

# IPS controller 4000

System for variable  
secondary application

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## Installation and operating instructions

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Armstrong integrated pumping system controllers, IPS controllers 4000, are completely factory-assembled, tested, and shipped to the job site as integral units ready to receive 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 IPS model no. .

## 1.0 IPS CONTROLLERS 4000

### 1.1 INSTALLATION INSTRUCTIONS

**Incoming supply, stand-alone IPS controllers (no rack):** The incoming power supply should be brought in through the bottom of the panel adjacent to the main terminals. Note that this is the only electrical connection required at the panel. The power supply voltage is 115VAC/1/60 or 230VAC/1/50 as standard. Please refer to drawings the wiring diagram supplied with the unit for instructions to connect to IPS controller terminal block.

**Incoming supply, IPS system on racks:** The incoming power supply to the IPS controller is achieved through a transformer in the main enclosure of the whole IPS system rack. No power connection is required.

**NOTE:** All electrical wiring should be performed by a qualified electrician in accordance with the latest edition of the national electrical code, local codes and regulations.

### 1.2 FIELD DEVICES INSTALLATION INSTRUCTIONS

Before attempting to start configuring the IPS controller using the display, make sure all the field installed devices such as DP sensors, flow sensors, DP switches are properly installed and wired to the IPS controller as per wiring diagrams provided..

**NOTE:** Please fill in the IPS commissioning check sheet (below) which will help you through the set-up procedure of the IPS controller

### 1.3 BUILDING AUTOMATION SYSTEM (BAS) CONNECTION

When the IPS controller is provided with a serial port to communicate serially to the BAS, the possible communication protocols are Modbus, LonWorks or BACnet. Refer to wiring diagrams supplied with the unit for wiring instructions. IPS controller can also communicate to the BAS by hard wired option. Please refer to the IPS controller generic terminal block for the different parameters and data points communicated to the BAS. For more information please contact your local Armstrong representative or Armstrong factory service department.

## 2.0 IPS COMMISSIONING CHECK SHEET (Used for inputting data in the IPS controller)

**NOTE:** The following data should be documented prior to setting up your new IPS controller. By collecting this information and documenting it, you will not only be prepared for the setup process, but you will also have a printed record of the data that was selected. If you have chosen

to have an Armstrong certified controls service technician enter the data onto the IPS controller, they will require that the contractor(s) sign off that the mechanical connections and electrical connections are completed prior to visiting the site to commission the controller.

PROJECT NAME: \_\_\_\_\_

BUILDING ADDRESS: \_\_\_\_\_

CONTRACTOR NAME: \_\_\_\_\_

IPS CONTROLLER SERIAL NUMBER: \_\_\_\_\_

DATE OF INSTALLATION/COMMISSIONING: \_\_\_\_\_

IPS MODEL NUMBER (E.G. IPS 4001 CONTROLLER): \_\_\_\_\_

ARMSTRONG SERVICE REPRESENTATIVE (IF APPLICABLE): \_\_\_\_\_

### SYSTEM CONFIGURATION

Number of pumps: \_\_\_\_\_  
 Is there a standby pump: \_\_\_\_\_  
 Pump make, model, and size pump(s) legend: \_\_\_\_\_  
 System design point flow (with units): \_\_\_\_\_  
 System design point head (with units): \_\_\_\_\_  
 Pump selection point flow: \_\_\_\_\_  
 Pump selection point head: \_\_\_\_\_  
 Pump end of curve flow rating: \_\_\_\_\_  
 Pump end of curve pressure rating: \_\_\_\_\_  
 Differential pressure switch (flow switch):  Yes  No  
 Desired default speed (factory preset at 95%): \_\_\_\_\_  
 Minimum drive speed (factory preset at 30%): \_\_\_\_\_  
 Number of controller zones (process variables): \_\_\_\_\_

\* If not known use pump selection point flow and head

### MOTOR DATA

Horsepower: \_\_\_\_\_  
 Speed: \_\_\_\_\_  
 Voltage: \_\_\_\_\_  
 FLA rating: \_\_\_\_\_  
 Service factor: \_\_\_\_\_  
 FL efficiency: \_\_\_\_\_  
 FL slip: \_\_\_\_\_  
 Power factor: \_\_\_\_\_  
 Temperature class: \_\_\_\_\_

### CONTROLLING DATA

#### PROCESS VARIABLES/CONTROLLING ZONES

| Zone number     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|-----------------|---|---|---|---|---|---|---|---|---|----|----|
| Zone legend     |   |   |   |   |   |   |   |   |   |    |    |
| DP sensor range |   |   |   |   |   |   |   |   |   |    |    |
| Zone set-point  |   |   |   |   |   |   |   |   |   |    |    |

Rate of speed change/ramp time (0 - full speed): 20 sec \_\_\_\_\_  
 Minimum speed (factory set 30%): \_\_\_\_\_  
 Maximum speed (factory set 100%): \_\_\_\_\_  
 Flow sensor range: \_\_\_\_\_  
 Temperature sensor type, range: \_\_\_\_\_  
 High temperature high alarm set-point: \_\_\_\_\_  
 Hours of operation before switching lead pump: \_\_\_\_\_

\_\_\_\_\_ Date

\_\_\_\_\_ Signature

### 3.0 IPS 4000 FUNCTION DISPLAYS

The IPS 4001 / 4002 / 4003 controllers displays are divided in two set of displays: Operation and Setup. The Operation displays are used by the operators to monitor and control the IPS. The Setup screens are used to set, view, save, and restore the system specific settings (i.e. number of pumps, sensor range, etc.).

#### OPERATION DISPLAYS:

- Main menu
- System overview
- Zone overview
- Pump overview
- Sensorless overview
- Pump control
- Temp control overview
- Auto bypass reset
- Login
- Alarm overview
- Diagnostics
- Languages

#### SETUP DISPLAYS:

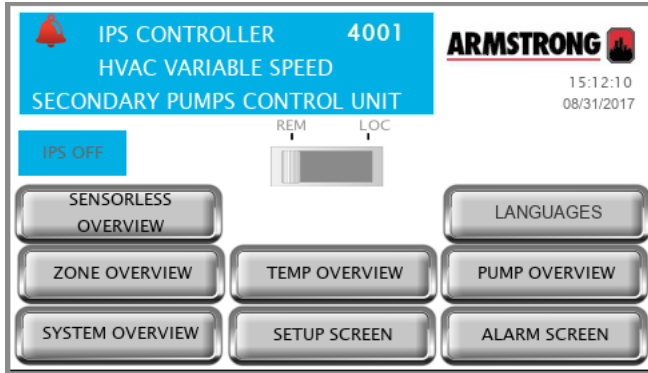
The setup displays are divided in three levels with each level having the same number of displays with different level of access. Level 0 setup displays are for viewing only and no adjustments can be made. Level 1 setup displays can be used for changing the system setup and restoring the system factory 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 (please contact Armstrong factory service department).

The list of setup/default displays for every level is as follow:

- System setup
- Zone setup
- Zone 1 to 12 setup
- Sensorless setup
- Pump setup
- Speed setup
- Staging setup
- PID setup
- BAS setup
- Clock setup
- Temperature control setup
- System valves setup
- VFD readout setup

## 4.0 OPERATION DISPLAYS

### 4.1.0 MAIN MENU



#### Description

This is the screen the operator will see when powering up the unit. Offers status of system's most important variables and navigation to all system screens

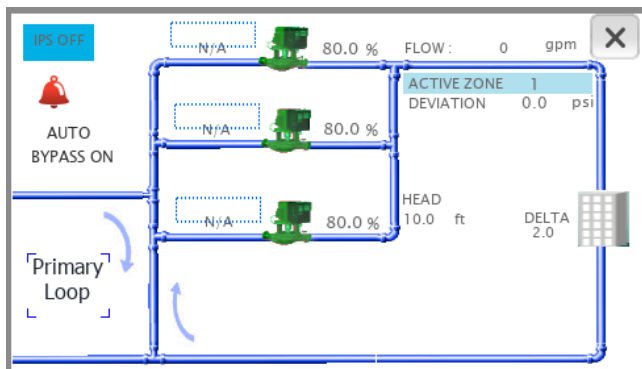
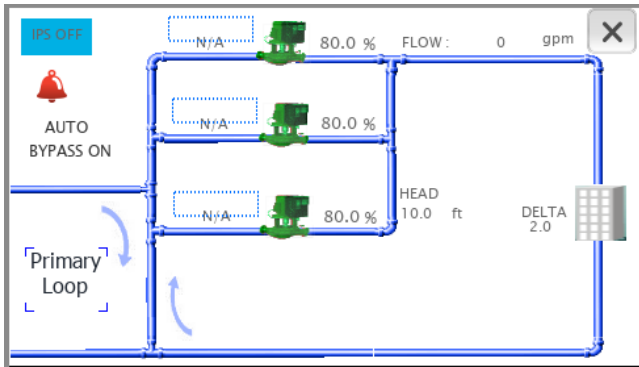
#### Data

|            |   |
|------------|---|
| IPS status | Indicates if the IPS is on or off   |
| Alarm      | If there is an alarm in the system, a red bell appears at the top left corner |

#### Buttons

|                     |  |
|---------------------|--|
| REM - LOC           | Slider button that allows changing the IPS mode to Remote or Local. Local will turn on the IPS immediately. Remote causes the IPS to follow the BAS signal (hardwired or serial communication) to turn on or off |
| ZONE OVERVIEW       | Changes the screen to zone overview. Not available if the VFD type is IPS sensorless   |
| SENSORLESS OVERVIEW | Changes the current screen to sensorless overview. Not available if the VFD type is FC102  |
| SYSTEM OVERVIEW     | Changes the current screen to system overview  |
| TEMP OVERVIEW       | Changes the current screen to temp overview. Only available if the temperature control is enabled  |
| SETUP SCREEN        | Navigates to the setup menu level 0 screen   |
| PUMP OVERVIEW       | Navigates to the pump overview screen  |
| ALARM SCREEN        | Shows the alarm screen. If there is an active alarm, this button turns red   |

4.1.1 SYSTEM OVERVIEW



**Description**

Shows a detailed view of the system. The screen adapts to the configuration of the system by showing the number of pumps, the zone PVs or head and flow. Press the x on the top right corner to go back to the previous screen

**Data**

|                           |   |
|---------------------------|---|
| <b>Pump 1 to 6 status</b> | The pump icon shows the pump status:<br>grey - stopped<br>green - running<br>red - alarm  |
| <b>Pump 1 to 6 mode</b>   | Shows each pump mode: Hand, Off or Auto   |
| <b>Pump 1 to 6 duty</b>   | Shows each pump duty: Duty1, Duty2, Duty3, Duty4, Duty5, Duty6 or Stand-by  |
| <b>Pump 1 to 6 speed</b>  | Shows each pump speed in percentage   |
| <b>ACTIVE ZONE</b>        | Indicates which zone is assigned as active. Not visible if the vFD type is IVS sensorless   |
| <b>ERROR</b>              | Indicates the active zone error. Not visible if the vFD type is IVS sensorless  |
| <b>AUTO BYPASS</b>        | Indicates the pump auto bypass condition (set at 4.1.7)   |
| <b>MAX OPEN VLV</b>       | Indicates the opening of the driving system valve. Not visible if the vFD type is IVS sensorless and the system valves control is not enabled |
| <b>FLOW</b>               | Indicates the total flow in the system. Only visible if the vFD type is IVS sensorless  |
| <b>HEAD</b>               | Indicates the total head in the system. Only visible if the vFD type is IVS sensorless  |
| <b>ERROR (DELTA)</b>      | Indicates how far from the control curve the pump(s) are operating. The IPS regulates the pump speed to achieve an error of zero              |
| <b>IPS STATUS</b>         | Indicates whether the IPS is ON or OFF  |
| <b>ALARM</b>              | A red bell indicates an alarm in the system   |

**Buttons**

|                         |   |
|-------------------------|---|
| <b>Pump 1 to 6 icon</b> | Touching a pump icon brings up the corresponding pump control screen  |
| <b>ALARM BELL</b>       | Alarm Bell is provided with navigation to the Alarm Page. User can go to the Alarm Page by clicking on Alarm bell present on the HMI screen |



4.1.2 ZONE OVERVIEW

| ZONE OVERVIEW         |        |        |        |
|-----------------------|--------|--------|--------|
| LEGEND                | ZONE 1 | ZONE 2 | ZONE 3 |
| ACTUAL ( psi )        | 12.0   | 13.0   | 9.0    |
| SET POINT ( psi )     | 10.0   | 10.0   | 10.0   |
| DEVIATION ( psi )     | 2.0    | 3.0    | -1.0   |
| STATUS                | ENABLE | ENABLE | ENABLE |
| ACTIVE ZONE           |        | 3      |        |
| ACTIVE ZONE DEVIATION |        | -1.0   | psi    |

MAIN MENU SYSTEM VIEW PUMP VIEW ALARMS

**Description**

Shows an overview of the system zones. If there are more than 3 zones, use the grey arrows to scroll. This screen is not available if the VFD type is IVS sensorless

**Data**

|                   |  |
|-------------------|--|
| ACTUAL            | Indicates the present value of the zone sensor in the selected units |
| SET POINT         | Indicates the set point of the zone in the selected units            |
| ERROR             | Indicates the zone error in the selected units                       |
| STATUS            | Indicates whether the zone is enabled or disabled                    |
| ACTIVE ZONE       | Indicates which zone is assigned as active.                          |
| ACTIVE ZONE ERROR | Indicates the active zone error.                                     |

**Buttons**

|             |  |
|-------------|--|
| MAIN MENU   | Navigates to the main menu   |
| SYSTEM VIEW | Changes the current screen to system overview                              |
| PUMP VIEW   | Changes the current screen to pump overview                                |
| ALARMS      | Shows the alarm screen. If there is an active alarm, this button turns red |

### 4.1.3 PUMP OVERVIEW

| LEGEND      | Pump 1 | Pump 2 | Pump 3 |
|-------------|--------|--------|--------|
| MODE        |        |        |        |
| DUTY STATUS | N/A    | N/A    | N/A    |
| STATUS      | Stop   | Stop   | Stop   |
| SPEED %     | 0.0    | 0.0    | 0.0    |
| SPEED RPM   | 0      | 0      | 0      |
| RUN HRS     | 0 000  | 0 000  | 0 000  |

#### Description

Allows monitoring pump information. If there are more than 3 pumps, scroll using the arrows on the top corners.

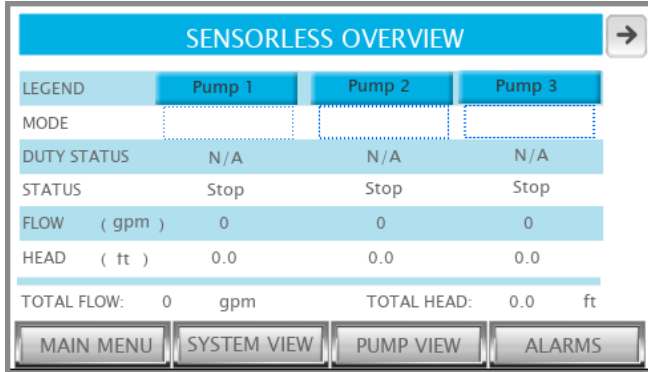
#### Data

|                       |  |
|-----------------------|--|
| Pump 1 to 6 mode      | Shows each pump mode: Hand, Off or Auto  |
| Pump 1 to 6 status 1  | Shows each pump duty: Duty1, Duty2, Duty3, Duty4, Duty5, Duty6 or Stand-by   |
| Pump 1 to 6 status 2  | Shows if the pump is running or stopped  |
| Pump 1 to 6 speed%    | Shows each pump speed in percentage  |
| Pump 1 to 6 speed RPM | Shows each pump speed in RPM   |
| Run HRS               | Shows the total pump run time in hours   |
| AUTO BYPASS ON        | If the pumps are in auto bypass, the AUTO BYPASS ON label appears on the top left corner. Touching this label brings up the auto bypass reset screen |

#### Buttons

|                 |   |
|-----------------|---|
| Pump 1 to 6     | Touching a pump button brings up the corresponding pump control screen. If the corresponding pump is in alarm, this button changes to red color |
| MAIN MENU       | Navigates to the main menu  |
| SYSTEM VIEW     | Changes the current screen to system overview   |
| SENSORLESS VIEW | Changes the current screen to sensorless overview. Only available if the vfd type is ivs sensorless   |
| ZONE OVERVIEW   | Navigates to the zone overview screen. Not available if the vfd type is ivs sensorless  |
| ALARMS          | Shows the alarm screen. If there is an active alarm, this button turns red  |
| Scroll arrows   | If there are more than 3 pumps in the system, use the grey arrow buttons to scroll  |

4.1.4 SENSORLESS OVERVIEW



**Description**

This screen is only available when the vfd type is ivs sensorless, it complements the pump overview screen. If there are more than 3 pumps, scroll using the arrows on the top corners

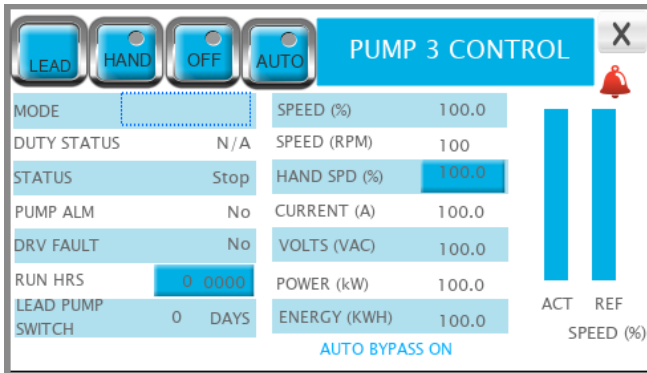
**Data**

|                      |  |
|----------------------|--|
| Pump 1 to 6 mode     | Shows each pump mode: Hand, Off or Auto                                    |
| Pump 1 to 6 status 1 | Shows each pump duty: Duty1, Duty2, Duty3, Duty4, Duty5, Duty6 or Stand-by |
| Pump 1 to 6 status 2 | Shows if the pump is running or stopped                                    |
| FLOW                 | Indicates the current flow of that pump in the selected units              |
| HEAD                 | Indicates the current head of that pump in the selected units              |
| TOTAL FLOW           | Indicates the system flow in the selected units                            |
| TOTAL HEAD           | Indicates the system head in the selected units                            |

**Buttons**

|               |   |
|---------------|---|
| Pump 1 to 6   | Touching a pump button brings up the corresponding pump control screen. If the corresponding pump is in alarm, this button changes to red color |
| MAIN MENU     | Navigates to the main menu  |
| SYSTEM VIEW   | Changes the current screen to system overview   |
| PUMP VIEW     | Changes the current screen to pump overview   |
| ALARMS        | Shows the alarm screen. If there is an active alarm, this button turns red  |
| Scroll arrows | If there are more than 3 pumps in the system, use the grey arrow buttons to scroll  |

4.1.5 PUMP 1 TO 6 CONTROL



**Description**

This screen allows control of each pump and shows more detailed information. Press the x on the top left corner to go back to the previous screen

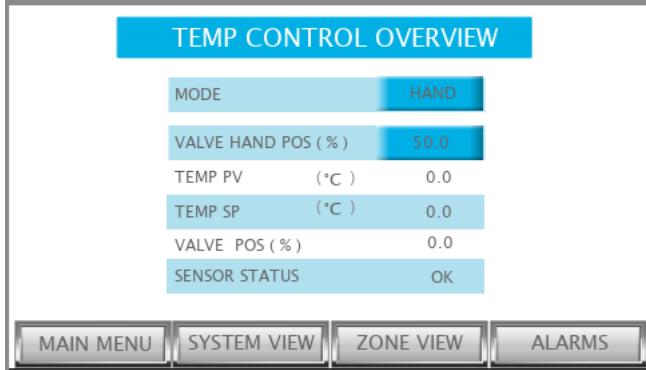
**Data**

|                         |   |
|-------------------------|---|
| <b>MODE</b>             | Shows pump mode: Hand, Off or Auto  |
| <b>STATUS 1</b>         | Shows pump duty: Duty1, Duty2, Duty3, Duty4, Duty5, Duty6 or Stand-by   |
| <b>STATUS 2</b>         | Shows if the pump is running or stopped   |
| <b>PUMP ALM</b>         | Indicates if there is a pump alarm  |
| <b>DRV FAULT</b>        | Indicates if the VFD is reporting a fault   |
| <b>RUN HRS</b>          | Indicates the pump total run time in hours. Touching the RUN HRS label resets the total run hours   |
| <b>LEAD PUMP SWITCH</b> | Indicates the remaining time in days or hours to switch the Duty1 (Lead) pump   |
| <b>SPEED (%)</b>        | Shows pump speed in percentage  |
| <b>SPEED (RPM)</b>      | Shows pump speed in RPM   |
| <b>CURRENT (A)</b>      | Shows the VFD current   |
| <b>VOLTS (VAC)</b>      | Shows the VFD AC voltage  |
| <b>POWER (KW)</b>       | Shows the VFD power in kW   |
| <b>ENERGY (kWh)</b>     | Show the VFD energy consumption in kWh for the above indicated run hours  |
| <b>SPEED BARS</b>       | Show the pump speed reference and actual speed in a graphical manner  |
| <b>AUTO BYPASS ON</b>   | If the pump is in auto bypass, the AUTO BYPASS ON label appears on the bottom of the screen. Touching this label brings up the auto bypass reset screen |
| <b>Alarm</b>            | If there is a pump alarm, a red bell appears at the top right corner  |

**Buttons**

|                   |   |
|-------------------|---|
| <b>LEAD</b>       | Assigns the pump as Duty 1 or Lead  |
| <b>HAND</b>       | Changes the pump mode to Hand. If the IPS is on, the pump will start immediately and run at the hand speed (see below).       |
| <b>OFF</b>        | Changes the pump mode to Off. The pump will stop immediately and it will be excluded from the duty rotation                   |
| <b>AUTO</b>       | Changes the pump mode to Auto. The pump will be assigned a duty status and it will run according to the IPS control algorithm |
| <b>HAND SPEED</b> | If the pump is placed in Hand, it will run at the hand speed entered  |

4.1.6 TEMP CONTROL OVERVIEW



**Description**

This screen allows monitoring and control of the temperature control feature

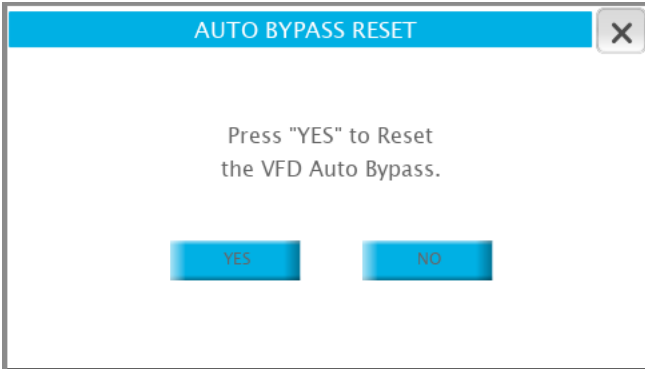
**Data**

|                    |  |
|--------------------|--|
| MODE               | Indicates the valve mode: HAND or AUTO                               |
| VALVE HAND POS (%) | Indicates the valve hand position in percentage                      |
| TEMP PV            | Indicates the temperature sensor present value in the selected units |
| TEMP SP            | Indicates the temperature set point in the selected units            |
| VALVE POS (%)      | Indicates the current position of the valve in percentage            |
| SENSOR STAT        | Indicates the status of the temperature sensor: OK or ALARM          |

**Buttons**

|                    |  |
|--------------------|--|
| MODE               | Allows changing the valve mode between HAND and AUTO                       |
| VALVE HAND POS (%) | Opens a keypad to enter the desired valve position                         |
| MAIN MENU          | Navigates to the main menu   |
| SYSTEM VIEW        | Changes the current screen to system overview                              |
| ZONE VIEW          | Changes the current screen to zone overview                                |
| ALARMS             | Shows the alarm screen. if there is an active alarm, this button turns red |

**4.1.7 AUTO BYPASS RESET**



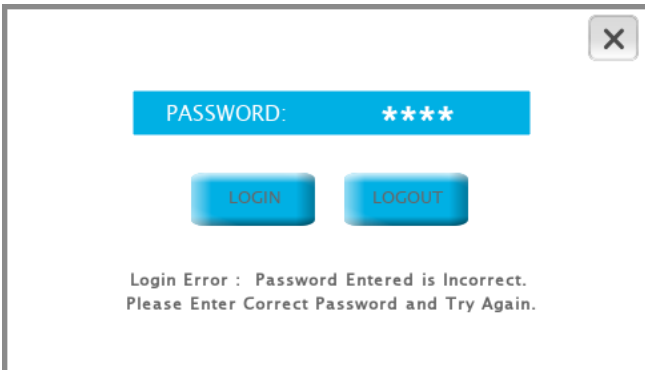
**Description**

This screen allows the operator to reset the pump auto bypass condition. Press the x on the top right corner to go back to the previous screen

**Buttons**

|     |   |
|-----|---|
| YES | Resets the auto bypass. If the conditions that caused the auto bypass don't exist anymore, the pumps will resume normal operation |
| NO  | Closes the auto bypass reset screen and returns to the previous screen  |

**4.1.8 LOGIN SCREEN**



**Description**

This screen allows the operator to login to the desired level by providing the appropriate password

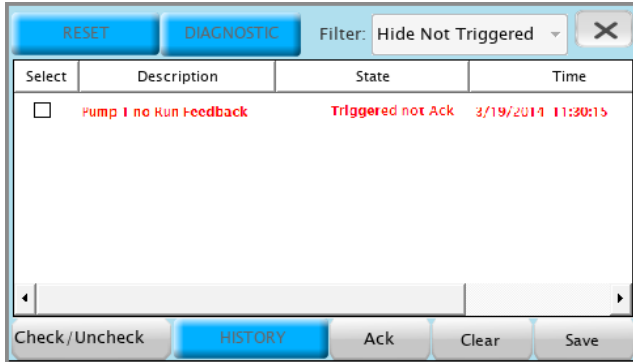
**Data**

|          |  |
|----------|--|
| PASSWORD | Shows the encoded password. Touching it brings up a numeric keypad to enter the password |
|----------|--|

**Buttons**

|        |  |
|--------|--|
| LOGIN  | If the password entered is valid, touching this button will change the screen to the setup menu of the corresponding level |
| LOGOUT | Changes the screen back to the main menu   |

4.1.9 ALARM SCREENS



**Description**

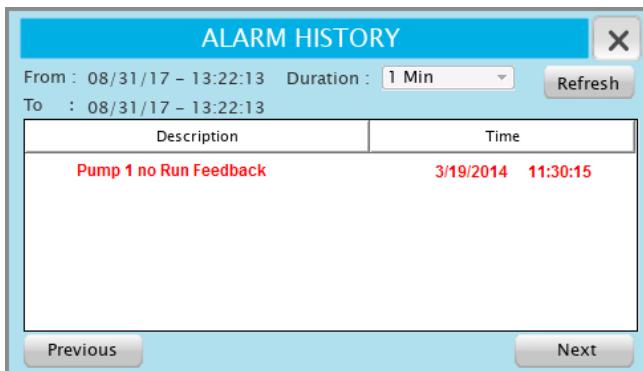
This screen shows the current alarms in the system. Press the x on the top right corner to go back to the previous screen

**Data**

|             |  |
|-------------|--|
| Select      | Select the alarm in order to be acknowledged and reset   |
| Description | Shows the description of the alarm. The possible alarms are shown below in section 1.2.1.  |
| State       | Provides information about two alarm conditions: <ol style="list-style-type: none"> <li>1 Triggered or Not Triggered (triggered means that the condition that generates the alarm is still present, the alarm can be acknowledged but not reset).</li> <li>2 Acknowledged or Not Acknowledged</li> </ol> |

**Buttons**

|                    |   |
|--------------------|---|
| RESET (upper case) | Resets the alarms. In order to clear from the list see <b>Reset</b> button below.               |
| DIAGNOSTIC         | Brings up the PLC diagnostics screen  |
| HISTORY            | Brings up the alarm history screen  |
| Check/Uncheck      | Selects/unselect the alarms. Only selected alarms can be acknowledged and cleared from the list |
| FILTER             | Not used  |
| ACK                | Acknowledges the selected alarms  |
| Reset              | Clears the selected alarms that are not triggered   |
| Save               | Not used  |



**Description**

This screen shows the alarms history. Press the x on the top right corner to go back to the previous screen

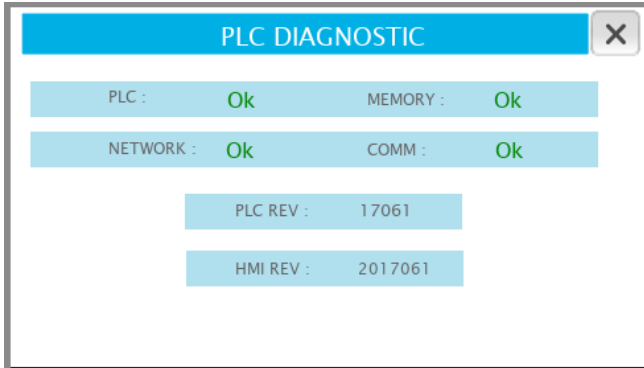
**Data**

|             |   |
|-------------|---|
| Description | Shows the description of the alarm. The possible alarms are shown below in section 1.2.1. |
| Time        | Shows the time of occurrence of each alarm  |

**Buttons**

|          |   |
|----------|---|
| REFRESH  | Refreshes the alarm list  |
| Duration | Drop down menu that allows to filter the list of alarms based on time of occurrence |
| Backward | Shows alarm history from the previous period selected in the duration dropdown menu |
| Forward  | Shows alarm history from the next period selected in the duration dropdown menu     |

#### 4.1.10 PLC DIAGNOSTIC



#### Description

This screen shows the current state of the PLC and the software revisions installed. Press the x on the top right corner to go back to the previous screen

#### Data

|         |   |
|---------|---|
| PLC     | Indicates if the PLC is working properly                                  |
| NETWORK | Indicates if the PLC network is working properly                          |
| MEMORY  | Indicates if the PLC memory is working properly                           |
| COMM    | Indicates if the serial communication port of the PLC is working properly |
| PLC REV | Indicates the software revision installed on the PLC                      |
| HMI REV | Indicates the software revision installed on the HMI                      |

#### 4.2.1 ALARMS

| Alarm                       | Description   | Possible causes  |
|-----------------------------|---|--|
| Pump n alarm                | Indicates that pump n is in alarm   | Any pump alarm will trigger this alarm   |
| Pump n run feedback alarm   | Indicates that the PLC didn't detect the pump run feedback after commanding the pump to start       | <ul style="list-style-type: none"> <li>vfd not configured for serial communication</li> <li>Loose or broken wire from vfd</li> <li>Incorrect vfd type selected on ips</li> <li>Impeller is stuck</li> </ul>          |
| Pump n no flow alarm        | Indicates that the PLC didn't detect flow (DP switch not closed) after commanding the pump to start | <ul style="list-style-type: none"> <li>DP switch not correctly adjusted</li> <li>Loose or broken wire</li> <li>Damaged PLC digital input</li> <li>Impeller is stuck</li> </ul>                                       |
| Pump n drive fault alarm    | Indicates that the pump vfd is reporting a fault  | vfd over current or other problem. Check vfd local display   |
| Dp transmitter fail alarm   | Indicates that the DP transmitter is out of range   | <ul style="list-style-type: none"> <li>Connection to transmitter is short or open circuited</li> <li>Damaged PLC analog input</li> <li>Loose or broken wire from transmitter</li> <li>Damaged transmitter</li> </ul> |
| Flow transmitter fail alarm | Indicates that the Flow transmitter is out of range   | <ul style="list-style-type: none"> <li>Connection to transmitter is short or open circuited</li> <li>Damaged PLC analog input</li> <li>Loose or broken wire from transmitter</li> <li>Damaged transmitter</li> </ul> |
| Zone n transmitter alarm    | Indicates that the zone transmitter is out of range   | <ul style="list-style-type: none"> <li>Connection to transmitter is short or open circuited</li> <li>Damaged PLC analog input</li> <li>Loose or broken wire from transmitter</li> <li>Damaged transmitter</li> </ul> |
| All zones transmitter alarm | Indicates that all zones transmitters are out of range  | All zone sensors are in alarm  |
| Pump n flow deviation alarm | Indicates that the sensorless flow of the pump is 20% off the average of the running pumps          | <ul style="list-style-type: none"> <li>There is a problem with the sensorless mapping of the vfd</li> <li>Air in the system</li> <li>A manual valve is obstructing flow</li> </ul>                                   |

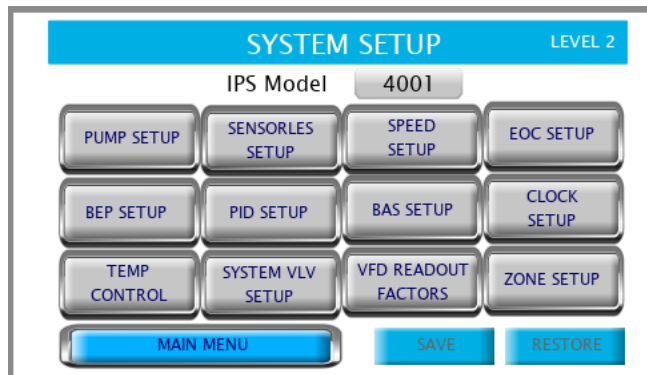


## 5.0 SETUP DISPLAYS

The setup displays allow viewing, modifying, saving and restoring system parameters. There are 3 levels of password protected access:

| Level   | Actions Allowed   |
|---------|---|
| Level 0 | <ul style="list-style-type: none"> <li>View only</li> </ul>   |
| Level 1 | <ul style="list-style-type: none"> <li>Modify all parameters</li> <li>Restore previously saved default values (factory defaults); except pump PID and BAS parameters</li> </ul> |
| Level 2 | <ul style="list-style-type: none"> <li>Modify all parameters</li> <li>Save changes</li> <li>Restore previously saved default values (factory defaults)</li> </ul>               |

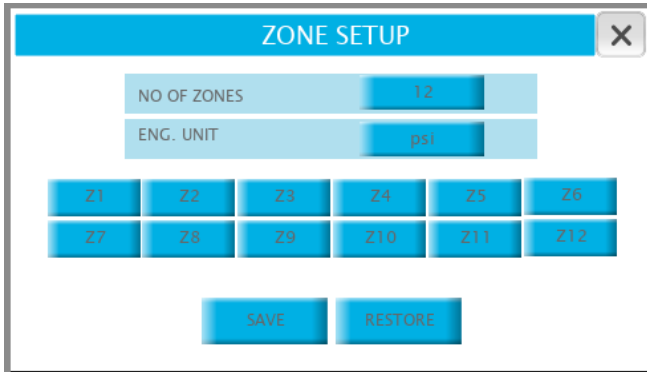
### 5.1.0 LEVEL 2 SETUP MENU



The following sections list and describe each setup screen. Only level 2 screens are shown, however each level has the same screens with their respective level restrictions.

| Description   |  |
|---|--|
| This screen allows navigation to each of the setup screens. |  |
| Button  |  |
| PUMP SETUP  | Navigates to the pump setup screen   |
| ZONE SETUP  | Navigates to the zone setup screen. Available if the vfd type on pump setup screen is IVS sensorless and if hybrid mode is selected.       |
| SENSORLESS SETUP  | Navigates to the sensorless setup screen. Available if the vfd type on pump setup screen is IVS sensorless and if hybrid mode is selected. |
| SPEED SETUP   | Navigates to the pump speed setup screen   |
| EOC SETUP   | Navigates to the End Of Curve (EOC) protection screen  |
| BEP SETUP   | Navigates to the duty speed staging setup screen   |
| PID SETUP   | Navigates to the PID setup screen  |
| BAS SETUP   | Navigates to the BAS setup screen  |
| CLOCK SETUP   | Navigates to the clock setup screen  |
| TEMP CONTROL  | Navigates to the temperature control setup screen  |
| SYSTEM VLV SETUP  | Navigates to the system valves setup screen  |
| VFD READOUT FACTORS   | Navigates to the vfd readout factors setup screen  |
| MAIN MENU   | Returns to the main menu. User must login again to return to the level 1 & level 2 setup menu  |
| SAVE  | Saves all the current setup parameters as default. Only available in level 2   |
| RESTORE   | Restores all the default parameters as default. Only available in level 1 & 2  |
| IPS Model   | Selects the IPS model: 4001, 4002 or 4003. Only available in level 1 & 2   |

5.1.1 ZONE SETUP



**Parameter: NO OF ZONES**

| Range | Function   |
|-------|--|
| 1-12  | Indicates how many zones will be used to control the system, typically one zone per area of the building |

**Parameter: ENG. UNIT**

| Options | Function                           |
|---------|------------------------------------|
| PSI     | DP sensors in psi are used         |
| FT      | DP sensors in ft are used          |
| KPA     | DP sensors in kPa are used         |
| M       | DP sensors in m are used           |
| BAR     | DP sensors in bar are used         |
| °F      | Temperature sensors in °F are used |
| °C      | Temperature sensors in °c are used |

**Button: SAVE**

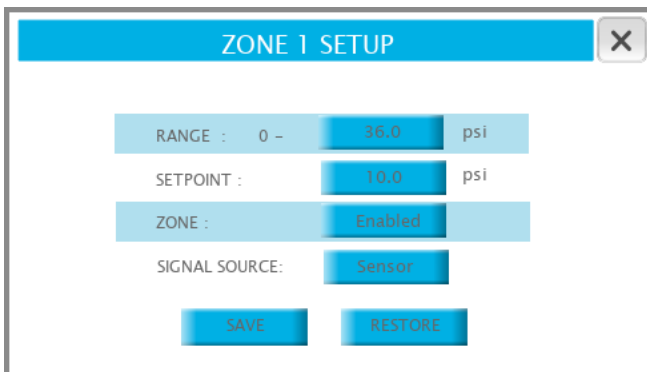
| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

There is one screen per zone

5.1.2 ZONE 1 TO 12 SETUP



**Parameter: RANGE**

| Range                                    | Function  |
|--|---|
| 0.0-999.9 (PSI, FT, kPa, m, BAR, °F, °C) | Indicates the range of the DP or temperature sensor of the zone |

**Parameter: SET POINT**

| Range                                    | Function   |
|--|--|
| 0.0-999.9 (PSI, FT, kPa, m, BAR, °F, °C) | Indicates the set point of the zone. The IPS uses this value to determine the pump speed |

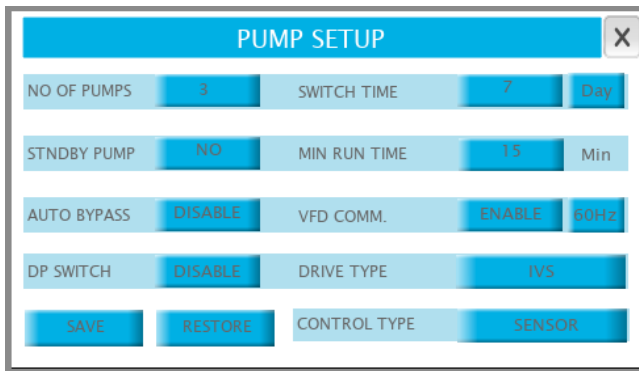
**Parameter: ZONE**

| Option: | Function   |
|---------|--|
| Disable | The zone is disabled, it won't be used to determine the active zone and pump speed |
| Enable  | The zone is enabled, it will be used to determine the active zone and pump speed   |

**Parameter: SIGNAL SOURCE**

| Option: | Function                       |
|---------|--------------------------------|
| Sensor  | Reading directly from a sensor |
| BAS     | Reading obtained from the BAS  |

5.1.3 PUMP SETUP



**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

**Parameter: NO OF ZONES**

| Range | Function   |
|-------|--|
| 1-6   | Indicates how many pumps are installed in the system |

**Parameter: STNDBY PUMP**

| Options | Function  |
|---------|---|
| NO      | All pumps in the system are duty  |
| YES     | One of the pumps in the system will be assigned as standby, it will only operate if a duty pump fails and there is no other duty pump to replace it |

**Parameter: AUTO BYPASS**

| Options | Function  |
|---------|---|
| DISABLE | Auto bypass function is disabled  |
| ENABLE  | When a pump fails (due to no run feedback, vfd fault or communication), the IPS will determine if there is another pump available to replace the faulty pump. If there is no pump available, a digital output will mechanically bypass the vfd and energize the pump motor directly. All pumps running at that moment will be bypassed. |

**Parameter: DP SWITCH**

| Options | Function   |
|---------|--|
| DISABLE | Pump DP switches are not installed. The IPS will use the drives' run feedback as confirmation that the pumps are operating |
| ENABLE  | Pump DP switches are installed. The IPS will use them as confirmation that the pumps are operating                         |

**Parameter: SWITCH TIME**

| Range               | Function  |
|---------------------|---|
| 1-999 (Days, Hours) | Indicates how often the lead (duty 1) pump will rotate among the duty pumps |

**PUMP SETUP**
✕

|  |         |              |                  |      |
|--|---------|--------------|------------------|------|
| NO OF PUMPS  | 3       | SWITCH TIME  | 7                | Day  |
| STNDBY PUMP  | NO      | MIN RUN TIME | 15               | Min  |
| AUTO BYPASS  | DISABLE | VFD COMM.    | ENABLE           | 60Hz |
| DP SWITCH  | DISABLE | DRIVE TYPE   | IVS (SENSORLESS) |      |
| <span style="background-color: #00AEEF; color: white; padding: 2px 10px; margin-right: 5px;">SAVE</span> <span style="background-color: #00AEEF; color: white; padding: 2px 10px; margin-right: 5px;">RESTORE</span> |         | CONTROL TYPE | HYBRID           |      |

**Parameter: MIN RUN TIME**

| Range | Function  |
|-------|---|
| 1-999 | Indicates what is the minimum time the lead (duty minutes 1) pump will run once it is started |

**Parameter: VFD COMM.**

| Options | Function   |
|---------|--|
| DISABLE | No serial communication to VFDs. The IPS will use hard wired connections   |
| ENABLE  | The IPS uses serial communication to the VFDs. Select if the VFD power is 50 or 60 Hz. The available VFDs are listed below |

**Parameter: DRIVE TYPE**

| Options          | Function  |
|------------------|---|
| IVS              | Serial communication to Armstrong IVS drive   |
| ACH 550          | Serial communication to ABB ACH 550 drive   |
| FC 102           | Serial communication to Danfoss FC102 drive   |
| E7               | Serial communication to Yasgawa E7 drive  |
| IVS (SENSORLESS) | Serial communication to Armstrong IVS drive configured for sensorless operation. By selecting this option the IPS4000 will operate in parallel sensorless mode. |

**\*NOTE:** The IPS4000 is configured to communicate to the drives with the following parameters: Modbus RTU, 19200 baud, no parity, 8 bits 1 stop bit

**Parameter: CONTROL TYPE**

| Options    | Function   |
|------------|--|
| SENSOR     | If SENSOR is selected the drive type is defaulted to FC102               |
| SENSORLESS | If SENSORLESS is selected, the drive type is defaulted to IVS sensorless |
| HYBRID     | If HYBRID is selected, the drive type is defaulted to IVS (sensorless)   |

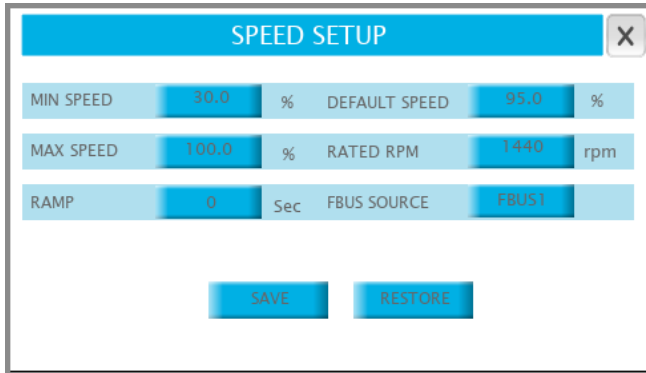
**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

5.1.4 SPEED SETUP



**Parameter: MIN SPEED**

| Range       | Function  |
|-------------|---|
| 0.0–100.0 % | The minimum speed the pumps will be allowed to run in Auto or Hand mode |

**Parameter: MAX SPEED**

| Range       | Function  |
|-------------|---|
| 0.0–100.0 % | The maximum speed the pumps will be allowed to run in Auto or Hand mode |

**Parameter: DEFAULT SPEED**

| Range       | Function   |
|-------------|--|
| 0.0–100.0 % | Indicates the speed the pumps will run at if all zone sensors fail. It does not apply in sensorless mode |

**Parameter: RATED RPM**

| Range      | Function   |
|------------|--|
| 0-9999 RPM | The pump rated RPM as indicated on the motor nameplate |

**Parameter: RAMP**

| Range     | Function   |
|-----------|--|
| 1-999 SEC | Indicates the amount of time it will take the pumps to increase their speed from 0% to 100% or to decrease their speed from 100% to 0% |

**Parameter: FBUS SOURCE**

| Options: | Function:   |
|----------|---|
| FBUS1    | This is the default. The PLC utilizes the field card in the FieldBus card slot to communicate with the VFDs   |
| FBUS2    | The PLC utilizes port J26 FBus2 to communicate with the VFDs. This option can be used if the field card is damaged (this option is not available for IPS4003) |

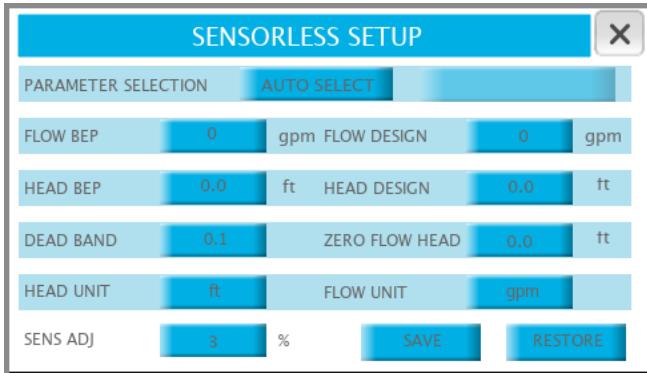
**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

5.1.5 SENSORLESS SETUP



**Parameter: PARAMETER SELECTION**

| Options       | Function   |
|---------------|--|
| AUTO SELECT   | The below parameters will be filled automatically based on the selected pump model |
| MANUAL SELECT | The below parameters will need to be filled by the user                            |

**Parameter: FLOW BEP**

| Range   | Function   |
|---------|--|
| 0–32767 | Flow at BEP (Best Efficiency Point) for one pump. It is used in conjunction with HEAD BEP to stage pumps on and off in order to maintain the system operating efficiently. For more information please contact your local Armstrong representative |

**Parameter: HEAD BEP**

| Range      | Function   |
|------------|--|
| 0.0–9999.9 | Head at BEP (Best Efficiency Point) for one pump. It is used in conjunction with FLOW BEP to stage pumps on and off in order to maintain the system operating efficiently. For more information please contact your local Armstrong representative |

**Parameter: DEAD BAND**

| Range      | Function   |
|------------|--|
| 0.0 to 1.0 | It is used to prevent constant staging of pumps. For more information please contact your local Armstrong representative |

**Parameter: HEAD UNIT**

| Options | Function                                       |
|---------|--|
| FT      | The drive sensorless head is programmed in ft  |
| PSI     | The drive sensorless head is programmed in psi |
| kPa     | The drive sensorless head is programmed in kPa |
| m       | The drive sensorless head is programmed in m   |
| BAR     | The drive sensorless head is programmed in bar |

**Parameter: SENS ADJ**

| Range   | Function  |
|---------|---|
| 0 – 5 % | It is used to adjust the sensorless mapping of the vfd. For more information please contact your local Armstrong representative |

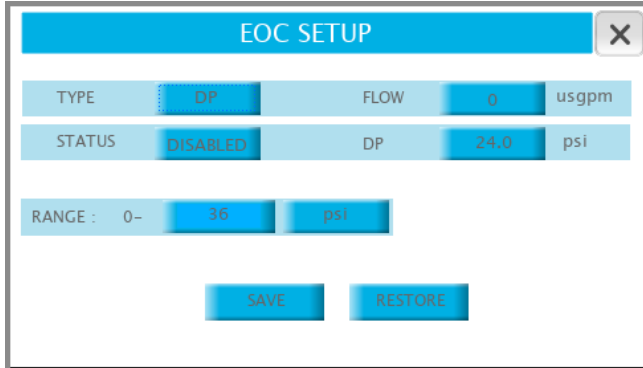
**Parameter: FLOW DESIGN**

| Range     | Function   |
|-----------|--|
| 0 – 32767 | Pump design flow. It is used to determine the system control curve |

**Parameter: HEAD DESIGN**

| Range        | Function   |
|--------------|--|
| 0.0 – 9999.9 | Pump Design Head. It is used to determine the system control curve |

5.1.6 EOC SETUP



| Parameter: ZERO FLOW HEAD |  |
|---------------------------|--|
| Range                     | Function   |
| 0.0 – 9999.9              | Pump Head at zero flow. It is used to determine the system control curve |

| Parameter: FLOW UNIT |  |
|----------------------|--|
| Options              | Function   |
| gpm                  | The drive sensorless flow is programmed in gpm               |
| l/s                  | The drive sensorless flow is programmed in l/s               |
| m <sup>3</sup> /h    | The drive sensorless flow is programmed in m <sup>3</sup> /h |

| Button: SAVE |  |
|--------------|--|
| Range        | Function   |
| N/A          | Saves current parameters as default. Only available in level 2 |

| Button: RESTORE |   |
|-----------------|---|
| Range           | Function  |
| N/A             | Restores default parameters. Only available in levels 1 & 2 |

| Parameter: TYPE |   |
|-----------------|---|
| Options         | Function  |
| DP              | EOC (End of Curve) protection is achieved with a DP sensor only for sensor or hybrid control mode |
| FLOW            | EOC protection is achieved with a flow sensor or with the sensorless flow if available            |

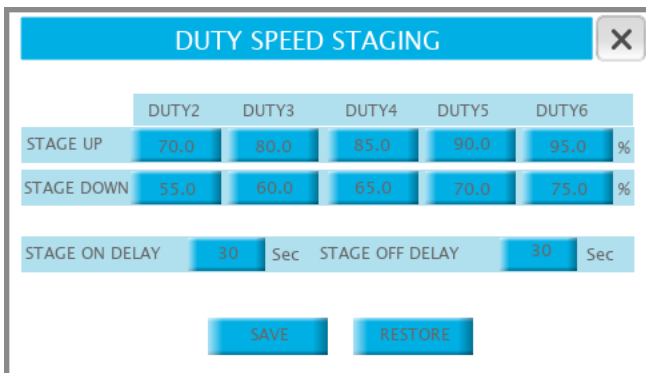
| Parameter: STATUS |   |
|-------------------|---|
| Options           | Function  |
| DISABLED          | EOC protection is disabled  |
| ENABLED           | EOC protection is enabled. If the DP or flow of one pump exceeds the EOC set point (see below), the next lag pump will be immediately staged on |

| Parameter: RANGE |  |
|------------------|--|
| Range            | Function   |
| 0 – 32767        | Indicates the range of the sensor (DP or flow) in engineering units. This value corresponds to the sensor's 20mA output. (Not available for IVS sensorless drives) |

| Parameter: FLOW |  |
|-----------------|--|
| Range           | Function   |
| 0 – 32767       | Indicates the pump's flow EOC set point. If the reading from the sensor exceeds this value, the next lag pump is staged on |

| Parameter: DP |  |
|---------------|--|
| Range         | Function   |
| 0–32767       | Indicates the pump's DP EOC set point. If the reading from the sensor exceeds this value, the next lag pump is staged on |

5.1.7 STAGING SETUP



**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

**Parameter: STAGE UP DUTY2**

| Range         | Function   |
|---------------|--|
| 0.0 – 100.0 % | Determines the Duty1 pump speed at which the Duty2 pump will be staged on. (Not available for IVS sensorless drives) |

**Parameter: STAGE UP DUTY3**

| Range         | Function   |
|---------------|--|
| 0.0 – 100.0 % | Determines the Duty1 pump speed at which the Duty3 pump will be staged on. (Not available for IVS sensorless drives) |

**Parameter: STAGE UP DUTY4**

| Range         | Function   |
|---------------|--|
| 0.0 – 100.0 % | Determines the Duty1 pump speed at which the Duty4 pump will be staged on. (Not available for IVS sensorless drives) |

**Parameter: STAGE UP DUTY5**

| Range         | Function   |
|---------------|--|
| 0.0 – 100.0 % | Determines the Duty1 pump speed at which the Duty5 pump will be staged on. (Not available for IVS sensorless drives) |

**Parameter: STAGE UP DUTY6**

| Range         | Function   |
|---------------|--|
| 0.0 – 100.0 % | Determines the Duty1 pump speed at which the Duty6 pump will be staged on. (Not available for IVS sensorless drives) |

**Parameter: STAGE DOWN DUTY2**

| Range         | Function   |
|---------------|--|
| 0.0 – 100.0 % | Determines the Duty1 pump speed under which the Duty2 pump will be staged off. (Not available for IVS sensorless drives) |

**Parameter: STAGE DOWN DUTY3**

| Range         | Function   |
|---------------|--|
| 0.0 – 100.0 % | Determines the Duty1 pump speed under which the Duty3 pump will be staged off. (Not available for IVS sensorless drives) |



---

**Parameter: STAGE DOWN DUTY4**

| Range            | Function   |
|------------------|--|
| 0.0 –<br>100.0 % | Determines the Duty1 pump speed under which the Duty4 pump will be staged off. (Not available for IVS sensorless drives) |

---

**Parameter: STAGE DOWN DUTY5**

| Range            | Function   |
|------------------|--|
| 0.0 –<br>100.0 % | Determines the Duty1 pump speed under which the Duty5 pump will be staged off. (Not available for IVS sensorless drives) |

---

**Parameter: STAGE DOWN DUTY6**

| Range            | Function   |
|------------------|--|
| 0.0 –<br>100.0 % | Determines the Duty1 pump speed under which the Duty6 pump will be staged off. (Not available for IVS sensorless drives) |

---

**Parameter: STAGE ON DELAY**

| Range            | Function  |
|------------------|---|
| 0.0 –<br>999 sec | Determines the time delay before staging on the next lag pump once the conditions are met. It applies to all drives, including IVS sensorless |

---

**Parameter: STAGE OFF DELAY**

| Range            | Function   |
|------------------|--|
| 0.0 –<br>999 sec | Determines the time delay before staging off the last lag pump once the conditions are met. It applies to all drives, including IVS sensorless |

---

**Button: SAVE**

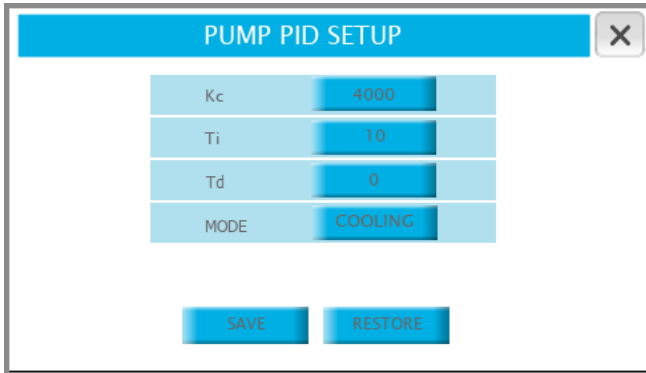
| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

---

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

5.1.8 PID SETUP



**Parameter: Kc**

| Range  | Function   |
|--------|--|
| 0-9999 | Determines the pump speed control PID loop gain. Smaller values correspond to a more responsive controller |

**Parameter: Ti**

| Range | Function  |
|-------|---|
| 0-999 | Determines the pump speed control PID loop integral time. Larger values correspond to more iterations and reduction of steady state error |

**Parameter: Td**

| Range | Function |
|-------|----------|
| 0-999 | Not used |

**Parameter: TYPE**

| Options | Function   |
|---------|--|
| Cooling | The speed of the pumps will increase when the Active Zone present value is below the set point |
| Heating | The speed of the pumps will decrease when the Active Zone present value is below the set point |

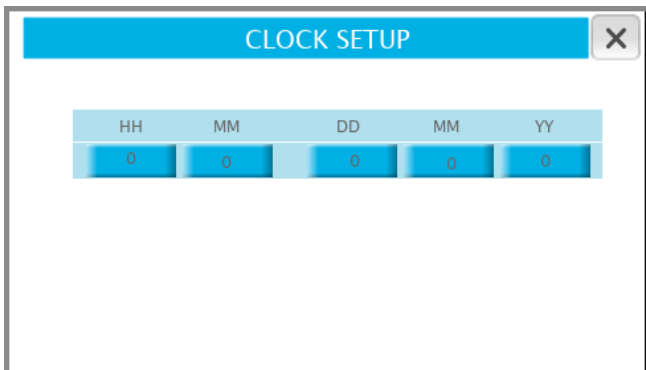
**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

5.1.9 CLOCK SETUP



**Parameter: HH**

| Range  | Function          |
|--------|-------------------|
| 0 - 24 | System clock hour |

**Parameter: MM**

| Range  | Function            |
|--------|---------------------|
| 0 - 60 | System clock minute |

**Parameter: DD**

| Range  | Function         |
|--------|------------------|
| 1 - 31 | System clock day |

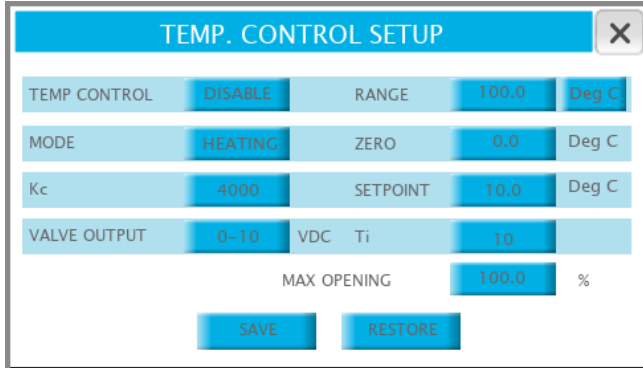
**Parameter: MM**

| Range  | Function           |
|--------|--------------------|
| 1 - 12 | System clock month |

**Parameter: YY**

| Range   | Function          |
|---------|-------------------|
| 00 - 99 | System clock year |

5.1.10 TEMPERATURE CONTROL SETUP



**Parameter: TEMP CONTROL**

| Options | Function   |
|---------|--|
| DISABLE | The temperature control setup is disabled. The temperature control button on the main menu is not displayed  |
| ENABLE  | The temperature control setup is enabled. The PLC will control a modulating valve to maintain the temperature at set point. The temperature control button on the main menu is displayed |

**Parameter: MODE**

| Options | Function   |
|---------|--|
| HEATING | The valve opens if the temperature is under the set point  |
| COOLING | The valve closes if the temperature is under the set point |

**Parameter: Kc**

| Range  | Function  |
|--------|---|
| 0-9999 | Determines the valve control PID loop gain. Smaller values correspond to a more responsive controller |

**Parameter: VALVE OUTPUT**

| Options    | Function                                    |
|------------|---|
| 0 - 10 VDC | Selects 0 VDC as valve fully closed command |
| 2 - 10 VDC | Selects 2 VDC as valve fully closed command |

**Parameter: RANGE**

| Range       | Function   |
|-------------|--|
| 0.0 - 999.9 | Indicates the range of the temperature sensor in engineering units. This value corresponds to the sensor's 20mA output |

**Parameter: ZERO**

| Range       | Function   |
|-------------|--|
| 0.0 - 999.9 | Indicates the zero of the temperature sensor in engineering units. This value corresponds to the sensor's 4mA output |

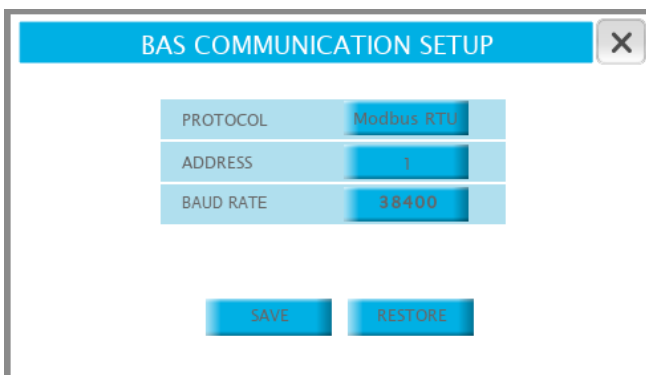
**Parameter: UNITS**

| Option: | Function                           |
|---------|------------------------------------|
| °F      | Temperature sensors in °F are used |
| °C      | Temperature sensors in °C are used |

**Parameter: Ti**

| Range   | Function   |
|---------|--|
| 0 - 999 | Determines the valve control PID loop integral time. Larger values correspond to more iterations and reduction of steady state error |

5.1.11 BAS COMMUNICATION SETUP



**Parameter: MAX OPENING**

| Range         | Function  |
|---------------|---|
| 0.0 - 100.0 % | Determines the maximum allowable opening (in %) of the valve. |

**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

**Parameter: PROTOCOL**

| Options    | Function                    |
|------------|-----------------------------|
| N/A        | No BAS protocol is selected |
| Modbus RTU | Selects Modbus RTU          |
| Lonworks   | Selects Lonworks            |
| BACnet     | Selects BACnet              |

**Parameter: ADDRESS**

| Range | Function  |
|-------|---|
| 0-127 | Selects the IPS BAS address. Only applies to Modbus RTU protocols |

**Parameter: BAUD RATE**

| Options | Function  |
|---------|---|
| 1200    | Selects 1200 as baud rate. Only applies to Modbus RTU protocol  |
| 2400    | Selects 2400 as baud rate. Only applies to Modbus RTU protocol  |
| 4800    | Selects 4800 as baud rate. Only applies to Modbus RTU protocol  |
| 9600    | Selects 9600 as baud rate. Only applies to Modbus RTU protocol  |
| 19200   | Selects 19200 as baud rate. Only applies to Modbus RTU protocol |
| 38400   | Selects 38400 as baud rate. Only applies to Modbus RTU protocol |

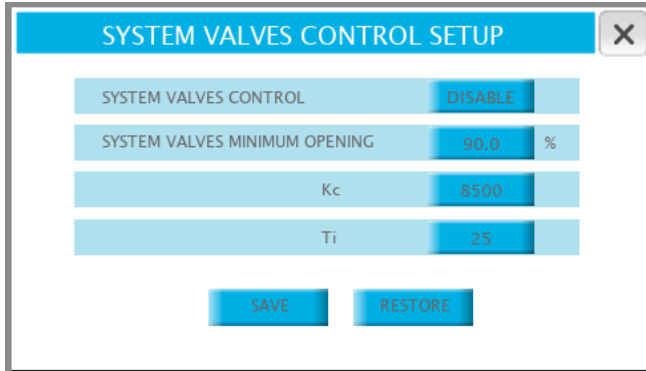
**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

5.1.12 SYSTEM VALVES CONTROL SETUP



**Parameter: SYSTEM VALVES CONTROL**

| Options | Function  |
|---------|---|
| DISABLE | System valves control is disabled   |
| ENABLE  | System valves control is enabled. The PLC will modify the active zone set point in order to maintain the system valve with the maximum opening at set point |

**Parameter: SYSTEM VALVES MINIMUM OPENING**

| Range        | Function   |
|--------------|--|
| 0.0 – 100.0% | Indicates the set point for the minimum opening of the system valves |

**Parameter: Kc**

| Range  | Function  |
|--------|---|
| 0–9999 | Determines the system valves control PID loop gain. Smaller values correspond to a more responsive controller |

**Parameter: Ti**

| Range   | Function   |
|---------|--|
| 0 – 999 | Determines the system valves control PID loop integral time. Larger values correspond to more iterations and reduction of steady state error |

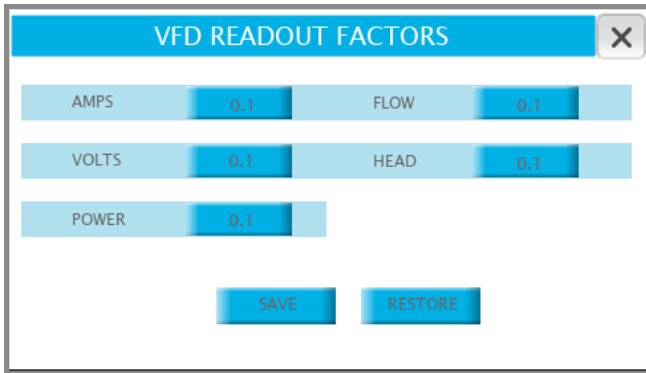
**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

5.1.13 VFD READOUT SETUP



**Parameter: AMPS**

| Options | Function  |
|---------|---|
| 0.1     | The current value read from the vFD is divided by 10    |
| 1       | The current value read from the vFD is not scaled       |
| 10      | The current value read from the vFD is multiplied by 10 |

**Parameter: VOLTS**

| Options | Function  |
|---------|---|
| 0.1     | The voltage value read from the vFD is divided by 10    |
| 1       | The voltage value read from the vFD is not scaled       |
| 10      | The voltage value read from the vFD is multiplied by 10 |

**Parameter: POWER**

| Options | Function   |
|---------|--|
| 0.1     | The kW value read from the vFD is divided by 10    |
| 1       | The kW value read from the vFD is not scaled       |
| 10      | The kW value read from the vFD is multiplied by 10 |

**Parameter: FLOW**

| Options | Function   |
|---------|--|
| 0.1     | The flow value read from the vFD is divided by 10    |
| 1       | The flow value read from the vFD is not scaled       |
| 10      | The flow value read from the vFD is multiplied by 10 |

**Parameter: HEAD**

| Options | Function   |
|---------|--|
| 0.1     | The head value read from the vFD is divided by 10    |
| 1       | The head value read from the vFD is not scaled       |
| 10      | The head value read from the vFD is multiplied by 10 |

**Button: SAVE**

| Range | Function   |
|-------|--|
| N/A   | Saves current parameters as default. Only available in level 2 |

**Button: RESTORE**

| Range | Function  |
|-------|---|
| N/A   | Restores default parameters. Only available in levels 1 & 2 |

5.1.14 LANGUAGES



**Description**

This screen allows the selection of the language on the different screens

**Button**

|            |                                    |
|------------|------------------------------------|
| ENGLISH    | Displays all screens in English    |
| SPANISH    | Displays all screens in Spanish    |
| PORTUGUESE | Displays all screens in Portuguese |
| FRENCH     | Displays all screens in French     |
| CHINESE    | Displays all screens in Chinese    |

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