

480 Legend Series

*Digital Weight Indicator
Version 1.03*

Technical Manual



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REVOLUTION
SCALE SOFTWARE

RICE LAKE
WEIGHING SYSTEMS
To be the best by every measure®

119201 Rev G

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1.0 Introduction

This manual is intended for use by service technicians responsible for installing and servicing 480 digital weight indicators. This manual applies to indicators using Version 1.03 of the 480 software.

Configuration and calibration of the indicator can be accomplished using the *Revolution*® configuration utility or the indicator front panel keys. See Section 3.2 on page 29 for information about configuration methods.



This manual can be viewed or downloaded from the Rice Lake Weighing Systems website at www.ricelake.com.

The *Operator Manual* included with this manual provides basic operating instructions for users of the 480. Please leave it with the indicator when installation and configuration are complete.

1.1 Safety

Safety Symbol Definitions



Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death, and includes hazards that are exposed when guards are removed.



Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

Safety Precautions



Do not operate or work on this equipment unless you have read and understand the instructions and warnings in this manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals. Proper care is your responsibility.

General Safety



Failure to heed may result in serious injury or death.

Some procedures described in this manual require work inside the indicator enclosure. These procedures are to be performed by qualified service personnel only.

DO NOT allow minors (children) or inexperienced persons to operate this unit.

DO NOT operate without the enclosure completely assembled.

DO NOT use for purposes other than weight taking.

DO NOT place fingers into slots or possible pinch points.

DO NOT use this product if any of the components are cracked.

DO NOT exceed the rated specification of the unit, see Section 9.17 on page 72.

DO NOT make alterations or modifications to the unit.

DO NOT remove or obscure warning labels.

DO NOT submerge.

Before opening the unit, ensure the power cord is disconnected from the outlet.

1.2 Overview

The 480 is a single-channel digital weight indicator housed in a NEMA 4X/IP66-rated stainless steel enclosure. The indicator front panel consists of a large (.8 in, 20 mm), six-digit, seven-segment LED display, with a seven-button keypad (480) or an 18-button full numeric keypad (480 Plus).

Features

- Auto switching AC power supply 115 VAC to 230 VAC, 50-60 Hz.
- Drives up to ten 350Ω or twenty 700Ω load cells.
- Supports four and six wire load cell connections.
- Two communications ports with Demand or Continuous (COM 2 only) outputs.
- Optional analog output module provides 0–10/2–10 VDC or 0–20/4–20 mA tracking of gross or net weight values.
- Optional digital I/O card, four outputs/two inputs for setpoints and key functions.
- Unit ID up to six numeric, operator entered.
- Optional Ethernet/USB
- Accumulator with report and clear.
- Time and date.
- Audit trail tracking.

Supported Applications

- Custom Ticket Printing: Gross, Net & Setpoint format can be customized up to 300 characters and print Time and Date, Unit ID, and Consecutive Ticket Number.
- Basic Weighing: Gross or net mode with operator menu to other functions.
- Accumulation: Weights are totaled, with armed print function.
- Batching: Up to eight batch steps with latched or continuous outputs for Gross, Net or Delay setpoint. Actions include trip high or low, wait for standstill, print, accumulate and tare.
- Keyed Tare: Preset tare value can be entered when the gross weight is at zero.
- Local/Remote: Remote unit displays weight and transmits key press commands to the local unit.

1.3 Operating Modes

The 480 has four modes of operation.

Normal (Primary) Weigh Mode

Normal mode is the default mode of the indicator. The indicator displays gross or net weights as required, using the annunciators described in Section 1.6 on page 4 to indicate scale status and the type of weight value displayed.

Configuration Mode

Most of the procedures described in this manual, including calibration, require the indicator to be in configuration mode.

To enter configuration mode:

1. Remove the setup switch access screw from the back of the enclosure. See Figure 2-1 on page 10.
2. Insert a non-conductive tool into the access hole and press the configuration switch. Indicator display changes to show **CONFIG**.

User Menu Setup Mode

The user menu setup mode is used to access the Accumulator Functions, Audit Trail, display the Tare, Unit ID, Time & Date, Setpoints, Data Communications parameters, Print Formats, and view the Firmware Version.

It is accessible by pressing the **MENU** key on the front panel.

See Section 3.1 for more information about the user setup mode.

Test Mode

Test mode provides a number of diagnostic functions for the 480 indicator. See Section 9.13 on page 67 for more information about entering and using test mode.

1.4 Front Panel Keypad

See Section 1.7 for information about using the front panel keys in configuration mode.

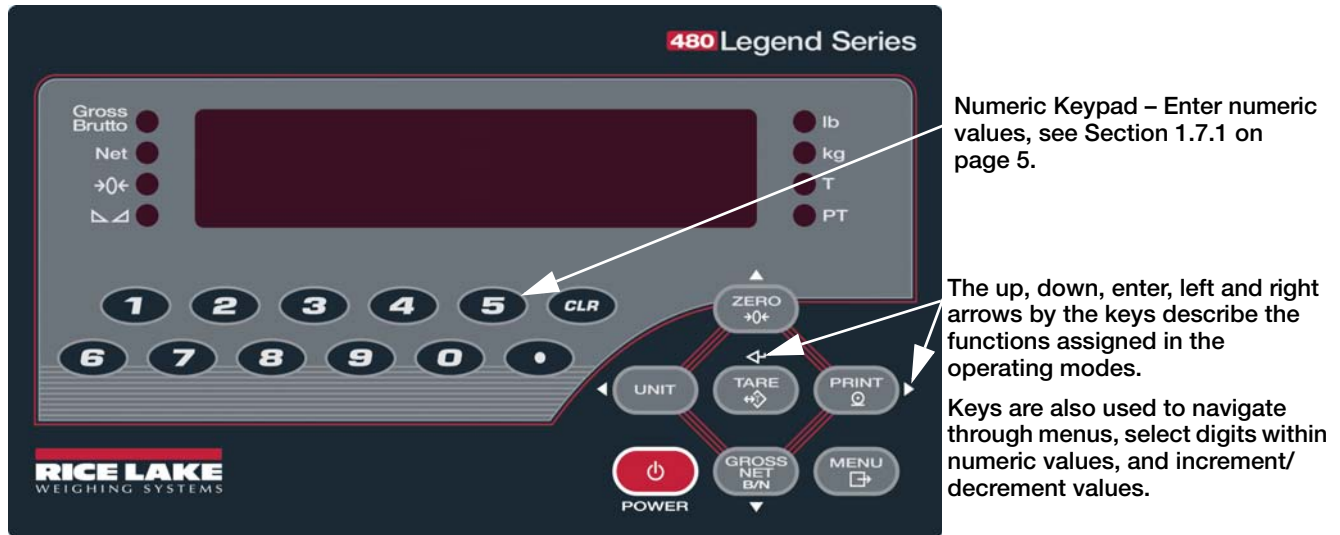











Figure 1-1. 480 Front Panel, Showing LED Annunciators and Key Functions (480Plus Shown)

1.5 Keypad Functions

Key	Function
 POWER	Turns the unit on/off.  Note <i>If power mode is set to manual, the POWER button must be used to turn the unit on and off. If power mode is set to auto, the unit will automatically power on when it's plugged in and the only way to turn it off is to unplug power. See Section 3.1.7.</i>
 MENU	The MENU key is used to access the User Setup menu.
 ZERO →0←	Sets the current gross weight to zero, provided the amount of weight to be removed or added is within the specified zero range and the scale is not in motion. The zero band is defaulted to 2% of full scale, but can be configured for up to 100% of full scale. Also used as a “move up” key to navigate to different menu levels or used to increment a number when editing a value.
 UNIT	Switches the weight display to an alternate unit. The alternate unit is defined in the Configuration menu, and could be kg, g, lb, oz, tn, or t. Also used as a “scroll left” key to navigate to different menus or to toggle to another digit when editing a value.
 PRINT	Sends “on-demand” print format out the serial port, provided the conditions for standstill are met. PRINT may be displayed while printing. Also used as a “scroll right” key to navigate to different menus or to toggle to another digit when editing a value.
 TARE ↕	Performs one of several predetermined Tare functions dependent on the mode of operation selected in the TAREFN parameter. To view a stored tare, see Section 1.8.7. Also acts as an “enter” key for numeric or parameter entry.
 GROSS NET B/N	Switches the display mode from gross to net, or from net to gross. If a tare value has been entered or acquired, the net value is the gross weight minus the tare. Gross mode is shown by the Gross/Brutto annunciator; net mode is shown by the Net annunciator. Also used as a “move down” key to navigate to different menu levels or to decrement a number when editing a value.
 CLR	During a numeric entry, sets the currently select digit to 0, then selects one digit to the right.

1.6 LED Annunciators

The 480 display uses a set of eight LED annunciators to provide additional information about the value being displayed.

LED	Description
<div style="display: flex; flex-direction: column; align-items: center;"> <div>Gross Brutto</div> <div>Net</div> <div>→0←</div> <div>▲▼</div> </div>	<p>Gross/Brutto LED Gross weight display mode (or Brutto in OIML mode)</p> <p>Net LED Net weight display mode</p> <p>→0← Zero (Center of Zero) LED The Center of Zero LED indicates that the current gross weight reading is within +/- 0.25 display divisions of the acquired zero, or is within the center of zero band. A display division is the resolution of the displayed weight value, or the smallest incremental increase or decrease that can be displayed or printed.</p> <p>▲▼ Standstill LED Scale is at standstill or within the specified motion band. Some operations, including Zero, Tare and Printing, can only be done when the standstill LED is on.</p>
<div style="display: flex; flex-direction: column; align-items: center;"> <div>lb</div> <div>kg</div> <div>T</div> <div>PT</div> </div>	<p>lb/kg LED Displays which unit of measure is being used. lb and kg annunciators indicate the units associated with the displayed value: lb = pounds, kg = kilograms. The displayed units can also be set to short tons (tn), metric tons (t), ounces (oz), grams (g), NONE (no units information displayed). The lb and kg LEDs function as primary and secondary units annunciators. If neither primary nor secondary units are lb or kg, the lb annunciator is lit for primary units and kg is lit for secondary units.</p> <p>T LED Indicates that a push-button tare weight has been acquired and stored in memory.</p> <p>PT LED Indicates that a preset tare weight has been keyed in or entered and stored in memory.</p>

Table 1-1. LED Annunciators

See Section 3.2.3 for more information about configuring primary and secondary display units.

1.7 Front Panel Navigation

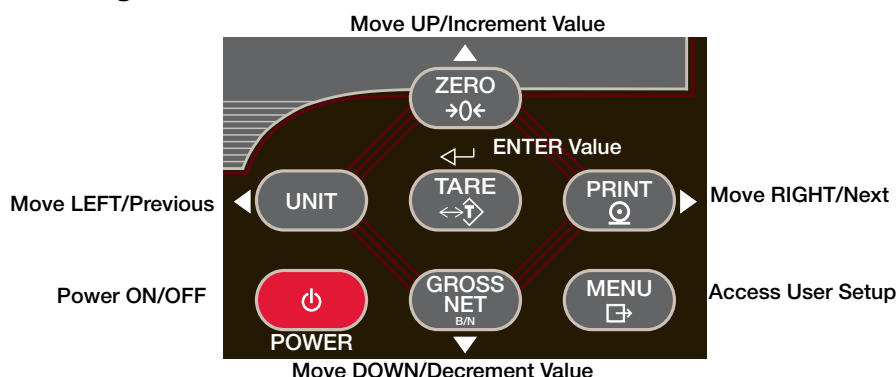
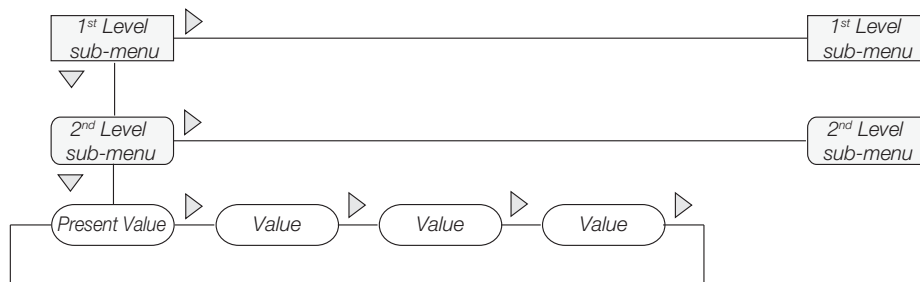


Figure 1-2. Front Panel Key Functions

Four front panel keys are used as directional keys to navigate through the menus (see Figure 1-2).

- **UNIT** (◀) and **PRINT** (▶) scroll left and right on the same menu level.
- **ZERO** (▲) and **GROSS/NET** (▼) move up and down to different menu levels.
- The **TARE** key serves as an Enter key (↵) for selecting parameter values within the menus.
- The **MENU** key allows front panel access to user setup and configuration mode.

Navigating Through Levels



When moving through values below the first menu level, press \triangle to return to the level above. Press ∇ to move to the next parameter on the level below.

Figure 1-3. Menu Navigation

To select a parameter, press \triangleleft or \triangleright to scroll left or right until the desired menu group appears on the display, then press ∇ to move down to the sub-menu or parameter you want. When moving through the menu parameters, the present value appears first on the display.

Edit Parameter Values

To change a parameter value, scroll left or right to view the values for that parameter. When the desired value appears on the display, press **ENTER (TARE)** to select the value and move back up one level. To edit numerical values, use the navigation keys to select the digit and to increment or decrement the value.

0 0 0 0 0 0

When editing numeric values, press \triangleleft or \triangleright to change the digit selected. Press \triangle or ∇ to increment or decrement the value of the selected digit. Press \leftarrow to save the value entered and return to the level above.



Figure 1-4. Editing Procedure for Numeric Values

1.7.1 Numeric Keypad - Editing Procedure for Numeric Values (480Plus Only)



Figure 1-5. Numeric Keypad for the 480Plus

With the numeric keypad option the method for editing numeric values relies on the numbers which are embossed on the keypad in oppose to using the arrows.

1. When editing numeric values, insert the required value using the numeric keypad.
2. Press \leftarrow to save the value entered and return to the level above.
 - Press  to set the currently selected digit to 0.
 - Press  to enter a decimal point.



Note When editing fractional numeric values, the decimal point must be positioned in accordance with the primary units formatting, otherwise the keyed number may be rejected by the software.

1.8 Indicator Operations

Basic 480 operations are summarized below.

1.8.1 Menu

Press , MENU will be displayed.

Press ▽, then ◀ or ▶ to select the following parameters.

- Audit Trail (See Section 1.8.10)
- Display Tare (See Section 1.8.7)
- Unit ID (See Section 1.8.11)
- Accumulator (See Section 1.8.12)
- Time and Date (See Section 1.8.13)
- Setpoints (See Section 1.8.14)
- Serial (See Section 3.1.2)
- Print Formats (See Section 7.0)
- USB (See Section 9.8)
- Ethernet (See Section 9.9)
- Version (See Section 1.8.15)
- Misc. (Power Option) (See Section 3.1.7)

See Section 3.1 for more information.



Note

Press △ repeatedly to return to the weigh mode.


Menus may be password protected. See Section 1.8.16 to setup a password.

1.8.2 Status Lights While in Various Menus


Sub-menu levels are indicated by the LEDs as shown below.

Gross Brutto	●	First sub-menu level
Net	●	Second sub-menu level
→0←	●	Third sub-menu level
▾	●	Fourth sub-menu level


1.8.3 Zero Scale

1. In gross mode, remove all weight from the scale and wait for the ▴ ▴ LED to light.
2. Press . The →0← LED lights to indicate the scale is zeroed.

1.8.4 Toggle Units



1. Press  to toggle between primary and secondary units. The current unit LED will be lit.

1.8.5 Acquire Tare

1. Place container on scale and wait for the ▴ ▴ LED to light.
2. Press  to acquire the tare weight of the container. Net weight is displayed and the T LED lights to show the tare value was entered.


See Section 9.14 for Regulatory Mode Functions.

1.8.6 Preset Tare (Keyed Tare)

1. With the scale empty and display showing zero weight, press .
2. Display will show (000000); the focused digit will flash.
3. Edit the value using the following method; or with the 480PLUS, use the keypad. See Section 1.7 on page 4.
 - Press \triangleleft or \triangleright to select the digit.
 - Press \triangle or ∇ to increment or decrement the value.
4. Press  when the value is correct. The display will change to the Net mode and the *PT* LED lights to show the preset tare was entered.




1.8.7 Display Tare


When a stored Tare value is displayed, the Gross and Net LEDs will be off and the $\rightarrow 0 \leftarrow$ will be lit. To display a stored tare:

1. Press .
2. Press ∇ to AUDIT.
3. Press \triangleright to *TARE* and press ∇ .
4. Press \triangle repeatedly to return to weighing mode.


If there is no tare in the system, the value displayed will be zero and the Gross and Net LED will be turned off. See Section 9.14 for more information pertaining to the regulatory mode of operation.

1.8.8 Print Ticket

1. Press  to print either the Gross or Net format.
2. Wait for  LED to light.
3. Press  to send data to the serial port.


If  LED is not lit and the **PRINT** key is pressed, the print action will take place only if the scale comes out of motion within 3 seconds. If the scale stays in motion for over 3 seconds, the **PRINT** key press is ignored.

1.8.9 Toggle Gross/Net Mode



1. Press  to switch the display mode between gross and net. If a tare value has been entered or acquired, the net value is the gross weight minus the tare.
 - Gross mode — *Gross/Brutto* LED is lit.
 - Net mode — *Net* LED is lit.

1.8.10 View Audit Trail




See Section 3.1.

1. Press .
2. Press ∇ to AUDIT.
3. Press ∇ . The audit trail CALIB is displayed.
4. Press ∇ then \triangleleft or \triangleright to CNT, TIME or DATE.
5. Press ∇ to view selected parameter.
6. Press \triangle twice to return to CALIB.
7. Press \triangleright to the audit trail CONFIG and repeat steps 5 and 6 to view configuration number.
8. Press \triangle repeatedly to return to weighing mode.

1.8.11 Enter New Unit ID

1. Press .
2. Press ∇ to AUDIT.
3. Press \triangleright until display reads UNIT ID.
4. Press ∇ to view the current value.
5. Edit the value using the following method; or with the 480PLUS, use the keypad. See Section 1.7 on page 4.
 - Press \triangleleft or \triangleright to select the digit.
 - Press \triangle or ∇ to increment or decrement the value.
6. Press  when the value is correct.
7. Press \triangle repeatedly to return to weighing mode.

1.8.12 Display Accumulator

1. Press .
2. Press ∇ to AUDIT.
3. Press \triangleright until display reads ACCUM.
4. Press ∇ to display VIEW.
5. Press \triangleleft or \triangleright to select desired parameter (VIEW, TIME, DATE, PRINT, CLR Y).
 - For VIEW, TIME or DATE, press ∇ to view the value. Press \triangle or  to return to selected parameter.
 - To PRINT or CLEAR, press ∇ , then press  to print or clear the accumulator. Press \triangle to return to selected parameter
6. Press \triangle repeatedly to return to weighing mode.



See Section 3.1 for the ACCUM menu structure.



Note *If the accumulated value exceeds 999999, display show “EE ACC”. The value will still be correct and will print correctly up to 1,000,000,000.*

1.8.13 Display or Change Time and Date

To set the date and time:

1. Press .
2. Press ∇ to AUDIT.
3. Press \triangleright until display reads TIMDAT (TIME/DATE).
4. Press ∇ and select Time or Date with \triangleleft or \triangleright .
5. Press ∇ to view the current setting.
6. To edit the value of the time, in 24 hour or 12 hour format (hh.mm.ss), use the following method.
 - Press \triangleleft or \triangleright to select hours, minutes, or seconds – the selected value will be flashing
 - Press \triangle or ∇ to increment or decrement the value.
7. Press  when the value is correct.

Use the same procedure to enter the date in the same format configured for the indicator.
See Section 3.2.5 for available formats.
8. Press \triangle repeatedly to return to weighing mode.






Note *The time and date are backed up with an internal battery. If the main power is interrupted, time and date will not be lost.*


When in 12 hour format, the PT LED indicates pm setting.

1.8.14 Display, Edit and Set Setpoint Value


(Also see Section 8.0.)

1. Press .
 2. Press ∇ to AUDIT.
 3. Press \triangleright until display reads **SETPNT**.
 4. Press ∇ and navigate across to desired setpoint number (1-8).
 5. Press ∇ and navigate across to select User.
 6. Press ∇ and navigate across to select Value or Enable.
 7. Press ∇ to view and edit the value.
 - To edit Value, use the following method; or with the *480PLUS*, use the keypad. See Section 1.7 on page 4.
 - Press \triangleleft or \triangleright to select the digit.
 - Press \triangle or ∇ to increment or decrement the value.
 - Press  when the value is correct.
 - To edit **ENABLE**:
 - Press \triangleleft or \triangleright to select ON/OFF.
 - Press  when the value is correct.
 8. Press \triangle repeatedly to return to weighing mode.
- See Section 3.1.1 for the **SETPNT** menu layout.

1.8.15 View Firmware Version

1. Press .
2. Press ∇ . AUDIT is displayed.
3. Press \triangleright until display reads VERS.
4. Press ∇ . FIRMW is displayed.
5. Press ∇ to view version.
6. Press \triangle repeatedly to return to weighing mode.

1.8.16 Enter User Password

1. Remove the setup switch access screw from the back of the enclosure, see Figure 2-1 on page 10.
2. Insert a non-conductive tool into the access hole and press the configuration switch. Indicator display changes to show **CONFIG**.
3. Press \triangleleft or \triangleright until PASWRD is displayed.
4. Press ∇ . CNFG is displayed.
5. Press \triangleright to USER.
6. Press ∇ . 000000 is displayed.
7. To edit the password, use the following method; or with the *480PLUS*, use the keypad. See Section 1.7 on page 4:
 - Press \triangleleft or \triangleright to select the digit.
 - Press \triangle or ∇ to increment or decrement the value.
 - Press  when the value is correct.
8. Press \triangle to return to PASWRD.
9. Press \triangleright to CONFIG.
10. Press \triangle to return to weighing mode.

When entering a user function, the operator will now be required to enter the password.



Important Enter 999999 to reset password, this will also reset the configuration back to default values.

2.0 Installation

2.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the 480 to ensure all components are included and undamaged. The shipping carton should contain the indicator, this manual, and a parts kit. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

See Section 2.7 on page 16 for parts kit contents.

2.2 Enclosure Disassembly

The indicator enclosure must be opened to connect the scale load cell cable and any other interface connection.



WARNING Before opening the unit, ensure the power cord is disconnected from the power outlet.

Ensure power to the indicator is disconnected, then place the indicator face-down on an anti static work mat. Remove the screws that hold the backplate to the enclosure body. Then lift the backplate away from the enclosure and turn it over to access boards.



Important The display cable will still be attached. Be careful when lifting and turning over the backplate so it does not become damaged or dislodged.

2.3 Cable Connections

The 480 provides four cord grips for cabling into the indicator: one for the power cord, three to accommodate load cell, communications, digital inputs and outputs, and analog output cables. Two of the three free cord grips come with a plug installed to prevent moisture from entering the enclosure. Depending on your application, remove the plug from any cord grip that will be used and install cables as required. Figure 2-1 shows the recommended assignments for the 480 cord grips.

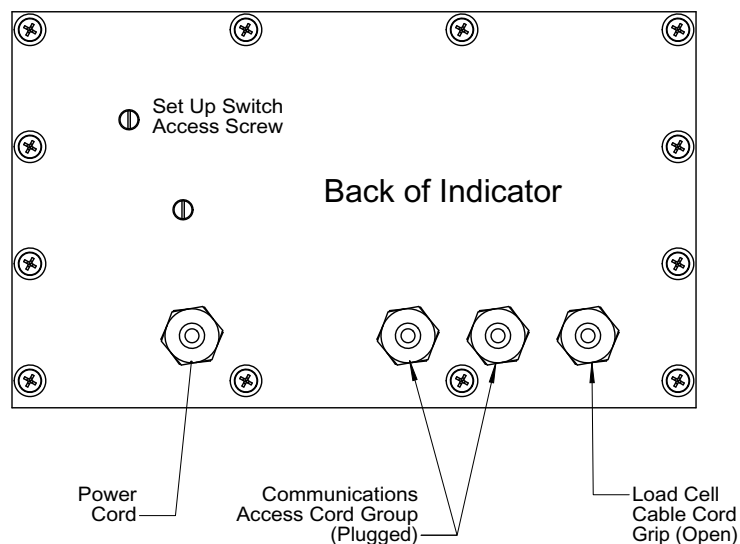


Figure 2-1. Recommended Cord Grip Assignments

2.3.1 Cable Grounding

Except for the power cord, all cables routed through the cord grips should be grounded against the indicator enclosure. Do the following to ground shielded cables:

- Use the ground clamp screws to install grounding clamps on the grounding bar. Do not tighten screws yet.
- Route cables through cord grips and grounding clamps to determine cable lengths required to reach cable connectors. Mark cables to remove insulation and shield as described below:
 - For cables with foil shielding, strip insulation and foil from the cable 1/2" (15 mm) past the grounding clamp (see Figure 2-2). Fold the foil shield back on the cable where the cable passes through the clamp. Ensure silver (conductive) side of foil is turned outward for contact with the grounding clamp.
 - For cables with braided shielding, strip cable insulation and braided shield from a point just past the grounding clamp. Strip another 1/2" (15 mm) of insulation to *only* expose the braid where the cable passes through the clamp (see Figure 2-2).
 - For load cell cables, cut the shield wire just past the grounding clamp. Shield wire function is provided by contact between the cable shield and the grounding clamp.
- Route stripped cables through cord grips and grounding clamps. Ensure shields contact grounding clamps as shown in Figure 2-2. Tighten ground clamp screws.

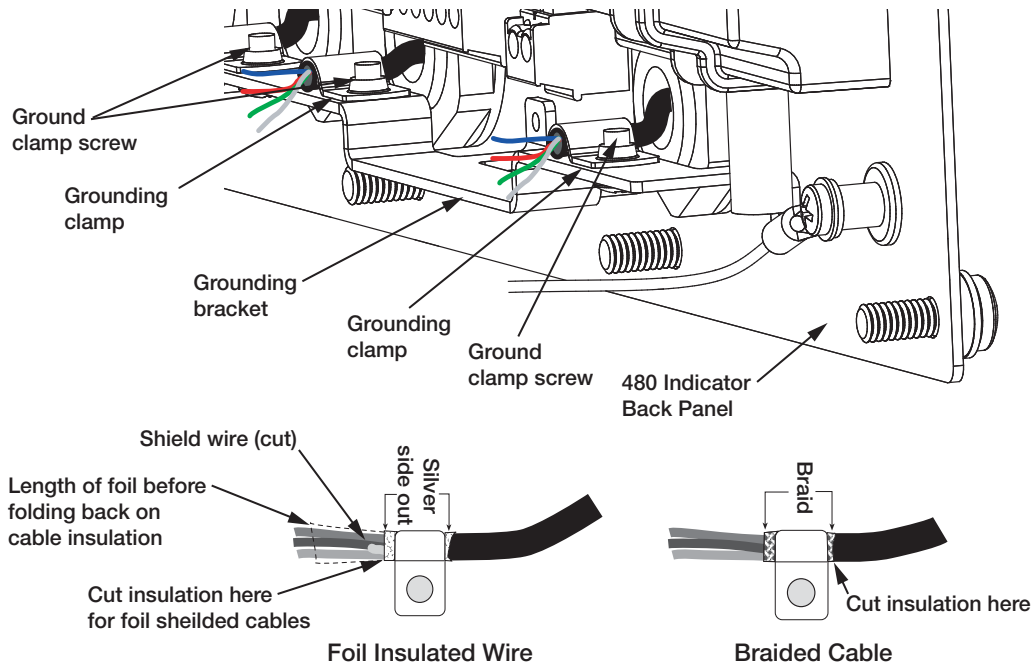


Figure 2-2. Grounding Clamp Attachment for Foil-Shielded and Braided Cabling

2.3.2 Wiring

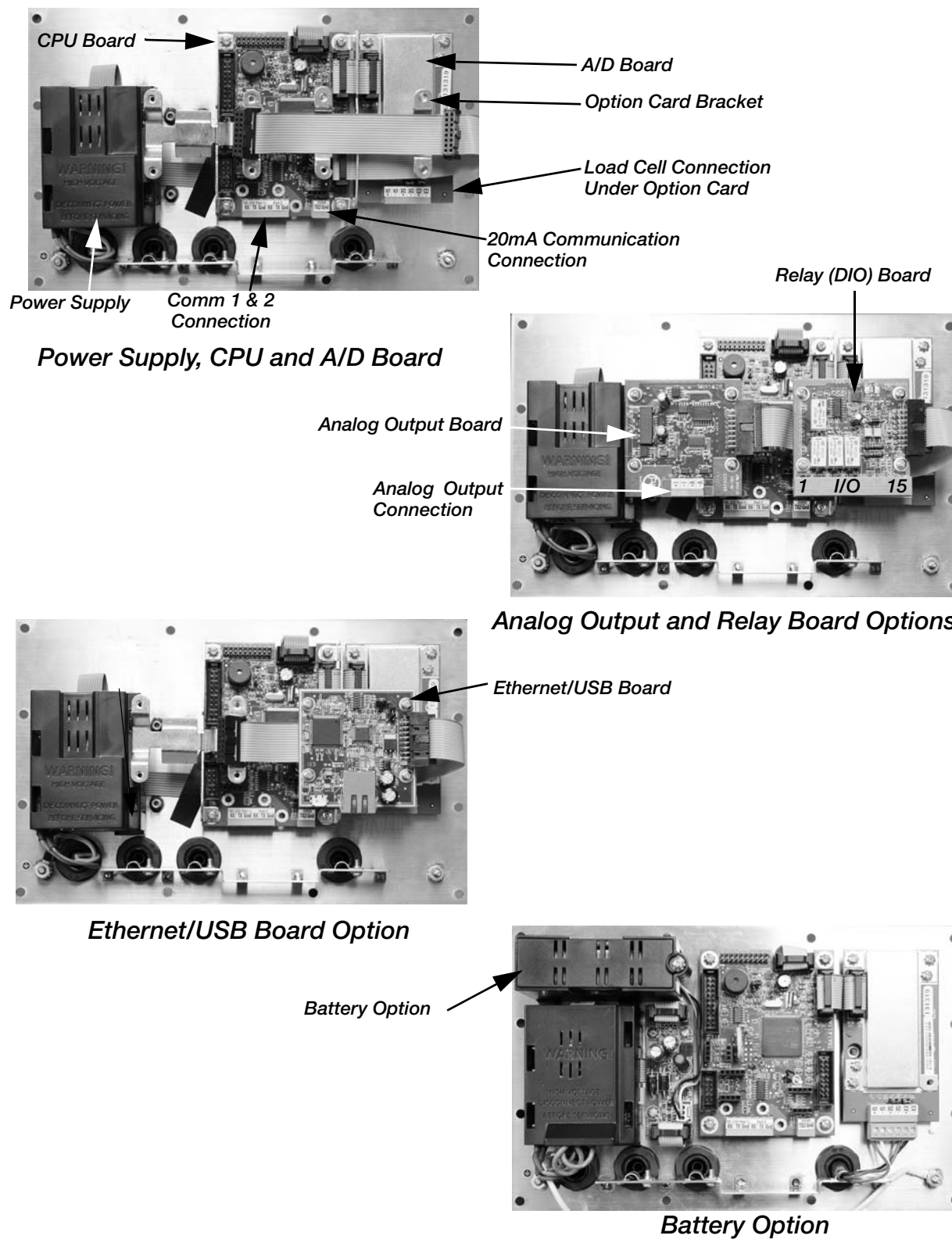
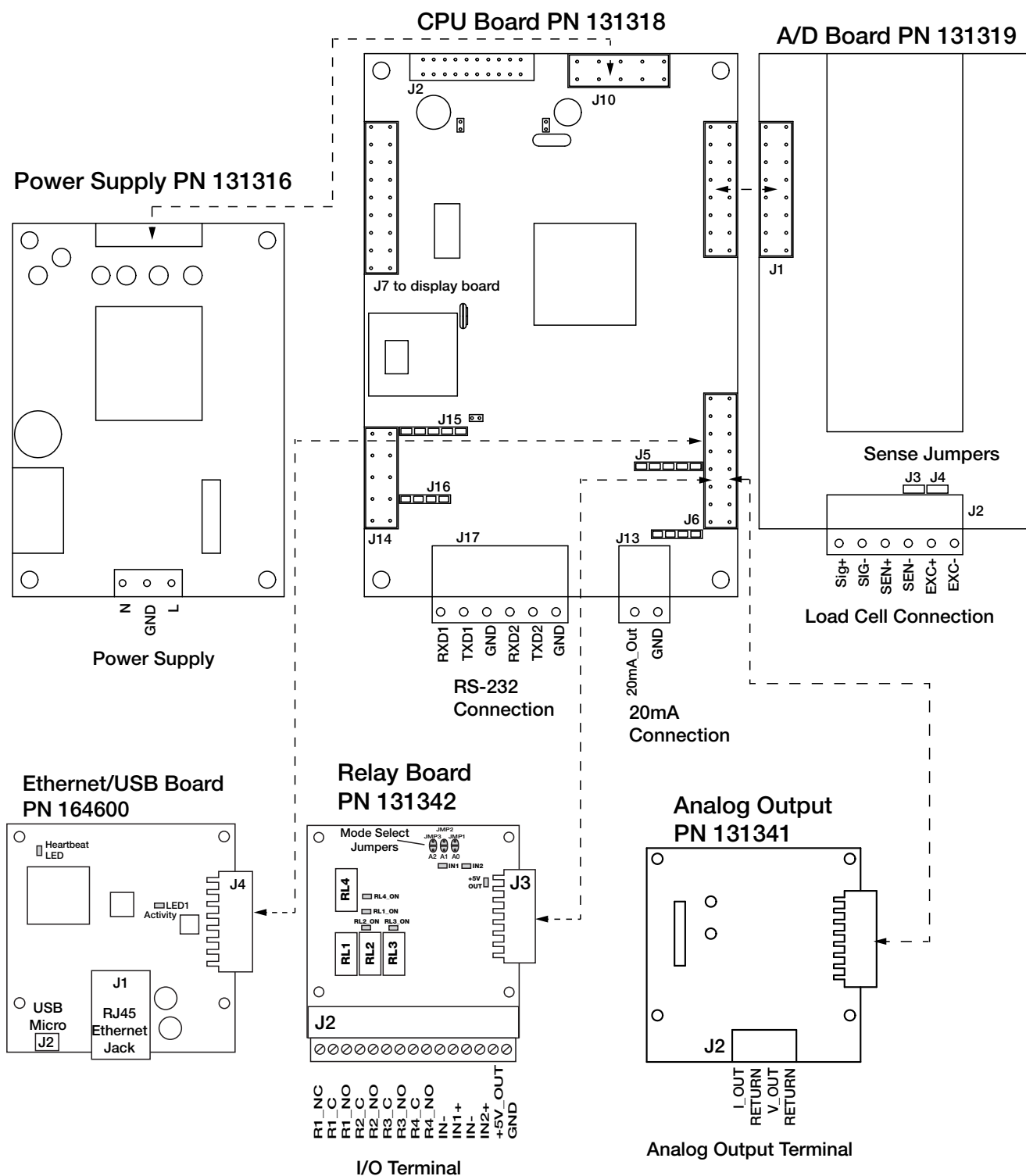


Figure 2-3. 480 Board Options



Note

Analog and Relay boards require an option card bracket (PN131340) for mounting.

To use outputs 1-4 and inputs 1-2, short jumper A1 (JP2)

To use outputs 5-8 and inputs 3-4, short jumpers A0 (JP1) and A1 (JP2)

Output relay rating of relay 2 AMPS at 30 VDC

Figure 2-4. Wiring Diagram

2.4 Option Card Installation

Install or replace the Analog Output Module (PN 131341), Relay Board (PN 131342) or Ethernet/USB option card (PN 164600).

1. Disconnect power to the indicator. Remove backplate as described in Section 2.2 on page 10.
2. If not already in place, install an option card bracket (PN 131340). See Figure 2-3.
3. Mount the analog output module, relay card or the Ethernet/USB option card, on the option card bracket in Figure 2-3. The Ethernet/USB option card has to be installed on the option card bracket above the A/D card, not in the location near the power supply.
4. Connect the option card ribbon to the option card(s).
5. Connect the option card ribbon to J13 on the CPU board.
6. Connect output cables, as needed, to the option card(s).



Note Either option card position can be used for the Analog Output Module, or the Relay Card.
The Ethernet/USB Option Card must be installed in the location above the A/D Card, not next to the Power Supply.

2.5 Board Removal

If you must remove any 480 board, use the following procedure:

1. Disconnect power to the indicator. Remove backplate as described in Section 2.2 on page 10.
2. Disconnect all cables from the board.
3. Label connections for re-installation of board.
4. Remove the four screws from the board, then lift the board off the backplate.

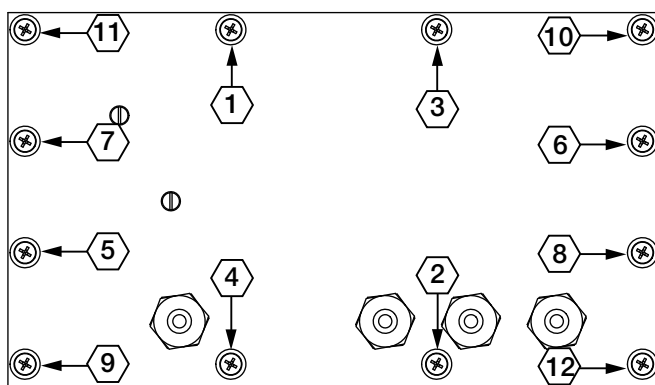
To install a board, reverse the above procedure. Be sure to reinstall cable ties to secure all cables inside the indicator enclosure.



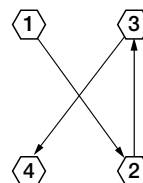
Note When removing lower boards, the upper boards and option bracket, if installed, will need to be removed first.

2.6 Enclosure Reassembly

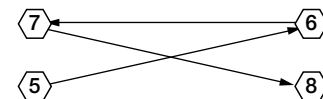
Once cabling is complete, position the backplate over the enclosure and reinstall the backplate screws. Use the torque pattern shown in Figure 2-5 to prevent distorting the backplate gasket. Torque screws to 10 in-lb (1 N-m).



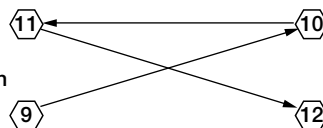
Step 1.
Torque 1-4 in the order shown



Step 2.
Torque 5-8 in the order shown



Step 3.
Torque 9-12 in the order shown



Torque	in-lb	Nm
Backplate screws	10	1
Cable Glands	22	2.5
Cable Gland Caps	13.3	1.5
Vent	5-7	0.6-0.8

Table 2-1. Torque Values

Figure 2-5. 480 Enclosure Backplate



Note Torqued screws may become less tight as the gasket is compressed during torque pattern; a second torque is required using the same pattern and torque value.

2.6.1 Seal the Indicator (Optional)



Note For access to configuration parameters, the setup switch must be pressed.

Prevents Service Access

Insert a lead wire seal through 3 fillister screws. This prevents access to the electronics, electrical contacts, and Legal for Trade configuration parameters.

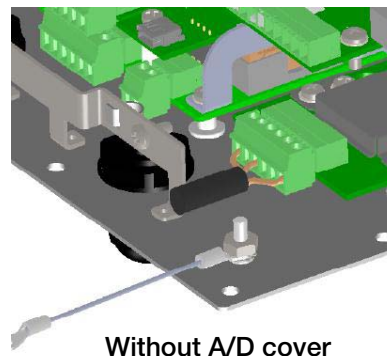
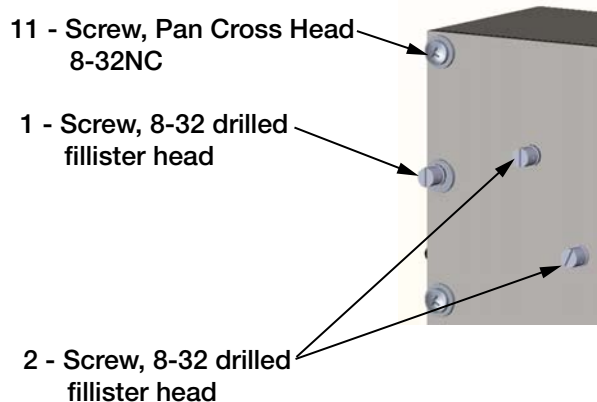


Figure 2-6. Sealing the Indicator to Prevent Access

Allows Service Access – Optional

The calibration cover is used for inserting a lead wire seal through both fillister screws and the plastic cover. The cover allows access to the electronics and electrical contacts, while preventing access into Legal for Trade configuration parameters.

There is an alternative cover over the A/D to ensure the A/D and load cell connection cannot be changed after the unit is sealed.

There is also an audit trail counter to track calibration and configuration changes made to legally relevant parameters.

Place the Calibration Cover on the backplate and secure with the existing fillister head screws and o-rings to seal the indicator for Legal for Trade approval.

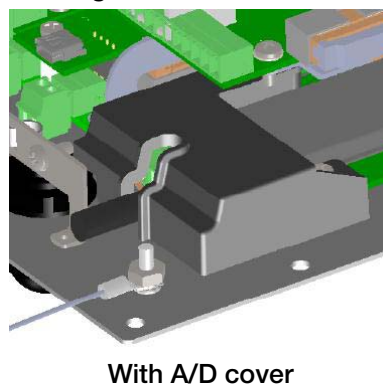
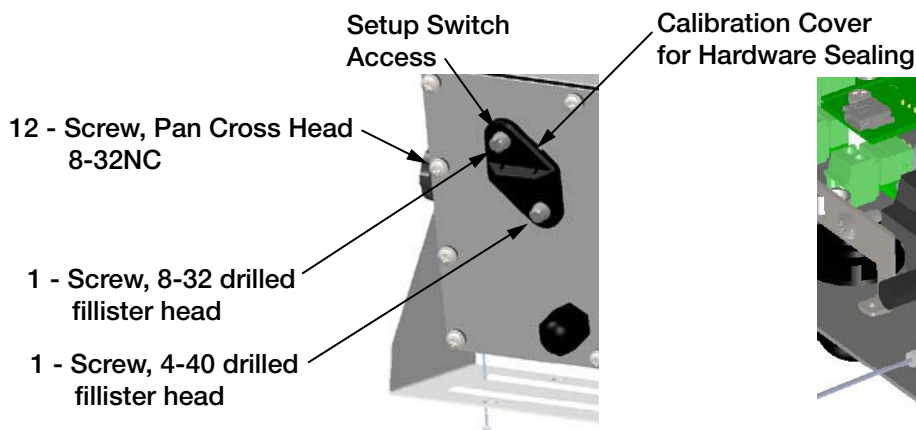


Figure 2-7. Sealing the Indicator to Allow Access Option

2.7 Replacement Parts

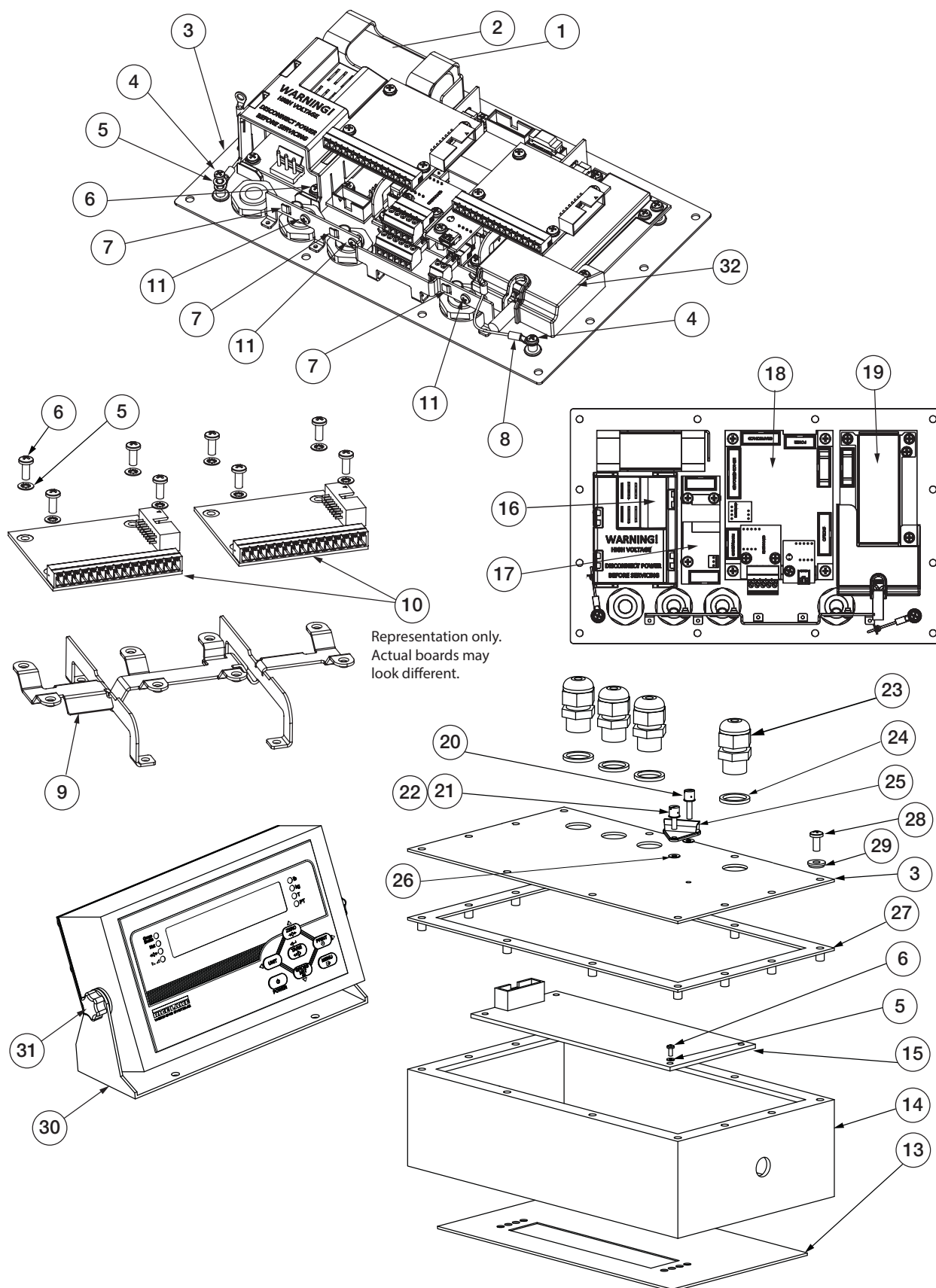


Figure 2-8. Replacement Parts

Item No.	Part No.	Description	QTY
1	131322	Battery bracket (Opt)	1
2	131323	Battery, rechargeable (Opt)	1
3	131321	Backplate, back plane base	1
4	14626	Nut, Kep 8-32 NC Hex	4
5	131326	Lock washer, external tooth	1
6	131328	Screw, 4-40 x 0.3125	1
7	131333	Ground clamp, 3/16 Ø	3
	164580	Ground Clamp, 1/4 Ø	1
8	131334	Ground wire, insulated	2
9	131340	Bracket for option module	1
10	131341	Analog output, 0-10VDC, 4-20mA	1
	131342	Relay board, 2 inputs, 4 relays	1
	164600	USB/Ethernet TCP/IP	1
11	131327	Screw, 4-40 x 0.188	8
13	131345	Overlay, 480 6-key	1
	159612	Overlay, 480Plus, numeric keypad	1
14	131343	Enclosure, front	1
15	131346	Display board, LED 7 segment	1
16	131316	Power supply, 85-265 VAC	1
17	131317	Battery charger, VDC to VDC (Opt)	1
18	131318	Board assembly, CPU	1
19	131319	Board, assembly, A/D	1
20	131324	Screw, 4-40 drilled fillister head	1
21	131325	Screw, 8-32 drilled fillister head	1
22	131335	O-ring	2
23	15626	Cord-grip, PG9	4
24	30375	Seal ring, nylon PG9	4
25	131336	Calibration cover (Opt)	1
26	131337	Washer, rubber	2
27	131344	Gasket, backplate	1
28	14862	Screw, 8-32NC x 3/8	4

Table 2-2. Parts List

Item No.	Part No.	Description	QTY
29	45042	Washer, bonded sealing 8 x 0.375	4
30	164912	Tilt Stand	1
31	164577	Knob & washer, M6 thread	2
32	164579	Cover, A/D Sealing	
	164604	Ethernet cable with cord grip, 6 ft	1
	164602	USB cable with cord grip, type A	1
	88733	Vent, breather vent	1
	88734	Nut, breather vent	1
	103462	2-position screw terminal	1
	76513	4-position screw terminal	1
	76514	6-position screw terminal	2
	157223	15-position screw terminal	1
	155230	Ribbon cable CPU to display	1
	155231	Ribbon cable CPU to A/D	1
	155232	Ribbon cable PS to CPU Board	1
	155233	Ribbon cable CPU to Option	1
	155234	Pwr cord 115VAC, NEMA 5-15 plug	1
	155235	Pwr cord 230VAC, Euro CEE 7/7	1

Table 2-2. Parts List

Part No.	Description	Qty
94422	Label, Capacity	1
53374	Label, Annunciators	1
14862	Screw, 8-32NCx3/8	8
45042	Washer, Bonded Sealing #8 x 0.375	8
76514	Conn, 6-Pin for LC and RS-232 ports	2
103462	Conn, 2- Pin for 20 mA port	1
131325	Screw, Fillister 8-32NC x ¼	1
131320	Screw, Fillister 8-32NC x ½	1

Table 2-3. Parts Kit (PN 131314)

3.0 Configuration

There are two types of configuration parameters in the 480. Legal for Trade configuration and non-legal configuration (or operator parameters). Legal for Trade configuration requires pressing the setup switch (see Section 3.2). Non-legal configuration parameters do not require pressing the setup switch, but may be password protected.

The following sections provide graphic representations of the 480 menu structures. In the actual menu structure, the settings you choose under each parameter are arranged horizontally. To save page space, menu choices are shown in vertical columns. The factory default setting appears at the top of each column in bold type. Most menu diagrams are accompanied by a table that describes all parameters and parameter values associated with that menu.



Note Parameter level is indicated by the left LED position, levels 1-4.

See Section 1.7 on page 4 For navigation methods.

3.1 User Menu Setup

Press the Menu key to access the menu parameters.



Note The menu key can be pushed while in the weigh mode. The configuration parameters can be accessed by pressing the setup switch while in the User Menu. See Section 3.2 for configuration setup.

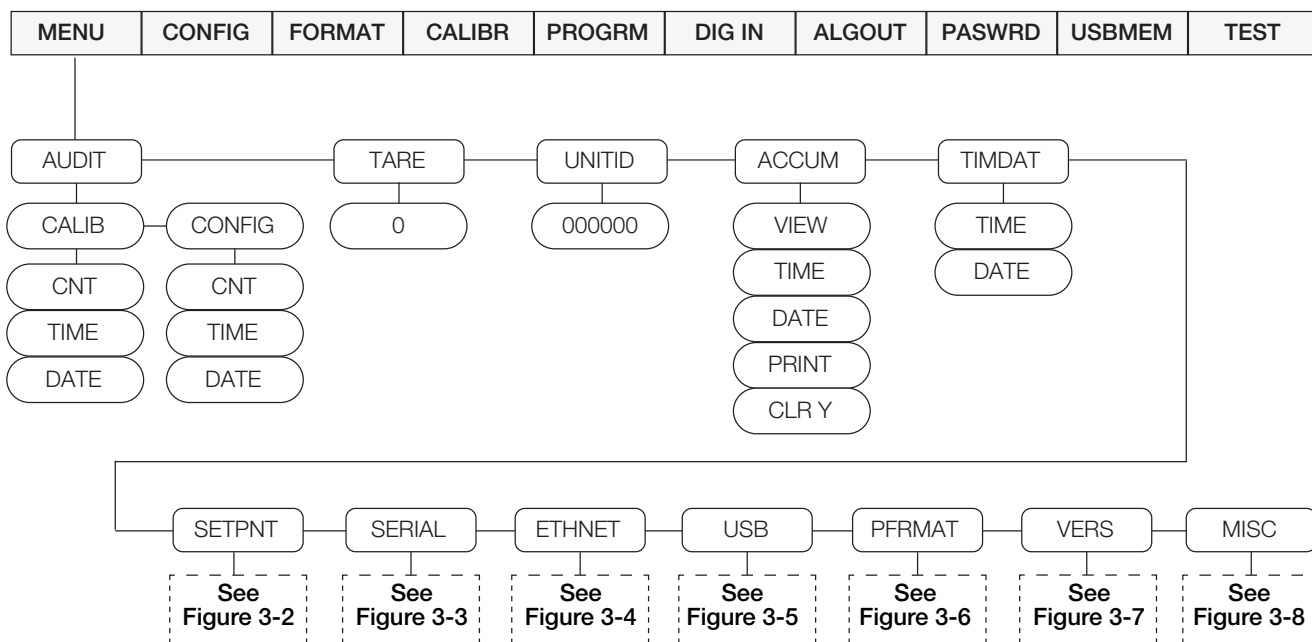


Figure 3-1. Menu Key User Menu

Parameter	Choices	Description
AUDIT	CALIB CONFIG	View audit trail including the time and date of last configuration or calibration. Options: CNT, TIME, DATE
TARE	0	View the Tare value.
UNITID	0 – 999999	View and edit the Unit ID (up to a 6 digit number)
ACCUM	VIEW TIME DATE PRINT CLR Y	View the current accumulator value. View the time and date of the last accumulation. Print or clear the accumulator data.
TIMDAT	TIME DATE	View/set time and date as currently programmed in the indicator. See Section 1.8.13. Edit date as MMDDYY, DDMMYY, YYMMDD or YYDDMM.

Table 3-1. Menu Key Parameters

Parameter	Choices	Description
SETPNT	BATCHG SETPNT1-8	See Section 3.1.1.
SERIAL	COM-1 COM-2 STREAM	Configure serial ports. See Section 3.1.2.
ETHNET	DHCP IPADR NETMSK DFLGTW DNSPRI DNSSEC LCHOST PORT ECHO MAC REMPO REMIP	Configure optional Ethernet ports. See Section Section 3.1.3.
USB	DEVICE TRIGGER	Configure optional USB port. See Section 3.1.4.
PFRMAT	GFMT NFMT ACCFMT SPFMT	View or configure the print format used for gross, net ticket, accumulator and setpoint print tickets. See Section 7.0 on page 54 for more information. See Section 3.1.5.
VERS	FIRMW LR	Displays the firmware and legally relevant firmware currently installed.
MISC	POWER BKLGHT BAT	Set miscellaneous parameters, see Section 3.1.7.

Table 3-1. Menu Key Parameters

3.1.1 Setpoint Menu

For more information on setpoints, see Section 8.0.

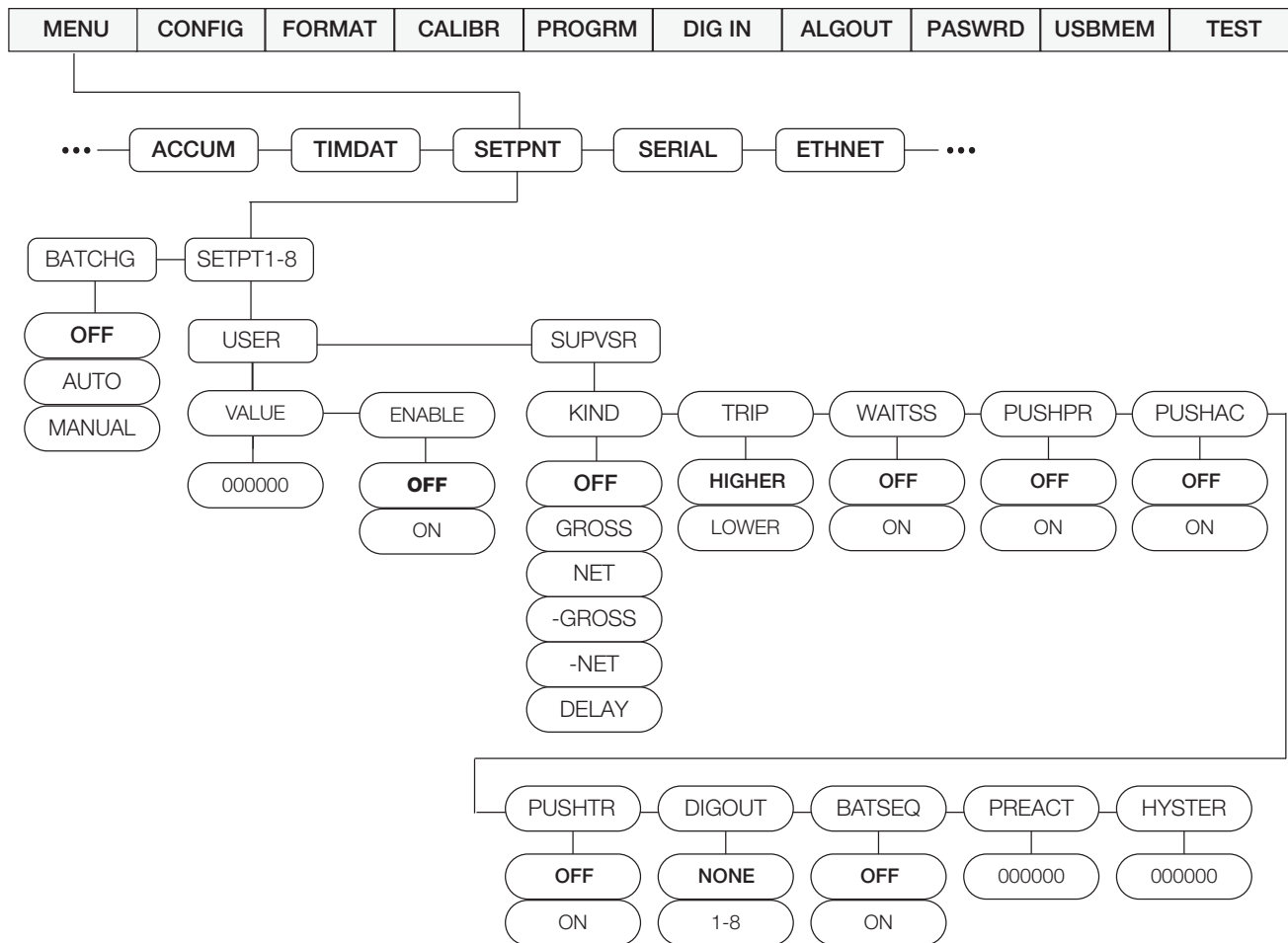


Figure 3-2. Setpoint Setup Menu

Parameter	Choices	Description
SETPT1-8	USER SUPVSR	Setpoint options that do not require a user password, see sub-menu below. Setpoint options that require a user password, see sub-menu below.
BATCHCHG	OFF AUTO MANUAL	Set to OFF batching is disabled. Set to AUTO or MANUAL to allow a batch sequence to run. MANUAL requires a batch start signal (BATSTRT digital input or BATSTART serial command) before the batch sequence can run. AUTO allows batch sequences to repeat continuously, after receiving a single batch start signal.
User submenus		
VALUE	number	Display and edit the setpoint target value. <ul style="list-style-type: none"> For weight-based setpoints: specifies the target weight value, 0 – 999999. For time-based setpoints (delay): specifies, in 0.1-second intervals, a time value in the range 0 – 65535.
ENABLE	OFF ON	Enable or disable the setpoint.

Table 3-2. Setpoint Setup Menu Parameters



Parameter	Choices	Description
Supervisor Submenus		
KIND		Specifies the setpoint kind and determines whether function is based on GROSS or NET weight or based on time value for delay.
	OFF	Setpoint turned off/ignored.
	GROSS	Gross setpoint. Performs functions based on the gross weight. The target weight entered is considered a positive gross weight.
	NET	Net setpoint. Performs functions based on the net weight. The target weight entered is considered a positive net weight value.
	-GROSS	Negative gross weight. Performs functions based on the gross weight. The target weight entered is considered a negative gross weight.
	-NET	Negative net weight. Performs functions based on the net weight. The target weight entered is considered a negative net weight value.
	DELAY	Delays the batch sequence for a specified time. The length of the delay (in tenths of a second) is specified by the VALUE parameter.
TRIP	HIGHER LOWER	Trips the setpoint when the weight is higher or lower than the setpoint value. If batch sequence is off (Continuous Setpoint) with: <ul style="list-style-type: none"> • TRIP = HIGHER – the associated digital output will become active when the weight value is higher than the setpoint value • TRIP = LOWER – the output is active when the weight is below the setpoint value. If batch sequence is on (Batching Setpoint) with: <ul style="list-style-type: none"> • TRIP = HIGHER – the associated digital output is active until the setpoint value is reached or exceeded • TRIP = LOWER – the output is active until the weight goes below the setpoint value.
WAITSS	OFF ON	Wait for Standstill – Value must be stable to satisfy this action.
PUSHPR	OFF ON	Push Print – Specify ON to perform a print operation when the setpoint is satisfied. This action does not wait for standstill, it prints as soon as the setpoint is satisfied. To wait for standstill before printing, set the WAITSS parameter to ON. This action uses the Setpoint Print Format.
PUSHAC	OFF ON	Push Accumulator – Specify ON to update the accumulator when the setpoint is satisfied. This action does not wait for standstill, it accumulates as soon as the setpoint is satisfied. To wait for standstill before accumulating, also set the WAITSS parameter to ON.
PUSHTR	OFF ON	Push Tare – Specify ON to perform an acquire tare operation when the setpoint is satisfied. This action does not wait for standstill, it tares the weight as soon as the setpoint is satisfied. To wait for standstill before performing the tare, also set the WAITSS parameter to ON.  Note <i>PUSHTR acquires the tare regardless of the value specified for the REGULATE parameter on the PROGRAM menu.</i>
DIGOUT	NONE 1-8	Digital Output – specify the digital output associated with this setpoint.  Note <i>To use outputs 1-4 and inputs 1-2, short jumper A1 (JP2) To use outputs 5-8 and inputs 3-4, short jumpers A0 (JP1) and A1 (JP2)</i>
BATSEQ	OFF ON	Determines if the setpoint is a continuously running setpoint (OFF), or part of a batch sequence (ON).
PREACT	number	Allows a setpoint to shut off before the setpoint is satisfied to allow for material in suspension.
HYSTER	number	Specifies a band around the setpoint value that must be exceeded before the setpoint, once off, can trip on.

Table 3-2. Setpoint Setup Menu Parameters (Continued)

3.1.2 Serial Menu

See Section 9.3 for information about the 480 serial data format.

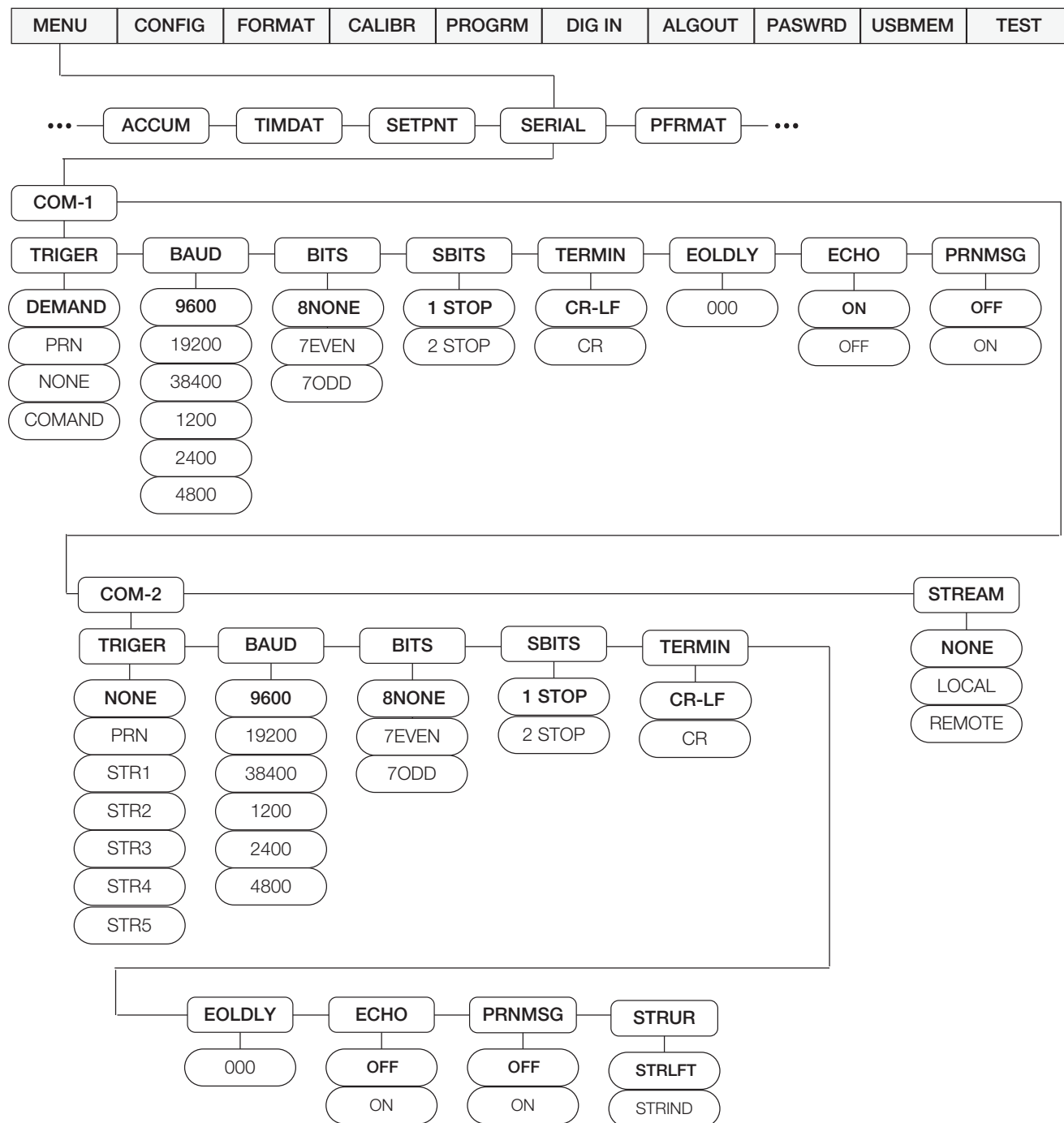


Figure 3-3. Serial Menu


Parameter	Choices	Description
COM-1	TRIGER BAUD BITS SBITS TERMIN EOLDLY ECHO PRNMSG	Specifies settings for COM-1.
COM-2	TRIGER BAUD BITS SBITS TERMIN EOLDLY ECHO PRNMSG STRUR	Specifies settings for COM-2.
STREAM		Specifies the operating mode of the indicator. See Section 9.4 on page 62.
	NONE	Indicator operates normally, COM-2 will not stream, even if the TRIGER is set to a streaming parameter (STR1-5)
	LOCAL	Indicator operates normally, data streaming occurs on COM-2 if the TRIGER is set to stream data (STR1-5)
	REMOTE	Indicator acts as a Serial Data scale, displaying values based on a received stream of Serial Data into COM-2. It also sends keypress commands back through COM-2 to the <i>Local</i> indicator.
Submenus COM-1 and COM-2		
TRIGER (COM-1)		Specifies the ports mechanism for triggering a transmission of data.
	DEMAND	Demand port – printing is performed by pressing the Print key or when a KPRINT EDP command is received. This port will also allow operation and EDP commands.
	PRN	Printer Port - printing is performed by pressing the Print key. The port does not allow operation of EDP commands.
	NONE	Port is inactive.
	COMAND	Command port – allows operation of EDP commands, but will not print.
TRIGER (COM-2)	NONE	Port is inactive.
	PRN	Printer Port - Printing is performed by pressing the Print key. The port does not allow operation of EDP commands.
	STR1	Port is used to transmit a continuous stream of data according to RLWS stream format.**
	STR2	Port is used to transmit a continuous stream of data according to Toledo8142 stream format.**
	STR3	Port is used to transmit a continuous stream of data according to Cardinal738 stream format.**
	STR4	Port is used to transmit a continuous stream of data according to Weightronix WI-120 stream format.**
	STR5	Port is used to transmit a continuous stream of data according to consolidated stream format.**
	**STREAM must be set to local to enable streaming.  See Section 9.3 on page 59 for more information on Stream formats. Com-2 streams simultaneously on both the RS-232 and 20mA outputs.	
BAUD	9600 19200 38400 1200 2400 4800	Baud rate. Selects the transmission speed of data.
BITS	8NONE 7EVEN 7ODD	Selects number of data bits and parity of data.

Table 3-3. Serial Menu Parameters



Parameter	Choices	Description
SBITS	1 STOP 2 STOP	Stop bits. Sets the number of stop bits to 1 or 2.
TERMIN	CR/LF CR	Termination character. Selects line termination character(s) for data sent.
EOLDLY	000000 0 – 255	End-of-line delay – specifies, in 0.1 second intervals, the delay between transmitted lines of data.  Note <i>An end-of-line delay may be required for continuous transmission at slower baud rates to ensure the receiving buffer is empty before another string is transmitted.</i>
ECHO	ON OFF	Specifies whether characters received by the port are echoed back to the sending unit.  Note <i>Port 1 default is ON, Port 2 default is OFF</i>
PRNMSG	OFF ON	Print displays when a demand print is performed.
STRUR		Com 2 only – defines the stream data update rate when one of the stream formats is selected.
	STRLFT	Stream Legal for Trade – the weight information in the data stream is updated at the same rate as the indicator's display.
	STRIND	Stream industrial – the weight information in the data stream is updated at up to the A/D sample rate.

Table 3-3. Serial Menu Parameters (Continued)

3.1.3 Ethernet Menu

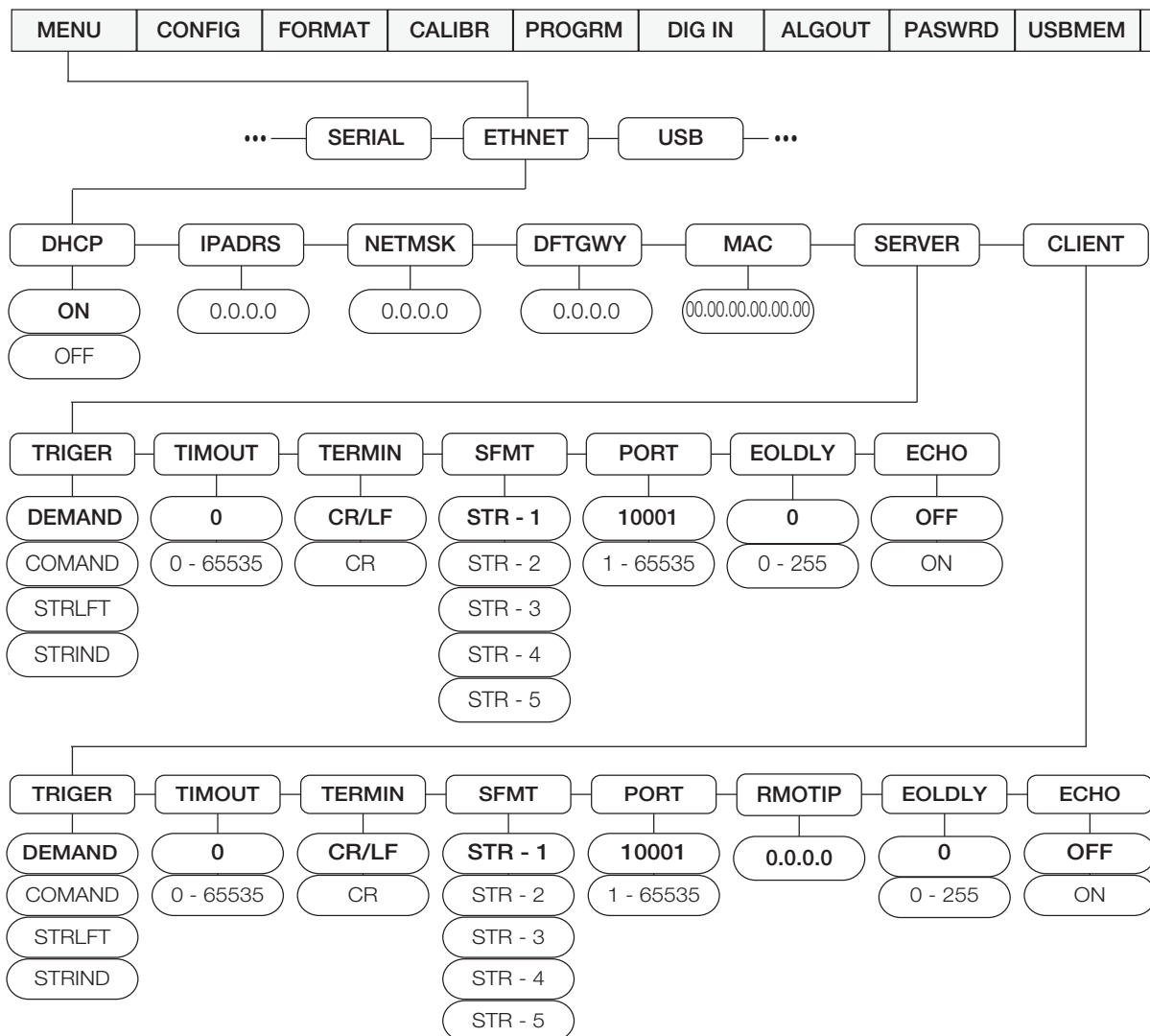


Figure 3-4. Ethernet Menu Layout

Parameter	Choices	Description
DHCP	ON OFF	Dynamic Host Configuration Protocol (DHCP) ON – Dynamic allocation of IP address OFF – Static allocation of IP address
IPADRR	0.0.0.0	IP address, a 4 field value, the range of each field is 0-255.
NETMSK	0.0.0.0	SUBNET mask, a 4 field value, the range of each field is 0-255.
DFTGWY	0.0.0.0	Default gateway, a 4 field value, the range of each field is 0-255.
MAC	00.00.00.00.00.00	View the MAC Address, in hexadecimal base. Read only
SERVER		See Submenu below.
CLIENT		See Submenu below.

Table 3-4. Ethernet Menu Parameters

Parameter	Choices	Description
SERVER/CLIENT Submenu		
TRIGGER		Selects the operation of the port.
	DEMAND	Allows operation of EDP commands and will print.
	COMAND	Allows operation of EDP commands only, does not print.
	STRLFT	Stream legal for trade scale data – data is transmitted at the configured display update rate. Will also accept EDP commands and print.
	STRIND	Stream industrial scale data – data is transmitted up to the configured A/D sample rate. Will also accept EDP commands and print.
TIMOUT	0 0-65535	Timeout – inactivity disconnect timeout. A connection (either client or server) is closed if there is no activity before the timeout expires. Time is in seconds. A timeout value of 0 disables the inactivity disconnect.
TERMIN	CR/LF CR	Termination. Selects the termination character(s) for data sent from the port.
SFMT	STR1-5	Stream format – specifies the stream format used for streaming output of scale data (TRIGGER=STRLFT or STRIND). See Section 9.3 on page 59.
PORT	10001 1-65535	The TCP port number of the 480 server. Server level only.
RMOTIP	0.0.0.0	Remote Host IP address – IP address of the Remote Host (Server) the 480 Client will connect to. Client level only.
RMPort	1 1-65535	Remote Host TCP Port number - The TCP Port of the Remote Host (Server) the 480 Client will connect to Client level only.
EOLDLY	0 0-255	Port end-of-line delay – specifies, in 0.1 second intervals, the delay between transmitted lines of data.
ECHO	OFF ON	Specifies whether characters received by the port are echoed back to the sending unit.

Table 3-4. Ethernet Menu Parameters (Continued)

3.1.4 USB Menu

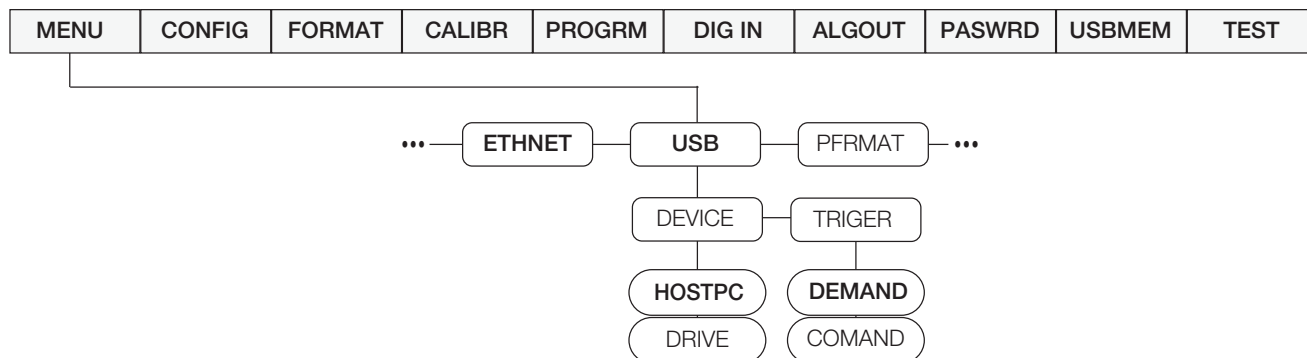


Figure 3-5. USB Menu Layout

Parameter	Choices	Description
DEVICE	HOSTPC	The port is assigned to a HOSTPC, the protocol is a demand type similar to serial communications demand mode, meaning that the port supports EDP commands and Printing.
	DRIVE	The port is assigned to a flash memory drive, the data is written in a FAT32 system, no special driver is required. Use the USBMEM Load and Save functions, found in the Configuration Menu (Section 3.2.1 on page 30), to Load configuration data to or from a flash drive.
TRIGGER	DEMAND	Allows operation of EDP commands and prints.
	COMAND	Allows operation of EDP commands only, does not print.

Table 3-5. USB MENU

3.1.5 Print Format Menu

See Section 7.0 for information about custom print formatting.

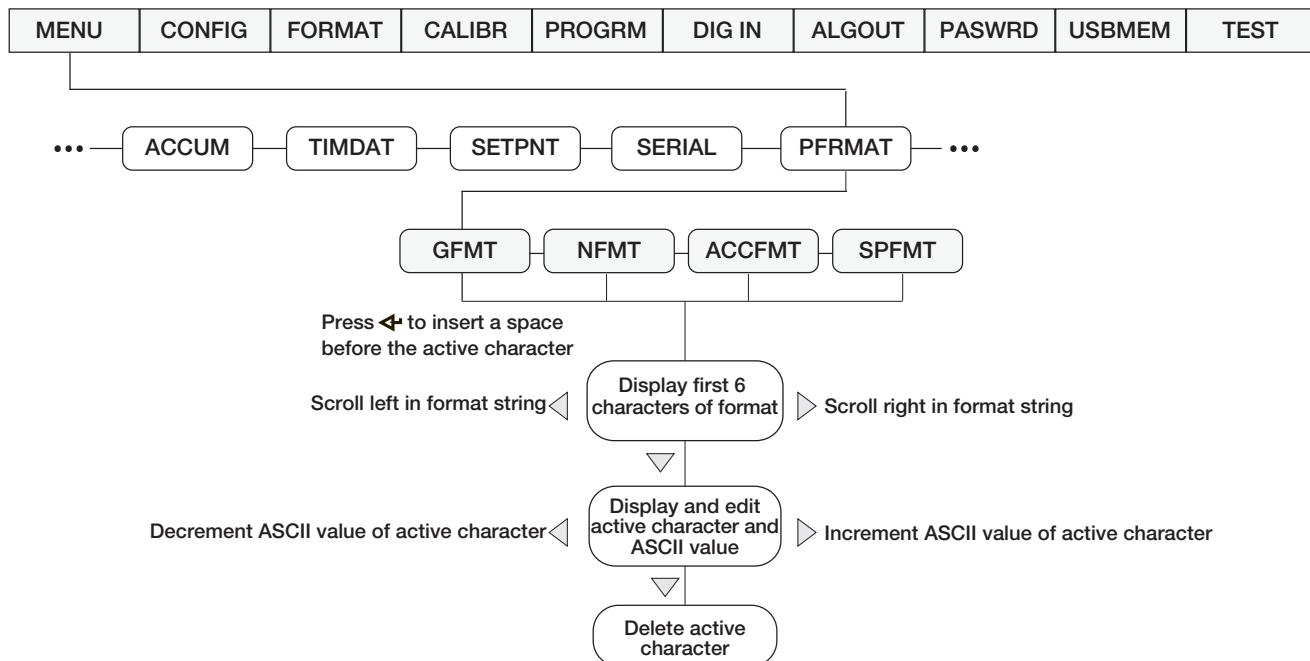


Figure 3-6. Print Format Menu

Parameter	Description
GFMT	Gross demand print format string Default – GROSS<G><NL2><TD><NL>
NFMT	Net demand print format string Default – GROSS<G><NL>TARE<SP><T><NL>NET<SP2><N><NL2><TD><NL>
ACCFMT	Accumulator demand print format string Default – ACCUM <A><NL><DA><SP><TI><NL>
SPFMT	Setpoint print format Default – <SCV><SP><SPM><NL>

Table 3-6. Print Format Parameters



Note Format strings are case sensitive and must be entered in upper case.

3.1.6 Version Menu

The VERS menu is used to view the firmware version

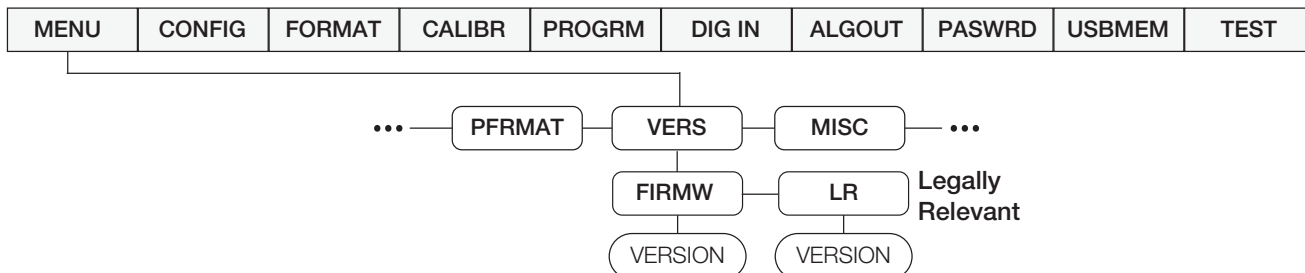


Figure 3-7. Firmware Version User Menu

Parameter	Description
FIRMW	Displays Firmware Version
LR	Displays Legally Relevant Firmware Version

Table 3-7. Firmware Version Menu Parameters

3.1.7 MISC Menu

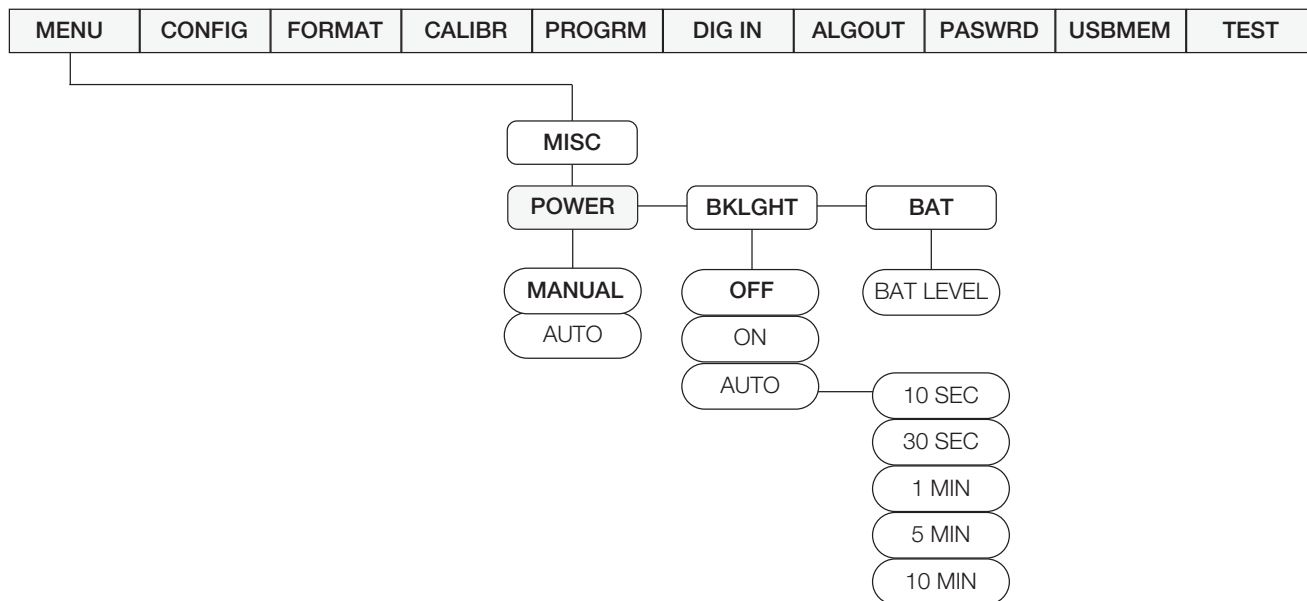


Figure 3-8. Misc. Menu


Parameter	Choices	Description
POWER	MANUAL	Indicator powers ON/OFF by pressing POWER key.
	AUTO	<p>The power up functionality depends on whether the battery option is installed:</p> <ul style="list-style-type: none"> • If the battery option is NOT installed, the indicator turns on automatically when connected to AC power. It turns off by disconnection of AC power or by pressing the power key. • If the battery option is installed, and CPU Jumper 4 is connected, the indicator turns on automatically when connected to AC power. It turns off by disconnection of AC power or by pressing the power key. This configuration is not recommended due to increased leakage current from the battery when the indicator is turned off. • If the battery option is installed, and CPU Jumper 4 is disconnected, the indicator only turns on and off by pressing the power key.
BKLIGHT	OFF ON AUTO	<p>Allows control of the LCD backlight display.</p> <p>OFF – backlight always off.</p> <p>ON – backlight always on.</p> <p>AUTO - backlight will turn off after the configured amount of time, if no buttons are pressed and there is no change in the weight. Once either of these occurs, the backlight will turn on.</p> <p>Auto time Options: 10 sec, 30 sec, 1 min, 5 min, 10 min.</p>
BAT	LEVEL	<p>Allows reading the battery level in mV units.</p> <p> Note <i>If there is no battery option installed NOBATT will display.</i> <i>When the battery is charging, CHRNG will display.</i></p>

Table 3-8. MISC Menu Parameters


3.2 Configuration Using the Front Panel (Legal for Trade)

The 480 indicator can be configured using a series of menus accessed through the indicator front panel when the indicator is in configuration mode.

When the indicator is placed in configuration mode, **CONFIG** is shown on the display. The CONFIG menu is the first of eight main menus used to configure the indicator. Detailed descriptions of these menus are given in Section 3.2.1 on page 30. When configuration is complete, return to **CONFIG** and press the Δ (ZERO) key to exit configuration mode and save changes. Then replace the configuration switch access screw.

To place the indicator into the configuration mode, a configuration switch is accessed by removing the setup switch access head screw on the enclosure back, see Figure 2-1 on page 10. The switch is activated by inserting a non-conductive tool into the access hole after pressing the menu switch.

1. Remove setup switch access screw from back of indicator.
2. Using a non-conductive tool, press the button located in the access hole. This allows access to configuration menus.

Menu		Required Password*	Menu Function
CONFIG	Configuration	Config	Graduations (scale capacity), Configure zero tracking, zero range, motion band, overload, tare function, sample rate, and digital filtering parameters.
FORMAT	Format	Config	Set primary and secondary units.
CALIBR	Calibration	Config	Calibrate indicator. See Section 4.0 on page 43 for calibration procedures.
PROGRM	Program	Config	Set power-up and regulatory modes, consecutive numbering and sleep parameters.
DIG IN	Digital Input	User	Assign digital input functions. Used only if the Relay option is installed.
ALGOUT	Analog Output	Config	Configure analog output module. Used only if analog output option is installed.
PASWRD	Password	Config	Enable and edit configuration and user passwords.
USBMEM	USB Memory	Config	Allows the saving and loading of configuration settings from a USB flash memory device.
TEST	Test	Config	Test A/D, Test and set Digital I/O, reset indicator to default settings, set over and under weighment characteristics.
MENU	Menu	User	Non Legal-for-Trade settings, such as Audit Trail, view Tare, set Unit ID, view/print Accumulator, set Time/Date, and Non Legal for Trade setting for Serial Port, Setpoints, and Print Format parameters. See Section 3.1.  Note <i>Can be accessed without pressing the Setup Switch, by pressing the MENU key on the front panel.</i>

* Password required for all menus if a password for that level has been entered. See Section 3.2.8.

Table 3-9. 480 Menu Summary

3.2.1 Configuration Menu Structures and Parameter Descriptions

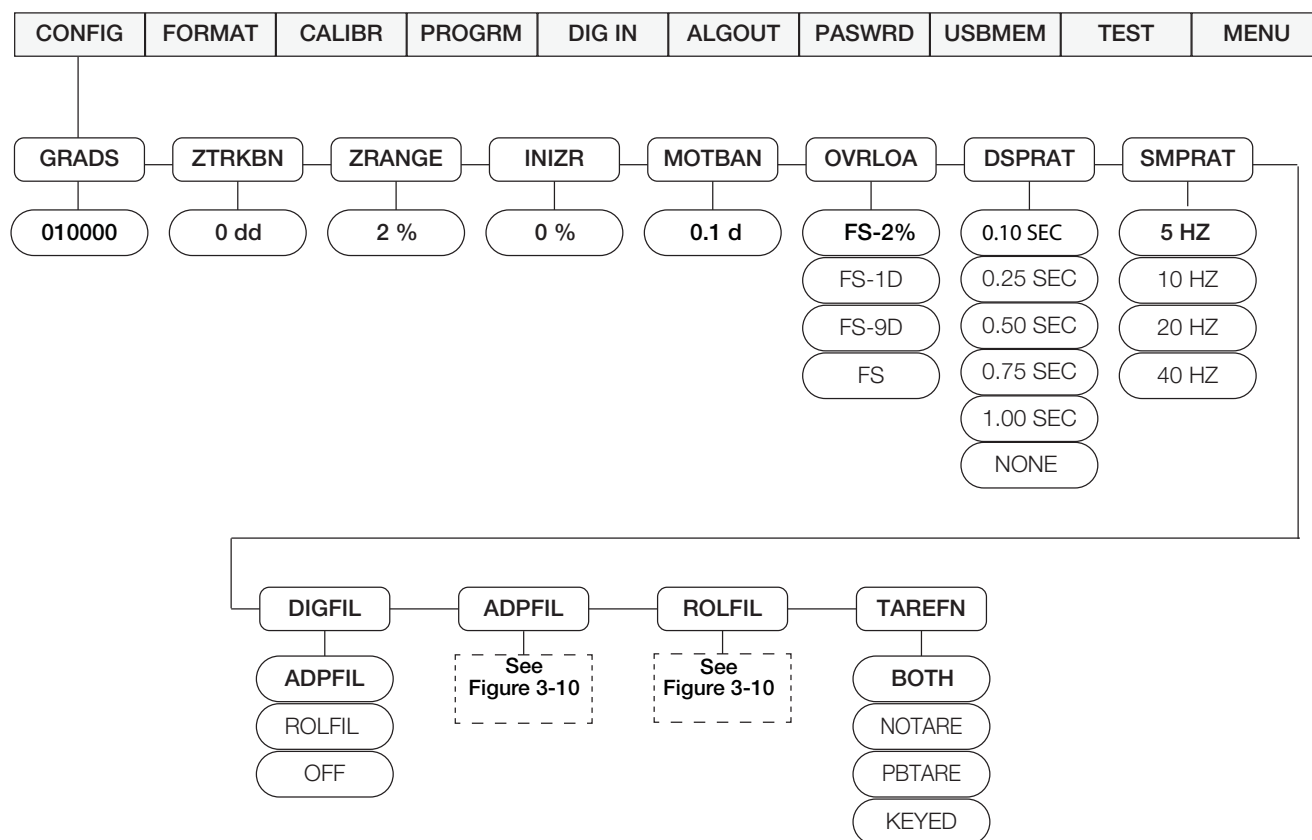


Figure 3-9. Configuration Menu



Parameter	Choices	Description
GRADS	10000 1 – 100000	Graduations. Specifies the number of full scale graduations. The value entered must be in the range 1 – 100 000 and should be consistent with legal requirements and environmental limits on system resolution.
ZTRKBN	0 dd 0.0 – 3.0dd	Zero track band. Automatically zeros the scale when within the range specified, as long as the input is within the configured zero range (ZRANGE parameter). Selections are \pm display divisions. Maximum legal value varies depending on local regulations.
ZRANGE	2% 1% – 100%	Zero range. Selects the range within which the scale can be zeroed. The 2% selection is \pm 2% around the calibrated zero point, for a total range of 4%. Indicator must be at standstill to zero the scale.
INIZR	0 % 0 – 100%	Initial ZERO Range at power up. See Error messages HINOFF and LINOFF in Section 9.1.1 If on power up, the weight value is between the \pm % range specified of Calibrated Zero, the indicator will zero off that weight. If outside that range, the indicator will display HINOFF or LINOFF, depending on whether the initial reading is above or below the range.  Note <i>If not set at zero, hopper/scale MUST be empty when powered up.</i>
MOTBAN	0.1d 0.0d – 100d	Motion band. Sets the level, in display divisions, at which scale motion is detected. If motion is not detected, the standstill symbol lights. Some operations, including print, tare, and zero, require the scale to be at standstill. Maximum legal value varies depending on local regulations.  Note <i>Setting the MOTBAN setting to 0.0 disables motion sensing, the scale will always be considered stable.</i>

Table 3-10. Configuration Menu Parameters

Parameter	Choices	Description
OVRLA	FS+2% FS+1D FS+9D FS	Overload. Determines the point at which the display blanks and an out-of-range error message is displayed. Maximum legal value varies depending on local regulations.
DSPRAT	0.1SEC 0.25 SEC 0.5 SEC 0.75 SEC 1 SEC NONE	Display rate. Sets the update rate for displayed values. Values are in seconds (SEC). No display filtering – the display is updated at up to the A/D sample rate.
SMPRAT	5HZ 10HZ 20HZ 40HZ	A/D Sample rate. Selects measurement rate, in samples per second, of the analog-to-digital converter. Lower sample rate values provide greater signal noise immunity.
DIGFIL	ADPFIL ROLFIL OFF	Adaptive Filter - selects the adaptive digital filter. See Figure 3-10. Rolling Average Filter - selects the rolling average filter. See Figure 3-10. OFF- Disables the digital filter. See Section 9.11 on page 65 for more information on Digital Filtering.
TAREFN		Tare function. Enables or disables push-button and keyed tares.
	BOTH	Both push-button and keyed tares are enabled
	NOTARE	No tare allowed (gross mode only)
	PBTARE	Push-button tare enabled
	KEYED	Keyed tare enabled

Table 3-10. Configuration Menu Parameters (Continued)

3.2.2 Adaptive Filter and Rolling Filter Sub-menu Parameters

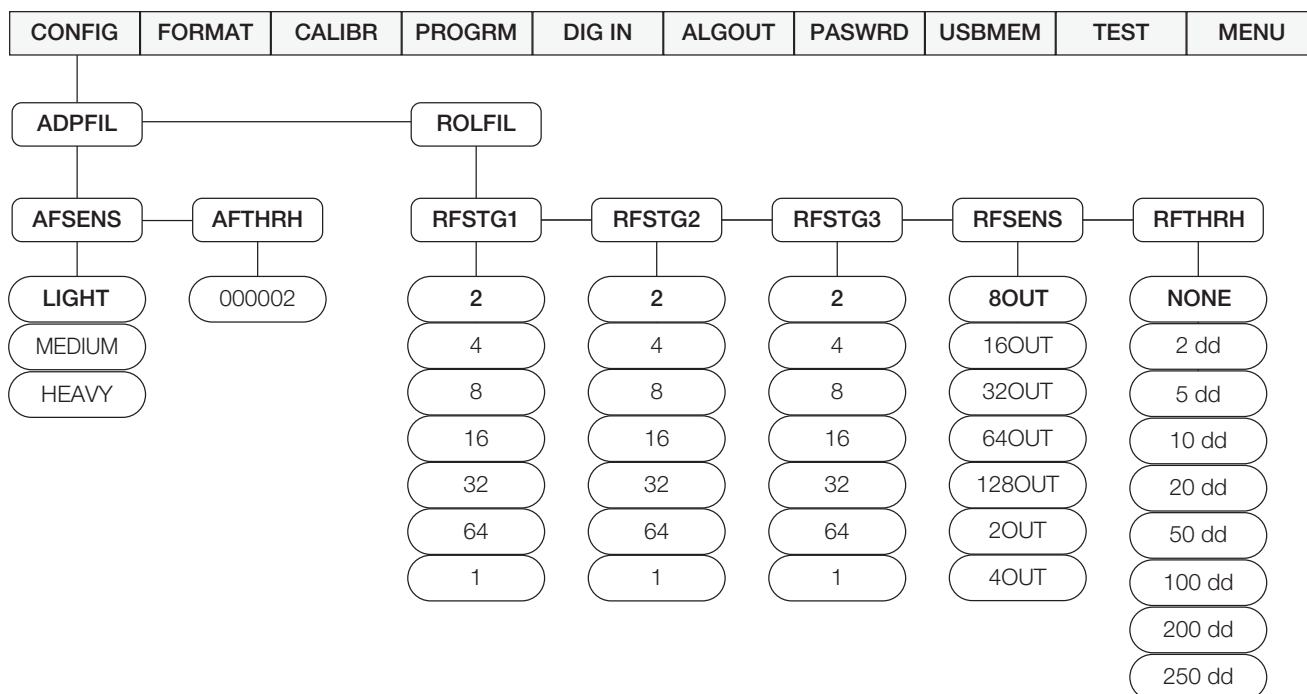


Figure 3-10. Adaptive Filter and Rolling Averaging Filter Sub-menu

Parameter	Choices	Description
ADPFIL Sub-menu		
AFSENS	LIGHT MEDIUM HEAVY	Digital filter cutout sensitivity – specifies the amount of influence each A/D sample has on the running averaged value. The Light setting responds quicker to small weight changes, the Heavy setting slowly small weight changes to increase stability in a unstable environment.
AFTHRH	000002	Digital filter cutout threshold – specifies the filter threshold, in weight value. When a weight change exceeds the value set for threshold, digital filtering is suspended. A setting of 0 disables the filter. The decimal point in the entered value is assumed, so if the dd is 1lb, a value of 1 is equal to 1lb. If the dd is 0.1lb, a value of 1 is equal to 0.1lb.
ROLFIL Sub-menu		
RFSTG1 RFSTG2 RFSTG3	2, 4, 8, 16, 32, 64, 1	Rolling Filter Stages - The number of A/D samples that are averaged in each stage. A higher number gives a more stable display by minimizing the effect of a few noisy readings, but slows down the settling rate of the indicator. See Section 9.11 on page 65 for more information on digital filtering.
RFSENS	8OUT 16OUT 32OUT 64OUT 128OUT 20OUT 4OUT	Rolling filter cutout sensitivity – specifies the number of consecutive readings that must fall outside the rolling filter threshold (RFTHRH parameter) before digital filtering is suspended. If NONE is selected, the filter is always enabled.
RFTHRH	NONE 2 dd 5 dd 10 dd 20 dd 50 dd 100 dd 200 dd 250 dd	Rolling filter cutout threshold – specifies the rolling filter threshold, in display divisions. When a specified number of consecutive scale readings (RFSENS parameter) fall outside of this threshold, digital filtering is suspended. If NONE is selected, the filter is always enabled.

Table 3-11. Adaptive Filter and Rolling Filter Submenu Parameters

3.2.3 Format Menu

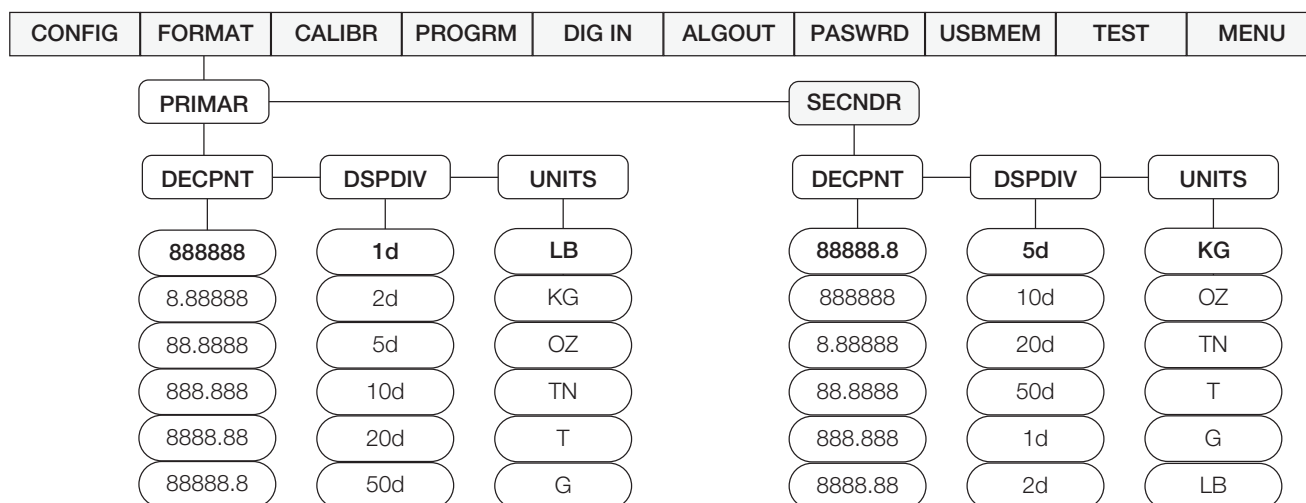


Figure 3-11. Format Menu


Parameter	Choices	Description
PRIMAR	DECPNT	Primary Units – specifies the capacity, decimal position, display divisions, and units used.
SECNDR	DSPDIV	Secondary Units – specifies the capacity, decimal position, display divisions, units, and conversion multiplier used. See below for submenu parameter descriptions.
	UNITS	
Sub-menus		
DECPNT	888888 8.88888 88.8888 888.888 8888.88 88888.8	Decimal point location. Specifies the location of the decimal point in the primary unit display. Value should be consistent with local legal requirements. Primary default – 888888 Secondary default – 88888.8
DSPDIV	1 2 5 10 20 50	Enter divisions (external) in Primary units. Scale resolution will be determined by the formula CAP / DIV = Resolution. Primary default – 1 Secondary default – 5
UNITS	lb kg OZ TN T G	Specifies primary units for displayed and printed weight. Values are: lb = pound; kg = kilogram; OZ = ounce; TN = short ton; T = metric ton; G = gram Primary default – lb Secondary default – kg  Note <i>Indicators sold outside North America are configured with kg for both primary and secondary units.</i>

Table 3-12. Format Menu Parameters

3.2.4 Calibration Menu

See Section 4.0 on page 43 for Calibration procedures.

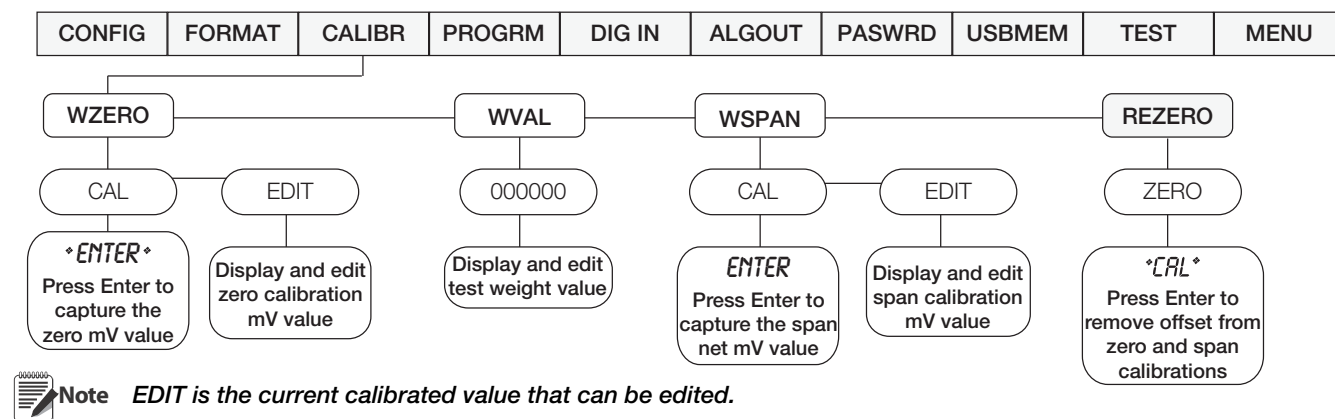


Figure 3-12. Calibration Menu

Parameter	Choices	Description
WZERO	CAL	DO NOT adjust this value after WSPAN has been set. Press ▽ to display ENTER, then press ↵ to capture the zero value.
	EDIT	Press ▽ to display the current captured zero mV value. The value may be edited as required. Press ↵ to save the edited value.
WVAL	number	Press ENTER to display and edit the test weight value.
WSPAN	CAL	Press ▽ to display ENTER, then press ↵ to capture the net span value.
	EDIT	Press ▽ to display the current captured net span mV value. The value may be edited as required. Press ↵ to save the edited value.
REZERO	ZERO (Flashing)	Press Enter to remove the weight of testing apparatus like hooks or chains used during calibration process. Always use this parameter after WZERO and WSPAN have been set to recapture a new zero value. See Section 4.1 on page 43 for more information about using this parameter.

Table 3-13. Calibration Menu Parameters

Note Zero is the dead weight millivolt value.
Span is the test weight millivolt value.
Total millivolts = zero + span.

3.2.5 Program Menu

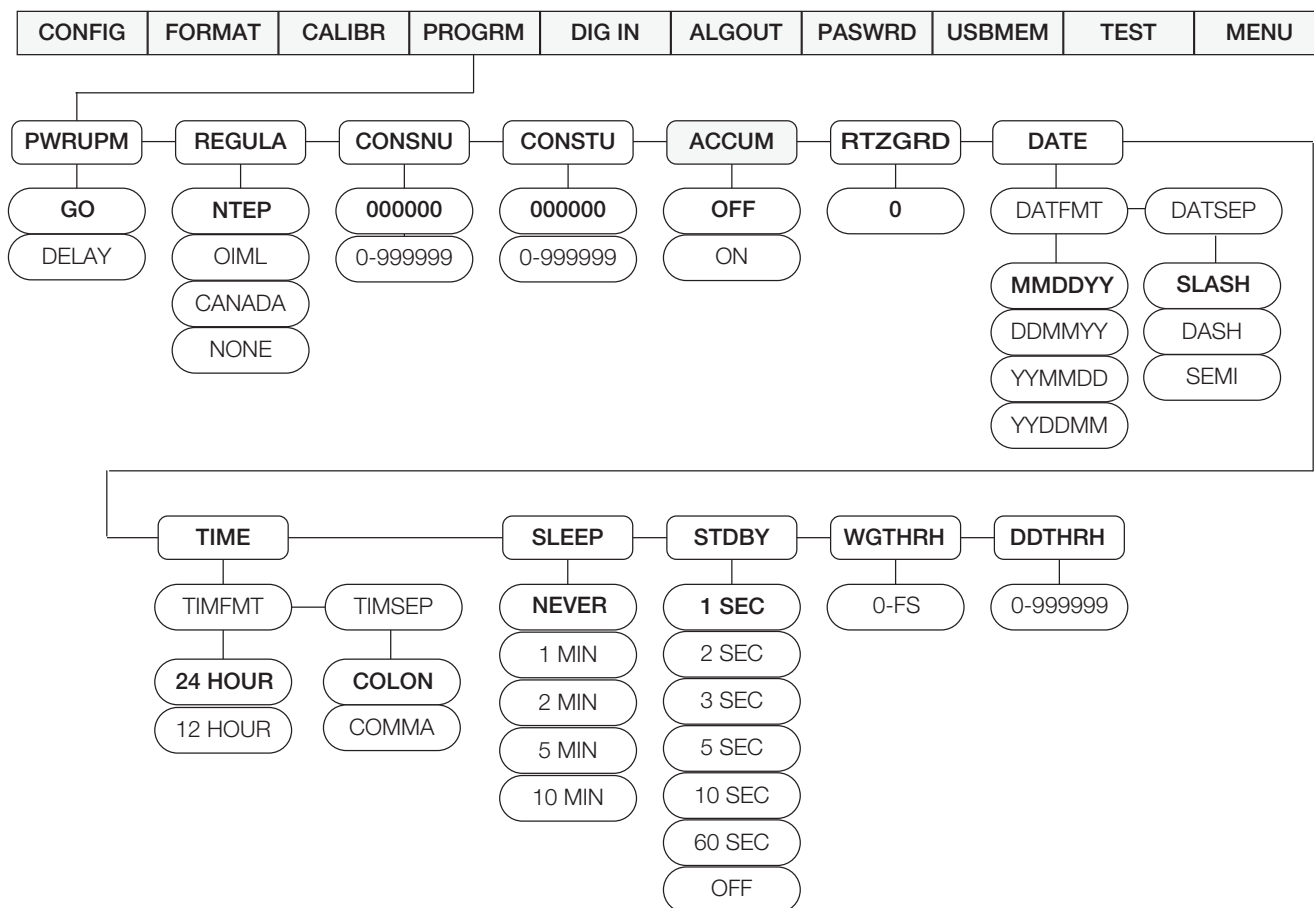


Figure 3-13. Program Menu




Parameter	Choices	Description
PWRUPM	GO DELAY	Power up mode. In GO mode, the indicator goes into operation immediately after a brief power up display test. In DELAY mode, the indicator performs a power up display test and then enters a 30 second warm-up period. If no motion is detected during the warm-up period, the indicator becomes operational when the warm-up period ends; if motion is detected, the delay timer is reset and the warm-up period repeated.
REGULA	NTEP OIML CANADA NONE	Regulatory mode. Specifies the regulatory agency having jurisdiction over the scale site. OIML, NTEP, and CANADA modes allow a tare to be acquired at any weight greater than zero. NONE allows tares to be acquired at any weight value. OIML, NTEP, and CANADA modes allow a tare to be cleared only if the gross weight is at no load. NONE allows tares to be cleared at any weight value. NTEP and OIML modes allow a new tare to be acquired even if a tare is already present. In CANADA mode, the previous tare must be cleared before a new tare can be acquired. NONE, NTEP and CANADA modes allow the scale to be zeroed in either gross or net mode as long as the current weight is within the specified ZRANGE. In OIML mode, the scale must be in gross mode before it can be zeroed; pressing the ZERO key in net mode clears the tare.
CONSNU	000000 0 – 999999	Consecutive numbering. Allows sequential numbering for print operations. The consecutive number value will increment following each print operation when the print format used contains the <CN>, or consecutive number formatting token. This value is read only.  Note <i>The initial value of this parameter is set to the start up value specified on the CONSTU parameter. Changing CONSTU immediately resets the consecutive number used for printing.</i>
CONSTU	000000 0 – 999999	Consecutive number start up value. Specifies the initial consecutive number (CONSNU) value used when the indicator is reset or configured.  Note <i>Consecutive numbering starts with number entered. Example: If 100 is entered the first ticketed printed will be 100.</i>
ACCUM	OFF ON	Turns the accumulator on and off. Stores the accumulated weight, time and date of last accumulation.
RTZGRD	0 0 – 999999	Return to zero grads to re-arm the accumulator. Default = 0. Defines the number of graduations from Zero that the weight has to go below before the accumulator will be re-armed.
DATE	DATFMT DATSEP	Allows selection of date format and date separator. See Date sub-menu for parameter descriptions.
TIME	TIMFMT TIMSEP	Allows selection of time format and separator. See Time sub-menu for parameter descriptions.
SLEEP	NEVER 1MIN 2MIN 5MIN 10MIN	Sleep mode. When weight is stable, no buttons have been pressed, and the weight is below the sleep weight threshold (WGTHRH), the indicator will enter the sleep mode in the time defined in the SLEEP Parameter. A NEVER setting will disable the sleep mode. See Section 9.6 on page 62.  Note <i>The SLEEP mode will only operate if the indicator is operating on Internal Battery Power - disconnected from AC power. Setting the WGTHRH or DDTHRH parameters to 0 also disables sleep mode.</i>
STDBY	1SEC 5SEC 10SEC 15SEC 30SEC 60SEC OFF	Controls the Standby mode. When in the sleep mode, at the set STDBY seconds, the indicator will wake if: <ul style="list-style-type: none"> • there is weight on the scale of more than the WGTHRH value • the weight has is changed greater than DDTHRH value • it detects that a button is being pressed
WGTHRH	0 – FS (in primary units)	Controls the Weight Threshold of the Sleep Mode. If the weight is above WGTHRH, the indicator will not go into sleep mode. If the weight is below, it will go into sleep mode if the weight remains stable, and no buttons are pressed, for the time set in the Sleep mode parameter.

Table 3-14. Program Menu Parameters

Parameter	Choices	Description
DDTHRH	999999 (in display divisions)	Controls the weight change detection feature of SLEEP mode, once the indicator detects that the weight level on the scale is changed more than DDTHRH it will wake up.
DATE sub-menus		
DATFMT	MMDDYY DDMMYY YYMMDD YYDDMM	Specifies the format used to display or print the date.
DATSEP	SLASH DASH SEMI	Specifies the date separator character.
TIME sub-menus		
TIMFMT	24HOUR 12HOUR	Specifies the format used to display or print the time.
TIMSEP	COLON COMMA	Specifies the time separator character.

Table 3-14. Program Menu Parameters (Continued)

3.2.6 Digital Input Menu

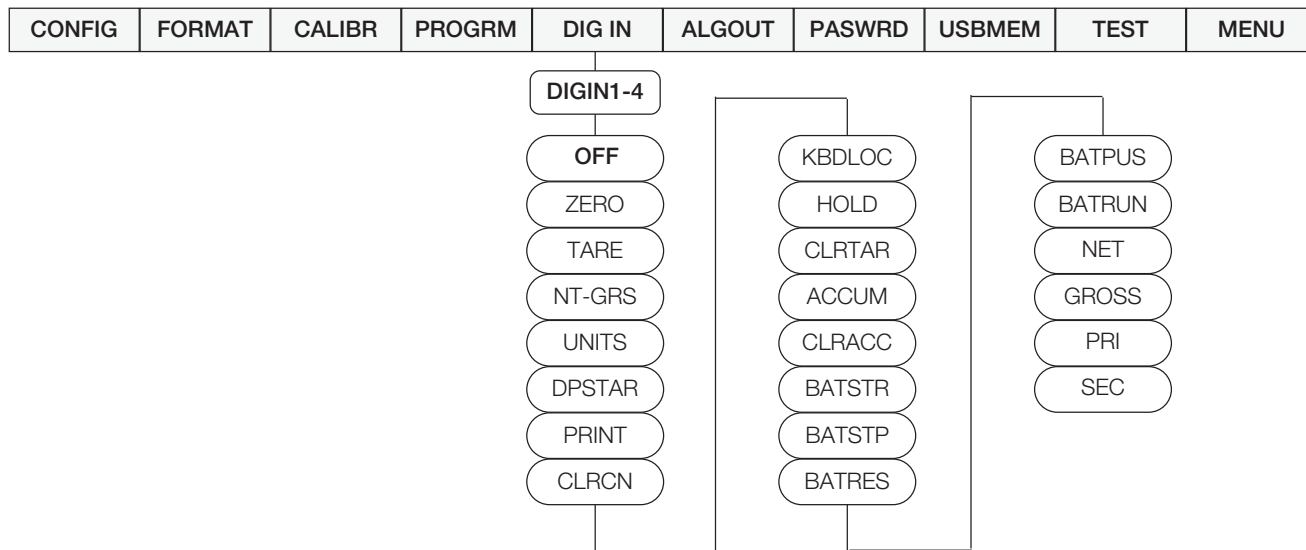


Figure 3-14. Digital Input Menu

Parameter	Choices	Description
DIGIN1 DIGIN2 DIGIN3 DIGIN4		Specifies the function activated by digital inputs 1, 2, 3 and 4.
	OFF	Sets the Digital Input to perform no function.
	ZERO	Same function as the front panel key.
	TARE	Same function as the front panel key.
	NT-GRS	Net-Gross – same function as the front panel key.
	UNITS	Same function as the front panel key.
	DSPTAR	Displays the current tare value.
	PRINT	Same function as the front panel key.
	CLRCN	Resets the consecutive number to the value specified on the CONSTU parameter (PROGRM menu).
	KBDLOC	Disables the keypad while the digital input is held active.
	HOLD	Holds the current display. Releasing this input returns to normal display update mode.
	CLRTAR	Clears the tare.
	ACCUM	Displays the accumulator.
	CLRACC	Clears the accumulator.
	BATSTR	Starts a batch process.
	BATSTP	Stops a batch; any restart starts the batch at the beginning.
	BATRES	Resets the batch process so the pointers are aimed at first batching setpoint.
	BATPUS	Pauses a batch, but allows it to restart at the point where it was paused.
	BATRUN	A switch that allows a batch to be started. It must be active to allow any batch to run. If not active, and a BATSTRT input is activated, the batch will abort or reset.
	NET	Puts the scale in NET mode.
	GROSS	Puts the scale in GROSS mode.
	PRI	Puts the scale in primary units.
	SEC	Puts the scale in secondary units.

Table 3-15. Digital Input Menu Parameters

3.2.7 Analog Output Menu

If the analog output option is installed, configure all other indicator functions and calibrate the indicator (see Section 4.0 on page 43) before configuring the analog output. See Section 9.12 on page 67 for analog output calibration procedures.

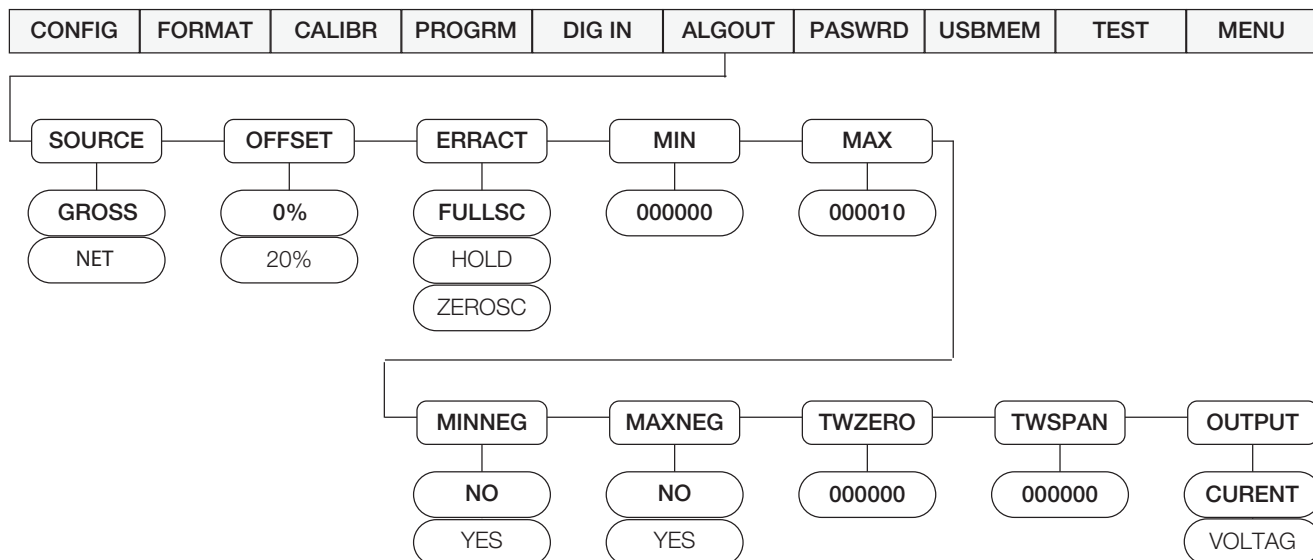


Figure 3-15. Analog Output Menu

Parameter	Choices	Description
SOURCE	GROSS NET	Specifies the weigh data, gross or net, tracked by the analog output.
OFFSET	0 20	Zero offset in %. Select 0% for 0–10 V / 0–20 mA; select 20% for 2–10 V / 4–20 mA output.
ERRACT	FULLSC	Error action. Specifies how the analog output responds to system error conditions. Set to full value (10 V or 20 mA)
	HOLD	Hold current value
	ZEROSC	Set to zero value (0 V or 0 mA) or (2 V or 4 mA)
MIN	000000 0 – 999999	Specifies the minimum weight value tracked by the analog output. Specify a weight value (in primary units) in the range 0 – 999999.
MAX	000010 0 – 999999	Specifies the maximum weight value tracked by the analog output. Specify a weight value (in primary units) in the range 0 – 999999.
MINNEG	NO Yes	YES implies that the value in MIN is a negative value. NO is the default and implies that MIN is a positive value.
MAXNEG	NO Yes	YES implies that the value in MAX is a negative value. NO is the default and implies that MAX is a positive value.
TWZERO	000000 0 – 65535	Tweak zero. Adjust the analog output zero calibration. Use a multimeter to monitor the analog output value. Press ◀ or ▶ to select the digit to edit. Press ▲ or ▼ to edit the selected (flashing) digit. Press ↵ to save the new value.
TWSPAN	000000 0 – 65535	Tweak span. Adjust the analog output span calibration. Use a multimeter to monitor the analog output value. Press ◀ or ▶ to select the digit to edit. Press ▲ or ▼ to edit the selected (flashing) digit. Press ↵ to save the new value.
OUTPUT		Defines the output type.
	CURENT	0–20 mA or 4–20 mA Depends on OFFSET
	VOLTAG	0–10 V or 2–10 V Depends on OFFSET

Table 3-16. Analog Output Menu Parameters

3.2.8 Password Menu

The PASSW menu is used to edit or set passwords.

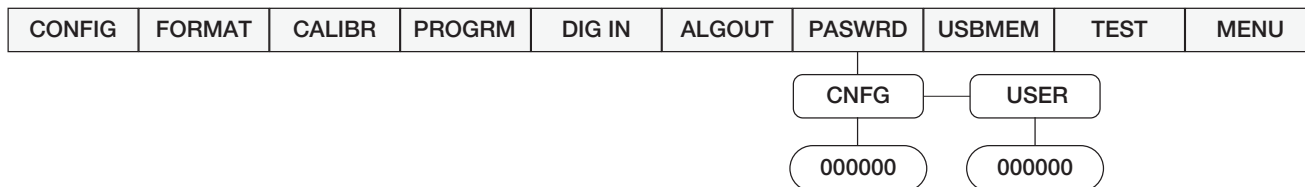


Figure 3-16. Password Menu



Parameter	Choices	Description
CNFG	0 0 – 999998	Edit configuration password. 0 = no password  Note If enabled, the configuration password is used for electronic sealing of the indicator. When configuration password has been entered, the existing configuration password is required to edit. Entering this menu requires the SETUP switch to be pressed.
USER	0 0 – 999998	Edit user password. 0 = no password  Note If enabled, the user password restricts access to the setpoint, serial and print formatting menus. Once a user password has been entered, the existing user password is required to edit parameters.

Table 3-17. Password Menu Parameters



Important Enter 999999 to reset password, this will also reset the configuration back to default values.

3.2.9 USBMEM Menu



Note USBMEM features will be available in future versions.

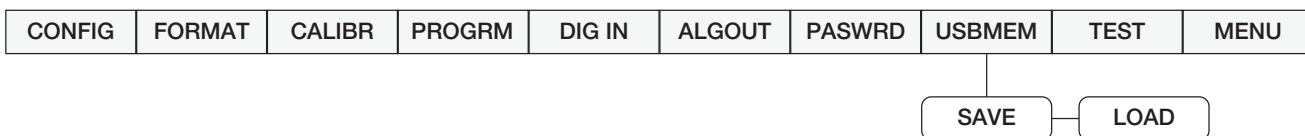


Figure 3-17. USBMEM Menu

Parameter	Choices	Description
SAVE		Save the Configuration parameters to a File on a Flash Drive.
LOAD		Load the configuration parameters from a file on a Flash Drive.

Table 3-18. USBMEM Menu Parameters



Note For more information on using a USB Flash Drive to load and save configuration settings, see Section 9.8.

3.2.10 Test Menu



Note Access to this menu requires the configuration password, if it has been enabled.

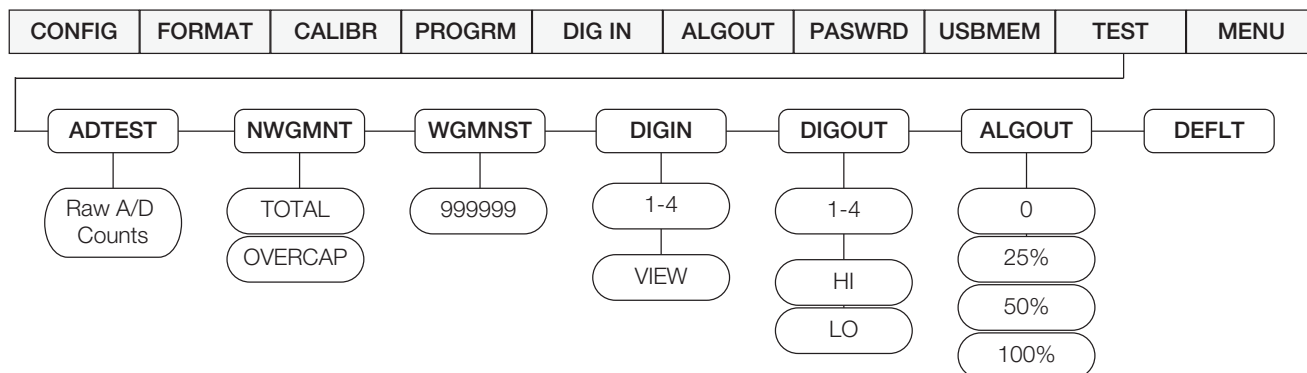


Figure 3-18. Test Menu



Note Digital output relay test.

HI = Active = ON

LO = Inactive = OFF

Parameter	Choices	Description
ADTEST		Displays raw A/D counts.
NWGMNT	TOTAL	The number of weighments that exceed value set in WGMNST.
	OVECAP	The number of weighments that exceed the capacity of the scale as set in the config and format menus.(See Table 3-10 and Table 3-12.)
WGMNST	0 – 999999	Weightment Threshold – Sets the weight threshold over which WGMNST/Over value will be counted.
DIGIN	1 – 4 VIEW	Access to display status. Allows selection of each Digital Input to display its current state, HI or LO. Note If you cannot view the setting, that option is not installed.
DIGOUT	1 – 8 HI LO	Access to each of the Digital Output and to manually set them individually to HI or LO. HI is active. Note If you cannot view the setting, that option is not installed.
ALGOUT	0 25% 50% 100%	Allows analog output to be manually set to certain output values for calibration and test of external equipment Note The analog output must NOT be in an error state as that will override these settings. If you cannot view the setting, that option is not installed.
DEFLT		Resets all parameters to factory defaults. At DEFLT, press GROSS/NET, indicator will display SAVING and cycle power.

Table 3-19. Test Menu Parameters

3.2.11 User Menu Setup

See Section 3.1.

3.3 Revolution® Configuration

The *Revolution* configuration utility provides another method for configuring the 480 indicator. *Revolution* runs on a personal computer to set configuration parameters for the indicator. When *Revolution* configuration is complete, configuration data is downloaded to the indicator. *Revolution* supports both uploading and downloading of indicator configuration data. This capability allows configuration data to be retrieved from one indicator, edited, and then downloaded to another indicator with an identical hardware configuration. See Section 4.3 and Section 5.0 for more information about using *Revolution*.

4.0 Calibration

The 480 can be calibrated using the front panel or the *Revolution*® configuration utility. Each method consists of the following steps:

- Zero calibration
- Entering the test weight value
- Span calibration
- Optional rezero calibration for test weights using hooks or chains.

The following sections describe the calibration procedure for each of the calibration methods.

4.1 Front Panel Calibration

The CALIBR sub-menu is used to calibrate the 480. See Section 3.2.4 for the calibration menu structure and parameter descriptions. To calibrate the indicator using the front panel:

1. Remove the setup switch access screw from the back of the enclosure.
2. Insert a non-conductive tool into the access hole and press the configuration switch. Indicator display changes to show **CONFIG** (see Figure 2-1).
3. Press \triangleright until **CALIBR** is displayed.
4. Remove all weight from the scale platform. If the test weights require hooks or chains, place the hooks or chains on the scale for zero calibration.
5. Press ∇ to **WZERO**.
6. Press ∇ to **CAL**.
7. Press ∇ to **ENTER**.
8. Press \leftarrow to calibrate zero. The indicator displays ***CAL*** while calibration is in progress. When complete, the mV value for the zero calibration is displayed.
9. Press \triangle to save the zero calibration value and go to **CAL**.
10. Press \triangle to **WZERO**.
11. Press \triangleright to **WVAL**.
12. Press ∇ to show the test weight value.
13. Press ∇ to edit value using the procedure shown in Section 1.7 on page 4 to enter the actual value of the test weights to be used for the span calibration. Press \leftarrow to store the entered **WVAL** value.
14. Press \triangle to **WVAL**.
15. Press \triangleright to **WSPAN**.
16. Press ∇ to **CAL**.
17. Press ∇ to **ENTER**.
18. Place test weights on the scale and press \leftarrow to calibrate span. The indicator displays ***CAL*** while calibration is in progress. When complete, the net millivolt value of the test weight for the span calibration is displayed.



Note Net mV value is equal to the raw mV value at the span minus the mV value captured for zero.

19. Press \triangle to save value and go to **CAL**.
20. Press \triangle to **WSPAN**. If using chains or hooks for your test weights, proceed with step 21. If no chains or hooks were used, proceed with step 23.
21. Press \triangleright to **REZERO**. The REZERO function is used to remove a calibration offset when hooks or chains are used to hang the test weights.
22. Remove the hooks or chains used during calibration and remove the test weights from the scale. Press ∇ . **ZERO** will flash. With all weight removed, press \leftarrow to rezero the scale. This function adjusts the zero and span calibration values. The indicator displays ***CAL*** while the zero and span calibrations are adjusted.
23. Press \triangle to return to the CALIBR menu.
24. Remove all weight from the scale. Press \triangleleft until the display reads **CONFIG**. Press \triangle to exit configuration mode.



Note The **INIZR** (initial zero) parameter may affect the weight display reading immediately following calibration.

4.2 EDP Command Calibration

To calibrate the indicator using EDP commands, the indicator COM 1 port must be connected to a terminal or personal computer. See Section 6.0 on page 48 for more information about using EDP commands.

Once the indicator is connected to the sending device, use the following steps:

1. Place the indicator in configuration mode (display reads **CONFIG**) and remove all weight from the scale platform. If your test weights require hooks or chains, place them on the scale for zero calibration.
2. Send the SC.WZERO EDP command to calibrate zero. The indicator displays ***CAL*** while calibration is in progress.
3. Place test weights on the scale and use the SC.WVAL command to enter the test weight value in the following format:
WVAL=nnnnnn<CR>
4. Send the SC.WSPAN EDP command to calibrate span. The indicator displays ***CAL*** while calibration is in progress.
5. To remove an offset value, clear all weight from the scale, including items used to hang test weights, and then send the SC.REZERO EDP command. The indicator displays ***CAL*** while the zero and span calibrations are adjusted.
6. Send the KUPARROW EDP command to exit configuration mode.

4.3 Revolution Calibration

To calibrate the indicator using *Revolution*, the indicator COM 1 port must be connected to a PC running the *Revolution* configuration utility.

Use the following procedure to calibrate the indicator:

1. Select **Calibration Wizard** from the *Revolution* tools menu.
2. *Revolution* uploads calibration data from the indicator and presents the information in the calibration wizard, as shown in Figure 4-1.



Figure 4-1. Revolution Calibration Display

3. Enter the **Value of Test Weight** to be used for span calibration and click **OK**.
4. The Zero Calibration dialog box prompts you to remove all weight from the scale. Clear the scale and click **OK** to begin zero calibration.



Note If your test weights require hooks or chains, place them on the scale for zero calibration.






5. When zero calibration is complete, the Span Calibration dialog box prompts you to place test weights on the scale for span calibration. Place test weights on the scale and click **OK**.
6. When calibration is complete, the **New Settings** fields of the Indicator Calibration display are filled in. Click **Exit** to save the new values and return to the *Revolution* main menu; to restore the previous calibration values, click **Restore Settings**.

4.4 More About Calibration

The following provides additional information about compensating for environmental factors.

4.4.1 Adjusting Final Calibration

Calibration may be affected by environmental factors including wind, vibration, and angular loading. For example, if the scale is calibrated with 1000 lb, a strain test may determine that at 2000 lb the calibration is 3 lb high. In this case, final calibration can be adjusted by tweaking WVAL to 998.5 lb. This adjustment provides a linear correction of 1.5 lb per 1000 lb.

To adjust the final calibration, return to the **WVAL** prompt and press  to show the test weight value. Press  or  to adjust calibration up or down. Press  to save the value. Press  to return to the CALIBR menu.

5.0 Using Revolution

The *Revolution*® utility provides a suite of functions used to support configuration, calibration, customizing and backup of the 480 software.

Calibration values and scale configuration can be both saved and restored to the 480 using *Revolution*

Hardware and Software Requirements

Minimum system requirements: 166 MHz, x86-compatible, with 32 MB RAM (64 MB for NT4/2000/XP), 40 MB disk space. Recommended system: 233 MHz, x86-compatible or greater, with 64 MB RAM, 40 MB disk space.

Revolution runs on most Windows® operating systems, including Windows 98, Windows 98 SE, Windows ME, Windows NT 4.0 (SP4 or greater), Windows 2000, Windows XP (Home or Professional), Windows Vista™ and Windows 7.

Internet Explorer® (IE) 4.0 or greater is required to use the *Revolution* help system. Internet Explorer is included on the *Revolution* installation CD or is available from Microsoft Corporation.

5.1 Connecting to the Indicator

Connect the PC serial port to com 1 of the 480, then click **Connect** in the toolbar. *Revolution* attempts to establish communications to the indicator. If communications settings need to be adjusted, select **Options...** from the Tools menu.

Downloading to the Indicator

The **Download Configuration** function on the *Revolution* Communications menu allows a *Revolution* configuration file (with or without scale calibration data) or ticket formats to be downloaded to a connected indicator in configuration mode.

The **Download Section** function on the Communications menu allows you to download only the currently displayed object, such as a scale configuration.

Because less data is transferred using **Download Section**, it is typically faster than a full configuration download, but there is an increased possibility that the download may fail due to dependencies on other objects. If the download fails, try performing a complete download using the **Download Configuration** function.

Uploading Configuration to Revolution

The **Upload Configuration** function on the *Revolution* Communications menu allows the existing configuration of a connected indicator to be saved to a file on the PC. Once saved, the configuration file provides a backup that can be quickly restored to the indicator if needed. Or, the file can be edited within *Revolution* and downloaded back to the indicator.

5.2 Saving and Transferring Data



Note *Revolution[®] has a module to save and transfer data. It is the preferred method over using ProComm or Hyper Terminal.*

5.2.1 Saving Indicator Data to a Personal Computer

Configuration data can be saved to a personal computer connected to the selected port. The PC must be running a communications program such as PROCOMMPLUS[®].

When configuring the indicator, ensure that the values set for the BAUD and BITS parameters on the SERIAL menu match the baud rate, bits, and parity settings configured for the serial port on the PC.

To save all configuration data, first put your communications program into data capture mode, then place the indicator in configuration mode and send the DUMPALL command to the indicator. The 480 responds by sending all configuration parameters to the PC as ASCII-formatted text.

5.2.2 Downloading Configuration Data from PC to Indicator

Configuration data saved on a PC or disc can be downloaded from the PC to an indicator. This procedure is useful when a number of indicators with similar configurations are set up or when an indicator is replaced.

To download configuration data, connect the PC to the selected port as described in Section 5.2.1. Place the indicator in configuration mode and use the PC communications software to send the saved configuration data to the indicator. When transfer is complete, calibrate the indicator as described in Section 4.0.

6.0 EDP Commands



Note EDP commands are case sensitive. Commands must be entered in upper case.

The 480 indicator can be controlled by a personal computer or remote keyboard connected to one of the indicators communication ports. Control is provided by a set of EDP commands that can simulate front panel key press functions, display and change setup parameters, and perform reporting functions. This section describes the EDP command set.

6.1 The EDP Command Set

The EDP command set can be divided into five groups: key press commands, reporting commands, the RESETCONFIGURATION special function command, parameter setting commands, and transmit weight data commands.

When the indicator processes an EDP command, it responds with the message **OK**. The **OK** response verifies that the command was received and has been executed. If the command is unrecognized or cannot be executed, the indicator responds with **??**.

The following sections list the commands and command syntax used for each of these groups.

6.1.1 Key Press Commands

Key press EDP commands (see Table 6-1) simulate pressing the keys on the front panel of the indicator. Most commands can be used in both setup and weighing mode. Several of the commands serve as “pseudo” keys, providing functions that are not represented by a key on the front panel.

For example, to enter a 15 pound tare weight using EDP commands:

1. Type **K1** and press **ENTER** (or **RETURN**).
2. Type **K5** and press **ENTER**.
3. Type **KTARE** and press **ENTER**. The display shifts to net mode when the tare is entered.

Command	Function
KZERO	In normal mode, press the ZERO key
KGROSSNET	In normal mode, press the GROSS/NET key
KGROSS	Go to gross mode
KNET	Go to net mode
KTARE	Press the TARE key
KUNITS	In weighing mode, press the UNIT key
KPRIM	Go to primary units
KSEC	Go to secondary units
KPRINT	In normal mode, press the PRINT key
KDISPACCUM	Displays current accumulator value.
KCLRACCUM	Clears accumulator
KDISPTARE	Display tare
KMENU	Press the MENU key
KCLRCN	Reset consecutive number
KCLRTAR	Clear tare from system
KLEFTARROW	In setup mode, move left in the menu
KRIGHTARROW	In setup mode, move right in the menu
KUPARROW	In setup mode, move up in the menu
KDOWNARROW	In setup mode, move down in the menu
KSAVE	In setup mode, saves the current configuration. Command works only if a parameter has been changed.
KLOCK	Lock specified front panel key. For example, to lock the ZERO key, enter KLOCK=KZERO.
KUNLOCK	Unlock specified front panel key. For example, to unlock the PRINT key, enter KUNLOCK=KPRINT.
KCLR	Press the CLEAR key
KDATE	Display date
KTIME	Display time
KTIMEDATE	Display time and date

Table 6-1. Serial Key Press Commands

6.1.2 Reporting Commands

Reporting commands (see Table 6-2) send specific information to the selected port. These commands can be used in both setup mode and normal mode.

Command	Function
DUMPALL	List all parameter values
DUMPAUDIT	List audit data information
P	Write current displayed weight with units identifier. See Section 9.2 on page 58 for more information.
ZZ	Write current weight and annunciator status. See Section 9.2 on page 58 for more information.
S	Write one frame of stream format
VERSION	Returns the currently installed firmware version

Table 6-2. EDP Reporting Commands

6.1.3 The RESETCONFIGURATION Command

The RESETCONFIGURATION command can be used to restore all configuration parameters to their default values. Before issuing this command, the indicator must be placed in configuration mode.

This command is equivalent to using the DEFLT function on the TEST menu. See Section 9.1.2 for more information about test mode and using the TEST menu.



Note All load cell calibration settings are lost when the RESETCONFIGURATION command is run.

6.1.4 Parameter Setting Commands

Parameter setting commands allow you to display or change the current value for a particular configuration parameter.

Current configuration parameter settings can be displayed in either setup mode or normal mode using the following syntax:

command<ENTER>

Most parameter values can be changed in setup mode only; setpoint parameters listed in Table 6-9 can be changed when in normal weighing mode.

Use the following command syntax when changing parameter values: **command=value<ENTER>**, where *value* is either a number or a parameter value. Use no spaces before or after the equal (=) sign. If you type an incorrect command, the display reads ??.

6.1.5 Soft Reset

The command RS will reset the indicator without losing configuration and calibration. It does reset consecutive number and count mode.

Command	Description	Values
SC.GRADS	Graduations	1-100000
SC.ZTRKBND	Zero track band	0.0-3.0
SC.ZRANGE	Zero range	1 - 100 (example: to make it 5%, enter "SC.ZRANGE=5").
SC.INIZR	Initial zero range	0-100 (if set to zero , no initial zero is performed)
SC.MOTBAND	Motion band	0.0 - 100 (in display divisions) Example: to enter 5 divisions, send "SC.MOTBAND=5.0".
SC.OVRLOAD	Overload	FS+2%, FS+1D, FS+9D, FS
SC.DSPRAT	Display Rate	0.1 SEC, 0.25 SEC, 0.5 SEC, 0.75 SEC, 1 SEC, NONE
SC.SMPRAT	Sample rate	5HZ, 40HZ, 20HZ, 10HZ
SC.DIGFIL	Select Digital Filter Type	ADAPTIVE, ROLLING, OFF
SC.AFILTER.SENSITIVITY	Adaptive digital filter cutout sensitivity	LIGHT, MEDIUM, HEAVY
SC.AFILTER.THRESHOLD	Adaptive digital filter cutout threshold	0 – 999999
SC.RFILTER.SENSITIVITY	Digital filter cutout sensitivity	2OUT, 4OUT, 8OUT, 16OUT, 32OUT, 64OUT, 128OUT
SC.RFILTER.THRESHOLD	Digital filter cutout threshold	NONE, 2DD, 5DD, 10DD, 20DD, 50DD, 100DD, 200DD, 250DD
SC.RFILTER.STAGE1-3	Digital filtering	1, 2, 4, 8, 16, 32, 64
SC.TAREFN	Tare function	BOTH, NOTARE, PBTARE, KEYED

Table 6-3. CONFIG EDP Commands

Command	Description	Values
SC.PRI.DECPNT	Primary units decimal position	8.88888, 88.8888, 888.888, 8888.88, 88888.8, 888888
SC.PRI.DSPDIV	Primary units display divisions	1D, 2D, 5D, 10D, 20D , 50D
SC.PRI.UNITS	Primary units	LB, KG, OZ, TN, T, G
SC.SEC.DECPNT	Secondary units decimal position	8.88888, 88.8888, 888.888, 8888.88, 88888.8, 888888
SC.SEC.DSPDIV	Secondary units display divisions	1D, 2D, 5D, 10D, 20D , 50D
SC.SEC.UNITS	Secondary units	LB, KG, OZ, TN, T, G

Table 6-4. FORMAT EDP Commands

Command	Description	Values
SC.WZERO	Zero calibration	—
SC.WVAL	Test weight value	value
SC.WSPAN	Span calibration	—
SC.REZERO	Rezero	—
SC.LC.CD	Read or set dead load counts	value
SC.LC.CW	Read or set span counts	value

Table 6-5. CALIBR EDP Commands

Command	Description	Values
PWRUPMD	Power up mode	GO, DELAY
REGULAT	Regulatory compliance	NTEP, OIML, CANADA, NONE
CONSUM	Consecutive number	0 – 999999
CONSTUP	Consecutive number start-up value	0 – 999999
ACCUM	Accumulator	ON/OFF
ACCUM.RTZGRADS	Return to zero trigger in grads	0 – 10000
DATEFMT	Date format	MMDDYY, DDMMYY, YYMMDD, YYDDMM
DATESEP	Date separator	SLASH, DASH, SEMI
TIMEFMT	Time format	12HOUR, 24HOUR
TIMESEP	Time separator	COLON, COMMA
UID	Unit ID Value	0 – 999999
POWER	Power switch mode	AUTO, MANUAL
SLEEP	Sleep mode setting	NEVER, 1, 2, 5, 10
STDBY	Standby setting	OFF, 1SEC, 2SEC, 3SEC, 5SEC, 10SEC, 60SEC
WGTHRH	Sleep Mode Weight Threshold	0-999999
DDTHRH	Sleep Mode Display Division Threshold	0-999999

Table 6-6. PROGRM EDP Commands

Command	Description	Values
DIGIN1 DIGIN2 DIGIN3 DIGIN4	Digital input function	OFF, ZERO, TARE, NT-GRS, UNITS, DSPTAR, PRINT, CLRCN, KBDLOC, HOLD, CLRTAR, ACCUM, CLRACC, BATSTR, BATSTP, BATRES, BATPUS, BATRUN, NET, GROSS, PRI, SEC

Table 6-7. DIG IN EDP Commands

Command	Description	Values
ALG.SOURCE	Analog output source	GROSS, NET
ALG.OFFSET	Zero offset	0%, 20%
ALG.ERRACT	Error action	FULLSC, HOLD, ZEROSC
ALG.MIN	Minimum value tracked	0 – 999999
ALG.MAX	Maximum value tracked	0 – 999999
ALG.MINNEG	Minimum negative	NO, YES
ALG.MAXNEG	Maximum negative	NO, YES
ALG.TWZERO	Zero calibration	0 – 65535
ALG.TWSPAN	Span calibration	0 – 65535
ALG.OUTPUT	Voltage or current output	CURRENT, VOLTAGE

Table 6-8. ALGOUT EDP Commands

Command (n = setpoint number)	Description	Values
SP.BATCHG	Batching	OFF, AUTO, MANUAL
SP.ENABLE#n	Setpoint enable	OFF, ON
SP.KIND#n	Setpoint kind	GROSS, NET, -GROSS, -NET, OFF, DELAY
SP.VALUE#n	Setpoint value	number
SP.TRIP#n	Trip	HIGHER, LOWER
SP.PREACT#n	Band value	number
SP.HYSTER#n	Hysteresis	number
SP.PUSHPR#n	Perform print when setpoint is satisfied	OFF, ON
SP.PUSHAC#n	Updates accumulator and performs a print when setpoint is satisfied	OFF, ON
SP.PUSHTR#n	Perform Tare when setpoint is satisfied	OFF, ON
SP.DIGOUT#n	Digital outputs	NONE, 1 – 8
SP.BATSEQ#n	Batch type setpoint	OFF, ON
SP.WAITSS#n	Value must be stable	OFF, ON

Table 6-9. SETPNTS 1–8 EDP Commands

Command (p = port number)	Description	Values
EDP.TRIGGER#p	EDP port trigger	Port 1 – COMAND, DEMAND, PRN, NONE Port 2 – NONE, PRN, STR-1, STR-2, STR-3, STR-4, STR5
EDP.BAUD#p	EDP port baud rate	1200, 2400, 4800, 9600, 19200, 38400
EDP.BITS#p	EDP port data bits/parity	8NONE, 7EVEN, 7ODD
EDP.SBITS#p	EDP port stop bits	1STOP, 2STOP
EDP.TERMIN#p	EDP port termination character	CR/LF, CR
EDP.EOLDLY#p	EDP port end-of-line delay	0 – 255 (0.1-second intervals)
EDP.ECHO#p	EDP port echo	ON, OFF
EDP.PRMSG#p	Enable print message when a demand print is performed	OFF, ON
EDP.STRUR#p	Legal for Trade or industrial stream	STRLFT,STRIND
EDP.STREAM	Specifies the operating mode of the indicator (see Section 9.4)	NONE, LOCAL, REMOTE

Table 6-10. SERIAL EDP Commands

Ethernet Functionality

The Ethernet port works in COMMAND mode meaning that it is possible to send any EDP command to the indicator and receive a response from the indicator accordingly. It is not possible to print from the port.

Command	Description	Values
ETH.DHCP	Dynamic Host Configuration Protocol (DHCP)	ON – Dynamic allocation of IP address OFF – Static allocation of IP address
ETH.IPADDRESS	Source IP address, a 4 field value	The range of each field is 0-255 (0-255).(0-255).(0-255).(0-255)
ETH.NETMASK	SUBNET mask, a 4 field value	The range of each field is 0-255 (0-255).(0-255).(0-255).(0-255)
ETH.DEFAULTGATEWAY	Default gate way, a 4 field value	Range of each field is 0-255 (0-255).(0-255).(0-255).(0-255)
ETH.MAC	Returns the MAC address, read only	6 fields, 8 bit each, in hexadecimal base
ETH.SERVER.PORT	The ethernet server TCP port	1-65535
ETH.SERVER.ECHO	Sets the Server Port Echo	ON, OFF
ETH.SERVER.TRIGGER	Server Port Trigger	DEMAND, COMAND, STRLFT, STRIND
ETH.SERVER.TIMEOUT	Server Inactivity Timeout in seconds	0-65535
ETH.SERVER.TERMIN	Server Line Termination	CR or CR/LF
ETH.SERVER.SFMT	Server Stream Format	STR-1, STR-2, STR-3, STR-4, STR-5
ETH.SERVER.EOLDLY	Server End of Line Delay	0-255
ETH.CLIENT.REMOTESERVERIP	Client Remote Server IP Address	Range of each field is 0-255 (0-255).(0-255).(0-255).(0-255)
ETH.CLIENT.REMOTESERVERPORT	Client Remote Server TCP Port number	1-65535
ETH.CLIENT.TRIGGER	Client Port Trigger	DEMAND, COMAND, STRLFT, STRIND
ETH.CLIENT.TIMEOUT	Client Inactivity Timeout in seconds	0-65535
ETH.CLIENT.TERMIN	Client Line Termination	CR or CR/LF
ETH.CLIENT.SFMT	Client Stream Format	STR-1, STR-2, STR-3, STR-4, STR-5
ETH.CLIENT.EOLDLY	Client End of Line Delay	0-255
ETH.CLIENT.ECHO	Sets the Client Echo	ON, OFF

Table 6-11. Ethernet Commands

Command	Description	Default Values
GFMT	Gross demand print format string	GROSS<G><NL2><TD><NL>
NFMT	Net demand print format string	GROSS<G><NL>TARE<SP><T><NL>NET<SP2><N><NL2><TD><NL>
ACCFMT	Accumulator demand print format string	ACCUM <A><NL><DA> <TI><NL>
SPFMT	Setpoint print format	<SCV><SP><SPM><NL>

Table 6-12. PFORMT EDP Commands

Command	Description	Values
POWER	Determines if indicator automatically powers on when plugged in or if power key must be pressed. Read only in Weighing Mode.	AUTO MANUAL
BKLGHT	Controls the LCD backlight display. Read only in Weighing Mode.	ON, OFF, AUTO
BKLGHT.AUTO	Controls the LCD backlight display auto off time. Read only in Weighing Mode.	10SEC, 30SEC, 1MIN, 5MIN, 10MIN
BAT	Reads the battery level. Read only.	Current battery level in millivolts.
USB.DEVICE	Select the USB Device	HOSTPC, DRIVE, PRINTER
USB.TRIGGER	Set the USB Port Trigger	DEMAND, COMAND

Table 6-13. MISC Commands

6.1.6 Normal Mode Commands

The serial transmit weight data commands (see Table 6-14) transmit data to the selected port on demand. The SX and EX commands are valid only in normal operating mode; all other commands are valid in either setup or normal mode.



Command	Description	Response Format
UID	View and set unit ID when in setup mode. In Weigh mode, the value can be changed temporarily. It will revert to last saved value at next power up.	nnnnnn
DATESET	View or set date.	The response will be in the format, and using the separators, as defined in configuration. To Set, first query the date, then send DATESET= , in exactly the same format (except use only 2 digits for the year).
TIMESET	View or set time.	The response will be in the format, and using the separators, as defined in configuration. To Set, first query the time, then send TIMESET= followed by the time in exactly the same format as the query, including seconds, and AM or PM if 12 hour.
SX	Start streaming on Port 2.  Note <i>The Trigger Mode of Port 2 must be set to one of the five stream modes for this command to function.</i>	OK or ??
EX	Stop streaming on Port 2  Note <i>The Trigger Mode of Port 2 must be set to one of the five stream modes for this command to function.</i>	OK or ??
RS	Soft reboot	—
XA	Transmit accumulator value	nnnnnn UU Where nnnnnn is the weight value, UU is the units.
XG	Transmit gross weight in displayed units	
XN	Transmit net weight in displayed units	
XT	Transmit tare weight in displayed units	
XG2	Transmit gross weight in non-displayed units	
XN2	Transmit net weight in non-displayed units	
XT2	Transmit tare weight in non-displayed units	
XE	Query system error conditions	nnnnn nnnnn See Section 9.0 for detailed information about the XE command response format.

Table 6-14. Normal Mode Commands

7.0 Print Formatting

The 480 provides multiple print formats, GFMT, NFMT, ACCFMT and SPFMT, that determine the format of the printed output when the **PRINT** key is pressed. If a tare has been entered or acquired, NFMT is used; otherwise, GFMT is used.

Each print format can be customized to include up to 300 characters of information, such as company name and address, on printed tickets. You can use the indicator front panel (PFORMT menu) to customize the print formats.



Note Display will only show capital letters. Press the down arrow to view the ASCII character decimal value on the second menu level. Refer to Table 9-6 on page 69 and Table 9-7 on page 70 to view the ASCII character charts.

7.1 Print Formatting Tokens

Table 7-1 lists tokens you can use to configure the print formats. Tokens included in the format strings must be enclosed between < and > delimiters. Any characters outside of the delimiters are printed as text on the ticket. Text characters can include any ASCII character that can be printed by the output device.

Token	Description
<G>	Gross weight in displayed units
<G2>	Gross weight in non-displayed units ***
<N>	Net weight in displayed units
<N2>	Net weight in non-displayed units ***
<T>	Tare weight in displayed units
<T2>	Tare weight in non-displayed units ***
<A>	Accumulated weight in displayed units
<AC>	Number of accumulator events (5 digit counter)
<AD>	Date of last accumulator event
<AT>	Time of last accumulator event
<UID>	Unit ID number
<CN>	Consecutive number
<NLnn>	New line (nn = number of termination (<CR/LF> or <CR>) characters)*
<SPnn>	Space (nn = number of spaces)*
<SU>	Toggle weight data format (formatted/unformatted) ** ***
<TI>	Time
<DA>	Date (prints 4 digit year)
<TD>	Time & Date
<SCV>	Setpoint captured value
<STV>	Setpoint target value
<SPM>	Setpoint mode (Net or Gross)
<SN>	Setpoint number
Gross, net, and tare weights are 9 digits in length, including sign (10 digits with decimal point), followed by a space and a two-digit units identifier. Total field length with units identifier is 12 (or 13) characters.	
UID and consecutive number (CN) fields are 6 characters in length.	
* If nn is not specified, 1 is assumed. Value must be in the range 1–99.	
** After receiving an SU command, the indicator sends unformatted data until the next SU command is received. Unformatted data omits decimal points, and leading and trailing characters.	
*** Not available if regulatory mode is set to OIML.	

Table 7-1. Print Format Tokens

The default 480 print formats are shown in Table 7-2:

Format	Default Format String	When Used
GFMT	GROSS<G><NL2><TD><NL>	Normal mode – no tare in system
NFMT	GROSS<G><NL>TARE<SP><T><NL>NET<SP2><N><NL2><TD><NL>	Normal mode – tare in system
ACCFMT	ACCUM <A><NL><DA><SP><TI><NL>	Accumulator demand print format string
SPFMT	<SCV><SP><SPM><NL>	Setpoint print operation with PSHPRNT=ON

Table 7-2. GFMT and NFMT Formats



Note The <G2>, <N2>, and <T2> tokens (Table 7-1) print the gross, net, and tare weights in the units not currently displayed on the indicator.

The 300 character limit of each print format string includes the output field length of the print formatting tokens, not the token length. For example, if the indicator is configured to show a decimal point, the <G> token generates an output field of 13 characters: the 10 character weight value (including decimal point), one space, and a two-digit units identifier.

PT (preset tare) is added to the tare weight if tare was keyed in.

7.2 Customizing Print Formats

The following sections describe procedures for customizing the GFMT, NFMT, ACCFMT and SPFMT formats using the front panel (PFORMAT menu). See Figure 3-6 for print format menu structure.

7.2.1 Using the Front Panel

You can use the PFORMAT menu to customize the print formats.

Using the PFORMAT menu (see Figure 3-6), you can edit the print format strings by changing the decimal values of the ASCII characters in the format string.



Note Some characters cannot be displayed on the 480 front panel (see the ASCII character charts on page 69 and page 70) and are shown as blanks. The 480 can send or receive any ASCII character; the character printed depends on the particular ASCII character set implemented for the receiving device.

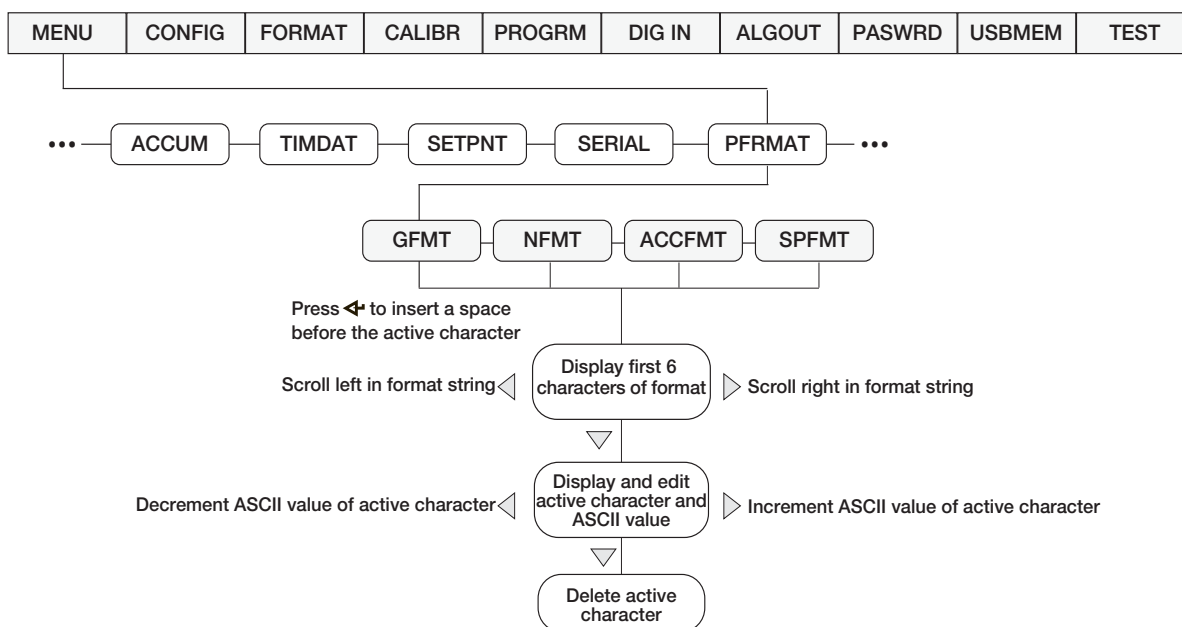


Figure 7-1. Print Format Menu

8.0 Setpoints

The 480 indicator provides eight configurable setpoints for control of both indicator and external equipment functions. Setpoints can be configured to perform actions or functions based on specified parameter conditions. Parameters associated with various setpoint kinds can, for example, be configured to perform functions (print, tare, accumulate), to change the state of a digital output controlling indicator or external equipment functions, or to make conditional decisions.



Note *Weight-based setpoints are tripped by values specified in primary units only.*



Important *Firmware versions 1.00 and 1.01 require having a relay board installed for the setpoints to operate.*

8.1 Batch and Continuous Setpoints

480 setpoints can be either continuous or batch.

Continuous setpoints are free-running: the indicator constantly monitors the condition of free-running setpoints at each A/D update. The specified setpoint action or function is performed when the designated setpoint parameter conditions are met. A digital output or function assigned to a free-running setpoint continuously changes state, becoming active or inactive, as defined by the setpoint parameters.

Batch setpoint (BATSEQ = ON) A digital output associated with a batch setpoint is active until the setpoint condition is met. Then it is latched for the remainder of the batch sequence.

To use batch setpoints, set the batching (BATCHG) parameter on the setpoints (SETPTS) menu. This parameter defines whether a batch sequence is automatic or manual. AUTO sequences repeat continuously after receiving a single batch start signal, while MANUAL sequences only run through once for each Batch Start signal. The batch start signal can be initiated by a digital input (set to BATSTR), or an EDP command (BATSTART).

For a setpoint to be used as part of a batch sequence, its batch sequence (BATSEQ) parameter must be set to ON. If a setpoint is defined and enabled, but its Batch Sequence parameter is set to OFF, the setpoint operates as a continuous setpoint even during batch sequences.



Note *In applications that contain both batch setpoint routines and continuous setpoints, it is good practice to keep continuous setpoints separate from the batch sequence.*

Do Not assign them the same digital output.

9.0 Appendix

9.1 Error Messages

The 480 indicator provides a number of error messages. When an error occurs, the message is shown on the indicator LED display.

9.1.1 Displayed Error Messages

The 480 provides a number of front panel error messages to assist in problem diagnosis. Table 9-1 lists these messages and their meanings.

Error Message	Description	Solution
E A/D	A/D physical error	Call Rice Lake Weighing Systems (RLWS) Service at 800-472-6703.
EEEROM	EEPROM physical error	
EVIREE	Virgin EEPROM	Use TEST menu to perform DEFLT (restore defaults) procedure, then recalibrate load cells.
EPCKSM	Parameter checksum error	
EACKSM	A/D calibration checksum error	A/D converter requires recalibration. Call RLWS Service.
EFCKSM	Printer format checksum error	Call RLWS Service at 800-472-6703.
ELCKSM	Load cell calibration checksum error	Recalibrate load cells.
EIDATA	Internal RAM checksum error	Call RLWS Service at 800-472-6703.
E REF	A/D reference error	A/D converter requires recalibration. Call RLWS Service.
ERROR	Internal program error	Check configuration. Call RLWS Service if unable to clear error by cycling power or if error recurs.
OVERFL	Overflow error	Weight value too large to be displayed.
-----	Gross > overload limit	Gross value exceeds overload limit. Check configuration or signal input level. Overload can be caused by input signal > 45 mV or common mode voltage > 950 mV.
-----	Gross < 20d behind zero	Gross value is more than 20 divisions behind zero (OIML).
RNGERR	GRADS > 100,000 WVAL > 100,000	Only shows up in Config mode.
EEPERR	EEPROM error	Call RLWS for service at 800-472-6703.
HINOFF?	High offset	Zero load at powerup is more than initial zero range (INIZR) setting of calibration zero – remove the extra load.
LINOFF	Low offset	Zero load at power up is less than initial zero range (INIZR) setting of calibration zero – add the missing load.
NOBATT	No battery	The RTC lost time/date tracking at previous power off state due to low battery or no battery condition. The printer, accumulator and AUDUT functions will fail to get time and date.
EUCKSM	Configuration checksum	The checksum value of configuration has changed from that stored in memory.
OIMLER	OIML parameter error	Parameter set incorrectly for use in the OIML mode. Example: Primary units set for lb or oz.
EE-ACC	Accumulator error	Error with the accumulator such as attempting to display an accumulated value greater than six digits.

Table 9-1. 480 Error Messages



Note

Shorting the excitation voltage shuts the excitation voltage off. The only way to restore excitation voltage is to cycle power.

9.1.2 Using the XE EDP Command

The XE EDP command can be used to remotely query the 480 for the error conditions shown on the front panel. The XE command returns two 5 digit numbers in the format:

xxxxx yyyy

where xxxxx contains a decimal representation of any existing error conditions as described in Table 9-2.

If more than one error condition exists, the number returned is the sum of the values representing the error conditions. For example, if the XE command returns the number 1040, this value represents the sum of an A/D reference error (1024) and an A/D calibration checksum error (16).

The second number returned (yyyyy) uses the same bit assignments as shown in Table 9-2 to indicate whether the test for the error condition was run. For example, the value yyyyy = 50815 represents the decimal equivalent of the binary value 1100 0110 0111 1111. Using the bit assignments in Table 9-2, this value indicates all tests were run.

Error Code	Description	Binary Value
1	EEPROM Error	0000 0000 0000 0001
2	Virgin EEPROM	0000 0000 0000 0010
4	Config Parameter Checksum	0000 0000 0000 0100
8	Load Cell Checksum	0000 0000 0000 1000
16	A/D Calibration Checksum	0000 0000 0001 0000
32	Print Formats Checksum	0000 0000 0010 0000
64	XA Internal RAM Error	0000 0000 0100 0000
128	External RAM Error	0000 0000 1000 0000
256	Reserved	0000 0001 0000 0000
512	ADC Physical Error	0000 0010 0000 0000
1024	ADC Reference	0000 0100 0000 0000
2048	Count Error	0000 1000 0000 0000
4096	Reserved	0001 0000 0000 0000
8192	Display Range	0010 0000 0000 0000
16384	ADC Range	0100 0000 0000 0000
32768	Gross Limit	1000 0000 0000 0000
0x10000 - 0x80000000		Reserved

Table 9-2. Error Codes Returned on XE Command

9.2 Status Messages

Two EDP commands, P and ZZ, can be used to provide status about the indicator. These commands are described in the following sections.

9.2.1 Using the P EDP Command

The P EDP command returns the current displayed weight value, along with the units identifier. If the indicator is in an underrange or overload condition, the weight value is replaced with &&&&& (overload) or ::::: (underrange).

9.2.2 Using the ZZ EDP Command

The ZZ EDP command can be used to remotely query which annunciators are currently displayed on the indicator front panel. The ZZ command returns the currently displayed weight and a decimal number representing the LED annunciators currently lit. The format of the returned data is:

wwwwww uu zzz

where wwwwww uu is the current displayed weight and units, and zzz is the annunciator status value (see Table 9-3). If more than one annunciator is lit, ZZZ is the sum of the values representing the active annunciators.

Example: If the annunciator status value returned on the ZZ command is 145, the gross, standstill, and lb annunciators are lit. The number 145 represents the sum of the values for the standstill annunciator (128), gross mode annunciator (16), and the lb/primary units annunciator (1).

Decimal Value	Annunciator
1	lb/primary units
2	kg/secondary units
4	Tare entered
8	Keyed tare entered
16	Gross
32	Net
64	Center of zero
128	Standstill

Table 9-3. Status Codes Returned on the ZZ Command

9.3 Continuous Data (Stream) Output Formats

When the trigger setting for COM-2 is set to one of the stream formats (STR1-STR5), or the Ethernet client or server trigger setting is STRLFT or STRIND, data is continuously streamed from the appropriate port in one of the five fixed formats that follow.

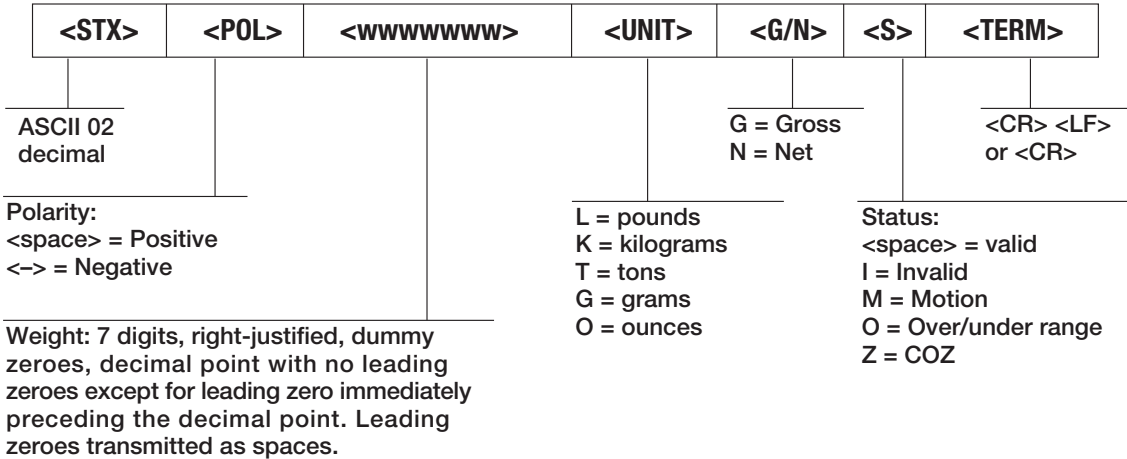


Figure 9-1. STR-1 Rice Lake Stream Data Format

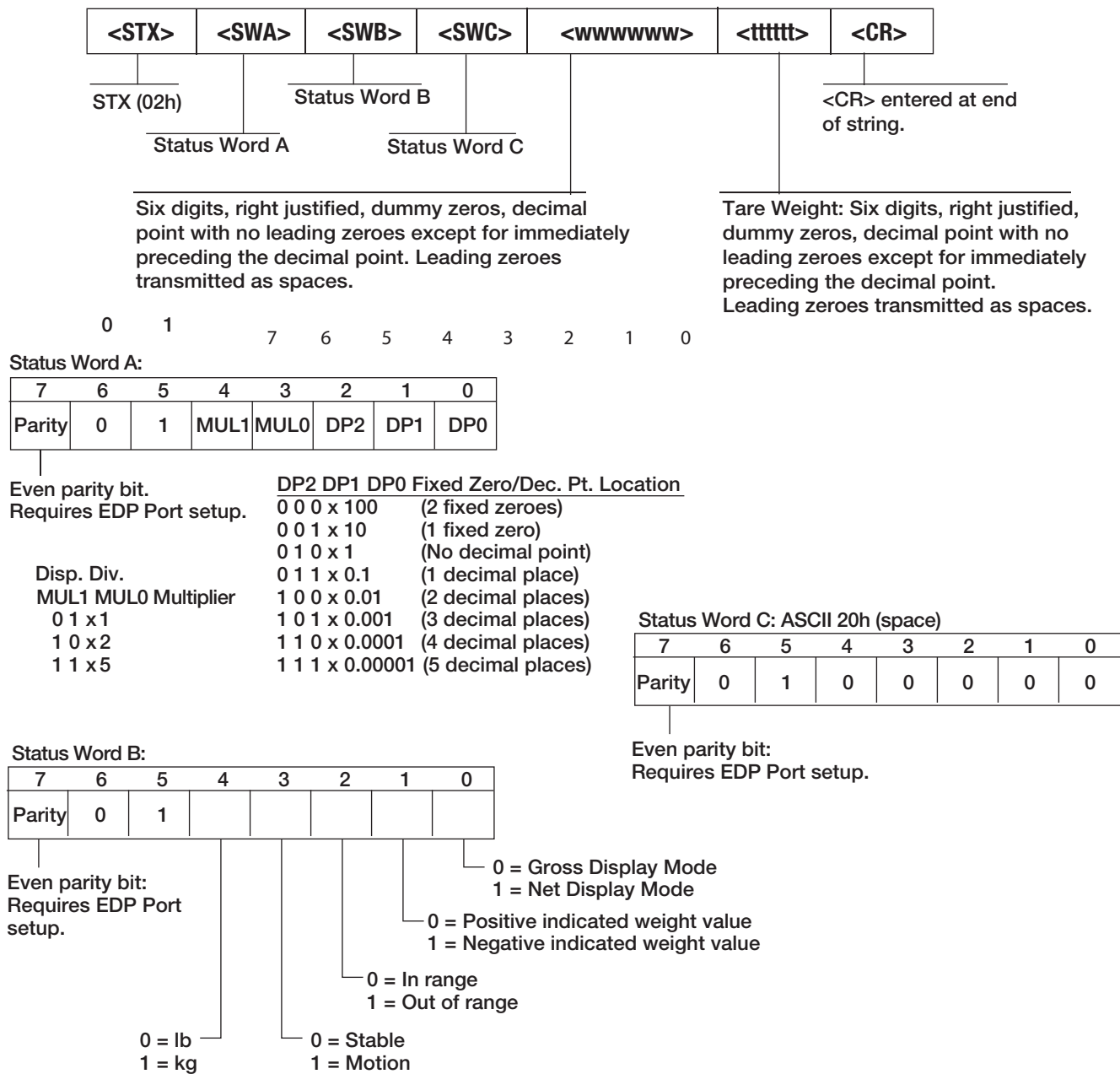


Figure 9-2. STR-2 Toledo Stream Data Format

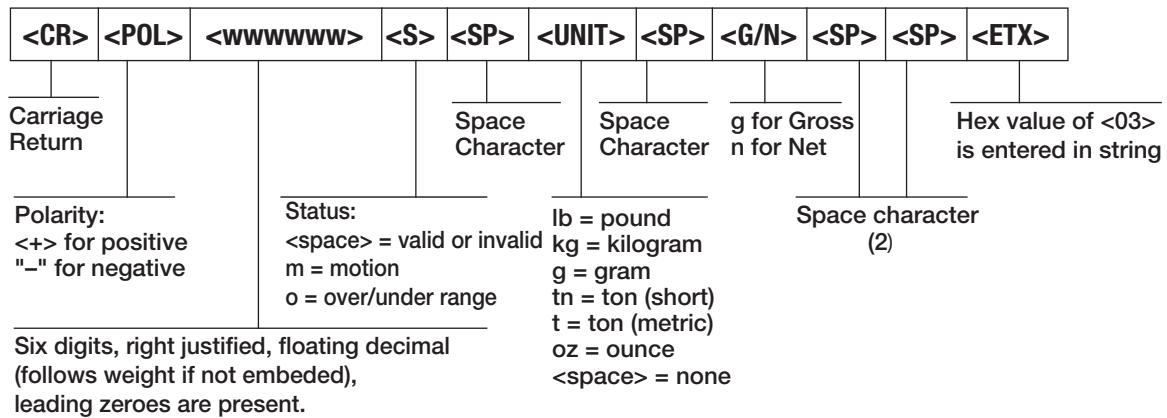


Figure 9-3. STR-3: Weightronix Stream Data Format

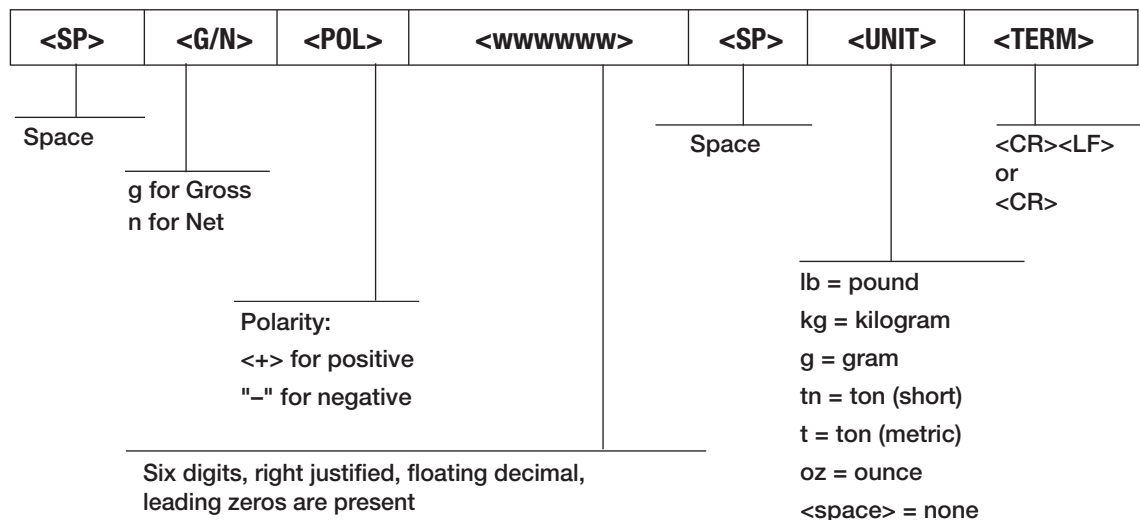


Figure 9-4. STR-4 Cardinal Stream Data Format

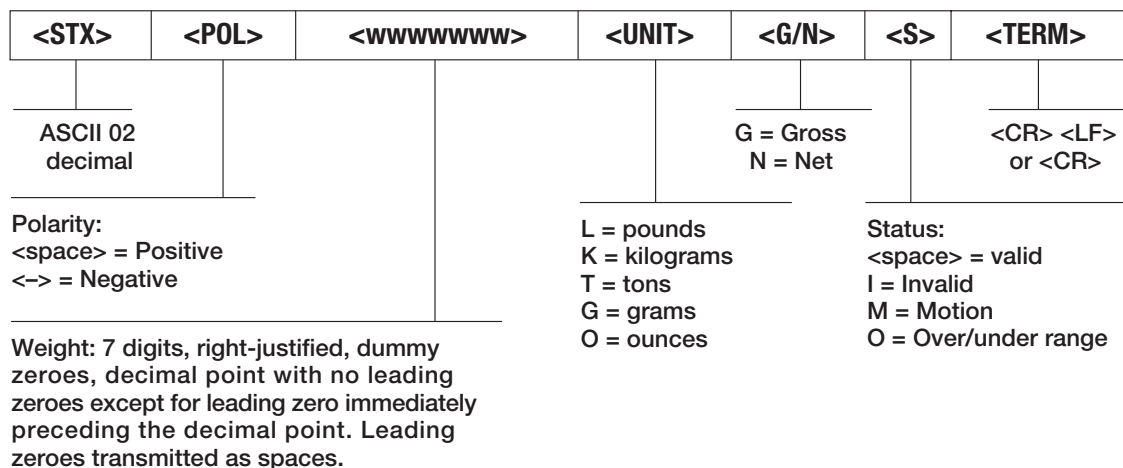


Figure 9-5. STR-5: Consolidated Controls Stream Data Format



Note Port 1 cannot be set to stream.

9.4 Local/Remote Operation

For systems that require two locations, local/remote support provides function equivalent to that of a legal-for-trade remote display with keypad. Scale data from the local indicator is also displayed at the remote unit, and keypad input from the remote allows transactions to be initiated from either the local or remote unit.

To configure for local/remote operation, set **STREAM** to local or remote. Once the local unit scale has been configured, use the **SERIAL** menu, serial commands, or *Revolution* to set the serial parameters for local/remote operation. See Table 3-3 for comport options.

Serial Configuration Parameter	Local Unit		Remote Unit	
	Parameter Value	Function	Parameter Value	Function
STREAM	Local	Stream Continuous Data	Remote	Sets indicator to display the weight data sent from the Local Unit.
COM2.TRIGER	Select STR-1	Streams the local unit weight data to the remote unit	Select STR-1	Transmits demand key presses, zero, gross/net, tare, units
COM2.BAUD	Local and remote must match			
COM2.ECHO	OFF		OFF	

Table 9-4. Local/Remote Configuration

Printing operation can be performed at the remote unit and/or at the local unit. When the operator presses the print key at the local unit, a printing ticket will be issued only locally. When the operator presses the print key at the remote unit, print will only occur at the remote unit.

9.5 Audit Trail Support

Audit trail support provides tracking information for configuration and calibration events. To prevent potential misuse, all configuration and calibration changes are counted as change events.

Audit trail information can be printed from *Revolution* or by sending the **DUMPAUDIT** serial command. See Figure 3-1. *Revolution* can be used to display audit trail information. The audit trail display includes the legally relevant (LR) version number (firmware version for the code that provides audit trail information), a calibration count and, if **REGULA=NTEP** or **Canada**, a configuration count. The exact format of the information shown depends on the regulatory agency specified for the **REGULA (PROGRM menu)** parameter.

See Section 1.8.10 for steps to view the Audit Trail.

For NTEP and Measure Canada modes, there are two numbers displayed; Configs and Calibs. The Configs number tracks changes to the legally relevant configuration parameter changes. The Calibs number tracks changes to the scale calibration.

In OIML mode, there is only one number displayed; Audit Trail. The Audit trail number is incremental for any legally relevant configuration parameter changes and all calibration changes. The last date the scale was calibrated is also displayed.

9.6 Sleep Mode

Firmware version 1.03 and newer of the 480 features a **SLEEP** mode. It is designed to place the indicators into a low power mode to reduce power consumption.

The sleep mode will only activate if the indicator is operating on its internal optional battery. If connected to external AC power, the indicator will not go into sleep mode regardless of the parameter settings.

The indicator will enter the sleep mode, after the time specified in the **SLEEP** parameter, when no keypad activity is detected and the displayed weight is below the weight threshold (**WGTHRH**). Setting the sleep parameter to **NEVER** disables the sleep mode.

Standby

While in sleep mode, at a time specified in the standby (**STDBY**) parameter, the indicator wakes up for about 0.5 seconds. The range of the standby time is 1 to 60 seconds. During the awake time, it checks for a change in weight greater than the display division threshold (**DDTHRH**), or if the weight has gone above the weight threshold (**WGTHRH**). It also checks to see if a key is being pressed, and it performs zero tracking.

Example:

If the standby parameter set to 1 second, the weight threshold to 100, and the display division threshold is set to 10d, once in sleep mode, the indicator will wake up every second for about half a second to check to see if a key is being pressed, the weight threshold is over 100 (WGTHRH), or the weight has change more than 10d (DDTHRH) since the last time it checked.

Setting the standby parameter to a higher value reduces the amount of time the indicator is awake, this will increase battery life.

An OFF setting stops the indicator from waking up. The only way to wake up the indicator is to press the power button.



Note *The indicator only checks for a depressed key during the time it is awake, so key presses may not be detected, especially if the standby parameter is set to a longer time. The Power button will always wake the indicator.*

9.7 Internal Battery Option

In Firmware version 1.03 and later, an optional internal rechargeable Li-ion battery is available. The battery can replace the AC power when needed. The amount of time the indicator will operate on the battery depends on:

- Type of display (LED)
- If sleep mode is used or not
- How many load cells are attached
- What options are installed.

The battery is automatically charged when the indicator is connected to AC power. It automatically switches to battery power if the AC power is removed. The battery is designed to only be charged by connecting to AC power.

When operating on battery power, the indicator features a Sleep mode that allows the indicator to go into a low power mode. Using the sleep mode helps improve battery life. See Section 9.6 for more information about the sleep mode.

When the battery life reaches 5-10% of capacity, the **Lo Bat** flashes on the display. When the battery life is less than 5%, it will flash faster, at 0% , the indicator will turn off.

9.8 USB Option

In Firmware version 1.03 and later, an optional Ethernet/USB board is supported.

The USB connection is capable of being either of the following:

- USB device (connected to a PC and appearing as an available communication port)
- USB host interface to a USB flash memory device

The mode of the USB option is selected in the user Menu.

9.8.1 HOSTPC

When set to HOSTPC mode, the USB port can be connected to a USB connection on a PC.

The *ST Microelectronics Virtual Com Port Driver V1.3.1* or newer is required on the PC. When connecting to Windows 7 or newer computers, that are connected to the Internet, the driver may load automatically. If not, it can be downloaded from the Rice Lake web site, or directly from ST Microelectronics.

When connected to a PC, the connection will appear to applications as another serial communications port. Using the USB trigger parameter in the 480 user menu, it is possible to set the port to act as both a serial command port and demand print port (DEMAND), or as a serial command port only (COMAND). All EDP serial commands can be used through the USB HOSTPC port. The USB port cannot be used to stream data.

9.8.2 Flash Drive

When set to DRIVE mode, the USB port can be connected to a USB flash memory drive to allow the upload and download of the indicator configuration parameters. The data is written to the drive in a FAT32 system format, no special drivers are required.

To use with a flash drive, first configure the USB parameter in the user menu to DRIVE. Saving the configuration to the drive, or loading it from the drive, can only be done in the configuration menu.

To save the configuration:

1. Attach a flash drive to the USB port.
2. Enter the configuration menu and navigate go to USBMEM. See Section 3.2 on page 29.
3. Press ▾, then press ◀ or ▶ to select SAVE. See Section 3.2.9 on page 40
4. Press the Enter or Tare key. A copy of the configuration DUMPALL, will be written to the drive in an ASCII text file with the name “480_<UID>.txt”, where <UID> is replaced with the unit ID configured in the indicator.

To load a configuration file:

1. Install the file on the flash drive. The file can be either of two formats, a configuration dumpall text file, or a configuration file created by the Revolution indicator configuration utility. The file name must be “480_<UID>.txt” for a text file, or “480_<UID>.rev” for a Revolution file, where <UID> is the currently configured Unit ID of the indicator.
2. Attach the flash drive to the USB port.
3. Enter the configuration menu and navigate go to USBMEM. See Section 3.2 on page 29.
4. Press ▾, then press ◀ or ▶ to select LOAD. See Section 3.2.9 on page 40
5. Press the Enter, or Tare key. If a file is found on the flash drive with a <UID> that matches that currently in the indicator, it will be loaded. If the loading of the file fails for any reason, an error will be displayed.

A File saved to the flash drive may be edited, and saved, by the Revolution indicator configuration utility.

1. To open the file, select the appropriate 480 module and open it.
2. Use the Import function in the File menu to import the configuration parameters into Revolution.

9.9 Ethernet Option

In Firmware version 1.03 and later, an optional Ethernet/USB board is supported.

With the Ethernet option installed, the 480 can either be connected directly to a PC via the Ethernet connection, or to an Ethernet network.

The 480 Ethernet option will support two simultaneous connections, one as a server, the other a client. It can be set up with a static, or DHCP-provided IP address. Both ports can be used to communicate to the indicator using all the available serial EDP commands. Both ports can be set to print on demand and can stream data.

The server port has a configurable TCP port number, and can accept a single remote client connection.

The client port can be configured to connect to a remote server's IP and TCP port number upon power up, or whenever there is data to send.

Connection is made via a RJ45 connector inside the indicator on the Ethernet/USB option board.

For details on all the configurable parameters for the optional Ethernet ports, see Section 3.1.3 on page 25.

9.10 Conversion Factors for Secondary Units

The 480 has the capability to mathematically convert a weight into many different types of units and instantly display those results with a press of the **UNIT** key.

Secondary units can be specified on the **FORMAT** menu using the **SECNDR** parameter.



Note

Multipliers are preconfigured within the indicator.

Ensure that the secondary decimal point position is set appropriately for the scale capacity in the secondary units. If the converted value requires more digits than are available, the indicator will display an overflow message (OVERFL).

For example, if the primary units are short tons, secondary units are pounds, and the secondary decimal point is set to 8888.88, the indicator will overflow if 5 tons or more are applied to the scale. With 5 tons applied, and a conversion factor of 2000, the secondary units display needs five digits to the left of the decimal point to display the 10000 lb secondary units value.

9.11 Digital Filtering (DIGFIL)

Digital filtering is used to create a stable scale reading in challenging environments. The 480 (firmware version 1.03 and later) allows selection of Adaptive Filtering (see Section 9.11.2), Rolling Filtering (see Section 9.11.3) or OFF for no filtering.

The A/D sample rate must be selected first (see Section 9.11.1). Then select the type of digital filter using the **DIGFIL** parameter.

9.11.1 Sample Rate (SMPRAT)

The A/D sample rate is the number of weight readings the indicator takes per second (SMPRAT). This can be 5, 10, 20, or 40 Hertz (Hz), or readings per second.

Set the A/D sample rate to the lowest setting required for the application. Lower settings result in better stability, so 5Hz is more stable than 40Hz.

9.11.2 Adaptive Filter

The Adaptive Filter has two settings, Sensitivity (AFSENS) and Threshold (AFTHRH). It maintains a running average of the A/D readings when the weight change remains less than the defined Threshold value. The filter automatically applies less value to each successive A/D reading the longer the weight change is less than the Threshold value. The amount of value given to the most recent A/D reading is determined by the sensitivity setting.

Adaptive Filter Sensitivity (AFSENS)

Adaptive filter sensitivity (AFSENS) can be set to **HEAVY**, **MEDIUM** or **LIGHT**. A heavy setting will result in an output that is more stable to weight changes, than that of light. However, small changes in weight data (a few grads) on the scale base will not be seen as quickly.

If the difference in typical subsequent weight values on the scale will only be a few grads, use a light setting. On a truck scale where the changes in subsequent weight values will be 100s of grads, a heavy setting will be more appropriate. When the weight has not exceeded the Threshold (AFTHRH) setting, the effective response is approximately 30 A/D cycles for **LIGHT**, 90 A/D cycles for **MEDIUM** and 180 A/D cycles for **HEAVY**.

Adaptive Filter Threshold (AFTHRH)

The adaptive filtering threshold (AFTHRH) should be set for the amount of observed instability in the system. This parameter can be set in the range of 0 to 99999 and is entered as a weight value. When a new sampled weight value is acquired, the adaptive filter compares the new value to the previous (filtered) output value.

If the difference between the new value and the previous output value is greater than the AFTHRH parameter the adaptive filter is reset to the new weight value.

If the difference between the new value and the previous output value is less than the AFTHRH parameter, the two values are averaged together using a weighted average. The weighted average is based on the amount of time the system has been stable, and selected AFSENS sensitivity.

With the adaptive filter threshold set at zero, determine the amount of instability that is present. Enter this amount of weight instability to set the threshold of the adaptive filter. The adaptive filter is set to OFF the AFTHRH parameter is set to zero.

9.11.3 Rolling Averaging Filter

The Rolling Averaging Filter uses mathematical averaging with three stages. These configurable stages control the effect of a single A/D reading on the displayed weight. When an A/D reading is encountered that is outside a predetermined band, the rolling averaging filter is overridden, and the display jumps directly to the new value.

Filter Stages (RFSTG1-3)

The filter stages can each be set to a value of 1 to 64. The value assigned to each stage sets the number of readings received from the preceding filter stage before averaging. Setting the filter stages to 1 effectively disables the rolling filter.

A rolling average is passed to successive filter stages for an overall filtering effect that is effectively a weighted average of the product of the values assigned to the filter stages (RFSTG1 x RFSTG2 x RFSTG3) within a time frame corresponding to the sum of the values (RFSTG1 + RFSTG2 + RFSTG3).

Filter Sensitivity (RFSENS) and Threshold (RFTHR)

The Rolling Averaging Filter can be used by itself to eliminate vibration effects, but heavy filtering also increases settling time. The RFSENS and RFTHR parameters can be used to temporarily override filter averaging and improve settling time.

- RFSENS specifies the number of consecutive A/D readings that must fall outside the filter threshold (RFTHR) before filtering is suspended.
- RFTHR sets a threshold value, in display divisions. When the specified number of consecutive A/D readings (RFSENS) fall outside of this threshold, filtering is suspended. Set RFTHR to NONE to turn off the filter override.

Setting the Rolling Averaging Filter Parameters.

1. In setup mode, set the rolling filter stage parameters (RFSTG1-3) to 1.
2. Set RFTHR to NONE.
3. Return to weigh mode.
4. Remove all weight from the scale, then watch the indicator to determine the magnitude of vibration effects on the scale.
5. Record the weight below which all but a few readings fall. This value is used to calculate the RFTHR parameter in step 8.
Example – if a heavy-capacity scale (10000x5lb) produces vibration-related readings of up to 50 lb, with occasional spikes to 75 lb, record 50 lb as the threshold weight value.
6. Place the indicator in setup mode and set the filter stage parameters (RFSTG1-3) to eliminate the vibration effects on the scale (Leave RFTHR set to NONE).
7. Find the lowest effect value for the RFSTG1-3 parameters.

If needed, the Rolling Filter Cutout Sensitivity (RFSENS) and the Rolling Filter Cutout Threshold (RFTHR) can be used to reset the averaging filter so the response to a rate change is faster.

8. Calculate the RFTHR parameter value by converting the weight value recorded in Step 5 to display divisions: (Threshold_Weight_Value / Display_Divisions).
In the example in Step 5, with a threshold value of 50lb, and a display divisions value of 5lb, RFTHR should be set to 10DD.
9. Set the RFSENS parameter high enough to ignore transient peaks. Longer transients (typically caused by lower vibration frequencies) will cause more consecutive out-of-band readings, so RFSENS should be set higher to counter low frequency transients.

9.12 Analog Output Calibration

The following calibration procedure requires a multimeter to measure voltage or current output from the analog output module. See Figure 3-15 for Analog Output menu structure.



Note The analog output must be calibrated **after** the indicator itself has been configured (see Section 3.0) and calibrated (see Section 4.0).

1. Enter configuration mode and go to the ALGOUT menu (see Figure 3-15).
 - Set source to GROSS or NET, depending on the weight value to be tracked by the analog output
 - Set OFFSET to 0% for 0–10V/0–20mA output, 20% for 2–10V/4–20 mA output
 - Set MIN to lowest weight value to be tracked by the analog output
 - Set MAX to highest weight value to be tracked by the analog output



Note Calibrate the minimum weight value for 0 mA, even if a 4–20 mA output will be used. After the calibration is complete, select the 20% offset.

If set to a 20% offset, the lowest value tracked will be 4 mA. To use a value lower than 4mA, use the 0–20 mA setting.

2. Connect multimeter to analog output:
 - For voltage output, connect voltmeter leads to pins three and four
 - For current output, connect ammeter leads to pins one and two
3. Adjust zero calibration: Scroll to the TWZERO parameter. Check voltage or current reading on multimeter. Press ◀ or ▶ to select the digit to edit and ▲ or ▼ to adjust the value of selected (flashing) digit to set the zero value.
4. Adjust span calibration: Scroll to the TWSPAN parameter. Check voltage or current reading on multimeter. Press ◀ or ▶ to select the digit to edit and ▲ or ▼ to adjust the value of selected (flashing) digit to set the span value.
5. Final zero calibration: Return to the TWZERO parameter and verify that the zero calibration has not drifted. Press ◀ or ▶ to select the digit to edit and ▲ or ▼ to adjust the value of selected (flashing) digit to set the zero value.
6. Return to normal mode. Analog output function can be verified using test weights.

9.13 Test Mode

In addition to normal and setup modes, test mode provides a number of diagnostic functions for the 480, including:

- Display raw A/D count
 - Reset configuration parameters to default values
 - Number of weighments over threshold
 - View the state of the digital inputs
 - Control the state of the digital outputs
 - Test the analog output
1. Enter configuration mode by removing the setup switch access screw from the back of the enclosure.
 2. Then insert a non-conductive tool into the access hole and press the configuration switch. Indicator display changes to show **CONFIG**.
 3. Navigate over to **TEST** and then down into the **TEST** menu.

Figure 3-18 shows the Test Menu structure and Table 3-19 summarizes the test menu functions.

9.14 Regulatory Mode Functions

Regulatory Parameter	Weight On Scale	Tare In System	Front Panel Key Tare	Front Panel Key Zero
NTEP	Zero	No	"000000"	Zero
		Yes	Clear tare	Zero
	Negative	No	No action	Zero
		Yes	Clear tare	Zero
	Positive	No	Tare	Zero
		Yes	Tare	Zero
Canada	Zero	No	"000000"	Zero
		Yes	Clear tare	Clear tare
	Negative	No	No action	Zero
		Yes	Clear tare	Clear tare
	Positive	No	Tare	Zero
		Yes	No action	Clear tare
OIML	Zero	No	"000000"	Zero
		Yes	Clear tare	Zero & Clear tare
	Negative	No	No action	Zero
		Yes	Clear tare	Zero & Clear tare
	Positive	No	"000000"	Zero
		Yes	Tare	Zero & Clear Tare
None	Zero	No	"000000"	Zero
		Yes	Clear tare	Clear tare
	Negative	No	No action	Zero
		Yes	Clear tare	Clear tare
	Positive	No	Tare	Zero
		Yes	Clear tare	Clear tare

Table 9-5. TARE and ZERO Key Functions for REGULA Parameter Settings



Note At zero weight push-button tare will prompt for keyed tare when tare function is set to keyed or both.

9.15 ASCII Character Chart

Use the decimal values for ASCII characters listed in Tables 9-6 and 9-7 when specifying print format strings on the 480 PFORMAT menu. The actual character printed depends on the character mapping used by the output device.

The 480 can send or receive any ASCII character value (decimal 0–255), but the indicator display is limited to numbers, upper-case, unaccented letters, and a few special characters. See Section 9.16 for information about the 480 LED display.

Control	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex
Ctrl-@	NUL	00	00	space	32	20	@	64	40	`	96	60
Ctrl-A	SOH	01	01	!	33	21	A	65	41	a	97	61
Ctrl-B	STX	02	02	"	34	22	B	66	42	b	98	62
Ctrl-C	ETX	03	03	#	35	23	C	67	43	c	99	63
Ctrl-D	EOT	04	04	\$	36	24	D	68	44	d	100	64
Ctrl-E	ENQ	05	05	%	37	25	E	69	45	e	101	65
Ctrl-F	ACK	06	06	&	38	26	F	70	46	f	102	66
Ctrl-G	BEL	07	07	'	39	27	G	71	47	g	103	67
Ctrl-H	BS	08	08	(	40	28	H	72	48	h	104	68
Ctrl-I	HT	09	09	)	41	29	I	73	49	i	105	69
Ctrl-J	LF	10	0A	*	42	2A	J	74	4A	j	106	6A
Ctrl-K	VT	11	0B	+	43	2B	K	75	4B	k	107	6B
Ctrl-L	FF	12	0C	,	44	2C	L	76	4C	l	108	6C
Ctrl-M	CR	13	0D	-	45	2D	M	77	4D	m	109	6D
Ctrl-N	SO	14	0E	.	46	2E	N	78	4E	n	110	6E
Ctrl-O	SI	15	0F	/	47	2F	O	79	4F	o	111	6F
Ctrl-P	DLE	16	10	0	48	30	P	80	50	p	112	70
Ctrl-Q	DC1	17	11	1	49	31	Q	81	51	q	113	71
Ctrl-R	DC2	18	12	2	50	32	R	82	52	r	114	72
Ctrl-S	DC3	19	13	3	51	33	S	83	53	s	115	73
Ctrl-T	DC4	20	14	4	52	34	T	84	54	t	116	74
Ctrl-U	NAK	21	15	5	53	35	U	85	55	u	117	75
Ctrl-V	SYN	22	16	6	54	36	V	86	56	v	118	76
Ctrl-W	ETB	23	17	7	55	37	W	87	57	w	119	77
Ctrl-X	CAN	24	18	8	56	38	X	88	58	x	120	78
Ctrl-Y	EM	25	19	9	57	39	Y	89	59	y	121	79
Ctrl-Z	SUB	26	1A	:	58	3A	Z	90	5A	z	122	7A
Ctrl-[	ESC	27	1B	;	59	3B	[	91	5B	{	123	7B
Ctrl-\	FS	28	1C	<	60	3C	\	92	5C	|	124	7C
Ctrl-]	GS	29	1D	=	61	3D	]	93	5D	}	125	7D
Ctrl-^	RS	30	1E	>	62	3E	^	94	5E	~	126	7E
Ctrl- _~	US	31	1F	?	63	3F	_	95	5F	DEL	127	7F

Table 9-6. ASCII Character Chart (Part 1)

ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex
Ç	128	80	á	160	A0		192	C0	α	224	E0
ü	129	81	í	161	A1		193	C1	β	225	E1
é	130	82	ó	162	A2		194	C2	Γ	226	E2
â	131	83	ú	163	A3		195	C3	π	227	E3
ä	132	84	ñ	164	A4		196	C4	Σ	228	E4
à	133	85	Ñ	165	A5		197	C5	σ	229	E5
å	134	86	ª	166	A6		198	C6	μ	230	E6
ç	135	87	º	167	A7		199	C7	τ	231	E7
ê	136	88	¿	168	A8		200	C8	Φ	232	E8
ë	137	89		169	A9		201	C9	Θ	233	E9
è	138	8A	¬	170	AA		202	CA	Ω	234	EA
ï	139	8B	1/2	171	AB		203	CB	δ	235	EB
î	140	8C	1/4	172	AC		204	CC	∞	236	EC
ì	141	8D	¡	173	AD		205	CD	φ	237	ED
Ä	142	8E	«	174	AE		206	CE	€	238	EE
Å	143	8F	»	175	AF		207	CF	∩	239	EF
É	144	90		176	B0		208	D0	≡	240	F0
æ	145	91		177	B1		209	D1	±	241	F1
Æ	146	92		178	B2		210	D2	≥	242	F2
ô	147	93		179	B3		211	D3	≤	243	F3
ö	148	94		180	B4		212	D4	∫	244	F4
ò	149	95		181	B5		213	D5	∫	245	F5
û	150	96		182	B6		214	D6	÷	246	F6
ù	151	97		183	B7		215	D7	≈	247	F7
ÿ	152	98		184	B8		216	D8	°	248	F8
Ö	153	99		185	B9		217	D9	•	249	F9
Ü	154	9A		186	BA		218	DA		250	FA
¢	155	9B		187	BB		219	DB		251	FB
£	156	9C		188	BC		220	DC		252	FC
¥	157	9D		189	BD		221	DD	²	253	FD
Pts	158	9E		190	BE		222	DE		254	FE
f	159	9F		191	BF		223	DF		255	FF

Table 9-7. ASCII Character Chart (Part 2)

9.16 Front Panel Display Characters

Figure 9-6 shows the seven-segment LED character set used to display alphanumeric characters on the 480 front panel.

























































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Figure 9-6. 480 Display Characters

9.17 Specifications

Model Numbers

United States	480-2A/480Plus-2A (NEMA 5-15)
International	480-2A/480Plus-2A (CEE 7/7)

Power – AC

Line Voltages	115 to 230 VAC
Frequency	50 or 60 Hz
Power Consumption	70 mA @ 115 VAC (8W) 35 mA @ 230 VAC (8W)
Fusing	2.5 A 5 x 20 mm fuse

Analog Specifications

Full Scale Input Signal	Up to 35 mV
Excitation Voltage	5 ± 0.1VDC
Sense Amplifier	Differential amplifier with 4- and 6-wire sensing
Analog Signal Input Range	Up to 7 mV/V
Analog Signal Sensitivity	0.1 µV/graduation minimum 0.5 µV/grad recommended
Local Resistance	35-1140 Ω ²
Noise (ref to input)	0.5 µV p-p ³
Internal Resolution	523,376 counts
Display Resolution	100,000 dd
Measurement Rate	37 measurements/sec
Input Sensitivity	38 nV per internal count
System Linearity	Within 0.01% of full scale
Zero Stability	13 nV/°C ⁴
Span Stability	13 ppm/°C ⁵
Calibration Method	Software, constants stored in EEPROM
Common Mode	
Voltage	AGND + 250mV V min ⁶ Excitation - 250 mV V max
Rejection	120 dB minimum @ 50 or 60 Hz
Normal Mode	
Rejection	100 dB minimum @ 50 or 60 Hz
Input Overload	-0.3 V to Excitation +0.3 V ⁷
RFI Protection	Signal, excitation, and sense lines protected by capacitor bypass and ESD suppressors

Analog Output (Optional)

Type	Fully isolated, voltage or current output, 16-bit resolution.
Voltage output	0–10 VDC
Voltage load resistance	1KΩ minimum
Current output	0–20 mA or 4–20 mA
Current loop resistance	1200Ω ⁸ maximum



Note Ethernet/USB options will be available in future versions.

Digital Specifications

Microprocessor	ARM Cortex M3 STM32F103ZET6
Digital Filters	Adaptive Filter and Rolling Averaging Filter; software selectable

Digital I/O (Optional)

Type	Fully isolated
Digital Inputs	2 or 4 inputs, Opto isolated, 5 to 24 VDC input, active high
Digital Outputs	4 or 8 dry-contact relays Up to 30VDC at 2A current

Serial Communications

Port 1	Full duplex RS-232
Port 2	Full duplex RS232, or output only Active 20mA current loop.
Both Ports	1200 to 38400 bps; 7 or 8 data bits; even, odd, or no parity; 1 or 2 stop bits

Operator Interface

Display	6-digit LED display. 7-segment, 0.8 in (20 mm) digits
LED annunciators	Gross, net, center of zero, standstill, lb/ primary units, kg/secondary units, T, PT
Keypad	7-key flat membrane panel

Environmental

Operating Temperature	–10 to +40°C (legal); –10 to +50°C (industrial)
Storage Temperature	–25 to +70°C
Humidity	0–95% relative humidity

Enclosure

Enclosure Dimensions	9.5 in x 6 in x 2.75 in 24 cm x 15 cm x 7 cm
Weight	6 lb
Rating/Material	4X

Certifications and Approvals



NTEP

CoC Number	12-123
Accuracy Class	III/IIIL n_{max} : 10 000



OIML	R76/2006-NL1-12.48
European Test Certificate	TC8322
European EC Type-Approval	T5692
Accuracy Class	III n_{max} : 10 000

Measurement Canada

Approval	AM-5892
Accuracy Class	III/IIILD n_{max} : 10 000



¹ Calculated based on 350Ω x 10 load cells, 1x I/O card, 1x Analog card, 7 segment display.

² The indicator was tested for EMC with a 380Ω load cell; the maximal approved impedance is therefore 380Ω x 3 = 1140kΩ.

³ Measured during EMC tests per OIML R76-2006 (10v/m) without any digital filter in s/w; sampling rate was 4.7Hz.

⁴ Measured on an indicator with a simulator; the nominal zero stability of the ADC is 5 nV/°C.

⁵ Measured on an indicator with a simulator; the nominal span stability of the ADC is 1ppm/°C.

⁶ Based on the internal ADC specifications.

⁷ Based on the internal ADC specifications.

⁸ Based on the internal DAC specifications.

480 Limited Warranty

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RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

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- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged nonconformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

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