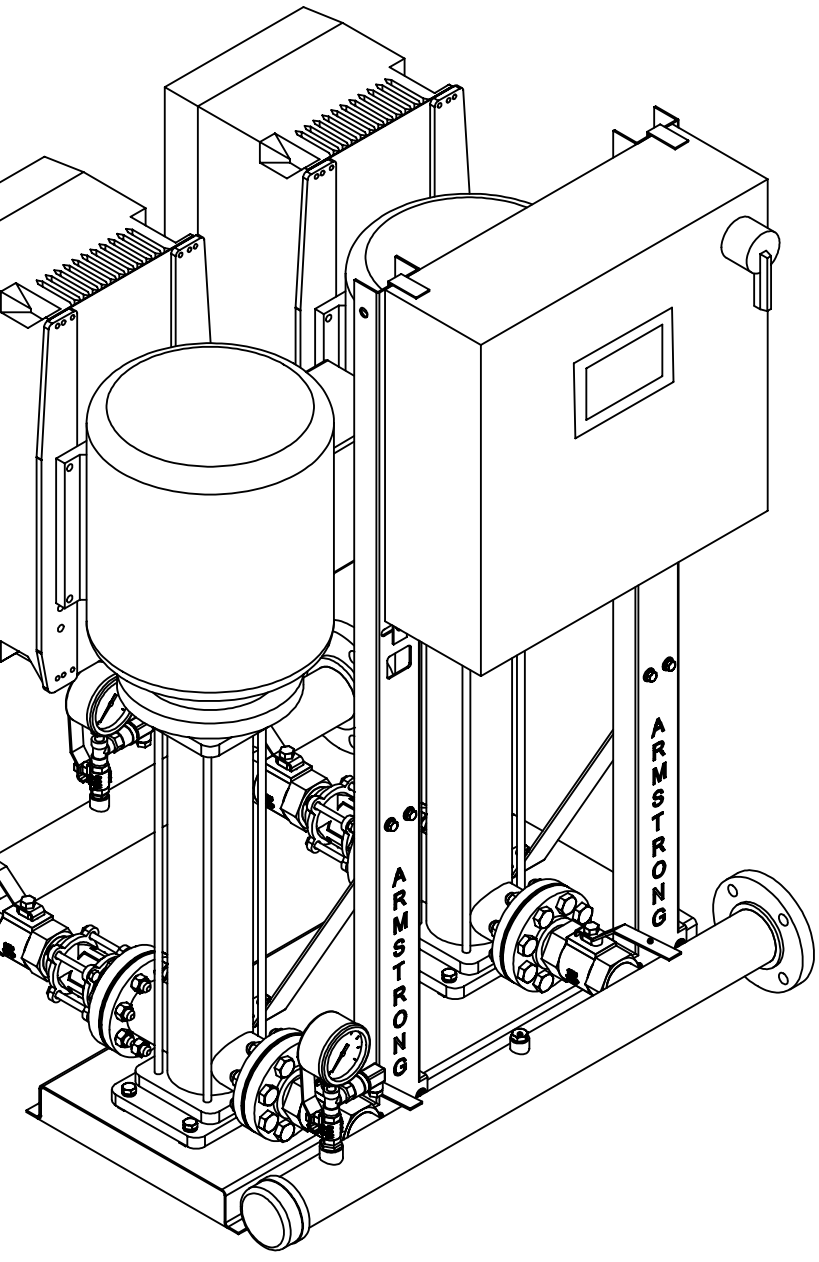
ARMSTRONG



Design Envelope 6800G and 6900

Booster Systems with standard controller (Legacy 4" Monochrome)

Installation and operating instructions

File No: 62.806
Date: OCTOBER 25, 2018
Supersedes: 62.806
Date: FEBRUARY 05, 2016

CONTENTS

Armstrong Packaged Pressure Booster Systems are completely factory-assembled, tested, adjusted, and shipped to the job site as integral units ready to receive suction and discharge piping and incoming power supply. These instructions describe the procedures to be followed during installation, commissioning and operation to ensure optimum performance and reliability. When contacting the factory for assistance, please provide the unit Serial Number and other pertinent data, such as motor amperage, voltage and suction and discharge pressures.

A DESIGN ENVELOPE BOOSTER SYSTEMS INSTALLATION INSTRUCTIONS

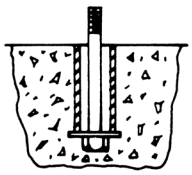
Storage - Make sure that all components are kept as clean as possible. Do not remove the crating or plastic wrapping until the unit is ready for installation.

Uncrating - After removal of the unit from the crate, check to see that the equipment is in good order and that all components are received as called for on the packing slip. Any shortages or damage should be reported immediately.

Location - Locate the unit where it is easily accessible for inspection and servicing. Provide adequate room for pump withdrawal and also for access to the interior of the control panel.

Foundation - The foundation should be sufficiently substantial to absorb any vibration and to form a permanent rigid support for the base plate. A good concrete foundation should be approximately 2½ times the weight of the packaged unit.

Foundation bolts - Foundation bolts of the proper size should be arranged as shown in the sketch, with a pipe sleeve embedded in the concrete to permit adjustment of the bolts after the concrete has been poured. Use sleeves with a diameter 2½ times the diameter of bolts.



Leveling - When the unit has been placed on its foundation, insert metal wedges approximately 1" thick on either side of the foundation bolts under the base plate. Adjust the wedges until the suction and discharge headers are truly horizontal. Check this by means of a spirit level on the suction and discharge flanges. When leveling is complete, the foundation bolts should be tightened evenly and firmly. Do not over tighten the bolts at this stage.

Piping - Both the suction and discharge pipes should be independently supported so that no strain is imposed on the packaged unit when the pipes are connected. All connecting pipe work should be accurately located-do not attempt to force the suction and discharge pipes into position.

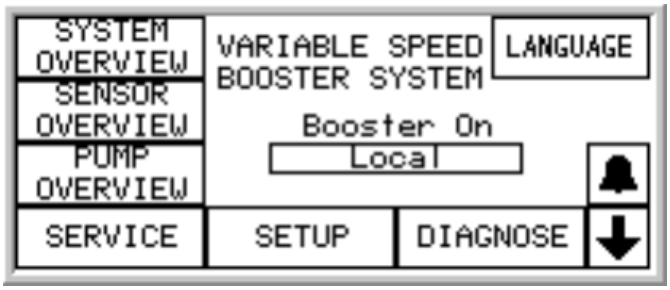
Incoming Supply - The incoming power supply should be brought in through the top of the panel adjacent to the main terminals. Note that this is the only electrical connection required at the panel.

Adjustments - The touch display Interface provides access for the adjustable set points, alarms and timers. No other devices require adjustments.

The operation and adjustment procedures for the set points, alarms and timers are described in the manual.

Note carefully, however, that all devices are pre-set at the factory and will normally require no further adjustment.

Automatic operation and Initial Run - To set the unit for automatic operation, turn all the isolating valves to the fully open position, close the main disconnect, ensure all pumps are already in the **AUTO** position, all drives are already in the Auto On position so press  to go to main screen,



put the Remote/Local switch in Local position and the booster system will run. If start/stop of the booster is control by the remote BAS dry contact switch put the Remote/Local switch in Remote position and close BAS remote switch. **In initial run note any problems (see page 7)**.

B INTELLIGENT VARIABLE SPEED BOOSTER SYSTEMS: BASIC OPERATING FUNCTION

Every Armstrong Intelligent variable speed (Design Envelope) Packaged system – regardless of size or power rating – incorporates the twelve basic operating functions as follows:

1. For Continous run and Intermittent systems - Sequential starting and stopping of the pumps is achieved by a combination of pump speed, power and set point pressure. A set point pressure control will bring on a lag pump if the lead pump(s) are operating at full speed and not maintaining set point pressure. When the lead pump reaches 100% speed or maximum motor nameplate power and the system pressure is not being satisfied, the second pump (lag pump) is automatically started. When a lag pump is started up, a timeclock in the pump controller keeps it operating for a minimum of a 1 minute period to prevent the pump from cycling on and off. On a three, four or five pump system, the third, fourth and fifth pumps are brought on in the same way when the combined pumps reach 100% speed or maximum motor nameplate power and the system pressure is not being satisfied. A similar sequence of events takes place in reverse on decreasing demand.
2. Pump RPM is controlled by a Variable Frequency Drive (VFD) connected directy to each individual pump motor. An analog signal from the discharge pressure transmitter is compared to a desired set point entered in to the operator panel. The pump logic controller then instructs the VFD to either speed up or slow down in order to meet or maintain the system set point pressure.
3. A low suction pressure or level shutdown alarm is included with every system to protect the pumps from a loss of suction pressure or water supply. If the water supply pressure, as measured by the suction pressure transmitter falls to 5 psi or the tank level switch (supplied by other) sends a signal to the panel, the pump controller will prevent the pumps from running. This condition is indicated by a low suction pressure or low suction level alarm description on the control panel alarm page.
4. To protect plumbing the booster come with standard alarm functions for:
   - High discharge pressure shutdown
   - Low discharge pressure shutdown
5. Should a pump or drive fail to operate, the next pump in sequence starts up automatically.
6. Lead pump status is alternated after every 24 hrs of operation, as a default. The first pump placed in the auto position is considered the lead pump. Hand off-Auto switches are located in the individual pump control screens. Alternation includes all duty and optional standby pumps.
7. No-flow shut down is achieved through drive parameter control and pressure monitoring. Once a no-demand condition is achieved for a period of 5 minute, the controller will increase the pump speed and charge the drawdown tank or system an additional 5 psi before shutting down.
8. In every system restart, once started, the pumps ramp up to meet the required set point pressure.
9. The Soft fill mode is enabled when the booster system is first powered and after any power disruption. Once started, the pumps ramp up slowly from the Soft Fill set point pressure to nominal pressure in a five minute period.
10. The Pressure Setback Mode is enabled as standard. The system pressure set point is reduced linearly, as a percentage, as flow decreases.
11. When the Emergency power mode is enabled upon receiving an Emergency Power digital signal, power and control will be restricted to the lead pump only. The Low system pressure shutdown will be disabled and the Emergency power low system pressure alarm will be enabled. The one pump will operate for the duration of the Emergency power mode and the system will switch to Normal Mode when a signal is not present.
12. Controllers are supplied with 3 analog inputs and 8 digital Normally Open (NO) dry contacts for remote monitoring.

    Analog

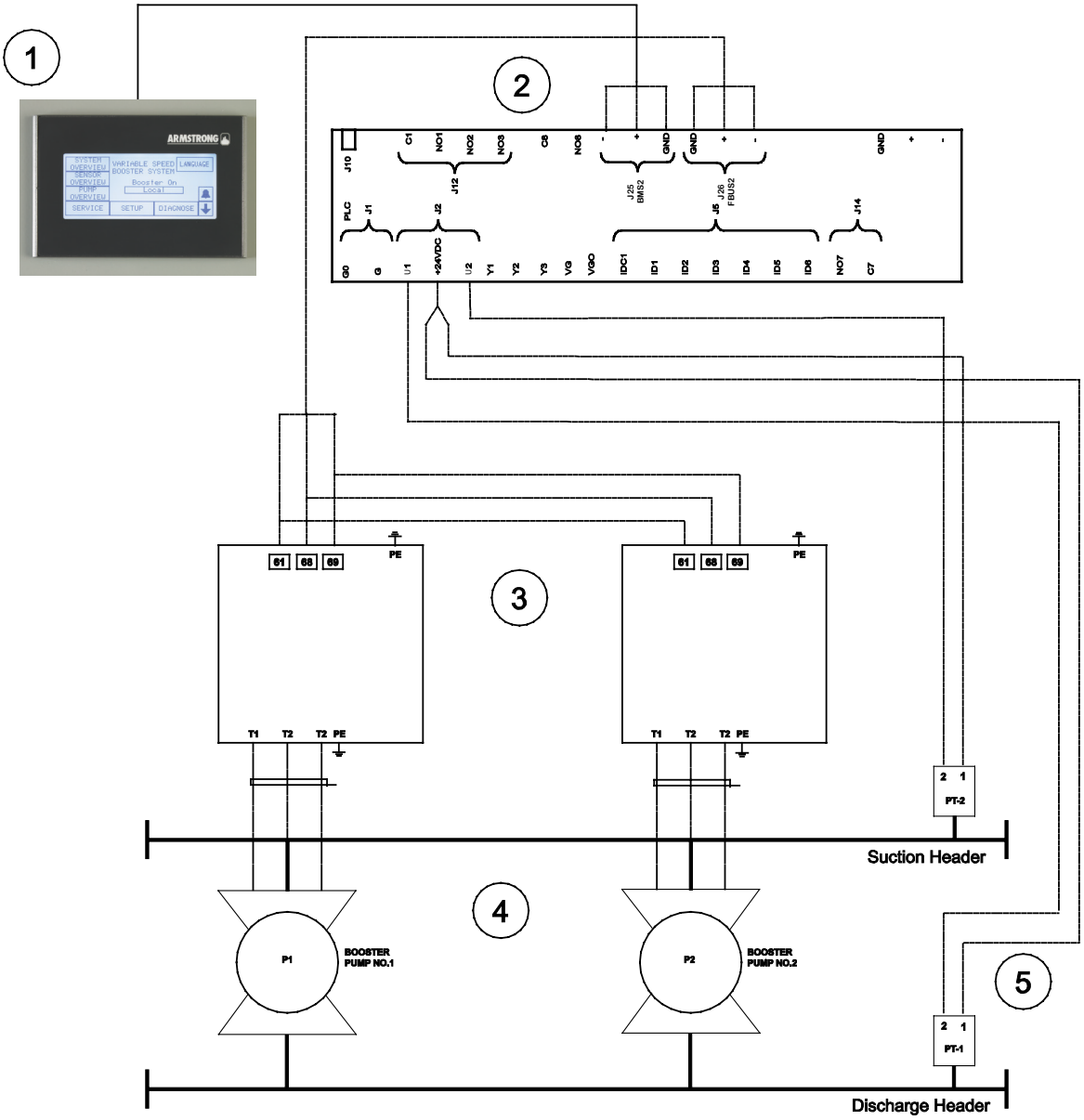
    1, 2 – Discharge pressure transducer
    3, 4 – Suction pressure transducer (optional)
    5, 6 – Remote pressure transducer (optional)

    Digital

    7, 8 – Remote start (optional)
    9, 10 – Emergency power (optional)
    11, 12 – Use alternate setpoint 1 (optional)
    13, 14 – Use alternate setpoint 2 (optional)
    15, 16 - Use alternate setpoint 3 (optional)
    17, 18 - Use aquastat (optional)/ Alternate setpoint 4 (optional)
    19, 20 - Use level switch 1 (optional)/ Alternate setpoint 5 (optional)
    21, 22 - Use level switch 2 (optional)/ Alternate setpoint 6 (optional)

    Communication option
    (Serial connection except for BACnet (IP/ENET))
    29,30 – BAS communication
    GDN – BAS/VFD Ground
    33,34 - VFD communication

C VARIABLE SPEED BOOSTER SYSTEMS: GENERAL ARRANGEMENT SCHEMATIC DIAGRAM



1. Operator Interface
2. Programmable Logic Controller (PLC)
3. Variable Frequency Drives (VFD)
4. Booster Pumps
5. Pressure Transmitters

D DESIGN ENVELOPE BOOSTER PACKAGE COMMISSION CHECK SHEET

The following is a step-by-step guide for starting up and commissioning Armstrong fire pumps. **One check sheet is to be completed per system!** You must follow and fill out all fields below to ensure that all aspects of the booster is checked and set up for proper operation. Once complete, this sheet requires that end-user / general contractor sign off on the work rendered as final approval that the pump is functioning as intended. Please submit this commissioning check sheet along with your work invoice / startup claim in order to ensure prompt and timely payment of work rendered!

NO CHECK SHEET + STARTUP DATA SHEET = INCOMPLETE STARTUP!

UNLESS STATED OTHERWISE ALL FIELDS ARE MANDATORY!

Project name: _____

Building address: _____

Contractor name: _____

Site contact name: _____ Site contact tel. #: _____

Your company: _____ Your name: _____

Pump model: _____ Booster serial #: _____

Pump serial #(s): _____ Sales order #: _____

NOTES:

- GC = General Contractor
- BAS = Building Automation System

PRE-STARTUP PACKAGE:

YES	NO	N/A	
☐	☐	☐	Do you have the Booster Order Annexe?
☐	☐	☐	Do you have a copy of the electrical wiring diagram?
☐	☐	☐	Do you have a copy of the Design Envelope Booster Installation and Operation Manual?
☐	☐	☐	OPTIONAL: Do you have the pump-specific variable speed curve with duty point indicated?

PRE-STARTUP ARRANGEMENTS:

YES	NO	N/A	
☐	☐	☐	Verify with GC that water and power is available and ready to the pump
☐	☐	☐	Verify with GC that pumps can be run without damage to system
☐	☐	☐	Verify with GC that BAS is wired to Design Envelope Booster controller and ready to go (if applicable)
☐	☐	☐	Verify with GC that BAS contractor will be there on site to meet you (if applicable)

BEFORE POWER UP CHECKLIST:

DONE	
☐	Check booster installation for proper mounting as per Installation & Operation Manual instructions
☐	Check incoming voltage across the lines and record here: L1 _____ L2 _____ L3 _____ Note: Voltage should be no more than±10% of design voltage
☐ ☐	Check if booster set is to be controlled remotely by BAS start / stop remote contact with BAS contractor: **YES:** Check if BAS remote dry contact is wired across terminals 7 & 8 inside control panel. **NO**: Move on to the next step. Note: Contacts close = booster runs. Contacts open = booster stops.
☐	Open up and bleed pump seal flush line to verify no air is locked inside seal / seal lines. If the pumps are Vertical Multi Stage (VMS) pumps, make sure the vertical column is bled for air by cracking open the bolt located at the top of the stages.
☐	Check alignment of pump (horizontally mounted pumps only)
☐	Record the actual suction pressure from the gauge here: Suction _____ Verify if suction pressure is within range of design suction pressure on Order Annex.

BOOSTER PANEL PARAMETER CHECKLIST:

Begin the commissioning by logging into the **Setup** screen with the Level 1 password. Go through all parameters, verify against the order annex and record below.

IMPORTANT: Pressing **Restore** button in a setting screen will Restore the Default settings on same screen. The text will change to **OK** for a few seconds

Parameter definition: (min, max, default)

NOTE:
pressure units default to psi, but in the controller users can also select bar, kPa, ft and m.

Factory adjustable settings

- Number of Pumps (2, 5, based on package configuration)
- Standby pump (Yes or No, No)
- Level switch 1 (Enable or Disable, Disable)
- Level switch 2 (Enable or Disable, Disable)
- Drive type (FC102 or FCM300, FC102)
- Motor frequency (50 or 60, 60) Hz
- Lead pump switch time (1, 168, 24) hours of lead pump operation time
- Pump rated power (1,40,based on package configuration) kW
- (Pressure) units (psi, ft, kPa, m, bar) psi
- Suction pressure sensor (Enable or Disable, Enable)
- Suction pressure sensor Range (0, 3200, 300) psi
- Discharge pressure sensor (Enable or Disable, Enable)
- Discharge pressure sensor Range (0, 3200, 300) psi
- Remote pressure sensor (Enable or Disable, Disable)
- Remote pressure sensor range (0, 3200, 300) psi
- Local discharge pressure setpoint (0, max working pressure, based on order) psi.
- Remote discharge pressure setpoint (0, max working pressure, based on order) psi. It appears only if the Remote Sensor is enabled.
- System discharge pressure setpoint (it's one of the previous two (depending on which sensor is selected as Control Sensor) or one of six the Alternate Discharge pressure setpoints (depending on PLC digital input selection))
- (Choose) Control Sensor (LOCAL or REMOTE, LOCAL)
- **Update limits** or **Auto set pressure limits** updates (sets up) all pressure limits and No flow shutdown boost pressure proportionally to the System discharge pressure setpoint.
- High suction pressure limit (low suction pressure shutdown + 5, max working pressure, System discharge pressure Setpoint - 10) psi. It is updated (setup) by pressing **Update limits**. High suction pressure limit (Disable or Enable, Enable).
- Low suction pressure limit (0, System pressure setpoint, 5) psi. It is updated (setup) by pressing **Update limits**.
- High discharge pressure limit (low system pressure + 5, max working pressure, System discharge pressure setpoint + 15) psi. It is updated (setup) by pressing **Update limits**. High Discharge Pressure Limit (Disable or Enable, Disable).
- Emergency Power mode low discharge pressure limit (0, System discharge pressure setpoint * 0.5, System discharge pressure setpoint * 0.2). It is updated (setup) by pressing **Update limits**.
- Factory High system shutdown pressure (max working pressure, max working pressure, 200) psi. Maximum Working Pressure, choice of 175, 200, 232, 370 or 400 psi, based on package configuration.
- Low discharge pressure limit (0, System discharge pressure setpoint *0.8, Pressure Setback at start *0.8) psi. It is updated (setup) by pressing **Update limits**.
- Number of Alternate discharge setpoints (0, 6, 0)
- Alternate discharge pressure setpoint 1 to 6 (0, max working pressure, System discharge pressure setpoint) psi.
- Emergency power mode (Enable or Disable, Disable)
- Number of running pumps in Emergency (0,5,1)
- EOC (End of Curve) Protection (Enable or Disable, Disable)
- EOC (End of Curve) Head coefficient (0, 100, 90) % of Local discharge pressure
- Aquastat protection (Enable or Disable, Disable)
- Airlock protection (Enable or Disable, Disable)
- Airlock shutdown pump power setpoint (0 to 30, 15) % Pump rated power
- Airlock shutdown delay (0, 600, 20) sec
- Pump stage on speed (33, 100, 100) % speed
- Pump stage off by selector (Speed, Power, Speed or Power, Speed and Power), default is Speed and Power

- Pump stage off speed (33, 98, 70) % speed
- Pump stage off power (70, 200, 90) % power (see Normal mode for description)
- Pump stage on delay (0,999,10) seconds
- Pump stage off delay (0,999,30) seconds
- Soft fill mode (Disable or Enable, Enable).
- Soft fill pressure setpoint (20, 100, 30) % of System discharge pressure setpoint
- Soft fill ramp time (0,999,120) seconds
- No flow shutdown (Disable or Enable, Enable).
- No flow shutdown delay (0,999,300) seconds
- No flow shutdown speed/Power (Power or Speed, Power)
- No flow shutdown speed/Power (0, 100, 95) % Power/speed
- No flow shutdown wait time (0,999,60) seconds
- No flow shutdown set speed (0, 100, 70) % speed
- No flow shutdown boost pressure (0, max working pressure - System discharge pressure setpoint, 5) psi. It is updated (setup) by pressing **Update limits** after Pressure units are selected. Setup is 5 psi or 11 ft or 35kPa or 3.5m or 0.34bar.
- Pump minimum speed setpoint (0, 98, 40) % speed
- Pump maximum speed setpoint (0, 100, 100) % speed
- Pump ramp (5,15,15) seconds
- Pump default speed (0,100,70)% when all discharge sensors fail and the aquastat is enabled
- Pump motor rated RPM (0,9999,1780) rpm
- PLC PID Proportional gain (1, 99, 10) %/sec
- PLC PID Speed up limit (0.2, 99.9, 1.0) %/sec
- PLC PID Speed down limit (0.2, 99.9, 3.0) %/sec
- Pressure setback (Enable or Disable, Enable)
- Pressure setback setpoint (80, 100, 85) % of System discharge pressure setpoint
- Pressure setback control mode (Linear or Quadratic, Quadratic)
- BAS Interface setup: Protocol(Modbus or Lonworks or Bacnet MSTP or BACnet IP or none, none), Node (1 to 128, 1), Baud(9600 to 115200, 19200)
- FieldBus setup: Source(Fbus2, Fieldbus card, Fbus2)
- Pump model (Current pump model).
- Design flow (number).It is the (Maximum) Design flow of the booster system.
- Design flow unit ((US GPM, UK GPM, m^3/hour, l/sec), US GPM).
- (Display) Flow units ((US GPM, UK GPM, m^3/hour, l/sec), US GPM) – Not Important, setup by a customer.
- Flow offset (0.75, 1.2, 1.0) adjust the calculated flow to the measured flow.

When changing the system discharge setpoint press the **Update limits yes** button to automatically update the High and Low pressure limits for the discharge and suction pressure.

RUNNING:

DONE

- ☐ Check and make sure all pumps are in the **auto** position (on PLC and VFD)
- ☐ Turn all the isolating valves to the fully open position
- ☐ Put the Remote/Local switch in Local position and the booster system will run.
  If start/stop of the booster is control by the remote BAS dry contact switch put the Remote/Local switch in Remote position and close BAS remote switch.
- ☐ In initial run check for noise, vibration, etc., and any leaks in the pipework.
- ☐ Pumps should continue to maintain set point

NO FLOW SHUTDOWN (NFS) TEST:

DONE

- ☐ Check and make sure all pumps are in the **auto** position (on PLC and VFD)
- ☐ When system is running, isolate booster system from building loop (run it against a deadhead)
- ☐ Pumps should continue to maintain set point while ramping down and eventually shutting down to one pump only
- ☐ The single pump after 300s (default) will ramp up to your NFS Pressure Boost setpoint and then shut down

SIGNOFF:

By signing off on this startup checklist, both parties hereby accept that the equipment listed in this checklist has been properly verified to be fully operational and functioning as per the sales order for the equipment listed.

Startup Technician Name (Please print):	Customer Name (Please print):
Startup Technician Signature:	Customer Signature:
Date (mm/dd/yyyy): / /	Date (mm/dd/yyyy): / /

1.0 INTRODUCTION

The IVS Booster HMI is divided in three set of displays: Operation, Setup, and Alarm Management. The Operation Displays are used by the operators to view and control the Booster Pumps. The Setup Screens are used to set, view, save, and restore the system specific settings (i.e. number of pumps, sensor range, etc.). The Alarm Management screens are used to display the current alarms.

The list of displays in each set is as follow:

OPERATION DISPLAYS:

- Main menu
- Language
- PLC diagnostic
- System overview
- Sensor overview
- Pump overview
- Pump control
- Pump drive status
- Service overview

ALARM MANAGEMENT DISPLAYS:

- Active alarms
- Alarm history

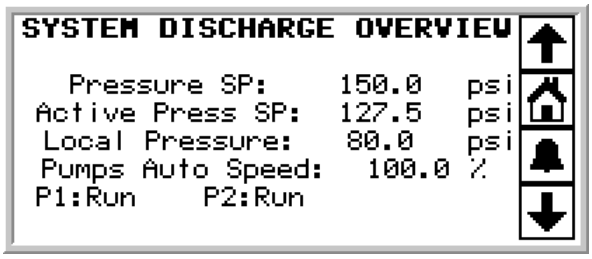
SETUP DISPLAYS:

The Setup Displays are divided in three levels with each level having the same number of displays with different level of access. Level 0 setup displays are for viewing only and no adjustments can be made. Level 1 setup displays can be used for changing the system setup and restoring the system factory defaults. Level 2 setup displays can be used for changing the system setup, and saving and restoring the system factory defaults. To access Level 1 and 2 an operator need to enter the proper password: Level 1 password is 9393, Level 2 password is for factory setup.

The list of Setup displays for every level is as follow:

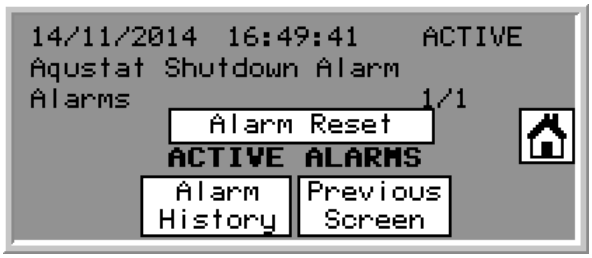
- Main setup screen
- System setup
- Sensor setup
- System discharge pressure setup
- Pressure alarm limits setup
- EOC protection setup
- Aquastat protection setup
- Airlock protection setup
- Pump staging setup
- Soft fill mode setup
- No flow shutdown setup
- Speed setup
- Pump PID setup
- Pressure setback setup
- Building automation system (BAS) interface setup
- Fieldbus setup
- PLC clock setup
- Flow setup

HMI PANEL – DESCRIPTION OF BUTTONS FUNCTION



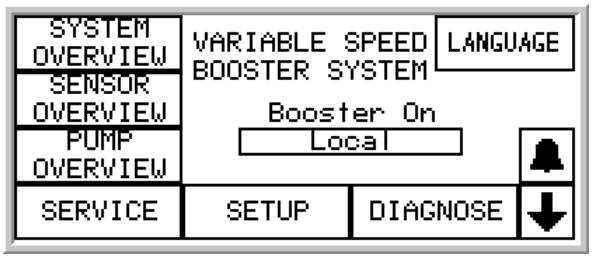
The display panel has four standard touch buttons:

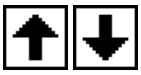
- **The Alarm button** 
  - The Alarm button will stay solid when there are no active alarms.
  - The Alarm button will blink when an alarm is activated.
  - Press the Alarm button to call up the Alarm display:



  - The Alarm Button will go solid when all active alarms are reset (acknowledged).
  - The Alarm Button will blink when the alarms are reset and there are still some active alarms.

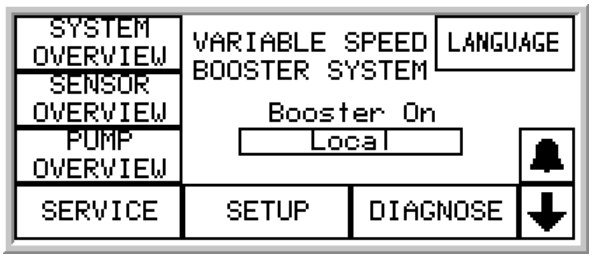
- **The Home button** 
  - Pressing the Home button at any time will call up the Main menu display:



- **The Up and Down arrow Touch buttons** 
  - Pressing the **up** or **down** arrow buttons will let you navigate between displays.

2.0 OPERATION DISPLAYS

MAIN MENU

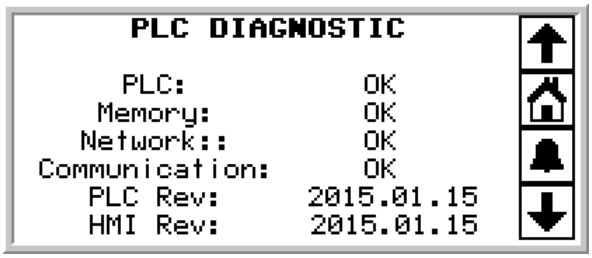


- This is the Main menu display of the Variable speed booster.
- Pressing the **Up** or **Down** arrow will navigate between the active Operation displays: Main menu, System overview, Sensor overview, and Pump overview.
- Press **System overview**, **Sensor overview**, **Pump overview**, **Language**, **Service**, **Setup** or **Diagnose** buttons to call up a corresponding screen.
- Press the **Local** or **Remote** button to toggle between Remote and Local control. The text will toggle between **Remote** and **Local**. The **Local** control will start a lead drive and the Booster off indication will change to the Booster on.
- Main screen indicates the Booster on or off status. The Booster can also be switched on in **Remote** control position if the remote start contact is closed.

LANGUAGE DISPLAY

- English, Spanish French and Portuguese languages can be selected.

DIAGNOSTIC DISPLAY

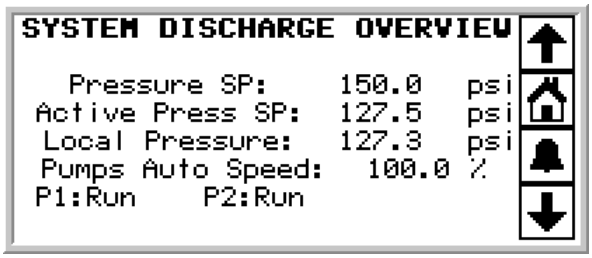


- The PLC, Memory, Network, and Communication status are displayed.
- The PLC and HMI Software Revision numbers are displayed.

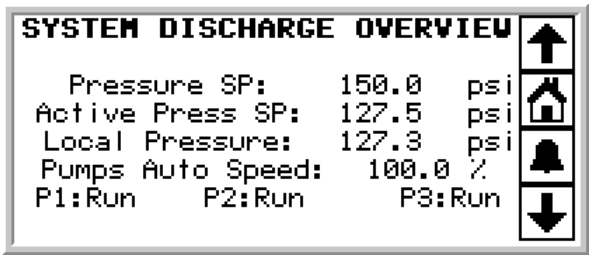
SYSTEM OVERVIEW

SYSTEM DISCHARGE OVERVIEW DISPLAYS

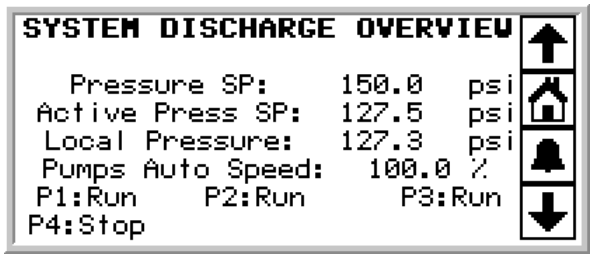
Two pumps



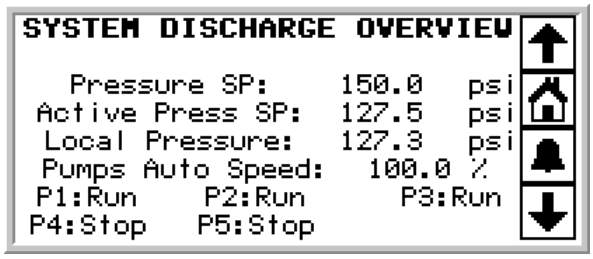
Three pumps



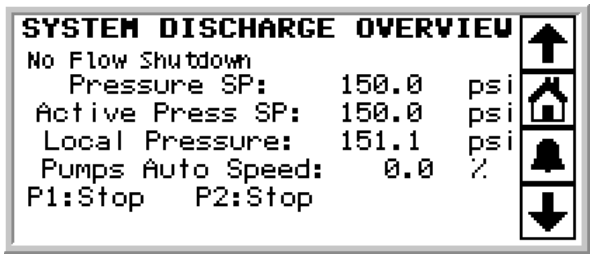
Four pumps



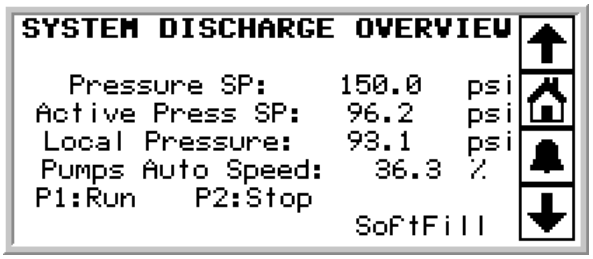
Five pumps



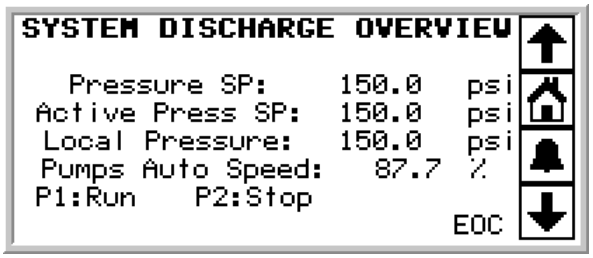
- The System overview screen is for viewing only.
- Press the **Up** or **Down** arrow to navigate between the Operations displays or press **Home** to go to the Main screen.
- The **Pressure SP** is the (System) Discharge pressure Set Point.
- The Active discharge pressure set point is the Discharge pressure set point adjusted for Soft fill and Pressure setback.
- The actual **Local pressure** or **Remote pressure** is displayed depending of Local/Remote sensor control way selected.
- The Pumps auto speed and the pumps feedback status **Stop** or **Run** are displayed.
- When the booster set stops because there is no flow demand, the text **No flow shutdown** is displayed on the System overview screen:



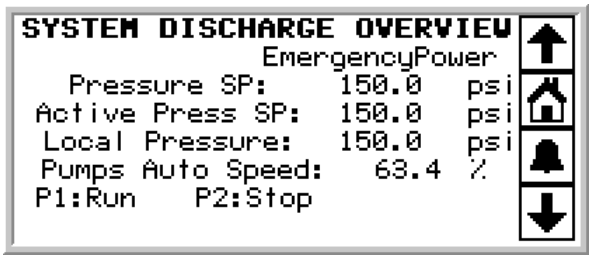
- When the booster set is started (but not from No flow shutdown mode), or after a power cycle, and if the Soft fill mode is enabled, the text **Soft fill** will appear on the System overview screen:



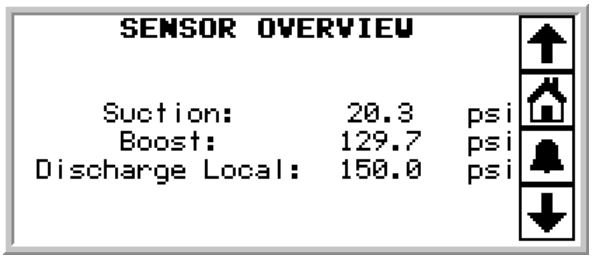
- When the booster set is in EOC protection mode, the next lag pump will be staged On and the text **EOC** will be displayed on the System overview screen:

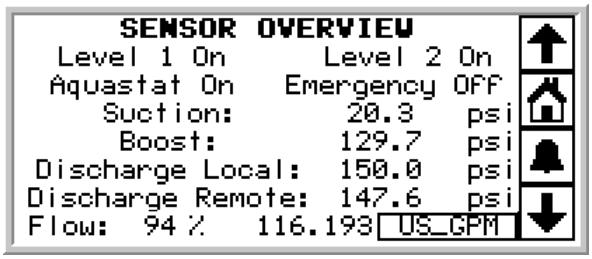


- When the booster set is in Emergency mode, only set number of pumps will run and the text **Emergency power** will be displayed on the System overview screen:



SENSOR OVERVIEW DISPLAY





- This screen displays the actual value of the suction pressure, the discharge pressure, the remote discharge pressure, the flow, the tank level switches, the Aquastat switch, Emergency switch if any is enabled. It also calculates the pump boost pressure, the total flow percentage and the flow. The flow display units can be changed.
- This display is for viewing only.
- Press the **Up** or **Down** arrow to navigate between the Operations displays or press **Home** to go to the Main screen.

PUMP OVERVIEW DISPLAYS

Two pumps

Three pumps

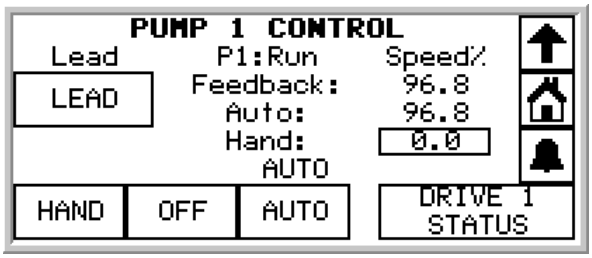
Four pumps

Five pumps

- The Pump Overview screen for the selected amount of pumps will be the only one to be active and displayed.
- This display is for viewing only.
- Press the **Up** or **Down** arrow to navigate between the Operations displays or press **Home** to go to the Main screen.
- This screen will display for each pump: the run feedback **Stop or Run**, the mode **Hand-off-auto**, the **Lead-lag-N/A** and the feedback speed.
- This screen also displays the Pump control display buttons.

PUMP CONTROL DISPLAYS

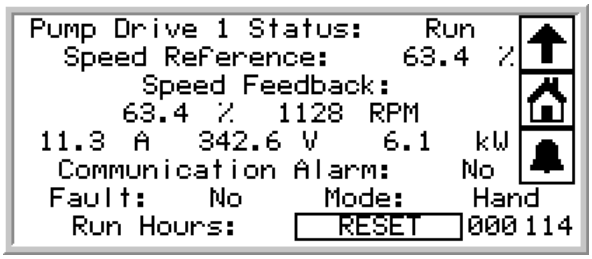
- There are similar displays for Pump 1 to 5.



- Press the **Up** arrow to go back on the Pump overview display or press **Home** to go to the Main screen.
- The following information is displayed for the corresponding pump:
  - The screen indicates the pump parallel status (Lead, Lag 1, Lag 2, Lag 3, Lag 4 or Standby), the pump number, the pump running status (Run, Stop) and the speed.
  - Press the pump LEAD selector button to set the pump as lead pump. A pump can only be set as Lead pump if it is in Auto mode and it is not in alarm.
  - The pump **Feedback** and **Auto** speeds are displayed.
  - Line 5 at the right of the screen is used to set the pump speed in Hand mode.
  - The Pump mode (HAND-OFF-AUTO) is indicated on line 6.
  - On line 7 are the HAND-OFF-AUTO selector buttons (the pump mode selector buttons). The picture above indicates the pump is in AUTO mode.
  - Press **Drive 1-5** status to call up the Drive status displays.

PUMP DRIVE STATUS DISPLAYS

Select Drive Status on Pump Control Screen to access Pump Drive Status screen



- It can be called up from Pump control displays.
- There are similar displays for Pump 1 to 5.
- Only the displays corresponding to the number of pumps selected is active and displayed.
- Press the **Up** arrow to go back on the Pump 1-5 control screen or the **Home** to go on the Main screen.
- The run feedback **Stop or Run**, the **Speed Reference**, the drive current, the voltage, the power, the **Communication Alarm**, the Drive **Fault**, the drive mode **HAND or AUTO** and the **Run hours** are displayed.
- Press reset to reset the number of run hours to zero.
- Press the **Up** arrow to call up the Pump control display or the **Home** to go on the Main screen.

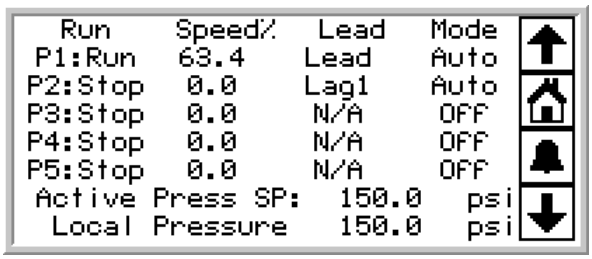
SERVICE OVERVIEW DISPLAYS

- It can be called up from for the Main menu of the Variable Speed Booster. Press the **Home** button at any display to call up the Main menu display. Press the **Service** button to call up the Service overview screens
- Pressing the **Up** or **Down** arrow will navigate between the active Service displays.

Service 1 overview display

This is the service contact overview display.

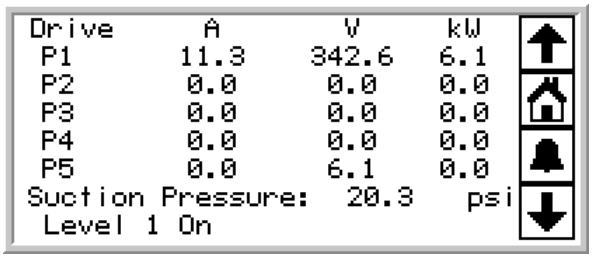
Service 2 overview display



Where:

- **RUN** is the current status of VFD and can either be: Stop / Run.
- **Speed%** is the current actual VFD speed.
- **LEAD** is the current status of pump and can either be: Lead / Leg1/ Leg2 / Leg3 / Leg4 / Standby / (N/A).
- **MODE** is the pump mode and can either be: Hand / Off / Auto.
- **Active press SP** is the current system discharge pressure setpoint.
- **Local/Remote pressure** is the Local / Remote discharge pressure sensor value.

Service 3 overview display



Where:

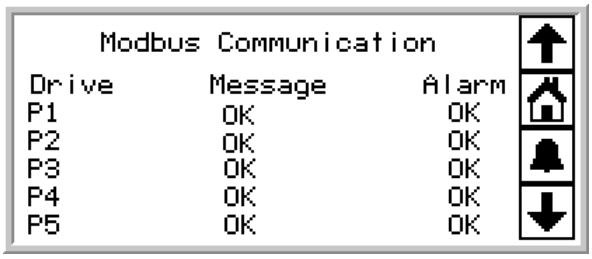
- **Drive** is Variable Frequency Drive.
- **A** is the actual pump motor current.
- **V** is the actual pump motor voltage.
- **kW** is the actual pump motor power.
- **Suction sensor** is the current actual suction pressure value.
- **Level 1 Switch on/Level 1 Switch off** is the current state of the Tank 1 Level Switch if it is enabled.
- **Level 2 Switch on/Level 2 Switch off** is the current state of the Tank **2** Level switch if it is enabled.

Service 4 overview display

Where:

- **Drive** is variable frequency drive.
- **Hand/Auto** is the current auto status of VFD and can either be: Hand/Auto.
- **Ramp** is the current ramp status of VFD and can either be: Stop/Ramp.
- **Fault** is the current fault status of VFD and can either be: Ok/Fault**.**

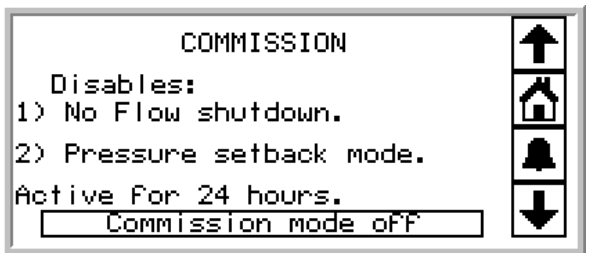
Service 5 overview display



Where:

- **Drive** is Variable frequency drive.
- **Modbus communication massage** is the current Modbus communication status between PLC and VFD. It can either be: Invalid Request / Timeout / Invalid Response / OK / Illegal Faction / Illegal Address / Illegal Value / Slave Failure / Acknowledge / Slave Busy.
- **Modbus communication alarm** is the current Modbus communication alarm status of VFD and can either be: OK/Fault.

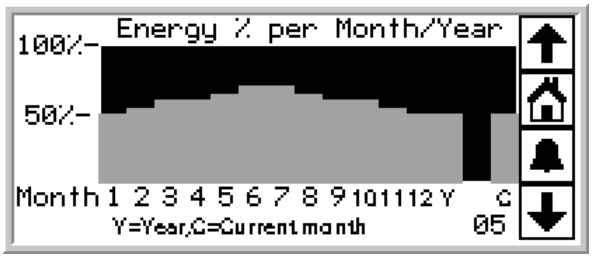
Service 6 overview display



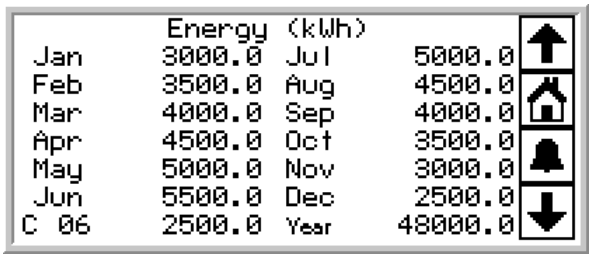
Where if:

- **Commission mode off/on** switch is in **Commission mode on** position it disables the no flow shutdown and the pressure setback mode. The commission mode is active for only 24 hours. The commission mode is used for testing an IVS Booster system in case of not occupy building with no flow in it.

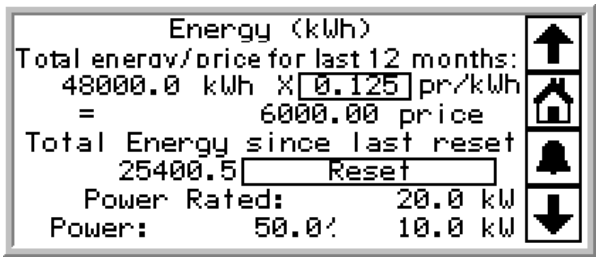
Service 7 overview display



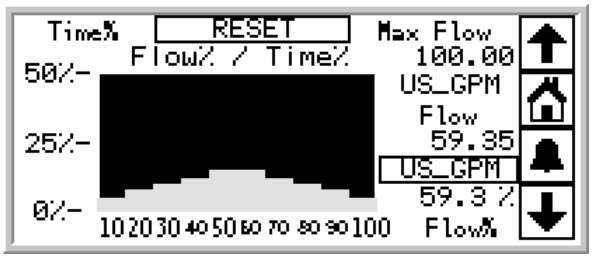
Service 8 overview display



Service 9 overview display



Service 10 overview display



The last four screens are the energy and flow profiling screens.

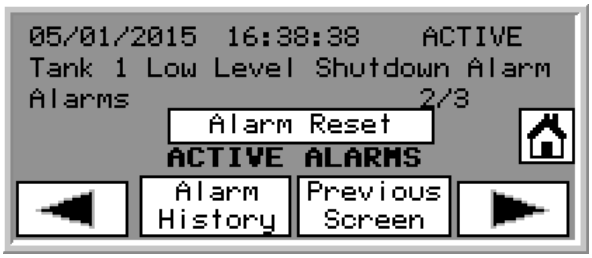
3.0 ALARM MANAGEMENT DISPLAYS

ALARM DISPLAYS

ACTIVE ALARM DISPLAY

- Pressing the **alarm** button  at any time will call up the active alarm display.
- If there is no active alarm the following **Alarm list empty** text will appear:

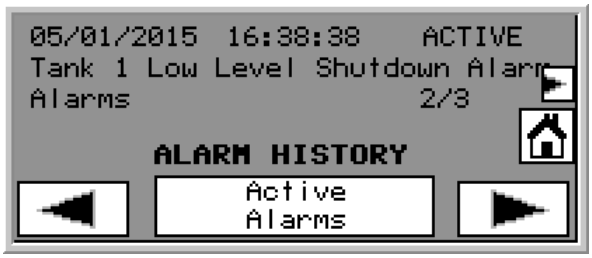
- If there is one or more active alarms an active alarm display will look similar to the one below.



- The first line shows the date and time (DD/MM/YYYY, HH:MM:SS) when the alarm occurred.
- An alarm message will appear in second line.
- An active alarm number/a total active alarm number will appear in line3.
- The horn message will blink if new active alarm is activated. The horn can be deactivated if the alarm reset is pressed.
- Press the **Left** or **Right** arrow buttons to navigate between the active alarms messages.
- Press **Reset** button to reset all non active alarm. It will also silence the alarm horn and stop the **Alarm** button from flashing (if there are no more active alarms).
- Press the **Alarm history** button to call up the alarm history display.

ALARM HISTORY DISPLAYS

- Press the **Alarm History** button from the Active alarm display to call up the history alarm display.
- The alarm history display memory can hold up to the last hundred alarm messages.



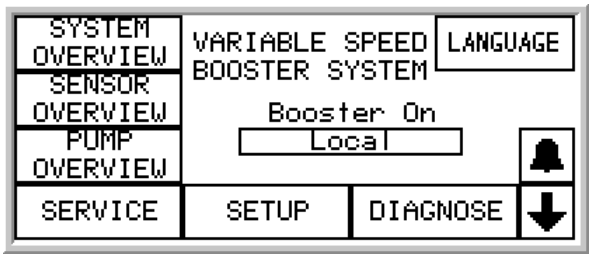
- Press the **Active alarm** button to call up the active alarm display.
- The first line shows the date and time (DD/MM/YYYY, HH:MM:SS) when an alarm occurred.
- An alarm message will appear in second line.
- An alarm number/a total alarm number will appear in line3.
- Press the **Left** or **Right** arrow buttons to navigate between the active alarms messages.
- Press the **Active alarm** button to call up the Active alarm display.

ALARM MESSAGES

1 Tank 1 Low level shutdown alarm
2 Tank 2 Low level shutdown alarm
3 Low suction level shutdown alarm
4 Suction pressure sensor failure alarm
5 Discharge pressure sensor failure alarm
6 Remote pressure sensor failure alarm
7 Low suction pressure shutdown alarm
8 Low discharge pressure shutdown alarm
9 High suction pressure shutdown alarm
10 High discharge pressure shutdown alarm
11 Pump 1 to 5 Run feedback alarms
12 Pump 1 to 5 Drive fault alarms
13 Pump 1 to 5 Airlock alarms
14 Pump 1 to 5 Drive communication alarm
15 Factory high system shutdown alarm

4.0 SYSTEM SETUP DISPLAYS

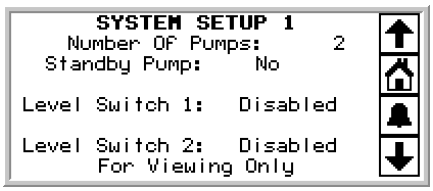
To go to the **Main setup screen** first call up the **Main menu** by pressing the **home** button.

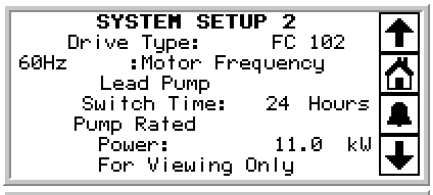


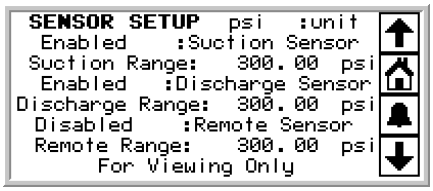
- Press the **setup** to call up the Main setup screen.

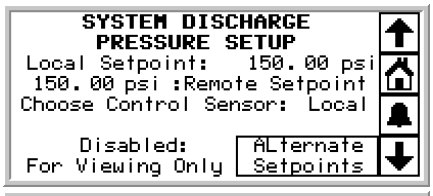
MAIN SETUP (LOG IN) DISPLAY (LEVEL 0)

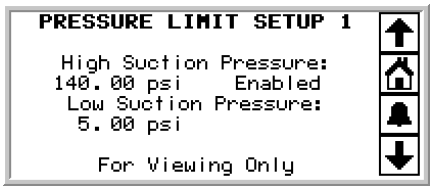
- This display is for viewing only. Level 0 setup display.
- The Setup displays are divided in three levels with each level having the same number of displays with different levels of access. Level 0 setup displays are for viewing only and no adjustment can be made. Level 1 setup displays can be used for changing the system setup and restoring the system factory defaults. Level 2 setup displays can be used for changing the system setup, and saving and restoring the system defaults.
- To access Level 1 and 2 an operator needs to enter the proper password: Level 1 password is 9393, Level 2 password is for factory setup.
- Press the password number and input the value you want. It is **9393** for level 1, or the factory password number for level 2. This will call up the Main Setup Display for the password you selected.
- If you enter a wrong password value nothing will happen.
- After a password is entered, it will log out automatically after 10 minutes of inactivity.
- Press the **Up** or **Down** arrow button to navigate between the Level 0 Setup displays.
- These displays will give anybody a quick look at all the system setup pages.
- The following are all the level 0 setup displays:

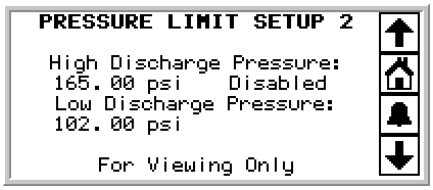


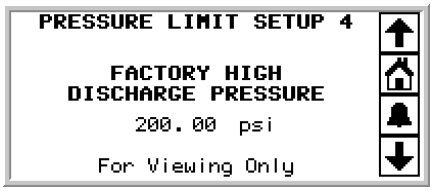


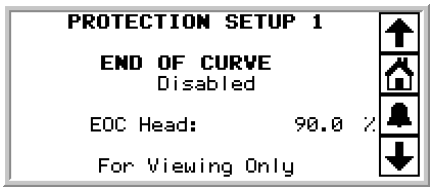


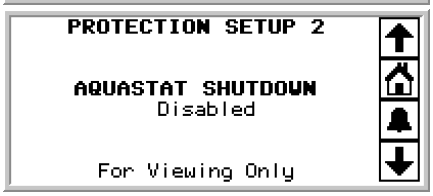


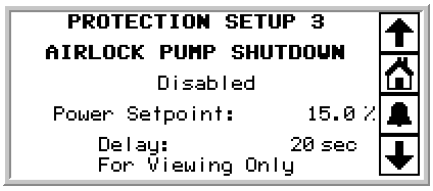


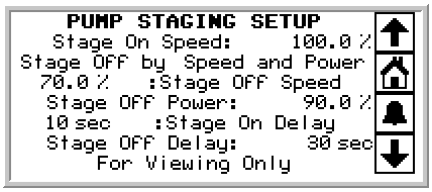


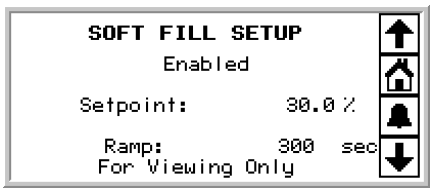


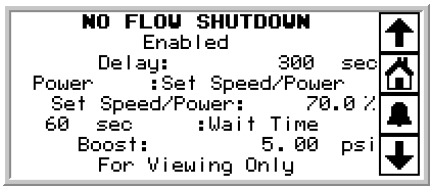


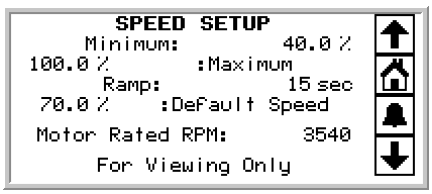


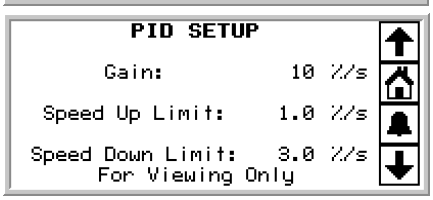


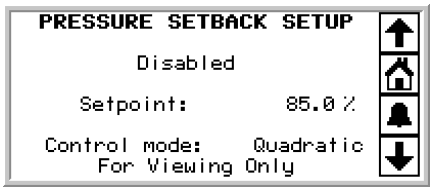


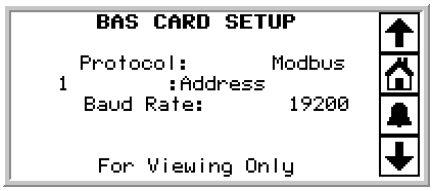


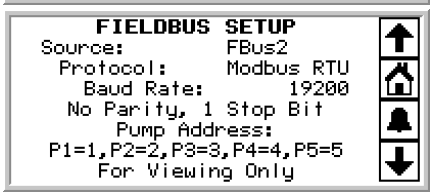


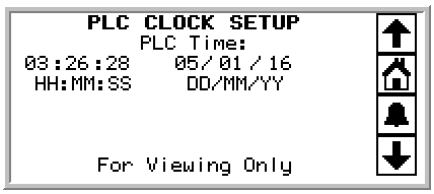


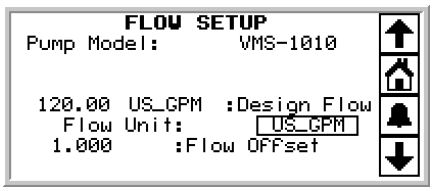












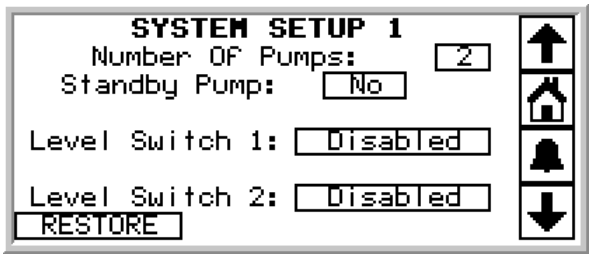
SETUP DISPLAYS - LEVEL 1 AND LEVEL 2

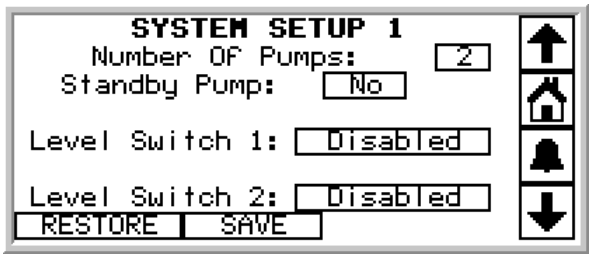
MAIN SETUP DISPLAY

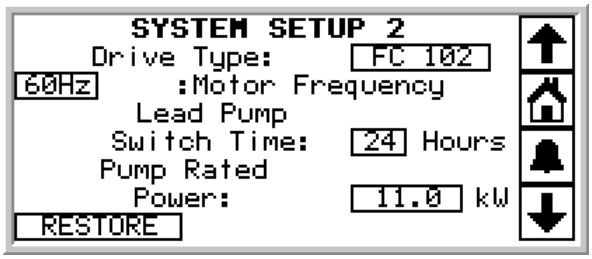
- These are the first displays to appear when entering the Log In password for Level 1 and 2 respectively.

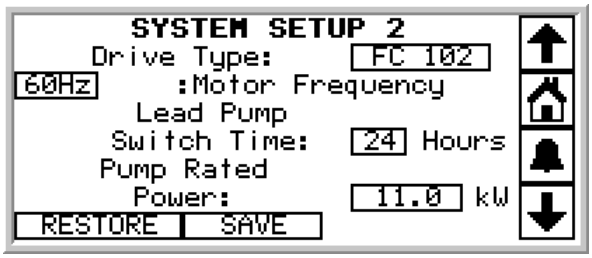
- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Pressing the **Restore** all the default settings will restore all Setup values in all the setup displays. This is indicated by the text changing to **OK** for a few seconds.
- On the Level 2 display pressing **Save all default settings** will Save the Setup values in all Setup displays as Default values. The text will change to **OK** for a few seconds.
  Important reminder: Save All Default function must be executed after initial setup in order for the restore function to work properly. Otherwise restore will setup all variables to improper values!!!

SYSTEM SETUP DISPLAY



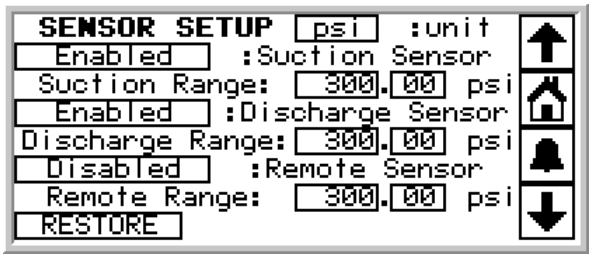


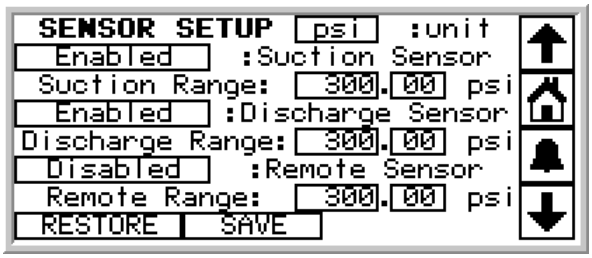




- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press **No of pumps** button to select the number of pumps.
- Press **Standby pump** button to select **Yes** or **No**.
- Press **Level switch 1** button to enable or disable the Level switch 1 sensor.
- Press **Level switch 2** button to enable or disable the Level Switch 2 sensor.
- Press **Drive type** button to select **FC 102** or **FCM 300**.
- Press **Motor frequency** button to select 60Hz or 50Hz.
- Press **Lead pump switch time** button to select the number of hours.
- Press **Pump rated power** button to set the Pump rated power (in kW) to the desired value.
- Pressing the **Save** button will Save the settings on this screen as Default values. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will Restore the Default settings for the settings on this screen. The text will change to **OK** for a few seconds.

SENSOR SETUP DISPLAYS

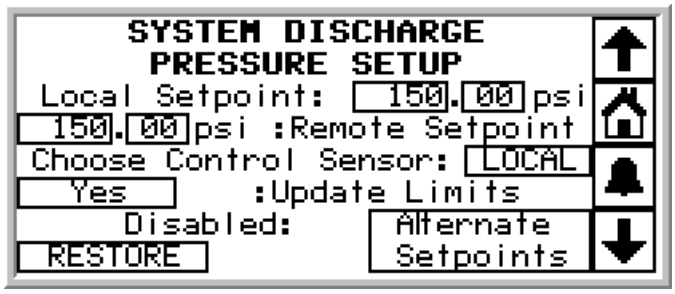


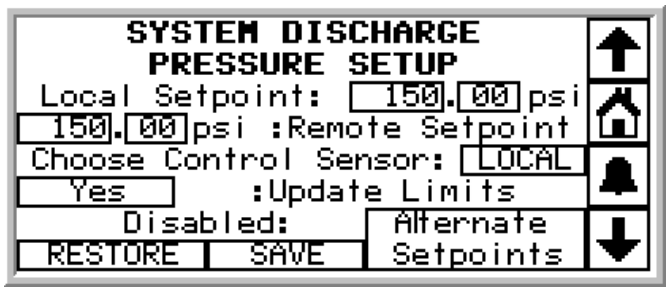


- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the Pressure units button to select between: psi, ft, Kpa, m, and bar.
- Press **Suction sensor** button to enable or disable the suction pressure sensor.
- Press the **Suction range** button to set the range for the suction pressure sensor to the desired value.
- Press the **Discharge sensor** button to enable or disable the discharge pressure sensor.
- Press the **Discharge range** button to set the range for the discharge pressure sensor to the desired value.

- Press the **Remote sensor** button to enable or disable the remote pressure sensor.
- Press the **Remote range** button to set the range for the remote pressure sensor to the desired value.
- Pressing the **Save** button will Save the settings on this screen as Default values. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will Restore the Default settings for the settings on this screen. The text will change to **OK** for a few seconds.

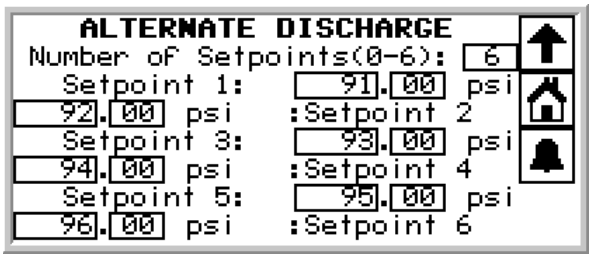
SYSTEM DISCHARGE PRESSURE SETUP DISPLAYS





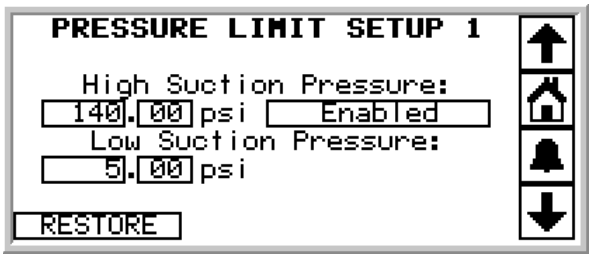
- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **Local setpoint** button if the Discharge (Local) sensor is enabled, to set the System (Local) discharge pressure Setpoint to the desired value.
- Press the **Remote setpoint** button if the Discharge remote sensor is enabled, to set the System (Remote) discharge pressure Setpoint to the desired value.
- Press the **LOCAL** or **REMOTE** under **Choose control sensor** to select whether to use the **LOCAL** or **REMOTE** discharge sensor.
- Press the **Update limits yes** button to automatically update the High and Low pressure limits for the discharge and suction pressure according to the System discharge set point entered.
- Pressing the **Save** button will **save the settings on this screen as Default values**.
- Pressing **Restore** button will **restore the Default settings for the settings on this screen**.

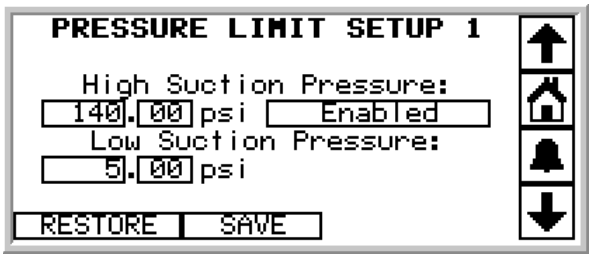
ALTERNATE DISCHARGE SETPOINTS SETUP DISPLAY

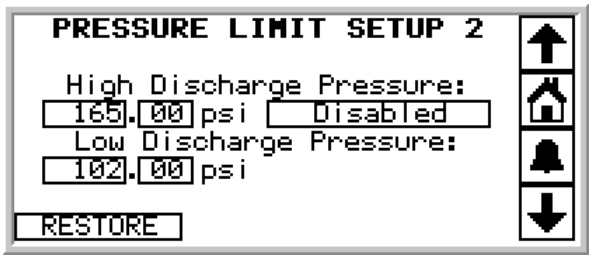


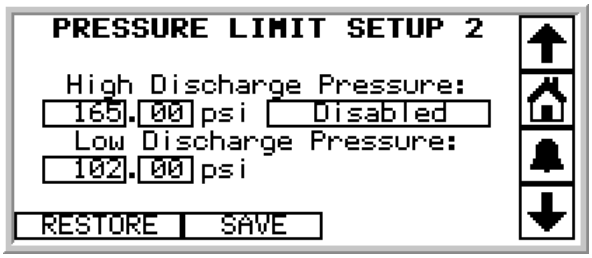
- Press the **Up** arrow button to go beck to the active setup screens of the respective Level.
- Press the Number of setpoint (0-6) button to set the Alternate Discharge setpoint number to the desired value (0-6). Selecting any number greater than zero will display the same number of the Alternate discharge pressure Setpoints.
- Activation of any of the Alternate Setpoint digital inputs 1 to 6 (4, 5 and 6 are not available when aquastat, and float switches 1 and 2 respectively are connected) changes the System discharge setpoint to the corresponding Alternate Setpoint. If more than one Alternate setpoint digital input is active the one with the lowest index is used.

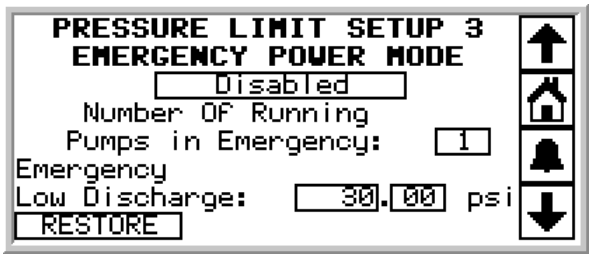
PRESSURE ALARM LIMITS DISPLAYS

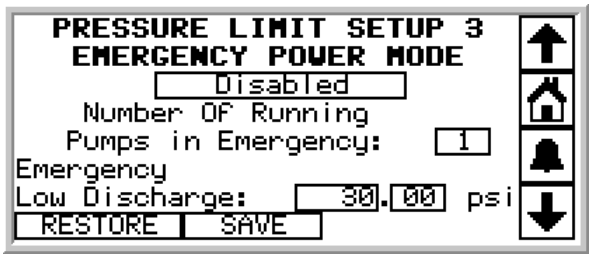






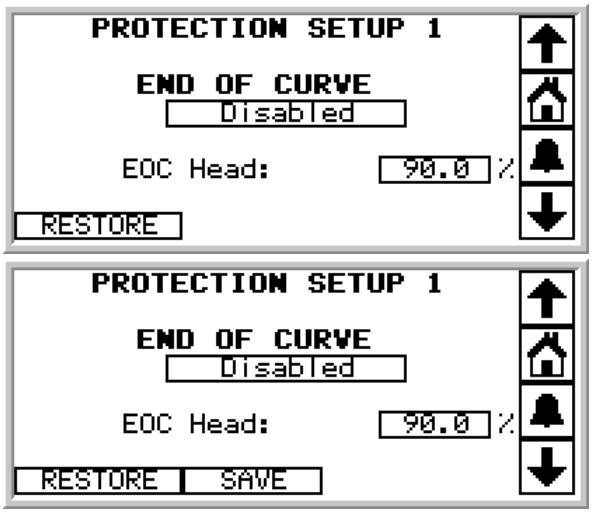






- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **High suction press limit** value button to set the High suction pressure shutdown setpoint to the desired value.
- Press the **High suction press limit enabled/Disabled** button to enable or disable the High suction pressure limits alarm.
- Press the **Low Suction Press Limit** value button to set the Low suction pressure shutdown setpoint to the desired value. It is possible to enable or disable the Low suction Limit alarm. Set the value to 0 unit to disable it
- Press the **High discharge press limit** value button to set the High discharge pressure shutdown setpoint to the desired value.
- Press the **High discharge press limit enabled/disabled** button to enable or disable the High Discharge Pressure Limits alarm.
- Press the **Low discharge press limit** value button to set the Low discharge pressure shutdown setpoint to the desired value. It is possible to enable or disable the Low discharge limit alarm. Set the value to 0 unit to disable it
- Press the **Emergency Power Mode enabled/disabled** button to enable or disable the Emergency power mode and alarm.
- Press the **Number of running pumps in emergency** button to set it to the desired value.
- Press the **Emergency low discharge** value button to set the Low discharge pressure alarm setpoint to the desired value.
- Press the **Factory high discharge pressure** value button to set the Factory high discharge shutdown setpoint to the desired value.
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will **Restore the Default settings for the settings on this screen**. The text will change to **OK** for a few seconds.

EOC PROTECTION SETUP DISPLAYS

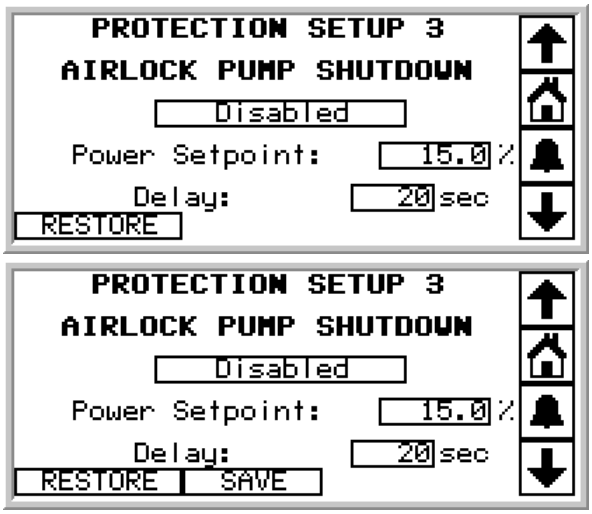


- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press **EOC PROTECTION** button to enable or disable the EOC protection.
- Press the **EOC head** value button to set the Setpoint to the desired value. This is the full speed EOC Head in percent of design head.
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will **Restore the Default settings for the settings on this screen**. The text will change to **OK** for a few seconds.

AQUASTAT SETUP DISPLAYS

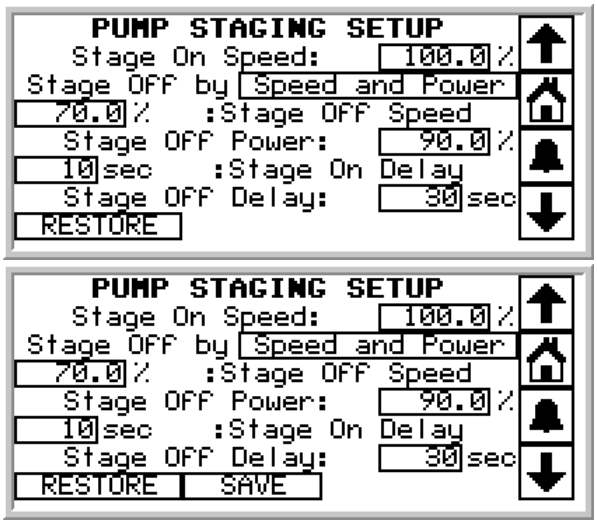
- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **Aquastat shutdown** button to enable or disable the Aquastat protection.
- When the aquastat switch (enabled) is closed the Booster can run and if it is open the booster stops.
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will **Restore the Default Settings for the settings on this screen.** The text will change to **OK** for a few seconds.

AIRLOCK PUMP SHUTDOWN SETUP DISPLAYS



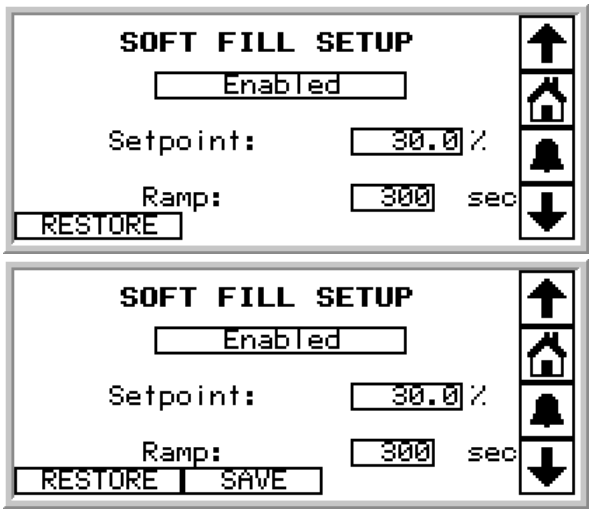
- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **Airlock pump enabled/disabled** button to enable or disable the Airlock Pump protection.
- Press **Power setpoint** button to set the Airlock setpoint percent to the desired value. This is percent of the pump power.
- Press **Delay** button to set the Airlock pump delay time to the desired value. Default is 180 second.
- When any pump speed is faster than 50% and the power it consumes is less than the Airlock power setpoint for longer than the Airlock alarm delay time, it will be disabled.
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will **Restore the Default settings for the settings on this screen.** The text will change to **OK** for a few seconds.

PUMP STAGING SETUP DISPLAYS



- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- The **Stage on speed** value is the pump speed (in percentage) at which the booster set will stage On the next lag pump. Press it to set the Stage on Speed Setpoint to the desired value.
- Press the pump **Stage off by** selector text box to set a desired state. The program switches off a pump, after the Stage off delay time if the pumps speed is less than the Stage off Speed and/or disconnection of one pump will cause the remaining pump(s) power to be less than the Pump(s) Stage off power. The speed or power condition also can be disabled. (The stage off selector settings: Speed, Power, Speed or Power, Speed and Power.)
- Press the **Stage off speed** value button to set the Stage off speed setpoint to the desired value.
- Press the **Stage off power** value button to set the Stage off power setpoint to the desired value.
- Press the **Stage on delay** value button to set the Stage on delay setpoint to the desired value.
- Press the **Stage off delay** value button to set the Stage off delay setpoint to the desired value.
- **Staging in Normal mode description:** In Normal mode the booster system adjusts the pump(s) speed and adds or sheds pumps to maintain system pressure at the active setpoint. When the system is switched on the lead pump is started. The program stages on a new pump, when the existing pump(s) are all running at same speed and have/has reached its Maximum speed setpoint or any pump has reached the pumps motor nameplate power for the Stage on delay time. All pumps runs at same speed except during a pump ramp time. Speed is not increased if any running pump nameplate power is reached (next pump starts). The program switches off a pump, after the Stage off delay time if the pumps speed is less than the Stage off speed and/or disconnection of one pump will cause the remaining pump(s) power to be less than the Pump(s) Stage off power. The speed or power condition also can be disabled. (The pump stage off selector settings: Speed, Power, Speed or Power, Speed and Power.)
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will **Restore the Default settings for the settings on this screen**. The text will change to **OK** for a few seconds.

SOFT FILL MODE SETUP DISPLAYS

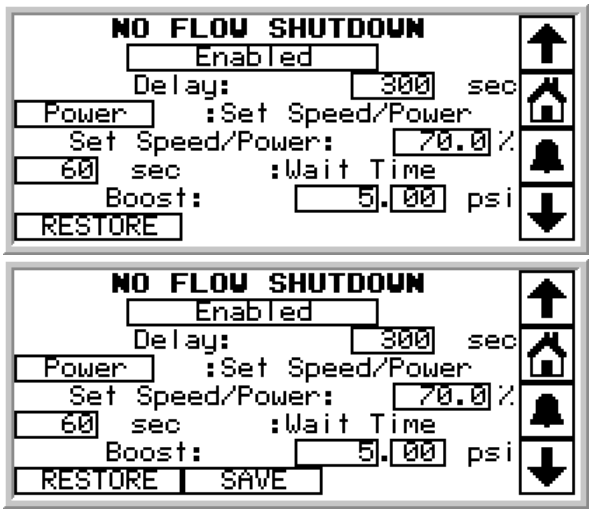


- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **Soft fill setup enabled/Disabled** button to enable or disable the Soft Fill Mode.
- Press the **Setpoint** button to set the Soft fill setpoint percent to the desired value. This is percent of the discharge setpoint pressure.
- Press the **Ramp** button to set the Ramp time Setpoint to the desired value. This is the pump speed ramp time during Soft fill mode.
- **Full Soft Fill mode description:** When the booster is powered up, the lead pump starts. The System Discharge Pressure Setpoint increases in a linear ramp, starting at the Soft Fill pressure Setpoint or the real discharge pressure whatever is higher at a rate of (System discharge pressure

setpoint – Soft fill pressure setpoint) / Soft fill ramp time), until the pressure reaches the System pressure setpoint or the Pressure setback setpoint (if Pressure setback mode is enabled), then the booster switches to Normal mode.

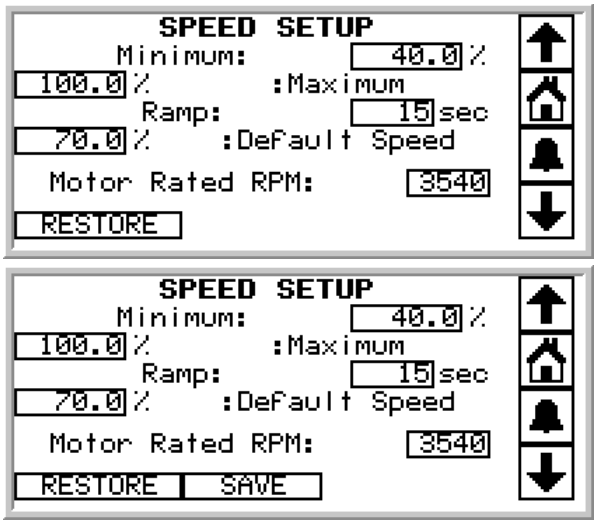
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will **Restore the Default settings for the settings on this screen**. The text will change to **OK** for a few seconds.

NO FLOW SHUTDOWN SETUP DISPLAYS



- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **No flow shutdown enabled/disabled** button to enable or disable the No flow shutdown mode.
- Press the **Delay** button to set the No flow shutdown delay setpoint to the desired value. This is the maximum time the booster will run with only one pump under the Set speed or Power setpoint before checking the No flow condition.
- Press the **Set speed/power** button to set the No Flow Shutdown Setpoint to Speed or Power condition.
- Press the **Set speed/power** setpoint button to set the No Flow Shutdown Speed/Power setpoint to the desired value.
- Press the **Wait time** button to set the Wait time setpoint to the desired value. This is the time to wait before checking for a pressure drop after the pump was slowed down.
- Press the **Boost** button to set the No flow shutdown pressure boost setpoint to the desired value.
- **Full no flow mode description:** This can be enabled or disabled, with enabled as the default. If the booster is running on the lead pump only and at or below No-flow shutdown set speed or Power (field selectable, default: power, 70%), for longer than the No flow shutdown delay time (default is 300s), the pump speed and discharge pressure values are stored, the speed is reduced by 5% and the No-flow wait timer (default is 60s) is started. If until the wait timer expires the pressure doesn't fall by more than 2 psi, then the controller assumes there is no-flow demand, otherwise it returns immediately to Normal mode. When the no-flow condition is met, the pressure is increased by the No-flow shutdown pressure boost (default is 5psi) and the lead pump is shutdown after Pressure boost is met or Boost time of 2 minutes has passed. When the pressure drops 5 psi below the Active discharge pressure setpoint, the lead pump is started in Normal mode.
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will **Restore the Default settings for the settings on this screen**. The text will change to **OK** for a few seconds.

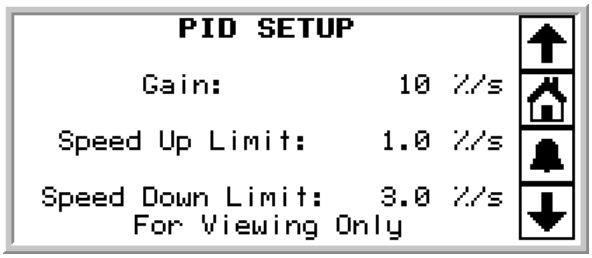
SPEED SETUP DISPLAY



- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the value beside **Min** button to set the Minimum pump speed setpoint to the desired value.
- Press the value beside **Max** button to set the Maximum pump speed setpoint to the desired value.

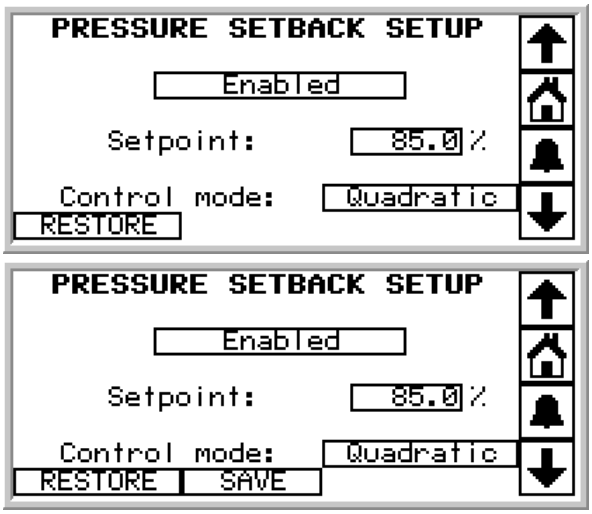
- Press the value beside **Ramp** button to set the Pump ramping speed time setpoint to the desired value. This is the minimum time the pump will take to go from 0% to 100% speed. The ramp time in the PLC and the drives should always be 15sec. That allows the actual ramp up time to be controlled by the PID Speed up and Speed down limits.
- Press the value beside **Default speed** button to set the Default pump speed setpoint to the desired value. This is the speed the pumps will default to when the discharge pressure sensor fails and the aquastat sensor (enabled) is closed.
- Press the **Rated RPM** button to set the Drive rated RPM to the desired value. This is to display the pump speed in RPM.
- Pressing the **Save** button will Save the settings on this screen as Default values. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will Restore the Default settings for the settings on this screen. The text will change to **OK** for a few seconds.

PUMP PID SETUP DISPLAYS



- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **Gain** button to set the PID Proportional gain to the desired value. Increasing the Proportional gain increases the reaction speed to discharge pressure changes.
  Decreasing the value slows down the reaction speed to a discharge pressure deviations from setpoint.
- Press the **Speed up limit** button to set it to the desired value.
- Press the **Speed down limit** button to set it to the desired value.
- The ramp time in the PLC and the drives should always be 15sec. That allows the actual ramp up time to be controlled by the PID Speed up and Speed down limits.
  If the Speed up limit = 1.0% , Max speed =100%, Min speed=40% then the actual ramp up time = (Max speed- Min speed) /Speed up limit = 60sec.
- **Example for PID parameters and speed relationship:**
  If Disch press deviation from setpoint = 15.0 PSI, Gain=10%/sec and Current speed=58.0%, then
  Updated pumps speed= Current speed + Disch Press deviation* Gain = 58.0% + 15.0 * 10/100 = 58.0% + 1.5% = 59.5%
  But the pumps acceleration rate is limited by the Speed up limit, so if the Speed up limit = 1% then the updated speed is 58.0% + minimum (1.0%, 1.5%) = 59.0% instead of 59.5%.
  The pump speed update is done once per second.
- Pressing the **Save** button will Save the settings on this screen as Default values. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will Restore the Default settings for the settings on this screen. The text will change to **OK** for a few seconds.

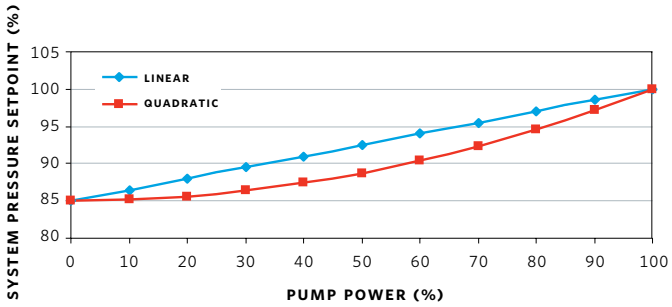
PRESSURE SETBACK SETUP DISPLAYS



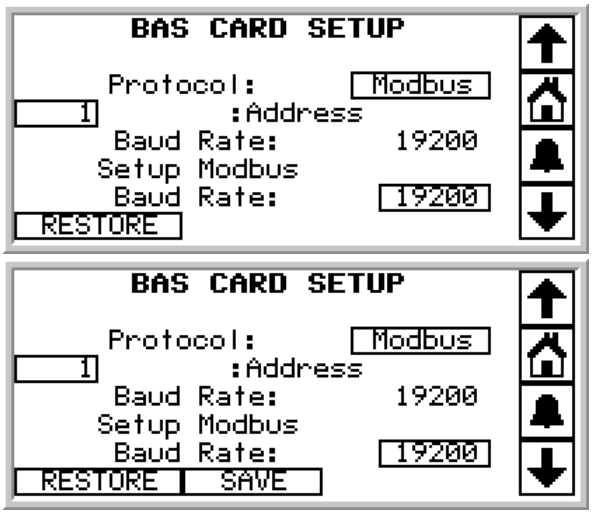
- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **Pressure setback setup enabled/Disabled** button to enable or disable the Pressure setback mode.
- Press the **Setpoint** button to set the Pressure setback setpoint to the desired value. This is percentage of system discharge setpoint.
- Press the **Control mode linear/Quadratic** button to select whether to use the Linear or Quadratic control curve mode.

- **Full pressure setback mode description:** Pressure setback is the adjustable reduction of the System discharge pressure setpoint. This feature decreases the System discharge pressure setpoint relative (Linear or Quadratic) to the pumps power. When the pumps consume no power, the pressure setpoint is reduced to **Pressure setback setpoint** percent value. When all the pumps run at their rated power, the **System discharge pressure setpoint** is the value inputted in the pressure setup screen. The **Pressure setback control mode** is a **Linear** or **Quadratic** (Default) function. In next examples **Pressure setback setpoint** is setup to 85.0 % (Default).
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will **Restore the Default settings for the settings on this screen**. The text will change to **OK** for a few seconds.

PRESSURE SETBACK

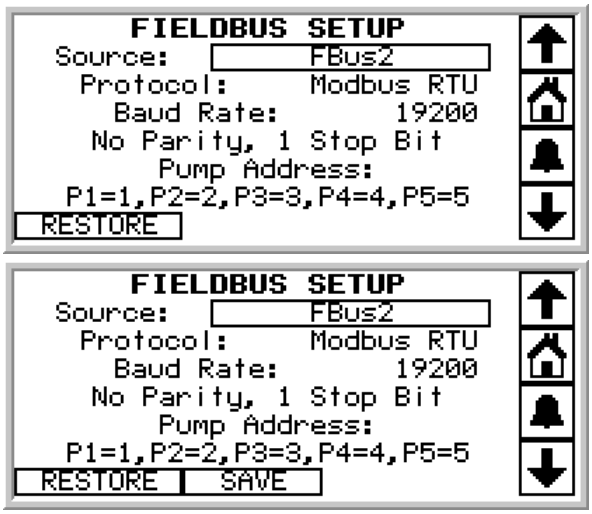


BUILDING AUTOMATION SYSTEM (BAS) INTERFACE SETUP DISPLAYS



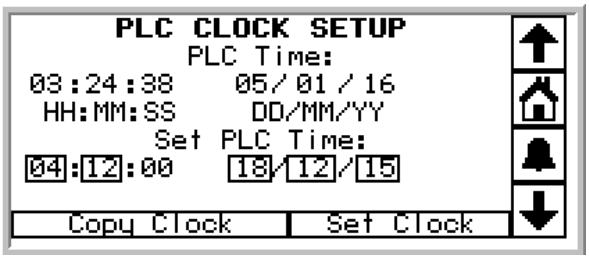
- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the **Protocol** button to set the Protocol to the desired type. **The choices are:** N/A, Modbus, Lonworks, Metasys, and BACnet.
- Press the **Node** button to set the Node address to the desired value.
- The **Baud** is the Baud rate.
- If the Protocol is Modbus pressing the **Setup modbus baud rate** button will set it to the desired value.
- Pressing the **Save** button will Save the settings on this screen as Default values. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will Restore the Default settings for the settings on this screen. The text will change to **OK** for a few seconds.

FILEDBUS SETUP



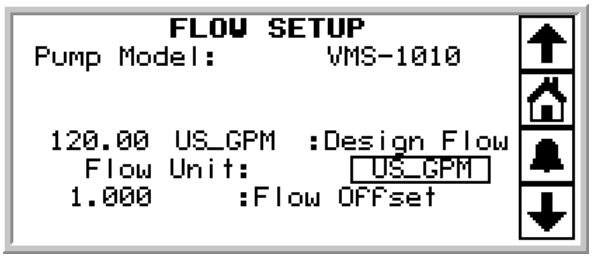
- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the value beside **Source** to toggle between **FBus2** and **FieldBus card**. Default is **FBus2**.
- The Protocol is Modbus RTU.
- The Baud rate is 19200; No parity; 1 is Stop bit; Address: Pump 1=1, Pump 2=2, Pump 3=3, Pump 4=4, Pump 5=5.
- Pressing the **Save** button will Save the settings on this screen as Default values. The text will change to **OK** for a few seconds.
- Pressing **Restore** button will Restore the Default settings for the settings on this screen. The text will change to **OK** for a few seconds.

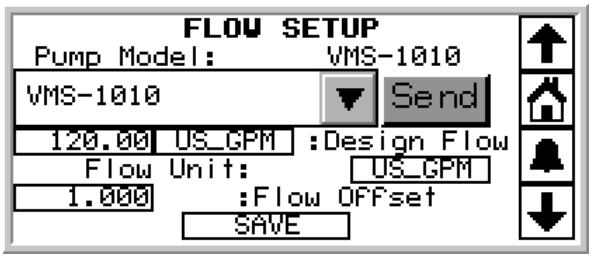
PLC CLOCK SETUP DISPLAY



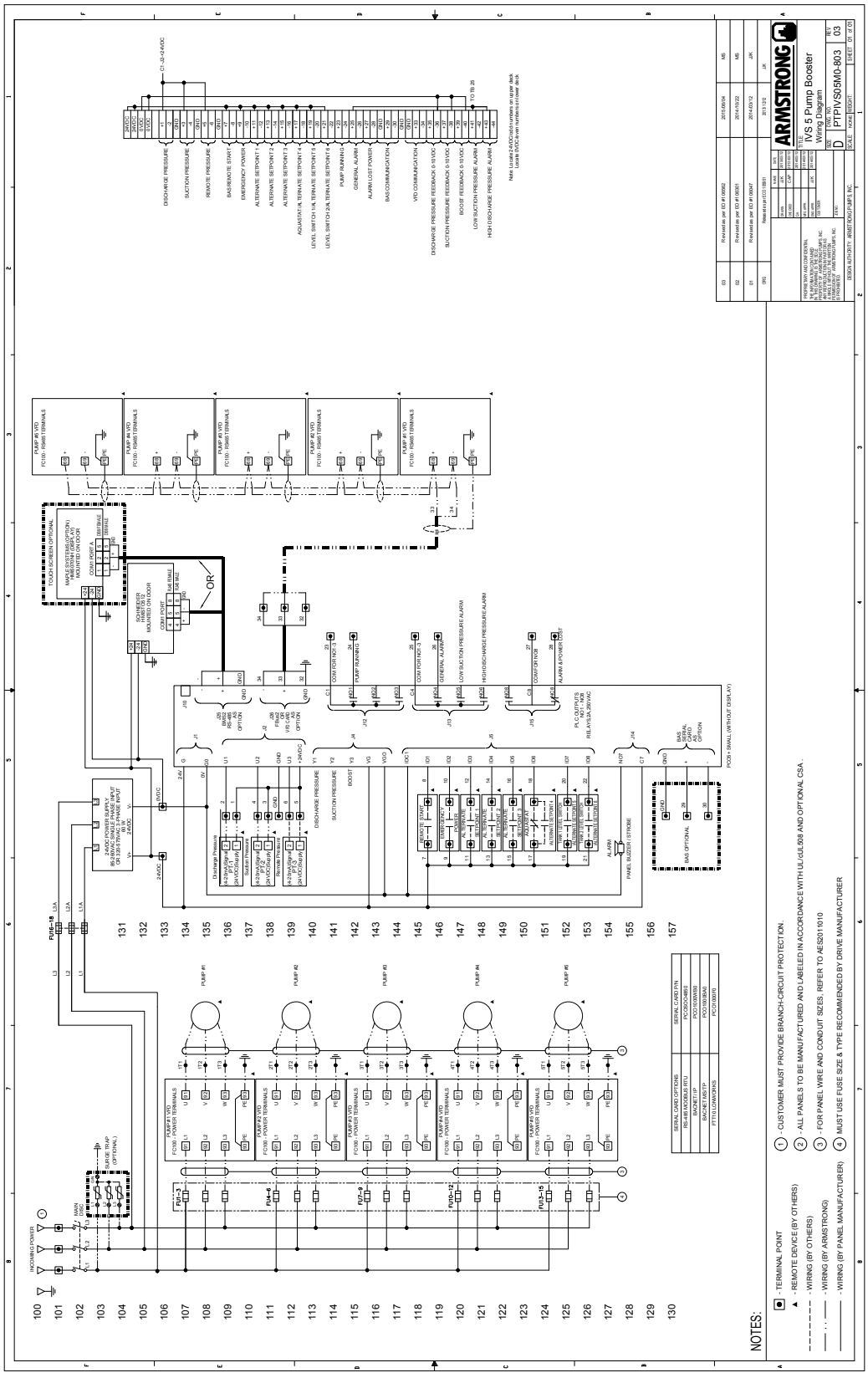
- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press **Copy clock** to copy the current time and date from the PLC to the display. This will overwrite any values previously entered.
- Press the number below HH:MM:SS to set the hour (HH), the minute (MM) and the second (SS) to the desired values.
- Press the number below DD/MM/YYYY to set the day (DD), the month (MM) and the year (YYYY) to the desired values.
- Press **Set clock** to set the entered time and date to the PLC.

FLOW SETUP DISPLAYS





- Press the **Up** or **Down** arrow button to navigate between the active setup screens of the respective Level.
- Press the ▼ button to select a pump model and press **Send** button. Pump model will change from **No model** to selected pump model.
- Press the **Design flow** value button to set the (Maximum) Design flow of system to the desired value.
- Press the **Design flow** unit of measurement button to set it to the desired unit (US GPM, liter/sec, m^3/hour, UK GPM).
- Press the **Flow (display) Unit** button to set it to the desired unit (US GPM, liter/sec, m^3/hour, UK GPM).
- Press the **Flow offset** button to adjust the calculated flow to the test lab real flow measured by a certified flow sensor.
- Pressing the **Save** button will **Save the settings on this screen as Default values**. The text will change to **It is now safe to turn off this target**. Press Restart button.


ARMSTRONG
IVS 5 Pump Booster
Wiring Diagram
PTPIVS05M0-803
NOTES:
1 - CUSTOMER MUST PROVIDE BRANCH-CIRCUIT PROTECTION.
2 - ALL PANELS TO BE MANUFACTURED AND LABELED IN ACCORDANCE WITH UL/cUL 508 AND OPTIONAL CSA.
3 - FOR PANEL WIRE AND CONDUIT SIZES, REFER TO AES2011010
4 - MUST USE FUSE SIZE & TYPE RECOMMENDED BY DRIVE MANUFACTURER
- TERMINAL POINT
- REMOTE DEVICE (BY OTHERS)
- WIRING (BY OTHERS)
- WIRING (BY ARMSTRONG)
- WIRING (BY PANEL MANUFACTURER)

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