# ARMSTRONG

## INSTALLATION AND OPERATING INSTRUCTIONS

# 6800 HMP Series Booster Set

**Please read all these notes carefully,**

## CE CONFORMITIES:

| | |
|---|---|
| LVD | BS EN 61010-1 |
| Low Voltage Switchgear | BS EN 60439-1 |
| Safety of Machinery | BS EN ISO 12100-1 |
| Safety of Machinery | BS EN ISO 12100-2 |
| Safety of Machinery | BS EN 60204-1 |
| Electromagnetic compatibility | |
| Harmonic Emissions | BS EN 61000-3-2 |
| Electrostatic discharge | BS EN 61000-4-2 |
| Radiated RF Immunity | BS EN 61000-4-3 |
| Fast transient bursts | BS EN 61000-4-4 |
| Voltage Surges | BS EN 61000-4-5 |
| Conducted RF Immunity | BS EN 61000-4-6 |
| Voltage Dips | BS EN 61000-4-11 |
| Generic immunity | BS EN 61000-6-1 |
| Generic immunity | BS EN 61000-6-2 |
| Generic emissions | BS EN 61000-6-3 |
| Generic emissions | BS EN 61000-6-4 |

## PREFACE

1. The 6800 HMP Series booster sets are designed for ease of setting and operation
2. All packaged pump systems are pre-wired and fully tested, both hydraulically and electrically prior to dispatch.
3. All parameter data has been entered into the controller in accordance with the system criteria. Once on-site connections have been made, and all pre-checks carried out the system is ready for commissioning.
4. If during commissioning system conditions are found to vary from those set out in the design criteria, the parameters can be easily changed.

## INTRODUCTION

1. This leaflet contains specific information regarding the safe installation and operation of 6800 HMP Series booster sets. These instructions must be read and understood by any one responsible for the installation and maintenance of this equipment.
2. Prior to power being applied, it is essential that all pre-commissioning procedures are carried out in full.
3. Operators and installers must familiarise themselves with the operation and controls of the equipment.

## WARNING SYMBOLS

Safety instruction where an electrical hazard is involved.

Safety instruction where non-compliance would affect safety.

Safety instruction relating to safe operation of the equipment. (ATTENTION)

## INSTRUCTIONS FOR SAFE USE

1. No installation of this equipment should take place until this I,O&M instruction has been studied and understood by the person responsible.
2. Handling, transportation and installation of this equipment shall only be undertaken with the proper use of lifting gear.
3. The set shall not be used for any purpose other than that for which it was designed and sized.
4. **The set *shall not be operated with the door open and the Door Interlocked Isolator overridden*.**

## STORAGE

Store in a dry place. Protect against dirt, damage and frost.

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## LIMITATIONS

1. Maximum system working pressure: 10, 15 and 25 bar.
2. Operating pressure:
   Nominal - as shown on pump name plates.
   Maximum - shut valve head of pumps fitted.
3. Electrical supplies: 3 phase, 50 Hz, 400volts.
4. Power supply fluctuation: +/- 10% maximum.
5. Humidity none condensing: 80% RH up to 31°C decreasing linearly to 50% RH at 40°C.
6. Ambient temperature: 5°C to 40°C.

## PROTECTION

The set must be protected from the formation of condensation.  If there is a likelihood of condensation forming on or in the control panel then an anti-condensation heater should be fitted.  Contact our service department for details.

## GENERAL NOTES

The sets comprise two, three, four or five pumps operating on a duty stand-by or duty, support and stand-by or duty, support, support arrangement.
Each unit is set-up for a specific application, any change in the system conditions may necessitate a change in the settings.

## INSTALLATION

### Mechanical

1. The pump set is intended for use under flooded suction conditions, unless suction lift conditions were specifically included in the order, and should be positioned in such a way that it's relationship to the storage tank ensures a positive suction head at full flow.
2. Site the set with sufficient space to the front and rear for maintenance purposes.
3. The set should be installed on a flat and even surface.

### Electrical

1. The power supply required is 400 volt +/-10%, 3 phase, 50Hz to suit motors fitted.
2. The incoming supply should be connected to the door interlocked isolator from a local distribution board.
3. ***THE SET MUST BE EFFICIENTLY EARTHED.***

## IMPORTANT SAFETY INFORMATION

1. The voltage on the HMP Booster Set is dangerous when it is connected to the mains. Incorrect installation of the set may lead to material damage or serious injury or it may be fatal. Consequently, the instructions in this manual as well as the local rules and safety regulations must be complied with.
2. Touching the electrical parts may be fatal, even after the mains supply has been disconnected, wait at least 4 minutes.
3. The installation must be fused and isolated correctly.
4. Covers and cable entries must be fitted.

**NB!**
**It is the user's or certified electrician's responsibility to ensure correct earthing and protection in accordance with applicable national and local requirements and standards.**

### Safety Regulations

1. The 6800 HMP Series Booster Set must be disconnected from the mains if repair work is to be carried out. Check the mains supply has been disconnected and the necessary time has passed (4 minutes).
2. The correct protective earthing of the equipment must be established, the user must be protected against supply voltage, and the set must be protected against overload in accordance with applicable national and local regulations.
3. RCD's (ELCB relays), multiple protective earthing or earthing can be used as extra protection, provided that local safety regulations are complied with.
4. In case of an earth fault, a DC content may develop in the fault current.
5. If RCD's are used, local regulations must be observed. Relays must be suitable for protection of 3 phase equipment with a bridge rectifier and for a brief discharge on power up.
6. The earth leakage currents are higher than 3.5mA. This means that the 6800 HMP Series Booster set requires a fixed, permanent installation as well as reinforced protective earthing.

## GENERAL FUNCTIONALITY

1. Pumps are staged in or out as required and all operate at the same speed
2. If a fault occurs with any support pump then it will be omitted from the duty cycle and the individual pumps 'tripped' indicator displayed. The set will continue to operate as normal (where possible, within the limits of the set). If a standby pump is selected, this will become active when a pump fault occurs.
3. When demand is minimal and only the duty pump is running, the set will enter sleep mode and monitor system conditions whilst all pumps are stopped. If demand resumes then pump(s) will automatically start.

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## BOOSTER SET PROTECTION PROCEDURE

### Remote Stop/Inhibit

1.  The 6800 HMP Series Booster Set is fitted with a Remote Stop/Inhibit feature which holds the set in STANDBY mode until a link is made between terminals *13 & 14*. These terminals are mounted inside the control panel.
2.  This feature is provided as a means for the Building Management System (BMS) to remotely disable the set via a switch.
    If this feature isn't required the link must be fitted as described above.

### Low Water Level Device

3.  Each booster set has Dual break tank protection as standard within the control software. Ensure that the customer supplied break tank No. 1 low water level switch is connected to the terminals numbered *15 & 16*. Also ensure that the customer supplied break tank No. 2 low water level switch is connected to the terminals numbered *17 & 18*.These terminals are mounted on the terminal rail inside the control panel. Both switches should be NORMALLY CLOSED when the tank levels are healthy.

**NB!**

**The above procedure is designed to ensure that the set does not run dry. It is the user's responsibility to ensure that the Booster Set has a sufficient water supply at all times.**

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## INTRODUCTION

The Constant Speed Booster HMI is divided in four 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:

1. Main Menu
2. System Overview
3. Pressure Overview
4. Pump Overview
5. Pump 1 to 5 Control
6. Pump 1 to 5 Status Displays
7. PLC Diagnostic Screen

### Alarm Management Displays:

Alarm Screens
1. Tank 1 Low Level Shutdown Alarm
2. Tank 2 Low Level Shutdown Alarm
3. Discharge Pressure Sensor Failure Alarm
4. Suction Pressure Sensor Failure Alarm
5. Low Suction Pressure Shutdown Alarm
6. Low Discharge Pressure Shutdown Alarm
7. High Discharge Pressure Shutdown Alarm
8. Pump 1 to 5 Run Feedback Alarm
9. No More Alarm

### 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 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 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 2323.

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

1. Main Setup Screen
2. Booster Type Setup (Level 2 Only)
3. System Setup
4. Discharge Pressure Setup
5. Suction Pressure Setup
6. System Pressure Set Point Setup
7. Suction Pressure Alarm Set Points
8. Discharge Pressure Alarm Set Points
9. Pressure Staging Set Points
10. Staging Delay Set Points
11. Lag Pump Minimum Run Time Set Point
12. No Flow Shutdown Set Points
13. Lead Switch Time Set Point

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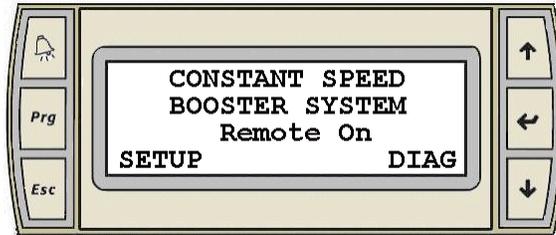
## HMI PANEL – DESCRIPTION OF BUTTONS FUNCTION
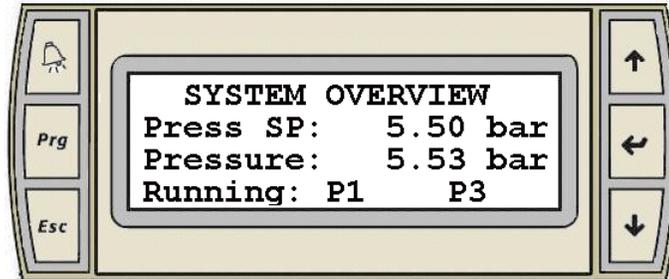


The display panel has following button:

1.  **The Alarm Button**

    a.  The Alarm Button will stay solid White when there are no active alarms.
    b.  The Alarm Button will flash RED when an alarm is activated.
    c.  Pressing the Alarm Button will call up the Alarm Display.
    d.  The Alarm Button will go solid White when all alarms are reset (acknowledged).
    e.  The Alarm Button will go solid Red when the alarms are reset and there are still some active alarms.
    f.  The Alarm Button will stay solid White when there are no active alarms.

2.  **The Prg Button**

    a.  Pressing the Prg Button at any time will call up the Main Menu display.

3.  **The Esc Button**

    a.  Pressing the Esc Button will bring you back to the previous display level.
    b.  For example pressing the Esc button from the Pump Status display will call up the Pump Overview display.

4.  **The Up and Down Arrow Button**

    a.  When the cursor is at the top left corner of the screen pressing the "Up" or "Down" Arrow buttons will let you navigate between displays.
    b.  When the cursor is over a digital value pressing the "Up" or "Down" Arrow button will toggle the value.
    c.  When the cursor is over an analog value pressing the "Up" or "Down" Arrow button will increase or decrease its value respectively.

5.  **The Enter Button**

    a.  Pressing the Enter button will move the cursor to the control values within a display from top to bottom' left to right.

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## OPERATION DISPLAYS

**Main Menu**



```
        CONSTANT SPEED
        BOOSTER SYSTEM
          Remote On
SETUP              DIAG
```

1. The display is the Main Menu for the Constant Speed Booster
2. Pressing the "Prg" Button at any time will call up the Main Menu display.
3. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active Operation displays: Main Menu, System Overview, Pressure Overview, Pump Overview, and Pump Control.
4. Pressing the "Enter" key will move the cursor over the "R" of "Remote", the "S" of "Setup", and the "D" of "Diag".
5. When the cursor is over "Remote" pressing the "Up" or "Down" arrow will toggle between Remote and Local control. The text will toggle between "Remote" and "Local".
6. When the cursor is over "Setup" pressing the "Up" or "Down" arrow will call up the Main Setup Screen (Level 0).
7. When the cursor is over "Diag" pressing the "Up" or "Down" arrow will call up the PLC Diagnostic screen.

**No Configuration Display**



```
      THE BOOSTER SET
    IS NOT CONFIGURED
        GO TO THE
        SETUP MENU
```
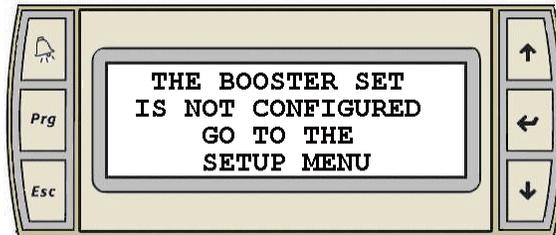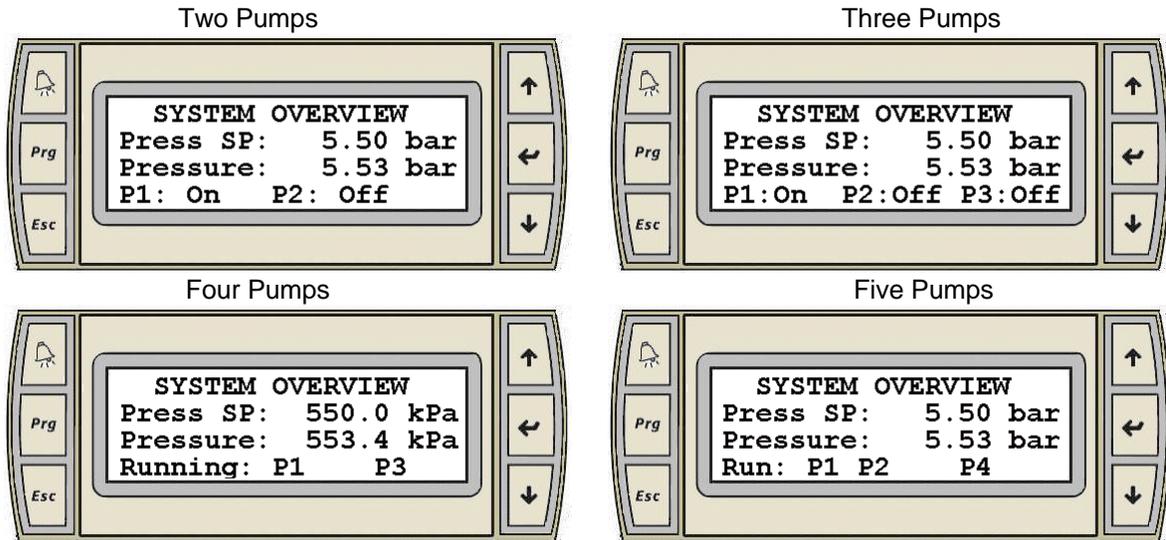
1. When the Booster has not been setup this display and the Main Menu display will be the only operation displays to appear.

**Diagnostic Display**



```
      PLC DIAGNOSTIC
PLC: Ok    Mem: Ok
Net: Ok   Comm: Ok
Software Rev: 7.091
```
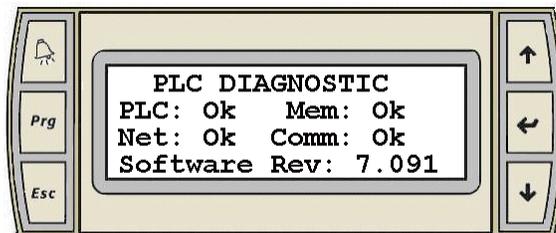
1. Line 2 and 3 indicates the PLC, Memory, Network, and Communication status.
2. Pressing the "Esc" key will call up the main menu.

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## System Overview Displays

Two Pumps

```
    SYSTEM OVERVIEW
Press SP:    5.50 bar
Pressure:    5.53 bar
P1: On    P2: Off
```

Three Pumps

```
    SYSTEM OVERVIEW
Press SP:    5.50 bar
Pressure:    5.53 bar
P1:On   P2:Off P3:Off
```

Four Pumps

```
    SYSTEM OVERVIEW
Press SP:   550.0 kPa
Pressure:   553.4 kPa
Running: P1     P3
```

Five Pumps

```
    SYSTEM OVERVIEW
Press SP:    5.50 bar
Pressure:    5.53 bar
Run: P1 P2      P4
```
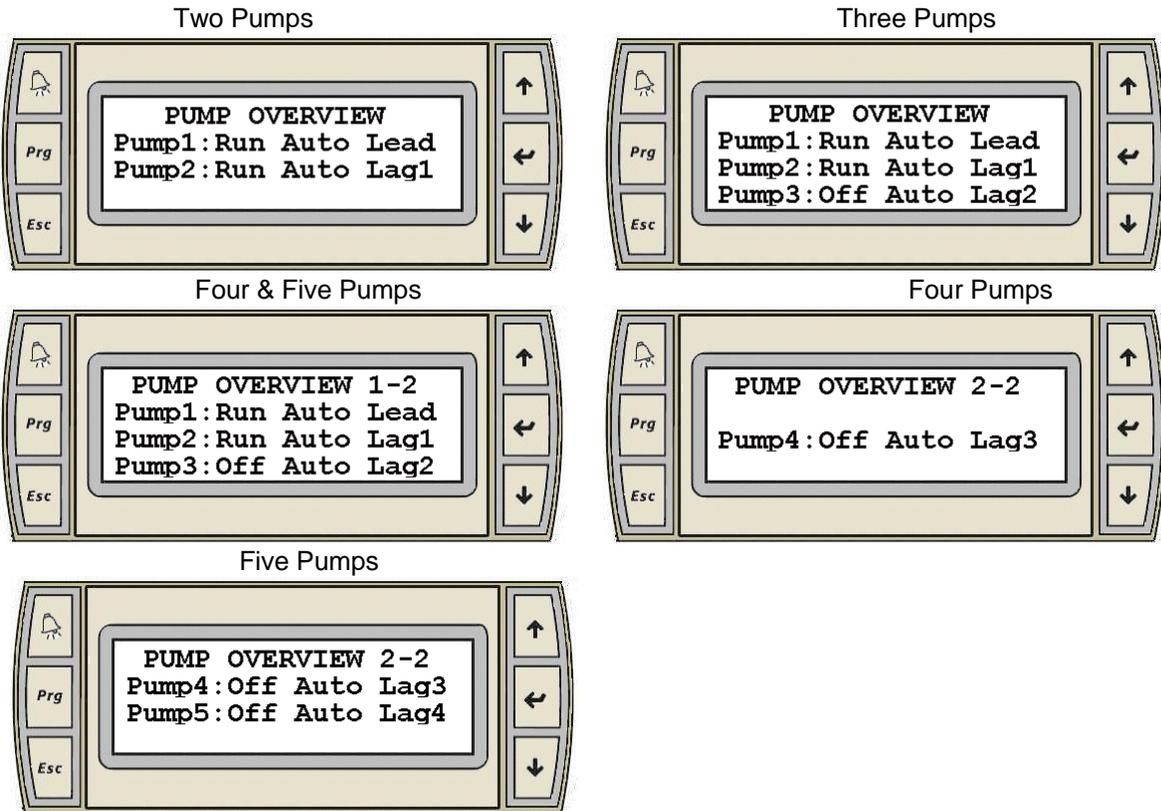
1. The System Overview screen for the selected amount of pumps will be the only one to be active and displayed.
2. This display is for viewing only.
3. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active Operation displays.
4. The first line displays the System Pressure Set Point.
5. The second line displays the actual system pressure value.
6. The third line shows which pump is On or Off.

## Pressure Overview Display

```
    PRESSURE OVERVIEW
   Suction:   1.38 bar
 Discharge:   5.53 bar
     Boost:   4.15 bar
```
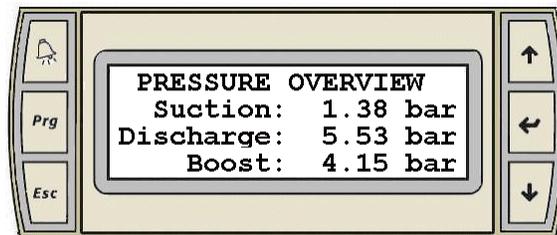
1. This screen will only be active and displayed when the suction pressure sensor is enabled.
2. This display is for viewing only.
3. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active Operation displays.
4. This screen displays the actual value of the suction and discharge pressure. It also calculates the pump boost.

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**Pump Overview Displays**

Two Pumps

```
        PUMP OVERVIEW
Pump1:Run Auto Lead
Pump2:Run Auto Lag1
```

Three Pumps

```
        PUMP OVERVIEW
Pump1:Run Auto Lead
Pump2:Run Auto Lag1
Pump3:Off Auto Lag2
```

Four & Five Pumps

```
      PUMP OVERVIEW 1-2
Pump1:Run Auto Lead
Pump2:Run Auto Lag1
Pump3:Off Auto Lag2
```

Four Pumps

```
      PUMP OVERVIEW 2-2

Pump4:Off Auto Lag3
```

Five Pumps

```
      PUMP OVERVIEW 2-2
Pump4:Off Auto Lag3
Pump5:Off Auto Lag4
```

1. The Pump Overview screen for the selected amount of pumps will be the only one to be active and displayed.
2. This display is for viewing only.
3. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active Operation displays.
4. This screen will display for each pump: the run feedback "Off or Run", the mode "Hand-Off-Auto", the order of the pumps "Lead, Lag1, Lag2, Lag3, or Lag4".
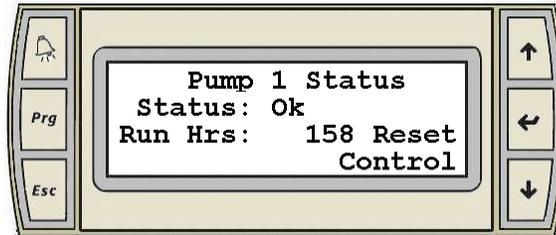
**Pump Control Display**
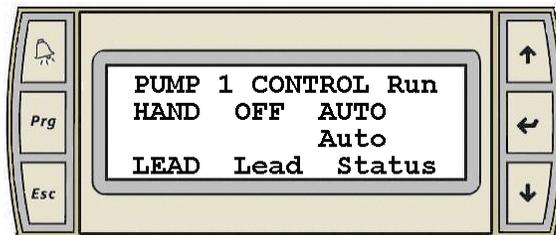
```
PUMP 1 CONTROL Run
HAND   OFF   AUTO
              Auto
LEAD   Lead  Status
```

1. There are similar displays for Pump 1 to 5.
2. Only the displays corresponding to the number of pumps selected will be active and displayed. For example if the number of pumps is set to two on the pump setup display, only the control display for pump 1 and 2 will be active.
3. When the cursor is at the top left corner of the screen pressing the "Up" or "Down" arrow will navigate between all active operation displays.
4. The following information is displayed for the corresponding pump:
   a. The top line indicates the Pump number, and the pump running status (Run, Stop).
   b. Line 2 is used to select the Pump Mode: Hand, Off, or Auto.

    c.   Line 3 is used to indicate the pump mode. The picture above indicates the pump is in Auto mode.
    d.   Line 4 is used to select the lead pump, and the pump status display.
    e.   Line 4 also indicates if the pump is the Lead, Lag1, Lag2, Lag3, or Lag4 pump.

5. Pressing the "Enter" key will move the cursor as follow: HAND, OFF, AUTO, LEAD, Status, and back to the top left corner.
6. When the cursor is over "HAND", "OFF", or "AUTO" pressing the "Up" or "Down" key will change the pump mode to Hand, Off, Auto correspondingly.
7. When the cursor is over Lead, pressing the "Up" or "Down" arrow will 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.
8. When the cursor is over Status pressing the "Up" or "Down" arrow will call up the Pump Status Display.

## Pump Status Display



```
          Pump 1 Status
        Status: Ok
        Run Hrs:    158 Reset
                       Control
```
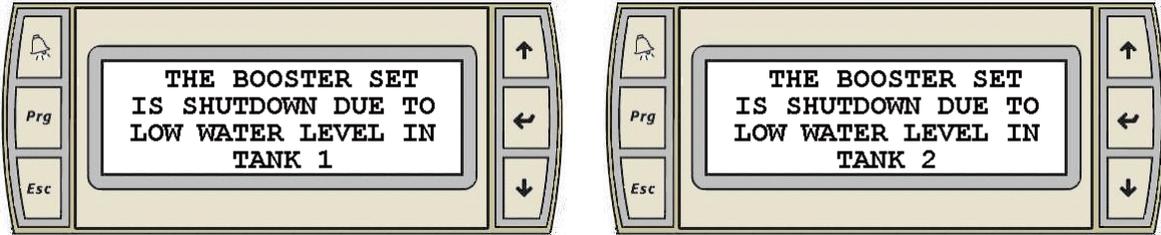
1. There are similar displays for Pump 1 to 5.
2. Only the displays corresponding to the number of pumps selected will be active and displayed.
3. When the cursor is at the top left corner of the screen pressing the "Up" or "Down" arrow will navigate between all active pump status displays.
4. Line 2 indicates the status of the pump: Ok or Alarm.
5. Line 3 indicates the total number of running hours since the last reset.
6. Pressing the "Enter" key will move the cursor as follow: Reset, Control, and back to the top left corner.
7. When the cursor is over Reset pressing the "Up" or "Down" arrow will reset the number of run hours to zero.
8. When the cursor is over Control pressing the "Up" or "Down" arrow will call up the Pump Control Display.
9. Pressing the "Esc" button at anytime will call up the Pump Overview display.

## No Flow Shutdown Display



```
        THE BOOSTER SET
             IS IN
        NO FLOW SHUTDOWN
```
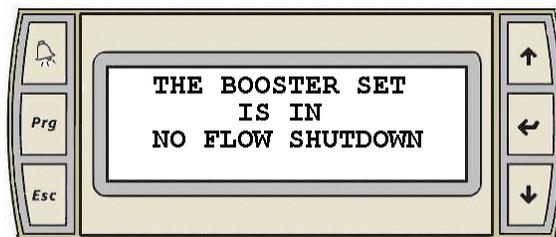
1. When the booster set stops because of No Flow Shutdown (Sleep Mode) this display appears.
2. When the booster set start up again the system overview display appears.
3. When the cursor is at the top left corner of the screen pressing the "Up" or "Down" arrow will navigate between all actives operation displays.

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**Low Tank Level Shutdown Displays**

```
┌──────────────────────────────┐      ┌──────────────────────────────┐
│ 🔔              ↑             │      │ 🔔              ↑             │
│      ┌────────────────┐      │      │      ┌────────────────┐      │
│ Prg  │ THE BOOSTER SET│  ↵   │      │ Prg  │ THE BOOSTER SET│  ↵   │
│      │ IS SHUTDOWN DUE TO│   │      │      │ IS SHUTDOWN DUE TO│   │
│      │ LOW WATER LEVEL IN│   │      │      │ LOW WATER LEVEL IN│   │
│ Esc  │     TANK 1     │  ↓   │      │ Esc  │     TANK 2     │  ↓   │
│      └────────────────┘      │      │      └────────────────┘      │
└──────────────────────────────┘      └──────────────────────────────┘
```

1. When the booster set stops due to low water level in tank 1 or 2 the corresponding display appears.
2. When the booster set start up again the system overview display appears.
3. When the cursor is at the top left corner of the screen pressing the "Up" or "Down" arrow will navigate between all actives operation displays.
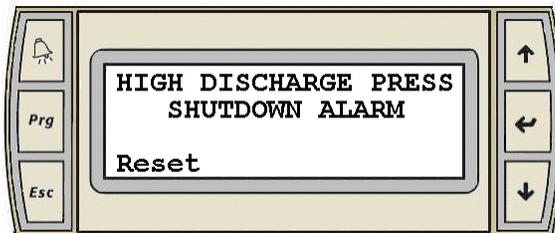

# ALARM MANAGEMENT DISPLAYS

## Alarm Displays

1. Pressing the "Alarm" button 🔔 at any time will call up the alarm display.
2. If there is no active alarm the following "No More Alarms" display will appear:

```
┌──────────────────────────────┐
│ 🔔              ↑             │
│      ┌────────────────┐      │
│ Prg  │                │  ↵   │
│      │ No More Alarms │      │
│      │                │      │
│ Esc  └────────────────┘  ↓   │
└──────────────────────────────┘
```

3. This display will also appear when navigating through a number of Active Alarm displays to indicate when you reach the end of the list of active alarm.
4. If there is one or more active alarms an alarm display similar to the one below will appear:
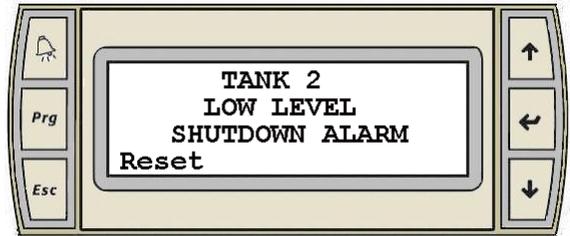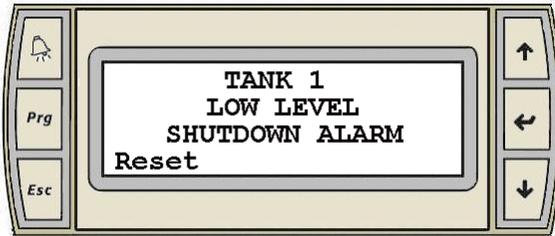
```
┌──────────────────────────────┐
│ 🔔              ↑             │
│      ┌────────────────┐      │
│ Prg  │ HIGH DISCHARGE PRESS  ↵   │
│      │   SHUTDOWN ALARM │      │
│      │ Reset          │      │
│ Esc  └────────────────┘  ↓   │
└──────────────────────────────┘
```

5. When the cursor is at the top left corner of the screen pressing the "Up" or "Down" arrow will navigate between the active alarm displays.
6. When you reach the end of the alarm list the "No More Alarms" display will appear.
7. All alarm displays are setup as the one above.
8. **The top three lines give a brief alarm description.**
9. When the cursor is above "Reset", pressing the "Up" or "Down" arrow will reset all non active alarm. It will also silence and stop the "Alarm" button from flashing red. If there are no more active alarms the "Alarm" button will turn white.
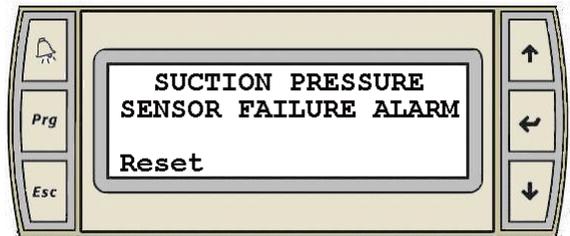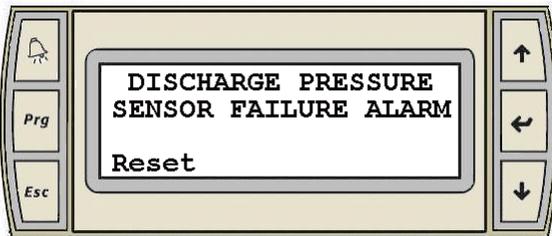
![ARMSTRONG logo]

**Alarm Displays**

1. These are all the different Alarm Display in order they will appear when navigating through the active alarms. Only the displays associated with an active alarm will appear.
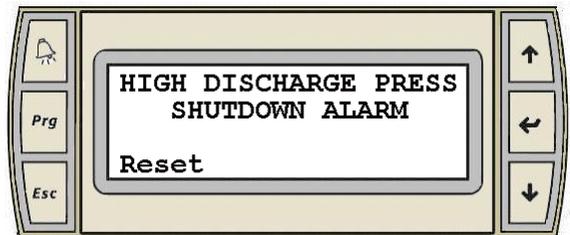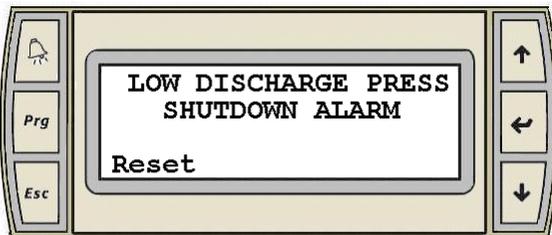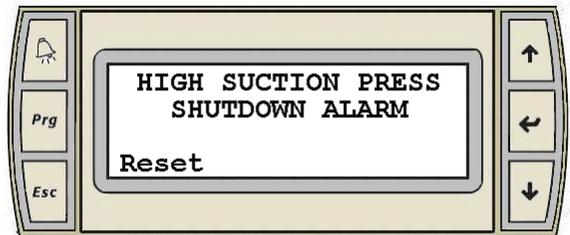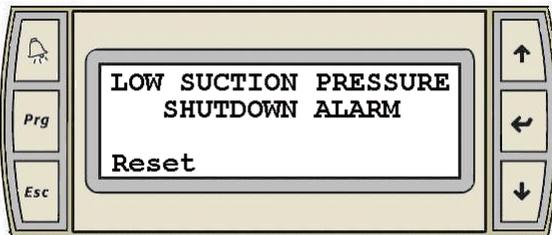
   1. **Low Water Level Shutdown Alarms**

      ```
      TANK 1
      LOW LEVEL
      SHUTDOWN ALARM
      Reset
      ```
      ```
      TANK 2
      LOW LEVEL
      SHUTDOWN ALARM
      Reset
      ```

   2. **Pressure Sensors Failure Alarms**

      ```
      DISCHARGE PRESSURE
      SENSOR FAILURE ALARM

      Reset
      ```
      ```
      SUCTION PRESSURE
      SENSOR FAILURE ALARM

      Reset
      ```

   3. **Pressure Alarms**

      ```
      LOW SUCTION PRESSURE
      SHUTDOWN ALARM

      Reset
      ```
      ```
      HIGH SUCTION PRESS
      SHUTDOWN ALARM

      Reset
      ```
      ```
      LOW DISCHARGE PRESS
      SHUTDOWN ALARM

      Reset
      ```
      ```
      HIGH DISCHARGE PRESS
      SHUTDOWN ALARM

      Reset
      ```

   4. **Booster Pump Alarms (Similar for pump 1 to 5)**

      ```
      PUMP 1
      RUN FEEDBACK ALARM
      CHECK OVERLOAD RELAY
      Reset
      ```

# ARMSTRONG
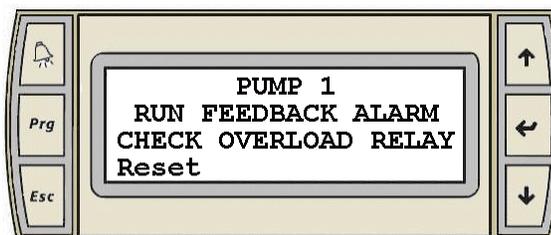
## SYSTEM SETUP DISPLAYS

To go to the "Main Setup Screen" first go to the "Main Menu" by pressing the "Prg" button.

```
        CONSTANT SPEED
        BOOSTER SYSTEM
          Remote On
SETUP              DIAG
```
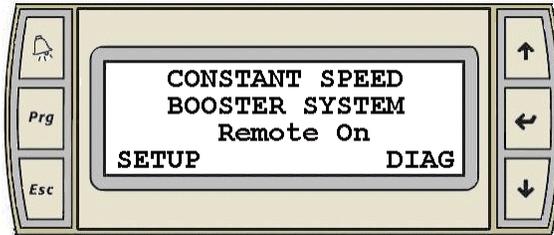
1. Press the "Enter" key to move the cursor over "Setup".
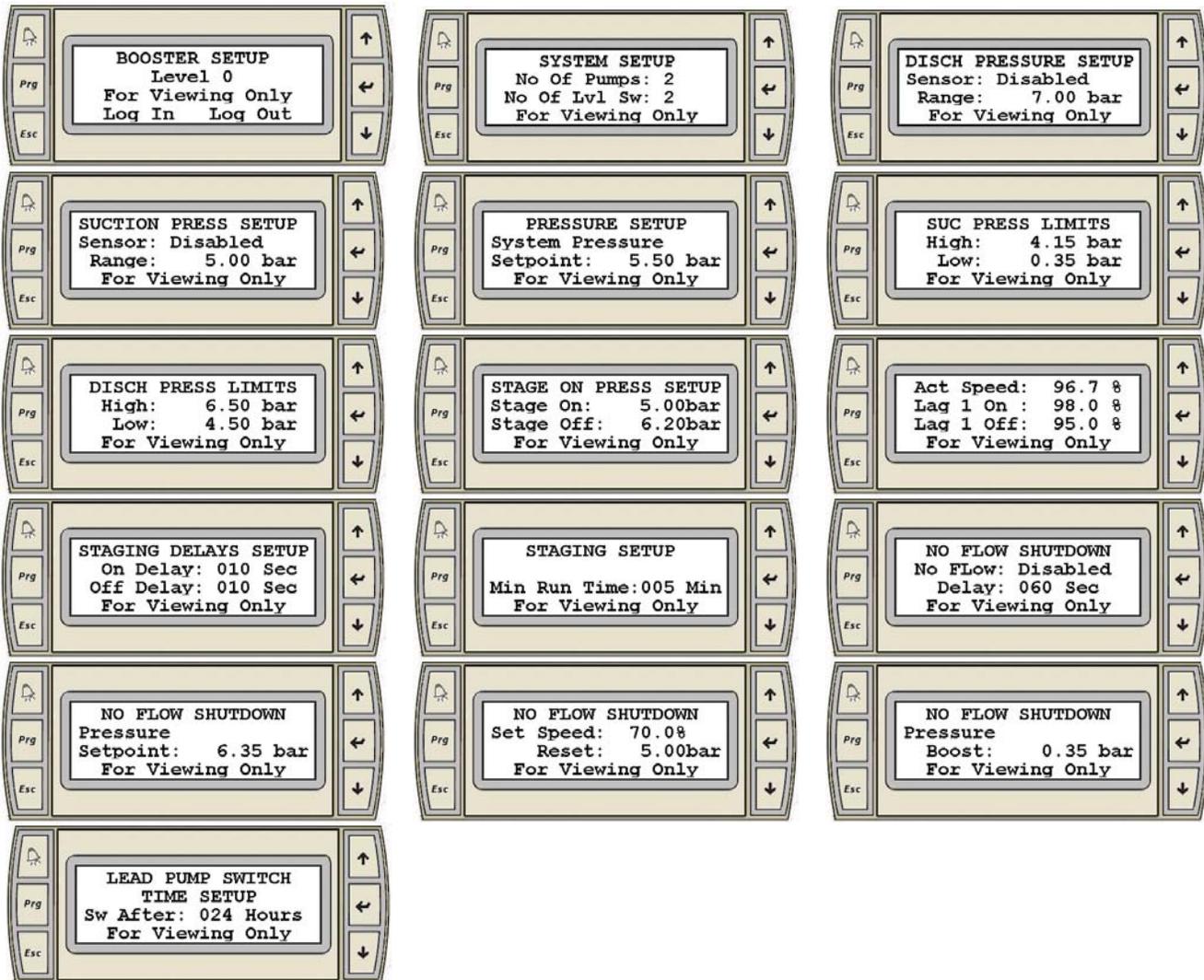2. When the cursor is over "Setup" pressing the "Up" or "Down" arrow will call up the Main Setup Screen.

**Main Setup Display (Level 0)**

```
       BOOSTER SETUP
          Level 0
      For Viewing Only
      Log In   Log Out
```
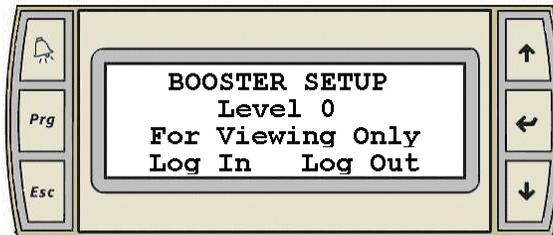
1. This display is for viewing only. Level 0 setup display.
2. The Setup Displays are divided in three levels with each level having the same number of displays with different level of access.  Level 0 setup displays are for viewing only and no adjustment can be made. Level 1 setup displays can be used 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.
3. To access Level 1 and 2 an operator need to enter the proper password: Level 1 password is 9393, Level 2 password is 2323.
4. Pressing the "Enter" key will move the cursor over "Log In" and "Log Out".
5. When the cursor is over "Log In" pressing the "Up" or "Down" arrow will call up the "Log In" display.

```
            LOG IN

       Password:   0000
```
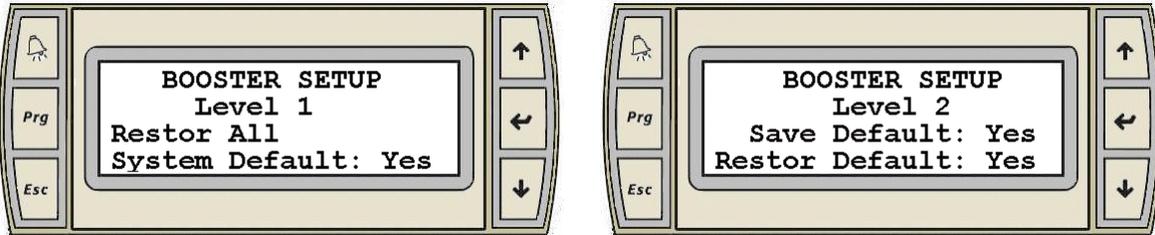
   a. Pressing the "Enter" key will move the cursor above the number area.
   b. When the cursor is over the number area, pressing the "Up" or "Down" arrow will increase or decrease the password number.
   c. When you reach the value you want "9393" for level 1, or "2323" for level 2, press the "Enter" key. This will call up the Main Setup Display for the password you selected.
   d. If you enter a wrong password value nothing will happen.
   e. After a password is entered, it will log out automatically after 5 minutes.

6. When the cursor is over "Log Out" pressing the "Up" or "Down" arrow will clear the password and take away the access to Level 1 and 2 setup screen.
7. When the cursor is at the top left corner of the screen pressing the "Up" or "Down" arrow will navigate between the Level 0 Setup Displays.
8. These displays will give anybody a quick look at all the system setup.
9. The following are all the level 0 setup displays:

```
     BOOSTER SETUP
        Level 0
     For Viewing Only
     Log In   Log Out
```

```
       SYSTEM SETUP
     No Of Pumps: 2
     No Of Lvl Sw: 2
      For Viewing Only
```

```
   DISCH PRESSURE SETUP
   Sensor: Disabled
    Range:     7.00 bar
      For Viewing Only
```

```
  SUCTION PRESS SETUP
  Sensor: Disabled
   Range:    5.00 bar
     For Viewing Only
```

```
      PRESSURE SETUP
   System Pressure
   Setpoint:   5.50 bar
      For Viewing Only
```

```
     SUC PRESS LIMITS
      High:    4.15 bar
      Low:     0.35 bar
      For Viewing Only
```

```
   DISCH PRESS LIMITS
      High:     6.50 bar
      Low:      4.50 bar
      For Viewing Only
```

```
   STAGE ON PRESS SETUP
   Stage On:     5.00bar
   Stage Off:    6.20bar
      For Viewing Only
```

```
   Act Speed:   96.7 %
   Lag 1 On :   98.0 %
   Lag 1 Off:   95.0 %
      For Viewing Only
```

```
  STAGING DELAYS SETUP
    On Delay: 010 Sec
    Off Delay: 010 Sec
       For Viewing Only
```

```
      STAGING SETUP

   Min Run Time:005 Min
      For Viewing Only
```

```
    NO FLOW SHUTDOWN
   No FLow: Disabled
      Delay: 060 Sec
      For Viewing Only
```

```
    NO FLOW SHUTDOWN
  Pressure
   Setpoint:    6.35 bar
      For Viewing Only
```

```
    NO FLOW SHUTDOWN
   Set Speed:   70.0%
       Reset:    5.00bar
      For Viewing Only
```

```
    NO FLOW SHUTDOWN
  Pressure
      Boost:      0.35 bar
      For Viewing Only
```

```
   LEAD PUMP SWITCH
       TIME SETUP
   Sw After: 024 Hours
      For Viewing Only
```

10. Only the displays relevant to the system setup will be active and visible.

# ARMSTRONG

## SETUP DISPLAYS – LEVEL 1 AND LEVEL 2

### Main Setup Display

```
BOOSTER SETUP          BOOSTER SETUP
   Level 1                Level 2
Restor All            Save Default: Yes
System Default: Yes   Restor Default: Yes
```

1. These are the first displays to appear when entering the Log In password for Level 1 and 2 respectively.
2. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
3. On the Level 1 display pressing the "Enter" key will move the cursor over "Yes".
4. When the cursor is over "Yes" pressing the "Up" or "Down" arrow will **Restore the default settings for all the values in all the setup displays**. This is indicated by the text changing from "Yes" to "Done" for a few seconds.
5. On the Level 2 display pressing the "Enter" key will move the cursor over "Yes" beside "Save Default", and "Restore Default".
6. When the cursor is over "Yes" beside "Save Default" pressing the "Up" or "Down" arrow will **Save the Setup Values in all Setup Displays as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
7. When the cursor is over "Yes" beside "Restore Default" pressing the "Up" or "Down" arrow will **Restore the Default Settings for all the Values in all the Setup Displays**. The text will change between "Yes" to "Ok" for a few seconds.

### System Setup Display
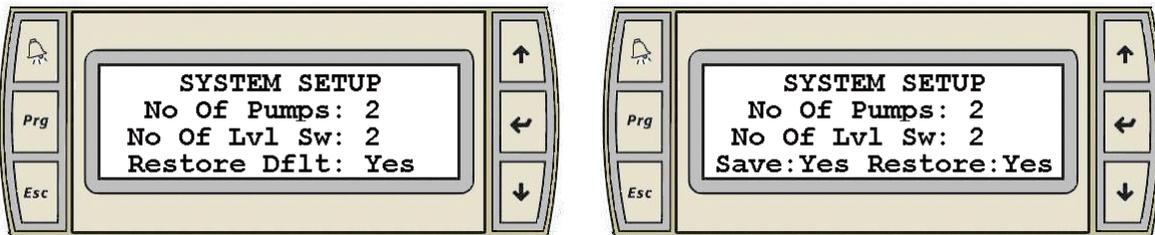
```
SYSTEM SETUP           SYSTEM SETUP
No Of Pumps: 2         No Of Pumps: 2
No Of Lvl Sw: 2        No Of Lvl Sw: 2
Restore Dflt: Yes      Save:Yes Restore:Yes
```

1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. Pressing the "Enter" key will move the cursor over both values, over "Yes" beside Save and Restore and back at the top left corner.
3. When the cursor is over the value beside "No of Pumps", press the "Up" or "Down" key to select the number of pumps.
4. When the cursor is over the value beside "No of Lvl Sw", press the "Up" or "Down" key to select the number of level switch connected to the booster set.
5. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
6. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

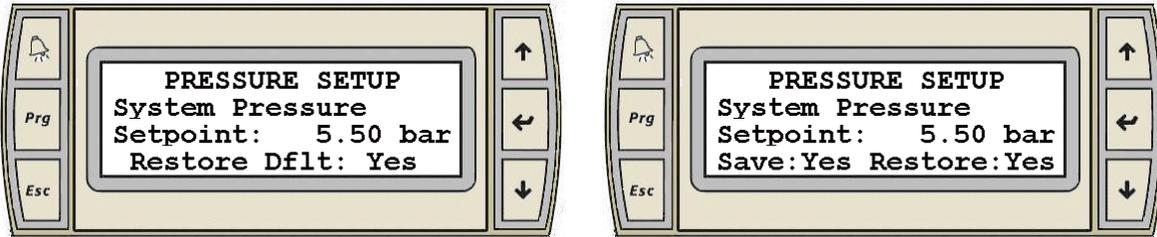## Discharge Pressure Sensor Setup Display
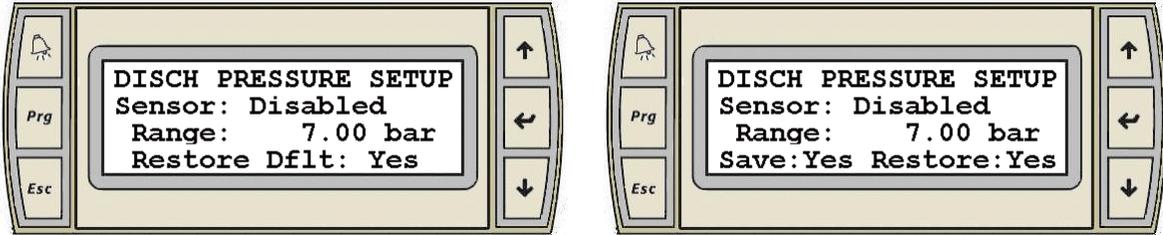


1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. Pressing the "Enter" key will move the cursor over the text beside "Sensor", the value beside "Range", over the engineering unit, over "Yes" beside Save and Restore, and back at the top left corner.
3. When the cursor is over the text beside "Sensor" pressing the "Up" or "Down" key will select between disabling (Disabled), and enabling (Enabled) the discharge pressure sensor.
4. When the cursor is over the value beside "Range", pressing the "Up" or "Down" key will set the range for the discharge pressure sensor to the desired value.
5. When the cursor is over the Engineering Unit, pressing the "Up" or "Down" key will select between: psi, ft, Kpa, m, and bar.
6. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
7. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.
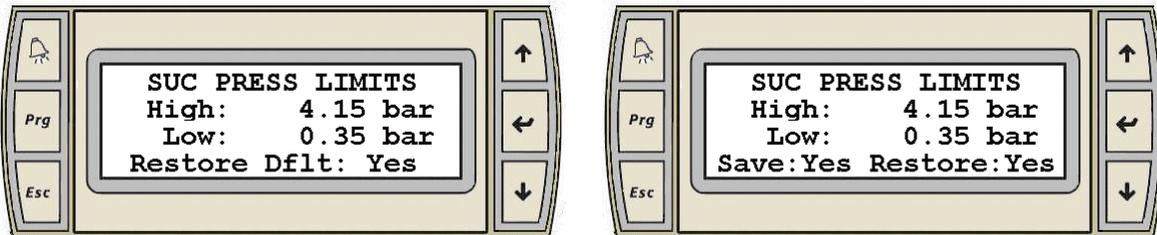

## Suction Pressure Sensor Setup Display
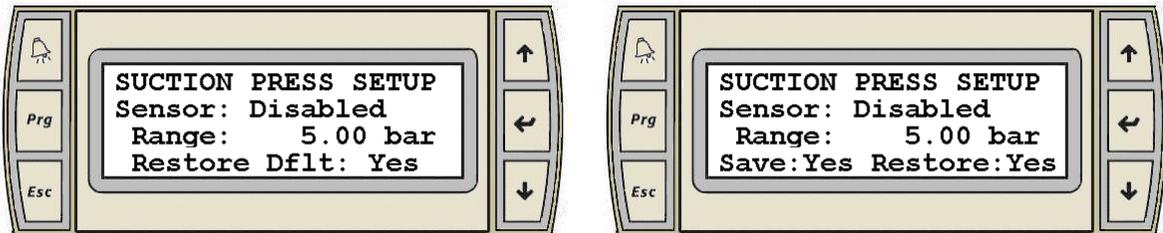


1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. Pressing the "Enter" key will move the cursor over the text beside "Sensor", the value beside "Range", over "Yes" beside Save and Restore, and back at the top left corner.
3. When the cursor is over the text beside "Sensor" pressing the "Up" or "Down" key will select between disabling (Disabled), and enabling (Enabled) the suction pressure sensor.
4. When the cursor is over the value beside "Range", pressing the "Up" or "Down" key will set the range for the suction pressure sensor to the desired value.
5. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
6. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

# ARMSTRONG

## System Pressure Setpoint Setup Display

```
       PRESSURE SETUP              PRESSURE SETUP
System Pressure             System Pressure
Setpoint:    5.50 bar       Setpoint:    5.50 bar
  Restore Dflt: Yes         Save:Yes Restore:Yes
```
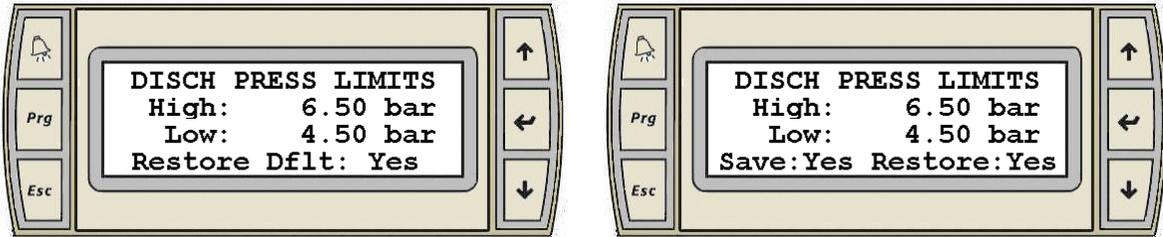
1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. Pressing the "Enter" key will move the cursor over the value beside "Setpoint", over "Yes" beside Save and Restore, and back at the top left corner.
3. When the cursor is over the value beside "Setpoint", pressing the "Up" or "Down" key will set the System pressure Setpoint to the desired value.
4. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
5. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

## Suction Pressure Alarm Setpoints Setup Display

```
     SUC PRESS LIMITS            SUC PRESS LIMITS
  High:     4.15 bar          High:     4.15 bar
   Low:     0.35 bar           Low:     0.35 bar
  Restore Dflt: Yes        Save:Yes Restore:Yes
```
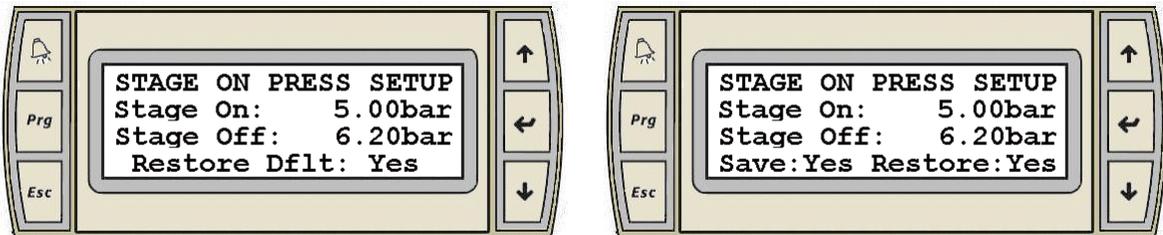
1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. This display is only active when the suction pressure sensor is enabled.
3. Pressing the "Enter" key will move the cursor over the value beside "High", the value beside "Low", over "Yes" beside Save and Restore, and back at the top left corner.
4. When the cursor is over the value beside "High", pressing the "Up" or "Down" key will set the High Suction Pressure Shutdown Setpoint to the desired value.
5. When the cursor is over the value beside "Low", pressing the "Up" or "Down" key will set the Low Suction Pressure Shutdown Setpoint to the desired value.
6. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
7. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

![ARMSTRONG logo]

### Discharge Pressure Alarm Setpoints Setup Display

```
DISCH PRESS LIMITS
 High:    6.50 bar
 Low:     4.50 bar
Restore Dflt: Yes
```

```
DISCH PRESS LIMITS
 High:    6.50 bar
 Low:     4.50 bar
Save:Yes Restore:Yes
```
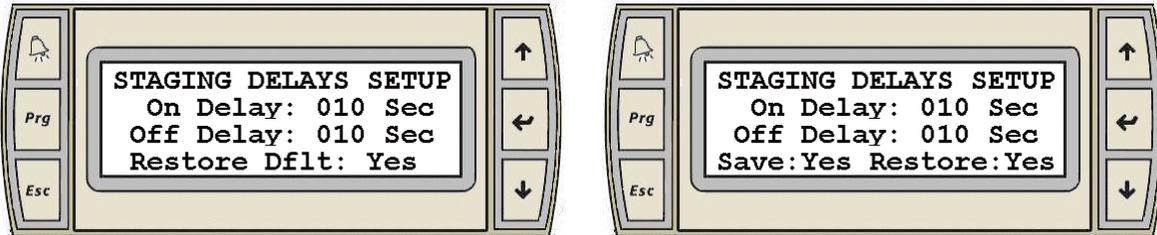
1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. Pressing the "Enter" key will move the cursor over the value beside "High", the value beside "Low", over "Yes" beside Save and Restore, and back at the top left corner.
3. When the cursor is over the value beside "High", pressing the "Up" or "Down" key will set the High Discharge Pressure Shutdown Setpoint to the desired value.
4. When the cursor is over the value beside "Low", pressing the "Up" or "Down" key will set the Low Discharge Pressure Shutdown Setpoint to the desired value.
5. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
6. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

### Pressure Staging Setpoint Setup Display

```
STAGE ON PRESS SETUP
Stage On:    5.00bar
Stage Off:   6.20bar
 Restore Dflt: Yes
```

```
STAGE ON PRESS SETUP
Stage On:    5.00bar
Stage Off:   6.20bar
Save:Yes Restore:Yes
```
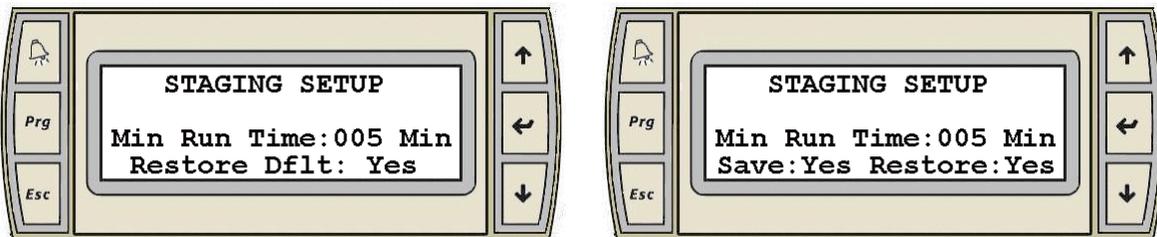
1. This display is only active when the booster type is set to constant speed.
2. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
3. Pressing the "Enter" key will move the cursor over the value beside "Stage On", the value beside "Stage Off", over "Yes" beside Save and Restore, and back at the top left corner.
4. When the cursor is over the value beside "Stage On", pressing the "Up" or "Down" key will set the Stage On Pressure Setpoint to the desired value.
5. When the cursor is over the value beside "Stage Off", pressing the "Up" or "Down" key will set the Stage Off Pressure Setpoint to the desired value.
6. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
7. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

**ARMSTRONG**

**Staging Delay Setpoint Setup Display**

```
STAGING DELAYS SETUP
  On Delay: 010 Sec
 Off Delay: 010 Sec
 Restore Dflt: Yes
```

```
STAGING DELAYS SETUP
  On Delay: 010 Sec
 Off Delay: 010 Sec
Save:Yes Restore:Yes
```
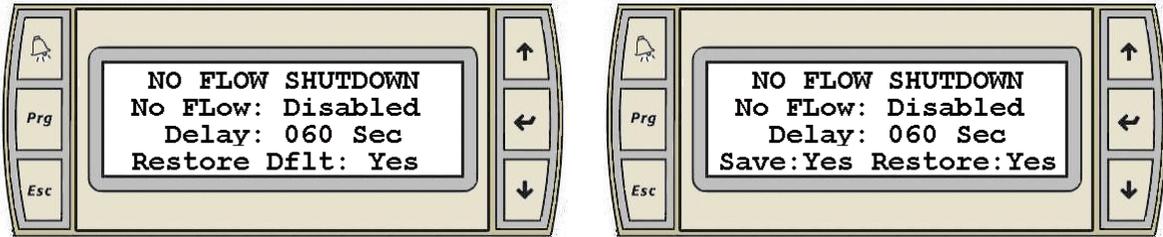
1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. Pressing the "Enter" key will move the cursor over the value beside "On Delay", the value beside "Off Delay", over "Yes" beside Save and Restore, and back at the top left corner.
3. When the cursor is over the value beside "On Delay", pressing the "Up" or "Down" key will set the Stage On Delay Setpoint to the desired value.
4. When the cursor is over the value beside "Off Delay", pressing the "Up" or "Down" key will set the Stage Off Delay Setpoint to the desired value.
5. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
6. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

**Minimum Runtime Setup Display**

```
STAGING SETUP

Min Run Time:005 Min
  Restore Dflt: Yes
```

```
STAGING SETUP

Min Run Time:005 Min
Save:Yes Restore:Yes
```
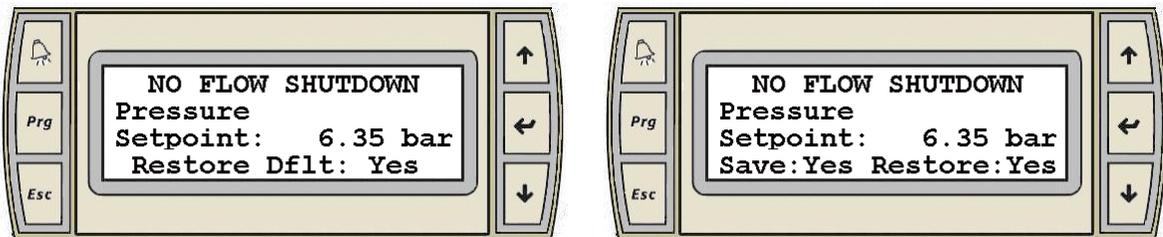
1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. Pressing the "Enter" key will move the cursor over the value beside "Min Run Time", over "Yes" beside Save and Restore, and back at the top left corner.
3. When the cursor is over the value beside "Min Run Time", pressing the "Up" or "Down" key will set the Pump Minimum Run Time Setpoint to the desired value. This is the minimum run time the lag pump will run before shutting down. It is also the minimum time the lead pump will run before a no flow shutdown.
4. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
5. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

**ARMSTRONG**

**No Flow Shutdown Setup Display**

```
        NO FLOW SHUTDOWN              NO FLOW SHUTDOWN
        No FLow: Disabled            No FLow: Disabled
         Delay: 060 Sec               Delay: 060 Sec
         Restore Dflt: Yes           Save:Yes Restore:Yes
```
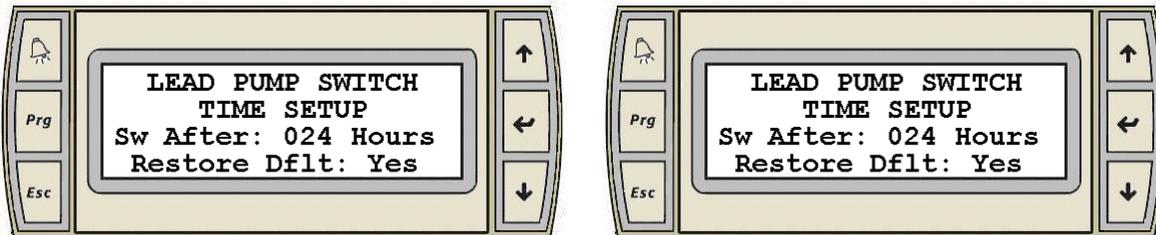
1. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2. Pressing the "Enter" key will move the cursor over the text beside "No Flow", the value beside "Delay", over "Yes" beside Save and Restore, and back at the top left corner.
3. When the cursor is over the text beside "No Flow", pressing the "Up" or "Down" key will toggle the text between "Disabled", and "Enabled"
4. When the cursor is over the value beside "Delay", pressing the "Up" or "Down" key will set the No Flow Shutdown Delay Setpoint to the desired value.
5. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
6. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

**No Flow Shutdown Setpoint Setup Display**

```
        NO FLOW SHUTDOWN              NO FLOW SHUTDOWN
        Pressure                     Pressure
        Setpoint:   6.35 bar         Setpoint:   6.35 bar
         Restore Dflt: Yes           Save:Yes Restore:Yes
```

1. This display is only active when the booster type is set to constant speed and No Flow Shutdown is enabled.
2. When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
3. Pressing the "Enter" key will move the cursor over the value beside "Setpoint", over "Yes" beside Save and Restore, and back at the top left corner.
4. When the cursor is over the value beside "Setpoint", pressing the "Up" or "Down" key will set the No Flow Shutdown Pressure Setpoint to the desired value.
5. When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
6. When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.

# ARMSTRONG

**Lead Pump Switch Time Setup Display**

```
       LEAD PUMP SWITCH
          TIME SETUP
     Sw After: 024 Hours
       Restore Dflt: Yes
```

```
       LEAD PUMP SWITCH
          TIME SETUP
     Sw After: 024 Hours
       Restore Dflt: Yes
```

1.  When the cursor is at the top left corner of the screen, pressing the "Up" or "Down" arrow will navigate between the active setup screens of the respective Level.
2.  Pressing the "Enter" key will move the cursor over the value beside "Sw After", over "Yes" beside Save and Restore, and back at the top left corner.
3.  When the cursor is over the value beside "Sw After", pressing the "Up" or "Down" key will set the Lead Pump Run Hours Setpoint to the desired value. The Lag 1 pump will become the Lead pump after the Lead pump runs for the set amount of time.
4.  When the cursor is over "Yes" beside "Save" pressing the "Up" or "Down" arrow will **Save the settings on this screen as Default Values**. The text will change between "Yes" to "Ok" for a few seconds.
5.  When the cursor is over "Yes" beside "Restore Dflt" or "Restore" pressing the "Up" or "Down" arrow will **Restore the Default Settings for the settings on this screen**. The text will change between "Yes" to "Ok" for a few seconds.