

Metal Detection

Motoweigh

Operation Manual



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6.0 Limited Warranty 73



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1.0 Introduction

This manual is intended for use by qualified service technicians responsible for installing and servicing the Motoweigh Metal Detection Unit.



Authorized distributors and their employees can view or download this manual from the Rice Lake Weighing Systems distributor site at www.rlws.com.

1.1 Safety

Safety Signal Definitions:



DANGER Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.



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



CAUTION Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.



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

General Safety



Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Contact any Rice Lake Weighing Systems dealer for replacement manuals.



Failure to heed may result in serious injury or death.

Failure to heed may result in serious injury of death.

Do not allow minors (children) or inexperienced persons to operate this unit.

Do not operate without all shields and guards in place.

Do not step on the unit.

Do not jump on the conveyor.

Do not use for purposes other than metal detection.

Do not place fingers into slots or possible pinch points.

Do not use any load bearing component that is worn beyond 5% of the original dimension.

Do not use this product if any of the components are cracked.

Do not exceed the rated load limit of the unit.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Before opening the unit, ensure the power cord is disconnected from the outlet. Or, if supplied, use the power disconnect switch (lockout tag-out).

Keep hands, feet and loose clothing away from moving parts.

1.2 Handling Instructions

IMPORTANT Do not lift the metal detector by inserting anything into or through the tunnel.

The inner surface of the tunnel protects the precisely tuned electronic circuit and internal parts. The tunnel liner also protects the internal parts against water damage. The integrity of this liner and seal must be maintained. Any damage or distortion to this surface caused by handling will invalidate the warranty.

When handling, keep the metal detector on the shipping pallet as long as possible. When removing the detector from the shipping pallet:

- Lift only on the detector housing surfaces or supporting feet
- Do not lift by the control housing that protrudes from the body of the metal detector

If possible lift the metal detector by using a crane and soft nylon slings running under the entire metal detector housing as seen in Figure 1-1 .

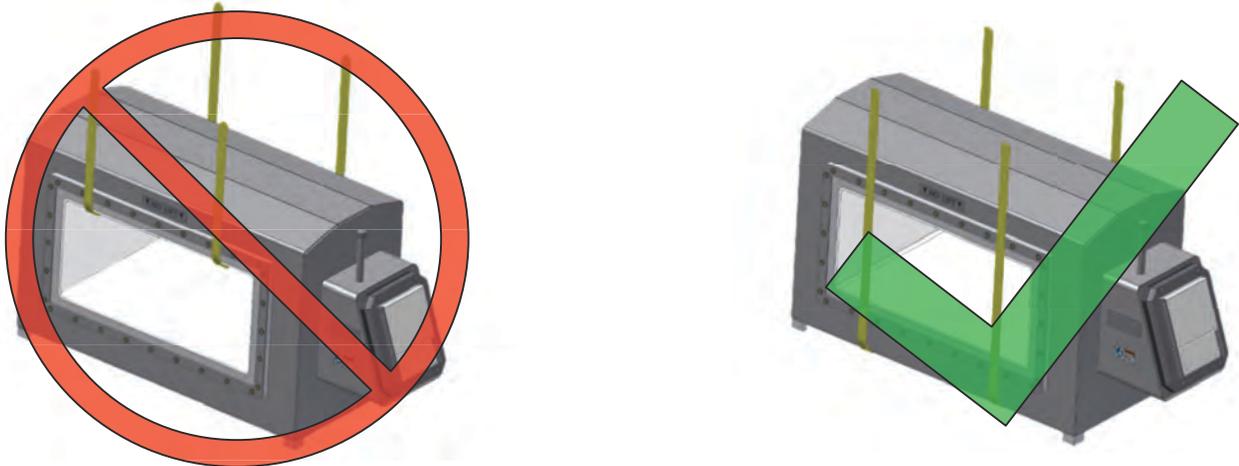


Figure 1-1. Handling the Unit

Larger metal detectors may have eye bolts pre-installed at the factory. When handling with the eye bolts ensure loads are never applied perpendicular to the shank of the eye bolts; they will break.



CAUTION The metal detector is heavy. Use care when handling to avoid injury to personnel or damage to property. It is not recommended that the metal detector be lifted by hand or supported by personnel.

IMPORTANT

Never weld any attachment to the metal detector. Do not attempt to drill and/or tap the metal detector for lifting or mounting attachments.

1.3 Specifications

Supply, Mains, Voltage

AC supply voltages – 100 to 240 VAC RMS, 50 or 60 Hz.

Mains supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal value.

Equipment Classification

Class 1 equipment requiring a protective ground conductor.

Installation Category II (Over voltage Classification)

Pollution Degree 2

Maximum Demand

Internal electronics require 60 VA to operate.

Power available for external loads (powered from the internal source) is 1250 VA and is limited to 5 amps of current by CB1.

Maximum demand will be 1310 VA.

Outputs

Nine total outputs, each with one set of contacts.

Four programmable “Form C” (NO-C-NC) relay outputs rated at 5A (due to PCB trace width) up to 250 VAC, 30 VDC each.

Reject (K1)

Relay 1 (K3)

Relay 2 (K2)

Relay 3 (K4)

All four relays are fail-safe wired; if power is lost, the relays will switch to the activated position.



Note

If the power at L1B and L2B is used to power the relays, its maximum available current is 5A, and the voltage will be equal to that applied at L1 and L2 on TB3. Power at L1B and L2B passes through the circuit breaker switch located on the left side of the control housing.

There are five programmable “Form A” (SPST-NO) solid state relay outputs rated at 500mA up to 40 VDC.

Out 1 (K9)

Out 2 (K8)

Out 3 (K7)

Out 4 (K6)

Out 5 (K5)

These five outputs can be wired as NPN or PNP. The output can be set to NO or NC under normal running conditions.

Reject

Reject (K1) is the primary reject device output. It must run via Reject Timer 1 or Overhead A-B when used.

All reject log information is based on Reject Timer 1.

RELAY 1-3

Relay 1(K3), Relay 2 (K2), and Relay 3 (K4) are fully programmable and may use any of the eight reject timers.

They also may use Overhead A-B or be used as a fault or warning output.

OUT 1-5

Out 1 (K9), Out 2 (K8), Out 3 (K7), Out 4 (K6), and Out 5 (K5) are fully programmable and may use any of the eight reject timers.

They also may use Overhead A-B or be used as a fault or warning output.

TIMERS

There are eight independent reject timers.

Each reject timer has its own travel (delay) time and reject (duration) time in the range of 0 to 60 seconds or 0 to 1200 tachometer pulses.

Each timer has its own fixed on/off time ideal for the use of pusher arms.

Each reject timer runs off of time or tach for both travel and duration time.

Each reject timer can run with or without an index device, and can be set to manual or automatic reset.

Only Reject Timer 1 can use reject confirmation.

FAULT

All outputs except Reject (K1) can be configured as a fault output.

WARNING

All outputs except Reject (K1) can be configured as a warning output.

OVERHEAD A-B

Overhead A-B runs via Reject Timer 1 and is used for an overhead pusher arm. It can be setup to reject on one or both sides of the conveyor.

It can also be setup to always return to the same side of the conveyor when actuated.

The functionality of Overhead A-B is based on the hardware used.

Additional information on how to setup Overhead A-B is located in the wiring section of this manual.

INPUTS

There are eight configurable inputs that can be set to "Active High" or "Active Low".

Input Voltage

High = 10 to 30 VDC

Low = 0 to 0.9 VDC

Input Impedance = 2.8k Ω

Current Requirement = 3 to 10 mA

TACHOMETER INPUT

Input Voltage

Logic 0 = 0.0 to 0.9 VDC

Logic 1 = 10 to 30 VDC

Input Impedance = 2.8k Ω

Current Requirement = 3 to 10 mA

Frequency: 50Hz (determined by number of poles on Tachometer and maximum belt speed)

Minimum pulse width = 0.005 seconds (5 mSec)

OPERATING AMBIENT TEMPERATURE RANGE

Integral Control -10° C (14° F) to 49° C (120° F)

Remote Control -10° C (14° F) to 54° C (130° F)

STORAGE TEMPERATURE

-10° C (14° F) to 80° C (175° F)

RELATIVE HUMIDITY

0 TO 95%

MAXIMUM OPERATING ALTITUDE

2000 meters (6561 feet)

PRODUCT VELOCITY

2 ft/min (0.6 m/min) to 3000 ft/min (914 m/min)

ENCLOSURE

The standard enclosure is rated NEMA 4X and will withstand the high pressure wash-down standard of 800 C (1760 F) water at 100 bar (1450 psi).

2.0 Installation

IMPORTANT

Metal Detectors are manufactured to very stringent quality standards, the installer must follow the installation procedures outlined in this manual.

Metal detectors are extremely sensitive to very small changes in the electrical and physical environment. Unstable operation is possible if installed incorrectly. Metal detectors are sensitive to excessive vibration and may generate a false reject signal when the conveyor starts and stops.

Please read all instructions prior to using the metal detector. Problems caused by improper installation techniques are not covered under warranty.

2.1 Mechanical

The metal detector contains several components which must be physically mounted to a conveyor or suitable stand.

These include the sensing head, the control (if remote), and other devices such as a tachometer. Most sensing heads have an integral control thus simplifying installation and wiring.



Figure 2-1. Metal Detection Unit

The sensing head contains the coils and main electronics. The head must be installed so the products being inspected can pass through the aperture in a consistent and controllable manner. It is vital that the sensing head be protected from excessive vibration, physical abuse, electromagnetic interference, static electricity, and corrosive materials. The conveyor belt, chute, or other conveyance device must not contact the metal detector aperture.

Utilizing the control remotely requires that it be mounted to a convenient surface with minimal vibration. It should also be easily accessible in the event an adjustment is necessary. The control enclosure is fitted with mounting tabs that must be isolated to prevent electrical current loops.

2.1.1 Location of Sensing Head

The location of the metal detector sensing head is extremely important. When selecting a location, consider the surrounding processing equipment, product velocity, and rejection of foreign objects. Operator convenience should also be evaluated. Ensure installation guidelines are followed and met before the final location is selected. If there are any questions please contact Rice Lake Weighing Systems for assistance.

2.1.2 Metal Free Area

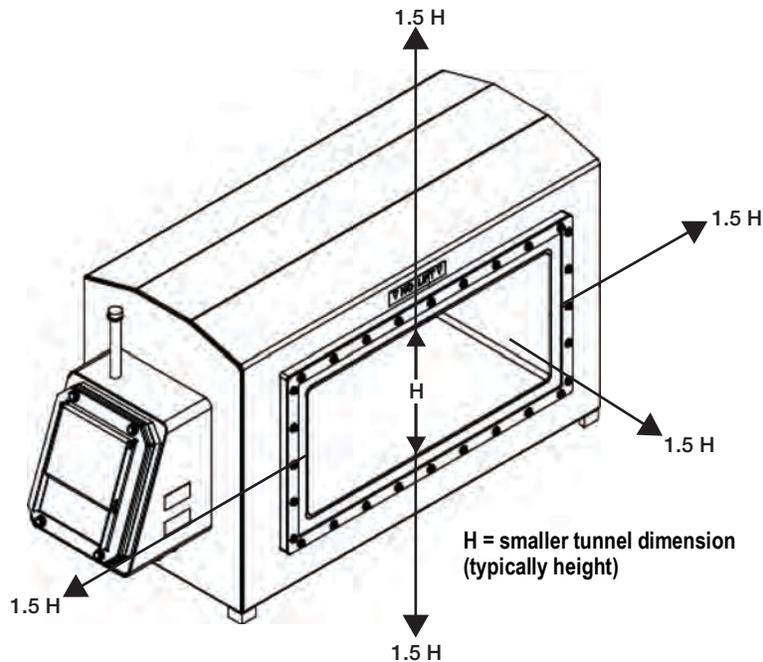


Figure 2-2. Metal Free Area

The metal detector monitors an electromagnetic field to detect metal. This field is predominantly contained within the aperture of the detector. However, some of the electromagnetic field extends out from the inlet and outlet of the aperture. This extended field causes the metal detector to be affected by metal in the vicinity of the aperture. Metal that is not part of the product stream must not be present in this area. The required metal free area depends on the size of the smaller dimension of the aperture. In most circumstances 1.5 times the smaller aperture dimension is a sufficient distance for stationary metal and 2.0 times for moving metal. Testing to determine the metal free distance will help ensure mitigation of false tripping. See [Figure 2-2](#).

2.1.3 Electrical Current Loop

The most frequent problem encountered in metal detector installations is false tripping, caused by intermittent electrical current loops. The electromagnetic field dissipates in strength with distance to a point that metal outside the “metal free” area will not cause false detections. Since the field is time varying, it will generate small electrical currents in conductive paths (metalwork) beyond the metal free area. These currents along with ground currents from nearby equipment will not cause false tripping as long as they are constant. If the current is disrupted, the resulting disturbance in the electromagnetic field may cause the metal detector to false trip.

The schematic diagram shown in [Figure 2-3](#) provides a simplified view of a typical metal detector and conveyor. The arrows represent electrical currents. The bearings supporting the pulleys and idlers turn causing them to become “make and break” contact points. Likewise, the cross-members of the conveyor framework represent possible break points. Over time, these connections can work loose or corrode and cause “make and break” connections due to vibration. The interruption or change of the current is a source of electromagnetic interference detectable by the metal detector.

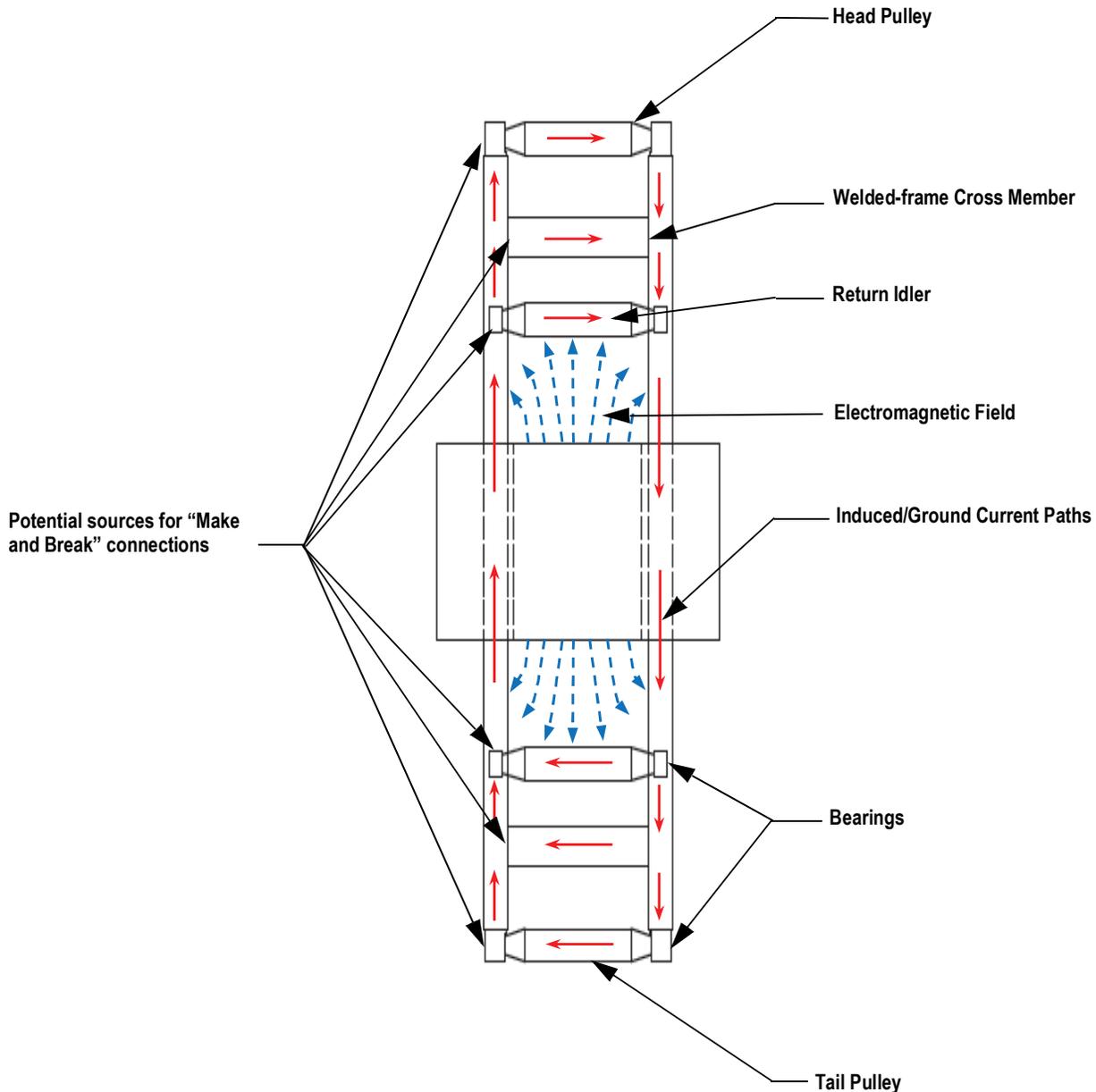


Figure 2-3. Electrical Current Loop

2.1.4 Insulating Conveyor Shafts

A continuous electrical path through pulleys and idlers cannot be assured. As a result, current changes cannot be prevented in these components. They must be electrically isolated from the rest of the system by introducing an isolating medium into the conductive path. There are three common methods to accomplish this task.

Figure 2-4 shows the method recommended by Rice Lake Weighing Systems, it is also the simplest method. It requires the bearing block on the end opposite the motor to be replaced with a plastic/non-metallic one.

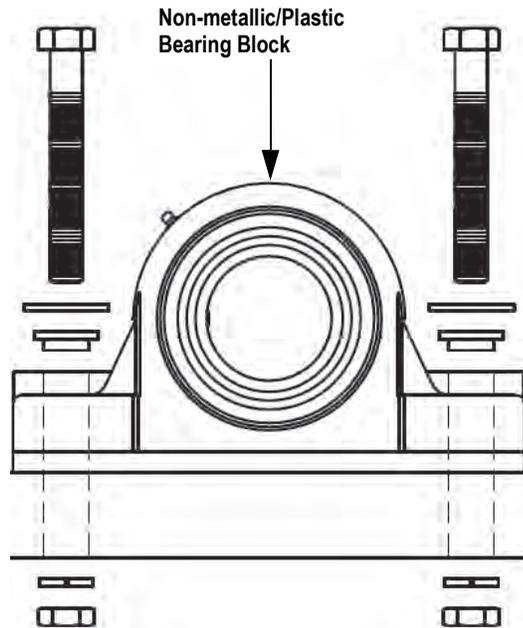


Figure 2-4. Plastic Bearing Block Method

The method shown in Figure 2-5 requires machining the end of the shaft to a smaller diameter to allow space for a nylon plastic sleeve. The outside diameter of the sleeve is the same as the inside diameter of the bearing. This sleeve breaks the electrical connection between the bearing and the shaft, thus permanently preventing current flow.

IMPORTANT

Do not cut through the sleeve when tightening the bearing set screw.

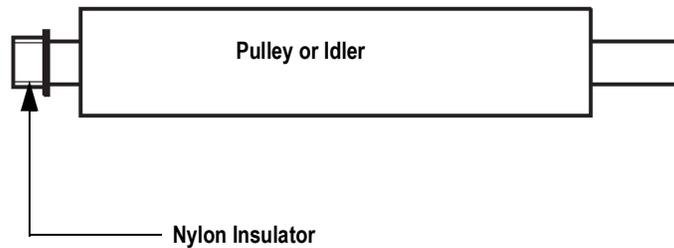


Figure 2-5. Sleeve Insulating Method

Figure 2-6 shows a method of insulating the complete bearing block from the conveyor frame. This requires drilling the bolt holes through the bearing block to a diameter large enough to accept an insulating shoulder washer. The bearing block should also be insulated from the conveyor frame with non-metallic insulators extending across the base of the block.

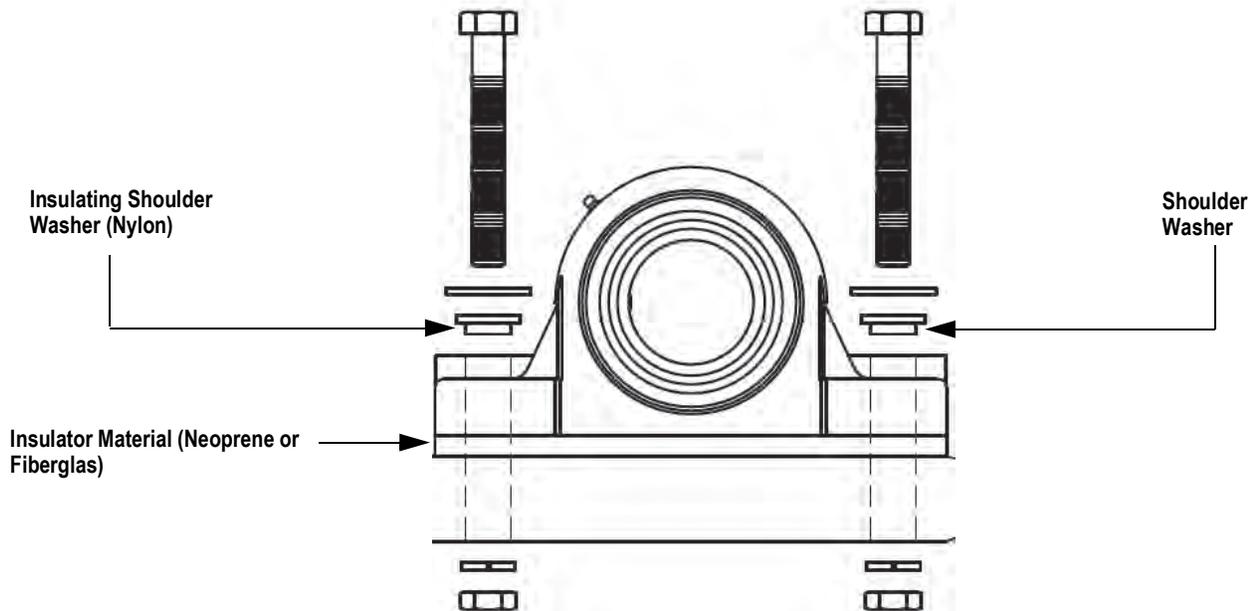


Figure 2-6. Bearing Block Insulating Method

All three insulating methods are reliable. However, it only takes a small metal shaving or burr to cut through and short-circuit the insulators. A check of the integrity of the insulation with an ohmmeter will ensure everything is correctly installed. Insulating either end of the shaft will prevent current loops but will also prevent testing with an ohmmeter. For this reason, isolating both ends during testing is recommended.

Build-up of a static electric charge on the conveyor belt can also cause false tripping. A static charge can build up on pulleys or idlers that are insulated on both ends. To prevent this build-up and subsequent false tripping, the insulation must be modified to ensure a ground. After the integrity of the insulators is checked with an ohmmeter, one end of each shaft should be electrically reconnected to the conveyor frame.

- If using the Plastic Bearing Block method (Figure 2-4 on page 8) the opposite bearing block is metallic and grounded already.
- If the Sleeve Insulating method (Figure 2-5 on page 8) has been used, the setscrew of one of the bearings should be extended to make contact with the shaft. This may require drilling a small hole through the sleeve and inserting a sharp pointed setscrew.
- If the Bearing Block Insulating method (Figure 2-6) has been used, simply remove one of the shoulder washers on one end of the shaft.

The integrity of the insulators can easily be rechecked when using any of the three methods.



Note

If a drive pulley is powered by a metal chain, it is not necessary to remove the insulators on either end of the shaft as described above. The metal drive chain will bleed off any static charge that may accumulate on the pulley. If a non-metallic drive belt is used, insulate the conveyor pulley on the side opposite the drive motor.

2.1.5 Permanent Current Loops

Permanent conduction paths (i.e. cross members) in the conveyor frame should be welded securely to provide a reliable path for any current that may be created. Bolted construction may eventually degrade and is not recommended unless designed and executed by experts in metal detector conveyor construction. Any conduction path that is to remain removable or that cannot be welded or permanently bolted must be electrically isolated from the conveyor frame.

Figure 2-7 shows a conveyor frame properly modified for a metal detector installation. Notice that possible breaks in the current paths no longer exist and the only current loops in the conveyor frame are running through a permanently welded connection. These current loops will be constant and therefore will not cause false detections.

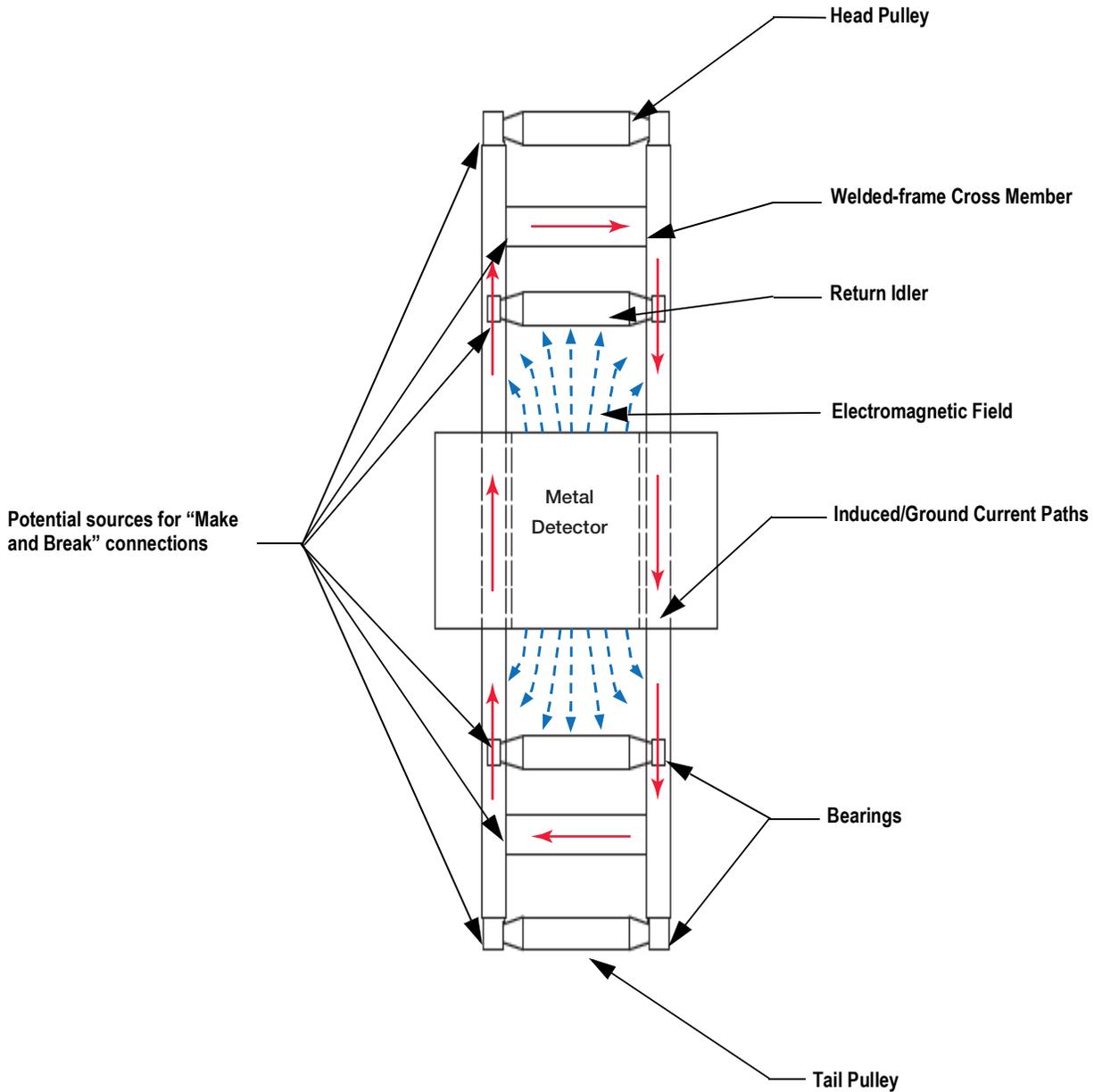


Figure 2-7. Conveyor Frame Properly Modified

2.1.6 Supporting Structure

The structure that supports the metal detector sensing head must be strong, rigid, and as free from vibration as possible. Electronically, the metal detector can be configured to ignore most vibration. Improved sensitivity can be obtained by preventing mechanical vibration from reaching the detector head.

Four insulating mounting feet are supplied with the metal detector. These mounting feet must be used to ensure proper operation (Figure 2-8). All four mounting feet must sit flat on the supporting structure. Do not draw the feet down to the structure by tightening the mounting bolts as this will put uneven stress on the sensing head shell which in turn may cause instabilities in operation. If the mounting feet do not rest flat on the supporting structure, shim with appropriate washers until supported evenly.

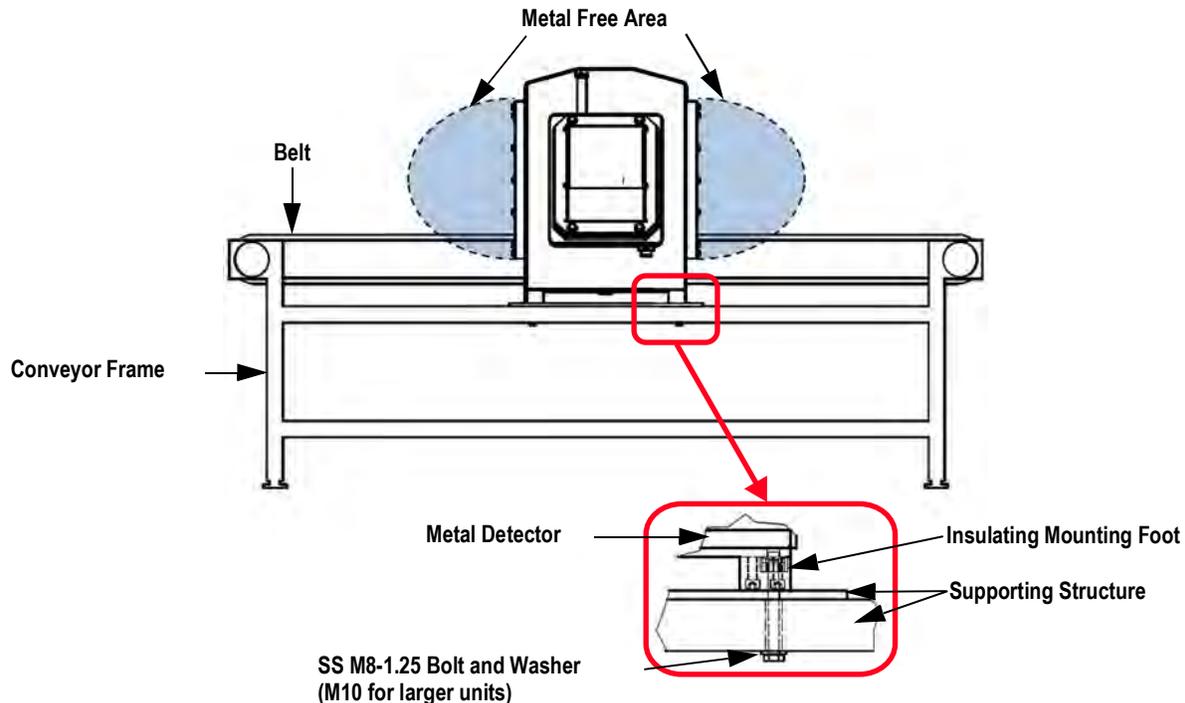


Figure 2-8. Mounting Feet

IMPORTANT

Only the insulating mounting feet and electrical connections should contact the sensing head. Conduit attached to the metal detector sensing head should utilize plastic fittings (refer to Section 2.2 on page 13).

2.1.7 Belts And Belt Splices

The metal detector's sensing head cannot be disassembled to be fitted around an endless conveyor belt. The conveyor must be designed to return the belt through the aperture, or the belt must be cut and spliced (non-metallic) back together. Splicing the belt with lacing or clamps is not recommended since foreign materials tend to collect at the joint and may eventually cause false detections.

A proven, trouble free choice for metal detector conveyor belts are modular plastic conveyor belts. RLWS recommends and uses this option as they are easily maintained and faulty sections can be changed out quickly. Conductive plastic components, belts, and metallic hinge pins or rods must be avoided. Vulcanized belt splices are the most reliable and are recommended for continuous belt applications where plastic chain cannot be used (Figure 2-9 on page 12). If the belt is single-ply, the finger splice configuration should be used. If the belt is multi-ply, a diagonal bevel or step splice configuration is recommended.

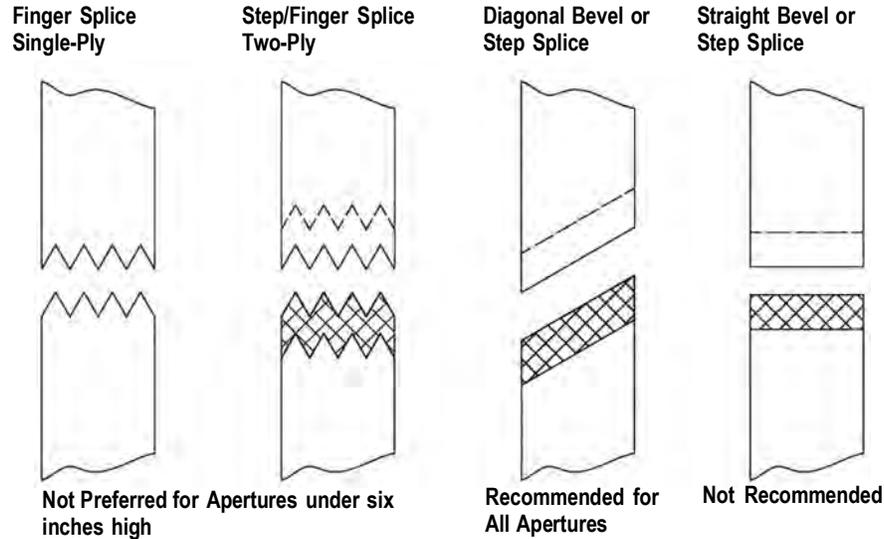


Figure 2-9. Belt Splices



Note

During all splicing it is absolutely necessary to ensure that no foreign material (especially metal) is trapped within the splice. If metal is trapped in the splice the detector will trip each time the splice passes through the aperture. Since the metal is trapped inside the splice, it cannot normally be located and removed without ruining the belt.

2.1.8 Conveyor Slider Bed

The conveyor belt must be supported as it travels through the metal detector. This is accomplished by providing a stationary slider bed which must be capable of holding the belt off the aperture liner when fully loaded. The slider bed must not touch the aperture liner.

The slider bed should be made of static-resistant non-metallic material. Anti-static UHMW and phenolic are acceptable choices. RLWS has designed and incorporated a static-dissipative food grade plastic slider bed into our standard and custom metal detector conveyor systems. Most solid plastics cannot be used because these materials tend to generate static electricity as the conveyor belt slides across. Static-resistant plastics that incorporate metallic particles cannot be used.

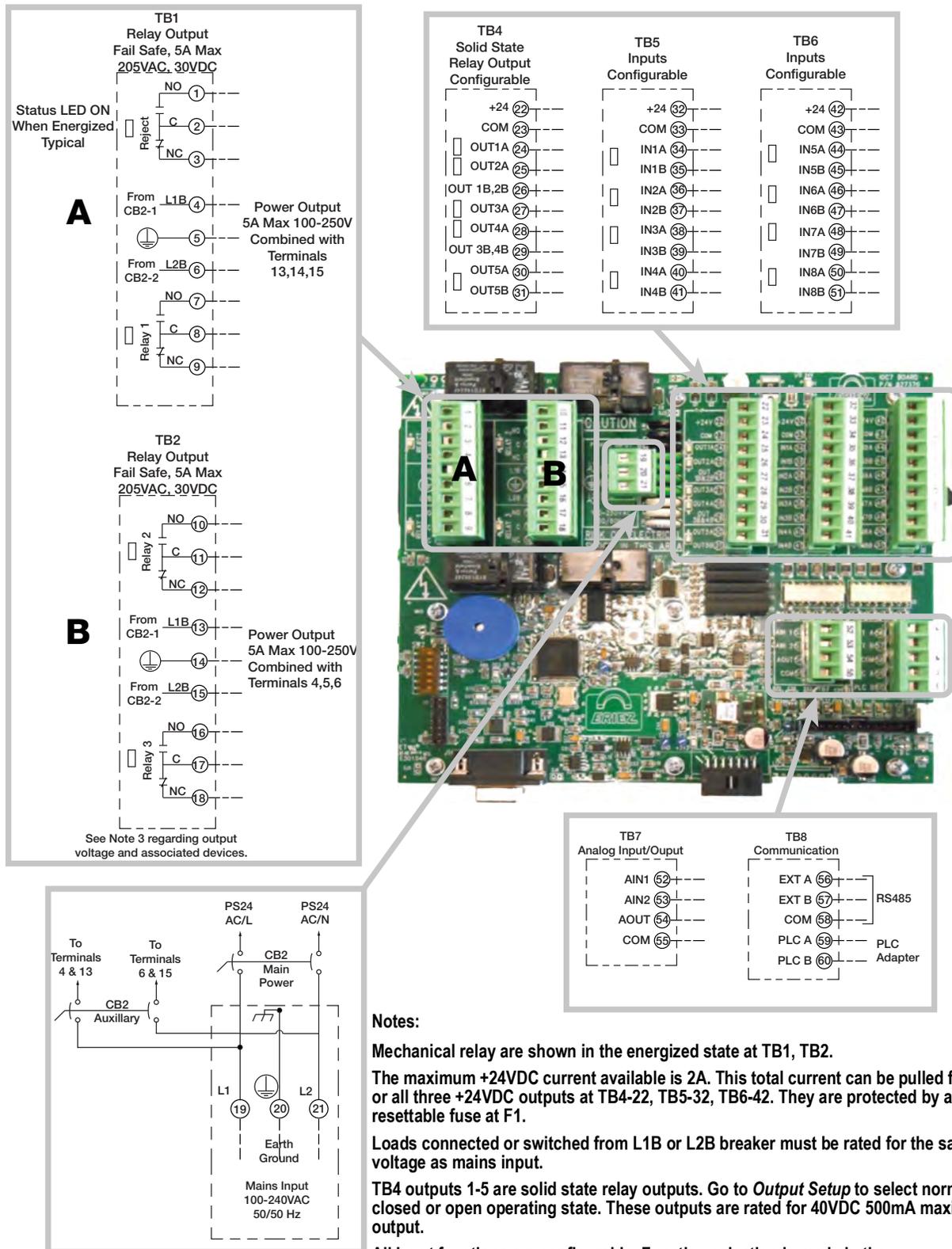
2.1.9 Product Position

The product should always be guided through the center of the aperture, both vertically and horizontally. The product must be centered regardless of the method of conveyance through the metal detector (i.e. conveyor, chute, or vertical pipe). If the same metal detector will be used to inspect multiple products with differing sizes, design the system to center the largest product in the aperture. In such a case be aware that the sensitivity of the detector to metal of a particular size and type may vary with the product position, and may require different detector settings for the different product sizes and positions in the aperture.

2.1.10 Reject Proximity Switch

A proximity switch indicates when a package is aligned with a reject device. For example, a product in a box may need to align with a reject device such as a pusher arm. Reliable rejection requires that the proximity switch indicate when the alignment is achieved. The normal position for the proximity switch is before the reject device. The metal detector incorporates a timer capable of delaying the output until the product aligns with the reject device. Be certain not to infringe on the required detector “metal-free” area when choosing the location of the proximity switch.

2.2 Electrical Installation



A

B

A

B

Notes:

- Mechanical relay are shown in the energized state at TB1, TB2.**
- The maximum +24VDC current available is 2A. This total current can be pulled from one or all three +24VDC outputs at TB4-22, TB5-32, TB6-42. They are protected by a resettable fuse at F1.**
- Loads connected or switched from L1B or L2B breaker must be rated for the same voltage as mains input.**
- TB4 outputs 1-5 are solid state relay outputs. Go to *Output Setup* to select normally closed or open operating state. These outputs are rated for 40VDC 500mA maximum output.**
- All Input functions are configurable. Function selection is made in the *Input Setup* section.**

Protective Conductor

Figure 2-10. Terminal Connections



The light indicators on the Information Tower are configurable via the "Output Configuration" Screen. (shown is default configuration)

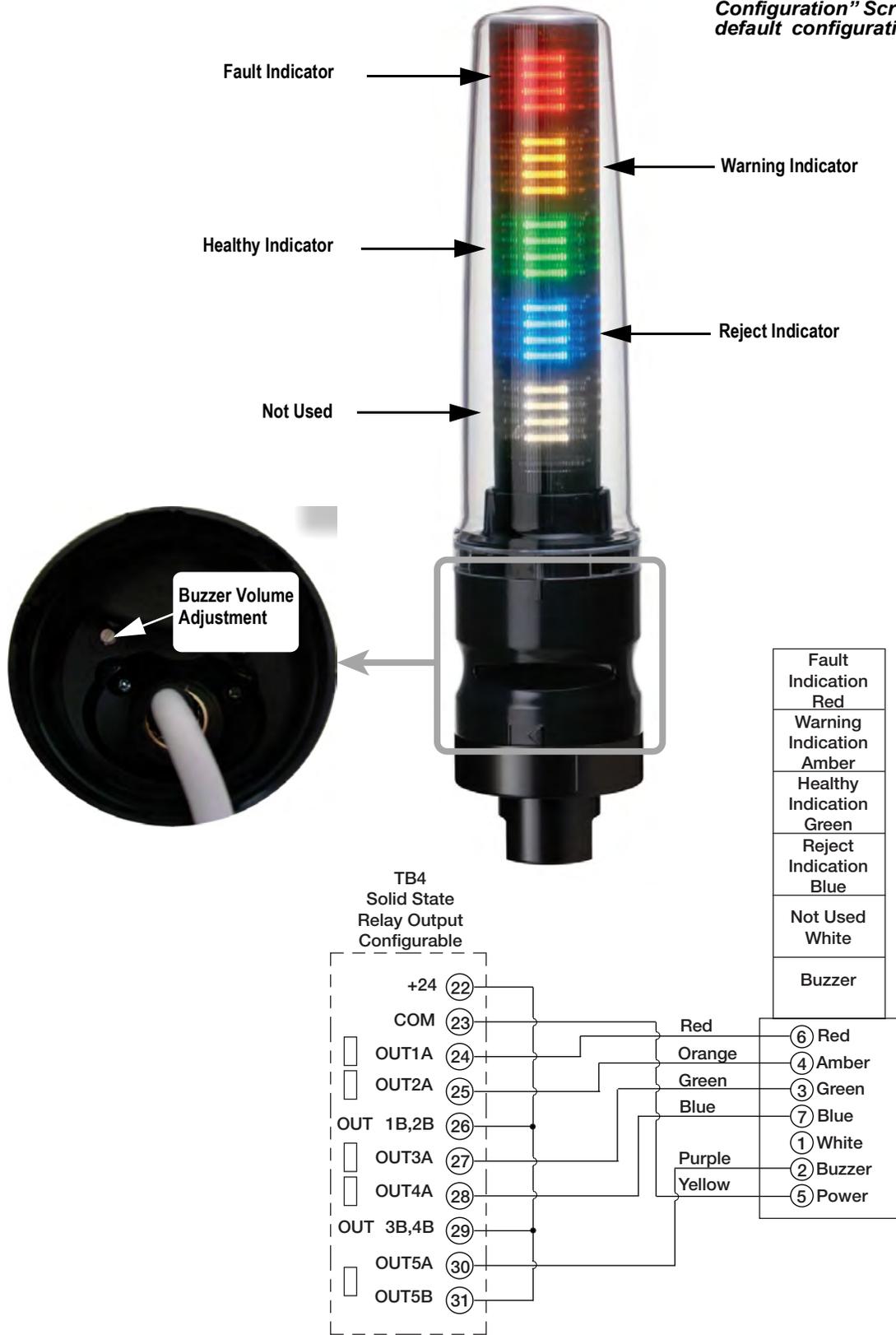


Figure 2-11. Information Tower

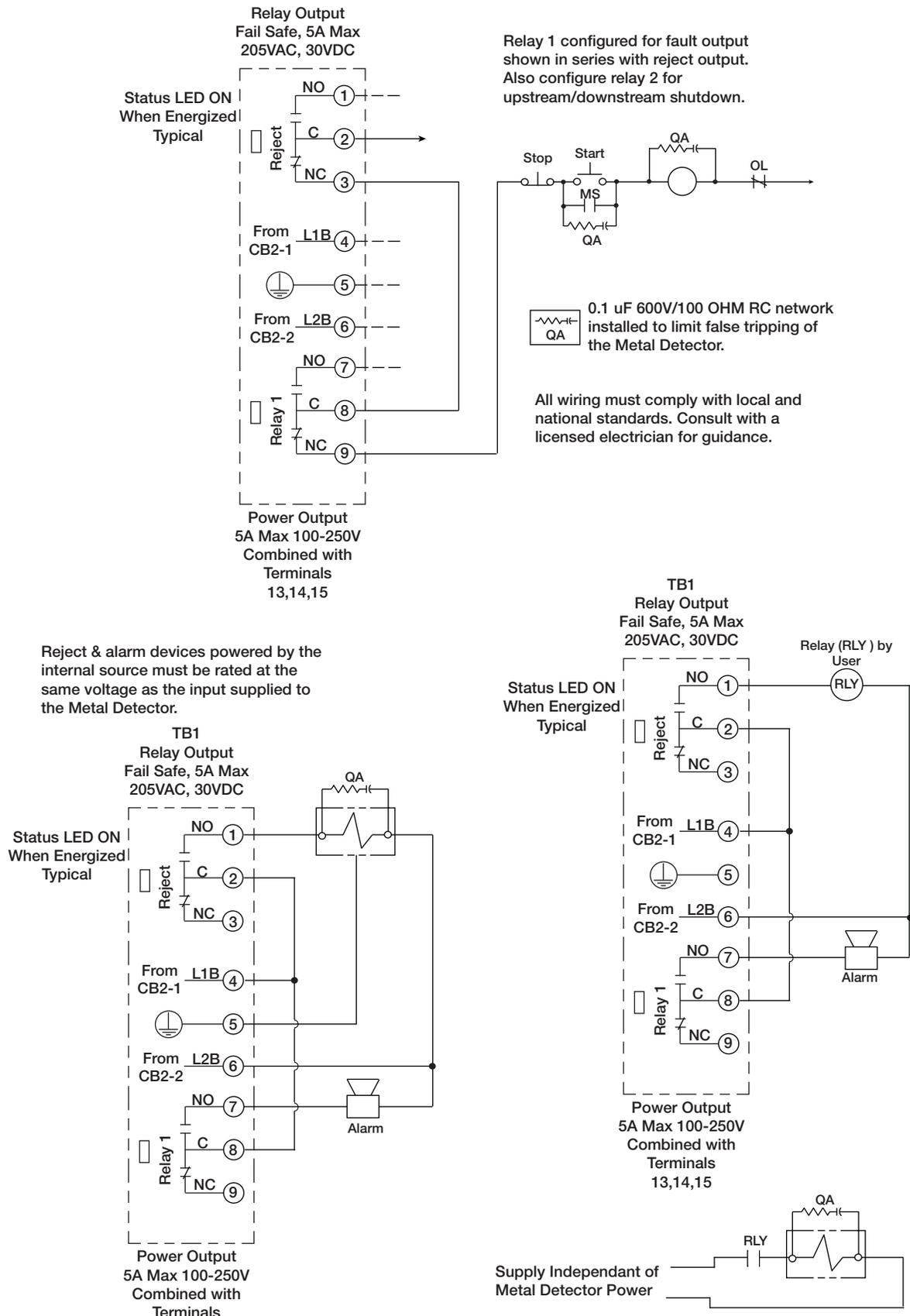


Figure 2-12. Input Connection Samples

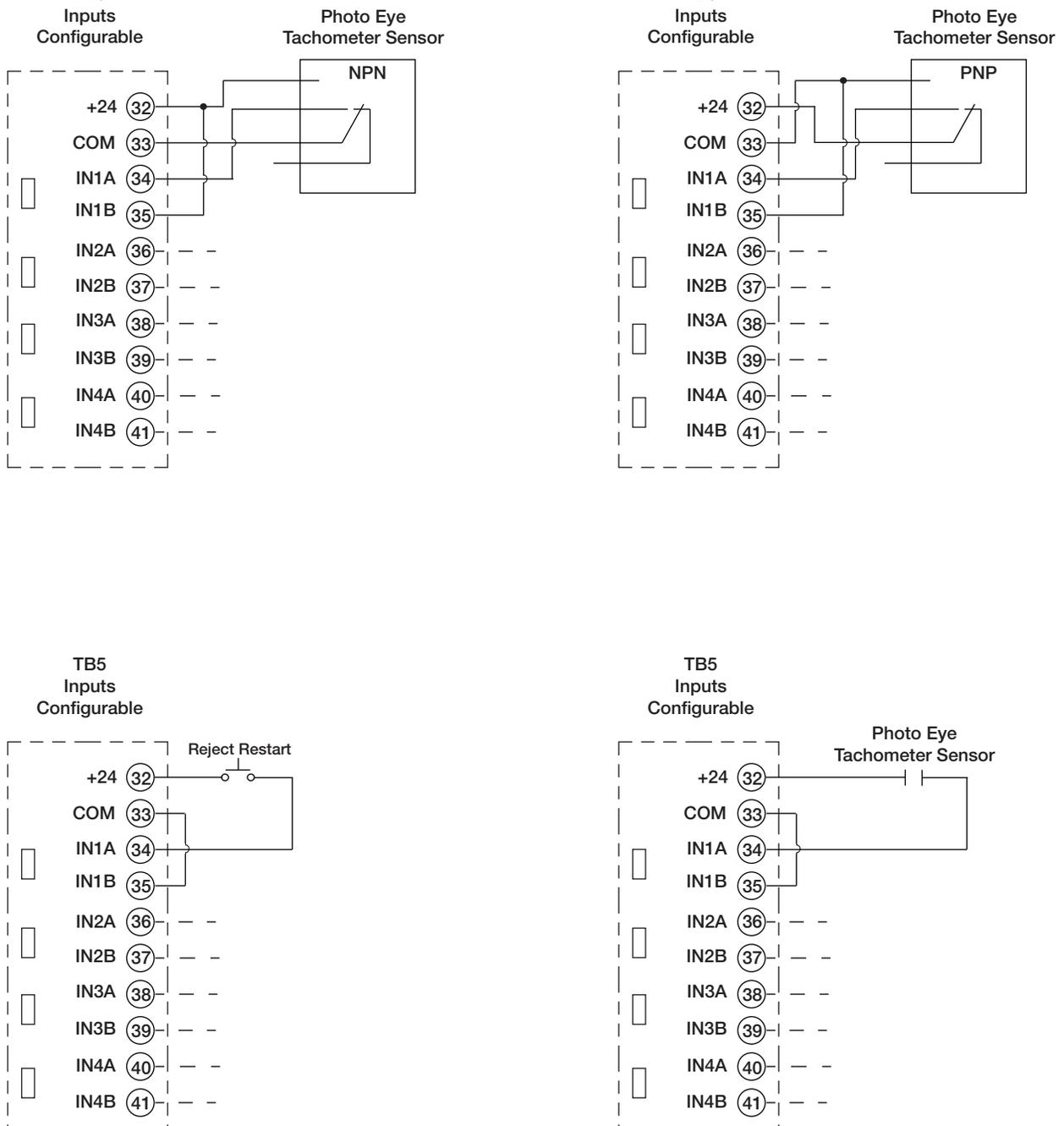


Figure 2-13. Input Connectors

2.2.1 Introduction

All electrical connections are made within the control enclosure. [Figure 2-10 on page 13](#) shows the *IOC PCB* and the electrical connections to the circuit board. Connections are pull-apart terminal blocks, this feature allows the connections to be made outside the enclosure and snapped back in place. [Figure 2-12](#) and [2-13](#) show example connections for input/output devices and power connections to the metal detector.

2.2.2 Choice of Input Power Source

The wiring from the main supply panel to the metal detector should be a minimum of 14 AWG and should include a dedicated earth ground wire for safety and proper operation of the metal detector. The power wiring should be run in a dedicated conduit. The best insurance against electrical noise and false tripping is to run a separate circuit to the metal detector from the main power bus. This circuit should be free of all loads except the metal detector. If this is impractical, reliable operation can often be obtained by powering the metal detector from a “clean” lighting or instrument circuit. This circuit must be free of inductive loads such as motors, solenoids, and motor starters.



Note

If the metal detector must be powered by a less favorable source, a constant voltage transformer with harmonic neutralization can be used to eliminate or reduce false tripping caused by line noise. This transformer should be mounted within 3-5 feet (1 to 1.5 meters) of the metal detector.

The power source is connected to terminals L1 and L2. L1 and L2 are connected through auxiliary circuit breaker 2 to terminals L1B and L2B on the circuit board. These terminals are intended to be conveniently available to the user to power various pieces of auxiliary equipment. The circuit breaker has limited capacity as indicated in the specifications. If a piece of auxiliary equipment requires power in excess of the circuit breaker capacity, the auxiliary equipment must be controlled from an intervening relay and powered from a separate source. The metal detector power source must contain a reliable ground (earth) connection. It must be connected to the protective earth terminal of the metal detector.

The metal detector should be grounded at one point through the power supply ground wire. No other ground connections are permitted including mounting hardware and conduit.

Main Circuit Breaker 1 protects the metal detector electronics. It is located on the right side of the control door inside the control housing.

The metal detector is equipped with electronic filter circuits to reduce incoming electrical noise. Inductive loads sharing the same power circuit usually create noise. Although there are filters, there is a limit to what the metal detector can withstand without false tripping.



WARNING

L1B and L2B are not disconnected by Main Circuit Breaker 1. They are disconnected by Auxiliary Circuit Breaker 2.

An external disconnect switch labeled “Metal Detector” should be installed near the metal detector to allow for interruption of the power to the metal detector for service or installation. In 240 VAC systems this switch should interrupt both sides of the line. This switch should include a provision to lockout the switch for service and maintenance. Failure to follow these precautions may result in serious injury or death.

2.2.3 Output Relays

The IQ plus 710 has four mechanical and five solid state relays for a total of nine programmable outputs, each with one set of contacts.

There are four programmable “Form C” (NO-C-NC) output relays rated at 5A up to 250 VAC or 30 VDC each. These relays are wired as fail-safe. If the power at L1B and L2B is used to power the relays, its maximum available current is 5A and the voltage will be equal to that applied at L1 and L2 on TB3. Power at L1B and L2B passes through Auxiliary Circuit Breaker 2, which is located on the left side of the control door. Connect to L1B and L2B only if the voltage and current ratings are compatible with the auxiliary device to be used.

Reject (Relay K1) has one set of “Form C” (NO-C-NC) contacts. It is located at terminals 1, 2, and 3 on TB1. “Reject” is the primary reject device output. “Reject” must run via Reject Timer 1 or Overhead A-B when used. All reject log information is based on Reject Timer 1 only. Reject Timer is controlled using the “Reject Setup” screen which is found on the Running Product Settings page.

Relay 1 (Relay K3) has one set of “Form C” (NO-C-NC) contacts. It is located at terminals 7, 8, and 9 on TB1.

Relay 2 (Relay K2) has one set of “Form C” (NO-C-NC) contacts. It is located at terminals 10, 11, and 12 on TB2.

Relay 3 (Relay K4) has one set of “Form C” (NO-C-NC) contacts. It is located at terminals 16, 17, and 18 on TB2.

There are five programmable “Form A” (SPST-NO) solid state relays each rated at 500mA up to 40 VDC. These relays can be wired as NPN or PNP. The output can be set to NO or NC under normal running conditions. If +24V is used to power the relays the maximum current available is 2A. This current rating is controlled by a resettable fuse (F1). Only connect +24V if the voltage and current ratings are compatible with the auxiliary device being used.

Out 1 (Relay K9) has one set of “Form A” (SPST-NO) contacts. It is located at terminals 24 and 26 on TB4.

Out 2 (Relay K8) has one set of “Form A” (SPST-NO) contacts. It is located at terminals 25 and 26 on TB4.

Out 3 (Relay K7) has one set of “Form A” (SPST-NO) contacts. It is located at terminals 27 and 29 on TB4.

Out 4 (Relay K6) has one set of “Form A” (SPST-NO) contacts. It is located at terminals 28 and 29 on TB4.

Out 5 (Relay K5) has one set of “Form A” (SPST-NO) contacts. It is located at terminals 30 and 31 on TB4.

Relay 1 - Relay 3 and Out 1 - Out 5 are fully programmable and may use any of 8 reject timers or Overhead A-B. They can also be used as a fault or warning output. Relay 1- Relay 3 and Out 1- Out 5 are controlled using the *Reject Setup* screen see .

Relay Notes

If switched power is needed for an external device in excess of the 5A 240VAC source or the 2A 24VDC source, it must be supplied from an external source using an auxiliary relay. The voltage and ampere ratings for devices switched by the relays should not exceed the relay ratings.

Tachometer Input Applications having variable speed product flow and requiring automatic reject timing use this input. A tachometer is used to allow the metal detector control to monitor product speed, and reject according to the distance the product has traveled rather than according to elapsed time since detection. Electrical requirements are listed in the Specifications Section.

Proximity Switch The metal detector can also be used to scan and automatically reject packages. In this application a proximity switch is used to sense the location of the package so it can be reliably rejected. The device can be a mechanical switch, photo-eye, or any other device that is capable of precisely locating the package.

Electrical requirements are the same as the Tachometer input which is listed in the Specifications Section.



Terminals 22, 33, and 43 of this input are DC common. Since the metal detector is grounded only by the input power supply ground, this terminal must not be connected to earth ground by the proximity device.

Reject Confirmation

The reject confirmation input is used to monitor the function of the reject device. It is usually a limit switch attached to the reject device that indicates it is functioning. If for example you were using a pusher bar, the reject confirmation switch would be wired to the reject confirmation input and positioned in such a way that it closes as the pusher bar reaches maximum extension.

Electrical requirements are the same as the Tachometer input which is listed in the Specifications Section.



Terminals 22, 33, and 43 of this input are DC common. Since the metal detector is grounded only by the input power supply ground, this terminal must not be connected to earth ground by the Reject Confirmation device.

Reject Reset

The metal detector has eight reject timers. Each timer has the option of being set to either manual or automatic reset mode. Manual Reject Reset is typically used for a stop belt reject. When a timer is set to manual reject reset and a rejection occurs, a password protected button will appear at the bottom center of the screen to reset the metal detector. Another option is to wire a reject reset button to one of the eight input connections to reset the timer. Typically a momentary push-button switch is used for this purpose. The logic can be set to either NO or NC and the specific input selected. When either manual reset is performed all reject times that are set to manual reset will be reset.

The electrical specifications are as follows:

Voltage:

Logic 0: 0 to 0.9VDC

Logic 1: 10 to 30VDC

Current: 20mA

Conduit

Wiring to and from the metal detector should be routed through conduit. High voltage wiring for the power supply and reject devices should not be located in the same conduit as low power sensor wiring (i.e. tachometer and reset switch). Keep all metal detector wiring separate from electrical supplies carrying heavy or switched loads. This is especially important for variable speed motor control wiring. Interference from electrical noise can be greatly decreased by following these guidelines.

The use of metal conduit has the potential to create a ground path unless plastic fittings are used to attach the conduit to the metal detector housing. Always use a plastic fitting for this purpose to avoid potential false trips.

Power Switch

The on-off circuit breakers/switches located inside the control enclosure are intended to be a service convenience only. It is recommended that the metal detector remain ON at all times to provide optimum performance. This also enhances the longevity of the electronic components.

Hole plugs On the bottom of the control there are six conduit entry holes. Five of these holes have Type (NEMA) 4X rated plugs installed at the factory. The sixth hole has a plastic plug installed. The plastic plug must be removed and if any other plugs are removed they shall be replaced with a Type (NEMA) 4X non-metal conduit fitting.

In order to maintain the Type (NEMA) 4X rating the plugs must be installed properly. Once installed and snug, turn the wing nut one and one-half turns or more to compress the rubber gasket. Visually check to ensure the gasket is compressed.

3.0 Menus and Display Screens

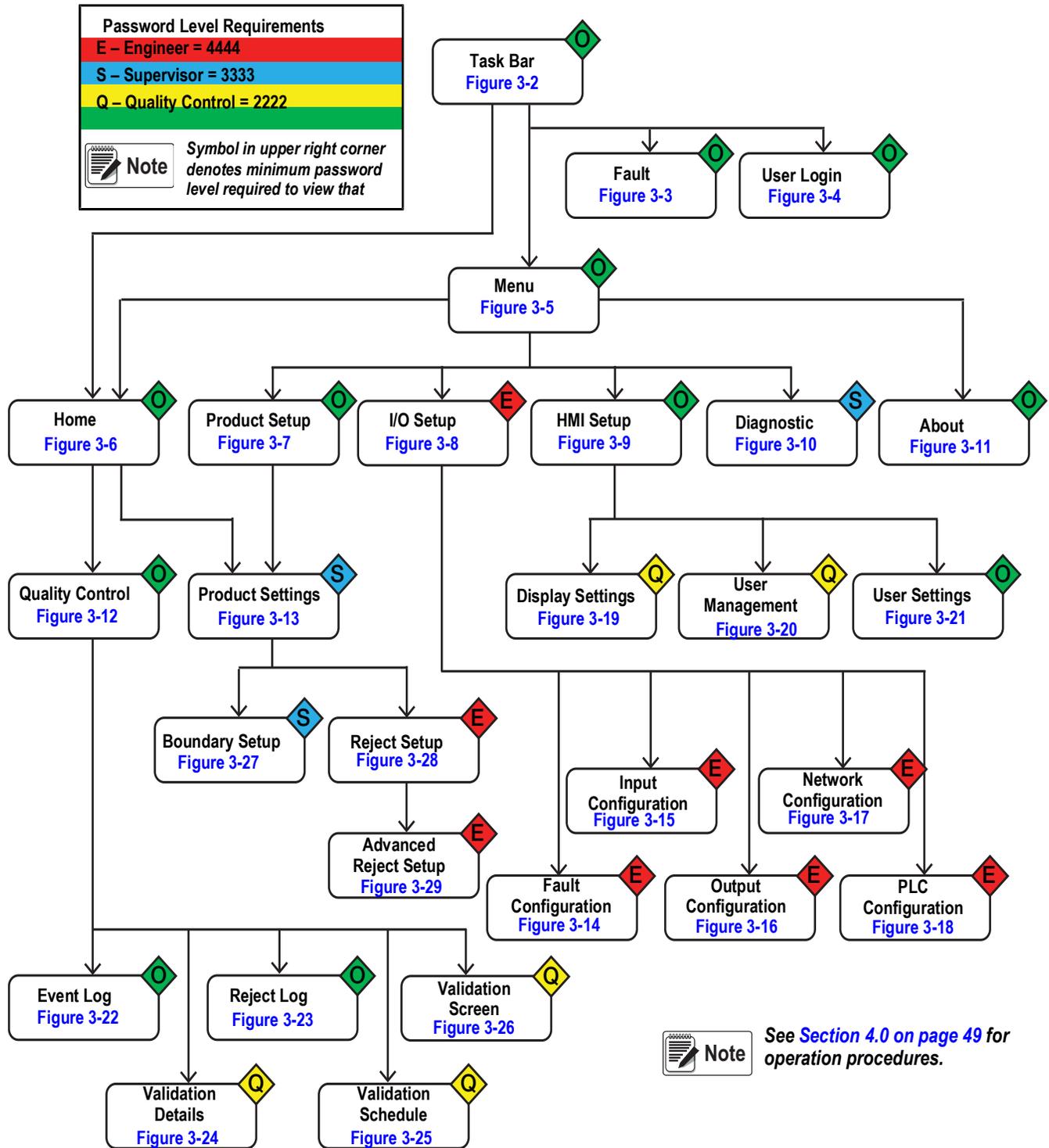
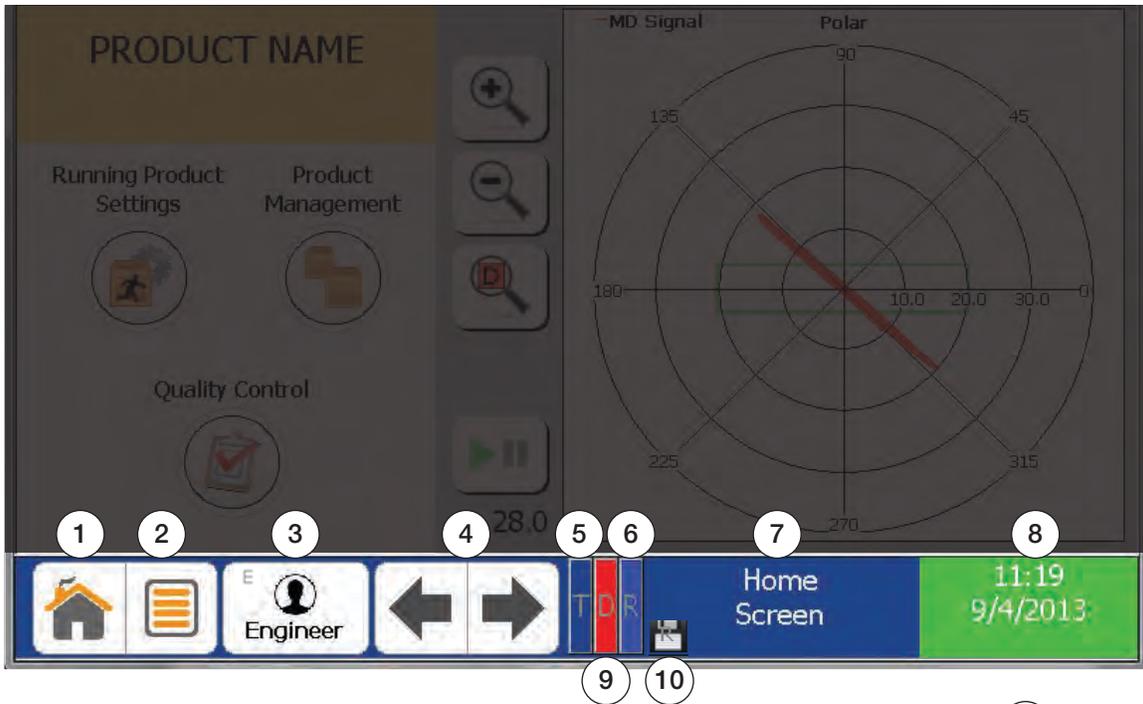


Figure 3-1. Menu Map



Note The Task Bar is accessible from all screens.

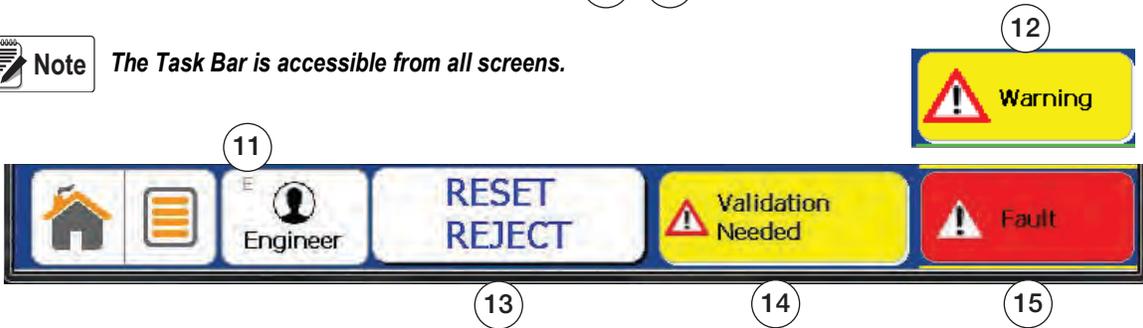


Figure 3-2. Task Bar

| Item No. | Parameter | Description |
|----------|-------------------|---|
| 1 | Home | Return to home screen. See Figure 3-6 on page 25 |
| 2 | Menu | Displays Menu Screen. See Figure 3-5 on page 24 |
| 3 | Login Level/User | User Login. See Figure 3-4 on page 23 |
| 4 | Forward/Back | Scroll through choices |
| 5 | Touch Screen | Indicates the touch screen is depressed |
| 6 | Reject | Indicates detector is in reject mode. |
| 7 | Current Screen | Indicates the name of current screen displayed |
| 8 | Time and Date | Set time and date. See Figure 3-19 on page 38 |
| 9 | Detect | Indicates Detect mode is on |
| 10 | Write File | Indicate detector is writing to a file |
| 11 | User level | Indicates User Login Level |
| 12 | Warning | Indicates Warning (overlays Time and Date). See Figure 3-3 on page 22 |
| 13 | Reset Reject | Manual Reset Reject Button (Overlays Current Screen Name). See Figure 3-29 on page 48 |
| 14 | Validation Needed | Indicates a Validation Check is needed. See Figure 3-26 on page 45 |
| 15 | Fault | Fault indicator. (Overlays Current Screen Name) |

Table 3-1. Task Bar Parameters

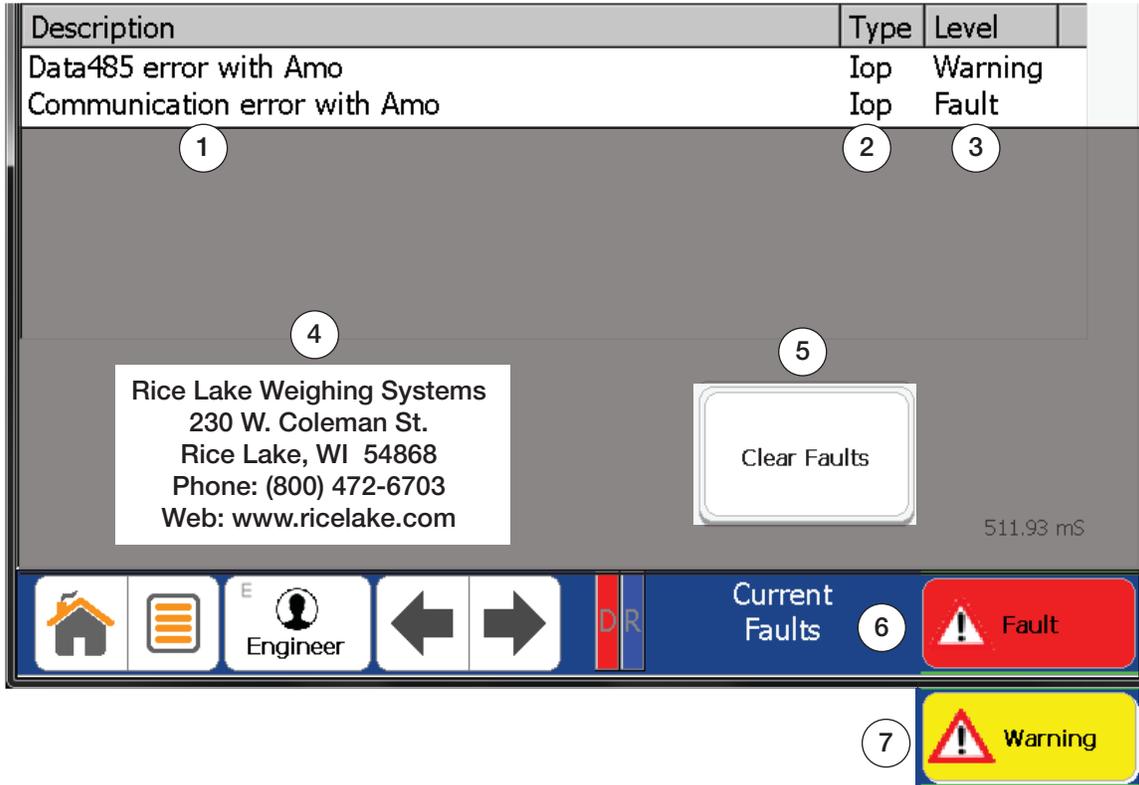


Figure 3-3. Current Faults

| Item No. | Parameter | Description |
|----------|---------------------|--|
| 1 | Fault Description | Describes active fault |
| 2 | Fault Type | Indicates what type of fault has occurred |
| 3 | Fault Level | Level where the fault occurred. See Figure 3-14 on page 33 |
| 4 | Contact Information | Rice Lake Weighing Systems contact information |
| 5 | Clear Faults | Clear current faults. Requires <i>Engineer Level</i> |
| 6 | Fault | Fault indicator. (Overlays Current Screen Name) |
| 7 | Warning | Indicates Warning (overlays Time and Date) |

Table 3-2. Current Fault Parameters



Note If a Fault and Warning have both occurred the Fault Indicator will take precedence over the Warning Indicator

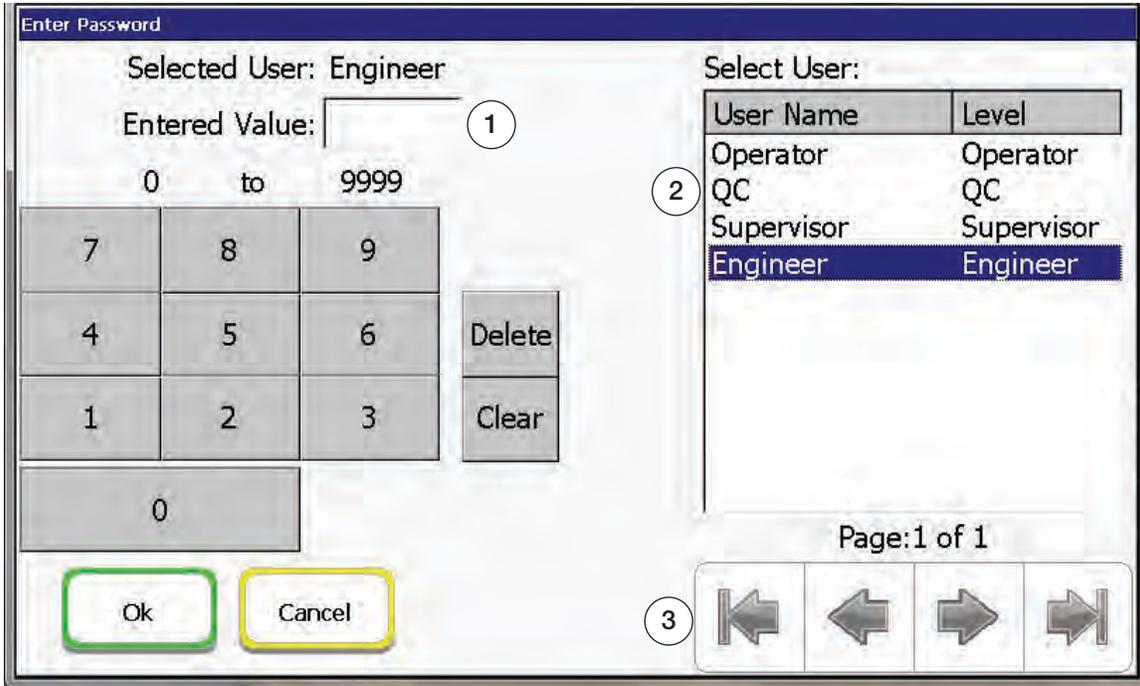


Figure 3-4. Input User Password

| Item No. | Parameter | Description |
|----------|--------------|--|
| 1 | Enter Value | Enter a password, maximum 4 digit |
| 2 | Select User | Select a displayed user. See for other options |
| 3 | Forward/Back | Scroll for additional user name pages |

Table 3-3. Input User Password Parameters



Note Entering an incorrect password will revert you to the View level, which has no user functionality.

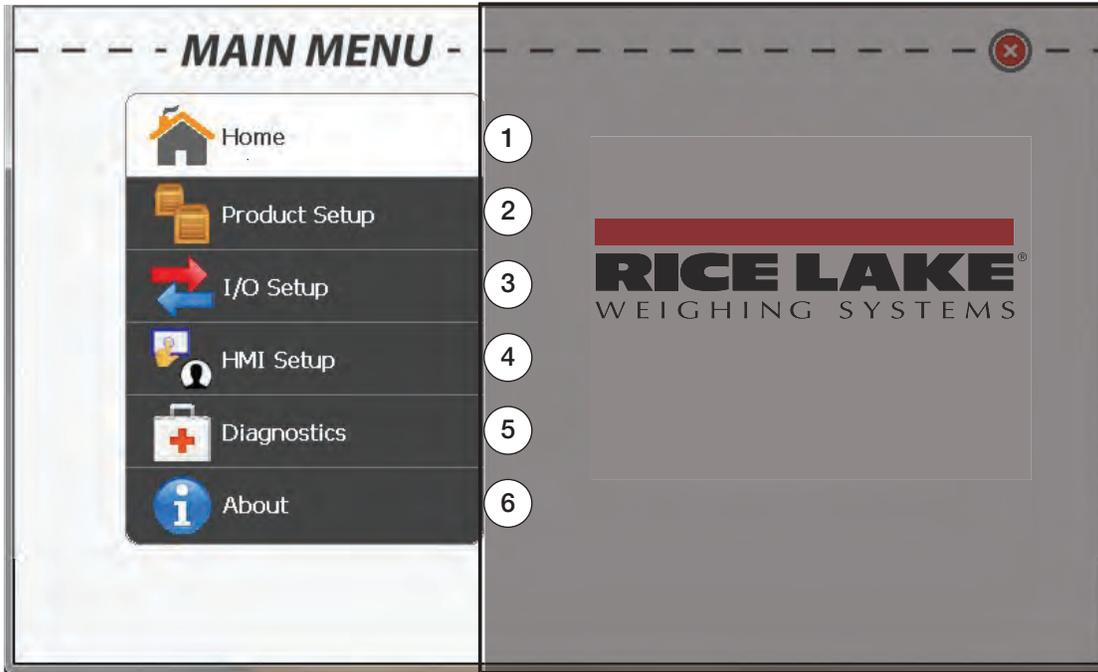


Figure 3-5. Main Menu

| Item No. | Parameter | Description |
|----------|---------------|---|
| 1 | Home | Displays graphing features and commonly used functions. See Figure 3-6 on page 25 |
| 2 | Product Setup | Adds/deletes/modifies products and selects <i>Running Product</i> . See Figure 3-7 on page 26 |
| 3 | I/O Setup | Configures faults, inputs, outputs, and network. Requires <i>Engineer Level</i> to View. See Figure 3-8 on page 27 |
| 4 | HMI Setup | Modifies display and user login options. See Figure 3-9 on page 28 |
| 5 | Diagnostics | Displays circuit board diagnostic information. Requires <i>Supervisor Level</i> or more to view. See Figure 3-10 on page 29 |
| 6 | About | Display software versions. See Figure 3-11 on page 30 |

Table 3-4. Main Menu Parameters



Note *The Main Menu is accessible from most screens.*

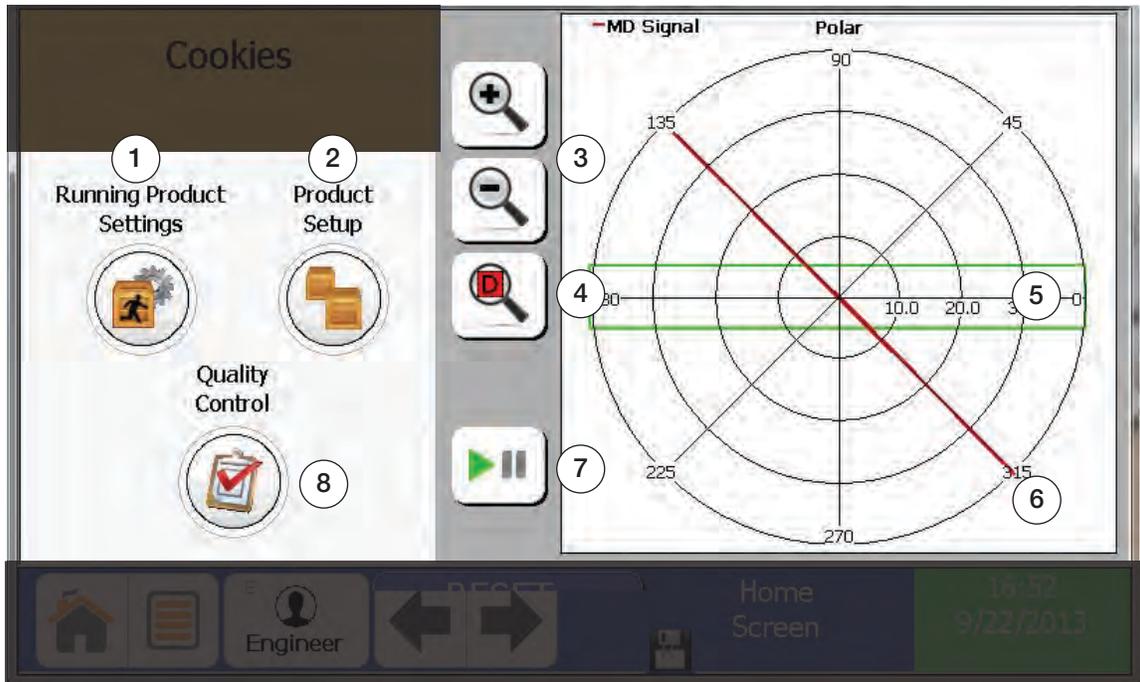


Figure 3-6. Home Screen

| Item No. | Parameter | Description |
|----------|--------------------------|---|
| 1 | Running Product Settings | View and edit boundary, reject setup, beltspeed, frequency. Requires Supervisor Level or higher to view |
| 2 | Product Setup | Adds, deletes and modifies products. Selects <i>Running Products</i> |
| 3 | Zoom In/Out | Zooms screen in or out |
| 4 | Zoom D | Zooms to product or boundary setting |
| 5 | Boundary Box | Green box indicates boundary |
| 6 | Product Signal | Red line indicates product signal |
| 7 | Start/Pause | Starts and pauses live graphing feature |
| 8 | Quality Control | View Event/Reject log and validation information |

Table 3-5. Home Screen Parameters



Note This is the default screen when the detector is initially turned on.



Figure 3-7. Product Setup

| Item No. | Parameter | Description |
|----------|--------------------|---|
| 1 | Running Product | Indicates product is running |
| 2 | Product Selection | Make current selection the running product |
| 3 | New Product Wizard | Runs the <i>New Product Wizard</i> |
| 4 | Copy Product | Makes an exact copy of selected product |
| 5 | Delete Product | Deletes selected product. Requires <i>Engineer Level</i> to view |
| 6 | Edit Product | Allows editing of product name and setup. Requires <i>Supervisor Level</i> or higher to view. |
| 7 | Backup/Restore | Performs backup of systems files and restores product settings. Requires <i>Engineer Level</i> to view |

Table 3-6. Product Setup Parameters

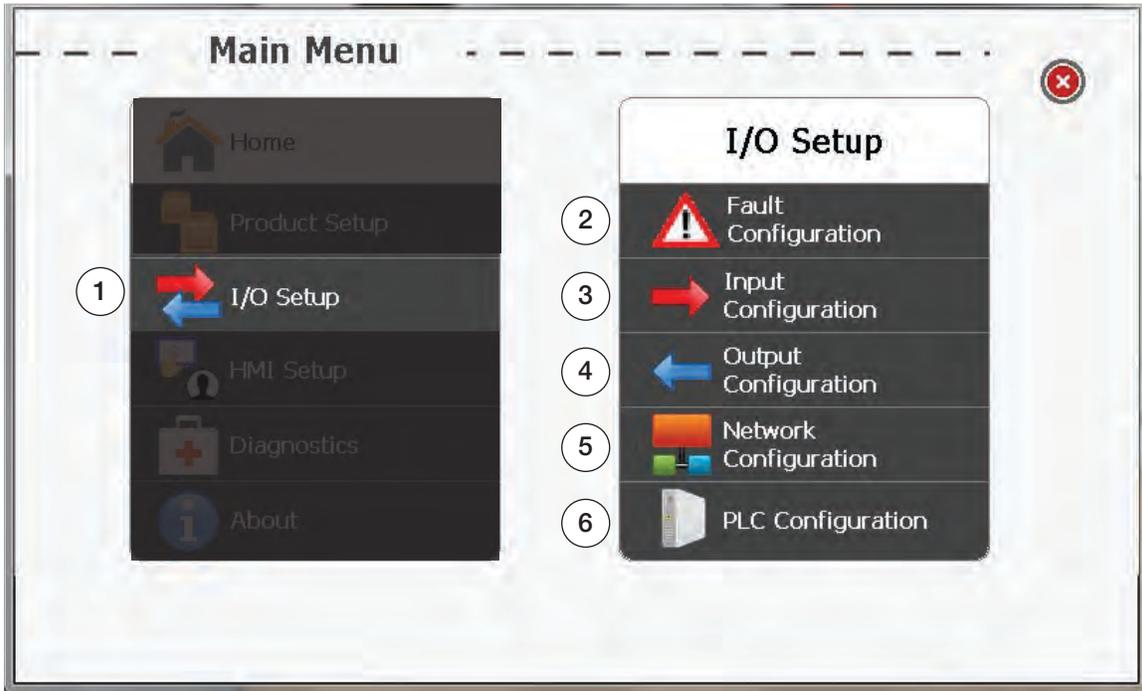


Figure 3-8. I/O Setup

| Item No. | Parameter | Description |
|----------|-----------------------|---|
| 1 | I/O Setup | Displays the submenu |
| 2 | Fault Configuration | Allows enable/disable of faults and selection of priority level |
| 3 | Input Configuration | Setup input devices |
| 4 | Output Configuration | Setup output devices |
| 5 | Network Configuration | Set network settings |
| 6 | PLC Configuration | Set PLC settings |

Table 3-7. I/O Setup Parameters



Note This screen requires Engineer Level to review.

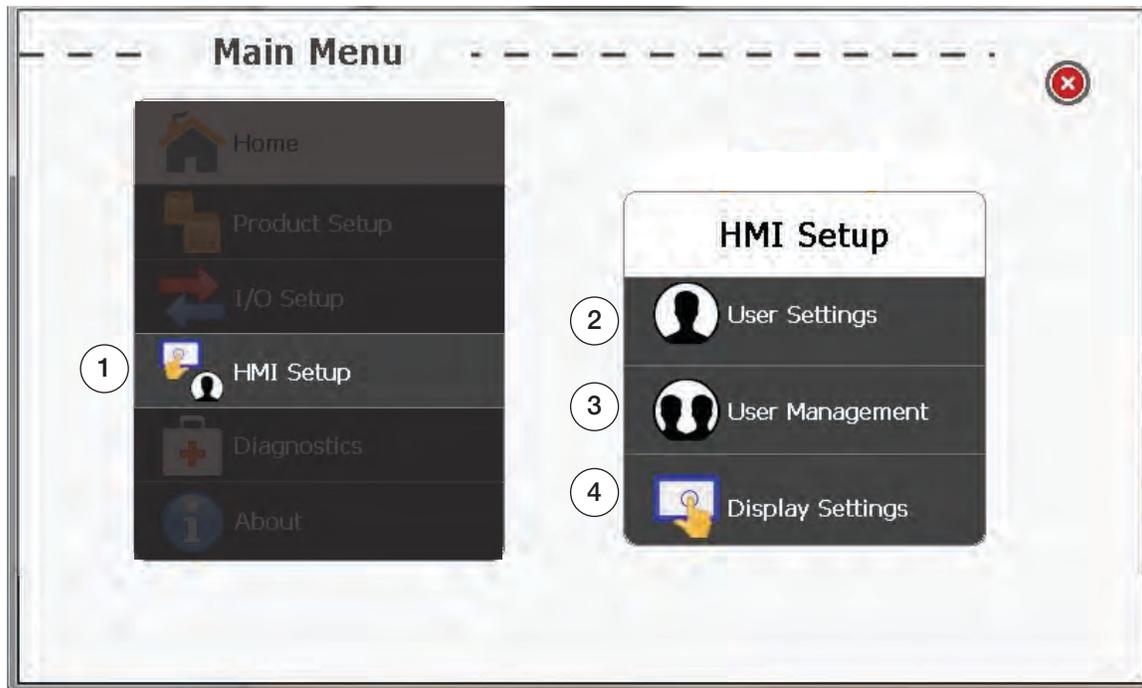


Figure 3-9. HMI Setup

| Item No. | Parameter | Description |
|----------|------------------|---|
| 1 | HMI Setup | Displays the HMI submenu |
| 2 | User Settings | Allows password change |
| 3 | User Management | Add, delete and change users. Requires QC Level or higher to view. |
| 4 | Display Settings | Adjust Time/Date, screen brightness and password timeout. Requires QC Level or higher to view. |

Table 3-8. HMI Setup Parameters

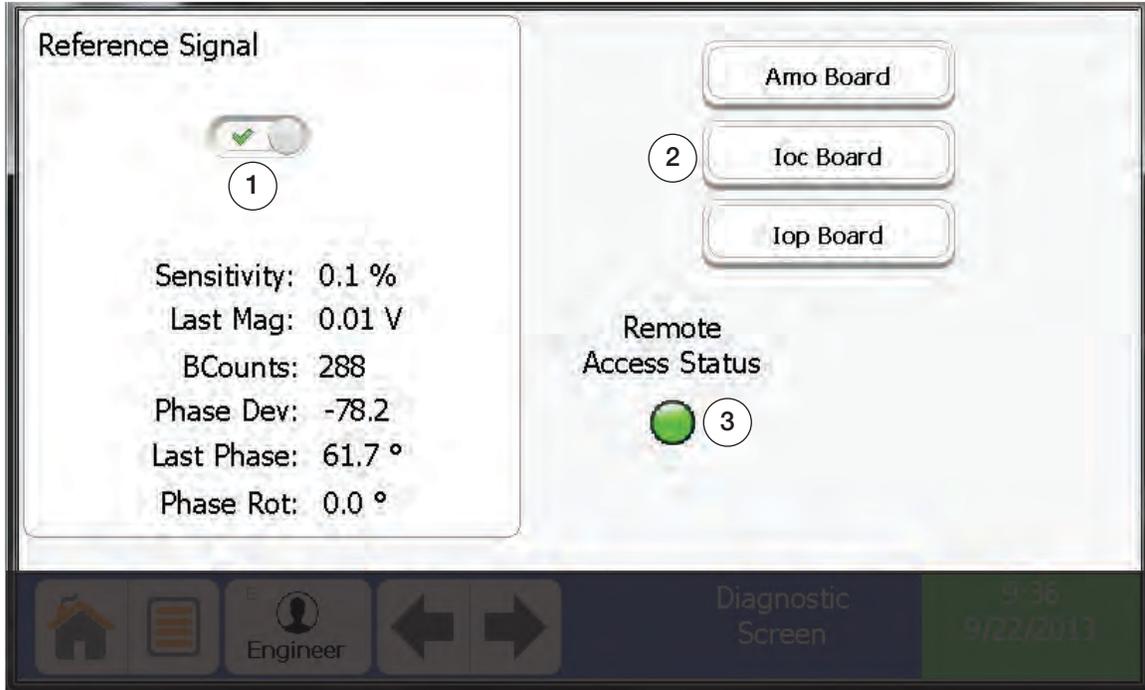


Figure 3-10. Diagnostic Screen

| Item No. | Parameter | Description |
|----------|----------------------|--|
| 1 | Reference Signal | Troubleshooting feature for use with Factory Technician. Default is ON |
| 2 | Ioc Board | Troubleshooting feature for use with Factory Technician |
| 3 | Remote Access Status | Green Light indicates remote support option is available |

Table 3-9. Diagnostic Parameters



Note

Remote Support capability requires that a static IP Address be assigned to the Metal Detector and a Secure Gateway (Purchased Separately) be connected to your LAN.

This screen requires at least "Supervisor Level" to view.

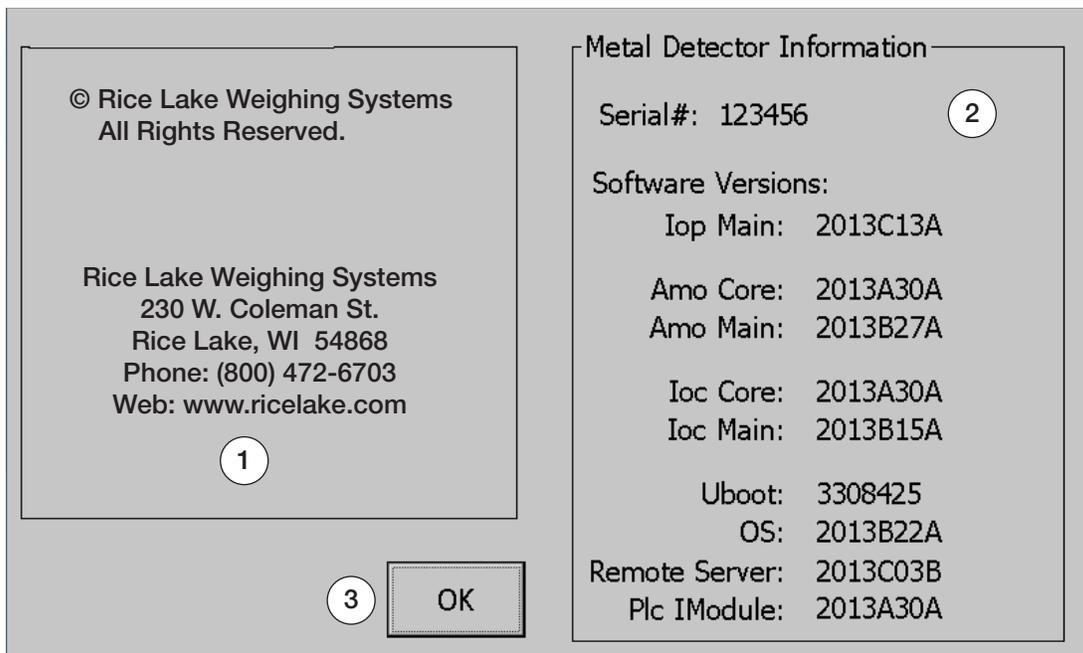


Figure 3-11. About Screen

| Item No. | Parameter | Description |
|----------|----------------------------|--|
| 1 | Contact Information | Rice Lake Weighing Systems Contact Information |
| 2 | Metal Detector Information | Displays current software versions and serial number |
| 3 | OK | Returns to the main menu |

Table 3-10. About Screen Parameters

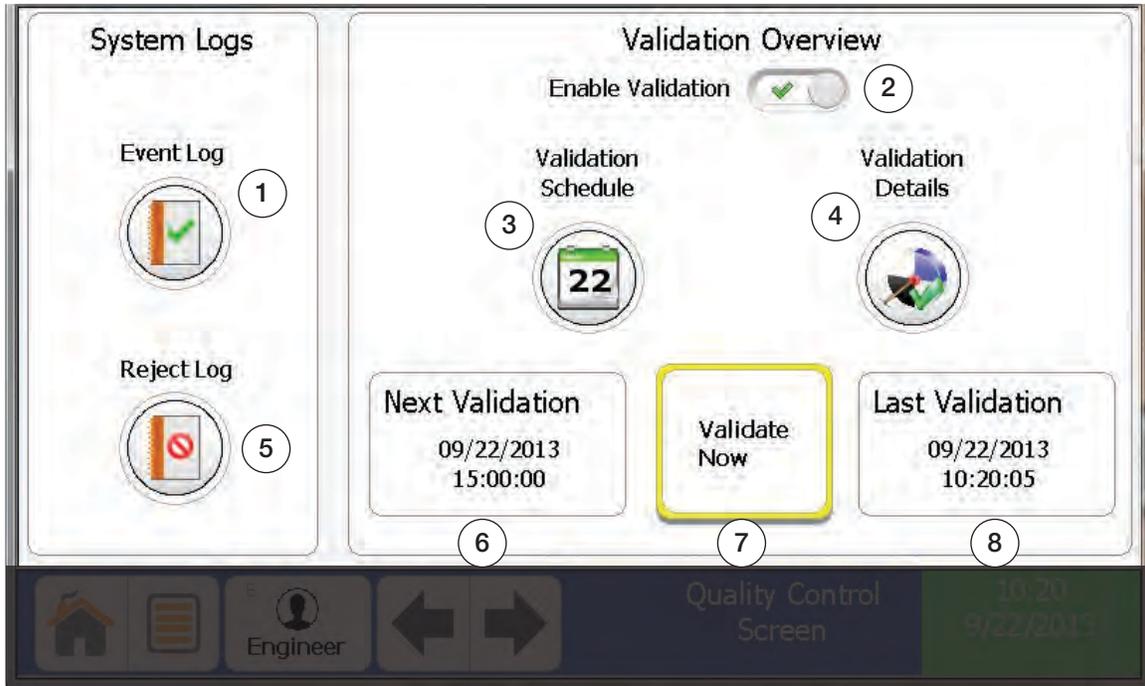


Figure 3-12. Quality Control Screen

| Item No. | Parameter | Description |
|----------|---------------------|--|
| 1 | Event Log | View event log |
| 2 | Enable Validation | Displays validation overview information when enabled. |
| 3 | Validation Schedule | Enter validation scheduling. See Figure 3-25 on page 44 |
| 4 | Validation Details | Enter validation details. Requires a QC Level or higher. See Figure 3-24 on page 43 |
| 5 | Reject Log | View reject log |
| 6 | Next Validation | Displays the next scheduled validation |
| 7 | Validate Now | Initiates validation test. Requires a QC Level or higher. See Figure 3-26 on page 45 |
| 8 | Last Validation | Displays the last validation time and date |

Table 3-11. Quality Control Parameters



Note The validation window opens the set number of minutes prior to the next validation check and closes at the time when the validation check is overdue. A warning will be displayed when the window opens and a fault when it closes if the validation check was not completed.

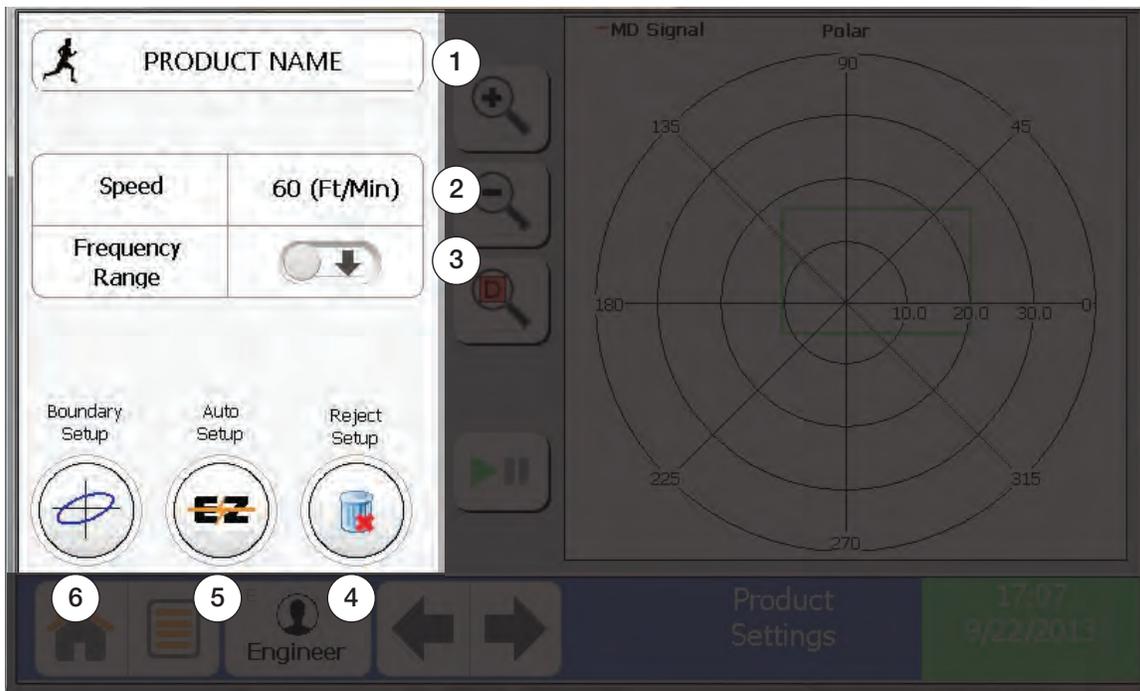


Figure 3-13. Product Setting Screen

| Item No. | Parameter | Description |
|----------|-----------------|--|
| 1 | Product Name | Edit Product Name |
| 2 | Speed | Enter belt speed |
| 3 | Frequency Range | Selects frequency |
| 4 | Reject Setup | Setup reject devices and timing |
| 5 | Auto Setup | Performs auto setup of boundary |
| 6 | Boundary Setup | Allows manual editing of boundary settings |

Table 3-12. Product Setting Parameters



Note

This screen requires at least Supervisor Level to view. Some features of this page require Engineer Level.

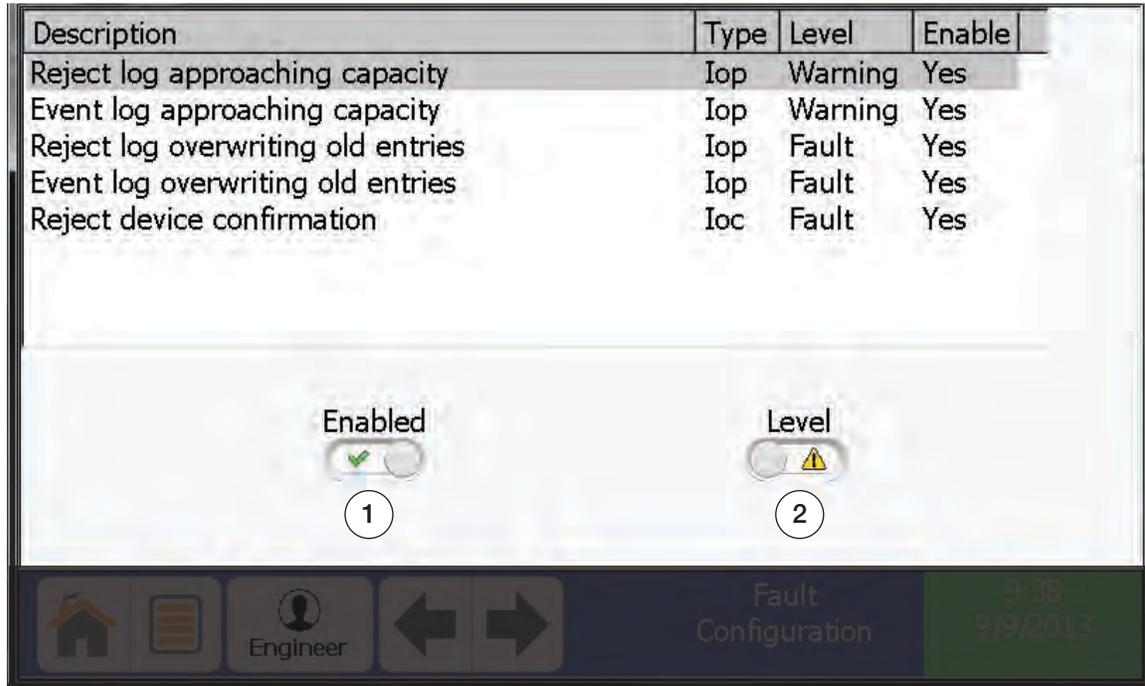


Figure 3-14. Fault Configuration Screen

| Item No. | Parameter | Description |
|----------|-----------|--|
| 1 | Enabled | Enable/Disable Notifications |
| 2 | Level | Set notification level (warning/fault) |

Table 3-13. Fault Configuration Parameters



Note If a Fault and Warning have both occurred the Fault Indicator will take precedence over the Warning Indicator. This screen requires Engineer Level to view.

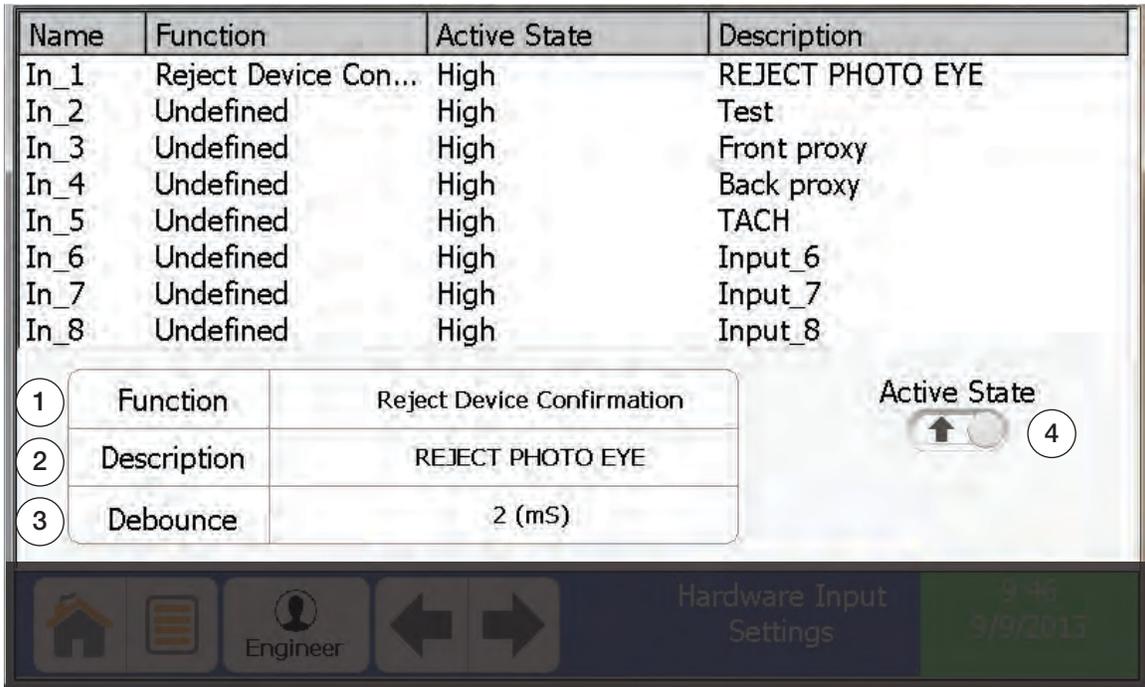


Figure 3-15. Input Configuration Screen

| Item No. | Parameter | Description |
|----------|--------------|------------------------|
| 1 | Function | Selects input function |
| 2 | Description | Edit input description |
| 3 | Debounce | Edit debounce timing |
| 4 | Active State | Select active low/high |

Table 3-14. Input Configuration Parameters



Note This screen requires Engineer Level to view.

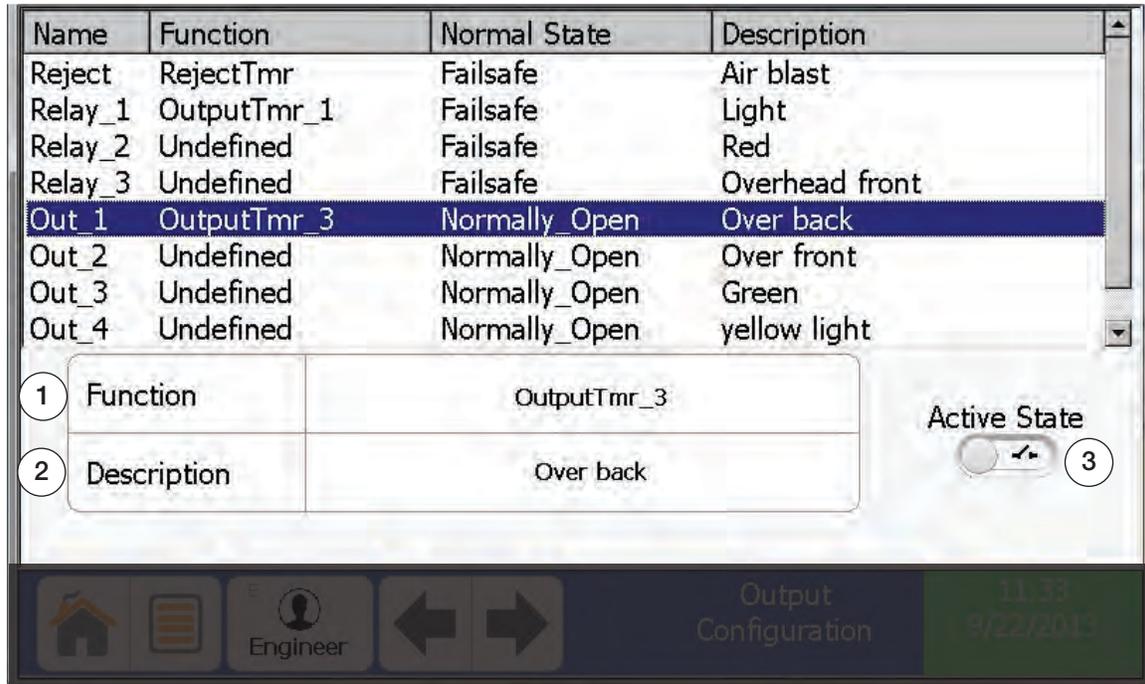


Figure 3-16. Output Configuration Screen

| Item No. | Parameter | Description |
|----------|--------------|---|
| 1 | Function | Selects output timer or fault warning |
| 2 | Description | Edit output description |
| 3 | Active State | Select normally open or normally closed |

Table 3-15. Output Configuration Parameters

**Note**

Reject functionality is limited to Reject Timer or Overhead A-B.

This screen requires Engineer Level to view.



Figure 3-17. Network Configuration Screen

| Item No. | Parameter | Description |
|----------|------------|-----------------------------|
| 1 | Gateway | Edit Gateway |
| 2 | IPAdr | Edit static IP Address |
| 3 | SubnetMask | Edit subnet mask |
| 4 | Update | Applies changes to settings |

Table 3-16. Network Configuration Parameters



Note This screen requires *Engineer Level* to view.

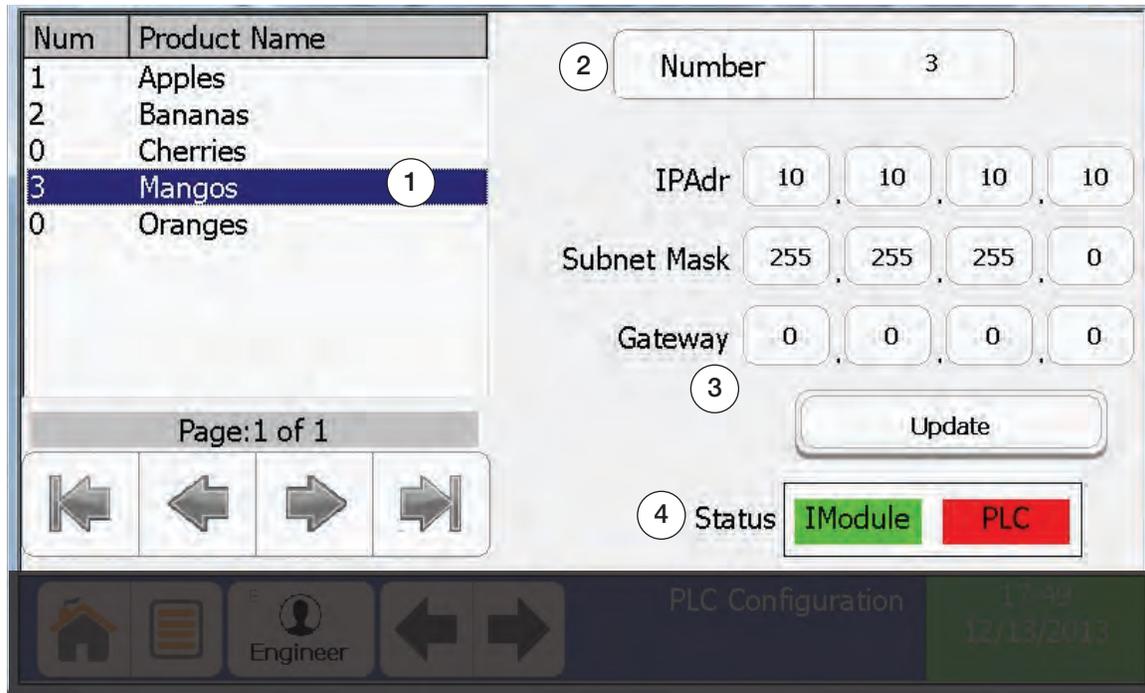


Figure 3-18. PLC Configuration Screen

| Item No. | Parameter | Description |
|----------|----------------|--|
| 1 | Select Product | Select product to edit number for PLC use |
| 2 | Number | Edit product number |
| 3 | PLC Networking | Edits PLC networking settings and updates to take effect |
| 4 | Status | Connection status of I/O Module and PLC. Red = not connected Green = connected |

Table 3-17. PLC Configuration Parameters



Note This screen requires *Engineer Level* to view.

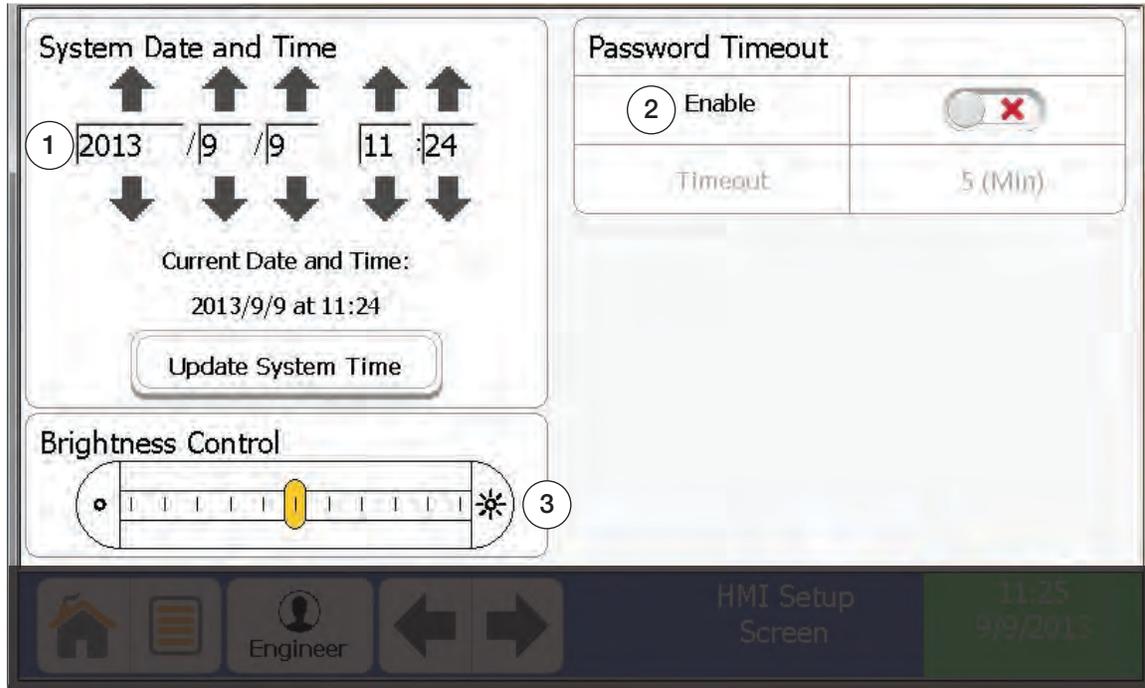


Figure 3-19. Display Settings Screen

| Item No. | Parameter | Description |
|----------|----------------------|---|
| 1 | System Date and Time | Edit date and time |
| 2 | Password Timeout | Enables/disables password timeout feature |
| 3 | Brightness Control | Adjusts screen brightness |

Table 3-18. Display Setting Parameters



Note Time is set using 24 hour clock (military time).
This screen requires QC Level or higher to view.

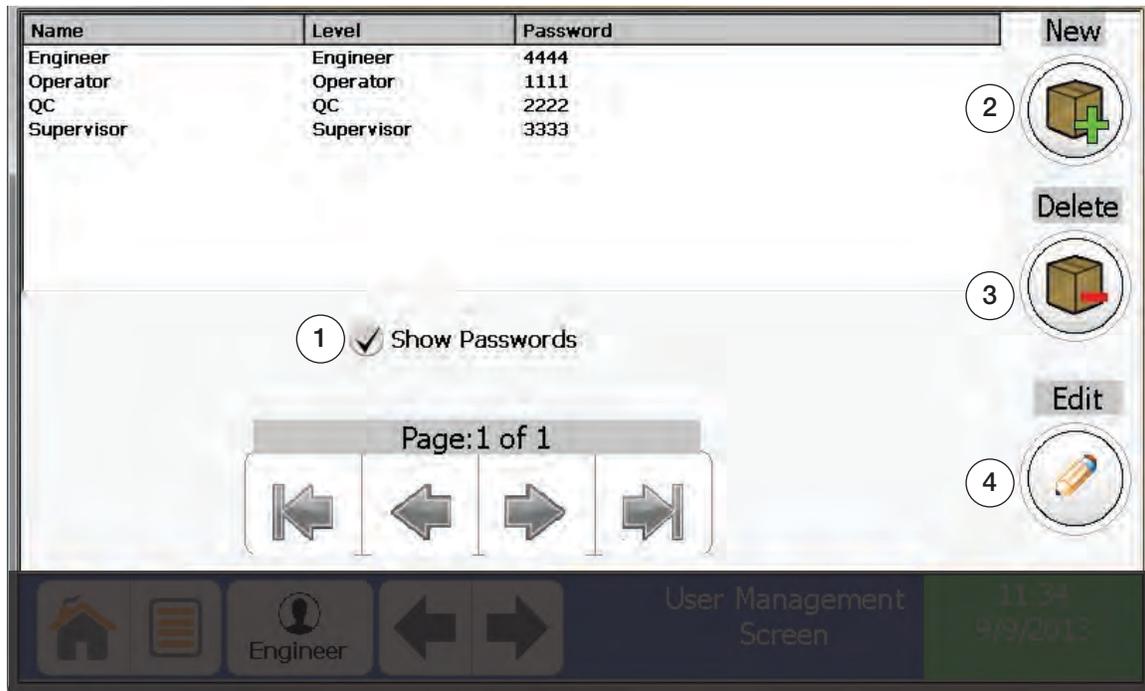


Figure 3-20. User Management Screen

| Item No. | Parameter | Description |
|----------|----------------|----------------------------------|
| 1 | Show Passwords | Displays passwords when checked. |
| 2 | New | Create a new user |
| 3 | Delete | Delete a user |
| 4 | Edit | Edit user |

Table 3-19. User Management Parameters



**Users can only be edited, deleted or created at current management level and below.
This screen requires QC Level or higher to view.**

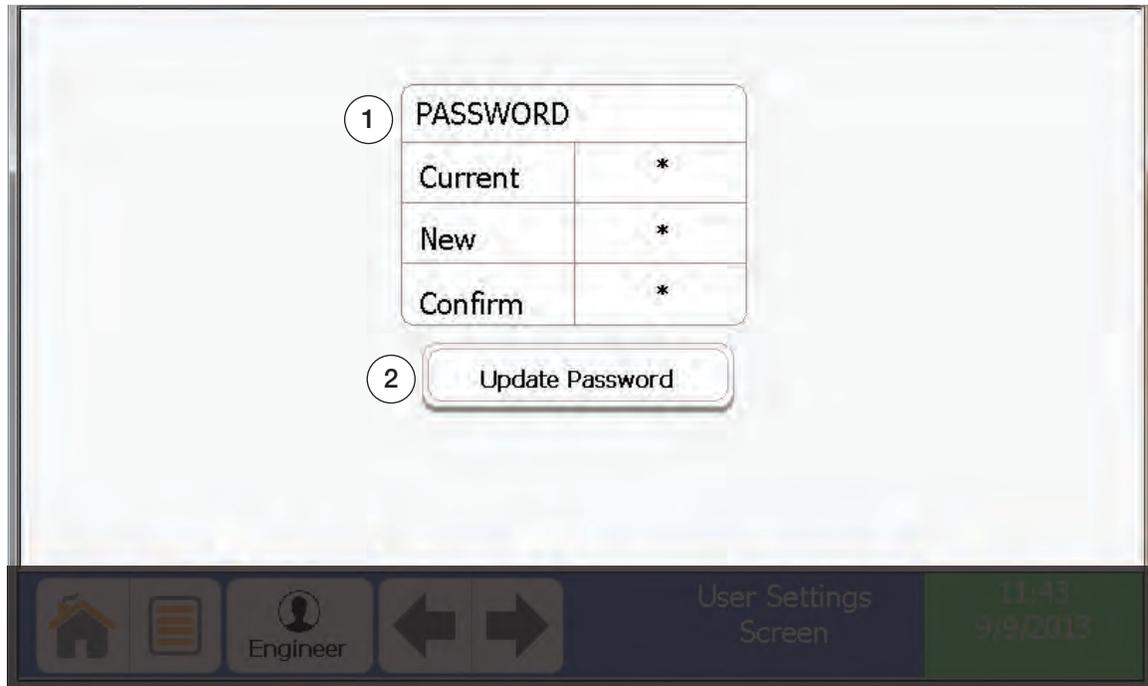


Figure 3-21. User Settings Screen

| Item No. | Parameter | Description |
|----------|-----------------|--|
| 1 | Passwords | Allows user to change passwords |
| 2 | Update Password | Updates password after all blocks have been filled |

Table 3-20. User Setting Parameters

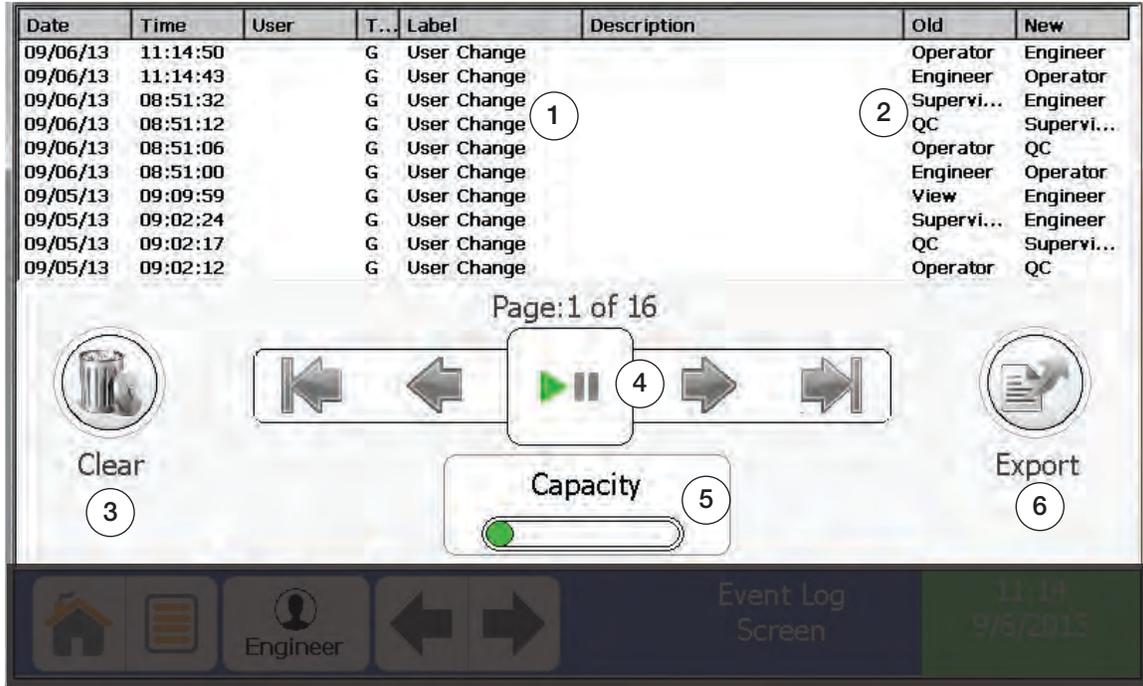


Figure 3-22. Event Log Screen

| Item No. | Parameter | Description |
|----------|------------|--|
| 1 | Label | Type of event |
| 2 | Old/New | If event caused a change, old and new settings will be displayed |
| 3 | Clear | Clear event log. Requires QC Level or above |
| 4 | Play/Pause | Turn on/off auto refresh |
| 5 | Capacity | Holds up to 1000 entries |
| 6 | Export | Export log to USB stick. Requires QC Level and above |

Table 3-21. Event Log Parameters



Figure 3-23. Reject Log Screen

| Item No. | Parameter | Description |
|----------|------------|--|
| 1 | Clear | Clears log. Requires QC Level or above |
| 2 | Play/Pause | Turn on/off auto refresh |
| 3 | Capacity | Holds up to 1000 entries |
| 4 | Export | Export log to USB stick. Requires QC Level and above |

Table 3-22. Reject Log Parameters

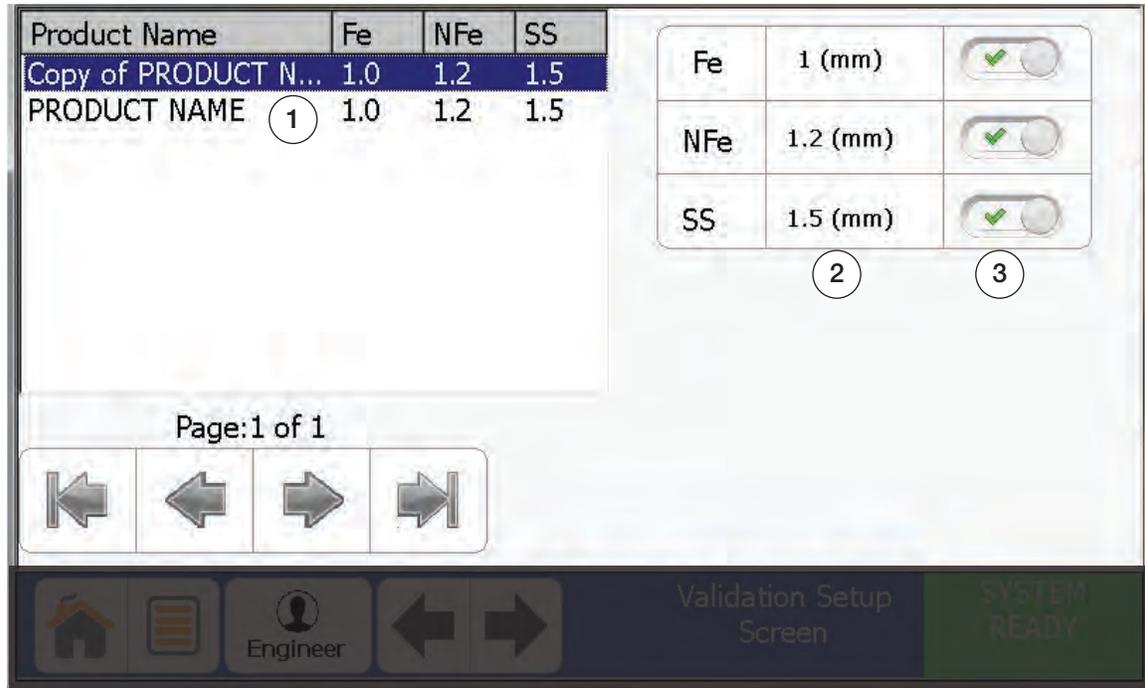


Figure 3-24. Validation Details Screen

| Item No. | Parameter | Description |
|----------|----------------|--|
| 1 | Product Name | Select product to set validation metal sizes |
| 2 | Metal Size | Select metal size in millimeters |
| 3 | Enable/Disable | Enable/disable metal type |

Table 3-23. Validation Detail Parameters



Note This screen requires QC Level or above to view.

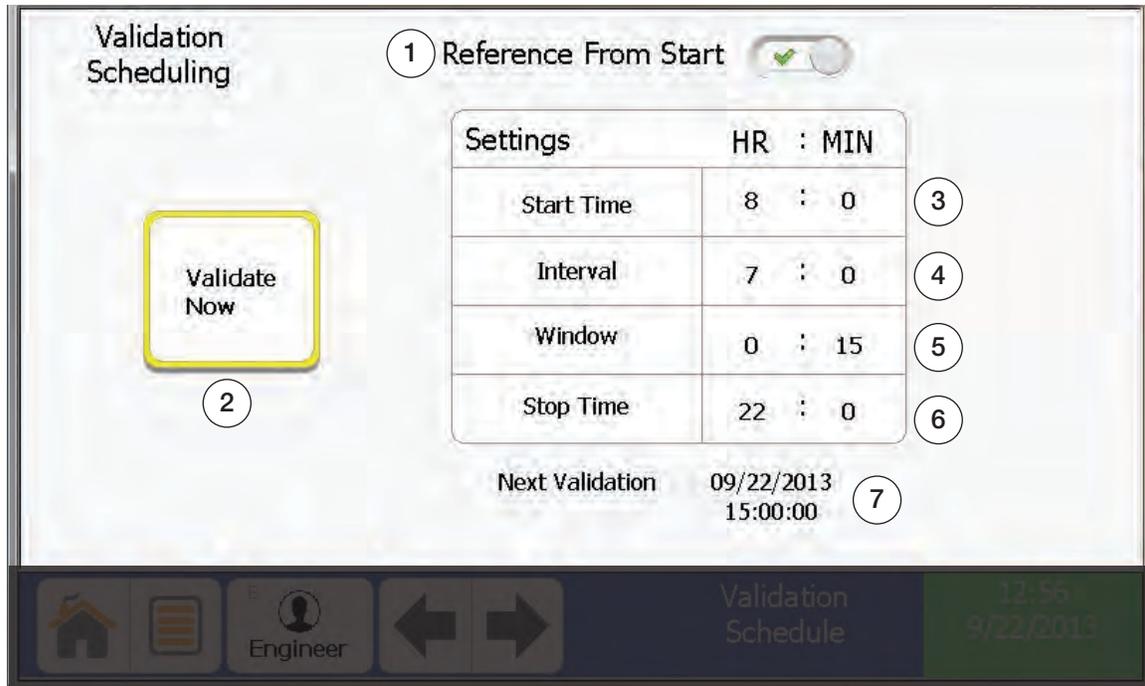


Figure 3-25. Validation Schedule Screen

| Item No. | Parameter | Description |
|----------|----------------------|---|
| 1 | Reference From Start | References the next validation from start when enabled or last validation when disabled |
| 2 | Validate Now | Select to validate running product |
| 3 | Start Time | Sets reference for validation interval |
| 4 | Interval | Select to edit how often you wish to validate |
| 5 | Window | Select to edit when validation window opens |
| 6 | Stop Time | Set stop time reference for validation interval |
| 7 | Next Validation | Display when the next validation is due |

Table 3-24. Validation Schedule Parameters



Note If your company runs 24/7 it is recommended that you set the start time to 00:01 and the stop time to 23:59. This screen requires QC Level or higher to view.

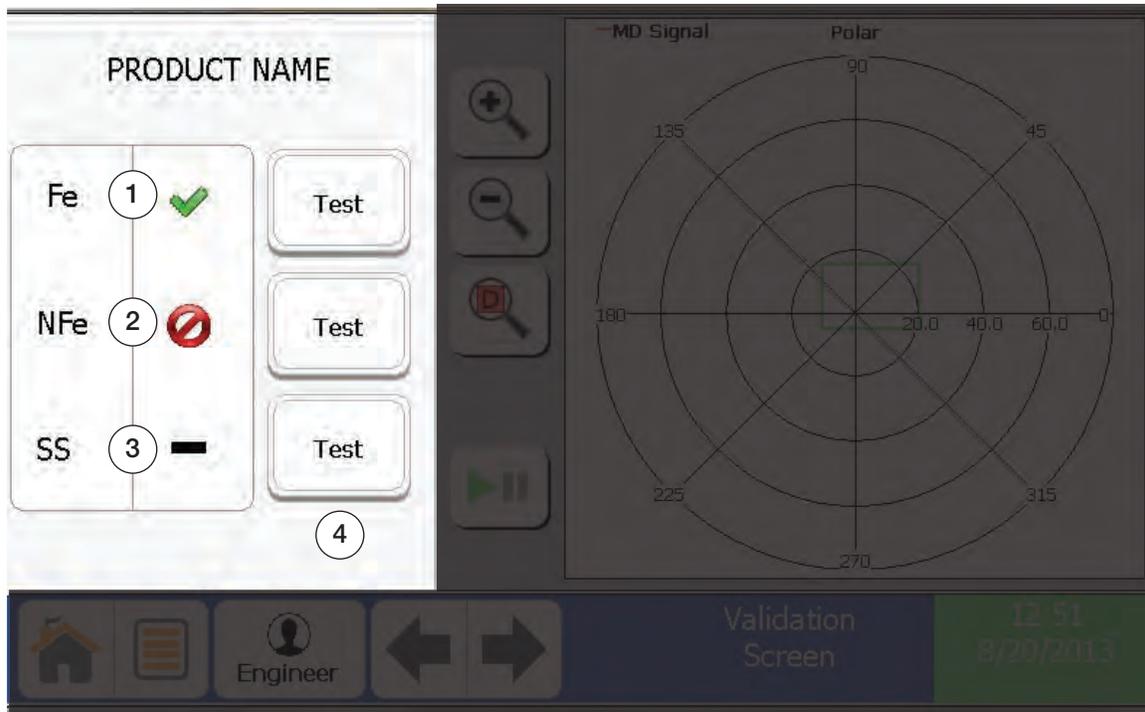


Figure 3-26. Validation Screen

| Item No. | Parameter | Description |
|----------|-------------|--|
| 1 | Green | Indicates validation check passed |
| 2 | Red | Indicates validation check failed |
| 3 | Black | Indicates validation check has not been accomplished |
| 4 | Test Button | Press to test desired metal type |

Table 3-25. Validation Parameters



Note This screen requires QC Level or above to view.

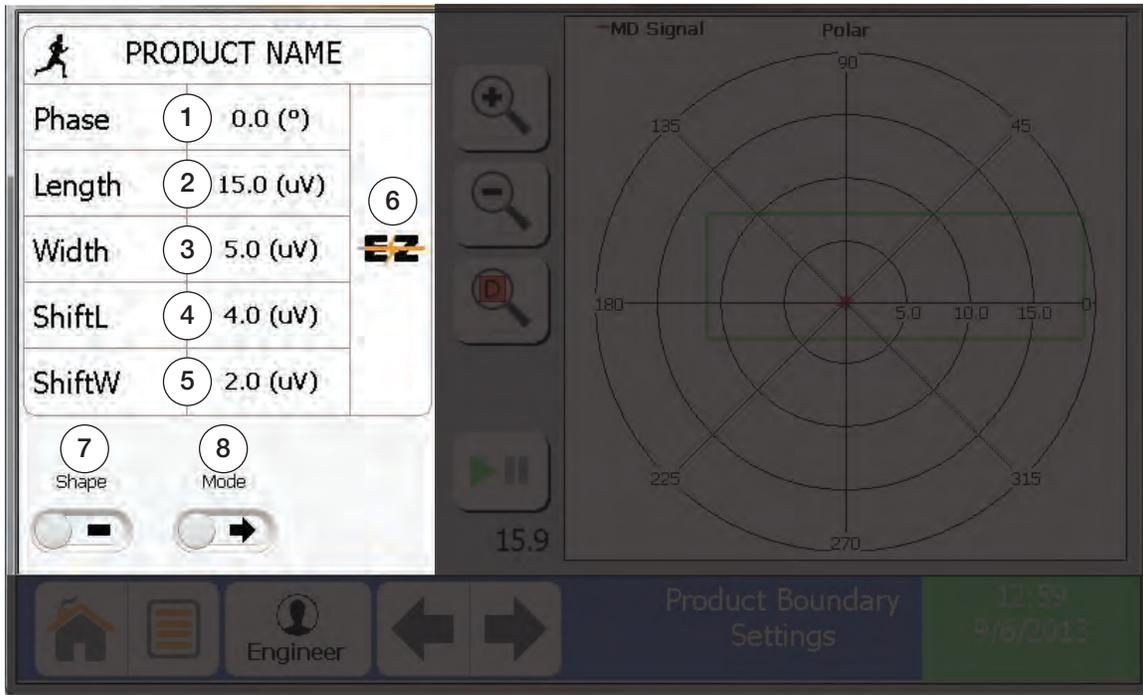


Figure 3-27. Boundary Setup Screen

| Item No. | Parameter | Description |
|----------|------------|---|
| 1 | Phase | Set phase angle of boundary in degrees |
| 2 | Length | Set length of boundary |
| 3 | Width | Set width of boundary |
| 4 | ShiftL | Shifts boundary about length axis |
| 5 | ShiftW | Shifts boundary about width axis |
| 6 | Auto Setup | Starts auto setup feature |
| 7 | Shape | Toggles between ellipse and rectangle boundaries |
| 8 | Mode | Toggles between unipolar and bipolar modes. Leave on unipolar. unless directed by factory to change |

Table 3-26. Boundary Setup Parameters



See [Section 5.1 on page 65](#) for explanation of the Detection Boundary.
 This screen requires Supervisor Level or higher to view.

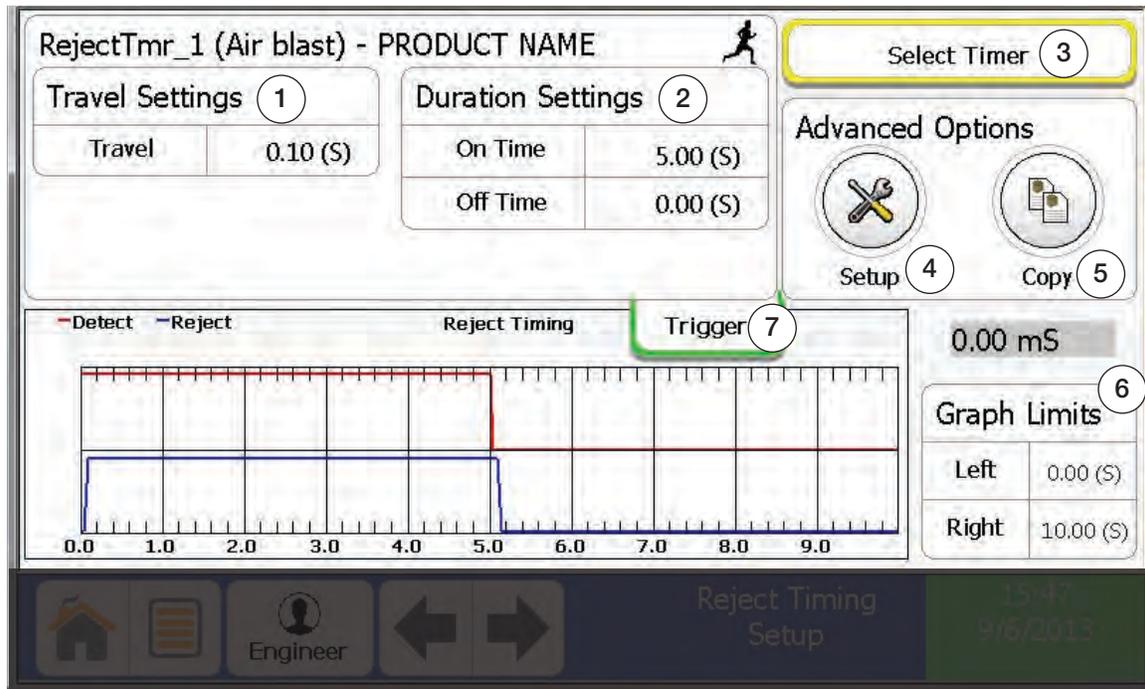


Figure 3-28. Reject Setup Screen

| Item No. | Parameter | Description |
|----------|-------------------|--|
| 1 | Travel Settings | Sets travel time from detection to when reject fires |
| 2 | Duration Settings | Sets on/off timing for reject device |
| 3 | Select Timer | Selects reject timer to view/edit |
| 4 | Advanced Setup | Advanced reject setup options |
| 5 | Advanced Copy | Copies selected timer settings |
| 6 | Graph Limits | Used to setup scaling of timing window |
| 7 | Trigger | Triggers graph to acquire timing data on next reject |

Table 3-27. Reject Setup Parameters



Duration off time is normally used for pusher are type reject devices.

This screen requires Engineer Level to view.

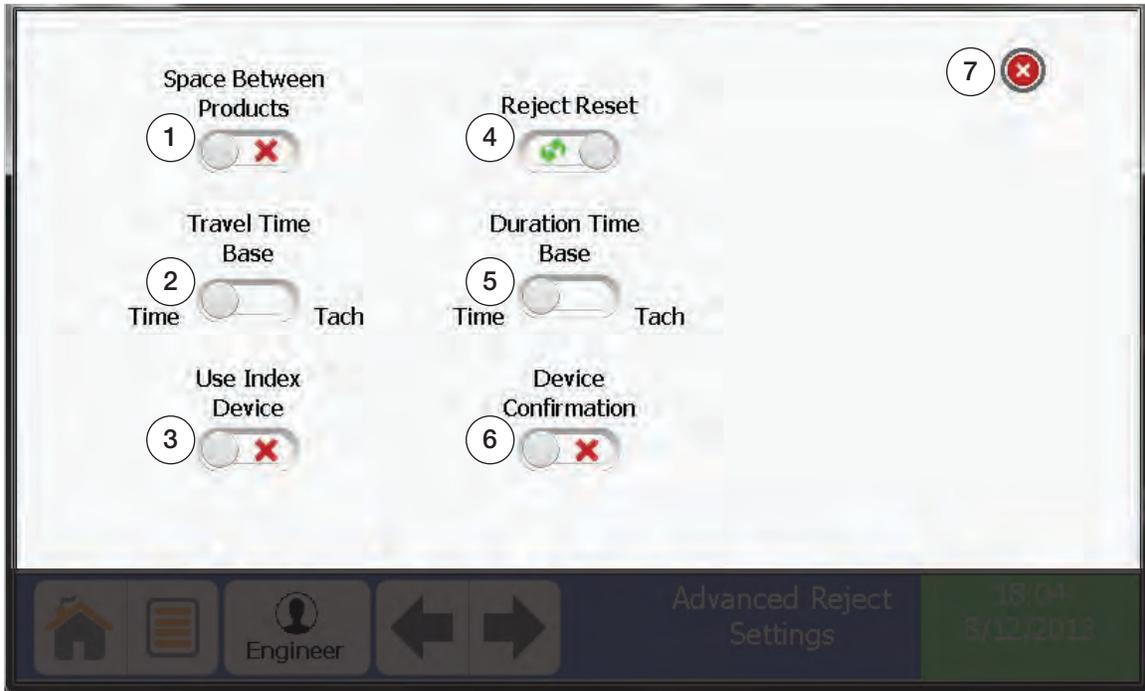


Figure 3-29. Advanced Reject Setup Screen

| Item No. | Parameter | Description |
|----------|------------------------|---|
| 1 | Space Between Products | When enabled, indicates there is a space between products |
| 2 | Travel Time Base | Travel time based in internal timer |
| 3 | Use Index Device | Select yes if index device is being used |
| 4 | Reject Reset | Select manual or automatic reject reset |
| 5 | Duration Time Base | Duration based on internal timer |
| 6 | Device Confirmation | Select yes if device confirmation is being used |
| 7 | Exit | Exit advanced reject setup |

Table 3-28. Advanced Reject Setup Parameters



Note This screen requires Engineer Level to view.

4.0 Operation

4.1 Operator's Guide

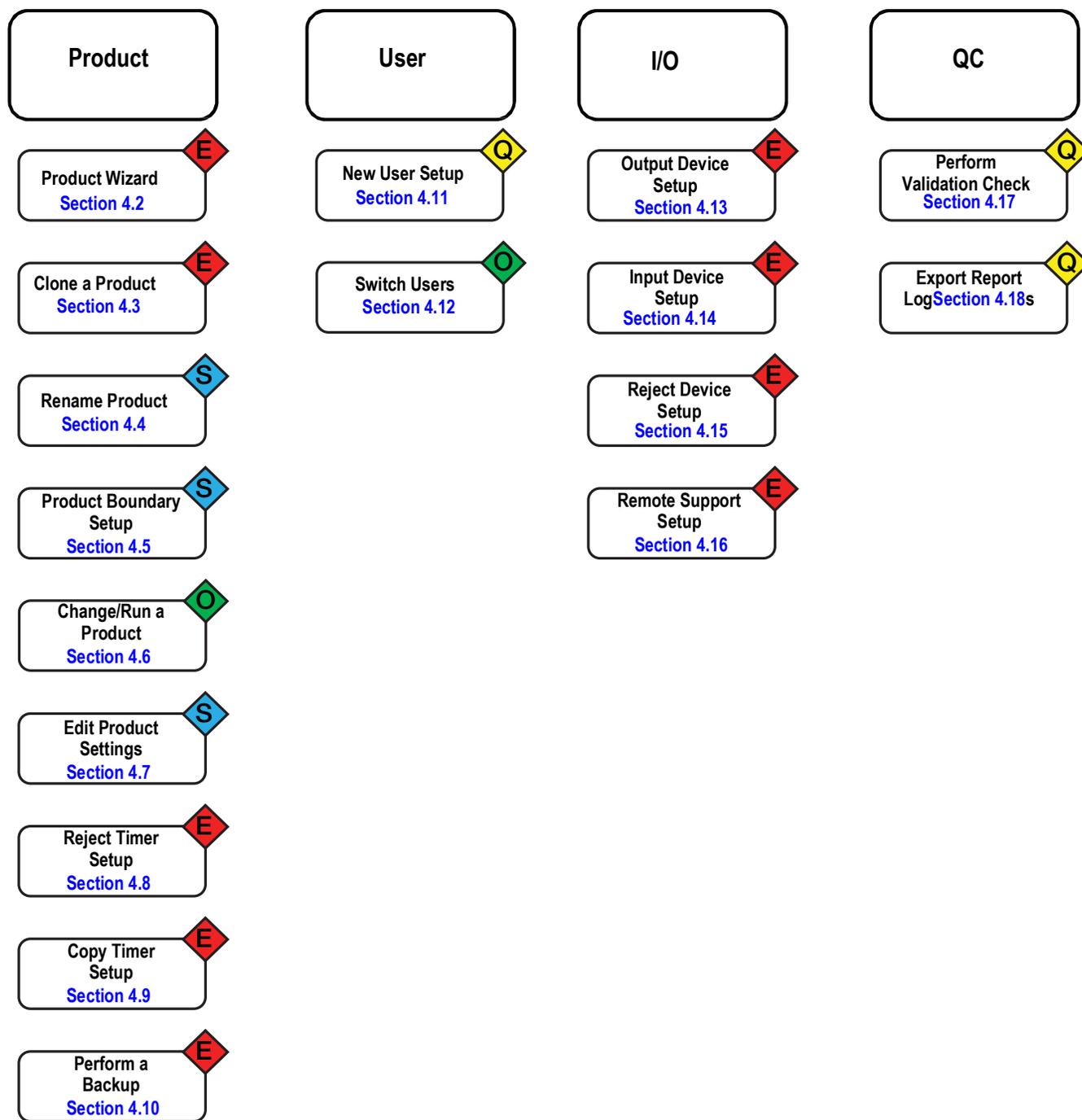


Figure 4-1. Operation Menu

4.2 Product Wizard

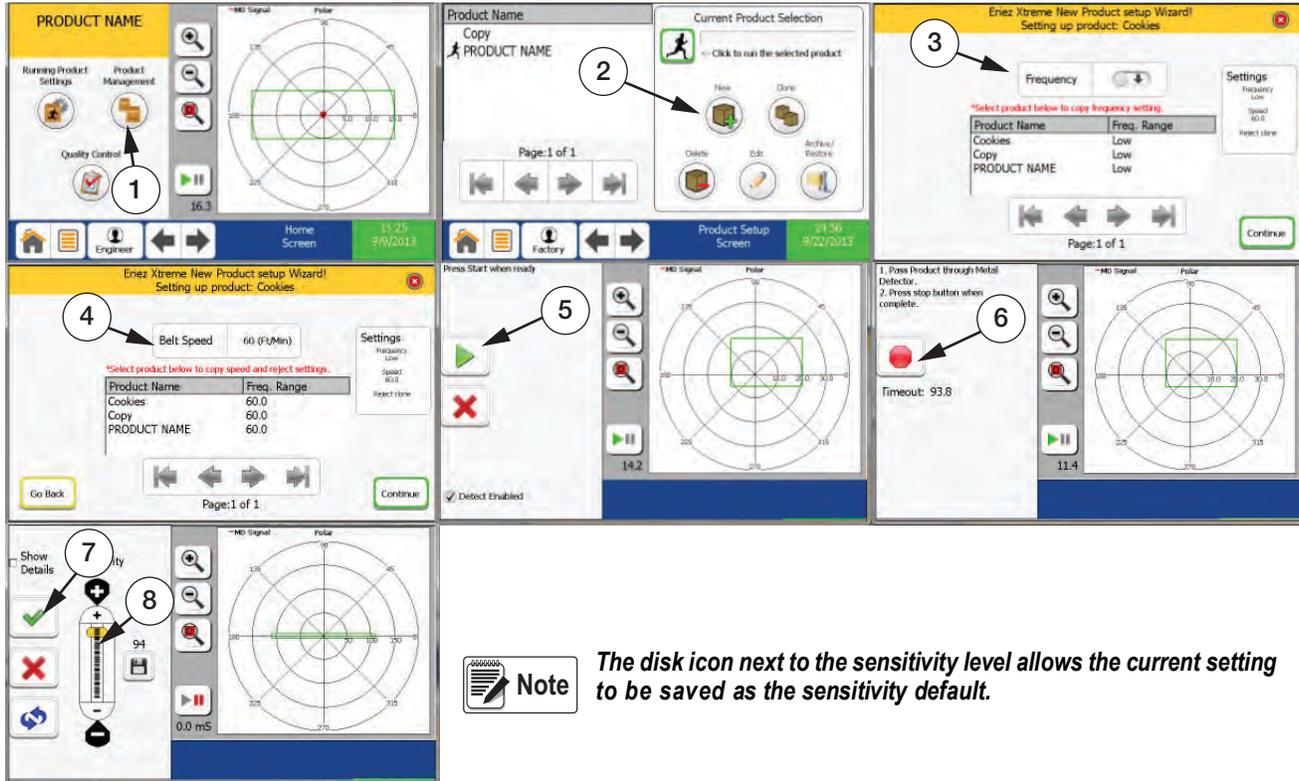


Figure 4-2. Product Wizard

Note Ensure the belt is running and the product being setup is nearby.

1. From the *Home Screen* press *Product Management*.
2. Press *New* and rename your product.
3. Select *Frequency* or copy from the list below.
4. Select *Belt Speed* or copy from the list below.

Note Copying *Belt Speed* also copies that products reject settings.

5. Press and pass product.
6. Press after product has passed through the tunnel.
7. If the settings are acceptable select the . If you wish to be more aggressive or conservative with the sensitivities, adjust using the sensitivity slider (Item 8 in Figure 4-2).

Note The sensitivity slider is set to 94 as the default (Item 8 in Figure 4-2). In most cases no adjustment is necessary to achieve desired sensitivity levels. The sensitivity slider increases to a maximum of 100 and a minimum of 0.

4.3 Cloning a Product

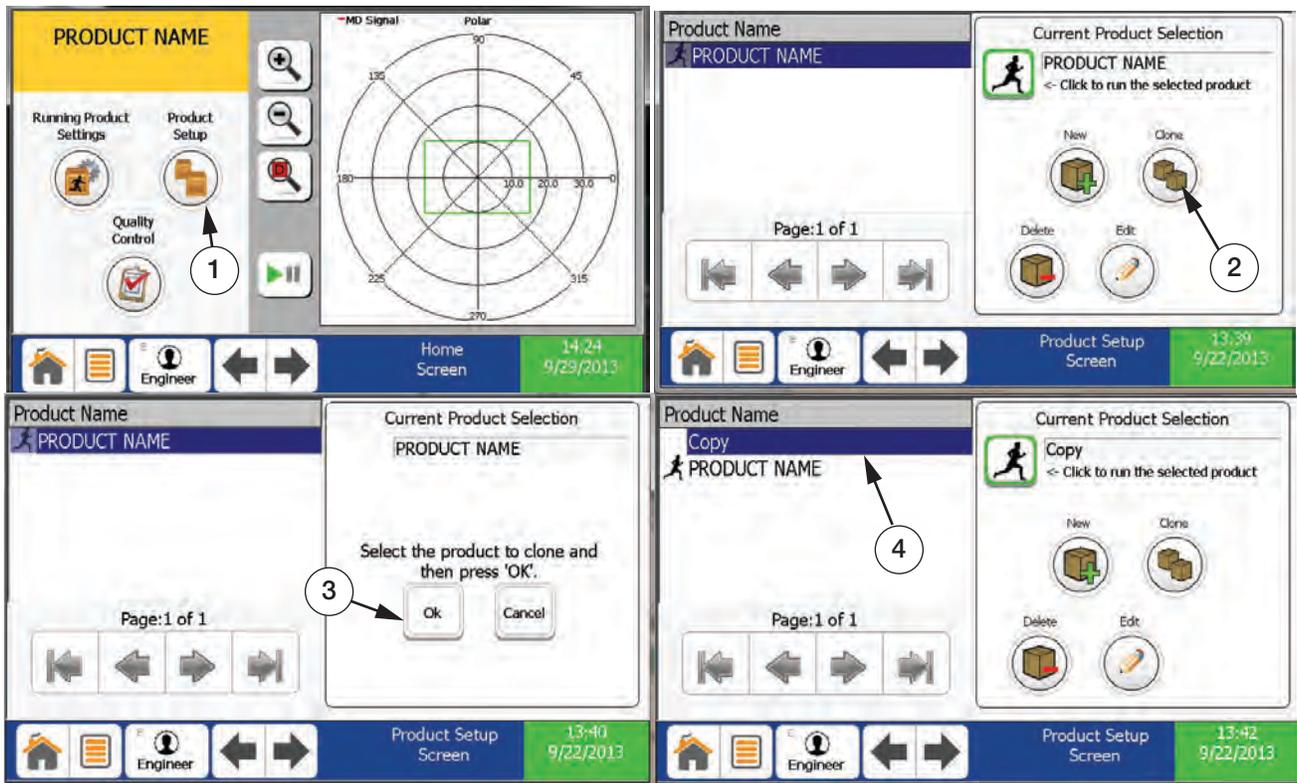


Figure 4-3. Clone A Product

1. From the home screen press **Product Setup**.
2. Press **Clone**.
3. Select Product from the list on the left to clone. Once selected it will be visible under **Current Product Selection**. Press **OK**.
4. Rename your new product and it will display in the Product Name list. (See [Section 4.4 on page 52](#) to rename product).

4.4 Rename Product

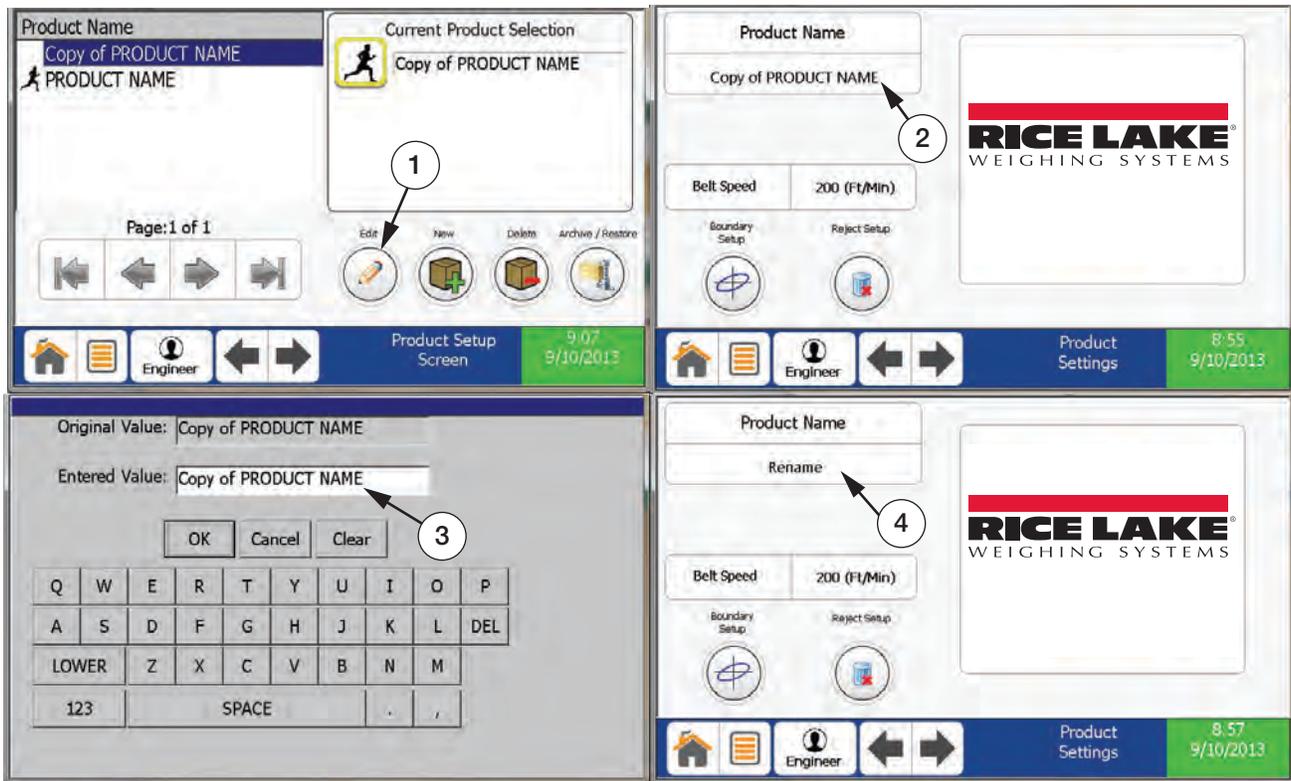


Figure 4-4. Rename Product

1. From the *Product Setup* screen select the product to be edited and press *Edit*.
2. Press the box below *Product Name* to rename the product.
3. Rename the product using the keyboard and press *OK*.
4. The new product name will display under *Product Name*.

4.5 Product Boundary Setup

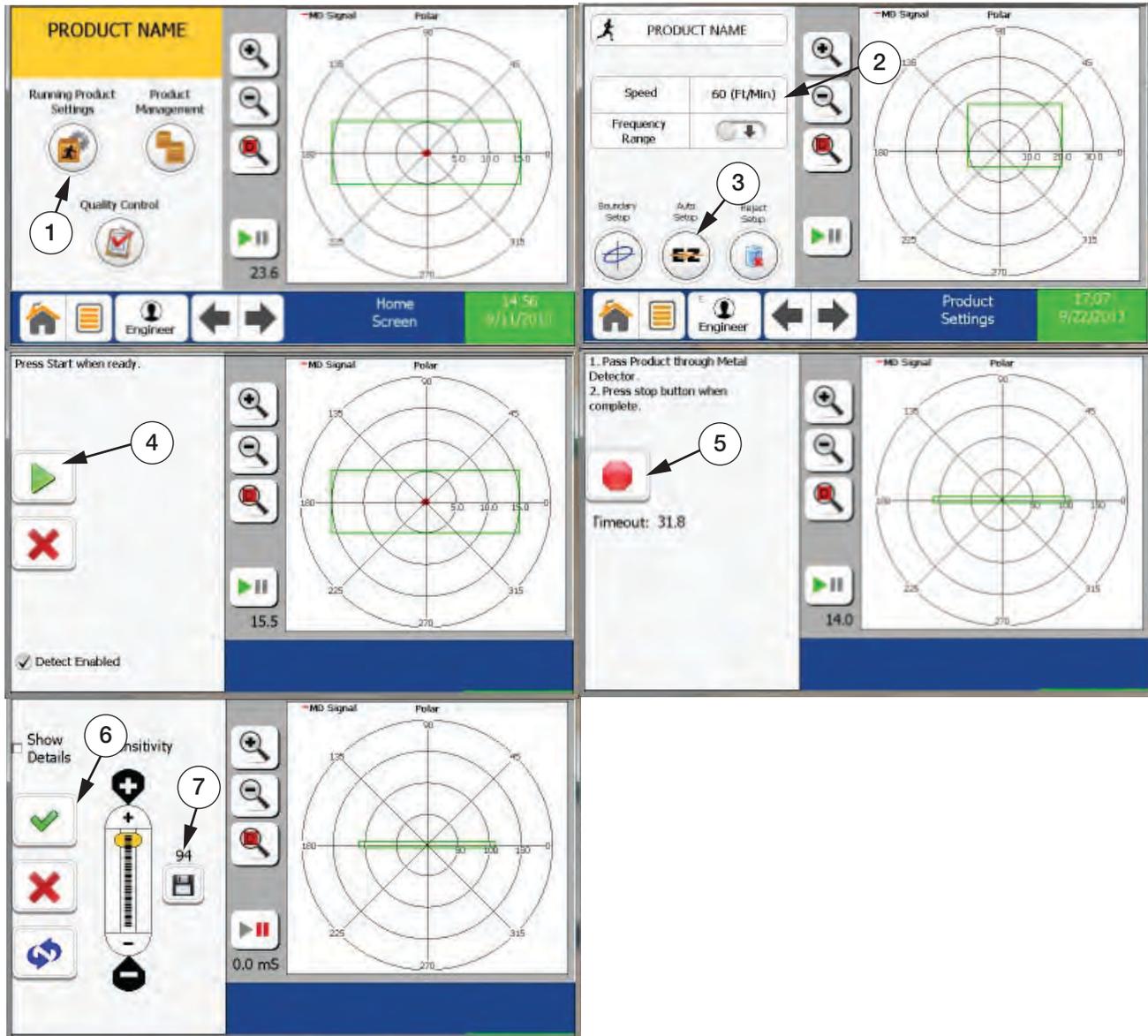


Figure 4-5. Product Boundary



Note Ensure the belt is running and the product being setup is nearby.

1. From the *Home Screen* select **Running Product Settings**.
2. Edits belt speed. Ensure this parameter matches the physical belt speed. A tachometer is recommended to get an accurate reading.
3. Press the **Auto Setup** button.
4. Press the **▶** button.
5. Pass the product through the aperture and press the **●** button.
6. If the settings are acceptable select the **✓**.



The sensitivity slider is set to 94 as the default. In most cases no adjustment is necessary to achieve desired sensitivity levels. The sensitivity slider increases to a maximum of 100 and a minimum of 0.

The disk icon under the sensitivity level allows saving the current setting as the sensitivity default should the need arise (Item 7 in Figure 4-5 on page 53).

4.6 Change/Run a Product



Figure 4-6. Change/Run a Product

1. From the **Product Setup** screen select the product to be run.
2. Press the **Running Man** button.
3. The **Home** screen will now be displayed with the new running product.

4.7 Edit a Product Settings

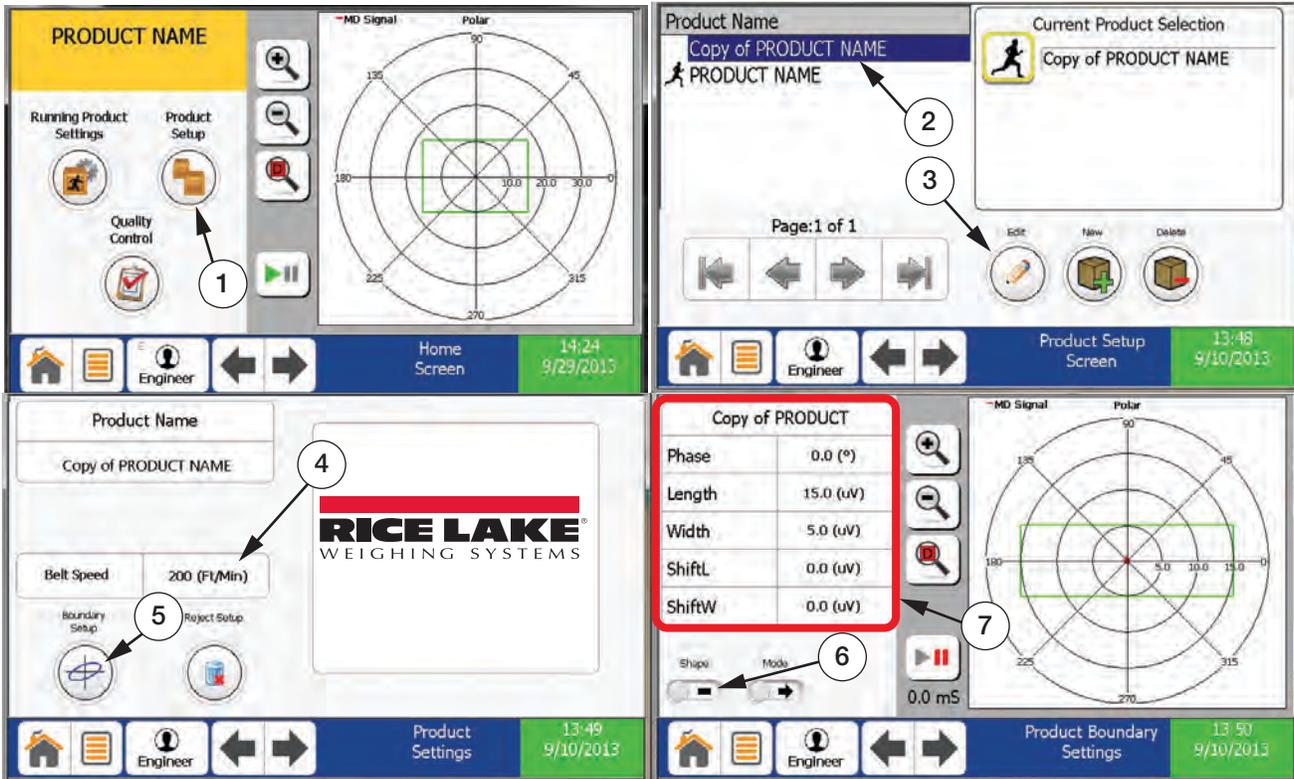


Figure 4-7. Edit a Product Setting

1. Select **Product Setup**.

2. Select product to be edited.
3. Press the Edit button.
4. Edits belt speed. Ensure this parameter matches the physical belt speed. A tachometer is recommended to get an accurate reading.
5. Select **Boundary Setup**.
6. Press to toggle between the rectangle boundary and the ellipse.
7. Press desired parameter value to alter the **Boundary** shown by the green rectangle.

4.8 Reject Timing Setup

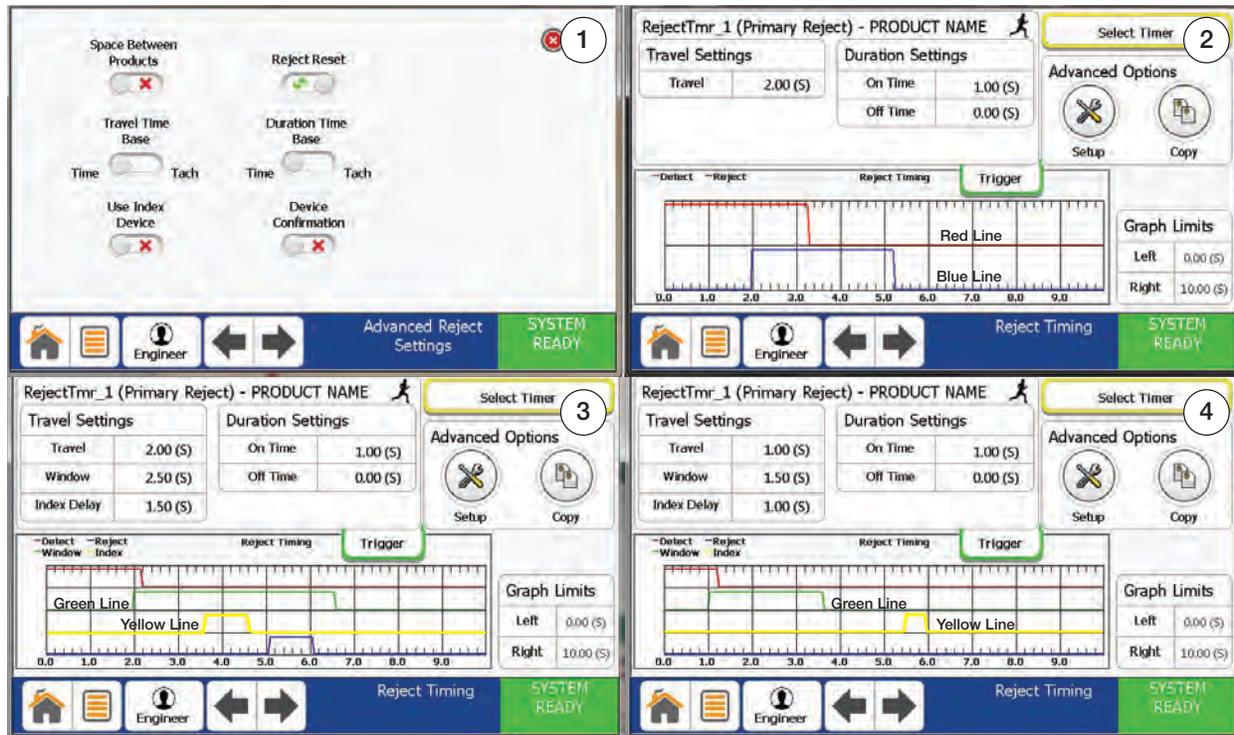


Figure 4-8. Setup Reject Timing

1. From the **Advanced Reject Settings** screen make the appropriate selections based on your product.



Note *Not all options may be available depending on the inputs and outputs that have been setup.*

2. In this example an index device (i.e. photo eye) is not being used.
 - Set the desired **Travel** and **On Time**
 - The reject device on time (blue) will always be greater than or equal to the detect time (red) regardless of the **On Time** setting.
 - Examples of use would be a stop belt or air blast.
3. In this example an index device (i.e. photo eye) is being used CORRECTLY.
 - Set the desired **Travel** and **On Time**. **Off Time** is usually reserved for Pusher Arm devices
 - The **Window** (green) opens at the end of the **Travel Time**
 - The index device (yellow) has to fire within this window
 - The index delay is used to delay the reject from firing until it has passed the index device and is ready to be rejected
4. In this example an index device (i.e. photo eye) is being used INCORRECTLY.
 - The index device (yellow) did not fire within the window (green).
 - The reject device did not fire

4.9 Copy Timer Settings

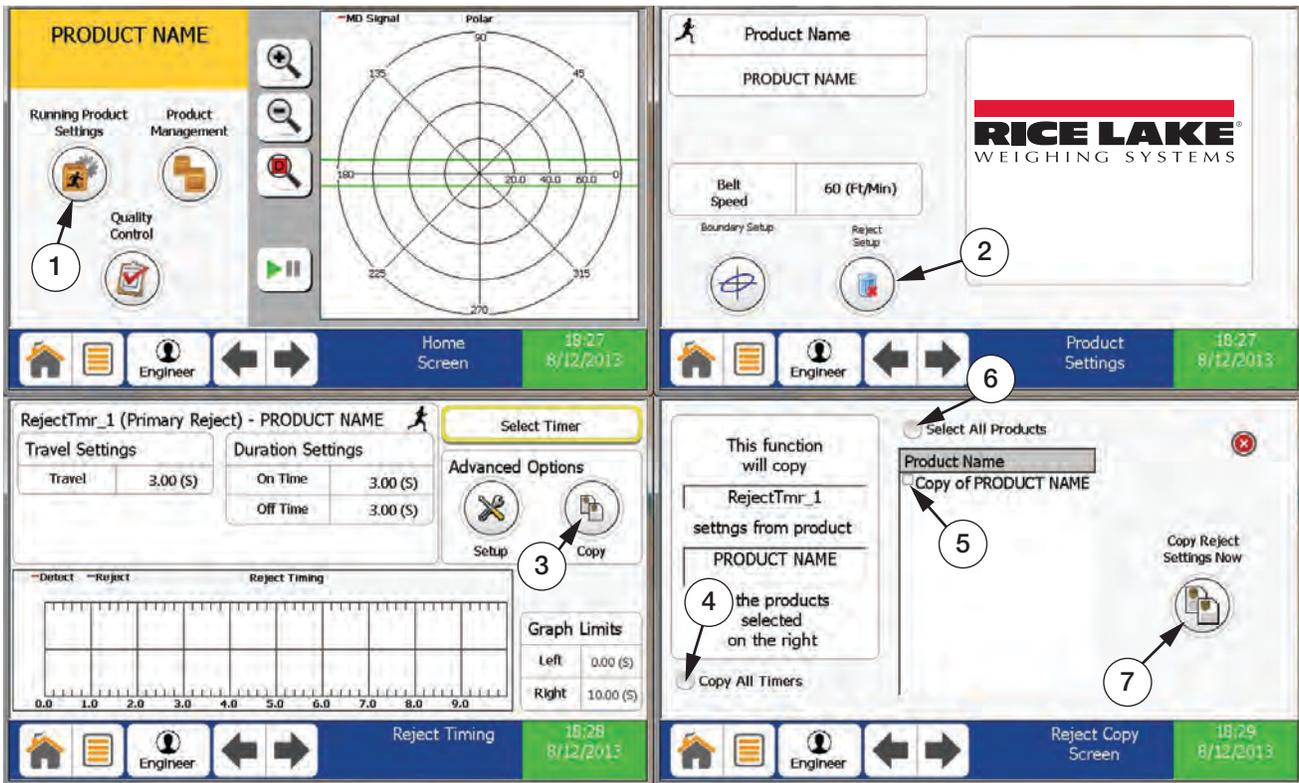


Figure 4-9. Copy Timer Settings



Note Ensure product to be copied from has been selected and is running.

1. From the *Home Screen* select *Running Product Settings*.
2. Select *Reject Setup* and pick the timer to be copied.
3. Select *Copy* from the *Advanced Options*.
4. Select *Copy All Timers* to copy all timers associated with this product.
5. Select the product to copy timer to.
6. Select *Select All Products* to copy to all products.
7. Press *Copy Reject Settings Now* to initiate.

4.10 Perform a Backup

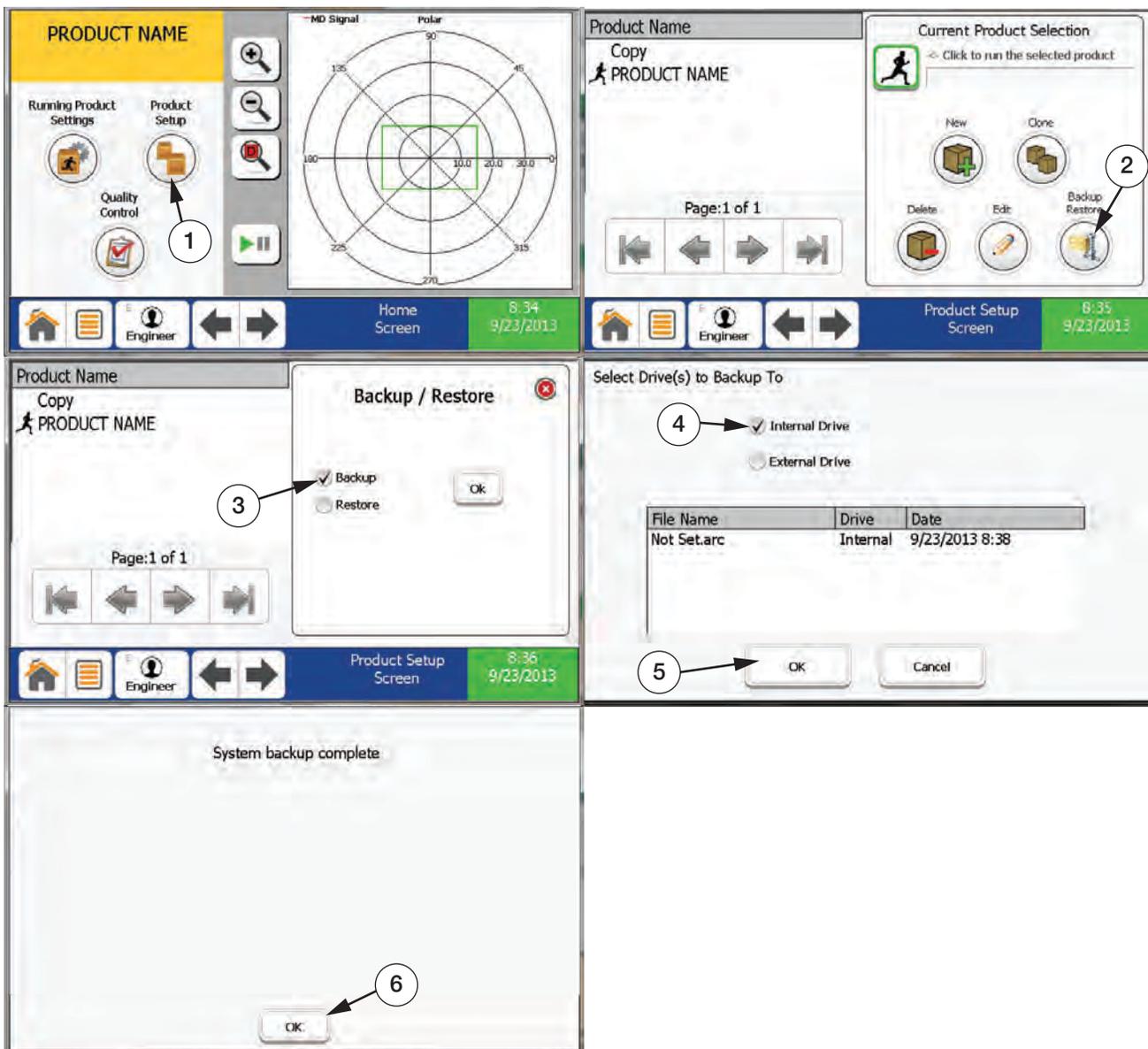


Figure 4-10. Perform a Backup

1. From the *Home Screen* press **Product Setup**.
2. Press **Backup Restore**.
3. Select **Backup** and press **OK**.
4. Select appropriate drive to backup to. If using a USB stick select **External Drive**.
5. Press **OK**.
6. **System Backup Complete** will display when finished. Press **OK**.

4.11 New User Setup

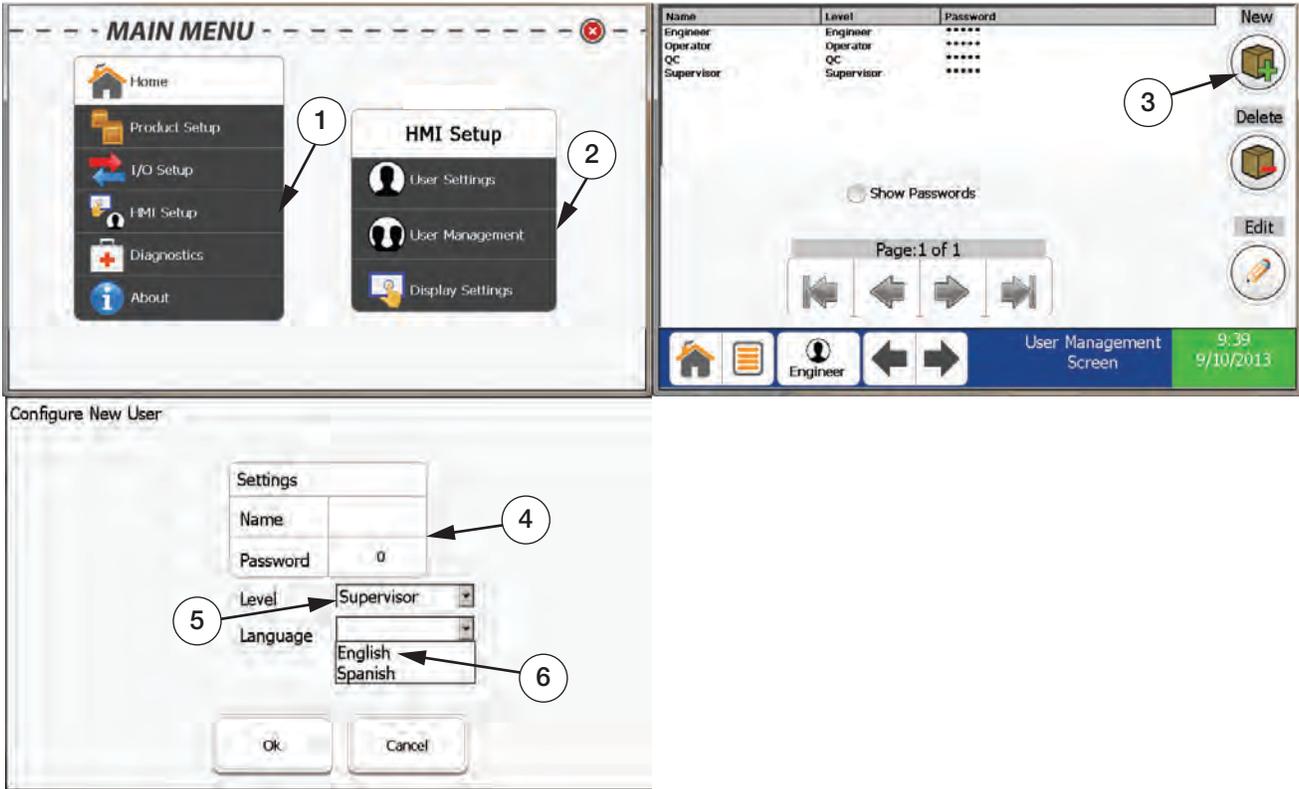


Figure 4-11. New User Setup

1. From the **Main Menu** select **HMI Setup**
2. Then select **User Management**.
3. Press the **New** button.
4. Input the new user's name and select a password.
5. Select the user login level from the drop down.
6. Select the user language from the drop down.
7. Press **OK**.

4.12 Switching Users

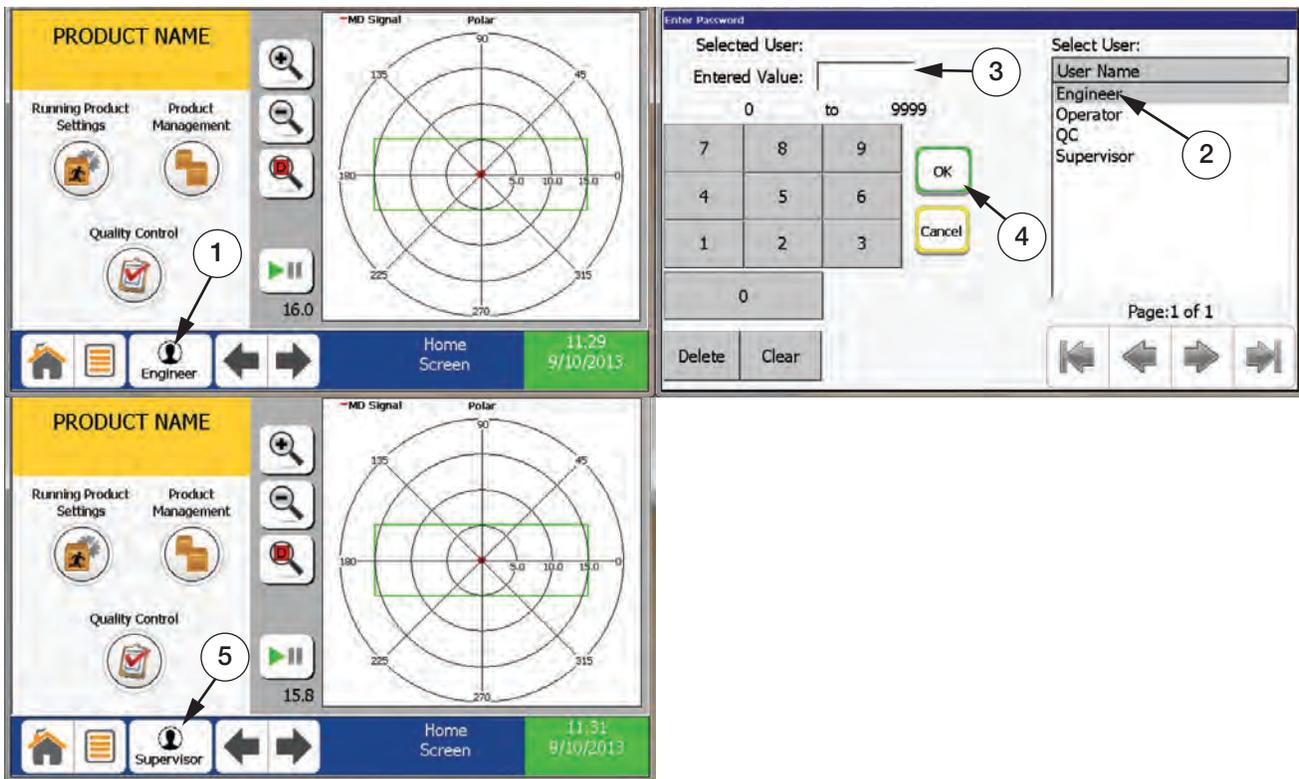


Figure 4-12. Switching Users

1. From the *Task Bar* press the *User Log in* button.
2. Select the *User Name* from the list.
3. Enter the password.
4. Press *OK*.
5. Verify user login name appears on *User Login* button.

4.13 Output Device Setup

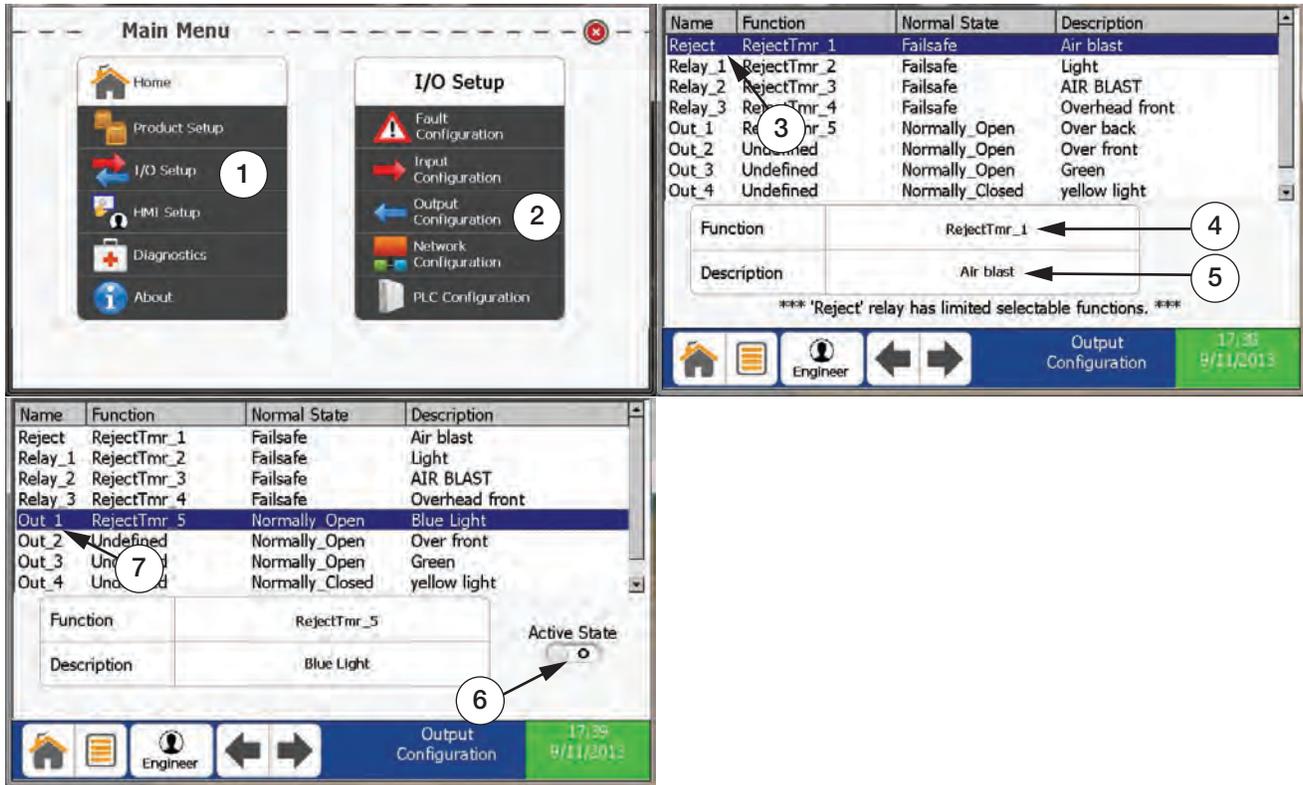


Figure 4-13. Output Device Setup

1. From the **Main Menu** select **I/O Setup**.
2. Then select **Output Configuration**.
3. Select the output that the output device is wired to.
4. Select output device function. The reject output has limited functionality and is the primary reject output.



Note *Reject and Relay 1-3 are failsafe wired. Out 1-5 are solid state relays and are not failsafe (see item 7 in Figure 4-13).*

5. Enter a description for the output device.
6. Select the active state (Normally Open/Normally Closed) when using Out 1-5.

4.14 Input Device Setup

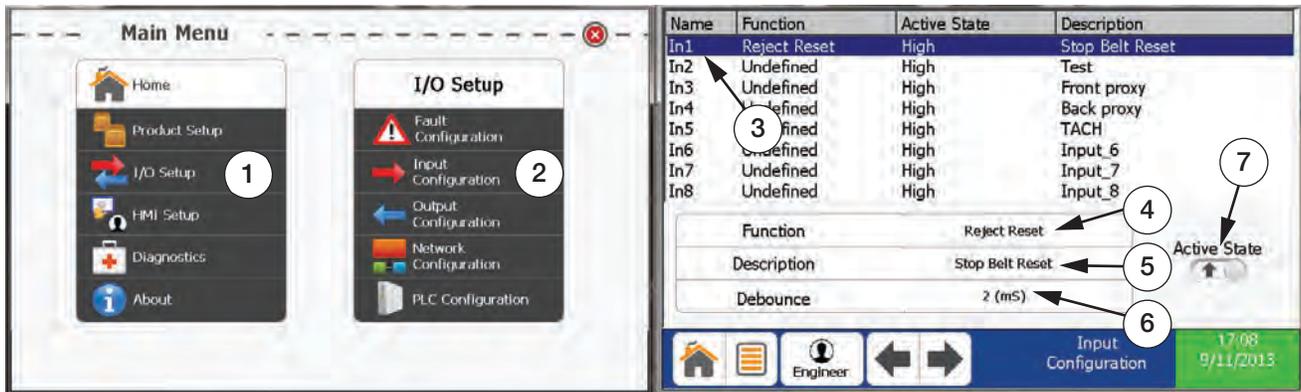


Figure 4-14. Input Device Setup

1. From the *Main Menu* select *I/O Setup*.
2. Then select *Input Configuration*.
3. Select the input that the input device is wired to.
4. Select the device function (i.e. tachometer, overhead, etc.).
5. Enter a description for the input device.
6. Set the debounce. Default is 2 ms.
7. Select *Active State* for input device.
 - High = 10-30V
 - Low = 0-0.9V

4.15 Reject Device Setup

1. Ensure reject device and all associated devices (i.e. photo eye, tachometer, etc.) are wired into the control. See [Section 2.2 on page 13](#).
2. Configure Input ([Section 4.14](#)) and Output ([Section 4.13 on page 60](#)) devices.
3. Configure Advanced Reject Settings ([Figure 3-28 on page 47](#)).
4. Setup Reject Timing ([Section 4.8 on page 55](#)).

4.16 Remote Support Setup

Connect Secure Gateway (purchased separately) and Metal Detector to the Intranet/LAN as shown below (ensure outbound port 5721 on the firewall is open).

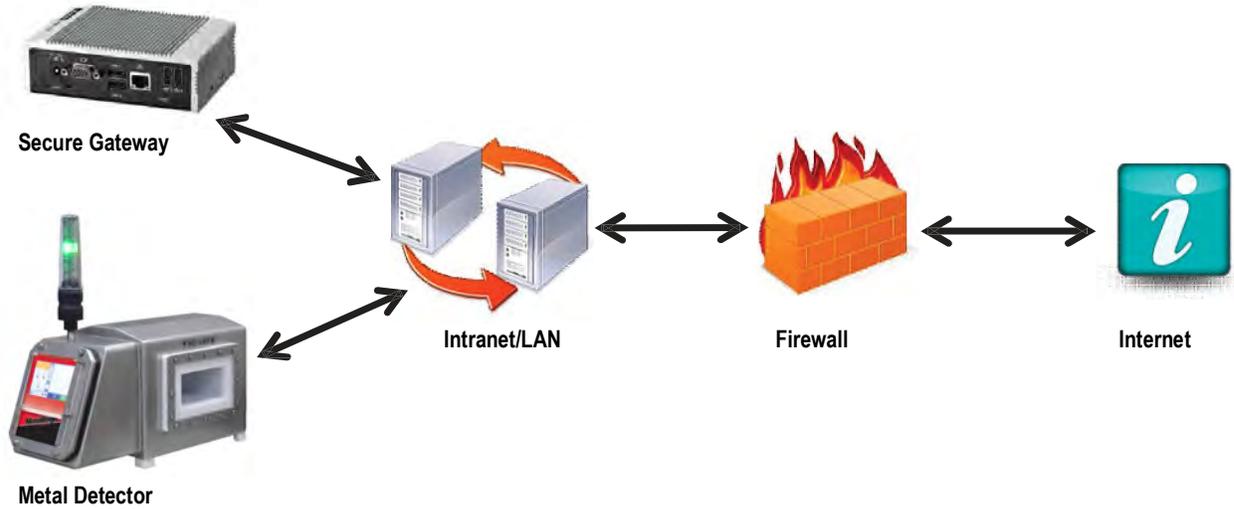
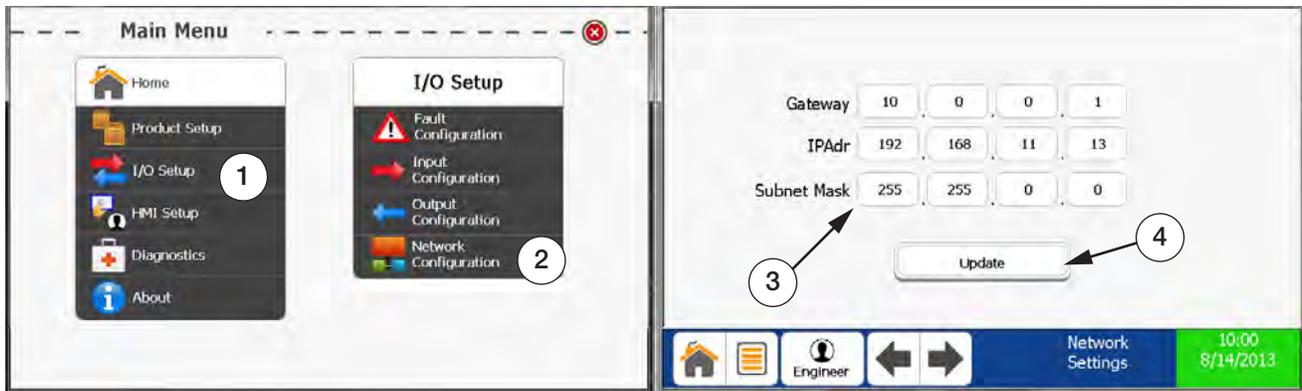


Figure 4-15. Setup Remote Support

Configure network settings on the metal detector by following the steps below.



1. From the **Main Menu** select **I/O Setup**.
2. Then select **Network Configuration**.
3. Enter the Gateway, a static IP Address, and the Subnet Mask.
4. Press **Update** for changes to take effect.

4.17 Perform a Validation Check

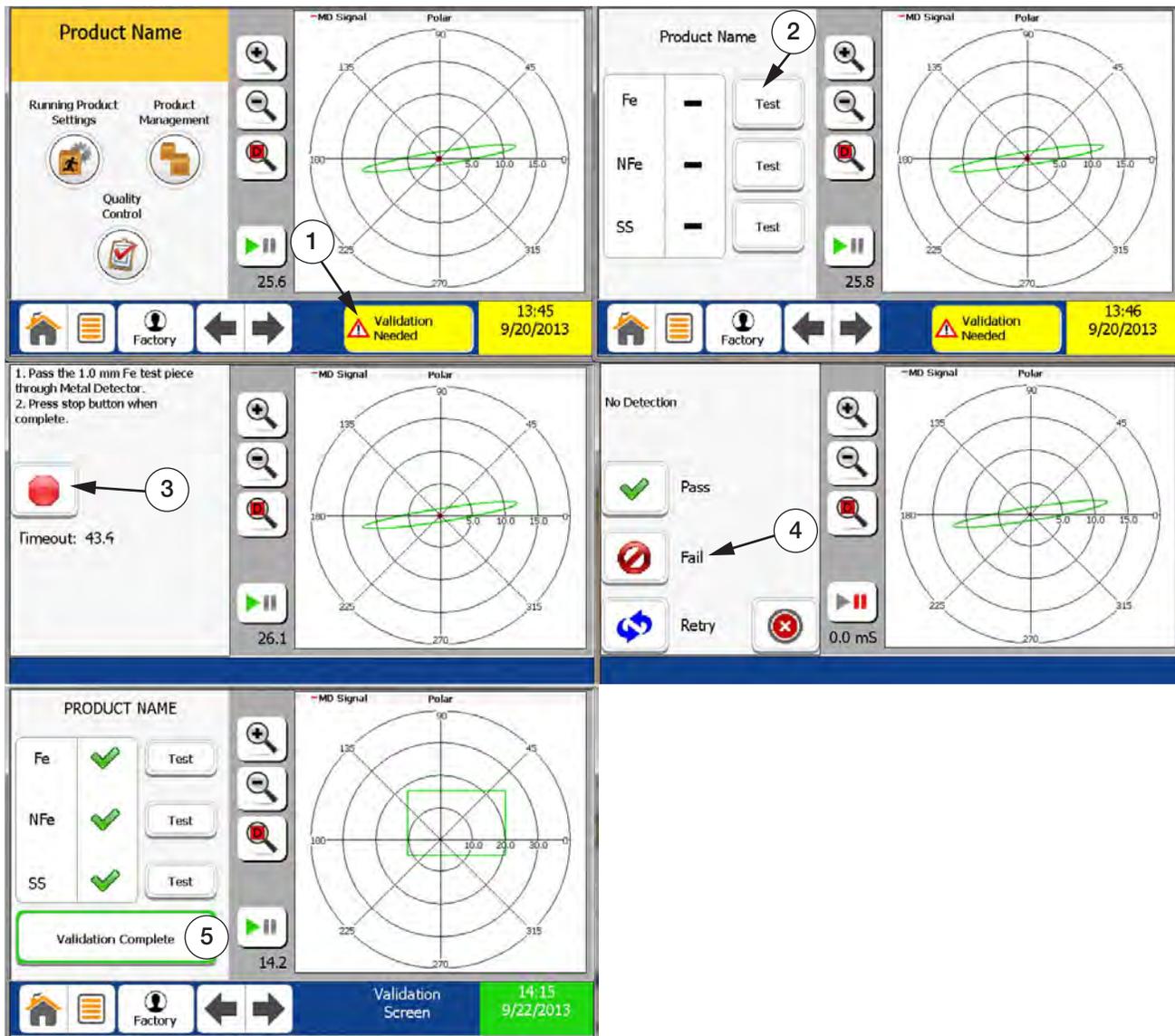


Figure 4-16. Perform a Validation Check

1. On the task bar press **Validation Needed**.
2. Press **Test** for the metal type you wish to test.
3. Pass the listed metal through the aperture and press the **Stop** button.
4. Select **Pass**, **Fail**, or **Retry** and repeat the process if necessary for the other metals.
5. Press **Validation Complete** when all metals have been tested.

4.18 Export Report Logs

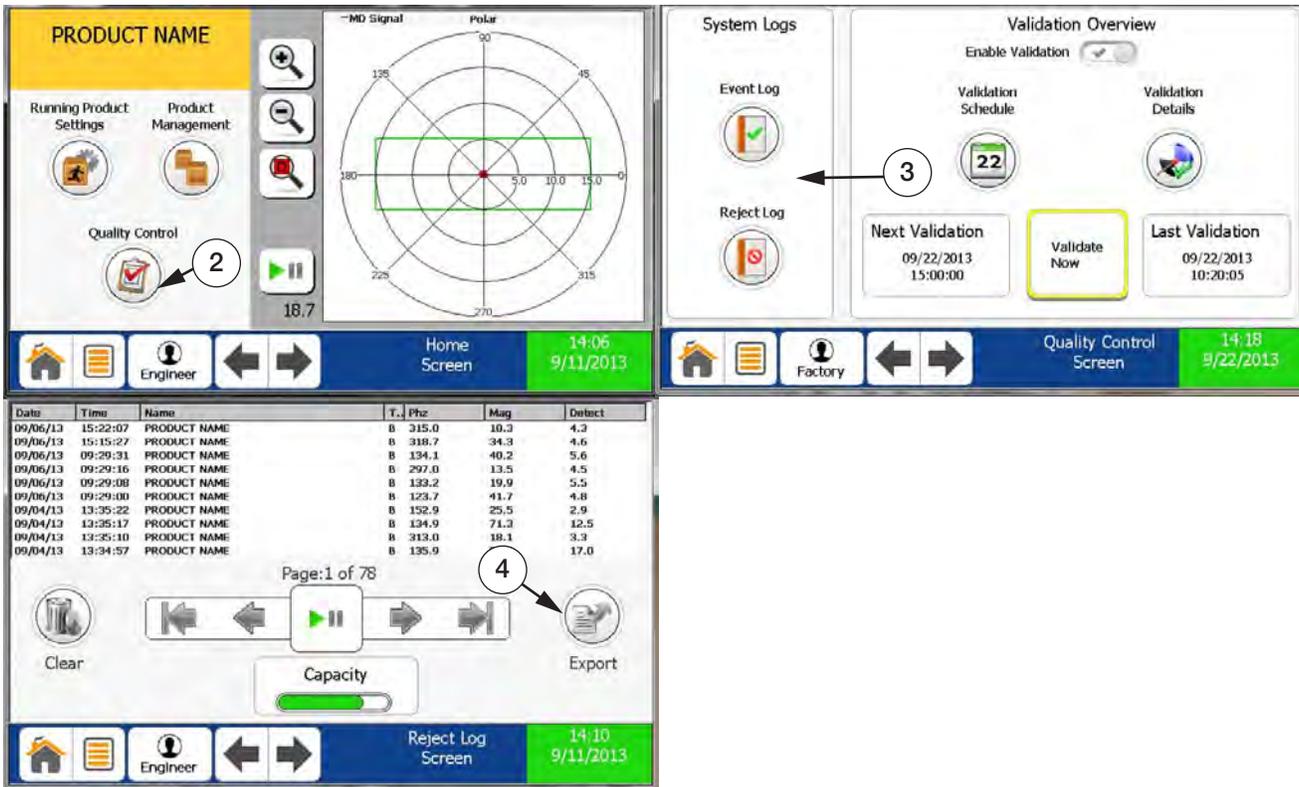
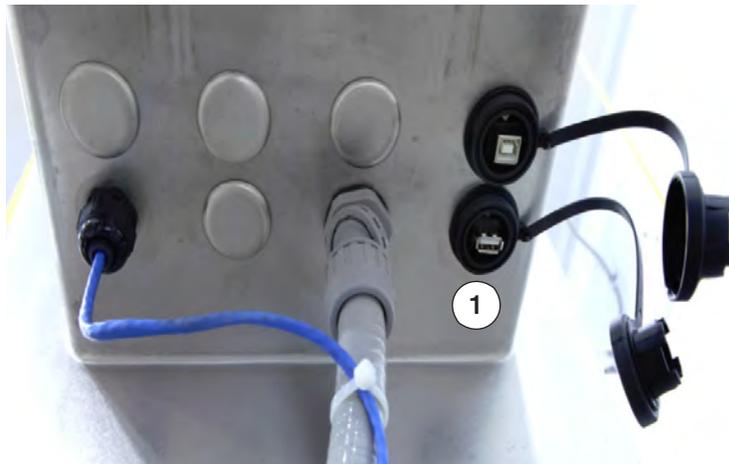
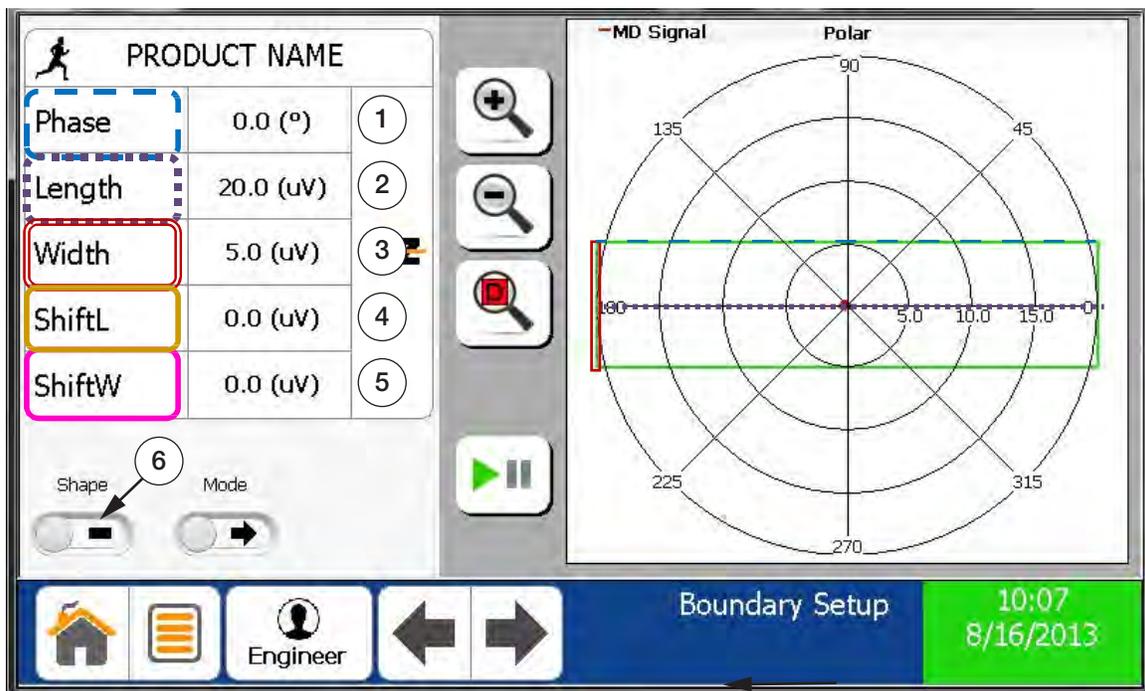


Figure 4-17. Export Report Logs

1. Ensure a USB drive is inserted into the appropriate USB connector.
2. From the *Home Screen* select **Quality Control**.
3. Select which log you would like to view and export.
4. Press **Export**. Rename the file if desired.
5. Press **OK** after the *Done Exporting Log* window pops up (not shown).

5.0 Appendix

5.1 Detection Boundary



Boundary Shape Options

Rectangle 

Ellipse 

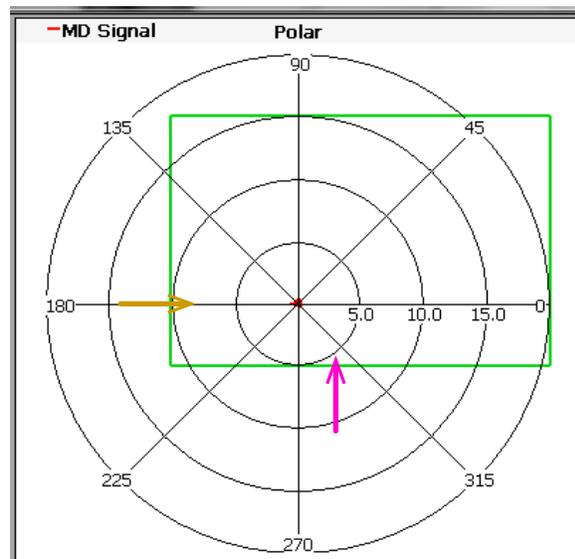


Figure 5-1. Detection Boundary

1. Phase adjustment (degrees). Should align with product signal.
2. Length adjustment (uV). Should run parallel to product signal length.
3. Width adjustment (uV). Should run parallel to product signal width.
4. Shift about the length axis in parallel with selected phase.
5. Shift about the width axis in perpendicular with selected phase.
6. Detection boundary shape selection. Default is the rectangle.

5.2 Ethernet IP Interface

PLC Interface

A PLC can be connected to the metal detector by means of the factory installed PLC Interface Module. This module allows the PLC to set and retrieve the running product number. It can also retrieve metal detector status information.

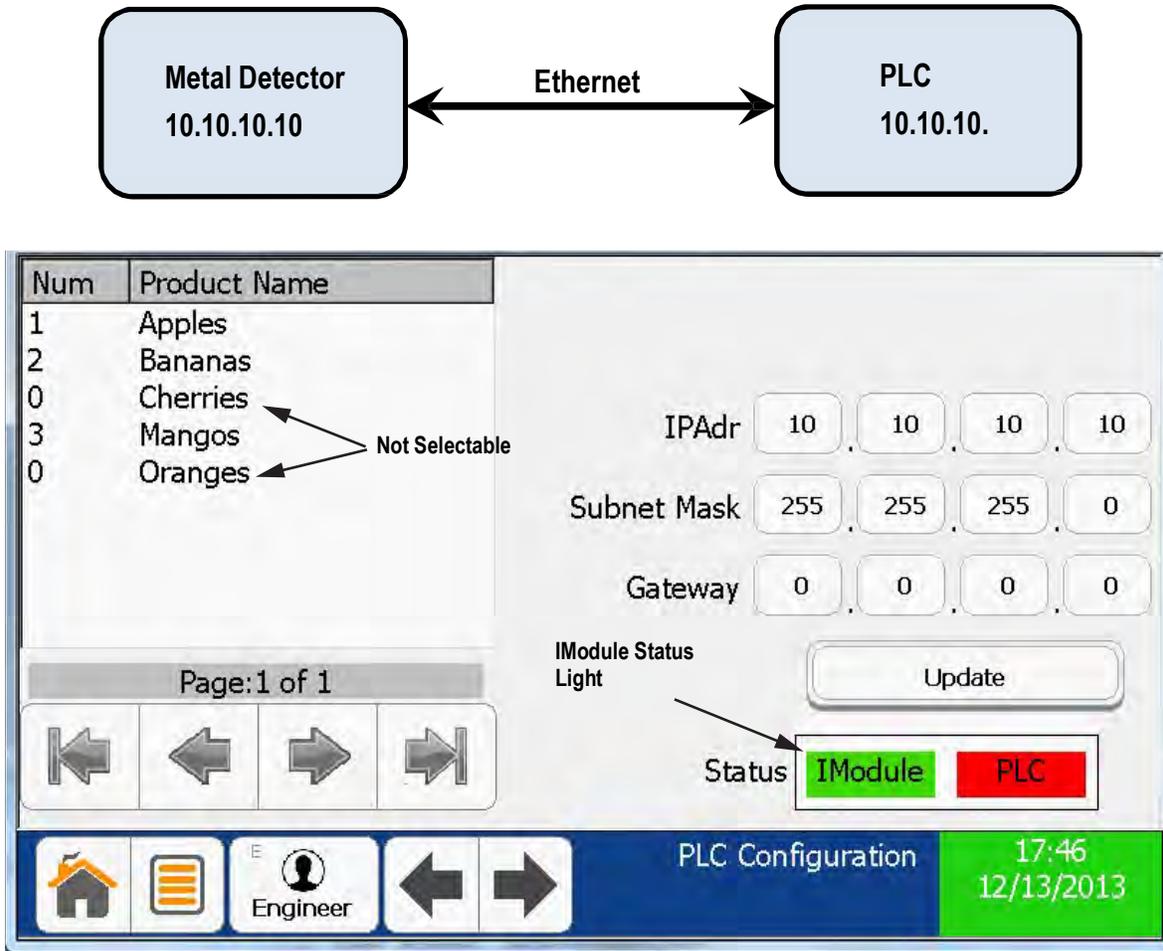


Figure 5-2. Ethernet IP Interface

Metal Detector Communication Setup

1. From the metal detector *Main Menu* select *I/O Setup*
2. Then select *PLC Configuration*.
3. Verify that the *IModule* status light is green. See [Figure 5-2](#).

IMPORTANT If it is red, contact the factory.

4. Assign product numbers (1, 2, 3 ...) to all products that will be remotely selected from the PLC.

Note Assigning 0 to any product makes it not selectable by the PLC.

5. Connect an Ethernet cable between the Metal Detector and the desired network.
 - The Red cat5 cable in the metal detector is for the PLC connection
 - The Blue cable is for remote support (if installed)

5.3 PLC Communication Setup

1. In the Controller Organizer window, under I/O Configuration, right click on the controller **Ethernet Port LocalENB**.
2. Select **Properties**, select the **General Tab**, and assign the PLC Ethernet IP Address, (such as 10.10.10.9)

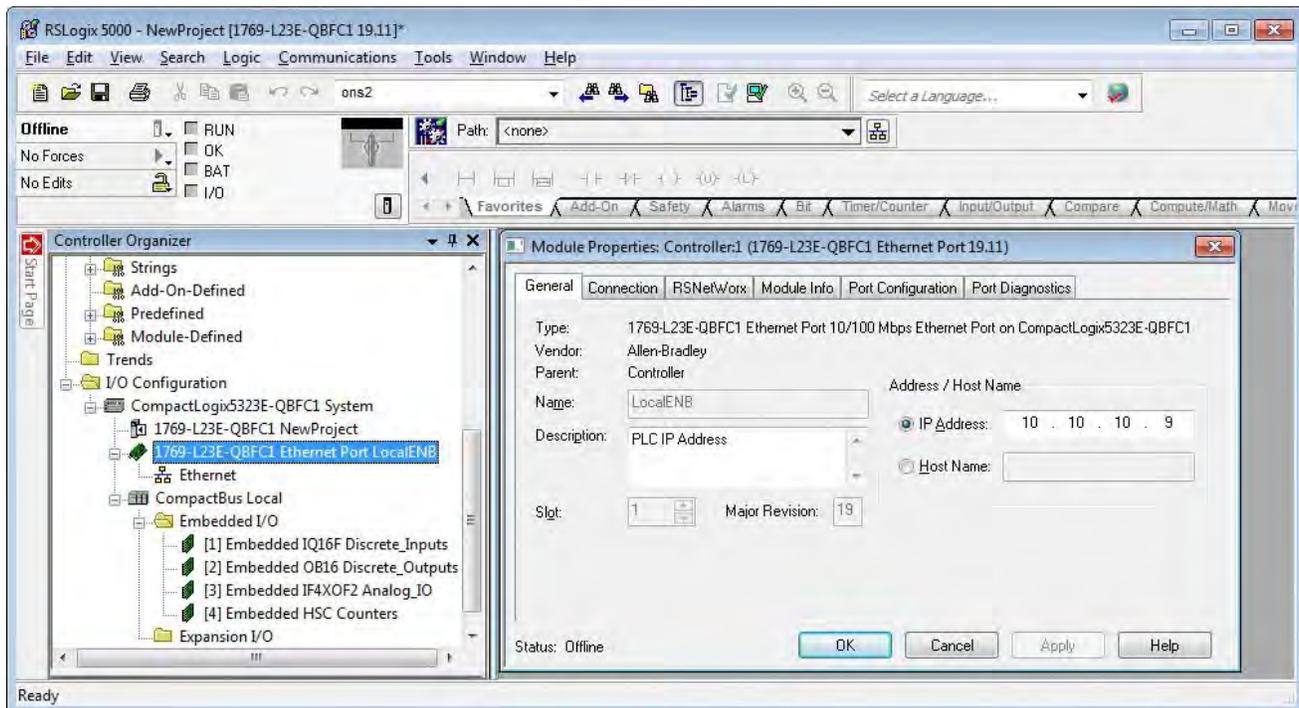


Figure 5-3. Select Controller

3. In the Controller Organizer window, under I/O Configuration, under the controller, right click on **Ethernet**, select **New Module**.

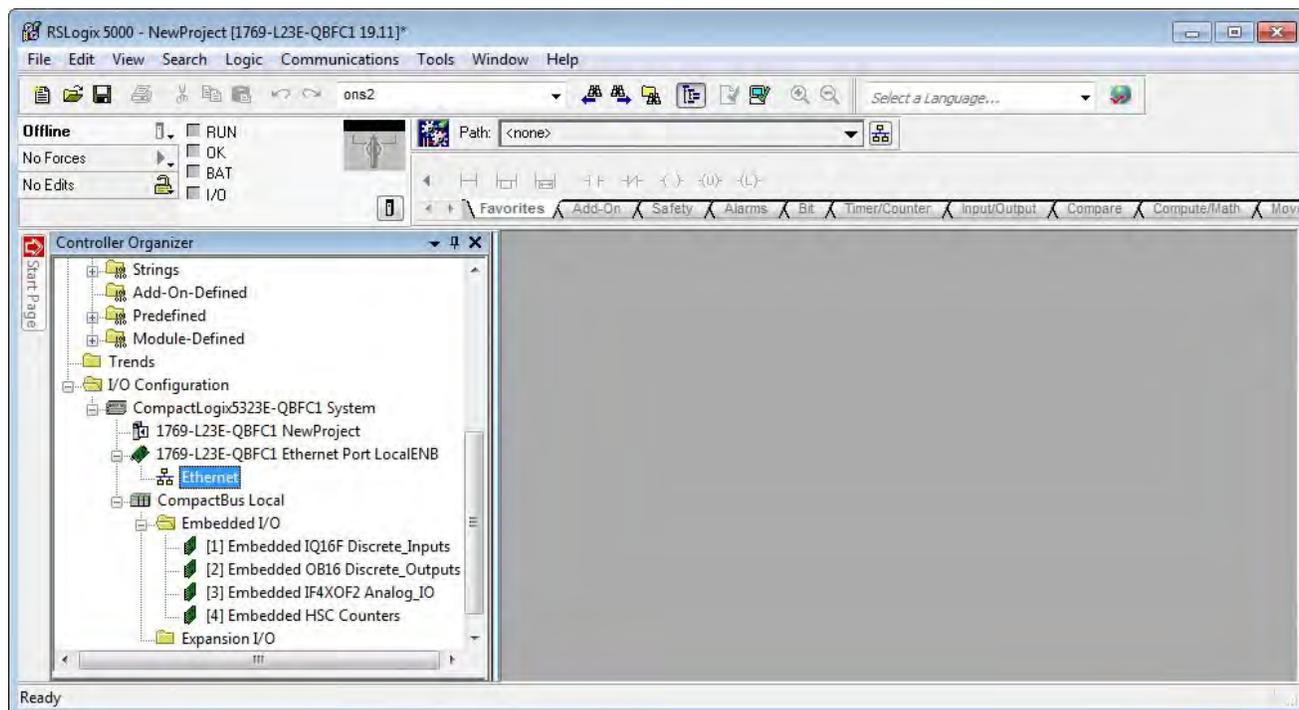


Figure 5-4. Select New Module

4. From the Select Module dialog box expand Communications and select **Generic Ethernet-Module**.
5. Press **OK**.

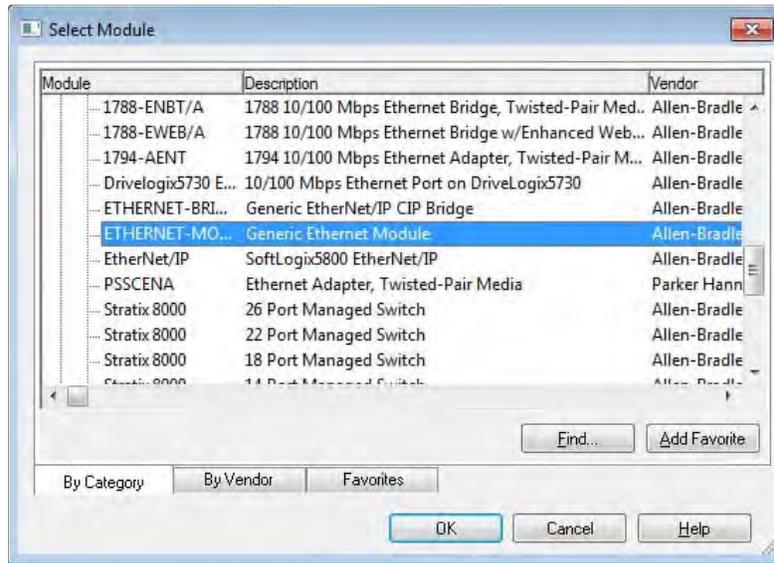


Figure 5-5. Select Module

6. On the New Module Properties Page (General tab):
 - Assign a unique Name
 - Assign the Metal Detector IP Address (such as 10.10.10.10). This must match the address set on the PLC Configuration page of the metal detector.
 - Set Assembly Instance Input to 101 and Size to 6
 - Set Assembly Instance Output to 110 and Size to 6
 - Set Assembly Instance Configuration to 148 and Size to 0

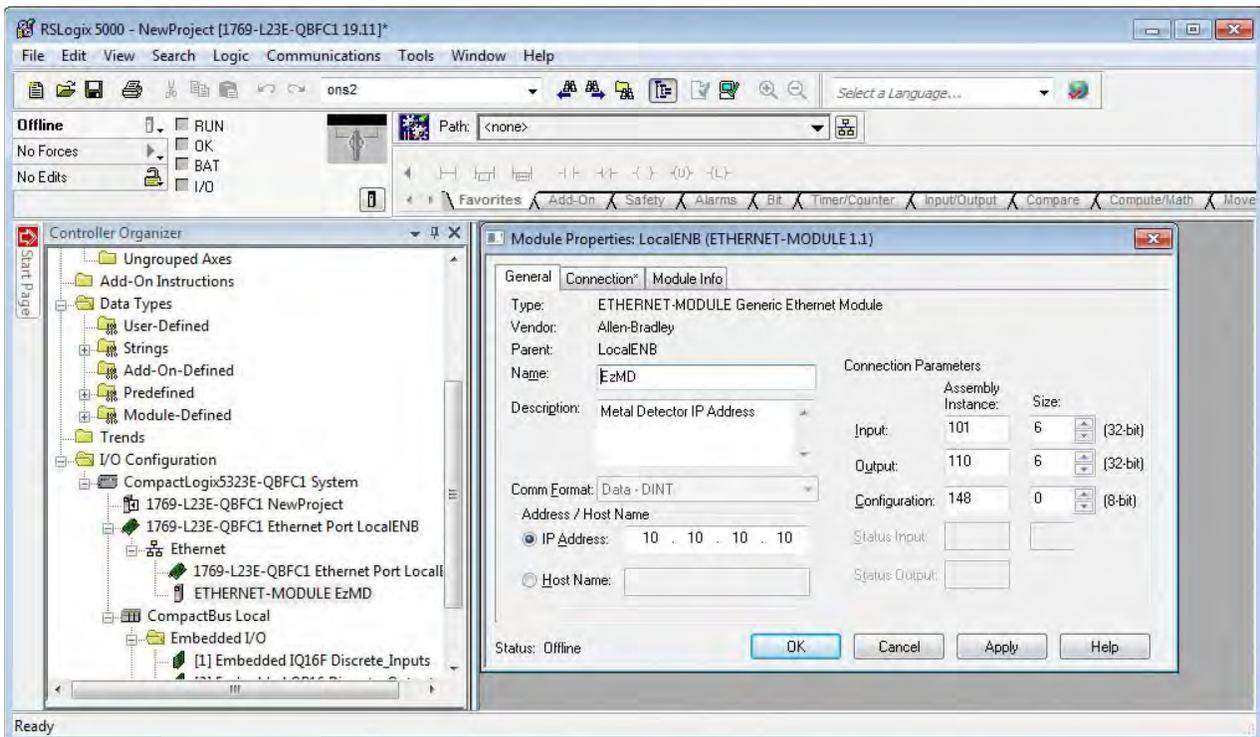


Figure 5-6. New Module Properties

7. From the Module Properties: LocalENB select the **Connection Tab**.
 - Set the **Requested Pack Interval (RPI)** to 250 ms

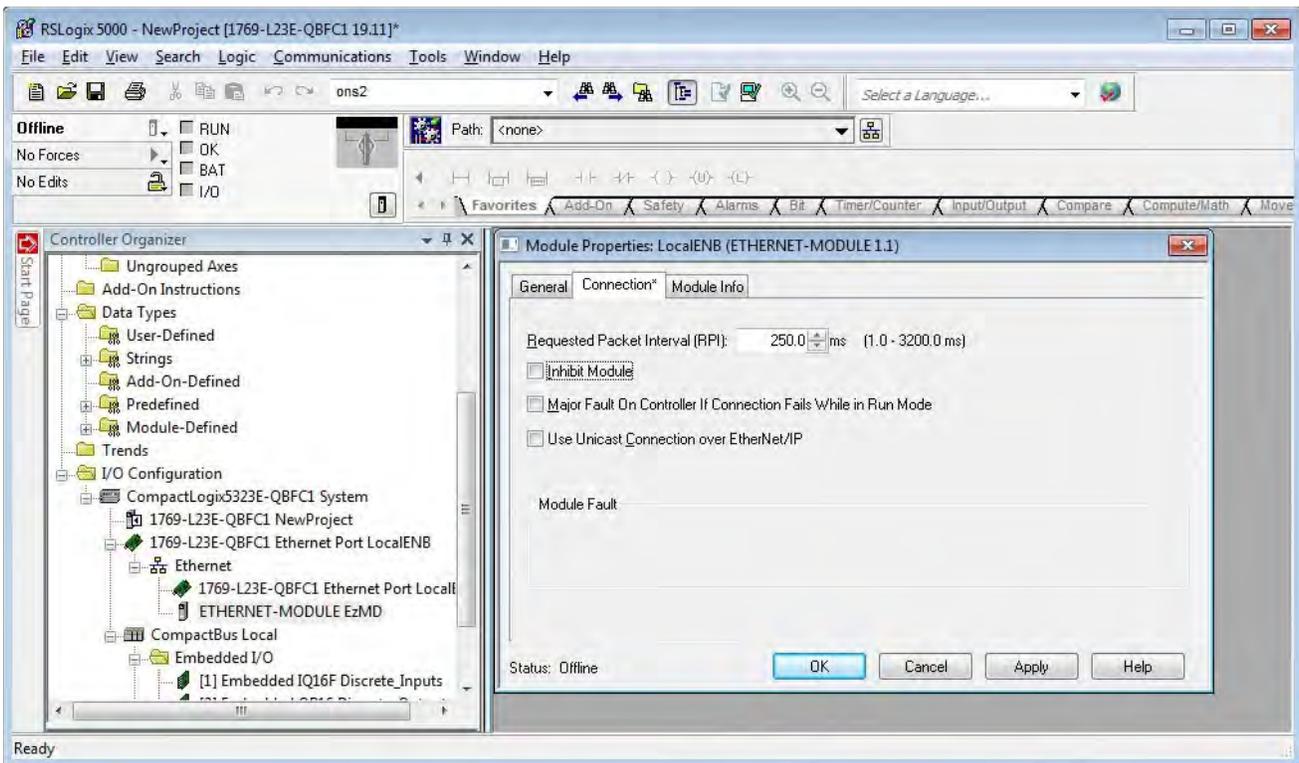


Figure 5-7. Connection Tab

8. Connect the PLC Ethernet cable to the same network as the metal detector.

- On the metal detector PLC configuration screen, verify both the and status lights are green.

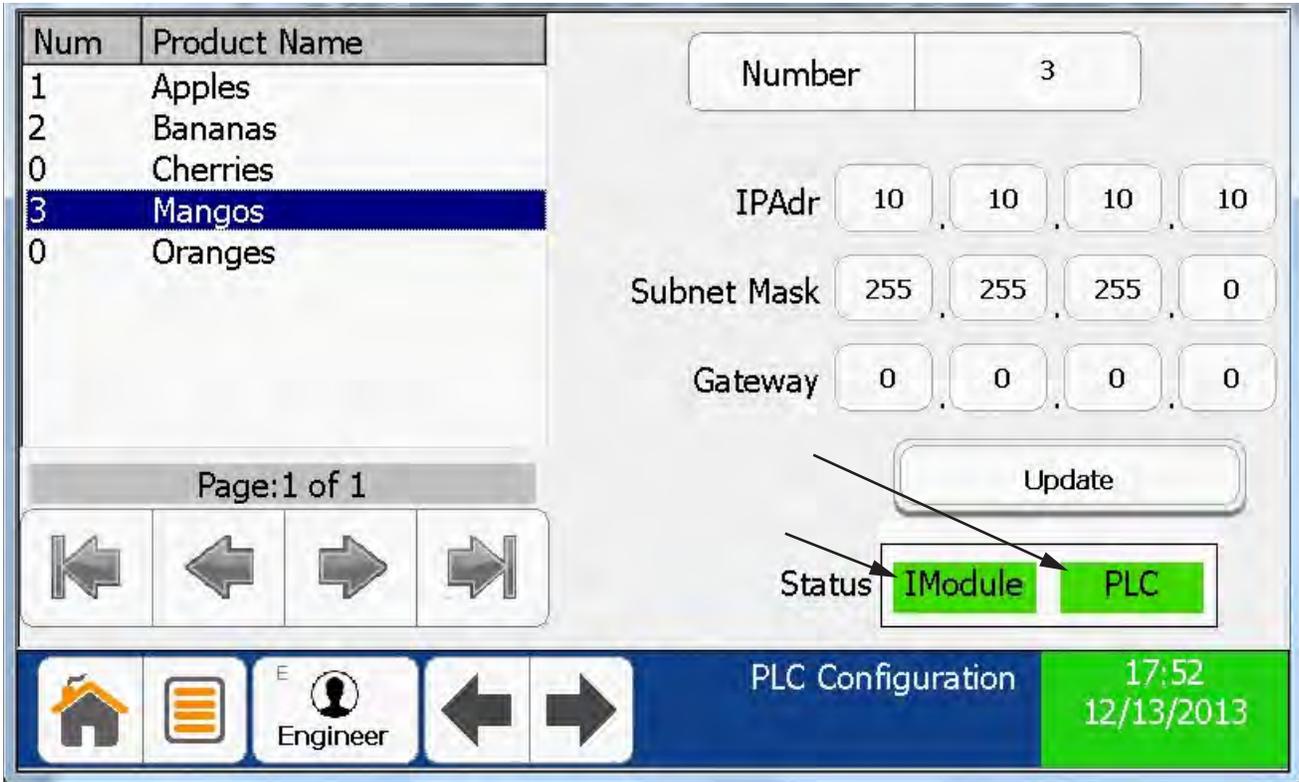


Figure 5-8. Metal Detector PLC Configuration Screen

5.4 PLC PROGRAMMING

- The PLC communicates with the Metal Detector using two 6-word blocks of memory in the Generic Ethernet Module. Each word is 16 bits.

| MD:O. | PLC output | MD:I. | PLC input |
|---------|-----------------|---------|--------------------------|
| Data[0] | reserved | Data[0] | metal detector status |
| Data[1] | command | Data[1] | command confirmation |
| Data[2] | param 1 to send | Data[2] | received param 1 |
| Data[3] | param 2 to send | Data[3] | received param 2 |
| Data[4] | param 3 to send | Data[4] | received param 3 |
| Data[5] | reserved | Data[5] | metal detector heartbeat |

Table 5-1. PLC Communication

- The PLC initiates all communication with the Metal Detector by first filling in the necessary output (send) parameters, then writing (a command) to MD:O.Data[1].
- When the Metal Detector responds with the same command and any associated input (receive) parameters, the PLC writes a NO-OP command 0xFF to MD:O.Data[1] and the Metal Detector responds with 0x00.

4. The following Metal Detector commands are available:

| DECIMAL | HEX | COMMAND |
|---------|--------|---|
| 1 | 0x0001 | Set Running Product (for example product 3) MOV 3 to MD:O.Data[2] MOV 16#0001 to MD:O.Data[1] |
| | Reply | MD:I.Data[0] contains Metal Detector status MD:I.Data[1] contains command 16#0001 MD:I.Data[5] contains Metal Detector heartbeat |
| | | See Sample Program ladder diagram rung 6 |
| 2 | 0x0002 | Read Running Product MOV 16#0002 to EzMD:O.Data[1] |
| | Reply | MD:I.Data[0] contains Metal Detector status MD:I.Data[1] contains command 16#0002 MD:I.Data[2] contains <u>running product number</u> MD:I.Data[5] contains Metal Detector heartbeat |
| | | See Sample Program ladder diagram rung 5 |
| 255 | 0x00FF | No operation |
| | Reply | MD:I.Data[0] contains Metal Detector status MD:I.Data[1] contains command 16#0000 MD:I.Data[5] contains Metal Detector heartbeat |
| | | See Sample Program ladder diagram rung 8 for automatic no-op insertion |

Figure 5-9. Metal Detection Commands

5. Metal Detector status MD:I.Data[0] is updated approximately every second and with every command exchange. See the sample program rung 0.

| BIT | DESCRIPTION | VALUE=1 | VALUE=0 |
|------|------------------------------|----------|------------|
| 0 | Metal Detector Fault | Fault | No Fault |
| 1 | Metal Detector Warning | Warning | No Warning |
| 2 | Metal Detector Ready | Ready | Not Ready |
| 3 | Invalid Ethernet Command | Invalid | Valid |
| 4-14 | | | |
| 15 | No Reply From Metal Detector | No Reply | Reply |

Table 5-2. Status MD:I.Data[0]

6. The Metal Detector increments a 16-bit counter (heartbeat) and sends it back to the PLC MD:I.Data[5] with every status update. See the ladder diagram rung 1 in Sample PLC Program .

5.5 Sample PLC Program

The sample program assumes one generic Ethernet IP module named MD, one 16-bit DC input module named Local:1, and one 16-bit DC output module named Local:2. Inputs and outputs assigned below.

The ladder diagram, tags, and rung descriptions can be found on the pages that follow.

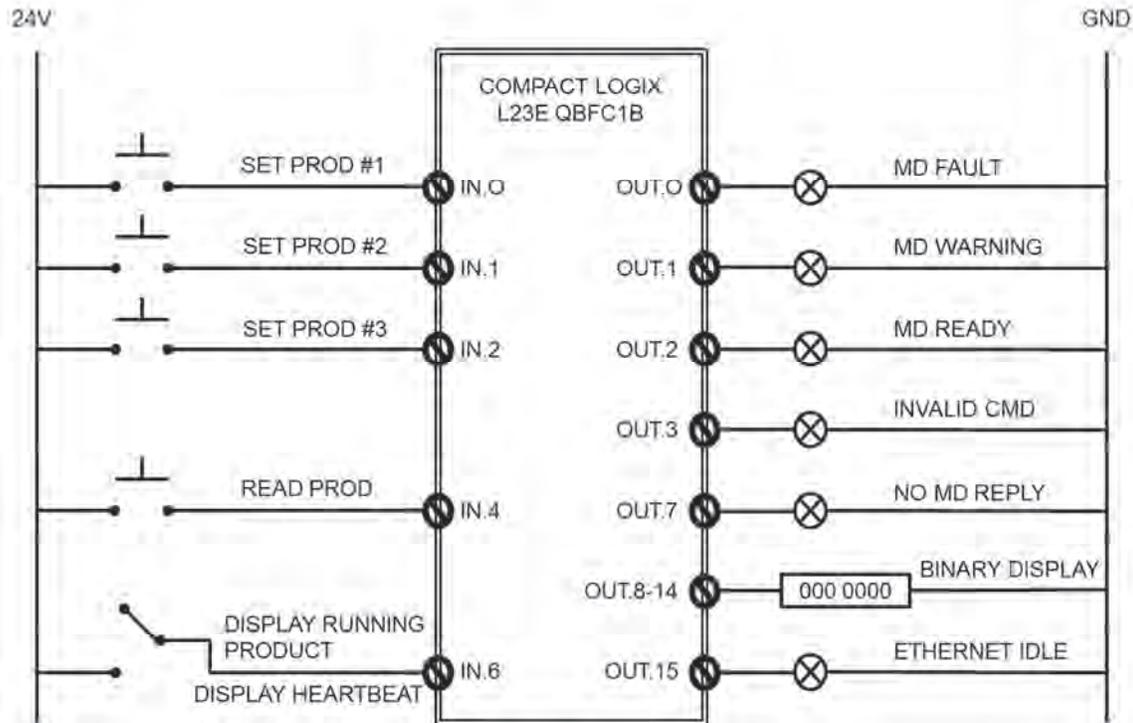


Figure 5-10. Inputs and Outputs

| DC Inputs Local:I.Data | | DC Outputs Local:O.Data | |
|---------------------------|--|----------------------------|----------------------|
| 0 | SetProduct #1 (momentary 24V) | 0 | MD Fault |
| 1 | Set Product #2 (momentary 24V) | 1 | MD Warning |
| 2 | Set Product #3 (momentary 24V) | 2 | MD Ready |
| 3 | | 3 | MD Invalid Command |
| 4 | Read Running Product (momentary 24V) | 4 | |
| 5 | | 5 | |
| 6 | Select data to display 0V = Display running product 24V = Display heartbeat | 6 | |
| 7 | | 7 | No Reply from MD |
| 8-14 | | 8-14 | 7-bit Binary display |
| 15 | | 15 | Ethernet Idle |

Table 5-3. Inputs and Outputs

6.0 Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for one year.

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

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

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RLWS and buyer agree that RLWS's sole and exclusive liability hereunder is limited to repair or replacement of such goods. In accepting this warranty, the buyer waives any and all other claims to warranty.

Should the seller be other than RLWS, the buyer agrees to look only to the seller for warranty claims.

No terms, conditions, understanding, or agreements purporting to modify the terms of this warranty shall have any legal effect unless made in writing and signed by a corporate officer of RLWS and the Buyer.

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