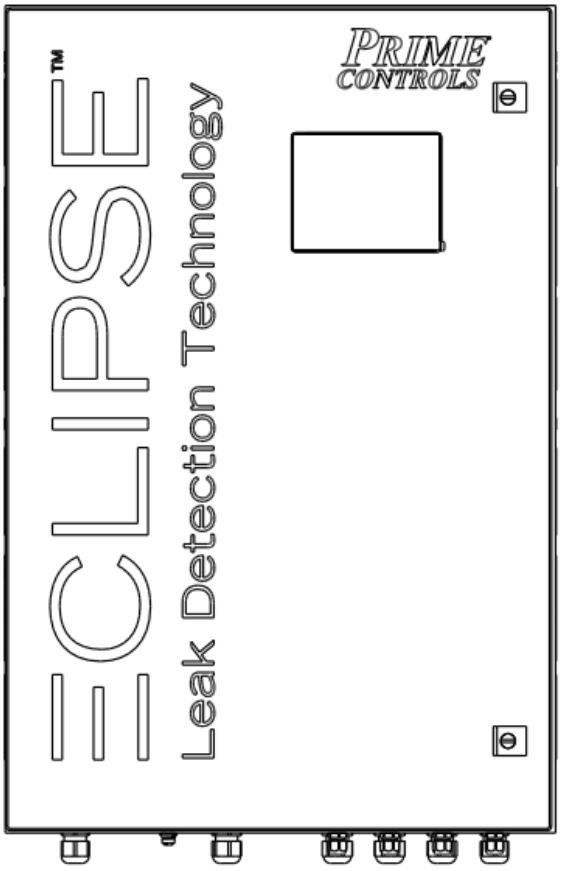
EP200 Multi-Lane End Leak Detection System

Operating Instructions

202920 Revision F

10/19/2023

Prime Controls, Inc.



DESCRIPTION

The EP200 End Leak Detection System (ELDS) uses Prime Controls LH200H and SL100H featuring Eclipse Leak Detection Technology to provide up to four lanes of light-based end leak detection for conversion presses. The system can operate at up to 1000 ends per minute while detecting holes and cracks as small as 0.5µm.

Revision History

Revision	Date	Description	Author
A	2021-05-03	Initial Release	RMC
B	2021-05-21	Updated LH200H-3 Mechanical Drawings	RMC
C	2021-06-21	Updated terminal block numbers 2401 -> 24X1	RMC
D	2021-11-02	Replaced LH200H-3 with LH200H-202 and LH200H-300. Added SL100H-2	RMC
E	2022-04-13	Updated Troubleshooting sections, expanded installation sections	BP
F	2023-10-19	Identified and clarified function of Fuses, Expanded Troubleshooting section to include Fuse issues, upgraded Wiring Diagrams to make clearer. Added SL101H-D as an option. Added Result Mode 3.	BP

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1 INTRODUCTION

The EP200 End Leak Detection System (ELDS) chassis supports one to four lanes of light-based leak detection using LH200H, LH200H-202 or LH200H-300 Light Detectors and SL100H-1 or SL100H-2 compact LED Illuminators. The system can operate at up to 1000 ends per minute while detecting 0.5µm defects. A minimum installation requires only a single trigger pulse from the Press Controller to initiate measurement during press dwell. A full system can take advantage of the system's Press Run input, measurement output, built-in rejector control, lane measurement phasing, Ready Signal output, and optional Modbus or Ethernet/IP communications.

2 SYSTEM COMPONENTS

The End Leak Detection System consists of nine major components as described below:

2.1 EP200 Chassis

The chassis uses an IP66 NEMA4 cabinet to house its power supplies, SL100H-D LED drivers (one per lane), reject solenoid relays, and terminal blocks. A door-mounted 5.7” color touch-panel provides set up and system monitoring capability for all four lanes. The chassis includes two tool operated quarter-turn latches on the door to secure it.

2.1.1 Indicators

The EP200 has internal LED indicators for its PLC, reject solenoid relays, LED Illuminator Drivers, and power supply.

2.1.2 Interconnects

The EP200 has connections to the LH200H or LH200H-opt and SL100H-1 or SL100H-2 detectors and illuminators, the reject solenoids, Press Controller, and AC mains.

2.2 MI200 Touch Screen

The MI200 is a 5.7” color touch screen, door mounted on the EP200 chassis. The touch screen provides configuration, diagnostic, and status reporting for the system.

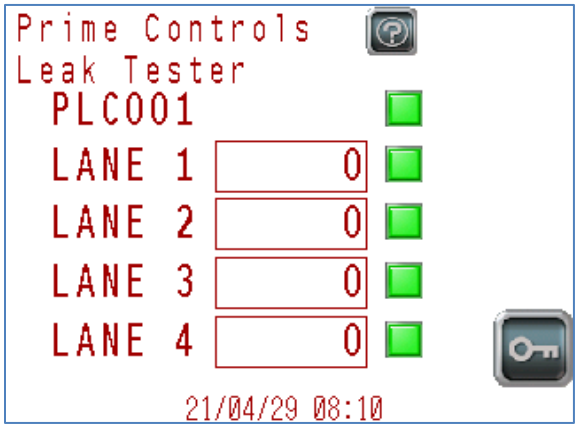


Figure 1 – MI200 Touch Screen

2.3 SL100H-D or SL101H-D LED Driver

The SL100H-D or SL101H-D drives the SL100H-1 or SL100H-2 remote LED illuminator. It provides constant current drive to the LEDs and pulse confirmation to the LH200H to ensure correct leak detection operation.

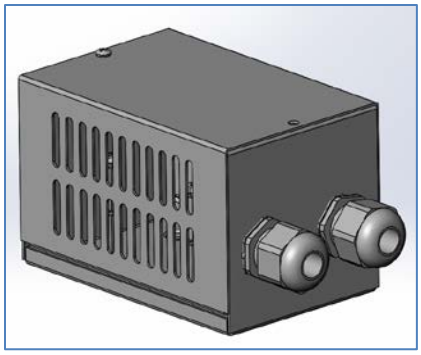


Figure 2 – SL100H-D LED Driver

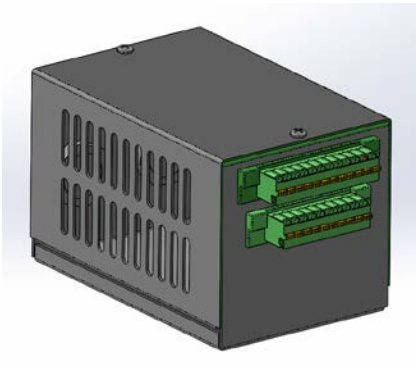


Figure 3 – SL101H-D LED Driver

The SL101H-D is functionally the same as the SL100H-D. It has been modified with detachable headers to make changeout easier.

2.4 PS506 Power Supply

The PS506 power supply of the system is a high current, +27V power supply selected for its current handling capability and reliability. The assembly includes an externally mounted current limiting resistor. The supply is adjusted to produce 27VDC. It is DIN rail mounted for ease of service.

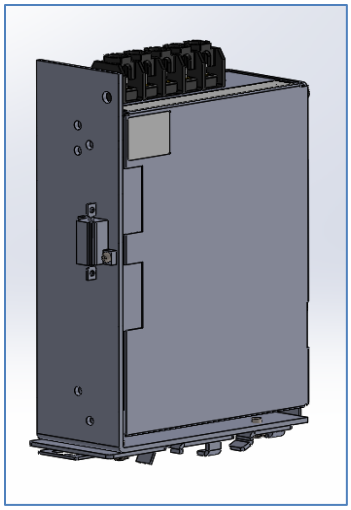


Figure 4 – PS506 Power Supply

2.5 CAP001 Power Filter

CAP001 provides current smoothing for the PS506 and SL100H-D OR SL101H-D LED drivers. It is DIN-rail mounted for ease of service.

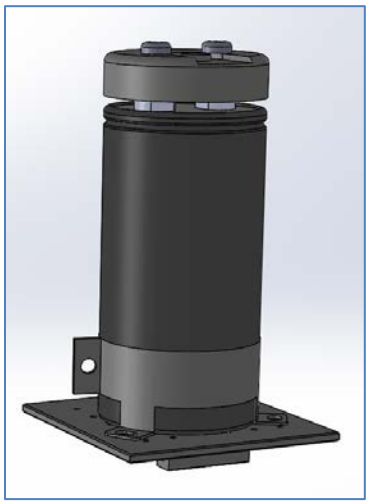


Figure 5 – CAP001 Power Filter

2.6 PLC001 Programmable Controller

The PLC001 controller integrates the signals from each detector into a common set of signals for connection to the Press Controller. It also monitors all signals and each lane to ensure the system is fully functional. PLC001 is configured using the HMI.

Figure 6 – PLC001

2.7 ET230 Ethernet Gateway (Option)

The ET230 can be used as an alternative to the MI200 touch screen. It translates the native Modbus communication of the LH200H and PLC001 to Ethernet/IP.

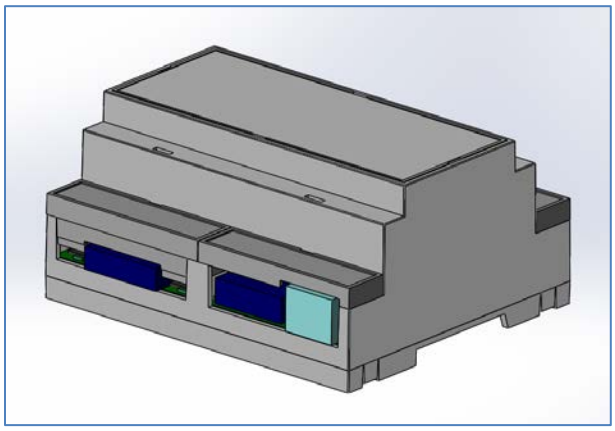


Figure 7 – ET230 Ethernet Gateway

2.8 LH200H or LH200H-opt Light Detector

The system uses LH200H or LH200H-opt light detectors based on Prime Controls' proprietary Eclipse Leak Detection Technology. One detector is used per lane. These detectors are designed to work in the hostile industrial environment of a conversion press while detecting leaks down to 0.5µm. The LH200H is packaged to mechanically match the Prime Controls LH200 light detectors, while the LH200H-opt is packaged to mechanically match a common mounting interface used in the industry. The nomenclature LH200H-opt refers to either the LH200H-202 or LH200H-300 detectors optimized for 202 or 300 sized ends respectively.

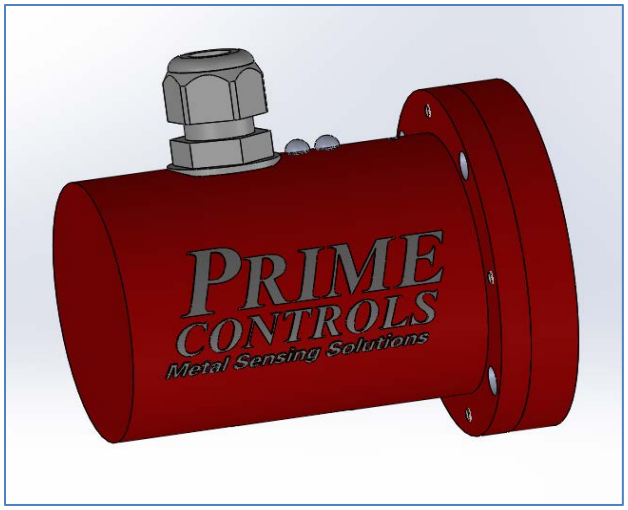


Figure 8 – LH200H

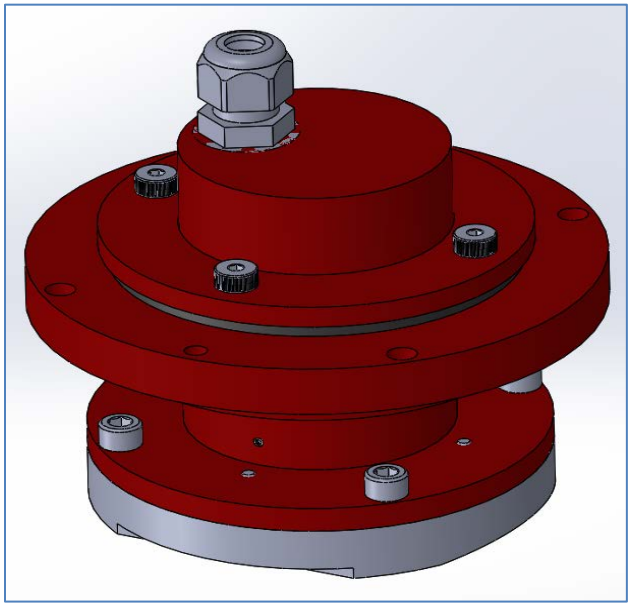


Figure 9 – LH200H-202 or LH200H-300

2.9 SL100H-1 or SL100H-2 Remote LED Illuminator

The system uses the SL100H-1 or SL100H-2 compact remote all-solid-state LED based illumination source for the system. One SL100H-1 or SL100H-2 is used per lane.

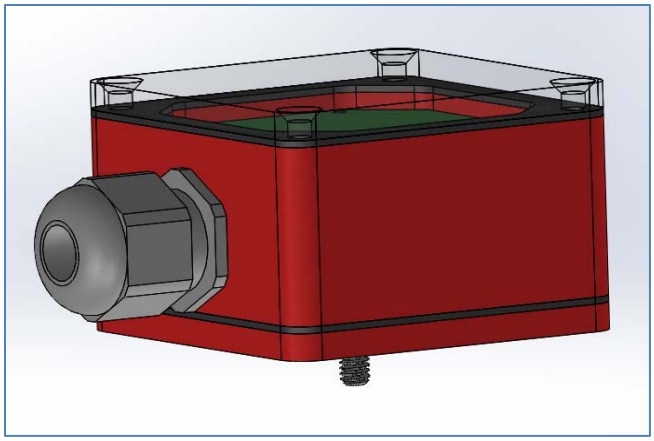


Figure 10 – SL100H-1 Remote LED Illuminator

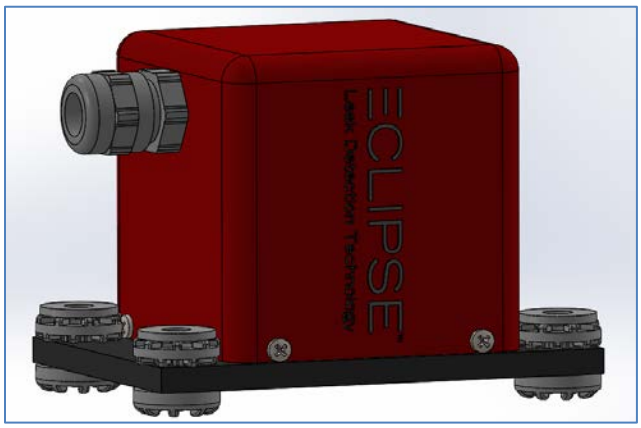


Figure 11 - SL100H-2 Remote LED Illuminator

2.10 Cable Set

The following cables are used in the system:

Table 1 – Cable Set

Name	Part Number	Description	Note
CBL144-10	202807-10	Connector/Cable, 12 pole, F PUR, Shielded, 10M	EP200 to LH200H or LH200H-opt
CBL145-10	202806-10	Connector/Cable, 12 pole, F PUR, Shielded, 10M	EP200 to SL100H-1 or SL100H-2
202928-2	202829-2	MI101 Display Cable, 2M	EP200 to MI200
CBL142-2	202568	MI1000 Power Cable, 2M	EP200 to MI200

The customer is responsible for cables to the reject solenoids, Press Controller, and AC power source.

2.11 Sensors and Actuators

In addition to the LH200H or LH200H-opt and SL100H-1 or SL100H-2 mounted on the machine, the customer may supply a reject solenoid (actuator) to reject failed can ends from the product flow by using a blast of air or other means to remove a leaking end from the outfeed conveyor.

2.12 Fuses

The EP200 panel is equipped with in-line buss fuses to protect the electronic circuitry. These fuses consist of the following:

Table 2 – Fuses

Part Number	Fuse Rating	Location	Protects
202858	Fuse, Med. 4.0A 125V 5mm x 20mm	PSIO Rail F1	+27V to PLC and Lane #1
202858	Fuse, Med. 4.0A 125V 5mm x 20mm	PSIO Rail F2, F3, F4	+27V to Lanes #2, #3, & #4 Respectively
203058	Fuse, Med 2.5A 125V 5mm x 20mm	PSIO Rail F5	+27V to Rejector Solenoids
105863	Fuse, Fast .500A 250V 5mm x 20mm	PSIO Rail F6	2402 Circuit +27V to PLC Outputs and SSR Isolating Trigger from Press

3 INSTALLATION

Prior installation of any components, verify that power is off to the unit and lock-outs are in place per workplace safety policies.

3.1 EP200 Chassis Mounting

The EP200 enclosure is wall-mounted using four 7.62mm (.300”) holes on its back face. See section 16 for drawing 202924 for details.

3.2 LH200H, LH200H-opt Mounting

The LH200H is mounted using four 6.75mm (0.266”) holes on a 69.85mm (2.75”) bolt circle. The unit should be shock-mounted to reduce vibration transmitted to the unit from the press. See section 16 for drawing 202690 for details.

The LH200H-opt is mounted using four 6.75mm (0.266”) holes on a 117.48mm (4.625”) bolt circle. See section 16 for drawing 202798 at the back of this document for details. Shim the unit to achieve proper contact with ends as they pass under the detector.

3.3 SL100H-1, SL100H-2 Mounting

The SL100H-1 is mounted using a single ¼-20 x 0.50” stud. See section 16 for drawing 202801 for details. Orient the cable direction to simplify cable routing.

The SL100H-2 is mounted using 4 ¼-28 socket head cap screws. See section 16 for drawing 202993 for details. Orient the cable direction to simplify cable routing.

3.4 Wiring and Cabling

3.4.1 Introduction

Refer to section 16 for drawing 202912 for system wiring and cabling details. The system has two sets of DIN rail mounted terminal blocks in the EP200 chassis for interconnection purposes. The horizontal power entry and Press Controller interconnect rail is designated PSIO while the vertical detector/illuminator connection rail is designated LHSL. The connections to the PSIO rail between the EP200 System and the Press Controller are listed below.

For a full list of terminal connections on the EP200 System, refer to Section 15.

Inputs from the Press Controller are optically isolated and use the PC_IO_POWER_(+) and PC_IO_POWER_(-) for their returns.

Outputs to the Press Controller are referenced to the local ELDS_IO_POWER_(+) and ELDS_IO_POWER_(-) signals.

Table 3 – Discreet Inputs / Outputs

IO Connections needed for MINIMUM INSTALL CONFIGURATION						
SIGNAL	USE	PRESS CONTROLLER TERMINAL	TO	EP200 PSIO RAIL TERMINAL	NOTE	TEST
READ TRIGGER	Signal to EP200 that Press is in dwell, take measurement			700 (C)	Initiates measurement by EP200 System	Toggle at Press PLC - Visible at EP200 PLC Z1-X6 (27VDC)
PC_IO_POWER (+)	+27V for inputs from Press Controller			PLC +	+27V for inputs from Press Controller	DMM 27VDC differential between Press ELDS IO Power and Gnd terminals PLC+/PLC-
PC_IO_POWER (-)	Common for inputs from Press Controller			PLC -	Common for inputs from Press Controller	
PE	Protective Earth Ground			PE (D)	GREEN/YELLOW	DMM at EP200 PE (C)
NEUTRAL	AC Neutral			ACN (D)	WHITE	DMM at EP200 CAN (C)
AC LINE	SYSTEM POWER			CB1 (A)	BLACK 90-260VAC 47-63Hz POWER	DMM at EP200 CB1 (A)

The following IO connections are optional for the FULL SYSTEM INSTALLATION CONFIGURATION						
SIGNAL	USE	PRESS CONTROLLER TERMINAL	TO	EP200 PSIO RAIL TERMINAL	NOTE	TEST
PRESS RUN	Signal to EP200 that the Press is running normally			201	Signal to EP200 that the Press is running normally	Toggle at Press PLC – Press Run Visible at EP200 PLC Z1-X5 LED
LANE 1 REJECT	Signal to Press to activate Rejector Lane 1 / Track leak counts (leak detected)			305 (C)	Used for Press controlled rejector	Toggle at EP200 -IO Config: Rejector for Lane 1 Visible at Press PLC rejector input – Lane 1 (27VDC)
LANE 2 REJECT	Signal to Press to activate Rejector Lane 2 / Track leak counts (leak detected)			405 (C)	Used for Press controlled rejector	Toggle at EP200 -IO Config: Rejector for Lane 2 Visible at Press PLC rejector input – Lane 2 (27VDC)
LANE 3 REJECT	Signal to Press to activate Rejector Lane 3 / Track leak counts (leak detected)			505 (C)	Used for Press controlled rejector	Toggle at EP200 -IO Config: Rejector for Lane 3 Visible at Press PLC rejector input – Lane 3 (27VDC)
LANE 4 REJECT	Signal to Press to activate Rejector Lane 4 / Track leak counts (leak detected)			605 (C)	Used for Press controlled rejector	Toggle at EP200 -IO Config: Rejector for Lane 4 Visible at Press PLC rejector input – Lane 4 (27VDC)
FAULT	Signal to Press that there is a problem with the EP200 System			202	Used to stop Press due to EP200 Problem	Toggle at EP200 – IO PLC: Fault Sig Visible at Press PLC Fault Input (27VDC)

READY SIGNAL	Signal to Press that EP200 System is ready for measurements			204	Used to prevent Press start without measurement	Toggle at EP200 – IO PLC: <u>Ready Signal</u> Visible at Press PLC Ready Signal input (27VDC)
EXCESS REJECT OUT	Signal to Press when Reject Limit is exceeded			203 (D)	Used to stop Press when excess rejects detected	Toggle at EP200 – IO PLC: <u>Ready Signal</u> Visible at Press PLC Excess Reject input (27VDC)
ELDS IO POWER (-) GND	Common for outputs to Press Controller			2400 (D)	Common for outputs to Press Controller	DMM 27VDC differential between Press ELDS IO Power and Gnd terminals
ELDS IO POWER (+) 27V	+27V for outputs to Press Controller			2402 (D)	+27V for outputs to Press Controller	
EXT HMI MODBUS A	MODBUS A between external HMI and EP200			301 (D)	For External Modbus communications	DMM Verify continuity between EP200 panel and Press Controller
EXT HMI MODBUS B	MODBUS B between external HMI and EP200			302 (D)	For External Modbus communications	DMM Verify continuity between EP200 panel and Press Controller
EXT HMI CHASSIS PE	External HMI chassis PE			PE (D)	For External Modbus communications	DMM Verify continuity between EP200 panel and Press Controller
EXT HMI COMMON GND	Externa HMI common GND			2400 (C)	For External Modbus communications	DMM Verify continuity between EP200 panel and Press Controller

REJECT SSR - LANE 1	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (+)		RJ1	For EP200 controlled rejectors	Toggle at EP200 -IO Config: Rejector for Lane 1 Visible at Rejector Solenoid Lane 1 (27VDC)
REJECT SSR RET LANE 1	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (-)		2400 (D)	For EP200 controlled rejectors	
REJECT SSR CHASSIS LANE 1	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (CHASSIS)		PE (D)	For EP200 controlled rejectors	
REJECT SSR - LANE 2	LANE REJECTOR	REJECTOR SOLENOID LANE 2 (+)		RJ2	For EP200 controlled rejectors	Toggle at EP200 -IO Config: Rejector for Lane 2 Visible at Rejector Solenoid Lane 2 (27VDC)
REJECT SSR RET LANE 2	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (-)		2400 (C)	For EP200 controlled rejectors	
REJECT SSR CHASSIS LANE 2	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (CHASSIS)		PE (C)	For EP200 controlled rejectors	
REJECT SSR - LANE 3	LANE REJECTOR	REJECTOR SOLENOID LANE 3 (+)		RJ3	For EP200 controlled rejectors	Toggle at EP200 -IO Config: Rejector for Lane 3 Visible at Rejector Solenoid Lane 3 (27VDC)
REJECT SSR RET LANE 3	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (-)		2400 (D)	For EP200 controlled rejectors	
REJECT SSR CHASSIS LANE 3	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (CHASSIS)		PE (D)	For EP200 controlled rejectors	
REJECT SSR - LANE 4	LANE REJECTOR	REJECTOR SOLENOID LANE 4 (+)		RJ4	For EP200 controlled rejectors	Toggle at EP200 -IO Config: Rejector for Lane 4 Visible at Rejector Solenoid Lane 4 (27VDC)
REJECT SSR RET LANE 4	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (-)		2400 (C)	For EP200 controlled rejectors	
REJECT SSR CHASSIS LANE 4	LANE REJECTOR	REJECTOR SOLENOID LANE 1 (CHASSIS)		PE (C)	For EP200 controlled rejectors	

3.4.2 General Terminal Block Connections

The terminal blocks used for power and signal connections are designed for 26-12 AWG, 0.14-4mm^2 wires. Stripping length is specified as 8-10mm.

3.4.3 AC Power

The system uses 90-260 VAC, 47-63Hz power. The terminal blocks support wire gauges 26-12 AWG wire using Line1, Neutral (or Line 2), and Protective Earth (PE) ground. Select an appropriate wire gauge within the allowable range consistent with system safety requirements. A 4 amp circuit breaker is included in the unit.

3.4.4 Press Controller Connections

Connections to the Press Controller are made via the PSIO DIN rail located horizontally at the bottom of the EP200 chassis. A total of up to fifteen (15) connections may be made to the Press Controller including reference voltages.

Description	Type	Use
PC IO POWER (+)		Unused
PC IO POWER (-)	Input Reference	Common for Press Controller Inputs
READ_TRIGGER	Sinking Input	Press Controller Trigger for Measurement
PRESS_RUN	Sinking Input	Indicates press is running
LAMP_FAULT_CLEAR_IN	Sinking Input	Unused
LANE_1_REJECT_SIG	Sourcing Output	Press Controller Monitor Leaks
LANE_2_REJECT_SIG	Sourcing Output	Press Controller Monitor Leaks
LANE_3_REJECT_SIG	Sourcing Output	Press Controller Monitor Leaks
LANE_4_REJECT_SIG	Sourcing Output	Press Controller Monitor Leaks
FAULT_SIG	Sourcing Output	Indicates a fault in the Light Tester
EXCESS_REJECT_OUT	Sourcing Output	Indicates excessive rejects
READY_SIGNAL	Sourcing Output	Press Controller Monitor System Status
SPARE_OUTPUT	Sourcing Output	Unused
ELDS IO POWER (-)	Output Reference	Common for Press Controller Outputs
ELDS IO POWER (+)		Unused

3.4.4.2 Input Logic Signals

These signals originate at the Press Controller and are received by the EP200 system.

The signals are optically isolated from the ELDS system using the PC_IO_POWER signals to power the isolation circuitry.

The EP200 system uses two input signals. The first indicates the press is running and the second triggers the measurement cycle. The PRESS_RUN signal is routed exclusively to PLC001 while the READ_TRIGGER signal is routed to PLC001 and a buffer relay used to drive each lane's detector. The detector can be programmed to trigger on the rising or falling edge of this signal. The timing of the measurement cycle is programmable. It is possible to have all lanes measure at once or to sequence them in several ways. The default is for lanes 1 and 3 to measure together and lanes 2 and 4 to measure together 1mS later. Sequencing helps to reduce the possibility of light interacting between adjacent lanes. Sequence timing is controlled via the Phase setting on the MI200. A third, unused input, LAMP_FAULT_CLEAR_IN is available on the terminal block.

3.4.4.3 Output Logic Signals

These signals originate at the EP200 system and are received by the Press Controller.

These signals should be optically isolated from the Press Controller power system by using the provided ELDS power signals to power isolators located in the Press Controller.

The system has one output per lane, LANE_x_REJECT_SIG, where x is 1-4 depending on the number of lanes in the system and four global outputs: FAULT_SIG, EXCESS_REJECT_OUT, READY_SIGNAL, and SPARE_OUTPUT. READY_SIGNAL captures the general health of the system and is used by the Press Controller to confirm the system is fully functional with no faults detected. LANE_x_REJECT_SIG is the resulting output from each measurement cycle per lane.

3.4.4.4 Signal Polarities

Asserted means current is flowing. For a sourcing output, asserted means the output is pulling up to the (+) power supply rail. Unasserted means no current is flowing. The output is neither pulling the signal to (+) or (-); i.e., the signal behaves as if it is not connected. Sourcing outputs connect to Sinking inputs.

Conversely, for a sinking output, asserted means the output is pulling down to the (-) power supply rail. Unasserted means no current is flowing. The output is neither pulling the signal to (+) or (-); i.e. the signal behaves as if it is not connected. Sinking outputs connect to Sourcing inputs.

Fail-safe signal polarities are defined so that in the event a wire is disconnected the received signal indicates an abnormal operating condition triggering a fault and forcing the operator to diagnose and repair the wiring fault.

3.4.4.4.1 Drop-In Replacement Wiring Configuration

Description	Type	Interpretation
READ_TRIGGER	Sinking Input	Start of assertion indicates start of press dwell
PRESS_RUN	Sinking Input	Asserted when press is running.
LAMP_FAULT_CLEAR_IN	Sinking Input	Unused
LANE_1_REJECT_SIG	Sourcing Output	Asserted when leaker is detected
LANE_2_REJECT_SIG	Sourcing Output	Asserted when leaker is detected
LANE_3_REJECT_SIG	Sourcing Output	Asserted when leaker is detected
LANE_4_REJECT_SIG	Sourcing Output	Asserted when leaker is detected
FAULT_SIG	Sourcing Output	Asserted when fault
EXCESS_REJECT_OUT	Sourcing Output	Asserted when excessive rejects are detected.
READY_SIGNAL	Sourcing Output	Asserted when ELDS is ready
SPARE_OUTPUT	Sourcing Output	Unused

“Types” are from the perspective of the ELDS. For example, the READ_TRIGGER type of Sinking Input means it is an input to the ELDS and therefore, a Sourcing Output from the Press Controller.

The LANE_x_REJECT_SIG and FAULT_SIG signals are not fail-safe. If any of the wires to these signals were to break or be disconnected, the Press Controller would sense non-fault and non-leak conditions regardless of the true state of the system. The same is true for EXCESS_REJECT_OUT. Similarly, if the PRESS_RUN input wire was to break, the ELDS would never know the press was on and would never make a measurement.

This electrical configuration is designed to simplify the installation of the ELDS in a retro-fit situation where it is replacing some models of a competitor’s End Light Tester Package (ELTP)

3.4.4.4.2 Fail Safe Wiring Configuration (Preferred)

Description	Type	Interpretation
READ_TRIGGER	Sinking Input	Start of assertion indicates start of press dwell
PRESS_RUN	Sinking Input	**Asserted when press is not running.**
LAMP_FAULT_CLEAR_IN	Sinking Input	Unused
LANE_1_REJECT_SIG	Sourcing Output	**Asserted when non-leaker is detected**
LANE_2_REJECT_SIG	Sourcing Output	**Asserted when non-leaker is detected**
LANE_3_REJECT_SIG	Sourcing Output	**Asserted when non-leaker is detected**
LANE4_REJECT_SIG	Sourcing Output	**Asserted when non-leaker is detected**
FAULT_SIG	Sourcing Output	**Asserted when no fault**
EXCESS_REJECT_OUT	Sourcing Output	**Asserted when excessive rejects are not detected.**
READY_SIGNAL	Sourcing Output	Asserted when ELDS is ready
SPARE_OUTPUT	Sourcing Output	Unused

Boldface is used to highlight differences in the signal polarity compared to the Standard (Drop-In) wiring configuration.

Signal assertion states designed so that a broken wire would appear as a fault to the Press Controller forcing corrective action to repair the system.

3.4.5 External Rejector Signals

The Rejector signals are solid-state relay driven signals to drive rejector solenoids based on each lane's measurement results. The signals include timing provisions to account for the time lag between the measurement and the arrival of an end at the lane's rejector blow-off position along with the capability to reject ends before and after the suspect end to ensure successful rejection of the end regardless of minor speed and handling variations between the light detector and reject position.

3.4.6 Internal Signals

The logic outputs of the LH200H, LH200H-opt are programmable for PNP, NPN, and Push-Pull drive. The default is PNP. The polarities of the signals default to fail-safe values for PNP drive. This means that fault conditions are signaled by a low or ground signal, and non-fault signals are signaled by high or +27V (PNP driven signals).

Table 4 – Signal Drive Types

Drive Type	High Signal	Low Signal	Fail-Safe
Hi-Z	No Drive	No Drive	N/A
PNP	Pull Up	No Drive	Low
NPN	No Drive	Pull Down	High
Push-Pull	Pull Up	Pull Down	Low

Table 5 – Internal Signal Polarities

Unit	**Signal**	**High True**	**Low True**
LH200H	Trigger	Rising Edge Trigger	Falling Edge Trigger
LH200H	Lane Reject	High for No Leak	Low for No Leak
LH200H	Rejector	High to Reject	Low to Reject
LH200H	Strobe Trigger	High to Strobe	Low to Strobe
LH200H	System OK	High for OK	Low for OK
SL100H-D OR SL101H-D*	Strobe Good	High for Good	Low for Good

* - The Strobe Good signal enters a high impedance state after 2 seconds after the last strobe.

3.4.8 Configuring System Parameters

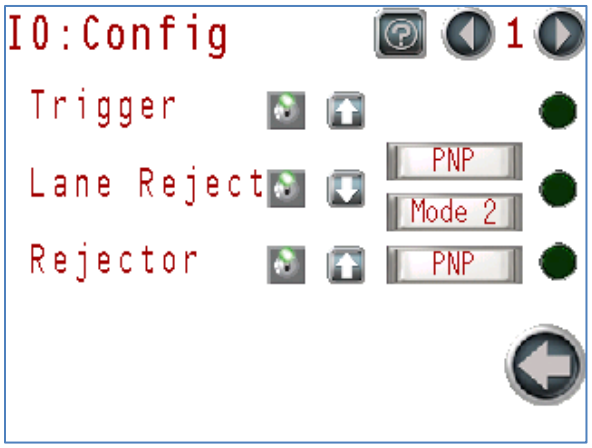
To function properly, the EP200 system inputs and outputs need to be properly configured. Below is a list of the necessary inputs and outputs and the recommended configurations of those signals. The following pages show the recommended settings for Drop-in Replacement, and Fail-Safe configurations.

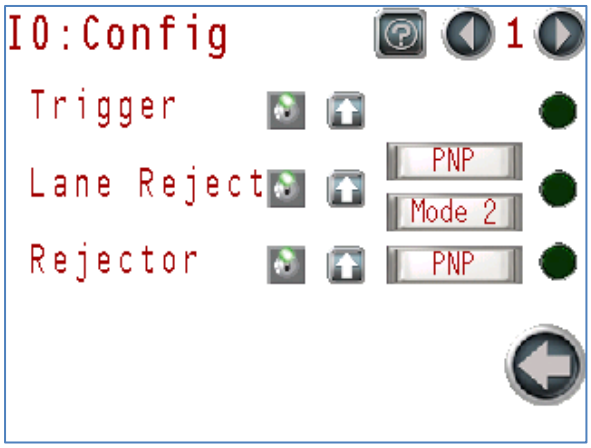
DROP-IN-REPLACEMENT SETTINGS	(**RECOMMENDED**) FAIL-SAFE SETTINGS

To access the following screens, unlock the HMI and navigate to:

SETUP>CONFIG IO>

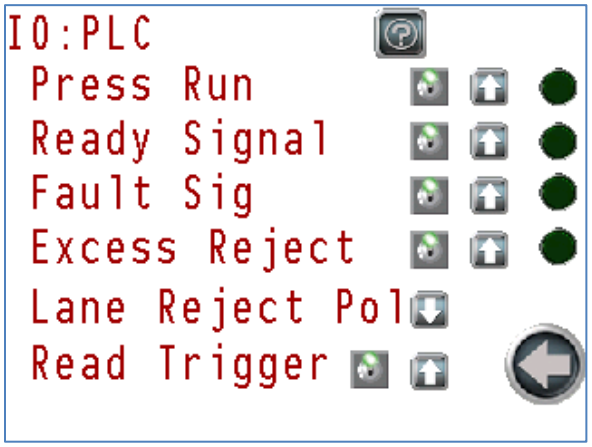
Verify for all lanes

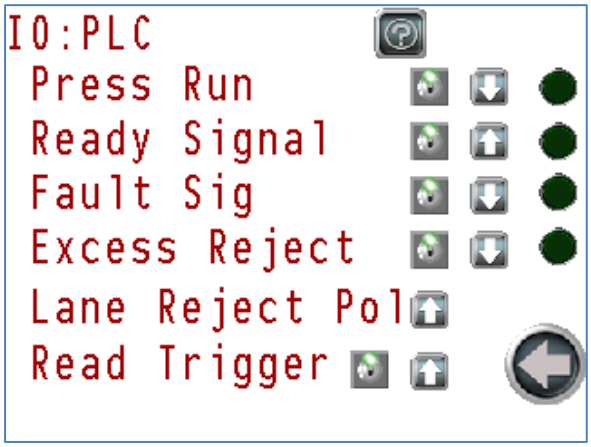




SETUP>CONFIG PLC>

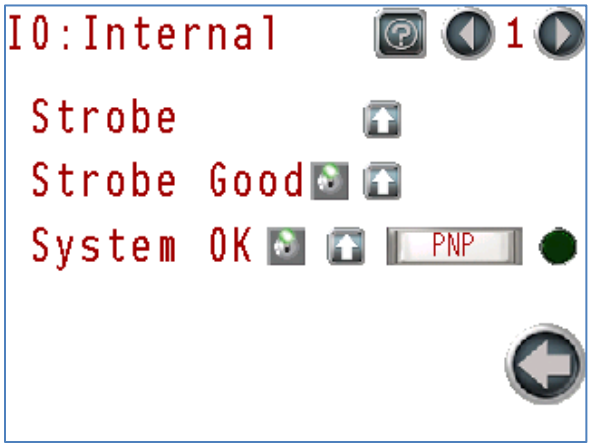
Not lane specific

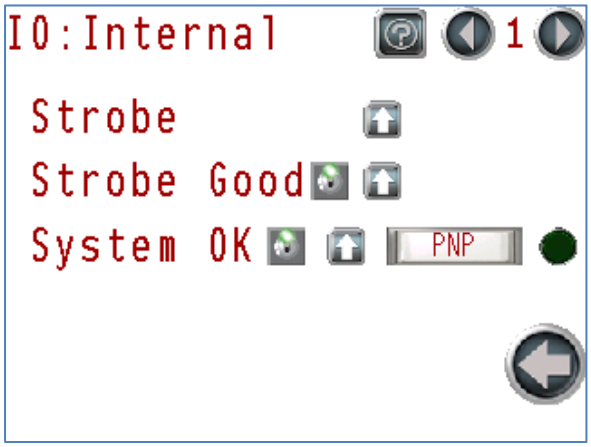




DIAGNOSTICS>INT IO>

Verify for all lanes

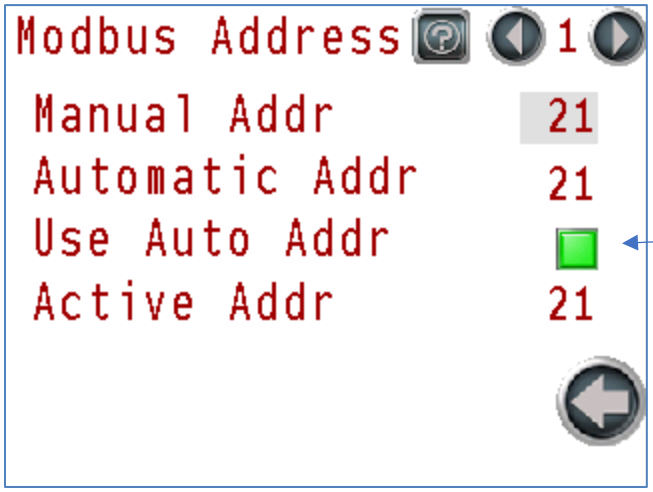




In addition to properly configured Inputs/Outputs, other system parameters must be set correctly.

UTILITY>ADDRESS>

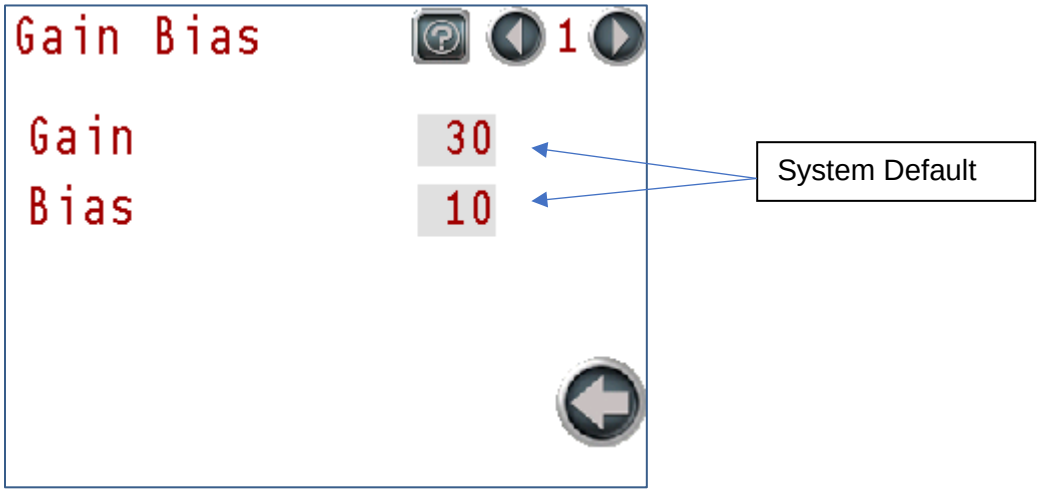
Use Auto Addr Recommended. Verify for all lanes.



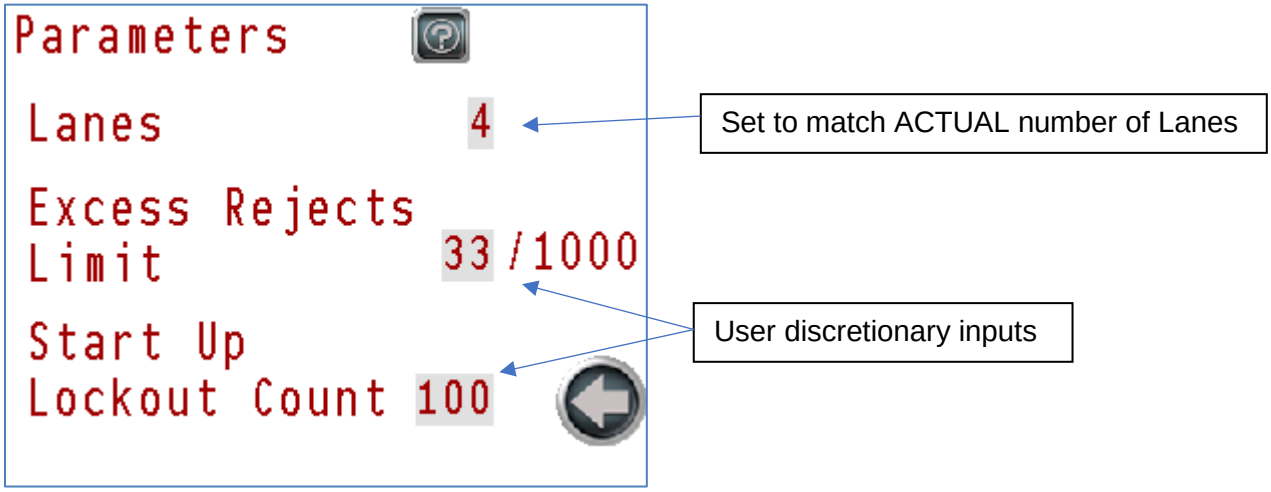
Recommended. Active Addr and Automatic Addr should match

UTILITY>GAIN BIAS

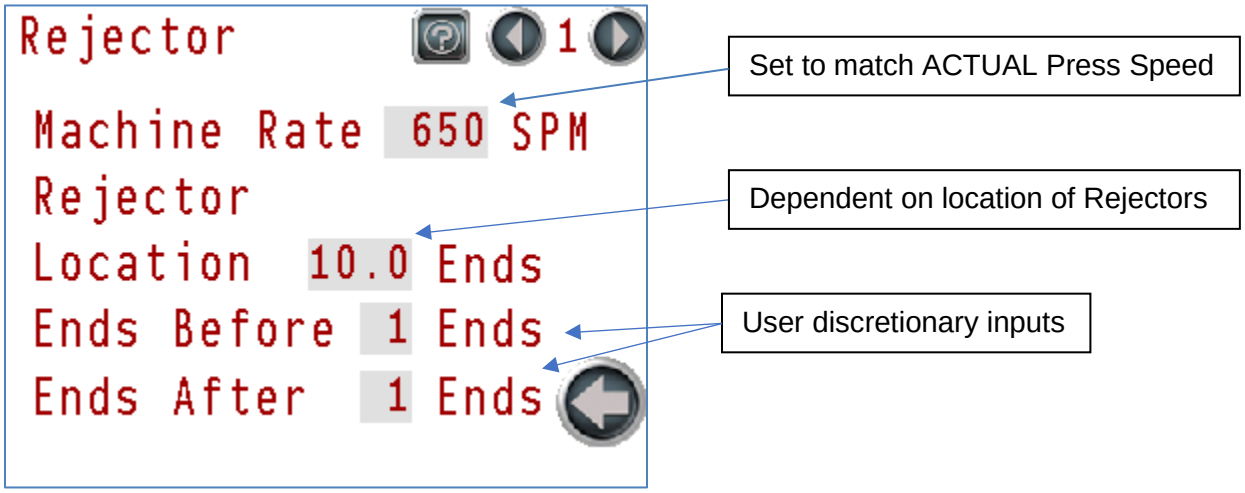
Recommended



SETUP>PARAMETERS>

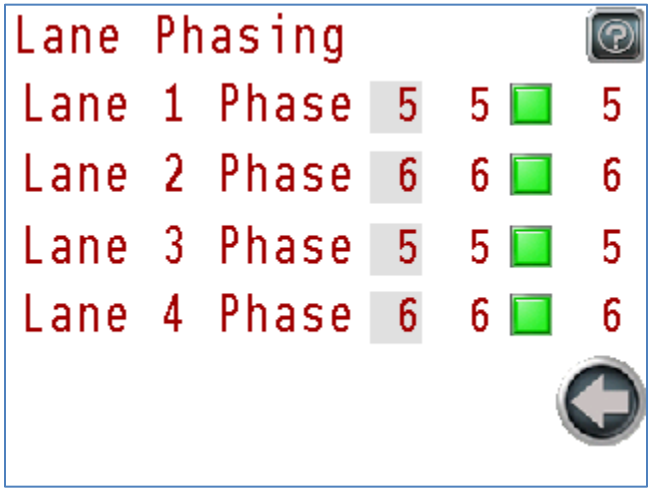


SETUP>REJECTOR>



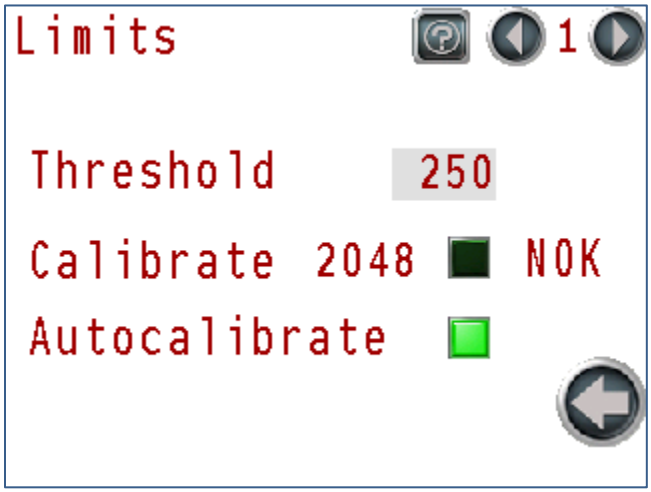
SETUP>PHASING>

Recommended Setting



SETUP>LIMITS>

Recommended Setting



4 OPERATION

4.1 Power-Up Sequence

Prior to powering on the unit, verify that all cables are properly connected to the LH200H or LH200H-opt, and SL100H-1 or SL100H-2 units. Power to the system may be controlled using circuit breaker CB1 located in the lower left-hand corner on the mounting plate DIN rail PSIO located inside the controller. Toggle its lever up to energize the system. The system is designed to be continuously powered. It is not necessary to periodically cycle power other than as required for maintenance of the system. See section 16 for drawing 202924 for details.

4.2 Power Troubleshooting

NOTE:

DO NOT MAKE HARDWARE CHANGES TO THE EP200 SYSTEM WHILE THE SYSTEM IS ENERGIZED.

See section 9 for proper hardware change procedures.

On startup of the EP200 Panel using the main breaker CB1 in the lower left corner of the panel, LED power indicators should be illuminated on the PS506, SL100H-D OR SL101H-Ds, and the PLC001 inside the panel and the MI200 should beep and begin its startup. The power LEDs on the LH200H/LH200H-202/LH200H-300s on the press should also illuminate. See section 8.3 for indicator locations.

Should this not occur, take the following steps.

1) Is the power indicator on PS506 illuminated?
If no
a) Verify correct AC Voltage, Ground, and PE connections to CB1.
b) Verify correct AC Voltage (120/240) is present at CB1.
c) Verify connections between CB1 and PS506.
d) Verify 27VDC at the V+ terminal on PS506. **IF NOT,** replace PS506. (see Section 9)

2) **Is the power indicator on PLC001 illuminated?** (If equipped with expansion modules, each modules power indicator should be illuminated).
If no
a) Verify 27VDC at the V+ terminal on PS506.
b) Verify 27VDC is present at terminal blocks 2401 on the PSIO rail. **IF NOT**, check connections between PS506 V+ terminal and terminal blocks 2401.
c) Verify that the fuse on the PSIO rail fuse block F1 is not missing or blown. Replace if necessary.
d) Verify 27VDC and Ground present at PLC001 + and – terminals. **IF NOT**, verify connections between PLC001 and the PSIO Rail.
e) Verify PLC001 RUN/STOP switch is in the RUN position.
f) If power indicators still not on, replace PLC001. (see Section 9)

3) **Are power indicators on the SL100H-D OR SL101H-Ds illuminated?**
If no
a) Verify 27VDC is present at the 24x1 terminal blocks on the LHSL rail at the corresponding lane. **IF NOT,** refer to 2), a) thru b) above.
b) Verify that the fuse on the PSIO rail fuse block F(Lane #) is not missing or blown. Replace if necessary.
c) Verify connections between the SL100H-D OR SL101H-D and the corresponding lane on the LHSL rail.
d) If problem persists, replace any SL100H-D OR SL101H-Ds not illuminated. (see Section 9)

To remove an installed SL100H-D OR SL101H-D, remove the top 2 cover mounting screws. The 4 component mounting screws are on the base inside the enclosure.

4) **Are the power indicators on the LH200H (H-200, H-300 if equipped) illuminated?**
if no
   a) Verify 27VDC is present at the 24x1 terminal blocks on the LHSL rail at the corresponding lane. **IF NOT**, refer to section 24), a) thru b) above.
   b) Verify that the fuse on the PSIO rail fuse block F(Lane #) is not missing or blown. Replace if necessary.
   c) If 27 V is present at LHSL terminal block for the corresponding lane, verify the connections between the LH200H and the LHSL Rail.
   d) If problem persists, swap cables with a working LH200H.
   If still no power indicator, replace the LH200H with a known good unit.
   If power problem moves to the previously working LH200H, switch the cables back to their original units and replace the cable between the EP200 panel and the unit that was originally not working. (see Section 9)
   Note: It is important to switch the cables back to their original units as this will affect the MODBUS configuration and failing to do so will cause the system to function improperly.

5) Is the HMI screen on and displaying?
If no
   a) Verify 27VDC is present on the + terminal of the HMI. **IF NOT,** refer to 2), a) thru b) above.
   b) Verify connections between HMI and PSIO rail.
   c) Verify Serial Cable connection.
   d) If problem persists, replace the HMI with a known good unit. (see Section 9)

5 USER INTERFACE

The EP200 system uses the door-mounted MI200 touch screen to show system status and allow for set up and diagnostics.

5.1.1 MI200 Touch Screen Interface

The End Leak Detection System is set up, calibrated, monitored, and diagnosed using the MI200 touch screen. This panel is a 5.7” diagonal color resistive touch screen display. All system functions are controlled and monitored via this display using multiple screens accessed by pressing buttons on the screen.

5.1.2 MI200 Screen Elements

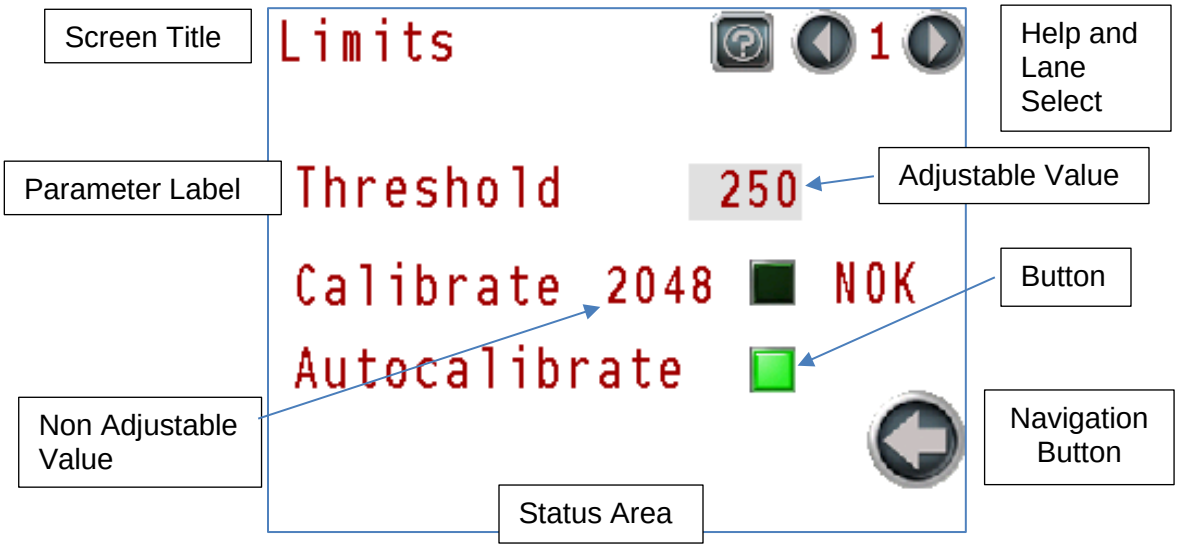


Figure 12 – MI200 Screen Elements

5.1.3 Introduction

Each MI200 touch screen follows a standard layout. The screen title is in the upper left corner of the screen. A navigation button to change screens or move back to a previous screen is located at the bottom of the screen generally in the right-hand corner.

5.1.4 Menu Buttons

Figure 13 – MI200 Menu Buttons

Buttons have a shaded gray outline, red body, and white text. Buttons respond immediately when pressed.

Buttons may be disabled to prevent certain operations while the machine is running. Disabled buttons have grey text.

5.1.5 Toggle Buttons


Toggle Button – ON


Toggle Button – OFF

Toggle buttons are square with a shaded gray outline. Buttons illuminate when active. Buttons typically respond immediately when pressed. Some buttons have two- or three-second lock-out to prevent inadvertent operation. For these buttons press and hold until the button responds.

5.1.6 Indicators

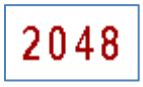

Indicator – On


Indicator – Off

Indicators are round with a shaded gray outline. Indicators illuminate when active.

5.1.7 Changing Values

User Adjustable Value



Un-adjustable Value

Numeric values are displayed in one of two ways. Values shown with a white background are not operator adjustable. Values with a gray background are adjustable. Press the value to cause a numeric touch screen to appear allowing the operator to directly enter the value.

5.1.7.1 Numeric Keypad

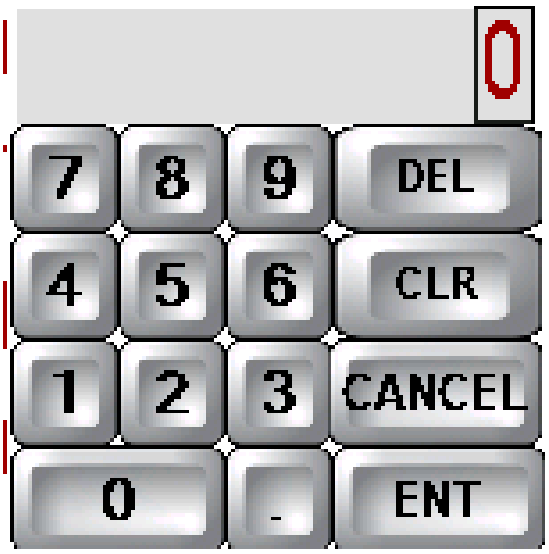


Figure 14 – Numeric Keypad

Numeric values are entered using the numeric keypad. The following abbreviations are used:

DEL – Delete

CLR – Clear

CANCEL – Cancel input and restore original value

ENT – Enter

In some cases, the range of acceptable values for a parameter is limited. Attempts to enter a value outside of this range are not allowed.

5.2 MI200 Screens

5.2.1 Main Screen

5.2.1.1 System Operating No Status Messages

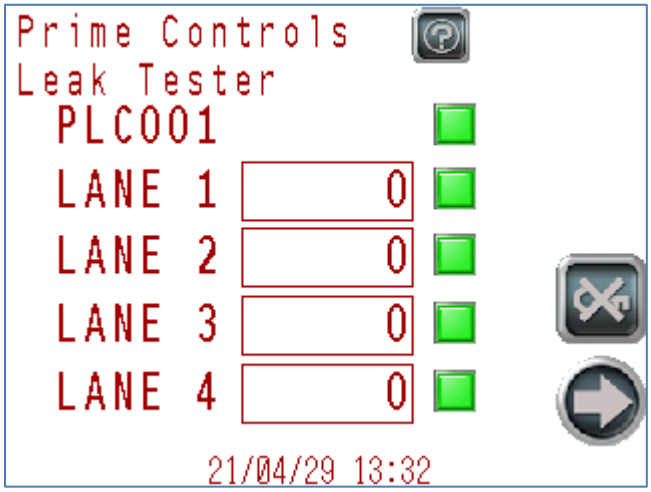


Figure 15 – Main Screen

This screen is shown when the system is operating normally. It shows system status, the current measurements of up to four lanes in the system and provides buttons to select Setup Functions, Help, Measurement Logs, Status Logs, and to Enable or Disable any lane.

5.2.1.1.1 Communication Status

The communication status with each of the LH200H, LH200H-opt detectors are indicated by the “LANE #” text.

Communication Operating Normally

The MI200 can communicate with the light detector via its Modbus connection.

Communication Fault

The MI200 cannot communicate with the LH200H/LH200H-opt light detector via the Modbus connection. The MI200 will periodically retry the connection to restore operation **when on the main screen**. The retry action will slow the operation of the MI200 when communicating with other light detectors in the system. If communication does not restore automatically, refer to section 8.4.6 for Modbus Communication Troubleshooting.

Communication Disabled

The operator has disabled communication with this lane. Communication is enabled/disabled by pressing and holding any of the “Lane 1-4” text for three seconds. The operator may disable communication with an LH200H/LH200H-opt light detector while is it disconnected for service to

speed up communication with the remaining detectors. Be sure to restore communication when a light detector is reconnected to the system. If unable to restore communication, refer to section 8.4.6 for Modbus Communication Troubleshooting.

5.2.1.1.2 System Status

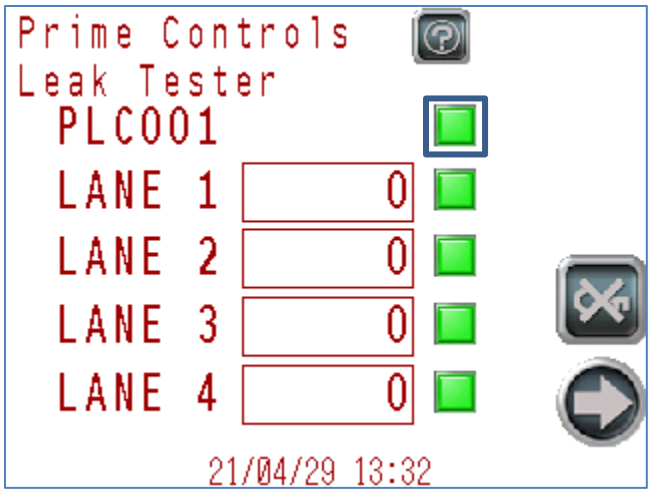


Figure 16 – Main Screen System Status

The status toggle button to the right of the PLC001 text shows the status of the entire system. Bright green indicates the system is operating normally. Bright red indicates that an error or action needs to be brought to the attention of the operator. Pressing the status toggle button switches to the System Status screen that gives a detailed, real-time status information of the system.

5.2.1.1.3 Measurement Results

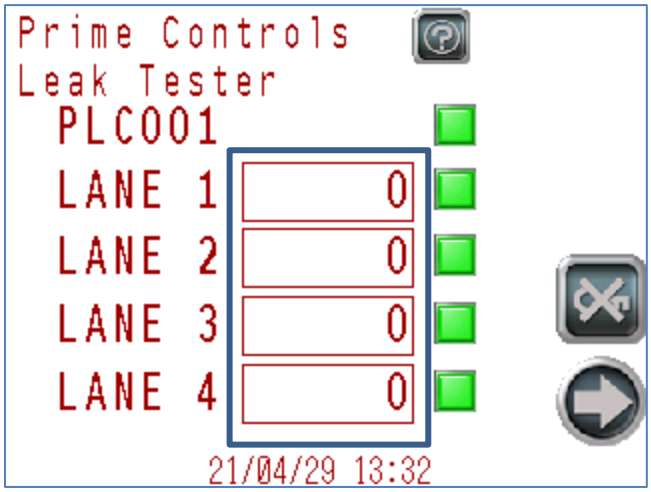


Figure 17 – Main Screen Measurement Results

Each lane's leak measurement is displayed on the main screen. A value near zero indicates a no leak condition, increasingly higher values indicate a proportional increase in light entering the light detector. An operator adjustable threshold determines the level necessary to indicate a leak. Pressing inside the box outlining any of the measurements switches to the Leak Log

screen that displays a list of the values determined to be leakers according to the Leak Threshold.

5.2.1.1.4 Lane Status

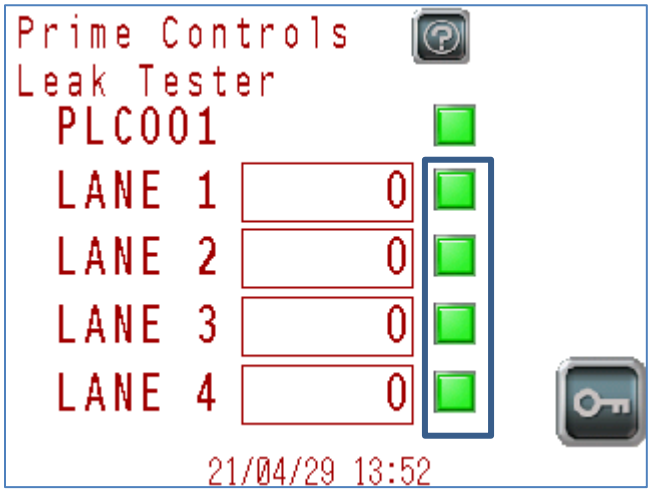


Figure 18 – Main Screen Lane Status

The lane status indicators to the right of the measurement results indicate the status of each lane. Bright green indicates the lane is operating normally. Bright red indicates that an error or action needs to be brought to the attention of the operator. Pressing any of the status indicators switches to the Lane Status screen that gives a detailed real-time status of the selected lane.

5.2.1.1.5 Menu Login

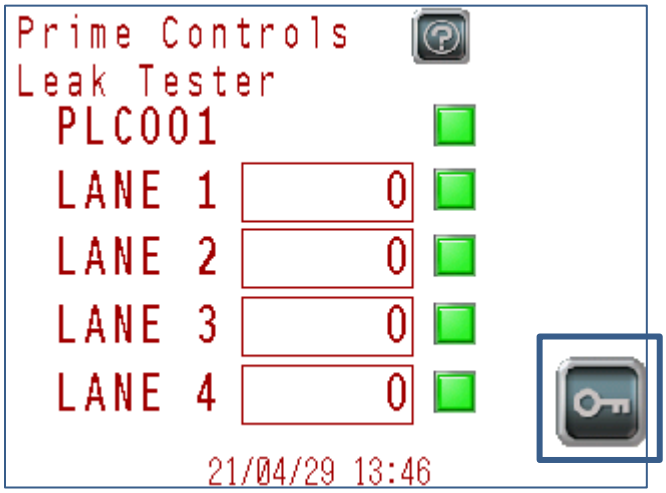


Figure 19 – Main Screen Menu Login

Pressing the Menu Login button brings up a password entry screen to enter a password to allow access to system settings.

5.2.1.1.6 Password Entry

Figure 20 – Password Entry Screen

The password entry screen allows the entry of a password to proceed to the settings screens. Enter the password and press ENT. Otherwise press ESC to abort and return to the main screen.

5.2.1.1.7 Menu Select

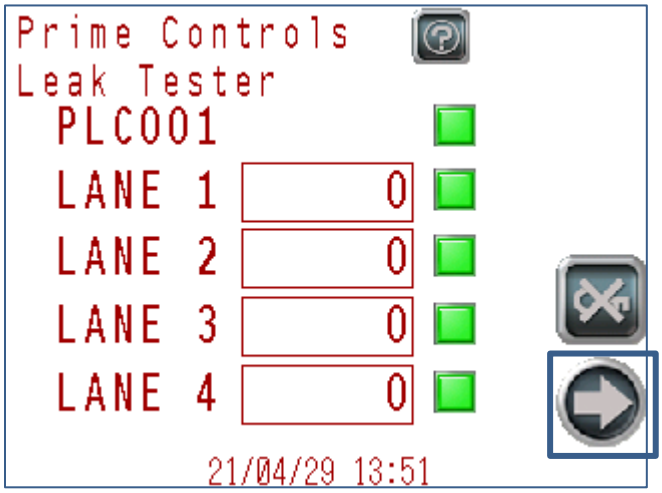


Figure 21 – Main Screen Menu Select

Once logged in, press the Menu Select button to switch to the main system menu used to access the set-up, diagnostic, and utility functions for the system.

5.2.1.1.8 Menu Log Out

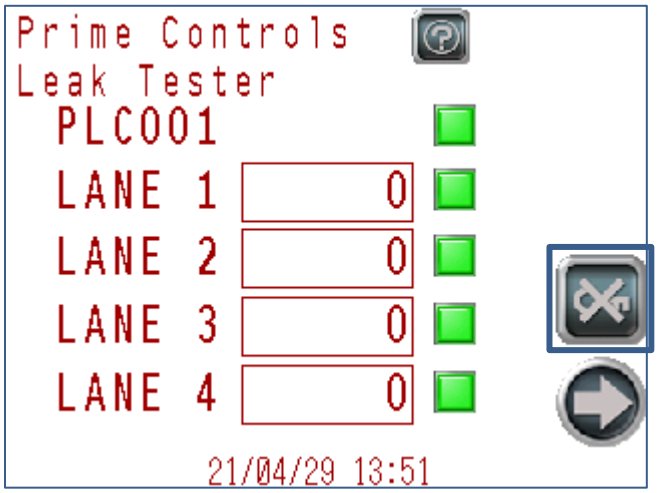


Figure 22 – Main Screen Menu Select

Once logged in, the press the Log Out button to restore the system to the pre-logged in state and prevent access to the set-up menus. The system will automatically log out after a period of five minutes of inactivity.

5.2.1.1.9 Help

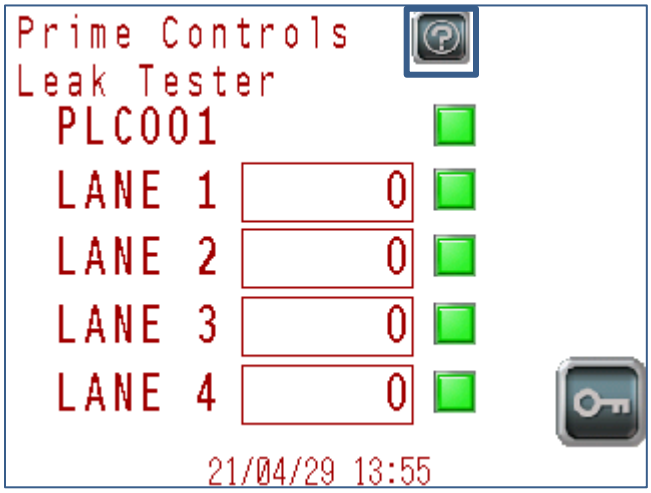


Figure 23 – Main Screen Help

Pressing the Help button brings up a help screen for this page. Pressing the button again removes it.

5.2.1.1.10 Main Screen with Status Message

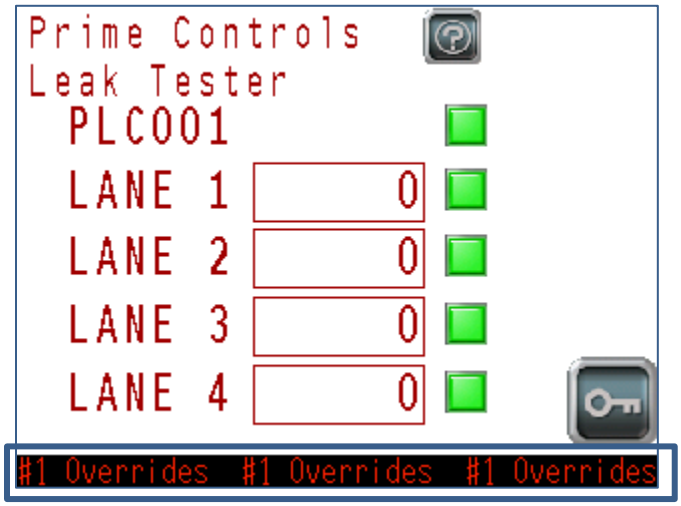


Figure 24 – Main Screen Status Message

Status messages appear at the bottom of the screen when active. These messages scroll right to left and automatically clear when no longer in effect.

5.2.1.1.11 Main Screen with Leak Reset

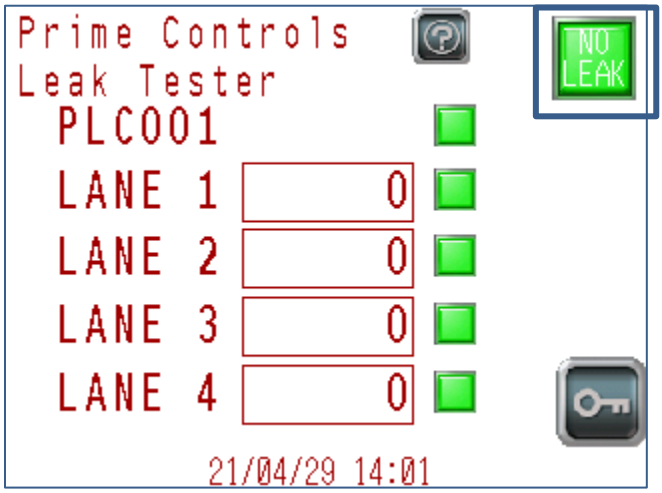


Figure 25 – Main Screen Leak Reset

If the system is running with the Lane Reject output mode set to 2, a leak reset button is displayed in the upper right-hand corner of the main screen. Should the press stop following the detection of a leaker, this button will turn red. Pressing the button will result in the result output switching to the No-Leak condition should this be needed to restart the press. The PLC001 will automatically clear the Leak state when the Press Run signal is de-asserted (i.e. the press is stopped).

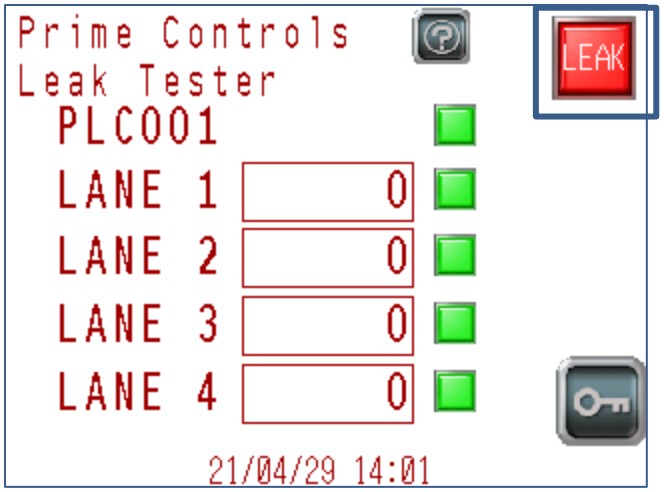


Figure 26 – Main Screen Leak Reset Active

Leak clear button indicating a leak. Press the button to clear the leak condition.

5.2.2 Leak Log Screen

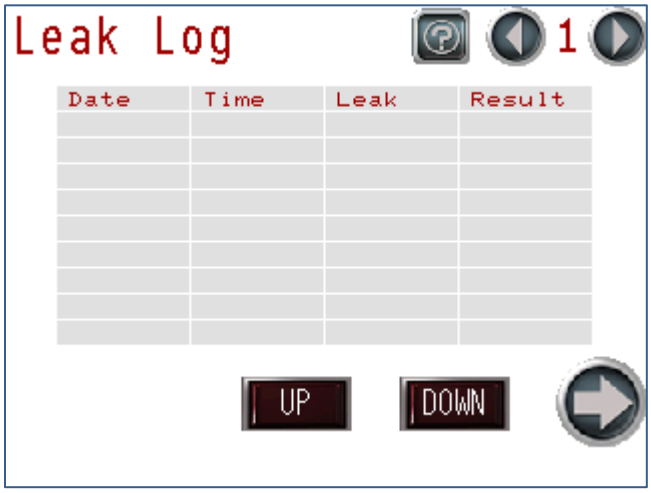


Figure 27 – Leak Log Screen

The Leak Log screen displays a list of all leakers detected by lane with the date, time, measured leak value, and result code in hexadecimal. The Up and Down buttons facilitate scrolling through the list of leakers.

Access the Leak Log screen by pressing any of the leak values on the main screen.

Pressing the right arrow button advances to the Measurements Log screen.

5.2.3 Measurement Log Screen

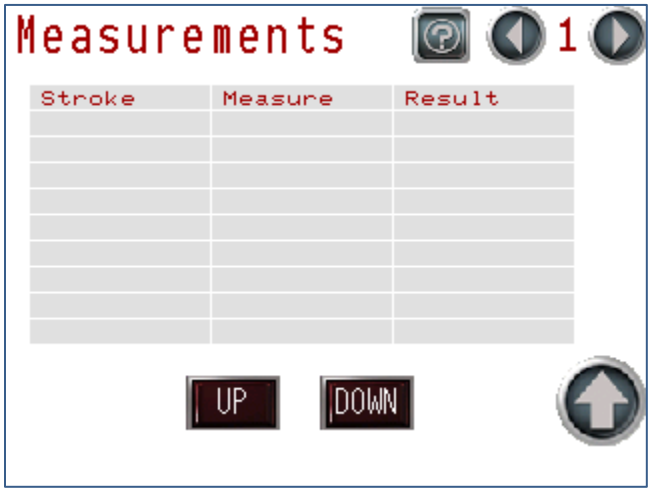


Figure 28 – Measurement Log Screen

The Measurements Log screen displays a list of all measurements made by lane with the measured value, stroke count, and result code in hexadecimal. The Up and Down buttons facilitate scrolling through the list of leakers.

Due to the communication rate limitations of the Modbus protocol, not all measurements can be captured and displayed for presses operating at high speeds. However, the detectors maintain an internal list of the measurements, and when the press stops, at least last 16 measurements are listed with no gaps giving the operator a full list of all 16 measurements prior to the press shut down.

Press the Up arrow button to return to the main screen.

5.2.4 System Status Screen

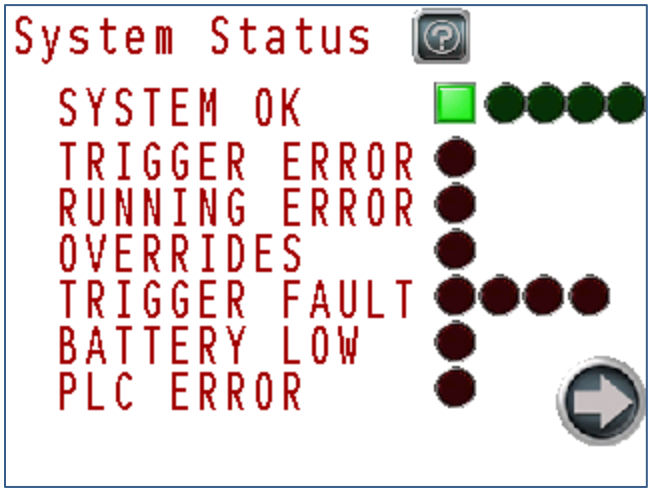


Figure 29 – System Status Screen

The System Status screen displays the status of many potential system faults in real-time. This screen is also used to reset the system status by pressing the System OK toggle button. Pressing this button when all statuses are OK will reset the system status to OK (illuminated).

Table 6 – System Status List

Name	Meaning
System OK	The system is functional and ready to test. Each indicator to the right of toggle button displays the status of each lane in order from lane 1 to 4.
Trigger Error	Press Run is asserted but no Read Trigger pulses are present
Running Error	Press Run is not asserted but Read Trigger pulses are present.
Overrides	PLC001 signals have been overridden
Trigger Fault	One or more lanes are not triggering. Each indicator displays the status of each lane in order from lane 1 to 4.
Battery Low	PLC001 battery is low.
PLC Error	Internal PLC001 System Error

Access the System Status screen by pressing the system status indicator on the main screen.

Pressing the right arrow button advances to the System History screen.

5.2.5 System History Screen

Figure 30 – System History Screen

The System History screen displays a list of all system status messages made by the PLC001. The Up and Down buttons facilitate scrolling through the list of leakers. Pressing an entry and then pressing clear will erase the entry.

The following messages can be posted to the history:

Table 7 – System History List

Message	Meaning
PLC Read Trigger Fault	Press Run is asserted but no Read Trigger pulses are present
PLC Press Running Fault	Press Run is not asserted but Read Trigger pulses are present
PLC Overrides	A PLC signal is overridden
#1 Trigger Fault	Lane #1 is not strobing.
#2 Trigger Fault	Lane #2 is not strobing.
#3 Trigger Fault	Lane #3 is not strobing.
#4 Trigger Fault	Lane #4 is not strobing.
PLC Battery Low	PLC Real Time Clock battery is low
PLC Error	Unspecified issue with PLC

5.2.6 Lane Status Screen

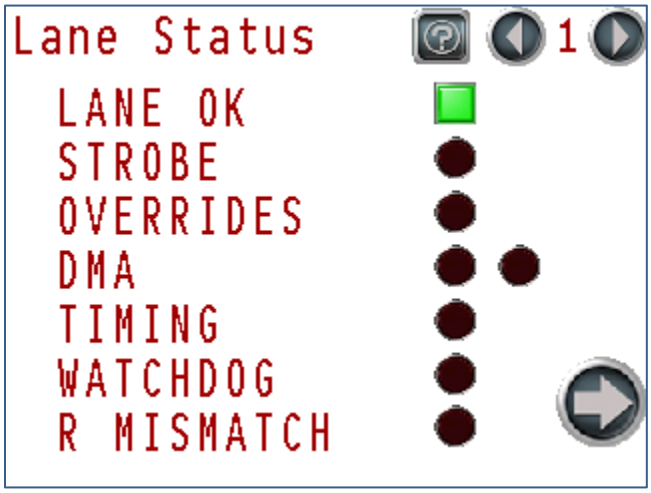


Figure 31 – Lane Status Screen

The Lane Status screen displays the status of several potential detector/strobe faults in real-time. This screen is also used to reset the lane status by pressing the Lane OK toggle button. Pressing this button when all statuses are OK will reset the lane status to OK (illuminated).

Table 8 – Lane Status List

Name	Meaning
Lane OK	This Lane's System Status
Strobe	Strobe Error. Strobe OK Signal Incorrect
Overrides	Operator Asserted Overrides in Effect
DMA (Left)	Internal Measurement Error
DMA (Right)	Internal Measurement Error
Timing	Internal Measurement Error
Watchdog	Internal System Error
R Mismatch	Lane Rejector Mismatch. Rejector Position May Be Wrong

Access the Lane Status screen by pressing any of the lane status indicators on the main screen.

Pressing the right arrow button advances to the Status History screen.

5.2.7 Lane History Screen

Figure 32 – Lane History Screen

The Lane History screen displays a list of all status messages made by the lane. The Up and Down buttons facilitate scrolling through the list of leakers. Pressing an entry and then pressing clear will erase the entry.

The following messages can be posted to the history:

Table 9 – Lane History List

Message	Meaning
#x NOK	Lane #x Not OK. System OK Not Asserted
#x DMA Comp. NOK	Lane #x Internal Measurement Error
#x DMA Start NOK	Lane #x Internal Measurement Error
#x Timing NOK	Lane #x Internal Measurement Error
#x Watchdog NOK	Lane #x Internal Software Error
#x Strobe NOK	Lane #x Strobe Error
#x Overrides	Lane #x Has Operator Asserted Overrides
#x Flash Full	Lane #x Flash Full Error
#x Save Pending	Lane #x Settings Change Not Yet Saved
#x Default Loaded	Lane #x Settings Corrupt. Defaults Loaded

#x can be #1, #2, #3, or #4 indicating the lane associated with the status information. Press the Up arrow button to return to the Main screen. For example, **#2 Overrides** means lane 2 has an IO override set.

5.2.8 Main Menu

Figure 33 – Main Menu Screen

Press the Setup button to enter set up parameters for the system. Press the Diagnostics button to perform diagnostics on the system such as checking the input/output signals. Press the Utility button to access utility functions.

5.2.8.1 Setup

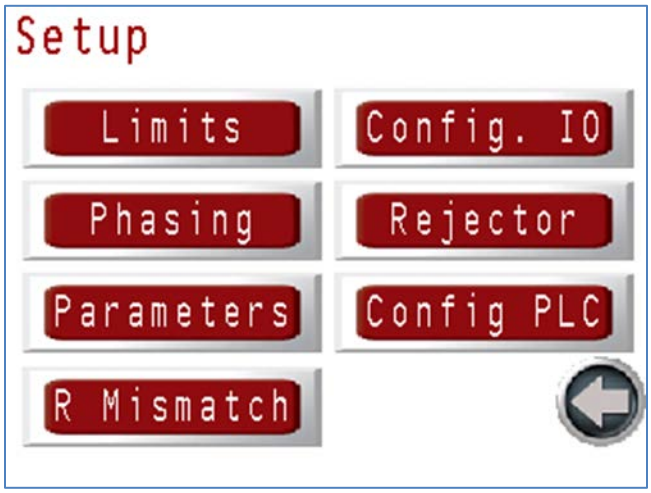


Figure 34 – Setup Screen

The Setup menu allows the operator to set the system sensitivity via the Limits menu, measurement timing via the Phasing menu, configure the IO drive type and polarity via the Config. IO menu, configure the rejector via the Rejector menu, set system parameters via the Parameters menu, configure the PLC via the Config PLC menu, and restore rejector settings after changing a light head or HMI. Press the appropriate button according to the function desired.

5.2.8.1.1 Limits

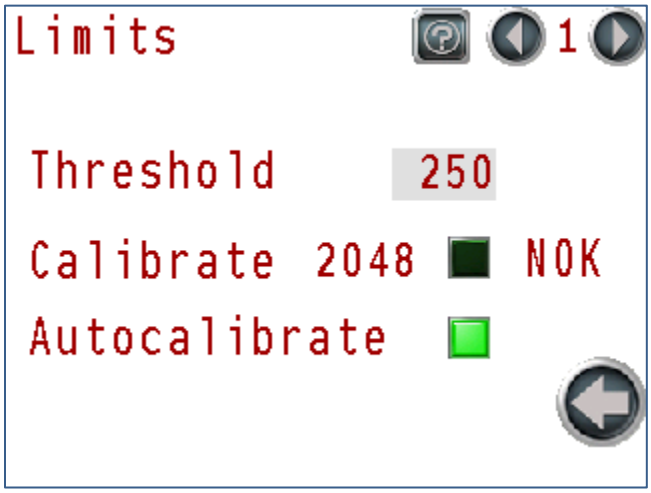


Figure 35 – Limits Screen

The Limits menu controls the measurement process used by the LH200H/LH200H-opt light detector and its leak detection threshold. A leak is detected when a measured value exceeds the threshold value. The threshold can be set between 1 and 5000. The default value of 250 is a good compromise between sensitivity and accuracy for the system.

The system includes a manual and automatic calibration system that compensates for variations in system operation over time. Auto calibrate is on by default as indicated by bright green on the Auto calibrate toggle button which can be used to turn Auto calibrate on or off.

Manual calibration can be initiated when the machine is not running by pressing the toggle button to the right of the Calibrate text. The toggle button remains on until calibration is complete. The status of the manual calibrate operation is indicated by the “OK” – success or “NOK” – failure text.

Manual calibration must only be performed when the LH200H/LH200H-opt light detector is sealed in complete darkness.

5.2.8.1.2 Phasing

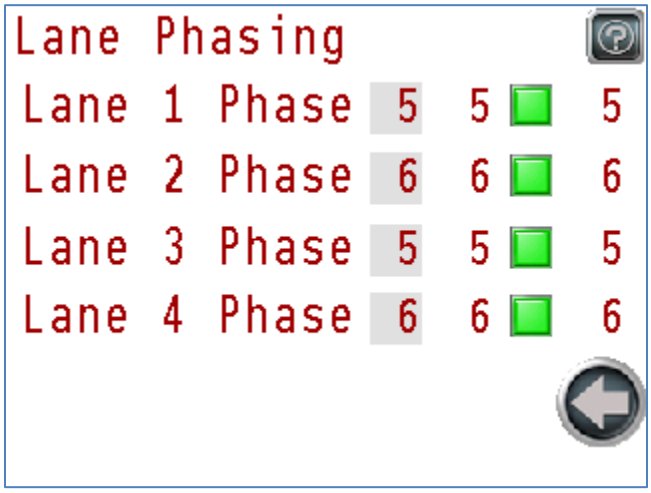


Figure 36 – Phasing Screen

The system controls the timing of when an individual lane triggers its illuminator and makes a measurement. Setting different trigger times between adjacent lanes helps to prevent interactions between the illuminators and detectors. The different timings are called phasing. Each lane may use one of ten (1-10) phase values. These values may be automatically or manually set.

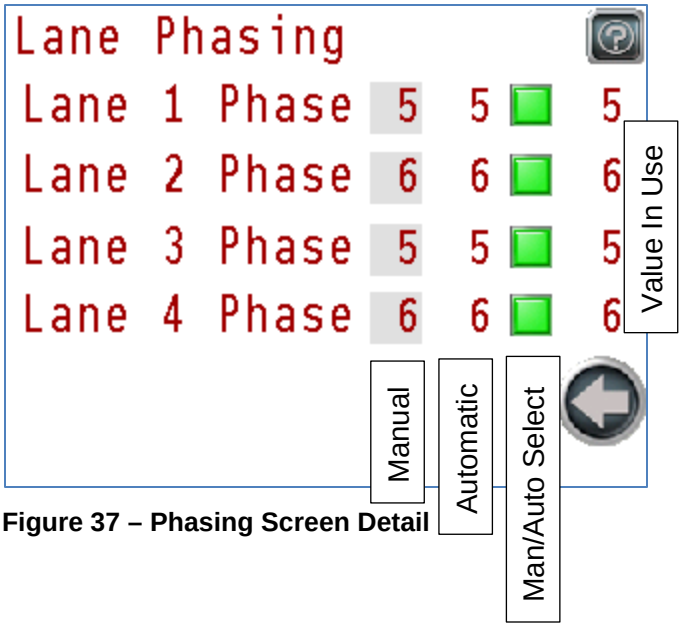


Figure 37 – Phasing Screen Detail

The Phasing screen has a row for each lane and a column for each possible adjustment. The first column is the manual phase adjustment. The second column is the phase adjustment proposed by the automatic phase selection logic. The third column of toggle buttons selects between the manual adjustment or the automatic adjustment. The last column is the phasing in use for each lane based on the selection between automatic/manual and the manual value.

The default setting is automatic which sets adjacent lanes to different phases which are best for most systems.

If your system requires the measurement to occur more quickly, you can lower the phases to 1 and 2. This will speed up the measurement by 4mS compared to the defaults shown (5 and 6). If you have interference between lanes, you can set them all to unique phase values such as 4,5,6,7 or 3,5,7,9.

5.2.8.1.3 Configure IO

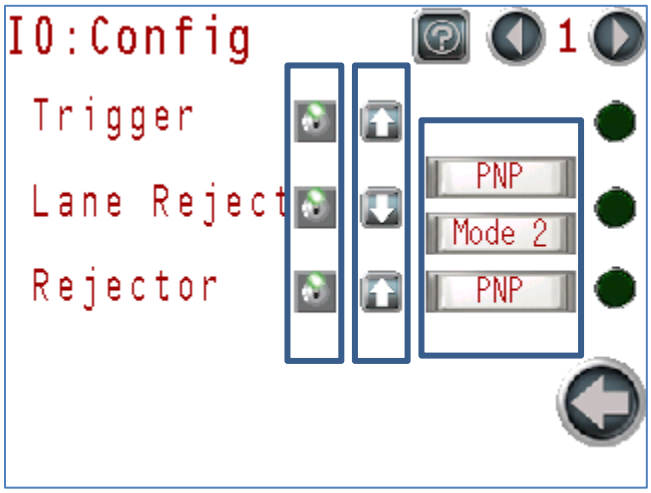


Figure 38 – Configure IO Screen

The Config IO screen controls the use, polarity, drive type, and operation of the various Input/Output signals of the detector.

5.2.8.1.3.1 Default Settings

Use the settings shown in Figure Figure 38 – Configure IO Screen.

5.2.8.1.3.2 IO Enable/Disable Switch


IO Enabled (Default)


IO Disabled

Each input and output can be enabled or disabled using their respective IO Enable/Disabled switch. An output that is disabled asserts a state defined by its polarity control. The Trigger input when disabled will be treated by the software as if it is not changing (no trigger pulse).

Caution: Leaving any signal disabled may prevent the End Leak Detection System from properly testing any ends.

5.2.8.1.3.4 **IO Polarity**

 High True Polarity

 Low True Polarity

The polarity of each input and output is set using the polarity toggle switches.

Table 10 – Signal Polarities

Signal	**High True**	**Low True**
Trigger	Rising Edge Trigger	Falling Edge Trigger
Lane Reject	High for No Leak	Low for No Leak
Rejector	High to Reject	Low to Reject

Settings in gray are “fail-safe” meaning that a broken or disconnected wire will result in a leak or fault condition.

5.2.8.1.3.5 **IO Drive Type**

High Impedance Drive – The driver is disabled.

PNP Drive – The driver pulls up to +27V when the signal is **on.**

NPN Drive – The driver pulls down to common when the signal is **off.**

Push-Pull Drive – The driver pulls up to +27V when the signal is on and pulls down to common when the signal is off.

The drive type of each output is controlled by pressing the Drive Type buttons. The buttons cycle through Hi-Z, PNP, NPN, and Push-Pull with each press. The EP200 system requires PNP drive to operate.

5.2.8.1.3.6 **Lane Reject (Result) Mode**

Result Mode 0

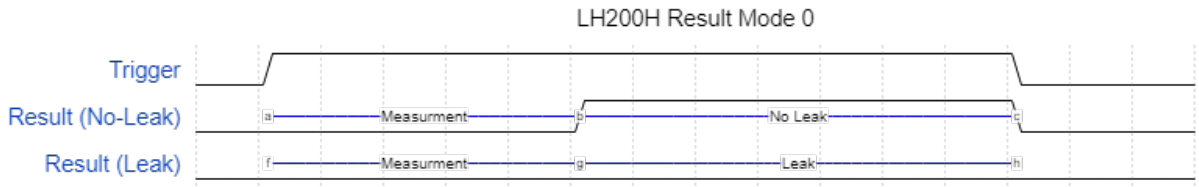
Result Mode 1

Result Mode 2

The Result output can operate in one of three modes depending upon the needs of the Press Controller. Press the Mode button to cycle through Modes 0, 1, and 2. The details

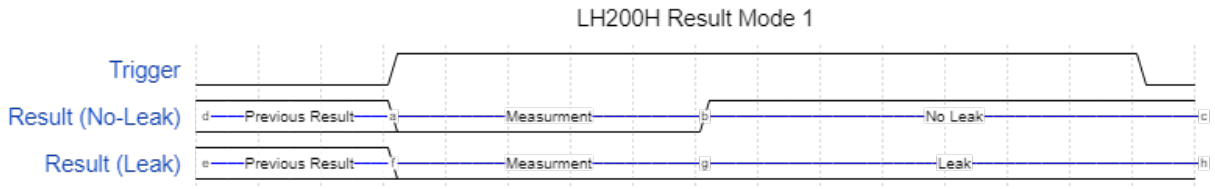
of each mode are described below. In each diagram, the top row is a representation of the trigger pulse assuming rising edge trigger, the second row represents the Result output if a no leak is detected Result (No-Leak), and the bottom row represents the Result output if a leak is detected Result (Leak). In the example, the Result output is set to High True. Setting the Result output to Low True inverts the signals from those shown.

Result Mode 0



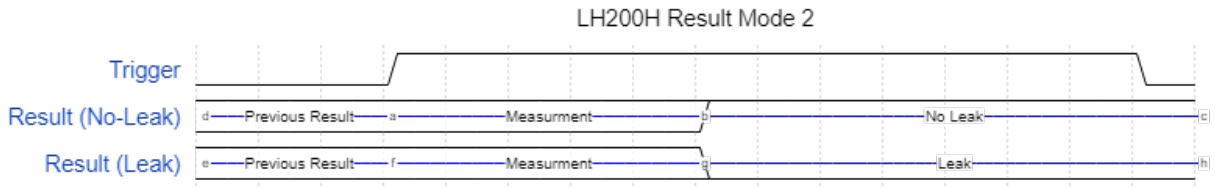
The Result output operating in Result Mode 0, always asserts the Leak state other than after the completion of the measurement and prior to the de-assertion of the Trigger signal when the measurement results in a no-leak condition. This mode is useful as the Press Controller may sample the Result output prior to triggering a measurement to assure the Result output can indicate the Leak state. The Press Controller must sample the result output prior to de-asserting the Trigger input to capture the Leak/No Leak condition of the end.

Result Mode 1



The Result output operating in Result Mode 1, asserts the Leak state when triggered and once the measurement is completed, asserts Leak or No Leak as appropriate. This mode is useful as the Press Controller may sample the Result output immediately after triggering a measurement to assure the Result output can indicate the Leak state. The Press Controller can then sample the result output at any time prior to the next trigger to capture the Leak/No Leak condition of the end.

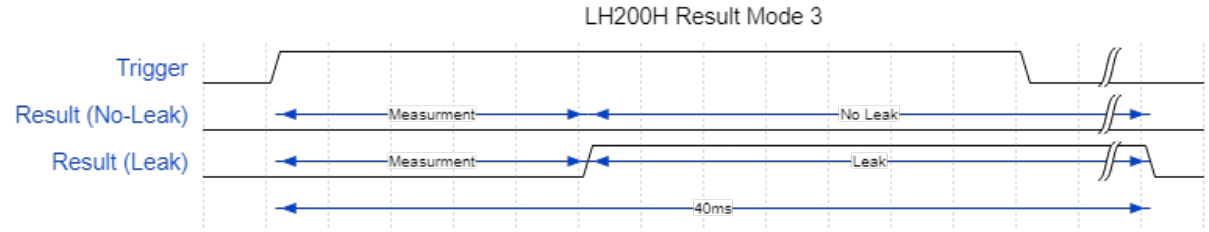
Result Mode 2



The Result output operating in Result Mode 2, maintains the Leak/No Leak state from the prior measurement until the next measurement completes. Once the next measurement is completed, it asserts Leak or No Leak as appropriate. This mode is

useful as the Press Controller may sample the Result output at any time to capture the Leak/No Leak condition of the end. A disadvantage of this mode is that the Press Controller cannot verify that the Result signal is functional and is not stuck in the No Leak state due to a wiring error or cable damage. When operating in Mode 2, a Leak Reset button is displayed in the upper right-hand corner of the main screen. Pressing this button when the press is stopped will reset any result outputs in the leak condition to no leak.

Result Mode 3



The Result output operating in Result Mode 3, only asserts a No Leak or Leak State at the conclusion of the measurement cycle. If a Leak is detected, the Result Output will indicate the Leak State immediately after the measurement is completed for a duration of 40ms. After 40ms, the Result output reverts to the No Leak state. The process repeats for each measurement. This mode is useful when the Press Controller samples the Result output immediately after the trigger to capture the Leak/No Leak condition of the end and latches the Leak State until the next Trigger. This will prevent the Press Controller from inadvertently latching a Leak State for the next end prior to the next measurement being completed and causing a good end to be rejected. A disadvantage of this mode is that the Press Controller cannot verify that the Result signal is functional and is not stuck in the No Leak state due to a wiring error or cable damage.

5.2.8.1.3.6.1 ELTP Drop-In-Replacement Settings

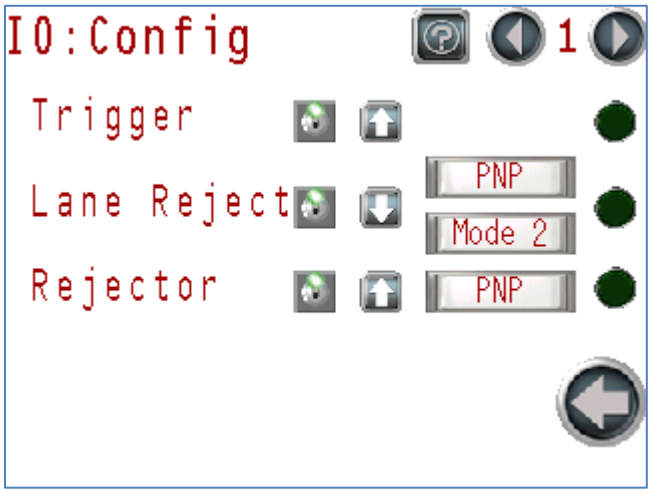


Figure 39 – ELTP Drop-In IO Configuration

Use the settings as shown above for all lanes to configure the ELDS IO signals to operate as a drop-in for an ELTP system.

5.2.8.1.3.6.2 ELDS Fail-Safe Signal Settings

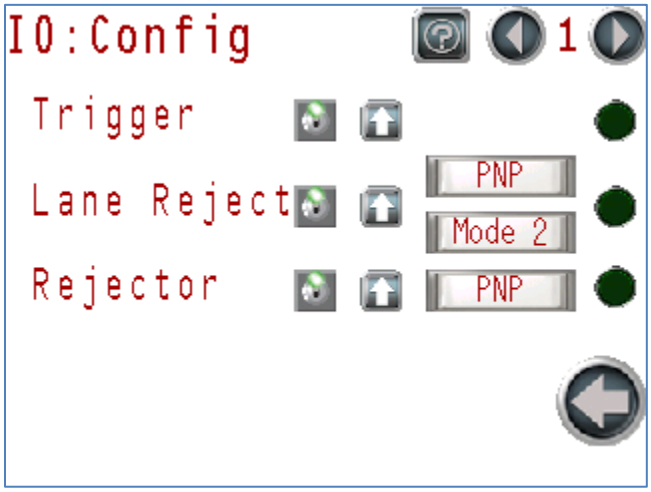


Figure 40 – ELDS Fail Safe IO Configuration

Use the settings above for all lanes to configure the system for Fail-Safe IO operation.

5.2.8.1.4 Rejector

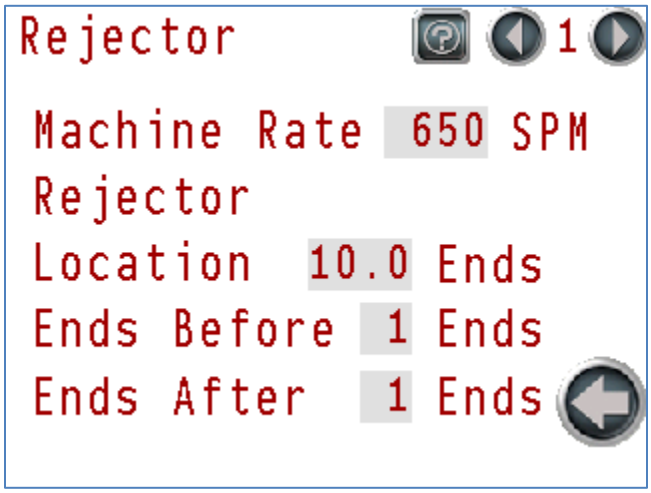


Figure 41 – Rejector Screen

Set the machine rate to the number of strokes per minute of the press. Set the location of the rejector relative to the rejector blow-off position specified in ends. The system is designed to reject a specified number of ends before and after a leaking end. Specify the number of ends before the leaker in Ends Before and the number of ends after the leaker in Ends After.

5.2.8.1.5 Parameters

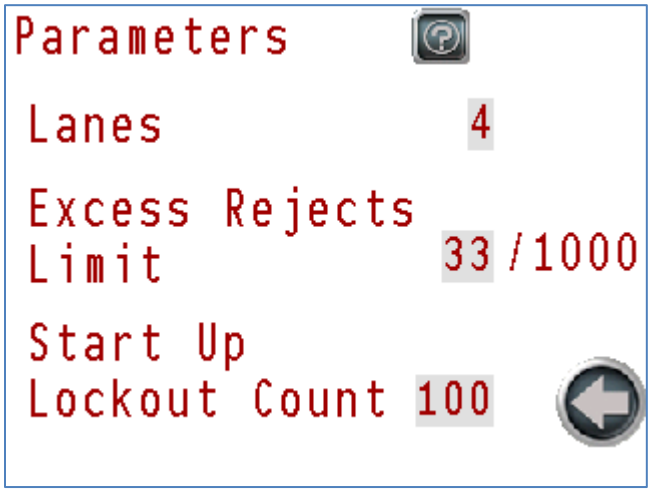


Figure 42 – Parameters Screen

Set the number of lanes to the number of lanes of the press within the range from 1 to 4. Set the Excess Rejects Limit to any value between 0 and 99. Setting the value to 0 disables the Excess Rejects function. The Start Up Lockout Count is the number of strokes after press startup ignored by the Excess Reject Limit logic. This value helps prevent nuisance Excess Reject faults.

5.2.8.1.6 Configure PLC

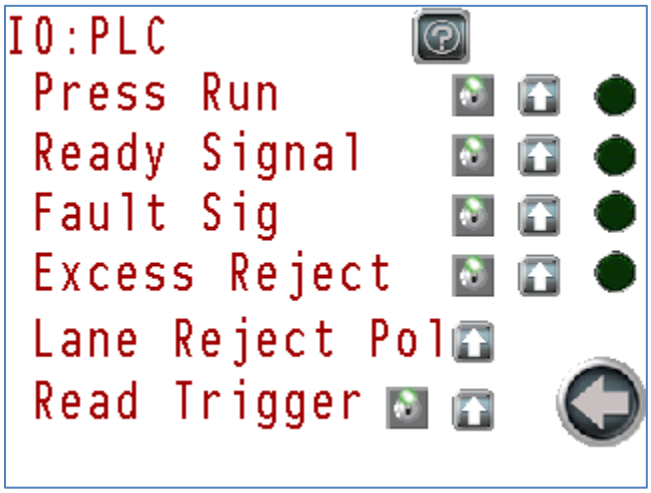


Figure 43 – Configure PLC Screen

The Configure PLC IO screen controls the use, and polarity of the various Input/Output signals of the system.

Table 11 – PLC IO Signals

Signal	Definition
Press Run	Signal from the Press Controller that the press is running.
Ready Signal	Signal from the End Leak Detection System that is it ready to test.
Fault Sig	Signal from the End Leak Detection System that a fault has been detected.
Excess Reject	Signal from the End Leak Detection System that the ratio of bad to good product exceeds the set threshold.
Lane Reject Polarity	Reject signal from the detectors to the PLC.
Read Trigger	Signal from the Press Controller that indicates a measurement should be made.

5.2.8.1.6.1 IO Enable/Disable Switch

 IO Enabled (Default)

 IO Disabled

Each input and output can be enabled or disabled using their respective IO Enable/Disabled switch. An output that is disabled asserts a state defined by its polarity control.

Caution: Leaving any signal disabled may prevent the End Leak Detection System from properly testing any ends.

5.2.8.1.6.2 IO Polarity

 High True Polarity

 Low True Polarity

The polarity of each input and output is set using the polarity toggle switches.

Table 12 – Signal Polarities

Signal	High True	Low True
Press Run	High to Run	Low to Run
Ready Signal	High for Ready	Low for Ready
Fault Sig	High for Fault	Low for Fault
Excess Reject	High for Excessive	Low for Excessive
Lane Reject Pol(arity)	High to No Leak	Low for No Leak
Read Trigger	High to trigger	Low to trigger

Settings in gray are fail-safe meaning that a broken or disconnected wire will result in a leak or fault condition.

5.2.8.1.6.2.1 ELTP Drop-In-Replacement Settings

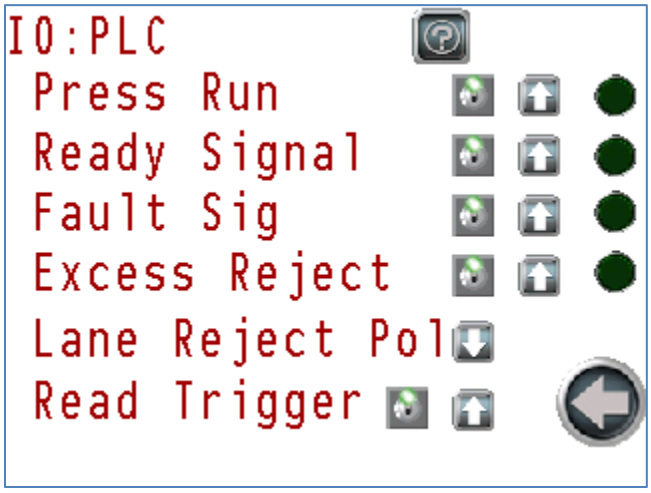


Figure 44 – ELTP Drop-In IO Configuration

Use the settings as shown above to configure the ELDS IO signals to operate as a drop-in for an ELTP system.

5.2.8.1.6.2.2 ELDS Fail-Safe Signal Settings

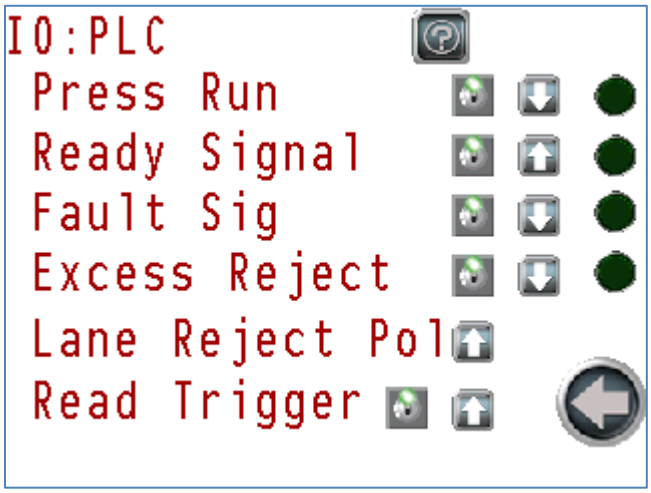


Figure 45 – ELDS Fail Safe IO Configuration

Use the settings above to configure the system for Fail-Safe IO operation.

5.2.8.1.1 Rejector Mismatch

If the system is equipped with HMI Firmware Version 2.5.0 or later, the system stores the rejector settings by lane on the HMI and on the LH200H heads. With this firmware, the system will detect when an LH head, or HMI has been changed on the system by comparing the settings stored on both. If the firmware detects a discrepancy between the HMI stored settings and the LH settings, the HMI will display the lane # followed by the 'Rejector Mismatch' flag indicating there has been a component change and could potentially not reject the correct ends in the event of a leak detection. The firmware gives the option of either copying the HMI stored settings to the LH head stored settings or copying the LH head stored settings to the HMI stored settings and will store the desired settings on both.

In general, if any changes are made to the LH heads on a system (moved to a different lane, or new LH head installed) use the 'Copy HMI to LH' function.

If the HMI is changed on the system, but the LH heads stay the same, use the ‘Copy LH to HMI’ function.

On this screen the Rejector lane # and a red circle to the right of Setting Mismatch if there is a discrepancy between the HMI stored settings and the LH head on that lane. Use the left or right arrows to scroll through the lanes to see which lanes have a mismatch in settings.

Press and hold for 2 seconds the square to the right of ‘Copy HMI to LH’ or ‘Copy LH to HMI’ depending on which you want to do. The square will flash green momentarily, the red light will turn off, and the flag at the bottom of the screen will go away after a few seconds indicating the settings now match on both for that lane. Use the left or right arrows next to the lane number to navigate to any other lane that has a mismatch and repeat this procedure. **This function is lane specific and must be repeated for each lane that indicates a mismatch.**

5.2.8.2 Diagnostics

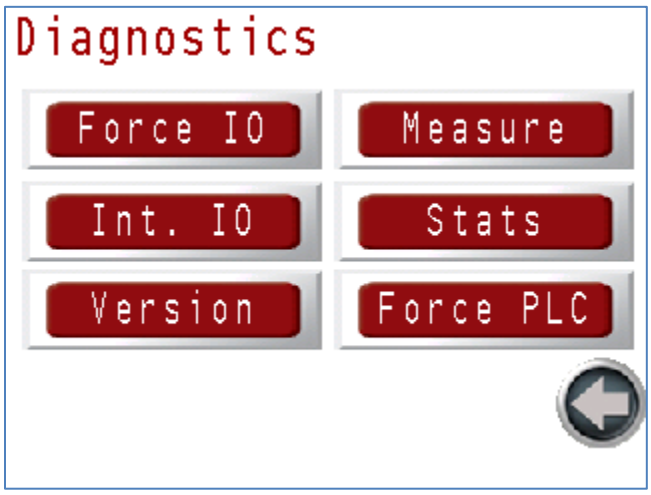


Figure 46 – Diagnostics Menu Screen

The Diagnostics menu allows the operator to Force IO settings for wiring confirmation, configure additional IO signals between the detector and illuminator, check the software version, force IO signals for the Press Controller or PLC001, and initiate manual measurements and system measurement statistics.

5.2.8.2.1 Lane Force IO

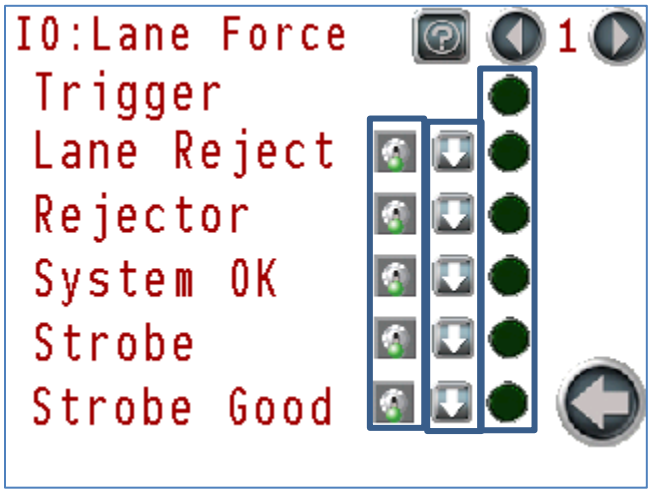


Figure 47 – Lane Force IO Screen

The Force IO screen allows the installer to force the system IOs into known states to easily verify wiring between the LH200H, SL100H-D OR SL101H-D, and PLC001.

When any IO is forced, a scrolling message appears at the bottom of the display to warn the operator that a force is in effect.

Remove all forces prior to operating the press.

5.2.8.2.1.1 IO Force Enable/Disable Switch


IO Forced


IO Not Forced (Default)

Each input and output can have its signal forced to a known value using their respective Force IO switch. When forced, the IO will take on the state of the IO Polarity switch.

5.2.8.2.1.2 IO Polarity


Forced High


Forced Low

The polarity of each input and output is set using the Polarity toggle switches.

5.2.8.2.1.3 IO Signal State


IO is On (+27V)


IO is Off (0 V)

5.2.8.2.2 Configure Internal IO

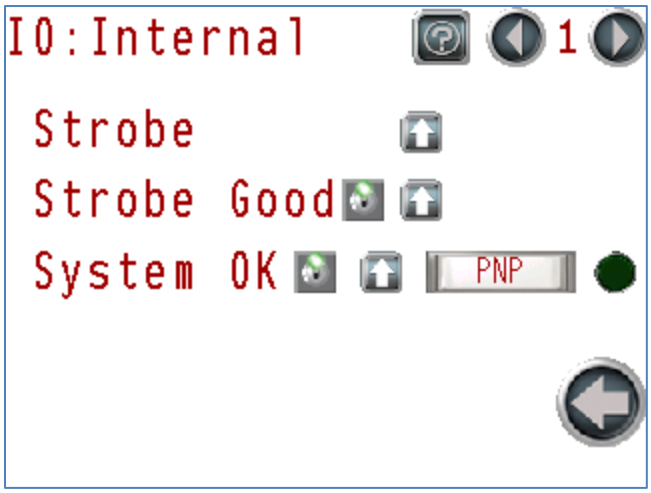


Figure 48 – Configure IO Screen

The Config IO screen controls the use, polarity, drive type, and operation of the IO signals between the light detector, illuminator, and PLC001. These signals are not included in the Setup Configure IO screen because their polarities and drive requirements are known and are not installation dependent. Only in rare circumstances would these settings need to be changed from their default values.

5.2.8.2.2.1 IO Enable/Disable Switch


IO Enabled (Default)


IO Disabled

The Strobe Good input to the light detector enabled or disabled using the IO Enable/Disabled switch. When disabled, the LH200H/LH200H-opt light detector will operate as if the strobe good signal is fully functional, and it will not post any alarms related to this signal. If this IO is disabled, the PLC001 or other device should monitor the Strobe Good signal from the illuminator to assure proper operation.

5.2.8.2.2.2 **IO Polarity**

 High True Polarity

 Low True Polarity

The polarity of each input and output is set using the polarity toggle switches.

Table 13 – Internal IO Polarities

Signal	**High True**	**Low True**
Strobe	Rising Edge Triggered	Falling Edge Trigger
Strobe Good	High for Operational	Low for Operational
System OK	High for Operational	Low for Operational

Settings in gray are “fail-safe” meaning that a broken or disconnected wire will result in a leak or fault condition.

5.2.8.2.2.3**IO Drive Type**

High Impedance Drive – The driver is disabled.

PNP Drive – The driver pulls up to +27V when the signal is **on.**

NPN Drive – The driver pulls down to common when the signal is **off.**

Push-Pull Drive – The driver pulls up to +27V when the signal is on and pulls down to common when the signal is off.

The drive type of the System OK output is controlled by pressing the Drive Type buttons. The buttons cycle through Hi-Z, PNP, NPN, and Push-Pull with each press. The EP200 requires PNP drive type.

5.2.8.2.2.3.1 ELTP Drop-In-Replacement Settings

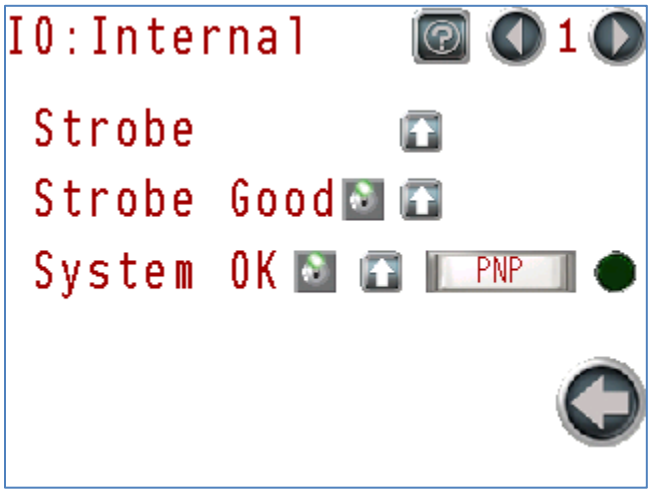


Figure 49 – ELTP Drop-In IO Configuration

Use the settings as shown above for each lane to configure the ELDS IO signals to operate as a drop-in for an ELTP system.

5.2.8.2.2.3.2 ELDS Fail-Safe Signal Settings

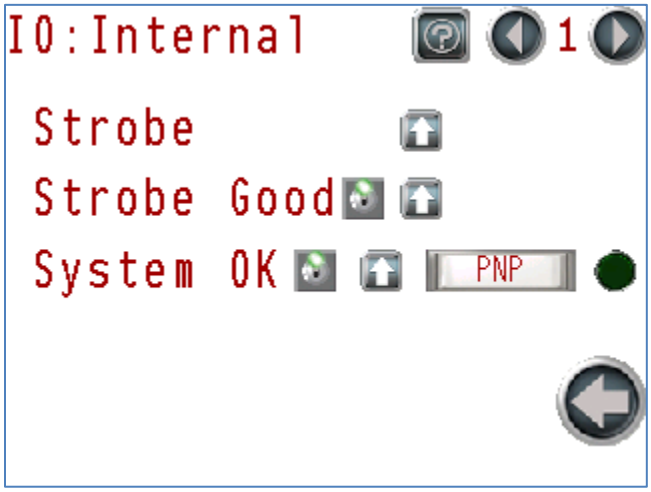


Figure 50 – ELDS Fail Safe IO Configuration

Use the settings above for each lane to configure the system for Fail-Safe IO operation.

5.2.8.2.3 Version

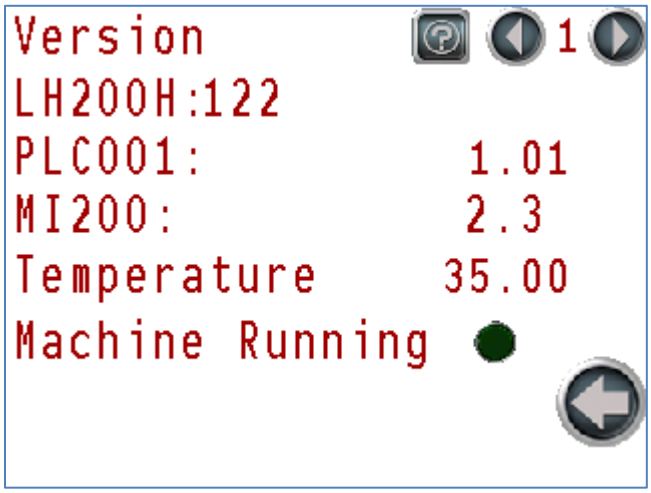


Figure 51 – Version Screen

The Version screen shows the software version of the LH200H/LH200H-opt light detector, PLC001, and MI200 touch screen, the current detector temperature in degrees Celsius, and the machine running state as determined by the light detector.

5.2.8.2.4 Measurement Screen

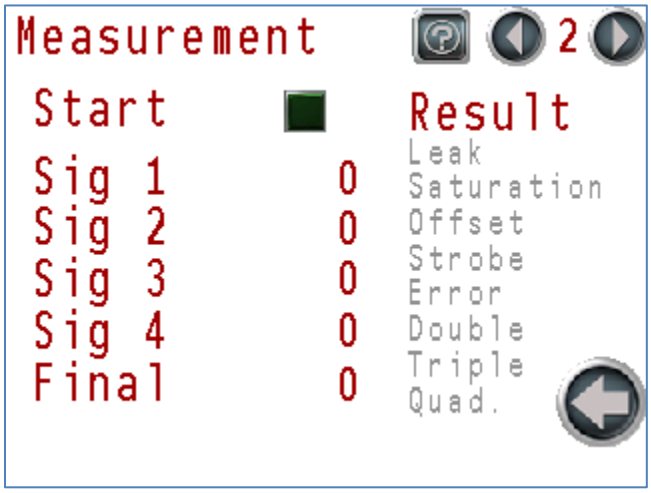


Figure 52 – Measurement Screen

The measurement screen provides the installer with the ability to manually trigger a measurement and gives detailed information about the measurement process. A measurement can only be initiated when the machine is stopped.

Machine is Running: Start is Disabled (Gray)

Press the Start Toggle switch to initiate a measurement. The Sig1-4, Final, and Result values will update. The toggle switch turns on when the measurement starts and off when it completes. Because a measurement occurs so quickly, the toggle switch may not appear to illuminate.

The system has four independent measurement systems, a leaker will typically stimulate all four to varying degrees. The four values are combined into a final value as displayed here and on the Main screen. This screen can be used to verify all four lanes are working as indicated by non-zero values when measuring a leaker. It is typical for these values to vary by several counts even when measuring a non-leaking end.

The result value is decomposed into detailed information about why a leak determination was made as indicated below:

Table 14 – Result Bit Meanings

Bit	Result	Meaning
0	Leak	A leaker was detected
1	Saturation	Significant light entering the light detector caused by a large defect in the end
2	Offset	Incorrect system calibration or improper seal
3	Strobe	Strobe did not function correctly
4	Error	Internal system error
5	Double	Leak detected by combination of two signals
6	Triple	Leak detected by combination of three signals
7	Quad	Leak detected by combination of four signals

Grey text means not asserted. Red text means asserted.

5.2.8.2.5 Statistics Screen

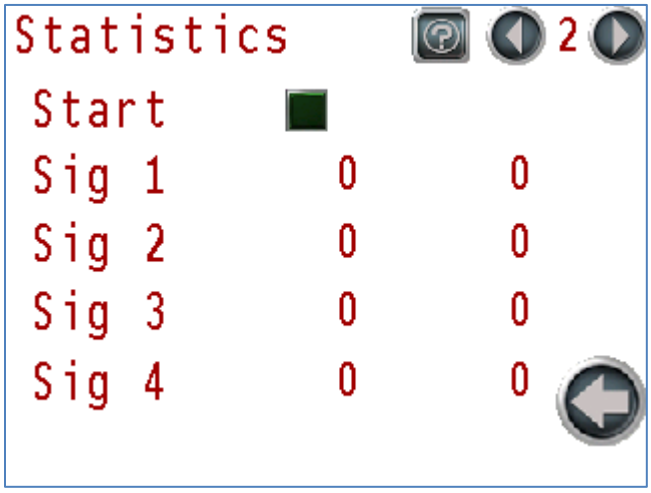


Figure 53 – Statistics Screen

The Statistics screen provides the installer with the ability to detect noise in the measurement system. An assessment can only be initiated when the machine is stopped. A calibrated leaker or no-leak end should be used during noise measurement.

Machine is Running: Start is Disabled (Gray)

Press the Start toggle switch to initiate a noise measurement. The Sig1-4, Final, and Result values will update. The toggle switch turns on when the measurement starts and off when it completes. This measurement takes 30-45 seconds to complete.

The first column of numbers is the measured signal value for each of the four independent signal paths. The second column of numbers is an estimate of the noise in the measurement. Consult Prime Controls for details on how to interpret these numbers.

5.2.8.2.6 Force PLC001 IO Screen

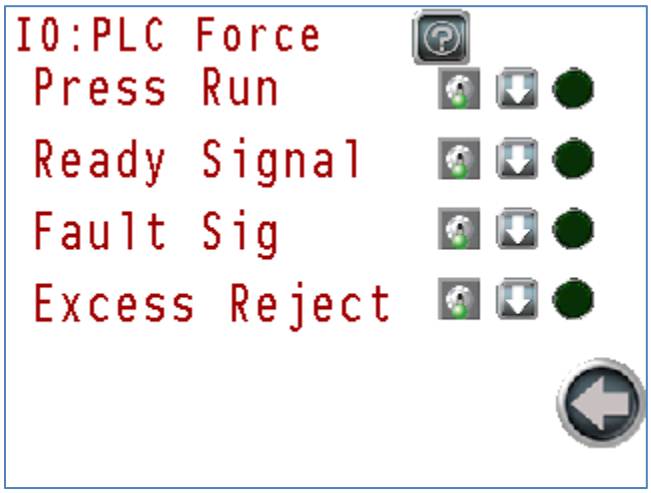


Figure 54 – Force PLC001 IO Statistics Screen

The Force IO screen allows the installer to force the system IOs into known states to easily verify wiring between the system and Press Controller.

When any IO is forced, a scrolling message appears at the bottom of the display to warn the operator that a force is in effect.

Remove all forces prior to operating the press.

5.2.8.2.6.1 IO Force Enable/Disable Switch

 IO Forced

 IO Not Forced (Default)

Each input and output can have its signal forced to a known value using their respective IO Force switch. When forced, the IO will take on the state of the IO Polarity switch.

5.2.8.2.6.2 IO Polarity

 Forced High

 Forced Low

The polarity of each input and output is set using the Polarity toggle switches.

5.2.8.2.6.3 IO Signal State

 IO is On (+27V)

 IO is Off (0V)

5.2.8.3 Utility Menu

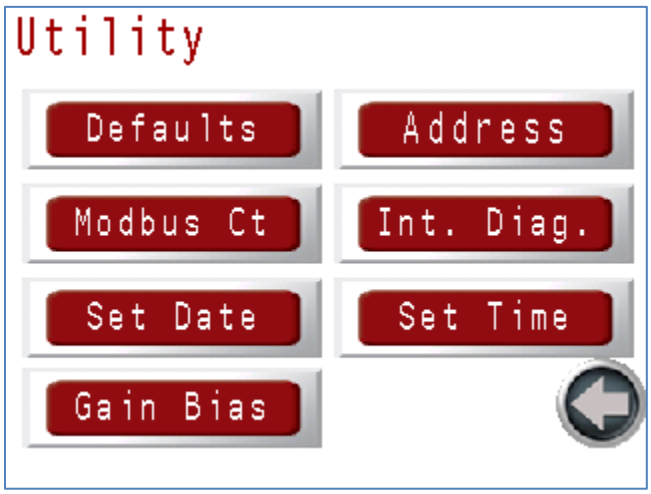


Figure 55 – Utility Menu Screen

The Utility menu allows the operator to restore the system to default settings, set its Modbus address, verify Modbus communication, check internal diagnostics, set the date and time, and adjust the light detector gain and bias.

5.2.8.3.1 Load Defaults

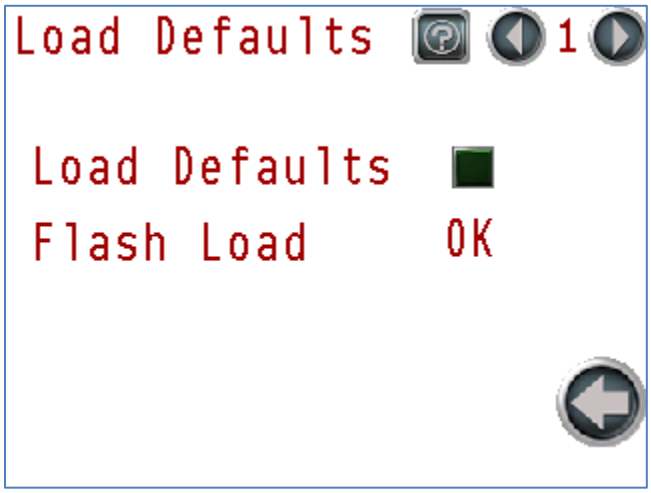


Figure 56 – Load Defaults Screen

System default settings can be restored by pressing the Load Defaults toggle button. The toggle switch turns on when the loading starts and off when it completes. Because restoring defaults occurs so quickly, the toggle switch may not appear to illuminate.

Flash Load may be OK or NOK (Not OK). OK means that the stored settings were properly loaded on power on. If this screen indicates NOK, then the system was unable to load its settings and has instead loaded the default settings. If this occurs, take care to check all settings in the system to ensure they are reset to the correct operational values.

5.2.8.3.2 Modbus Address

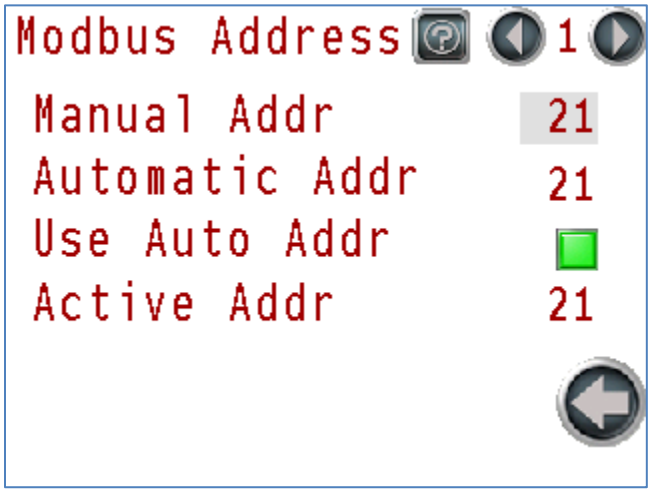


Figure 57 – Modbus Address Screen

The system controls the Modbus address of each light detector. Each lane must have a unique address amongst all devices on the network. The address values may be automatically or manually set.

The Modbus Address screen has a manual address setting, an automatic address setting set by the automatic selection logic, a toggle button to select between the manual adjustment or the

automatic adjustment, and finally the address in use for each lane based on the selection between automatic/manual and the manual value.

The default setting is automatic which sets lane 1 to 21, lane 2 to 22, lane 3 to 23, and lane 4 to 24, which is best for most systems and a requirement for the MI200 software.

It is generally not necessary to make any adjustments to this screen. If adjustments are made, one should take care that the address change is instantaneous and if the address is changed to an address not serviced by the MI200 (e.g. 21, 22, 23, 24) then communication with the unit will be lost possibly requiring intervention via the serial terminal interface. Also, if an address is changed to an address currently in use by another detector, conflicts will occur. If this happens, disconnect power to one of the conflicting detectors and adjust the remaining detector to eliminate the conflict.

Do not make changes on this screen unless advised by Prime Controls.

5.2.8.3.3 Modbus Counts

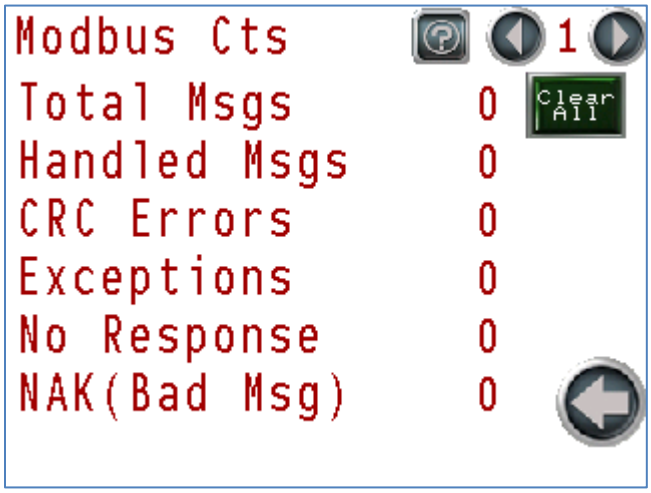


Figure 58 – Modbus Counts Screen

The Modbus Cts (Counts) screen provides information on the quality of the Modbus communications between the MI200 and the individual light detectors. For each category, a counter capable of counting to a maximum value of 65535 is displayed. A toggle button resets the counters to zero.

Table 15 – Modbus Counter Descriptions

Counter	Description
Total Messages	Total messages received by the light detector
Handled Messages	Number of messages responded to by the light detector
CRC Errors	Number of messages received with error
Exceptions	Number of messages with out of bound requests
No Response	Number of messages received that required no response
NAK (Bad Msg)	Number of short or partial messages received with error

Table 16 – Modbus Counters Normal Operation

Counter	Normal Operation
Total Messages	Count continuously to 65535 with MI200 connected
Handled Messages	Count continuously to 65535 with MI200 connected
CRC Errors	Possible slow count
Exceptions	Zero
No Response	Zero
NAK (Bad Msg)	Possible slow count

Table 17 – Modbus Counters Trouble Shooting

Counter	Trouble Shooting
Total Messages	No action required
Handled Messages	No action required
CRC Errors	Noise on communication pair. Improper termination
Exceptions	Modbus master requests are invalid
No Response	No action required (master broadcast message)
NAK (Bad Msg)	Noise on communication pair. Improper termination

5.2.8.3.4 Internal Diagnostics

Figure 59 – Internal Diagnostics Screen

Do not make changes to this screen unless advised by Prime Controls.

The Internal Diagnostics screen should only be used when directed by Prime Controls while troubleshooting the system.

5.2.8.3.5 Set Date

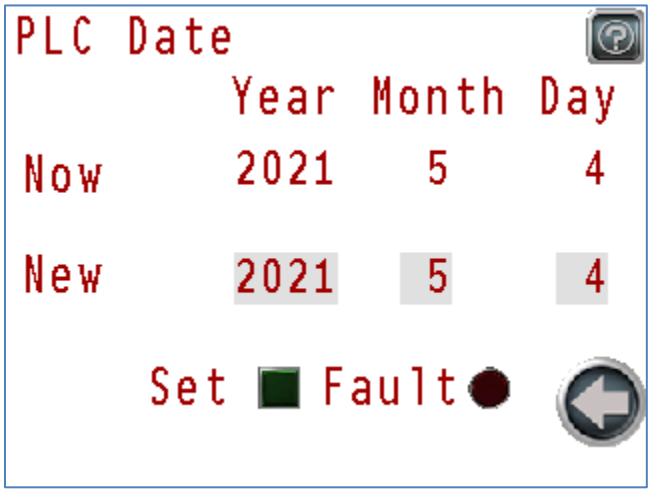


Figure 60 – Set Date Screen

The current date is displayed in the upper row and the user entered date is displayed in the lower row. Set the date in the lower row and press the square next to the word “Set”. If the date is valid the current date will change. If the date is incorrect, the fault indicator will illuminate. Correct the error in the date and retry.

5.2.8.3.6 Set Time

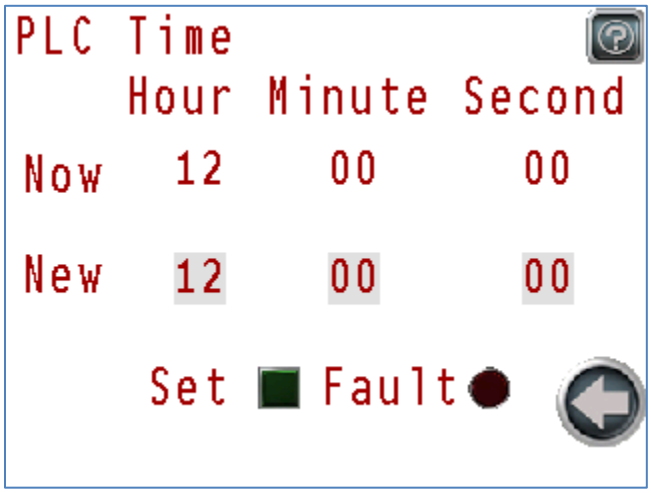


Figure 61 – Set Time Screen

The current time is displayed in the upper row and the user entered time is displayed in the lower row. Set the time in the lower row and press the square next to the word “Set”. If the time is valid the current time will change. If the time is incorrect, the fault indicator will illuminate. Correct the error in the time and retry.

5.2.8.3.7 Limits

Figure 62 – Gain Bias Screen

Do not make changes to this screen unless advised by Prime Controls.

The Gain Bias screen controls the measurement process used by the LH200H/LH200H-opt light detector and its leak detection threshold. Gain may be adjusted from 1 to 100 depending on the desired sensitivity of the system. The system defaults to 30 which provides the best mix of sensitivity and accuracy.

The Bias setting determines the target dark level signal for the manual and automatic calibration routines. The system defaults to 10.

6 MODBUS COMMUNICATION

6.1 Serial Interface

The Modbus serial protocol is a Master-Slave protocol where each LH200H or LH200H-opt, and PLC001 operates as a Modbus slave that responds to a master when a request is received. The LH200H and PLC001 operate in RTU transmission mode with its electrical interface in accordance with the EIA/TIA-485 standard in a two-wire (half-duplex) configuration at 38400 bps. The signals are available on the PSIO terminal block; however, the Modbus standard only allows for one bus master. Therefore, Modbus communication to the Press Controller or the ET230 can only be used at the exclusion of the MI200 touch screen.

Table 18 – Modbus PSIO Terminal Block Connections

Terminal	Function	Wire Color	Comment
2400	Common	Blue	Modbus Return
301	D0	Black	RS-485 A/A’
302	D1	Grey	RS-485 B/B’

6.2 LH200H Commands

Table 19 – Modbus Command Codes

Command Code	Message Type	Meaning
1	Read Coils	Bit Reads From Addresses 0000nn
2	Read Discrete Inputs	Bit Reads From Addresses 1000nn
3	Read Holding Registers	Register Reads From Addresses 4000nn
4	Read Input Registers	Register Reads From Addresses 3000nn
5	Write Single Coil	Bit Writes to Addresses 0000nn
6	Write Single Register	Register Writes to Addresses 4000nn
15	Write Multiple Coils	Bit Writes to Addresses 0000nn
16	Write Multiple Registers	Register Writes to Addresses 4000nn

6.2.1 Discrete Coil Outputs (000001)

Do not write to undefined Coil or Holding register addresses.

Table 20 – Modbus Discrete Coils

Coil Address	Name	Meaning
1	Trigger_Int_Enable	1-Enables
2	Trigger_Polarity	1-High True
3	Strobe_Enable	1-Enables
4	Strobe_Polarity	1-High True
5	Strobe_Override	1-Overrides
6	Strobe_OverrideValue	Override Value
7	Rejector_Polarity	1-Low Leak, 0-High Leak
8	Rejector_Enable	1-Enables
9	Rejector_Override	1-Overrides
10	Rejector_OverrideValue	Override Value
11	StrobeGood_Polarity	1-High True
12	StrobeGood_Enable	1-Enables
13	StrobeGood_Override	1-Overrides
14	StrobeGood_OverrideValue	Override Value
15	SystemOK_Polarity	1-High True
16	SystemOK_Enable	1-Enables
17	SystemOK_Override	1-Overrides
18	SystemOK_OverrideValue	Override Value
19	Result_Polarity	1-High True
20	Result_Enable	1-Enables
21	Result_Override	1-Overrides
22	Result_OverrideValue	Override Value
23	Auto_Adjust	1-Enables
24	VDiodePS_Enable	1-To Enable
26	DoSoftTriggerTrue	Triggered Event - Bit Clears When Function Completes

Coil Address	Name	Meaning
27	DoCalibrate	Triggered Event - Bit Clears When Function Completes
28	GetLoadDefault	Triggered Event - Bit Clears When Function Completes
30	Freerun	Initiate Freerun
34	DoStatistics	Triggered Event - Bit Clears When Function Completes
38	System_Ok_Clear	Reset System OK If It Latches To Fault
39	LanePhaseAutoEnabled	Select Between Auto and Manual Value
40	ModbusAddressUseEnnum	Flag to Select Manual or Automatic Address
43	ModbusCtClr	Modbus Counter Clear

6.2.2 Discrete Inputs (100001)

Table 21 – Modbus Discrete Inputs

Coil Address	Name	Meaning
100001	Trigger_Value	Trigger IO Pin State
100002	Strobe_Value	Strobe IO Pin State
100003	Rejector_Value	Rejector IO Pin State
100004	StrobeGood_Value	Strobe Good IO Pin State
100005	SystemOK_Value	System OK IO Pin State
100006	Result_Value	Result IO Pin State
100007	Calibrate_Status	Calibrate Busy Status
100010	StoreXREF_Status	Store XREF Busy Status
100011	RecallXREF_Status	Recall XREF Busy Status
100012	Machine_Running	Machine Running
100013	System_Ok_Error	System OK Error

6.2.3 Register Inputs (300001)

Table 22 – Modbus Register Inputs

Register Address	Name	Size	Meaning
300001	VersionInt	16 Bit	Software Version Major
300002	VersionFrac	16 Bit	Software Version Minor
300051	GreatestSignal	16 Bit	Leak Value
300052	Result Bits	16 Bit	
300053	Temperature	16 Bit	Temperature °C x 100
300054	StatusLED	16 Bit	Status LED Value
300055	PowerLED	16 Bit	Power LED Value
300056	LanePhase	16 Bit	Lane Phase in Use
300057	LanePhaseAutomatic	16 Bit	Automatic Lane Phase Value
300058	ModbusAddress	16 Bit	Modbus Address in Use
300059	ModbusAddressAutomatic	16 Bit	Automatic Modbus Address
300060	ModbusEnnumerationADC	16 Bit	Internal Value for Modbus Enumeration
300061	StrokeCount	32 Bit	Running Stroke Count
300075	ModbusMsgCt	16 Bit	Total Message Count
300076	ModbusHandledMsgCt	16 Bit	Handled Msg Count
300077	ModbusCRCErrCt	16 Bit	CRC Error Count
300078	ModbusExceptionCt	16 Bit	Exception Count
300079	ModbusNoRespCt	16 Bit	No Response Count
300080	ModbusNakCt	16 Bit	Incoming Bad Msg Count

6.2.4 Holding Registers (400001)

Do not write to undefined Coil or Holding register addresses.

Table 23 – Modbus Holding Registers

Register Address	Name	Size	Meaning
400003	Strobe_OutputType	16 Bit	Strobe Output Type (0-Hi-Z, 1-PNP, 2-NPN, 3-Push-Pull)
400004	Rejector_Rate	16 Bit	Press rate in strokes per minute
400005	Rejector_Location	16 Bit	Rejector Location relative to detector
400006	Rejector_Before	16 Bit	# Ends to reject before suspect end
400007	Rejector_After	16 Bit	# Ends to reject after suspect end
400008	Rejector_OutputType	16 Bit	Rejector Output Type (0-Hi-Z, 1-PNP, 2-NPN, 3-PushPull)
400010	SystemOK_OutputType	16 Bit	System OK Output Type (0-Hi-Z, 1-PNP, 2-NPN, 3-PushPull)
400011	Result_Mode	16 Bit	Result Output Mode (0-Hi-Z, 1-PNP, 2-NPN, 3-PushPull)
400014	Result_OutputType	16 Bit	Result Output Type (0-2)
400016	Bias		Bias Value (1-100)
400019	Signal_Threshold	16 Bit	Leak Threshold (1-5000)
400020	Signal_Gain	16 Bit	Gain (1-100)
400021	LanePhaseManual	16 Bit	Manual Lane Phase Value
400022	ModbusAddressManual	16 Bit	Manual Modbus Address Value

6.3 PLC001 Commands

Table 24 – Modbus Command Codes

Command Code	Message Type	Meaning
1	Read Coils	Bit Reads From Addresses 0000nn
2	Read Discrete Inputs	Bit Reads From Addresses 1000nn
3	Read Holding Registers	Register Reads From Addresses 4000nn
4	Read Input Registers	Register Reads From Addresses 3000nn
5	Write Single Coil	Bit Writes to Addresses 0000nn
6	Write Single Register	Register Writes to Addresses 4000nn
15	Write Multiple Coils	Bit Writes to Addresses 0000nn
16	Write Multiple Registers	Register Writes to Addresses 4000nn

6.3.1 Discrete Coil Outputs (000001)

Do not write to undefined Coil or Holding register addresses.

Table 25 – Modbus Discrete Coil Outputs

Coil Address	Name	Meaning
016385	Press_Run_Enable	1-Enables
016386	Press_Run_Polarity	1-High True
016387	Press_Run_Override	1-Override
016388	Press_Run_OverrideValue	Override Value
016389	Press_Run_Value	Value at input pin
016390	Press_Run_Internal	Internal value of Press Run signal
016395	Read_Trigger_Enable	1-Enables
016936	Read_Trigger_Polarity	1-High True
016937	Read_Trigger_Override	1-Override
016398	Read_Trigger_OverrideValue	Override Value
016399	Read_Trigger_Value	Value at input pin
016400	Read_Trigger_Internal	Internal value of Press Run signal
016405	System_Ready_Enable	1-Enables

Coil Address	Name	Meaning
016406	System_Ready_Polarity	1-High True
016407	System_Ready_Override	1-Override
016408	System_Ready_OverrideValue	Override Value
016409	System_Ready_Internal	Value at input pin
016410	System_Ready_Value	Internal value of System Ready signal
016412	System_Ready_Error	
016415	Fault_Enable	1-Enables
016416	Fault_Polarity	1-High True
016417	Fault_Override	1-Override
016418	Fault_OverrideValue	Override Value
016419	Fault_Internal	Value at input pin
016420	Fault_Value	Internal value of Fault signal
016425	Excess_Reject_Enable	1-Enables
016426	Excess_Reject_Polarity	1-High True
016427	Excess_Reject_Override	1-Override
016428	Excess_Reject_OverrideValue	Override Value
016429	Excess_Reject_Internal	Value at input pin
016430	Excess_Reject_Value	Internal value of Excess Reject signal
016431	Excess_Reject_Lane_1	Excess rejects detected on lane
016432	Excess_Reject_Lane_2	Excess rejects detected on lane
016433	Excess_Reject_Lane_3	Excess rejects detected on lane
016434	Excess_Reject_Lane_4	Excess rejects detected on lane
016435	Result_Polarity	1-High True from LH200H
016445	System_Ok_Clear	1-Clear Alarms/Faults
016447	Reject_Lane_1	LH200H Reject Value Lane 1
016448	Reject_Lane_2	LH200H Reject Value Lane 2
016449	Reject_Lane_3	LH200H Reject Value Lane 3
016450	Reject_Lane_4	LH200H Reject Value Lane 4
016451	Reject_Lane_1_Internal	Internal Value of LH200H Reject Value Lane 1
016452	Reject_Lane_2_Internal	Internal Value of LH200H Reject Value Lane 2
016453	Reject_Lane_3_Internal	Internal Value of LH200H Reject Value Lane 3

Coil Address	Name	Meaning
016454	Reject_Lane_4_Internal	Internal Value of LH200H Reject Value Lane 4
016455	PLC_Read_Trigger_Fault	Alarm, Read Trigger Signal
016456	PLC_Press_Running_Fault	Alarm, Press Running Signal
016457	PLC_Overrides	Alarm, PLC Override
016458	Lane_1_Trigger_Fault	Alarm, Lane 1 Trigger
016459	Lane_2_Trigger_Fault	Alarm, Lane 2 Trigger
016460	Lane_3_Trigger_Fault	Alarm, Lane 3 Trigger
016461	Lane_4_Trigger_Fault	Alarm, Lane 4 Trigger
016462	PLC_Battery_Low	Alarm, Battery Low
016463	PLC_Error	Alarm, PLC Error
061493	New_Date_Set	1-Set New Date
061495	New Time Set	1-Set New Time
100001	Strobe_1	Input Signal – X1
100002	Strobe_2	Input Signal – X2
100003	Strobe_3	Input Signal – X3
100004	Strobe_4	Input Signal – X4
100005	Press_Run	Input Signal – X5
100006	Read_Trigger	Input Signal – X6
100007	Fault_Clear	Input Signal – X7
100033	Reject_Lane_1	Input Module – 1
100034	Reject_Lane_2	Input Module – 2
100035	Reject_Lane_3	Input Module – 3
100036	Reject_Lane_4	Input Module – 4
100037	System_OK_Lane_1	Input Module – 5
100038	System_OK_Lane_2	Input Module – 6
100039	System_OK_Lane_3	Input Module – 7
100040	System_OK_Lane_4	Input Module – 8
161494	New_Date_Error	1 – New date incorrect
161496	New_Time_Error	1 – New time incorrect

6.3.2 Discrete Inputs (100001)

Table 26 – Modbus Discrete Inputs

Coil Address	Name	Meaning
100001	Strobe_1	Input Signal – X1
100002	Strobe_2	Input Signal – X2
100003	Strobe_3	Input Signal – X3
100004	Strobe_4	Input Signal – X4
100005	Press_Run	Input Signal – X5
100006	Read_Trigger	Input Signal – X6
100007	Fault_Clear	Input Signal – X7
100033	Reject_Lane_1	Input Module – 1
100034	Reject_Lane_2	Input Module – 2
100035	Reject_Lane_3	Input Module – 3
100036	Reject_Lane_4	Input Module – 4
100037	System_OK_Lane_1	Input Module – 5
100038	System_OK_Lane_2	Input Module – 6
100039	System_OK_Lane_3	Input Module – 7
100040	System_OK_Lane_4	Input Module – 8
161494	New_Date_Error	1 – New date incorrect
161496	New_Time_Error	1 – New time incorrect

6.3.3 Register Inputs (300001)

Table 27 – Modbus Register Inputs

Register Address	Name	Size	Meaning

No registers defined.

6.3.4 Holding Registers (400001)

Do not write to undefined Coil or Holding register addresses.

Table 28 – Modbus Holding Registers

Register Address	Name	Size	Meaning
400001	Version	16	PLC Software Version
400003	Number_of_Lanes	16	Number of Lanes in System
400004	Excess_Reject_Limit	16	Excess Reject Value 1-99, 0 – Disabled
400005	Excess_Reject_Startup_Delay	16	Number of strokes before Excess Reject is enabled.
400010	Current Year	16	Real Time Clock
400011	Current Month	16	Real Time Clock
400012	Current Day	16	Real Time Clock
400013	Current Hour	16	Real Time Clock
400014	Current Minute	16	Real Time Clock
400015	Current Second	16	Real Time Clock
461469	New Year	16	Set Real Time Clock
461471	New Month	16	Set Real Time Clock
461472	New Day	16	Set Real Time Clock
461474	New Hour	16	Set Real Time Clock
461475	New Minute	16	Set Real Time Clock
461476	New Second	16	Set Real Time Clock

7 MAINTENANCE

With each preventative maintenance cycle, the LH200H or LH200H-opt and SL100H-1 or SL100H-2 should be inspected for damage or wear. The following kits are available for replacement of items subject to long-term wear:

Table 29 – Maintenance Parts

Prime Controls #	Description	Frequency
LH200H-3-GK	Light Head Gasket and Bushing Kit	Replace Each PM Cycle
202674C	Light Head Skid Plate (-202)	Inspect Each PM Cycle
FK 100	Fuse and SSR Replacement Kit	Replace As Needed

7.1 Light Head Gasket and Bushing Replacement

Refer to section 16 for drawing 202798C Exploded view illustrating light head disassembly for gasket and bushing replacement.

1. Remove four 202676-1.000 socket head shoulder bolts that retain the housing clamp ring.
2. Remove the clamp ring, first gasket, housing floating ring, and second gasket.
3. Remove the four 202799 bushings.
4. Inspect bushings for excessive wear and replace if found. The bushing should slide smoothly on the on the shoulder bolts and their outer surfaces should be cylindrical.
5. Replace both gaskets from the 202741 gasket and bushing kit.
6. Re-assemble in the reverse order of disassembly.

8 TROUBLESHOOTING

NOTE:

DO NOT MAKE HARDWARE CHANGES TO THE EP200 SYSTEM WHILE THE SYSTEM IS ENERGIZED.

See Sec. 9 for proper hardware change procedure.

8.1 Basic Guide

Should an issue develop, proceed as follows:

1. Check AC point input power to the system.
2. Verify the integrity of all electrical connections to and from the unit.
3. If the HMI is not on, check CB1 for appropriate AC power.
4. If the HMI is not on, check PS506 for incoming AC, and +27VDC on its output.
5. If System is powered but Lane #1 and PLC are not powered, check PSIO Rail F1 Fuse.
6. If System is powered but Lane #2, #3, and or #4 are not powered, check PSIO Rail F1, F2, F3, or F4 Fuse respectively.
7. If any lanes are indicating disabled communication (Lane # is gray), press and hold the Lane # text until it is restored to red color (communication OK) or orange color (communication fault).
8. If any lanes are not indicating proper communication (Lane # is orange), check power to the respective lane and that the lane has the correct Modbus Address. (See 5.2.8.3.2)
9. If System is powered but no Rejectors fire when triggered, check PSIO Rail F5 fuse.
10. If the system is powered but Lane 1, 2, 3, or 4 rejector does not fire when triggered, check PSIO Rail RJ1, RJ2, RJ3, or RJ4 Reject SSR respectively.
11. Check the system and lane status indicators on the Main screen. Press the toggle button of any item not indicating green to get to the respective status page. Press the System OK/Lane OK toggle button to clear any temporary system faults. If the fault clears, the System OK/Lane OK indicator will stay illuminated.
12. If the System OK/Lane OK indicator will not stay illuminated, use the indicated fault to further troubleshoot the system.
13. Use the MI200 to force outputs and read inputs to confirm connectivity to the Press Controller and Rejectors.
14. Use the MI200 to isolate the problem to a specific lane.
15. Use the MI200 to trigger a measurement on each lane to confirm the illuminator fires and a measurement can be made.
16. Use the diagnostic messages displayed on the MI200 touch screen to identify an appropriate corrective action.

8.2 Diagnostic Messages

Message	Meaning	Action
#x NOK	Lane #x Not OK System OK Not Asserted. Indicates a fault in 1 or more of the test lanes.	See procedure below. Sec. 8.4.1
#x DMA Comp. NOK	Lane #x Internal Measurement Error. Typically caused by corrupt or conflicting data from the sensors.	See procedure below. Sec. 8.4.2
#x DMA Start NOK	Lane #x Internal Measurement Error. Typically caused by corrupt or conflicting data from the sensors.	See procedure below. Sec. 8.4.2
#x Timing NOK	Lane #x Internal Measurement Error	See procedure below. Sec. 8.4.3
#x Watchdog NOK	Lane #x Internal Software Error	See procedure below. Sec. 8.4.4
#x Strobe NOK	Lane #x Strobe Error	See procedure below. Sec. 8.4.5
#x Overrides	Lane #x Has Operator Asserted Overrides	Remove Operator initiated overrides on Force IO screen. (See 5.2.8.2.1).
#x Flash Full	Lane #x Flash Full Error	Power down and restart ECLIPSE Panel. If issue persists, replace LH200H unit. (see Section 9)
#x Save Pending	Lane #x Settings Change Not Yet Saved	This message appears when the operator has changed a setting. It will clear after 30 seconds from the last parameter change. Do not power off the unit when this message is displayed.

#x Default Loaded	Lane #x Settings Corrupt Defaults loaded	The parameters stored in the LH200H have been corrupted. This could be caused by powering the unit off while the Save Pending message is displayed. Manually check all parameters in the affected unit to restore proper operation. If the problem persists, replace LH200H unit. (see Section 9)
PLC Read Trigger Fault	Press Run Signal is present but Read Trigger Signal is not pulsing.	Check connection of Read Trigger signal to End Leak Detection System.
PLC Press Running Fault	Press Run Signal is not present but Read Trigger Signal is pulsing.	Check connection of Press Run signal to End Leak Detection System.
PLC Overrides	An Override is in Effect on the PLC.	Check PLC settings and remove the override. (see 5.2.8.1.6).
#x Trigger Fault	Lane x is Not Strobing	Check Lane x settings for overrides. Check connection of Read Trigger to Lane x.
All Lanes Showing #xTrigger Fault	All Lanes are Not Strobing but LED at PLC Z1-X5 and on PLC Rail 700 SSR Block are flashing	Check all lanes for overrides. Check fuse at PSIO Rail F6 Check SSR on PLC Rail 700 SSR Block
PLC Battery Low	PLC Backup Battery is Low	Replace back up battery on PLC001. (see Section 9)
PLC Error	PLC has Experienced an Error.	Cycle power to system to clear error. If error persists, replace PLC001. (see Section 9)

8.3 Indicators

8.3.1 PS506

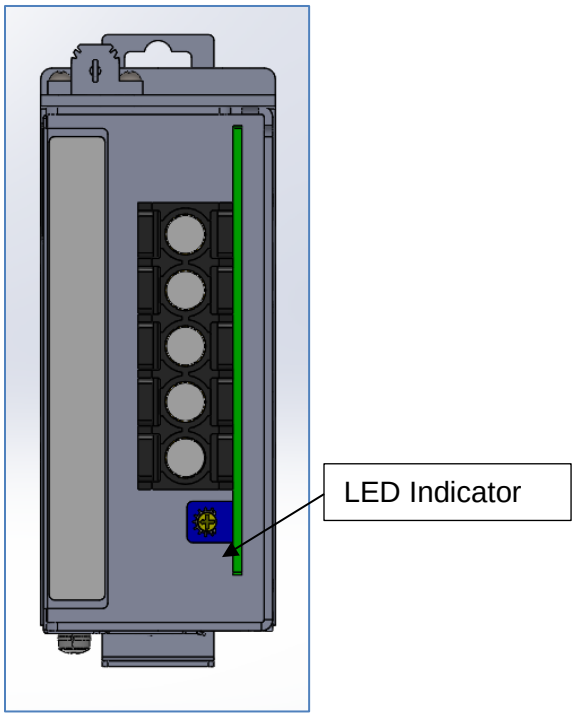


Figure 63 – PS506 LED Indicator

PS506 has a single LED indicator to show that power is present at the unit. It may still be necessary to check the input AC voltage and regulated DC output.

8.3.2 LH200H

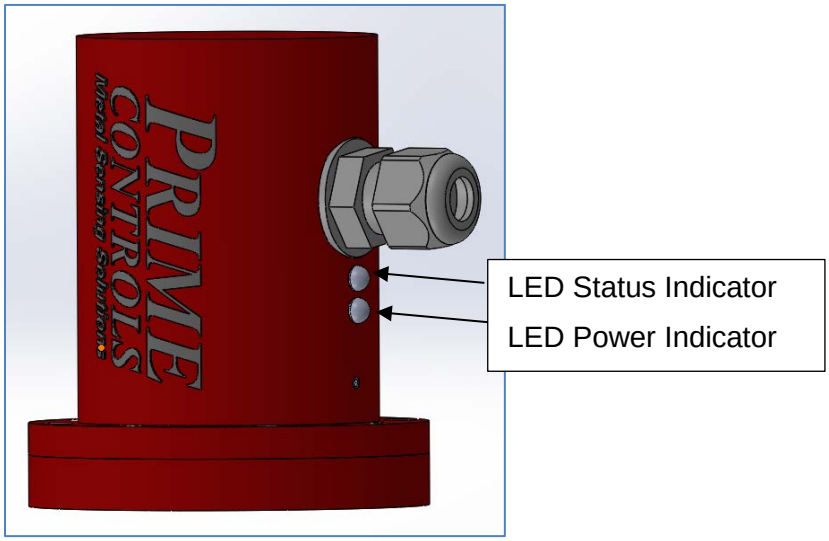


Figure 64 – LH200H Indicators

The LH200H has two indicator LEDs.

The Power Indicator illuminates green when power is applied. The Status Indicator is green for No-Leak, red-Leak, and yellow if a fault has been detected.

8.3.3 SL100H-D OR SL101H-D

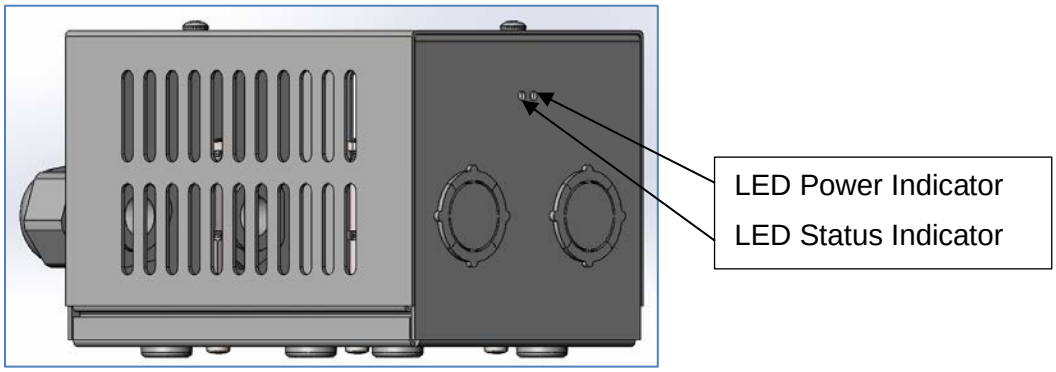


Figure 65 – SL100H-D OR SL101H-D Indicators

The Power Indicator illuminates green when power is applied. The Status Indicator is green for Strobe Good, yellow-Strobe Too Fast, and red if a strobe fault has been detected.

8.3.4 PLC001

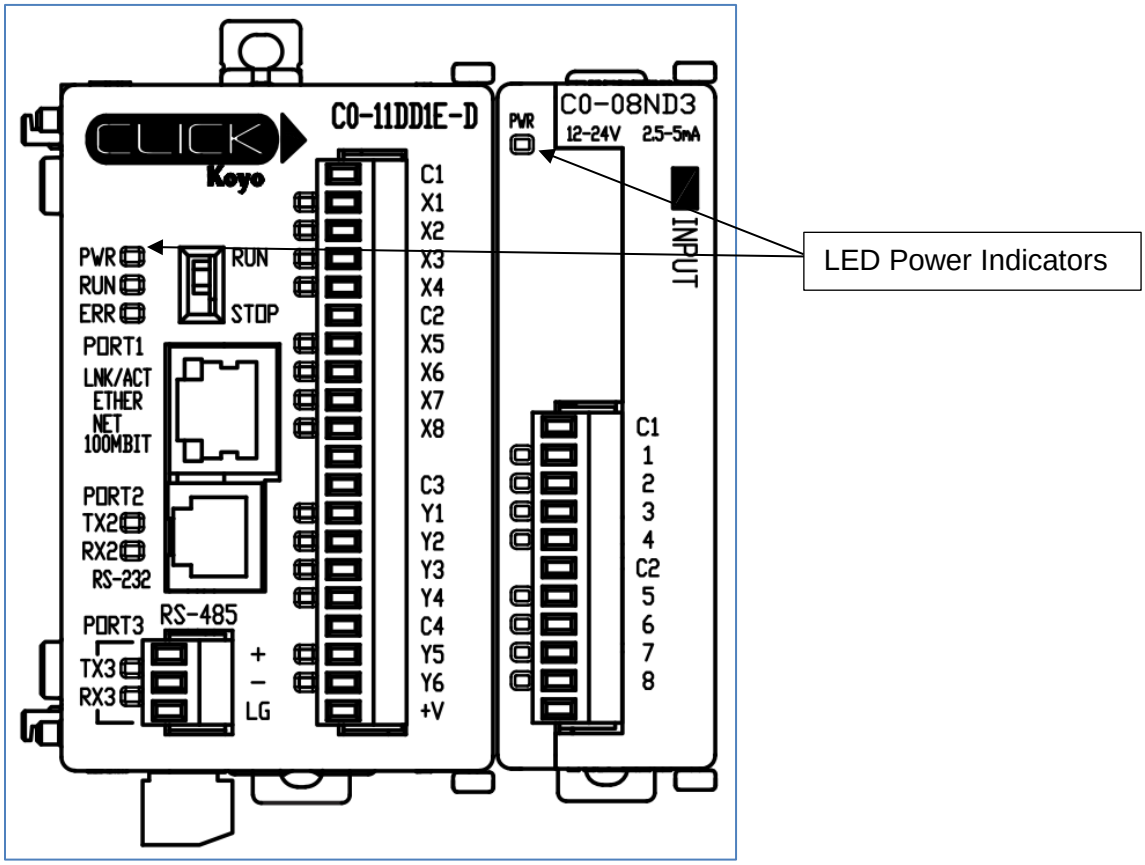


Figure 66 – PLC001 Indicators

The PLC001 module has LED indicators for each input and output along with other status and power indicators as listed in the Table 30 below.

Table 30 – PLC001 Indicators

Module	Indicator	Function
C0-11DD1E-D	PWR	Power present
C0-11DD1E-D	RUN	PLC Running
C0-11DD1E-D	ERR	PLC Error
C0-11DD1E-D	TX2	Port 2 Transmit (Unused)
C0-11DD1E-D	RX2	Port 2 Receive (Unused)
C0-11DD1E-D	TX3	Port 3 Transmit (Modbus to HMI)
C0-11DD1E-D	RX3	Port 3 Receive (Modbus to HMI)
C0-11DD1E-D	X1	Strobe 1
C0-11DD1E-D	X2	Strobe 2
C0-11DD1E-D	X3	Strobe 3

Module	Indicator	Function
C0-11DD1E-D	X4	Strobe 4
C0-11DD1E-D	X5	PRESS_RUN
C0-11DD1E-D	X6	READ_TRIGGER
C0-11DD1E-D	X7	Light Fault Clr
C0-11DD1E-D	X8	Unused
C0-11DD1E-D	Y1	READY_SIGNAL
C0-11DD1E-D	Y2	FAULT_SIG
C0-11DD1E-D	Y3	EXCESS_REJECT_OUT
C0-11DD1E-D	Y4	SPARE_OUTPUT
C0-11DD1E-D	Y5	Unused
C0-11DD1E-D	Y6	Unused
C0-08ND3	1	LANE_1_REJECT_SIG
C0-08ND3	2	LANE_2_REJECT_SIG
C0-08ND3	3	LANE_3_REJECT_SIG
C0-08ND3	4	LANE_4_REJECT_SIG
C0-08ND3	5	System OK Lane 1
C0-08ND3	6	System OK Lane 2
C0-08ND3	7	System OK Lane 3
C0-08ND3	8	System OK Lane 4

The input and output LEDs illuminate when the signal is asserted (current flowing). Check the polarity settings to proper interpret the LEDs. For example, if PRESS_RUN is defined as Low True, then the LED should be off when the press is running.

8.3.5 Rejector Relays

Figure 67 – Rejector Relay Indicator

Each lane's rejector relay has a single LED that illuminates when the relay is energized.

8.4 Detailed Instructions

8.4.1 #x NOK

The #x NOK message indicates that lane #x (1, 2, 3, or 4) has a fault. This will be indicated by the LANE STATUS toggle to the right of the lane lighting RED. By pressing the LANE STATUS toggle button, the system enters the LANE STATUS SCREEN (see 5.2.1.1.4). Under the Lane Status screen, the LANE OK toggle will show RED indicating that one or more of the following may have a fault as indicated by a RED DOT next to that attribute: STROBE, OVERRIDES, DMA, TIMING, or WATCHDOG. Take the following actions to resolve.

1. Attempt to clear that fault by pressing the LANE OK toggle to reset the lane. If the faults clear the LANE STATUS toggle will light GREEN and the lane should resume normal Function.
2. Should the fault(s) not clear, see the corresponding fault resolutions for the fault indicated.

8.4.2 DMA COMP NOK – DMA START NOK

These faults may occur when incorrect phase timing or signal polarities are implemented. Take the following actions to try to resolve this type of fault.

1. Manually check Lane Phase settings (see 5.2.8.1.2) and Signal Polarities (see 5.2.8.2.2). Correct any Phase or Polarity issues, then power down and restart the system.
2. If issue persists, replace the LH200H unit on the affected lane. (see Section 9)

8.4.3 #X Timing NOK

This fault may occur when incorrect phase timing or signal polarities are implemented. Take the following actions to try to resolve this type of fault.

1. Manually check Lane Phase settings (see 5.2.8.1.2) and Signal Polarities (see 5.2.8.1.3). Correct any Phase or Polarity issues, then power down and restart the system.
2. If issue persists, replace the LH200H unit on the affected lane. (see Section 9)

8.4.4 #x Watchdog NOK

The system Watchdog feature monitors system faults and will shut down the press when a fault repeatedly occurs. This is designed to protect the press and ensure correct operation. If the Watchdog Fault occurs, take the following steps to resolve the issue.

1. Check the System History screen for a list of system faults that may have triggered the Watchdog. This should tell which lane is responsible for the repeated faults.
2. Resolve the faults listed in the Lane History screen of the corresponding lane using the above guidelines, then power down and restart the unit.
3. If the issue persists, replace the corresponding LH200H. (see Section 9)

8.4.5 Strobe NOK

The Strobe NOK message indicates that the LH200H is not receiving a proper Strobe Good signal from the SL100H-D OR SL101H-D LED Driver. Receiving a proper Strobe Good signal is the culmination of many requirements:

1. The Strobe signal from the LH200H unit is properly connected to the SL100H-D OR SL101H-D LED driver.
2. The SL100H-D OR SL101H-D is powered and functional.
3. The SL100H-D OR SL101H-D is properly connected to the SL100H-1 or 2 remote LED illuminator.
4. The SL100H-1 or 2 remote LED illuminator is functional.
5. The Strobe Good signal from the SL100H-D OR SL101H-D is properly connected to the LH200H.

If any of these requirements are not met, the Strobe Good error will appear. To troubleshoot this issue check:

1. Are all cables between the LH200H, SL100H-1 or 2, and EP200 in place, undamaged, and secure?
2. Is the SL100H-D OR SL101H-D powered as indicated by the power LED located on the left-hand side of the unit? The green power LED is continuously on.
3. Cycle the press or use the Diagnostic, Measurement Screen, Start toggle button (see 5.2.8.2.45.2.8.2.4) to force a measurement.
    a. If the SL100H-D OR SL101H-D status LED did not flash, then it is not receiving the Strobe Signal from the LH200H. Verify the wiring and cables between the LH200H and SL100H. Verify that the Trigger input is enabled (see5.2.8.1.3). Verify that the Strobe Signals settings have not been overridden on the Force IO page (see 5.2.8.2.1). Verify that the strobe signals settings have not been changed on the Configure IO page (see 5.2.8.2.2).

b. If the SL100H-D OR SL101H-D status LED flashed but remain yellow, then one or more of the LEDs in the SL100H-1 or 2 did not illuminate correctly. Recheck all connections and cables between the SL100H-D OR SL101H-D and SL100H-1 or 2. Check the PS506 for correct voltage levels. Attach a spare SL100H-1 (or swap cables between a known good SL100H-1) to the CBL142-10 cable and retest (see Section 9). If the problem is resolved, replace the SL100H-1 or 2. If the problem persists, replace the SL100H-D OR SL101H-D (see Section 9).
c. If the SL100H-D OR SL101H-D status LED flashed green and then went dark, then the LED flash was correct and there is a problem with the Strobe Good signal between the SL100H-D OR SL101H-D and LH200H. Check the wiring and cable between the SL100H-D OR SL101H-D and LH200H. Check the setting of the Strobe Good signal and Verify that the strobe signals settings have not been overridden on the Force IO page (see 5.2.8.2.1). Verify that the Strobe Signals settings have not been changed on the Configure IO page (see 5.2.8.2.2).
d. Swap the LH200H cabling with another lane (see Section REPLACING ECLIPSE SYSTEM COMPONENTS). Take care that if you are using automatic Modbus address assignment (see 5.2.8.3.2) the addresses of the two LH200H will swap. For example, if the problem is on Lane 1 and you swap LH200H cables between Lane 1 and 2, then the LH200H responding on Lane 1 will now respond on Lane 2. If the problem moves to Lane 2, then the problem is in the LH200H now connected to Lane 2. However, if you are using a manual Modbus address assignment, then the address of the LH200H will not change. So if the problem remains on Lane1 then the problem is in the light head originally connected to Lane 1.
e. Change the affected component. (see Section 9).

8.4.6 Modbus Communication Troubleshooting

The HMI uses a Modbus protocol to send and receive information to and from the LH200H or LH200H-opt, PLC001, and Press Controller. If the HMI cannot communicate with any of the LH200H or LH200H-opt, the PLC001, or the Press Controller, this could indicate a problem with the Modbus system. To troubleshoot Modbus issues, check the following.

8.4.6.1 Incorrect or Broken Wiring (Individual Lane with HMI)

1. Verify all Modbus wiring connections.
2. Verify all cable connections are secure.
3. If problem persists, swap cables with another working lane. If problem moves to previously working lane, replace cable.

8.4.6.2 Duplicate Modbus Address

If 2 or more of the system components have the same Modbus Address, it will likely result in the HMI being unable to communicate with one or both of the components. All of the components in the system must have a unique Modbus Address, and in the case of the LH200H/LH200H-opt, the Modbus address should correspond to the Lane on which it is installed (see 5.2.8.3.2). Should communications be lost with multiple lanes, refer to section 8.4.6.3 for correcting this issue.

8.4.6.3 Incorrect Modbus Address

The LH200H and LH200H-opt must have a Modbus address that corresponds to its Lane Position, or the HMI will not be able to communicate with it. This is handled by the system with the combination of the SQ200 Sequencer and the LH200H/LH200H-opt Automatic Address Function. If the LH200H/LH200H-opt is set to Automatic Address Mode (Recommended), the LH200H/LH200H-opt can be moved from lane to lane and from EP200 system to EP200 system and the HMI should automatically be able to communicate with it. All LH200H/LH200H-opt units are set to Automatic Modbus Addressing from the factory.

If, however, the LH200H/LH200H-opt is set to Manual Address Mode, it must be set to the correct Modbus Address for the lane in which it is to be installed prior to removing it from its current lane (see section 5.2.8.3.2). If this is done, communication with the LH200H/LH200H-opt will be lost until it is installed in a lane that corresponds with its manually set Modbus Address.

It is strongly recommended that the LH200H/LH200H-opt is set to Automatic Modbus Addressing mode prior to removing it from any EP200 system. (see sec. 5.2.8.3)

Should an LH200H/LH200H-opt be installed and fail to communicate with the HMI, take the following steps to set the correct Modbus Address:

8.4.6.3.1 HMI Detecting Method

If the LH200H is in Manual Addressing mode and the Modbus address is not known, you can attempt to auto-detect the LH200H/LH200H-opt using the following method.

1. If the EP200 system is not configured to 4 lanes, reconfigure for 4 lanes under the SETUP>PARAMETERS> screen (see 5.2.8.1.5)
2. Power down the EP200 system
3. Connect the LH200H/LH200H-opt to the desired lane.
4. Disconnect all other LH200H/LH200H-opts connected to the panel. Be sure to wipe down and label the cables prior to disconnecting and guard against contaminants in the connectors. This helps ensure there are no problems when reconnecting the units correctly later.
5. Energize the panel. The HMI should now show communication with the unit in either the lane it is manually addressed to if the manual address is set to one of the 4 valid lane addresses (21-24), or in the lane it is physically connected to if in Automatic Address mode and if the SQ 200 for that lane is working correctly. If it does not, proceed to sec. 8.4.6.3.2
6. If communication is established to the LH200H/LH200H-opt, go to the ADDRESS screen in the UTILITY Menu (see 5.2.8.3.2)
7. If the Active Address, and the Automatic Address are the same, and the lane is set to Automatic Address, proceed to step i.
8. If the Active Address matches the Manual Address, but not the Automatic Address then leave in Manual Address mode until the SQ200 for that lane is replaced.
9. Power down the EP200 system
10. Repeat steps a. thru i. for any other LH200H/LH200H-opt units as necessary.
11. When all LH200H/LH200H-opt units are communicating, reconnect the other LH200H/LH200H-opt units back to the panel.
12. Energize the EP200 system.

If this procedure fails to restore communication, go to Serial Terminal method (see 8.4.6.3.2)

8.4.6.3.2 Serial Terminal Method

1. Connect the LH200H/LH200H-opt to a serial terminal. Refer to LH200H, SL100H END LEAK DETECTION SYSTEM Operating Instructions (PRIME CONTROLS Doc. 202867) Sec. 5.
2. Open the terminal and enter Installer Mode
3. Manually set the Modbus Address to correspond with the lane number where the LH200H/LH200H-opt is installed.
4. The HMI should now be able to communicate with the LH200H/LH200H-opt.

9 REPLACING ECLIPSE SYSTEM COMPONENTS

The EP200 system is a modular design making it possible to replace individual components should problems arise. Care should be taken when changing components in the system to maintain the system integrity. When changing components or making changes in system wiring, follow the following procedure.

9.1 Power Down Prior to Maintenance

1. Power down the ECLIPSE Panel by turning off the circuit breaker CB1. DO NOT make hardware changes to the system while the system is energized. “Hot Swapping” hardware could cause damage to other system components.
2. Power down and Lockout the Press per Standard Safety Protocols.
3. Wait 1 minute for CAP001 to discharge to safe levels.
4. Make necessary wiring adjustments or component replacements.
5. Restart the EP200 system by turning on the circuit breaker CB1.
6. If the component changed is the LH200H/LH200H-opt, it will be necessary to reconfigure the Limits (see 5.2.8.1.1), Phasing (see 5.2.8.1.2), Polarities (see 5.2.8.1.3), and the Rejector Parameters (see 5.2.8.1.4) associated with the new component to make the system run correctly.
7. Verify that the system is operating correctly.

9.2 LH200H/LH200H-opt Replacement

To replace an LH200H, follow the following steps:

1. Follow power down procedure Sec 9.1
2. Disconnect the unit from the CBL144-10 cable at the connector.
3. Remove the four mounting bolts and remove the LH200H unit.
4. If the unit being replaced is shimmed, retain the shimming for installing the replacement.
5. Install the new LH200H unit. See Sec. 16, DWG. 202690 or 202798 depending on which unit is being installed, for proper orientation.
6. Reconnect the CBL 144-10 cable.
7. Power up the EP200 panel
8. NOTE: IT MAY BE NECESSARY TO CHANGE THE SETTINGS ASSOCIATED WITH THE NEW UNIT. See Sec. 9.1, step 6 above
9. Remove Lockout and power the Press
10. Verify proper operation.

9.3 SL100H-1 or SL100H-2 Remote LED Illuminator Replacement

To replace an SL100H, follow the following steps:

1. Follow power down procedure Sec 8.1
2. Disconnect the unit from the CBL145-10 cable at the connector.
3. Remove the four mounting bolts and remove the SL100H unit.
4. If the unit being replaced is shimmed, retain the shimming for installing the replacement.
5. Install the new SL100H unit. See Sec. 16, DWG. 202801or 202993 depending on which unit is being installed, for proper orientation.
6. Reconnect the CBL 145-10 cable.
7. Power up the EP200 panel
8. Remove Lockout and power the Press.
9. Verify proper operation.

9.4 SL100H-D OR SL101H-D Replacement

To replace an SL100H-D OR SL101H-D, do the following steps:

1. Follow power down procedure Sec 8.1
2. Disconnect the unit from the wire harness connections for the unit at the LHSL Rail of the EP200 Panel. See Sec 16 DWG 202912-X for the connections.
3. Remove the two cover screws on the top of the unit and remove the unit top cover.
4. Remove the four chassis mounting screws on the base of the unit (retain the mounting screws for installing the new unit).
5. Install the new SL100H-D OR SL101H-D unit.
6. Install the new units' cover.
7. Reconnect the wire harness connections to the LHSL rail of the EP200 Panel. See Sec 16 DWG 202912-X for the connections.
8. Power up the EP200 panel
9. Remove Lockout and power the Press.
10. Verify proper operation.

9.5 PLC001 Programmable Controller Replacement

To replace a PLC001, do the following steps:

1. Follow power down procedure Sec 8.1
2. Carefully disconnect the grey terminal connection blocks from the unit being replaced
3. Release the DIN rail lock at the base of the PLC unit and remove the unit.
4. Install the new unit and lock in place with the DIN rail lock at the base.
5. Reconnect the Grey terminal connection blocks to the new unit.
6. Make sure the new unit RUN/STOP switch is set to RUN.
7. Power up the EP200 panel
8. Remove Lockout and power the Press.
9. Verify proper operation.

9.6 CAP001 Replacement

To replace a CAP001, do the following steps:

1. Follow power down procedure Sec 8.1
2. Remove the two top cover retaining screws.
3. Carefully disconnect the 2 wires from the terminals on the top of the CAP001. Be careful not to short the two terminals together while removing the wires.
4. Release the CAP001 base from the DIN rail. The cap snaps to the DIN rail
5. Snap the new CAP001 unit to the DIN rail.
6. Reconnect the 2 terminal wires to the Cap in the correct order. BLUE to (+) terminal, BLU/WHT to (-) terminal
7. Install top cap.
8. Power up the EP200 panel
9. Remove Lockout and power the Press.
10. Verify proper operation.

9.7 PS506 Power Supply Replacement

To replace a PS506, follow the following steps:

1. Follow power down procedure Sec 8.1
2. Note the wire connections and disconnect the wires from the terminals.
3. Release the PS506 DIN rail latch at the base from the DIN rail and remove the PS506.
4. Install the replacement PS506 and latch in place.
5. Reconnect the wires to the correct terminals.
6. Power up the EP200 panel
7. Remove Lockout and power the Press.
8. Verify proper operation.

10 FACTORY ASSISTANCE

For further information on service assistance, contact Prime Controls, Inc., 4528 Gateway Circle, Dayton, Ohio, 45440 USA. Phone +1-937-435-8659. Please have the model number and serial number of the unit available to expedite service.

11 OPERATING SPECIFICATIONS

Speed:	Up to 1000 Strokes per Minute
Detection:	0.5µm Leaks
Rejection Logic:	Up to 99.9 Ends between Detector and Rejector Up to 10 Ends Before the Leaker Up to 10 Ends After the Leaker
Excess Reject Logic:	Up to 99 Ends per Thousand Lock Out at Start up of Up to 999 Ends
Interfaces:	MI200 5.7” Full-Color Touch Screen Using Modbus External Modbus Link (Exclusive of MI200 - Optional) External Ethernet/IP (Exclusive of MI200 – Requires Optional ET230)

12 ELECTRICAL SPECIFICATIONS

Supply Voltage:	90-260 V AC, 47-63Hz
Supply Current:	< 4 A
Input Max Input Voltage:	-1V, 26.4V DC
Input Impedance:	6.8K ohms On Voltage: > 19V Off Voltage: < 7V
Outputs:	Drive Mode: PNP (Sourcing) On Voltage: 27 VDC Off Voltage: 0 volts Impedance: 240 Ohms Max Current: 100 mA
Output Overload Protection:	Self-limiting current
Rejector Output:	On Voltage: 27 VDC Limiting Current: 3A (Relay) Limiting Current: 200mA (System) Voltage Drop: 200mV Replacement Relay Phoenix Contact 2966595
LH200H Cable Length:	10m Maximum
LH200H-opt Cable Length:	10m Maximum
SL100H-1 Cable Length:	10m Maximum
SL100H-2 Cable Length:	10m Maximum

13 LIMITATIONS AND EXCLUSION OF WARRANTIES

All goods purchased from PRIME CONTROLS, INC. shall be free from defects in materials, design, and workmanship under normal conditions of use for one year from the date of shipment. THIS WARRANTY IS THE SOLE WARRANTY AND IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED, WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE. THE LIABILITY OF PRIME CONTROLS TO ANY PURCHASER SHALL BE LIMITED EXCLUSIVELY TO THE COST OF REPLACEMENT OR REPAIR OF DEFECTIVE PARTS, AND SHALL NOT INCLUDE LIABILITY FOR ANY DIRECT, CONSEQUENTIAL, OR INCIDENTAL DAMAGES WHATSOEVER, WHETHER FORESEEN OR UNFORESEEN, INCLUDING BUT NOT LIMITED TO LOST PROFITS, LOS T SALES, OR INJURY TO PERSONS OR PROPERTY.

14 ACRONYMS

A – Ampere

AC – Alternating Current

CB – Circuit Breaker

CLR – Clear

DC – Direct Current

DEL – Delete

DIN – Deutsches Institut für Normung (German institute for Standardization)

DMA – Direct Memory Access

ELDS – End Leak Detection System

ELTP – End Light Test Package

ENT – Enter

Hi-Z – High Impedance Output (Output is Disabled)

HMI – Human Machine Interface

Hz – Hertz

Inc. – Incorporated

IO – Input/Output

LED – Light Emitting Diode

LHSL – Light Head Strobe Lamp DIN Rail

m – Meters

mA – Milli-Ampere

Msg – Message

mV – Milli-Volt

NAK – No Acknowledge. Slave did not acknowledge its message

NEMA – National Electrical Manufacturers Association

NOK – Not Okay

NPN – Negative Positive Negative (Sinking Output)

OK – Okay

PC – Press Controller

PE – Protective Earth

PLC – Programmable Logic Controller

PM – Preventative Maintenance

PNP – Positive Negative Positive (Sourcing Output)

PS – Power Supply

PSIO – Power Supply Input Output DIN Rail

Push-Pull – Output Sources and Sinks.

RS – Recommended Standard

RTU – Remote Terminal Unit

µm – Micro-meter (1/1,000,000 of a meter)

V – Volt

15 GENERAL TERMINAL BLOCK CONNECTIONS

15.1 Wiring and Cabling

15.1.1 Introduction

Refer to section 16 for drawing 202912 for system wiring and cabling details. The system has two sets of DIN rail mounted terminal blocks in the EP200 chassis for interconnection purposes. The horizontal power entry and Press Controller interconnect rail is designated PSIO while the vertical detector/illuminator connection rail is designated LHSL. The connections to these two blocks on the EP200 are listed below:

Table 31 – PSIO Terminal Block External Connection List

Terminal	Description	Color/Direction	Use
CB1	Line Input of Circuit Breaker	BLACK	System Power
ACN	AC Neutral	WHITE	System Power
PE	Protective Earth	GREEN/YELLOW	Protective Earth
	PC_IO_POWER_(+)	From Press Controller	Power for Press Controller Inputs
	PC_IO_POWER_(-)	From Press Controller	Common for Press Controller Inputs
700	READ_TRIGGER	From Press Controller	PLC Trigger for Measurement
305	LANE_1_REJECT_SIG	To Press Controller	PLC Monitor Leaks
405	LANE_2_REJECT_SIG	To Press Controller	PLC Monitor Leaks
505	LANE_3_REJECT_SIG	To Press Controller	PLC Monitor Leaks
605	LANE_4_REJECT_SIG	To Press Controller	PLC Monitor Leaks
201	PRESS_RUN	From Press Controller	Indicates press is running
202	FAULT_SIG	To Press Controller	Indicates a fault in the Light Tester
203	EXCESS_REJECT_OUT	To Press Controller	Indicates excessive rejects
204	READY_SIGNAL	To Press Controller	PLC Monitor System Status
205	SPARE_OUTPUT	To Press Controller	Unused
206	LAMP_FAULT_CLR	From Press Controller	Not Used
	ELDS_IO_POWER_(-)	To Press Controller	Common for Outputs to Press Controller
	ELDS_IO_POWER_(+)	To Press Controller	+27V for Outputs to Press Controller

Terminal	Description	Color/Direction	Use
301	Modbus A		External HMI Modbus
302	Modbus B		External HMI Modbus
PE	Protective Earth		External HMI PE
2400	Common		External HMI Common
2400	Common	To Lane 1 Rejector	Reject Solenoid Common
PE	Protective Earth	To Lane 1 Rejector	Reject Solenoid PE
RJ1	Solenoid 1 Drive	To Lane 1 Rejector	Reject Solenoid Drive
2400	Common	To Lane 2 Rejector	Reject Solenoid Common
PE	Protective Earth	To Lane 2 Rejector	Reject Solenoid PE
RJ2	Solenoid 2 Drive	To Lane 2 Rejector	Reject Solenoid Drive
2400	Common	To Lane 3 Rejector	Reject Solenoid Common
PE	Protective Earth	To Lane 3 Rejector	Reject Solenoid PE
RJ3	Solenoid 3 Drive	To Lane 3 Rejector	Reject Solenoid Drive
2400	Common	To Lane 4 Rejector	Reject Solenoid Common
PE	Protective Earth	To Lane 4 Rejector	Reject Solenoid PE
RJ4	Solenoid 4 Drive	To Lane 4 Rejector	Reject Solenoid Drive

Inputs from the Press Controller are optically isolated and use the PC_IO_POWER_(+) and PC_IO_POWER_(-) for their returns.

Outputs to the Press Controller are referenced to the local ELDS_IO_POWER_(+) and ELDS_IO_POWER_(-) signals.

Table 32 – LHSL Terminal Block Connection List

Terminal	Description	Cable/Color	Use
200	Test Cycle Enable 1	Red	PLC Trigger for Measurement
301	Modbus A 1	Purple	Modbus A Serial
302	Modbus B 1	Black	Modbus B Serial
2400	Common 1	Brown	Common
303	Strobe Good 1	Light Brown (Tan)	Monitor Strobe Operation
304	Strobe Trigger 1	Pink	Strobe Trigger
305	Result 1	Green	Result
306	Reject 1	Orange	Reject Solenoid
307	System OK 1	Blue	System OK

Terminal	Description	Cable/Color	Use
308	Serial Data Out 1	Gray	Serial Data Out
309	Serial Data In 1	Yellow	Serial Data In
2411	+27VDC 1	White	+27V
PE	Shield 1	Braid	Cable Shield
PE	Braid 1	Braid	Cable Shield
PE	Braid 1	Green/Yellow	Cable Shield
2411	LED Power 1 1	Brown	Power for LED String
2411	LED Power 1 1	Blue	Power for LED String
1300	LED String 1 1	Brown/White	Driver for LED String
1301	LED String 2 1	White	Driver for LED String
1302	LED String 3 1	Green	Driver for LED String
1303	LED String 4 1	Yellow	Driver for LED String
1304	LED String 5 1	Gray	Driver for LED String
1305	LED String 6 1	Pink	Driver for LED String
1306	LED String 7 1	Red	Driver for LED String
1307	LED String 8 1	Black	Driver for LED String
1308	LED String W 1	Violet	Driver for LED String
200	Test Cycle Enable 2	Red	PLC Trigger for Measurement
301	Modbus A 2	Purple	Modbus A Serial
302	Modbus B 2	Black	Modbus B Serial
2400	Common 2	Brown	Common
403	Strobe Good 2	Light Brown (Tan)	Monitor Strobe Operation
404	Strobe Trigger 2	Pink	Strobe Trigger
405	Result 2	Green	Result
406	Reject 2	Orange	Reject Solenoid
407	System OK 2	Blue	System OK
408	Serial Data Out 2	Gray	Serial Data Out
409	Serial Data In 2	Yellow	Serial Data In
2421	+27VDC 2	White	+27V
PE	Shield 2	Braid	Cable Shield
PE	Braid 2	Braid	Cable Shield
PE	Braid 2	Green/Yellow	Cable Shield

Terminal	Description	Cable/Color	Use
2421	LED Power 1 2	Brown	Power for LED String
2421	LED Power 1 2	Blue	Power for LED String
2300	LED String 1 2	Brown/White	Driver for LED String
2301	LED String 2 2	White	Driver for LED String
2302	LED String 3 2	Green	Driver for LED String
2303	LED String 4 2	Yellow	Driver for LED String
2304	LED String 5 2	Gray	Driver for LED String
2305	LED String 6 2	Pink	Driver for LED String
2306	LED String 7 2	Red	Driver for LED String
2307	LED String 8 2	Black	Driver for LED String
2308	LED String W 2	Violet	Driver for LED String
200	Test Cycle Enable 3	Red	PLC Trigger for Measurement
301	Modbus A 3	Purple	Modbus A Serial
302	Modbus B 3	Black	Modbus B Serial
2400	Common 3	Brown	Common
503	Strobe Good 3	Light Brown (Tan)	Monitor Strobe Operation
504	Strobe Trigger 3	Pink	Strobe Trigger
505	Result 3	Green	Result
506	Reject 3	Orange	Reject Solenoid
507	System OK 3	Blue	System OK
508	Serial Data Out 3	Gray	Serial Data Out
509	Serial Data In 3	Yellow	Serial Data In
2431	+27VDC 3	White	+27V
PE	Shield 3	Braid	Cable Shield
PE	Braid 3	Braid	Cable Shield
PE	Braid 3	Green/Yellow	Cable Shield
2431	LED Power 1 3	Brown	Power for LED String
2431	LED Power 1 3	Blue	Power for LED String
3300	LED String 1 3	Brown/White	Driver for LED String
3301	LED String 2 3	White	Driver for LED String
3302	LED String 3 3	Green	Driver for LED String
3303	LED String 4 3	Yellow	Driver for LED String

Terminal	Description	Cable/Color	Use
3304	LED String 5 3	Gray	Driver for LED String
3305	LED String 6 3	Pink	Driver for LED String
3306	LED String 7 3	Red	Driver for LED String
3307	LED String 8 3	Black	Driver for LED String
3308	LED String W 3	Violet	Driver for LED String
200	Test Cycle Enable 4	Red	PLC Trigger for Measurement
301	Modbus A 4	Purple	Modbus A Serial
302	Modbus B 4	Black	Modbus B Serial
2400	Common 4	Brown	Common
603	Strobe Good 4	Light Brown (Tan)	Monitor Strobe Operation
604	Strobe Trigger 4	Pink	Strobe Trigger
605	Result 4	Green	Result
606	Reject 4	Orange	Reject Solenoid
607	System OK 4	Blue	System OK
608	Serial Data Out 4	Gray	Serial Data Out
609	Serial Data In 4	Yellow	Serial Data In
2401	+27VDC 4	White	+27V
PE	Shield 4	Braid	Cable Shield
PE	Braid 4	Braid	Cable Shield
PE	Braid 4	Green/Yellow	Cable Shield
2401	LED Power 1 4	Brown	Power for LED String
2401	LED Power 1 4	Blue	Power for LED String
4300	LED String 1 4	Brown/White	Driver for LED String
4301	LED String 2 4	White	Driver for LED String
4302	LED String 3 4	Green	Driver for LED String
4303	LED String 4 4	Yellow	Driver for LED String
4304	LED String 5 4	Gray	Driver for LED String
4305	LED String 6 4	Pink	Driver for LED String
4306	LED String 7 4	Red	Driver for LED String
4307	LED String 8 4	Black	Driver for LED String
4308	LED String W 4	Violet	Driver for LED String

15.1.2 LH200H, LH200H-opt Connections

The light detectors have a 12-wire male M12 connector. Pinout as indicated below:

Table 33 – LH200H/LH200H-opt Connection List

Pin	Signal	Color	Type
1	+27V power	White	Power
2	Common	Brown	Power
3	Result	Green	Output
4	Serial Data In	Yellow	RS-232 Input
5	Serial Data Out	Gray	RS-232 Output
6	Strobe Trigger	Pink	Output
7	System OK	Blue	Output
8	Trigger	Red	Input
9	Rejector	Orange	Output
10	Strobe Good	Light Brown (Tan)	Input
11	Modbus RS-485 B	Black	Bidirectional
12	Modbus RS-485 A	Violet (Purple)	Bidirectional
Shield	Shield	Braid	Shield

15.1.3 SL100H-1, SL100H-2 Connections

The illuminators have a 12-wire male M23 connector. Pinout as indicated below:

Table 34 – SL100H-1, SL100H-2 Connection List

Pin	Signal	Color	Type
1	+27V	Brown	Power
2	String 1	Brown/White	LED Drive
3	+27V	Blue	Power
4	String 2	White	LED Drive
5	String 3	Green	LED Drive
6	String 4	Yellow	LED Drive
7	String 5	Gray	LED Drive
8	String 6	Pink	LED Drive
9	String 7	Red	LED Drive
10	String 8	Black	LED Drive
11	String W	Violet	LED Drive
12	Shield	Green/Yellow	Protective Earth
Braid	Braid	Braid	Braid

Verify the color code of your cable before using the colors in this table to wire your system as color codes are not standardized.

16 DRAWINGS