

GUARDIAN XL / IS

**DIGITAL WEIGHT INDICATOR
FOR HAZARDOUS ENVIRONMENTS**

INSTALLATION AND INSTRUCTION MANUAL



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Chapter 1

Introduction

Thank you for purchasing this DORAN SCALE product. The *GuardianXL* Weighing System for Hazardous Locations is designed to provide consistent reliability in the most demanding environments. The *GuardianXL* Indicator is designed and manufactured in DORAN SCALE's corporate headquarters in Batavia, Illinois. DORAN SCALE's ISO9000 certification assures that your *GuardianXL* Indicator is manufactured to deliver the highest quality product possible.

The *GuardianXL* Weighing System is Factory Mutual approved for use in hazardous locations as defined by the National Electrical Code. Factory Mutual has determined that the *GuardianXL* Indicator, when used in accordance with the control drawing, is Intrinsically Safe and is approved for use in hazardous locations classified as Class I, II or III; Division 1 or 2; with the following Groups A, B, C, D, E, F, G. The *GuardianXL* Indicator has also been approved for use in areas classified under NEC. 505 as Class I, Zone 0, 1 or 2, Group IIC, IIB or IIA.

The *GuardianXL* Indicator can be powered with either the 9000XLBIS Battery Pack or the 9000XLAIS AC Power Supply. When the 9000XLBIS Battery Pack is used with the *GuardianXL* Indicator, it is approved for use in all Classes, Divisions and Groups. The 9000XLAIS AC Power Supply has been approved for installation in Class I, Division II, Groups A, B, C, and D locations only. However, the 9000XLAIS AC Power Supply has an intrinsically safe output which may be used in Hazardous Locations classified as Class I, II or III; Division 1 or 2; Group A, B, C, D, E, F or G or classified as Class I, Zone 0, 1 or 2, Group IIC, IIB or IIA.

The *GuardianXL* Indicator is approved for use with any Factory Mutual Approved or Intrinsically Safe Load Cells with the following parameters: $V_{max} = 10V$ or Higher and $I_{max} = 400mA$ or Higher (see control drawing 900180). These parameters include most load cells currently on the market. Contact your local DORAN SCALE distributor or DORAN SCALES Sales Department if you have any questions on load cell hazardous location compatibility. Multiple load cell installations may require the 9000XLJBX Summing Board which is approved for use in Class I, II, III; Division 1; Applicable Groups A, B, C, D, E, F, G; Hazardous Locations.

This manual describes the installation, operation and functionality of the *GuardianXL* Intrinsically Safe Indicator. Please be sure to read the entire manual to leverage the multitude of benefits that the *GuardianXL* provides. If any questions arise, please feel free to contact your local DORAN SCALE distributor or the DORAN SCALES Technical Support Department at 1-800-262-6844.

Standard Features

The Doran *GuardianXL* is a full-featured digital weight Indicator with a number of advanced features including dual displays, keypad data entry, set points, accumulators, ID, date & time and serial data communications capability. NTEP approved to 10,000 divisions, the *GuardianXL* calibration and pushbutton features can be accessed via the front panel using a pass code. NTEP integrity is maintained by an audit trail feature that records all metrological activity. Powered by external rechargeable battery or AC line power, the *GuardianXL* carries approvals from NTEP and Factory Mutual.

- **Dual Displays** – Bright, highly visible, 1” high, 6 digit, red LED display is the primary digital weight display. A two line, 32 character, alphanumeric, backlit Liquid Crystal Display (LCD) provides custom messaging for excellent user feedback, including Mode, Status and Units.
- **Zero** – Pushbutton ZERO up to 100% of scale capacity.
- **Tare** – A tare value can be entered in two ways – pushbutton tare or digital tare entry.
- **Keypad Data Entry** – Numeric keypad for digital entry of tare and set point values. Numeric pushbuttons have dual function to access pushbutton indicator functions.
- **Battery Power** – 80 hour battery pack is externally mounted and easy to change. A safe area charger is included – spare battery is highly recommended.
- **Auto Sleep Mode** –Prolongs battery life by shutting off the display after 1 to 20 minutes of no scale activity.
- **Gross/Net** – Display gross or net weight at the push of a button
- **Units** – Selects up to 6 weight display units – lb, kg, g, oz, lb&oz or user units.
- **Print** – Activates a serial data transmission to external devices
- **Accumulator and Counter** – automatically accumulates gross and net weight. Standard print string available for accumulator and counter output.
- **Time & Date**
- **Digital Calibration** – Set via front panel with operator pass code, and recorded in two audit trail memory. Select any capacity value and the corresponding resolution will be automatically selected. Zero and Span are independently set, allowing for easy calibration in large scale filling or hopper applications.
- **Resolution** – Display resolution from 200 to 50,000 divisions.
- **Update Rate** – Select from 5.5 to 11 updates/second
- **Digital Filters** - Wide selection of digital filter settings for maximum stability in the presence of vibration or air movement.
- **Auto Zero Tracking** feature compensates for small changes in zero and is selectable from 0.5 to 5.0 divisions.
- **Microprocessor Watchdog System** monitors operation to prevent scale failure or lock-up under severe fault conditions.
- **Approvals** – NTEP Class III certification to 10,000 divisions. Factory Mutual approval for intrinsically safe installations. Includes entity approval for load cells.

Optional Accessories

- **Hazardous Area AC Power Supply**
- **Fiber Optic Communications**
- **Safe Area Digital I/O** Including
 - Switch Input
 - RS-232 Output
 - Optional Relay Output
 - Optional Remote Display
- **4-20mA Analog Output** passive from the hazardous and safe area
- **Junction Box** for up to four load cells in a hazardous environment

Unpacking the *GuardianXL*

Before unpacking your Doran product, please read the instructions in this section. Your new *GuardianXL* is a durable industrial product, but it is also a sensitive instrument. Normal care should be taken when handling and using this product. Improper handling or abuse can damage the unit and result in costly repairs that will not be covered by the warranty. If you notice any shipping damage, notify the shipper immediately. Please observe the following precautions to insure years of trouble free service from your new product.

- DO NOT drop the enclosure.
- DO NOT immerse the enclosure.
- DO NOT drop objects on the enclosure.
- DO NOT pick up the enclosure by the cables.
- Carefully remove the enclosure from the shipping carton.

The *GuardianXL* has many advanced features. This Chapter will describe how to operate an installed and functioning *GuardianXL* indicator.

Battery Charger System

A battery powered *GuardianXL* system comes with a safe area battery charger. The battery charger can only be used in the safe area. The *GuardianXL* battery pack will last approximately 80 hours in continuous operation. To significantly extend this battery life, enable the Auto Sleep Timer which will power down the *GuardianXL* automatically after a period of non-use. See Chapter 4 for configuration of this parameter.



WARNING

The battery charger can only be used in a safe area.

Battery Pack Operation

The external intrinsically safe battery pack is located under the *GuardianXL* indicator. The battery pack supplies power to the *GuardianXL* indicator through a cable with a military style connector. To remove the battery pack, disconnect the battery power supply cable from the rear of the *GuardianXL* indicator by unscrewing the military style connector. Then loosen the two small black knobs and remove the battery pack by pulling up and outward on the battery pack handle. **Do not** remove the battery pack without first removing the battery power cable from the *GuardianXL* rear panel. If any damage occurs to the connector or power cable, discontinue use immediately and contact DORAN SCALE's Technical Support Department.

When the *GuardianXL* indicates low battery, the indicator will cease to function in approximately two hours. When the low battery warning appears, the battery should be recharged as soon as possible.

To place the battery back into service after being recharged, reinstall the battery pack by first securing the battery pack into the *GuardianXL* u-bracket by tightening the two small black knobs. Then reconnect the battery pack to the *GuardianXL* by aligning the keyed connector and screwing the connector firmly to the power cable power receptacle on the rear panel. **Do not** force the connector, this is a sign that the keyed connector is not properly aligned with the charger power receptacle.

Battery Charger

The battery pack must be removed from the hazardous area for charging. Only the DORAN SCALE battery charger can be used to charge the *GuardianXL* battery pack. Do not use the DORAN SCALE battery charger to charge any other batteries. The 9000XLCIS battery charger has two indicators on the front of the charger unit. The green READY light will be on when the charger is plugged into 115VAC (230VAC optional). If the READY light remains off, 115VAC is not present, the battery is shorted, or the charger has a blown fuse. The red CHARGING light will be on as long as charging current is supplied to the battery output connector. The battery is fully charged when the CHARGING light goes out.

Connect the battery pack to the charger by aligning the keyed connector and screwing the connector firmly to the power cable power receptacle on the front of the charger box. **Do not** force the connector, this is a sign that the keyed connector is not properly aligned with the charger receptacle. The battery pack will require approximately 12 hours to fully recharge.

Once charged, the battery pack will last 80 hours in a typical application (single 350 Ω load cell), after which the indicator will provide a low battery warning on the alphanumeric display. Multiple load cells, fiber optic or 4-20mA options will reduce battery life. For multiple load cell applications, battery life is significantly reduced. For example, with a four, 350 Ω load cell configuration, the low battery indication will begin at about 4 to 6 hours of continuous use. After the low battery indication begins, the indicator will operate for a while before the indicator will shut off. Load cells with higher input impedance values such as 1000 Ω will provide longer battery life. Use the auto sleep feature to prolong battery life, refer to Chapter 4 for detailed configuration information.

The battery pack should be able to support at least 300 recharges before the end of the battery life is reached. This is an estimate as many factors can affect battery life like, severe temperature changes and charging before the *GuardianXL* displays Low Battery.

An optional extra battery pack can be ordered for situations that require uninterrupted operation of the scale. The battery pack may be left plugged in the charger until ready to use.

AC Power Supply Operation

The AC power supply option delivers constant power to the *GuardianXL* indicator and removes the need to charge and maintain batteries. The AC Power Supply is recommended for multiple load cell installations, internal 4-20mA option and internal Fiber Optic option due to additional power consumption.

The AC power supply is approved for hazardous location use in a Division 2 area. This does not mean that the AC power supply must be located in a safe area. Division 2 locations are directly adjacent to Division 1 areas in a hazardous location. Therefore, to install the *GuardianXL* indicator in a Division 1 hazardous area, the AC power supply can

be located at the edge of a Division 1 area, which would be a Division 2 area. To accommodate this type of installation we offer optional extension cables up to 28 feet in length. The power output of the AC power supply is intrinsically safe and can be run to a *GuardianXL* indicator in a division 1 location.

For complete installation details see Appendix D FM Installation Instructions.

Front Panel Features

The *GuardianXL* is equipped with a 19 pushbutton keypad. The layout is shown in Figure 2.1 below. The *GuardianXL* display is divided into five areas.

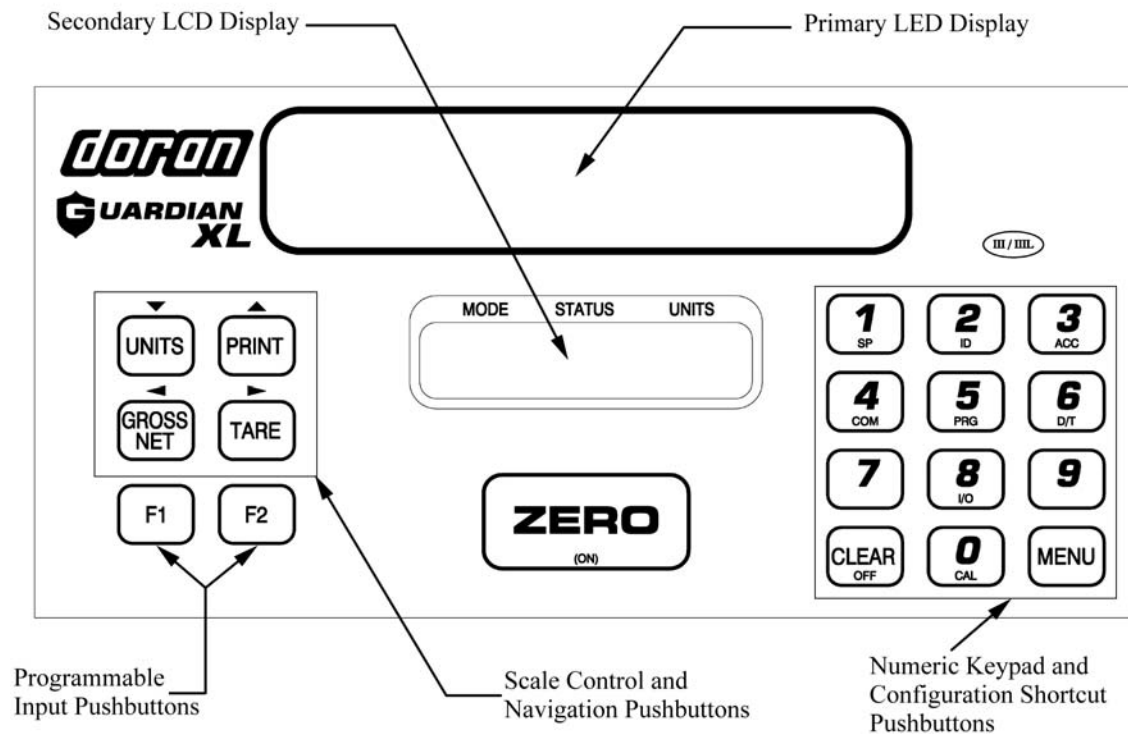


Figure 2.1 GuardianXL Front Panel Layout

Primary LED Display

The primary display consists of six bright, 1" high, seven-segment red LED digits. These digits typically display the current weight and are visible up to 50 feet away.

Secondary LCD Display

The two line 32-digit alphanumeric backlit LCD display provides feedback to the user. This display is primarily used for displaying the gross / net mode, center of zero status, motion, displayed units, setup mode and calibration mode information.

Scale Mode Control and Navigation Pushbuttons

The blue pushbuttons on the left of the touchpanel controls the displayed units, gross / net mode, tare, print and programmable pushbuttons. These pushbuttons also navigate through the setup and calibration modes.

Numeric Keypad and Configuration Shortcut Pushbuttons

The purple numeric keypad is used to enter data for tares, setpoints and setup configuration. The setup and calibration mode is entered through shortcut pushbuttons that have setup and calibration menu abbreviations below the numbers on the keypad. These dual function shortcut pushbuttons provide quick access to specific parameters in the setup and calibration modes.

Scale Zero Pushbutton

This is the most often used feature of the indicator. Therefore the ZERO pushbutton is centered on the front panel and the largest pushbutton on the *GuardianXL*.

Modes of Operation

Weighing Mode

The weighing mode of the *GuardianXL* is the most commonly used mode. While in this mode, the primary display will indicate current weight and the secondary display will indicate gross / net, center of zero, motion and displayed weight units. The rest of this Chapter describes this mode in detail.

Output Mode

The output mode is only active while the *GuardianXL* is in the weighing mode and when any output is enabled. The second line of the secondary display will indicate the status of each setpoint output while the indicator displays all weigh information included in the weighing mode. A sample output status line is “1- 2- 3- 4*” where a dash to the right of the output number indicates an inactive output while an asterisk to the right of the output number indicates an active output. Outputs are only accessible with the Digital I/O option. Setpoint configuration is described in Chapter 6.

Batch Mode

The batch mode controls outputs in a batch sequence. Batch sequences require no programming to implement, simply select a canned batch sequence from the menu and the program is ready to run. The second line of the secondary display will indicate the status of each setpoint output while the indicator displays all weigh information included in the weighing mode. A sample output status line is “1- 2- 3- 4*” where a dash to the right of the output number indicates an inactive output while an asterisk to the right of the output number indicates an active output. If a standard batch sequence does not meet your needs, the batch sequence can be altered by changing setpoint configurations. The batch mode is fully described in Chapter 7.

Setup Mode

The setup mode allows configuration of the standard non-metrological parameters for the *GuardianXL*. A standard parameter is one that cannot affect the weighing mode of the scale. For instance fiber optic output, auto sleep delay, accumulator and setpoint values are examples of these standard parameters. These standard parameters can be easily accessed through shortcut pushbuttons, or protected with a pass code. Setup mode parameter configuration is described in detail in Chapter 4.

Calibration Mode

The calibration mode allows configuration of the metrological makeup and calibration of the *GuardianXL*. Sealed parameters are those that can affect the weighing mode of the *GuardianXL*. Access to this mode can be done through the entry of a pass code or by pressing the sealed calibration switch located inside the *GuardianXL* housing in combination with a pass code. Only authorized DORAN SCALE distributors are factory trained to configure the *GuardianXL*. For information relating to your nearest DORAN SCALE authorized distributor call DORAN SCALE's Sales Department at 1-800-262-6844. Detailed calibration instructions are described in Chapter 5.

Test Mode

The *GuardianXL* provides a test mode for the outputs, fiber optic communications, serial port and 4-20mA option. See Chapter 4, Scale Test Mode section for more information.

Keypad Functions

ZERO / Scale Power On

Turns the scale on. Momentarily press ZERO to turn on the indicator.

The ZERO pushbutton is also used to zero the scale prior to making a reading. The ZERO pushbutton functions over the full range of the scale in standard operation. In legal for trade mode, it will be limited to a zero band equal to $\pm 1.9\%$ of scale capacity. When the indicated weight is within the center of zero band (gross zero ± 0.25 division) the secondary display will indicate $\rightarrow 0 \leftarrow$ in the center of the secondary display.

To zero the scale in gross mode, wait until the scale is stable and press the ZERO pushbutton. The scale will zero immediately.

The ZERO function will also work while the scale is in net mode. When in net mode, press zero and the scale will return to gross mode, zeroing out the scale weight. The tare value is saved and the scale can still switch from gross to net mode. This feature is useful when there is a consistent tare value used, but unwanted material is spilled onto the base surface between weighments.

TARE

A tare weight can be entered on the *GuardianXL* in two ways – Pushbutton Tare or Digital Tare entry.

To use Pushbutton Tare, simply place the tare item on the scale platform and press TARE. The scale will store this tare weight, automatically switch to Net weight mode and display zero weight. If you switch to the Gross mode by pressing the GROSS/NET pushbutton, the actual tare weight will be displayed.

If the tare item is then removed from the scale, the scale will display the negative tare weight in the Net mode and zero in the Gross mode.

To enter a Digital Tare, enter the weight through the keypad. The tare must be a positive, non-zero weight. This will place the indicator into entry mode and once the desired weight is entered press TARE to save the tare weight. If any errors are made while entering the tare weight, press CLEAR and reenter the weight. After the tare weight is stored, the scale will show zero in the Net mode when the tare item is on the scale. When the scale is empty, the scale shows the negative tare weight in the Net mode and zero in the Gross mode.

To recall the tare weight at any time, press MENU and TARE. The main display will indicate the tare weight in the currently selected units. The secondary display will show “RECALL TARE”. To exit this mode press CLEAR.

To clear a tare weight press 0 on the keypad then TARE. This will remove the tare from memory. If not cleared, the TARE weight will remain in memory, even if the indicator is turned off.

GROSS / NET

Press the GROSS / NET pushbutton to switch the display mode from gross weight to net weight, or from net to gross modes. The current mode is indicated on the secondary display with the word “GROSS” or “NET”. If a tare value has been entered, then the net value is the gross weight less the tare weight. If a tare is not currently stored, the display remains in gross mode when the GROSS / NET pushbutton is pressed. When a tare is entered the *GuardianXL* switches to the Net mode automatically.

UNITS

The UNITS pushbutton permits the operator to select from six displayed weight units. Simply press the UNITS pushbutton and the secondary display will indicate the current weight unit “lb”, “kg”, “g”, “oz”, “lb-oz” or “user”. The UNITS pushbutton can be configured to allow the selection of any combination of units listed above, preventing accidental selection of undesired units.

PRINT

The PRINT pushbutton transmits print string data out the Fiber Optic option. This feature can be used in conjunction with the Digital I/O box option for RS-232 data for a printer or data collection device.

CLEAR

The CLEAR pushbutton is used to cancel any digital entry from the keypad. Pressing CLEAR when the secondary display reads “ENTRY” will return the scale to the weigh mode from a digital entry mode.

F1, F2 Programmable Pushbuttons

These pushbuttons can be programmed as an output or function trigger and also act as batch controls while in the batch mode. See Chapter 4, Setpoint Output and I/O Function Parameters for details. See Chapter 7 for batch mode information.

MENU

The MENU pushbutton allows access to tare recall, and general configuration of the *GuardianXL* including: setpoints, accumulator, RS-232 port, date/time and calibration access. Pressing MENU, then a shortcut pushbutton on the numeric keypad accesses these configuration features and the non-calibration menu. There are nine shortcut pushbuttons on the numeric keypad. Each shortcut pushbutton has an abbreviated feature name accompanying the number on a numeric pushbutton. Each of these shortcut features is described below. To avoid accidental entry into these features, access can be eliminated through the use of a pass code. See Chapter 4 to learn about the features briefly described below in detail.

Power Off Function (MENU – OFF)

The *GuardianXL* can be turned off if not in use. To turn off the *GuardianXL*, press MENU then CLEAR (OFF). The *GuardianXL* will turn off. To turn the indicator on, press the ZERO pushbutton.

Programming and Recalling Setpoint & Preact Weight Values (MENU – SETPOINT)

The *GuardianXL* has four Setpoints and four Preacts. To access the Setpoint or Preact weight values, press MENU, then 1 (SP) on the numeric keypad. This key sequence places the *GuardianXL* into the recall mode. The primary display will show the stored weight value and the polarity. The secondary display will show “RECALL SP 1” when in the recall Setpoint mode or “RECALL PREACT 1” for the recall Preact mode. Press numbers 1, 2, 3 or 4 on the numeric keypad once, to recall the respective setpoint value. Press the number a second time to recall the respective Preact value. When review of the Setpoint or Preact values is complete, press CLEAR to exit the recall mode.

To program a Setpoint or Preact weight value, simply enter the weight value using the keypad. This places the *GuardianXL* into the “ENTRY” mode and the weight value is echoed to the primary display. Use the UNITS key to toggle the polarity of the setpoint weight value. If an error is made when entering the weight, press CLEAR to exit the entry

mode. When the number is correctly displayed press MENU and the secondary display will read “SETPOINT ENTRY” and “SELECT 1,2,3,4,M”. Press the number of the setpoint (1, 2, 3 or 4) you want to save the current displayed weight. Press MENU to enter the Preact entry mode, the secondary display will read “PRACT ENTRY” and “SELECT 1,2,3,4,M” Press the number of the Preact (1, 2, 3 or 4) you want to save the current displayed weight.

After the value is saved the scale will return to the weigh mode. Setpoint and Preact configuration is covered in detail in Chapter 4 and 6.

Scale ID (MENU – ID)

Allows entry of the scale ID number. To configure the scale ID, press MENU then 2(ID). The secondary display will read “SET SCALE ID ENTER ID NUMBER”. Simply enter the scale ID number – up to 6 digits and press MENU to accept.

Accumulator and Counter (MENU – ACCUMULATOR)

This displays the value of the accumulator. The maximum value for the accumulator and counter is 999999. When the maximum value is reached, the accumulator will not accumulate and the secondary display will read “ACCUMUALTOR ERROR”.

Press MENU 3 (ACC) to enter the accumulator recall mode. The secondary display will read “GROSS ACCUM lb ACCUM RECALL”. The accumulator recall mode will display the accumulator value in the units currently selected in the weigh mode as well as either gross or net mode. To toggle between the gross and net values press the GROSS / NET pushbutton. A net accumulator value can only be accessed by having an active tare in the weigh mode. The counter value may be displayed by pressing 3(ACC) while viewing the accumulator total.

To clear the accumulator and counter values, press CLEAR while in the accumulator recall mode. The accumulator counter is incremented once every time a manual or automatic accumulation occurs.

The counter value can be printed using the Fiber Optic option. When in accumulator recall mode, press PRINT to execute a print string that contains the gross accumulated weight, net accumulated weight and counter. See Appendix A, Accumulator Print String for print string formatting.

Accumulating of weights is possible either automatically or with a button press. See Chapter 6, Single Trigger Setpoint Configurations for an automatic accumulate configuration. To exit the accumulator recall mode, press MENU.

Fiber Optic Communications Protocol (MENU – COMMUNICATIONS)

Pressing MENU then 4 (COMM) on the numeric keypad places the *GuardianXL* into the setup mode. To exit to the weigh mode, press MENU. See Chapter 4, Communications Parameters for configuration details.

Batch Programming (MENU – PROGRAM)

Pressing MENU then 5 (PRG) See Chapter 7 for batch mode programming information.

Date Time (MENU – DATE / TIME)

This allows recall of the current date and time. Press MENU to exit the date time recall mode. To change the date and time see Chapter 4, Date Time Parameters.

I/O Configuration (MENU – I/O)

Pressing MENU then 8 (I/O) on the numeric keypad places the *GuardianXL* into setup mode. To exit to the weigh mode press MENU. Refer to Chapter 4 and 6 for I/O configuration.

Audit Trail and Calibration (MENU – CALIBRATION)

Pressing MENU then 0 (CAL) on the numeric keypad places the *GuardianXL* into the calibration mode. This shortcut pushbutton allows access to the entire calibration mode. The audit trail counter is displayed in the primary display, while the secondary display reads PARAMETER AUDIT. The parameter audit trail tracks changes in metrological related parameters in the calibration mode by incrementing every time changes are saved to the *GuardianXL*.

Press TARE (►) to advance to the calibration audit trail counter. The calibration audit trail counter is displayed in the primary display, while the secondary display reads CALIBRATE AUDIT. The calibration audit trail tracks changes in calibration by incrementing every time the *GuardianXL* is calibrated. Press TARE (►) to advance to the calibration mode entry point. The secondary display will read ACCESS CAL MODE ENTER PASS CODE. Access to the calibration mode requires a pass code. For detailed calibration mode menu configurations refer to Chapter 5.

Chapter 3

Load Cell Installation

Connecting a load cell or configuring jumpers requires the removal of the rear panel. Follow the *GuardianXL* Installation Manual guidelines for working with the *GuardianXL* in a hazardous environment.

Removing the Rear Panel

Before you remove the rear panel, remove the AC or battery power supply from the *GuardianXL*. This is done by unscrewing and removing the power connector from the rear panel.

Removing the rear panel requires a 5/16" nut driver. Remove all four screws and set aside. Removing the rear panel requires removal of the J7 power connector and the J6 chassis mounted resistor (see figure 6 below). Be cautious not to damage either the connector or the connector housing when removing J6 and J7. Do not loosen any watertights on the back panel that do not require modification.

Replacing the Rear Panel

Secure the J6, J7 and any other connections that have been modified. When replacing the rear panel it is necessary to mount the gasket, all four screws and gasket washers. Tighten all four screws to 20 ft-lb to achieve proper sealing. It is normal for the rear panel to dimple slightly when the screws are tightened to 20 ft-lb. Tighten any modified watertight until the cable exiting the watertight can no longer slide through the watertight – this is usually finger tight. With an open-end wrench, apply a quarter turn to the watertight for a tight seal.

Please note that if J7 is not replaced or properly seated, the *GuardianXL* will not power up. If J6 is not replaced or properly seated, the scale will display ERROR A/D on the secondary display.

Load Cell Installation

Refer to the *GuardianXL* Installation Manual for the entity parameters for load cell compatibility. The entity parameters are detailed in Doran Control Drawing 900180. If you question whether your load cell meets the *GuardianXL* entity parameters, either call your local DORAN distributor or call the DORAN SCALE Technical Support staff at 1-800-262-6844. Refer to Chapter 5 for calibration instructions.

Single Load Cell Installation

To install a single load cell, remove the rear panel and check the JU3 and JU4 jumper configuration. Remove JU3 and JU4 for a six-wire load cell. Inversely, JU3 and JU4

must be in place for a four-wire load cell. To install the load cell wires, press the load cell connector arm back with either your finger or a non-conductive object.

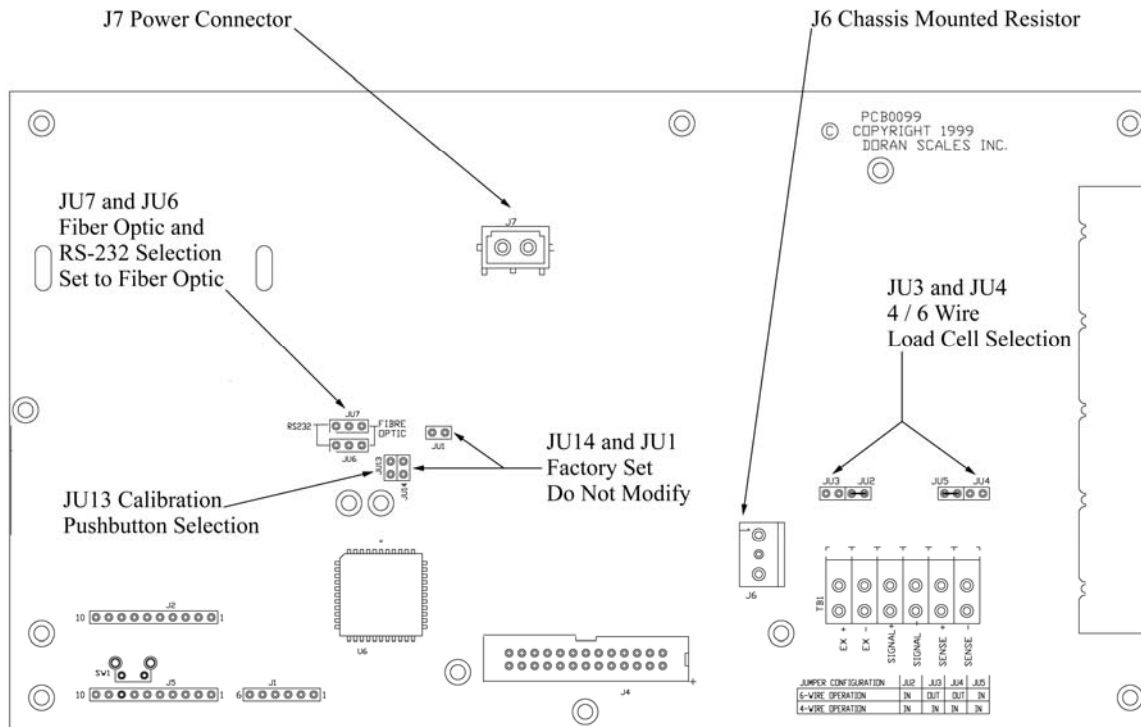


Figure 3.1 Motherboard Load Cell Connection and Jumper Location

Multiple Load Cell Installation

Installation of multiple load cells requires the optional 9000XLJBX *GuardianXL* Summing Box. The 9000XLJBX allows for the summing of two to four load cells. Four load cell systems will degrade the battery life between charging due to the additional load placed on the electronics. It is recommended that multiple load cell installations use 1000 Ω load cells. See Figure 3.2 below for summing box connection details.

Install load cell cabling into the load cell input terminals TB102, TB103, TB104, and TB105. Trimming adjustment for each load cell is controlled by R120, R130, R140 and R150 respectively. When using six wire load cells, tie the -Sense to -Excitation and +Sense to +Excitation in the load cell input terminals.

Connect the *GuardianXL* indicator load cell input to TB101. The summing board does allow for a four or six-wire cable to be run to the indicator. Check the JU3 and JU4 jumper configuration. Remove JU3 and JU4 for a six-wire cable. Inversely, JU3 and JU4 must be in place for a four-wire cable. To install the load cell wires press the load cell connector arm back with either your finger or a non-conductive object.

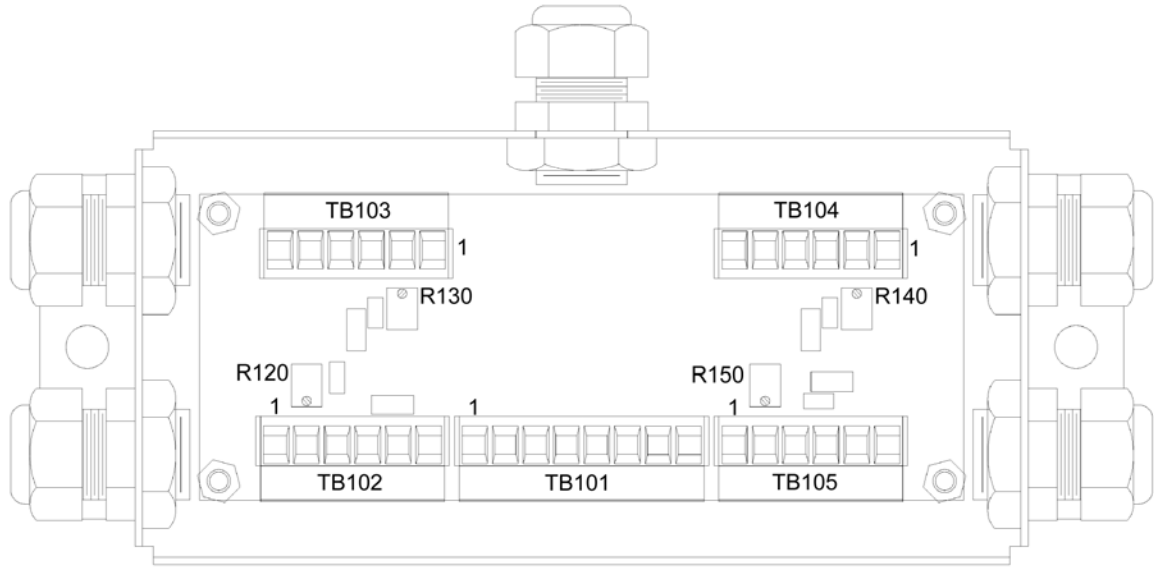


Figure 3.2 Junction Box

TB102, TB103, TB104, TB105	
Terminal 1	Chassis Ground
Terminal 2	– Signal
Terminal 3	+ Signal
Terminal 4	– Excitation (– Sense)
Terminal 5	+ Excitation (+ Sense)
Terminal 6	Chassis Ground

TB101	
Terminal 1	Chassis Ground
Terminal 2	– Signal
Terminal 3	+ Signal
Terminal 4	– Sense
Terminal 5	+ Sense
Terminal 6	– Excitation
Terminal 7	+ Excitation
Terminal 8	Chassis Ground

To configure standard parameters, the *GuardianXL* Indicator must be placed in Setup Mode. The Setup Mode can be accessed in two ways, through shortcut pushbuttons or shortcut pushbuttons in conjunction with a pass code. A pass code may be desired to protect these parameters from accidental setup mode entry. Detailed descriptions of all standard parameters and their settings are contained in this Chapter.

Configuration Methods

Front Panel Configuration

This is the most common configuration method for the *GuardianXL* Indicator. Front panel configuration is accessed through the shortcut pushbuttons or the shortcut pushbuttons in conjunction with a pass code.

Front panel configuration uses the primary and secondary displays for user feedback and current configuration settings. The navigation pushbuttons on the front panel keypad assist in moving through the configuration menus in the *GuardianXL*. This Chapter will describe the configuration of the *GuardianXL* using the front panel configuration method.

GuardianXL Software Configuration

The software configuration supports the uploading and downloading of *GuardianXL* batching parameters. Therefore, each *GuardianXL* batch configuration can be saved and recalled easily for future reconfiguration. All batch settings can be edited and then downloaded to the *GuardianXL*.

The *GuardianXL* configuration software is compatible with IBM compatible personal computers running Windows 98, ME or XP. This configuration option is accessed through the serial port on the Digital I/O option. Chapter 10 describes this setup method in detail.

Front Panel Setup Mode

The *GuardianXL* is configured using a menu of parameters in the setup mode. Four navigation pushbuttons are used to move through the menus and change parameter settings see Figure 2.1 in Chapter 2 for location of these pushbuttons.

To enter the setup mode through the front panel, press MENU then one of the shortcut pushbuttons on the keypad. The entire setup menu is accessible from any shortcut pushbutton entry point through the use of the navigation pushbuttons. The entire setup menu map is provided in figure 4.7 at the end of this Chapter. Entering the setup mode at a specific point, allows for fast configuration through fewer pushbutton presses. The shortcut pushbutton functions are described below:

1 SP	Allows for the recall of setpoint and preact values.
2 ID	Allows for recall and configuration of scale ID values.
3 ACC	Allows for recall of gross and net accumulator values.
4 COM	Enters the setup menu at communications parameters.
5 PRG	Enters the setup menu at batch programming.
6 D/T	Enters the setup menu at the date time parameters.
7 TEST	Enters the test menu at the Test Option parameters.
8 I/O	Enters the setup menu at setpoint and I/O configuration parameters.
0 CAL	Enters the calibration menu. Calibration is described in Chapter 5.

Setup Mode Pass Code Protection

It is possible to protect the setup mode with a pass code to prevent accidental entry and configuration changes.

If enabled, the pass code must be entered after pressing MENU and a shortcut pushbutton. The secondary display will then read ACCESS SETUP MD ENTER PASS CODE. Enter 2580 and the *GuardianXL* will enter the setup mode. The pass code will be echoed to the primary display to provide confirmation of pushbutton presses. If any error occurs while entering the pass code, simply re-enter the pass code.

It is possible that your DORAN distributor has changed the pass code or has enabled the sealed pushbutton located on the inside of the *GuardianXL* housing. If the standard code does not work contact your local DORAN distributor for service needs. See the Enable

Setup PW parameter in the Calibration Parameters section in this chapter to enable or disable this feature.

Working with the Setup Mode

When in the setup mode, the navigation pushbuttons will input selections and navigate through the setup mode menu. The current parameter is displayed on the first line of the secondary display. The current parameter value is displayed on the primary display. The second line of the secondary display provides a navigation pushbutton guide for the setup mode.

To select a parameter value, press the UNITS (▼) or PRINT (▲) pushbuttons to scroll through the possible selections for that particular parameter. The parameter value can be saved once the desired parameter is displayed on the primary display. To save the desired value press GROSS/NET (◀) or TARE (▶). This advances the indicator to the next parameter, confirming your selection. Once MENU is pressed, the setup mode is exited and the secondary display reads SAVING DATA to confirm that the parameter changes have been saved.

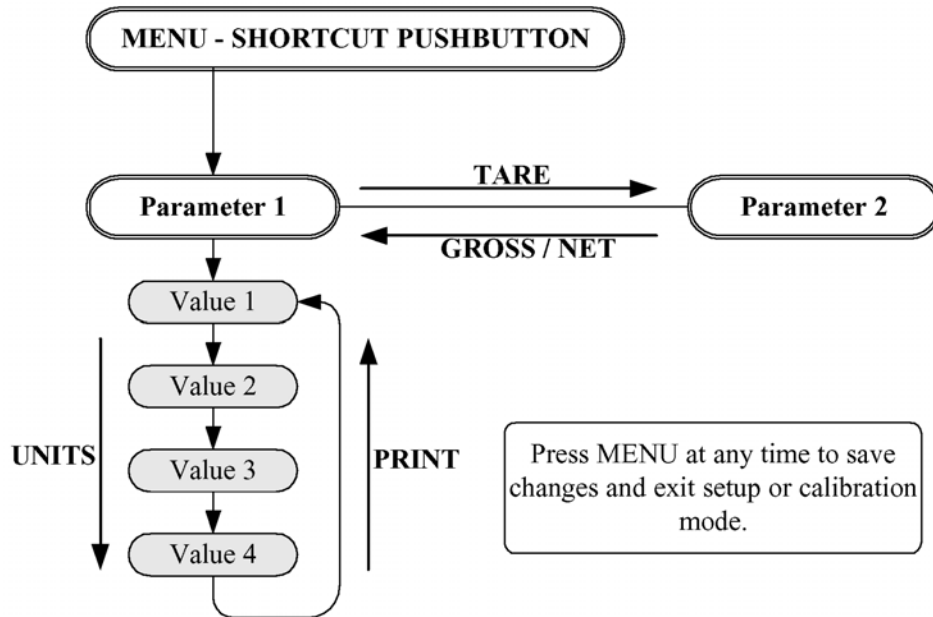


Figure 4.1 Menu Navigation

Setup Mode Configuration

Communications Parameters

Press MENU then 4 (COMM) on the keypad to enter the Communications parameter section of the setup menu. Communication parameters configure the Serial Port outputs.

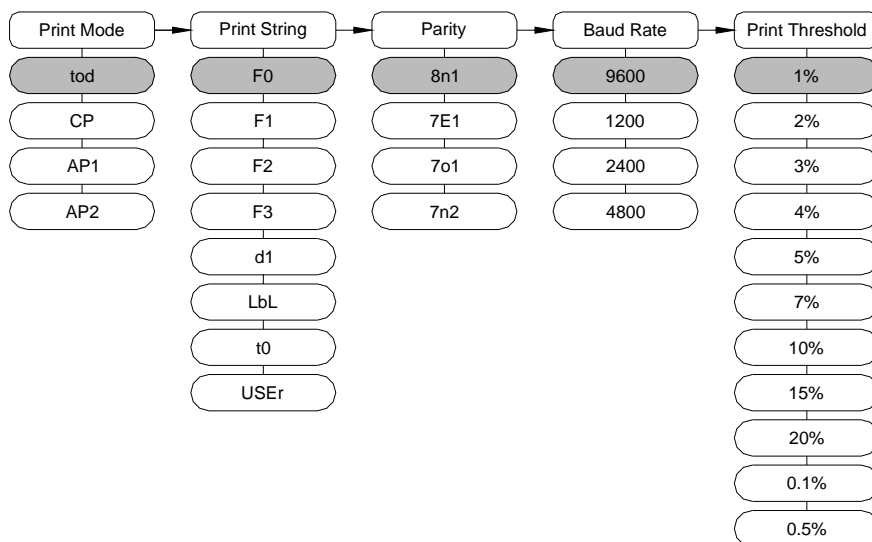


Figure 4.2 Communications Parameter Menu

Print Mode	
Configures the conditions where print strings are transmitted through the Serial Ports.	
tod	Transmit on Demand. Prints when a print request is received, i.e. the PRINT pushbutton is pressed.
CP	Continuous print. Prints once for every display update.
AP1	Automatic print function one. Automatically prints once when the scale is in a stable state.
AP2	Automatic print function two. Automatically prints once when the scale is in a stable state. The displayed weight must return within the print threshold before another print will be transmitted. Print threshold configuration is described below.

Print String	
Selects the print string to be outputted from the indicator when a print is executed. Use F3, when setting up communications with the Digital I/O option. See Appendix A for detailed information on data communication print strings.	
F0	Basic Output Format
F1	Basic Output Format with Setpoint Status and Tare Weight
F2	Basic Output Format with Setpoint Status
F3	Digital I/O Format
USER	User Defined Print String
t0	Basic Output Format with Time, Date and Scale ID
LbL	Eltron Label Printer Format
d1	Basic Output Format with Setpoint Status, Kilogram Weight and Tare Weight

Parity	
Selects the data bits, parity and stop bits for the Fiber Optic communications.	
8n1	Eight Data Bits, No Parity, One Stop Bit
7o1	Seven Data Bits, Odd Parity, One Stop Bit
7E1	Seven Data Bits, Even Parity, One Stop Bit
7n2	Seven Data Bits, No Parity, Two Stop Bits

Baud Rate	
Selects the baud rate of the Fiber Optic option.	
9600	9600 Bits Per Second
4800	4800 Bits Per Second
2400	2400 Bits Per Second
1200	1200 Bits Per Second

Print Threshold	
Selects the print threshold as a percentage of capacity for auto print function two, setpoint triggers Zero Band and Return to Zero below. The print threshold is a weight band around gross zero.	
1%	To calculate the print threshold, multiply the scale capacity by the selected percentage. For example using 2% will create a 100LB x 0.02 = 2LB threshold. Therefore the print threshold will be between -2LB and 2LB.
2%	
3%	
4%	
5%	
7%	
10%	
15%	
20%	
0.5%	
0.1%	

Date Time Parameters

Press MENU then 6 (D/T) to access and alter current date-time settings. The date-time feature is primarily used for print string output.

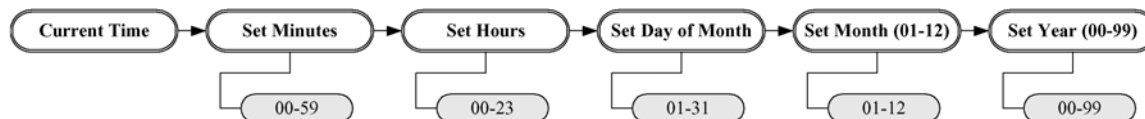


Figure 4.3 Date / Time Menu

Current Time
Displays the current date and time in 24 hour format for review.

Set Minutes
Enter the current minute. Press CLEAR. If the current minute is less than ten, first press zero then the current minute. For instance if it is three minutes past the hour, press 03 then TARE (►) to accept.

Set Hours (00-23)
Enter the current hour in 24 hour format. For instance if it is one o'clock PM, press CLEAR then enter 13 for the hour and press TARE (►) to accept. If the current time is less than ten, first press zero then the current hour.

Set Day of Month
Enter the current day of the month. Press CLEAR. If the current day is less than ten, first press zero then the current day. Press TARE (►) to accept the entry.

Set Month (01-12)
Enter the current month. Press CLEAR. If the current month is less than ten, first press zero then the current month. Press TARE (►) to accept the entry.

Set Year (00-99)
Enter the last two digits of the current year. Press CLEAR. If the last two digits of the current year is less than ten, first press zero, then the current month. Press TARE (►) to accept the entry.

Setpoint Output and I/O Function Parameters

Press MENU then 8 (I/O) to configure the *GuardianXL* I/O including batch functions. The application of triggers described below are described in detail in Chapter 6.

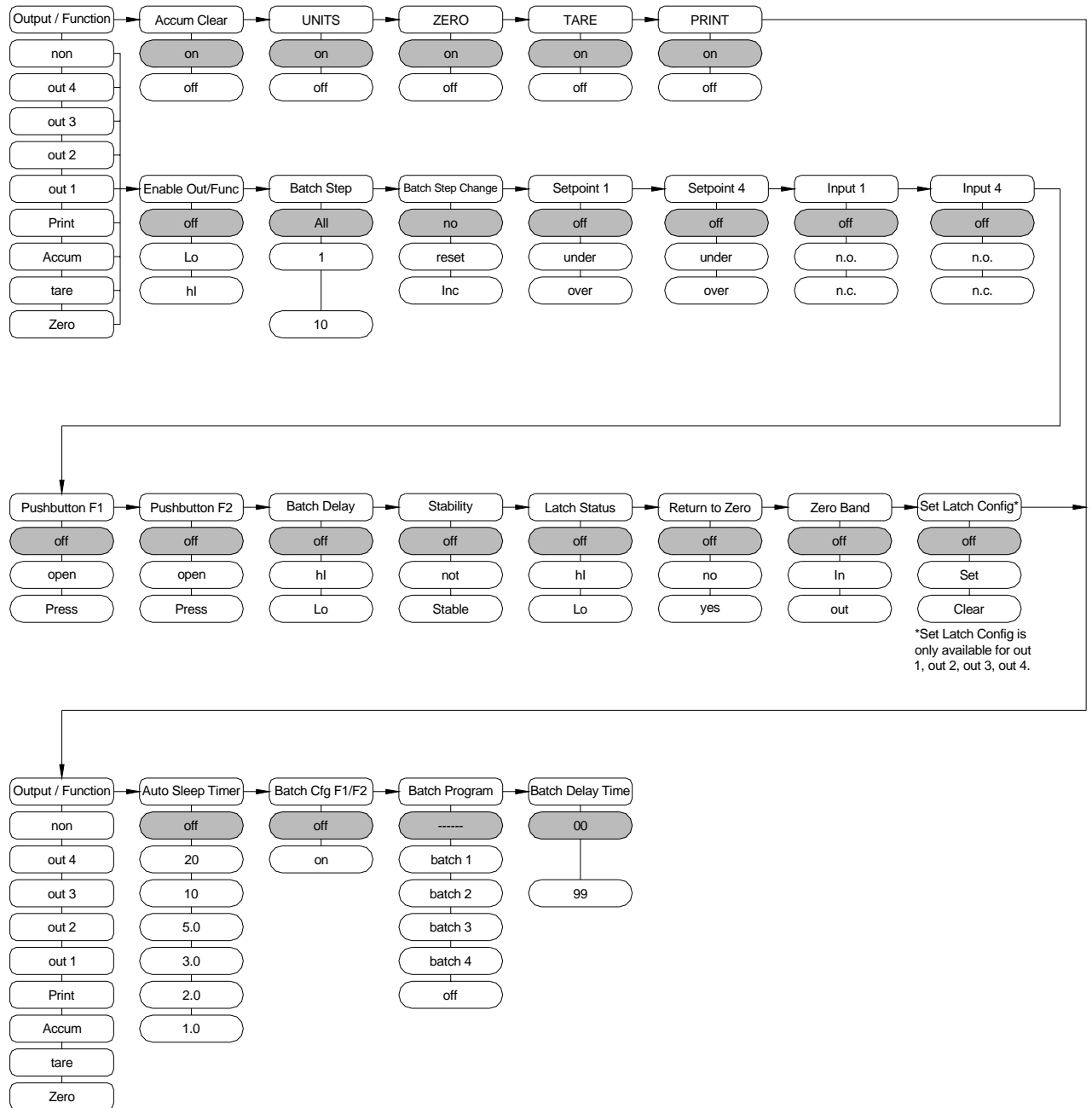


Figure 4.4 I/O and Batch configuration Menu

Output / Function	
This parameter selects the function or output to be configured with the triggers in this section. By selecting an output or function, allows trigger configuration that defines the active and inactive states for that particular output or function. If left in the Off selection, the trigger section will be bypassed and the menu will advance to Remote Input below.	
Off	If this selection is set to Off the trigger menus will not be accessible. The next available menu will be Accum Clear below.
Out 4	Activates the output for trigger configuration. These outputs activate both the internal relay option and / or the Digital I/O option relays.
Out 3	
Out 2	
Out 1	
Print	Allows configuration of a remote or trigger activated auto print function.
Accum	Allows configuration of a remote or trigger activated accumulation function.
Tare	Allows configuration of a remote or automatic Tare operation.
Zero	Allows configuration of a remote or automatic Zero operation.

Enable Out/Func	
This parameter is critical to the function of the output or function selected in the previous menu. The state can be used to invert triggers that activate a function or output. Normal operation will use Hi as the setting for activating a function or output.	
Off	Output or function is disabled.
Lo	If one or more of the following triggers is in a false condition, the setpoint will be activated. If all of the triggers are true, the setpoint will be inactive.
Hi	All active triggers must be in a true condition to activate the setpoint.

Batch Step	
A batch mode control parameter. This parameter allows a sequence number to be assigned to a given setpoint output or function. Once an output or function has been assigned a step number, it will be active only when the scale is executing that particular step in the batch sequence.	
All	Continuously Active
10	Step 10
9	Step 9
8	Step 8
7	Step 7
6	Step 6
5	Step 5
4	Step 4
3	Step 3
2	Step 2
1	Step 1

Batch Step Change	
A batch mode control parameter. When a batch program has completed the current step, (i.e. setpoint reached, weight is accumulated, scale is zeroed) the batch program then performs one of the three options that either stop or continue the batch program. Outputs will execute their assigned task as soon as the output trigger conditions transition from true to false. Functions will execute their task as soon as their trigger conditions are met.	
No	Does not Increment
Reset	Resets Batch Routine to Step One. If the Batch Program is not a Global Repeat, a Start Command is Required to Restart the Batch Program.
Inc	Increments to the Next Batch Step.

Setpoint 1, Setpoint 2, Setpoint 3, Setpoint 4	
These four menus share the same parameter values. Setpoint triggers are based upon the setpoint weights, see Chapter 2, Keypad Functions section for setpoint configuration details. Select one or several setpoint(s) to act as a trigger for the output or function selected in Output / Function above. This setting can cause a trigger active below or above the setpoint weight. The off selection will render a setpoint inactive for the output or function selected above.	
Off	The output or function ignores this setpoint trigger.
Under	This trigger is true when the weight display is less than the setpoint weight.
Over	This trigger is true when the weight display is greater than the setpoint weight.

Input 1, Input 2, Input 3, Input 4	
These four menus share the same parameter values. These parameters incorporate any input or combination of inputs to activate or inactivate the setpoint. Inputs are available in the Digital I/O Option through a dry contact. Also note that it is possible to tie outputs to inputs in the Digital I/O Option. See Chapter 8 for details on the Digital I/O Option.	
Off	The output or function ignores this setpoint trigger.
n.c.	The input is a normally closed input. The input has a true condition when the input is open.
n.o.	The input is a normally open input. The input has a true condition when the input is closed.

Pushbutton F1, Pushbutton F2	
These two menus share the same parameter values. This trigger value is based upon the F1 and F2 function pushbuttons on the front panel, located below the navigation pushbuttons. This trigger acts as an input above does, without the requirement of having the Digital I/O Option.	
Off	The output or function ignores this trigger.
Open	The trigger value is true if the pushbutton is not pressed.
Press	The trigger value is true if the pushbutton is pressed.

Batch Delay	
A batch mode control parameter. The delay timer begins whenever an output switches from true to false. The delay timer lasts for a period defined by the Enter Delay Time parameter located in the Date Time Parameters above.	
Off	No Delay
Lo	The trigger value is true when delay timer ends.
Hi	The trigger value is true when delay timer begins.

Stability	
This trigger is used when a stable scale reading is necessary to verify the displayed weight or to trigger when the scale is in motion. Couple this trigger with a setpoint above to assure the output or function will be true only when the scale is stable, which assures the most accurate weight will trigger the output or function.	
Off	The output or function ignores this trigger.
Not	This trigger is true when the scale is in motion – when the MOT. status is active in the secondary display.
Stable	This trigger is true when the scale is stable. This is useful for capturing as accurate a weight as possible.

Latch Status	
This allows a latching flag to be used as a trigger. The flag can be set or cleared by any combination of the four outputs. See Config Set Latch on how to set and clear this flag.	
Off	The output or function ignores this trigger.
Hi	This trigger is true when the flag has been set.
Lo	This Trigger is true when the flag is cleared.

Return to Zero	
This trigger is based upon the return to zero flag. The return to zero flag is set any time the gross weight on the scale returns to gross zero band. The gross zero band value is set by the Print Threshold parameter. When the return to zero trigger is set to Yes or No, the status of the return to zero flag is checked and used as a trigger. The return to zero flag is false when a standard auto print occurs or when a trigger base print function occurs.	
Off	The output or function ignores this trigger.
No	This trigger is true when the scale has not returned to zero after auto printing.
Yes	The trigger is true when the scale has returned to gross zero and has not met the print conditions.

Zero Band	
This trigger is based upon the Print Threshold value. The trigger state is based upon either being within or outside the Print Threshold.	
Off	The output or function ignores this trigger.
In	This trigger is true when the weight display is within the Set Print Thresh percentage of capacity.
Out	This trigger is true when the weight display is outside the Set Print Thresh percentage of capacity.

Set Latch Config	
This parameter allows one or more of the four outputs to set or clear the Latch Flag. When enabled, the output will set or clear the Latch Flag as the output switches from active to inactive. The Latch Flag will not change unless an output is configured to do so by setting this parameter to Set or Clear.	
Off	Does not alter the Latch Flag parameter above.
Set	When the output status transitions from active to inactive, the Latch Flag is set.
Clear	When the output status transitions from inactive to active, the Latch Flag is cleared.

Accum Clear	
This parameter enables or disables the Accum Clear Function used in the Accumulator / Counter recall mode.	
On	Enables use of the Accum Clear function on Accumulator/Counter.
Off	Disables use of the Accum Clear function on Accumulator/Counter.

UNITS	
This parameter enables or disables the front panel UNITS push button function.	
On	Enables use of the UNITS push button.
Off	Disables use of the UNITS push button.

ZERO	
This parameter enables or disables the front panel ZERO push button function.	
On	Enables use of the ZERO push button.
Off	Disables use of the ZERO push button.

TARE	
This parameter enables or disables the front panel TARE push button function.	
On	Enables use of the TARE push button.
Off	Disables use of the TARE push button.

PRINT	
This parameter enables or disables the front panel PRINT push button function.	
On	Enables use of the PRINT push button.
Off	Disables use of the PRINT push button.

Auto Sleep Timer	
Configures the time in minutes of non-activity before the scale automatically enters sleep mode.	
Off	The indicator is continuously on.
20	
10	
5.0	
3.0	
2.0	
1.0	

Batch Cfg F1/F2	
A batch mode control parameter. This parameter enables or disables the F1/F2 Pushbuttons while in batch mode.	
On	Enables use of F1/F2 batch control pushbuttons.
Off	Disables use of F1/F2 batch control pushbuttons.

Batch Program	
A batch mode control parameter. This parameter selects the pre-programmed batch program to load into memory. See Chapter 7 Batch Programs for implementation of batch programs.	
-----	No change to batch settings.
Batch 1	Two Speed Net Weight Fill with Manual Feed
Batch 2	Two Speed Hopper Fill with Manual Dump and Fill
Batch 3	Three Speed Fill with Automatic Dump and Auto Repeat
Batch 4	Three Speed Loss In Weight with Manual Dump

Batch Delay Time	
A batch mode control parameter. This parameter allows a delay to be inserted into a batch program.	
0-99	Press CLEAR to Erase Previous Setting. Enter Desired Time from 0-99 Seconds.

Scale Test Mode

Press MENU then 7 to access the test mode menu. This menu can be password protected, enter a pass code of 60510 to access the test mode. Use caution when using these parameters as outputs can be triggered in the “Test: Outputs” parameter and the 4-20mA option can be forced to 4 mA or 20 mA in the “Test: 4-20” parameter. Ensure that all process controls are deactivated while in this mode to prevent accidental triggering of process controls. Press MENU to exit the test mode.

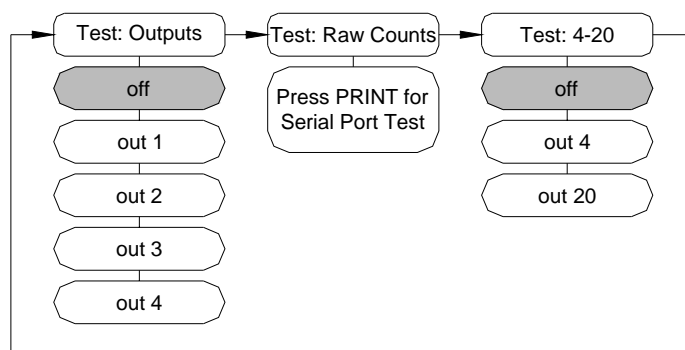


Figure 4.5 Test Mode Menu

Test: Outputs	
This parameter activates each output, one at a time as you scroll through the parameter values. Use this parameter to troubleshoot relays that are not activating and communications between the <i>GuardianXL</i> and the Digital I/O option. Once this menu is exited all outputs are inactive.	
Off	No outputs are activated.
Out 1	Activates output 1
Out 2	Activates output 2
Out 3	Activates output 3
Out 4	Activates output 4

Test: Raw Counts	
This parameter displays the A/D raw output and tests the serial port. Press PRINT while in this mode and a test print string, consisting of the current raw counts, will be transmitted on 9600 baud, 8n1.	

Test: 4-20	
This parameter is used for 4-20 panel meter calibration and is only available when the Print Mode parameter is set to 4-20. The value selected will force the 4-20 output to either 4 mA or 20 mA. When this parameter menu is exited the 4-20 will return to normal operation.	
off	Output is set to 3.5 mA
Out 4	Output is set to 4 mA
Out 20	Output is set to 20 mA

Calibration Parameters

Press MENU then 0 (CAL) to enter the calibration audit trail and calibration entry menu.

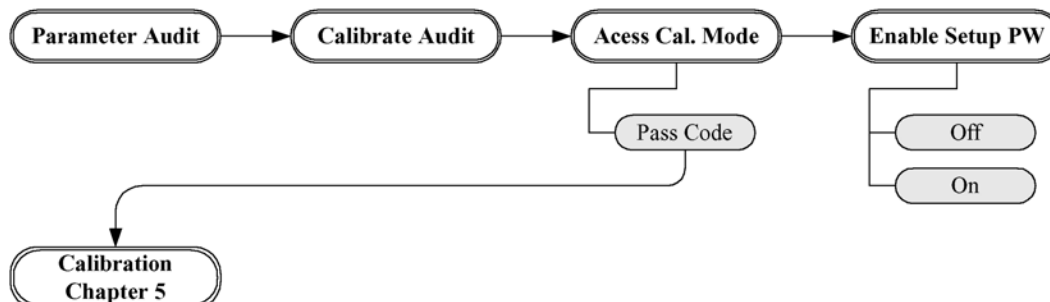


Figure 4.6 Calibration Mode Entry Menu

Parameter Audit
The primary display shows the current metrological parameter count. This count is incremented once for each metrological parameter changed in the calibration mode described in Chapter 5. The counter can therefore be used to track metrological changes in the <i>GuardianXL</i> indicator, facilitating legal for trade and quality control verification.

Calibrate Audit
The primary display shows the current calibration count. Each time the indicator is calibrated this counter is incremented once. The counter can therefore be used to track metrological changes in the <i>GuardianXL</i> indicator, facilitating legal for trade and quality control verification.

Access Cal Mode
To enter the calibration mode the calibration password must be entered here. Refer to Chapter 5 for calibration mode entry and configuration.

Enable Setup PW	
This enables or disables pass code protection for the setup mode parameters. Disabling entry of the setup mode allows tight control of the setup parameters and accidental setup mode entry. The pass code for the setup mode is not changeable. If enabled, the pass code must be entered after pressing MENU and a shortcut pushbutton. The secondary display will read ACCESS SETUP MD ENTER PASS CODE. Enter 2580 and the <i>GuardianXL</i> will enter the setup mode. Use pass code 60510 to enter the test mode.	
On	The setup mode pass code is enabled.
Off	The setup mode pass code is disabled.

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Chapter 5

Calibration Mode

To configure metrological parameters and calibrate the *GuardianXL* Indicator, it must be placed in calibration mode. The calibration mode can be accessed two ways, through front panel pass code or an internally mounted pushbutton in combination with a pass code. The setup pushbutton is accessed by removing the two-screw access panel on the bottom of the indicator. The *GuardianXL* is placed into calibration mode when the pass code is entered and the pushbutton is pressed.

It is recommended that only authorized DORAN distributors calibrate your *GuardianXL*. Authorized DORAN distributors have factory level training and the right tools to properly configure a *GuardianXL* for maximum performance. Contact the DORAN SCALES sales department at 1-800-262-6844 for information on the DORAN distributor in your area.

Configuration Methods

Front Panel Configuration

Front panel configuration is accessed through a front panel pass code or by entering a pass code and pressing the sealed calibration pushbutton. Using the pushbutton allows the *GuardianXL* calibration to be physically sealed. The sealed calibration pushbutton can be enabled by jumpering JU13 on the motherboard. See figure 3.1 in Chapter 3 for a complete list of motherboard connections and jumpers

The calibration mode uses the primary and secondary displays for user feedback and current parameter settings. The navigation pushbuttons on the front panel keypad assist in moving through the configuration menus in the *GuardianXL*. This Chapter will describe the configuration and calibration of the *GuardianXL* using the front panel configuration method.

Front Panel Calibration Mode Entry

The *GuardianXL* is configured using a menu of parameters in the calibration mode. Four navigation pushbuttons are used to move through the menus and change parameter settings. See Figure 5.1 below for navigation pushbutton functions.

Pressing MENU then 0 (CAL) on the numeric keypad places the *GuardianXL* into the setup mode. The audit trail counter is displayed in the primary display, while the secondary display reads PARAMETER AUDIT. The parameter audit trail tracks changes in metrological related parameters by incrementing every time changes are saved to the *GuardianXL*.

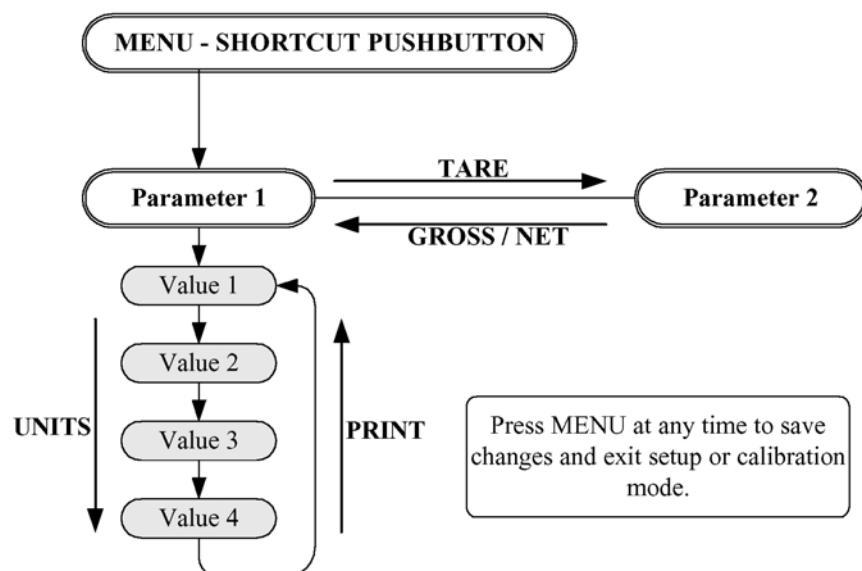


Figure 5.1 Menu Navigation

Press TARE (►) to advance to the calibration audit trail counter. The audit trail counter is displayed in the primary display, while the secondary display reads CALIBRATE AUDIT. The calibration audit trail tracks changes in calibration by incrementing every time the *GuardianXL* is calibrated. Press TARE (►) to advance to the calibration mode entry point. The secondary display will read ACCESS CAL MODE ENTER PASS CODE. Access to the calibration mode requires a pass code.

Each *GuardianXL* leaves the DORAN factory with a standard pass code and the sealed calibration pushbutton disabled. Enter 2580 and the *GuardianXL* will enter the calibration mode. The pass code will be echoed to the primary display to provide confirmation of pushbutton presses. If any error occurs while entering the pass code, simply re-enter the pass code. If this code does not place the indicator into calibration mode, your DORAN distributor has entered a custom pass code or has enabled the sealed calibration pushbutton to preserve calibration. Contact your local DORAN distributor for calibration service.

Working with the Calibration Mode

The calibration mode does not have shortcut pushbuttons to assist in navigating through the calibration mode. Therefore the parameters are listed in the order in which they occur in the calibration mode. Refer to Figure 5.2 at the end of this Chapter for a complete calibration mode parameter map.

When in the calibration mode the navigation pushbuttons will input selections and navigate through the calibration mode menu. The current parameter is displayed on the first line of the secondary display. The current parameter value is displayed on the primary display. The second line of the secondary display provides a navigation pushbutton guide for the setup mode.

To select a parameter value, press the UNITS (▼) or PRINT (▲) pushbuttons to scroll through the possible selections for that particular parameter. The parameter value can be

saved once the desired parameter is displayed on the primary display. To save the desired value press GROSS/NET (◀) or TARE (▶). This advances the indicator to the next parameter, confirming your selection. Once MENU is pressed, the calibration mode is exited and the secondary display reads SAVING DATA to confirm that the parameter changes have been saved.

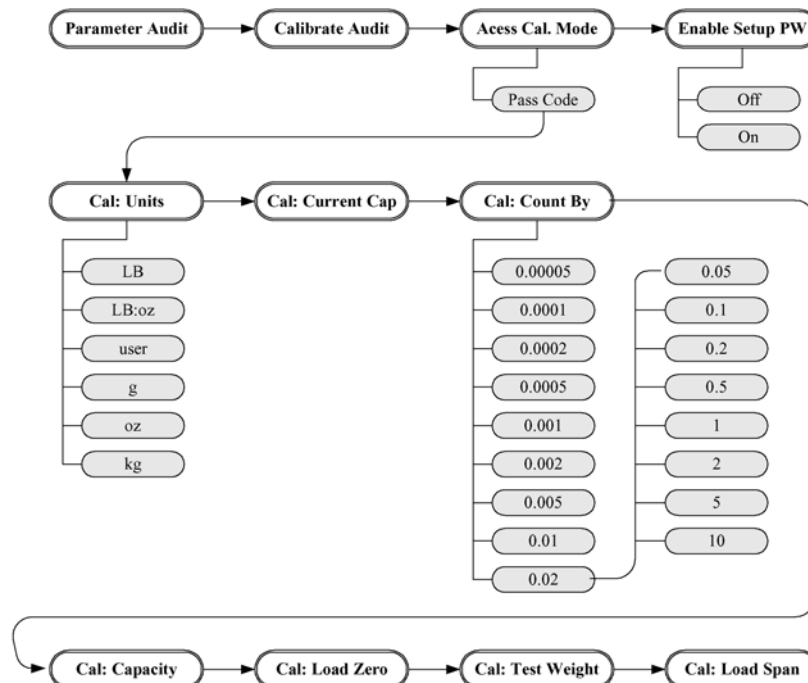
Calibration Mode Configuration

Count By and Capacity Configuration Procedure

The *GuardianXL* allows the user to calibrate to any capacity and resolution, only limited by the number of displayable digits and maximum displayed resolution of 50,000 divisions. Calibrating the *GuardianXL* consists of three steps: setting the resolution and capacity, calibrating zero, and calibrating the span.

If the capacity and resolution are already set to the desired values and only recalibration is desired, this section can be bypassed by pressing TARE (▶) until CAL: LOAD ZERO is displayed on the secondary display. Read the *GuardianXL* Span and Zero Calibration Procedure below for calibration instructions.

The first stage of calibration involves setting the scale resolution and capacity. To set the capacity and resolution, the operator must first enter the calibration menu. See Front Panel Calibration Mode Entry above to enter calibration mode. Once in the calibration



mode, the first menu encountered will be the calibration units select menu. While in this menu, verify that the current units match the capacity and resolution units for your scale configuration.

CAL: Units	
This parameter displays the calibration units. The first line of secondary display shows the current units in the right most two characters of the first line. It is possible to calibrate in any of the units below.	
lb	
lb:oz	
user	Allows a user defined non-metrological unit to be defined.
g	
oz	
kg	

After setting the units, press TARE (►) to enter the capacity review menu.

CAL: Current Cap
<p>This menu will show the current full scale capacity and decimal point position in the primary display. No configuration changes are possible in this menu, it is used for capacity review only. The capacity is displayed in the units selected in CAL: Units above.</p> <p>Capacities in all units can be recalled by pressing GROSS/NET (◀) to return to the Cal: Units menu. Change the Cal: Units parameter to any unit you wish to recall. Press TARE (►) to return to this parameter to display the capacity of the current Cal: Unit parameter value. Be sure to change the Cal: Unit parameter value back to your calibration unit before calibrating.</p>

Press TARE (►). This will place you in the count by and decimal point configuration menu. Attempting to select a restricted setting will generate a RESOLUTION ERROR on the secondary display. These settings have been restricted, because they could cause an abnormal operating mode. Please note, that changing the count by and decimal point location will force the CAL: Capacity value to zero.

CAL: Count By	
Displays the current scale resolution in the display. The resolution is displayed in the units selected in CAL: Units. The resolution is what the scale counts by in the weigh mode. For instance with a 500 x 0.1 lb capacity and resolution the count by value would be 0.1 lb. When setting up a scale in grams or ounces, resolution choices have been limited.	
0.00005	
0.0001	
0.0002	
0.0005	
0.001	
0.002	
0.005	
0.01	
0.02	
0.05	
0.1	
0.2	
0.5	
1	
2	
5	
10	
20	
50	
100	
200	

Once a desired resolution has been selected, press TARE (►) to enter the capacity entry menu. Use the numeric pushbuttons to enter the desired capacity. As an aid to scale setup, the scale provides you with several messages to assist in selecting a valid capacity.

Pressing CLEAR will erase the current capacity and a zero value will appear on the main display. In conjunction with this, the second line of the text display will read INCREASE COUNTS. This message informs you that the current capacity is not large enough to ensure that the scale meets the minimum number of divisions (min – 200d, max – 50,000d). If you leave the calibration mode with an increase counts menu, the scale will automatically assign a capacity value that will be slightly above the minimum division specification.

If a capacity is entered that exceeds the scale's maximum division specification, a RESOLUTION ERROR message will appear on the secondary display. The scale will also replace the entered capacity with the maximum capacity allowed for the selected

CAL: Count By value. When this occurs, either press CLEAR and enter a new capacity or simply accept the maximum default value by pressing TARE (►).

CAL: Capacity
Enter the desired capacity. The capacity is displayed in the units selected in CAL: Units.

GuardianXL Span and Zero Calibration Procedure

The *GuardianXL* permits an independent span and zero calibration procedure. For instance, if a scale has a valid span calibration, the calibration zero may be reloaded whenever needed without affecting the span or vice versa.

The *GuardianXL* allows span weight calibration to be performed prior to the zero weight calibration. The *GuardianXL* will also allow span calibration to occur by removing a known weight rather than adding weight. In these cases, it will be necessary to return to the scale later and reload the zero calibration. Calibration examples are described at the end of the calibration procedure.

Enter the calibration mode as described above in Front Panel Calibration Mode. Press TARE (►) until the secondary display reads CAL: LOAD ZERO to enter the zero calibration routine. Remove any unnecessary weight from the scale. Press ZERO to initiate the zero calibration. The scale will count down once or twice and then display ZERO WT OK. If the scale counts down more than twice, motion is preventing proper calibration. The scale will continue to count until motion stops. Zero calibration can be bypassed by pressing either GROSS/NET (◄) or TARE (►).

CAL: Load Zero
Zero calibration routine. Pressing ZERO initiates the zero calibration. Zero calibration can be bypassed by pressing either GROSS/NET (◄) or TARE (►).

Once the zero weight has been entered, press TARE (►) to enter the test weight entry mode. Using the numeric pushbuttons, enter the size of the test weight. Press CLEAR to erase entry if an error is made during test weight entry.

CAL: Test Weight
The value of the span calibration test weight. The maximum value possible is the capacity of the scale. The test weight value is displayed in the units selected in CAL: Units.

Press TARE (►) to enter the load span mode. Add the test weight and press ZERO. The scale will count down once or twice and then display CALCULATING SPAN followed by CALIBRATION DONE. Span calibration can be bypassed by pressing either GROSS/NET (◄) or TARE (►).

CAL: Load Span
Span calibration routine. Pressing ZERO initiates the zero calibration. Zero calibration can be bypassed by pressing either GROSS/NET (◀) or TARE (▶). If a SIGNAL TOO LOW or EXCESS SIGNAL message appears, the scale is either not receiving the correct load cell signal or an incorrect test weight was entered. Refer to the raw counts mode in Chapter 4, Scale Test Mode and correct before calibrating again.

GuardianXL Calibration Examples

Example 1 Hopper Calibration: Consider a hopper filled with 10,000lb. A zero calibration could be performed with a full hopper. Then a known amount of corn could be removed, (for example; 1000lb) and a span calibration performed. Later, when the hopper is empty, the calibration zero can be repeated and the calibration process is complete.

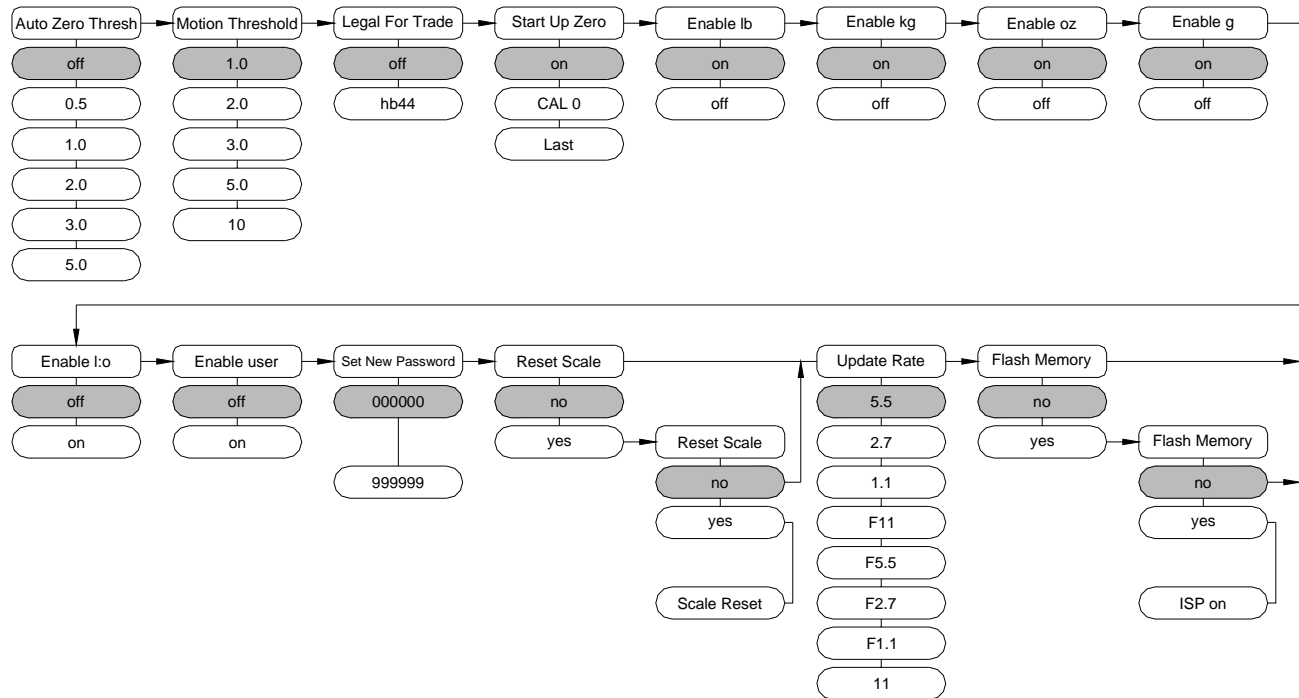
Example 2 User Units Calibration: Set up and calibrate the scale using standard units such as pounds. Set CAL: UNITS parameter to user. Set count by to desired user units count by. Enter the capacity in user units.

Using a 20LB scale, the customer wishes to display weight in percent. First calibrate the scale for 20LB using pounds mode. Go to the count by menu and set it for 0.01. Go to the capacity menu and set it to 100.00. Press menu. You can now switch between any active unit and user units.

Example 3 Units Count By Check: An important feature of the *GuardianXL* is the ability to change units once configuration has started. Let's take our previous example, of the 20lb scale. If the customer requested a scale to have a 20lb capacity with a 0.2oz count by you would normally convert the ounces count by to a pounds equivalent and verify the ounces count by after calibrating in pounds. In the *GuardianXL*, you would set the count by and decimal point location with CAL: Units set to ounces. Once the desired ounces count by is set, return to the CAL: units menu and select pounds to calibrate in pounds. While in the pounds mode, enter the 20lb capacity. The *GuardianXL* will automatically convert the ounce based count by and decimal point selection to the equivalent pound value.

Metrological Parameters

Metrological parameters are those that are controlled when a scale is used in a legal for trade application. Under a legal for trade application, these parameters must be properly configured to conform to the certificate of conformance issued by NCWM for the *GuardianXL*. These parameters are tracked by the parameter audit trail and hence protected with a pass code in the calibration mode.



Auto Zero Thresh	
The auto zero tracking threshold parameter allows for automatic zeroing of the displayed weight when small amounts of product remains on the weighing platform. The unit of this setting is divisions. Therefore a scale calibrated to 500 x 0.1 lb capacity and resolution would have 0.1 lb as one division. AZT should be turned off when light amounts of weight – 1 to 2 divisions of scale capacity is weighed.	
0.5	
1.0	Not available when Legal for Trade is set to HB44.
2.0	Not available when Legal for Trade is set to HB44.
3.0	Not available when Legal for Trade is set to HB44.
5.0	Not available when Legal for Trade is set to HB44.
Off	Auto zero is disabled.

Motion Threshold	
The motion threshold controls the motion indicator when in weighing mode. The unit of this setting is divisions. Therefore a scale calibrated to 500 x 0.1 lb capacity and resolution would have 0.1 lb as one division. The motion indicator is activated when the <i>GuardianXL</i> detects scale platform motion over the threshold setting. This setting must be configured properly when in a Legal for Trade application.	
1.0	One scale division. Legal for Trade Class III or Class III L.
2.0	Two scale divisions. Legal for Trade Class III L only.
3.0	Three scale divisions. Legal for Trade Class III L only.
5.0	Five scale divisions. Not available when Legal for Trade is set to HB44.
10	Ten scale divisions. Not available when Legal for Trade is set to HB44.

Legal For Trade	
This setting auto configures the scale indicator for legal for trade settings as required by NIST in the U.S.	
Off	
HB44	Modifies the following parameters: Start Up Zero parameter on and modifies its' behavior to comply with Handbook 44. The zero range is limited to $\pm 10\%$ of scale capacity. Auto Zero Thresh – 0.5 Motion Threshold – 1.0

Start Up Zero	
When activated, start up zero automatically zeros the scale as a part of the start up routine when the <i>GuardianXL</i> is turned on. It is recommended to leave this parameter off with battery powered systems as it will preserve any weight left on the scale if the <i>GuardianXL</i> goes into sleep mode.	
On	
LASt	Last push-button zero is loaded at startup. Recommended for battery powered systems.
CAL 0	Calibration zero is loaded at startup.

Enable lb, kg, oz, g, l:o, user	
Allows the user to include or remove units from the displayable units in the weighing mode. All active units will be available to the user by pressing the UNITS pushbutton in the weigh mode. Enable l:o must be set to off when in Legal for Trade applications.	
On	All units enabled. (Default for all units except USER.)
Off	Unit is not available in weigh mode.

Set New Password	
The primary display shows the current password. This setting allows the user to create a new password for the setup mode if the Enable Setup PW parameter is set to on. This password also accesses the calibration mode and replaces the default 2580 password. Note: if this password is set to 0 the password protection will be disabled for the setup and calibration modes.	

Reset Scale	
This function allows the scale to be returned to default values as highlighted in bold for each parameter. The scale calibration data will also be erased. The calibration and parameter audit trails are not cleared. The date time setting will also not be cleared. To default the scale press UNITS (▼) the second line of the secondary display reads CONFIRM. To confirm default condition press TARE (►) and press UNITS (▼). The primary display reads done and the scale has been defaulted.	

Flash Memory	
Used by qualified technicians to upload new firmware through RS232 port.	
no	bypass ISP parameter mode
yes	

Update Rate	
The update rate controls the number of updates to the primary display per second. The F prefix indicates a filter with approximately 20% faster settling time over the standard filters. The F filters are not recommended for resolutions greater than 10,000 divisions.	
1.1	
2.7	
5.5	
11	
F1.1	
F2.7	
F5.5	
F11	

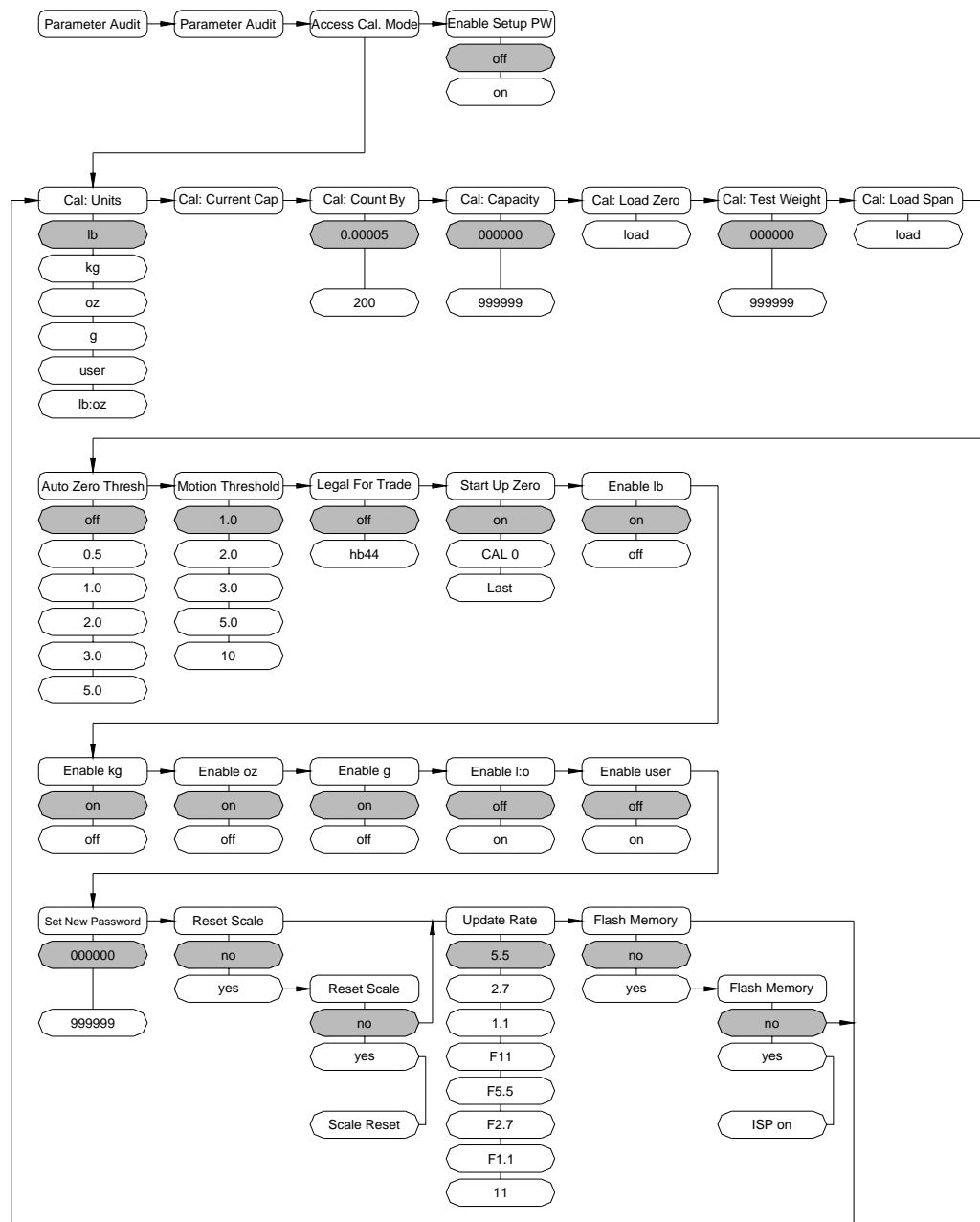


Figure 5.2 Complete Calibration Mode Map

Chapter 6

Setpoint Configuration

The *GuardianXL* features a robust setpoint capability. The first part of this Chapter will cover simple configurations and the second part of this Chapter will detail advanced setpoint configurations.

There are four setpoints available in the *GuardianXL*. Anytime one of these setpoints are enabled, the Setpoint Mode will be active in the Weighing Mode. The Setpoint Mode displays the status of all four setpoints in the second line of the secondary display. A dash directly to the right of the setpoint number indicates a setpoint that is inactive, an asterisk indicates an active status. Throughout this manual an active setpoint is defined by a setpoint with an asterisk indication.

The setpoint outputs displayed in the Setpoint Mode are defined by a set of triggers described in the Setpoint and I/O Parameter section of Chapter 4. Each trigger affects the operation by either being true or false. The *GuardianXL* offers a wide selection of triggers allowing setpoint configuration to vary from simple to complex.

In an Intrinsically Safe environment the *GuardianXL* setpoint status is transmitted to the safe area through the fiber optic option. The status output message is an ASCII string that can be interpreted by a PC with the DORAN optional fiber optic to RS-232 converter or the DORAN digital I/O option. Due to FM sealing requirements, the fiber optic option must be installed at the DORAN SCALES factory.

When used with the digital I/O option, an active setpoint is indicated by a lighted LED on the digital I/O board. The actual relay output depends on the style of relay used – normally open or normally closed. Detailed digital I/O configuration is contained in Chapter 8.

Single Trigger Setpoint Configurations

Basic configurations will be used in most applications. This section describes how to configure basic setpoints. The Over Setpoint example will describe in detail all pushbutton presses necessary to configure the setpoint, while the following examples will be in abbreviated format. The abbreviated format assumes that all parameters not listed are off. The example is based on a scale configured for 100 x 0.01 LB.

Over Setpoint

Begin the process of setting up an over setpoint by entering the setpoint configuration section of the setup mode. Press MENU then 8 (I/O). The first parameter will be CONFIG SET POINT. Press PRINT (▲) to select OUT 1. Press TARE (▶) to select CONFIG OUTPUT CH. Press PRINT (▲) to select HI and press TARE (▶) until the CONFIG THRESH 1 parameter is displayed. Press PRINT (▲) to select OVER. Press

MENU to return to the Weigh Mode. The Setpoint Mode is now active in the second line of the secondary display.

To configure the weight threshold enter 100 into the keypad, creating a 1.00 lb setpoint. Press MENU, press 1 (SP) to save weight threshold 1. To review the threshold setting press MENU, then 1 (SP), the threshold 1 value is displayed in the primary display. While in the threshold review routine pressing 1, 2, 3 or 4 will recall and display the current threshold values. Pressing TARE will recall the current tare value. Press CLEAR to exit the threshold review routine.

Under Setpoint

CONFIG SET POINT = out 2
CONFIG OUTPUT CH = hI
CONFIG THRESH 1 = undEr

Auto Print

The *GuardianXL* allows the user to use predefined auto print functions by setting print control parameters in the Communications Parameters section of the setup mode. If standard auto print functions do not meet the needs for your application a custom one can be configured using triggers.

CONFIG SET POINT = Print
CONFIG OUTPUT CH = hI
CONFIG THRESH 1 = ovEr
CONFIG STABILITY = STABLE

Additional triggers can be added to further customize the print command.

Auto Accumulate

Much like an auto print function, the *GuardianXL* can be configured to auto accumulate weights, net or gross.

CONFIG SET POINT = ACCUM
CONFIG OUTPUT CH = hI
CONFIG THRESH 1 = ovEr
CONFIG STABILITY = STABLE

Manual Accumulate

The *GuardianXL* does not have an accumulate pushbutton for manual accumulations. The F1 or F2 pushbuttons can be programmed to perform this feature. In the following example when the user presses F1, the scale will accumulate the displayed weight.

CONFIG SET POINT = ACCUM
CONFIG OUTPUT CH = hI
CONFIG PB F1 = PrESS

Single Trigger Setpoint Configuration Summary

If you have followed each of the examples above you have created four output functions based upon one threshold weight value. As you change the threshold 1 weight each of the four functions above will be affected. Although simple, these configurations are most commonly used. Keep reading for more complex operations.

Multi Trigger Setpoint Configuration

Multi trigger setpoint configurations create a robust setpoint that can have intelligence beyond evaluating the displayed weight versus the weight threshold values. The following examples build upon those described above.

Stable Over Setpoint

Building on the first Over Setpoint example, it is possible to have a setpoint active only when stable.

```
CONFIG SET POINT = out 1  
CONFIG OUTPUT CH = hI  
CONFIG THRESH 1 = ovEr  
CONFIG STABLE = StAbLE
```

Conversely, the setpoint can be active only when in the scale is in motion by setting
CONFIG STABLE = not.

Checkweigh Setpoint

The Over and Under setpoints above can be programmed as one setpoint using multiple triggers. Setpoint 1 will be active when under weight threshold 1 and above weight threshold 2 i.e. active in under and over.

```
CONFIG SET POINT = out 1  
CONFIG OUTPUT CH = Lo  
CONFIG THRESH 1 = ovEr  
CONFIG THRESH 2 = undEr
```

If CONFIG OUTPUT CH = hI, setpoint 1 will be active when the weight is between weight threshold 1 and weight threshold 2 i.e. active in the accept range.

Chapter 7

Batch Programs

The standard batch programs do not require learning a batch language. Simply select one of the batch programs below to begin operating. When a batch program is selected, setpoint and function triggers will be automatically configured. Batch mode and a state machine will be activated to control the steps of the batch program.

Each batch program can be modified to achieve alternate operations. Due to space limitations only typical modifications to standard batch programs are shown below. If one of the following batch programs or modifications does not meet your needs, contact Doran Scales Technical Support Staff at 800-262-6844 for assistance with batch program modification.

Standard Batch Program Modification

The standard batch programs below include the most common applications. Standard batch programs can be modified by altering the Setpoint Output and I/O Function Parameters described in Chapter 4. The batch control parameters that affect the operation of the batch program are as follows:

Batch Program
Batch Step
Batch Step Chang(e)
Batch Delay
Batch Cfg F1/F2
Batch Delay Time

All other output or function parameters affect the individual output or function, not how the entire batch program operates.

When the Batch Program parameter is changed, the entire configuration of the Setpoint Output and I/O Function Parameters is defaulted to one of the standard batch programs. Once this batch program is loaded into memory, the Setpoint Output and I/O Function Parameters can be modified to achieve a custom batch program. Each of the programs below has a few program alterations listed.

Batch Program 1

Two Speed Net Weight Fill with Manual Feed

This batch program allows a one or two speed container fill directly on a scale platform. The container placed on the scale platform can be detected by programming the minimum and maximum container weight into setpoints 3 and 4 as seen below in the Batch Program Configuration table. The container detection will prevent filling without a container present or when a filled or partially filled container is present.

This batch program does not offer a stop or pause once filling has commenced. If a hazardous condition could possibly exist, an emergency stop button should be wired directly to the relay output power.

BATCH PROGRAM CONFIGURATION			
Batch Control	Digital I/O Controls	Setpoint	Front Panel Pushbuttons
Batch Pause / Restart			MENU
Batch Start			F1
Fast Fill or Ingredient One	Output 1	Setpoint 1	
Slow Fill or Ingredient Two	Output 2	Setpoint 2	
Manual Fill	Output 3		F2
Minimum Container Weight		Setpoint 3	
Maximum Container Weight		Setpoint 4	

Batch Step	Batch Function
1	Place empty container on scale platform. Container weight must be between Setpoint 3 and Setpoint 4 weight values in order for the batch program to start.
2	Press F1 to start batch program
3	Scale Tares
4	Output 1 is closed until Setpoint 1 weight value is reached
5	Output 1 opens
6	Batch Delay Pause
7	Output 2 is closed until Setpoint 2 weight value is reached
8	Output 2 opens
9	Batch Delay Pause
10	Scale Accumulates weight in container, Counter is advanced
11	Remove filled container
ANY	Press F2 to manually fill. This function is available any time the indicator is on.

Single Speed Modification

This will remove output 2 from the batch program. Only output 1 will remain active.

Parameter / Pushbutton	Parameter Selection
Press MENU then 8 (I/O)	
“OUTPUT / FUNCTION”	OUT2
Press TARE (▶)	
“ENABLE OUT/FUNC”	o2 OFF
Press UNITS (▼)	
“OUTPUT / FUNCTION”	ACCUM
Press TARE (▶)	
“SP ACTIVE STEP”	3
Press MENU	

Batch Program 2

Two Speed Hopper Fill with Manual Dump and Fill

This batch program allows a one speed or two speed hopper fill. Containers are filled directly from a scale hopper. This mode of operation allows the hopper to be filled while the previous filled container is removed and an empty container is placed below the hopper, greatly improving efficiency.

This system is intended to work with external switches connected the Digital I/O option's remote inputs. These inputs will control the start of the batch and the hopper dump. A two position toggle switch is recommended for these two operations. The hopper dump will only execute after a fill has executed. Pressing F1 aborts the filling process and requires the hopper to be dumped before filling again.

BATCH PROGRAM CONFIGURATION			
Batch Control	Digital I/O Controls	Setpoint	Front Panel Pushbuttons
Batch Start	Input 1		
Batch Pause / Restart			F2 or MENU
Batch Abort			F1
Fast Fill or Ingredient One	Output 1	Setpoint 1	
Slow Fill or Ingredient Two	Output 2	Setpoint 2	
Manual Dump	Output 4		
Dump Hopper	Input 2		
Hopper Empty Threshold		Setpoint 4	

Batch Step	Batch Function
1	Close Input 1 contacts with external switch to begin filling. The hopper must be below the hopper empty threshold to begin filling.
2	Scale Zeroes
3	Output 1 is closed until Setpoint 1 weight value is reached
4	Output 1 opens
5	Batch Delay Pause
6	Output 2 is closed until Setpoint 2 weight value is reached
7	Output 2 opens
8	Batch Delay Pause
9	Scale Accumulates weight in hopper, Counter is advanced
10	Close Input 2 contact to dump hopper contents.

Single Speed Modification

This will remove output 2 from the batch program. Only output 1 will remain active.

Parameter / Pushbutton	Parameter Selection
Press MENU then 8 (I/O)	
“OUTPUT / FUNCTION”	OUT2
Press TARE (▶)	
“ENABLE OUT/FUNC”	o2 OFF
Press UNITS (▼)	
“OUTPUT / FUNCTION”	ACCUM
Press TARE (▶)	
“SP ACTIVE STEP”	4
Press MENU	

Batch Program 3

Three Speed Fill with Automatic Dump and Auto Repeat

This batch program allows a one, two or three speed fill and dump system with an automatic repeat. This program fills directly into a tank or hopper on a scale platform.

BATCH PROGRAM CONFIGURATION			
Batch Control	Digital I/O Controls	Setpoint	Front Panel Pushbuttons
Batch Start		Input 2	
Batch Reset			F1
Batch Pause / Restart			F2 or MENU
Fast Fill or Ingredient One	Output 1	Setpoint 1	
Slow Fill or Ingredient Two	Output 2	Setpoint 2	
Trickle Fill or Ingredient Three	Output 3	Setpoint 3	
Dump Hopper or Tank	Output 4	Setpoint 4	

Batch Step	Batch Function
1	Zero scale
2	Scale Accumulates weight in hopper, Counter is advanced
3	Output 4 is closed until Setpoint 4 weight value is reached
4	Output 4 opens
5	Batch Delay Pause
6	Output 1 is closed until Setpoint 1 weight value is reached
7	Output 1 opens
8	Batch Delay Pause
9	Output 2 is closed until Setpoint 2 weight value is reached
10	Output 2 opens
11	Batch Delay Pause
12	Output 3 is closed until Setpoint 2 weight value is reached
13	Output 3 opens
14	Batch Delay Pause
15	Batch automatically returns to batch step zero

Single or Double Speed Modification

This will remove output 1 or output 2 from the batch program.

Parameter / Pushbutton	Parameter Selection
Press MENU then 8 (I/O)	
“OUTPUT / FUNCTION”	OUT2 or OUT1
Press TARE (▶)	
Press TARE (▶)	
“SP ACTIVE STEP”	Reset
Press MENU	

Disable Accumulator

This will remove the accumulator step from the program.

Parameter / Pushbutton	Parameter Selection
Press MENU then 8 (I/O)	
“OUTPUT / FUNCTION”	ACCUM
Press TARE (▶)	
“ENABLE OUT/FUNC”	ACC OFF
Press MENU	

Batch Program 4

Three Speed Loss In Weight With Manual Dump

This batch program allows a one, two or three speed loss in weight with a dump. This batch program requires negative setpoints to be entered.

BATCH PROGRAM CONFIGURATION			
Batch Control	Digital I/O Controls	Setpoint	Front Panel Pushbuttons
Batch Pause / Reset			MENU
Start Batch			F1
Fast Fill or Ingredient One	Output 1	Setpoint 1	
Slow Fill or Ingredient Two	Output 2	Setpoint 2	
Trickle Fill or Ingredient Three	Output 3	Setpoint 3	

Batch Step	Batch Function
1	Press F1 to start batch
2	Tares Scale
3	Output 1 is closed until Setpoint 1 weight value is reached
4	Output 1 opens
5	Batch Delay Pause
6	Output 2 is closed until Setpoint 2 weight value is reached
7	Output 2 opens
8	Batch Delay Pause
9	Output 3 is closed until Setpoint 2 weight value is reached
10	Output 3 opens
11	Batch Delay Pause
ANY	To refill hopper or tank Press F2 Output 4 is closed

Dump Container or Reload Hopper Modification

This will configure F2 to manually trigger Output 4 to dump container or reload hopper.

Parameter / Pushbutton	Parameter Selection
Press MENU then 8 (I/O)	
“OUTPUT / FUNCTION”	OUT4
Press TARE (▶)	
“ENABLE OUT/FUNC”	o4 hi
Press TARE (▶) until	
“PUSHBUTTON F2”	PrESS
Press MENU	

Chapter 8

Safe Area Digital I/O Option

Introduction

Introducing the DORAN SCALES Digital I/O option. This option uses state of the art technology to provide you with a low cost solution to interface a scale through a fiber optic cable to a control system. The Digital I/O option offers many features. A few of these features are listed below:

- Four TTL signal Inputs.
- Four N.O. Outputs, capable of driving electromechanical relays (<100mA).
- A full duplex printer port with RS-232 support.
- A full duplex Fiber Optic interface (up to 9600 baud).
- Microprocessor monitoring system to prevent failure under severe fault conditions.
- 115/230 VAC 50/60 Hz (jumper selectable) operation.
- Four 10A / 250V Mechanical Relay (Optional).
- 4-20mA active or passive outputs (Optional).
- Six digit, 0.56" red LED remote display (Optional).

Please be sure to read the entire manual to obtaining all the benefits that the Digital I/O option can provide. If any questions arise, please feel free to contact the DORAN SCALES Technical Support Department at 1-800-262-6844.

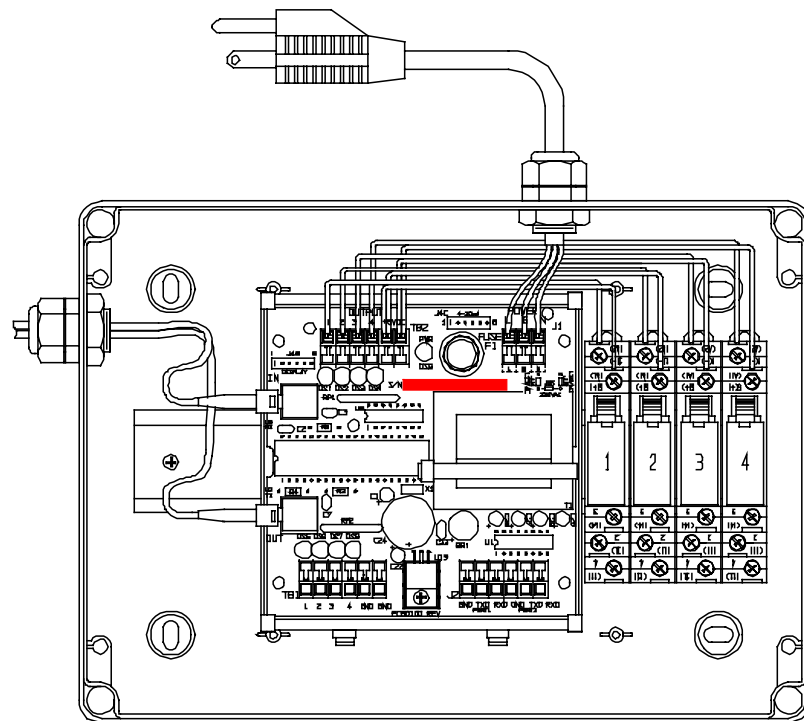


Figure 8.1 Digital I/O option

Setup Guide

Fiber Optic Water Tight Assembly

Remove the outer nut and split bushing from the PG16 water tight. Insert each of the fiber optic ST connector ends one at a time through the PG16 outer nut. Then install the two single fiber optic cables through a split bushing using the slits on the sides (see Figure 8.2). Feed each of the fiber optic ST connector ends through the PG16 water tight. Place the split bushing with cable attached into the outer receptacle of the PG16 water tight. Make sure that there is about 6 inches of cable length between ST ends and water tight (see Figure 8.3). Screw on PG16 nut finger tight, be careful not to over tighten nut.

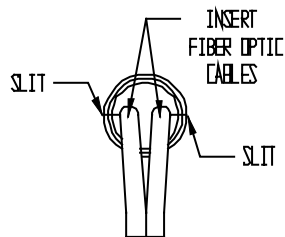


Figure 8.2 Split Bushing

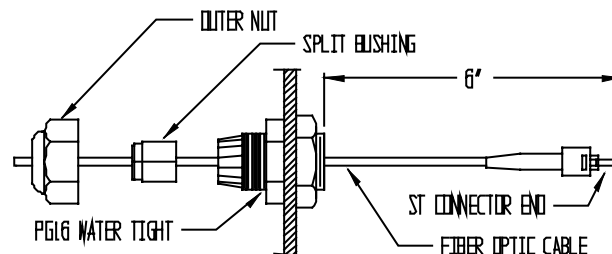


Figure 8.3 Fiber Optic Water Tight

Fiber Optic Connections

In order for the Digital I/O option to function properly, a communication cable must be connected between the scale and the I/O. This connection consists of a transmit and receive fiber optic cable. To connect the fiber optic cable to the I/O circuit board, insert the black ST end into the board connector marked “OUT” and the blue ST end into the connector marked “IN” (see Figure 8.4).

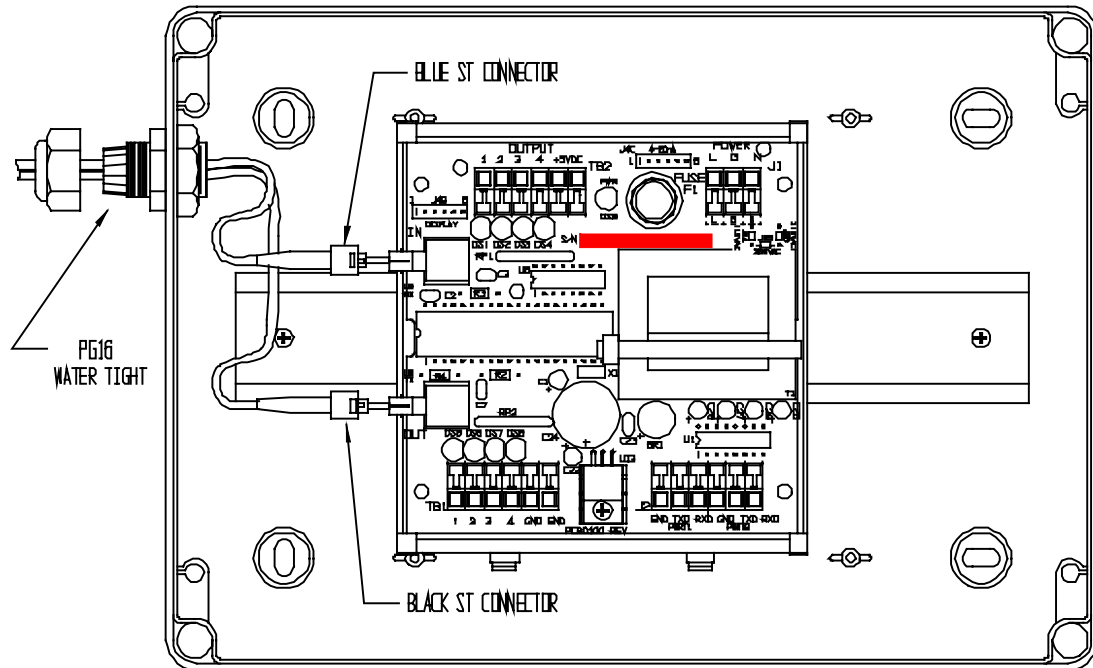


Figure 8.4 Fiber Optic Connection

Input Wiring Connections

The Digital I/O option module consists of four signal inputs used to interface switches or sensors to the scale. The input terminal block (TB1) is located at the bottom left corner of the circuit board. Positioned above each input channel is a status led, which indicates when the input contact is closed. A typical input connection is a switch across the input and GND terminals (see Figure 8.5). All four input channels will support a momentary or toggle switch operation.

When wiring more than two inputs, connect two ground wires per ground terminal.

Warning: all inputs are operated at TTL levels, severe damage will occur if any voltages greater than 5 volts is applied to input terminals.

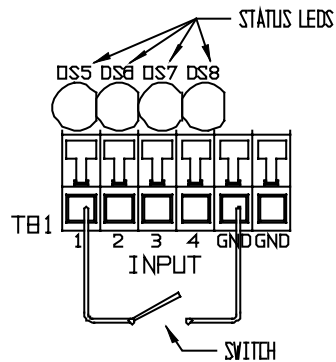


Figure 8.5 Example of Switch Input Connection

Relay Driver Wiring Connections

The Digital I/O option consists of four relay output drivers, used to control electromechanical relays. The output terminal block (TB2) is located at the top left corner of the circuit board. Each individual output driver is capable of supplying a maximum current of 100mA @ 5Vdc. Positioned below the output terminal block are status leds, which indicates when the output signal is inactive (low = gnd) or active (high = +5vdc).

To install an optional relay module, the module must first be snapped into the DIN rail to the right of the I/O module (see Figure 8.7). Connect the silver colored wire between the terminal marked TB2 OUTPUT 1 on the I/O module and the terminal 5(+) on relay module, connect the copper wire between TB2 +5VDC terminal block on the I/O module and the 1(-) on the relay module (see Figures 6 and 7). Repeat this process when adding additional relay modules to the other three outputs. When wiring more than two outputs, connect to the +5VDC terminal block with two wires per terminal.

Relay Option Output Connections

The relay option consists of up to four electromechanical relays. The electromechanical relay output consists of terminal 2 - common (COM), terminal 3 - normally open (NO), and terminal 4 - normally closed (NC) (see Figures 8.4 and 8.7). The electromechanical relay (OMRON G2R-1-SN) is rated for a maximum of 10A @250VAC or 10A @30VDC.

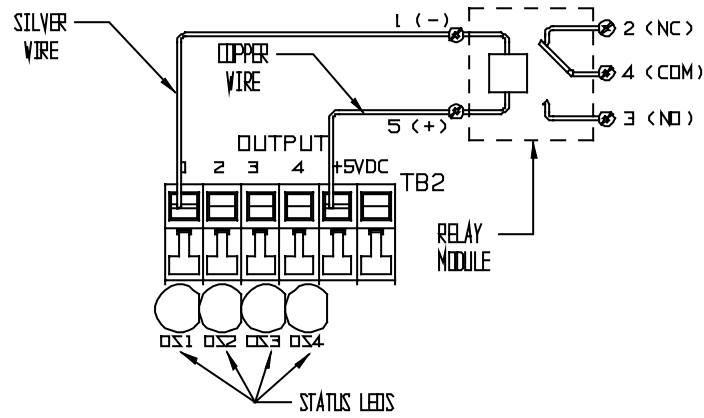


Figure 8.6 Example of Mechanical Relay Output Circuit

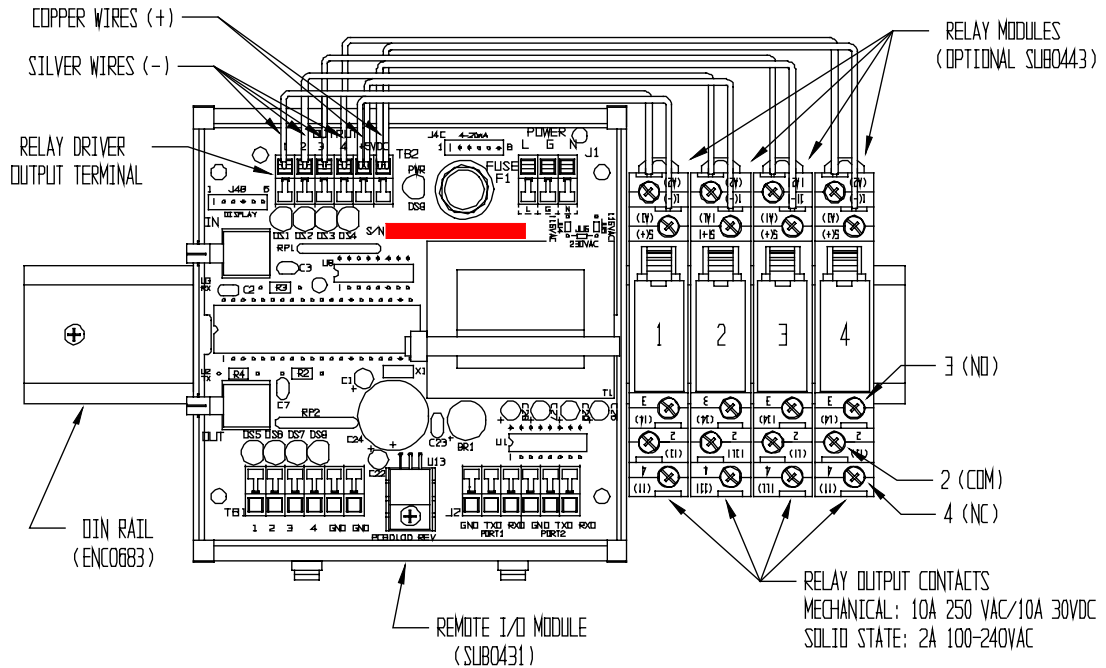


Figure 8.7 Example of Relay Output Connections

Power Terminal Connections

The Digital I/O option requires a continuous power source of 115VAC (standard) or 230VAC (optional). Make sure power is turned off before wiring AC lines to J1 on the Digital I/O option. The Power terminal block (J1) is located at the top right corner of the circuit board. Using Figure 8.8 as a guide, connect the blue or black color wire (Hot) to terminal labeled “L”, the green wire (Ground) to terminal “G”, and the brown or white wire (Neutral) to terminal “N”. After power is applied to Digital I/O option module, a red led marked PWR (DS9) will be lit.

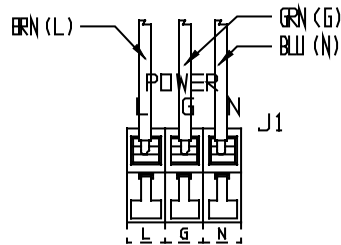


Figure 8.8 J1 Power Terminal Connections

Fuse Replacement

The Digital I/O option module line fuse (F1) is located next to the power terminal (J1). Make sure power is off, before replacing the fuse. Remove the fuse cap by unscrewing it counter clockwise, then pull the fuse out of the socket and insert the new fuse in socket (see Figure 8.9). Then screw the fuse cap back on the socket and apply power to the Digital I/O option module. For 115VAC use T500mA250V SLO-BLOW (DORAN P/N FUS0020) and for 230VAC use T250mA250V SLO-BLOW (DORAN P/N FUS0019).

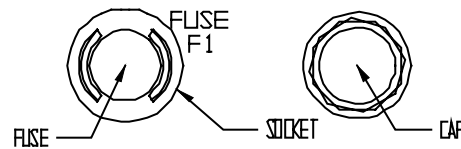


Figure 8.9 F1 Fuse Holder

115VAC / 230VAC Jumper Settings

The Digital I/O option module has jumper settings that will allow the power input to operate with 115VAC or 230VAC line voltage. For a 115VAC line voltage, change the fuse to FUS0020 and add jumpers to JU4, JU6 and remove the jumper at JU5. For a 230VAC line voltage, change the fuse to a FUS0019 and add a jumper to JU5 and remove jumpers at JU4, JU6.

RS232 Output Connections

The Digital I/O option features a full duplex RS-232 circuit which can be connected to a computer or printer (see Figure 8.10). All print string characters that are transmitted from the scale to the Digital I/O option are converted to an RS-232 signal. In order to access this output, connect the RS-232 device to the J2's terminal block marked PORT 2. See Figure 8.10 for wiring directions – color codes are for standard Doran RS-232 Cables. For further information on RS-232 communications refer to Doran's RS-232 Training Manual (P/N MAN214).

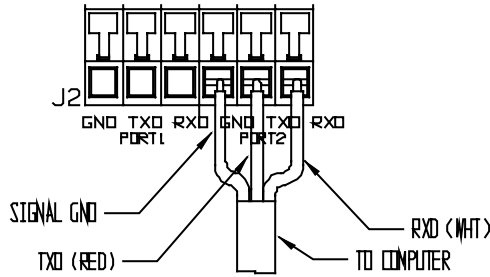


Figure 8.10 RS-232 Serial Terminal Connections

Serial Command Summary

In order for the Digital I/O option to operate properly, a continuous fiber optic connection must be maintained between the scale and the I/O module. The I/O module converts the bi-directional fiber optic signal to RS-232, and monitors the IN (RX) line for special serial commands being sent by the scale. The bi-directional serial commands the I/O module receives is shown in Appendix A. **If fiber optic connection between the scale and I/O module is broken for more then 2 seconds, the I/O module will open all outputs (relays), the remote display will show all dashes, and 4-20mA output level will be set to 3.5mA.**

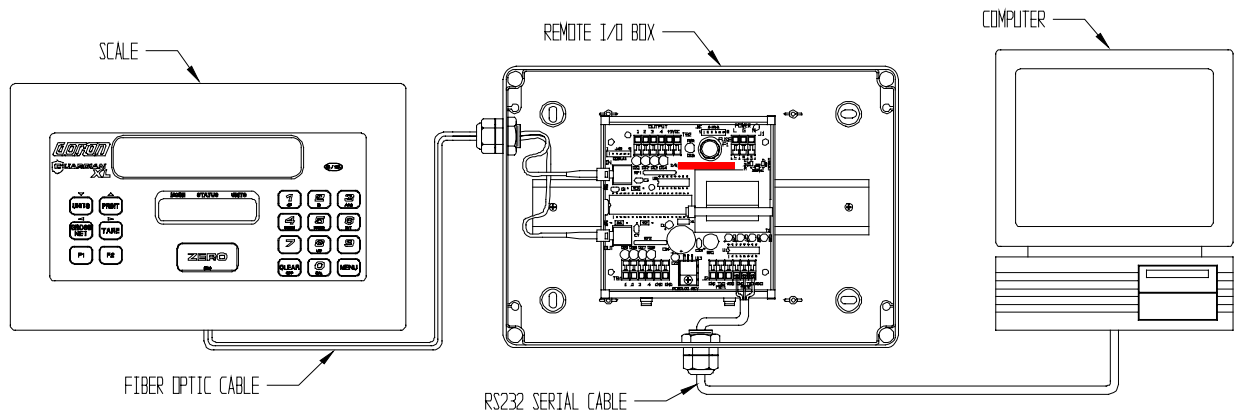


Figure 8.11 Digital I/O option System

Remote Display Option

The Remote Display option is used to indicate weight data by converting the ASCII characters printed from the scale. To install this option, first turn off power, then mount display circuit board to stud located next to TB1 on I/O module using a single screw (see Figure 8.12). Plug in the display cable connector into the J4B header on I/O board. On power up, indicator will show a display test, software number, revision level, followed by the weight data. If I/O module does not receive a continuous transmission from the scale, bars will show across all display digits “-----”. The Remote display option will be active when the Print Mode parameter is set to CP (continuous print) see Chapter 4 for details.

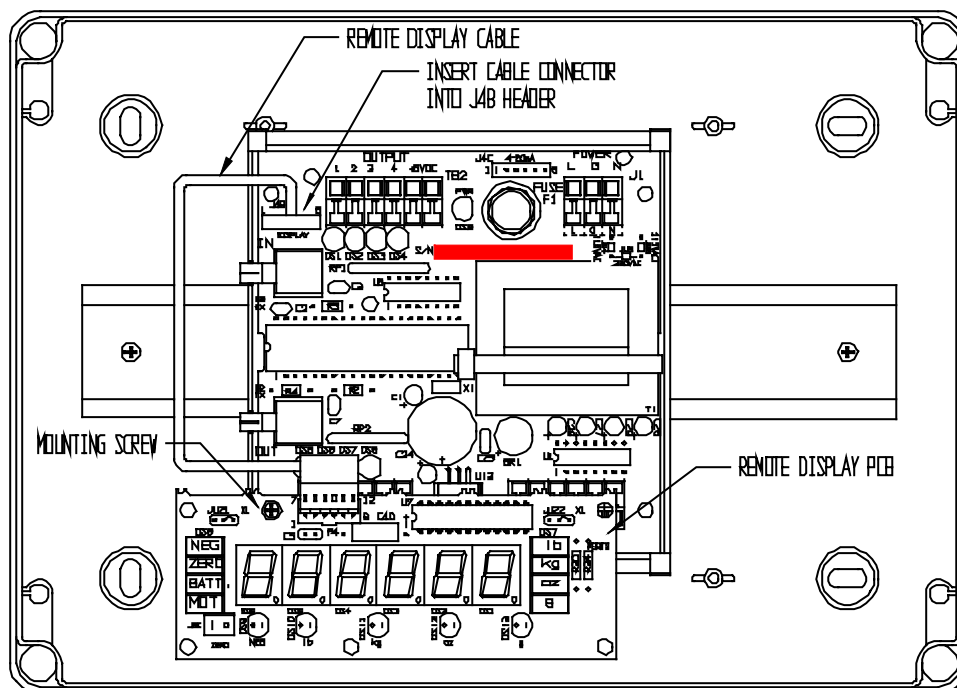


Figure 8.12 Remote Display Option

4-20mA Option

The 4-20mA Analog Output Option is used to provide an analog output that is proportional to the weight on the scale platform. Because of the inherent noise immunity present in a current loop, an isolated 4-20mA analog output is ideal for use in noisy environments. The 4-20mA analog output option can be used to send weight data to a process indicator, a simple on/off controller or to a programmable logic controller.

4-20mA Setup

To install this option, remove power, and insert the 4-20mA circuit board into J4C socket on I/O module, press down until option board snaps into place. To setup the 4-20mA Analog Output option set the Print Mode parameter to 4-20 see Chapter 4 for details. The 4-20mA option is automatically calibrated for an output range of 4mA to 20mA, (i.e. 4mA equals zero gross weight and 20mA equals the scale's capacity). Once the scale has been configured, attach the output cable from the appropriate controller or indicator to the 4-20mA option board. The white lead is connected to the + input of TB2 and the black lead is connected to the – input of TB2.

Active (default) or Passive mode

If your application requires a self power (Active mode) analog output, place jumpers on pins 3,4 (ACT) on JU1 and JU2. For loop power (Passive mode) applications, place jumpers on pins 1,2 (PAS) on JU1 and JU2. See Figure 8.13 for jumper locations.

Calibrate your process indicator or controller according to the manufacturer's instructions. The Analog Output option will output 4mA when the scale reads gross zero and 20mA when the scale reads full capacity. If the scale is in a fault condition, the 4-20mA output levels are 3.5mA for gross underload or underload, and 24mA for gross overload or overload. Output impedance range is zero to 600 ohms.

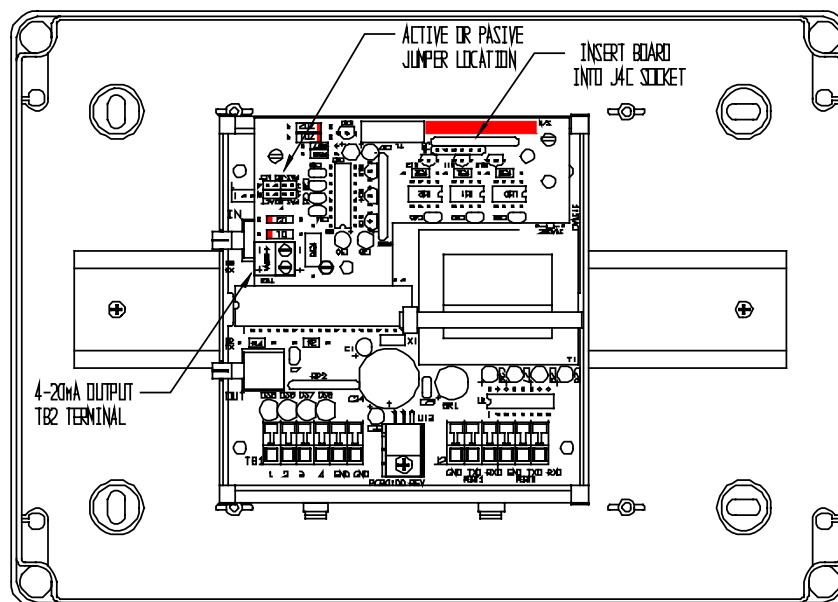


Figure 8.13 4-20mA Option

Chapter 9 Hazardous Area 4-20mA Option

Doran's *GuardianXL* can be supplied with a 4-20mA Analog Output Option in two ways. It can be offered as part of the Digital I/O Box Option as described in Chapter 8 or it can be installed in the hazardous area inside the *GuardianXL* enclosure. This chapter describes the latter.

The 4-20mA Analog Output Option is used to provide an analog output that is proportional to the weight on the scale platform. Because of the inherent noise immunity present in a current loop, an isolated 4-20mA analog output is ideal for use in noisy environments. The 4-20mA analog output option can be used to send weight data to a process indicator, a simple on/off controller or to a programmable logic controller.

4-20mA Setup

The Hazardous Area 4-20mA option cannot be field installed due to FM regulations. If this option is needed, it must be ordered with a *GuardianXL* indicator or the meter must be sent back to Doran for installation. The Hazardous Area 4-20mA option is only available in a passive version. This means that the 4-20mA receiver in the safe area must supply the 4-20mA loop excitation.

When installing a *GuardianXL* indicator with the Hazardous Area 4-20mA option, a two conductor cable must be used with an outside diameter of 0.157" to 0.314" to allow for a proper water tight seal. There is no FM limit on cable length.

An approved barrier must be used to interface the Hazardous Area 4-20mA option to the safe area for a proper installation. Barriers can be ordered from Doran.

The 4-20mA option is automatically calibrated for an output range of 4mA to 20mA, (i.e. 4mA equals zero displayed weight and 20mA equals the scale's capacity). If the scale is in a fault condition, the 4-20mA output levels are 3.5mA for gross underload or underload, and 24mA for gross overload or overload. Once the scale has been configured, attach the output cable from the appropriate controller or indicator to the 4-20mA option board. The white lead is connected to the + input of TB2 and the black lead is connected to the – input of TB2.

Calibrate the receiving process indicator or controller according to the manufacturer's instructions. The 4-20mA output can be forced to 4mA and 20mA in a test mode. This prevents having to load a scale base to full capacity in order to calibrate the 20mA output. For details on the test mode see Chapter 4 Scale Test Mode.

Output impedance range of the 4-20mA option is zero to 600 ohms.

Chapter 10 Hazardous Area Fiber Optic Option

Doran's *GuardianXL* can be supplied with a Fiber Optic Option in two ways. It can be offered as part of the Digital I/O Box Option as described in Chapter 8 or it can be installed in the hazardous area inside the *GuardianXL* enclosure. This chapter describes the latter.

Fiber Optic communication is perfect for a hazardous location as it has no electrical potential, and does not create a hazard. Fiber Optic cable does not have to be run through conduit, saving much installation expense.

This option must be installed at Doran and should be ordered at time of the *GuardianXL* initial purchase. If this is not possible, the option can be installed at Doran by returning the unit to the factory for retrofit. Field installation is not permitted by FM regulations. When ordering this option please know approximately how much cable is needed to reach the safe area. The maximum length available without the use of signal boosters is 1000 feet.

If you have purchased Doran's Fiber Optic Option and wish to communicate with a PC or Printer in the safe area, you must also purchase Doran's fiber optic to RS-232 option P/N 9XOPT51. Third party conversion boxes will not operate with Doran's fiber optic option. This is due to customizing the fiber optic standard to prolong battery life.

This option comes with the Digital I/O Box option as described in Chapter 8. Refer to that chapter if you ordered a the Digital I/O Box option for installation information.

Chapter 11

Configuration Software

The GuardianXL Setup program can be used to configure the user print string, batch program and setpoint values. This program provides a convenient way to create, download and save batch configurations and custom print strings. A simple terminal program is also included for print string and serial port testing.

Hardware Requirements

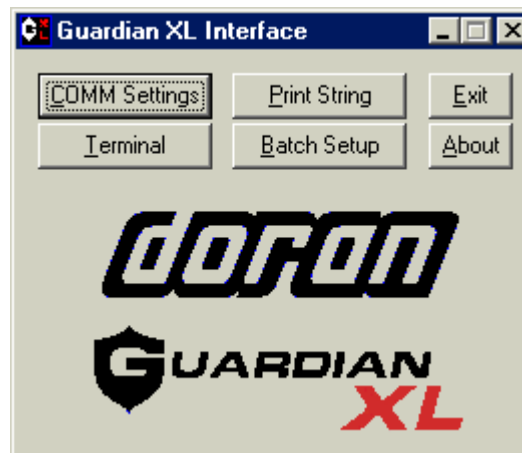
IBM-compatible computer running Windows® 95, 98, ME or XP. Minimum system requirements are 16 MB of RAM with 10MB of free hard drive space for installation. One free RS232 port is needed for communication with scale.

Software Installation

Close any programs that are currently running on your PC. Insert the installation CD into your CD drive. From the Windows START menu select Run... then Type D:Setup (where D is your CD drive) and press Enter. Follow the on-screen instructions.

Program Startup

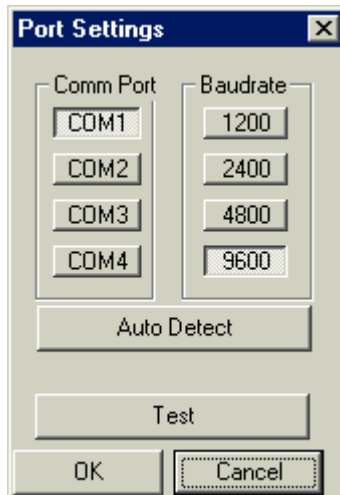
First, place the scale in the setup mode. Then double click the GuardianXL icon on the desktop. The program will start and the screen below will appear.



COMM Settings

To begin using this program, the PC and the GuardianXL indicator must be configured to communicate with each other. If the com settings are not properly configured, the program will be unable to communicate with the GuardianXL indicator. Refer to Chapter 4 for serial port configuration. The GuardianXL program only operates with a parity and databits of 8n1. Therefore, the GuardianXL indicator parity must be configured to 8n1.

After successfully communicating with the GuardianXL indicator, click on OK to save the current settings. Clicking Cancel will discard any changes.



Comm Port

Select the serial port your computer is using to connect to the GuardianXL (COM1, COM2, COM3 or COM4).

Baud rate

Select the baudrate the GuardianXL indicator is set to. The default setting for the GuardianXL indicator is 9600.

Auto Detect

The Auto Detect button will attempt to communicate with the GuardianXL, querying all available comports at all baudrates. If auto detect queries a comport that is in use, it will bypass that comport. Therefore ensure that any program that would access a comport is disabled. The databits and parity will remain at 8n1. If Auto Detect does not communicate with the GuardianXL indicator, check that you have a free comport available and that the GuardianXL indicator parity parameter is set to 8n1.

Test

Use this button to confirm that the current comport and baudrate settings are correct and that the GuardianXL indicator is communicating with your PC.

Terminal

The Terminal is a serial port communications program. Use it to verify that the GuardianXL is transmitting and receiving data. Data transmitted from the scale will be displayed in the right, Receive window. This will allow you to easily examine any custom print strings. Data typed into the left, Transmit window is sent to the GuardianXL. See Appendix A for print string and remote command information.

This window will not open if the scale is not communicating with your PC properly. See Comm Settings above for comport configuration instructions.

Print

Sends a remote print request command to the scale. The Transmit window will echo the command sent to the indicator. The scale will respond in the Receive window with the currently selected print string with a W appended to the beginning of the first line.

Units

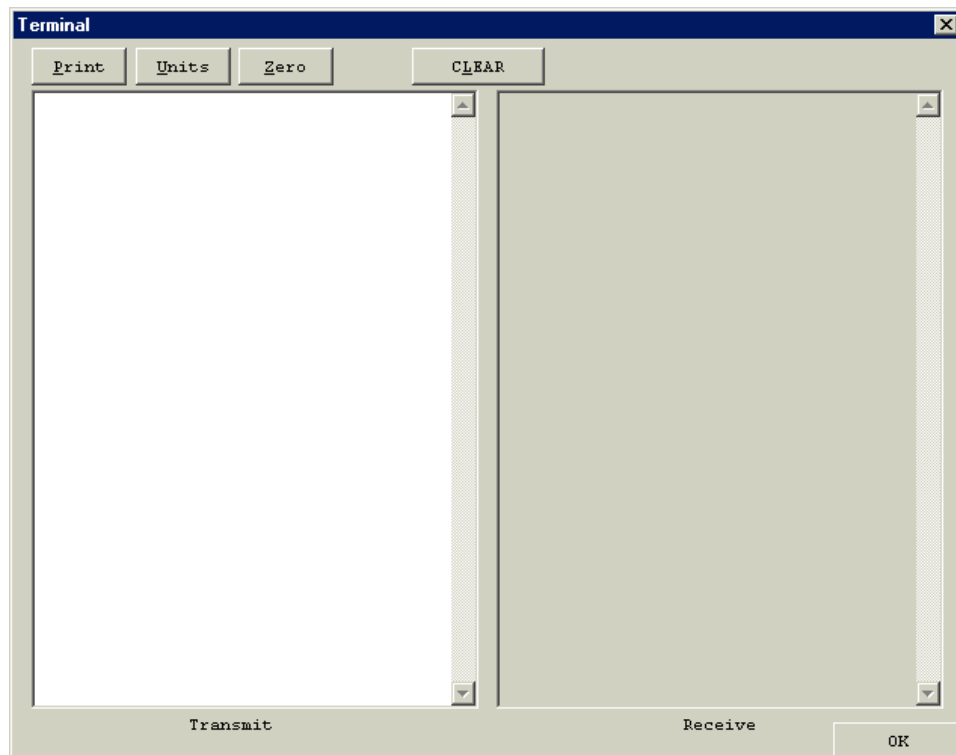
Sends a remote units change command to the scale. The Transmit window will echo the command sent to the indicator. The scale will respond in the Receive window with a U and the Guardian XL indicator will perform the units function.

Zero

Sends a remote zero request command to the scale. The Transmit window will echo the command sent to the indicator. The scale will respond in the Receive window with a Z and the Guardian XL indicator will perform the zero function.

Clear

Clears both the Transmit and Receive windows.



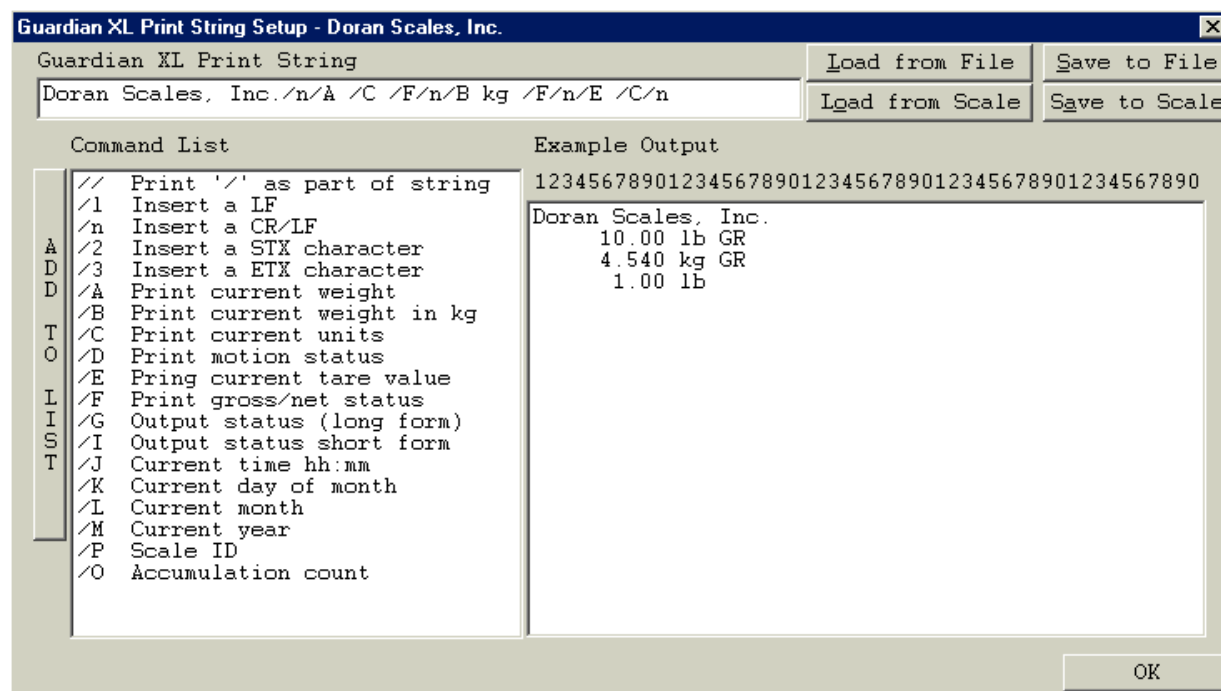
Print String

This part of the program allows the configuration of a user defined print string. The current user print string is displayed in the Guardian XL Print String text box. This string can contain both special commands and plain text. Double clicking a command in the Command List will insert that command into the print string, at the current cursor position. A command can also be inserted by clicking the command, then clicking ADD TO LIST. Plain text may be inserted into the string simply by typing it in. No special command or formatting is required for plain text. As data is entered into the Print String box, the Example Output window shows an example of how the data will look when transmitted from the scale.

When this window opens, it will automatically open a comport using the current Comm Settings. If it cannot open the current comport and communicate with the GuardianXL indicator, this window will still open but a window will warn the user of this status. When not connected to a GuardianXL, strings can only be loaded from a file and saved to a file.

Load from File	Loads a user print string from a previously saved file.
Load from Scale	Loads a user print string that is stored in the scale.
Save to File	Saves the user print string to a file on your computer.
Save to Scale	Saves the user print string to the scale.

NOTE: In order for the GuardianXL indicator to print a user print string, the Print String parameter must be set to user, See Chapter 4 for configuration details.



Batch Setup

This option allows the configuration of the Guardian XL batch program and setpoint values. For information on setpoints and batch program configuration see Chapter 6 and Chapter 7, respectively.

When this window opens, it will automatically open a comport using the current Comm Settings. If it cannot open the current comport and communicate with the GuardianXL indicator, this window will still open but a window will warn the user of this status. When not connected to a GuardianXL, configurations can only be loaded from file and saved to a file.

Each Output/Function is configured individually. Select the desired Output or Function from the Output/Function dropdown box. Setpoint weight values, Batch Delay Time and Batch Configuration F1/F2 are global settings, which are the same for all Outputs and Functions.

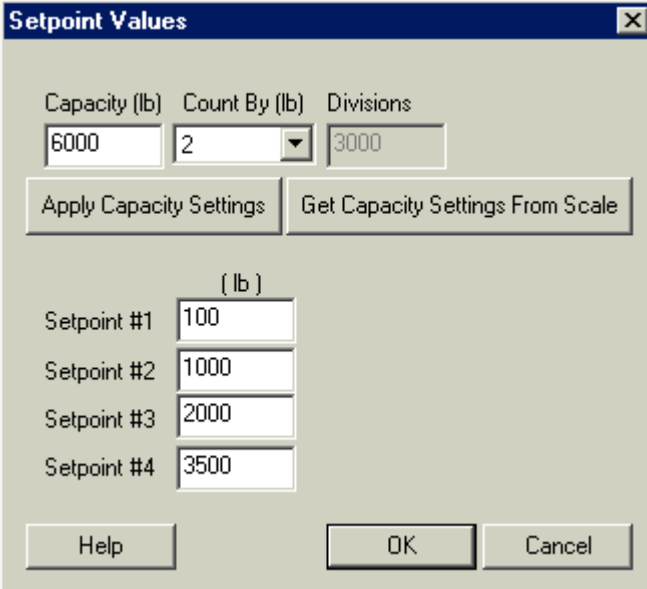
Load from File	Loads settings from a previously saved file.
Load from Scale	Loads settings from the scale.
Save to File	Save current settings to a file.
Save to Scale	Save current settings to the scale.
Setpoints	Opens Setpoint window described below.

The Setup window is a graphical user interface for configuring the Guardian XL batch program. It features a title bar with a close button (X). Below the title bar are three tabs: 'Outputs/Functions', 'Units, AZT, Motion', and 'Export Settings'. The 'Outputs/Functions' tab is active. The window is divided into several sections. At the top, there is a dropdown menu for 'Output/Function' (currently set to 'Output 1') and a dropdown for 'Enable' (currently set to 'Off'). To the right of these are four buttons: 'Load from File', 'Save to File', 'Load from Scale', and 'Save to Scale'. Below this, there are four columns of settings for SP 1, SP 2, SP 3, and SP 4. Each column has three radio buttons: 'Off', 'Under', and 'Over'. To the right of these columns is a section for 'Batch Step Change' with three radio buttons: 'No', 'Reset', and 'Inc'. Below this is a 'Batch Step' dropdown menu set to 'All'. Further down, there are four columns for Input 1, Input 2, Input 3, and Input 4. Each column has three radio buttons: 'Off', 'n.c.', and 'n.o.'. To the right of these is a 'Global Settings' section with a 'Setpoints' button, a 'Bat. Delay Time (sec)' dropdown set to '0', and a 'Batch Cfg F1/F2' section with two radio buttons: 'Off' and 'On'. At the bottom of the window are 'OK' and 'Cancel' buttons.

Setpoint Values

The Setpoint values window is accessed by pressing the Setpoints button in the Setup window under the Outputs/Functions tab. If the scale is connected to the computer, simply press Get Capacity Settings From Scale, enter the setpoint values in pounds and click OK. To update the setpoint values in the GuardianXL, you must then click Save To Scale in the Outputs/Functions screen above.

There may be some instances when the scale is not available. In this case, the capacity and count by must be entered manually. Type in the capacity, select the resolution from the dropdown box and click on Apply Capacity Settings. You can now enter the setpoint values and click OK. Clicking Cancel at any time will discard all changes and return to the Batch Setup.



The image shows a software dialog box titled "Setpoint Values". It contains fields for "Capacity (lb)" with the value 6000, "Count By (lb)" with a dropdown menu showing 2, and "Divisions" with the value 3000. Below these are two buttons: "Apply Capacity Settings" and "Get Capacity Settings From Scale". Further down, there are four input fields for setpoints, each preceded by a label: "Setpoint #1" (100), "Setpoint #2" (1000), "Setpoint #3" (2000), and "Setpoint #4" (3500). The unit "(lb)" is centered above these fields. At the bottom are three buttons: "Help", "OK", and "Cancel".

	Capacity (lb)	Count By (lb)	Divisions
	6000	2	3000

Buttons: Apply Capacity Settings, Get Capacity Settings From Scale

Unit: (lb)

Setpoint	Value
Setpoint #1	100
Setpoint #2	1000
Setpoint #3	2000
Setpoint #4	3500

Buttons: Help, OK, Cancel

Units, AZT, Motion

This part of the program allows the configuration of auto zero tracking, motion, start up units and the available units. Note: The scale must be in the Setup mode when saving to the scale.

Load from File Loads settings from a previously saved file.

Load from Scale Loads settings from the scale.

Save to File Save current settings to a file.

Save to Scale Save current settings to the scale.

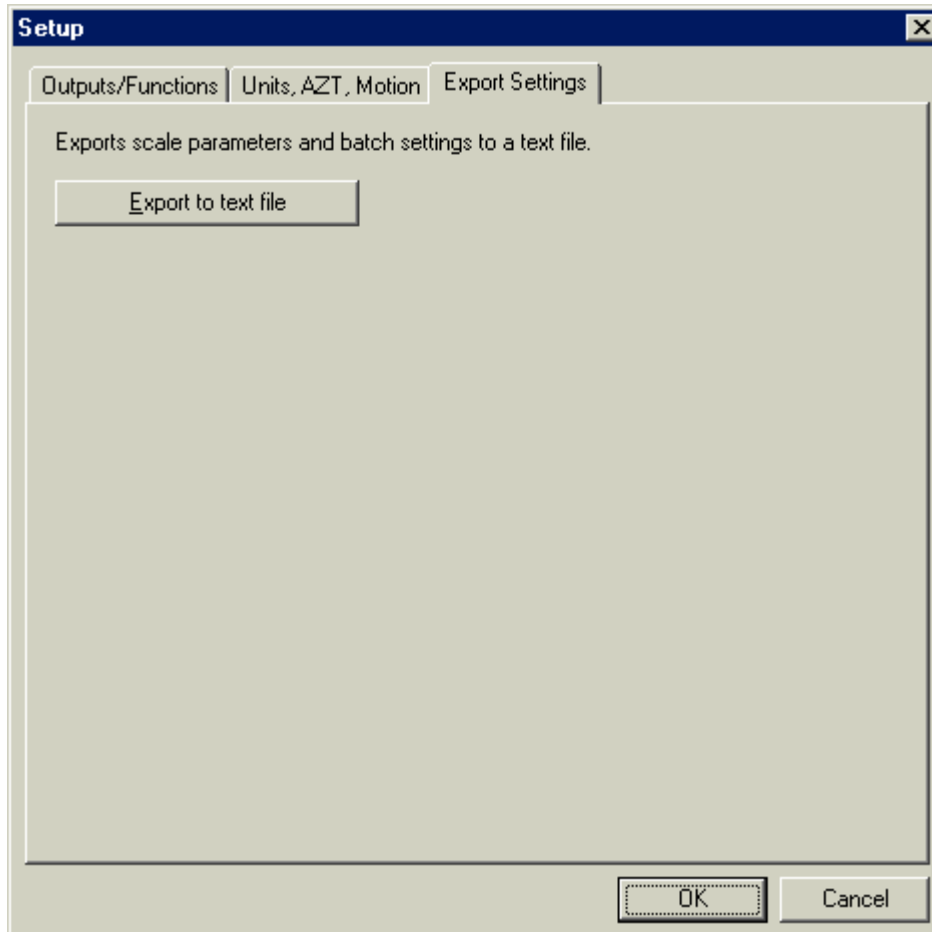
The screenshot shows the 'Setup' dialog box with the 'Units, AZT, Motion' tab selected. The dialog has three tabs: 'Outputs/Functions', 'Units, AZT, Motion', and 'Text File'. The 'Units, AZT, Motion' tab contains several settings:

- Auto Zero Tracking (AZT):** Radio buttons for Off, 0.5 d, 1.0 d (selected), 2.0 d, 3.0 d, and 5.0 d.
- Legal for Trade:** Radio buttons for Off (selected) and On.
- Motion Aperture (MOT):** Radio buttons for 1.0 d (selected), 2.0 d, 3.0 d, 5.0 d, and 10.0 d.
- Units Enabled:** Checkboxes for lb (checked), kg (checked), oz (checked), g (checked), lb-oz (unchecked), and User (unchecked).
- Start Up Units (SU):** Radio buttons for lb (selected), kg, oz, g, lb-oz, and User.

At the top right of the tab, there are four buttons: 'Load from File' (highlighted with a dashed border), 'Save to File', 'Load from Scale', and 'Save to Scale'. At the bottom right of the dialog are 'OK' and 'Cancel' buttons.

Text File

Clicking on “Export to text file” will save some critical scale parameters and batch settings to a text file. This file can later be viewed or printed by a text editor like Notepad, which is included in Windows.



Appendix A

Print String Formatting

The *GuardianXL* provides six predefined print strings that are outputted when a manual print, auto print or print function is executed. The user print string provides the opportunity to define a custom print string up to 256 characters in length. The exact contents of the predefined print strings and user print string configuration is shown below.

	Print String	Description
F0	<p>Basic Output Format</p> <p><STX><P><X.XX><SP><U><SP> <GN><SP><M><LF><CR></p> <p>Sample Print String ±-----10.05-lb-GR--MOT</p> <p>Sample Pounds – Ounces String ±271b-12.2-oz-GR--MOT</p> <p>Note: “-” represents a space</p>	<p><STX> Start of Text (02h)</p> <p><P> Weight Polarity Negative weight printed as “-”, positive weight are printed as a space (20h).</p> <p><X.XX> Weight Data fixed field of 8 digits plus decimal. In overload, or underload “-----” is printed. Leading zeros are printed as spaces (20h).</p> <p><U> Displayed Units “lb”, “oz”, “lb:oz”, “g”, “kg”, or “usr”</p> <p><GN> Display Status in Gross mode “GR”, in Net mode “NT” is printed.</p> <p><M> Motion Status Appends “MOT” to the end of the print string when printing while in motion.</p> <p><SP> Line Space (20h)</p> <p><LF> Line Feed (0Ah)</p> <p><CR> Carriage Return (0dh)</p>

F1	<p>Basic Output Format with Setpoint Status and Tare Weight</p> <p><STX><P><X.XX><SP><U><SP> <GN><SP><M><ETX>O:<AOS> <LF><CR><T.TT><SP><U>TR<LF> <CR></p> <p>Sample Print String ±----10.05-lb-GR--MOT-O:a ±----10.05-lb-TR</p> <p>Note: “-” represents a space</p>	<p>See Basic Output Format above for Basic Output formatting.</p> <p><AOS> Abbreviated Output Status. Printed as a single lower case letter. See Abbreviated Output Status Table below. <T.TT> Tare Weight fixed field of 8 digits plus decimal. Leading zeros are printed as spaces (20h) <LF> Line Feed (0Ah) <CR> Carriage Return (0dh) <ETX> Carriage Return (03h)</p>
F2	<p>Basic Output Format with Setpoint Status</p> <p><STX><P><X.XX><SP><U><SP> <GN><SP><M><ETX>O:<AOS> <LF><CR>OUTPUTS:<OS><LF><CR></p> <p>Sample Print String ±----10.05-lb-GR--MOT-O:a OUTPUTS:1:off 2:off 3:off 4:off</p> <p>Note: “-” represents a space</p>	<p>See Basic Output Format above for Basic Output formatting.</p> <p><AOS> Abbreviated Output Status. Printed as a single lower case letter. See Abbreviated Output Status Table below. <OS> Output Status This string contains output status – on or off – for each output “1:on 2:off 3:off 4:off” <LF> Line Feed (0Ah) <CR> Carriage Return (0dh) <ETX> Carriage Return (03h)</p>
USER	<p>User Defined Print String See User Print String Configuration Below for Programming Details.</p>	

t0	<p>Basic Output Format with Date, Time and Scale ID</p> <p><STX><P><X.XX><SP><U><SP> <GN><SP><M><LF><CR> <SP><T><SP><M/D/Y><LF><CR> <SP>ID#:<SP><ID><LF><CR></p> <p>Sample Print String ±----10.05-lb-GR--MOT -1300-12/31/2001 -ID#:-123456 <BLANK LINE></p> <p>Note: “-” represents a space</p>	<p>See Basic Output Format above for Basic Output formatting.</p> <p><T> Current Time 24 hour format. Leading zeros are printed as spaces (20h). <M/D/Y> Current Date “MM/DD/YYYY” Leading zeros printed as spaces (20h). <ID> Scale ID Number fixed field of 6 digits plus decimal. Leading zeros are printed as spaces (20h) <LF> Line Feed (0Ah) <CR> Carriage Return (0dh)</p>
LbL	<p>Eltron Label Printer Format</p> <p><LF>FR“L1”<LF>?<LF><X.XX> <LF><U><LF><GN><LF> <M><LF>P1,1<LF></p> <p>Sample Print String FR“L1” ? ±----10.05 lb GR MOT P1,1</p> <p>Note: “-” represents a space</p>	<p>FR“L1” Eltron Form Name The form in the Eltron printer must be named L1 for the printer to properly recall the correct form. <M> Motion “MOT” printed when scale is in motion. If not in motion one space is printed (20h). P1,1 Eltron Print Command This command prints one label. Note: Eltron printer must have programmed with a form that accepts this print string. Download sample labels from the Doran Dealer Network Web Page</p>

d1	<p>Basic Output Format with Setpoint Status, Kilogram Weight and Tare Weight</p> <p><STX><P><X.XX><SP><U><SP> <GN><SP><M><ETX>O:<AOS><LF> <CR>(<M.MM><SP>kg<SP><GN>) <LF><CR><SP><T.TT><SP><U> TR<LF><CR></p> <p>Sample Print String ±-----10.05-lb-GR--MOT-O:a (±-----4.55-kg-GR-) -±-----1.00-lb-TR</p> <p>Note: “-” represents a space</p>	<p>See Basic Output Format above for Basic Output formatting.</p> <p><AOS> Abbreviated Output Status. Printed as a single lower case letter. See Abbreviated Output Status Table on the next page.</p> <p><M.MM> Metric Weight fixed field of 8 digits plus decimal. In overload, or underload “-----” is printed. Leading zeros are printed as spaces (20h).</p> <p><T.TT> Tare Weight fixed field of 8 digits plus decimal. Leading zeros are printed as spaces (20h).</p> <p><LF> Line Feed (0Ah) <CR> Carriage Return (0dh) <ETX> Carriage Return (03h)</p>
	<p>Accumulator Print String – Only available when in Accumulator Recall mode. See Chapter 2, Accumulator and Counter section.</p> <p><STX><P><A.AA><SP><U><SP> <GN><LF><CR># OF READINGS: <CC><LF><CR><SP><T><SP> <M/D/Y><LF><CR>ID#:<SP><ID> <LF><CR></p> <p>Sample Print String TOTAL:-----0.000-lb-GR- #-OF-READINGS:0000 -1300-12/31/2001 -ID#:-123456</p> <p>Note: “-” represents a space</p>	<p><A.AA> Accumulator Weight fixed field of 8 digits plus decimal. In overload, or underload “-----” is printed. Leading zeros are printed as spaces (20h).</p> <p><U> Displayed Units “lb”, “oz”, “lb:oz”, “g”, “kg”, or “usr”</p> <p><GN> Display Status in Gross mode “GR”, in Net mode “NT” is printed.</p> <p><CC> Counter fixed field of 4 digits.</p> <p><T> Current Time 24 hour format. Leading zeros are printed as spaces (20h).</p> <p><M/D/Y> Current Date “MM/DD/YYYY” Leading zeros printed as spaces (20h).</p> <p><ID> Scale ID Number fixed field of 6 digits plus decimal. Leading zeros are printed as spaces (20h)</p> <p><LF> Line Feed (0Ah) <CR> Carriage Return (0dh)</p>

Abbreviated Output Status Table				
Letter	Output 4	Output 3	Output 2	Output 1
a	0	0	0	0
b	0	0	0	1
c	0	0	1	0
d	0	0	1	1
e	0	1	0	0
f	0	1	0	1
g	0	1	1	0
h	0	1	1	1
i	1	0	0	0
j	1	0	0	1
k	1	0	1	0
l	1	0	1	1
m	1	1	0	0
n	1	1	0	1
o	1	1	1	0
p	1	1	1	1

Note: A “1” status signifies an active output.

User Print String Configuration

Programming the user print string requires the use of a PC terminal program and the Digital I/O option. To program the *GuardianXL* for a custom print string, match the terminal program and the *GuardianXL* communications parameters. Confirm the system communications by typing a Z and pressing ENTER. The scale display should zero. If this does not occur, check the settings and cable configuration.

To configure the user print string, simply type the print commands into the terminal and press enter. The commands will be echoed back to the terminal by the *GuardianXL* while typing the string. If a command is not echoed back the string will not be properly programmed. The print string control characters are as follows:

//	Print “/”	/N	Net Weight
/l	New Line	/O	Accumulation Counter
/n	Carriage Return Line Feed	/P	Scale ID
/a	Accumulated Weight (gross or net)	/Q	Switches output to simplex port
/A	Current Weight	/S	4-20 mA output code
/B	Weight in KG		
/C	Current Units		
/D	Motion Status		
/E	Tare Value		
/F	Tare Status (GRS/NET)		
/G	Output Status		
/I	Abbreviated Output Status		
/J	Time in 24 Hour Format		
/K	Date		
/L	Month		
/M	Year in Two Digit Format		

Plain text can be inserted into the print string by inserting the text where desired. No slash or control character is necessary.

To download a user print string the string must be prefaced by a control code to tell the *GuardianXL* to expect a user print string.

^Fxx<string>/0	Download User Print String Preface
^D	Upload User Print String Response yy<string>

^ is an ASCII 94 (decimal).

xx is the number of characters, in decimal (must include leading zero)

yy is the string length in hexadecimal

To calculate the string length each character counts as one character. Therefore a control character counts as two characters. The following string is 6 characters in length “/A/B/C”. The custom string must be terminated with a /0 control character, adding two characters to the string length. To program this string into Guardian XL memory, send the following string:

^F08/A/B/C/0

Once programmed set the Print String parameter to “user” for the user print string to become active.

Remote Commands

The *GuardianXL* keypad interface can be remotely controlled via RS-232 with the following ASCII commands. All commands will be echoed by the *GuardianXL*.

W	Print
U	Units
G	Gross / Net
T	Tare
D	F1
E	F2
Z	Zero
M	Menu
C	Clear
0-9	Keypad 0-9 key

All commands are echoed back to the transmitting device to confirm receipt of the command. Any print strings echoed back will have a W appended to the beginning of the first line.

Appendix B

Specifications

Power

Line Voltages

9000XLIS AC
Charger

115 or 230 VAC at 50 or 60 Hz
115 or 230 VAC at 50 or 60 Hz

Analog and Digital Specification

Load Cell Signal Input Range

0.4 mV/V – 4 mV/V

Sensitivity

0.1 μ V

0.15 μ V per graduation minimum

Internal Resolution

1,000,000 counts

Display Resolution

50,000 d

Fiber Optic Output

Full Duplex

Zip Style Cable Type 62.5/125

Connector ST-ST

Maximum Transmission Length 1000m

4-20 Analog Output

12 bit resolution

Output Current 3.5-24mA

Output voltage 9-24VDC

Output Impedance 0-600 Ω

Maximum Transmission Length 1000m

Operator Interface

Display

Primary

6 digit 1" High LED

Secondary

2 line 20 character LCD display

Keyboard

19 key membrane switch

Enclosure

Dimensions (maximum extents LxWxH)

Indicator with Battery

12" x 6" x 11"

Indicator with Battery Tipped

12"x 6" x 11.25"

AC Power Supply

9.5" x 10" x 3.25"

Charger

7" x 7" x 2.75"

Material

304 Stainless Steel for *GuardianXL* Indicator,
AC Power Supply and Battery Housing

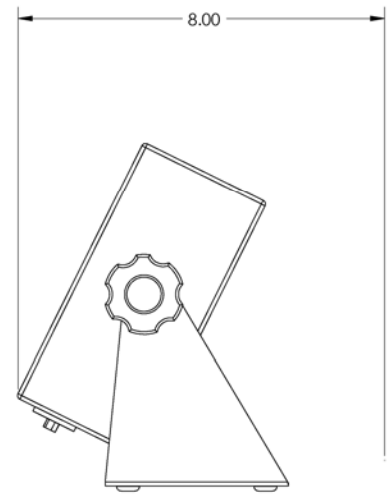
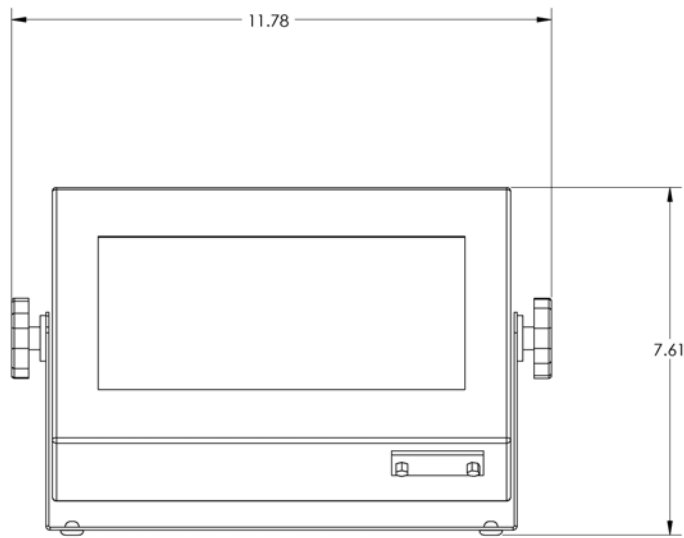


Figure A.1 AC Powered Indicator Dimensions

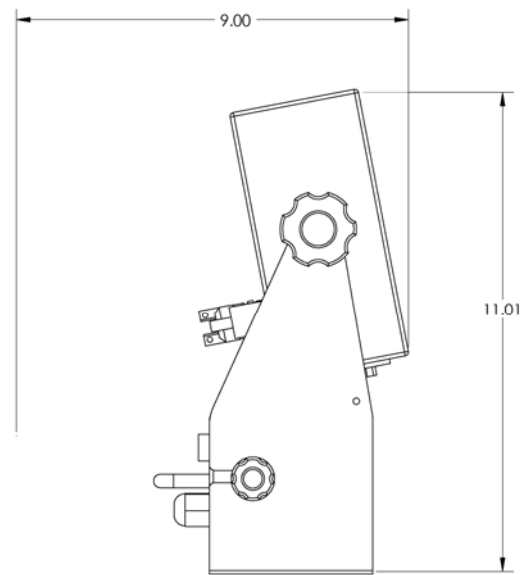
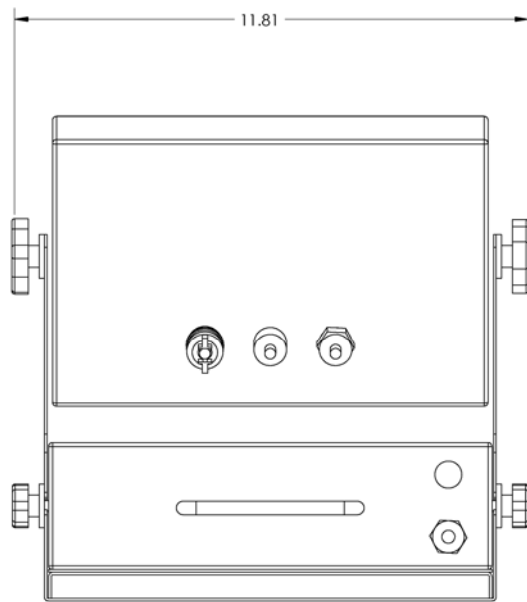


Figure A.2 Battery Powered Indicator Dimensions

Approvals

NTEP

CoC Number

01-095

Class

III/IIIL n_{max}10,000d

Factory Mutual

9000XLMIS *GuardianXL* Weight Indicator

IS / I, II, III / 1 / ABCDEFG / T4 – 900180; I / 0 / AEx ia IIC T4 – 900180

With Optional 90OPTFIBER or 90OPT4-20

9000XLBIS *GuardianXL* Battery Pack

IS / I, II, III / 1 / ABCDEFG / T4 – 900180; I / 0 / AEx ia IIC T4 – 900180

9000XLAIS *GuardianXL* AC Power Supply

AIS / I, II, III / 1 / ABCDEFG – 900180; [I / 0] AEx [ia] IIC – 900180;

NI / I / 2 / ABCD / T4

9000XLJBX *GuardianXL* Summing Board

IS / I, II, III / 1 / ABCDEFG / T4 – 900180; I / 0 / AEx ia IIC T4 - 900180

Appendix C

Error Codes

Code	Description
EPROM CSUM ERROR	A hardware error has occurred. Contact your qualified Doran Dealer for service.
CALIBRATION BAD	The scale calibration data fails internal integrity checks. The scale must be recalibrated by a qualified Doran Distributor.
DATA LINK ERROR	An internal processing error occurred. This will not affect scale operation. Contact your qualified Doran Dealer for service if this error occurs frequently.
SET UP DATA ERR.	Internal configuration data is corrupted. Contact your qualified Doran Dealer for service if this error occurs frequently.
DISPLAY ROM ERR.	A hardware error has occurred. Contact your qualified Doran Dealer for service.
CLEAR PLATTER!	Scale is attempting to perform a start up zero and is not within the startup zero band.
TARE LOAD ERROR	The scale attempted to load a TARE while in motion, or the tare value is negative.
ZERO LOAD ERROR	The scale attempted to ZERO while in motion, or while out of the zero band.
ACCUMULATOR ERROR	Scale attempted to accumulate while in motion, or the accumulator has reached maximum value of 999999 LB.
ACC TARE ERROR	The scale attempted to accumulate the current tare value and an error occurred.
DISPLAY OVERFLOW	The measured weight requires more characters than are available on the display.
DECIMAL PT ERROR	An invalid decimal point and count by setting was selected.

Appendix D

FM Installation Instructions

The following manual and control drawings pertain to the installation of the *GuardianXL* in hazardous environments. The instructions and control drawings must be followed to ensure proper installation.

INSTALLATION INSTRUCTIONS FOR FACTORY MUTUAL APPROVED GUARDIAN XL INTRINSICALLY SAFE WEIGHT INDICATOR SYSTEM

SPECIAL NOTE

Installation instructions must be strictly followed in compliance with The National Electrical Code Articles 500 through 505 or ANSI/ISA RP 12.6 and other applicable sections of the National Electrical Code.

Installation must be performed by personnel who have training and familiarity with the installation of electrical equipment in hazardous locations.

DORAN SCALES, INC.

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(800)262-6844 • FAX (630)879-0073

Special Note

Installation instructions must be strictly followed in compliance with The National Electrical Code Articles 500 through 505 or ANSI/ISA RP 12.6 and other applicable sections of the National Electrical Code.

Installation must be performed by personnel who have training and familiarity with the installation of electrical equipment in hazardous locations.

DORAN SCALES, INC. Batavia, IL is not responsible for the installation, use, or damages resulting from the installation or operation of the *GuardianXL* Intrinsically Safe Indicator System or the associated equipment used with it.

The classification of hazardous locations, the design of electrical systems in hazardous locations and the installation of electrical equipment in hazardous locations is the responsibility of the customer and/or the installer.

Introduction to Intrinsic Safety

This document is provided to supply the necessary information on Intrinsic Safety as it applies to the installation of the DORAN SCALE *GuardianXL* Intrinsically Safe Indicator System. Only equipment and accessories shown on the *GuardianXL* Control Drawing may be used within a hazardous location. The twelve control drawings are located at the end of this manual.

The installer/user should thoroughly read, be familiar with, and understand the requirements and any precautions or procedure associated with hazardous location installations.

What is Factory Mutual Approval?

Factory Mutual Approval means that Factory Mutual Research, a Nationally Recognized Testing Lab, has evaluated the Doran *GuardianXL* Intrinsically Safe Indicator System and approved it for use in the hazardous locations described in the control drawing. Details of this approval may be found in the Factory Mutual Research Approval Guide. Factory Mutual Research has determined that the *GuardianXL*, when used in accordance with the control drawing, will be safe for use in hazardous locations where flammable or explosive gasses, liquids or dusts are present.

The *GuardianXL* Intrinsically Safe Indicator system includes:

GuardianXL Intrinsically Safe Indicator

Load cells: Up to four load cells may be used with the indicator. These cells must be listed in the Control Drawing (900180) or must be compatible with the entity parameters

listed for the *GuardianXL* Indicator. The installation may incorporate the Doran 9000XLJBX summing board.

Power Source: The Model 9000XLBIS Battery Pack or Model 9000XLAIS AC/DC Power Supply may be used with the *GuardianXL* Intrinsically Safe Indicator.

Interface Options: The *GuardianXL* Intrinsically Safe Indicator may be fitted with either a 4-20mA current loop or a fiber optic interface in the hazardous area.

Cabling: an interconnect cable is provided for the 9000XLAIS AC/DC Power Supply.

Refer to the Control Drawing for the specific device and electrical specifications for connection of the listed components.

Please note that the Doran *GuardianXL* Intrinsically Safe Indicator has been approved for use with the load cells listed on the Control Drawing. The Doran *GuardianXL* Intrinsically Safe Indicator has also been listed with entity parameters. This means that it may be used with any load cell meeting the entity parameters listed on the Control Drawing (900180).

Factory Mutual Installation Adherence Requirements

The following is a synopsis of the requirements that must be satisfied to maintain the Factory Mutual approval for installation in hazardous locations.

- The *GuardianXL* Intrinsically Safe Indicator must have a nameplate indicating FM approval (class, group and division) for the specific hazardous location with the model number and referencing the Control Drawing.
- The Model 9000XLBIS battery pack must have a nameplate indicating FM approval (Class, Group and Division), model number, temperature code and a reference to the Control Drawing.
- The Model 9000XLAIS AC/DC power supply must have a nameplate indicating FM approval (class, group and division) for the specific hazardous locations with the model number, and referencing the Control Drawing. The 9000XLAIS is used in place of the 9000XLBIS and 9000XLCIS.
- All interconnections, wiring methods, sealing, fittings, grounding, etc. must be in accordance with the National Electrical Code (Articles 500 through 505) and local building codes.
- Only the device(s) listed in the Control Drawing or complying with the entity parameter limitations may be used in the installation.

- No modification to any circuits or enclosure in the *GuardianXL* Intrinsically Safe Indicator System may be made without written approval from Factory Mutual Research.

Barriers and Options

The *GuardianXL* Intrinsically Safe Indicator System offers a limited choice of options for use in hazardous locations. The Fiber Optic Interface (90OPTFiber) option is used to provide a printer or computer with a serial data output which can be installed without the need for barriers. The 4-20 mA Analog Output Option (90OPT4-20) provides a proportional 4-20 mA analog output for use with remote indicators and PLCs. The 4-20 mA option requires a approved barrier, which must be installed in the safe area, to insure that the system is safe.

Customer supplied interfaces and devices must meet the following:

- Cable and /or accessories must be exactly wired as illustrated in the Control Drawing.
- Only barriers listed in the Control Drawing can be used.
- A tamper proof ground must be supplied as shown to all barriers and equipment in a single point configuration to eliminate any ground potentials. Ground connections should be less than 1 Ω .
- Requirement that the remaining circuits must not generate or be connected to any voltage in excess of 250 volts must be observed

Unpacking and Installation

Overview

Installation of all electrical equipment including indicator, barriers, and associated scaling must be in compliance with the National Electrical Code and local building codes.

Scale Installation

Scale installation involves locating the weighing element(s) in the hazardous area and mounting the *GuardianXL* Intrinsically Safe Indicator in a secure location, which may (or may not) be located in the hazardous area. Power for the *GuardianXL* Indicator can be provided by either the Model 9000XLBIS rechargeable battery or the Model 9000AIS AC/DC Power Supply. The Model 9000XLAIS AC/DC Power Supply provides a permanent power source while the 9000XLBIS rechargeable battery must be removed from the hazardous area for charging. Only one power source can be used at a time.

The AC power supply for the 9000XLAIS AC/DC Power Supply must be installed in conduit (or other cabling method approved by the National Electrical Code) with the appropriate junction boxes and seals for the hazardous location. The use of conduit for the power supply output, interface output and the load cell cables is not required. The use of

conduit for these cables is a decision left to the Plant Safety Engineer and local building codes. All seals and accessories required to make the proper installation and maintain the separation of the hazardous and safe areas are the responsibility of the customer.

It is recommended that any cable runs that are part of the Intrinsically Safe circuit be marked with a bright blue tape. Blue cable may also be utilized.

All Intrinsically Safe wiring should be located more than 2 inches from Non-Intrinsically Safe wiring, unless separated by an insulating or ground partition. A 0.1 inch spacing must be maintained between intrinsically safe circuits.

All installation and / or maintenance should be coordinated with the plant engineer or the responsible personnel.



CAUTION

Although the *GuardianXL* Indicator is approved for use in hazardous locations, caution should always be observed in all areas designated as hazardous including the use of tools and equipment.



CAUTION

If there are any doubts concerning the classification of hazardous areas, the suitability of equipment for a hazardous location, or any questions about the installation, consult the Plant Engineer or personnel responsible for the installation.

The scale should be securely mounted using the supplied mounting bracket to a table, wall or under a cabinet to prevent the scale indicator from being accidentally dropped or damaged. The indicator should be mounted for easy removal of the battery pack for recharging purposes.

Installation with the 9000XLBIS Battery

The *GuardianXL* Intrinsically Safe Weight Indicating System can be installed in hazardous locations using the 9000XLBIS rechargeable battery. Battery operation permits the system to be used in locations where AC power is prohibited or is unavailable. When installing the system, it should be installed as a complete unit with the battery, indicator, weighing elements and options. Once the system is installed per the Control Drawing and the electrical circuit has been determined to be Intrinsically Safe, then the complete assembly with the options can be considered Intrinsically Safe.

The *GuardianXL* Intrinsically Safe Weight Indicating System can be ordered as a complete system including a pre installed weighing platform, *GuardianXL* Indicator, Model 9000XLBIS battery pack and Model 9000XLCIS battery charger. The system can also be ordered without the weighing platform, which must be provided by the customer.

Battery Installation

The *GuardianXL* Intrinsically Safe Indicator, Model 9000XLBIS and the platform are approved for use in the hazardous area per the Control Drawing. The Battery pack must be removed from the hazardous area and taken into the safe area to be recharged. The Battery pack must be charged with the Model 9000XLCIS Battery Charger. The Model 9000XLCIS battery charger **MUST** be located in the Safe area and is **NOT** approved for hazardous areas.



CAUTION

The Model 9000XLCIS battery charger **MUST be located in the Safe area and is **NOT** approved for hazardous areas**

Battery Pack Operation

The external intrinsically safe battery pack is located under the *GuardianXL* indicator. The battery pack supplies power to the *GuardianXL* indicator through a cable with a military style connector. To remove the battery pack, disconnect the battery power supply cable from the rear of the *GuardianXL* indicator by unscrewing the military style connector. Then loosen the two small black knobs and remove the battery pack by pulling up and outward on the battery pack handle. **Do not** remove the battery pack without first removing the battery power cable from the *GuardianXL* rear panel. If any damage occurs to the connector or power cable, discontinue use immediately and contact DORAN SCALE's Technical Support Department.

When the *GuardianXL* indicates low battery, the indicator will cease to function in approximately two hours. When the low battery warning appears, the battery should be recharged as soon as possible. The battery pack must be removed from the hazardous area for charging. Recharge time is typically 12 hours. Only the DORAN SCALE battery charger can be used to charge the *GuardianXL* battery pack. Do not use the DORAN SCALE battery charger to charge any other batteries.

The 9000XLCIS battery charger has two indicators on the top of the charger unit. The READY light will be on when the charger is plugged into 115VAC (220VAC optional). If the READY light remains off, 115VAC is not present, the battery is shorted, or the charger has a blown fuse. The CHARGING light will be on as long as charging current is supplied to the battery output connector. The battery is charged when the CHARGING light goes out.

To charge the *GuardianXL* battery pack, remove the battery from the hazardous area. Plug the *GuardianXL* charger into a wall outlet. When plugged in, the charger will display a green READY light. If the green light is not lit, plug the charger into another outlet. Connect the battery pack to the charger by aligning the keyed connector and screwing the connector firmly to the power cable power receptacle on the front of the charger box. **Do not** force the connector, this is a sign that the keyed connector is not properly aligned with the charger receptacle. The red CHARGING light will be lit while charging. When the battery pack has a full charge the red CHARGING light will turn off. The battery pack will require approximately 12 hours to fully recharge.

To place the battery back into service, reinstall the battery pack by first securing the battery pack into the *GuardianXL* u-bracket with the small black knobs. Then reconnect the battery pack to the *GuardianXL* by aligning the keyed connector and screwing the connector firmly to the power cable power receptacle on the rear panel. **Do not** force the connector, this is a sign that the keyed connector is not properly aligned with the charger receptacle.

Once charged, the battery pack will last 80 hours in a typical application (single 350 Ω load cell), after which the indicator will provide a low battery warning on the alphanumeric display. Multiple load cells, fiber optic or 4-20mA options will reduce battery life. For multiple load cell applications, battery life is significantly reduced. For example, with a four, 350 Ω load cell configuration, the low battery indication will begin at about 4 to 6 hours of continuous use. After the low battery indication begins, the indicator will operate for a while before the indicator will shut off. Load cells with higher input impedance values will provide longer life as will systems with fewer load cells. Use the auto sleep feature to prolong battery life, refer to Chapter 4 for detailed configuration information.

The battery pack should be able to support at least 300 recharges before the end of the battery life is reached. This is an estimate as many factors can affect battery life like, severe temperature changes and charging before the *GuardianXL* displays Low Battery.

An optional extra battery pack can be ordered for situations that require uninterrupted operation of the scale. The battery pack may be left plugged in the charger until ready to use.

Installation with the 9000XLAIS AC Power Supply

The Model 9000XLAIS is an AC/DC power supply that can be used for more permanent installations. The Model 9000XLBIS/CIS are not required in this installation. The power supply is designed to provide an intrinsically safe output and can be mounted in the hazardous areas provided the restrictions in the Control Drawing are followed. The power supply can also be mounted in the safe area with the output entering the hazardous. The cable installation must comply with National Electrical Code requirements for hazardous location wiring. The power supply provides an intrinsically safe power source when properly installed.

The power supply can be ordered for either 115VAC or 220VAC, 50/60 Hz operation. The voltage selection is not field selectable. The 9000XLAIS AC/DC Power Supply has been potted and can not be field serviced. The power supply has been designed to cease functioning under fault conditions such as shorted outputs, improper input voltage, excess current, etc. See Interconnect Extension Cable below for more information. The power supply must be returned to Doran Scales, Inc. for service if a failure occurs.



WARNING

There are no field serviceable parts in the 9000XLAIS AC/DC Power Supply. The power supply must be returned to Doran Scales, Inc. for service if a failure occurs.

AC Power Supply Installation in Hazardous Location

The Model 9000XLAIS can be installed within the hazardous area by following the proper guidelines outlined in the Control Drawing. A short adapter cable, which connects the *GuardianXL* Intrinsically Safe Indicator to the AC/DC Power Supply, is provided when the AC/DC Power Supply is ordered. An extension interconnect cable can be assembled with parts provided with the AC/DC Power Supply (see Interconnect Extension Cable below).

When only the adapter cable is utilized, the power supply must be mounted within 2 feet of the 9000XLMIS. The Model 9000XLAIS power supply and the *GuardianXL* Indicator must be securely mounted. Prior to installation in a hazardous location, the plug on the power supply should be removed (if present) to permit the cord to be installed in rigid conduit. If a cord grip is attached to the power supply, remove it from the female portion of the 1/2" conduit union. Power to the Model 9000XLAIS must be installed in 1/2 inch rigid conduit or National Electrical Code approved alternate. A union is provided on the power supply to simplify installation. The cord is then routed through the rigid conduit to a junction box approved for the area classification. The power connection is then completed in this junction box. When the conduit exits the hazardous area, it must be properly sealed in accordance with the National Electrical Code. Additional seals may be required at the junction box.

AC Power Supply Installation In Safe Areas

The Model 9000XLAIS AC/DC Power Supply can be installed within the safe area by following the proper guidelines outlined in the Control Drawing. A short adapter cable, which connects the *GuardianXL* Intrinsically Safe Indicator to the AC/DC Power Supply, is provided when the AC/DC Power Supply is ordered. A longer extension interconnect cable can be assembled with parts provided with the AC/DC Power Supply (see Interconnect Extension Cable below). This extension cable may exit the hazardous area provided it is installed in accordance with the National Electrical Code rules for hazardous location cabling. The interconnect cable makes the connection to the AC/DC power

supply within the safe area. The DC output of the power supply is considered Intrinsically Safe and should be treated as an intrinsically safe output from a barrier.



WARNING

NON-WARRANTY DAMAGE TO THE POWER SUPPLY IS LIKELY IF THE OUTPUT IS CONNECTED TO A SHORTED OR LOW IMPEDANCE CIRCUIT. THE DC POWER CIRCUIT TO THE 9000XLMIS SHOULD BE CHECKED WITH AN OHMMETER BEFORE APPLYING POWER TO THE 9000XLAIS POWER SUPPLY. A READING OF LESS THAN 1000 Ω s INDICATES A PROBLEM. DO NOT APPLY POWER UNTIL THE CAUSE OF THE LOW IMPEDANCE IS FOUND AND CORRECTED.

Once mounted in the safe area, the Model 9000XLAIS can be connected to the proper power supply utilizing the supplied power cord. Doran recommends grounding the case, of the AIS, when installed in the safe area.

Interconnect Extension Cable

The interconnect cable is assembled utilizing the plug and receptacle supplied with the 9000XLAIS AC/DC Power Supply and customer supplied cable. The interconnect extension cable is used to extend the length of the adapter cable in situations that require a longer run of cable between the 9000XLAIS AC/DC Power Supply and *GuardianXL* Intrinsically Safe Indicator. The gauge and length of wire must be as specified in the Control Drawing.



WARNING

NON-WARRANTY DAMAGE TO THE POWER SUPPLY IS LIKELY IF THE OUTPUT IS CONNECTED TO A SHORTED OR LOW IMPEDANCE CIRCUIT. THE DC POWER CIRCUIT TO THE 9000XLMIS SHOULD BE CHECKED WITH AN OHMMETER BEFORE APPLYING POWER TO THE 9000XLAIS POWER SUPPLY. A READING OF LESS THAN 1000 Ω s INDICATES A PROBLEM. DO NOT APPLY POWER UNTIL THE CAUSE OF THE LOW IMPEDANCE IS FOUND AND CORRECTED.

When assembling the cable, the mating receptacle is placed at the end that interfaces with the adapter cable and the plug is mounted at the end that interfaces to the Model 9000XLAIS.

The legend for the 3-conductor connector is:

Receptacle (to Adapter Cable)

Pin A	DC+ Power	to
Pin B	DC- Power	to
Pin C	Chassis Ground	to
Pin C	- Shield	to

Plug (to Power Supply)

Pin A	DC+ Power
Pin C	DC- Power
Pin B	Chassis Ground
Pin B	Shield

END 1 LARGE CONNECTOR

END 2 SMALL CONNECTOR

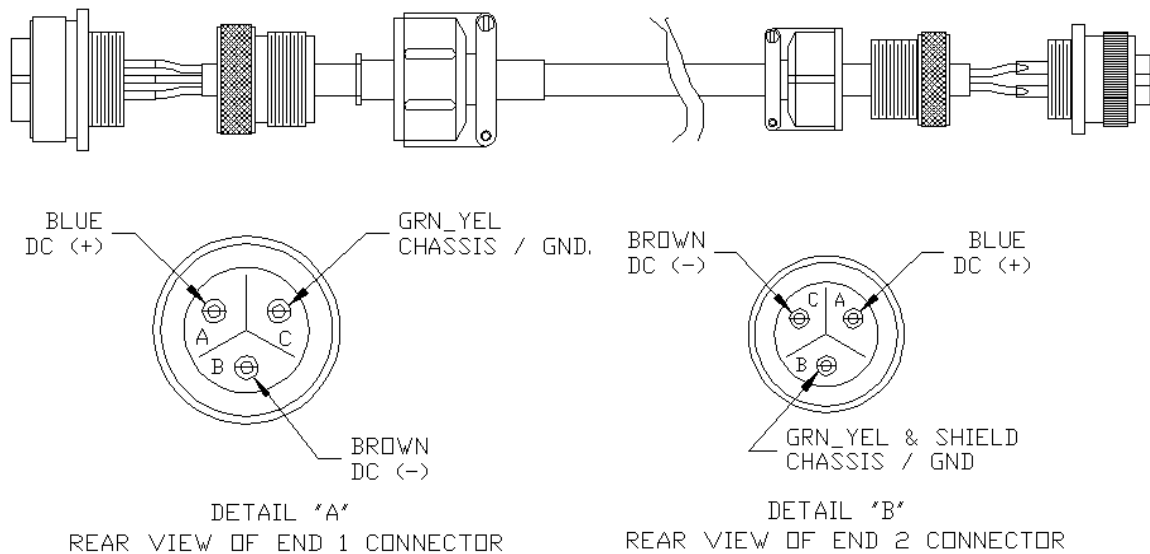


Figure D.1 Interconnect Extension Cable

Multiple Load Cell and Battery Life Considerations

The *GuardianXL* Intrinsically Safe Indicator System can be used in multiple load cell installations. Under all circumstances, the requirements of the *GuardianXL* Intrinsically Safe Indicator System Control Drawing must be followed.

There are several precautions you must be aware of when using the *GuardianXL* Intrinsically Safe Indicator System with multiple load cells.

Battery powered or AC powered: When multiple load cells are used, the intrinsically safe summing board 9000XLJBX load cell junction box must be used to maintain system accuracy. If the summing board is not used, then matched load cells must be used instead.

AC powered: Up to four (4) 350 Ω load cells can be connected to the *GuardianXL* Intrinsically Safe Indicator System with the 9000XL/ISAC AC Line Powered Indicator and 9000XLJBX load cell junction box.

Battery Powered: When multiple load cells are connected to the 9000XL/IS Battery Powered Indicator, the battery life will be decreased as described above. Further, Doran

does not recommend connecting an overall load lower than 100 Ω s resistance on the excitation terminals of the *GuardianXL* Intrinsically Safe Indicator. The overall load is the input (excitation) resistance of one load cell divided by the number of load cells (e.g., four 1000 Ω load cells represent a load of $1000 / 4 = 250 \Omega$ s.) The use of four 350 Ω load cells (overall load of 102 Ω s) will degrade the battery life between charging to about 20 hours (the typical 350 Ω cell has about 410 Ω s across the excitation). Use of an overall load lower than 100 will greatly decrease battery life or will not allow the *GuardianXL* Intrinsically Safe Indicator to function at all. When using the 9000XL/IS with multiple load cells, we recommend using 1000 Ω cells, such as the Revere SSB-D1 or HBM BLC or HBM TWM type.

Troubleshooting and System Repair

The troubleshooting of the *GuardianXL* Intrinsically Safe Indicator System should occur in the safe area and employ the use of spark-proof tools. Observe all safety precautions and use any safety equipment that may be required either by the installation or the customer. Follow the *GuardianXL* Indicator Operating and Service Manual for troubleshooting the scale portion of the installation. Any service that requires part replacement must be returned to DORAN SCALES, Batavia, IL. Factory repair is necessary to ensure that repairs will remain in compliance with the FM approval.



WARNING

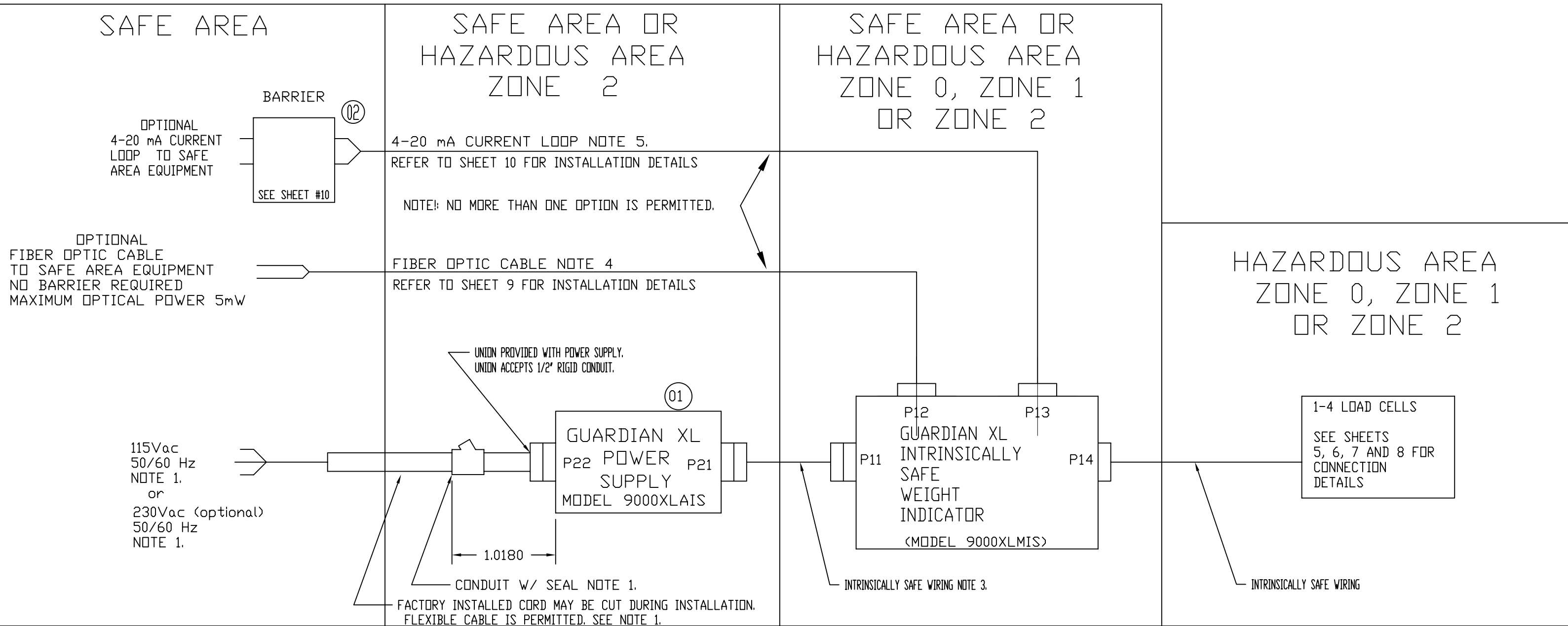
THERE ARE NO FIELD SERVICEABLE COMPONENTS IN THE GUARDIAN XL INTRINSICALLY SAFE WEIGHT INDICATOR SYSTEM. ALL SERVICE THAT REQUIRE PART REPLACEMENT MUST BE RETURNED TO DORAN SCALES, BATAVIA, IL TO ENSURE COMPLIANCE WITH FM APPROVALS.

Call the factory at 800-262-6844 to obtain an RMA (Return Material Authorization Number) before returning any equipment for repair.

THE INFORMATION CONTAINED HEREIN IS CONSIDERED PROPRIETARY TO DORAN SCALES, INC. IT IS RELEASED ONLY FOR USE IN CONNECTION WITH THE FABRICATION, ASSEMBLY, OPERATION OR MAINTENANCE OF THE EQUIPMENT OR COMPONENTS THEREOF DESCRIBED HEREIN. UNDER NO CIRCUMSTANCES SHALL THIS INFORMATION BE TRANSMITTED, REPRODUCED, DISCLOSED OR USED IN WHOLE OR IN PART BY ANY PERSON FOR ANY OTHER REASON WITHOUT THE EXPRESSED WRITTEN CONSENT OF DORAN SCALES, INC.

INSTALLATION OF GUARDIAN XL WITH AC POWER SUPPLY 01 FOR ZONES 0, 1, OR 2

ECD #	REV.	REVISIONS	DATE
			5/17/00
			5/17/00
	00	MISC. NOTE CHANGES. RELEASE FOR PRODUCTION.	1/18/01
02-104	01	MISC. DESCRIPTION CHANGES.	9-19-02
04-041	02	REMOVED APPROVED BARRIERS FROM THIS SHEET.	6-9-04



NOTES:

1) CONDUIT, FIELD WIRING AND SEALS SHALL COMPLY WITH NEC 501-4 AND 501-5. FLEXIBLE CORD IS PERMITTED IF INSTALLED PER NEC 501-11. PLUGS ARE PERMITTED PER NEC 501-12. ALL INSTALLATIONS SHALL COMPLY WITH NATIONAL ELECTRICAL CODE AND LOCAL CODES.

2> IF 9000XLAIS POWER SUPPLY IS LOCATED IN SAFE AREA, FACTORY SUPPLIED
LINE CORD MAY BE USED.

3) INTRINSICALLY SAFE WIRING BETWEEN POWER SUPPLY AND INDICATOR SHALL USE FACTORY SUPPLIED CABLE OR SHALL BE 14 GA OR LARGER AND 30 FEET MAXIMUM LENGTH. INSTALL PER NEC, 504-20.

4) P13 AND 4-20 mA CURRENT SHALL NOT BE INSTALLED WHEN FIBER OPTIC CABLES ARE INSTALLED.

5) P12 AND FIBER OPTIC CABLE SHALL NOT BE INSTALLED WHEN
4-20 mA CURRENT LOOP IS INSTALLED.

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

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TOLERANCE NOTE:

SHEET 1 OF 12



DORAN SCALES, INC.

1315 PARAMOUNT PARKWAY, BATAVIA, ILLINOIS, U.S.A.

SCALE 1=1

APPROVED BY:

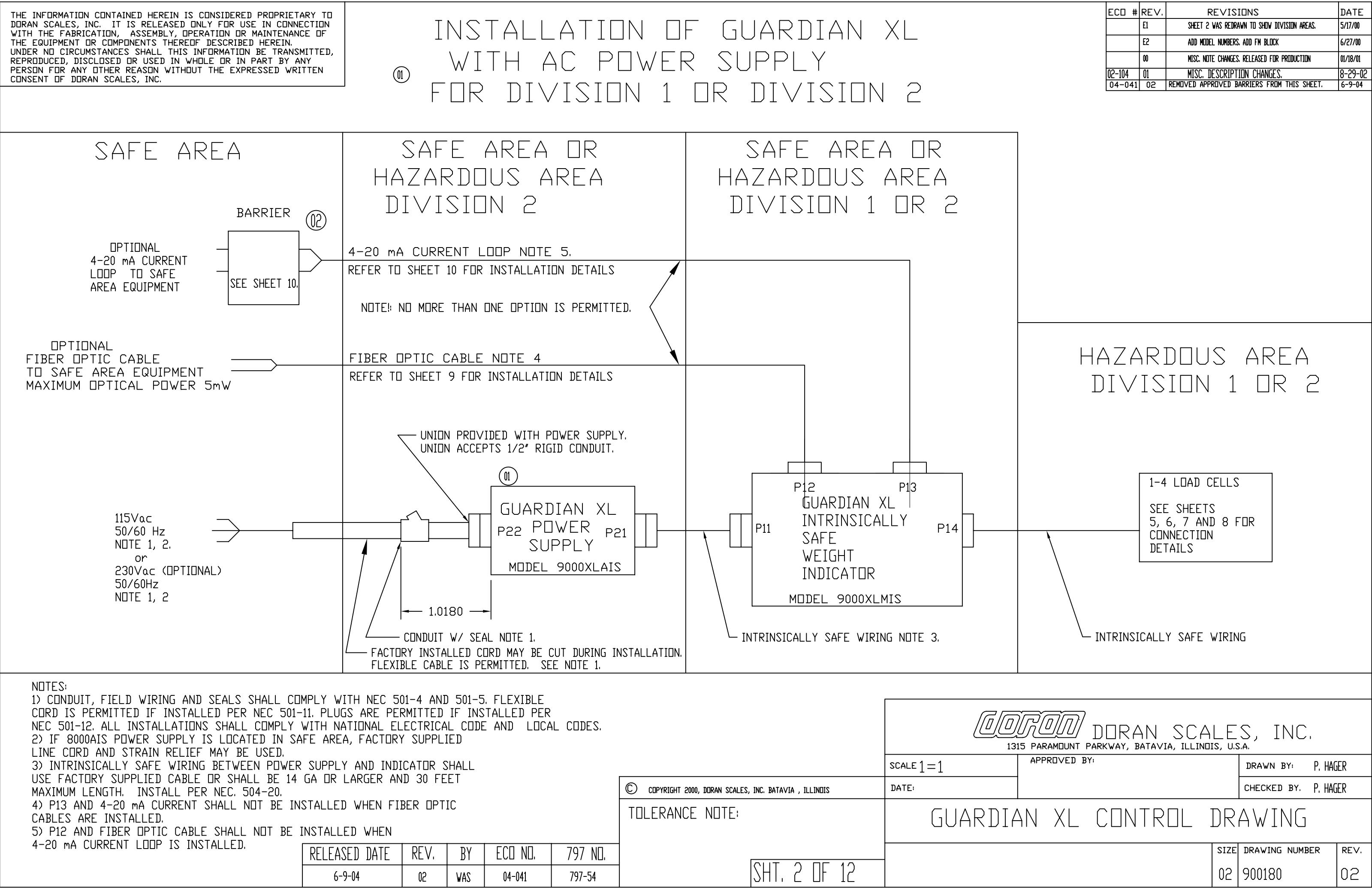
DRAWN BY: P. HAGER

DATE:

CHECKED BY. P. HAGER

GUARDIAN XL CONTROL DRAWING

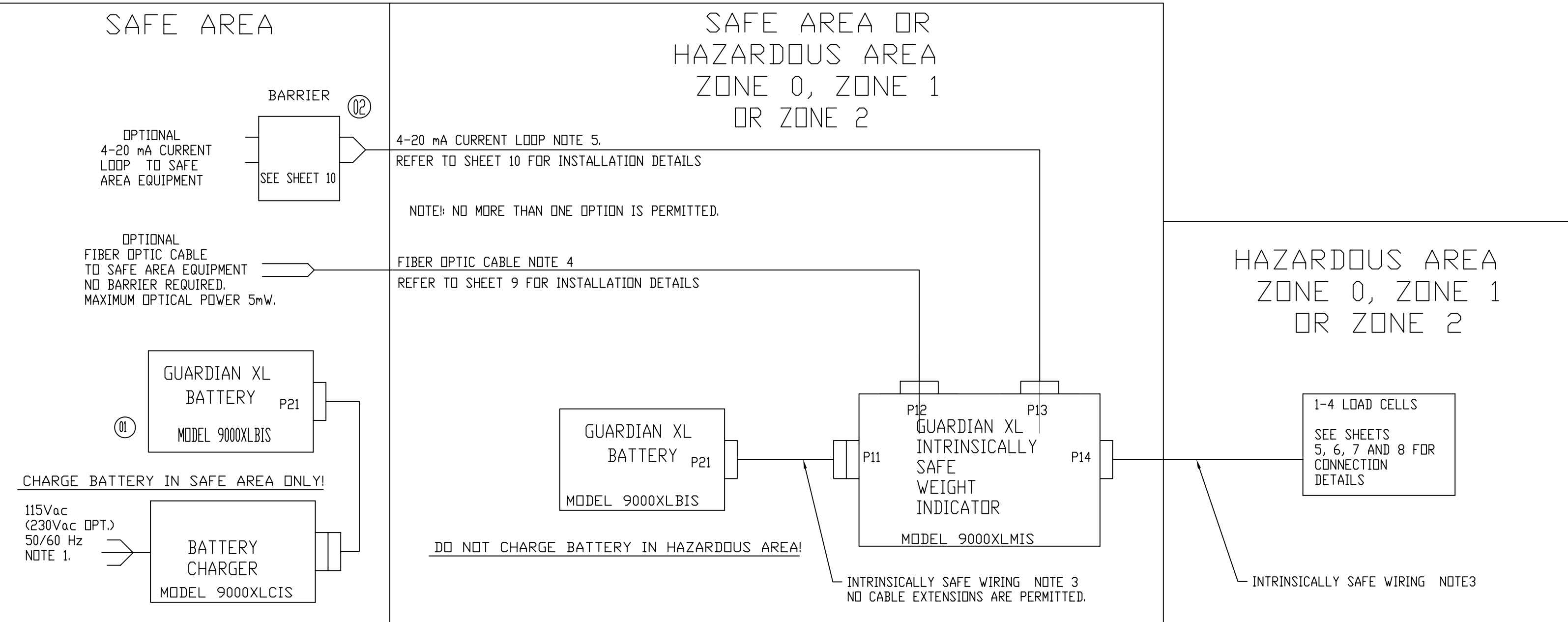
	SIZE	DRAWING NUMBER	REV.
	02	900180	02



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INSTALLATION OF GUARDIAN XL WITH BATTERY SUPPLY FOR ZONES 0, 1, OR 2

ECO #	REVISIONS		DATE
	E1	SHEET 3 WAS REDRAWN TO SHOW ZONE AREAS.	5/17/00
	E2	ADDED MODEL NUMBERS. ADDED FM BLOCK	6/27/00
	00	MISC. NOTE CHANGES. RELEASED FOR PRODUCTION	1/18/00
02-104	01	MISC. DESCRIPTION CHANGES.	8-29-02
04-041	02	REMOVED APPROVED BARRIERS FROM THIS SHEET.	6-9-04



NOTES:

- 1) CHARGE BATTERY IN SAFE AREA ONLY!
- 2) N/A
- 3) INSTALL PER NEC. 504-20
- 4) P13 AND 4-20 mA CURRENT SHALL NOT BE INSTALLED WHEN FIBER OPTIC CABLES ARE INSTALLED.
- 5) P12 AND FIBER OPTIC CABLE SHALL NOT BE INSTALLED WHEN 4-20 mA CURRENT LOOP IS INSTALLED.

DORON

DORAN SCALES, INC.

1315 PARAMOUNT PARKWAY, BATAVIA, ILLINOIS, U.S.A.

SCALE 1=1

APPROVED BY:

DRAWN BY: P. HAGER

DATE: 5-11-00

CHECKED BY. P. HAGER

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TOLERANCE NOTE:

GUARDIAN XL CONTROL DRAWING

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

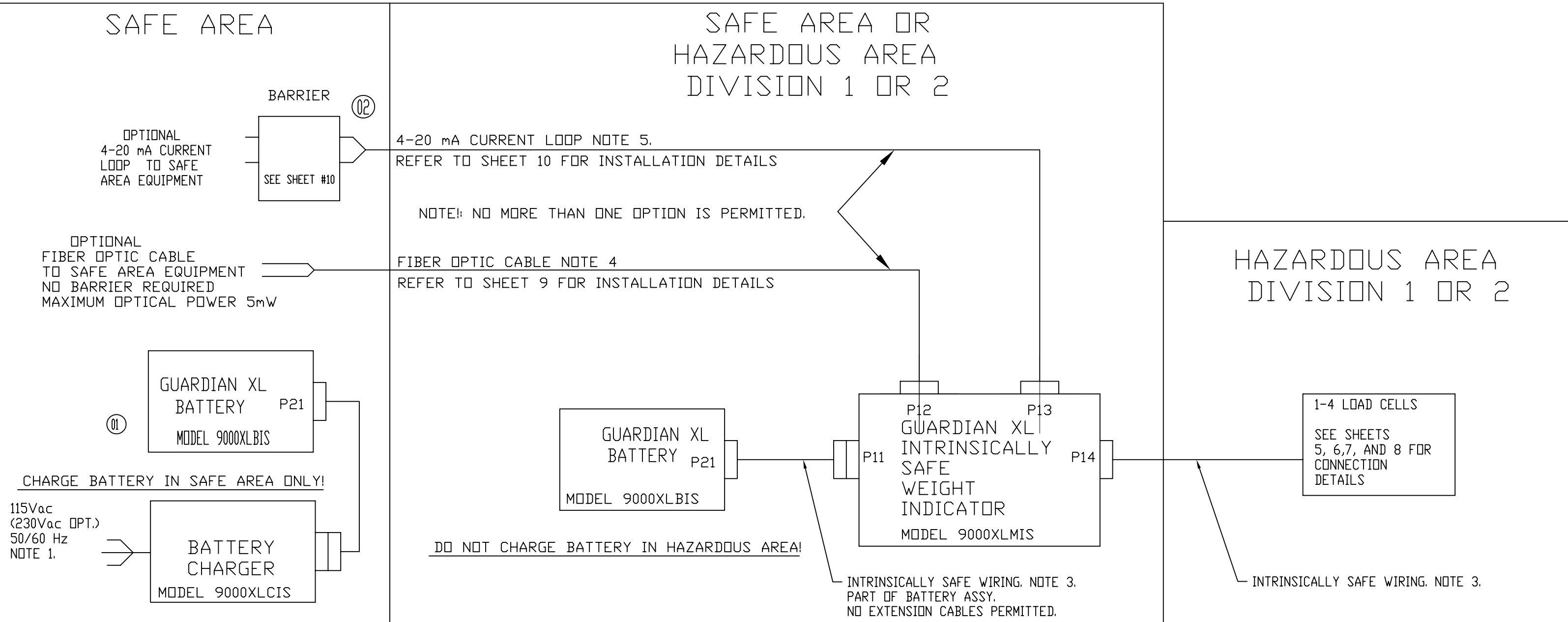
SHEET 3 OF 12

SIZE	DRAWING NUMBER	REV.
02	900180	02

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INSTALLATION OF GUARDIAN XL WITH BATTERY SUPPLY FOR DIVISION 1 OR DIVISION 2

ECD #	REVISIONS		DATE
	E1	SHEET 4 WAS REDRAWN TO SHOW DIVISION AREAS.	5/17/00
	E2	ADDED MODEL NUMBERS. ADDED FM BLOCK	5/17/00
	00	MISC. NOTE CHANGES. RELEASED FOR PRODUCTION	1/18/01
02-104	01	MISC. DESCRIPTION CHANGES.	8-29-02
04-041	02	REMOVED APPROVED BARRIERS FROM THIS SHEET.	6-9-04



NOTES:

- 1) CHARGE BATTERY IN SAFE AREA ONLY!
- 2) N/A
- 3) INSTALL PER NEC 504-20
- 4) P13 AND 4-20 mA CURRENT SHALL NOT BE INSTALLED WHEN FIBER OPTIC CABLES ARE INSTALLED.
- 5) P12 AND FIBER OPTIC CABLE SHALL NOT BE INSTALLED WHEN 4-20 mA CURRENT LOOP IS INSTALLED.

GORON

DORAN SCALES, INC.

1315 PARAMOUNT PARKWAY, BATAVIA, ILLINOIS, U.S.A.

SCALE 1=1

APPROVED BY:

DRAWN BY: P. HAGER

DATE:05-11-00

CHECKED BY. P. HAGER

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TOLERANCE NOTE:

GUARDIAN XL CONTROL DRAWING

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

SHT. 4 OF 12

SIZE	DRAWING NUMBER	REV.
02	900180	02

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DORAN SCALES PLATFORM MODEL STRUCTURE

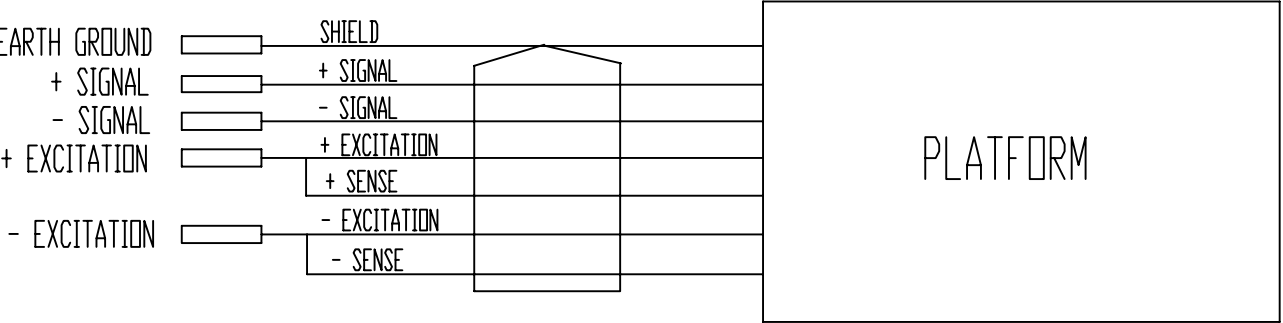
APPROVED LOAD CELLS FOR DORAN SCALE PLATFORMS

PLATFORMS	DORAN	TEDEA	
7***P	1040	1040	
	1042	1042	
	1000 SERIES	1140	
		1030	
		1000 SERIES	
DSP1***	1040	1010	
	1042	1040	
	1000 SERIES	1140	
		1015	
		1000 SERIES	
DSP2***	1040	1010	
	1042	1040	
	1000 SERIES	1140	
		1015	
		1000 SERIES	
DSP3***	1250	1250	
	1260	1000 SERIES	
	1000 SERIES		
DSP5***1824	1250	1250	
	1260	1000 SERIES	
	1000 SERIES		
DSP5****/2424	1250	1250	
	1260	1000 SERIES	
	1000 SERIES		
DXL7***	1022	1022	
DXL8***	1042	1042	
	1040	1040	
DXL9***	1042	1042	
	1040	1040	
①			
*****	SPECIFIES	CAPACITY	

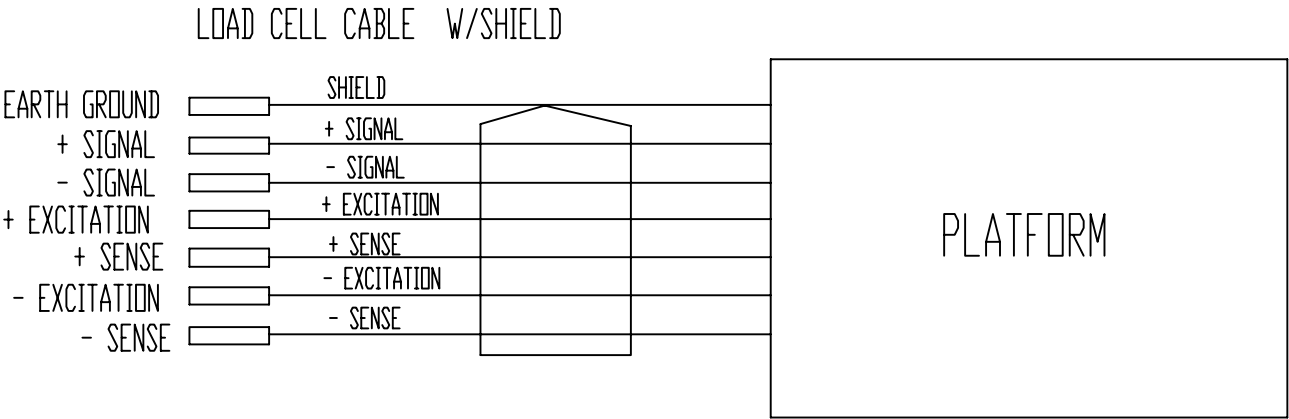
***** SPECIFIES CAPACITY

TO GUARDIAN-XL INDICATOR MAIN LOAD CELL
INPUT CONNECTION
LOAD CELL CABLE W/SHIELD

CONNECTION STYLE 'A'
TO P14 SHEET 8
(INSERT JU4 AND JU3)



CONNECTION STYLE 'B'
TO P14 SHEET 8
(REMOVE JU4 AND JU3)



NOTE:

- 1) CONNECT THE LOAD CELL CABLE SHIELD WIRE TO THE THREADED STUD ADJACENT TO P14. TO ASSURE PROPER GROUNDING, TEST FOR CONTINUITY BETWEEN PLATFORM AND SHIELD. THE PLATFORM SHOULD BE PROPERLY GROUNDED TO EARTH.
- 2) PASS LOAD CELL CABLE THROUGH WATER TIGHT STRAIN RELIEF ON INDICATOR AND CONNECT TO TB1.
- 3) REFER TO SHEET 8 FOR FIELD WIRING DETAILS.



DORAN SCALES, INC.

SCALE: NONE	APPROVED BY:	DRAWN BY: RFY
DATE: 3-29-00		CHECKED BY:

GUARDIAN-XL CONTROL DWG.-PLATFORM CONNECTION DETAIL

MATERIAL:	SIZE 02	DRAWING NUMBER 900180	REV. 02
-----------	---------	-----------------------	---------

REVISIONS				
ECO NO.	DESCRIPTION		DATE	APPROVED
	E1	WAS SHEET 6 OF 10. ADDED NOTES 2 AND 3	5/17/00	
	E2	ADDED FM BLOCK	6/24/00	
	00	RELEASED FOR PRODUCTION	1/18/00	
02-104	01	ADDED DXL9XXX PLATFORMS. CHANGED "XXX" TO '***'	8-29-02	
04-041	02	SEE SHEET 10.	6-9-04	

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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:

DECIMAL: .XX ± .010

.XXX ± .005

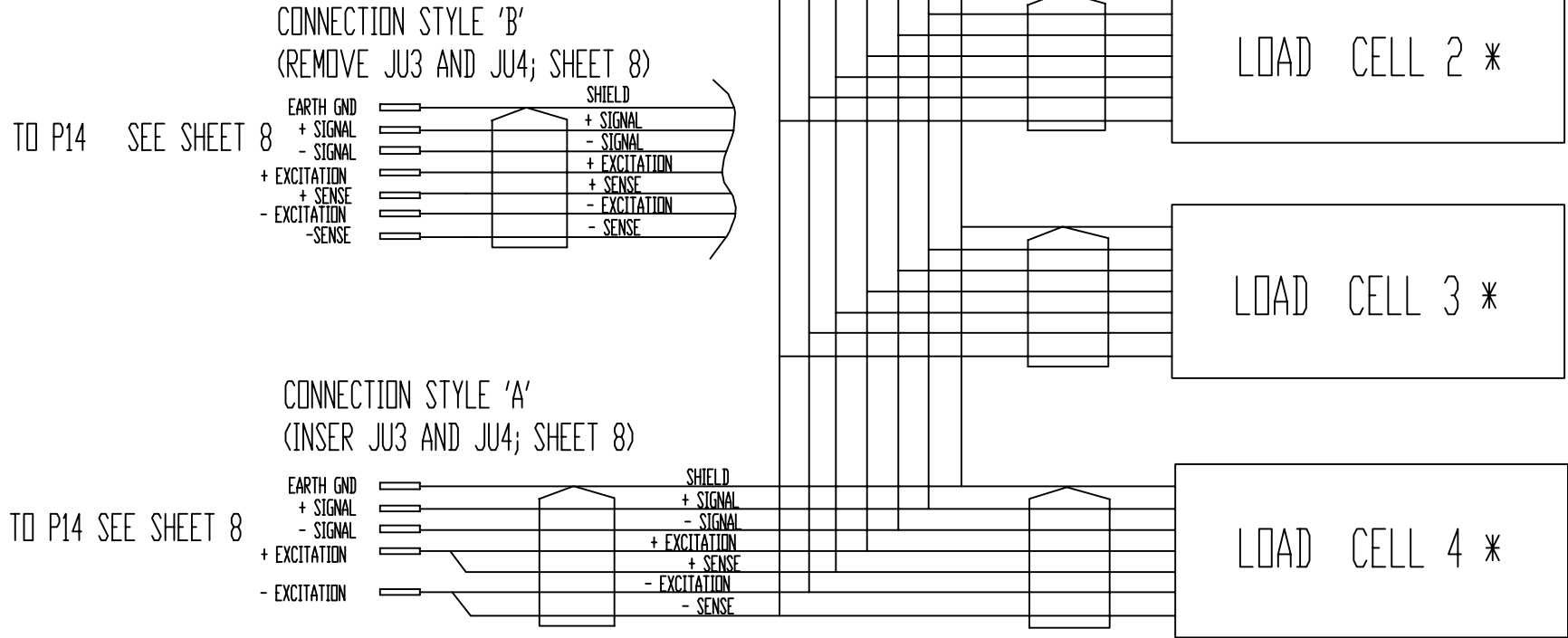
ANGLES: ± 0° 30'

SHT. 5 OF 12

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

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MULTIPLE LOAD CONNECTION DIAGRAM



NOTES:

- 1) LOAD CELLS TO BE INTRINSICALLY SAFE
Vmax= 10V OR HIGER, Imax= 400mA OR HIGHER.
- 2) INDIVIDUAL LOAD CELLS SHALL BE 350 OHM OR HIGHER.
- 3) NO COMPONENTS SHALL BE USED FOR TRIMMING OR CONNECTION PURPOSES.
SEE NOTE 5 FOR DETAILS.
- 4) SYSTEM IS SAFE FOR HAZARDOUS AREAS ONLY WHEN INSTALLED PER THIS CONTROL DRAWING.
- 5) THE ZERO OFFSET OF THE INDICATOR MAY BE COMPENSATED BY PLACING A 50K OHM OR GREATER RESISTOR FROM THE +SIGNAL TO THE + EXCITATION OR FROM THE -SIGNAL TO THE - EXCITATION. THE RESISTOR MUST BE A METAL FILM RESISTOR 1/8 WATT 25PPM TEMP. CO.
- 6) PASS MAIN LOAD CELL CABLE THROUGH WATER TIGHT STRAIN RELIEF P14 AND CONNECT TO TB1. SEE SHEET 8.
- 7) MULTIPLE LOAD CELL CONNECTIONS MAY BE USED IN DORAN SCALE PLATFORMS OR OTHER MECHANICAL ASSEMBLIES PROVIDED INSTALLATION COMPLIES WITH THIS DRAWING.

* 1 TO 4 LOAD CELLS MAY BE USED

REVISIONS				
ECO NO.	DESCRIPTION		DATE	APPROVED
	E1	WAS SHEET 7. ADDED NOTES 6, 7 AND 8.	5/17/00	
	E2	ADDED FM BLOCK	6/27/00	
	00	RELEASED FOR PRODUCTION	1/18/01	
02-104	01	ADDED 'MODEL 9000XLMIS'	8-29-02	
04-041	02	SEE SHEET 10.	6-9-04	

APPROVED LOAD CELLS FOR
USE WITH GUARDIAN-XL INDICATOR MODEL 9000XLMIS

DORAN

1022
1042
1250
1260

OTHER

ANY FM APPROVED LOAD CELL
OR INTRINSICALLY SAFE LOAD CELL
Vmax = 10v OR HIGHER
I max = 400mA OR HIGHER

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

DORAN DORAN SCALES, INC.

SCALE: NONE	APPROVED BY:	DRAWN BY: RFY
DATE: 3-29-00		CHECKED BY:

GUARDIAN-XL CONTROL DWG. LOAD CELL CONNECTION DETAIL

MATERIAL:	SIZE	DRAWING NUMBER	REV.
	02	900180	02

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DECIMAL: .XX ± .010

.XXX ± .005

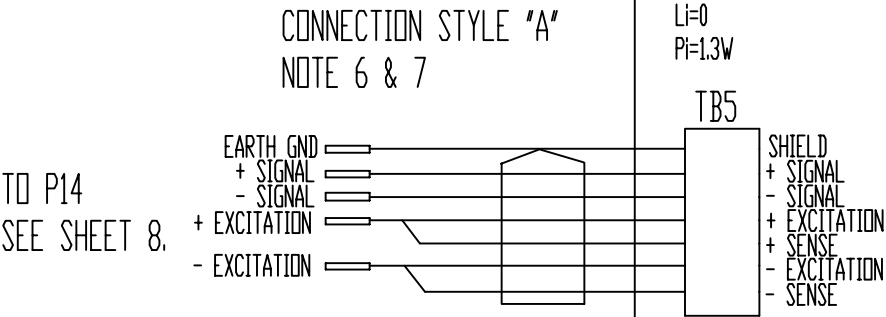
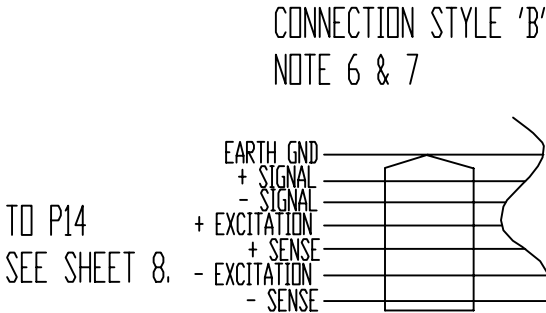
ANGLES: ± 0° 30'

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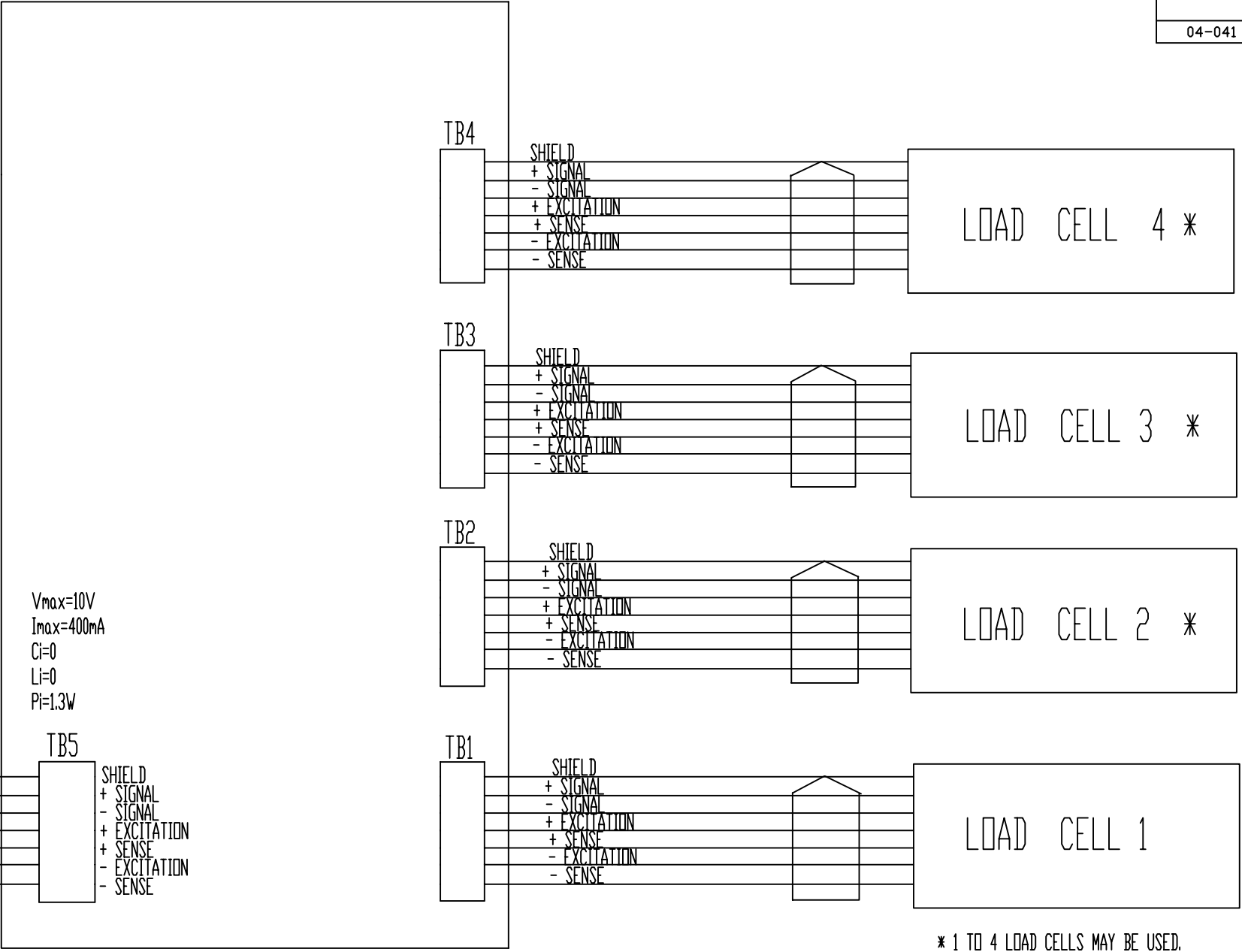
MULTIPLE LOAD CELLS W/SUMMING BOARD

PART NO. 9000XLJBX

REVISIONS				
ECO NO.	DESCRIPTION		DATE	APPROVED
	E1	WAS SHEET 8. REVISED NOTES 1-7.	5/17/00	
	E2	ADDED MODEL NUMBER. ADDED FM BLOCK	6/27/00	
	00	ADDED INPUT PARAMETERS. RELEASED FOR PRODUCTION.	1/18/01	
02-104	01	ADDED "GUARDIAN XL INDICATOR MODEL 9000XLMIS" REMOVED NOTE #4.	8-29-02	
04-041	02	SEE SHEET 10.	6-9-04	



Vmax=10V
Imax=400mA
Ci=0
Li=0
Pi=1.3W



* 1 TO 4 LOAD CELLS MAY BE USED.

APPROVED LOAD CELLS FOR
USE WITH GUARDIAN XL
INDICATOR MODEL 9000XLMIS

DORAN	OTHER
1022	ANY FM LISTED LOAD CELL
1042	OR INTRINSICALLY SAFE
1250	LOAD CELL
1260	Vmax=10V OR GREATER
	Imax= 400mA OR GREATER

- NOTES:
- 1) LOAD CELLS TO BE INTRINSICALLY SAFE.
 - 2) INDIVIDUAL CELLS SHALL BE 350 OHMS OR GREATER.
 - 3) SYSTEM IS SUITABLE FOR USE IN HAZARDOUS AREAS ONLY WHEN INSTALLED IN ACCORDANCE WITH THIS DRAWING (900180).
 - 4) PASS CABLE FROM SUMMING BOARD THROUGH THE WATER TIGHT STRAIN RELIEF P14 AND CONNECT TO TB1 ON BOARD.
 - 5) REFER TO SHEET 8 FOR FIELD WIRING DETAILS.
 - 6) MULTIPLE LOAD CELL CONNECTIONS MAY BE USED IN DORAN SCALE PLATFORMS OR OTHER MECHANICAL STRUCTURES FOLLOWING THIS CONTROL DRAWING.

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

DORAN DORAN SCALES, INC.

SCALE: NONE	APPROVED BY:	DRAWN BY: RFY
DATE: 3-29-00		CHECKED BY:

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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:

DECIMAL: .XX ± .010

.XXX ± .005

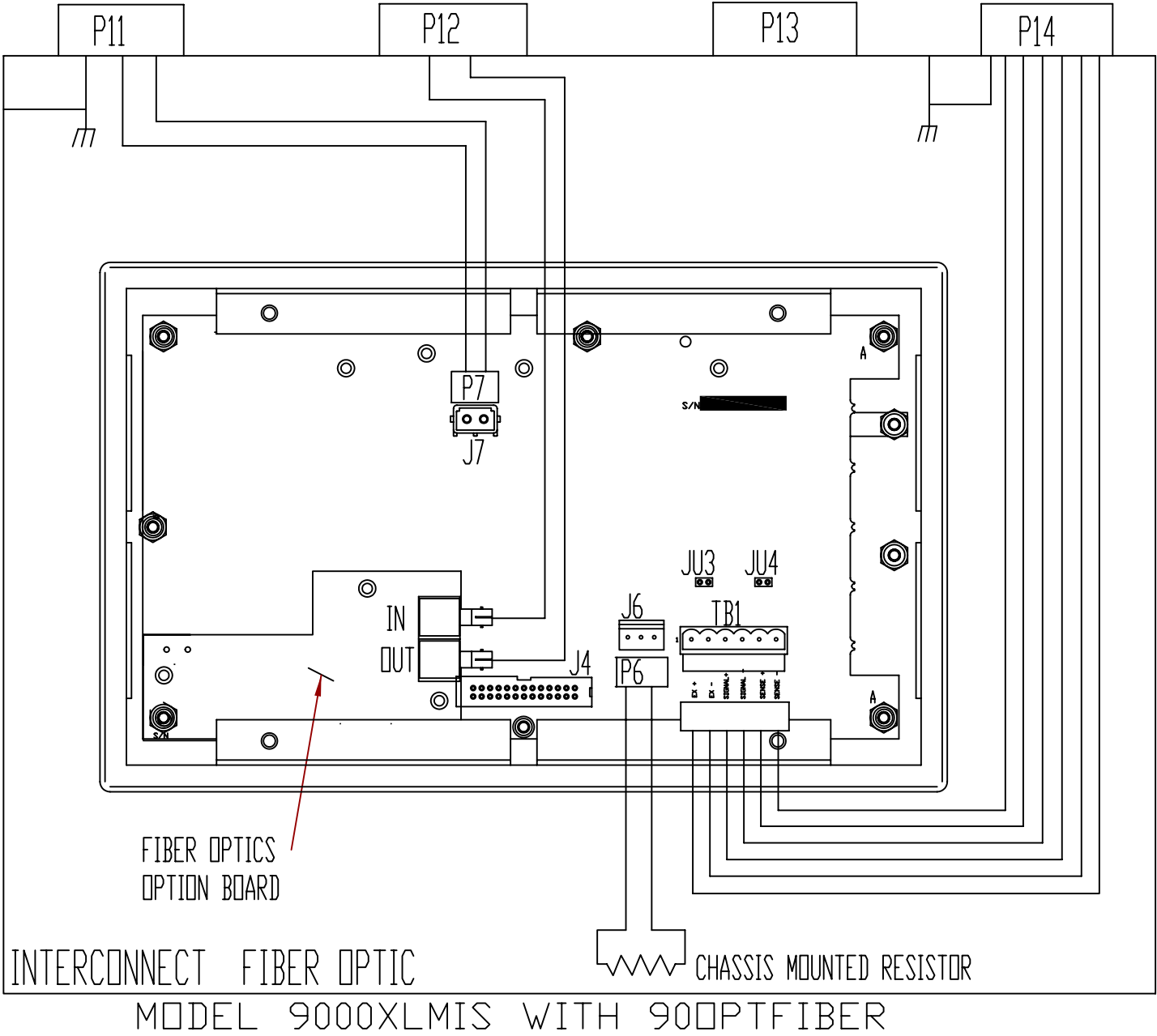
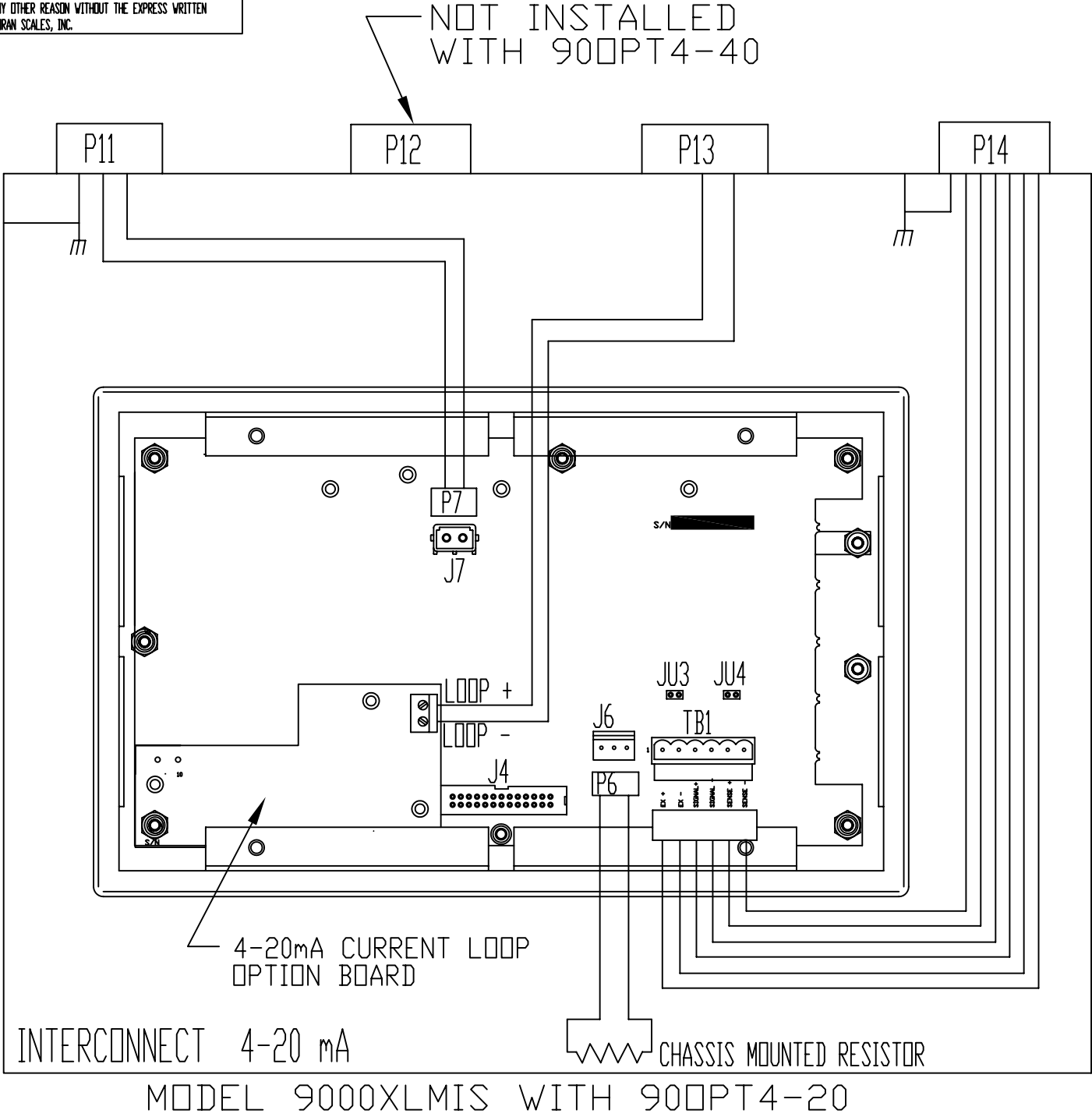
ANGLES: ± 0° 30'

GUARDIAN-XL CONTROL DWG. BASE CONNECTION DETAIL

MATERIAL:	SIZE	DRAWING NUMBER	REV.
	02	900180	02

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REVISIONS			
ECO NO.	DESCRIPTION		DATE
	E1	WAS SHEET 5. 4-20mA DETAIL. WAS RS-232 DETAIL.	5/17/00
	E2	ADDED MODEL NUMBERS. ADDED FM BLOCK	6/27/00
	00	REMOVED 4-20 LOOP GROUND. RELEASED FOR PRODUCTION	1/18/01
02-104	01	'OPTION' WAS 'OPTIN'	8-29-02
04-041	02	SEE SHEET 10.	6-9-04



NOTE:
WHEN USING LOAD CELL' CONNECTION STYLE A'
JU3 AND JU4 MUST HAVE A PLUGGABLE JUMPER BLOCK INSTALLED.

WHEN USING LOAD CELL 'CONNECTION STYLE B'
JU3 AND JU4 ARE LEFT OPEN.

TO MAINTAIN FM APPROVAL, OPTION BOARDS, MUST BE
FACTORY INSTALLED.

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:	
DECIMAL: .XX	± .010
.XXX	± .005
ANGLES: ± 0° 30'	SHT. 8 OF 12

<div><div>DORAN</div><div>DORAN SCALES, INC.</div></div>			
SCALE: NONE	APPROVED BY:		DRAWN BY: RFY
DATE: 3-29-00			CHECKED BY:
GUARDIAN XL CONTROL DRAWING			
MATERIAL:		SIZE 02	DRAWING NUMBER 900180
			REV. 02

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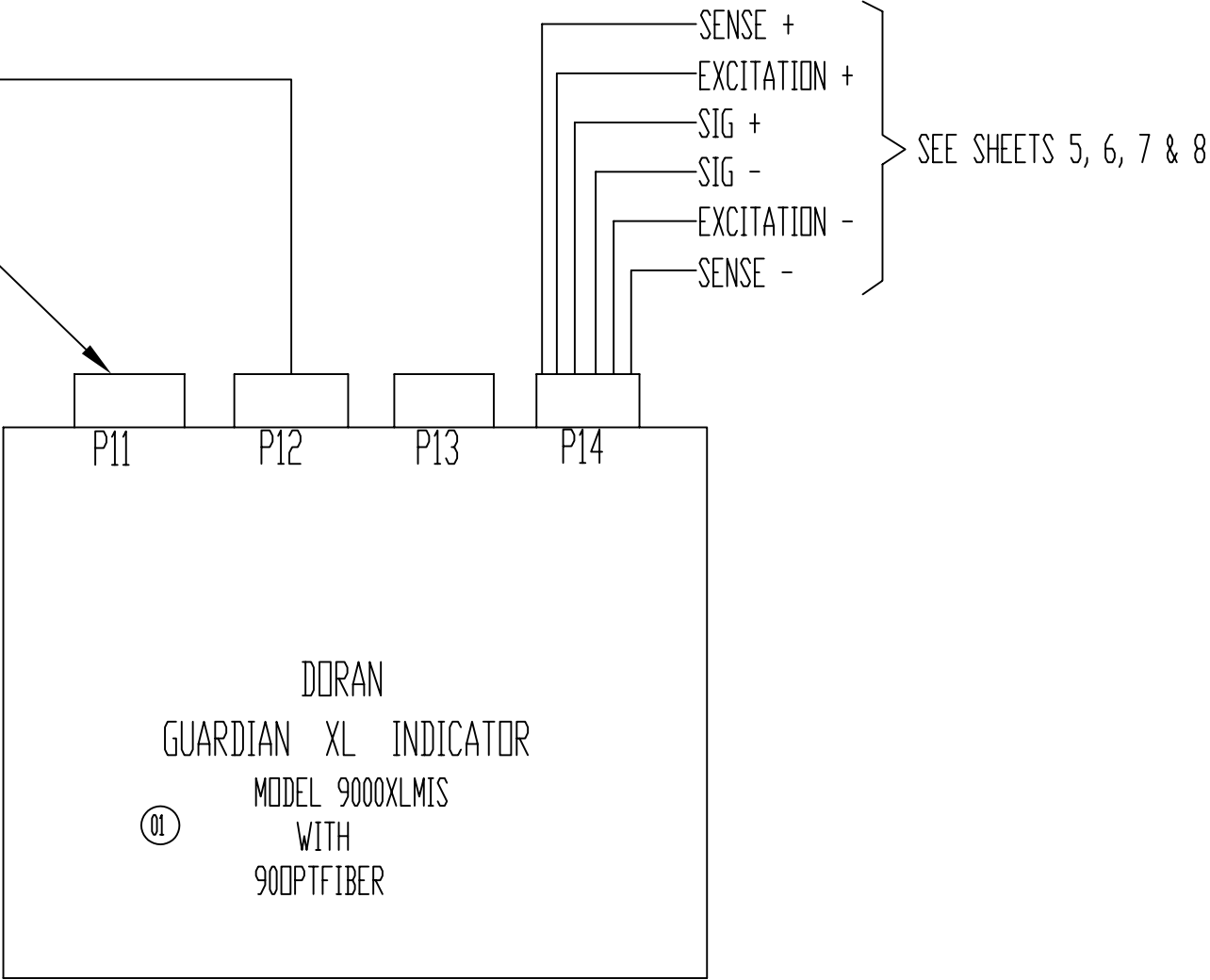
SAFE AREA

SAFE AREA
EQUIPMENT

NO BARRIER REQUIRED

FIBER OPTIC CABLE

POWER SUPPLY
OR BATTERY
SHEETS 1, 2, 3 OR 4



NOTE:
THE 4-20mA OPTION (900PT4-20) MAY NOT BE INSTALLED
WHEN THE FIBER OPTICS OPTION IS INSTALLED.

DORAN DORAN SCALES, INC.

SCALE: NONE	APPROVED BY:	DRAWN BY: RFY
DATE: 3-29-00		CHECKED BY:

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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:

DECIMAL: .XX ± .010

.XXX ± .005

ANGLES: ± 0° 30'

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

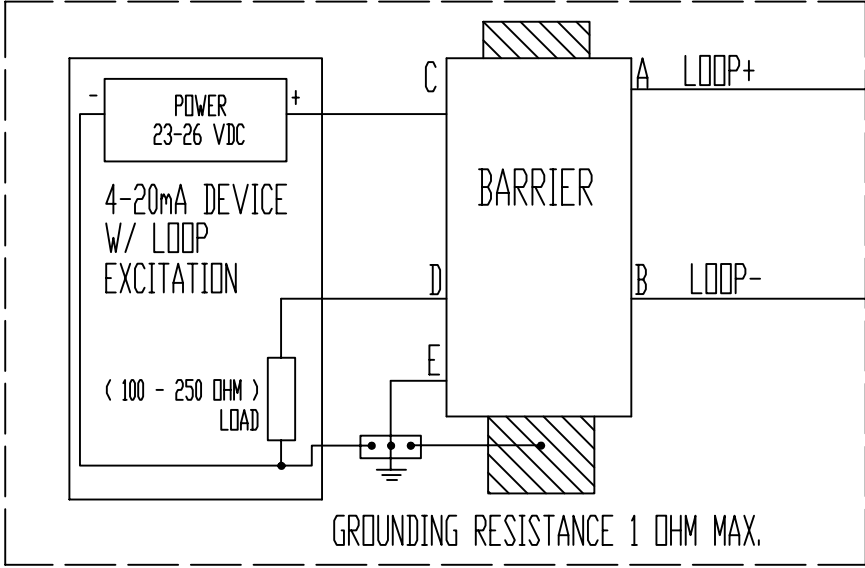
GUARDIAN XL CONTROL DRAWING

MATERIAL:	SIZE	DRAWING NUMBER	REV.
	02	900180	02

REVISIONS				
ECO NO.	DESCRIPTION		DATE	APPROVED
	E1	REPLACED SHEET 9.	5/17/00	
	E2	CLARIFIED MODEL NUMBER. ADDED FM BLOCK	6/27/00	
	00	RELEASE FOR PRODUCTION	1/18/00	
02-104	01	"MODEL" WAS "P/N"	8-29-02	
04-041	02	SEE SHEET 10.	6-9-04	

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SAFE AREA



02

APPROVED BARRIERS:

MTL: MTL7787+
R. STAHL: 9002/13-280-110-00
R. STAHL: 9001/51-280-091-14
PEPPERL+FUCHS: Z787.F

02

BARRIER SHALL NOT BE CONNECTED TO ANY DEVICE WHICH USES OR GENERATES ANY VOLTAGE IN EXCESS OF 250Vrms OR 250Vdc.

BARRIER CONNECTIONS:

BARRIER	TERMINAL				
	A	B	C	D	E
MTL7787+	3	4	1	2	na
9002/13-280-110-00	3	4	1	2	na
9001/51-280-091-14	3	4	1	2	na
Z787.F	1	4	8	5	6

na = not applicable

02

4-20mA CURRENT LOOP INSTALLATION

ZONE 0, 1, OR 2
OR
DIVISION 1 OR DIVISION 2

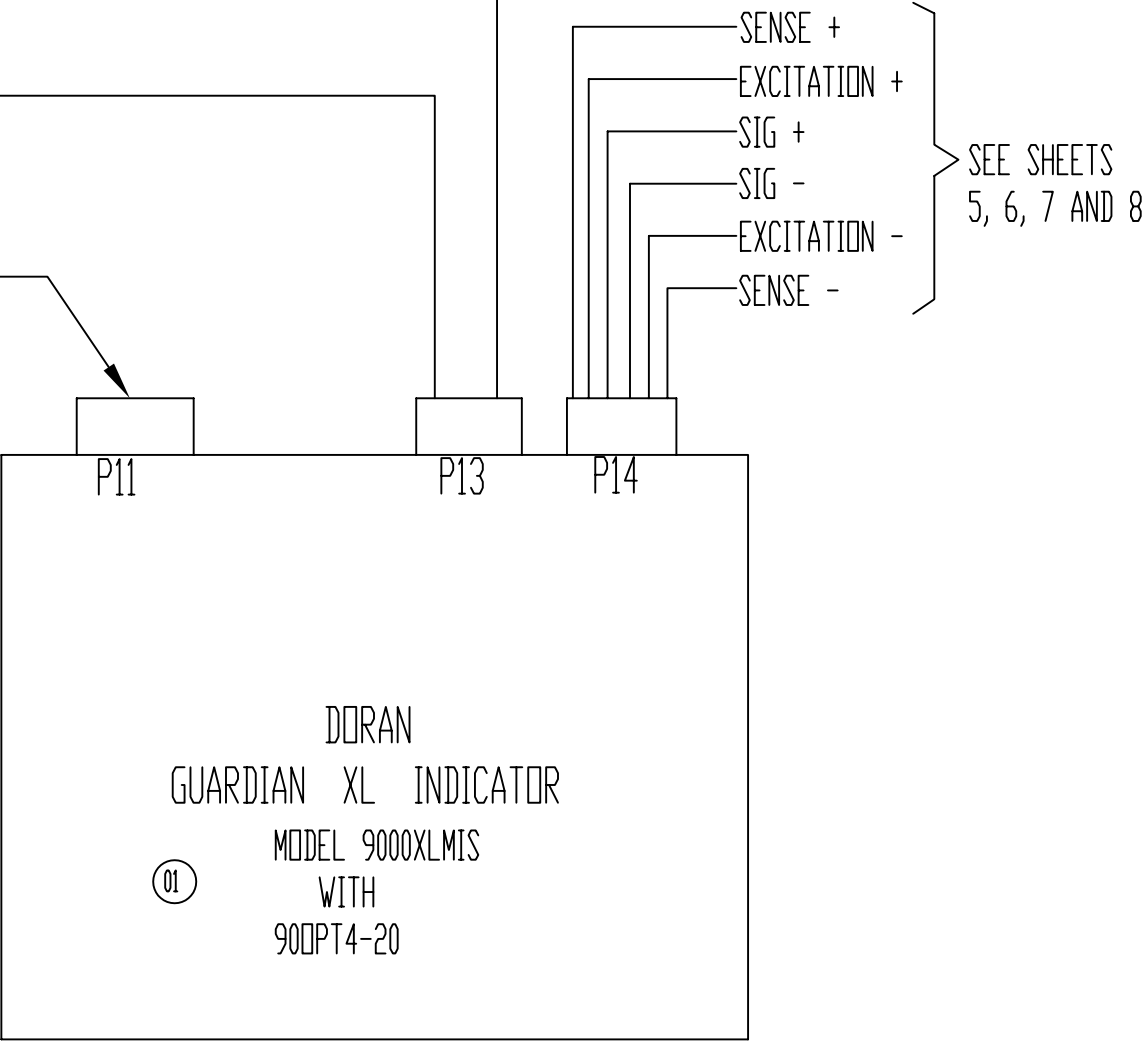
4-20mA CURRENT LOOP CABLE

POWER SUPPLY
OR BATTERY
SHEETS 1, 2, 3 OR 4

NOTE:
THE FIBER OPTICS OPTION (90OPTFIBER) MAY NOT BE INSTALLED WHEN THE 4-20mA OPTION IS INSTALLED.

WIRING METHODS MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE ANSI- NFPA 70 ARTICLE 504. ADDITIONAL INSTALLATION INFORMATION BE FOUND IN ISA RP12.6

REVISIONS				
ECO NO.	DESCRIPTION		DATE	APPROVED
	E1	SHEET 2 WAS REDRAWN TO SHOW DIVISION AREAS.	5/17/00	
	E2	BARRIER WAS Z764. CLARIFIED MODEL NUMBERS ADDED FM BLOCK.	6/27/00	
	00	ADDED WIRING AND BARRIER NOTES. REMOVED 4-20 LOOP GND. RELEASED FOR PRODUCTION.	6/27/00	
02-104	01	'MODEL' WAS 'P/N'	8-29-02	
04-041	02	REMOVED CURRENT BARRIER. ADDED 3 BARRIERS. REDREW WIRING CONNECTIONS, CHANGED WIRING TABLE.	6-9-04	



01

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

DORAN

DORAN SCALES, INC.

SCALE: NONE	APPROVED BY:	DRAWN BY: RFY
DATE: 3-29-00		CHECKED BY:

GUARDIAN XL CONTROL DRAWING

MATERIAL:	SIZE 02	DRAWING NUMBER 900180	REV. 02
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DECIMAL: .XX ± .010

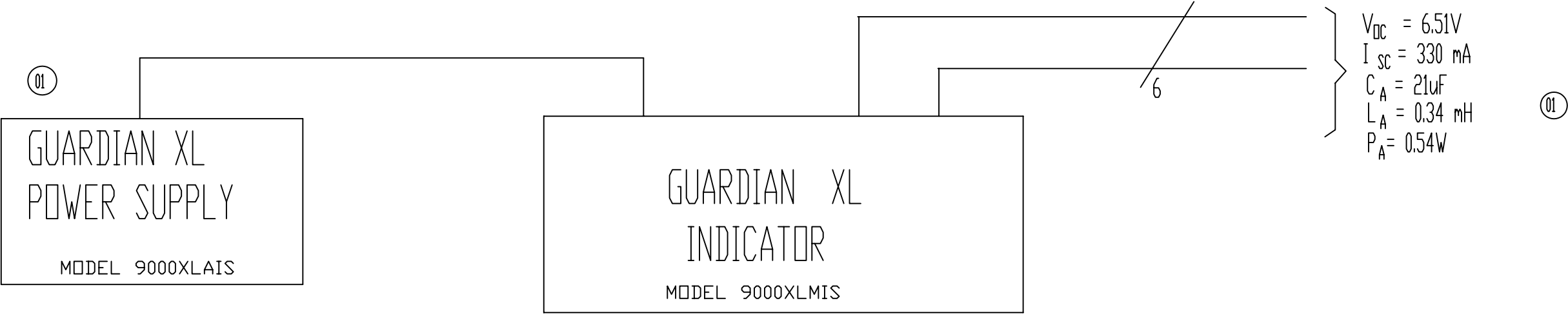
.XXX ± .005

ANGLES: ± 0° 30'

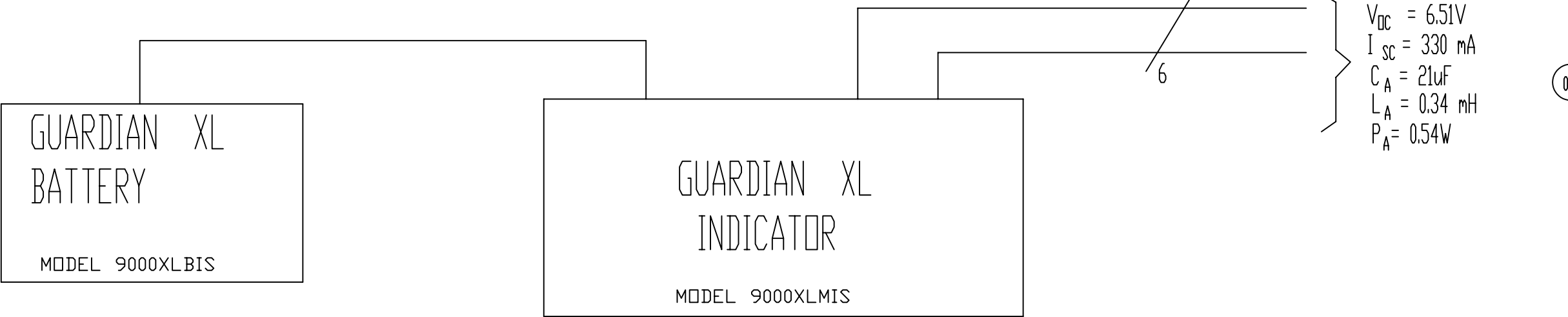
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REVISIONS				
ECO NO.		DESCRIPTION	DATE	APPROVED
02-104	01	21uF WAS 20uF. 0.34mH WAS 0.43mH. GUARDIAN XL WAS 8000 AIS.	8-29-02	
04-041	02	SEE SHEET 10.	6-9-04	

REVISIONS				
ECO NO.	DESCRIPTION		DATE	APPROVED
	E1	SHEET WAS SHEET 9. ADDED RATING INFO	5/17/00	
	E2	ADDED MODEL NUMBERS. ADDED FM BLOCK.	6/27/00	
	00	CORRECTED PARAMETERS. RELEASED FOR PRODUCTION	1/18/01	



GUARDIAN XL WITH AIS POWER SUPPLY



GUARDIAN XL WITH BATTERY POWER SUPPLY

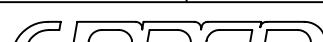
SYSTEM COMPONENTS ARELISTED BY FACTORY MUTUAL RESEARCH. AS FOLLOWS:
GUARDIAN XL INDICATOR (MODEL 9000XLMIS)
INTRINSICALLY SAFE, CLASS I, II, III, DIVISION 1, GROUPS A, B, C, D, E, F, G, T4
CLASS I, ZONE 0, AEx ia IIC T4

GUARDIAN XL POWER SUPPLY (MODEL 9000XLAIS)
ASSOCIATED INTRINSICALLY SAFE FOR CONNECTION TO CLASS I, II, III, DIV.1, GROUPS A-G
NONINCINDIVE CLASS I, DIVISION 2, A, B, C, D, T4
[CL 1, ZN 0] AEx [ia] IIC T4

GUARDIAN XL BATTERY (MODEL 9000XLBIS)
INTRINSICALLY SAFE, CLASS I, II, III, DIVISION 1, GROUPS A-G, T4
CLASS 1, ZONE 0, AEx ia IIC T4

GUARDIAN XL SUMMING BOARD (MODEL 9000XLJBX)
INTRINSICALLY SAFE CLASS I, II, III, DIVISION A, B, C, D, E, F, G, T4
CLASS I, ZONE 0, AEx ia IIC T4

RELEASED DATE	REV.	BY	ECO NO.	797 NO.
6-9-04	02	WAS	04-041	797-54

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			CHECKED BY:

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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:	
DECIMAL: .XX	± .010
	.XXX ± .005
ANGLES: ±	0° 30'

GUARDIAN XL CONTROL DRAWING				
MATERIAL:			SIZE 02	DRAWING NUMBER 900180
				REV. 02

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REVISIONS				
ECO NO.	DESCRIPTION		DATE	APPROVED
	00	ADDED TABLE OF CONTENTS. RELEASED FOR PRODUCTION	1/19/01	
02-104	01	'AC' WAS '9000XLATS'.	8-29-02	
04-041	02	SEE SHEET 10.	6-9-04	

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GUARDIAN-XL CONTROL DRAWING

MATERIAL:	SIZE	DRAWING NUMBER	REV.
	02	900180	02