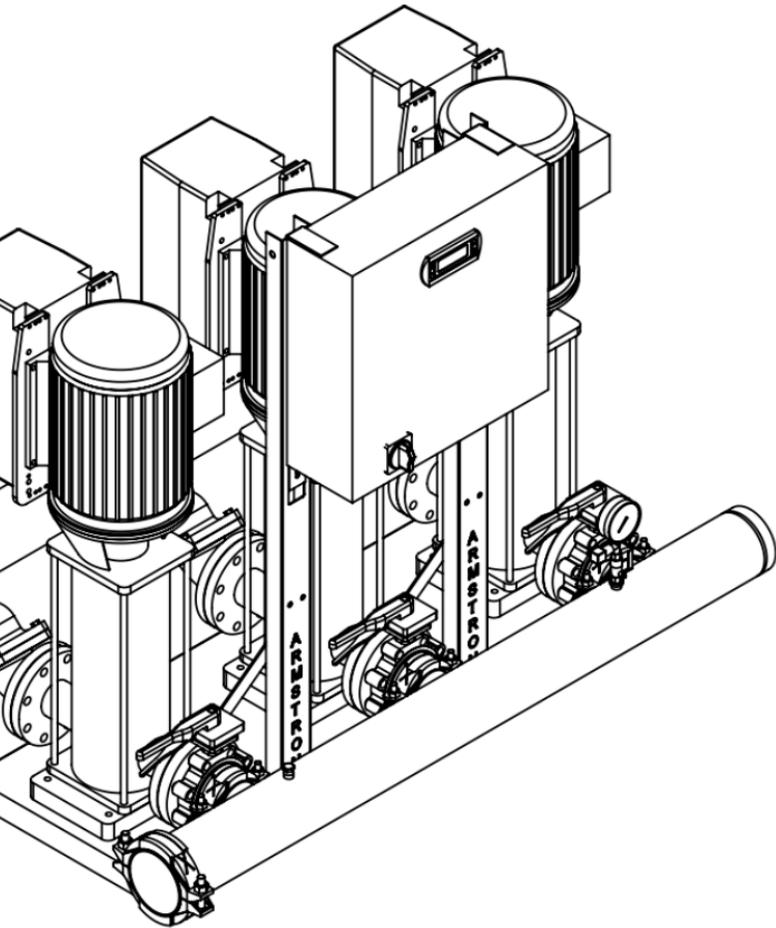


Design Envelope 6800 Booster

Motor DEPM 1.0 to 2.0
replacement

Installation and
operating instructions

File No: 62.8061
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Supersedes: NEW
Date: NEW



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1.0 PURPOSE

The purpose of this manual is to show how to replace DEPM 1.0 motors with DEPM 2.0 motors in a Design Envelope 6800 booster package.

2.0 HARDWARE REQUIRED

| DESCRIPTION | QUANTITY/NOS |
|-------------------------------------|----------------------------------|
| Booster wire harness DEPM 2.0 | 2 |
| Splicing connector | 4 |
| Smart key | 1 |
| Adaptor for USB flash drive | 1 |
| Metric Hex key set | M3 Hex, M5 Hex and M6 Hex needed |
| Slotted Terminal block Screwdriver | 1 |
| USB flash drive for HMI update | 1 |
| Combination wrench or Socket wrench | 13mm and 10mm |

FIGURE 2.1: Booster wire harness DEPM 2.0



FIGURE 2.2: Splicing Connector



FIGURE 2.3: Smart key



FIGURE 2.4: Adaptor for USB flash drive



FIGURE 2.5: Metric Hex key set



FIGURE 2.6: Slotted terminal screwdriver



FIGURE 2.7: USB flash drive



FIGURE 2.8: Combination Wrench



3.0 PROCEDURE: RECORD BOOSTER SETTINGS

All parameters and settings will be lost after updating PLC software. Therefore, it is recommended to note down all the parameter values from existing PLC programme before updating HMI and PLC programme.

Turn on the control panel with the motor breaker in position. Go to setup and to note down configuration parameters from the HMI.

Browse through various setup menus to capture all existing booster parameters. Take a video or pictures of all booster settings to keep a record of the booster settings. The Level 2 booster set up menus can be seen below. **Taking a video of all Booster settings is highly recommended.**

FIGURE 3.1: Booster HMI Main Screen



FIGURE 3.2: Booster Level 2 Set Up Screen



FIGURE 3.3: Booster Set Up Screen

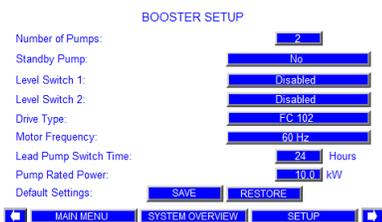


FIGURE 3.4: Sensor Set Up Screen

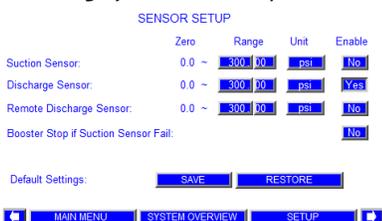


FIGURE 3.5: Discharge Pressure Set Up Screen

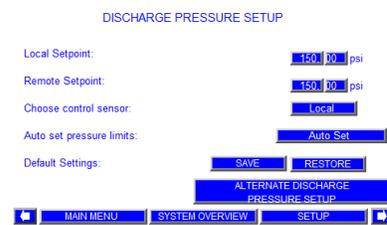


FIGURE 3.6: Pressure Limit Set Up 1 Screen

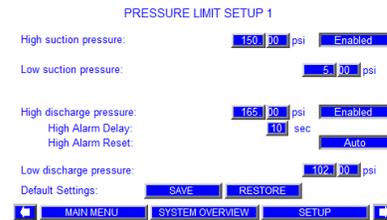


FIGURE 3.7: Pressure Limit Set Up 2 Screen

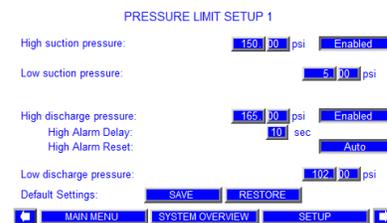


FIGURE 3.8: Protection Set Up Screen

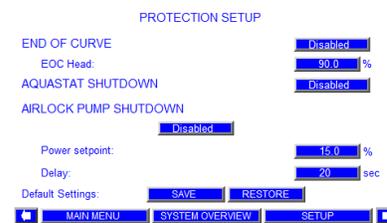


FIGURE 3.9: Pump Staging Set Up Screen

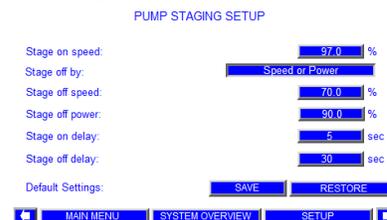


FIGURE 3.10: Soft Fill Set Up Screen



FIGURE 3.11: No Flow Shutdown Set Up Screen

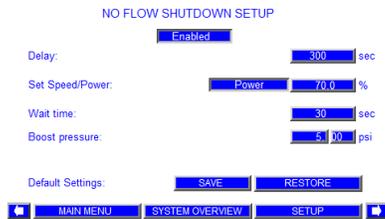


FIGURE 3.17: Flow Set Up Screen

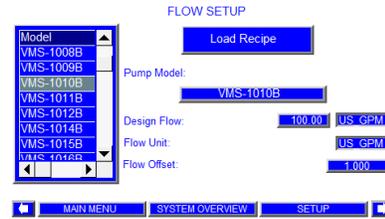


FIGURE 3.12: Speed Set Up Screen

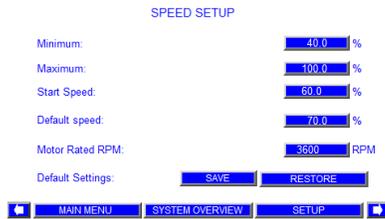


FIGURE 3.18: Clock Set Up Screen

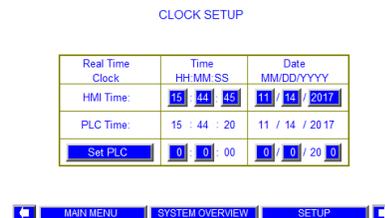


FIGURE 3.13: PID Set Up Screen

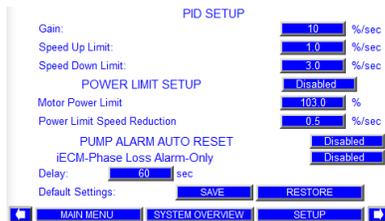


FIGURE 3.19: Save All Variables Screen



FIGURE 3.14: Pressure Setback Set Up Screen

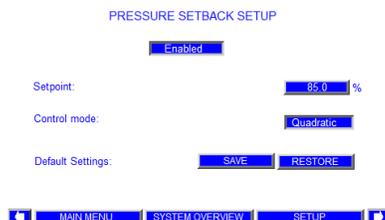


FIGURE 3.15: BAS Set Up Screen

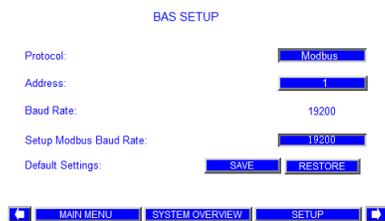
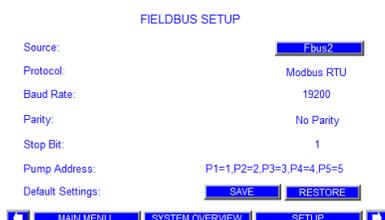


FIGURE 3.16: Fieldbus Set Up Screen



NOTE: Record value in the table below as per table before attempting to update

PLC SOFTWARE:

| # | PARAMETER | SET TO | SETTING VALUE |
|---------------------------------|----------------------------------|-----------------------|---------------|
| BOOSTER SET UP | | | |
| 1 | Number of Pumps | As per order | |
| 2 | Standby Pump | As per order | |
| 3 | Level Switch 1 | ENABLED/DISABLED | |
| 4 | Level Switch 2 | ENABLED/DISABLED | |
| 5 | Drive Type | As per order | |
| 6 | Motor Frequency | 60Hz | |
| 7 | Lead Pump Switch Time | 24 Hours | |
| 8 | Motor Rated Power | As per order | |
| SENSOR SETUP | | | |
| 9 | Pressure units | bar/psi | |
| 10 | Suction Pressure Sensor | ENABLED | — |
| 11 | Suction Pressure Range | See the transducer | |
| 12 | Discharge Pressure Sensor | ENABLED | — |
| 13 | Discharge Pressure Range | See the transducer | |
| 14 | Remote Pressure Sensor | ENABLED/DISABLED | |
| 15 | Remote Pressure Range | See the transducer | |
| DISCHARGE PRESSURE SETUP | | | |
| 16 | Local setpoint | As per the order | |
| 17 | Remote setpoint | As per the order | |
| 18 | Choose control sensor | As per the order | |
| 19 | Choose control sensor | As per the order | |
| PRESSURE LIMIT SETUP 1 | | | |
| 20 | High suction pressure - status | DISABLED | |
| 21 | High suction pressure - value | As per the order | |
| 22 | Low suction pressure - value | 0.1 bar/5 psi | |
| 23 | High discharge pressure - status | ENABLED | |
| 24 | High discharge pressure - value | 3 bars above setpoint | |
| 25 | High discharge pressure - delay | 5 sec | |
| 26 | High discharge pressure - reset | AUTO | |
| 27 | Low discharge pressure | — | |
| PRESSURE LIMIT SETUP 2 | | | |
| 28 | Emergency power mode | As per the order | |
| 29 | Factory high discharge | CVH+0.5 | |
| PROTECTION SETUP | | | |
| 30 | EOC | DISABLED | — |
| 31 | Aquastat pump shutdown | DISABLED | — |
| 32 | Aquastat pump shutdown | DISABLED | — |

8

| # | PARAMETER | SET TO | SETTING VALUE |
|-------------------------------|------------------|------------------------|---------------|
| PUMP STAGING SETUP | | | |
| 33 | Stage on speed | — | |
| 34 | Stage off by | Speed/power | |
| 35 | Stage off speed | — | |
| 36 | Stage off power | — | |
| 37 | Stage on delay | — | |
| 38 | Stage off delay | — | |
| SOFT FILL SETUP | | | |
| 39 | Status | ENABLED | — |
| 40 | Start setpoint | 30% | |
| 41 | Ramp | 120 sec | |
| NO FLOW SHUTDOWN | | | |
| 42 | Status | ENABLED | — |
| 43 | Delay | 40 sec | |
| 44 | Set speed/power | Speed/power | |
| 45 | Speed | 3% Above no flow speed | |
| 46 | Wait time | 20 sec | - |
| 47 | Boost pressure | 0.5 bar/5psi | |
| SPEED SETUP | | | |
| 48 | Minimum | 60% | |
| 49 | Maximum | 100% | |
| 50 | Ramp(up) | Same as drive ramp-up | |
| 51 | Default speed | 70% | |
| 52 | Motor rated rpm | 3600 rpm | |
| PID SETUP | | | |
| 53 | Gain | 30%/sec | |
| 54 | Speed up limit | 1.5%/sec | |
| 55 | Speed down limit | 3%/sec | |
| PRESSURE SETBACK SETUP | | | |
| 56 | Status | DISABLED | — |
| BAS SETUP | | | |
| 57 | Protocol | MODBUS | |
| 58 | Address | 1 | |
| FIELDBUS SETUP | | | |
| 59 | Source | Fbus2 | — |
| FLOW SETUP | | | |
| 60 | Pump model | Do not load any pump | |
| 61 | Design flow | N/A | |
| 62 | Flow units | l/s | |
| 63 | Flow offset | N/A | |

NOTE: Once all the parameters are copied, proceed with the software update procedure as mentioned in the additional documents provided.

4.0 PROCEDURE: UPGRADING THE MOTOR

Before beginning, please review lock out/tag out procedures and local safety regulations.

Local regulations may vary, may require service by licensed electrical contractor or professional

- Turn off the flow valve and suction valves.
- Turn off and tag out main power supply.
- Turn off Control panel power.

FIGURE 4.1: Turn Off the control panel power



4.1 REMOVING GEN 1 MOTOR

4.1.1 Unplug all the wirings

- 1 Take off the drive cover by removing the screws using a M3 Hex Head Driver (**FIGURE 4.2**).

FIGURE 4.2: Drive Cover



- 2 First, Check that the power is off with a voltmeter. Take pictures of the wiring before detaching from the drive. Detach the Power cables L1, L2, L3, the earth cable and the communication cable from the drive board (**FIGURE 4.3**).

FIGURE 4.3: Drive Wiring Gen1



- 3 Unscrew the hex nut from the metal fitting to disconnect the conduit from the fitting. Pull the power wiring from outside the drive. Unscrew the metal fitting from the side of the drive.
- 4 Unscrew the hex nut from the nylon cord grip body to disconnect the conduit from the fitting. Pull the communication wiring from outside the drive. Unscrew the connector from the side of the drive (**FIGURE 4.4**).

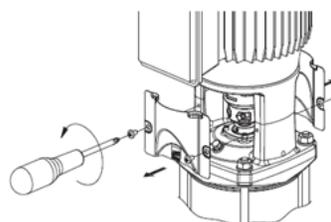
FIGURE 4.4: Connectors



NOTE: We need to attach the metal fitting and nylon cord connector to the new motor, so keep them safely stored away.

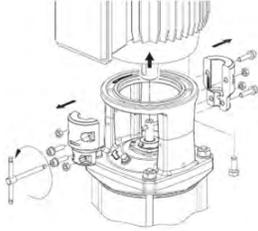
- 4.1.2 To detach the motor shaft from the coupling, remove both coupling guards (**FIGURE 4.5**). Reinstall the coupling guard screws on to the guard so that not to lose them.

FIGURE 4.5: Coupling guard



- 4.1.3 Loosen all 4 Socket Head Caps Screws from the coupling. Once the couplings are removed, take out the bolts that holds the motor with the pump stool (**FIGURE 4.6**).

FIGURE 4.6: Motor

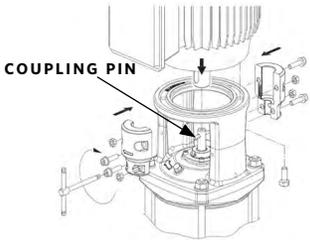


4.1.4 Carefully lift the motor and keep it in a secure position.

4.2 MOUNTING NEW MOTORS

4.2.1 Reinstall the coupling into the pump shaft with the coupling pin and reinstall the coupling bolts, but do not overtighten the bolts. Torque required is about 14 lb ft (FIGURE 4.7).

FIGURE 4.7: Coupling pin



4.2.2 Lift the new motor, align the motor shaft with the coupling, and place the motor gently on the pump stool. Use the four bolts to fasten the motor into the pump stool.

NOTE: Make sure the new motor is in position with the same orientation as the old motor

4.2.3 Using a long flat blade screwdriver, raise the coupling until it hits the motor shaft. Once the coupling hits the motor shaft tighten up the 4 socket head cap screws so that the coupling does not slide back down (FIGURE 4.8). Make sure the gap on both sides of the coupling is even, so the coupling isn't out of balance (FIGURE 4.9).

FIGURE 4.8: Coupling fix

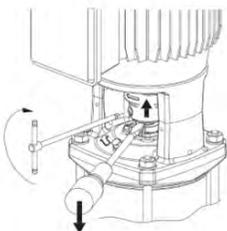
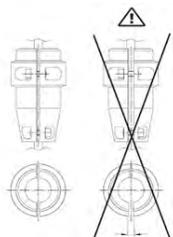


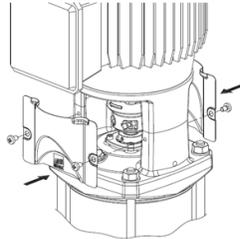
FIGURE 4.9: Coupling balance



4.2.4 Rotate the pump shaft by hand to verify the operation of the shaft. There should not be a lot of resistance in the shaft.

4.2.5 Reinstall coupling guards.

FIGURE 4.10: Coupling guard



4.3 WIRING NEW MOTOR (APPLICABLE TO MOTOR TYPE - HPIA 90S, 90 AND 112)

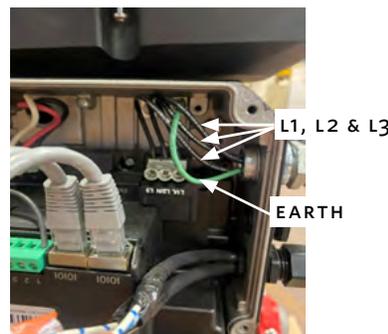
Check the motor label to identify the motor type. If it is HPIA 90s, 90 and 112 follow the below steps,

FIGURE 4.11: Motor label - HPIA

| | | | | | | |
|---------------------------|-----|--|------|-----------------------|------|--------------------------|
| CE UK CA | | ARMSTRONG PUMP INC. 93 EAST AVE, NORTH TONAWANDA NY, USA | | ARMSTRONG | | |
| P.N. 74352027-381 | | N° 1936924-002 | | 12 22 L1 | | |
| Type: HPIA 90 | | 3000 3.0 68 400 B14 | | [Barcode] | | |
| Input A | kW | Hp | S.F. | η | rpm | 380-480V 3 Phase 50-60Hz |
| 5.3-4.2 | 3.0 | 4.0 | 1.25 | 91.3% | 3000 | Class HPIA 90 400 |
| 5.4-4.2 | 3.0 | 4.0 | 1.25 | 92.0% | 3600 | Over Current Device 9.1A |
| 3.9-3.2 | 2.2 | 3.0 | 1.25 | 91.1% | 3000 | T.amb.40°C Weight=15.0Kg |
| 3.9-3.2 | 2.2 | 3.0 | 1.25 | 91.9% | 3600 | IP 66 / NEMA type 4x |
| Output: 0-100% Vin 0-9.5A | | Continuous Duty | | Ins.Cl.(ΔT)=F(B) TEFC | | |

4.3.1 Mount the metal Elbow connector into each drive from outside. Route the power cables into each drive through the elbow connector and secure it at correct L1, L2, L3 and earth point (FIGURE 4.12). Tight the hex nut from the metal fitting to connect the conduit with the metal elbow connector.

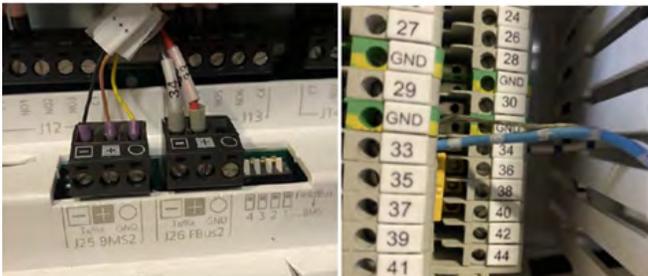
FIGURE 4.12: HPIA Wiring Frame 575v 90s, 90, 112 - L1, L2, L3(Black) and Earth (Green)



4.3.2 Route the communication cables from the panel into the first drive. The communication cables from the panel are #33 and #34.

4.3.3. To connect the existing communication cable to the drive, a wire harness (**FIGURE 1**) is offered. Check the panel and see the communications cable header connect to the top of the PLC (**FIGURE 4.13**). Cable number 33 (positive, blue with white strip) and cable 34 run from the PLC into the terminal block in the panel, then into the first drive.

FIGURE 4.13: Communication wire tags



1 For the first drive, connect White and Brown cable of wire harness to the Rx- terminal of communication cable coming from the panel (Cable with tag #34) and connect Solid Brown cable of wire harness with the Rx+ terminal of communication cable coming from the control panel (Cable with tag #33) using the inline splicing connectors (**FIGURE 4.14, 4.15**).

FIGURE 4.14: Connection diagram-wire harness

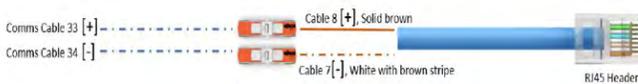


FIGURE 4.15: Wiring - Frame 90S, 90 and 112



2 Insert the RJ45 Header into either RJ45 port in the drive. The ports are wired in parallel so either port will work.

3 Insert another wire harness into the remaining RJ45 port in the drive. Use the same color communications cable used to connect to the positive brown wire on the previous wire harness to connect to the new one. Do the same for the negative wiring. Once the next wire harness is connect to the next communications cable, run this communications cable into the next drive to complete the daisy chain. **FIGURE 4.16** shows how the communications wiring goes from drive to drive.

FIGURE 4.16: Drive to drive - Communication wiring



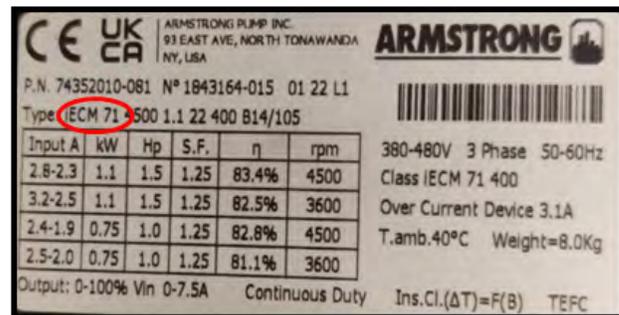
4 Once the communications wiring is in the next drive, connect it to the wire harness as done in step 1.
5 Repeat this process if you have more than 2 pumps.

4.3.4. Once all the cables are secured in position, fix the drive cover to the drive. Now the drives are connected to the control panel.

4.4 WIRING NEW MOTOR (APPLICABLE TO MOTOR TYPE - IECM 71)

Check the motor label to identify the motor type. If it is iECM 71 follow the below steps,

FIGURE 4.17: Motor label - iECM 71

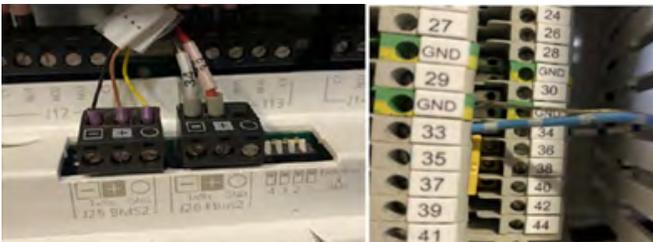


4.4.1 Mount the metal Elbow connector into each drive from outside. Route the power cables into each drive through the elbow connector and secure it at correct L1, L2, L3 and earth point. Tight the hex nut from the metal fitting to connect the conduit with the metal elbow connector.

NOTE: Power wiring is close to the side of the drive and hard to get fingers in to hold onto the cables, it is recommended to use needle-nose pliers to hold onto the cable while you screw the wires into the terminals.

4.4.2 Route the communication from the panel into the first drive using the cord connector. The communication wires from the panel are #33(positive, blue with white strip) and #34(negative, white with blue strip).

FIGURE 4.18: Communication wire tags



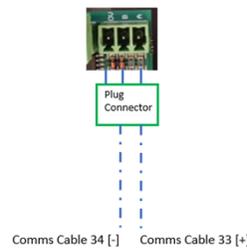
4.4.3 Check the panel and see which communications wire is positive or negative. This can be checked by looking at the header on the top on the PLC and by looking for terminals #33 and #34 in the panel.

4.4.4 Connect Rx+ terminal of communication cable from the panel (Cable with tag #33) to the terminal A in the drive board and connect Rx- terminal of communication cable from the panel (Cable with tag #34) to the terminal B in the drive board (**FIGURE 4.19**).

FIGURE 4.19: Wiring - iECM 71



FIGURE 4.20: Wiring - iECM 71



4.4.5 To connect drive 1 to drive 2, route the communication wire into each drive using the same logic above (**3.4.4**)

4.4.6 Do the same for all the drives and the drives will be connected to the control panel.

Now the system is ready to get it latest HMI and PLC programs.

5.0 PROCEDURE: UPDATING THE HMI SOFTWARE

- 1 To load a new HMI Revision onto an HMI screen for a DE booster, only one thing is needed, a flash drive with the need PLC/HMI Software Revision. Seen in **FIGURE 2.7**.
- 2 Power on the Booster if it is not already and allow the HMI to boot up.
- 3 Plug a flash drive into the USB port on the bottom of the HMI. The Flash Drive needs to have the required PLC software downloaded. If there is no room for the flash drive to plug into the HMI, use the pigtail adapter (**FIGURE 2.4**) to plug the flash drive into the HMI.

FIGURE 5.1: USB Plugged into HMI



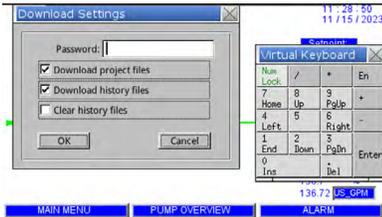
4 A New window will appear on the HMI. Select Download

FIGURE 5.2: Download/Upload HMI Screen



5 Enter Password 111111.

FIGURE 5.3: Password HMI Screen



6 Pick a Directory, Click the + to the left of the **usbdisk**. Keep clicking the next + that appears until the **DE Booster** folder is seen.

FIGURE 5.4: Pick a Directory HMI Screen Part 1

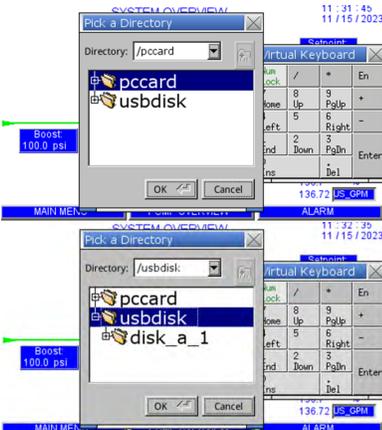
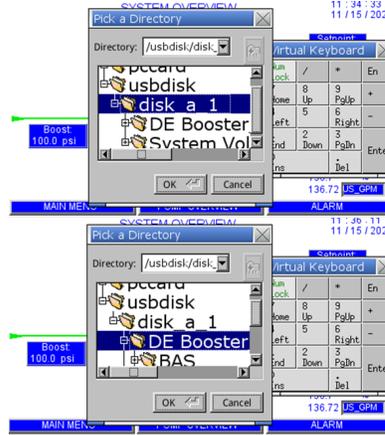
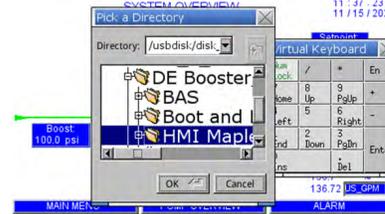


FIGURE 5.5: Pick a Directory HMI Screen Part 2



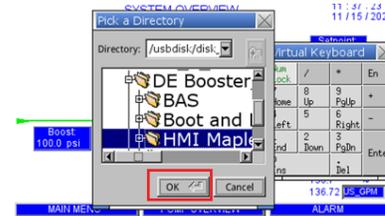
7 Click into the **DE Booster** folder. Click on the **HMI Maple** folder so that it is highlighted blue, do not click the + to open the folder.

FIGURE 5.6: Pick a Directory HMI Screen Part 3



8 Once the folder is selected, click **OK**.

FIGURE 5.7: Pick a Directory HMI Screen Part 4



9 The screen below will appear.

FIGURE 5.8: Downloading HMI Software Screen



10 Once complete, the Armstrong booster home screen will be displayed. Select **Diagnose** to make sure the program was correctly uploaded.

FIGURE 5.9: Booster HMI Home Screen



6.0 PROCEDURE: UPDATING THE PLC SOFTWARE

- 1 Switch off the PLC. To do this, disconnect the 24V fuse inside the panel. This Fuse will have a **24V** labelled wire coming out of the fuse block

FIGURE 6.1: 24V Fuse



- 2 Plug the Smart Key into the PLC into the telephone connector port.

FIGURE 6.2: Smart key - PLC Connection



- 3 Reconnect the PLC to power and it will turn on. All symbols on the Smart Key light up momentarily and the buzzer will beep.
- 4 Wait a few seconds and the key will become operational. During this period, the symbols \updownarrow will flash.
- 5 The controller then enters programming mode, and the start button and symbol \uparrow light up steadily. Press the button to start the data transfer, the data transfer should take a couple of minutes to complete.

FIGURE 6.3: Smart Key - Start



- 6 controller then enters programming mode, and the start button and symbol \uparrow light up steadily. Press the button to start the data transfer, the data transfer should take a couple of minutes to complete.
- 7 Now, verify the PLC software has been updated. At the booster home screen. Select **Diagnose** to verify the correct version was installed properly.

IMPORTANT: Do not remove the key while data is being transferred to the key itself, as the file being transferred will be lost and the corresponding space will not be restored.

NOTE: All parameters and settings will be lost after updating PLC software.

| | |
|--|--|
| \uparrow / \downarrow | Flashing: the key is connecting to pCO, during this phase, which may last a few seconds, the start button is disabled. |
| START | Flashing: the key has detected the pCO and is checking the access permission. |
| START + \uparrow | On steady: pressing the start button will start writing the software to the pCO. |
| START + \downarrow | On steady: pressing the start button will start reading the software from the pCO |
| START +  | On steady: pressing the start button will start reading the logos from the pCO. |
| MODE | On steady: in case of C or G keys, pressing the button for 1 second switches from read to write. |

7.0 PROCEDURE: UPDATE THE BOOSTER SETTINGS

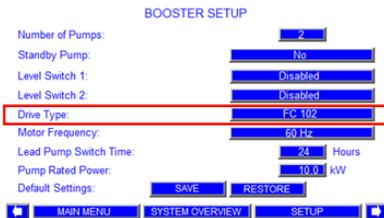
- 1 Now that the HMI and PLC are updated with the new software compatible with the new drives, the booster settings can be restored.

FIGURE 7.1: Booster Home and Set Up Screen



- For Level 2 Access to the Booster Settings, the password is **2323**.
- Now the booster settings can be configured as they were before. Use the video recorded before of the booster settings to configure the booster the same way.
- NOTE, with the update in drive type, the drive type setting will change. For the Drive Type setting, the **ieCM** drive type is needed. A new screen will appear, the **HPI2.0/71** drive type selection is needed.

FIGURE 7.2: Booster Set Up Screen



- Go through all Booster setting screens as seen in **FIGURE 3.1- FIGURE 3.19** and updating the booster settings will the video taken before updating the software.
- Save all default settings once complete.

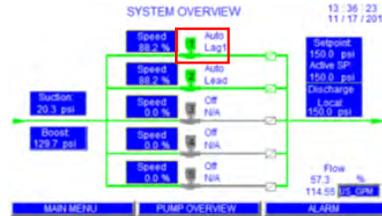
FIGURE 7.3: Save All Variables Screen



8.0 PROCEDURE: RUNNING EACH PUMP IN HAND MODE

- To run a motor in hand mode, click into the **System Overview** menu on the booster Home Screen.
- Click on each pump icon. this is where you can turn it from **OFF** to **Hand** and set the hand mode speed to 50%.

FIGURE 8.1: Booster System Overview



- Set the Hand Speed to 50% and turn the pump into Hand mode.

FIGURE 8.2: Pump Overview



- Turn the Booster on in the booster home screen by selecting **Remote Start** to run each pump in hand mode and verify the motor begins to communicate and run with no alarms.

FIGURE 8.3: Turning on the Booster



- Now, set each pump into **Auto** mode and the motor update is complete.

NOTE: If any issues occurs, contact the Armstrong Service Team for further assistance.

TORONTO

23 BERTRAND AVENUE
TORONTO, ONTARIO
CANADA, M1L 2P3
+1 416 755 2291

BUFFALO

93 EAST AVENUE
NORTH TONAWANDA, NEW YORK
U.S.A., 14120-6594
+1 716 693 8813

DROITWICH SPA

POINTON WAY,
STONEBRIDGE CROSS BUSINESS PARK
DROITWICH SPA, WORCESTERSHIRE
UNITED KINGDOM, WR9 0LW
+44 8444 145 145

MANCHESTER

WOLVERTON STREET
MANCHESTER
UNITED KINGDOM, M11 2ET
+44 8444 145 145

BANGALORE

#59, FIRST FLOOR, 3RD MAIN
MARGOSA ROAD, MALLESWARAM
BANGALORE, INDIA, 560 003
+91 80 4906 3555

SHANGHAI

UNIT 903, 888 NORTH SICHUAN RD.
HONGKOU DISTRICT, SHANGHAI
CHINA, 200085
+86 21 5237 0909

SÃO PAULO

RUA JOSÉ SEMIÃO RODRIGUES AGOSTINHO,
1370 GALPÃO 6 EMBU DAS ARTES
SAO PAULO, BRAZIL
+55 11 4785 1330

LYON

93 RUE DE LA VILLETTE
LYON, 69003 FRANCE
+33 4 26 83 78 74

DUBAI

JAFZA VIEW 19, OFFICE 402
P.O.BOX 18226 JAFZA,
DUBAI - UNITED ARAB EMIRATES
+971 4 887 6775

MANNHEIM

DYNAMOSTRASSE 13
68165 MANNHEIM
GERMANY
+49 621 3999 9858

JIMBOLIA

STR CALEA MOTILOR NR. 2C
JIMBOLIA 305400, JUD.TIMIS
ROMANIA
+40 256 360 030

ARMSTRONG FLUID TECHNOLOGY
ESTABLISHED 1934

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