

DIGI-GAGE PLUS™

Digital Constant Speed Controller

SCADA-Ready | Remote Access | Backwards Compatible

Retro configuration for Digi-Gage User Manual



**EG
Controls**
JACKSONVILLE, FLORIDA



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DIGI-GAGE PLUS USER MANUAL
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Introduction

Thank you for purchasing the Digi-Gage Plus™ digital constant speed controller by EG Controls. The Digi-Gage Plus™ is an affordable, flexible, compact, SCADA-ready system controller. It is designed to automatically control a maximum of six pumps in up to three process groups with independent start/stop and alternation in each group.

The Digi-Gage Plus™ has features including:

- Remote access from smartphones, tablets and computers
- Remote viewing of the built-in screens
- Well Clean-Out (Flush) mode
- Well F.O.G. mode
- Clog prevention mode (3 pumps or less)
- Advanced grouping
- Operation of up to 6 pumps
- Dematter

The Digi-Gage Plus™ with retro configuration is backward compatible with EG Control's classic Digi-Gage 2300, 2400, and 2600 products. It can integrate into virtually any SCADA system. Previous models of the Digi-Gage products no longer achieve today's system requirements, the Digi-Gage Plus™ can! The Digi-Gage Plus™ has been designed to fit in the same panel cutout of the previous model. **If a previous Digi-Gage didn't come installed with SCADA compatibility, this Digi-Gage Plus™ with retro configuration can!**

The Digi-Gage Plus™ can be partnered with popular flow meters or can make basic flow calculations based on wet-well dimensions. The Digi-Gage Plus™ features alternation that can alternate the lead and lag pumps. It uses information the system collects from pump start and run times. The Digi-Gage Plus can operate as a float controller and alternate the pumps under float control if set up in triplex or duplex operations only. The Digi-Gage Plus can also act as a float monitor to ensure floats are operating correctly while the system is running with transducer level input.

Digi-Gage Plus™ Controller (Retro) Data

2.1 Hardware Ratings:

The hardware ratings are as follows:

Display	3.5" graphical touch screen display
Operating temperature	0 to +60°C (32 to 140°F)
Storage temperature	-20 to +60°C (-4 to 140°F)
Relative humidity (RH)	10 to 95% (non-condensing)
NEMA/IP rating	NEMA4X/IP65/66
Voltage range	10.2 to 28.8 V DC <10% ripple
Power consumption	<p>pnp inputs 190 mA @ 24 V DC</p> <p>Back light 20 mA @ 24 V DC</p> <p>Ethernet card 35 mA @ 24 V DC</p> <p>Relay Outputs (ea.) 8 mA @ 24 V DC</p>

System Configuration:

The controller includes an integrated processor, embedded I/O, color touch screen panel, and five sealed membrane function keys.

System Ratings are as follows:

- 15 µs scan rate
- Colors 65,536 (16-bit)
- 320 x 240 pixel resolution
- 3.5" viewing area; resistive, analog touch screen
- Five function keys, sealed membrane switch

Controller supports the following features:

- Remote access
- Micro SD card backup/upload/logging
- Data logging
- OPC server compliant
- DDE format read/write

System Processor:

- Removable memory: standard SD or SDHC (32 GB maximum)
- Real-time clock
- Battery backup (seven years typical at 25°C)
- Replaceable, coin-type lithium battery (CR2450)

Base Features:

- Input voltage 24 V DC
- (22) digital inputs rated 24 V DC (two configurable as analog current/voltage)
- 12 relay outputs rated 5 A at 250 VAC/ 30 V DC
- COM1 port: RS232/ RS485 (up to 32 nodes)
- COM2 port: Ethernet

Communication Interfaces (optional):

COM1 port:

- RS232/485 baud rates between 300 and 115,200 bit/s
- RS485 up to 32 nodes/1200 m (4000 ft.) maximum
- USB 2.0 compliant; full speed

COM2 port:

- Ethernet

2.2 Process Features:

- Pressure
- Level
- Multi-functional control
- Pump up
- Pump down

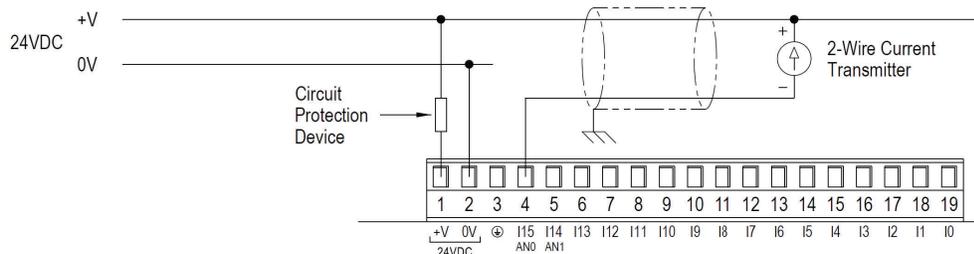
2.3 Controller Functionality:

- Supports up to six constant speed motors (pumps, blowers, etc.)
- Alternation:
 - Alternate on motor stop
 - Alternate to equalize run time (in development)
 - Fix any motor as lead (no alternation)
- Level simulation to test setup function and alarm set points
- SCADA integration
- Controller can be remotely viewable and operated
- Controller stores data locally that can be viewed locally or remotely
- Controller has web server features
- Controller displays the total pump or blower run-time hours, total starts, and starts per hour
- Relay outputs for pump start/stops, common alarms for high and low levels available

• The Digi-Gage Plus™ controller is backward compatible with the Digi-Gage 2300, 2400, and 2600 as manufactured by EG Controls of Jacksonville, Florida.

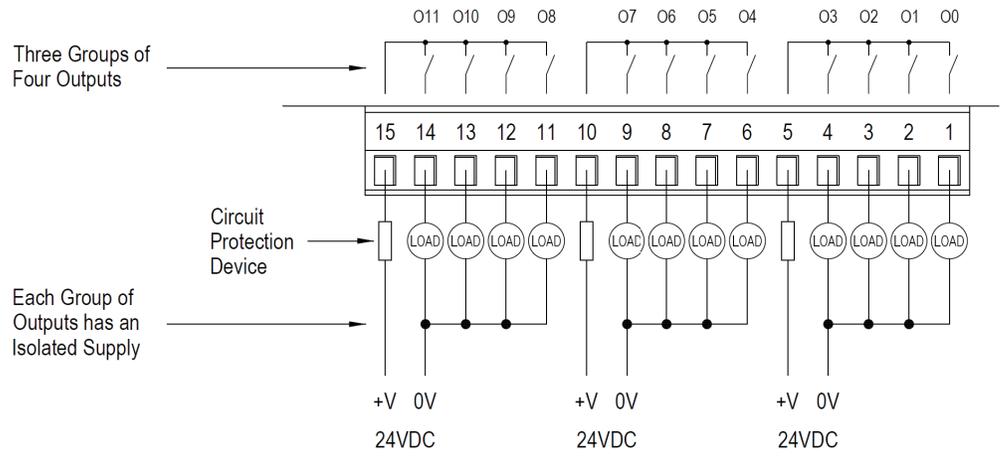
2.4 Typical Wiring Diagrams:

Analog input wiring

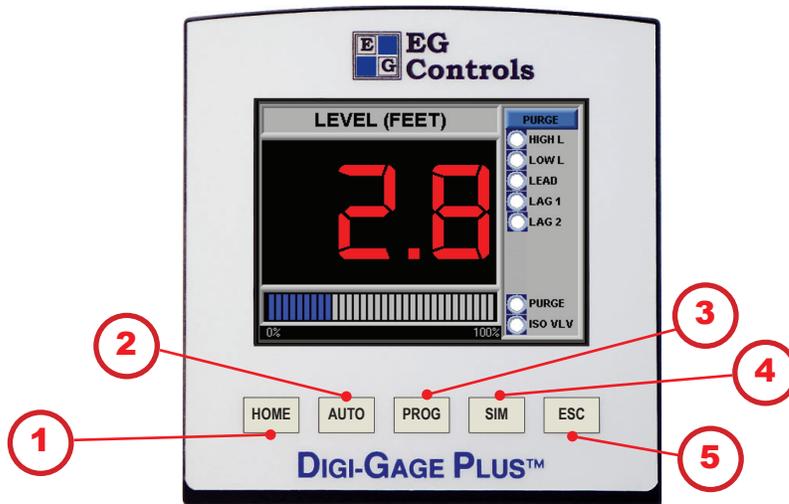


DIGI-GAGE PLUS USER MANUAL
CONTROLLER WIRING DIAGRAMS

Relay output wiring



DIGI-GAGE PLUS™ Front Bezel

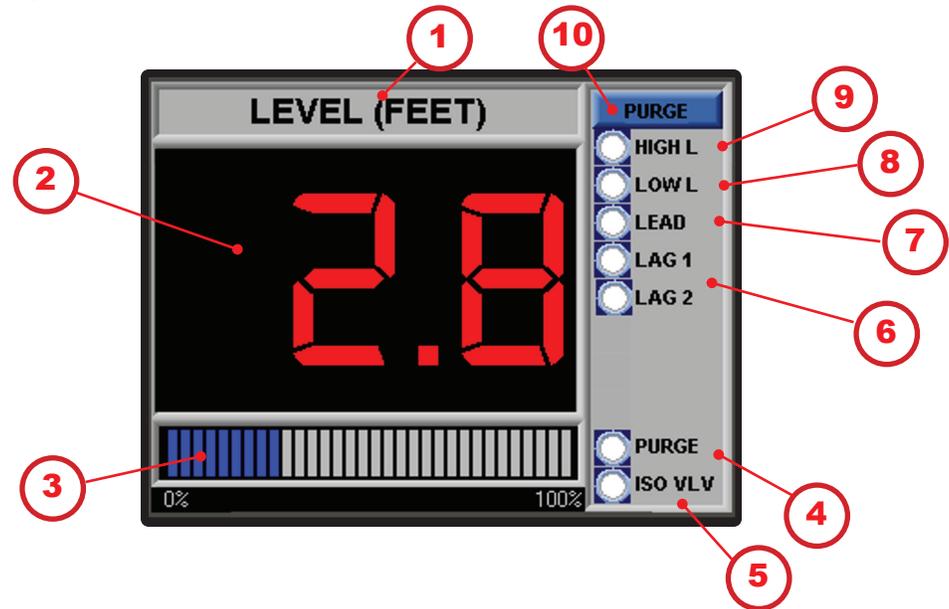


Buttons:

HOME	Returns to the traditional system status screen
AUTO	Terminates simulation control
PROG	Displays the System Menu screen
SIM	Displays the Simulate Level screen
ESC	Returns to previous screen or “back” button

These five blister buttons are available to the operator at any time, from any screen.

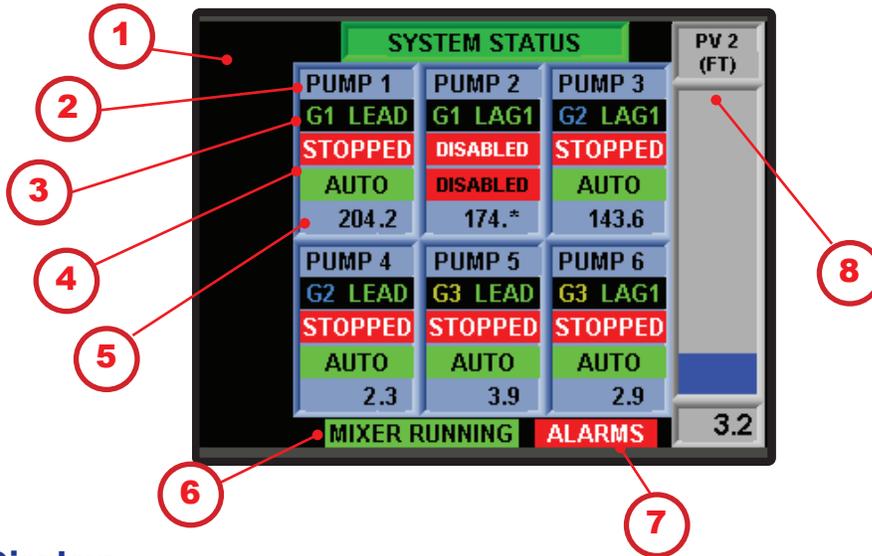
3.1 System status / Retro Home Screen:



Display:

1. Units (PSI, DO, FT, GPM) for the Process Value assigned to the Group set in the engineering screens
2. Scaled Process Value current measurement
3. A bar graph, scaled as 0-100% of the Process Value-
4. Purge Cycle Status: white off, solid red Purge in Progress (Available on Triplex and Quadplex)
5. Isolation Valve Status: white Valve Open, solid red Valve Closed (Available on Triplex and Quadplex)
6. Lag Pump(s) Status: white off, blinking red Starting, solid red Running
7. Lead Pump Status: white off, blinking red Starting, solid red Running
8. low level indicator: solid red Low-Level
9. High level indicator: solid red High-Level
10. Displays the Purge set up screen (Available on Triplex and Quadplex) (3.9)

3.2 System Status (detailed) with 1 or 2 transducers



Display:

1. Measured output of transducer 1 if present
2. Pump identifier
3. Starting identifier
4. Motor status
5. Hour meter
6. Mixer status if present
7. status
8. Measured output of transducer 2 if present



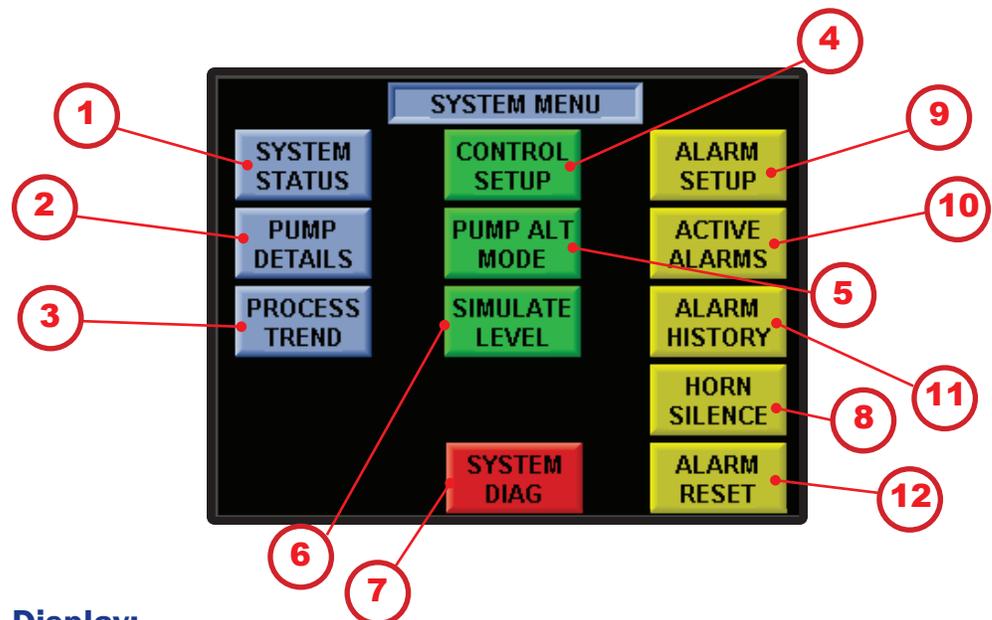
HOME

PROG

ESC

blister buttons navigate off this display

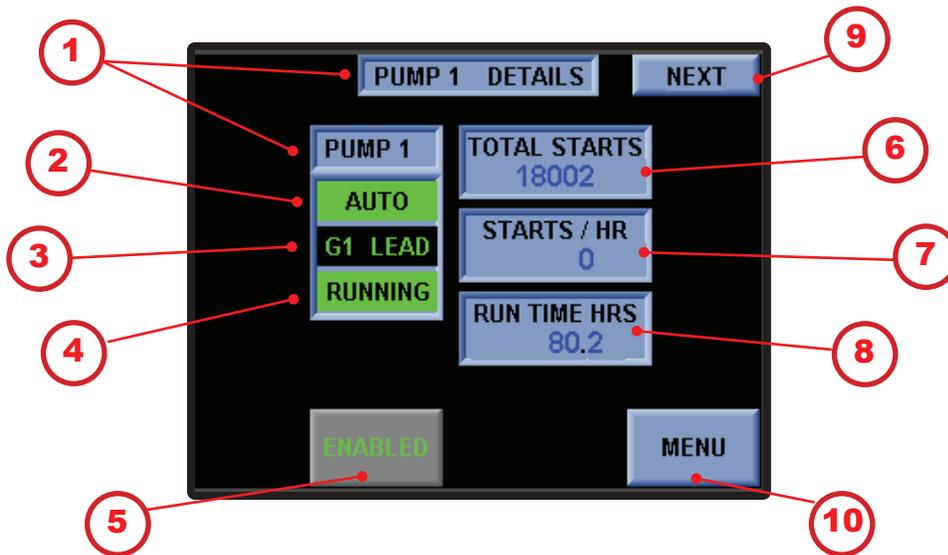
3.3 System Menu



Display:

-  1. System Status: displays the System Status home screen (3.1)
-  2. Pump Details: displays Pump Details screen (3.4)
-  3. Process Trend: displays the Process Trend screen (3.5)
-  4. Control Setup: displays the Control Setup screen (3.6)
-  5. Pump Alt Mode: displays the Alternation Setup screens for each configured group (3.7)
-  6. Simulate Level: displays the Simulation Level screen for group process variable (3.8)
-  7. System Diag: Displays input and output status (3.10)
-  8. Horn Silence: silences the horn in an alarm condition
-  9. Alarm Setup: displays the Alarm Setup screen for each of the configured groups (3.11)
-  10. Active Alarms: displays the Active Alarms pop-up screen (3.12)
-  11. Alarm History: displays the Alarm History screen (3.13)
-  12. Alarm Reset: resets the alarm logic if the condition has been cleared

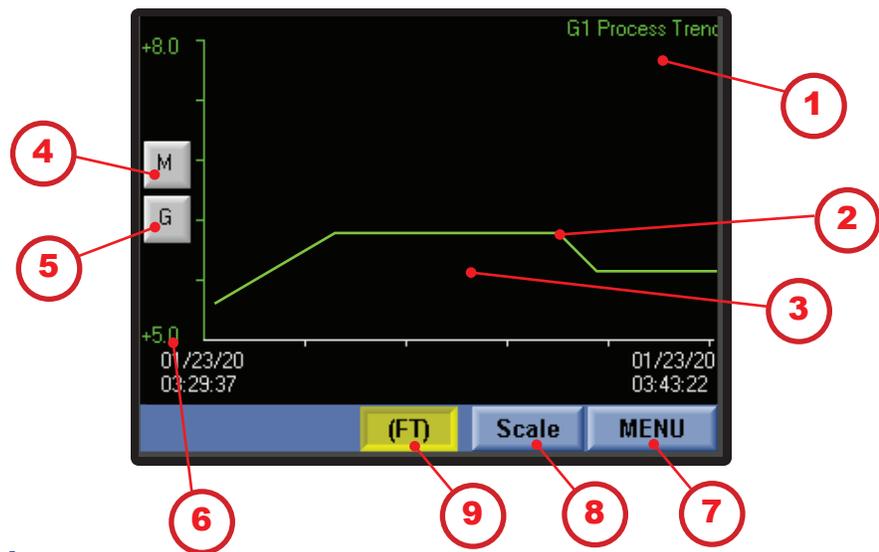
3.4 Pump Details



Display:

1. Pump Name: displays pump name, as defined in the Control Setup screen
2. Pump H-O-A Switch Status: displays Auto when control panel is in Auto. Displays Not Auto when control panel is in Off or Hand.
3. Group and Position: the group the pump belongs to and the pump's position in the alternation sequence of that group
4. Status of the Pump: Running or Stopped
-  5. Press to toggle Enabled or Disabled
6. Displays the number of total starts
7. Displays the number of starts per hour
8. Elapsed time meter
-  9. Next: displays the next Pump Details screen (typical for each Pump Detail screen; maximum of five pumps)
-  10. Menu: displays the System Menu screen (3.3)

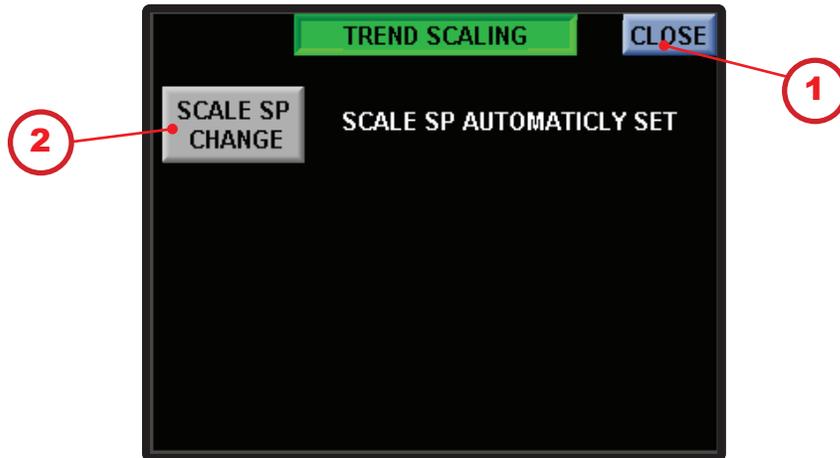
3.5 Process Trend



Display:

1. Trend Name: group process value and flow meter, if configured
2. Trend of the process value
-  3. Tap Screen: toggles between groups and flow meter (maximum three groups)
-  4. Toggles the Scroll buttons On and Off
-  5. Toggles the grid On and Off
6. Trend aperture.
-  7. Menu: displays the System Menu screen (3.3)
-  8. Scale button: Set up Trend Scaling (3.5.1)
9. Selected engineering unit (PSI, DO, FT, GPM)

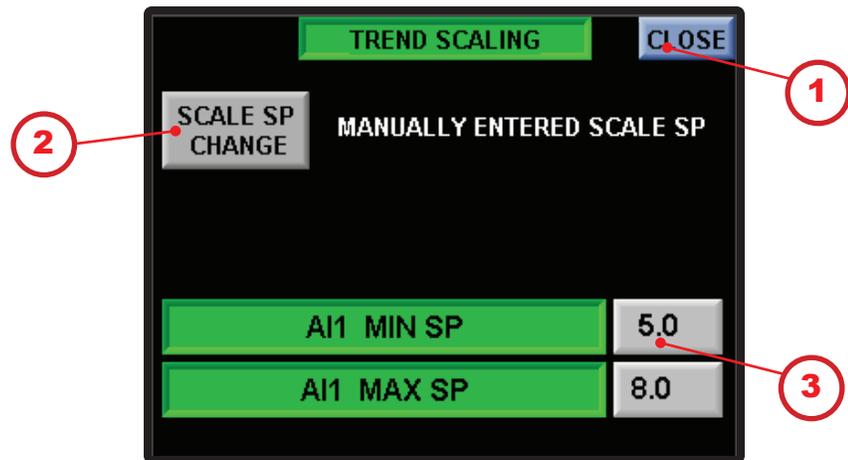
3.5.1 Process Trend: Automatic Trend Scaling



Display:

-  1. Close button: returns to Trending (4.5)
-  2. Scale SP Change: Toggle between automatic and manual (3.5.2)

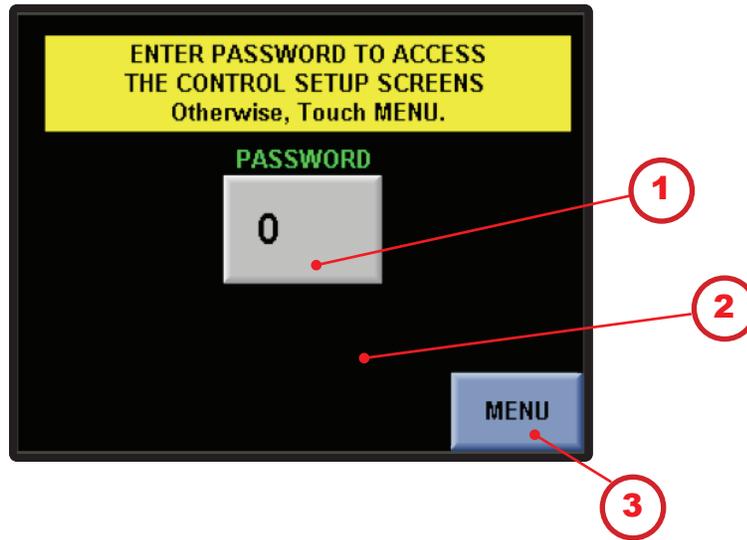
3.5.2 Process Trend: Manual Trend Scaling



Display:

-  1. Close button: returns to Trending (3.5)
-  2. Scale SP Change: Toggle between automatic and manual (3.5.1)
-  3. Set manual set points Min and Max

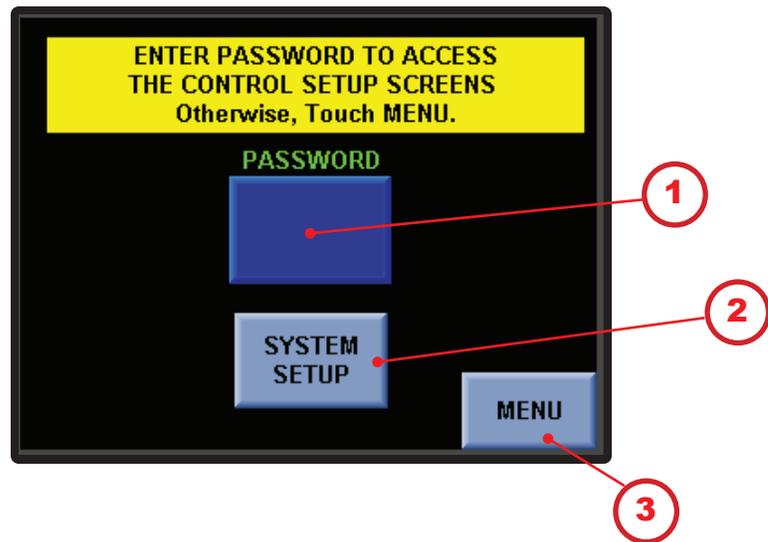
3.6 Control Setup: Login



Display:

-  1. Press to input password: _____ contact your rep for your password
2. If correct password is entered, System Setup button appears; press to display the first System Configuration screen
-  3. Menu: displays the System Menu screen (3.3)

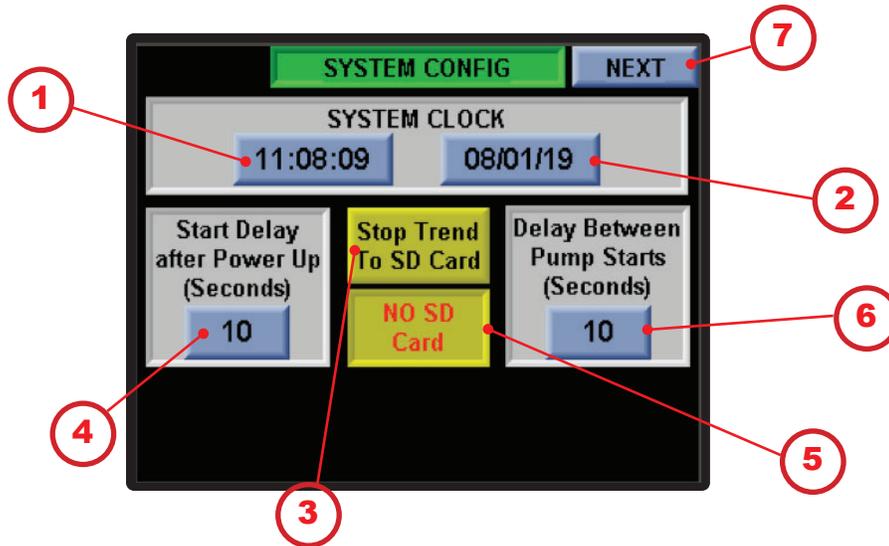
3.6.1 Control Setup: Login (continued)



Display:

1. Password will be displayed to indicate it has been accepted
-  2. Press to enter System Setup (3.6.2)
-  3. Menu: displays the System Menu screen (3.3)

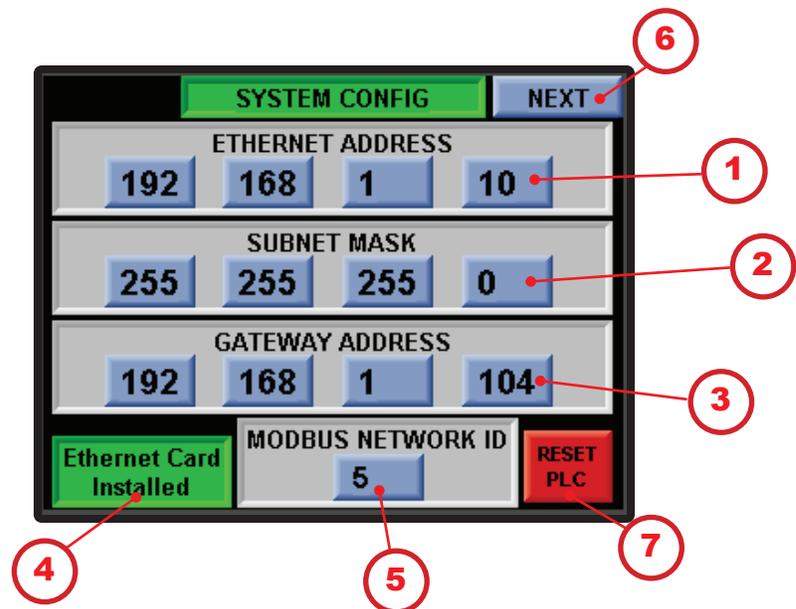
3.6.2 Control Setup: System Configuration



Display:

1. System Clock: displays the current time in the controller; press to change the time
2. System Clock: displays the current date in the controller; press to change the date
3. Start Delay After Power Up: the delay, in seconds, before starting pumps after power up or reset from float control; press to enter a new value
4. Stop Trend to SD Card: press to store process data to an SD card (an SD card must be installed)
5. The controller detects the existence of an SD card and displays the results
6. Delay Between Pump Starts: the delay, in seconds, between pump starts (prevents simultaneous starts if more than one pump is called at the same time); press to enter a new value
7. Next: displays the next configuration screen (3.6.3)

3.6.3 Control Setup: Network Setup



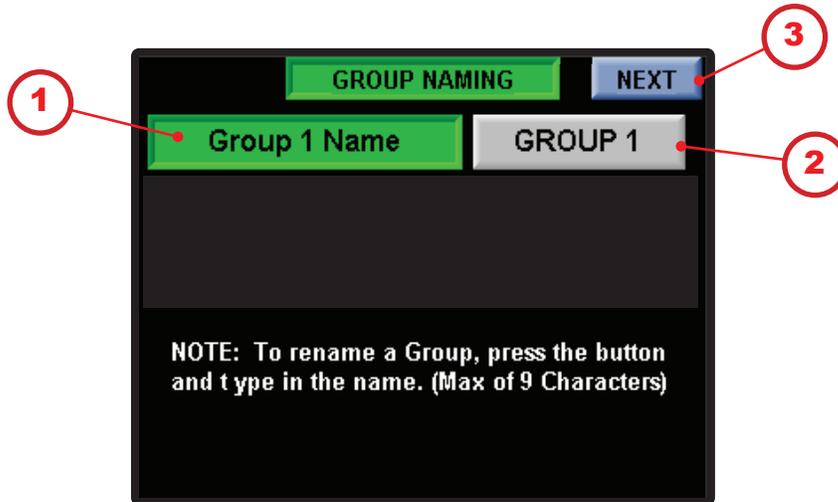
Display:

-  1. Current Ethernet address; press to enter a new Ethernet address
-  2. Current subnet mask; press to enter a new subnet mask
-  3. Current gateway address; press to enter a new gateway address
- 4. The Controller will detect the Ethernet card and display the results
-  5. Current Modbus address; press to enter a new Modbus address
-  6. Next: displays the next configuration screen (3.6.4)
-  7. Reset PLC: For any modifications on this screen to complete, the power must be cycled. Pressing Reset PLC will finalize this process.



ATTENTION: Cycle power to the controller to save the Ethernet address.

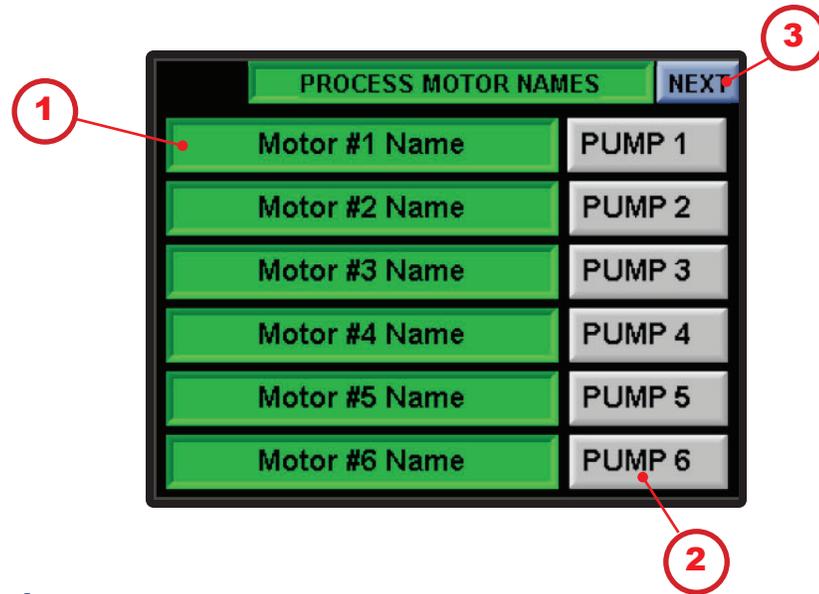
3.6.4 Control Setup: Group Naming



Display:

1. The label for each group to be named
-  2. Press to set name; nine-character maximum for pump group; the names will display on numerous screens
-  3. Next: displays the next configuration screen (3.6.5)

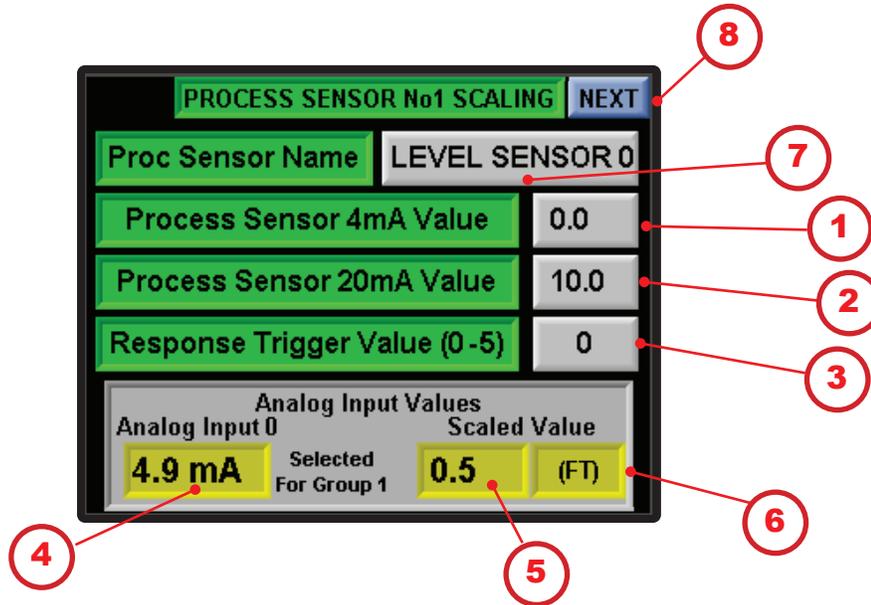
3.6.5 Control Setup: Motor Naming



Display:

1. The label for each motor to be named
-  2. Press to set name; seven-character maximum for each motor; the names will display on numerous screens
-  3. Next: displays the next configuration screen (3.6.6)

3.6.6 Control Setup: Process Sensor Setup



Display:

1. Press to set level value for 4 mA signal; this determines the minimum value for the process value the controller's measurements
2. Press to set level value for 20 mA; this determines the maximum value for the process value the controller's measurements
3. Response Trigger: a value between 0 and 5 that corresponds to sampling delay of 0–250 mS; press to set value for the sample rate for the controller to read the process value
4. Analog Input: scaled value of the sensor in mA
5. Scaled Value: engineering units based on the inputs above
6. Selected engineering unit (PSI, DO, FT, GPM)
7. The group or flow meter assigned to the process valve
8. Next: displays the next configuration screen (3.6.7)

Note: This screen is typical to the Process Sensor No. 2 Scaling screen.

3.6.7 Control Setup: Group Set Points

The screenshot shows a control setup screen titled 'CONTROL GROUP 1 SETUP'. It features a table with six rows of set points. A 'Next' button is located in the top right corner. Red callouts with numbers 1 through 4 point to the following elements:

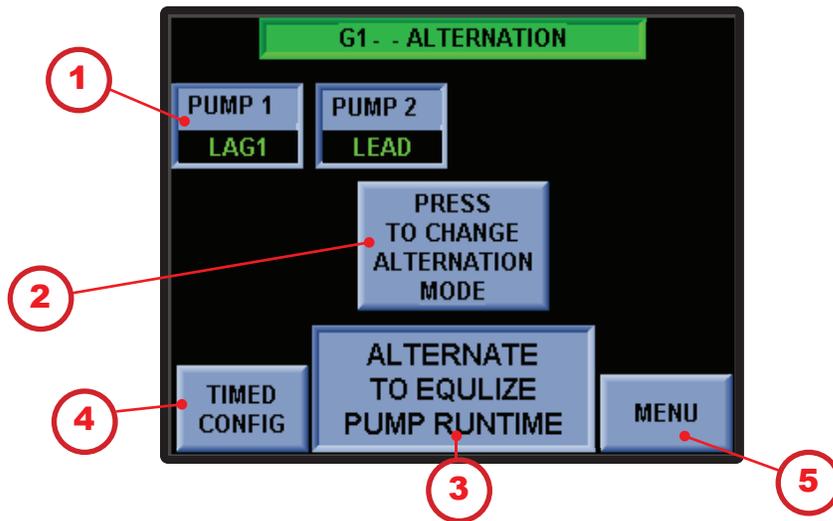
- 1: The '(FT)' unit indicator for the 'Lead Start Set Point'.
- 2: The '(FT)' unit indicator for the 'Lead Stop Set Point'.
- 3: The '(FT)' unit indicator for the 'Lag 2 Stop Set Point'.
- 4: The 'Next' button.

CONTROL GROUP 1 SETUP		Next
Lead Start Set Point	12.0	(FT)
Lead Stop Set Point	4.0	(FT)
Lag 1 Start Set Point	18.0	(FT)
Lag 1 Stop Set Point	5.5	(FT)
Lag 2 Start Set Point	16.0	(FT)
Lag 2 Stop Set Point	6.0	(FT)

Display:

-  1. Press to enter the lead pump start level set point (typical)
-  2. Press to enter the lead pump stop level set point (typical)
3. Displays the configured engineering units
-  4. Next: displays the system menu screen (3.3)

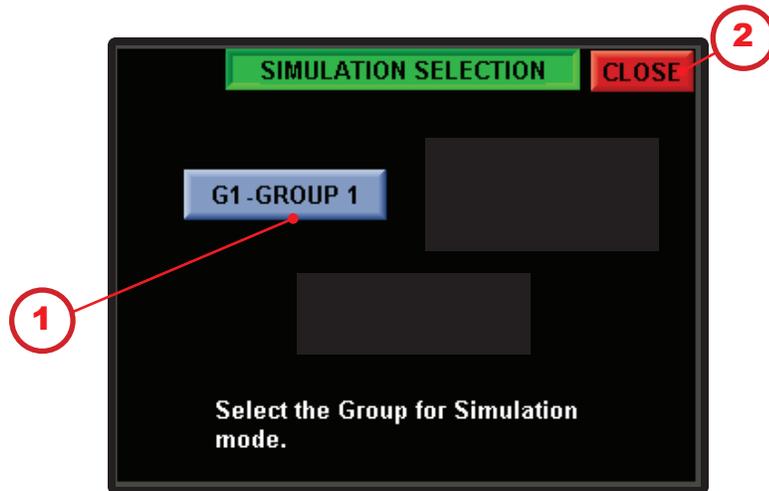
3.7 Control Setup: Pump Alternation Mode (in development)



Display:

1. Labels as defined in Process Motor Names (see 3.6.5) and their positions in the alternation schema
- 
 2. Press to Change Alternation Mode: toggles between a number of modes, depending on the number of pumps configured for the group. Possible modes:
 - Alternate on Pump Stop
 - Alternate to Equalize Pump Runtime
 - Motor 1 Lead No Alternation
 - Motor 2 Lead No Alternation
 - Motor 3 Lead No Alternation
 - Motor 4 Lead No Alternation
 - Motor 5 Lead No Alternation
 - Motor 6 Lead No Alternation
3. Displays current Alternation mode
- 
 4. Enter Offset SP: displays the Alternate to Equalize Pump Runtime mode; press to enter value
- 
 5. Menu: displays the System Menu screen (3.3)

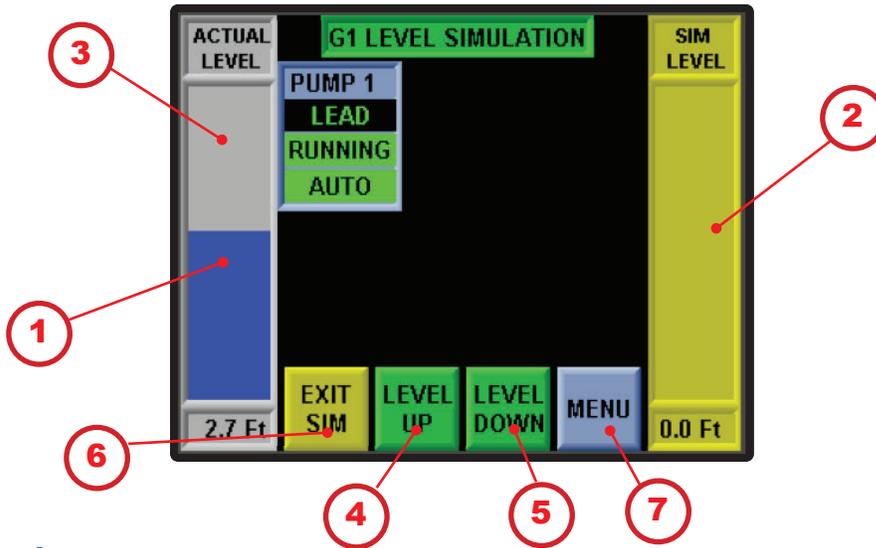
3.8 Simulation



Display:

-  1. Select a pump group for simulation (3.8.1)
 -  2. Close returns to the System Menu (3.3)
-   blister button will also navigate directly to this screen.

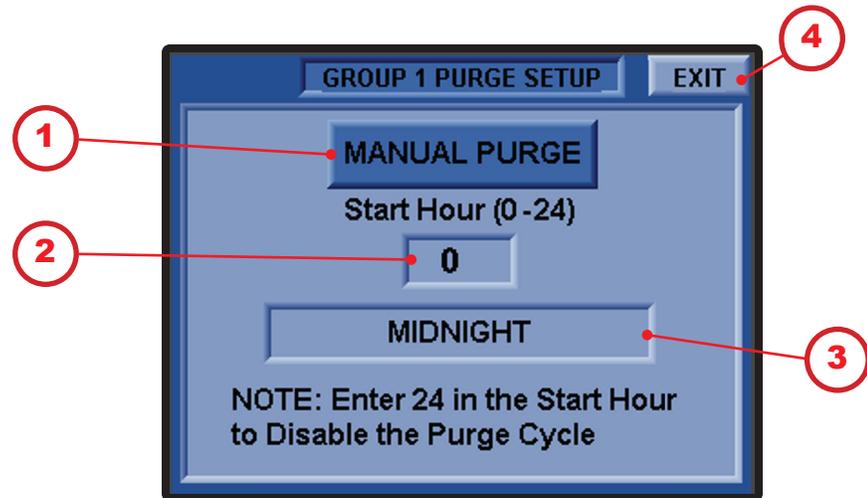
3.8.1 Simulation



Display:

1. Bar Graph: displays the actual level
2. Bar Graph: displays the simulated level
3. Pump Configurations:
 - Displays pump name as defined in the Control Setup screens
 - The group number the pump belongs to and the pump's position in the alternation sequence
 - Status of the pump: Running or Stopped
 - Pump H-O-A switch status: Auto or Not Auto
-  4. Level Up: increases the Simulation Level by one-tenth of a unit
-  5. Level Down: decreases the Simulation Level by one-tenth of a unit
-  6. Exit Simulation: exits Simulation Level screen and returns the process value input as the controlling signal
-  7. Menu: displays the System Menu screen (3.3)

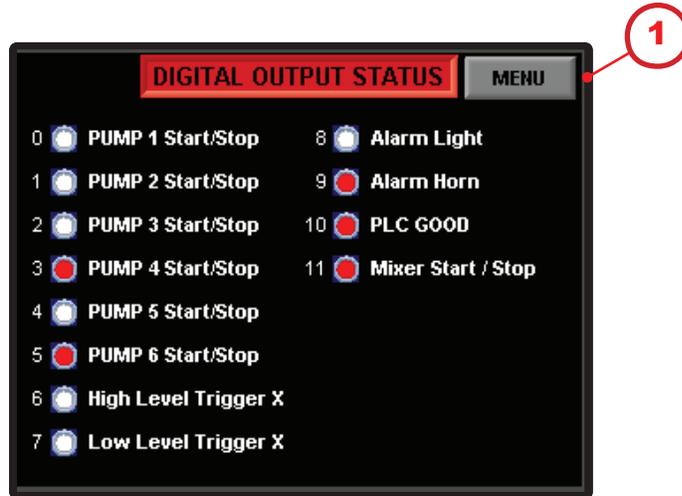
3.9 Control Setup: Purge Setup (if factory configured)



Display:

-  1. Manual Purge button: Press to trigger a Purge Cycle
-  2. Start Hour: Press to enter a value from 0 (Midnight) to 24 (Disable)
3. Displays the current configured Start Hour
-  4. Exit button: Press to close the Pop-up Screen (3.3)

3.10 System Diag: Digital Outputs



Display:

1. Menu button: Returns to System Menu (3.3)

3.11 Alarm Setup: Level Set Point by Group

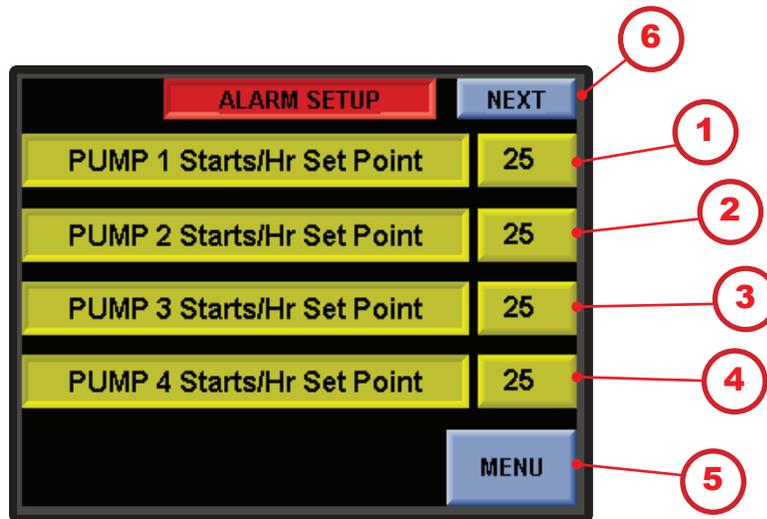


Display:

-  1. Press to set group 1 high-level alarm set point
-  2. Press to set group 1 low-level alarm set point
-  3. Next: displays the second Alarm Setup screen (3.11.1)
-  4. Menu: displays the System Menu screen (3.3)

The number of groups set up will be displayed

3.11.1 Alarm Setup: Starts Per Hour



Display:

-  1. Press to set pump 1 starts per hour set point
-  2. Press to set pump 2 starts per hour set point
-  3. Press to set pump 3 starts per hour set point
-  4. Press to set pump 4 starts per hour set point
-  5. Press to return the main menu (3.3)
-  6. Press to set pumps 5 and 6 then next Alarm Setup screen (3.11.2)

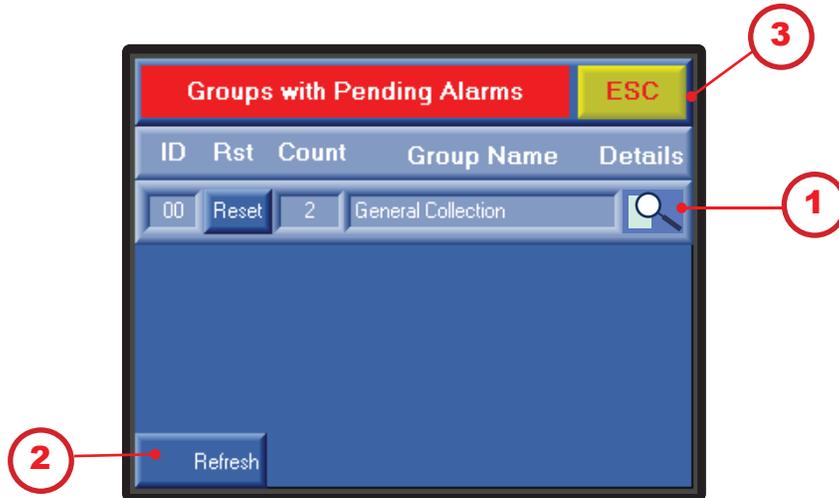
3.11.2 Alarm Setup: Alarm Bypass



Display:

-  1. Press to set Disable/Enable Group 1 High level
-  2. Press to set Disable/Enable Group 1 Low level
-  3. Press to return to the main menu (3.3)

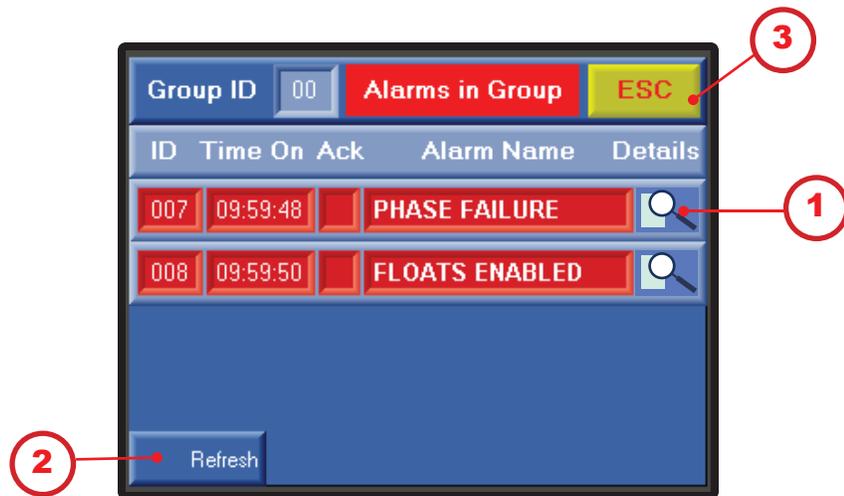
3.12 Active Alarms: Groups with Pending Alarms



Display:

-  1. Displays alarm group details (3.12.1)
-  2. Alarm Refresh: press to reset; the alarm will trigger again if the condition that caused the alarm still exists
-  3. Esc: returns to the previous screen (3.3)

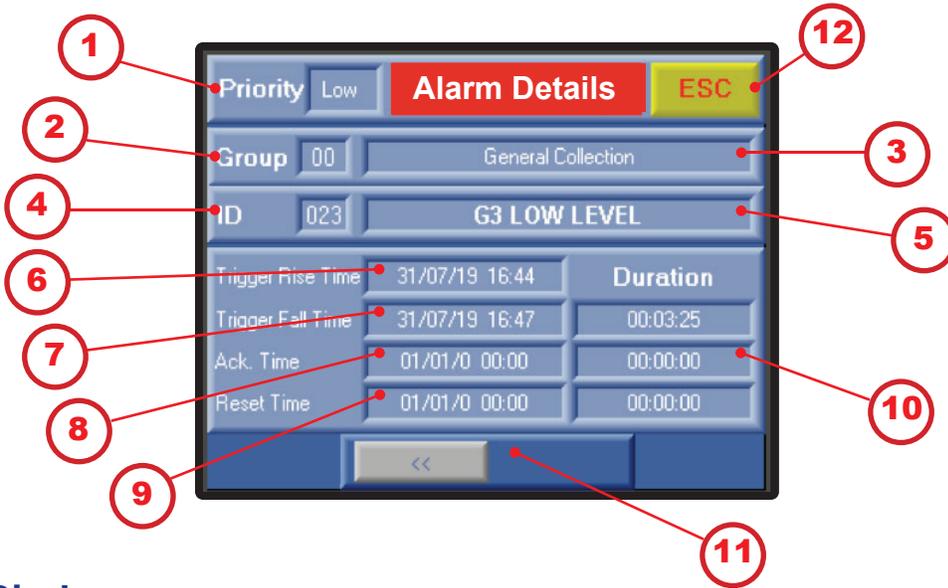
3.12.1 Active Alarms: Alarms in Group



Display:

-  1. Displays alarm details (3.12.2)
-  2. Alarm Refresh: press to reset; the alarm will trigger again if the condition that caused the alarm still exists
-  3. Esc: returns to the previous screen (3.12)

3.12.2 Active Alarms: Alarm Details



Display:

1. Priority: displays priority level of the alarm
2. Group: displays alarm's group ID number
3. Alarm group name
4. Alarm's ID
5. Alarm's name
6. Date and time stamp when the alarm became active
7. Date and time stamp when the alarm became inactive
8. Date and time stamp when the alarm was acknowledged
9. Date and time stamp when the alarm was reset
10. Time stamp of the duration of alarm events (active, inactive, acknowledged, and reset)
-  11. Navigation: scrolls between alarms
-  12. Esc: closes the Alarm History screen (3.12.1)

3.13 Alarm History

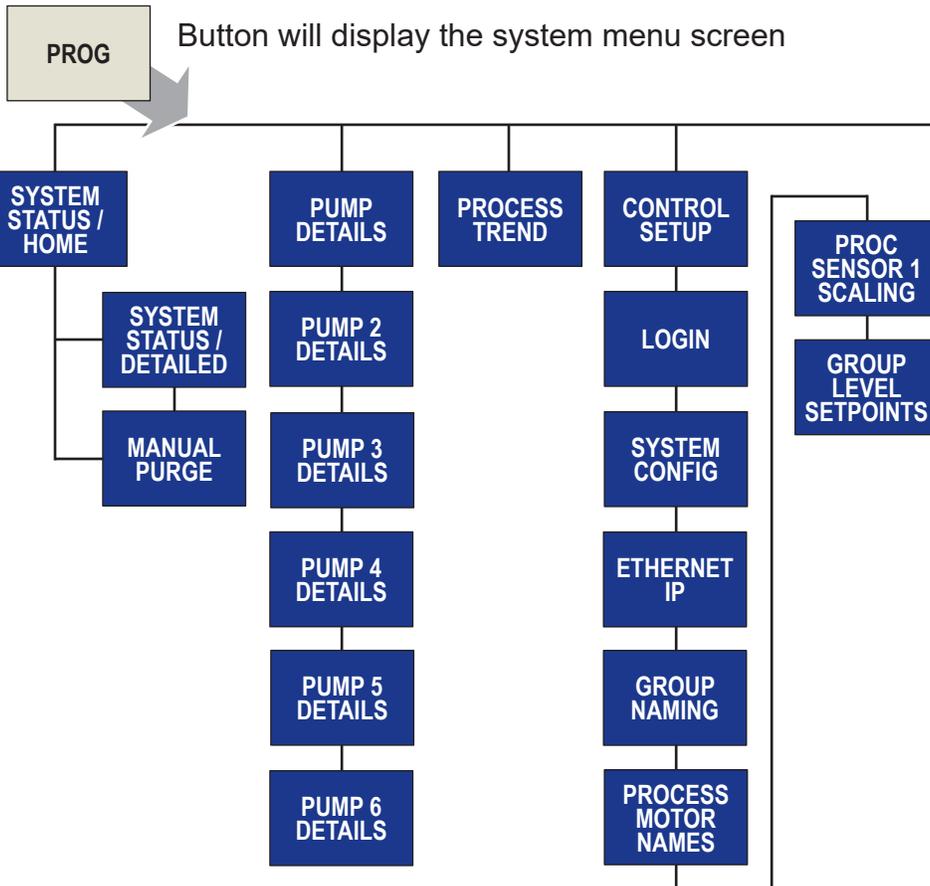


Display:

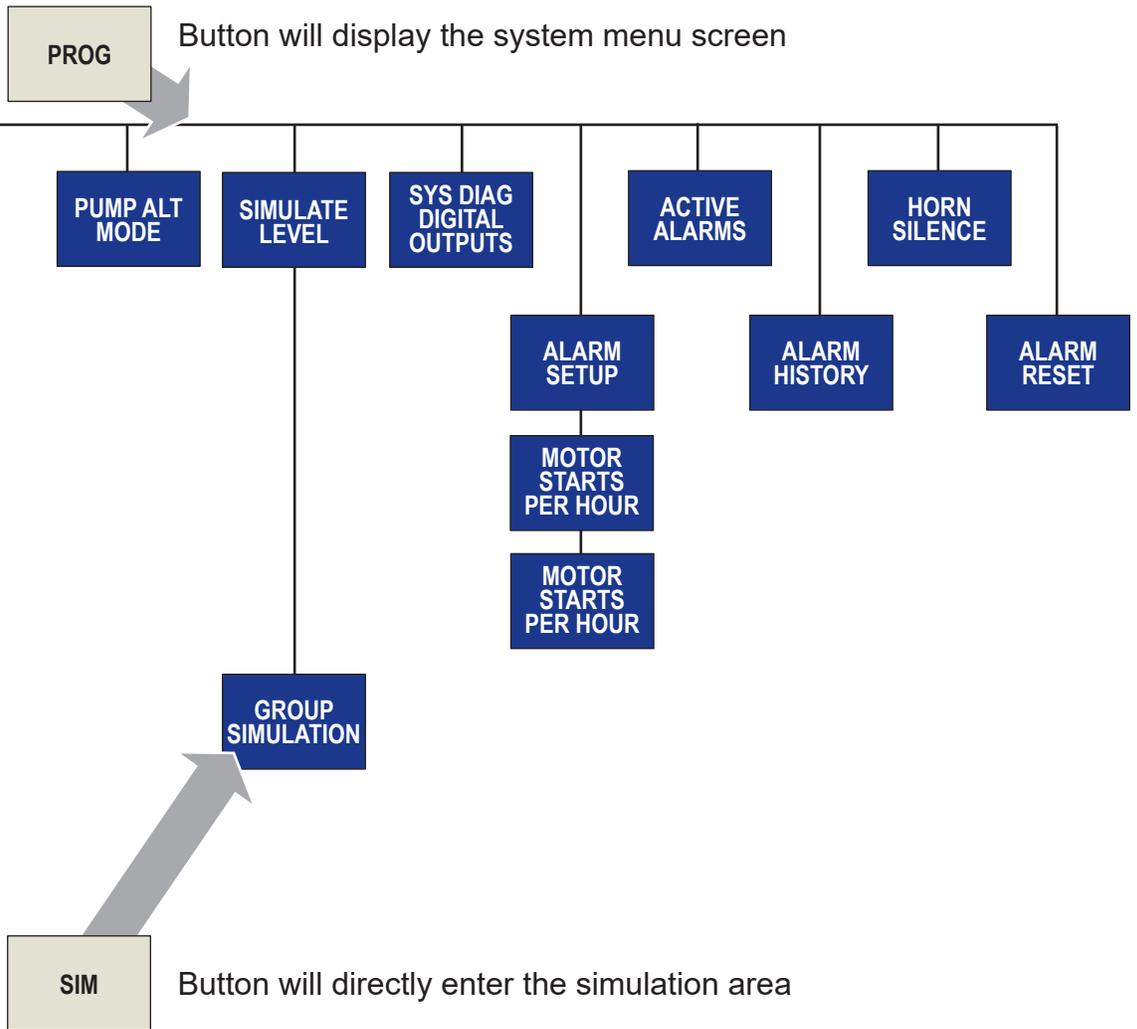
1. Priority: displays priority level of the alarm
2. Group: displays alarm's group ID number
3. Alarm group name
4. Alarm's ID
5. Alarm's name
6. Date and time stamp when the alarm became active
7. Date and time stamp when the alarm became inactive
8. Date and time stamp when the alarm was acknowledged
9. Date and time stamp when the alarm was reset
10. Time stamp of the duration of alarm events (active, inactive, acknowledged, and reset)
-  11. Navigation: scrolls between alarms
-  12. Esc: closes the Alarm History screen (3.3)

System Menu Screen Navigation

Navigation of Displays



Navigation of Displays



Section**5**

Installation

Procedure to replace a legacy Digi-Gage with a Digi-Gage Plus Retro

Review the instructions in their entirety and understand these processes before beginning. Time to complete this project is up to 2 hours depending on skill level.

Purpose:

The Digi-Gage Plus Retro is a direct replacement to the Digi-Gage (2300, 2400 and 2600) constant speed controllers installed in control panels manufactured by EG Controls of Jacksonville, FL. The records for your control panel have been matched to the configuration of the Digi-Gage Plus controller. If your panel has been modified after being manufactured, your system may not work properly if our factory was unaware of modifications when setting the controller configuration.

In addition, the Digi-Gage Plus can also be integrated into virtually an SCADA system. The controller can also take data from floats and transducers at the same time, log alarms and motor starting information.

The Digi-Gage Plus can also replace other pump controllers. This installation procedure is specific to the retro configuration and wiring specific to the Digi-Gage. If replacing a controller that is not a Digi-Gage, your kit should also include additional instructions. You can also refer to chapter 6 for general wiring diagrams.

Digi-Gage Plus Retro kit includes:

- Digi-Gage Plus controller
- Installation bracket
- Wiring harness between controller and terminals

Tools needed:

- Digital camera or smart phone with camera function
- 1/4" wrench or deep socket and ratchet
- 5/8" wrench or deep socket and ratchet (*if your system has a bubbler*)
- Flat screwdriver
- Phillips screwdriver
- Digital Multi-meter
- Side cutters
- Masking or painter's tape and pen

Step One

If your control panel is outside, try to time your installation to where the weather conditions are favorable. Water from rain or snow can damage electronics and create a shock hazard when the panel is energized. Power down the panel and disconnect power.



ATTENTION: Electricity can shock, burn and kill you. **DO NOT** do this modification with the panel energized! Verify panel has no power into the main power supply lines with a multi meter.



Step Two

The Digi-Gage is famous for simplicity and its ability to be easily swapped with another configured Digi-Gage in the event of a failure. The handle to pull the controller is below the faceplate. Lift the handle and slide the Digi-Gage out and set aside.



Step Three

The Digi-Gage Plus uses the same dimension hole once the Digi-Gage sleeve is removed. The Digi-Gage and Digi-Gage Plus Retro kit use the same terminal layout.

Take pictures of the original wiring on the Digi-Gage terminals with your camera to refer back to later. Use tape and label the wires numerically as you remove them. Or transfer one wire at a time from the Digi-Gage to the Digi-Gage Plus Retro bracket. If your panel has a bubbler, remember to transfer the hose to the transducer on the back of the new Digi-Gage Plus Retro.



ATTENTION: When tightening screws, be careful not to over-torque the terminal screws. They need to be just past “finger tight”.

Step Five

Pull the green plugs out of the Digi-Gage Plus. If your retro kit has a din rail strip, unsnap it from the back of the controller. Do Not unscrew any wires from the new unit. Slide the Digi-Gage Plus Retro into the front of the panel. The Digi-Gage Plus maintains up to a NEMA Type 4X rating when properly installed. Make sure the gasketing material is sandwiched between back of the controller and front of the panel.



ATTENTION: Use a piece of tape to hold the controller in place so it does not fall out before being secured.



Step Six

Slide bracket on to the controller in the door. Make sure to support the controller so it does not fall out. If you have an assistant, have them hold the bracket and controller in place.



Step Seven

Use the supplied screw clamps to secure the controller and bracket in place. The screw clamps insert into the slots and tips of the screws go into the back of the bracket. Tighten the clamps to hold put tension on the assembly. The screws need to be tight enough to compress the gasket material. The screws do not need to be extremely tight as over tightening will damage the controller housing.

 **ATTENTION:** Try to evenly tighten the screw clamps with the same amount of torque. The controller will make a better seal and damage will be less likely to occur to the controller over time.



Step Eight

Snap the din rail on to the back of the controller. This can be done with little effort by hooking the din rail into the top and sliding the black spring tab down.



Step Nine

Push the green plugs into their receptacles. The wire should help guide them where they belong. The plugs are not the same terminal count so connecting them wrong is not possible.



Step Ten

Land the wires to the terminals on the new bracket in the same locations as the Digi-Gage. If you have a bubbler, hook it up to the transducer.



Completion

This completes installation of the Digi-Gage Plus Retro. You can now reenergize your control panel. Go to page 18 of this manual to set your parameters for the Digi-Gage Plus. Your panel will then resume normal operation.

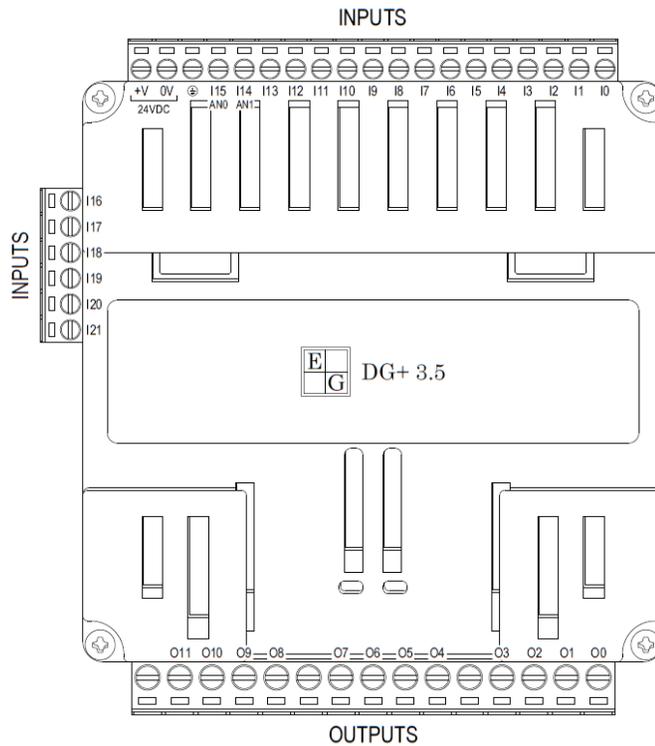


If you are adding features such as SCADA with this upgrade, you will need to do further configuration with an EG Controls Engineer in the Control Setup screens under the System Menu.

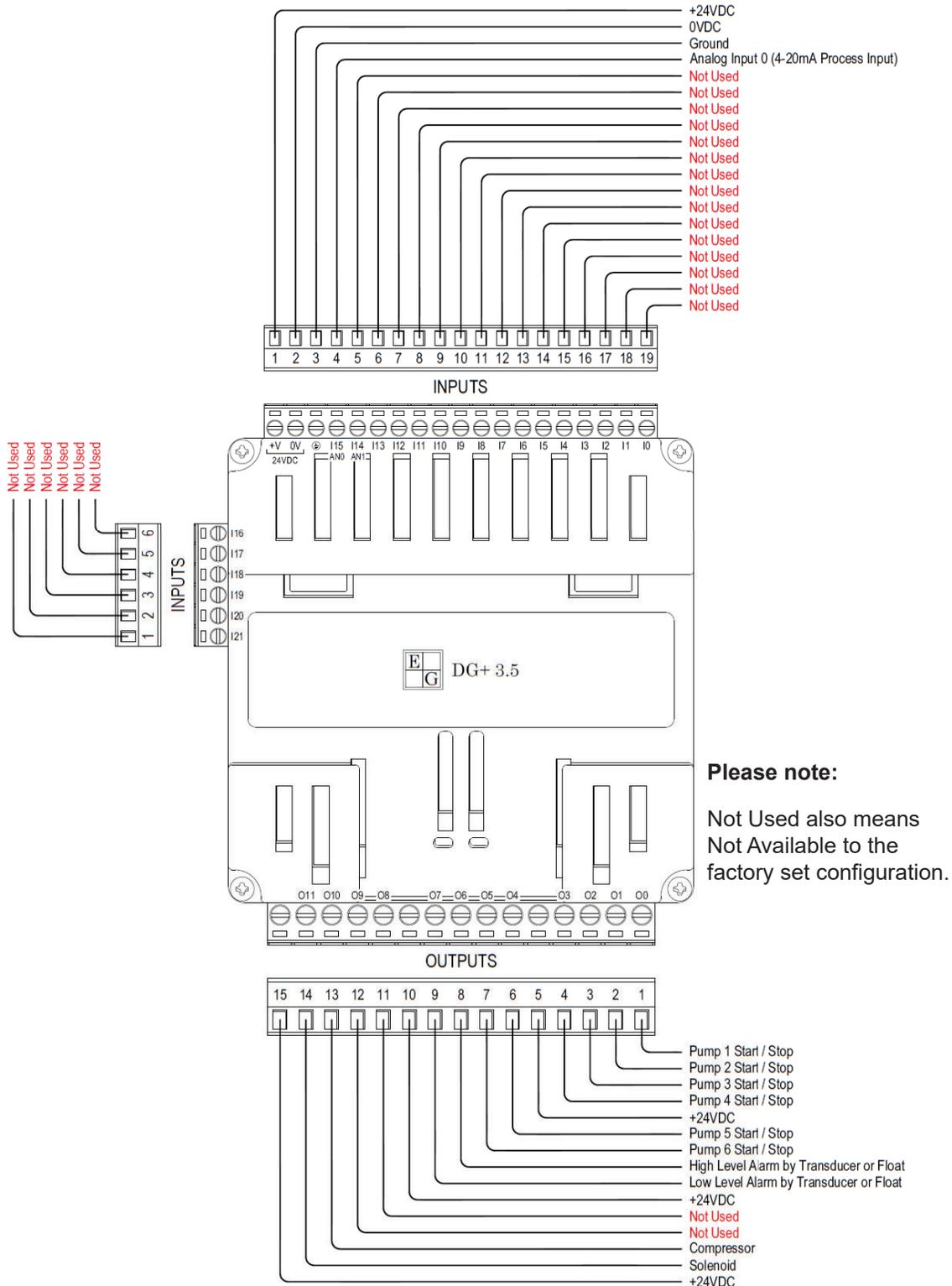
Typical Wiring by Configuration

Wiring configurations:

Your Digi-Gage Plus Retro should have come prewired as a kit. Wires between the controller and the terminal strips on the bracket should not be unscrewed. Only pull the green terminals from the controller. If a wire has been pulled, use this reference to land the wire again.



Retro Configuration:



Glossary / Index

% DO	Engineering Unit: Percentage dissolved oxygen <i>Pages 11,15,24</i>
20mA Value	Maximum scaled value when the process value is at 20mA
4mA Value	Minimum scaled value when the process value is at 4mA
Ack. Time	Time taken to acknowledge the alarm <i>Pages 36, 37</i>
Alarm	A system or equipment fault <i>Pages 8, 11, 12, 13, 31-39</i>
Alarm ID	Identification number associated with an alarm <i>Pages 36-37</i>
Alarm Name	The name of an alarm <i>Pages 36-37</i>
Alternate	Sequence motor operation to share lead position <i>Pages 5, 8, 26</i>
Analog Input	Process value in mA <i>Pages 6, 7, 8, 24</i>
Auto	The set condition for the controller to automatically start / stop motor(s) <i>Pages 10, 14, 28</i>
Duration	How long an event took place <i>Pages 36-37</i>
Equalize	Alternation setting to balance the runtime hours between motors <i>Pages 8, 26</i>
Ethernet Address	(IP Address) A unique number assigned to a device to communicate on a network <i>Page 21</i>
Ethernet Card	Hardware module for network communications <i>Pages 6, 21</i>

External Float Control	Float control system to run pumps without the controller input
Flow meter	A device that calculates flow of material <i>Pages 5, 15, 24</i>
Flush	A protocol meant to pump a large volume of fluid at one time to clear any restrictions in the pipes <i>Pages 6</i>
Flush Start	The flush protocol start setpoint
Flush Stop	The flush protocol stop setpoint
F.O.G.	Fats, Oils and Grease <i>Pages 5</i>
Ft	Engineering Units: Level measured in Feet <i>Pages 7, 11, 15, 24</i>
Gateway Address	A router interface connected to the local network that sends data packets out of the local network <i>Page 21</i>
GPM	Engineering Units: Gallons Per Minute <i>Pages 11, 15, 24</i>
Group 1	The first grouping of motors (1-6)
Group 2	The second grouping of motors (1-5)
Group 3	The third grouping of motors (1-4)
Group ID	Identification number a group associated with an alarm
Group Name	The name of the group <i>Groups are covered on pages 11, 13-15, 22, 24-28, 31, 33-39</i>
Hand	The set condition manually start / stop motor(s) <i>Page 14</i>
High-Level	Level setpoint to trigger a high level alarm <i>Pages 11-31</i>
Horn	The audible noise associated with the alarm <i>Page 13, 39</i>

Internal Float Control	Float control system to run the pumps with controller input <i>Page 52</i>
Lag 1	Second motor to start in the queue
Lag 2	Third motor to start in the queue
Lag 3	Forth motor to start in the queue
Lag 4	Fifth motor to start in the queue
Lag 5	Sixth motor to start in the queue
Lead	First motor to start in the queue <i>Lead / Lag is covered on pages 5, 8, 11, 25, 26,</i>
Level	The height measurement of the process liquid <i>Pages 5, 7, 8, 10, 11, 13, 25, 28, 31, 33, 36-40</i>
Low-Level	Measurement deemed too low for appropriate function <i>Pages 11, 31</i>
Mixer	A single output to control a blower or mixer based on time or level <i>Page 12</i>
Modbus	A type of industrial communication protocol over serial lines between electronic devices <i>Page 21</i>
Off	The set condition manually keeping motor(s) from running
Priority	The severity of a triggered alarm <i>Pages 36, 37</i>
Process Sensor	A device that takes the measurements and gives an analog value to the controller <i>Page 24</i>
PSI	Engineering Unit: Pressure per Square Inch <i>Pages 11, 15, 24</i>
Pump Delay	The amount of time the device will wait before turning on a pump or motor
Pump Down Control	Reads level and pumps water out of the well when water levels are too high

Pump Up Control	Uses pressure to detect when water levels are low and pumps water back into the well
Queue	A sequence of motors
Reset Time	Time taken to reset after an alarm <i>Pages 36, 37</i>
Response Trigger Value	A delay in the process value sampling (0-250) in milliseconds <i>Page 24</i>
Running	Feedback to the controller the motor is in operation <i>Pages 11, 14, 28</i>
Scaled Value	Process value displayed in Engineering Units <i>Page 24</i>
Start Delay	The minimum time between pump starts <i>Page 20</i>
Start Set Point	The process value has reached a condition where the motor is called to start <i>Page 25</i>
Stop Set Point	The process value has reached a condition where the motor is called to stop <i>Page 25</i>
Stopped	Feedback to the controller the motor is not in operation <i>Pages 14, 28</i>
Subnet Mask	A number that defines a range of IP addresses available within a network <i>Page 21</i>
Trigger Rise Time	Date and time stamp when the alarm became active
Trigger Fall Time	Date and time stamp when the alarm became inactive

Modbus Registers

Register	Definition
MB 302	Pump 1 Running
MB 305	Pump 2 Running
MB 308	Pump 3 Running
MB 311	Pump 4 Running
MB 316	Pump 5 Running
MB 319	Pump 6 Running
MB 682	Low Level Float Input
MB 686	High Float Input
MB 330	Pump 1 Start/Stop
MB 331	Pump 2 Start/Stop
MB 332	Pump 3 Start/Stop
MB 333	Pump 4 Start/Stop
MB 334	Pump 5 Start/Stop
MB 335	Pump 6 Start/Stop
MB 336	High Level Alarm Trigger by Xdcr
MB 337	Low Level alarm by Xdcr
MB 340	Purge Cycle
MB 341	Retro Isolation Solenoid
MI 304	Pump 1 Run Hrs to HMI
MI 305	Pump 2 Run Hrs to HMI

MI 306	Pump 3 Run Hrs to HMI
MI 307	Pump 4 Run Hrs to HMI
MI 308	Pump 5 Run Hrs to HMI
MI 309	Pump 6 Run Hrs to HMI
MI 43	Group 1 Level Signal

Alarms

Alarm	Definition
000	Alarm G1 High Level
001	Alarm G1 Low Level
006	High Float
009	Analog Signal out of Range or High Float Input
010	Pump 1 Starts/Hr Exceeded
015	Low Float
024	Pump 4 Failed to Start
025	Pump 5 Failed to Start
026	Pump 6 Failed to Start
028	Pump 4 Starts/Hr Exceeded
029	Pump 5 Starts/Hr Exceeded
030	Alarm P6 Starts/Hr Exceeded



EG
Controls
JACKSONVILLE, FLORIDA

11790 Philips Highway
Jacksonville, Florida 32256-1642

Phone 904 292 0110

Fax 904 292 0119

Email sales@egcontrols.com

Web www.egcontrols.com



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