

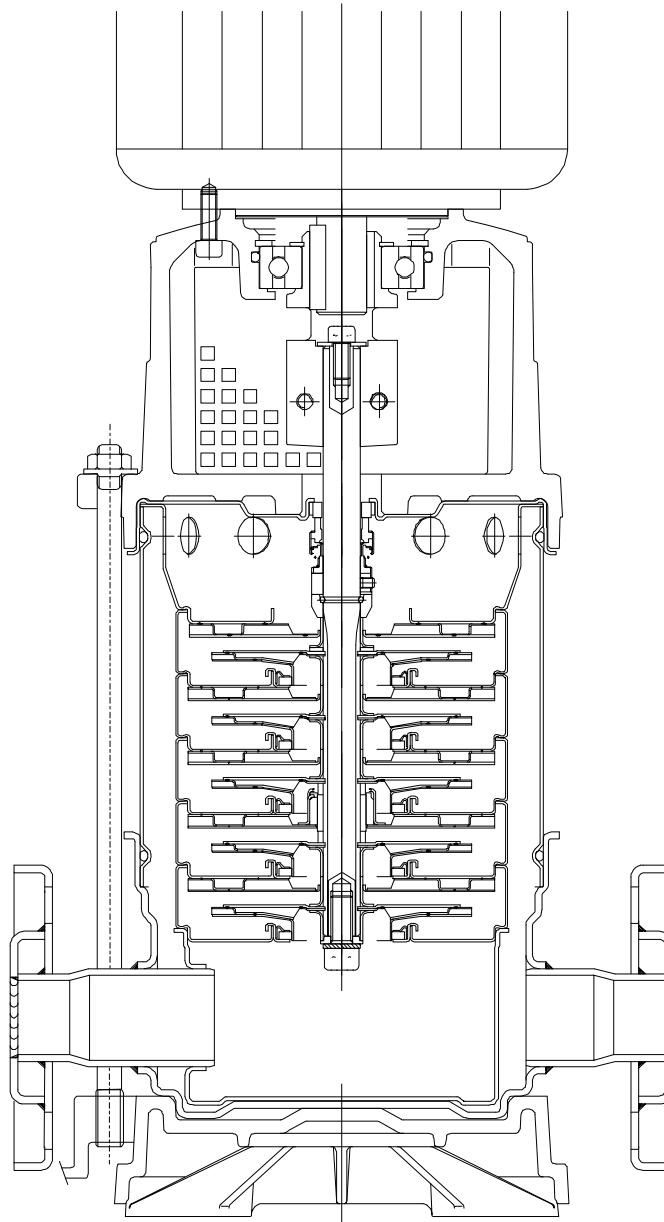
FILE NO.:	47.80
DATE:	APRIL 1, 1997
SUPERSEDES:	NEW
DATE:	NEW

INSTALLATION & OPERATING

ARMSTRONG®

COMMERCIAL PUMPS

SERIES 4700 VERTICAL MULTISTAGE PUMP



1. GENERAL

1.1 Applications

Pumps for clear liquids in residential, agricultural, industrial, and other applications.

- Boiler water supply with **mandatory BY-PASS kit**

1.2 Specifications

- Max. service pressure: 350 psig (25 bar)
- Max. suction pressure 145 psig (10 bar)

•Temperature range:

- Standard version: -15°C to 120°C (5° F to 250° F)
- Ambient temperature: Up to 40°C (104°F)
Maximum (consult factory for higher ambient temperatures).
- Suction head: refer to NPSH curves

2. SAFETY

Read this data sheet carefully before installing and starting up. Pay special attention to the points concerning the safety of the equipment for the intermediate or end user.

2.1 Symbols used in the manual



Warning



Instruction concerning electricity



Calls attention to a potential risk that might affect safety.

3. TRANSPORT AND STORAGE

When taking delivery of the equipment, check that it has not been damaged in transit. If anything is found wrong, take the necessary steps with the carrier within the allowed time.



If the equipment delivered is to be installed at a later time, store it in a dry place and protect it from impacts and outside hazards (moisture, frost, etc.).

Handle the pump carefully so as not to alter the geometry or alignment of the hydraulic assembly.

4. PRODUCTS AND ACCESSORIES

4.1 Recommended Components(see Figs. 1 & 2)

- 1) Foot valve-strainer
- 2) Pump suction valve
- 3) Pump discharge valve
- 4) Check valve
- 5) Venting-filling plug
- 6) Drain-priming plug
- 7) Pipe support
- 8) Strainer
- 9) Storage tank
- 10) City water supply
- 11) Motor starting equipment
- 12) Lifting hook
- 13) Foundation

4.2 Pump

Armstrong Series 4700 VMS Vertical Multistage centrifugal pump (2 to 20 stages)

Not self priming

Suction and discharge connections in-line on bottom.

Shaft sealing by mechanical seal (carbon against silicon carbide faces)

•Flanges

- Drilled for A.N.S.I. 250 rating

4.3 Motor

Standard NEMA design motor for 56c or TC vertical mounting.

5. INSTALLATION

Two scenarios are detailed (see Fig 1 & 2):

•Fig 1: Pump with suction lift

•Fig. 2 Pump under pressure (from storage tank (item 9) or city water supply (item 10) with dry-running protection system suggested.

5.1 INSTALLATION

Locate the unit as close as practical to the storage container of liquid being pumped (see Fig 1 & 2).

For heavier pumps (above 50 lbs or 25 kg), provide a point of attachment (lifting hook, item 12) on the pump centreline to facilitate removal.

Install the pump on a concrete foundation block (item 13) at least 10 cm high and attach by anchor bolts (for installation details see submittal data).

Place a vibration isolation pad under the concrete block to avoid transmitting noise and vibrations to the rest of the installation.

Before final tightening of the anchor bolts, make sure that the pump is perpendicular ; use shims if necessary.



Note that the altitude of the installation and the water temperature may reduce the suction head of the pump. Ensure system NPSH available is greater than pump NPSH requirement.

Above 80° C (176° F), plan to install the pump under pressure.

5.2 Hydraulic connections

Limit the length of the suction pipe and avoid all features that cause losses of head (reducers, elbows, etc.).

Use pipe supports so that the pump does not bear the weight of the pipes.

An arrow on the pump casing indicates the direction of fluid flow.

Carefully seal the pipes with suitable products.

Pump under pressure Connect a non-slam check valve to the pump discharge to protect from any water hammer effects.

Note: To pump water with a large air content or hot water, we recommend installing the By-Pass(BP) kit (see Fig. 1).

5.3 Electrical connections:



The electrical connections and check must be made by a qualified electrician and comply with applicable local standards.

Refer to the motor data plate for the electrical characteristics.

The motor must be protected by a circuit-breaker set to the current marked on the motor data plate.

Provide a disconnecting switch to protect the power supply.

DO NOT FORGET TO CONNECT THE GROUND WIRE.




A connection error would damage the motor. The power cable must never touch the pipe or the pump; make sure that it is protected from any moisture.

The orientation of the motor can be changed 90° by removing the motor capscrews (if necessary, remove the coupling guards) and turning the motor to the desired position.

Refit the screws and the coupling guards.

6. STARTING UP


6.1 Filling, venting

 **Never operate the pump dry, even briefly.**

Pump under pressure (see Fig. 2)

- Close the discharge valve (3)
- Open the bleed device (5) and the suction valve (2) and completely fill the pump.

Close the bleed device only after water flows out and all air has been eliminated.

 **In a hot-water application, a stream of water may escape from the bleed port. Do what is necessary to protect attending personnel and the motor.**

Pump with suction lift. Two cases are possible:

FIRST CASE (see Fig. 3-1):

- Close the discharge valve (3) and open the suction valve (2).
- Remove the bleed plug (5)
- Unscrew the bottom drain-priming plug (6) on the pump casing four or five turns.
- Put a funnel into the bleed port and completely fill the pump and the suction pipe.
- When water flows out and all air has been eliminated, filling is complete.
- Screw the bleed plug and the bottom drain-priming plug back in.

SECOND CASE (see Fig. 3-2):

Filling can be made easier by fitting, on the pump suction pipe, a vertical pipe with a 1-1/2" dia. valve and a funnel.

The length of pipe must protrude at least 2" (5 cm) above the bleed device.

- Close the discharge valve and open the suction valve.
- Open the valve and the bleed device.
- Fill the pump and the suction pipe completely, until water flows out of the bleed device.
- Close the valve (which can be left in place), remove the vertical fill pipe, and close the bleed device.

Dry-running protection

To avoid accidental loss of priming of the pump, we recommend protecting it with a discharge line pressure switch or a float switch connected in the starting equipment control circuit.

6.2 Check the direction of rotation of three-phase motor

Turn the coupling by hand to make sure that it turns freely, without binding. Power up the motor by briefly pressing the circuit-breaker and check that it turns in the direction indicated by the arrow on the motor pedestal. If not, interchange two phase wires on the starter terminal block.

NOTE: The single-phase motors are designed to rotate in the correct direction in all cases

6.3 Starting Up

 **The pump must not be operated in a no-flow condition (discharge**

valve closed) for more than 10 minutes with cold water (temperature below 40° C (104° F)) or more than 5 minutes above 60° C (140° F).

The resulting temperature rise might cause vapor to form and damage the pump.


We recommend establishing a minimum flow of about 10% of the rated capacity of the pump, to avoid the formation of a vapor pocket at the top of the pump.

If the pump is operated at high back-pressure, unscrew the bleed device a few turns to complete bleeding (until water flows out).

Open the discharge valve to start the pump.

Use a pressure gauge to check the stability of the discharge pressure; if it is unstable, bleed the pump again or perform the filling operation.

Check that the current draw does not exceed the value stated on the motor data plate.

 **Risk of burning. In operation, the motor temperature may exceed 100° C (212° F). Motor insulation is entirely suitable for working temperatures.**

7. SERVICING

No special servicing in operation. Always keep the pump and surrounding area clean.

For a prolonged shutdown, if there is no risk of frost, it is best not to drain the pump.

Motors without grease fittings

The bearings are greased for life and so need no lubrication.

Motors with grease fittings


Lubricate with high-temperature grease every 5,000 hours.

- The bearing holding the coupling is greased for life.

Mechanical seal

The mechanical seal needs no servicing in operation.

8. OPERATING TROUBLE

 **Switch the pump OFF before doing any work on it. It must never be allowed to operate dry.**

Replacement frequencies:

These are no more than recommendations: the actual replacement frequencies will depend on the pump operating conditions, namely:

- For the mechanical seal, the temperature and pressure of the liquid pumped.
- For the motor and other components, pressure head and ambient temperature.

8. OPERATING TROUBLE:

 **Switch the pump OFF before doing any work on it.**

Parts or components subject to wear		Mechanical Seal	Motor + Pump Bearing	Motor Winding
Operating Life		10,000 to 20,000h	12,000 to 50,000h	25,000 max. amb. + 40° C
Replacement	Conti. Duty	1 to 2 years	1.5 to 5 years	3 years
Frequency	15h/day 9 month/year	2 to 4 years	3 to 10 years	6 years

TROUBLES	CAUSES	REMEDIES
8.1 PUMP TURNS BUT NO WATER IS DELIVERED	<ul style="list-style-type: none"> a) The internal parts are obstructed by debris: b) Suction pipe obstructed: c) The pump has lost its priming: d) Air leaks in suction pipe: e) The suction pressure is too low; this is generally accompanied by cavitation noise. f) The pump turns the wrong way (three-phase motor): g) The supply voltage to the motor is too low: 	<ul style="list-style-type: none"> a) Dismantle the pump and clean it. b) Clean out the pipes. c) Fill the pump to re-prime. Check that the valve is tight. d) Check the tightness of the whole pipe, up to the pump, and make it tight. e) Loss of head on suction or suction height too great (check the NPSH of the pump installed). f) Interchange two phase wires at the motor or starter terminal strip to reverse the direction of rotation. g) Check the voltage on the terminals of the motor and the wire size.
8.2 THE PUMP VIBRATES	<ul style="list-style-type: none"> a) Loose on its foundation: b) Debris obstructing the pump: c) Pump is hard to turn: d) Incorrect electrical connection: 	<ul style="list-style-type: none"> a) Check the nuts of the stud bolts and tighten them fully. b) Dismantle the pump and clean it. c) Check that the pump turns freely without abnormal sticking. d) Check the connection to the pump.
8.3 THE PUMP OVERHEATS	<ul style="list-style-type: none"> a) Voltage incorrect: b) Debris obstructing the pump: c) Ambient temperature above +40° C (104° F) 	<ul style="list-style-type: none"> a) Check the voltage on the terminals of the motor; it should be within 10% of the rated voltage. b) Dismantle the pump and clean it. c) The motor is designed to operate at an ambient temperature of not more than +40° C (104° F).
8.4 THE PUMP DELIVERS INSUFFICIENT PRESSURE	<ul style="list-style-type: none"> a) The motor fails to run at its normal speed (debris, defective power supply, etc.) b) The motor is faulty: c) Pump poorly filled: d) The motor turns the wrong way (three-phase motor): 	<ul style="list-style-type: none"> a) Dismantle the pump and correct the problem. b) Replace it. c) Fill the pump and bleed until there are no more air bubbles. d) Interchange two phase wires at the motor terminal block or on the circuit-breaker to reverse the direction of rotation.
8.5 THE MOTOR TRIPS OUT	<ul style="list-style-type: none"> a) The setting of the thermal relay is too low (three phase motor) b) The voltage is too low: c) One phase is open-circuit: d) The thermal relay of the circuit-breaker is faulty: 	<ul style="list-style-type: none"> a) Check the current with an ammeter, or set to the current rating marked on the motor data plate. b) Check that the wire sizes are adequate. c) Check it and, if necessary, replace the power cable. d) Replace it.
8.6 THE FLOW IS IRREGULAR	<ul style="list-style-type: none"> a) The suction height (SH) is exceeded: b) The diameter of the suction pipe is smaller than that of the pump: c) The strainer and suction pipe are partially obstructed: 	<ul style="list-style-type: none"> a) Reread the installation instructions and check NPSH. b) The suction pipe must have the same diameter as the pump suction port. c) Remove and clean.

ARMSTRONG WARRANTY DOES NOT COVER ANY DAMAGES TO THE EQUIPMENT RESULTING FROM FAILURE TO OBSERVE THE ABOVE PRECAUTIONS.

S.A. Armstrong Limited
 23 Bertrand Avenue
 Toronto, Ontario
 Canada, M1L 2P3
 Tel: (416) 755-2291
 Fax: (416) 759-9101

Armstrong Pumps Limited
 Peartree Road, Stanway
 Colchester, Essex
 United Kingdom, C03 5JX
 Tel: 01206-579491
 Fax: 01206-760532



Armstrong Pumps Inc.
 93 East Avenue
 Buffalo, New York
 U.S.A. 14120-6594
 Tel: (716) 693-8813
 Fax: (716) 693-8970
 1-800-FLOW-845

Armstrong Darling Inc.
 2200 Place Transcanadienne
 Montreal, Quebec
 Canada, H9P 2X5
 Tel: (514) 421-2424
 Fax: (514) 421-2436