

Commercial pumps Series 4300, 4360 and 4380

Vertical In-Line pumps

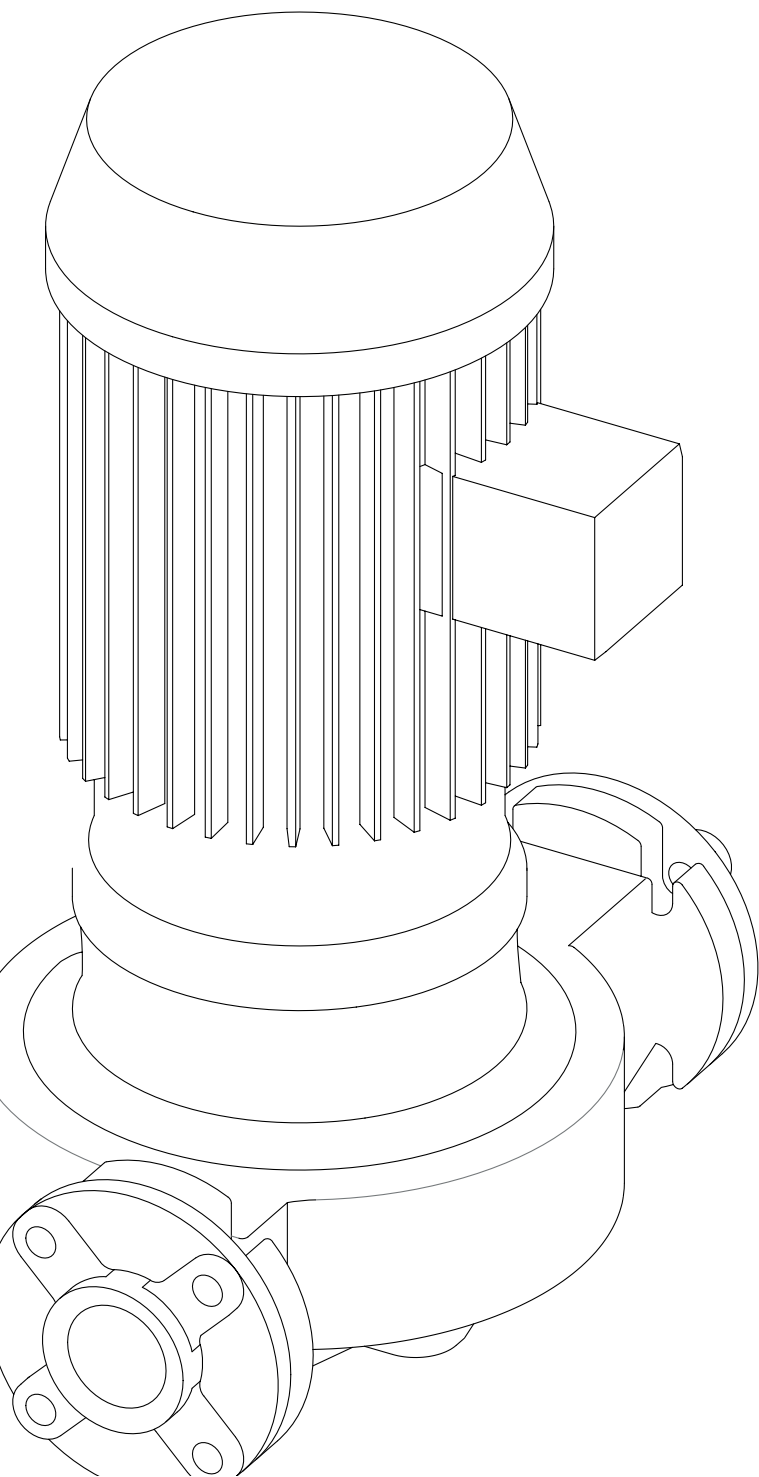
Installation and operating instructions

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1.0 INTRODUCTION

This document contains specific information regarding the safe installation, operating and maintenance of Vertical In-Line pumps and should be read and understood by installing, operating and maintenance personnel. The equipment supplied has been designed and constructed to be safe and without risk to health and safety when properly installed, operated and maintained. The following instructions must be strictly adhered to. If clarification is needed on any point please contact Armstrong quoting the equipment serial number.

WARNING SYMBOLS



Safety instruction where an electrical hazard is involved.



Safety instruction where non-compliance would affect safety risk.



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

1.1 INSTRUCTIONS FOR SAFE USE



No installation of this equipment should take place unless this document has been studied and understood. Handling, transportation and installation of this equipment should only be undertaken by trained personnel with proper use of lifting equipment. See later diagrams for lifting advice. Refer to the pump nameplate for pump speed, pressure and temperature limitations. The limits stated must not be exceeded without written permission from Armstrong.

1.2 TEMPERATURE

Where under normal operating conditions the limit of 68°C/155°F (restricted zone) for normal touch, or 80°C/176°F (unrestricted zone) for unintentional touch, may be experienced, steps should be taken to minimize contact or warn operators/users that normal operating conditions will be exceeded. In certain cases where the temperature of the pumped liquid exceeds the above stated temperature levels, pump casing temperatures may exceed 100°C/212°F and not withstanding pump insulation techniques appropriate measures must be taken to minimize risk for operating personnel.

1.3 NOISE LEVELS

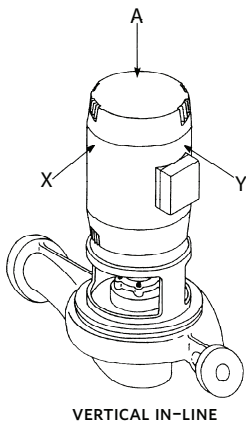
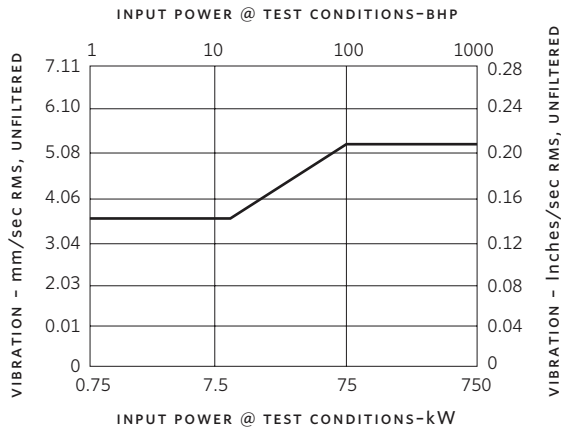
Typical Pumping Unit Sound Pressure Level, Decibels, A-Weighted, at 1 m (3 ft.) from unit.

FIG. 1 Noise levels.

FRAME DESIGNATION	1200 RPM				1800 RPM				3600 RPM			
	ODP		TEFC		ODP		TEFC		ODP		TEFC	
	hp	dB-A	hp	dB-A	hp	dB-A	hp	dB-A	hp	dB-A	hp	dB-A
140	0.75 - 1	59	0.75 - 1	58	1 - 3	64	1 - 2	64	1.5 - 3	70	1.5 - 2	79
180	1.5 - 2	61	1.5 - 2	61	3 - 5	66	3 - 5	68	5 - 7.5	74	3 - 5	82
210	3 - 5	66	3 - 5	65	7.5 - 10	70	7.5 - 10	73	10 - 15	76	7.5 - 10	85
250	7.5 - 10	70	7.5 - 10	69	15 - 20	74	15 - 20	78	20 - 25	78	15 - 20	88
280	15 - 20	75	15 - 20	74	25 - 30	74	25 - 30	82	30 - 40	80	25 - 30	89
320	25 - 30	77	25 - 30	77	40 - 50	78	40 - 50	83	50 - 60	83	40 - 50	94
360	40 - 50	80	40 - 50	80	60 - 75	80	60 - 75	89	75 - 100	88	60 - 75	95
400	60 - 75	82	60 - 75	84	100 - 125	83	100	92	125 - 150	92	100	96
440	100 - 125	85	100 - 125	88	150 - 200	87	125 - 150	96	200 - 250	95	125 - 150	98

1.4 VIBRATION LEVELS

Armstrong Vertical In-Line pumps are designed to meet vibration levels set by Hydraulic Institute Standard HI Pump vibration 9.6.4. standard levels are as detailed below:



1.5 STORAGE

Pumps not immediately placed into service, or removed from service and stored, must be properly prepared to prevent excessive rusting. Pump port protection plates must not be removed until the pump is ready to connect to the piping.

Rotate the shaft periodically (at least monthly) to keep rotating element free and bearings fully functional.

For long term storage (longer than 3 months), the pump must be placed in a vertical position in a dry environment.

Internal rusting can be prevented by removing the plugs at the top and bottom of the casing and drain or air blow out all water

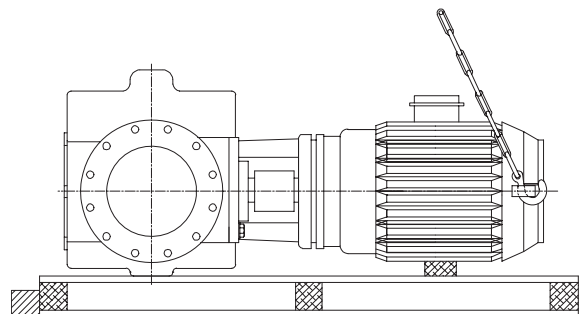
to prevent rust buildup or the possibility of freezing. Be sure to reinstall the plugs when the unit is made operational. Rust-proofing or packing the casing with moisture absorbing material and covering the flanges is acceptable. When returning to service be sure to remove the drying agent from the pump.

1.6 UNCRATING

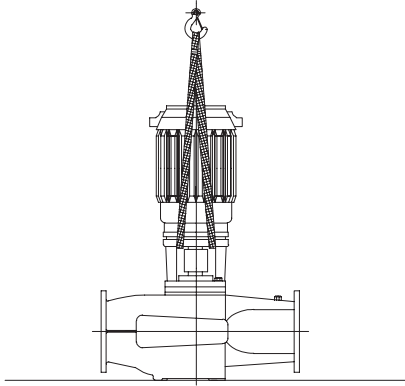
Armstrong Vertical In-Line pumps are thoroughly inspected before shipment to assure they meet with your order requirements. After removing the pump from the crate, make sure the equipment is in good order and that all components are received as called for on the packing list. Any shortages or damage should be reported immediately. Use extreme care in handling the unit, placing slings and hooks carefully so that stress will not be imposed on the pump. **Never place cable slings around the pump shaft.** The eye bolts or lifting lugs on the motor are intended for lifting the motor only and not the complete unit.

1.7 HANDLING LARGE VIL UNITS

One effective way of lifting a large Series 4300 unit from the shipment pallet following uncovering the unit is to place lifting hooks through the motor lifting rings or straps around the upper part of the motor and carefully lift sufficiently to stand the pump vertically. Lift only enough to remove the pallet then lower onto a flat surface. The pump and motor unit will free-stand on the casing ribs. Remove the coupling guard and place (2) lifting straps through the pump/motor pedestal (one on each side of the motor shaft) and secure to the lifting device. With the straps in place, using a spacer bar if necessary to protect the motor fan cover, the whole assembly can now be lifted securely and placed in position in the piping.



Secure pallet and lift pump vertical using motor eye-bolts lift only to clear pallet then sit on the flat surface.



Remove coupling guard and place lifting straps on each side of coupling, use spacer bar if necessary to protect motor fan cover.

IMPORTANT:



Do not run the pump for any length of time under very low flow conditions or with the discharge valve closed. This could cause the water in the casing to reach super heated steam conditions, cause premature failure and cause serious and dramatic damage to the pump and surrounding area.

2.0 INSTALLATION

2.1 LOCATION

In open systems, locate the unit as close as practical to the liquid being pumped, with a short, direct suction pipe. Ensure adequate space is left above and around the unit for operation, maintenance, service and inspection of parts.

In closed systems, where possible, the pumps should be installed immediately downstream of the expansion tank/make-up connection. This is the point of zero pressure change and is necessary for effective pump operation. Do not install more than one expansion tank connection into any closed hydronic system.

Electric motor driven pumps should not be located in damp or dusty locations without special protection.

Airflow into the motor and/or motor fan should not be obstructed.

2.2 INSTALLATION

When installing Vertical In-Line pumps, an important consideration to accrue full added-value from the pump design is to ensure that the pump is pipe-mounted and free to 'float' with any movement, expansion and contraction of the piping. Should any Vertical In-Line pump use supports to the structure it is imperative that no pipe strain is imposed on the pump flanges. Telltale pieces of equipment such as springs or 'waffle' style neoprene isolation pads that distort with pressure to indicate added piping weight, should be used under pump supports should the pump not be truly pipe mounted.

Various installation arrangements are detailed on Pages 6 and 7:

2.2.1

Vertical In-Line pumps may be installed directly in the system piping with no additional support. Pipe hangers are simply sized for the additional weight of the pumping unit. Many pumps are installed in this manner and are mounted at sufficient height to take zero floor space. (Fig. 2.1)

2.2.2

Piping, in many mechanical rooms, is hung close to the ceiling and larger pumps are mounted near ground level for ease of maintenance. Fig 2.2 illustrates such an arrangement with the piping supported at the ceiling and the VIL unit installed with an Armstrong Suction Guide and triple function Flo-Trex valve. Many very large VIL pumps are installed in this manner.

2.2.3

Should additional space saving be required the discharge spool piece and Flo-Trex valve may be replaced by a long-radius elbow and the Flo-Trex valve field converted to a straight-through valve and installed in the vertical discharge pipe. (Fig. 2.3)

2.2.4

Fig 2.4 illustrates a similar arrangement to Fig 2.2 with additional floor mounted pipe-stools isolated from the structure by 'waffle' style neoprene isolation pads under the Armstrong Suction Guide and Flo-Trex valve.

2.2.5

Floor mounted saddle supports (Fig. 2.5) are typical for condenser water pumps where the cooling tower base is near mechanical room elevation.

2.2.6

Where required, additional floor support may be used as shown in Fig. 2.6. Note that the pump should not be rigidly attached to the column. Leave a small gap between pump and column or install a 'waffle' isolation pad under the pump. It is critical that piping be installed in such a manner that the pump does not become a pipe support.

2.2.7

Fig. 2.7 illustrates stanchion plates at the pump inlet and outlet ports that may be supplied for installation convenience. Isolation pads must be used under the legs and monitored as pipe hangers are adjusted to ensure the pump flanges are not supporting the piping. Bolting to the floor or housekeeping pad is not recommended. If the stanchions are bolted down the bolts must be isolated from the stanchion or an inertia base and flexible pipe connectors should be used.

2.2.8

Fig. 2.8 illustrates installations with stanchion plates for seismically active regions. Seismically rated isolation pads or snubbers with bolts isolated from the stanchion plates are installed to restrain the pump during a seismic event. Pipe hangers carry the weight of the equipment as seismic components are designed only to restrain the equipment during a seismic event.

2.2.9

Close coupled in-line units (Series 4360 & 4380) up to 15 hp / 11 kW may be installed with the shaft horizontal. (Fig. 2.9) For horizontal mounting of large units or Series 4300 Split-Coupled style consult the factory. (Fig. 2.9)

2.2.10

Many Vertical In-Line pumps are piped successfully into grooved piping systems. In-line pumps are supported well by grooved piping however flange adapter locking devices or a welded flange at the pump should be used to prevent the possibility of pipe mounted pumps rotating in the piping. Armstrong offers grooved suction guides with cast-in outlet flanges and triple function Flo-Trex valves with inherent locking devices to prevent this possibility. (Fig. 2.10)

2.2.11

Do not support the unit by the motor eye bolts (Fig. 2.11) or by any other part of the motor.

2.2.12

Connecting the pump to a permanent rigid base (Fig. 2.12). is not recommended unless isolated from the piping by flexible

connectors and the base isolated from the building structure on an inertia base. (Fig. 2.12 is generally acceptable when using plastic piping).

IMPORTANT:

All Series 4300 pumps contain a tapped hole in the motor bracket above the discharge flange (see Fig. 2.13) for draining the well. Pipe this drain hole to a floor drain to avoid overflow of the cavity caused by collecting chilled water condensate or from seal failure.

2.3 PUMP PIPING - GENERAL

Never connect a pump to piping, unless extra care is taken to measure and align the piping flanges well. Always start piping from pump.

Use as few bends as possible and preferably long radius elbows.

Do not use flexible connectors on the suction or discharge of a Vertical In-Line pump, unless the pump is rigidly mounted to a foundation.

Ensure piping exerts no strain on pump as this could distort the casing causing breakage or early failure due to pump misalignment.

All connecting pipe flanges must be square to the pipework and parallel to the pump flanges.

Suction and discharge pipes may be increased or decreased at pump nozzle to suit pump capacity and particular conditions of installation. Use eccentric reducers on suction connection with flat side uppermost.

Layout the suction line with a continual rise towards the pump without high points, thus eliminating possibility of air pockets that may prevent the pump from operating effectively.

A strainer of three or four times the area of the suction pipe, installed in the suction line, will prevent the entrance of foreign materials into the pump. $\frac{3}{16}$ " (5 mm) diameter perforations in the strainer is typical.

In open systems, test suction line for air leaks before starting; this becomes essential with long suction line or static lift. Install, at the pump suction, a straight pipe of a length equivalent to 4 or 6 times its diameter; this becomes essential when handling liquids above 120°F (49°C). Armstrong suction guides may be used in place of the straight pipe run and in-line strainer.

Install an isolation valve in both suction and discharge lines on flooded suction application; these valves are used primarily to isolate the pump for inspection or repair.

Install a non-slam non-return check valve in discharge line between pump and isolation valve to protect pump from excessive back pressure and to prevent water running back through the pump in case of driver failure on open systems. An Armstrong Flo-Trex valve may be used in place of non-return check valve and isolation valve on pump discharge.

CAUTION:



Only the discharge valve is to be used to throttle pump flow, not the suction valve. Care must be taken in the suction line layout and installation, as it is usually the major source of concern in centrifugal pump applications.

2.4 ALIGNMENT

Alignment is unnecessary on close-coupled pumps, Series 4360 & 4380, as there is no shaft coupling.

Series 4300 units are accurately aligned at the factory prior to being shipped and do not need re-aligning when installed.

Alignment on a Series 4300 unit may be verified by assuring an equal and parallel gap between coupling halves on both sides of the coupling.

OPERATION

2.5 STARTING THE PUMP



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. On Series 4300 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 from series 4300 pumps, prior to starting, through the air vent on the seal flush line. Open vent until clear of air.**

Series 4360 & 4380 units 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, then gradually open the discharge valve when the motor is at operating speed. The discharge valve may be 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).

Star-Delta motor starters should be fitted with electronic/mechanical interlocks that have a timed period of no more than 40 milliseconds before switching from star (starting) to delta (run) connection yet allow the motor to reach full star (starting) speed before switching to delta (run).

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 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.

CAUTION:



Check rotation arrow prior to operating the unit. The rotation of all Armstrong Vertical In-Line units is clockwise when viewed from the drive end. (Looking from on top of/behind the motor).

2.6 GENERAL CARE

Vertical In-Line pumps are built to operate without periodic maintenance, other than motor lubrication on larger units. A systematic inspection made at regular intervals, will ensure years of trouble-free operation, giving special attention to the following:

- Keep unit clean.
- Provide the motor with correctly sized overload protection.
- Keep moisture, refuse, dust or other loose particles away from the pump and ventilating openings of the motor.
- Avoid operating the unit in overheated surroundings (above 100°F/40°C).

WARNING:



Whenever any service work is to be performed on a pumping unit, disconnect the power source from 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. (See Armstrong files 43.85 & 43.86 for seal environmental instructions).

2.7 LUBRICATION

Pump

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

Large Series 4300 units are installed with a shaft bushing located beneath the impeller that is lubricated from the pump discharge. This bearing is field removable for service on the 20 × 20 × 19 size without disturbing the motor or other major pump components.

Service instructions for the lower bearing is to be found in File no: 43.805.

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 from discharge of the pump casing on Series 4300 pumps and is flushed/vented to the suction on close coupled pumps, Series 4360 & 4380.

The Series 4300 pump is flushed from the pump discharge because the mechanical seal chamber is isolated from the liquid in the pump by a throttle bushing. Because the seal chamber is isolated, seal environmental controls such as filters and separators, when installed in the Series 4300 flush line are very effective, as only the seal chamber needs cleansing, and will prolong seal life in HVAC systems.

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.

The following Armstrong files are available for mechanical seal replacement instructions:

- Series 4360 & 4380: File no. 43.81
- Series 4300: P-Base and TCZ Motor Frame – File no. 43.84
TC Motor Frame – File no. 43.88

2.8 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?

WARRANTY

Does not cover any damages to the equipment resulting from failure to observe the above precautions. Refer to Armstrong General Terms and Warranty sheet. Contact your local Armstrong representative for full information.

2.9 INSTALLATION LAYOUTS

FIG. 2.1 Hanger supported pipe mounted.

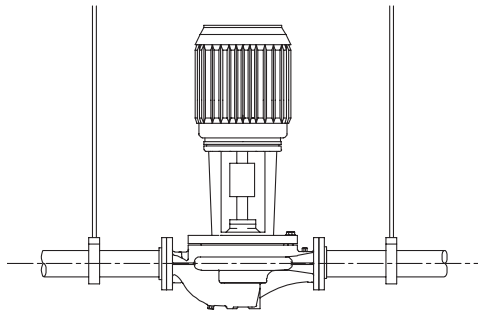


FIG. 2.2 Pipe mounted supported at ceiling.

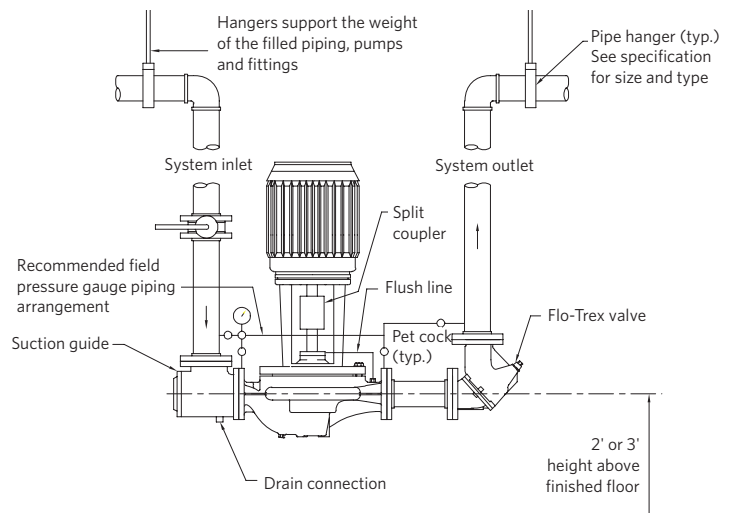


FIG. 2.3 Discharge elbow for minimum footprint.

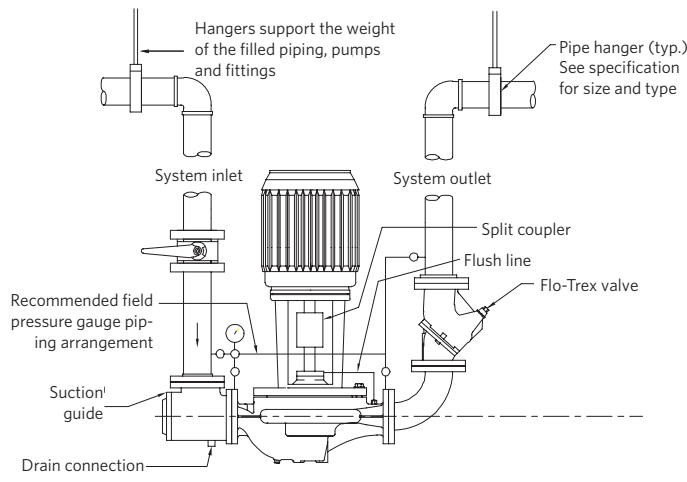


FIG. 2.4 With additional pipe supports.

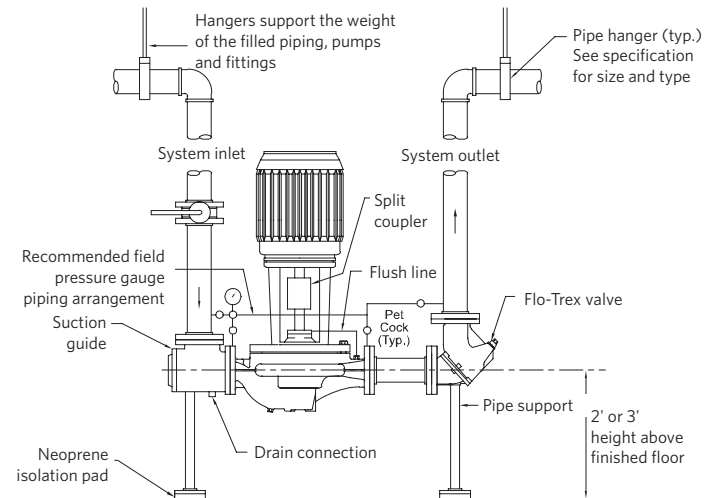


FIG. 2.5 Floor saddle support.

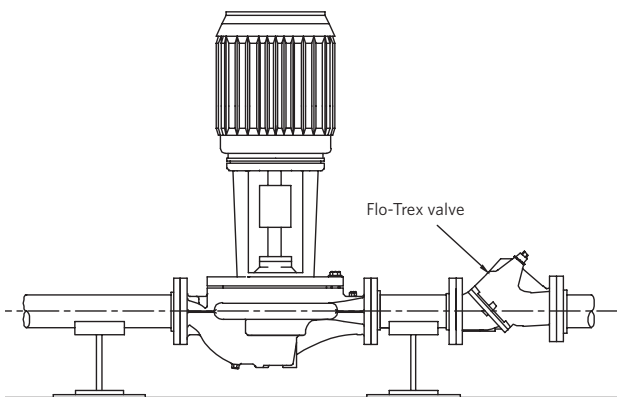


FIG. 2.6 Additional floor support.

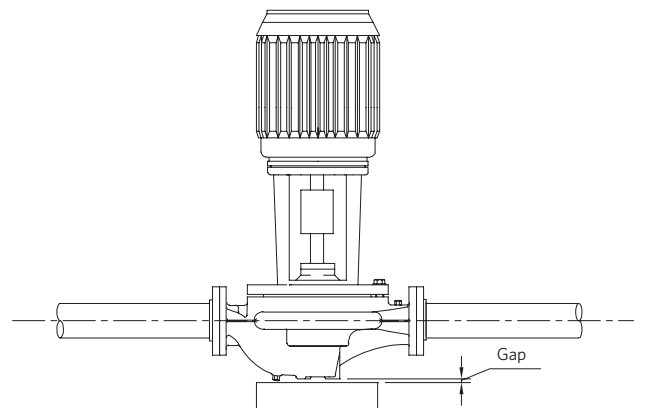


FIG. 2.7 With stanchion plates.

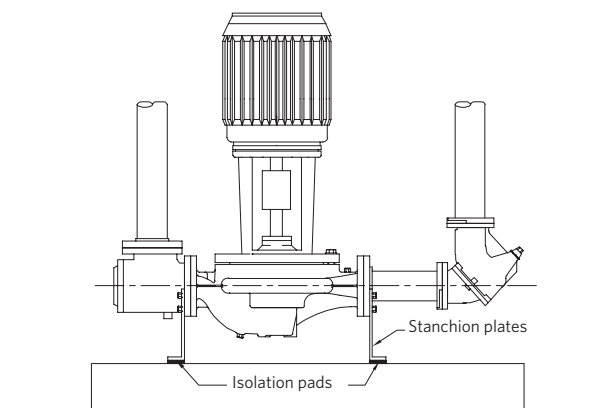


FIG. 2.9 Horizontal mounting - 4360/4380 only to 15 hp (11 kW).

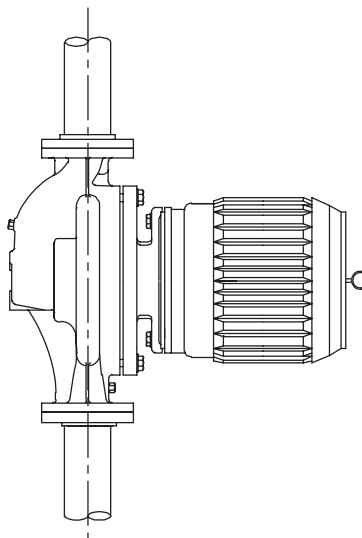


FIG. 2.8 Seismic region installation.

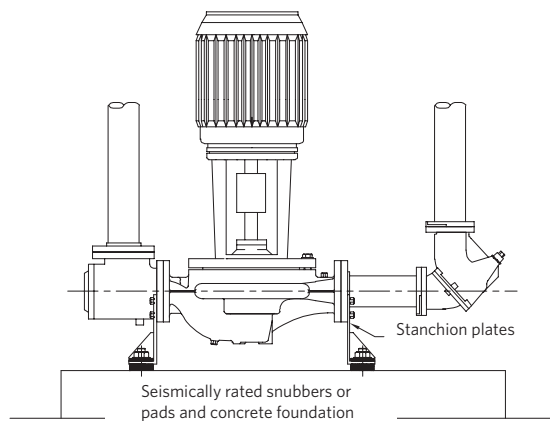


FIG. 2.10 Mounting in grooved pipe systems.

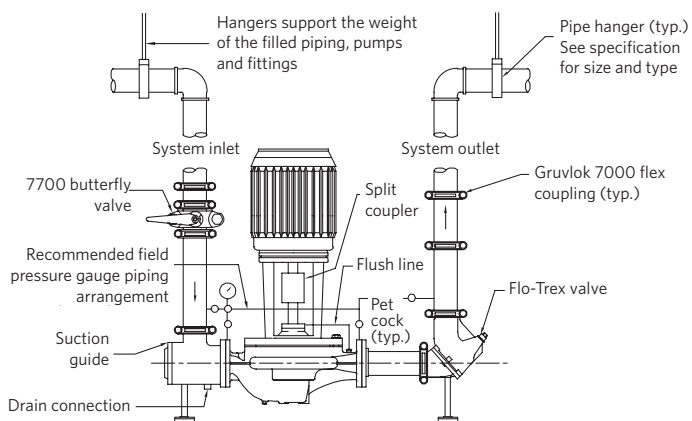


FIG. 2.11 Motor lifting hook supported.

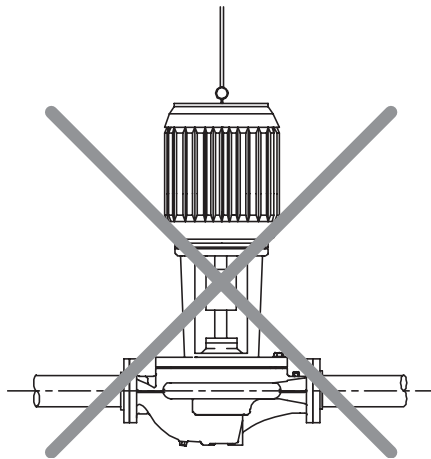


FIG. 2.13 Tapped collection well.

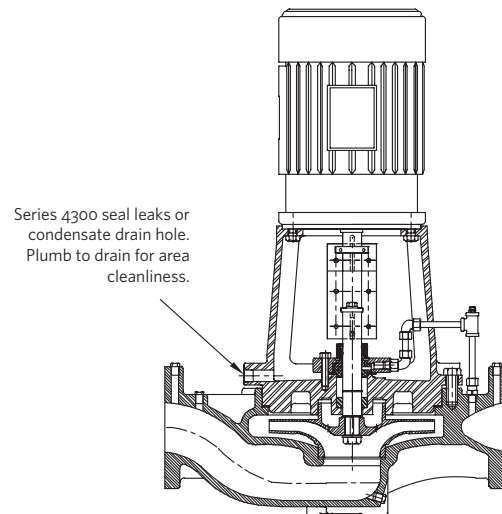
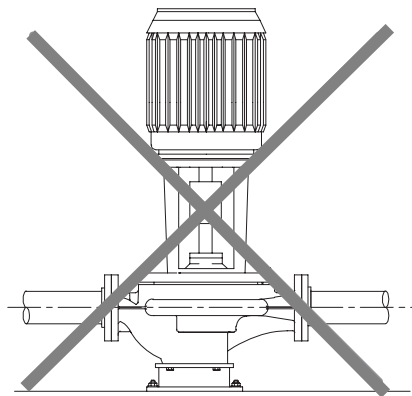


FIG. 2.12 Mounted on rigid base without flexible connectors.



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MAKING
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IN-LINE CIRCULATING PUMPS | MODELS S25 TO S69, H32 TO H68, AND SERIES 1050 & 1060 | INSTALLATION AND OPERATING INSTRUCTIONS

File No: 10.79
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ENGLISH

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FRANÇAIS

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CAUTION



Always disconnect power supply from motor before servicing.

1.0 INSTALLATION

For convenience, Armstrong circulators generally are installed in vertical pipelines, but may be changed easily on the job for horizontal pipelines or for opposite flow directions. To make the change, remove the body capscrews, taking care body gasket is kept in position, and rotate body to desired direction at 90° or 180° from the original position.

With the arrow on the body pointing in direction of the flow, insert body capscrews and tighten evenly. On models S25 to S57, H32 to H54 and series 1050 (1B to 2B), a gap between the bearing bracket and pump body (volute) is normal. Do not over tighten body capscrews! Turn pump shaft manually at coupler to make sure shaft turns freely and impeller does not rub in body. Always install with motor shaft in a horizontal position with pump oil cups or oil well cover on top.

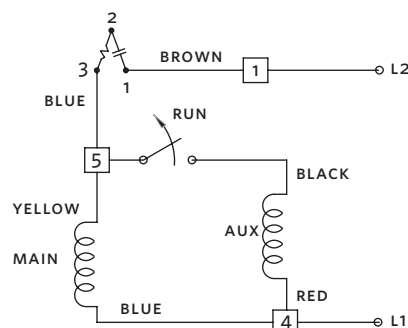
Models S25 to S46 and H32 to H41 are shipped for downward discharge. All other models are shipped for upward discharge as pumps of this size usually are installed in an upward direction on hydronic systems, so the point of zero pressure change - namely, the compression tank connection - can be made easily to the system on the suction side of the circulator.

The pump should be installed in a position to permit proper lubrication and servicing. Motor and bearing brackets are to be kept free of insulation. Pump and motor unit are designed to be supported by the in-line piping only. Do not support in any other manner. A height of approximately four feet above the floor is recommended. When placing the pump between flanges, tighten flange bolts evenly and do not tighten excessively.

Gate valves should be installed on the discharge and suction side of the pump to facilitate service. On larger pump sizes, a check valve should be located on the discharge side of pump between the pump body and the gate valve to prevent damage due to water hammer.

WIRING DIAGRAMS

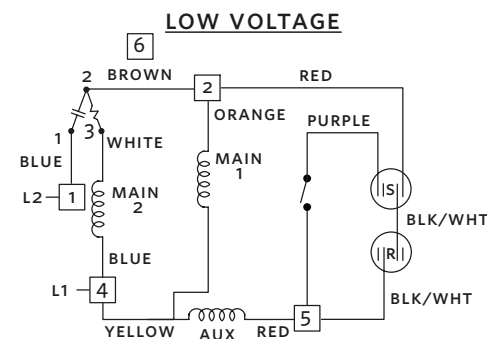
SINGLE PHASE LESS THAN 0.5HP



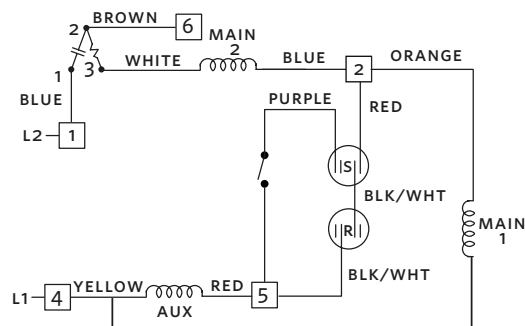
C.C.W. rotation shown

For C.W. Rotation interchange yellow and blue leads on term 5 & 4

SINGLE PHASE LESS THAN 1HP (with with part number beginning with 811757-...)



HIGH VOLTAGE

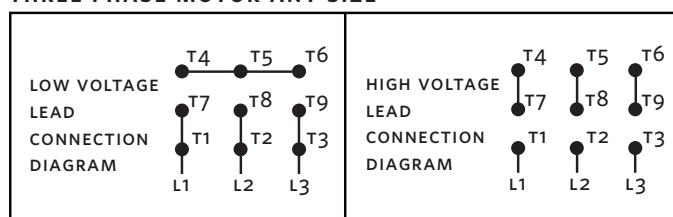


SINGLE PHASE 1HP - 1.5HP (only for part number not beginning with 811757-...)

	LINE A	LINE B	JOIN
HIGH STD	1	4,5	2,3,8
HIGH OPP	1	4,8	2,3,5
LOW STD	1,3,8	2,4,5	—
LOW OPP	1,3,5	2,4,8	—

NOTE: Standard rotation is ccw facing end opposite shaft extension

THREE PHASE MOTOR ANY SIZE



Interchange any two lead wires to reverse rotation

2.0 SYSTEM CLEANLINESS

Before starting the pump, the system must be thoroughly cleaned, flushed and drained, then replenished with clean liquid. Welding slag and other foreign materials, 'stopleak' and cleaning compounds, excessive or improper water treatment - all are detrimental to the pump. Warranty will be void if any of these conditions are allowed to exist. (Refer to **File no. 6090.645** design and care of closed hydronic systems.)

3.0 STARTING UP

The pump must be fully primed on start-up. Fill system piping and pump body with liquid and vent complete system, turning pump by hand to dislodge air from body. Make sure fittings and drain valves are airtight, then add any additional fill required.

Check motor against available electric supply, then start pump making sure rotation is correct. When viewed from motor end, rotation is counter-clockwise on models s25 to s46 and H32 to H41. On all other models, rotation is clockwise. If pressure does not develop, stop pump, re-check, vent and fill. Never attempt to fill the system when the pump is running

4.0 LUBRICATION

CAUTION:

Do not put oil in the **maintenance free** circulators. These models contain MF in their item numbers and are labelled:

'THIS BEARING ASSEMBLY CONTAINS PERMANENTLY LUBRICATED

BEARINGS AND DOES NOT NEED ANY OILING OR GREASING'.

Stop motor before lubricating, do not over-oil or spill oil on resilient motor rings. Do not force oil into cups, and stop if cup fills before addition of specified amount.

Pump lubrication: Only applicable for pumps those are with sleeve bearing SBA and have oil cup for lubrication.



Immediately after pump is installed and before running, slowly add the oil (SAE 30 non-detergent regular, supplied with pump) to pump oil cup, located on top of bearing bracket:

s25 to s57, H32 to H54 and series 1050 (1B to 2B) ¼ oz.
s69, H63 to H68, series 1060 (1½D to 3D) 2 oz.

At the start of each following heating season, lubricate with SAE 30 oil for models s25 to s57, H32 to H54 and series 1050 (1B to 2B), add approximately ¼ oz. Lubricate every six months for high temperature or constant operation. On models s69, H63 to H68 and series 1060 (1½D to 3D), be sure oil is visible at the top and center of window on side of bracket and maintain this level at all times.

Motor lubrication

CAUTION



Stop motor before lubricating. Do not over-oil or spill oil on resilient motor rings.

This motor has been lubricated properly at the factory. At the start of each following heating season, however, on motors with oil cups, add 15 drops SAE 30 non-detergent oil to each motor cup.

If the motor is fitted with grease fittings, follow the motor manufacturer's recommended procedure. Motors without oil cups or grease fittings are custom-greased for several years operation and require little or no attention.

5.0 SEAL REPLACEMENT

Remove the pump bracket from the body. Remove the impeller, damaged seal assembly, ceramic insert and rubber cup. Clean the recess in bearing bracket coverplate and install a new re-tainer cup and ceramic insert. Check the condition of the shaft sleeve. If scored, replace the shaft assembly. Otherwise, clean shaft extension and polish sleeve with a fine crocus cloth, using a rotating motion, if required.

Press against the coupler end of the shaft to take up play while pressing new seal firmly against the stationary face. A slight amount of clean vaseline may be put on shaft sleeve to assist installation. Press down firmly and evenly, using two screwdrivers and pushing against the four ears of driving band (the metal ring around rubber bellows), or around top outer edge of driving band on models s25 to s57, H32 to H54 and series 1050 (1B to 2B).

Do not use spring washer on models s25, s35 and H32 current style circulators, where recess to locate spring is provided on impeller hub.

Continue pressing against coupler end of shaft, re-mount impeller and re-assemble the seal bearing assembly into body. If necessary, install a new body gasket and clean gasket surface of both volute and bracket.

CAUTION



Before operating pump, carefully check:

- 1 Is the pump primed?
- 2 Is rotation correct?
- 3 Is pump properly lubricated?
- 4 Does the power supply agree with data on motor name plate?
- 5 Is overload protection provided?
- 6 Is the system clean?

For domestic water systems use bronze body pumps.

ATTENTION



Toujours couper l'alimentation électrique avant de procéder à l'entretien d'un moteur.

1.0 INSTALLATION

Pour des raisons pratiques, les circulateurs Armstrong sont généralement installés sur des conduites verticales, mais peuvent être facilement modifiés sur place pour des conduites horizontales ou pour changer la direction du liquide en circulation. Pour procéder au changement, retirer les boulons de fixation et, en prenant soin de maintenir en place le joint d'étanchéité, tourner le corps suivant l'angle désiré, 90° ou 180°, par rapport à la position originale.

La flèche sur le corps pointant dans la direction de la circulation du liquide, insérer les boulons de fixation et les visser uniformément. Sur les modèles s25 à s57, h32 à h54 et la série 1050 (1B à 2B), il est normal qu'il y ait un espace entre la chaise de palier et le corps de la pompe (volute). Ne pas trop serrer les boulons ! À la jonction, faire tourner l'arbre de la pompe à la main pour vous assurer qu'il tourne librement et que l'impulseur ne frotte pas l'intérieur du corps. Toujours installer de manière à ce que l'arbre du moteur soit en position horizontale, les godets à huile et le couvercle du réservoir d'huile étant placés sur le dessus.

Les modèles s25 à s46 et h32 à h41 sont livrés en prévision d'une évacuation vers le bas. Tous les autres modèles sont livrés en prévision d'une évacuation vers le haut, puisque les pompes de cette taille sont habituellement installées sur les systèmes hydroniques pour pomper vers le haut, de sorte que le point de changement de pression nul, c'est-à-dire la connexion au vase d'expansion, puisse facilement se trouver du côté aspiration du circulateur.

La pompe doit être installée à un endroit qui permet l'entretien et la lubrification. Le moteur et la chaise de palier doivent être exempts d'isolant. La pompe et le moteur sont conçus pour être soutenus uniquement par la tuyauterie en ligne. Ne pas les supporter d'aucune autre façon. Il est recommandé de les placer à environ 4 pi au-dessus du sol. Au moment de fixer la pompe par ses brides, serrer les boulons uniformément et sans excès.

Des robinets-vannes devraient être installés du côté évacuation et du côté aspiration de la pompe pour faciliter l'entretien. Sur les pompes plus grosses, un clapet antiretour devrait être placé du côté évacuation de la pompe, entre cette dernière et le robinet-vanne, pour prévenir les dommages causés par les coups de bélier.

SHÉMAS DE CÂBLAGE

MONOPHASÉ MOINS DE 0.5HP

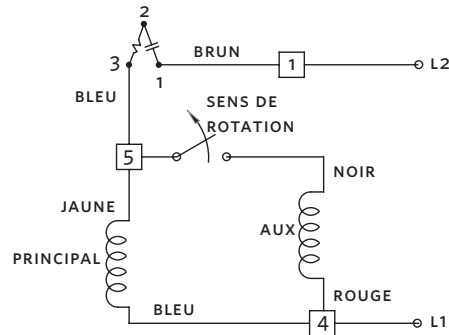
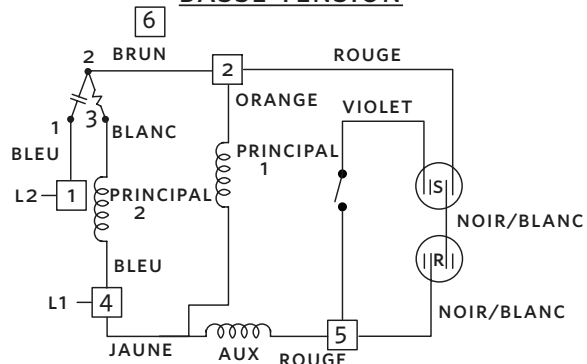


Schéma ci dessus à suivre dans le sens contraire des aiguilles d'une montre.

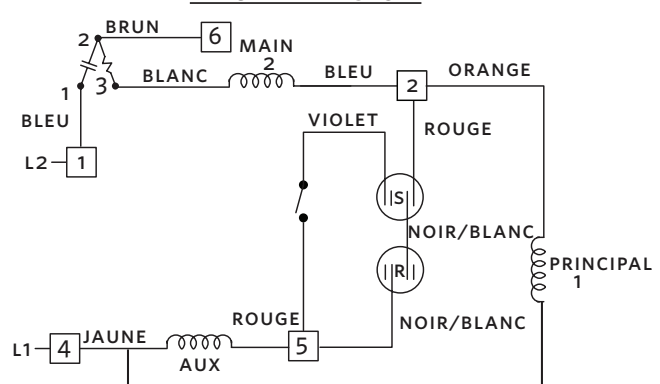
Pour une rotation dans le sens des aiguilles d'une montre, inverser les fils jaune et bleu des bornes 5 & 4.

MONOPHASÉ MOINS DE 1HP (avec un numéro de référence commençant par 811757-...)

BASSE TENSION



HAUTE TENSION

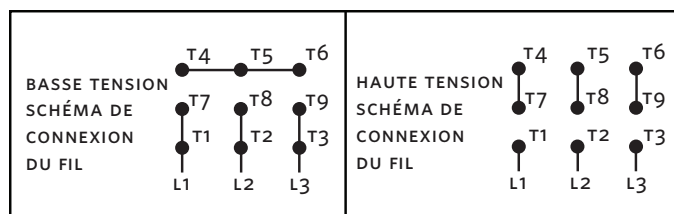


MONOPHASÉ 1HP-1.5HP (seulement pour un numéro de référence ne commençant pas par 811757-...)

	LIGNE A	LIGNE B	JONCTION
HAUTE TENSION ROTATION STD	1	4,5	2,3,8
HAUTE TENSION ROTATION OPP	1	4,8	2,3,5
BASSE TENSION ROTATION STD	1,3,8	2,4,5	—
BASSE TENSION ROTATION OPP	1,3,5	2,4,8	—

NOTE: Le sens de rotation standard est dans le sens contraire des aiguilles d'une montre en faisant face à l'extrémité opposée de l'extension de l'arbre

MOTEUR TRIPHASÉ DE TOUTE TAILLE



Permuter deux des fils de sorties pour inverser le sens de rotation

2.0 PROPRETÉ DU SYSTÈME

Avant de démarrer la pompe, le système doit être entièrement nettoyé, vidangé et rincé, puis rempli de nouveau d'un liquide propre. Les scories de soudage et autres matières étrangères, les composés de colmatage de fuites et de nettoyage, les produits de traitement excessifs ou inappropriés de l'eau, peuvent tous endommager les composants internes de la pompe. La garantie sera nulle si l'une ou l'autre de ces conditions est permise. (Consulter le **dossier n° 6090.645** conception et entretien des systèmes hydroniques fermés.)

3.0 DÉMARRAGE

La pompe doit être parfaitement amorcée avant le démarrage. Remplir la tuyauterie du système et le corps de la pompe de liquide, ventiler complètement le système, faire tourner la pompe à la main pour déloger les bulles d'air qui y seraient emprisonnées. Vous assurer que les raccords et les robinets de vidange sont étanches et ajouter le liquide qu'il faut pour remplir.

Comparer les exigences électriques aux conditions d'alimentation, puis faire démarrer la pompe et vous assurer qu'elle tourne correctement. Vue de l'extrémité moteur de la pompe, la rotation se fait dans le sens contraire des aiguilles d'une montre sur les modèles s25 à s46 et H32 à H41. Sur tous

les autres modèles, la rotation se fait dans le sens des aiguilles d'une montre. Si la pression ne grimpe pas, arrêter la pompe, vérifier de nouveau, ventiler et remplir. Ne jamais essayer de remplir le système lorsque la pompe est en marche.

4.0 LUBRIFICATION

ATTENTION:

NE PAS verser d'huile dans les Circulateurs ne nécessitant aucun entretien. Les modèles mentionnant **MF** dans leur référence sont étiquetés : 'CE SYSTÈME À ROULEMENT EST ÉQUIPÉ DE ROULEMENTS À GRAISSAGE PERMANENT ET NE NÉCESSITE AUCUN AJOUT D'HUILE NI DE GRAISSAGE'.

Arrêter le moteur avant de lubrifier. Ne pas mettre trop d'huile ni en renverser sur les bagues souples du moteur. Ne pas faire entrer l'huile de force dans les godets et arrêter le remplissage si un godet se remplit avant d'avoir ajouté la quantité spécifiée.

Lubrification de la pompe : Applicable seulement pour les pompes à paliers à douille et ayant un godet pour la lubrification



Immédiatement après l'installation de la pompe et avant de la démarrer, ajouter lentement de l'huile (SAE 30 non détergente régulière, fournie avec la pompe) dans le godet situé sur le dessus de la chaise de palier :

s25 à s57, H32 à H54 et série 1050 (1B à 2B)	¼ oz.
s69, H63 à H68, série 1060 (1½D à 3D)	2 oz.

Par la suite, au début de chaque saison de chauffage, lubrifier la pompe en utilisant de l'huile SAE 30. Pour les modèles s25 à s57, H32 à H54 et la série 1050 (1B à 2B), ajouter environ ¼ oz. Lubrifier à tous les six mois si la pompe fonctionne tout le temps ou à haute température. Sur les modèles s69, H63 à H68, série 1060 (1½D à 3D), vous assurer que l'huile est visible en haut et au centre de la lunette sur le côté de la chaise de palier et maintenir ce niveau en tout temps.

Lubrification du moteur

ATTENTION



Arrêter le moteur avant de le lubrifier. Ne pas ajouter trop d'huile ni en renverser sur les bagues souples du moteur.

Ce moteur a été lubrifié correctement en usine. Au début de chaque saison de chauffage, toutefois, sur les moteurs munis de godets d'huile, ajouter 15 gouttes d'huile non détergente SAE 30 dans chaque godet.

Si le moteur est équipé d'embouts de graissage, respecter la procédure recommandée par le fabricant. Les moteurs à godets d'huile ou à embouts de graissage sont graissés individuellement en prévision de plusieurs années d'utilisation et exigent peu ou pas d'attention.

5.0 REMPLACEMENT DES JOINTS D'ÉTANCHÉITÉ

Retirer la portion pompe du corps. Retirer l'impulseur, le joint d'étanchéité endommagé, la pièce de céramique et le godet de caoutchouc. Nettoyer le compartiment du joint dans la chaise de palier et installer un nouveau godet et une nouvelle céramique. Vérifier l'état de la chemise de l'arbre. Si elle est marquée, remplacer l'ensemble de l'arbre. Autrement, nettoyer le prolongement de l'arbre et, au besoin, polir la chemise à l'aide d'une toile à polir fine suivant un mouvement rotatif.

Pousser sur l'extrémité accouplement de l'arbre pour réduire le jeu tout en pressant fermement le nouveau joint d'étanchéité sur la face fixe. On peut mettre une petite quantité de vaseline sur la chemise de l'arbre pour aider à l'installation. Pousser fermement et uniformément en utilisant deux tournevis contre les quatre oreillettes du collet (l'anneau de métal autour des soufflets de caoutchouc) ou sur le pourtour extérieur du collet dans le cas des modèles s25 à s57, H32 à H54 et de la série 1050 (1B à 2B).

Ne pas utiliser de rondelle à ressort sur les circulateurs de modèles courants s25, s35 et H32 lorsque la dépression prévue pour le ressort se trouve sur le moyeu de l'impulseur. Continuer d'appuyer sur l'extrémité accouplement de l'arbre. Remonter l'impulseur et l'ensemble porteur du joint d'étanchéité dans le corps. Au besoin, installer un nouveau joint pour le corps et nettoyer la surface du joint de la volute et de la chaise de palier.

ATTENTION



Avant de faire fonctionner la pompe, vous assurer que :

- 1 La pompe a été amorcée?
- 2 Le sens de la rotation est le bon?
- 3 La pompe est correctement lubrifiée?
- 4 L'alimentation correspond aux données sur la plaque d'identification?
- 5 La pompe est protégée contre les surcharges?
- 6 Le système est propre?

Pour les systèmes domestiques de distribution d'eau, utiliser des pompes à corps de bronze.

TORONTO

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BUFFALO

+1 716 693 8813

BIRMINGHAM

+44 (0) 8444 145 145

MANCHESTER

+44 (0) 8444 145 145

BANGALORE

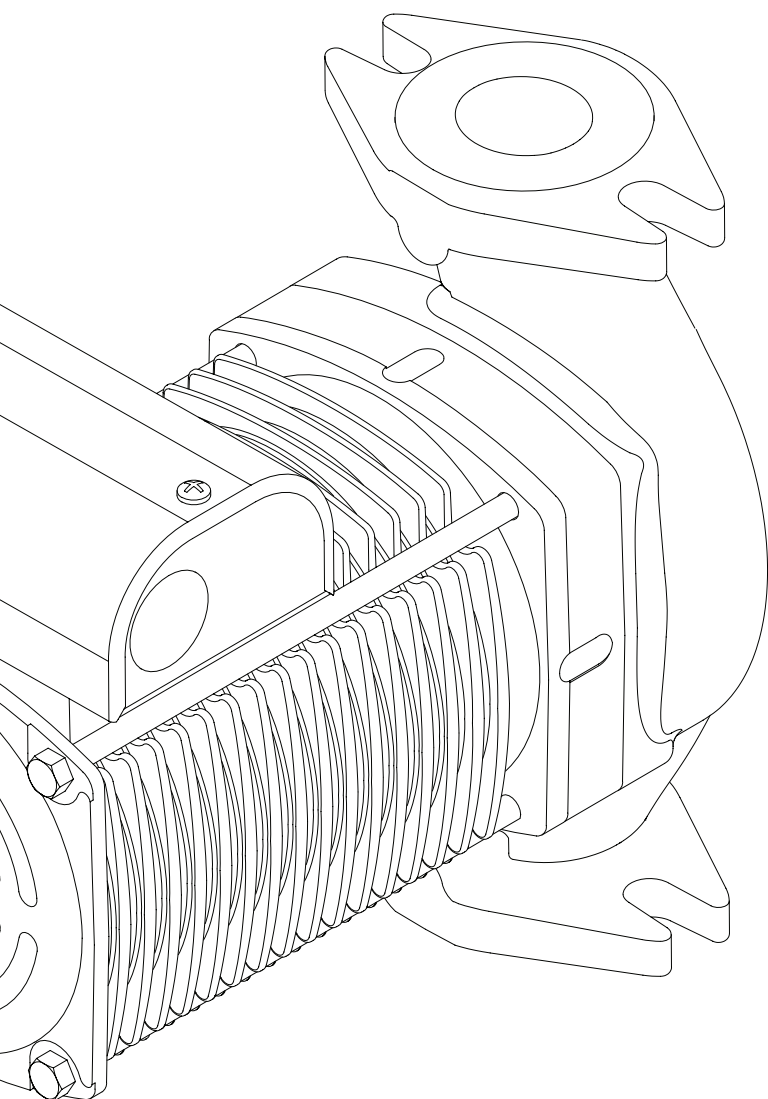
+91 (0) 80 4906 3555

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SÃO PAULO

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E.2 Series

**High efficiency
circulator**

Installation and operating instructions

File No: 10.84

Date: JULY 01, 2016

Supersedes: 10.84

Date: JUNE 08, 2016

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READ CAREFULLY BEFORE INSTALLING & OPERATING THE CIRCULATOR

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE

You are about to install an E.2 series circulator – a high-efficiency pump from Armstrong. E.2 series circulators are designed for heating and cooling in hydronic, geothermal or solar systems and circulating water, ethylene or propylene glycol/water solutions. For pumping domestic (potable) water, Armstrong recommends the use of circulators with bronze, or stainless steel body construction.

The E.2 series circulators are extremely efficient and quiet. They utilize a state of the art permanently lubricated bearing system designed for many years of trouble-free operation. They feature a permanent-split capacitor motor with thermal protection.

1.0 OPERATING LIMITS

Maximum operating pressure:

150 psi (1034 kPa)

Maximum operating temperature:

All standard models 230°F (110°C)

Minimum operating temperature:

All standard models 32°F (0°C)

Electrical rating:

For models with ¼ hp motors (100W): 120 v, 1 phase, 60 Hz or 208/240 v, 1 phase, 60 Hz, or 220-240v, 50Hz

For models with ¾ hp motors (300W): 120 v, 1 phase, 60 Hz or 208/240/277 v, 1 phase, 60 Hz, or 220-240v, 50Hz

When unpacking the circulator, inspect for any damage that may have occurred during transit. Check for loose, missing or damaged parts.

THIS PUMP IS FOR INDOOR USE ONLY

Before installing the circulator, proper installation practice recommends a thorough flush of the hydronic system, ensuring removal of all foreign materials.

This pump should be installed in a well lit location with good access.

Installation personnel must be qualified for the task.

All personnel performing installation must wear appropriate personal protective equipment

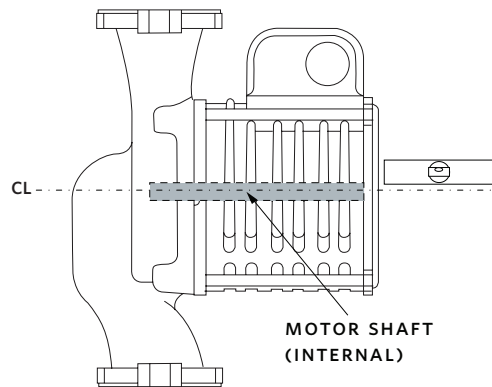
WARNING



Mount with motor shaft horizontal and terminal box above centerline (CL) only!

The circulator is supplied for up-discharge.

DIAGRAM 1: Installation Orientation



For alternate discharge orientation:

- 1 Loosen the four motor mounting bolts
- 2 Rotate the volute to match piping orientation
- 3 Observe flow direction arrow on volute
- 4 Ensure volute gasket is properly seated
- 5 Retighten mounting bolts evenly to 5 lb/ft (6.7 N/m)
- 6 Ensure the impeller spins freely

2.0 ELECTRICAL WIRING



The electrical wiring must be installed in strict accordance with the Canadian Electrical Code (Canada) or the U.S. National Electrical Code (USA), or BS7671 (Europe) as well as local codes and regulations.

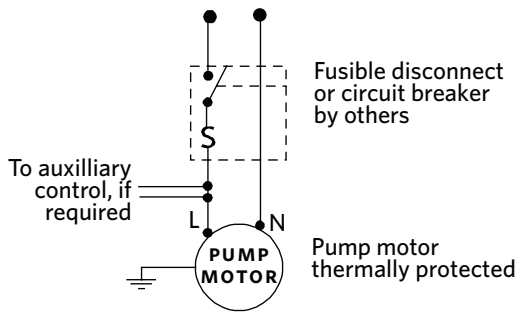
- 1 Electrical installation should be conducted by a qualified electrician. Installers should be equipped with proper personal protective equipment.
- 2 The motors of E.2 series circulators are designed for 1 phase, 60 Hz, 120 v 60 Hz, 240 v 60 Hz, 220-240 50 Hz service only. (Please refer to the rating label on the circulator's terminal box to determine the correct voltage.)
- 3 Always make sure the electric power is disconnected and locked out before wiring the circulator.
- 4 To wire, loosen the screw from the terminal box cover and remove the screw and cover.
- 5 Install the appropriate size conduit end to one of the holes on either side of the terminal box.

6 For 120 v models: Referring to **DIAGRAM 2** below, connect the black, hot, (L) and white, neutral, (N) leads of the supply wire to the black and white motor leads respectively inside the terminal box. Connect the ground wire to any one of the four green ground screws inside of the terminal box (use a minimum 18 AWG wire size).

For 208/240/277 v models: Referring to **DIAGRAM 3** below, connect the black (L1) and blue (L2) leads of the supply wire to the black and white motor leads respectively inside the terminal box. Connect the ground wire to any one of the four green ground screws inside of the terminal box (use a minimum 18 AWG wire size).

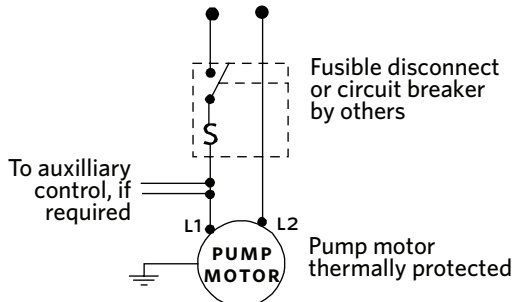
NOTE: For any voltage the brown and yellow wires are hard wired in and should **not** be touched they are for the capacitor only and can stop the motor from running.

DIAGRAM 2 120 v installations



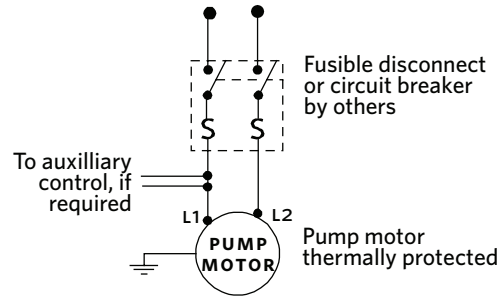
Typical wiring diagram for
single phase, 120 v, 60 Hz power source

DIAGRAM 3 208/240/277 v installations



Typical wiring diagram for
A single phase, 240 v, 60 Hz power source
B three phase, 208/277 v, 60 Hz power source

DIAGRAM 4 230 v installations



Typical wiring diagram for
single phase, 230 v, 50 Hz power source

7 Replace the terminal box cover.

The motor is thermally protected for your safety so thermal overload protection is not necessary. All that is required is a fused plug or circuit breaker in the power line for short circuit protection.

Electrical information can be found on the nameplate of the motor.

3.0 START UP

- Before starting up the circulator, proper installation practice recommends a thorough flush and draining of the hydronic system, ensuring removal of all foreign materials. Fill the system with clean water or glycol solution before starting.
- Air must be completely vented from the system before starting up the circulator. **If the system is not completely vented of air and the circulator is allowed to run dry, the mechanical seal will be damaged.**
- When the system has been completely filled and vented, only then can the pump be started.

4.0 PREVENTIVE MAINTENANCE - INSPECTION

Ε.2 series circulators are fitted with permanently lubricated ball bearings and **do not** require lubrication.

Although Armstrong long-life circulators are designed to provide years of worry-free service, it is good maintenance practice to inspect the entire hydronic system periodically – including the Ε.2 series circulator – for potential problems. If there is any evidence of leakage or damage, repair or replace the pump.

Disconnect and lockout the power before servicing.

5.0 PUMP REPLACEMENT IN AN EXISTING INSTALLATION

5.1 COMPLETE PUMP

- 1 Ensure that electric power is disconnected and locked out. Loosen the screw from the terminal box cover and remove the cover. Disconnect the supply wires from the circulator only, leaving the capacitor wires connected.



All servicing personnel should be equipped with proper personal protective equipment.

- 2 If valves have been installed, on the suction and discharge sides of the pump, close them before attempting to remove the circulator from the volute. If no valves have been installed it may be necessary to drain the system.



Allow water to cool to 100°F (40°C) before draining the system. It is best to leave the drain valve open while working on the system.

- 3 To relieve any residual pressure which may be present in the pump body, loosen the flange bolts and gently move the pump body back and forth to allow the pressurized water to escape.

NOTE: Place a pan under the pump to collect the drain water.

- 4 If the entire volute is needed to be removed, then remove the flange bolts and nuts. The entire circulator can then be removed from the piping system.
- 5 Install the E.2 series circulator where there will be sufficient room for inspection and service. It is recommended that isolation valves be installed on both the suction and discharge sides of the circulator for future servicing. This eliminates the need for draining the system when working on the circulator (for example, when replacing the mechanical seal).
- 6 Install suction and discharge flanges on the pipe ends. The use of Teflon tape sealer or a high quality thread sealant is recommended.
- 7 Pipe strain can be minimized by the use of pipe hangers near the pump, positioned to support the suction and discharge piping.

To wire the E.2 series circulator, follow steps C through G in the Electrical Wiring section above, noting that electrical supply and grounding wires must be rated for at least 194°F (90°C).

5.2 MOTOR END ONLY

- 1 Turn off the pump leaving it installed in the line.
- 2 Ensure electrical power is disconnected and locked out.
- 3 Close the water supply at the points closest to the pump's inlet and outlet.

- 4 For safety, allow water to cool to 100°F (40°C) before draining the system. It is best to leave the drain valve open while working on the system.
- 5 Bleed the water pressure from the pump.
- 6 Place a pan under the pump to collect the drain water.
- 7 While holding the motor body, loosen the four bolts that attach the motor to the pump casing (volute). Start with the two bottom bolts first and remove them, then slowly loosen the top two bolts. Allow the water to drain from the bottom of the pump. When the water has finished draining, remove the two top bolts. Remove the motor straight out from the volute being careful of its attached impeller. The motor is heavy, do not drop it.
- 8 Install new casing gasket.
- 9 Install new motor end (with impeller and seal kit).
- 10 Tighten four motor end bolts in a crisscross pattern and tighten evenly to 60 in/lbs.
- 11 Open isolation flanges or fill the system with water before starting circulator.
- 12 To wire the E.2 series circulator, follow steps C through G in the Electrical Wiring section above, noting that electrical supply and grounding wires must be rated for at least 194°F (90°C).

6.0 MECHANICAL SEAL REPLACEMENT

- 1 Follow steps 1 through 4 in section **Existing pump removal from system piping**.
- 2 While holding the motor body, remove the bottom two bolts that attach the motor to the pump casing (volute), then slowly loosen the top two bolts. Allow the water to drain from the bottom of the pump. When the water has finished draining, remove the two top bolts. Remove the motor straight out from the volute being careful of the attached impeller.

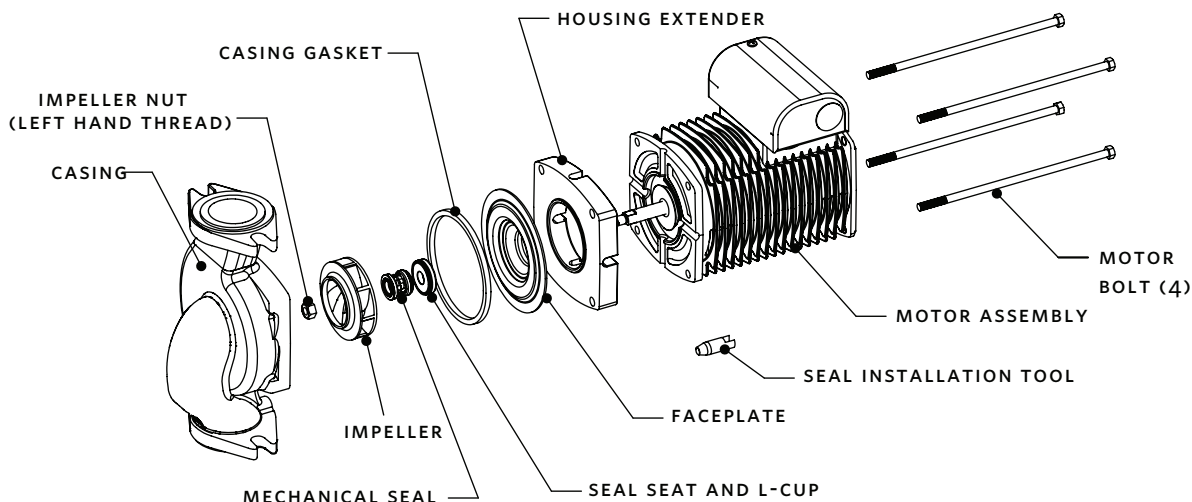


Handle with care

The motor is heavy, and possibly hot,
DO NOT drop it!

- 3 While holding the rotor very tightly by hand or a gloved hand only, unscrew the impeller nut off the motor shaft by turning it clockwise (i.e. opposite to most bolts and nuts). Place the motor on its back, with the shaft up.
- 4 Remove the rotary part of the mechanical seal by gently pulling it off the shaft. If it is too tight use two small flat bladed screwdrivers to gently pry it off the shaft by placing the flat side of the blades onto opposite sides of the mechanical seal.

- 5 Remove the face plate from the motor by gently prying it off of the motor housing extension, and carefully pulling it straight up, avoiding any shaft contact.
- 6 Remove the stationary part of the seal by gently prying it off the steel faceplate.
- 7 Remove any corrosion present on the stainless steel motor shaft and face plate (especially the seal seat area) with a non-metallic brush or scrub pad. Do not use a wire brush or steel wool.
- 8 Remove any dust created during step #7 above and put a few drops of non-petroleum lubricant around the face plate where the stationary seat is to be installed.
- 9 Install the new stationary seal seat into the faceplate by firmly pressing it down until it bottoms. The disk should be clean. If needed, wipe it with alcohol and a soft lint free cloth.
- 10 Replace the faceplate on the motor housing extension, being careful to avoid shaft contact. This may need to be gently tapped down until tight to the housing. Be sure to check that the stainless steel plate is flush to the extender plate face.
- 11 Install the special **installation tool** (item #180212-095) on the top of the shaft making sure it is tight to the flat base of the impeller to protect the seal from sharp edges during seal installation.
- 12 Apply a liberal amount of non-petroleum based lubricant on the outside of the special plastic **installation tool**.
- 13 Wipe any excess lubricant off of the stationary silicon carbide seal face with a lint free cloth and alcohol to ensure the surface is clean.
- 14 Install the new rotating seal element and spring assembly by gently pushing it (graphite ring first) over the **installation tool** and onto the shaft until the graphite ring presses tightly against the stationary seal seat. The seal spring may be compressed slightly.
- 15 Remove the **installation tool** from the shaft.
- 16 Install the impeller keeping the inlet end up. Make sure to align the flats to the shaft flats and push the impeller down tightly to the seal.
- 17 Place 2-3 drops of medium strength thread locker liquid on the nut threads.
- 18 Install the special left hand thread nut on the motor shaft. While holding the motor rotor in place as in step 3, thread the impeller nut on to the shaft in a counter-clockwise direction and tighten the nut to approximately 6ft-lbs (8.1Nm).
- 19 If the impeller will not spin freely contact Armstrong Technical Support at 1-416-755-2291 or email techsupport@armlink.com.
- 20 Ensure the gasket is properly seated in the pump casing (volute) gasket groove. Holding the motor body, insert the impeller straight into the volute. Verify the gasket was not dislodged during insertion, and is still seated properly. Hold the motor body steady while fastening the four bolts that attach the motor to the pump casing (volute). Tighten evenly and diagonally. There should be a small, even gap of about 0.02" (0.5 mm) between the motor flange and the pump casing (volute).
- 21 Follow the **START UP** instructions (File no. 10.84) and check for leaks.

DIAGRAM 5 Internal Assembly (Exploded view)

7.0 PRODUCT FAMILY SPECIFICATION

50 HZ E.2 SERIES MODELS

Hydraulic data

MODEL	E7.2/ E7.2B	E9.2/ E9.2B	E12.2/ E12.2B	E14.2/ E14.2B	E22.2/ E22.2B	E33.2/ E33.2B
Nominal Hydr. Power (watts)	105	105	252	252	252	252
Max Flow (L/sec.)	1.9	1.8	2.7	2.8	4.9	7.9
Max Head (m)	5.3	7.7	10.6	11.4	8.7	6.3
Max. Efficiency (BEP%)	22.5	26.4	31.2	32.4	40.7	42.1
Max. Fluid Temperature	110°C (All models)					
Max. Ambient Temperature	50°C (All models)					
Max. Working Pressure	1034 kPa (All models)					

Electrical (motor) data

MODEL	E7.2/E7.2B	E9.2/E9.2B	E12.2/E12.2B	E14.2/E14.2B	E22.2/E22.2B	E33.2/E33.2B
Nominal input voltage range @50 HZ.	220–240VAC	220–240VAC	220–240VAC	220–240VAC	220–240VAC	220–240VAC
Full load current draw @50 HZ.(AC Amperes)	0.80	0.90	1.7	1.8	2.3	2.3
Speed @ max flow (RPM)	2892	2855	2885	2868	2780	2760
Max. Efficiency (BEP%)	22.5	26.4	31.2	32.4	40.7	42.1

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IN-LINE CIRCULATING PUMPS | MODELS S25 TO S69, H32 TO H68, AND SERIES 1050 & 1060 | INSTALLATION AND OPERATING INSTRUCTIONS

File No: 10.79
Date: SEPTEMBER 06, 2016
Supersedes: 10.79
Date: NOVEMBER 27, 2013

ENGLISH

1.0	Installation	1
2.0	System cleanliness	2
3.0	Starting up	2
4.0	Lubrication	2
5.0	Seal replacement	3

FRANÇAIS

1.0	Installation	4
2.0	Propreté du système	5
3.0	Démarrage	5
4.0	Lubrification	5
5.0	Remplacement des joints d'étanchéité	6

CAUTION



Always disconnect power supply from motor before servicing.

1.0 INSTALLATION

For convenience, Armstrong circulators generally are installed in vertical pipelines, but may be changed easily on the job for horizontal pipelines or for opposite flow directions. To make the change, remove the body capscrews, taking care body gasket is kept in position, and rotate body to desired direction at 90° or 180° from the original position.

With the arrow on the body pointing in direction of the flow, insert body capscrews and tighten evenly. On models S25 to S57, H32 to H54 and series 1050 (1B to 2B), a gap between the bearing bracket and pump body (volute) is normal. Do not over tighten body capscrews! Turn pump shaft manually at coupler to make sure shaft turns freely and impeller does not rub in body. Always install with motor shaft in a horizontal position with pump oil cups or oil well cover on top.

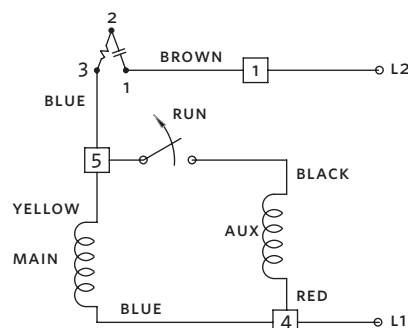
Models S25 to S46 and H32 to H41 are shipped for downward discharge. All other models are shipped for upward discharge as pumps of this size usually are installed in an upward direction on hydronic systems, so the point of zero pressure change - namely, the compression tank connection - can be made easily to the system on the suction side of the circulator.

The pump should be installed in a position to permit proper lubrication and servicing. Motor and bearing brackets are to be kept free of insulation. Pump and motor unit are designed to be supported by the in-line piping only. Do not support in any other manner. A height of approximately four feet above the floor is recommended. When placing the pump between flanges, tighten flange bolts evenly and do not tighten excessively.

Gate valves should be installed on the discharge and suction side of the pump to facilitate service. On larger pump sizes, a check valve should be located on the discharge side of pump between the pump body and the gate valve to prevent damage due to water hammer.

WIRING DIAGRAMS

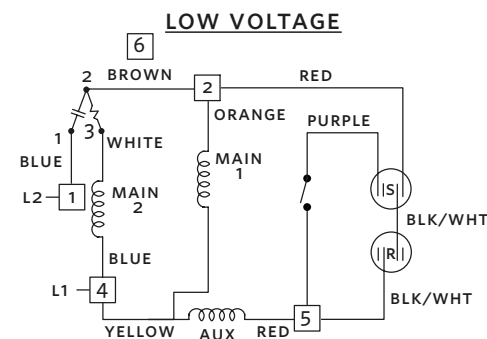
SINGLE PHASE LESS THAN 0.5HP



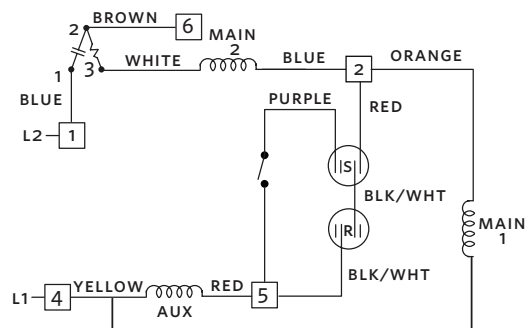
C.C.W. rotation shown

For C.W. Rotation interchange yellow and blue leads on term 5 & 4

SINGLE PHASE LESS THAN 1HP (with with part number beginning with 811757-...)



HIGH VOLTAGE

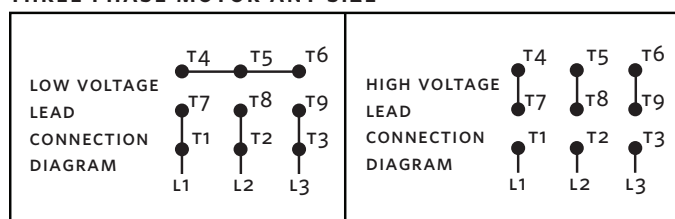


SINGLE PHASE 1HP - 1.5HP (only for part number not beginning with 811757-...)

	LINE A	LINE B	JOIN
HIGH STD	1	4,5	2,3,8
HIGH OPP	1	4,8	2,3,5
LOW STD	1,3,8	2,4,5	—
LOW OPP	1,3,5	2,4,8	—

NOTE: Standard rotation is ccw facing end opposite shaft extension

THREE PHASE MOTOR ANY SIZE



Interchange any two lead wires to reverse rotation

2.0 SYSTEM CLEANLINESS

Before starting the pump, the system must be thoroughly cleaned, flushed and drained, then replenished with clean liquid. Welding slag and other foreign materials, 'stopleak' and cleaning compounds, excessive or improper water treatment - all are detrimental to the pump. Warranty will be void if any of these conditions are allowed to exist. (Refer to **File no. 6090.645** design and care of closed hydronic systems.)

3.0 STARTING UP

The pump must be fully primed on start-up. Fill system piping and pump body with liquid and vent complete system, turning pump by hand to dislodge air from body. Make sure fittings and drain valves are airtight, then add any additional fill required.

Check motor against available electric supply, then start pump making sure rotation is correct. When viewed from motor end, rotation is counter-clockwise on models s25 to s46 and H32 to H41. On all other models, rotation is clockwise. If pressure does not develop, stop pump, re-check, vent and fill. Never attempt to fill the system when the pump is running

4.0 LUBRICATION

CAUTION:

Do not put oil in the **maintenance free** circulators. These models contain MF in their item numbers and are labelled:

'THIS BEARING ASSEMBLY CONTAINS PERMANENTLY LUBRICATED

BEARINGS AND DOES NOT NEED ANY OILING OR GREASING'.

Stop motor before lubricating, do not over-oil or spill oil on resilient motor rings. Do not force oil into cups, and stop if cup fills before addition of specified amount.

Pump lubrication: Only applicable for pumps those are with sleeve bearing SBA and have oil cup for lubrication.



Immediately after pump is installed and before running, slowly add the oil (SAE 30 non-detergent regular, supplied with pump) to pump oil cup, located on top of bearing bracket:

s25 to s57, H32 to H54 and series 1050 (1B to 2B) ¼ oz.
s69, H63 to H68, series 1060 (1½D to 3D) 2 oz.

At the start of each following heating season, lubricate with SAE 30 oil for models s25 to s57, H32 to H54 and series 1050 (1B to 2B), add approximately ¼ oz. Lubricate every six months for high temperature or constant operation. On models s69, H63 to H68 and series 1060 (1½D to 3D), be sure oil is visible at the top and center of window on side of bracket and maintain this level at all times.

Motor lubrication

CAUTION



Stop motor before lubricating. Do not over-oil or spill oil on resilient motor rings.

This motor has been lubricated properly at the factory. At the start of each following heating season, however, on motors with oil cups, add 15 drops SAE 30 non-detergent oil to each motor cup.

If the motor is fitted with grease fittings, follow the motor manufacturer's recommended procedure. Motors without oil cups or grease fittings are custom-greased for several years operation and require little or no attention.

5.0 SEAL REPLACEMENT

Remove the pump bracket from the body. Remove the impeller, damaged seal assembly, ceramic insert and rubber cup. Clean the recess in bearing bracket coverplate and install a new re-tainer cup and ceramic insert. Check the condition of the shaft sleeve. If scored, replace the shaft assembly. Otherwise, clean shaft extension and polish sleeve with a fine crocus cloth, using a rotating motion, if required.

Press against the coupler end of the shaft to take up play while pressing new seal firmly against the stationary face. A slight amount of clean vaseline may be put on shaft sleeve to assist installation. Press down firmly and evenly, using two screwdrivers and pushing against the four ears of driving band (the metal ring around rubber bellows), or around top outer edge of driving band on models s25 to s57, H32 to H54 and series 1050 (1B to 2B).

Do not use spring washer on models s25, s35 and H32 current style circulators, where recess to locate spring is provided on impeller hub.

Continue pressing against coupler end of shaft, re-mount impeller and re-assemble the seal bearing assembly into body. If necessary, install a new body gasket and clean gasket surface of both volute and bracket.

CAUTION



Before operating pump, carefully check:

- 1 Is the pump primed?
- 2 Is rotation correct?
- 3 Is pump properly lubricated?
- 4 Does the power supply agree with data on motor name plate?
- 5 Is overload protection provided?
- 6 Is the system clean?

For domestic water systems use bronze body pumps.

ATTENTION



Toujours couper l'alimentation électrique avant de procéder à l'entretien d'un moteur.

1.0 INSTALLATION

Pour des raisons pratiques, les circulateurs Armstrong sont généralement installés sur des conduites verticales, mais peuvent être facilement modifiés sur place pour des conduites horizontales ou pour changer la direction du liquide en circulation. Pour procéder au changement, retirer les boulons de fixation et, en prenant soin de maintenir en place le joint d'étanchéité, tourner le corps suivant l'angle désiré, 90° ou 180°, par rapport à la position originale.

La flèche sur le corps pointant dans la direction de la circulation du liquide, insérer les boulons de fixation et les visser uniformément. Sur les modèles s25 à s57, h32 à h54 et la série 1050 (1B à 2B), il est normal qu'il y ait un espace entre la chaise de palier et le corps de la pompe (volute). Ne pas trop serrer les boulons ! À la jonction, faire tourner l'arbre de la pompe à la main pour vous assurer qu'il tourne librement et que l'impulseur ne frotte pas l'intérieur du corps. Toujours installer de manière à ce que l'arbre du moteur soit en position horizontale, les godets à huile et le couvercle du réservoir d'huile étant placés sur le dessus.

Les modèles s25 à s46 et h32 à h41 sont livrés en prévision d'une évacuation vers le bas. Tous les autres modèles sont livrés en prévision d'une évacuation vers le haut, puisque les pompes de cette taille sont habituellement installées sur les systèmes hydroniques pour pomper vers le haut, de sorte que le point de changement de pression nul, c'est-à-dire la connexion au vase d'expansion, puisse facilement se trouver du côté aspiration du circulateur.

La pompe doit être installée à un endroit qui permet l'entretien et la lubrification. Le moteur et la chaise de palier doivent être exempts d'isolant. La pompe et le moteur sont conçus pour être soutenus uniquement par la tuyauterie en ligne. Ne pas les supporter d'aucune autre façon. Il est recommandé de les placer à environ 4 pi au-dessus du sol. Au moment de fixer la pompe par ses brides, serrer les boulons uniformément et sans excès.

Des robinets-vannes devraient être installés du côté évacuation et du côté aspiration de la pompe pour faciliter l'entretien. Sur les pompes plus grosses, un clapet antiretour devrait être placé du côté évacuation de la pompe, entre cette dernière et le robinet-vanne, pour prévenir les dommages causés par les coups de bélier.

SHÉMAS DE CÂBLAGE

MONOPHASÉ MOINS DE 0.5HP

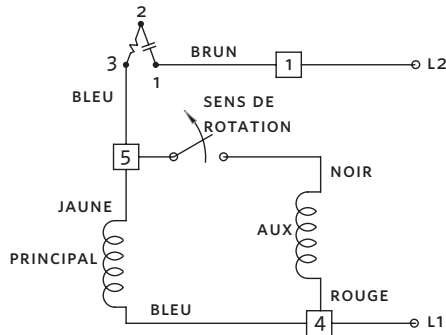
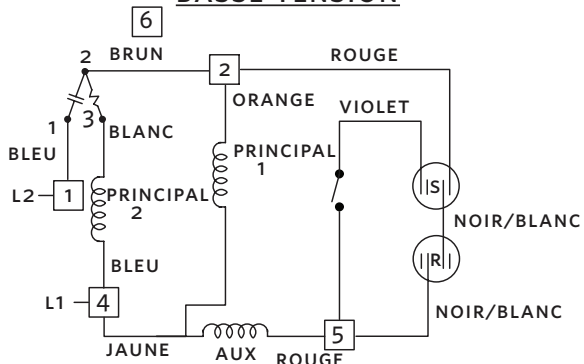


Schéma ci dessus à suivre dans le sens contraire des aiguilles d'une montre.

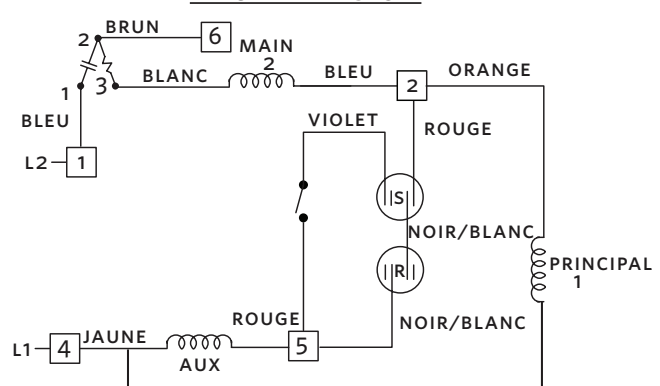
Pour une rotation dans le sens des aiguilles d'une montre, inverser les fils jaune et bleu des bornes 5 & 4.

MONOPHASÉ MOINS DE 1HP (avec un numéro de référence commençant par 811757-...)

BASSE TENSION



HAUTE TENSION

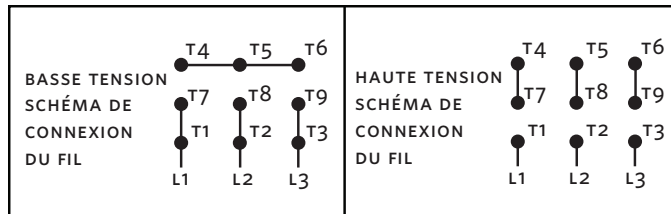


MONOPHASÉ 1HP-1.5HP (seulement pour un numéro de référence ne commençant pas par 811757-...)

	LIGNE A	LIGNE B	JONCTION
HAUTE TENSION ROTATION STD	1	4,5	2,3,8
HAUTE TENSION ROTATION OPP	1	4,8	2,3,5
BASSE TENSION ROTATION STD	1,3,8	2,4,5	—
BASSE TENSION ROTATION OPP	1,3,5	2,4,8	—

NOTE: Le sens de rotation standard est dans le sens contraire des aiguilles d'une montre en faisant face à l'extrémité opposée de l'extension de l'arbre

MOTEUR TRIPHASÉ DE TOUTE TAILLE



Permuter deux des fils de sorties pour inverser le sens de rotation

2.0 PROPRETÉ DU SYSTÈME

Avant de démarrer la pompe, le système doit être entièrement nettoyé, vidangé et rincé, puis rempli de nouveau d'un liquide propre. Les scories de soudage et autres matières étrangères, les composés de colmatage de fuites et de nettoyage, les produits de traitement excessifs ou inappropriés de l'eau, peuvent tous endommager les composants internes de la pompe. La garantie sera nulle si l'une ou l'autre de ces conditions est permise. (Consulter le **dossier n° 6090.645** conception et entretien des systèmes hydroniques fermés.)

3.0 DÉMARRAGE

La pompe doit être parfaitement amorcée avant le démarrage. Remplir la tuyauterie du système et le corps de la pompe de liquide, ventiler complètement le système, faire tourner la pompe à la main pour déloger les bulles d'air qui y seraient emprisonnées. Vous assurer que les raccords et les robinets de vidange sont étanches et ajouter le liquide qu'il faut pour remplir.

Comparer les exigences électriques aux conditions d'alimentation, puis faire démarrer la pompe et vous assurer qu'elle tourne correctement. Vue de l'extrémité moteur de la pompe, la rotation se fait dans le sens contraire des aiguilles d'une montre sur les modèles s25 à s46 et H32 à H41. Sur tous

les autres modèles, la rotation se fait dans le sens des aiguilles d'une montre. Si la pression ne grimpe pas, arrêter la pompe, vérifier de nouveau, ventiler et remplir. Ne jamais essayer de remplir le système lorsque la pompe est en marche.

4.0 LUBRIFICATION

ATTENTION:

NE PAS verser d'huile dans les Circulateurs ne nécessitant aucun entretien. Les modèles mentionnant **MF** dans leur référence sont étiquetés : 'CE SYSTÈME À ROULEMENT EST ÉQUIPÉ DE ROULEMENTS À GRAISSAGE PERMANENT ET NE NÉCESSITE AUCUN AJOUT D'HUILE NI DE GRAISSAGE'.

Arrêter le moteur avant de lubrifier. Ne pas mettre trop d'huile ni en renverser sur les bagues souples du moteur. Ne pas faire entrer l'huile de force dans les godets et arrêter le remplissage si un godet se remplit avant d'avoir ajouté la quantité spécifiée.

Lubrification de la pompe : Applicable seulement pour les pompes à paliers à douille et ayant un godet pour la lubrification



Immédiatement après l'installation de la pompe et avant de la démarrer, ajouter lentement de l'huile (SAE 30 non détergente régulière, fournie avec la pompe) dans le godet situé sur le dessus de la chaise de palier :

s25 à s57, H32 à H54 et série 1050 (1B à 2B)	¼ oz.
s69, H63 à H68, série 1060 (1½D à 3D)	2 oz.

Par la suite, au début de chaque saison de chauffage, lubrifier la pompe en utilisant de l'huile SAE 30. Pour les modèles s25 à s57, H32 à H54 et la série 1050 (1B à 2B), ajouter environ ½ oz. Lubrifier à tous les six mois si la pompe fonctionne tout le temps ou à haute température. Sur les modèles s69, H63 à H68, série 1060 (1½D à 3D), vous assurer que l'huile est visible en haut et au centre de la lunette sur le côté de la chaise de palier et maintenir ce niveau en tout temps.

Lubrification du moteur

ATTENTION



Arrêter le moteur avant de le lubrifier. Ne pas ajouter trop d'huile ni en renverser sur les bagues souples du moteur.

Ce moteur a été lubrifié correctement en usine. Au début de chaque saison de chauffage, toutefois, sur les moteurs munis de godets d'huile, ajouter 15 gouttes d'huile non détergente SAE 30 dans chaque godet.

Si le moteur est équipé d'embouts de graissage, respecter la procédure recommandée par le fabricant. Les moteurs à godets d'huile ou à embouts de graissage sont graissés individuellement en prévision de plusieurs années d'utilisation et exigent peu ou pas d'attention.

5.0 REMPLACEMENT DES JOINTS D'ÉTANCHÉITÉ

Retirer la portion pompe du corps. Retirer l'impulseur, le joint d'étanchéité endommagé, la pièce de céramique et le godet de caoutchouc. Nettoyer le compartiment du joint dans la chaise de palier et installer un nouveau godet et une nouvelle céramique. Vérifier l'état de la chemise de l'arbre. Si elle est marquée, remplacer l'ensemble de l'arbre. Autrement, nettoyer le prolongement de l'arbre et, au besoin, polir la chemise à l'aide d'une toile à polir fine suivant un mouvement rotatif.

Pousser sur l'extrémité accouplement de l'arbre pour réduire le jeu tout en pressant fermement le nouveau joint d'étanchéité sur la face fixe. On peut mettre une petite quantité de vaseline sur la chemise de l'arbre pour aider à l'installation. Pousser fermement et uniformément en utilisant deux tournevis contre les quatre oreillettes du collet (l'anneau de métal autour des soufflets de caoutchouc) ou sur le pourtour extérieur du collet dans le cas des modèles s25 à s57, H32 à H54 et de la série 1050 (1B à 2B).

Ne pas utiliser de rondelle à ressort sur les circulateurs de modèles courants s25, s35 et H32 lorsque la dépression prévue pour le ressort se trouve sur le moyeu de l'impulseur. Continuer d'appuyer sur l'extrémité accouplement de l'arbre. Remonter l'impulseur et l'ensemble porteur du joint d'étanchéité dans le corps. Au besoin, installer un nouveau joint pour le corps et nettoyer la surface du joint de la volute et de la chaise de palier.

ATTENTION



Avant de faire fonctionner la pompe, vous assurer que :

- 1 La pompe a été amorcée?
- 2 Le sens de la rotation est le bon?
- 3 La pompe est correctement lubrifiée?
- 4 L'alimentation correspond aux données sur la plaque d'identification?
- 5 La pompe est protégée contre les surcharges?
- 6 Le système est propre?

Pour les systèmes domestiques de distribution d'eau, utiliser des pompes à corps de bronze.

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INSTALLATION AND OPERATING INSTRUCTIONS

Series DAS Dirt & Air Separator

VESSEL DESCRIPTION

Armstrong Series DAS Dirt & Air Separators are designed to eliminate entrained air and separate debris associated with start-up and maintenance of any hydronic system. The design incorporates a removable end cover (optional) for coalescing medium access and an air vent (optional) to automatically release air from the separator. The design and construction conforms to ASME Section VIII, Div. 1 (excluding DAS-Q and DASH-Q models).

FACTORY TESTING AND SHIPPING

The Series DAS has been factory tested and inspected prior to shipment. Upon receipt of the unit, carefully inspect the unit for damage that may have occurred during shipment. If the DAS has been damaged, it should be noted on the freight bill and reported to the carrier.

INSTALLATION

Ideally the installation of the DAS is at the point in the system where full water flow is at the lowest pressure and highest temperature. For optimum air elimination, it is at this point where free system air (bubbles) is at its highest concentration. Complete elimination of the free air at this location insures that dissolved air (air in solution) is at its lowest concentration. As the fluid leaves the DAS, and travels throughout the piping system, it will absorb a portion of any free-air that it contacts. This air-saturated water will then circulate back to the DAS where the low pressure/high temperature condition will drive this air back out of solution. This continuous air absorption and subsequent release and elimination by the DAS will ensure an air-free system.

It is recommended that the DAS be installed in the system piping prior to the primary system circulator/pump. For high-rise systems where static pressures are high, placement of the DAS should be as high in the system as practical.

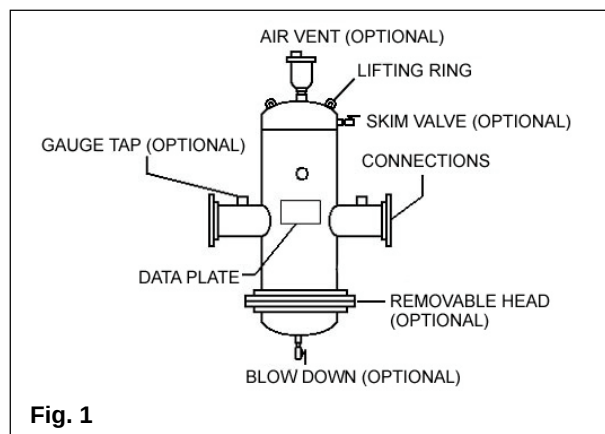


Fig. 1

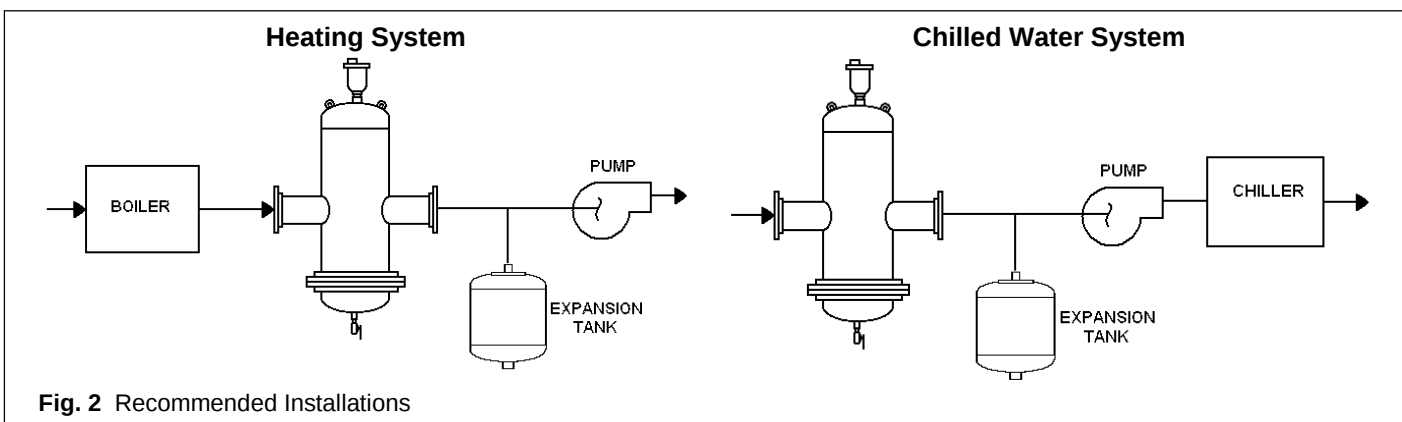
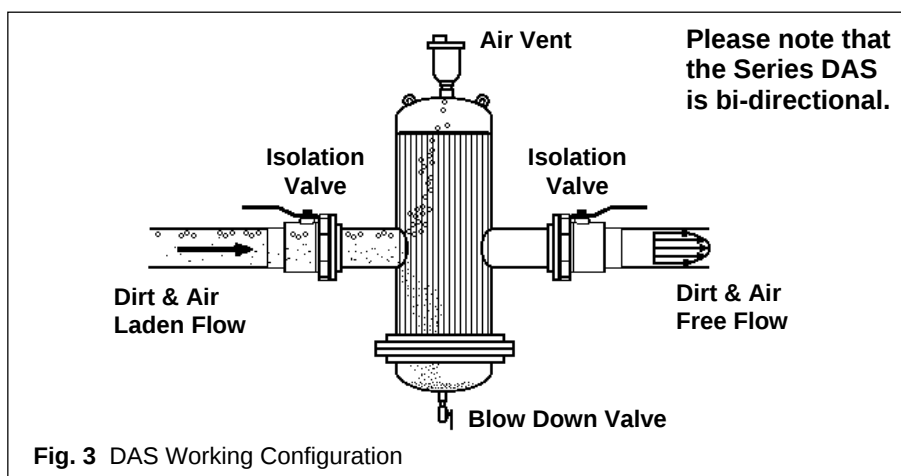


Fig. 2 Recommended Installations

Note: 100% of system flow should pass through the DAS to ensure all particles can be filtered.

OPERATION

All systems contain air in a dissolved state or as free air bubbles. Dirt particles, from multiple sources (piping fabrication, boiler or pump castings, welding beads, rust, etc.) also flow with the system water. As system fluid enters the DAS, air bubbles will rise to the top of the vessel to the vent location. Small, or sometimes referred to as micro-bubbles, will become trapped by the coalescing stainless steel media. With time, these bubbles will combine to form larger bubbles that will, over time as buoyancy overcomes surface tension, float to the top of the vessel to the vent location. Dirt particles are strained out by the enhanced surface stainless steel screen and collect at the vessel bottom. The debris is then periodically flushed out of the vessel through a blow-down valve. In removable base designs, the coalescing media can be removed and cleaned periodically.



MAINTENANCE

Air is eliminated automatically through the float-style vent. The vent should be periodically inspected to ensure optimum performance. If the vent used shows signs of continuous or intermittent leakage, or corrosion, it should be serviced or replaced.

During start up procedures, sediment should be removed frequently. The amount of sediment and the time of each blow-down should be recorded. As the amount of debris from blow-down diminishes, set a routine schedule to periodically blow-down the debris. If sediment builds on the coalescing screen, as evidenced through increased pressure drop, the screen can be removed. Inspect the screen cartridge periodically. Clean or replace if necessary.

WARNING: Standard units are not for use with potable water. Please consult factory for stainless steel option. For support recommendations, please reference local building code requirements

WARNING: The internal coalescing tubes are supported by the removable head. These tubes are not supported when the head bolts are removed.

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INSTALLATION AND OPERATING INSTRUCTIONS

SX Series Diaphragm Expansion Tanks

SX SERIES Expansion Tanks

This line of expansion tanks is specifically designed for use in hydronic heating systems.

The unique proven design of these tanks incorporates a flexible diaphragm that separates system water from the tank air charge (12 psig) resulting in more positive system protection.

HOW THEY WORK:

Heated water expands, and in a closed hot water heating system, provision must be made for this expansion. The captive air volume separated by the flexible diaphragm in the expansion tank provides for water expansion without permitting absorption of the air cushion by the water.

ATTACHING ACCEPTANCE FITTINGS:

SX tanks are equipped with a convenient bottom outlet elbow for connection to the system. Models SX-30V, SX-40V and SX-60V use a 1" NPTF fitting and models SX-90V, SX-110V and SX-160V use 1½" NPTF fitting. The air valve is located on top to provide accessibility no matter how the unit is positioned.

PROPER LOCATION AND INSTALLATION:

The SX Series tank may be located at any convenient point on a hot water heating system on the suction side of the pump. It may be installed into a tee or any other suitable tapping. The preferred installation is to pipe the SX tank into the system piping between the pressure reducing valve (in the water supply line) and the air removal trap / air vent, as shown in Figure 1. Conversely, the SX tank may be piped directly into the Armstrong Air Removal Trap. Regardless of installation, both offer continuous automatic air removal and complete pressure control protection.

ADJUSTING SX EXPANSION TANK PRECHARGE TO SYSTEM REQUIREMENTS:

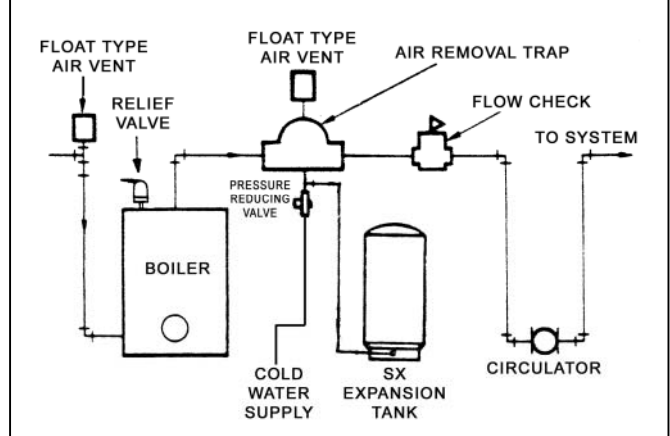
All SX Series tanks are shipped with a standard precharge of 12 psi. This precharge can be adjusted if necessary. The following steps should be taken:

1. Remove red air charge valve cap and, using a suitable pressure gauge, check precharge pressure.
2. Release or add air as necessary to make precharge pressure equal to the desired fill pressure.
3. Replace protective air valve cap and seal with the air valve label provided. This will enable you to determine if valve has been tampered with on possible future service calls.

SYSTEM CONNECTION:

1. Locate SX Series expansion tank in final desired location.
2. Level as necessary.
3. Connect to heating system.
4. All piping should be in accordance with prevailing local codes and standards.

RECOMMENDED INSTALLATION:



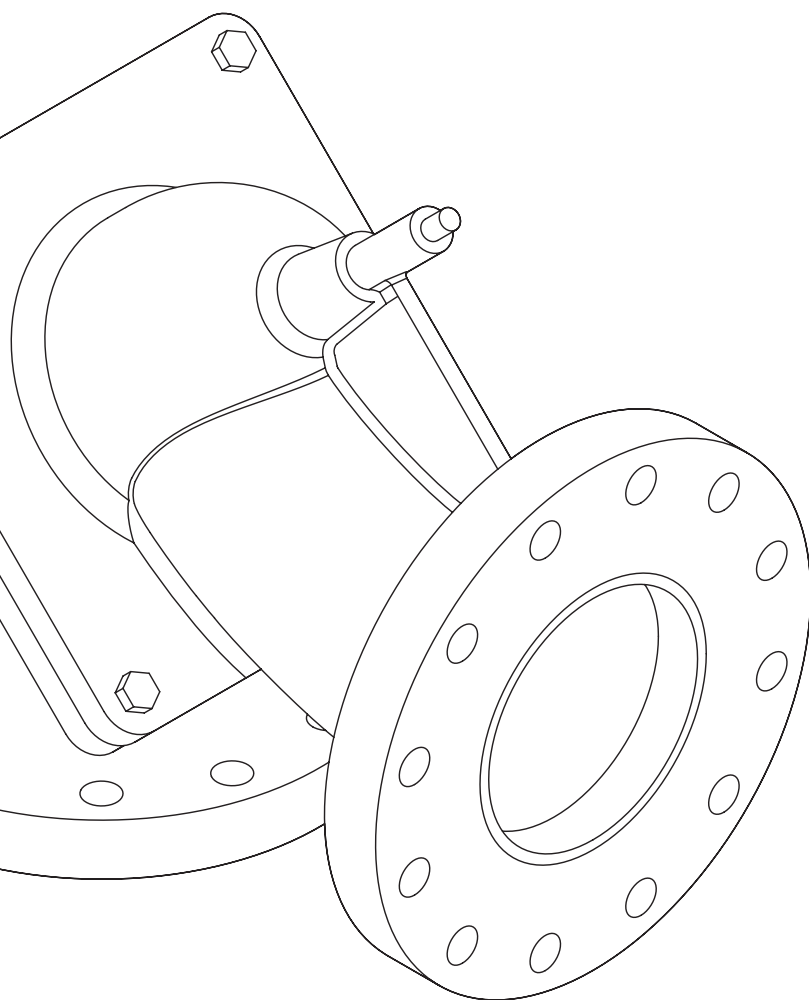
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Armstrong model FTV

Hard flanged Flo-Trex
combination valve

Installation and operating instructions

File No: 35.81

Date: SEPTEMBER 18, 2014

Supersedes: 35.81

Date: DECEMBER 02, 2010

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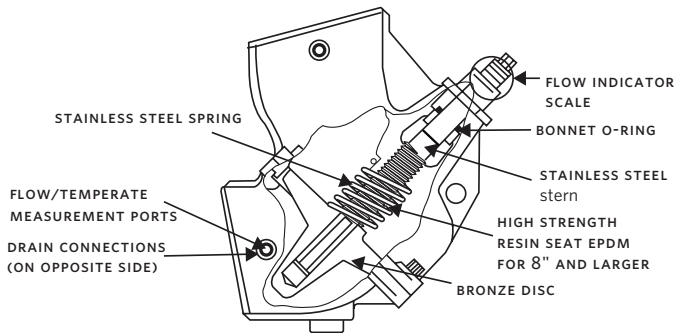
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1.0 INTRODUCTION

The Armstrong model FTV Flo-Trex combination valves are designed for installation on the discharge side of centrifugal pumps. The Armstrong combination valve incorporates three functions in one valve:

- Drip-tight, shut-off valve
- Spring closure design, non-slam check valve
- Flow throttling valve

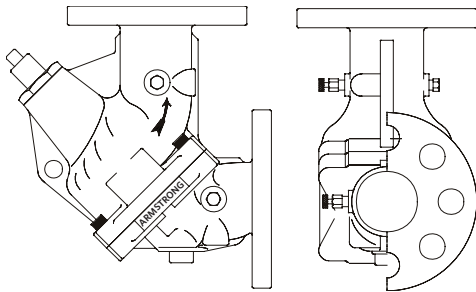
Armstrong model FTV-AF Flo-Trex combination valve



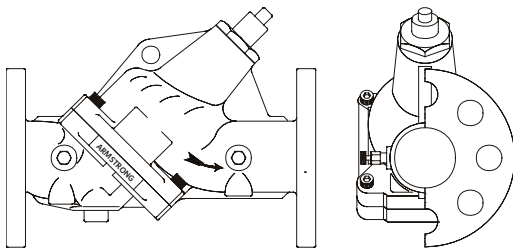
2.0 INSTALLATION

- 1 The valve should be mounted to a spool piece on the discharge side of the pump. Spool piece required is based on a minimum recommended space of 12" for pump sizes 2 × 2 to 6 × 6 and 24" for pump sizes 8 × 8 to 12 × 12.
- 2 It is not recommended to mount a valve directly to the pump as this could cause undesirable noise in the system.
- 3 Sufficient clearance around the valve should be left for valve removal or repair.
- 4 Install valve in the direction of the flow arrows on the valve body.
- 5 The valve body has been designed to handle the weight of the pump on vertical in-line installations. The body is not designed to support the piping weight. It is recommended that the piping be supported by hangers. Pipe supports are not required under the valve and strainer bodies but may be used if desired.
- 6 Ensure that the FTV is installed with the valve stem in the upright position. Valve slam may occur if installed in any other configuration

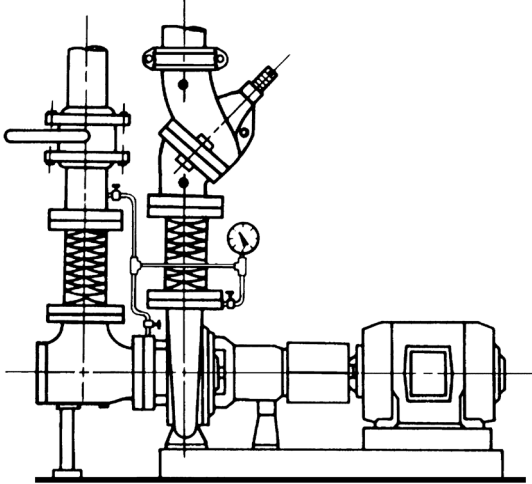
Angle pattern model FTV-AF



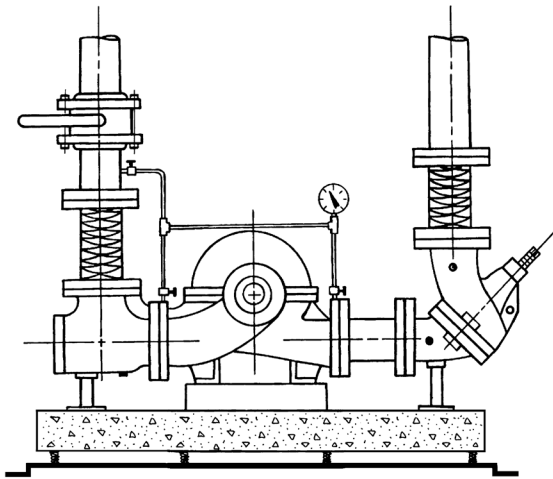
Angle pattern model FTV-SF



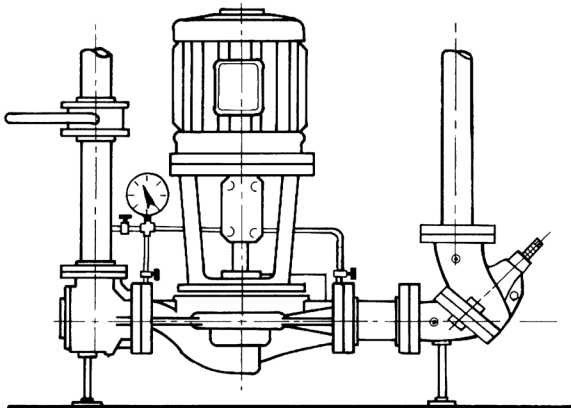
3.0 TYPICAL INSTALLATIONS



Base-mounted single suction



Base-mounted double suction



Vertical in-line

4.0 FLANGE BOLT TIGHTENING

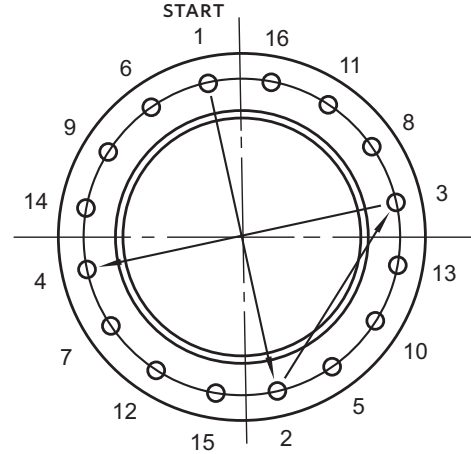


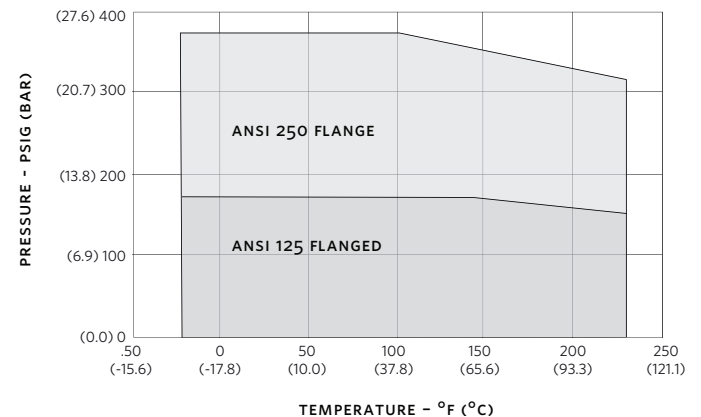
FIG 1: Recommended bolt tightening procedure

VALVE SIZE	125 PSI/150 PSI CAST IRON BOLT	
	BOLT NO.	SIZE
2½	4	5/8
3	4	5/8
4	8	5/8
5	8	¾
6	8	¾

TABLE 1

Tighten nuts evenly, following bolting instructions (FIG 1) so that the flange faces remain parallel. Flange bolts should be tightened to 70 ft/lbs. Torque minimum to assure firm metal-to-metal contact. When raised face flanges are used, there will be a gap between the faces of the outer diameter.

5.0 PRESSURE-TEMPERATURE LIMITS



6.0 FIELD CONVERSION (straight to angle pattern valve)

Open valve at least one complete turn.

Remove the body bolts from valve body using allen key.

Rotate one half of the valve body 180° making sure the lower valve seat and o-ring stay in position. Inspect the o-ring for any cuts or nicks and replace if necessary.

Replace body bolts and torque evenly to 70 ft/lbs.

7.0 FLOW MEASUREMENT

Where approximate indication of flow is acceptable the Armstrong Flo-Trex valve can be used.

Measure the flow with valve in fully open position.

- 1 Measure and record the differential pressure across the valve using an Armstrong CompuFlo with high pressure range transducer, or CBDM- 135/60 meter, or pressure gauges with PMP adapters.

Caution: Safety glasses should be used and the probe should not be left inserted into fittings for prolonged periods of time (overnight, etc), as leakage from the PMP may occur when probe is removed.

- 2 Refer to Flo-Trex performance curves with valve in full open position (**FIG 2**).

Locate Pressure Differential on left hand side of chart and extend line horizontally across to valve size being used. Drop line vertically down and read flow rate from bottom of chart.

Determining flow rate with valve in throttled position

FLO-TREX PERFORMANCE CURVE WITH VALVE IN FULL OPEN POSITION

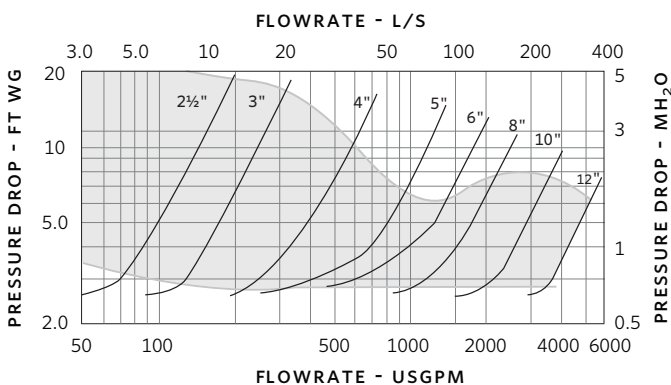


FIG: 5

INHERENT FLOW CHARACTERISTIC CURVE WITH VALVE IN THROTTLED POSITION

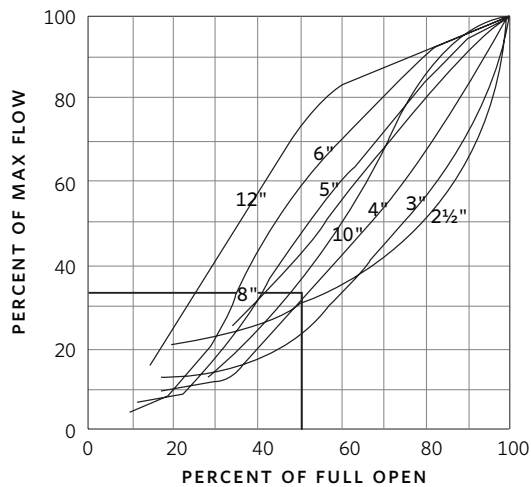


FIG: 6

- 1 Record the size of valve and stem position using the flow indicator scale (page 7). Calculate percentage of valve opening referring to table below:

VALVE SIZE	NUMBER OF RINGS (VALVE FULL OPEN)
2½"	5
3"	5
4"	6
5"	9
6"	10
8"	12
10"	18
12"	28

- 2 Measure and record the differential pressure across the valve in the throttled position.
- 3 Locate percentage of valve opening on the bottom scale of Flow characteristic curve (**FIG 3**). Project line vertically up to intersect with the valve characteristic curve and from this point project line horizontally across to the left of the chart and record the percentage of maximum flow rate.
- 4 On the Flo-Trex performance curve (**FIG. 2**) locate the differential pressure obtained in **STEP 2** and project line horizontally across to intercept with valve performance curve. Drop a line vertically down to read the flow rate at the bottom of the chart.
- 5 To calculate flow rate of valve in the throttled position, multiply the flow rate from **STEP 4** by the percentage flow rate from **STEP 2** divided by 100.

Example: Valve size 4 inch.

Differential Pressure is 5.4 ft. (1.65 m).

Number of rings open = 3. Therefore: 3 rings ÷ 6 rings x 100 = 50% throttled.

From the Flo-Trex Performance Curve (**FIG 2**), a 4 inch, valve with 5.4 ft. pressure drop (1.65 m) represents a flow of 400 USgpm (25.2 L/s).

From Flow Characteristic Curve (**FIG 3**), a 4 inch valve 50% open, represents 34% of maximum flow.

Approximate flow of a 4 inch valve, with a 5.4 ft (1.65 m) pressure drop when 50% throttled is:

$$\frac{400 \times 34}{100} = 136 \text{ USgpm } \left(\frac{25.2 \times 34}{100} = 8.57 \text{ L/s} \right)$$

Note: To prevent premature valve failure it is not recommended that the valve operate in the throttled position with more than 25 ft pressure differential. Instead the pump impeller should be trimmed or valves located elsewhere in the system be used to partially throttle the flow.

FLOW INDICATOR SCALE

The valve stem with its grooved rings and positioning sleeve indicates the throttled position of the valve. The quarter turn graduations on the sleeve, with the scribed line on the stem, provide for approximate flow measurement.

Note: The valve is shipped in the closed position. The indicator on the plastic sleeve is aligned with the vertical scribed line on the stem.



8.0 OPERATION

To assure tight shut off, the valve must be closed using a wrench with 25 to 30 ft/lbs of torque.

To assure trouble-free check valve operation and shut off operation, the valve should be periodically opened and closed to keep valve seat and valve disc guide stem free of build up of system contaminants.

9.0 REPACKING OF FTV VALVE UNDER FULL SYSTEM PRESSURE

1 Should it be necessary, stem o-ring can be changed under full system pressure.

Caution: Safety glasses should be worn.

2 Record the valve setting.

3 Turn the valve stem counter-clockwise until the valve is fully open and will not turn any further. Torque to a maximum force of 45 ft/lbs. This will ensure good metal-to-metal contact and minimum leakage.

4 The valve bonnet may now be removed. There may be slight leakage, as the metal-to-metal back seating does not provide a drip-tight seal.

5 Clean exposed portion of valve stem (do not scratch).

6 Remove and replace the o-ring and gasket.

7 Install the valve bonnet.

8 Tightening valve bonnet is necessary to stop any leaks.

9 Open valve to balance set point as recorded in **STEP 2**.

10.0 MAXIMUM NUMBER OF TURNS (FULL OPEN VALVE)

Note: On valve sizes 2½" and 3", full open position of valve is 5 turns. However valve will open to 5½ turns which is just back of seating of valve.

11.0 SEAT REPLACEMENT

1 Drain system and remove valve from piping.

2 Remove the body bolts from the body using an allen key.

3 Remove seat and o-ring. O-ring is not used on valves 8" and larger.

4 Inspect and clean o-ring cavity and install new o-ring and seat. Valve disc stem also should be inspected and replaced if worn. Valve stem o-ring should be replaced at this time. Refer to section **8.0**.

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MAKING
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Installation & Operating Instructions GLA - Glycol Make-up Units

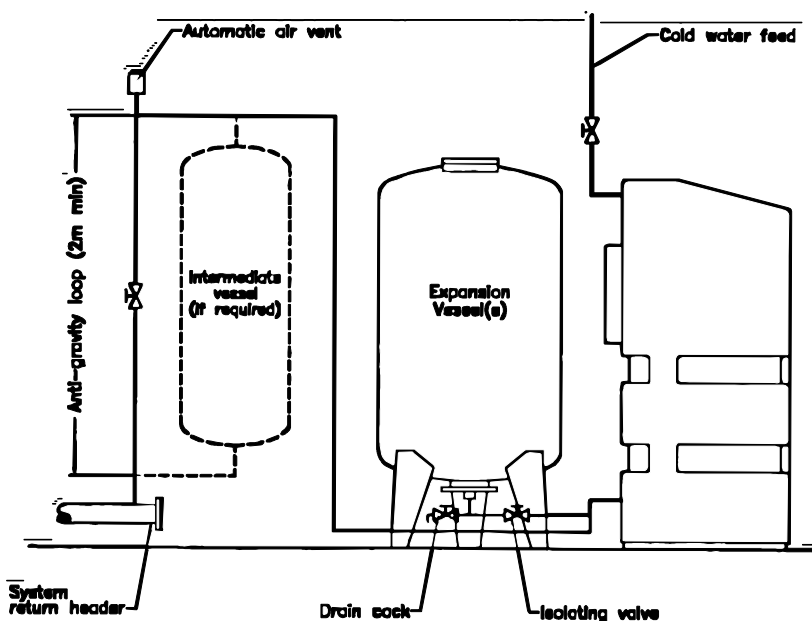
ESSENTIAL SAFETY REQUIREMENTS

- 1) **Glycol** is toxic and the glycol supplier's safety instructions must be adhered to. In critical areas a retaining wall should be used to contain any spillage or leakage. Overflows should be arranged not to contaminate drainage systems.
- 2) It is recommended that initial commissioning be carried out with water.
- 3) The flow rates from the unit are designed for make-up rates. It is therefore suggested that the system is back-filled with due precautions taken to avoid contamination.
- 4) Glycol is sometimes subject to bacterial attack and can become slimy as a result. We recommend the addition of a suitable biocide. The dosage should be calculated on the amount of water glycol mixture added and not the total tank contents. If bacterial attack occurs on untreated mixtures the unit should be drained, flushed and refilled with fresh mixture and dosed with biocide.
- 5) Locate units in a well-ventilated environment and ensure that ventilation fans and apertures are not obstructed.
- 6) Check that the supply voltage and overload protection is correct.
- 7) A competent electrician should perform the electrical installation.
- 8) Guards and covers must not be removed during operation.

Expansion Vessel Installation and Commissioning

Refer to separate Armstrong publication for Armstrong vessels.

Install the **GLA** unit as indicated in the diagram below.



NOTES:

- 1) The pipework from the system to the expansion vessels should not be insulated.
- 2) For systems operating above 200 degrees F (93 C), an anti-gravity loop with a minimum height of 6 feet, (or an intermediate vessel) should be installed to provide thermal protection to the expansion tanks.
- 3) For hot water systems, the connections to the intermediate vessel should be reversed, i.e. top to system, and bottom to expansion vessel.
- 4) The GLA unit is suitable for floor mounting.
- 5) The ball float valve is fitted with a low-pressure seat; a high-pressure seat is attached to the float valve and should be fitted if required.
- 6) The pipework to the expansion vessels should be sized according to the size and number of vessels and should be at least the same size as the vessel connection.
- 7) Where multiple expansion vessels are required it is recommended that each vessel be installed with its own isolating valve and drain cock.

Pressure Switch Adjustment

- 1) Low system pressure – PS1
- 2) High system pressure – PS2
- 3) Duty pump control switch – PS3
- 4) Standby pump control switch (where fitted) – PS4

For each switch, set the delivery to the required pressure. Then very slowly turn the adjusting screw on the switch until the contacts change.

The high system pressure switch should first be set higher than the required pressure by turning the screw clockwise, and the setting then made by turning the screw anti-clockwise until the switch contacts change-over. The other switches should first be set lower than the required pressure by turning the screw anti-clockwise, and the setting then made by turning the screw clockwise until the switch contacts changeover.

A pipe plug is provided on the outlet to allow connection of a test pump to simulate differing system pressures to check switch settings.

The Ultra versions of the GLA have the capability of controlling duty and standby pumps from a single pressure switch.

GLA Ultra Settings

The extra functionality of Ultra units is integral. The only selectable option is Manual or Automatic reset of alarm

conditions. DIP switch 1, on the display board should be set to OFF for auto reset (Factory setting), and ON for manual reset. On alarm conditions, the MUTE switch will mute the buzzer. In manual reset mode this MUTE switch will reset the alarms after the fault condition has been cleared. Other switches change the mode of the printed circuit board for use with other Armstrong products. For GLA application, all switches except 1 and 7 must be set to OFF.

Priming the make-up pumps

1. Close suction isolating valve.
2. Fill the glycol-mixing tank.
3. Remove the upper vent plug from the make-up pump.
4. Open suction isolation valve until water flows out of this tapping.
5. Close valve and replace plug.
6. Repeat for standby pump (where fitted).
7. Close the system-isolating valve.
8. Open suction isolating valve.
9. Switch on unit, initially both pumps will run. As the pressure reaches the pump control switch threshold, the pumps will switch off.
10. Check all piping for leaks following shipping.
11. Crack open system valve. The pressure will fall and the pump will start and maintain pressure.

Powered agitation (Ultra model only)

A solenoid valve is fitted to provide powered agitation of the mixture. Automatically this valve is periodically opened and the duty pump starts creating circulation through the pump and mixing tank. Automatic mixing is inhibited when there is a system demand for make-up.

A switch is provided for manual agitation when adding glycol to the mixing tank.

Topping up with glycol

The mixing tank is calibrated in liters and US gallons. The normal top up level is 53 US gallons (200 liters).

1. Calculate the amount of water needed and add or drain to the correct level.
2. Add the required amount of glycol.
3. Operate the manual-agitating switch.
4. Check the mixture percentage.

The unit is now ready for service.

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PRESSURE REDUCING VALVES | RD-11, RD-40, RD-50 & HRD-70 | INSTALLATION AND OPERATING INSTRUCTIONS

File No: 11.85
Date: DECEMBER 24, 2015
Supersedes: 11.85
Date: MAY 13, 2008

1.0 INSTALLATION

The pressure reducing valve should be installed with the flow arrow on the body pointing in the direction of the flow. Install the union fittings, supplied with the valve (model RD-11 and C-11), on the inlet side of the valve body, for quick installation and removal if necessary. A shut-off valve should be installed on the city water side of the pressure reducing valve. If the pressure reducing valve is not equipped with a fast fill feature, a by-pass may be used. A three valve by-pass around the pressure reducing valve will also serve as a fast fill option and is recommended for service.

CAUTION



The use of Teflon tape when installing a valve provides lubricity. Care should be taken to avoid over tightening, which may crack the valve body.

2.0 OPERATION

Models RD-11, RD-40 and RD-50 are preset at 12 psi, and the HRD-70 is preset at 45 psi. Open the cold water fill valve and the system will be filled until the boiler gauge indicates the preset valve pressure has been obtained.

Model RD-11 is preset at 12 psi and is equipped with a fast fill feature. When filling the system as noted above, the fast fill thumbscrew should be manually turned in completely. This overrides the pressure regulating function of the valve. The system should be filled until the boiler gauge indicates the preset pressure of the valve and then the fast fill thumbscrew should be backed off completely until it spins freely.

WARNING



The fast fill thumbscrew must never be left in the down position after the system has been filled. The thumbscrew must be placed in the free position to avoid over pressurization and unnecessary relief valve discharge.

3.0 ADJUSTMENT

Allow system water to cool to ambient temperature. If necessary, adjust valve pressure setting as follows: pressure setting can be raised or lowered by loosening the jam nut and turning the slotted adjusting screw clockwise to increase the set pressure or counter-clockwise to lower the set pressure. This should be done slowly until the boiler pressure gauge indicates the required system pressure. A screw driver should be used to hold the adjusting stem stationary while the jam nut is secured.

4.0 SERVICE

If the pressure reducing valve fails to maintain the set cold fill pressure, the sediment strainer may be clogged. To service the strainer, shut off city water supply and the isolation valve on the discharge of the pressure reducing valve. Remove and clean or replace the strainer and replace the strainer gasket and nut. Open both the city water shut-off valve and the isolation valve to resume normal system operation.

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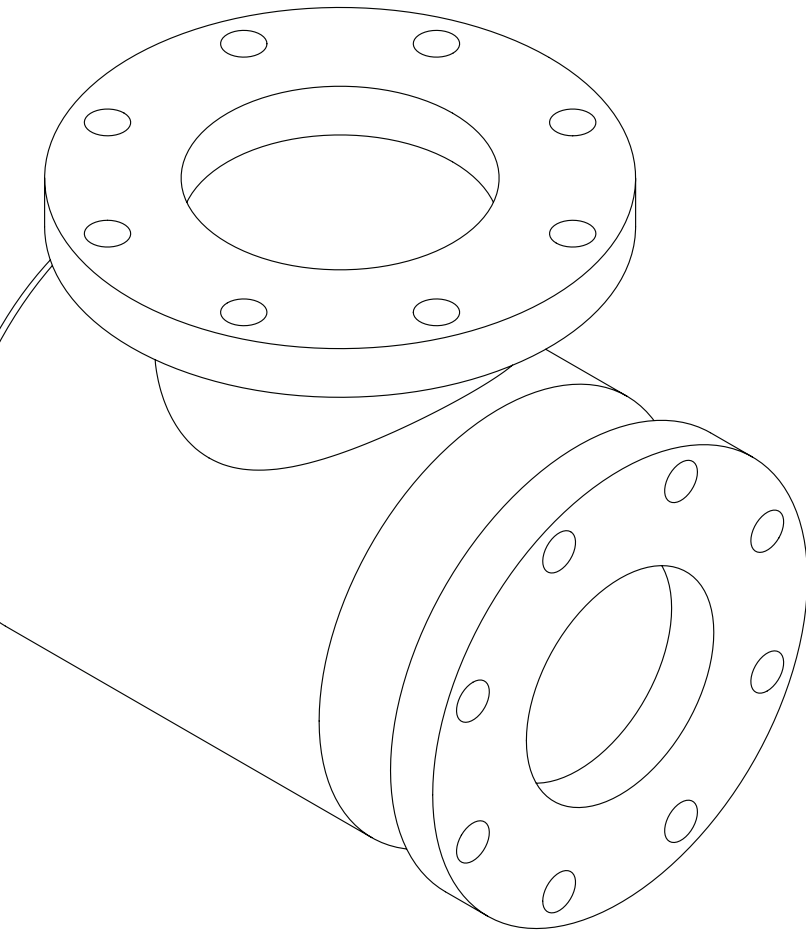
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MAKING
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Suction Guides

Installation and operating instructions

File No: 35.82

Date: OCTOBER 03, 2013

Supersedes: 35.82

Date: AUGUST 16, 2013

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1.0 INTRODUCTION

Armstrong Suction Guides are designed for bolting directly onto the suction flange of horizontal or vertical shaft centrifugal pumps.

2.0 OPERATING LIMITS

Armstrong Suction Guides are designed in five series:

SERIES DESIGNATION	INLET CONNECTION	PUMP CONNECTION
SG	ANSI 125 / PN16 flange	ANSI 125 / PN16 flange
SG-TF	NPTF / BSPT	ANSI 125 / PN16 flange
SGG	GROOVED*	ANSI 125 / PN16 flange
SGHH	ANSI 250 / PN25 flange	ANSI 250 / PN25 flange
SGH-TF	NPTF / BSPT	ANSI 250 / PN25 flange

*Suitable for straight cut grooved anvil or victaulic fittings.

Each series is designed to be a four-function fitting. Each Suction Guide is a 90° elbow, a pipe strainer and a flow stabilizer. It may also be used as a reducing elbow, should the suction piping be larger than the pump inlet.

3.0 INSPECTION

Armstrong Suction Guides are thoroughly tested and inspected before shipment to assure they meet with your order requirements. All units must be carefully examined upon arrival for possible damage during transit. Any evidence of mishandling should be reported immediately to the carrier and noted on the freight bill.

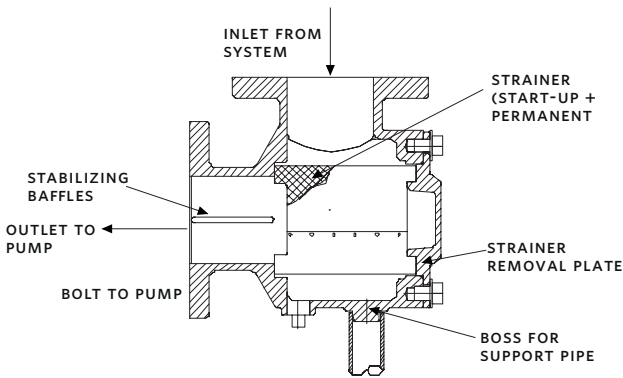


FIG. 1 Armstrong Suction Guide

4.0 INSTALLATION

Install the Suction Guide with the directional arrow, indicated on the body, being aligned with the system flow direction.

Armstrong Suction Guides may be installed in any position, providing the guide vanes are facing the pump inlet flange.

Centrifugal pumps need a minimum of 5 pipe diameters of straight pipe before the pump suction. This length of straight pipe, after the last elbow, tee or fitting, helps to ensure that the flow is stable when entering the pump suction.

Crosspiece guide vanes are fitted into the Armstrong Suction Guide outlet, where it bolts to the pump flange, to stabilize the flow and eliminate the need of long straight suction pipe.

Space must be allowed to remove the end cover and remove the strainer.

A blow-down valve may be installed on the Suction Guide drain connection. Should the Suction Guide be installed with the inlet port facing vertically down: The inlet piping configuration should include a blow-down valve at the lowest point on the down-pipe to exhaust any debris that may fall from the Suction Guide strainer.

The Suction Guide must not be used to support the suction piping. Piping must be supported independently.

On base mounted pumps, a flexible piping connections may allow the Suction Guide to be supported by the pump suction flange. A boss is cast on every SG allowing a supporting pipe-stool to be located under the fitting, thereby removing the weight of the Suction Guide from the pump suction flange.

Suction Guides are supplied with an inlet tapped gauge connection. Monitoring the differential pressure across the fitting, from the suction guide inlet gauge to the pump inlet gauge, will alert the operator should the strainer need to be removed and cleaned.

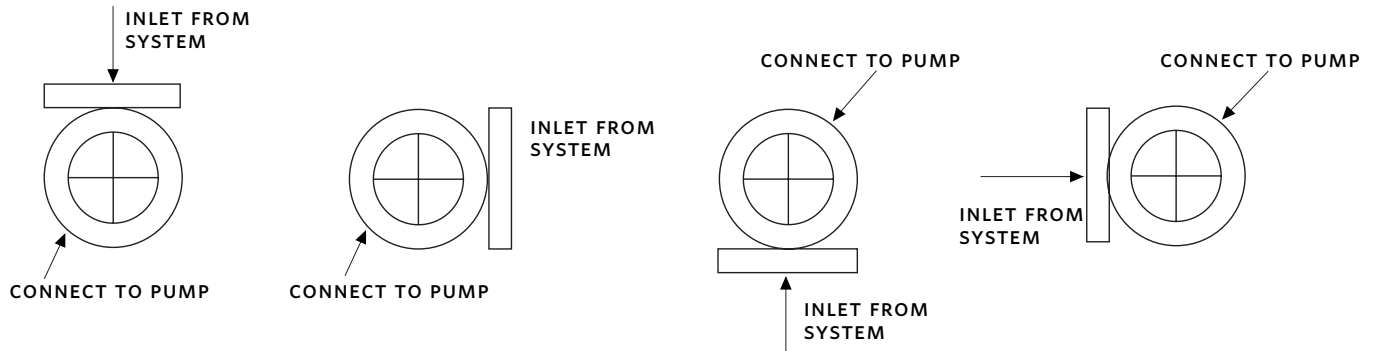


FIG. 2 Armstrong Suction Guide may be installed in any arrangement feasible by pump flange boltholes arrangement.

5.0 OPERATION

No special attention need be paid to the Suction Guide at start-up. The fitting is stationary and will strain the pumped fluid and stabilize the flow into the pump automatically.

Temporary strainer must be removed following system clean up.

After all debris has been removed from the system, or a maximum of 24 running hours, stop the pump and close the pump isolation valves. Drain the Suction Guide by removing the drain plug or opening the blowdown valve, if installed. Remove the Suction Guide cover and remove the strainer assembly from the valve body.

A temporary fine-mesh start-up strainer is tack-welded to the permanent stainless steel strainer. This temporary strainer should now be removed from the permanent strainer. The fine-mesh strainer is designed to remove small particulate from new piping systems and could easily clog with debris if left in place. This will be detrimental to the operation of the pump.

Replace the permanent strainer into the fitting body, once the temporary strainer is removed.

Inspect the cover O-ring and replace if necessary. Replace the cover into the body. Ensuring that the strainer is properly seated, tighten the cover bolts diagonally, evenly and firmly.



FIG. 3 Remove fine-mesh strainer

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