



# GOULDS PUMPS

SECTION 625D

# OWNER'S AND OPERATOR'S MANUAL

PLEASE FILL IN DATA  
FROM YOUR PUMP  
NAMEPLATE

Pump model \_\_\_\_\_

Spec. No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Seal No. \_\_\_\_\_

HORIZONTAL WHIRL-FLO  
MOTOR OR BELT DRIVEN  
2" THROUGH 8"

MODEL NUMBERS

2DW18	SL	SB	4FW7	SL	SB
2DWC20	SL	SB	4FWC10	SL	SB
3DW17	SL	SB	6EW25	SL	SB
3DWC22	SL	SB	6EWC27	SL	SB
3EW20	SL	SB	6FW8	SL	SB
3EWC21	SL	SB	6FWC11	SL	SB
4DW16	SL	SB	8FW9	SL	SB
4DWC19	SL	SB	8FWC12	SL	SB

SL = COUPLING CONNECTED  
SB = BELT DRIVEN

RETAIN MANUAL FOR REFERENCE



# ITT

## WARRANTY

WARRANTY – Company warrants title to the product(s) and, except as noted with respect to items not of Company's manufacturer, also warrants the product(s) on date of shipment to Purchaser, to be of the kind and quality described herein, and free of defects in workmanship and material.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS, AND CONSTITUTES THE ONLY WARRANTY OF COMPANY WITH RESPECT TO THE PRODUCT(S).

If within one year from date of initial operation, but not more than eighteen months from date of shipment by Company of any item of product(s), Purchaser discovers that such item was not as warranted above and promptly notifies Company in writing thereof, Company shall remedy such nonconformance by, at Company's option, adjustment or repair or replacement of the item and any affected part of the product(s). Purchaser shall assume all responsibility and expense for removal, reinstallation, and freight in connection with the foregoing remedies. The same obligations and conditions shall extend to replacement parts furnished by Company hereunder. Company shall have the right of disposal of parts replaced by it.

ANY SEPARATELY LISTED ITEM OF THE PRODUCT(S) WHICH IS NOT MANUFACTURED BY THE COMPANY IS NOT WARRANTED BY COMPANY and shall be covered only by the express warranty, if any, of the manufacturer thereof.

THIS STATES PURCHASER'S EXCLUSIVE REMEDY AGAINST COMPANY AND ITS SUPPLIERS RELATING TO THE PRODUCT(S), WHETHER IN CONTRACT OR IN TORT OR UNDER ANY OTHER LEGAL THEORY, AND WHETHER ARISING OUT OF WARRANTIES, REPRESENTATIONS, INSTRUCTIONS, INSTALLATIONS OR DEFECTS FROM ANY CAUSE. Company and its suppliers shall have no obligation as to any product which has been improperly stored or handled, or which has not been operated or maintained according to instructions in Company or supplier furnished manuals.

# Congratulations

You are now the owner of an ITT pump. This pump was carefully inspected and subjected to final performance tests before releasing for shipment. In order to achieve maximum performance, please follow the simple instructions in this manual.

## RECOMMENDED PRECAUTIONS

1. Avoid system pressures that may exceed one and a half times the operating point selected from the pump performance curve.
2. Should the fluid temperature rise more than 50 F. above ambient, expansion joints must be installed on both the suction and discharge ports to relieve any stress on the pump casing.
3. All electrical wiring of the pump installation must be done by a licensed electrician who will observe all national and local electrical codes. All motors require a magnetic starter with current over-load protection.
4. No modifications, additions or deletions should be made to the pump, without prior approval of the factory.
5. In systems where shock wave pressures may be generated, protective devices such as check valves/gate valves, etc., must be installed on discharge line to prevent shock pressures from entering the pump casing.
6. In systems containing discharge check valves, gate valves, etc., pump will not prime against a closed valve. Check the discharge valves making sure they are open before attempting to prime pump. If there is a possibility of air being entrapped in the pump casing, install an automatic venting device to bleed off the air.
7. This pump is designed primarily for water use. Before pumping other liquids, read carefully the CAUTION below.
8. Overheated pumps are dangerous. Burns or explosion could occur due to steam pressure. Operating pumps with suction and discharge closed is one cause of severe overheating. If overheating of pump casing occurs: 1. Stop pump immediately. 2. Allow pump to cool. 3. Slowly and cautiously vent pump.
9. Drain casing completely when servicing pump.
10. Do not use in a combustible atmosphere.
11. Make frequent checks of the tightness of suction and discharge pipe, drain, filter plug and pump gaskets.
12. After servicing the pump, always install any safety devices as originally found prior to dis-assembly.

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### CAUTION: (Read Carefully)

The performance of ITT pumps is based upon clear, cold, fresh water with suction conditions as shown on the performance curve. If used to pump other liquids, pump performance may differ from rated performance based on the different specific gravity, temperature, viscosity, etc. of the liquid being pumped. A standard pump may not be safe for pumping all types of liquids, such as toxic, volatile or chemical liquids, or liquids under extreme temperatures or pressures. Please consult ITT catalogs as well as local codes and general references to determine the appropriate pumps for your particular application. Since it is impossible for us to anticipate every application of an ITT pump, if you plan to use the pump for a non-water application, *consult ITT beforehand to determine whether such application may be proper or safe under the circumstances. Failure to do so could result in property damage or personal injury.*

## IMPORTANT SAFETY NOTICE

*To: Our Valued Customers*

User safety is a major focus in the design of our products. Following the precautions outlined in this manual will minimize your risk of injury.

ITT Goulds pumps will provide safe, trouble-free service when properly installed, maintained, and operated.

Safe installation, operation, and maintenance of ITT Goulds Pumps equipment are an essential end user responsibility. This *Pump Safety Manual* identifies specific safety risks that must be considered at all times during product life. Understanding and adhering to these safety warnings is mandatory to ensure personnel, property, and/or the environment will not be harmed. Adherence to these warnings alone, however, is not sufficient — it is anticipated that the end user will also comply with industry and corporate safety standards. Identifying and eliminating unsafe installation, operating and maintenance practices is the responsibility of all individuals involved in the installation, operation, and maintenance of industrial equipment.

Please take the time to review and understand the safe installation, operation, and maintenance guidelines outlined in this Pump Safety Manual and the Instruction, Operation, and Maintenance (IOM) manual. Current manuals are available at [www.gouldspumps.com/literature\\_ioms.html](http://www.gouldspumps.com/literature_ioms.html) or by contacting your nearest Goulds Pumps sales representative.

**These manuals must be read and understood before installation and start-up.**

For additional information, contact your nearest Goulds Pumps sales representative or visit our Web site at [www.gouldspumps.com](http://www.gouldspumps.com).

# SAFETY WARNINGS

Specific to pumping equipment, significant risks bear reinforcement above and beyond normal safety precautions.

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 **WARNING**

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A pump is a pressure vessel with rotating parts that can be hazardous. Any pressure vessel can explode, rupture, or discharge its contents if sufficiently over pressurized causing death, personal injury, property damage, and/or damage to the environment. All necessary measures must be taken to ensure over pressurization does not occur.

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 **WARNING**

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Operation of any pumping system with a blocked suction and discharge must be avoided in all cases. Operation, even for a brief period under these conditions, can cause superheating of enclosed pumpage and result in a violent explosion. All necessary measures must be taken by the end user to ensure this condition is avoided.

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 **WARNING**

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The pump may handle hazardous and/or toxic fluids. Care must be taken to identify the contents of the pump and eliminate the possibility of exposure, particularly if hazardous and/or toxic. Potential hazards include, but are not limited to, high temperature, flammable, acidic, caustic, explosive, and other risks.

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 **WARNING**

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Pumping equipment Instruction, Operation, and Maintenance manuals clearly identify accepted methods for disassembling pumping units. These methods must be adhered to. Specifically, applying heat to impellers and/or impeller retaining devices to aid in their removal is strictly forbidden. Trapped liquid can rapidly expand and result in a violent explosion and injury.

ITT Goulds Pumps will not accept responsibility for physical injury, damage, or delays caused by a failure to observe the instructions for installation, operation, and maintenance contained in this Pump Safety Manual or the current IOM available at [www.gouldspumps.com/literature](http://www.gouldspumps.com/literature).

# SAFETY

## DEFINITIONS

Throughout this manual the words **WARNING**, **CAUTION**, **ELECTRICAL**, and **ATEX** are used to indicate where special operator attention is required.

**Observe all Cautions and Warnings highlighted in this Pump Safety Manual and the IOM provided with your equipment.**



### **WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**Example:** Pump shall never be operated without coupling guard installed correctly.



### **CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

**Example:** Throttling flow from the suction side may cause cavitation and pump damage.




### **ELECTRICAL HAZARD**

Indicates the possibility of electrical risks if directions are not followed.

**Example:** Lock out driver power to prevent electric shock, accidental start-up, and physical injury.









When installed in potentially explosive atmospheres, the instructions that follow the Ex symbol must be followed. Personal injury and/or equipment damage may occur if these instructions are not followed. If there is any question regarding these requirements or if the equipment is to be modified, please contact an ITT Goulds Pumps representative before proceeding.














**Example:**  Improper impeller adjustment could cause contact between the rotating and stationary parts, resulting in a spark and heat generation.

## GENERAL PRECAUTIONS



### WARNING

A pump is a pressure vessel with rotating parts that can be hazardous. Hazardous fluids may be contained by the pump including high temperature, flammable, acidic, caustic, explosive, and other risks. Operators and maintenance personnel must realize this and follow safety measures. Personal injuries will result if procedures outlined in this manual are not followed. ITT Goulds Pumps will not accept responsibility for physical injury, damage or delays caused by a failure to observe the instructions in this manual and the IOM provided with your equipment.

General Precautions		
WARNING		NEVER APPLY HEAT TO REMOVE IMPELLER. It may explode due to trapped liquid.
WARNING		NEVER use heat to disassemble pump due to risk of explosion from tapped liquid.
WARNING		NEVER operate pump without coupling guard correctly installed.
WARNING		NEVER run pump below recommended minimum flow when dry, or without prime.
WARNING		ALWAYS lock out power to the driver before performing pump maintenance.
WARNING		NEVER operate pump without safety devices installed.
WARNING		NEVER operate pump with discharge valve closed.
WARNING		NEVER operate pump with suction valve closed.
WARNING		DO NOT change service application without approval of an authorized ITT Goulds Pumps representative.
WARNING		<p><b>Safety Apparel:</b></p> <ul style="list-style-type: none"> <li>♦ Insulated work gloves when handling hot bearings or using bearing heater</li> <li>♦ Heavy work gloves when handling parts with sharp edges, especially impellers</li> <li>♦ Safety glasses (with side shields) for eye protection</li> <li>♦ Steel-toed shoes for foot protection when handling parts, heavy tools, etc.</li> <li>♦ Other personal protective equipment to protect against hazardous/toxic fluids</li> </ul>
WARNING		<p><b>Receiving:</b></p> <p>Assembled pumping units and their components are heavy. Failure to properly lift and support equipment can result in serious physical injury and/or equipment damage. Lift equipment only at specifically identified lifting points or as instructed in the current IOM. Current manuals are available at <a href="http://www.gouldspumps.com/literature_ioms.html">www.gouldspumps.com/literature_ioms.html</a> or from your local ITT Goulds Pumps sales representative. Note: Lifting devices (eyebolts, slings, spreaders, etc.) must be rated, selected, and used for the entire load being lifted.</p>
WARNING		<p><b>Alignment:</b></p> <p>Shaft alignment procedures must be followed to prevent catastrophic failure of drive components or unintended contact of rotating parts. Follow coupling manufacturer's coupling installation and operation procedures.</p>

<b>General Precautions</b>		
<b>WARNING</b>		Before beginning any alignment procedure, make sure driver power is locked out. Failure to lock out driver power will result in serious physical injury.
<b>CAUTION</b>		<b>Piping:</b> Never draw piping into place by forcing at the flanged connections of the pump. This may impose dangerous strains on the unit and cause misalignment between pump and driver. Pipe strain will adversely effect the operation of the pump resulting in physical injury and damage to the equipment.
<b>WARNING</b>		<b>Flanged Connections:</b> Use only fasteners of the proper size and material.
<b>WARNING</b>		Replace all corroded fasteners.
<b>WARNING</b>		Ensure all fasteners are properly tightened and there are no missing fasteners.
<b>WARNING</b>		<b>Startup and Operation:</b> When installing in a potentially explosive environment, please ensure that the motor is properly certified.
<b>WARNING</b>		Operating pump in reverse rotation may result in contact of metal parts, heat generation, and breach of containment.
<b>WARNING</b>		Lock out driver power to prevent accidental start-up and physical injury.
<b>WARNING</b>		The impeller clearance setting procedure must be followed. Improperly setting the clearance or not following any of the proper procedures can result in sparks, unexpected heat generation and equipment damage.
<b>WARNING</b>		If using a cartridge mechanical seal, the centering clips must be installed and set screws loosened prior to setting impeller clearance. Failure to do so could result in sparks, heat generation, and mechanical seal damage.
<b>WARNING</b>		The coupling used in an ATEX classified environment must be properly certified and must be constructed from a non-sparking material.
<b>WARNING</b>		Never operate a pump without coupling guard properly installed. Personal injury will occur if pump is run without coupling guard.
<b>WARNING</b>		Make sure to properly lubricate the bearings. Failure to do so may result in excess heat generation, sparks, and / or premature failure.
<b>CAUTION</b>		The mechanical seal used in an ATEX classified environment must be properly certified. Prior to start up, ensure all points of potential leakage of process fluid to the work environment are closed.
<b>CAUTION</b>		Never operate the pump without liquid supplied to mechanical seal. Running a mechanical seal dry, even for a few seconds, can cause seal damage and must be avoided. Physical injury can occur if mechanical seal fails.
<b>WARNING</b>		Never attempt to replace packing until the driver is properly locked out and the coupling spacer is removed.
<b>WARNING</b>		Dynamic seals are not allowed in an ATEX classified environment.
<b>WARNING</b>		DO NOT operate pump below minimum rated flows or with suction and/or discharge valve closed. These conditions may create an explosive hazard due to vaporization of pumpage and can quickly lead to pump failure and physical injury.



General Precautions		
WARNING		Ensure pump is isolated from system and pressure is relieved before disassembling pump, removing plugs, opening vent or drain valves, or disconnecting piping.
WARNING		<b>Shutdown, Disassembly, and Reassembly:</b> Pump components can be heavy. Proper methods of lifting must be employed to avoid physical injury and/or equipment damage. Steel toed shoes must be worn at all times.
WARNING		The pump may handle hazardous and/or toxic fluids. Observe proper decontamination procedures. Proper personal protective equipment should be worn. Precautions must be taken to prevent physical injury. Pumpage must be handled and disposed of in conformance with applicable environmental regulations.
WARNING		Operator must be aware of pumpage and safety precautions to prevent physical injury.
WARNING		Lock out driver power to prevent accidental startup and physical injury.
CAUTION		Allow all system and pump components to cool before handling them to prevent physical injury.
CAUTION		If pump is a Model NM3171, NM3196, 3198, 3298, V3298, SP3298, 4150, 4550, or 3107, there may be a risk of static electric discharge from plastic parts that are not properly grounded. If pumped fluid is non-conductive, pump should be drained and flushed with a conductive fluid under conditions that will not allow for a spark to be released to the atmosphere.
WARNING		Never apply heat to remove an impeller. The use of heat may cause an explosion due to trapped fluid, resulting in severe physical injury and property damage.
CAUTION		Wear heavy work gloves when handling impellers as sharp edges may cause physical injury.
CAUTION		Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

## ATEX CONSIDERATIONS and INTENDED USE

Special care must be taken in potentially explosive environments to ensure that the equipment is properly maintained. This includes but is not limited to:

1. Monitoring the pump frame and liquid end temperature.
2. Maintaining proper bearing lubrication.
3. Ensuring that the pump is operated in the intended hydraulic range.

The ATEX conformance is only applicable when the pump unit is operated within its intended use. Operating, installing or maintaining the pump unit in any way that is not covered in the Instruction, Operation, and Maintenance manual (IOM) can cause serious personal injury or damage to the equipment. This includes any modification to the equipment or use of parts not provided by ITT Goulds Pumps. If there is any question regarding the intended use of the equipment, please contact an ITT Goulds representative before proceeding. Current IOMs are available at [www.gouldspumps.com/literature\\_ioms.html](http://www.gouldspumps.com/literature_ioms.html) or from your local ITT Goulds Pumps Sales representative.

All pumping unit (pump, seal, coupling, motor and pump accessories) certified for use in an ATEX classified environment, are identified by an ATEX tag secured to the pump or the baseplate on which it is mounted. A typical tag would look like this:



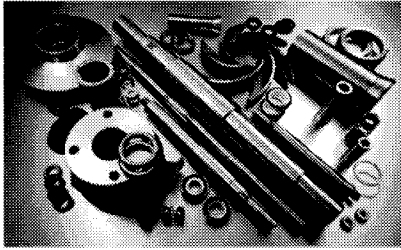
The CE and the Ex designate the ATEX compliance. The code directly below these symbols reads as follows:

- II = Group 2
- 2 = Category 2
- G/D = Gas and Dust present
- T4 = Temperature class, can be T1 to T6 (see Table 1)

<b>Code</b>	<b>Max permissible surface temperature °F (°C)</b>	<b>Max permissible liquid temperature °F (°C)</b>
T1	842 (450)	700 (372)
T2	572 (300)	530 (277)
T3	392 (200)	350 (177)
T4	275 (135)	235 (113)
T5	212 (100)	Option not available
T6	185 (85)	Option not available

The code classification marked on the equipment must be in accordance with the specified area where the equipment will be installed. If it is not, do not operate the equipment and contact your ITT Goulds Pumps sales representative before proceeding.

## PARTS



The use of genuine Goulds parts will provide the safest and most reliable operation of your pump. ITT Goulds Pumps ISO certification and quality control procedures ensure the parts are manufactured to the highest quality and safety levels.

Please contact your local Goulds representative for details on genuine Goulds parts.

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# OPERATING INSTRUCTIONS

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## HORIZONTAL WHIRL-FLO MOTOR OR BELT DRIVEN

### GENERAL

Our shipping container has been specifically designed to prevent transit damage. However, any indications of damage should be carefully noted on the delivery ticket and a claim filed promptly with the carrier.

### PROPER LOCATION IMPORTANT

By placing your ITT pump on a firm, level foundation, you reduce harmful vibrations and unnecessary noise. Best pump operation is obtained by locating the pump as close as possible to the liquid being handled, keeping in mind a pump can push liquid more effectively than it can pull or draw liquid. Provide the necessary space around the pump for future inspection and servicing of the unit. Manual priming devices must be used when the pump is located above the source of liquid supply.

### CONNECTIONS

All suction & discharge piping should be independently supported to eliminate excessive strain on the pump. Joint compound used on pipes should not be soluble in the liquid being pumped. Pumps fitted with clean-out covers should be given special consideration when installing. They should have a check valve installed correctly on the discharge side of the pump and a gate valve on the suction side to prevent unwanted flow when cleaning.

### PIPING

The design of the pump suction piping is critical to satisfactory pump operation. The designer of the piping system must be sure that the available NPSH of the system exceeds the required NPSH of the pump (as shown on the appropriate ITT Pump Performance curve).

All piping, especially the suction line, should be as short as possible with the fewest elbows to reduce friction loss. The suction line should rise continuously to the pump.

Installations requiring long pipe lines, or handling hot liquids, require provisions for relieving expansion and contraction of the pipe to eliminate severe pipe strains on the pump. The length of the line, the number of elbows, the fittings and the quantity of liquid to be pumped should be considered before selecting the size of pipe to be used. Piping one or more sizes larger than the pump connections will reduce the friction loss. Use a friction loss table to convert elbows and fittings to straight pipe losses when determining the exact friction loss and the pipe size required.

Desirable, but not necessary, are the use of eccentric reducers, taper reducers, and long-sweep elbows.

### PRIMING

Turn on the gland seal liquid supply or turn the grease cup down to lubricate the packing and shaft before attempting to prime. Auxiliary primers are used when the pump is above the liquid supply. These primers should be connected to the uppermost vent on the pump. Keep all lines air tight. Install and operate the primer according to the manufacturer's instructions.

Horizontal units operating with flooded or positive suctions do not require the filling of the pump by external means.

### WARNING!

When handling toxic, flammable, or aggressive liquids, make certain that the liquid is not inadvertently discharged to the atmosphere when venting or priming pump. Provide valves and piping systems to direct the vapors and liquid to a safe location.

### START UP

Read all instructions and start up procedures for drivers, speed reducers and couplings before operating the pump.

### ROTATION

Your pump is specifically designed to rotate in a clockwise direction when viewed from the coupling end of the pump shaft. A rotation arrow is cast on the Bearing Housing End Cap. Always check and compare the shaft rotation with this arrow when starting up for the first time. Interchanging any two leads of a three phase motor will reverse its direction of rotation.

### COUPLING ALIGNMENT

#### FLEXIBLE COUPLINGS

A flexible coupling should not be used to compensate for misalignment of the pump and driver shafts. The purpose of the flexible coupling is to compensate for temperature changes and to permit end movement of the shafts without interference with each other while transmitting power from the driver to the pump.

# OPERATING INSTRUCTIONS

## TYPES OF MISALIGNMENT

There are two forms of misalignment between the pump shaft and the driver shaft, as follows:

Angular misalignment—shafts with axes concentric but not parallel.

Parallel misalignment—shafts with axes parallel but not concentric.

## COUPLING ALIGNMENT

The faces of the coupling halves should be spaced far enough apart so that they cannot strike each other when the driver rotor is moved hard over toward the pump. A minimum dimension for the separation of the coupling halves is usually specified by the manufacturer (usually 1/8"). The necessary tools for approximately checking the alignment of a flexible coupling are a straight edge and a taper gauge or a set of feeler gauges.

A check for angular alignment is made by inserting the taper gauge or feelers at four points between the coupling faces and comparing the distance between the faces at four points spaced at 90-degree intervals around the coupling. The unit will be in angular alignment when the measurements show that the coupling faces are the same distance apart at all points. (Figs. 1 and 2).

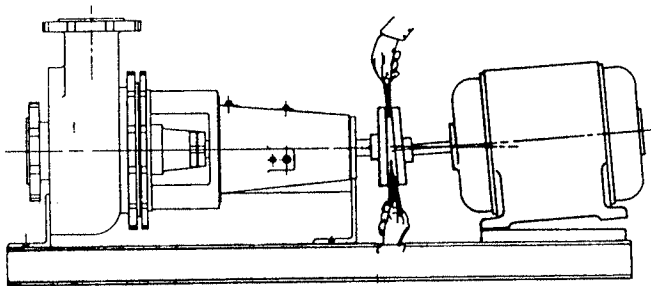


Fig. 1

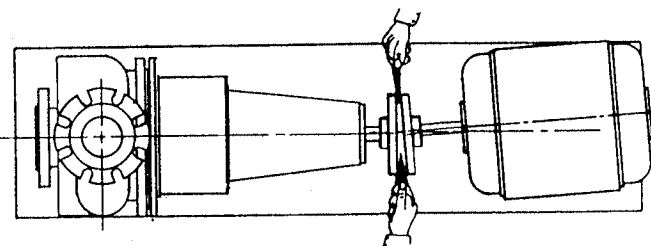


Fig. 2

A check for parallel alignment is made by placing a straight edge across both coupling rims at the top, bottom and at both sides. The unit will be in parallel alignment when the straight edge rests evenly on the coupling rim at all positions.

Allowance may be necessary for temperature changes and for coupling halves that are not of the same outside diameter. Care must be taken to have the straight edge parallel to the axis of the shafts. (Figs. 2 and 3.)

Angular and parallel misalignment are corrected by means of shims under the motor mounting feet. After each change, it is necessary to recheck the alignment of the coupling halves. Adjustment in one direction may disturb adjustments already made in another direction. It should not be necessary to adjust the shims under the pump.

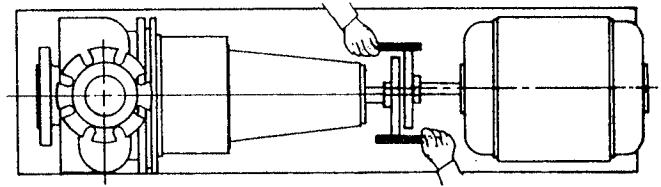


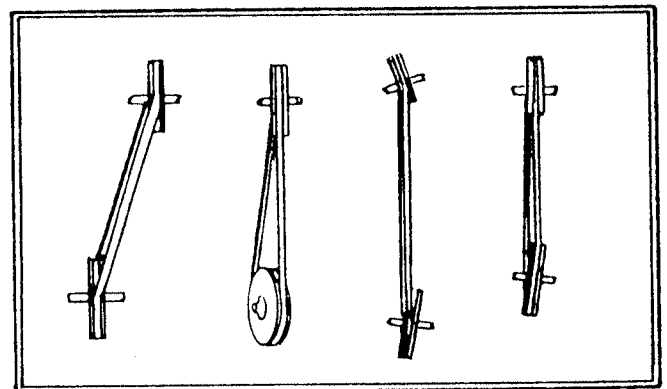
Fig. 3

In general parallel misalignment should not exceed .015" and angular misalignment 1/2°.

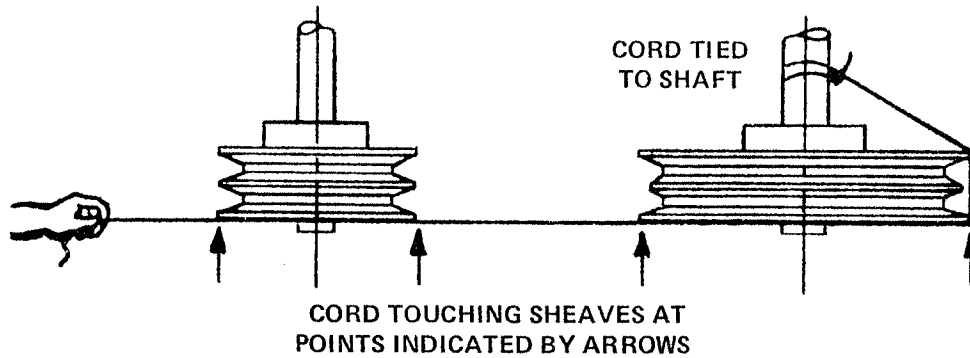
## BELT AND SHEAVE ALIGNMENT

Although alignment is not as critical in V-belt drives as in others, proper alignment is essential to long belt and sheave life.

First, make sure that drive shafts are parallel. The most common causes of misalignment are nonparallel shafts and improperly located sheaves. Where shafts are not parallel, belts on one side are drawn tighter and pull more than their share of the load. As a result, these belts wear out faster, requiring the entire set to be replaced before it has given maximum service. If misalignment is in the sheave, belts will enter and leave the grooves at an angle, causing excessive belt cover and sheave wear.



# OPERATING INSTRUCTIONS



Shaft alignment can be checked by measuring the distance between the shafts at three or more locations. If the distances are equal, then the shafts will be parallel.

To check the location of the sheaves on the shafts, a straightedge or a piece of string can be used. If the sheaves are properly lined up, the string will touch them at the points indicated by the arrows in the accompanying sketch. Rotating each sheave a half revolution will determine whether the sheave is wobbly or the drive shaft is bent. Correct any misalignment.

The best tension for a V-belt drive is the lowest tension at which the belts will not slip under the highest load condition.

Too much tension shortens belt and bearing life. Check the tension on a new drive frequently during the first day of operation and periodically thereafter.

## GROUTING

When the alignment is correct, the foundation bolts should be tightened evenly but not too firmly. The unit can then be grouted to the foundation. The base plate should be completely filled with grout, and it is desirable to grout the leveling pieces, shims or wedges in place. Foundation bolts should not be fully tightened until the grout is hardened, usually about 48 hours after pouring.

## PACKING PLATE WITH PACKING RINGS

If your pump is supplied with packing, follow these instructions:

- a) When installing the Packing Rings (29) and Lantern Rings (30), twist the rings slightly to get them around the shaft.
- b) Insert one ring of packing in the stuffing box.

- c) A lantern ring (30) is then inserted in the stuffing box. When this ring is in the proper position, it will be directly opposite the tapped inlet hole on the packing plate.
- d) After the lantern ring is in place, insert four more packing rings, staggering the joints.
- e) Place the split gland (32) on the shaft (51). Line up with the gland bolts, and bolt the gland halves together. Finger tighten the gland bolts in the beginning. Retighten again if leakage is too much. Do not over tighten, as this will damage packing rings as well as the shaft sleeve.

The packing plate supplied with your pump is equipped with two "in" and "out" tapped holes to flush and/or cool the packing rings.

If the packing plate is above atmospheric pressure and the fluid being pumped is clean, a normal leakage of several drops per minute is necessary to lubricate and/or to cool the packing rings. If the leakage is excessive, tighten the gland bolts to reduce the leakage to an acceptable limit.

Flushing or a grease lubricator for packing rings is required if:

Pump is operating with suction lift (packing plate below atmospheric pressure). Under this condition, the packing will not be cooled or lubricated.

If the liquid contains abrasives an outside source of clean, compatible liquid must be used at pressure equal to or slightly greater than the pump discharge pressure.

A grease lubricator may be used if clear recirculating fluid or an outside fluid source is not available. The grease should be compatible with, and insoluble in the fluid being pumped. Before starting and every four or five hours of operation, turn the grease cup 1/4 turn down to grease the packing.

# OPERATING INSTRUCTIONS

## DOUBLE INTERNAL MECHANICAL SEALS

If your pump is supplied with a double mechanical seal, this type of seal requires constant flushing for cooling and lubrication. Use the "in" and "out" flush connections provided in the seal plate and use flushing liquid at a pressure equal to or slightly greater than the pump discharge pressure. A flow of 1/4 to 1/2 GPM will normally be required. This flow can be controlled by providing a control valve in the inlet pipe line.

## OIL LUBRICATED BEARINGS

Before operating the pump check the oil level in the bearing housing. Proper level is at the bottom of the tapped hole marked "OIL LEVEL" on either side of the housing. It is important that the pump be set down on its foundation with its base as level as possible so that the oil level at the tapped holes will be a true indicator and bearings will not be over-lubricated or starved.

## RECOMMENDED OIL

A high quality mineral base lube oil with rust and oxidation inhibitors should be used. *Do not use automotive engine oils.* For pump speeds of 1750 RPM and below a viscosity of *SAE 30 or equivalent lubricating oil* is recommended.

## GREASE LUBRICATED BEARINGS

Grease lubricated bearings are prelubricated at the factory. Bearing housings are provided with grease fittings and require small amounts of Lithium base general purpose grease every four to six months depending upon usage.

## BEARING REPLACEMENT

Bearings should be pressed on the shaft, using an arbor press, with the force applied to the inner ring of the bearing. Normal shaft axial movement should be no less than 0.005 inch or more than 0.010 inch. If shimming is required, to limit movement, these should be placed between the outboard bearing and bearing end cap.

## MOTORS

Most electric motors use sealed ball bearings. Check your motor nameplates for detailed lubrication information.

## MAINTENANCE

Always disconnect the power at its source before attempting any repairs.

Periodically check the pump for excessive vibrations. These may indicate a broken impeller vane which, if not replaced, could ruin the motor.

It is good practice to occasionally flush out the entire system with clean water. This will prevent accumulations of silt from clogging the lines.

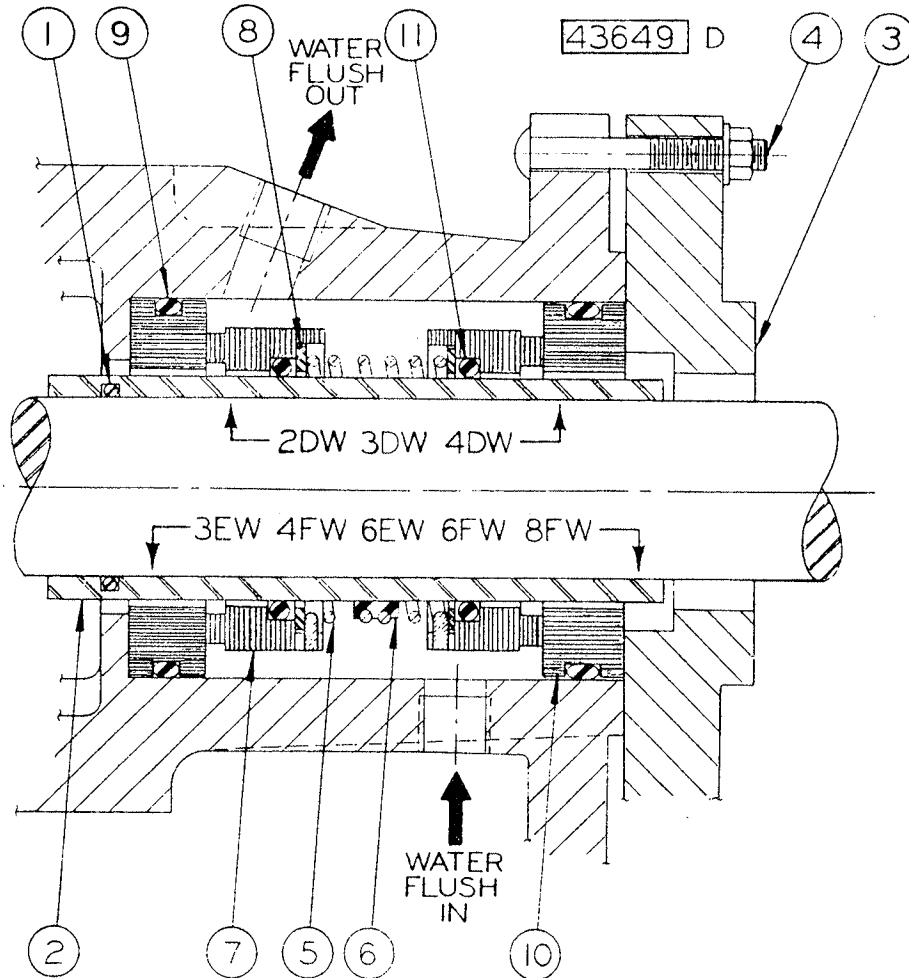
## TROUBLE GUIDE

The following are some common causes of problems that may arise:

SYMPTOMS	PROBABLE CAUSE	RECOMMENDED ACTION
Will not pump.	<ol style="list-style-type: none"> <li>1. Low motor speed.</li> <li>2. Air leaks.</li>   <li>3. Worn packing.</li> <li>4. Clogged lines or pump.</li> <li>5. Incorrect rotation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltage at pump. Rewire.</li> <li>2. Tighten all suction line joints, connection, couplings, and plugs. Use new washers or gaskets.</li> <li>3. Adjust packing gland or install new packing.</li> <li>4. Clean lines and volute.</li> <li>5. Change two leads of 3 phase motor.</li> </ol>
Stops pumping.	Clogged lines or pump.	Clean out debris.
Excessive leakage around pump shaft while operating.	Worn packing.	Adjust gland or replace with new packing.
Will not hold prime.	<ol style="list-style-type: none"> <li>1. Leaks in packing.</li> <li>2. Leaks in piping.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten or replace.</li> <li>2. Tighten or replace.</li> </ol>
Performance poor.	<ol style="list-style-type: none"> <li>1. Worn impeller or packing.</li> <li>2. Motor not up to speed. Low voltage.</li> <li>3. Suction lift too high.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace with new parts.</li> <li>2. Check voltage at pump. Rewire.</li> <li>3. Relocate pump closer to supply.</li> </ol>

# OPERATING INSTRUCTIONS

## WHIRL-FLO DOUBLE MECHANICAL SEAL



ITEM	DESCRIPTION	MATERIAL
1	Sleeve "O" Ring	Buna-N
2	Shaft Sleeve	416 S/STL*
3	Gland	Cast Iron*
4	Gland Bolts	Carbon Steel*
5	Spring	316 S/STL
6	Drive Ring	Buna-N
7	Primary Ring	Carbon
8	Disc	316 S/STL
9	"O" Ring	Buna-N**
10	Mating Ring	Ceramic
11	"O" Ring	Buna-N**

\*316 S/STL in CF8M Pump Construction

\*\*Viton in CF8M Pump Construction

### SEAL FLUSH CONNECTIONS

Liquid used to flush seal should be clean and debris free, and should be compatible with liquid being pumped. Connect inlet hose of water supply to bottom tapped hole, and outlet or drain to upper hole in stuffing box. Flow rate should be approximately  $\frac{1}{4}$ – $\frac{1}{2}$  GPM at a pressure slightly above discharge pressure.



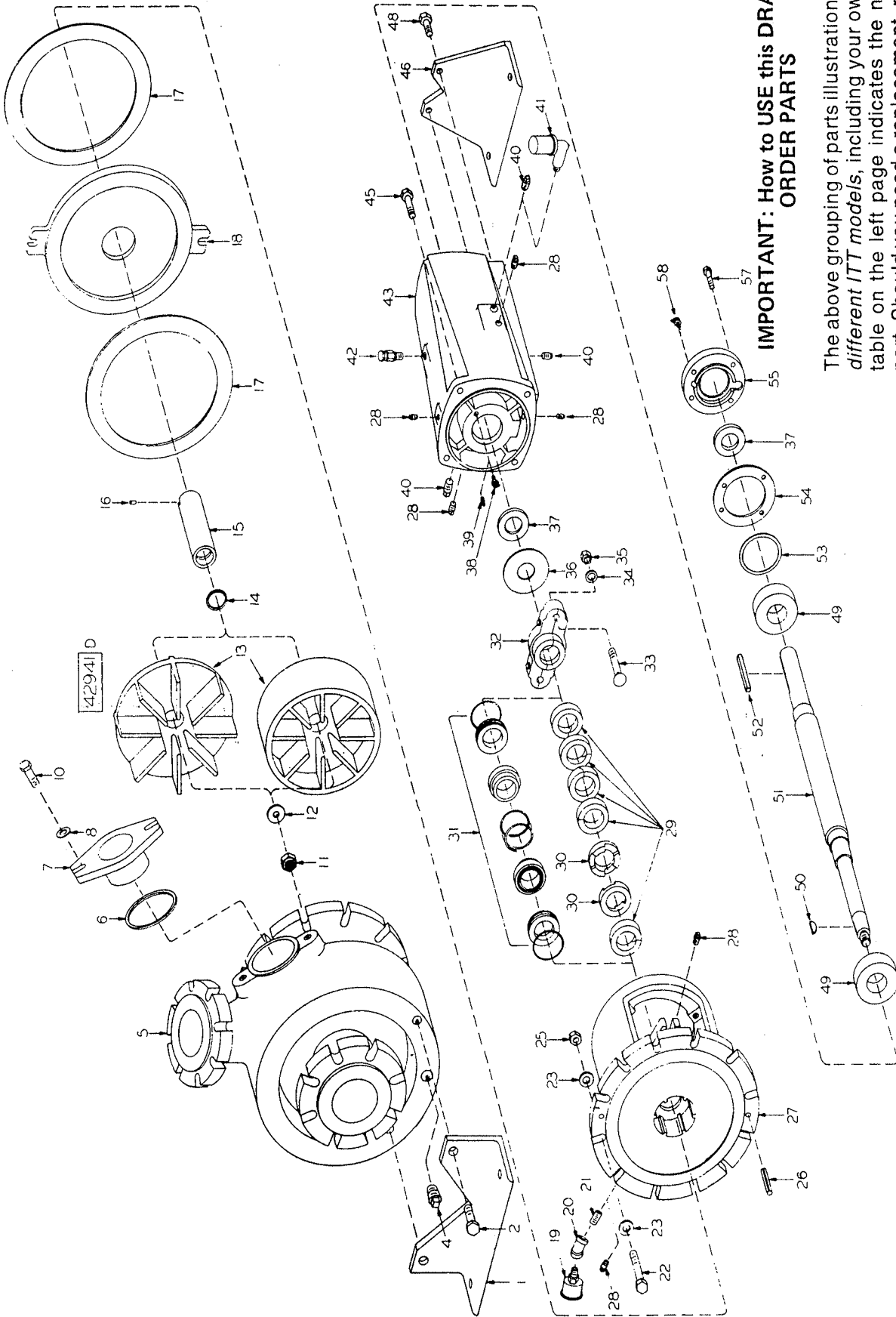
# OPERATING INSTRUCTIONS

## PUMP PARTS LIST

KEY	DESCRIPTION	KEY	DESCRIPTION
1	Mounting Foot	* 30	Lantern Ring (Split Vertically or Horizontally)
2	Cap Screw	* 31	Seal Assembly – (Opt.)
4	Pipe Plug	32	Gland Assembly
5	Volute	33	Carriage Bolt
6	Gasket, Clean Out – (Opt.)	34	Washer, Flat
7	Cover, Clean Out – (Opt.)	35	Hex Nut
8	Washer, Flat – (Opt.)	36	Slinger
10	Cap Screw – (Opt.)	* 37	Oil Seal
* 11	Nut, Lock	38	Grease Fitting (45°)
* 12	Washer, Impeller	39	Pipe Plug (Oil Lube)
■ 13	Impeller	40	Pipe Plug
* 14	Gasket, "O" Ring	41	Oiler – (Opt.)
* 15	Shaft Sleeve	42	Filler/Vent
* 16	Sleeve, Lock Pin	43	Bearing Housing
* 17	Gasket	45	Cap Screw
■ 18	Wear Plate (Hi-Chrome Construction)	46	Mounting Foot
19	Grease Cup – (Opt.)	* 48	Cap Screw
20	Elbow – (Opt.)	* 49	Bearing
21	Pipe Nipple – (Opt.)	■ 50	Key, Impeller
22	Cap Screw	51	Shaft
23	Washer, Flat	* 52	Key, Input
25	Hex Nut	* 53	Shim, Bearing
26	Roll Pin	54	Gasket, End Cap
27	Bracket, Seal Plate	55	Bearing End Cap
28	Pipe Plug	57	Cap Screw
* 29	Packing Set	58	Grease Fitting (90°)

\* Recommended Spare Parts.

■ Recommended Distributor Stock, Export Spares, and Critical Service.



**IMPORTANT: How to USE this DRAWING to ORDER PARTS**

The above grouping of parts illustrations cover many different ITT models, including your own pump. The table on the left page indicates the name of each part. Should you need a replacement, refer to above drawings - locate the part that matches your pump part. Contact your local ITT dealer and supply him with the Key Number and Description of the parts required, along with your pump Model number, Spec number and Serial number, which are located on the pump nameplate.





Form IWHIRL-FLO

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