



# Design Envelope iFMS

Intelligent Fluid  
Management System

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Installation and  
operating instructions

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# CONTENTS

1.0	Introduction	4
2.0	General installation	4
2.1	Offloading	4
2.2	Storage	4
2.3	Unpacking	4
2.4	Location	4
2.5	Electrical connections	4
2.6	Commissioning	4
3.0	General operating instruction	5
3.1	Pumps	5
3.2	Lubrication	5
3.3	System cleanliness	5
4.0	Recommended system drainage	6
4.1	Determining method of drainage and/or purging	6
4.2	Preparation for drainage	6
4.3	Draining and/or purging system	6
4.3	Completion of draining/purging system.	6
5.0	Recommended flush regime checklist	6

The following installation and operating guides pertain to products within the iFMS system and should be reviewed:

**4300 iVs Design Envelope** : File no: 94.81

**Flo-Trex valves** : File no: 35.80/ 35.81

**Suction guide** : File no: 35.82

**IPS 4000**: File no: 90.xxx

**IPS 5000** : 90.81

**IPC11550**: Project specific, please contact Armstrong factory

## 1.0 INTRODUCTION

Armstrong Design Envelope iFMS (Intelligent Fluid Management System) are completely factory-assembled, tested, adjusted, and shipped to the job site as integral units ready to receive suction and discharge piping and incoming power supply. These instructions describe the procedures to be followed during installation, commissioning and operation to ensure optimum performance and reliability. When contacting the factory for assistance, please provide the unit serial number and other pertinent data, such as model motor amperage, voltage and suction and discharge pressures.

The iFMS Design Envelope is a prefabricated solution with the integration of Armstrong Design Envelope pumps and drives, Flo-Trex valves, Suction guides, with the optional Sensorless controls, pump level control using model IPS or with demand based chilled water plant control using Armstrong IPC11550.

The following are references to various installations and operating manual for each of the devices included on the Design Envelope iFMS. Hard copy of this document should be accompanied by the following Installation and operating guides.

**4300 iVs Design Envelope** : File no: 94.81

**Flo-Trex valves** : File no: 35.80/ 35.81

**Suction guide** : File no: 35.82

**IPS 4000/ 5000** : File no: 90.xxx / 90.81 (where applicable)

**IPC11550**: Project specific, please contact Armstrong factory

## 2.0 GENERAL INSTALLATION

### 2.1 OFFLOADING

The iFMS Design Envelope systems are delivered to site on wooden skids with transparent plastic wrapped around wooden frame. The system should preferably be offloaded by forklift or crane using slings attached to the lifting lugs (yellow) provided on each corner of the goal post assembly. The Design Envelope iFMS (NA) are also provided with cross bars on the lower portion of the goal post structure used to reinforce the frame and also to allow lifting using a forklift.

### 2.2 STORAGE

Make sure that all components are kept as clean as possible. **DO NOT** remove the crating or plastic wrapping until the unit is ready for installation.

### 2.3 UNPACKING

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

### 2.4 LOCATION

Locate the unit where it is easily accessible for inspection and servicing.

Provide adequate room for pump and vFD drives.

For mounted control panels, ensure that there is access to the interior of the panel.

### 2.5 ELECTRICAL CONNECTIONS



Danger of electrical shock! All electrical work in connection with the installation must be carried out by a qualified electrician and tested prior to energizing the supply.

When provided with a single point power panel, all interconnecting wiring to the controller (as applicable) and pumps are completed and tested in the factory prior to shipping.

When provided with a control panel, all electronic wiring between the controller and the pump drives are completed and tested in the factory prior to shipping.

The only site wiring required (by others) is to bring the incoming power supply into the 3-phase terminals inside the junction box. BAS communication wiring (if applicable) should also be completed on site by a certified electrician. All electrical work must be in accordance with the current NEC wiring regulations and any other local regulations that may apply.

### 2.6 COMMISSIONING

The commissioning of the system should be undertaken by suitably qualified personnel. The commissioning process is to be documented and the results recorded on the commissioning record sheet provided where applicable on each I&O manual. Please return the completed record sheet to Armstrong to confirm your warranty period.

### 3.0 GENERAL OPERATING INSTRUCTION

#### 3.1 PUMPS

Ensure that the pump turns freely by hand, or with some gentle mechanical help such as a strap or allen key in coupling bolt.

Ensure that all protective guarding is securely fixed in position. The pump must be fully primed on start up. Fill the pump casing with liquid and rotate the shaft by hand to remove any air trapped in the impeller. Any air trapped in the casing as the system is filled must be removed by the manual air vent in the seal flush line.

**Ensure entrained air is removed prior to starting, through the air vent on the seal flush line – open vent until clear of air.**

Pumps are fitted with seal flush/vent lines piped to the pump suction area. When these units operate residual air is drawn out of the pump towards the suction piping.

'Bump' or energize the motor momentarily and check that the rotation corresponds with the directional arrow on the pump casing. To reverse rotation of a three phase motor, interchange any two power leads. Start the pump with the discharge valve closed and the suction valve open, and then gradually open the discharge valve when the motor is at operating speed. The discharge valve may be 'cracked' or open slightly at start up to help eliminate trapped air. **When stopping the pump:** Close the discharge valve and de-energize the motor. **DO NOT** run the pump against a closed discharge valve for an extended period of time (a few minutes maximum).

Should the pump be noisy or vibrate on start-up a common reason is overstated system head. Check this by calculating the pump operating head by deducting the suction pressure gauge value from the discharge gauge reading. Convert the result into the units of the pump head as stated on the pump nameplate and compare the values.

Should the actual pump operating head be significantly less than the nameplate head value it is typically permissible to throttle the discharge isolation valve until the actual operating head is equal to the nameplate value. Any noise or vibration usually disappears. The system designer or operator should be made aware of this soon as some adjustment may be required to the pump impeller diameter or drive settings, if applicable, to make the pump suitable for the system as installed.

#### WARNING



Whenever any service work is to be performed on a pumping unit, disconnect the power source to the driver, **LOCK** it **OFF** and tag with the reason. Any possibility of the unit starting while being serviced must be eliminated. If mechanical seal environmental accessories are installed, ensure water is flowing through the sight flow indicator and that filter cartridges are replaced as recommended.

#### 3.2 LUBRICATION

##### PUMP

Lubrication is not required. There are no bearings in the pump that need external lubrication service.

##### MOTOR

Follow the lubrication procedures recommended by the motor manufacturer. Many small and medium sized motors are permanently lubricated and need no added lubrication. Generally if there are grease fittings evident the motor needs periodic lubrication. None if not.

Check the lubrication instructions supplied with the motor for the particular frame size indicated on the motor nameplate.

##### MECHANICAL SEAL

Mechanical seals require no special attention. The mechanical seal is fitted with a flush line. The seal is flushed/vented to the suction on close coupled pumps.

**DO NOT** run the pump unless properly filled with water as the mechanical seals need a film of liquid between the faces for proper operation.

Mechanical seals may 'weep' slightly at start-up. Allow the pump to continue operating for several hours and the mechanical seal to 'seat' properly prior to calling for service personnel.

#### 3.3 SYSTEM CLEANLINESS

Before starting the pump the system must be thoroughly cleaned, flushed and drained and replenished with clean liquid.

Welding slag and other foreign materials, 'Stop leak' and cleaning compounds and improper or excessive water treatment are all detrimental to the pump internals and sealing arrangement.

Proper operation cannot be guaranteed if the above conditions are not adhered to.

## NOTE

Particular care must be taken to check the following before the pump is put into operation:

- A Pump primed?
- B Rotation ok?
- C Lubrication ok?
- D Pipe work properly supported?
- E Voltage supply ok?
- F Overload protection ok?
- G Is the system clean?
- H Is the area around the pump clean?

## 4.0 RECOMMENDED SYSTEM DRAINAGE

### 4.1 DETERMINING METHOD OF DRAINAGE AND/OR PURGING

- 1 Proper and complete drainage of the system will require purging with air. A vacuuming device (shop vac with small tubing adapted) may be required to remove water from entrapped areas.
- 2 A vent valve on the testing cap end for venting off entrapped air pressure upstream of the FTV or other check valve is to be used.

### 4.2 PREPARATION FOR DRAINAGE

- 1 Shut off water supply valves on header.
- 2 Hook up air supply line to header. Do not exceed (20 psig).
- 3 Hook up hoses to all drain points and route to floor drains.
- 4 Open all vents and drain valves. It may be beneficial to drain one section at a time and valve off when complete.
- 5 Remove all drain plugs.

### 4.3 DRAINING AND/OR PURGING SYSTEM

- 1 Slowly open air purge line ensuring minimum build-up of pressure in system. (**DO NOT** exceed 20 psig).
- 2 Continue draining until all visible water is non-existent at all drain points.
- 3 Articulate all valves to 50% to ensure movement and no pockets of air or water.
- 4 All drain valves are to be left open.

### 4.4 COMPLETION OF DRAINING/PURGING SYSTEM

- 1 Shut off air to unit.
- 2 Close all air system isolation valves to unit.
- 3 Ensure all pressure is removed by using drain and/or vent valves.
- 4 Disconnect all hoses to unit.
- 5 Replace drain plugs.

## 5.0 RECOMMENDED FLUSH REGIME CHECKLIST

Establishing best practices in the initial start-up of pumps/systems will mitigate the risk of mechanical damage to pumps, seals and bearings as well as other complications caused by vibration.

Supplied pumps should not be used for the system flush. Use temporary pumps to avoid potential damage to the supplied product. If temporary pumps are not available for the flushing process, this checklist will minimize the risk of damage to the supplied product.

**All identified drain plugs are removed at the factory before shipment, bagged, and attached to visible pipe support. All the drain plugs must be installed prior to filling the system.**

**Note:** This is recommended practice only. The contractor assumes all risk and responsibility for any damage to the supplied product.

- Use as few of the installed pumps as possible.
- Use the largest capacity pump to improve the flushing results.
- Prevent the pump from running in a run out (end of curve) during the flushing, because an increase in vibration may damage the mechanical seal.
- Partially close the FTV valve during the flush period in order to keep the operating point of the pump under 25% of the pump best efficiency point. The pump generally operates to the right of its curve during flush because there is less system resistance than during normal operating practice.
- Do not speed up the pump during the flush stage, because the lower system resistance will create a run out situation.
- Dirt in the system will result in erosive or catastrophic mechanical seal failure. Dirt is common during new construction, as well as on retro-fit application.
- If a commissioning strainer was installed during start-up, remove it after start-up is complete because it will eventually build up a pressure drop due to plugging.
- Reduce damage by dirt by installing a seal flush plan complete with dirt separator or filter on the pump.
- Perform a visual inspection of the mechanical seal after flush. Is there any indication of liquid leakage from the seal?
- Replace the seal if there are any signs of leakage after the flush.

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