

DIGI-GAGE PLUS™

Digital Constant Speed Controller

SCADA-Ready | Remote Access | Backwards Compatible

User Manual



EG Controls
JACKSONVILLE, FLORIDA



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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

The Digi-Gage Plus™ is designed to be 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, the Digi-Gage Plus™ 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 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	nnp inputs 280 mA @ 24 V DC pnp inputs 190 mA @ 24 V DC Back light 20 mA @ 24 V DC Ethernet card 35 mA @ 24 V DC Relay Outputs (ea.) 8 mA @ 24 V DC

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
- Adjustable white LED back light TFT LCD display
- 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:

- Clean-out (flush mode) — simple time- or cycle-based conditions
- Fats, Oils and Grease (F.O.G.) buildup prevention mode
- Clog prevention mode — simple time- or cycle-based conditions up to 3 pumps. (Option requires the addition of reversing contractors, pressure feedback, and expanded input module; check with pump manufacturer to ensure reversing pump is allowed)
- Floats
- Pressure
- Level

Process Features Continued:

- Flow
- Multi-functional control
- Pump up
- Pump down
- Function combinations
- Advanced grouping features up to 3 groups

2.3 Feature Details:

Six-Pump System:

- No user selectable I/O — use standard fixed I/O assignments
- Pump/blower grouping feature
- Clog prevention feature
- Grease buildup feature
- Clean-out feature

Five-Pump System:

- Allows for three user-selectable inputs
- Allows for one user-selectable output
- Pump/blower grouping feature
- Clog prevention feature
- Grease buildup feature
- Clean-out feature

Four-Pump System:

- Allows for six user-selectable inputs
- Allows for two user-selectable outputs
- Pump/blower grouping feature
- Clog prevention feature
- Grease buildup feature
- Clean-out feature

Three-Pump System:

- Allows for nine user-selectable inputs
- Allows for three user-selectable outputs
- Pump/blower grouping feature (maximum of three groups)
- Clog prevention feature (lift station feature)
- Grease buildup feature (lift station feature)
- Clean-out feature (lift station feature)
- Float monitoring feature (lift station feature)
- If enabled, five of the user-selectable inputs will be predefined as float feedback inputs

2.4 Controller Functionality:

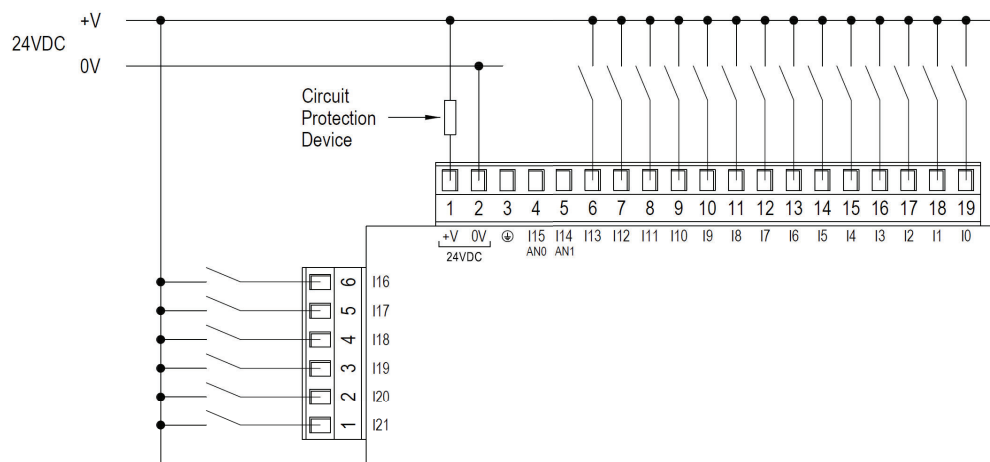
- Supports up to six constant speed motors (pumps, blowers, etc.)
- Alternation:
 - Alternate on motor stop
 - Alternate to equalize run time (in development)
 - Fix any motor as lead (no alternation)
 - Alternate motors independently within each group
- Level simulation to test setup function and alarm set points
- SCADA integration
- Advanced grouping:
 - Group any number of the six pumps in up to three groups
- Controller can be remotely viewable and operated
- Controller stores data locally that can be viewed locally or remotely
- Controller has web server features
- Controller can be configured for different modes of operation:
 - Pump down
 - Pump up
 - Retro
- Controller is configurable for selectable monitoring modes:
 - Float system monitoring
 - Backup transducer
 - Seal water system monitoring

Controller Functionality Continued:

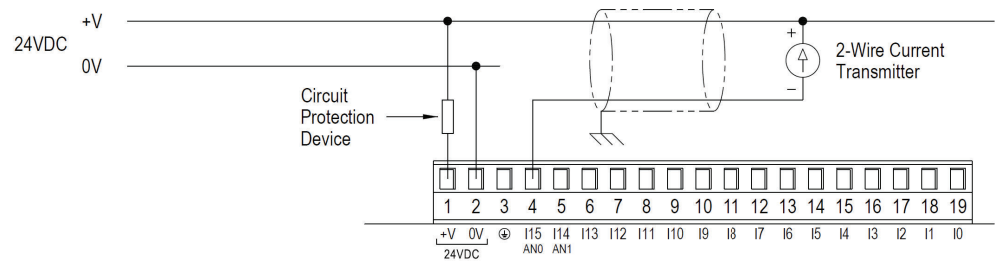
- Pump monitoring
 - Suction pressure
 - Discharge pressure
 - Calculates inflow and outflow dynamically in gallons per minute or cubic feet per minute (with compatible flow meter installed)
 - Controller displays the total pump or blower run-time hours, total starts, and starts per hour
 - Controller allows entry of wet-well geometry for flow calculations when no flow meter is present.
 - Relay outputs for system faults, 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.

2.5 Typical Wiring Diagrams:

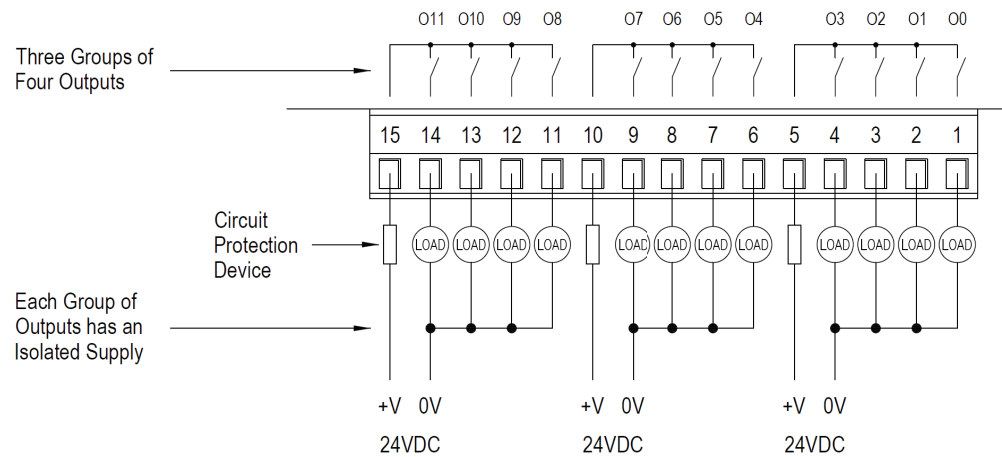
Digital input wiring



Analog input wiring



Relay output wiring



Modes of Operation

3.1 Clean Out (Flush) Mode Description (For Lift Stations):

The system employs user-adjustable time/cycle set points to allow pumps to run beyond the normal level set points to flush the wet well to help prevent a buildup of solids.

Clean Out Theory of operation:

As the lift station operates based on configured level set points, the pumps go through the automated operations to pump down the lift station to the configured low-level pump shutoff set point.

A screen is provided for the user configured pump down cycles, number of days of operation, and a Clean-Out (enable/disable) mode.

Once this mode is enabled and the number of cycles or number of days is configured, the system will operate as follows:

Once the user-configured set point (either the number of cycles or number of days) is reached, the system will ignore the normal start/stop pump set points and allow the station to fill to the flush high-level set point. Once this flush high level is reached, the system will start the user-selected available pumps to pump down the lift station and flush the station wet well.



ATTENTION: Use of this feature requires understanding of lift station and pump operations. This feature should be set up by qualified personnel to ensure proper functionality and prevent potential damage to pumps and lift-station hardware.

3.2 Anti-F.O.G. Mode Description (For Lift Stations):

This feature provides the system with a varying start level (percentage based) mode to help prevent F.O.G. (Fats, Oils, Grease) buildup due to the wet-well level reaching the same point, causing an accumulation of F.O.G. on the sides of the lift station.

A screen is provided for the user to enable/disable this feature and to set the percentage variation allowed to the level.

Anti-F.O.G. Theory of operation:

When the Anti-F.O.G. mode is enabled, the percentage variable is set. Each time the pump down cycle is initiated, the system will adjust the user-defined level set point by the percentage entered into the variance field. The next cycle will wait until this “calculated” level value is reached and start the pump down cycle. The system will run through a series of these calculations to allow a semi-random level for starting the pump down cycle.

Anti-F.O.G. will not necessarily reduce the amount of matter on the well walls. Anti-F.O.G. will eliminate “shelves” of matter building up.



ATTENTION: Use of this feature requires understanding of lift station levels. This feature should be set up by qualified personnel to ensure proper functionality and prevent nuisance activation of float backup operations.

3.3 Clog Prevention Mode (Key Shaft Pumps Only):

This feature provides an autonomous means of helping to prevent clogs that build up on a pump’s impeller.

Clog Prevention Theory of Operation:

A screen is provided to enable/disable the Clog Prevention mode. The de-matter operation is based on a configurable number of pumping cycles or number of days. Once this mode is enabled and the number of cycles or number of days is set, the system will operate as normal until the set point is reached. A clog prevention cycle will initiate, and the pump will reverse direction and then run forward (based on the number of cycles set by the user) to attempt to clean the pump impeller. This is an open-loop automatic mode that does not use any feedback to determine a clog or matter buildup.



ATTENTION: Ensure that reverse function is available from the pump manufacturer. Use of this feature without key-shafted pumps can damage pumps!

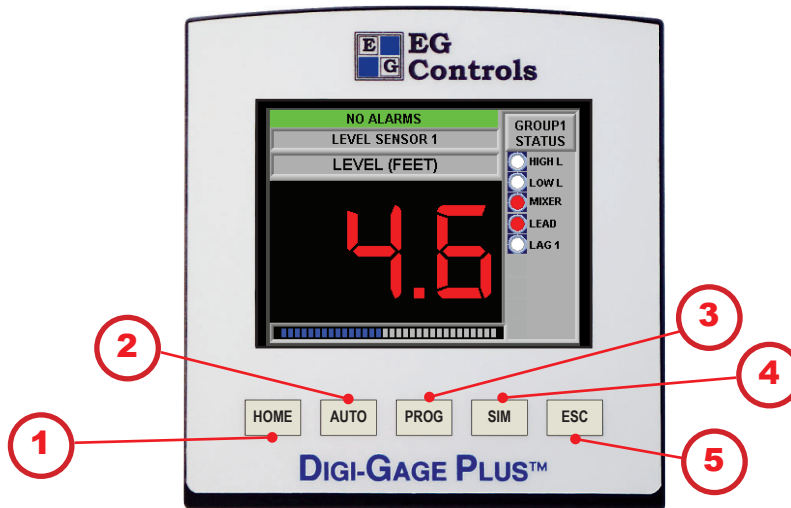


ATTENTION: Use of this feature requires additional reversing starters and hardware installed in the control panel.



ATTENTION: This option works on systems of 3 pumps or less.

DIGI-GAGE PLUS™ Front Bezel

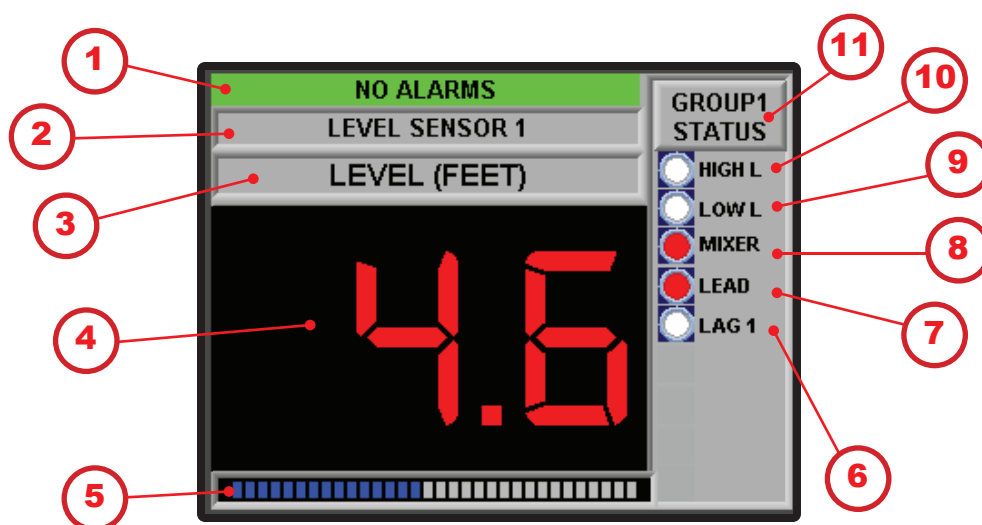


Buttons:

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.

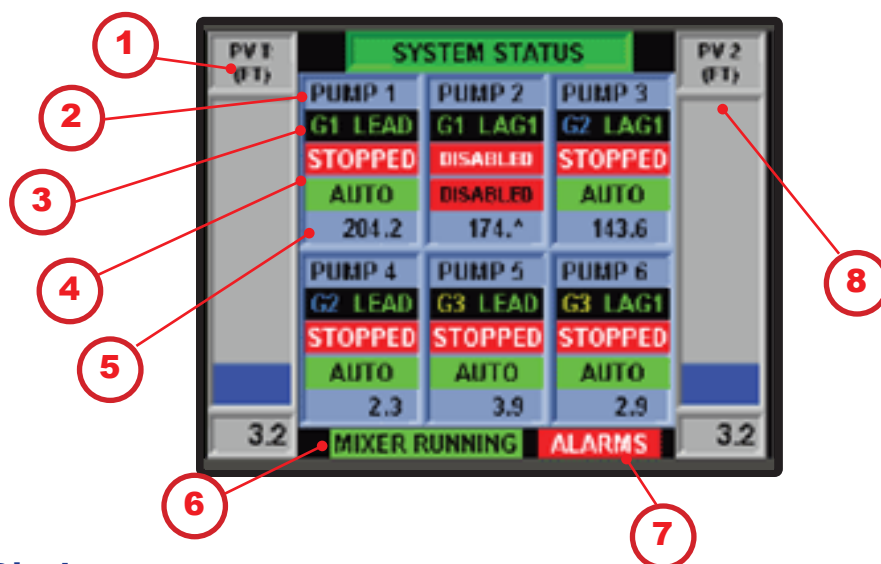
4.1 System Status / Home



Display:

1. Alarm status
2. Sensor in use
3. Level: units (PSI, DO, FT, GPM) for the process value assigned to the group displayed
-  4. Scaled Process Value: current measurement; press to display the System Status detailed screen. (4.2.1)
5. Bar Graph: scaled as 0%–100% of the process value
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. Mixer Status: white (Off), solid red (Running)
9. Low-Level Indicator: solid red (Low-Level Alarm)
10. High-Level Indicator: solid red (High-Level Alarm)
-  11. Group Status: displays current group System Status; press to toggle between the configured groups (typical of each group; maximum of three groups)

4.2.1 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. Alarm status
8. Measured output of transducer 2 if present



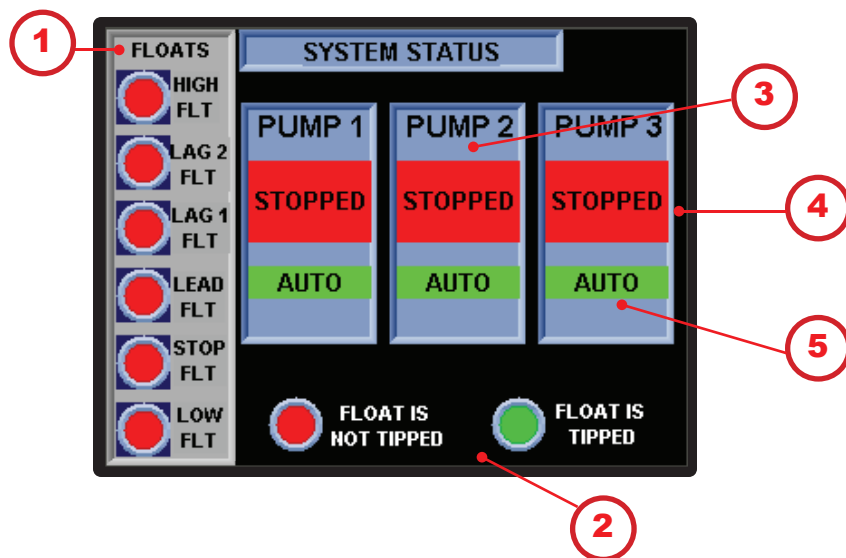
HOME

PROG

ESC

blister buttons navigate off this display

4.2.2 System Status (detailed) with floats only



Display:

1. Status of each of the 6 Floats needed for proper control of the pumps:

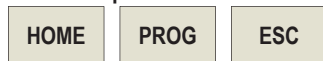
- High Float: High Wet Well Level Alarm Float
- LAG 2 Float: 2nd Lag Pump call to Run Float
- LAG 1 Float: Lag Pump call to Run Float
- Lead Float: Lead Pump call to Run Float
- Stop Float: Pump Stop Float
- Low Float: Low Wet Well Level Alarm Float

2. Float Status Key: RED Float not Tipped; GREEN Float is Tipped

3. Pump Name as defined in the Control Setup screens displays here

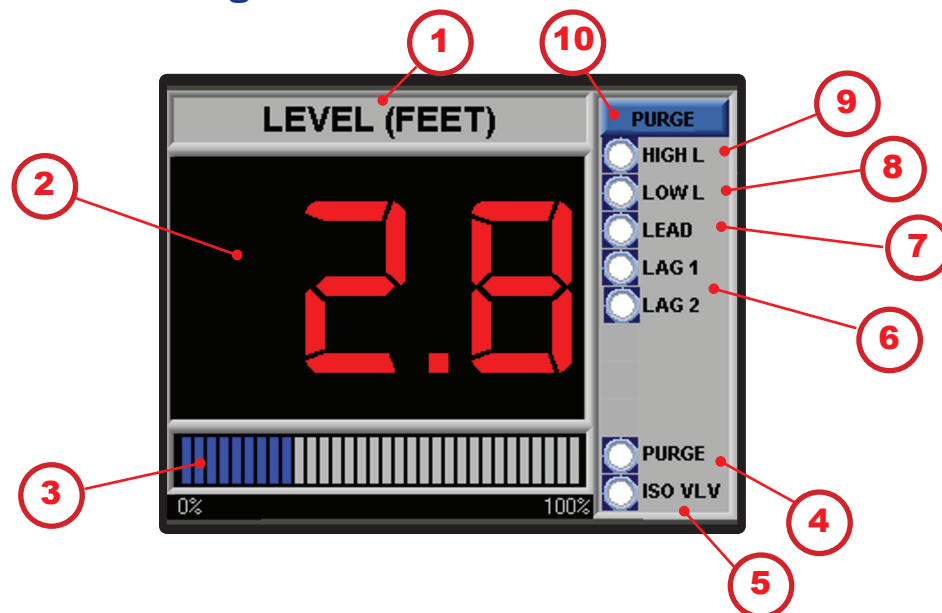
4. Status of the Pump; RUNNING or STOPPED

5. Pump H-O-A Switch status: AUTO, NOT AUTO



blister buttons navigate off this display

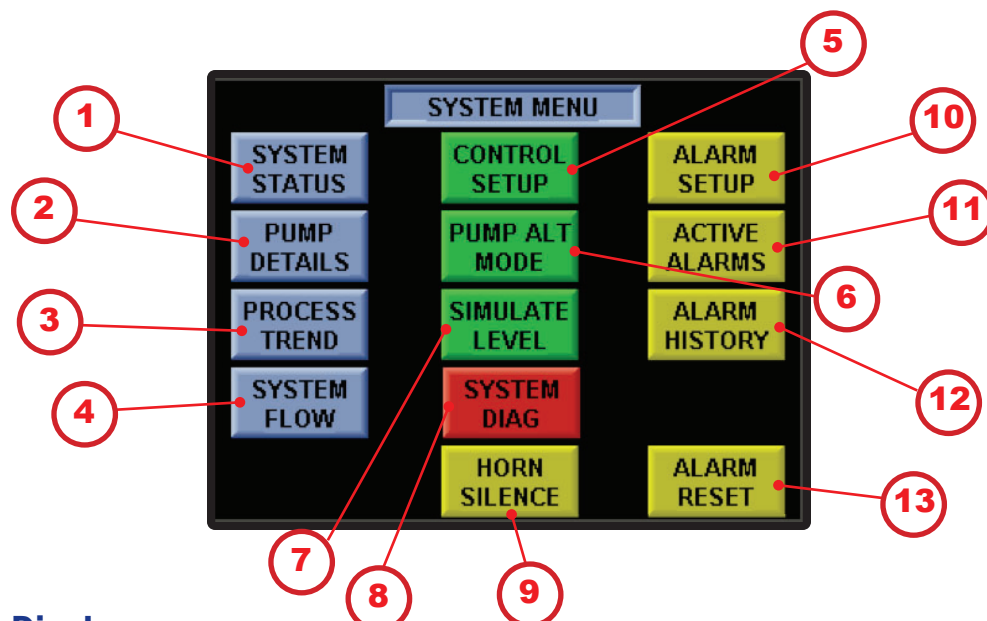
4.2.3 Retro Configuration



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 Alarm
9. High level indicator: solid red High-Level Alarm
10. Displays the Purge set up screen (Available on Triplex and Quadplex) (4.7.10)

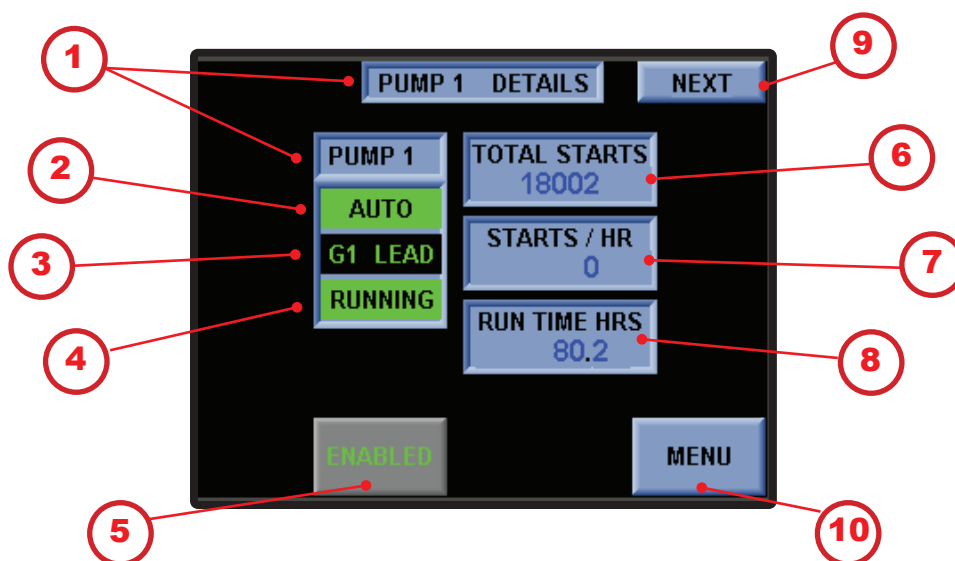
4.3 System Menu



Display:

-  1. System Status: displays the System Status home screen (4.1)
-  2. Pump Details: displays Pump Details screen (4.4)
-  3. Process Trend: displays the Process Trend screen (4.5)
-  4. System Flow: displays the System Flow screen (4.6)
-  5. Control Setup: displays the Control Setup screen (4.7)
-  6. Pump Alt Mode: displays the Alternation Setup screens for each configured group (4.8)
-  7. Simulate Level: displays the Simulation Level screen for group process variable (4.9)
-  8. System Diag: Displays input and output status (4.10)
-  9. Horn Silence: silences the horn in an alarm condition
-  10. Alarm Setup: displays the Alarm Setup screen for each of the configured groups (4.11)
-  11. Active Alarms: displays the Active Alarms pop-up screen (4.12)
-  12. Alarm History: displays the Alarm History screen (4.13)
-  13. Alarm Reset: resets the alarm logic if the condition has been cleared

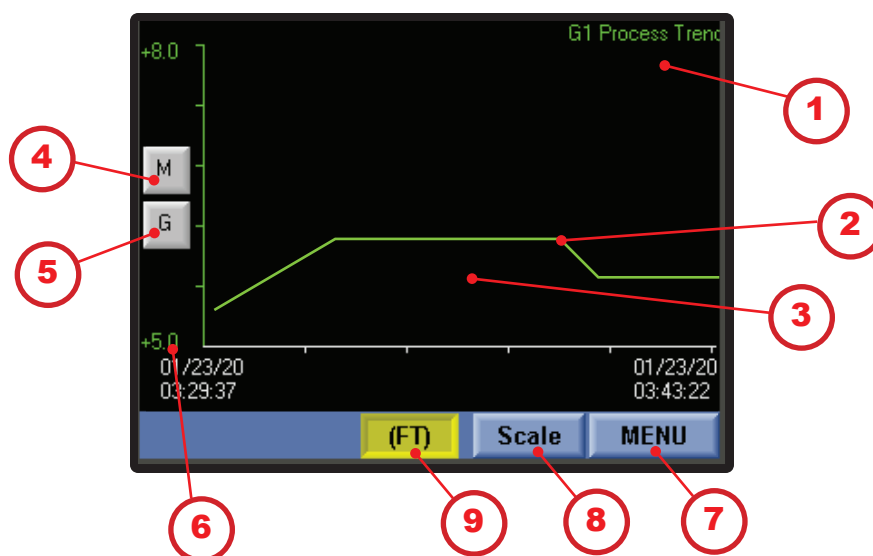
4.4 Pump Details



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 (4.3)

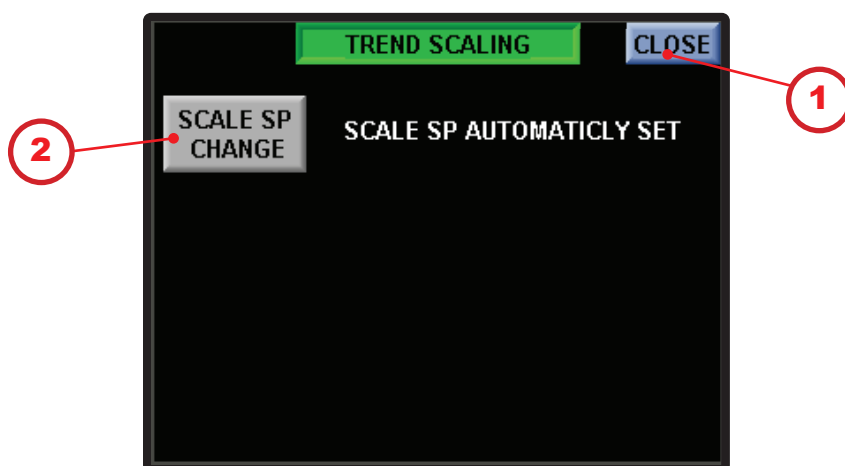
4.5 Process Trend



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. This is set up in 4.7.6 if the fluid level is outside of this range, nothing will be displayed
-  7. Menu: displays the System Menu screen (4.3)
-  8. Scale button: Set up Trend Scaling (4.5.1)
9. Selected engineering unit (PSI, DO, FT, GPM)

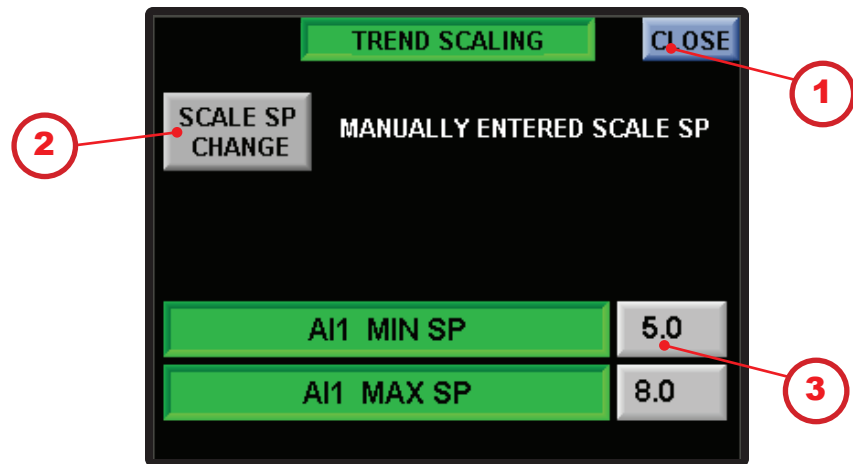
4.5.1 Process Trend: Automatic Trend Scaling



Display:

-  1. Close button: returns to Trending (4.5)
-  2. Scale SP Change: Toggle between automatic and manual (4.5.2)

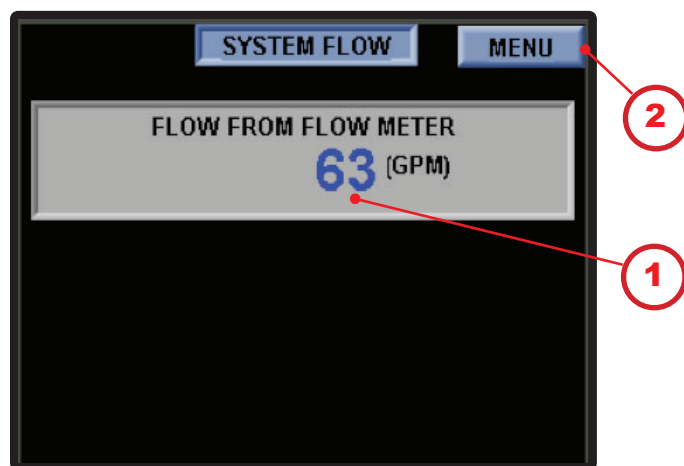
4.5.2 Process Trend: Manual Trend Scaling



Display:

-  1. Close button: returns to Trending (4.5)
-  2. Scale SP Change: Toggle between automatic and manual (4.5.1)
-  3. Set manual set points Min and Max

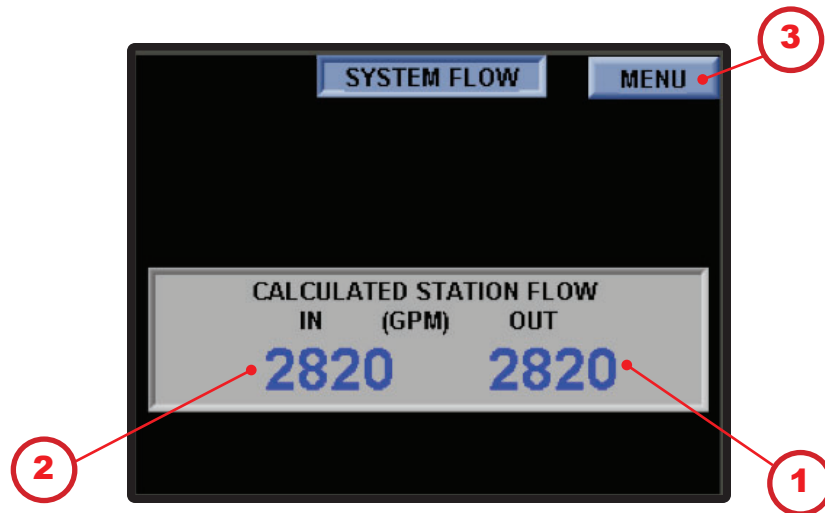
4.6 System Flow: With attached flow meter



Display:

1. Displays the current reading from the flow meter
-  2. Menu: displays the System Menu screen (4.3)

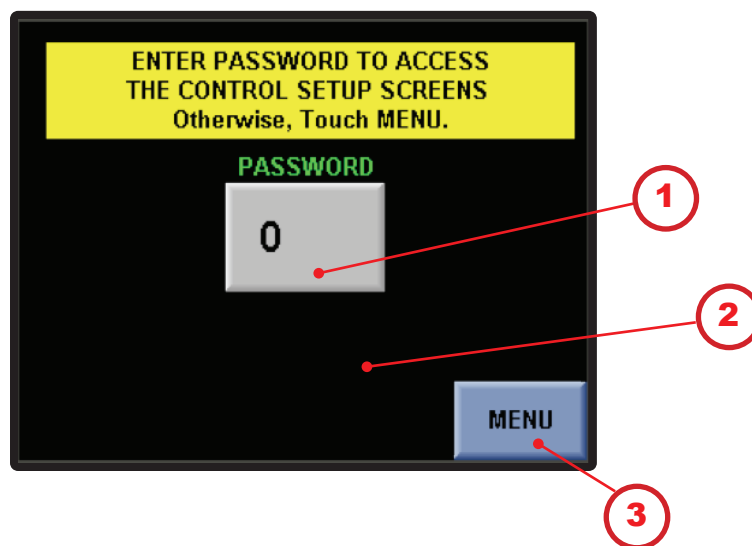
4.6.1 System Flow: Flow based on calculations



Display:

1. Calculated Discharge Flow in GPM: calculated when a pump comes on line and pumps down the well
2. Calculated In-Flow in GPM: calculated by the time it takes to fill the well
-  3. Menu: displays the System Menu screen (4.3)

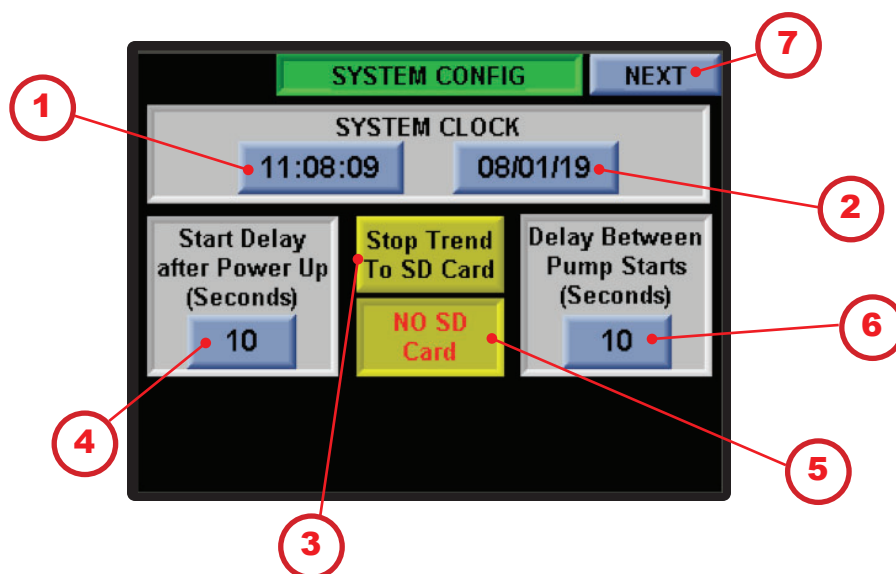
4.7 Control Setup: Login



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 (4.3)

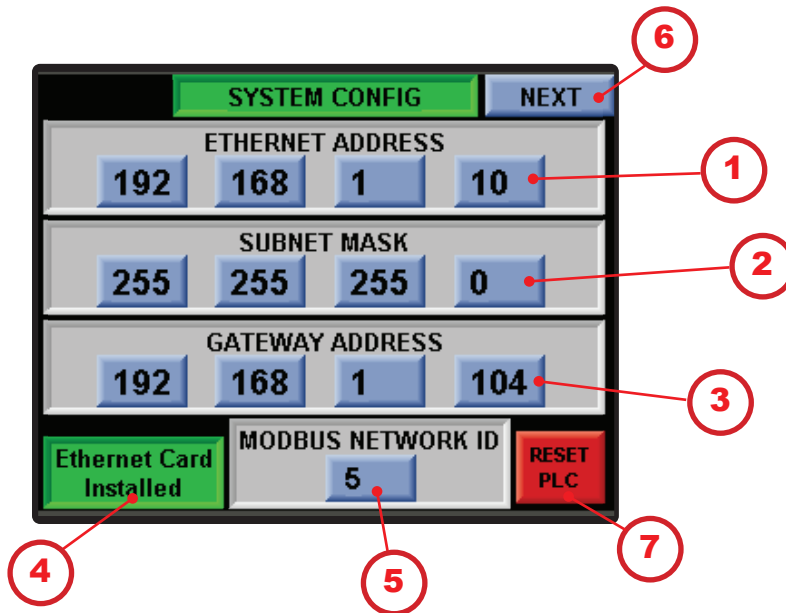
4.7.1 Control Setup: System Configuration



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 (4.7.3)

4.7.2 Control Setup: Network Setup



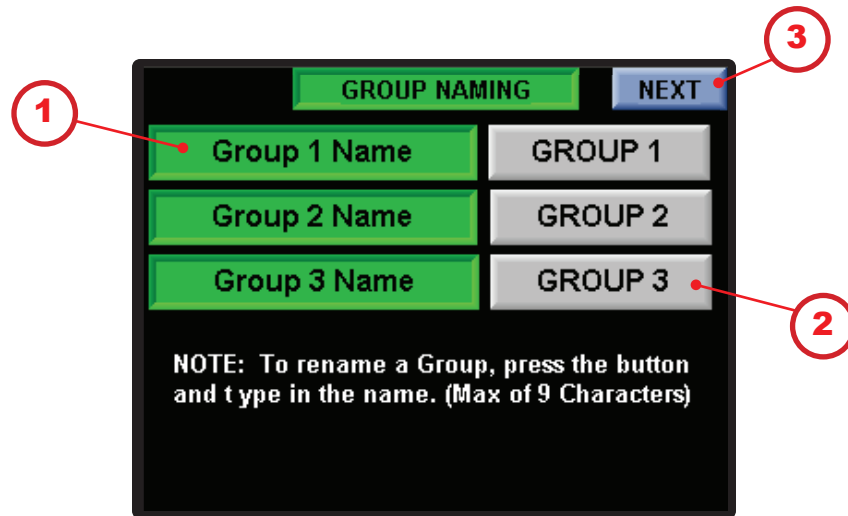
Display:

-  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 (4.7.4)
-  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.

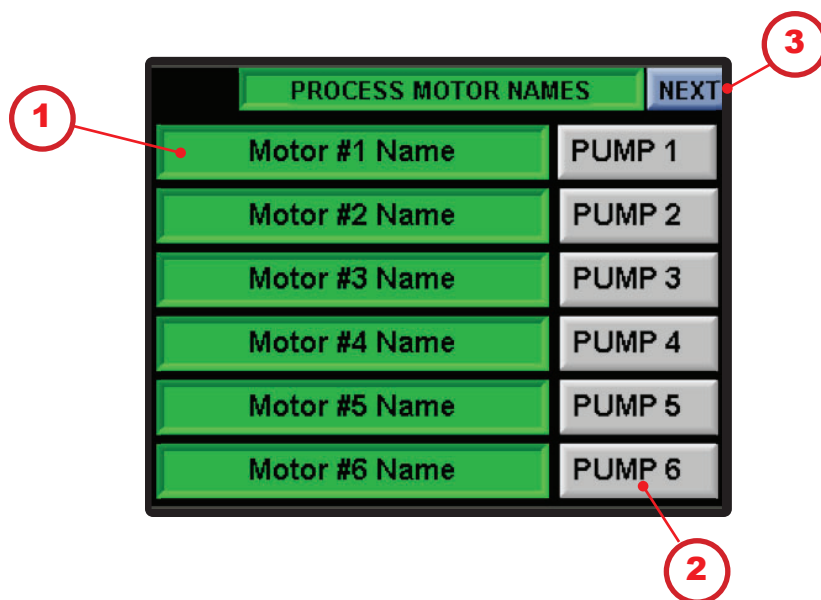
4.7.3 Control Setup: Group Naming



Display:

1. The label for each group to be named
-  2. Press to set name; nine-character maximum for each group; the names will display on numerous screens
-  3. Next: displays the next configuration screen (4.7.5)

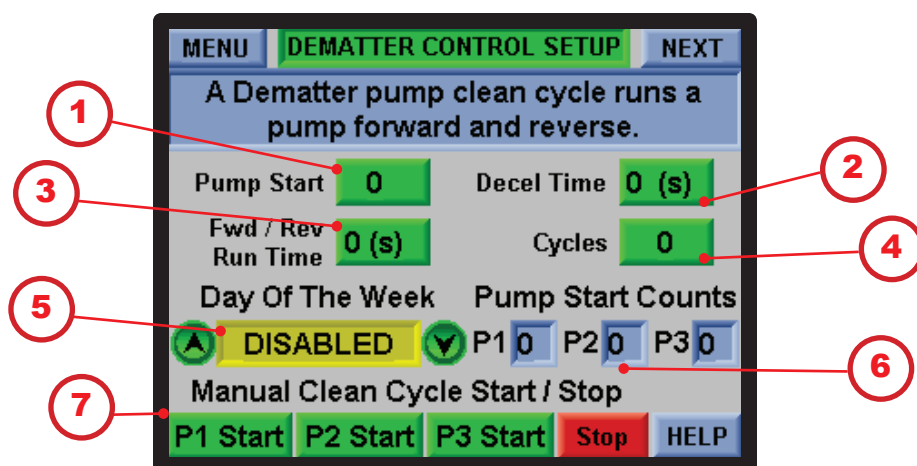
4.7.4 Control Setup: Motor Naming



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 (4.7.6)

4.7.5 Control Setup: Dematter (if factory configured)



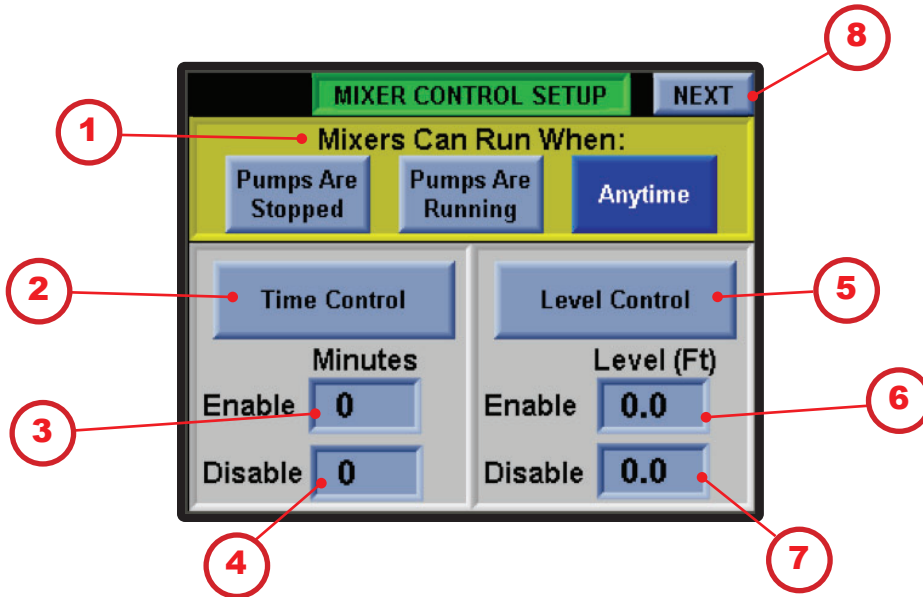
Display:

1. The number of pump starts between the clean cycles. A valid number must be between 1 and 99
2. The time (in seconds) it takes the pump to come to a full and complete stop. A valid entry must be between 0 and 99.
3. The amount of time (in seconds) the pump will run forward or reverse during a clean cycle.
4. The number of cycles to run each time this module is called.
5. The day or days of week that the clean cycle is to run:
Disable, All days, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
6. The number of pump starts between the clean cycles.
7. Manual start and stop a clean cycle for each pump up to 3 pumps.



ATTENTION: Use of this feature requires pump motors that are capable of running in reverse and reversing contactors inside of the control panel.

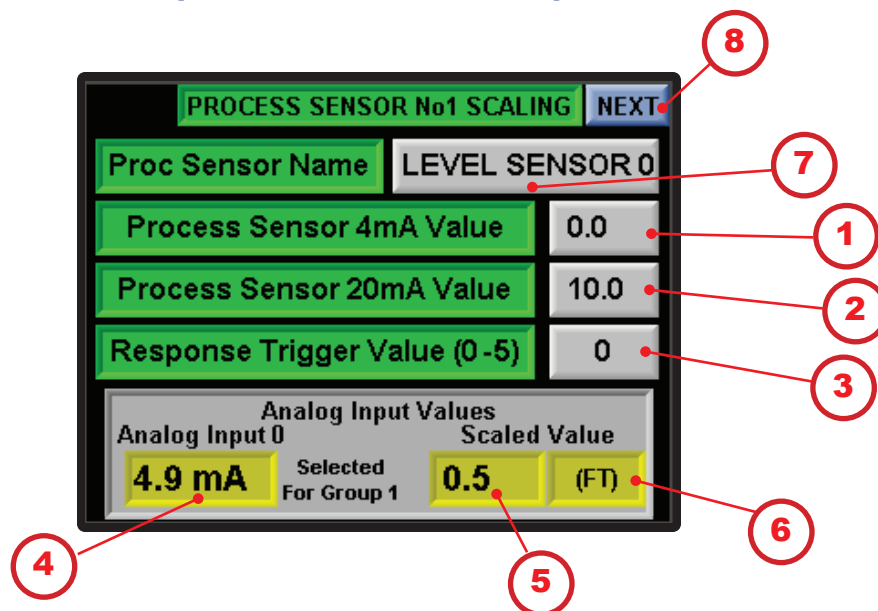
4.7.6 Control Setup: Mixer Setup (if factory configured)



Display:

1. Select when the mixer can run:
 - Pumps are stopped
 - Pumps are running
 - Anytime
2. Time Control: controls the mixer based on time
3. The number of minutes the mixer runs
4. The number of minutes the mixer is off
5. Level Control: select to control the mixer base on level set points
6. The start level for the mixer
7. The stop level for the mixer
8. Next: displays the System Menu screen (4.7.7)

4.7.7 Control Setup: Process Sensor Setup

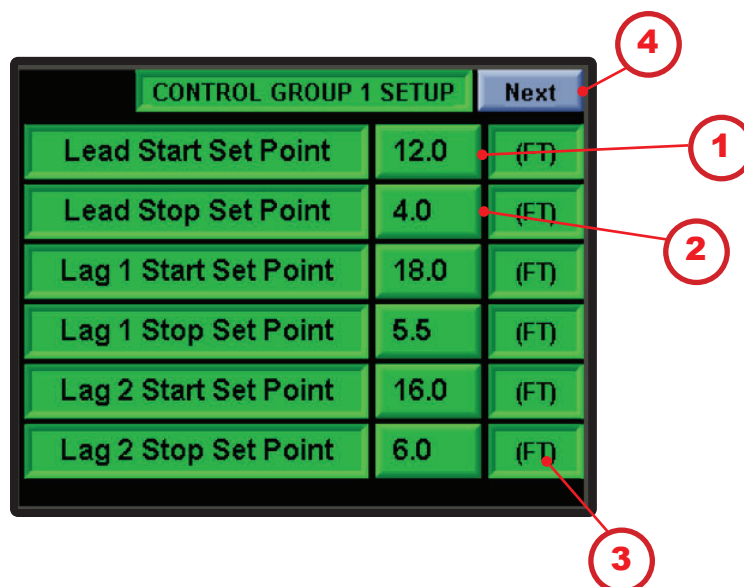


Display:

-  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 (4.7.8)

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

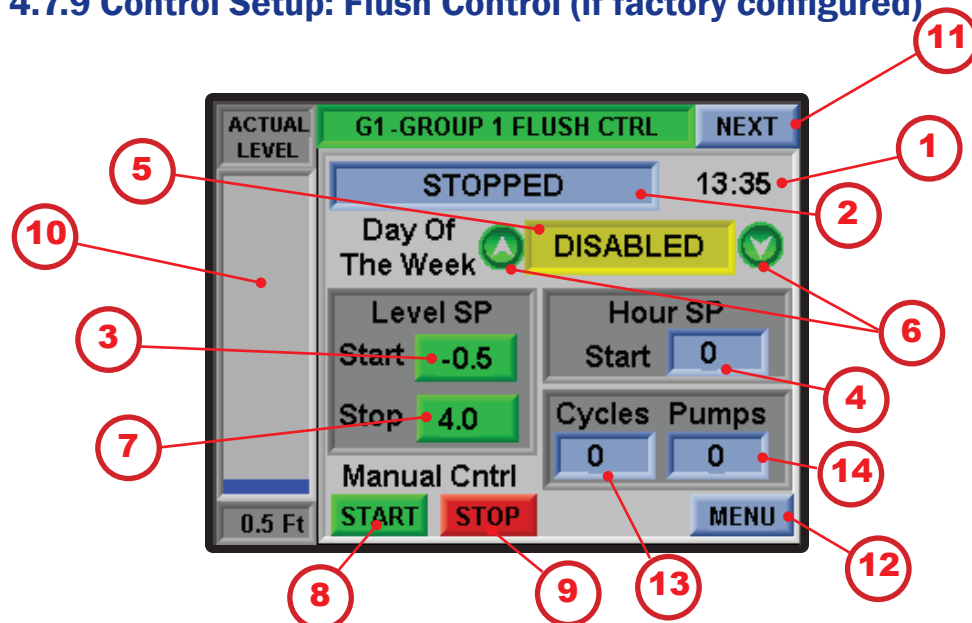
4.7.8 Control Setup: Group Set Points



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 next configuration screen (4.7.9)

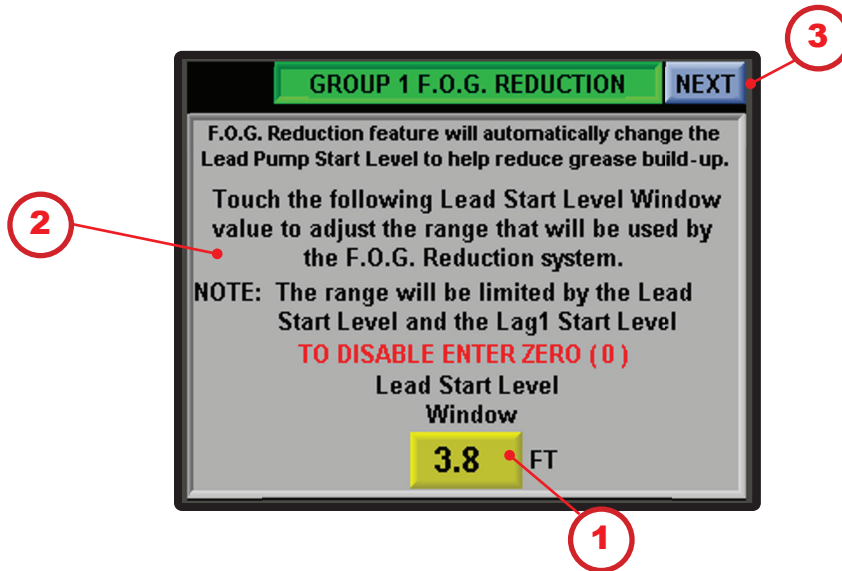
4.7.9 Control Setup: Flush Control (if factory configured)



Display:

1. Displays the current time
2. Status of the flush protocol: Stopped, Waiting on Level, or Running
-  3. Start set point for level of the flush; press to change the value
-  4. Hour to start the flush; press to change the value
5. Day of the week to run the flush: Monday, Tuesday, Wednesday, Thursday, Friday, or Disable
-  6. Press the Up or Down arrows to change the day of week
-  7. Stop set point for level of the flush; press to change the value
-  8. Start: starts the flush, overriding the automatic configuration
-  9. Stop: stops the flush, overriding the automatic configuration
10. Bar Graph: displays the actual well level
-  11. Next: displays the next configuration screen (4.7.10)
-  12. Menu: displays the System Menu screen (4.3)
-  13. Number of flush cycles performed
-  14. Number of pumps selected - this is limited to the number of pumps in the group

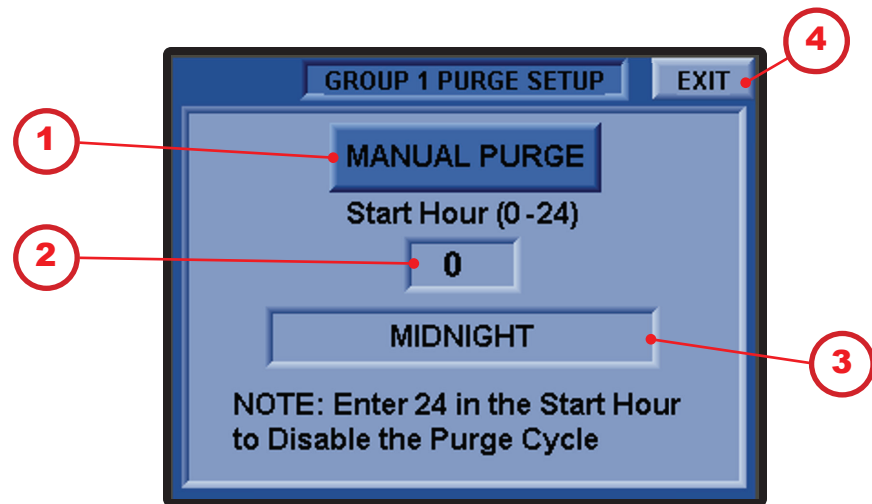
4.7.10 Control Setup: F.O.G. Reduction (if factory configured)



Display:

1. Lead Start Level Range button: Press to enter a value. If the value exceeds the Lag1 Start Level set-point the entered value will be automatically adjusted below the Lag1 set-point.
2. Description and instruction on the F.O.G. Reduction feature
3. NEXT button displays Group 2 Level Set Point screen. If only one Group is configured the Main Menu is displayed (4.3)

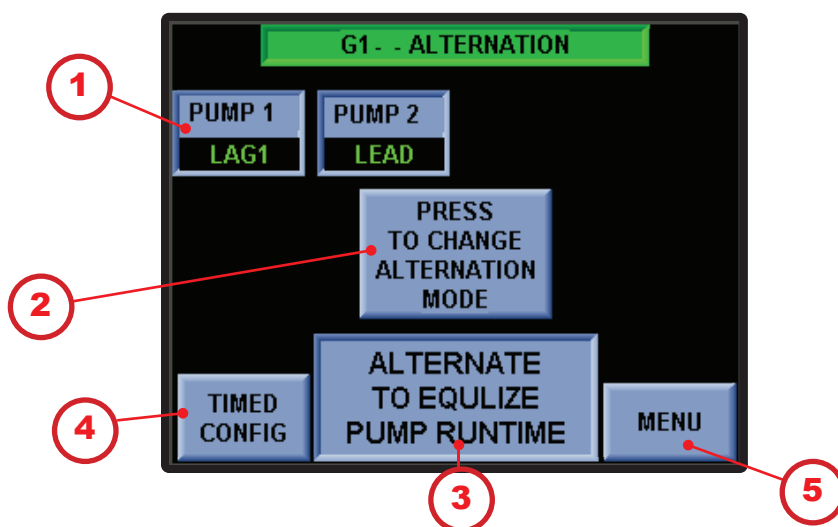
4.7.11 Control Setup: Purge Setup (if factory configured)



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 (4.3)

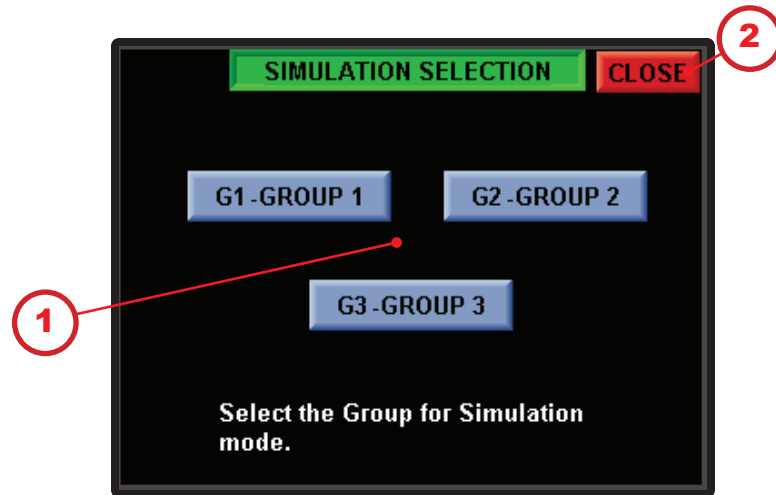
4.8 Control Setup: Pump Alternation Mode (in development)



Display:

1. Labels as defined in Process Motor Names (see 4.7.5) 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 (4.3)

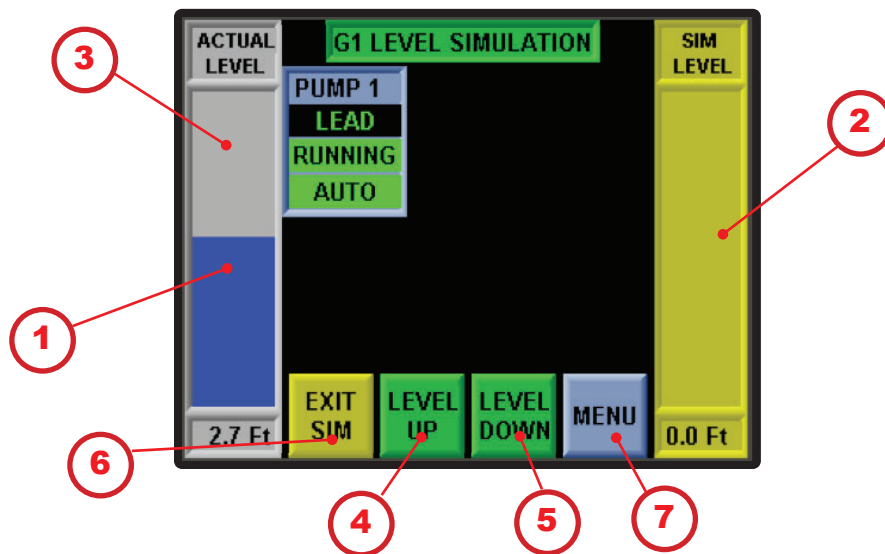
4.9 Simulation



Display:

-  1. Select a pump group for simulation (4.9.1)
-  2. Close returns to the System Menu (4.3)
-   blister button will also navigate directly to this screen.

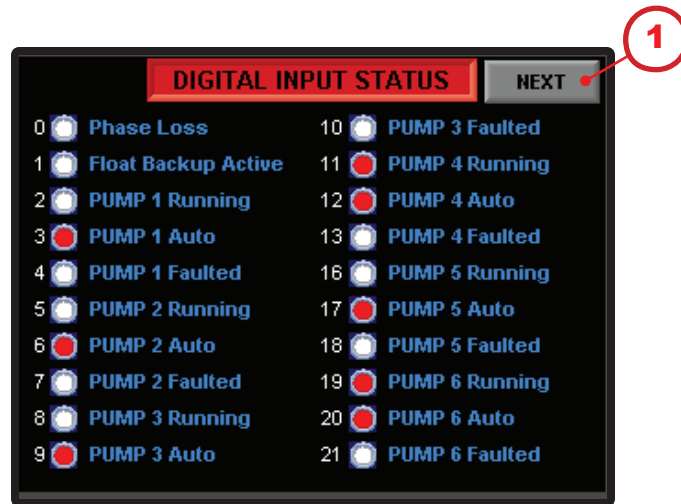
4.9.1 Simulation



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 (4.3)

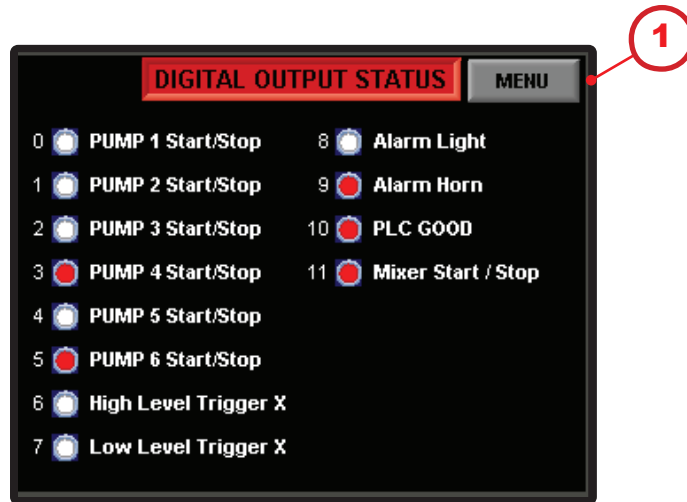
4.10 System Diag: Digital Inputs



Display:

-  1. Next button: to display Digital Outputs (4.10.1)

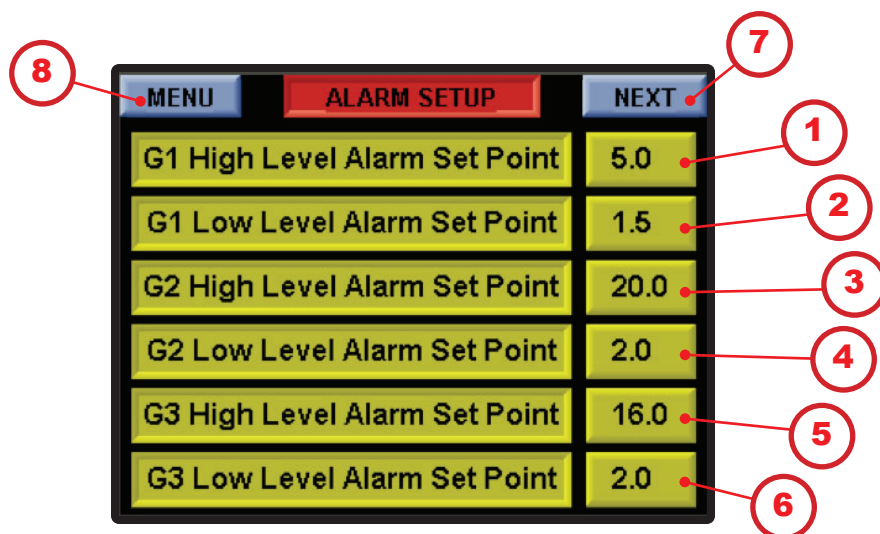
4.10.1 System Diag: Digital Outputs



Display:

-  1. Menu button: Returns to System Menu (4.3)

4.11 Alarm Setup: Level Set Point by Group

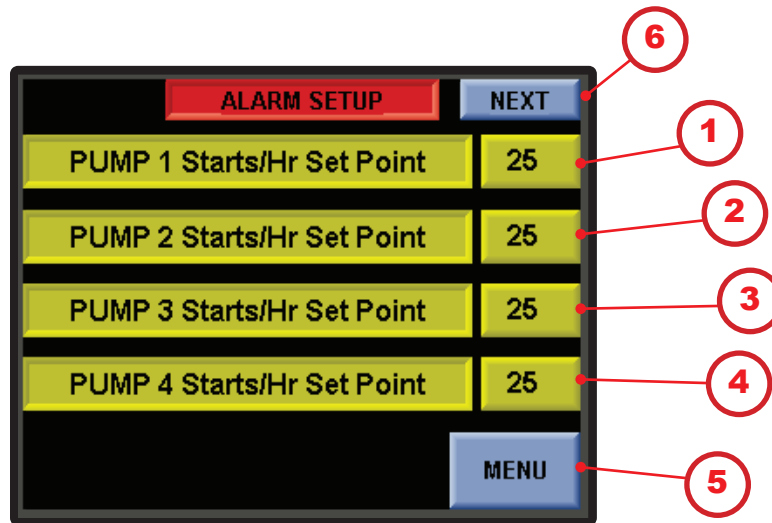


Display:

-  1. Press to set group 1 high-level alarm set point
-  2. Press to set group 1 low-level alarm set point
-  3. Press to set group 2 high-level alarm set point
-  4. Press to set group 2 low-level alarm set point
-  5. Press to set group 3 high-level alarm set point
-  6. Press to set group 3 low-level alarm set point
-  7. Next: displays the second Alarm Setup screen (4.11.1)
-  8. Menu: displays the System Menu screen (4.3)

The number of groups set up will be displayed

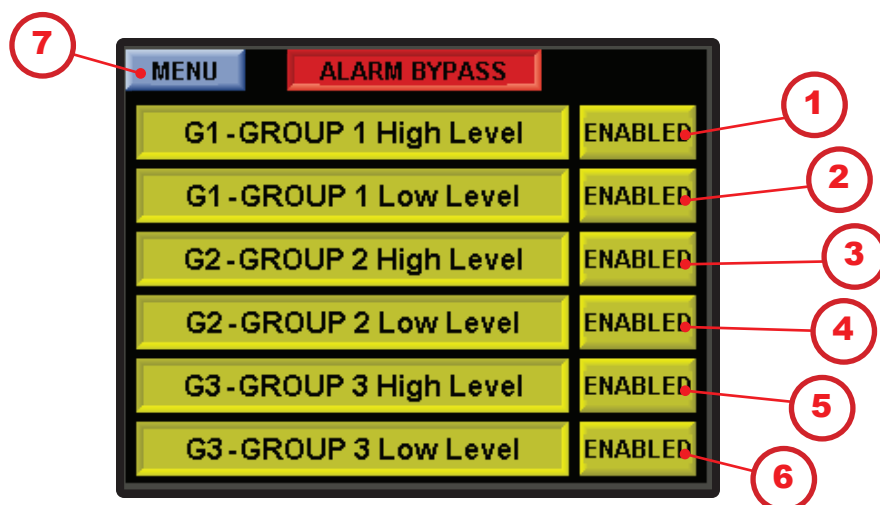
4.11.1 Alarm Setup: Starts Per Hour



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 (4.3)
6. Press to set pumps 5 and 6 then next Alarm Setup screen (4.11.2)

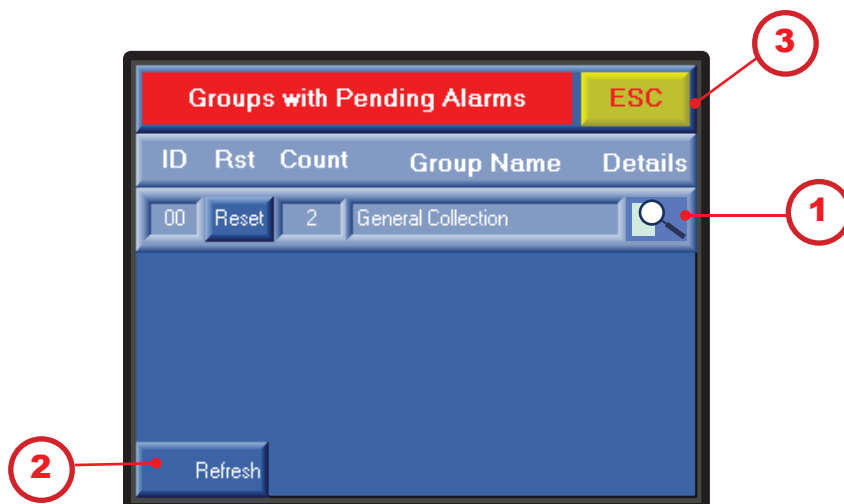
4.11.2 Alarm Setup: Alarm Bypass



Display:

-  1. Press to set Disable/Enable Group 1 High level
-  2. Press to set Disable/Enable Group 1 Low level
-  3. Press to set Disable/Enable Group 2 High level
-  4. Press to set Disable/Enable Group 2 Low level
-  5. Press to set Disable/Enable Group 3 High level
-  6. Press to set Disable/Enable Group 3 Low level
-  7. Press to return to the main menu (4.3)

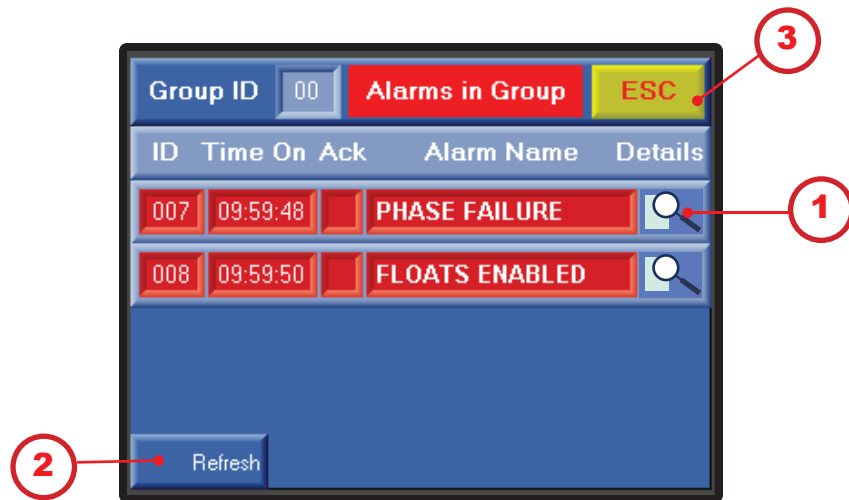
4.12 Active Alarms: Groups with Pending Alarms



Display:

- 1. Displays alarm group details (4.12.1)
- 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 (4.3)

4.12.1 Active Alarms: Alarms in Group



Display:

-  1. Displays alarm details (4.12.2)
-  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 (4.12)

4.12.2 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 (4.12.1)

4.13 Alarm History



Display:

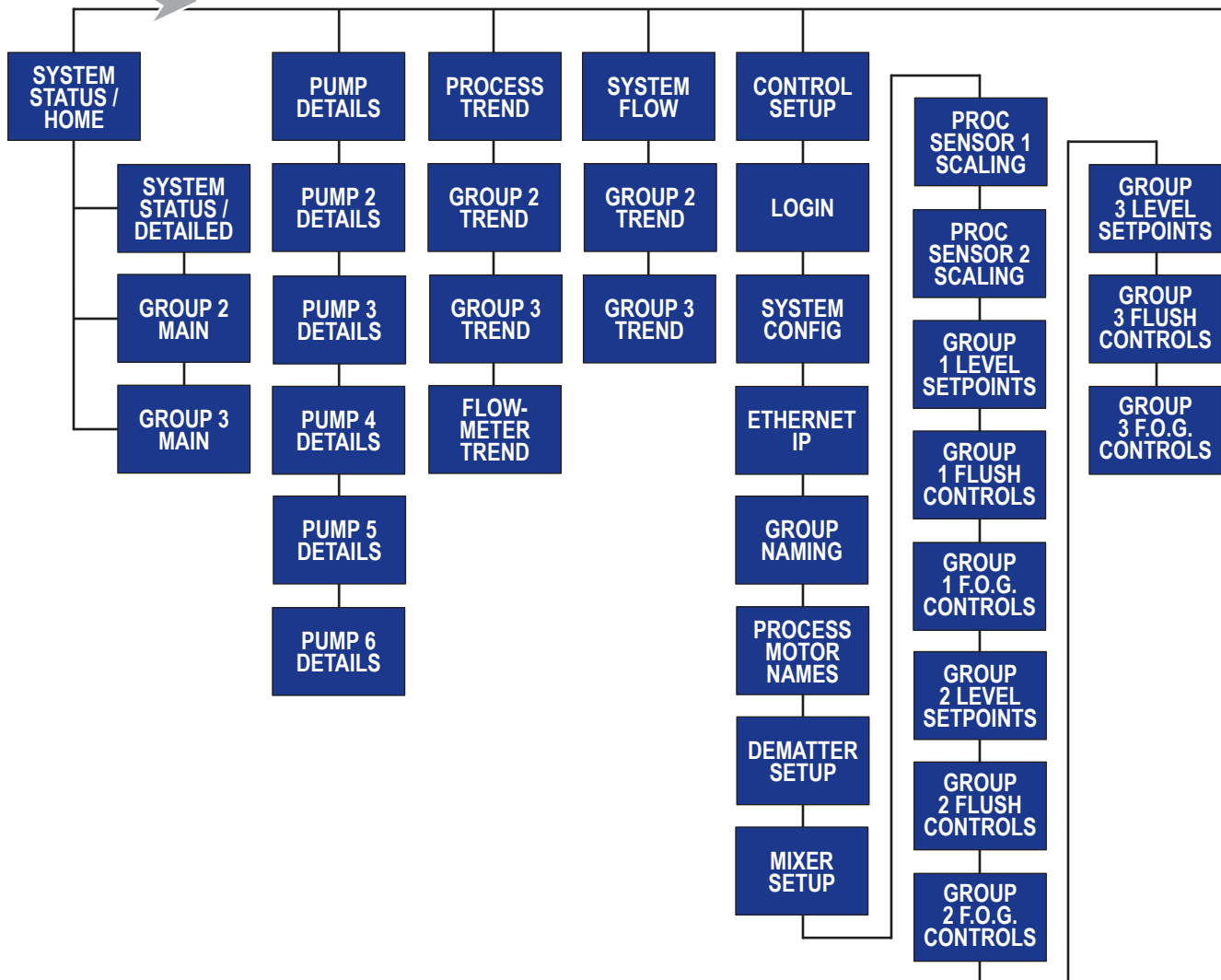
1. Priority: displays priority level of the alarm
2. Group: displays alarm's group ID number
3. Alarm group name
4. Alarm's ID
5. Alarm's name
6. Date and time stamp when the alarm became active
7. Date and time stamp when the alarm became inactive
8. Date and time stamp when the alarm was acknowledged
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 (4.3)

System Menu Screen Navigation

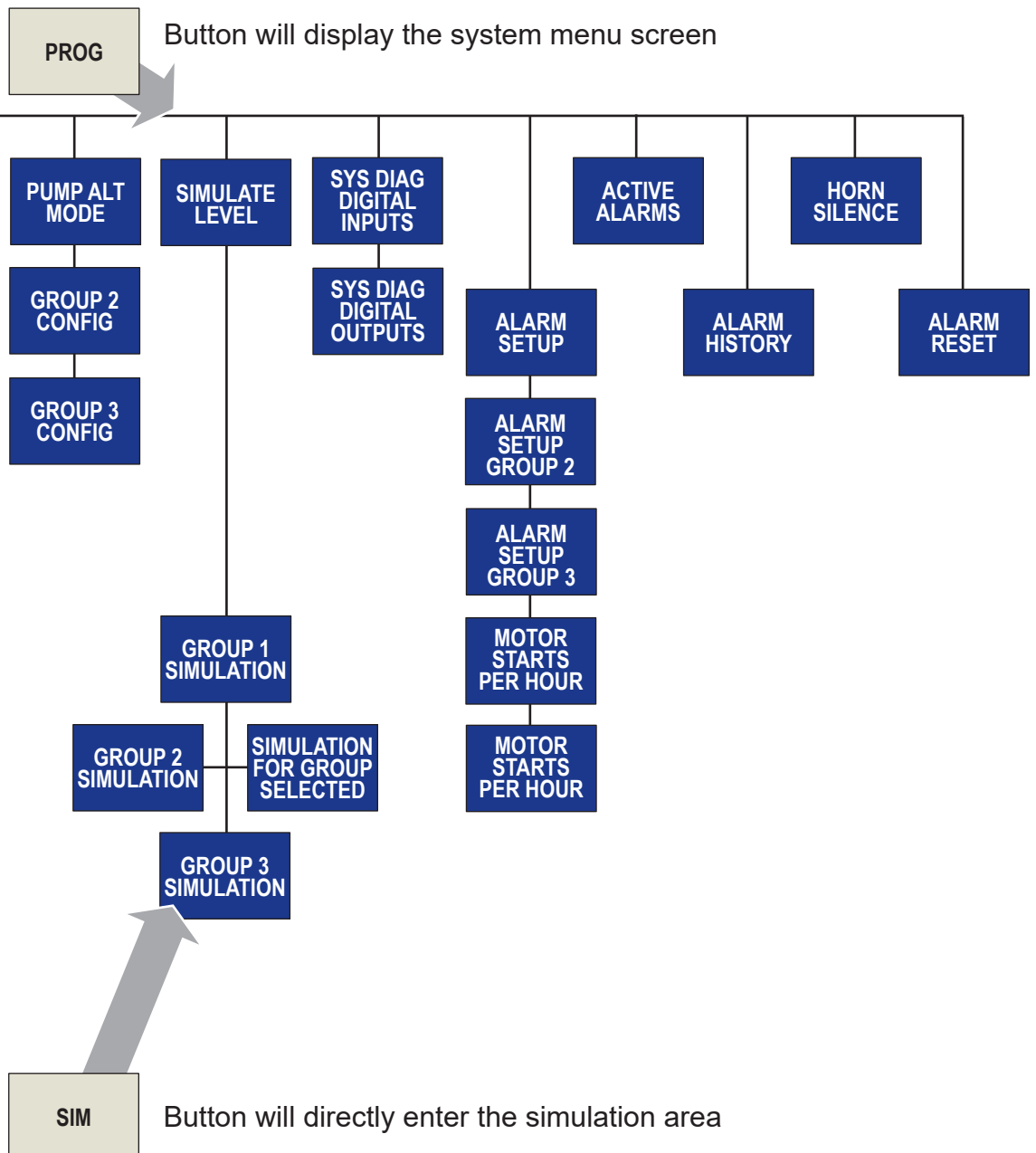
Navigation of Displays

PROG

Button will display the system menu screen



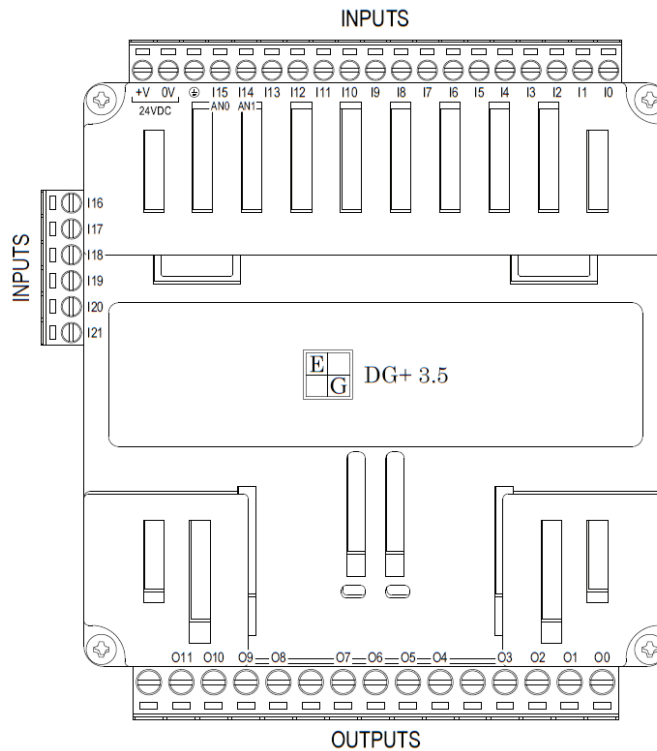
Navigation of Displays



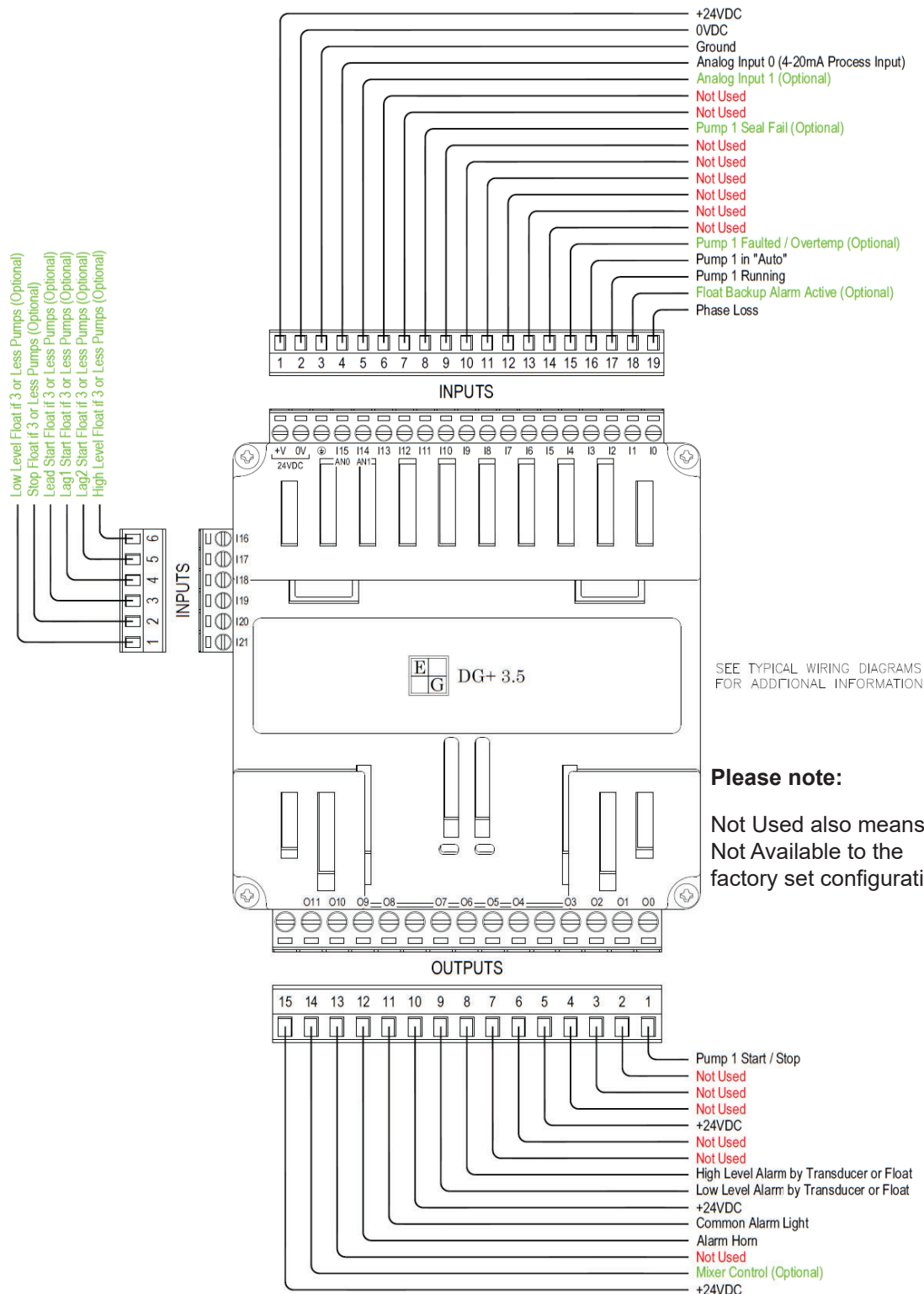
Typical Wiring by Configuration

Wiring configurations:

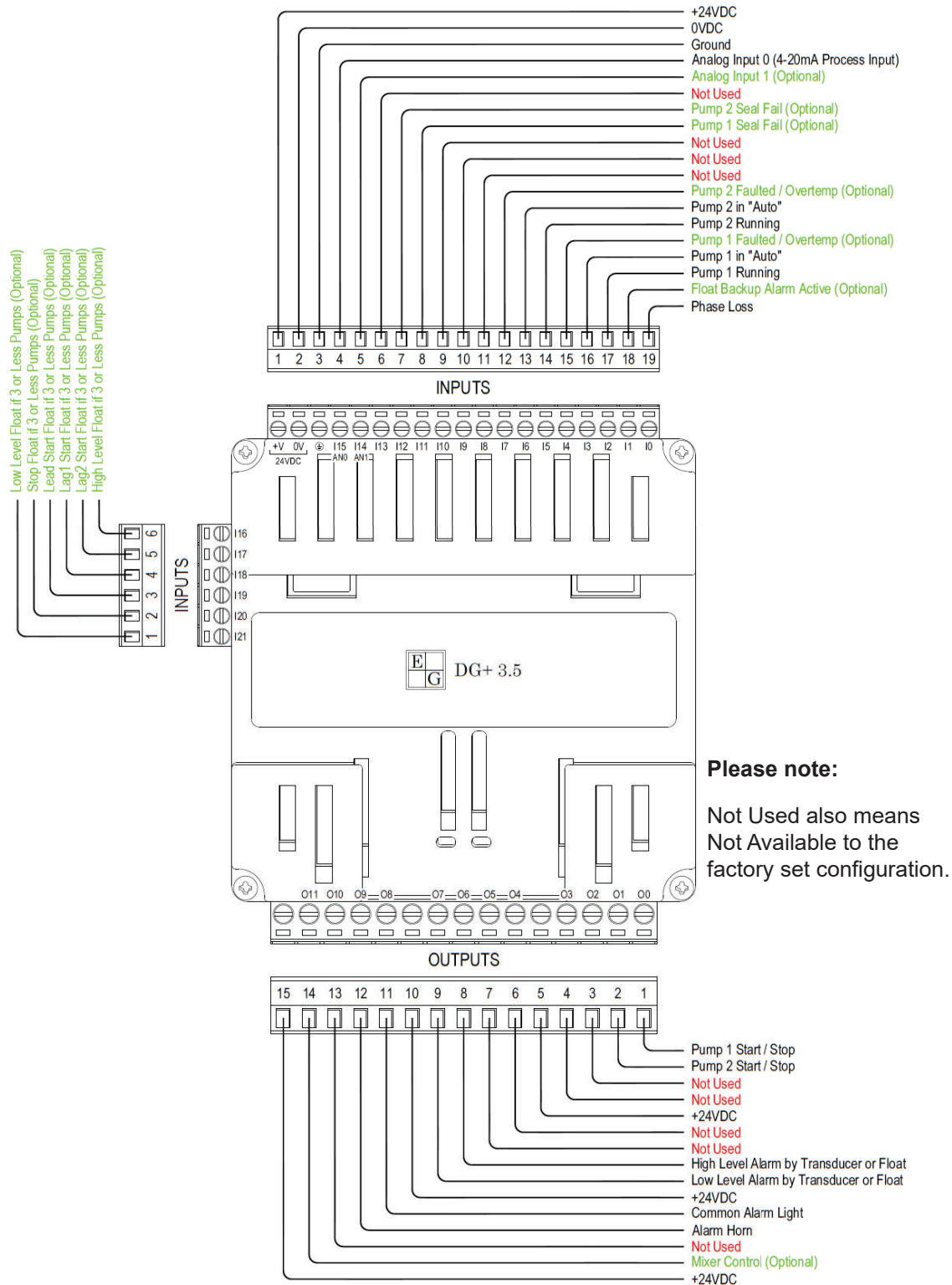
The following pages show full page terminations for Simplex, Duplex, Triplex, Quadplex, Fiveplex, Sixplex, Float Only and Retro configurations.



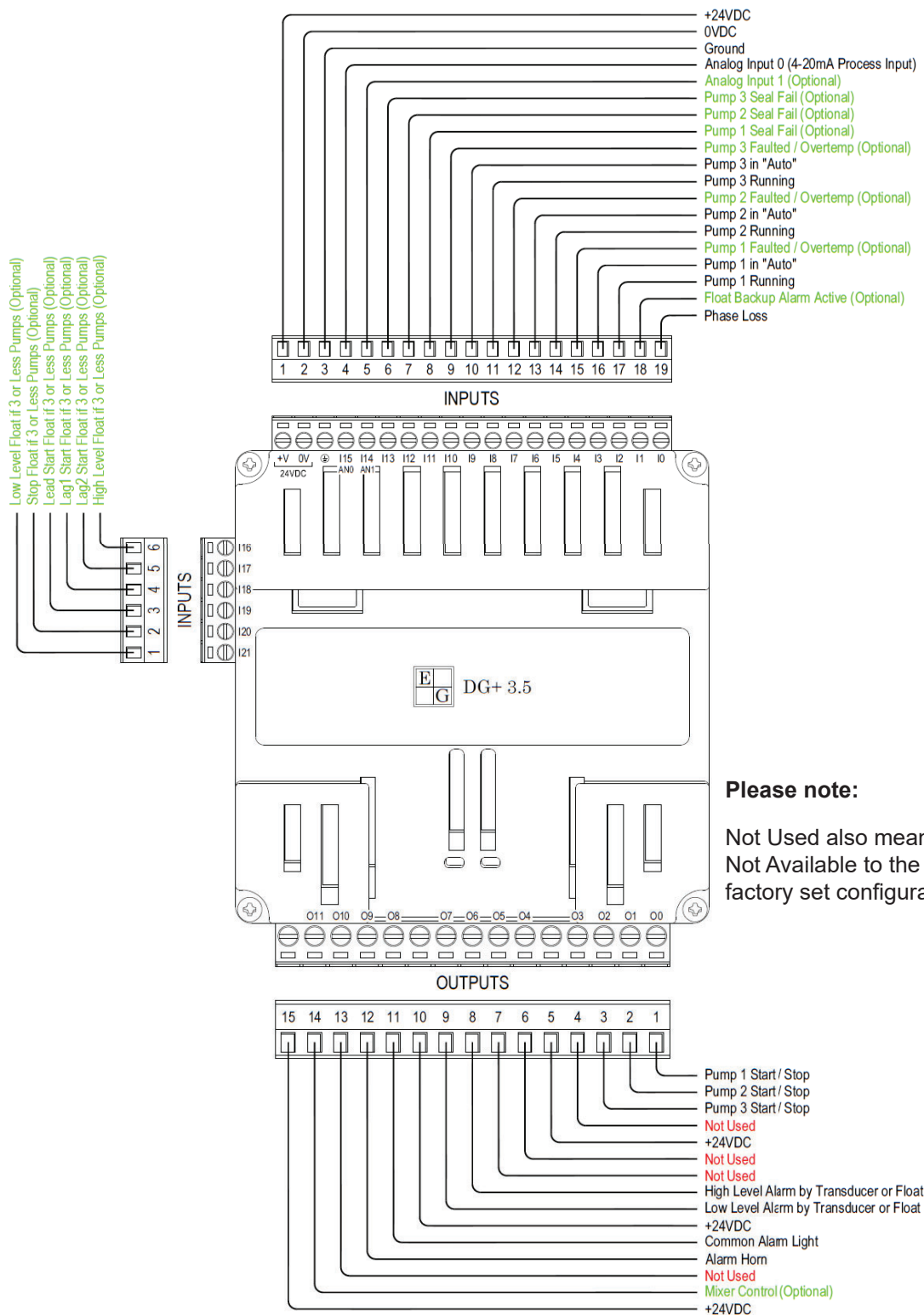
Simplex Configuration:



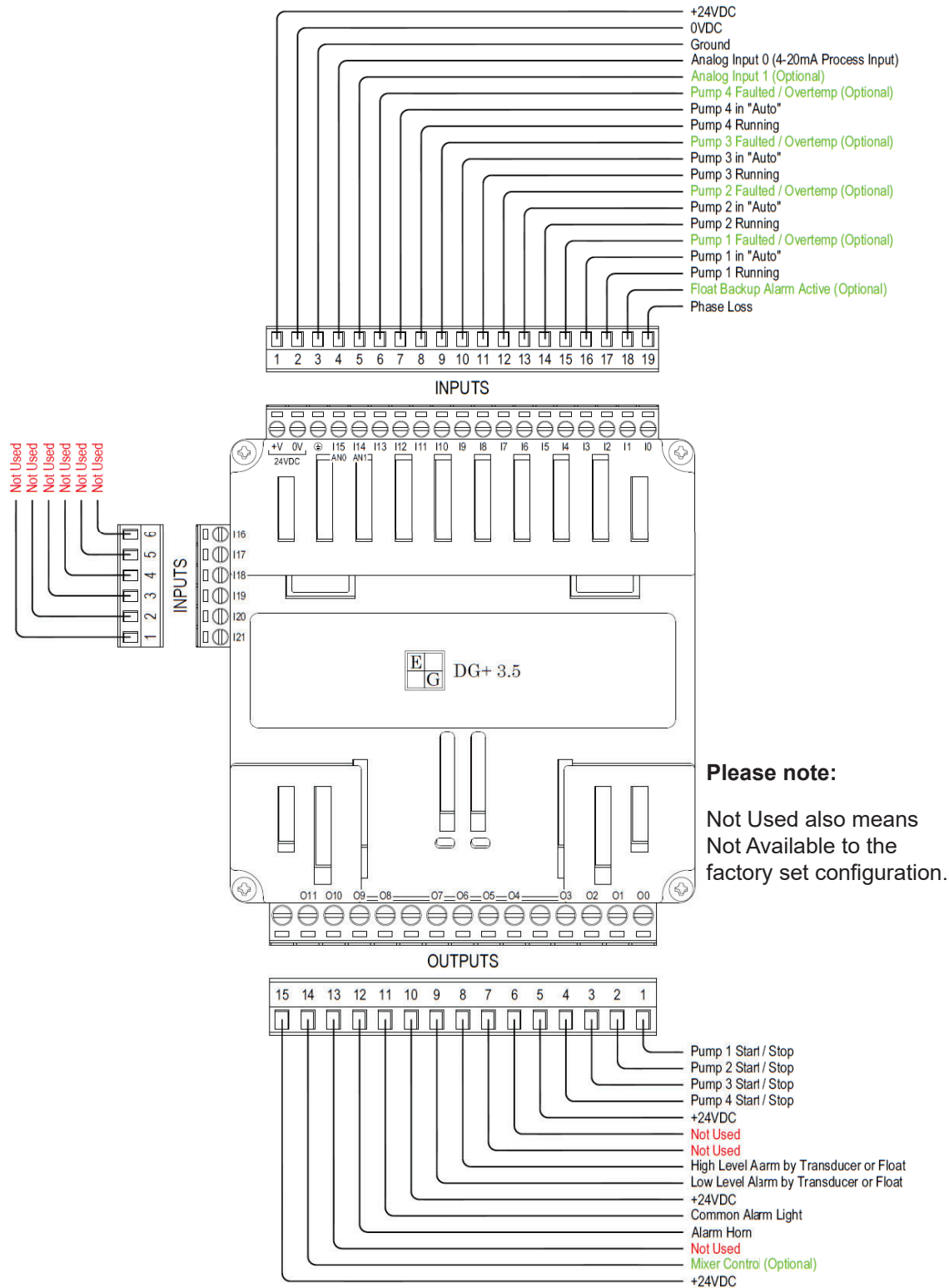
Duplex Configuration:



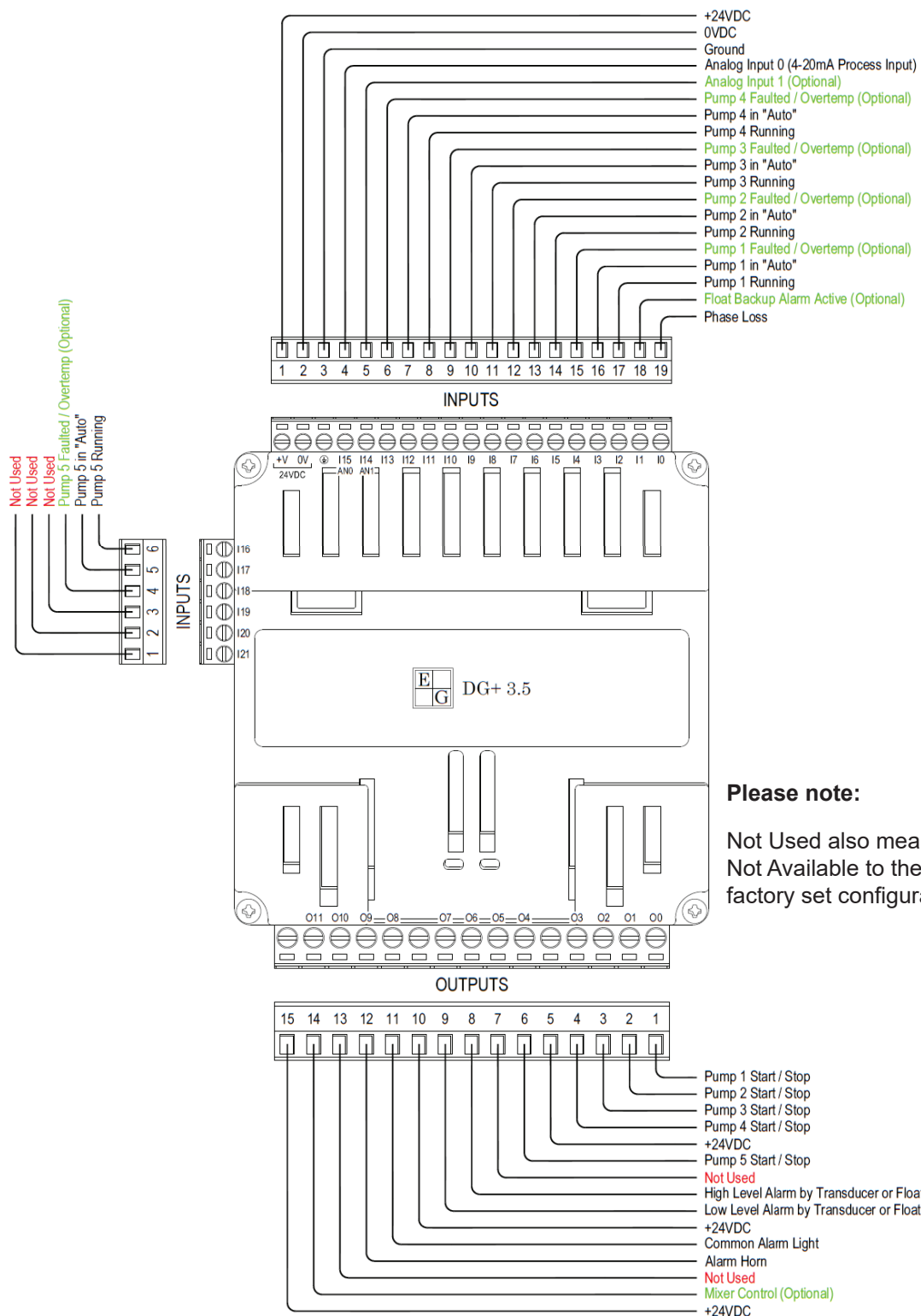
Triplex Configuration:



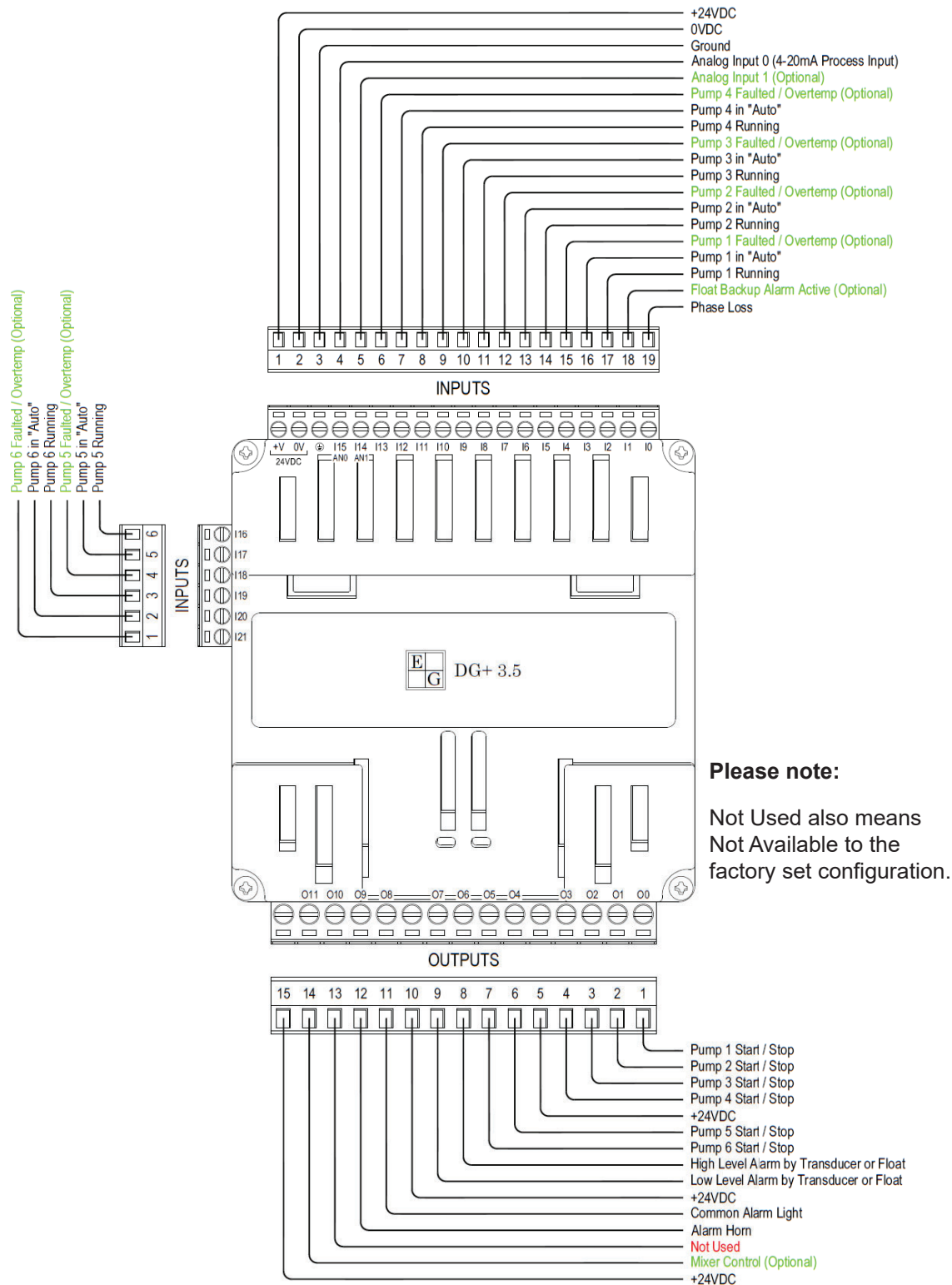
Quadplex Configuration:



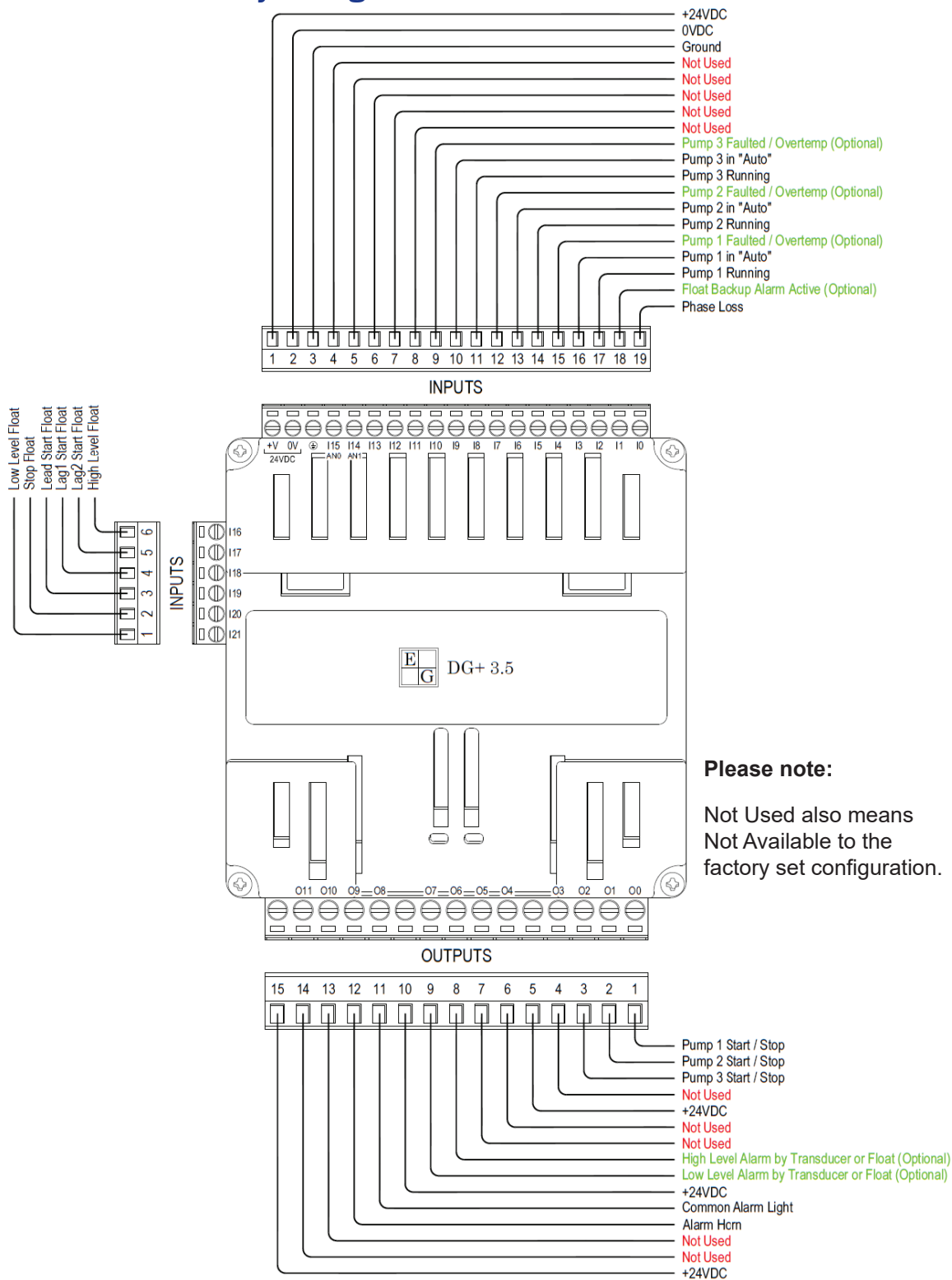
Fiveplex Configuration:



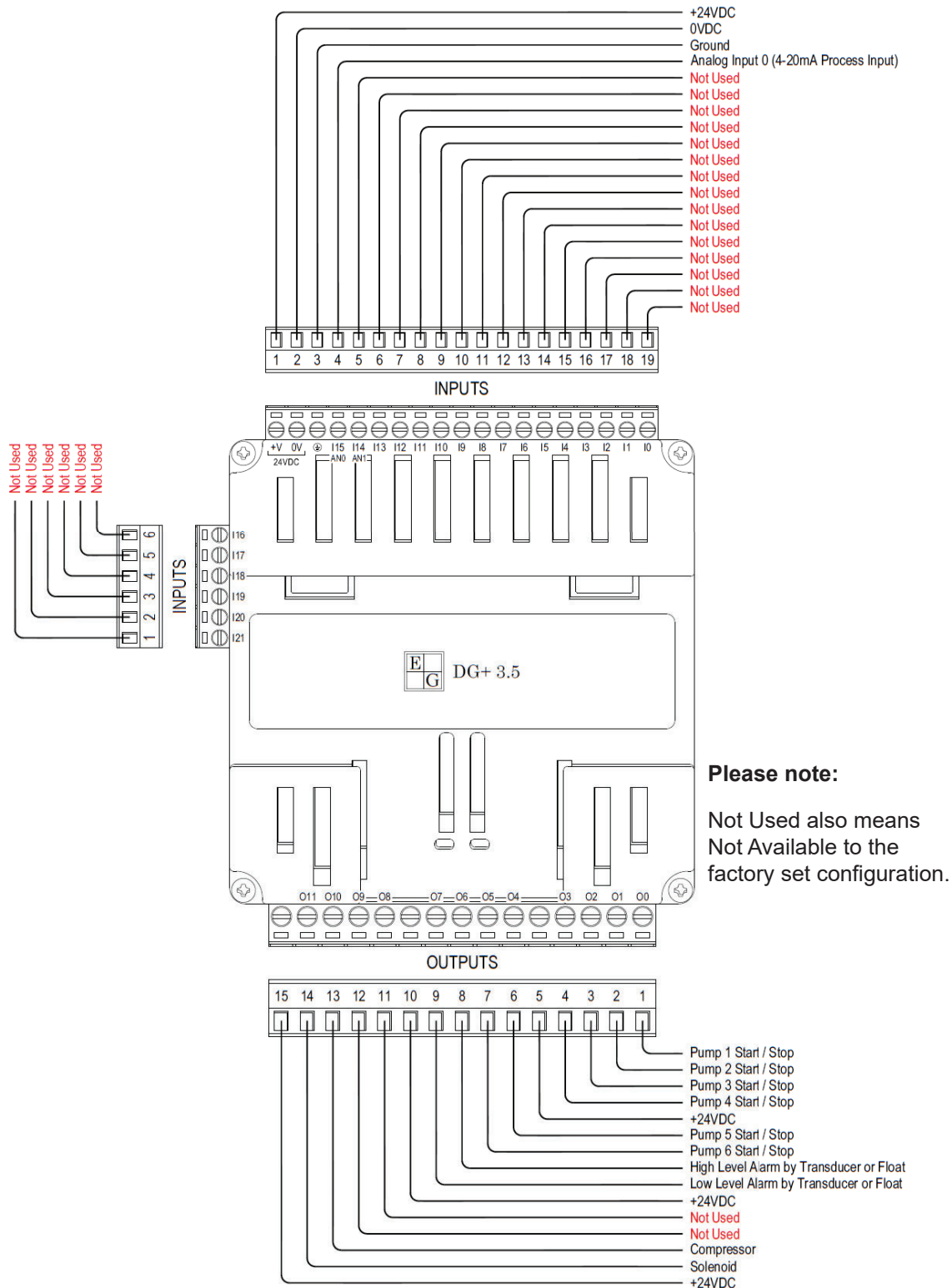
Sixplex Configuration:



Floats Only Configuration:



Retro Configuration:





Glossary / Index

% DO	Engineering Unit: Percentage dissolved oxygen <i>Pages 15, 18, 21, 33</i>
20mA Value	Maximum scaled value when the process value is at 20mA <i>Page 33</i>
4mA Value	Minimum scaled value when the process value is at 4mA <i>Page 33</i>
Ack. Time	Time taken to acknowledge the alarm <i>Pages 48, 49</i>
Alarm	A system or equipment fault <i>Pages 9, 10, 15, 16, 19, 43-49, 68, 69</i>
Alarm ID	Identification number associated with an alarm <i>Pages 46-49</i>
Alarm Name	The name of an alarm <i>Pages 46-49</i>
Alternate	Sequence motor operation to share lead position <i>Pages 5, 9, 38</i>
Analog Input	Process value in mA <i>Pages 7, 11, 33</i>
Auto	The set condition for the controller to automatically start / stop motor(s) <i>Pages 17, 20, 22, 23, 40</i>
Duration	How long an event took place <i>Pages 48, 49</i>
Equalize	Alternation setting to balance the runtime hours between motors <i>Pages 9, 38</i>
Ethernet Address	(IP Address) A unique number assigned to a device to communicate on a network <i>Page 29</i>
Ethernet Card	Hardware module for network communications <i>Pages 6, 29</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 19, 21, 24, 52, 33</i>
Flush	A protocol meant to pump a large volume of fluid at one time to clear any restrictions in the pipes	<i>Pages 7, 12, 35</i>
Flush Start	The flush protocol start setpoint	<i>Page 35</i>
Flush Stop	The flush protocol stop setpoint	<i>Page 35</i>
F.O.G.	Fats, Oils and Grease	<i>Pages 7, 12, 13, 36</i>
Ft	Engineering Units: Level measured in Feet	<i>Pages 15, 18, 21, 33</i>
Gateway Address	A router interface connected to the local network that sends data packets out of the local network	<i>Page 29</i>
GPM	Engineering Units: Gallons Per Minute	<i>Pages 15, 18, 21, 25, 33</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 8, 9, 15, 18, 19, 20, 21, 30, 33-36, 38-40, 43, 45-49</i>
Hand	The set condition manually start / stop motor(s)	<i>Page 20</i>
High-Level	Level setpoint to trigger a high level alarm	<i>Pages 12, 18, 45</i>
Horn	The audible noise associated with the alarm	<i>Page 19</i>

Internal Float Control	Float control system to run the pumps with controller input <i>Page 28</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 9, 15, 17, 18, 34, 36, 38</i>
Level	The height measurement of the process liquid <i>Pages 7, 9, 10, 12-15, 17-19, 21, 32-36, 40, 43, 45</i>
Low-Level	Measurement deemed too low for appropriate function <i>Pages 12, 15, 18, 43</i>
Mixer	A single output to control a blower or mixer based on time or level <i>Pages 15, 16, 32</i>
Modbus	A type of industrial communication protocol over serial lines between electronic devices <i>Pages 29, 65-67</i>
Off	The set condition manually keeping motor(s) from running
Priority	The severity of a triggered alarm <i>Pages 48, 49</i>
Process Sensor	A device that takes the measurements and gives an analog value to the controller <i>Page 33</i>
PSI	Engineering Unit: Pressure per Square Inch <i>Pages 15, 18, 21, 33</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 48, 49</i>
Response Trigger Value	A delay in the process value sampling (0-250) in milliseconds	<i>Pages 33, 37</i>
Running	Feedback to the controller the motor is in operation	<i>Pages 15, 17, 18, 20, 32, 35, 40</i>
Scaled Value	Process value displayed in Engineering Units	<i>Page 33</i>
Start Delay	The minimum time between pump starts	<i>Page 28</i>
Start Set Point	The process value has reached a condition where the motor is called to start	<i>Page 35</i>
Stop Set Point	The process value has reached a condition where the motor is called to stop	<i>Page 35</i>
Stopped	Feedback to the controller the motor is not in operation	<i>Pages 17, 20, 32, 35, 40</i>
Subnet Mask	A number that defines a range of IP addresses available within a network	<i>Page 29</i>
Trigger Rise Time	Date and time stamp when the alarm became active	<i>Pages 17, 33</i>
Trigger Fall Time	Date and time stamp when the alarm became inactive	<i>Pages 17, 33</i>

Modbus Registers

Register	Definition
MB 300	Phase Loss
MB 301	Float Backup Active
MB 302	Pump 1 Running
MB 303	Pump 1 Auto
MB 304	Pump 1 Fault or Over-temp Alarm
MB 305	Pump 2 Running
MB 306	Pump 2 Auto
MB 307	Pump 2 Fault or Over-temp Alarm
MB 308	Pump 3 Running
MB 309	Pump 3 Auto
MB 310	Pump 3 Fault or Over-temp Alarm
MB 311	Pump 4 Running
MB 312	Pump 4 Auto
MB 313	Pump 4 Fault Alarm
MB 316	Pump 5 Running
MB 317	Pump 5 Auto
MB 318	Pump 5 Fault Alarm
MB 319	Pump 6 Running
MB 320	Pump 6 Auto
MB 321	Pump 6 Fault Alarm

MB 322	Pump 1 Seal Fail
MB 323	Pump 2 Seal Fail
MB 324	Pump 3 Seal Fail
MB 680	Lead Float Input
MB 681	Stop Float Input
MB 682	Low Level Float Input
MB 683	Lag1 Float Input
MB 684	Lag2 Float Input
MB 685	3 or Less Pumps
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 338	Common Alarm Light
MB 340	PLC Faulted or Purge Cycle
MB 341	Mixer Control or 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
MI 75	Group 2 Level Signal
MI 176	Group 3 Level Signal

MB - Memory Bit. Values are 1 or 0

MI - Memory Integer. Value range is -32768 to 32767

Alarms

Alarm	Definition
000	Alarm G1 High Level
001	Alarm G1 Low Level
002	Pump 1 Fail to Start
003	Pump 2 Fail to Start
004	P1 Common Alarm or Over-temp
005	P2 Common Alarm or Over-temp
006	High Float
007	Phase
008	Floats Enabled
009	Analog Signal out of Range or High Float Input
010	Pump 1 Starts/Hr Exceeded
011	Pump 2 Starts/Hr Exceeded
012	Analog Signal 1 out of Range
013	G2 High Level Analog
014	Alarm G2 Low Level Analog
015	Low Float
016	Pump 1 Seal Failure
017	Pump 2 Seal Failure
018	Pump 3 Seal Failure
019	Pump 3 Failed to Start

DIGI-GAGE PLUS USER MANUAL
ALARMS

020	P3 Common alarm or Over-temp
021	Pump 3 Starts/Hr Exceeded
022	G3 High Level
023	G3 Low Level
024	Pump 4 Failed to Start
025	Pump 5 Failed to Start
026	Pump 6 Failed to Start
027	Pump 4 Common Alarm or Seal Fail
028	Pump 4 Starts/Hr Exceeded
029	Pump 5 Starts/Hr Exceeded
030	Alarm P6 Starts/Hr Exceeded



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