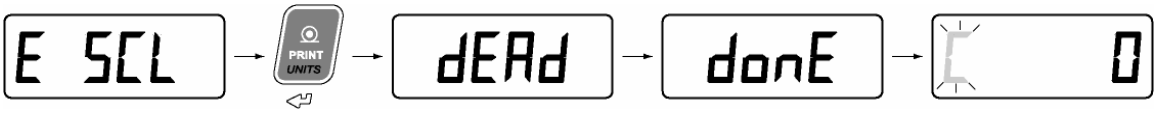
1. Enter Calibration Mode (Factory password 0001).

2. Set the following parameters:

   P1.0 – Grad Size = 1d
   P1.1 – Decimal Place = 0
   P1.4 – Capacity = 005000
   P1.6 – Calibrated Units = 2 (lb)

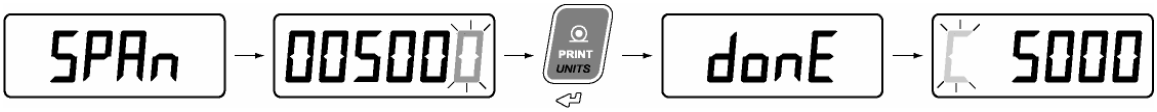
3. Remove any weight from the scale and go to **P1.2 – Deadload Scale** (Scale Zero Calibration). Press **ENTER** to select the parameter. "**E SCL**" is displayed.

4. Press **ENTER** to begin deadload. When done, the indicator should read "**0**".

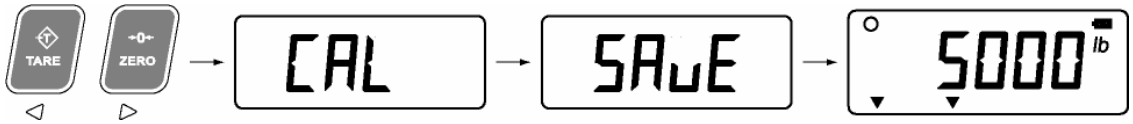


5. Verify the scale is at zero then add test weights. This example shows 5000 lbs (max. capacity). The MAX indicator can be calibrated to any test weight amount. Go to **P1.3 – Calibrate Scale** (Span). Press **ENTER** to select the parameter.

6. "**SPAn**" is briefly displayed. Enter the test weight amount using the **ARROW** keys to select and alter digits. Press the **ENTER** key to confirm the test weight value.



7. Press the **LEFT** and **RIGHT ARROW** keys together to exit Calibration Mode.



SEALING THE INDICATOR (LEGAL FOR TRADE)

Electronic Seal

Calibration and configuration settings are electronically sealed with a password. This safeguard helps prevent accidental or unauthorized alteration of important scale settings.

IMPORTANT! If the password is forgotten, Calibration Mode will be inaccessible. Record ALL password changes and alert the customer. If the password is lost, call the factory for assistance.

The MAX features a **Category 1 Audit Trail System** for recording changes in calibration. Two counters are utilized:

Calibration Counter:	Increments by 1 whenever the scale is deadloaded or calibrated.
Configuration Counter:	Increments by 1 whenever changes are made to parameters affecting scale setup.

The counters increment for each Calibration Mode session where parameters are changed. Multiple changes may be made for each counter increase, but simply entering and exiting Calibration Mode does not increment the counters. The counters will count from 0 to 999 before rolling over to 0 again.

Important Note: *Because the Audit Trail becomes active during factory testing, the Calibration and Configuration Counters may not be* ***0*** *when the indicator is new out of the box.*

The counters can be accessed at any time by pressing the **TARE** and **PRINT** keys together in normal Weighing Mode.

The Calibration and Configuration Audit Counters will alternate on the display until the **PRINT** key is pressed.

Physical Seal

If your jurisdiction only accepts a physical seal, the indicator must be set to use the Calibration Jumper (See P9.9). Place a jumper across the 2 “CAL” pins (J30) on the MAX PCB to enter Calibration Mode. The back cover of the indicator must be sealed by running a lead/wire seal through 2 sealing screws.

REMOTE DISPLAY MODE

Remote Display Mode uses a connected indicator's Data String to display weight and scale status information to the user. Remote Display Mode is only tested for compatibility with Western Indicators (Models **M2000**, **MAX**, **Lightspeed** & **M1**).

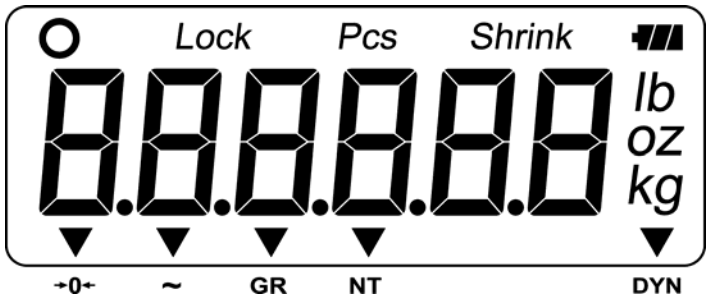
- Wire other indicator to MAX COM terminal.
- Set MAX to Remote Display Mode (P5.2 to 5).
- Exit Calibration Mode and restart MAX.

Indicator Requirements

- Indicator Output Mode must be **Continuous stream** or **Poll Mode**.
- Indicator Data Format must be **9600-N-8-1**.
- M2000 Indicators must be set to **Poll Mode** & **DF2000** output string to receive remote keypad commands.
    - M2000 Parameter 34 / 35 set to **3**
    - M2000 Parameter 38 / 39 set to **4**

Important Note: *A '?' character is transmitted continuously to poll the indicator. Do not terminate the Remote Display TX to the Indicator RX if the remote keypad function is not being used.*

Display & Annunciators



- The weight display should show the same weight numbers as the connected indicator (complete with minus signs and decimals).
- Units and Mode annunciators will work. DYN, Centre of Zero, Pieces, Shrinkage, Lock and battery level annunciators are not supported in Remote Display Mode.
- Gram and Ounce annunciators will only work with M1, MAX or Lightspeed indicators.

Start-Up

1. Ensure the AC power cord is plugged into a power outlet or that external 12 volt or battery power is being applied, then press and hold the **ON/OFF** key.
2. The start-up sequence displays the software version then the word ‘dSPLAY’ on the screen to indicate Remote Display Mode. The scale weight from the connected indicator is then displayed.

Remote Keypad Functions

Remote Display Mode utilizes the keypad to send serial commands for remote operation of indicator functions. To maximize functionality, some keys perform multiple functions.

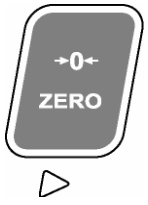
Press the key: **MENU** – NO FUNCTION

Press & hold the key (2 sec): **ON / OFF** – NO FUNCTION

Press the key: **GR/NT** - Sends a serial command to toggle between GROSS and NET weighing modes if a tare value is stored.

Press & hold the key (2 sec): **CLEAR** - Sends the serial command ‘C’ (ASCII 67) to clear any tares from the indicator.

TARE: Sends the serial command ‘T’ (ASCII 84) to tare the indicator.



ZERO: Sends the serial command ‘Z’ (ASCII 90) to set the indicator weight display to ZERO.

PRINT: Sends the serial command ‘P’ (ASCII 80) to the other indicator to transmit a scale ticket.

Sends a serial command to toggle between Primary and Secondary Weighing Units.

USER MENU

The User Menu gives Scale Operators access to additional indicator functions and features.

1. From Weighing Mode, press the **MENU** key to enter the User Menu.
    - Tickets are numbered by default as in Fig. A.
    - Tickets may be named in the Ticket Editor to describe functions as in Fig. B.
    - If there are no active tickets or functions, the User Menu will be empty.
2. Use the **UP** & **DOWN ARROW** keys to cycle through the User Menu functions.
3. When the desired menu item is displayed, press **ENTER** to activate it. Once the function is complete the display returns to Weighing Mode.

    To return to Weighing Mode without activating a ticket or function, press the **LEFT ARROW** key or wait 8 seconds for the User Menu to time out.

Fig. A

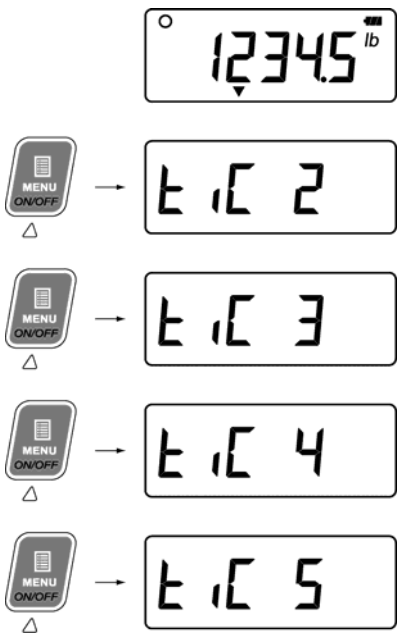
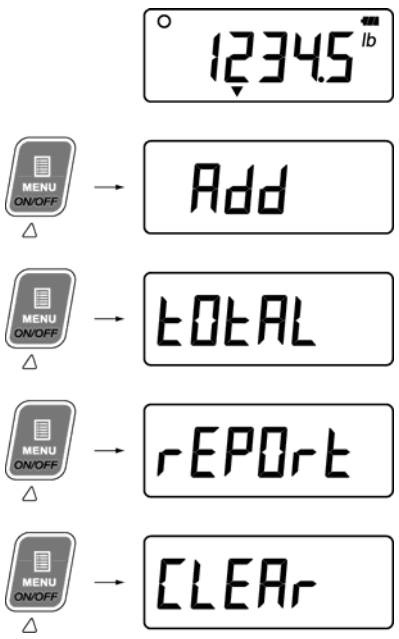


Fig. B

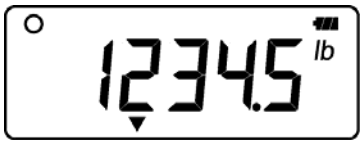


For more information on the User Menu and programming Tickets, see the MACRO II Ticket System Programming Manual.

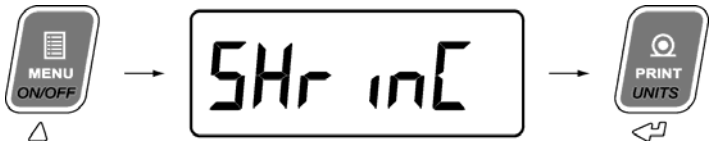
Livestock Shrinkage

The MAX features a livestock shrinkage program to compensate for potential "weight loss" experienced during transport.

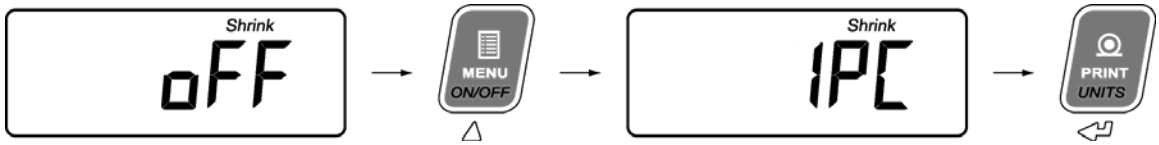
1. Load the livestock on the scale. The actual weight is displayed.



2. Press the **MENU** key until "SHrinC" is displayed. Press **ENTER** to confirm.



3. Use the **UP** & **DOWN ARROW** keys to select the percentage to be used for shrinkage (1 to 5%).



4. The display will show the shrinkage weight (actual weight minus the percentage) and the "***Shrink***" annunciator will be illuminated.

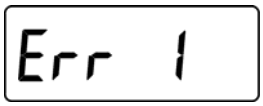
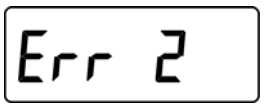
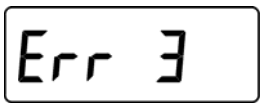
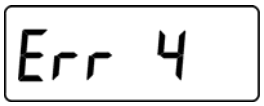
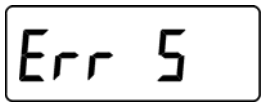
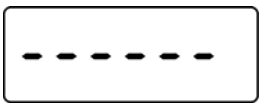
5. To return to actual weight, set "SHrinC" to "OFF". The "***Shrink***" annunciator will be turned off.

Shrinkage must be enabled in Calibration Mode (P6.6). The Shrinkage option will appear in the User Menu after the tickets. If not enabled, it will not appear in the User Menu at all.

TROUBLESHOOTING & ERROR MESSAGES

Unit won't power up:	Check diagnostic LED lamps on the MAX PCB.
12V LED **ON**:	The MAX PCB is receiving 12 VDC from the Power Supply module or external 12 volt battery. • Check the STS LED on the MAX PCB.
12V LED **OFF**:	The MAX PCB is NOT receiving 12 VDC from the Power Supply module or external 12 volt battery. • Verify power source (Cords, Outlets, breakers). • Verify power cord connection to Power Supply module. • Check Power Supply module connection to J15 on MAX PCB. • Power Supply module may be damaged. • Verify external 12 volt battery voltage, strength, wiring, etc. (if applicable).
STS LED **BLINKING**:	Processor running properly. • Display may be damaged.
STS LED **OFF**:	Processor NOT running. • MAX PCB may be damaged.
STS LED **ON**:	Processor LOCKED UP. • Cycle power to the unit. The unit may recover or the MAX PCB may be damaged.

Unit won't power up:	When using D Cell batteries (or C cells in older versions)
Blank Display with BLINKING battery symbol:	Battery power is too low for the indicator to function properly. • Replace batteries. • Use alternate power source.
No Display:	Verify battery installation and power. • Check STS LED on MAX PCB. See conditions above.

Error Message	Condition	Solution
	Cannot print on motion or if scale is overloaded.	Wait for scale weight to settle before attempting to print. If overloaded, remove weight.
	Cannot TARE on motion or if gross weight is at zero or below zero.	Place a weight on the scale and wait for weight to settle before attempting to tare.
	Calibration checksum error. The calibration memory is corrupted.	Recalibrate. Call WSCL factory for assistance.
	Cannot ZERO scale outside of zero range.	Clean scale (debris may have accumulated); - or - Deadload scale; - or- Increase Pushbutton Zero Range (P2.0).
	PC Ticket transfer timeout or Ticket Memory Full.	Verify wiring/cable to PC. Reduce the number of ticket characters; - or - Insert a character delay in the PC Terminal program.
	Scale Overload Error: Scale weight is greater than scale capacity.	Remove weight from scale.
	Remote Display Mode: Communications lost.	Verify wiring/cable. Verify Indicator requirements (Data Format and Output String, etc.) Verify Indicator is transmitting.