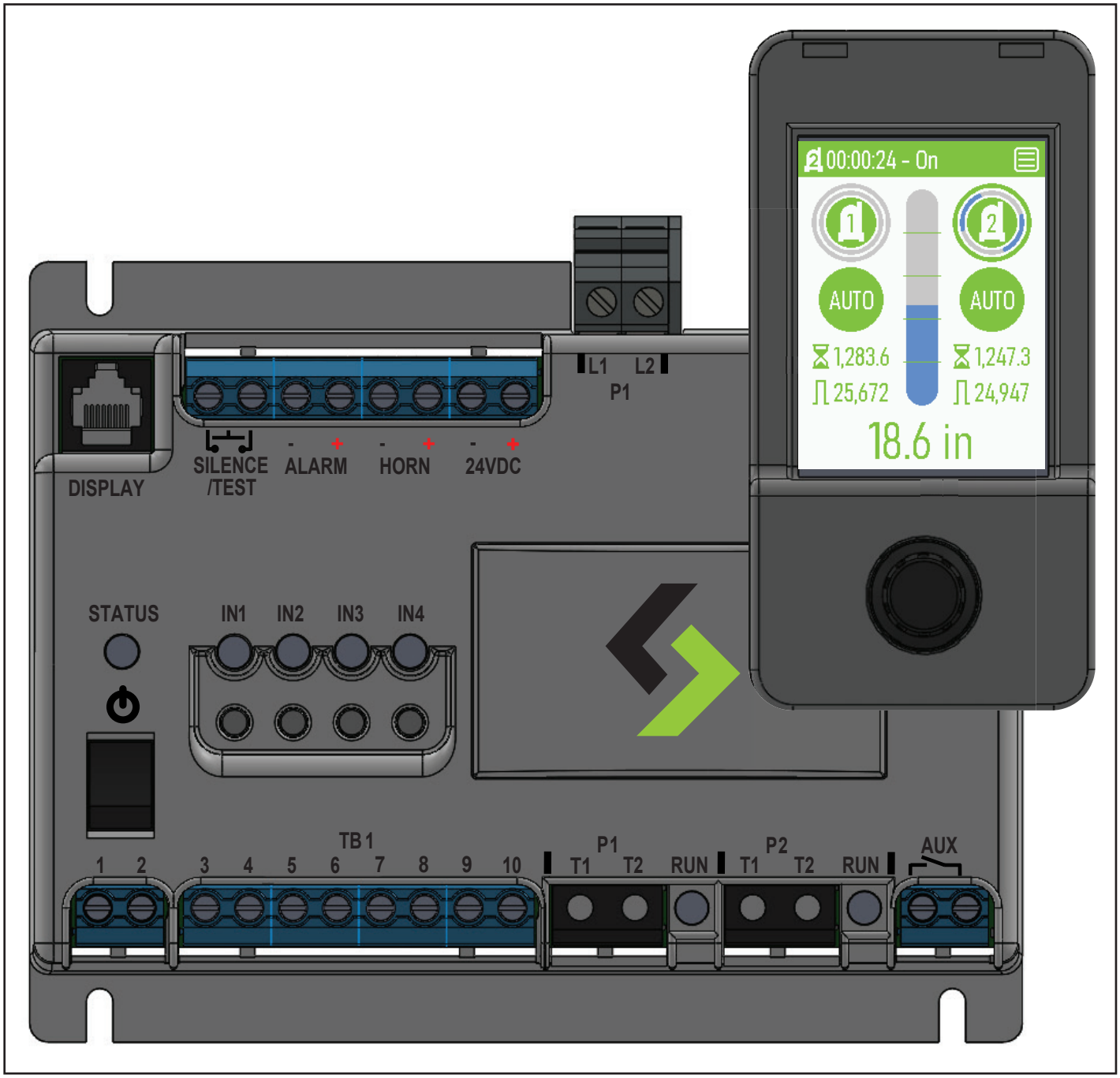
Installer Friendly Series®

SJE RHOMBUS® Controller/LCD Interface

Operation Manual



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⚠WARNINGS

Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

Failure to follow these precautions could result in serious injury or death. Keep these instructions with warranty after installation. This product must be installed in accordance with National Electrical Code, ANSI/NFPA 70 so as to prevent moisture from entering or accumulating within the controller housing.

⚠WARNING **ELECTRICAL SHOCK HAZARD**

A qualified service person must install and service this product according to applicable codes and electrical schematics. Disconnect power prior to servicing any equipment.

- Do not connect power to this equipment if it has been damaged or has any missing parts.
- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks, or excessive vibration.

⚠WARNING **EXPLOSION OR FIRE HAZARD**

Do not use this product with flammable liquids. Do not install in hazardous locations as defined by National Electrical Code, ANSI/NFPA 70.

Warning: Users must read this manual and understand controller operation before changing any settings. Entering incorrect settings may result in damage to equipment.

If the controller was shipped pre-installed in a control panel, some default values may have been changed at the factory in order to properly test the control panel operation. The user must adjust the settings to the requirements of the installation.

The user should always keep a record of the settings before making changes, in case there is a need to revert to previous settings. The user should also record all settings changed for use in programming a new controller in case a replacement is ever needed.

Always thoroughly test controller operation in the installed configuration to verify user settings.

INTRODUCTION & SPECIFICATIONS

Congratulations and thank you for your purchase of a control panel utilizing the Installer Friendly Series® controller. This manual explains the features and operations of the controller which was designed to operate up to two pumps for tank pump down applications. The controller automatically controls the operation of the pump(s) based on the status of float switches, 4-20mA level sensor, or C-Level™ sensor.

GENERAL
- One or two pump level controller
- HMI - Rotary selector for menu navigation and editing settings
- HMI - High-Brightness 2.4" color graphic LCD display, 240X320 pixel resolution

PUMP CONTROL AND PROTECTION
- Automatic pump alternation (duplex)
- Multiple alternation configurations
- Automatic alternation on pump fault
- Pump run indication
- 1-2 Pump power relays, 240 Vac, 20A max.

SYSTEM
- Alarm counts
- Pump cycle counts
- Pump run time

ELECTRICAL SPECIFICATIONS
- Universal 85-265 Vac, 50/60Hz Control/Alarm power input
- 0-250 Vac, 50/60Hz, 20A max. Pump Power input
- 5kA short circuit current rating
- Auxiliary Power -- 24 Vdc, 100mA max. class 2

DEDICATED I/Os
- 4 Float switch inputs
- C-Level™ sensor with 2 backup floats
- 4-20mA level sensor (2 wire) with 2 backup floats
- 1 Auxiliary alarm input
- 2 Pump OL/thermal cutout inputs
- 1 Test/Silence/Manual alarm reset input
- 1 Alarm beacon output, 24 Vdc, 60mA max.
- 1 Alarm horn output, 24 Vdc, 30mA max.

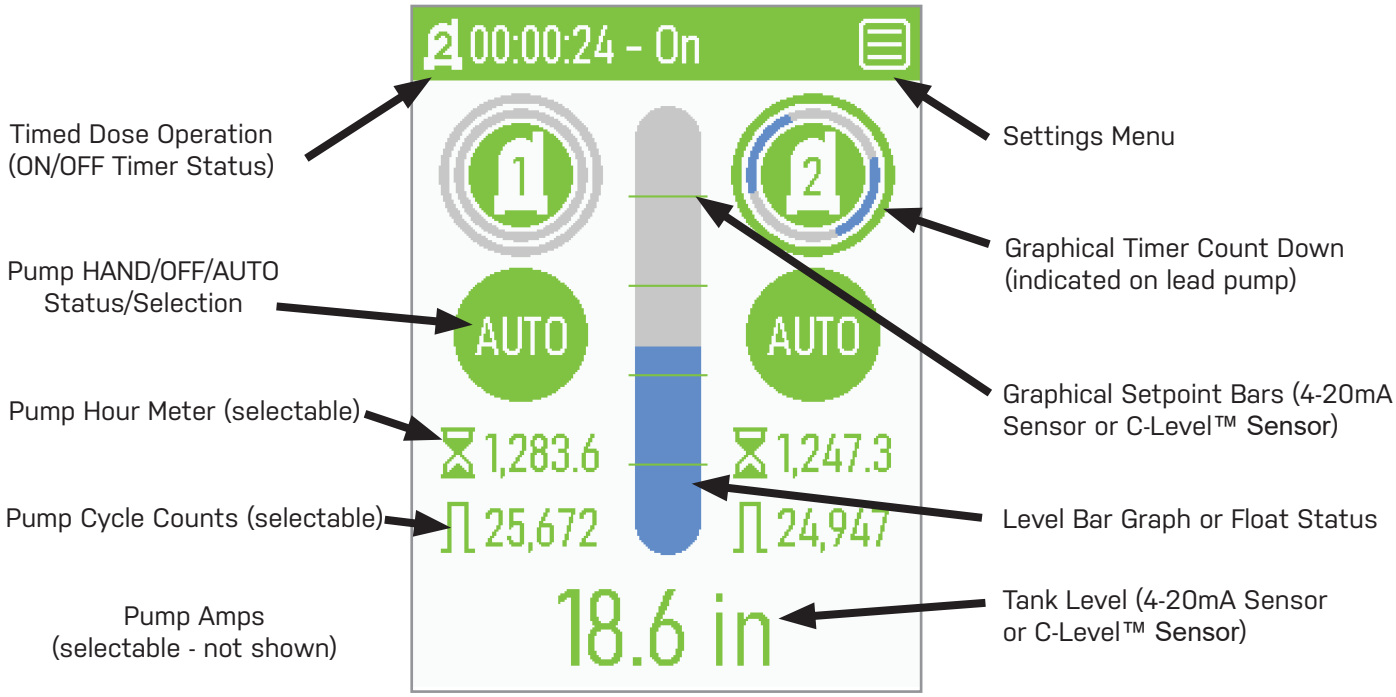
COMMUNICATION
- Dedicated display communication port (RJ45), RS485, Modbus protocol.
- Expansion communication port (RJ45), RS485, Modbus protocol

ENVIRONMENT
- Operational temperature -20ºF to 122ºF (-30ºC to 50ºC)
- Storage temperature -40ºF to 140ºF (-40ºC to 60ºC)
- Relative Humidity (RH) 5% to 95% (non-condensing)
- Indoor rated - for indoor use or mounted inside of an outdoor rated enclosure

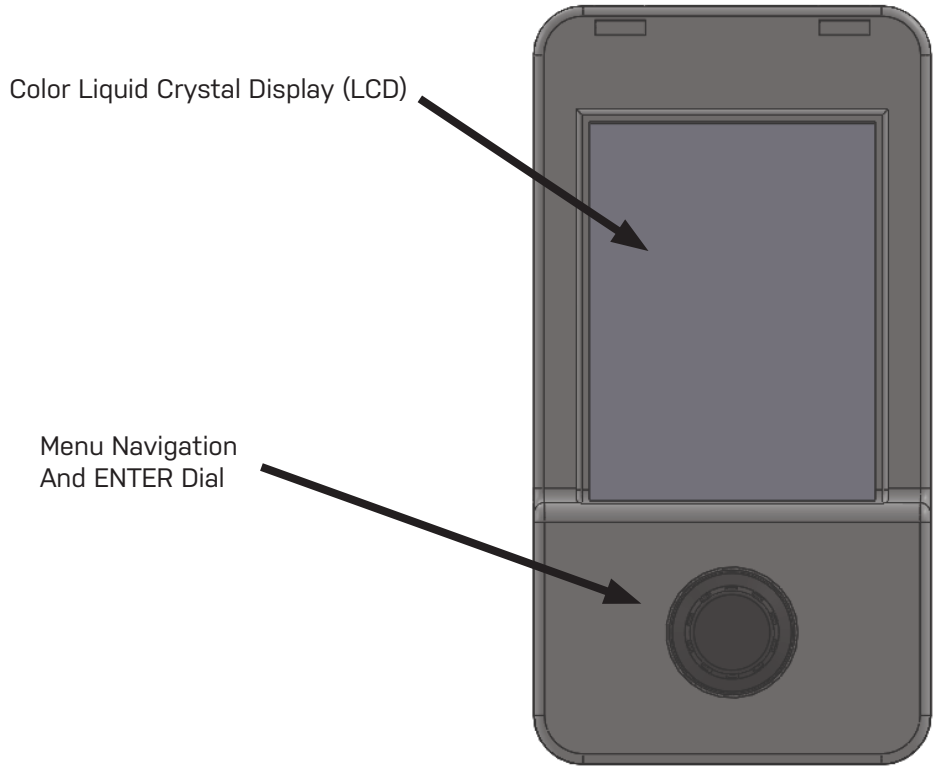
PROGRAMMING

HMI MAIN SCREEN

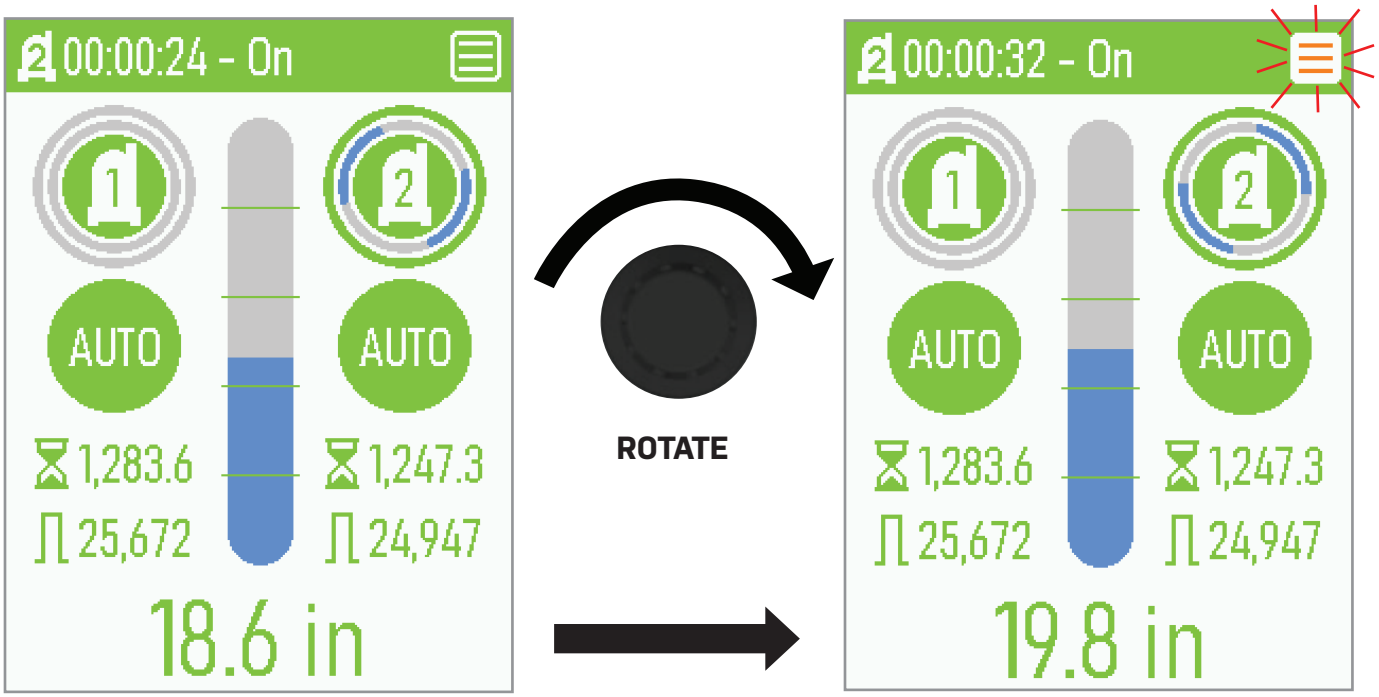
The main screen shows an overview of the system status including any active alarms.



USER INTERFACE



MAIN MENU



Counts and ETMs
- Displays pump run time, pump run counts and alarm counts

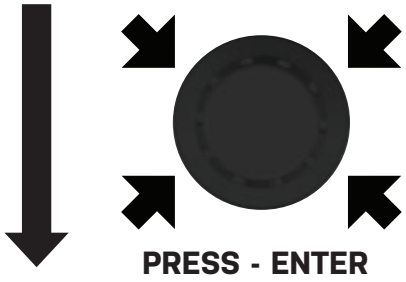
Timer Settings (timed dose mode only)
- Configures timers for timed dose operation

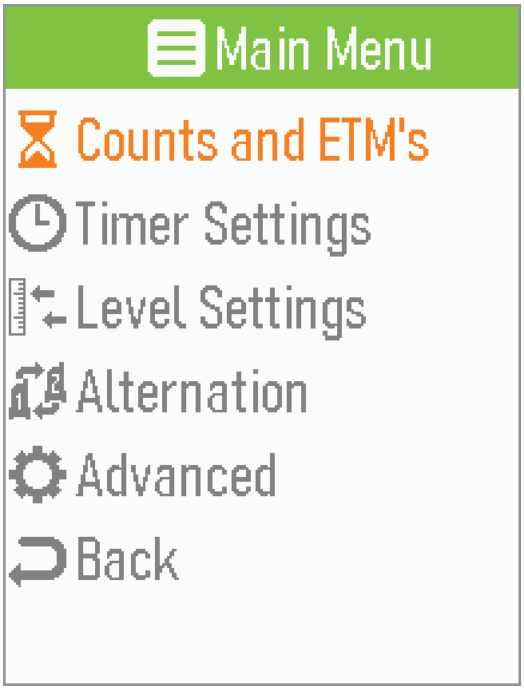
Level Settings
- Configures level setpoints

Alternation (duplex only)
- Configures alternation mode for duplex panels

Advanced
- Configures advanced functions and accesses troubleshooting tools

Back
- Exits the Main Menu





Main Menu

Counts and ETM's

ETM	HH:MM:SS
Pump 1	00:00:00
Pump 2 *	00:00:00
Cycles	
Pump 1	0000
Pump 2 *	0000
Counts	
High Alarm	0
Pump 1 Fault	0
Pump 2 Fault*	0
Pump 1 Overload	0
Pump 2 Overload*	0
Pump 1 Thermal	0
Pump 2 Thermal*	0
Pump 1 Seal	0
Pump 2 Seal*	0
Sensor Fail	0

Back

*visible only for duplex controllers

Timer Settings (Timed Dose Mode Only)

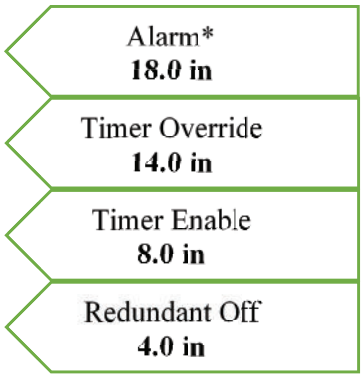
- **Pump 1 ***
  - On Time
  - Off Time
  - Override On Time
  - Override Off Time
- **Pump 2 ***
  - On Time *
  - Off Time *
  - Override On Time *
  - Override Off Time *

Back

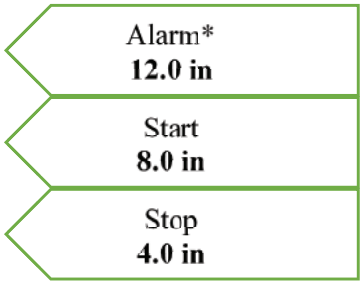
*visible only for independent timers mode

Level Settings (4-20mA Sensor or C-Level™ Modes Only)

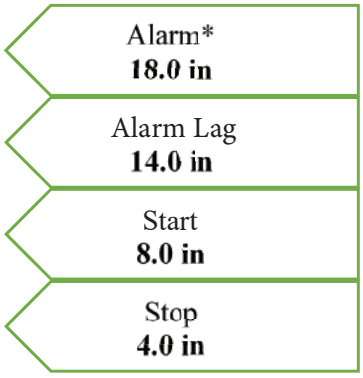
Timed Dose Mode



Simplex Demand Dose Mode



Duplex Demand Dose Mode



= save and exit = exit without saving

*the order of the alarm setting changes based on the value entered

Alternation (Duplex Controller Only)

- [x] Alternate
- [ ] Pump 1 Lead
- [ ] Pump 2 Lead
- Back

Advanced

Level Sensing
Timed/Demand Dose
Expansion Port
Seal Fail/Thermal
Overload Cutout
Alarm Options
Maximum Pumps On
Troubleshooting
General
Back

Level Sensing

- [x] Float Switches
- [ ] C-Level Sensor
- [ ] 4-20mA Sensor
- Back

C-Level™ Range (when C-Level™ Sensor is selected)

- [x] 40” Sensor
- [ ] 100” Sensor
- Back

4-20mA Sensor Range (when 4-20mA Sensor is selected)

000.0 inches
= save and exit
= exit without saving

Offset (when 4-20mA or C-Level™ Sensor is selected)

000.0 inches
= save and exit
= exit without saving

Timed/Demand Dose

- [x] Timed Dose
- [ ] Demand Dose
- Back

Timer type (when Timed Dose is selected, duplex panels only)

- [x] Single Timer
- [ ] Independent Timers*
- Back

*Allows for two independent timed dose systems on a duplex panel

Expansion Port

- [x] Enable
- [ ] Disable
- Back

Seal Fail/Thermal (when Expansion Port is enabled)

- [x] Enable
- [ ] Disable
- Back

P1/P2 Leak Setpoint (when Seal Fail/Thermal is enabled)

000.0 kOhm

= save and exit = exit without saving

*This function is used for manually setting up seal fail trip points. Automatic setup is recommended.

Overload Cutout

- [x] Enable
- [ ] Disable
- Back

Alarm Options

Beacon Flash
Horn Flash
Manual Reset
Redundant Off Alarm Enable (with 4-20mA sensor or C-Level™ only)
Redundant High Water Lag/Run (with 4-20mA sensor or C-Level™ only)
Seal Fail Alarm/Cutout (when Seal Fail/Thermal Module enabled)
Thermal Alarm (when Seal Fail/Thermal Module enabled)
Overload Alarm (when Overload Cutout enabled)
Back

Beacon Flash

- [x] No Flash
- [ ] Flash All
- [ ] Flash Alarm 2 Only
- Back

Horn Flash

- [x] No Flash
- [ ] Flash All
- [ ] Flash Alarm 2 Only
- Back

Manual Reset

- [x] Enable
- [ ] Disable
- Back

Redundant Off Alarm Enable

- [x] Enable
- [ ] Disable
- Back

Redundant High Water Lag/Run

- [x] Enable
- [ ] Disable
- Back

Thermal Alarm

- [x] Enable
- [ ] Disable
- Back

Seal Fail Alarm/Cutout

- [ ] No Alarm, No Cutout
- [ ] No Alarm, W/Cutout
- [x] Alarm, No Cutout
- [ ] Alarm, W/Cutout
- Back

Overload Alarm

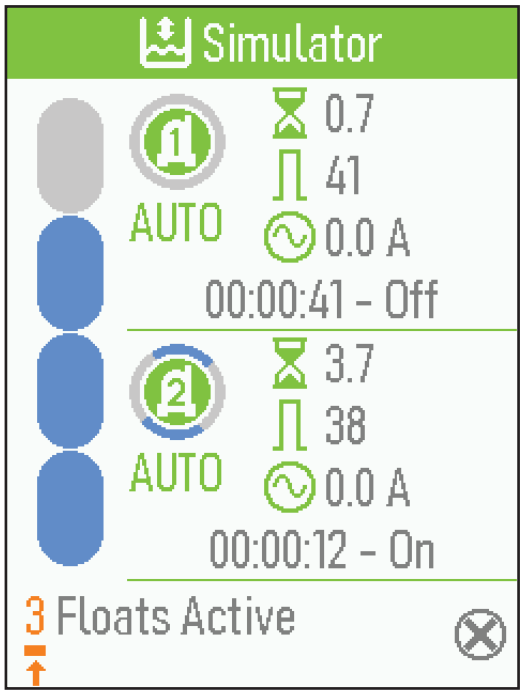
- [x] Enable
- [ ] Disable
- Back

Troubleshooting

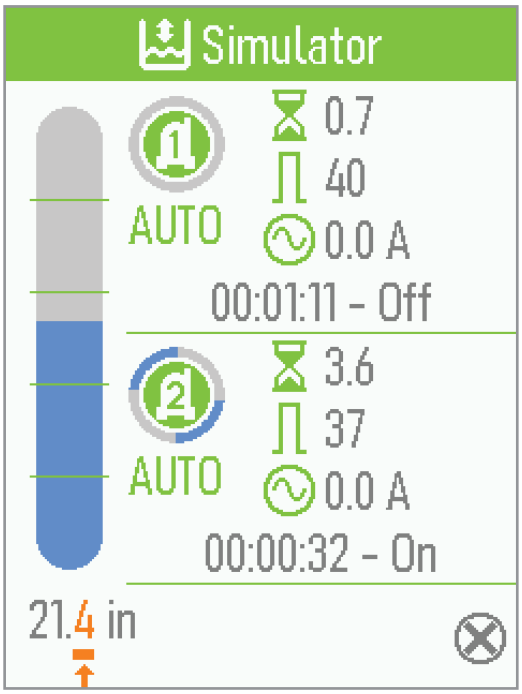
4-20mA Status *	
Simulator	
mA*	12.34 mA
Tank Level*	27.0 in
C-Level™ Status **	
Simulator	
Frequency**	1234 Hz
Tank Level**	4.7 in
Float Status**	
Lag	Down
Alarm	Down
Start	Down
Stop	Down
Pump Status	
Pump 1 Called	Off
Pump 1 Amps	0.01 A
Pump 2 Called****	Off
Pump 2 Amps****	0.01 A
Alert Status	
Horn	Off
Beacon	Off
Alarm Aux	Off
Input Status	
Test/Silence	Off
Alarm 2	Off
Overload 1	Off
Overload 2	Off
Fault Status	
Pump 1	Inactive
Thermal 1	Inactive
Seal 1	Inactive
Pump 2****	Inactive
Thermal 2****	Inactive
Seal 2****	Inactive
Seal Fail Status	
P1 Leak Setpoint	012.3 kOhm
P1 Leak	054.3 kOhm
P2 Leak Setpoint****	123.4 kOhm
P2 Leak****	234.5 kOhm
Controller Status	
DC Bus 1	22.50 V
DC Bus 2	11.80 V
DC Bus 3	3.29 V
Back	

*Visible only for 4-20mA mode.
**Visible only for C-Level™ mode.
***Float Status for duplex demand dose configuration.
Float labels change based on controller configuration.
****Visible only for duplex configuration.

Simulator



Float Simulator



4-20mA or C-Level™ Sensor Simulator

General

- Firmware
- Display V 0.00
- Controller V 0.00
- Settings
- Color Theme
- Home Display Data
- Level Units
- Password Setup
- Factory Reset
- Back

Color Theme

- ☑ Dark
- ☐ Light
- Back

Home Display Data

- ☑ ETMs and Amps
- ☐ ETMs and Cycles
- ☐ Amps and Cycles
- Back

Level Units

- ☑ in
- ☐ cm
- Back

Password Setup

- 00-00
- ☑ Enable

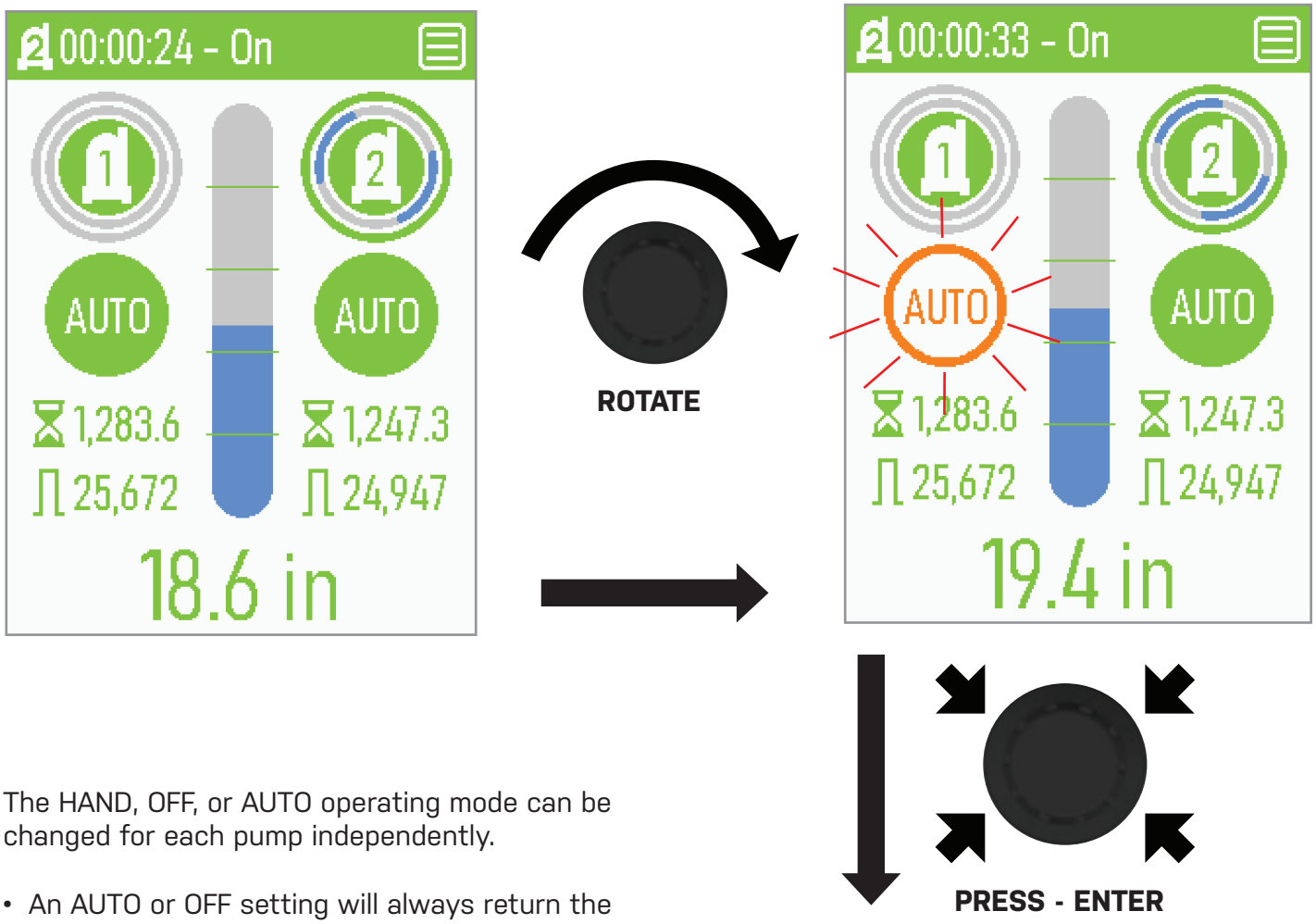
Factory Reset

Reset All Settings?

- No
- Yes

= save and exit = exit without saving

HAND/OFF/AUTO OPERATION

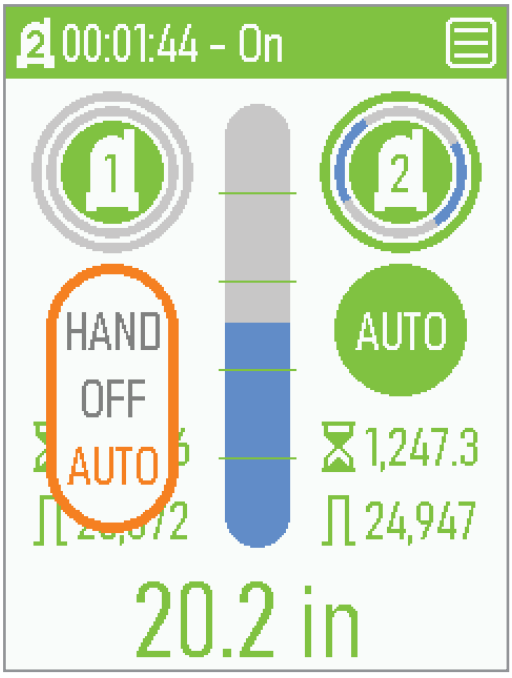


The HAND, OFF, or AUTO operating mode can be changed for each pump independently.

- An AUTO or OFF setting will always return the user to the main screen upon selecting.

- A HAND setting will return to the main screen upon selecting if the tank level is above the lowest float or the level sensor's lowest setpoint. Once the tank level drops to the lowest float or the level sensor's lowest setpoint, the controller will automatically be changed to AUTO mode.

  - If the tank level is lower than the lowest float or the level sensor's lowest setpoint, then the user must press and hold the enter button to enable HAND mode. Upon releasing the enter button, in this case, the controller will automatically be changed to AUTO mode and will return to the main screen.

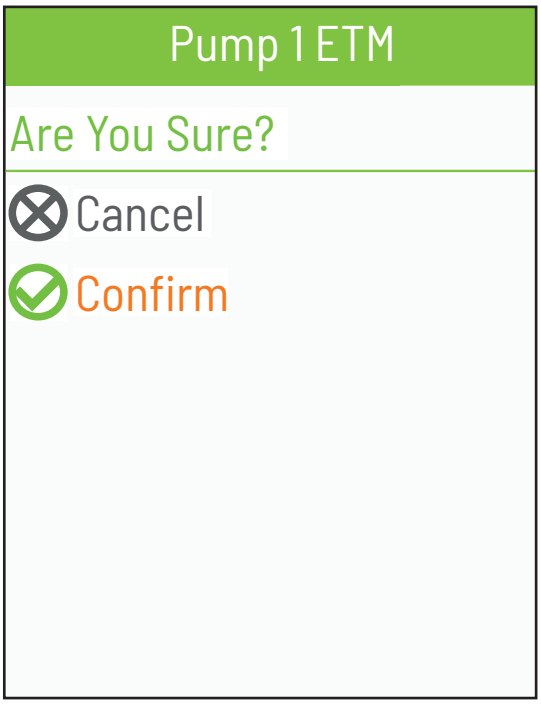


CLEARING COUNTS AND ETMS

All counts and elapsed time meters in the "Counts and ETMs" are able to be cleared.

To clear an individual count or ETM:

- Navigate to the "Counts and ETMs" screen and to the data to be cleared.
- Press and hold the enter button.
- Navigate to "Yes" when asked to reset the value.
- Navigate to "Confirm" to clear the count or ETM, or to "Cancel" to exit without clearing the count or ETM.



ALARMS

ALARM TEXT	DEFINITION	FIX
High Level Sensor	Tank level has risen above the high alarm level setpoint.	• Ensure pumps are operating normally. • Ensure discharge pipe is intact. • Ensure the high alarm level setpoint is set above the normal operating level.
High Level Float	Tank level has risen above the high water float switch level.	• Ensure pumps are operating normally. • Ensure discharge pipe is intact. • Ensure the high water float switch has been installed above the normal operating level.
Redundant Off Alarm	Tank level has fallen below the redundant off float switch level. (Redundant off alarm activation must be enabled - 4-20mA or C-Level™ sensor configurations only)	• Ensure pumps are operating normally. • Ensure there are no leaks in the tank. • Ensure the redundant off float switch has been installed below all other floats or sensor setpoint levels.
Comm Fault	The display has lost communication connection with the controller.	• Ensure display cable is properly connected to the display and controller.
Expansion Port Fault	The controller has lost communication connection with the expansion modules.	• Ensure expansion module cable is properly connected to the controller.
P1 Overload	The controller has sensed an open circuit on the Pump 1 OL/Thermal input terminals.	• Ensure Pump 1 motor overload relay or thermal cutout is functioning correctly. • Ensure Pump 1 motor is functioning correctly.
P1 Seal Fail	The seal fail module has sensed a seal leak condition in Pump 1, based on the seal fail setting.	• Service Pump 1 seal.
P1 Thermal Cutout	The controller has sensed a change in the status of the Pump 1 thermal input on the Seal Fail/Thermal Cutout expansion module.	• Ensure Pump 1 motor thermal cutout is functioning correctly. • Ensure Pump 1 motor is functioning correctly.
P1 Fault	The controller has operated in lag mode for three consecutive cycles while Pump 1 was lead pump.	• Ensure Pump 1 is operating normally. • Ensure the discharge pipe for Pump 1 is intact.
P2 Overload	The controller has sensed an open circuit on the Pump 2 OL/Thermal input terminals.	• Ensure Pump 2 motor overload relay or thermal cutout is functioning correctly. • Ensure Pump 2 motor is functioning correctly.
P2 Seal Fail	The seal fail module has sensed a seal leak condition in Pump 2, based on the seal fail setting.	• Service Pump 2 seal.
P2 Thermal Cutout	The controller has sensed a change in the status of the Pump 2 thermal input on the Seal Fail/Thermal Cutout expansion module.	• Ensure Pump 2 motor thermal cutout is functioning correctly. • Ensure Pump 2 motor is functioning correctly.
P2 Fault	The controller has operated in lag mode for three consecutive cycles while Pump 2 was lead pump.	• Ensure Pump 2 is operating normally. • Ensure the discharge pipe for Pump 2 is intact.
Float Fail	The controller has sensed a float switch closure that is outside of the normal sequence of operation.	• Ensure the float switches have been installed in the proper order. • Ensure the float switches do not contact the sides of the tank, or objects in the tank.

ALARMS - Continued

ALARM TEXT	DEFINITION	FIX
Stop Float Fail	The controller has sensed that the stop float has failed to close while higher level float switches have closed	• Ensure the float switches have been installed in the proper order. • Ensure the float switches do not contact the sides of the tank, or objects in the tank.
Lead Float Fail	The controller has sensed that the lead float has failed to close while the stop and higher level float switches have closed.	• Ensure the float switches have been installed in the proper order. • Ensure the float switches do not contact the sides of the tank, or objects in the tank.
Off Float Fail	The controller has sensed that the redundant off float has failed to close while higher level float switches have closed.	• Ensure the float switches have been installed in the proper order. • Ensure the float switches do not contact the sides of the tank, or objects in the tank.
Enable Float Fail	The controller has sensed that the timer enable float has failed to close while the redundant off and higher level float switches have closed.	• Ensure the float switches have been installed in the proper order. • Ensure the float switches do not contact the sides of the tank, or objects in the tank.
Float Config Error	The controller has sensed a 4-20mA or C-Level™ sensor signal connected to the field wiring terminals, while configured as float switch controlled.	• Ensure the controller is configured for 4-20mA or C-Level™ sensor.
Level Sensor Error	The controller has sensed a signal outside the normal operating range of the 4-20mA or C-Level™ sensor.	• Ensure the controller is configured for float switch control if a 4-20mA or C-Level™ sensor is not used. • Ensure the 4-20mA or C-Level™ sensor is properly connected to the controller. • Ensure the 4-20mA or C-Level™ sensor cable has not been damaged.
Alarm 2	A contact closure has been sensed by the Alarm 2 input circuit.	• Check the system monitored by the Alarm 2 input.
Alarm 3	A contact closure has been sensed by the fourth digital input circuit when in Simplex Demand mode or Duplex Demand 3-Float mode.	• Check the system monitored by the fourth digital input.
Press Test/Silence to Reset Alarm	The controller is configured for manual alarm reset and the formerly active alarm is now inactive.	• Press the Test/Silence button to reset the alarm status.

TROUBLESHOOTING INFORMATION SCREENS

Current Panel Configuration

Duplex
Timed Dose
C-Level™ Sensor
40" Sensor
Offset **0.0 in**

This section displays the current configuration of the controller. *The example shows a controller configured as a Duplex, Timed Dose using a 40" C-Level™ sensor for level sensing with zero inches of sensor offset.

4-20mA Status

Simulator
mA **6.93 mA**
Tank Level **7.2 in**

The simulator is used to verify the functionality of the controller by simulating the tank level.

This section displays the milliamp output of the level sensor as measured by the controller, as well as the calculated tank level. The normal operating range of the level sensor is between 4 milliamps and 20 milliamps. If the level sensor is operating significantly outside of the normal range, a "Sensor Fail" alarm will occur.

C-Level™ Status

Simulator
Frequency **2315 Hz**
Tank Level **26.3 in**

The simulator is used to verify the functionality of the controller by simulating the tank level.

This section displays the frequency of the C-Level™ sensor as measured by the controller, as well as the calculated tank level. The normal operating range of the C-Level™ sensor is between 1000Hz and 3000Hz. If the C-Level™ sensor frequency is operating significantly outside of the normal range, a "Sensor Fail" alarm will occur.

Float Status

Redundant High Level **Down**
Redundant Low Level **Up**

This screen displays the status of each float switch connected to the controller. *The example shows a controller configured as C-Level™ sensor control.

Pump Status

Pump 1 Called **Off**
Pump 1 Amps **0.0 A**
Pump 2 Called **Off**
Pump 2 Amps **0.0 A**

This screen displays the status of each pump connected to the controller. *The example shows a controller configured as Duplex.

TROUBLESHOOTING INFORMATION SCREENS - Continued

Alert Status

Horn	**Off**
Beacon	**Off**
Alarm Aux	**Off**

This screen displays the status of the controller alarm.

Input Status

Test/Silence	**Off**
Alarm 2	**Off**
Overload 1	**Off**
Overload 2	**Off**

This section displays the status of the general inputs on the controller.

Fault Status

Pump 1	**Inactive**
Thermal 1	**Inactive**
Seal 1	**Inactive**
Pump 2	**Inactive**
Thermal 2	**Inactive**
Seal 2	**Inactive**

This section displays the fault status of each pump connected to the controller. *The example shows a controller configured as Duplex with a seal fail/thermal cutout module.

Seal Fail Status

P1 Leak Setpoint	**012.3 kOhm**
P1 Leak	**054.3 kOhm**
P2 Leak Setpoint	**123.4 kOhm**
P2 Leak	**234.5 kOhm**

This section displays the seal fail status of each pump connected to seal fail/thermal cutout expansion module. *The example shows a controller configured with a seal fail/thermal cutout module.

Controller Status

DC Bus 1	**22.41 V**
DC Bus 2	**11.79 V**
DC Bus 3	**3.29 V**

This section displays the status of the voltage buses on the controller.

I/O TABLES

TB1 - SUPPLY POWER, LEVEL SENSING, PUMP AND AUXILIARY ALARM CONTACTS	
TERMINAL	DESCRIPTION
1	90-265 VAC SUPPLY
2	90-265 VAC SUPPLY
3	DIGITAL INPUT COMMON
4	DIGITAL INPUT 1
5	DIGITAL INPUT COMMON/C-LEVEL NO-CONNECTION
6	DIGITAL INPUT 2/4-20mA or C-LEVEL (+) SUPPLY
7	DIGITAL INPUT COMMON/C-LEVEL (-) SUPPLY
8	DIGITAL INPUT 3/4-20mA or C-LEVEL SIGNAL INPUT
9	DIGITAL INPUT COMMON
10	DIGITAL INPUT 4
P1:T1	PUMP 1 (T1)
P1:T2	PUMP 1 (T2)
P2:T1	PUMP 2 (T1)
P2:T2	PUMP 2 (T2)
AUX:1	AUXILIARY ALARM CONTACT (N.O.)
AUX:2	AUXILIARY ALARM CONTACT (N.O.)

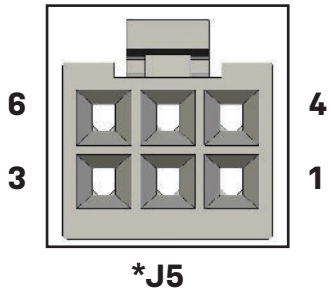
TB3- PUMP SUPPLY POWER	
TERMINAL	DESCRIPTION
P1:L1	PUMP 1 (L1)
P1:L2	PUMP 1 (L2/N)
P2:L1	PUMP 2 (L1)
P2:L2	PUMP 2 (L2/N)

All Digital Input functions are activated upon a contact closure to the Digital Input Common terminal.

Note:
Terminals TB1-3, TB1-5, TB1-7, TB1-9 commons are internally connected.

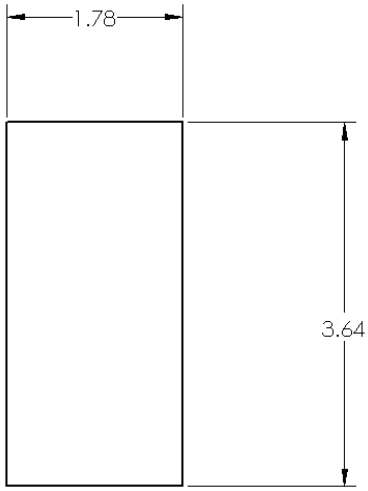
TB2- HORN, BEACON, TEST/SILENCE SWITCH, AUX 24VDC SUPPLY	
TERMINAL	DESCRIPTION
1	TEST/SILENCE/RESET SWITCH (1)
2	TEST/SILENCE/RESET SWITCH (2)
3	ALARM LIGHT (0V)
4	ALARM LIGHT (24V)
5	ALARM HORN (0V)
6	ALARM HORN (24V)
7	AUX 24VDC SUPPLY (-)
8	AUX 24VDC SUPPLY (+)

J5 - ALARM 2, OVERLOAD 1, OVERLOAD 2	
TERMINAL	DESCRIPTION
1	ALARM 2 INPUT
2	OVERLOAD 1 INPUT
3	OVERLOAD 2 INPUT
4	DIGITAL INPUT COMMON
5	DIGITAL INPUT COMMON
6	DIGITAL INPUT COMMON

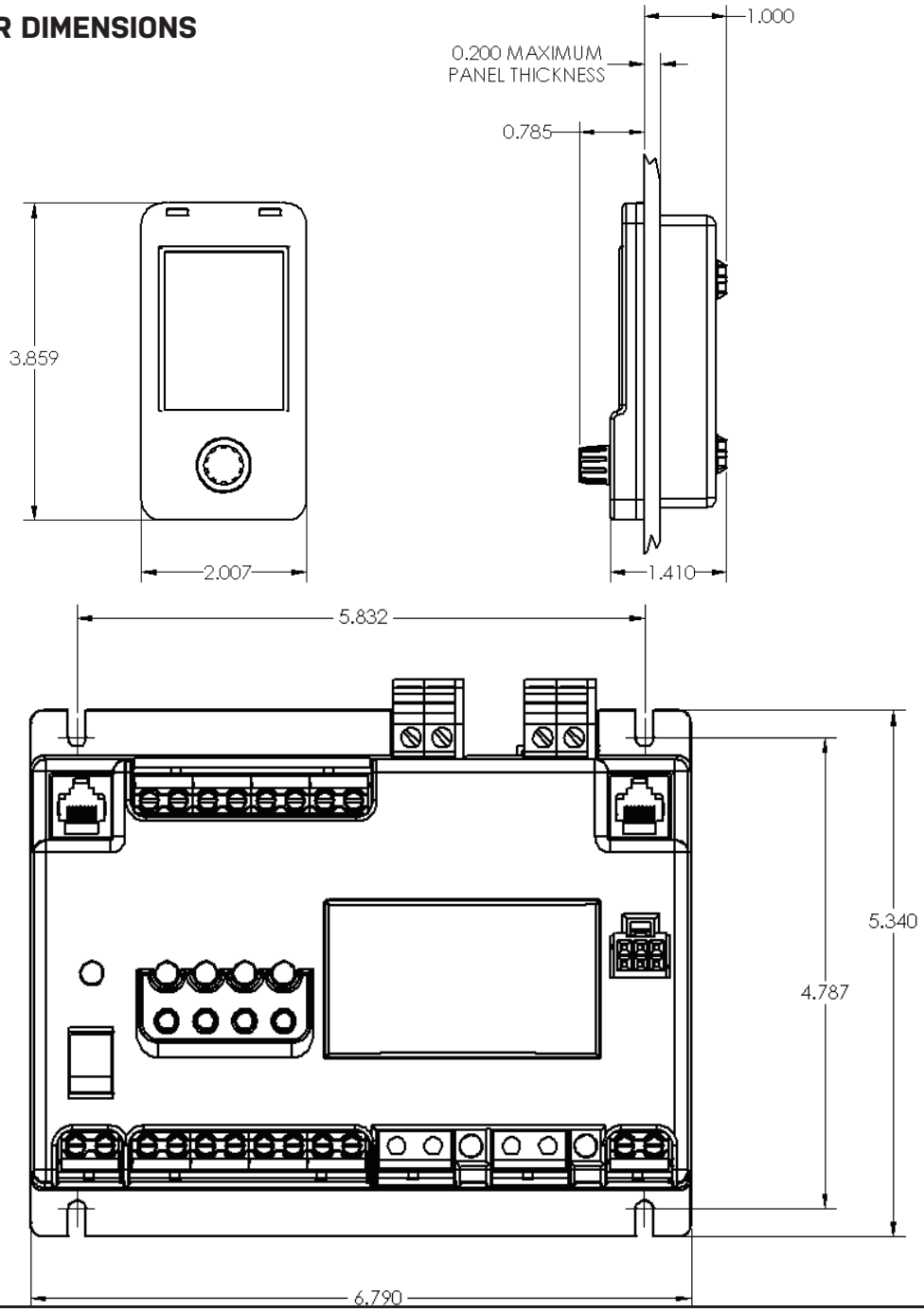


*J5

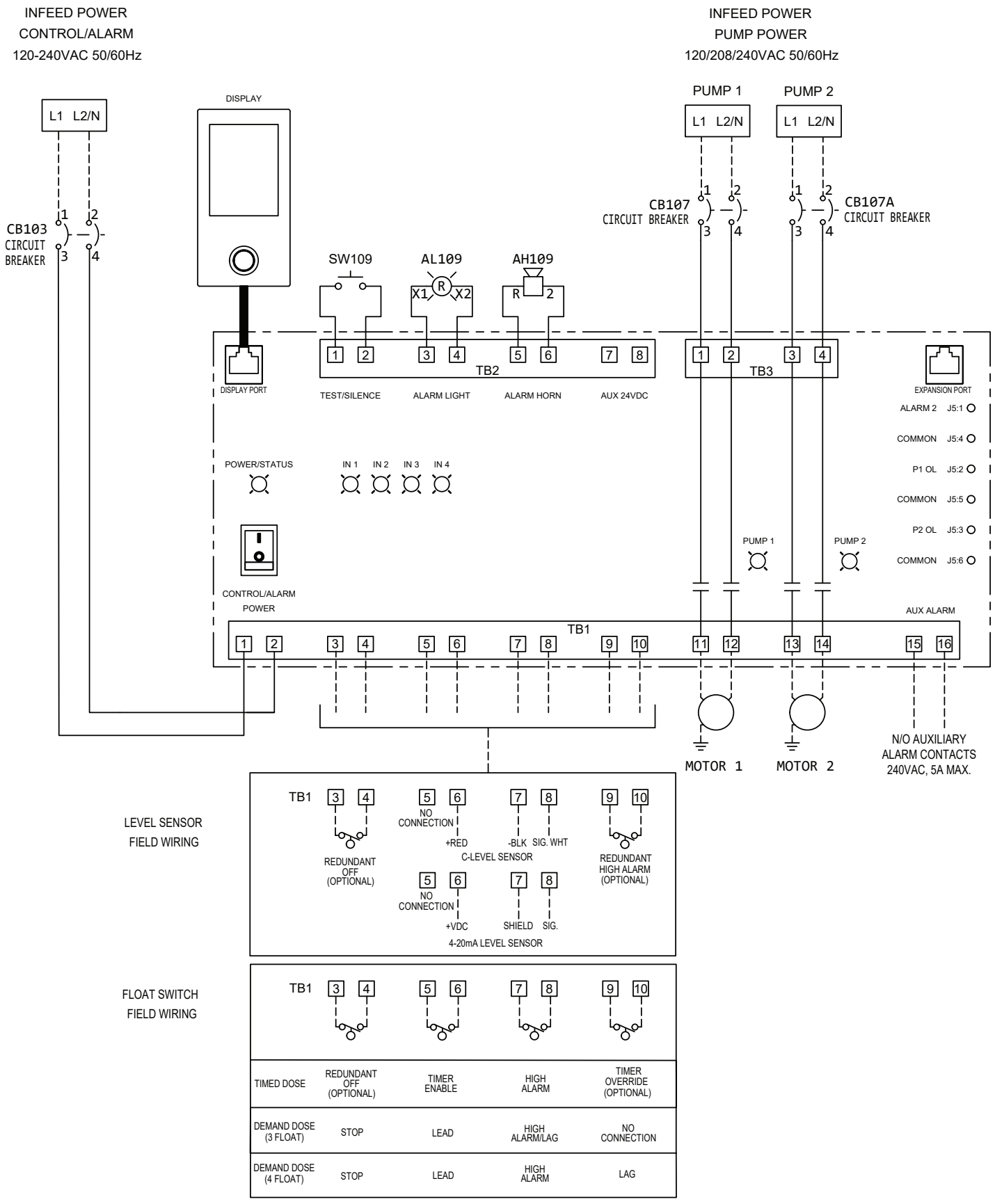
MOUNTING DIMENSIONS (DISPLAY)



CONTROLLER DIMENSIONS



SCHEMATIC EXAMPLE



TIMED DOSE	REDUNDANT OFF (OPTIONAL)	TIMER ENABLE	HIGH ALARM	TIMER OVERRIDE (OPTIONAL)
DEMAND DOSE (3 FLOAT)	STOP	LEAD	HIGH ALARM/LAG	NO CONNECTION
DEMAND DOSE (4 FLOAT)	STOP	LEAD	HIGH ALARM	LAG

NOTES

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