

INSTALLATION, OPERATION
AND
MAINTENANCE MANUAL
FOR THE

Acculobe

OBSOLETE PRODUCT
2007





JOHNSON PUMP (UK)

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FOR THE ACCULOBE PUMP

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1.0 Safety Information

INCORRECT INSTALLATION, OPERATION OR MAINTENANCE OF EQUIPMENT MAY CAUSE SEVERE PERSONAL INJURY AND/OR EQUIPMENT DAMAGE AND MAY INVALIDATE THE WARRANTY.

THIS INFORMATION MUST BE READ FULLY BEFORE COMMENCING INSTALLATION, OPERATION OR MAINTENANCE AND MUST BE KEPT WITH THE PUMP. SUITABLY TRAINED OR QUALIFIED PERSONS MUST UNDERTAKE ALL INSTALLATION AND MAINTENANCE ONLY.

Safety instructions given in this manual non-compliance with which would affect safety are identified by the symbol

Safety instructions, which shall be considered for reasons of safe operation of the pump or pump unit and/or protection of the pump or pump unit itself, are marked:



DANGER

WARNING



DO NOT OPERATE PUMP IF:

- THE FRONT COVER IS NOT INSTALLED CORRECTLY.
- ANY GUARDS ARE MISSING OR INCORRECTLY INSTALLED.
- THE SUCTION OR DISCHARGE PIPE WORK IS NOT CONNECTED.



DO NOT PLACE FINGERS ETC INTO THE PUMPING CHAMBER OR ITS CONNECTION PORTS OR INTO ANY PART OF THE GEARBOX IF THERE IS ANY POSSIBILITY OF THE PUMP SHAFTS BEING ROTATED. SEVERE INJURY WILL OCCUR.



DO NOT exceed the rated pressure, speed, and temperature, or change the system/duty parameters from those for which the pump was originally supplied, without confirming its suitability for the new duty. Running of the pump outside of its operation envelope can cause mechanical contact, excessive heat and can represent a serious risk to health and safety.



Installation and operation of the pump must always comply with health and safety regulations.

WARNING

A device must be incorporated into the system or drive to prevent the pump exceeding its stated duty pressure. It must be suitable for both directions of pump rotation where applicable. Do not allow pump to operate with a closed/blocked discharge unless a pressure relief device is incorporated.



The mounting of the pump or pump unit should be solid and stable. Pump orientation must be considered in relation to drainage requirements. Once mounted, shaft drive elements must be checked for correct alignment. Rotate pump shaft by at least one full revolution to ensure smoothness of operation. Incorrect alignment will produce excessive loading and will create high temperatures and increased noise emissions. The installation must allow safe routine maintenance and inspection (check for leakage, monitor pressures, etc) and provide adequate ventilation necessary to prevent overheating. It may also be necessary to earth the pump head to avoid the build up of a potential charge difference that could cause a spark.



WARNING

Before operating the pump, ensure that it and all parts of the system to which it is connected are clean and free from debris and that all valves in the suction and discharge pipelines are fully opened. Ensure that all pipe work connecting to the pump is fully supported and aligned with its relevant connections. Misalignment and/or excess loads will cause severe pump damage. This could result in unexpected mechanical contact in the pump head and has the potential to be a source of ignition.

WARNING

Ensure that pump rotation is correct for the desired direction of flow.

WARNING

Do not install the pump into a system where it will run dry (i.e. without a supply of pumped media) unless it is equipped with a flushed shaft seal arrangement complete with a fully operational flushing system. Mechanical seals require a thin fluid film to lubricate the seal faces. Dry running can cause excessive heat and seal failure.

WARNING

Install pressure gauges/sensors next to the pump suction and discharge connections to monitor pressures.



Caution must be taken when lifting the pump. Suitable lifting devices should be used as appropriate. If pump is base plate mounted, the base plate must be used for all lifting purposes, not any part of the pump. If slings are used for lifting, they must be safely and securely attached. For weights of bare shaft pumps refer to pump installation dimensions section.



DO NOT attempt any maintenance or disassembly of the pump or pump unit without first ensuring that:

- The pump is fully isolated from the power source (electric, hydraulic, pneumatic).
- The pumping chamber and any shaft seal support system, front cover barrier support system, and rotorcase port barrier support system are de-pressurised and purged.
- Any temperature control devices (jackets, heat-tracing, etc) are fully isolated, that they are de-pressurised and purged, and components allowed to reach a safe handling temperature.



DO NOT loosen or undo the front cover, any connections to the pump, shaft seal housings, barrier support systems, temperature control devices, or other components, until sure that such action will not allow the unsafe escape of any pressurised media.



Avoid any contact with hot parts of pumps and/or drives, which may cause injury. Certain operating conditions, temperature control devices (jackets, heat-tracing, etc), bad installation, or poor maintenance can all promote high temperatures on pumps and/or drives.

WARNING

When cleaning, either manually or by CIP method, the operator must ensure that a suitable procedure is used in accordance with the system requirements. For CIP cleaning requirements, refer to section 3.3.2. The exterior of the pump should be cleaned periodically.



Surface temperature of pump is also dependent on the temperature of pumped medium.

**1.1 Risk assessment relating to the use of Johnson Pump (UK) Ltd.
Acculobe rotary lobe pumps and pump units in potentially explosive
atmospheres.**

Note:- For a feature to be suitable for an application, The feature must be fit for its designated purpose and also suitable for the environment where it is to be installed.

Source Of Hazards	Potential Hazards	Frequency Of Hazards	Recommended Measures
Unvented cavities	Build up of explosive gas	Very Rare	Ensure that pump is totally filled. Consider mounting ports vertically. See Chapter 1.0
Rotorcase / Rotors / Front Cover	Unintended mechanical contact	Rare	Ensure that operating pressures are not exceeded. Ensure that sufficient NPSH to prevent cavitation. See Chapter 1.0/3.1 Service plan.
Pump external surfaces	excess temperature. Electrostatic charging	Rare	User must ensure temperature limits. Do not overfill gearboxes with lubricant. Provide a ground contact for pump. See Chapter 1.0 / Service plan.
Cover 'O' ring	Pump liquid leakage. Build up of explosive gas.	Very Rare	Check selection of elastomers are suitable for application. Ensure cover retaining nuts are tight. Service plan.
Pump casing / cover	Pump liquid leakage. Build up of explosive gas.	Very Rare	Stainless steel, Corrosion resistant.
Shaft seals	excess temperature. Unintended mechanical contact. Leakage. Build up of explosive gas.	Rare	Selection of seal system must be suitable for application. See Chapter1.0 / 4.0. Service plan.
Auxiliary system for shaft sealing	Pump liquid leakage. Build up of explosive gas.	Rare	Selection of auxiliary seal system must be suitable for application.
Rotation direction test	Excess temperature	Very Rare	If flushed seals are installed ensure that flush is applied to seal assemblies. Only allow pump to run for minimum period - just a few seconds.
Closed valve condition	Excess Temperature. Excess Pressure. Mechanical contact.	Rare	Can cause excessive pressure, heat and mechanical contact. See Chapter 1.0
Shaft	Random induced current	Very Rare	Provide a ground contact for pump. See Chapter 1.0.
Mechanical shaft coupling (Torque Protection)	Temperature from friction Sparks from break up of shear pins. Electrostatic charging	Rare	Coupling selection must suit application. See Chapter 1.0.
Mechanical shaft coupling (standard)	Break up of spider. Unintended mechanical contact. Electrostatic charging	Rare	Coupling selection must suit application. Service plan. See Chapter 1.0.

2.0 Introduction

2.1 General

Acculobe rotary lobe pump is manufactured by Johnson Pump (UK) Ltd. a subsidiary of Viking Pump Inc., Cedar Falls, USA, (a unit of the IDEX Corporation) herein after referred to as 'JPUK'.

This manual includes all the necessary information for the Acculobe pump and should be read prior to commencing installation, operation or maintenance.

When asking for assistance please quote the pump model and serial number. This information can be obtained from the pump nameplate, which is located on the top of the pump gearbox body.

If it is proposed to modify the system or change the characteristics of the product to be pumped from that for which the pump was originally selected, Johnson Pump (UK) or their authorised distributor should be consulted.

2.2 Johnson Pump (UK) Ltd Distributors

Johnson Pump (UK) distributes their products internationally via a network of authorised distributors. Throughout this manual where reference is made to Johnson Pump (UK), any authorised distributor will also provide service and assistance. Should you require any additional information regarding the Acculobe pump contact Johnson Pump (UK) or their local authorised distributor.

2.3 Receipt and Storage

On receipt of the pump, immediately examine for any signs of visible damage. If any damage is noted, contact Johnson Pump (UK) and clearly mark upon the carriers' paperwork that the goods have been received in a damaged condition, with brief description of damage.

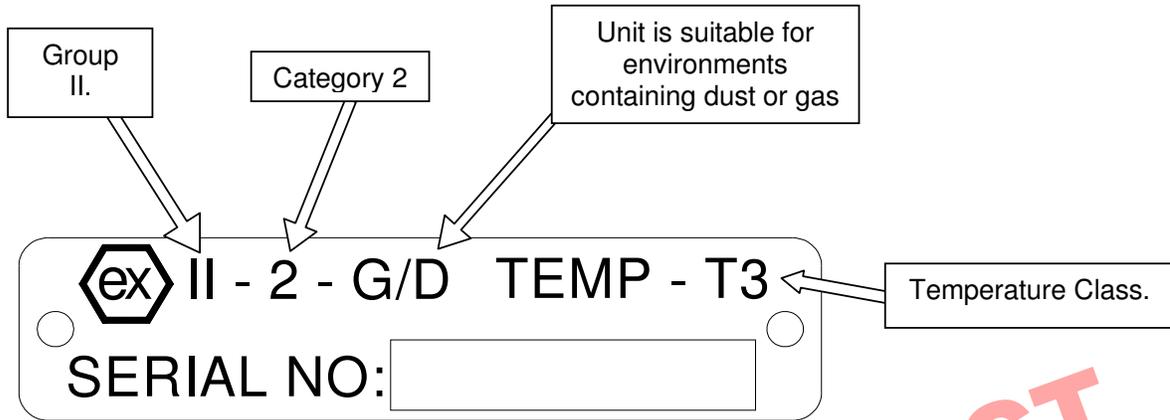
If the pump is not required for immediate installation then it should be stored within a suitable environment.

2.4 Cleaning.

The product seals are mounted directly behind the rotors and are designed and positioned to minimize product entrapment and maximize the effects of cleaning.

It is recommended that the exterior of the pump is cleaned periodically.

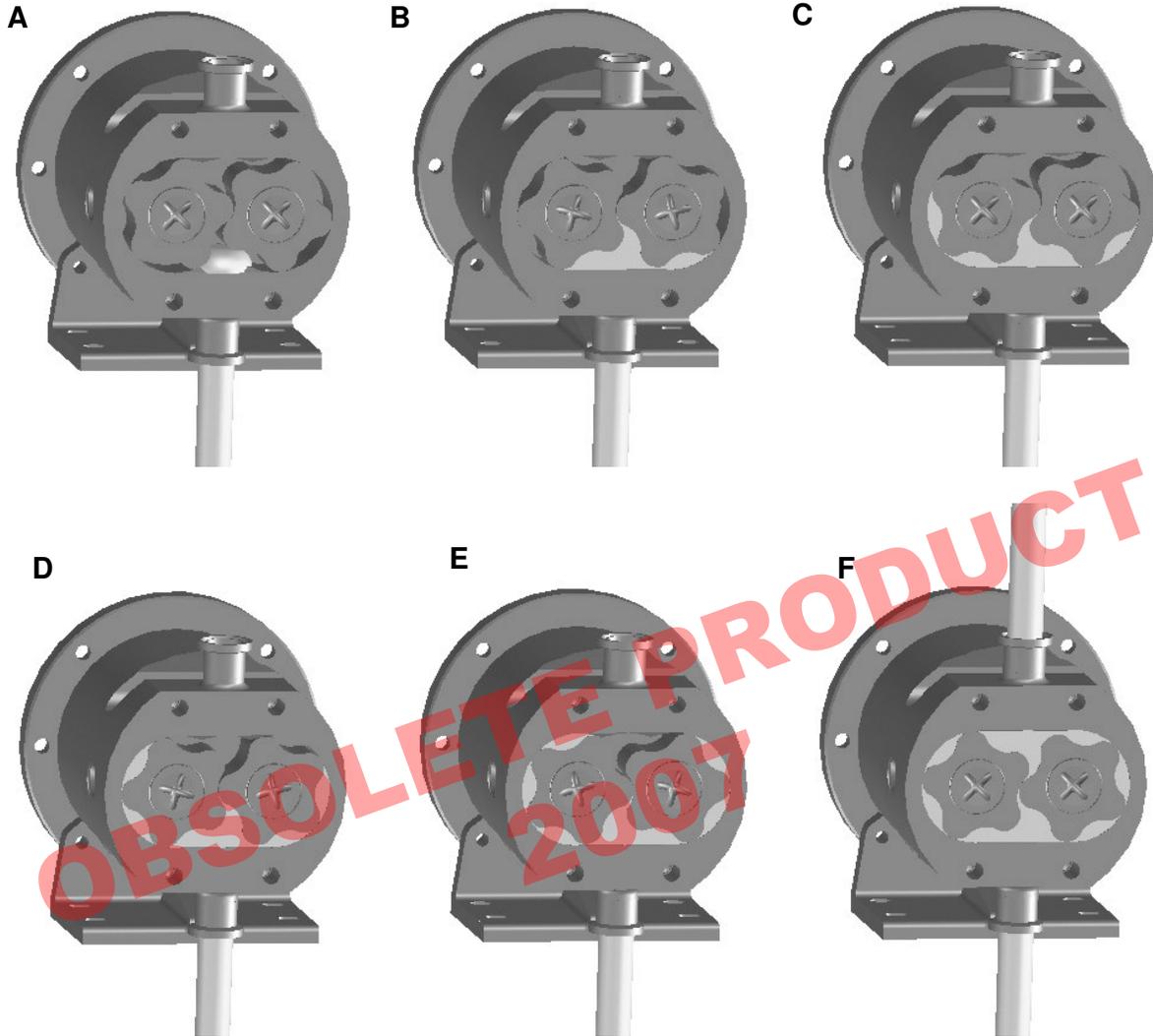
2.5 Atex Information Plate



2.5.1 Equipment Groups & Categories

Equipment-groups (Annex I of the EC-Directive 94/9/EC)							
Group I (mines, mine gas and dust)		Group II (other explosive atmospheres gas/dust)					
Category M		Category 1		Category 2		Category 3	
1	2	G (gas) (Zone 0)	D (dust) (Zone 20)	G (gas) (Zone 1)	D (dust) (Zone 21)	G (gas) (Zone 2)	D (dust) (Zone 22)
for equipment providing a very high level of protection when endangered by an explosive atmosphere	for equipment providing a high level of protection when likely to be endangered by an explosive atmosphere	for equipment providing a very high level of protection when used in areas where an explosive atmosphere is very likely to occur		for equipment providing a high level of protection when used in areas where an explosive atmosphere is likely to occur		for equipment providing a normal level of protection when used in areas where an explosive atmosphere is less likely to occur	

3.0 General



The pumping action of the rotary lobe pump principle is generated by the contra-rotation of two pumping elements (rotors) within a chamber (rotorcase). The rotors are located on shafts, which in turn are held within the pump body. The shaft assemblies comprise of the support bearings and the timing gears. The timing gears transfer the drive from the driven shaft to the lay shaft, synchronising the rotors such that they rotate without contact with each other.

As the rotors pass the suction port, (see 'A'), the cavity generated increases creating a pressure decrease, which induces the media to be pumped to flow into the rotorcase ('B').

The pumped media is carried around the rotorcase by the rotors; ('C' and 'D') to the discharge side of the pump ('E'). Here the cavity decreases and the pumped medium is discharged from the rotorcase ('F').

The maximum pressure and speed operating parameters are shown below. In practice these may be limited due to the nature of the product to be pumped and/or

design of the system in which the pump is to be installed. Consult Johnson Pump (UK) Ltd or your local distributor for assistance.

Pressure Rating		Displacement		Maximum Speed	Port Size		Maximum Temperature		Maximum Viscosity	
bar	psi	L/rev	US gal / rev	Rotor rpm	mm	inches	°C	°F	cPs	ssu
12	174	0.02	0.00528	1750	12 & 19	1/2" & 3/4"	150	300	150,000	682,500

WARNING

If the system or product characteristics are to be changed from the original application for which the pump was selected, the factory or their authorized distributor should be consulted to ensure the pump is suitable for the new application.

The pump should not be subjected to sudden temperature changes to avoid the risk of damage from sudden expansion/contraction of components. Care should be taken when selecting pumps for handling liquids containing abrasive particles as these may cause wear of pump head components. Contact the factory or their authorized distributor for advice or assistance.

Model Designation: AL05

Standard Construction:

- 316L St. Steel Wetted Parts (0.6 µM Surface Finish).
- Multi-Lobe (5 Lobe) Rotors
- 1/8" Male BSP Flush Connections
- 3/4" Tri-Clamp Connections
- Foot Mounted
- FDA EPDM Elastomers
- Silicon Carbide Seal Faces
- Sealed For Life Grease Lubrication

Should any additional information be required, contact the factory or their authorized distributor quoting the pump model and serial number as stated on the nameplate fastened to the exterior of the pump.

Should this be damaged or missing, the serial number is also stamped on the gearbox endplate.

3.1 System Design and Installation.

When incorporating any pump into a system it is considered good practice to minimize piping runs and the number of pipe fittings (tees, unions, bends etc.) and restrictions. Particular care should be taken in designing the suction line, which should be as short and straight as possible with a minimum of pipe fittings to minimize restricting product flow to the pump. The following should be considered at the design stage of any system:



- Be sure ample room is provided around the pump to allow for:
 - Access to the pump and drive for routine inspection and maintenance, i.e. to remove pump front cover and rotors.
 - Ventilation of the drive to prevent over heating.



- The exterior of the pump unit may exceed 68°C (154°F), appropriate measures must be taken to warn or protect operators.
- The pump must not be used to support piping. All piping to and from the pump unit must be independently supported. Failure to observe this may distort the pump head components or assembly and cause serious consequential damage to the pump.

WARNING

- Valves should be provided adjacent to the pump suction and discharge connections to allow the pump to be isolated from the system for routine inspection and maintenance.



Rotary lobe pumps are of the positive displacement type and therefore an overload protection device must be provided. This can take the form of:

- An in-line pressure relief system, i.e. external to the pump.
- Incorporation of a torque-limiting device in the drive system.

WARNING

It is recommended that all piping and associated equipment from the tank to the discharge point is thoroughly cleaned before installation of the pump to avoid the possibility of debris entering the pump and causing damage.

WARNING

Pressure gauges should be installed adjacent to the pump suction and discharge connections such that system pressures can be monitored. These gauges will provide a clear indication of changes in operating conditions and where a relief valve is incorporated in the system, will be necessary for setting and checking the functioning of the valve.

WARNING

It is imperative that the suction condition at the pump inlet meets the Net Positive Suction Head Required (NPSHr) by the pump. Failure to observe this could cause cavitation, resulting in noisy operation, reduction in flow rate and mechanical damage to the pump and associated equipment.

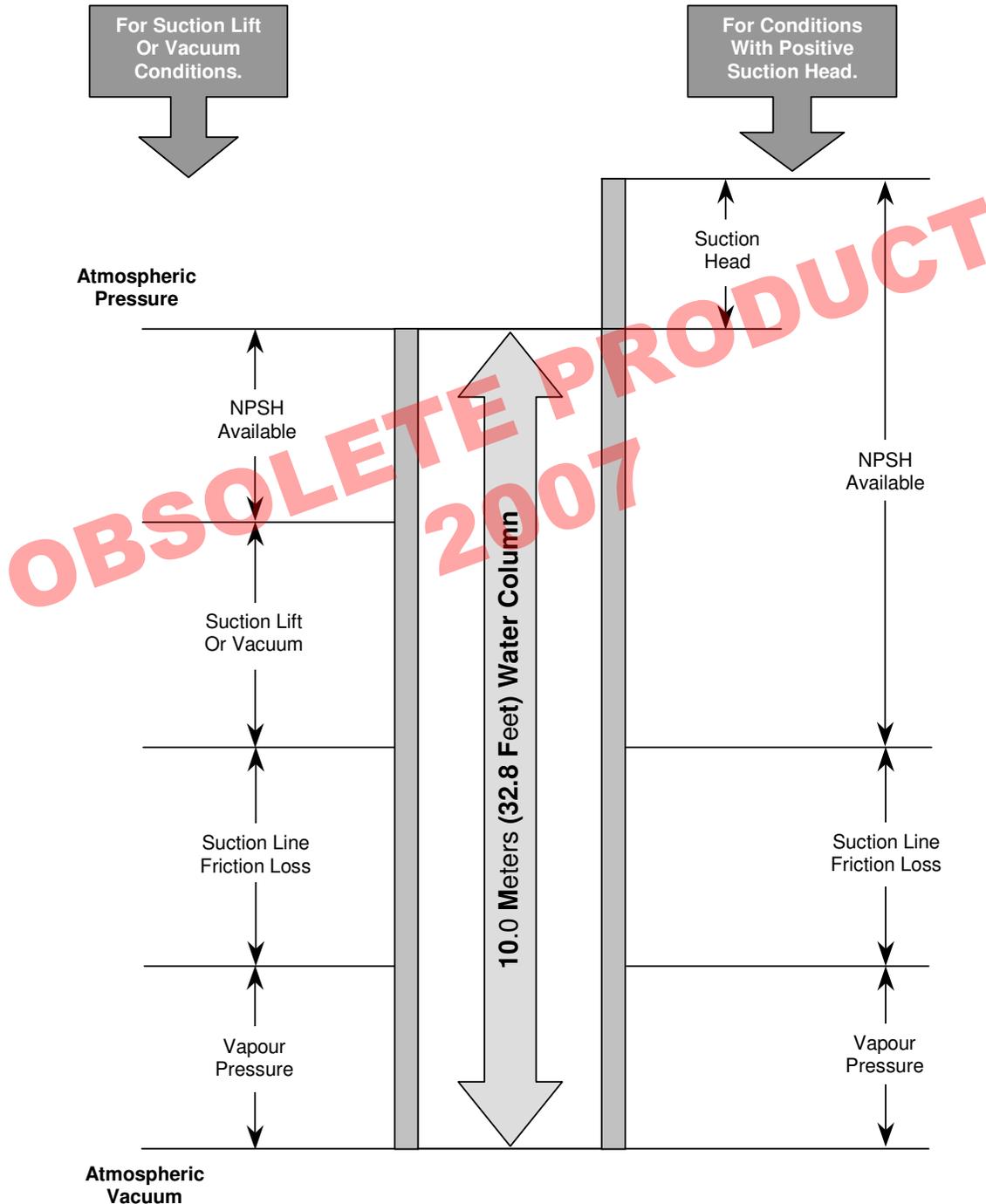
WARNING

The Net Positive Suction Head Available (NPSHa) from the system must always exceed the Net Positive Suction Head Required (NPSHr) by the pump. Observing the following general guidelines should ensure the best possible suction condition is created.

- Suction piping is at least the same diameter as the pump connections.

- The length of suction piping is kept to the absolute minimum.
- The minimum number of bends, tees and pipework restrictions are used.
- Calculations to determine system NPSHa are carried out for the worst condition see below.

Should advice on pump or system NPSH characteristics be required contact the factory or their authorized distributor.



Where motor mounted options are to be installed follow manufactures recommended guidelines. However, when installing a pump complete with base and drive the following guidelines must be observed:



- The preferred drive arrangement for any rotary lobe pump is in-line direct coupled.
- Flexible couplings must always be incorporated and correctly aligned within the limits recommended by the coupling manufacturer. To check coupling alignment rotate the shaft by at least one full revolution and ensure that the shaft rotates smoothly.

Couplings of a non-flexible design must never be used.



- Couplings must always be enclosed in a suitable guard to prevent contact with rotating parts that could result in personal injury. Guards should be of suitable material, and of sufficiently rigid design to prevent contact with rotating parts under normal operating conditions.



- When installing pump sets in flammable or explosive environments, or for handling flammable or explosive materials, special consideration must be given not only to the safety aspects of the drive unit enclosure but also to the materials used for both the coupling and the guard to eliminate the risk of explosion.



- Baseplates must be secured to a flat level surface such that distortion and misalignment are avoided. **Once baseplates are fastened in position the drive alignment must be re-checked.**
- When using electric motor drives, ensure that the electrical supply is compatible with the drive and controls and that the method of wiring is correct for the type of starting required by the motor i.e. Direct On Line, or other similar method. Ensure all components are correctly grounded.

3.2 Installations with CIP Systems

The Acculobe is has been designed to be cleaned effectively by the CIP procedures recommended for in place cleaning of process equipment. It is recommended that a differential pressure of 2 to 3 bar (30 to 45 psi) be developed across the pump head during cleaning in order to develop the necessary fluid velocities required for thorough cleaning.

3.3 Start Up Procedure.

WARNING

Check that all piping and associated equipment are clean and free from debris and that all pipe connections are secure and leak free.

WARNING

For pumps installed with flushed product seals check that all auxiliary services are in place and connected and provide sufficient flow and pressure for flushing purposes.

WARNING

If an external relief valve is incorporated in the system check that it is set correctly. For start up purposes it is considered good practice to set the relief valve lower than the system design pressure. On completion of start up the relief valve should be reset to the required setting for the application. The required setting should never exceed the lower of either the pumps maximum pressure rating or the system design pressure.

WARNING

Ensure both suction and discharge valves are fully open, and pipework is free from all obstructions. Acculobe pumps are of the positive displacement type and should therefore never be operated against a closed valve as this would result in pressure overload, resulting in damage to the pump and possibly the system.

WARNING

Ensure product is available in the tank before starting pump. This is very important for pumps installed with unflushed product seals, as these sealing arrangements must never be allowed to run dry.

Before beginning operation it is considered good practice to momentarily start/stop the pump to check the direction of rotation and ensure that the pump is free of obstructions. Once this has been carried out, begin operation keeping a visual check on suction and discharge pressure gauges and monitor pump temperature and power absorbed where possible.

Note: For motor flange mounted Acculobe pumps the 'driven' rotor is on the right hand side when looking from the front cover and the name plate is in the top position. The driven rotor rotates in the same direction as the motor shaft.

3.4 Shutdown Procedure.



When shutting the pump down close both the suction and discharge valves and ensure that the necessary safety precautions are taken:

The prime mover power source has been isolated.

If Installed, flushed product seal auxiliary services have been isolated and depressurized.

Pump head and piping have been drained and purged.

4.0 Product Seal Fitting and Removal

General Procedures for Installing Seals.

Mechanical seals are precision-engineered assemblies incorporating finely lapped seal faces and seats. They must therefore be handled with care and will not give optimum performance unless installed carefully and according to instructions

Where mechanical seals are to be reused ensure that seal components are kept in their appropriate sets. **Do not mix old and new seal faces on the same seal.**

Remove any sharp corners and burs that may damage and elastomers such as o-rings or lip seals.

Ensure that all seal component fitting bores and housings are thoroughly cleaned before instillation.

The seal faces are undamaged and the o-rings are not cut, swollen, or cracked.

Lip seals and o-rings within the seal assemblies should be lightly lubricated with an elastomers compatible, food grade lubricant. Ensure there is not an excessive amount of lubricant especially around the seal face area.

Ensure seals seats are mounted squarely.

Ensure when installing seals with brittle faces such as silicon carbide that extra care is taken.

Do not use any excessive force to install a mechanical seal. If it is difficult to position and assemble the seal then something is wrong.

If you drop or damage a seal, Do not install it before an inspection has been carried out.

WARNING

Do not run any seal options dry.

Terminology

a) "Quench"

- To provide a liquid barrier, which is not, induced to flow through the seal area by any external means.

b) "Flush"

- To provide a liquid barrier that is induced to flow through the seal area by an external means.

'Quench' or 'Flush' Media

WARNING



The media used for quenching or flushing a seal area must be fully compatible with the pumped media, and the relevant materials of construction of the pump.

Special consideration must be given to the temperature limitations of the media to ensure that no hazards are created, e.g. risk of fire or explosion.

This seal arrangement requires a supply of media to the outboard side of the mechanical seal to quench or flush the seal area. The nature of the pumped media and the specific duty conditions will determine whether a 'quench' or 'flush' is required.

A quench provides a static head. The media vessel should be mounted a minimum of 1.5 feet above the pump, preferably directly above the seal area. The interconnecting pipework should be as straight as possible, avoiding horizontal runs, and with the minimum number of bends and restrictions.

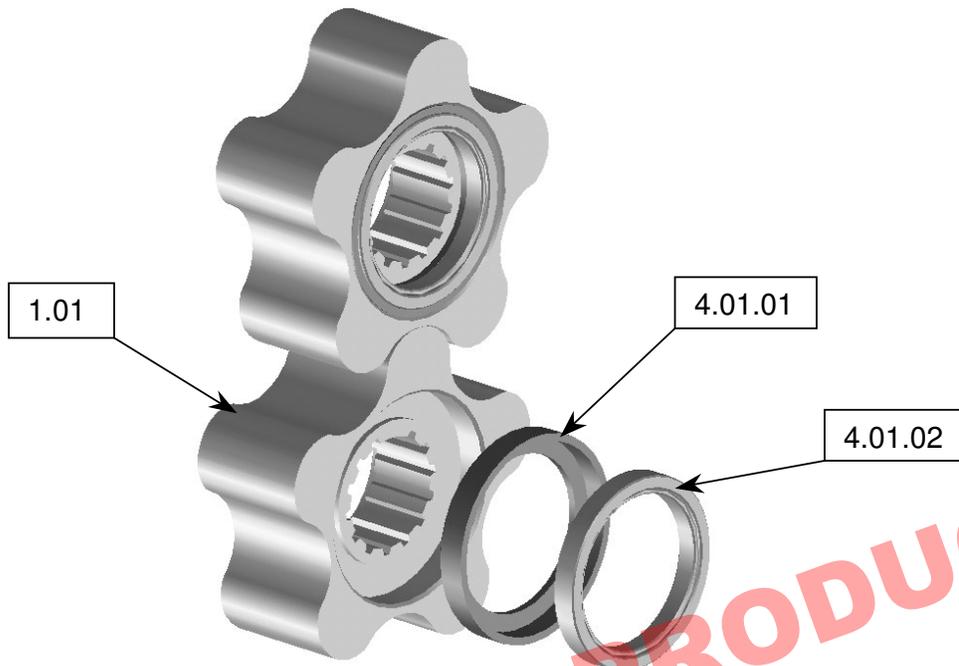
For a suitable flush, the media must be supplied at a flow rate of three liters per minute per shaft seal (0.8 US Gal per min).

WARNING

Note: The limiting 'flush' or 'quench' pressure in any application is 0.5 bar (7 psi).

5.0 Seal Assembly.

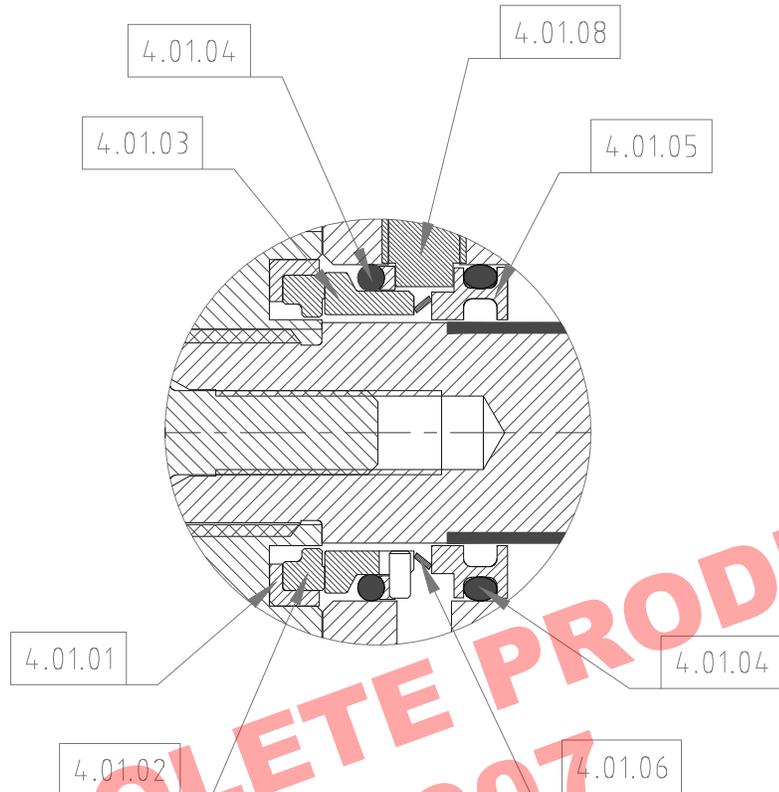
5.1 Rotary Faces



Item No	Description	Material	Quantity
4.01.01	Rotary Seal Face L-Cup	EPDM / VITON	2
4.01.02	Rotary Seal Face	SILICON CARBIDE	2
1.01	Multilobe Rotor	316S11 St Steel	2

- Lubricate with Water and install the rotary seal face (4.01.02) into the L-Cup (4.01.01).
- Install the L-Cup (4.01.01) and seal face (4.01.02) into the Rotor (1.01). Pressing both, the L-cup (4.01.01) and the Rotary face (4.01.02) firmly into the rotor bore, Making sure not to damage the seal face in any way.

5.2 Single Mechanical Seal.



Item Number	Description	Material	Quantity
4.01.03	Static Face	Silicon Carbide	2
4.01.04	O-ring	EPDM / VITON	4
4.01.05	Housing	316 S11 St. Steel	2
4.01.06	Wave Spring	St. Steel	2
4.01.07 *	Slinger O-ring	EPDM / VITON	2
4.01.08	M8 Dog Point Grub Screw	316 St. Steel	2
4.01.09 *	1/8 BSPT Hex Plug	316 St. Steel	2

*- Not Shown

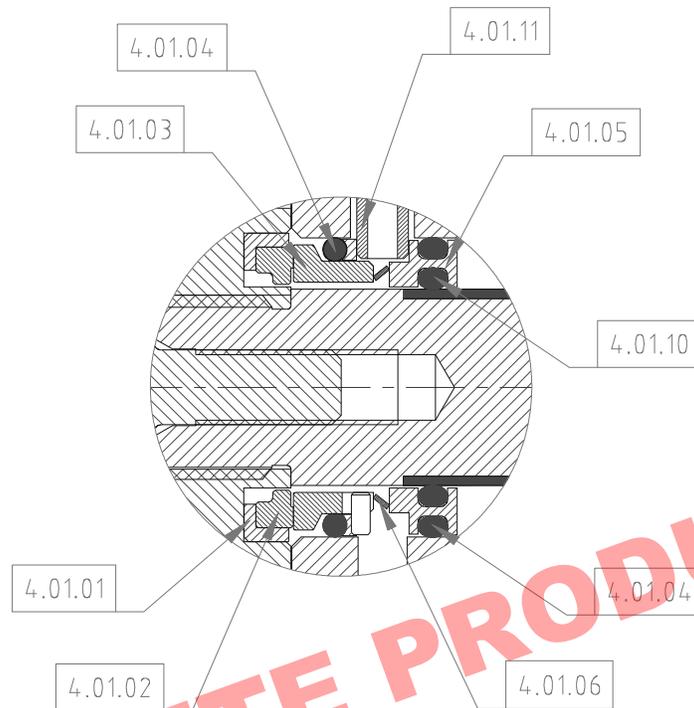
- Install Slinger O-Ring (4.01.07) onto the shaft ensuring the o-ring is all the way up the shaft and against the pump body bore face. This is also visible through the slots in the sides of the pump body.
- Install external o-rings (4.01.04).
- Install the seal housing into the pump assembly. Aligning the flush holes with the tapings in the pump body.

WARNING

- Install the locking grub screw (4.01.08) such that the point of the grub screw is locking the seal housing in position.
- Undo the locking grub screw (4.01.08) by one complete turn. This is to ensure no side loading is placed on the housing or seal face resulting in seal leakage.
- Install the primary o-ring (4.01.04) onto the Static Seal (4.01.03).
- Install the static seal face (4.01.03) aligning the slots in the seal face with the anti-rotation pins in the seal housing.
- Install the rotor and rotary seal face assembly.

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5.3 Single Flushed Mechanical Seal.



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Item Number	Description	Material	Quantity
4.01.03	Static Face	Silicon Carbide	2
4.01.04	O-ring	EPDM VITON	4
4.01.05	Housing	316 S11 St. Steel	2
4.01.06	Wave Spring	St. Steel	2
4.01.07*	Slinger O-ring	EPDM / VITON	2
4.01.10	O-ring	EPDM / VITON	2
4.01.11	Flush / Locking Adapter	316 St. Steel	2
4.01.12 *	Flush / Locking Adapter O-Ring	EPDM / VITON	2

*- Not Shown

- Install Slinger O-Ring (4.01.07) onto the shaft ensuring the o-ring is all the way up the shaft and against the pump body bore face. This is also visible through the slots in the sides of the pump body.
- Install external o-rings (4.01.04) and internal o-ring (4.01.10) to the Seal housing (4.01.05)
- Install the seal housing into the pump assembly. Aligning the flush holes with the tappings in the pump body.

- Install the flush locking adapter o-ring (4.01.12) onto the adapter (4.01.11).
- Install the flush locking adapter (4.01.12) such that the end of the component is locking the seal housing in position.
- Install the primary o-ring (4.01.04) onto the Static Seal (4.01.03).
- Install the static seal face (4.01.03) aligning the slots in the seal face with the anti-rotation pins in the seal housing.
- Install the rotor and rotary seal face assembly.

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6.13 Seal Arrangement (Exploded)



Item Number	Description	Material	Number Off
4.01.01	Cup Rubber	EPDM / VITON	2
4.01.02	Rotary Face	Silicon Carbide	2
4.01.03	Static Face	Silicon Carbide	2
4.01.04	O-ring	EPDM / VITON	2
4.01.05	Housing	316 S11 St. Steel	2
4.01.06	Wave Spring	St. Steel	2
4.01.07 *	Slinger O-ring	EPDM / VITON	2
4.01.08 *	Dog Point Grub Screw	316 St. Steel	2
4.01.09 *	BSPT Hex Plug	316 St. Steel	2

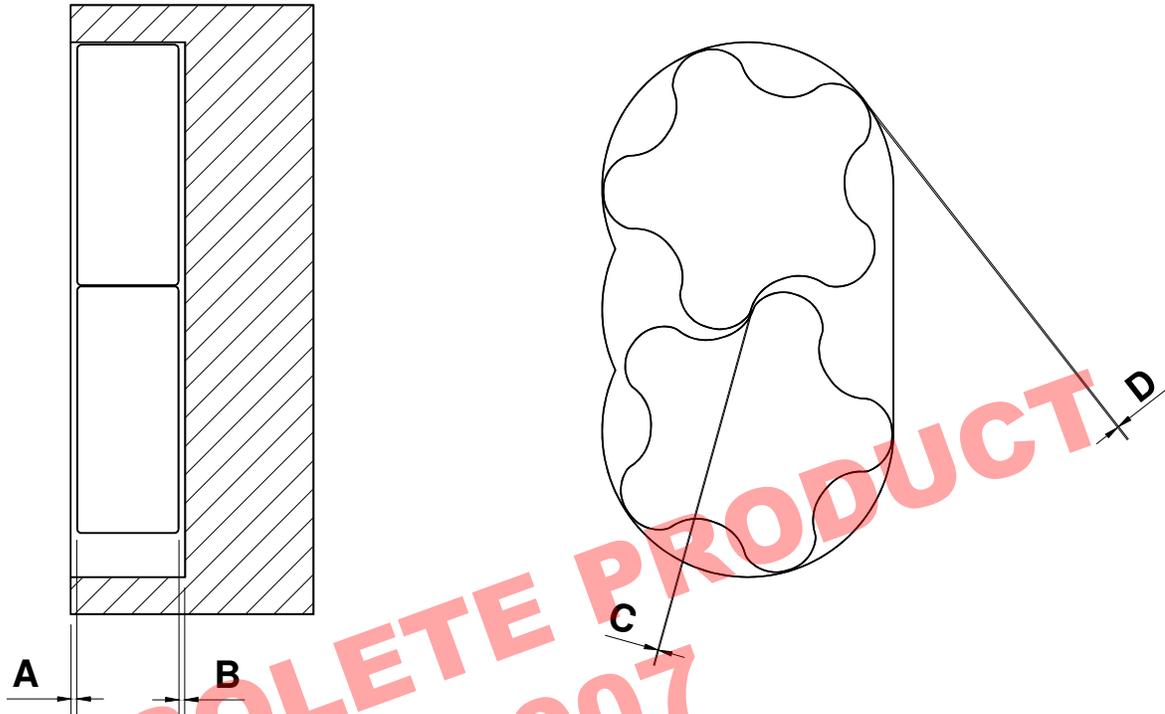
Note: - For Single flush seal add items

Item Number	Description	Material	Number Off
4.01.10 *	O-ring	EPDM / VITON	2
4.01.11 *	Flush / Locking Adapter	316 S11 St. Steel	2
4.01.12 *	O-ring	EPDM / VITON	2

Note: - * = Not Shown

7.0 Technical Data

7.1 Clearance Chart



Metric (Millimetres)

Front 'A'	Rear 'B'	Sides 'D'	Mesh 'C'
0.090 – 0.150	0.090 – 0.150	0.090 – 0.200	0.120 – 0.250

Imperial (Inches)

Front 'A'	Rear 'B'	Sides 'D'	Mesh 'C'
0.0035 – 0.0059	0.0035 – 0.0059	0.0035 – 0.0079	0.0047 – 0.0100

7.2 Torque Settings

Item	Description	Position		
1.02	Rotor Retainer	Rotor / Shaft	Quantity / Pump Part No. Torque – NM (ft lbs)	2 K13-2051-01M 24 (18)
2.01	Socket Head Cap Screw	Front Cover / Pump Body	Quantity / Pump Size Torque – NM (ft lbs)	8 M8 x 20 39 (29)
4.01.13	Seal Locking Adapter (Flush Only)	Pump Body / Seal Housing	Quantity / Pump Size Torque – NM (ft lbs)	2 1/8" BSP 16 (12)
7.02	Socket Head Cap Screw	Foot / Pump Body	Quantity / Pump Size Torque – NM (ft lbs)	3 M6 x 16 16 (12)

7.3 Lubricants.

The recommended lubricant for use in the Acculobe is lithium based, extreme pressure grease intended for 'sealed for life' units. Suitable for operating temperatures between -30°C and 120°C (-22°F to 266°F) and a base viscosity in the region of 200 cSt at 40°C (104°F).

The unit is shipped with 'Shell Retinax CS00' type. Refer to manufacturers recommended operating conditions concerning limitations, servicing and application. In case of doubt, please consult the factory for details.

In any mounting attitude only 55 ml (1.86 US fl oz) is required to fill the gear cavity and suitably lubricate the bearings. During the filling operation, lubricant should be directed at the front bearings to ensure good circulation and coverage in this area.

Care should be taken not to overfill the gearbox.

7.4 Tool List

Listed below are tools required for the maintenance of the Acculobe pump.

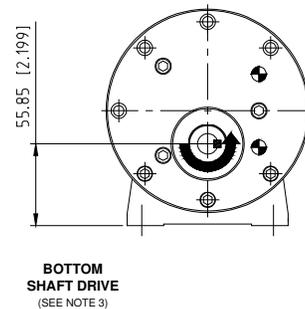
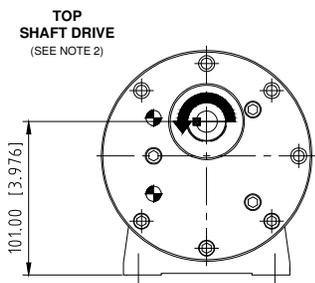
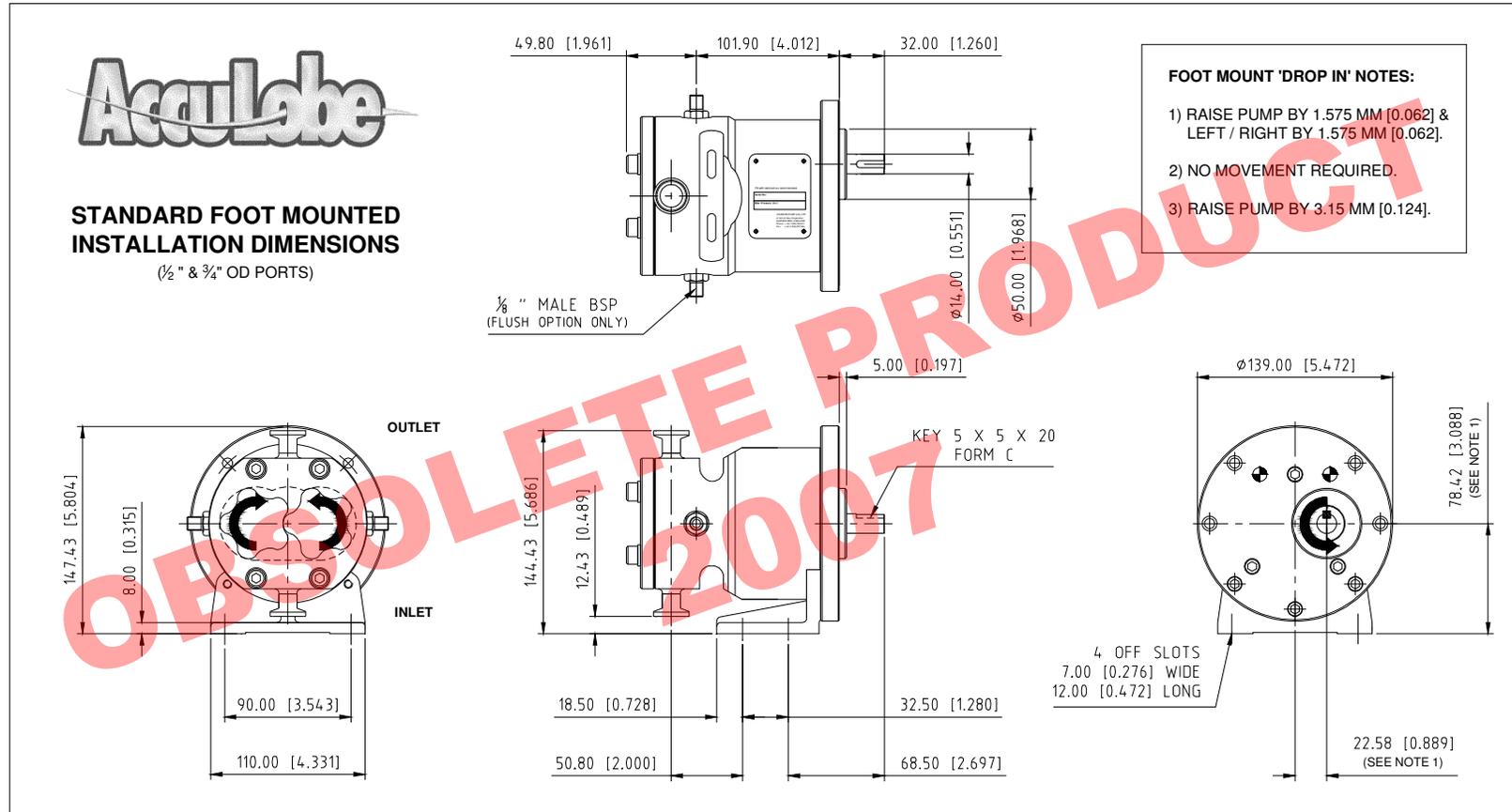
Type	Size or Range
Rotor Retainer Tool	Supplied
Seal Removal Tool	Supplied
Hexagon (Allen) Keys	4 mm, 5 mm, 6 mm
Depth Micrometer	0 - 25 mm
Feeler Gauge Set	-
Rolling Torque Meter	0 – 25 NM (18.5 ft lbs)
Torque Wench	0 - 65 NM (48 ft lbs)

7.5 Pump Data

Pump Weight with Foot Mount: 9.75 kg (21.5 lbs)
Pump Weight for Drop in Style TBA kg (XXX lbs)
Pump Weight with IEC Motor Adaptor: TBA kg (XXX lbs)
Pump Weight with Nema Motor Adapter: TBA kg (XXX lbs)



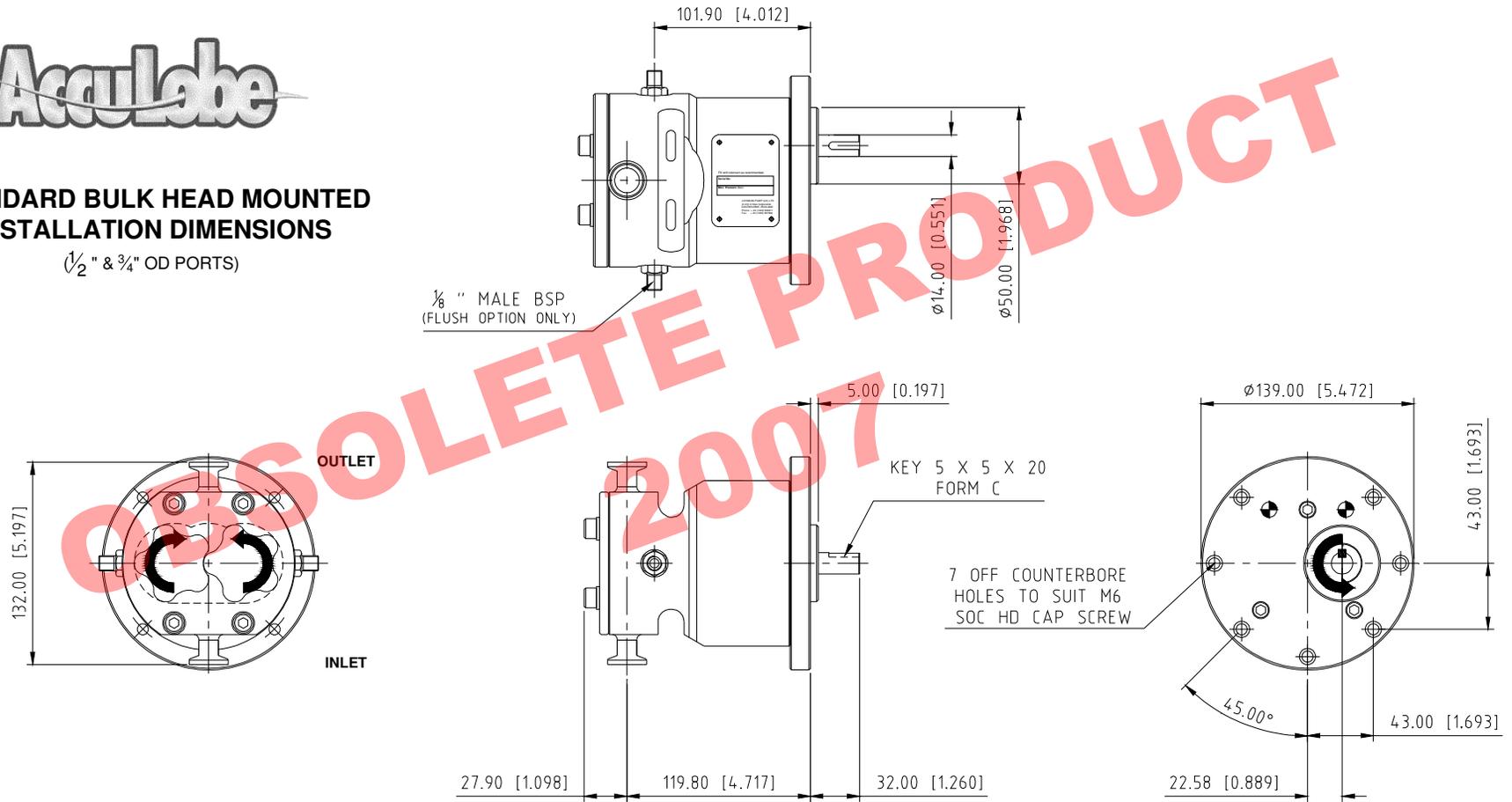
7.8 Acculobe Installation Dimensions





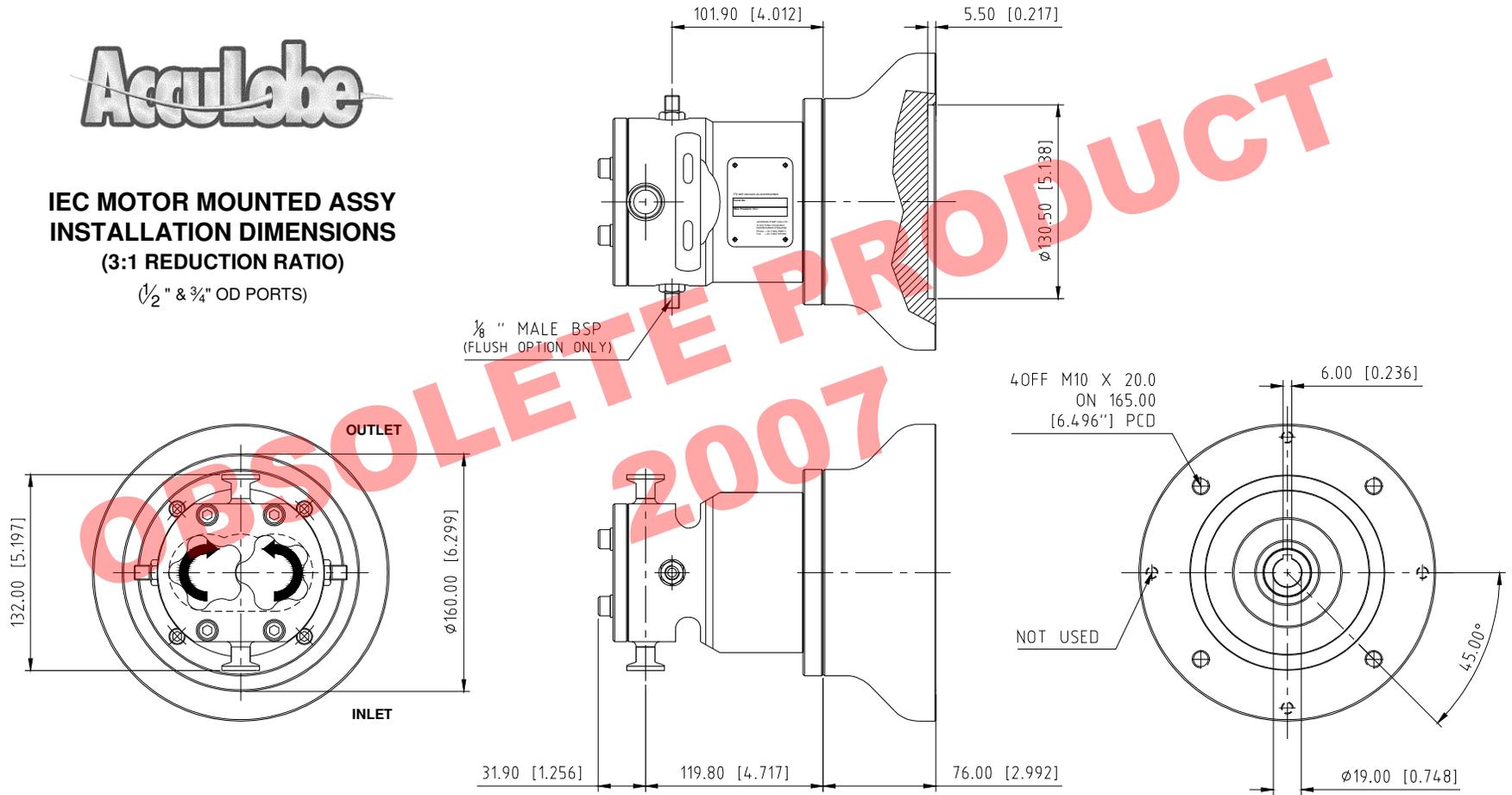
STANDARD BULK HEAD MOUNTED INSTALLATION DIMENSIONS

($\frac{1}{2}$ " & $\frac{3}{4}$ " OD PORTS)



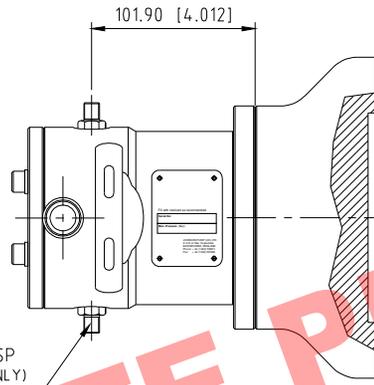


**IEC MOTOR MOUNTED ASSY
INSTALLATION DIMENSIONS
(3:1 REDUCTION RATIO)
(1/2" & 3/4" OD PORTS)**

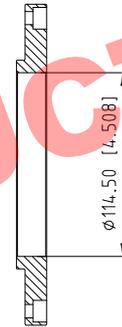




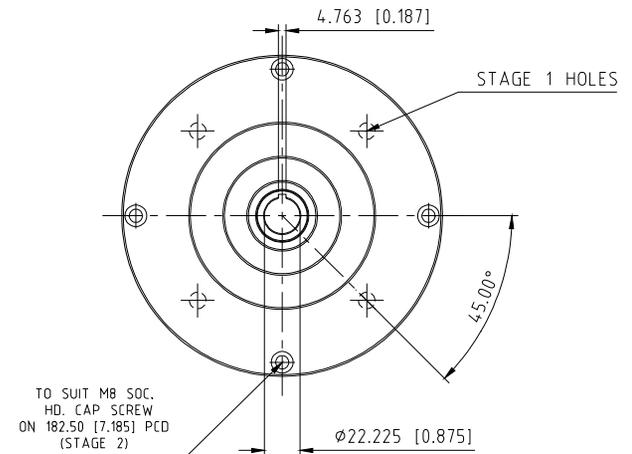
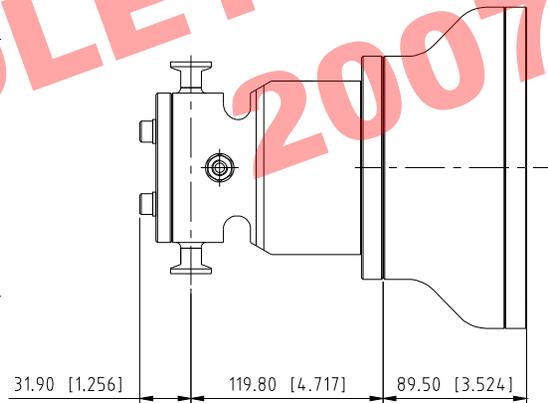
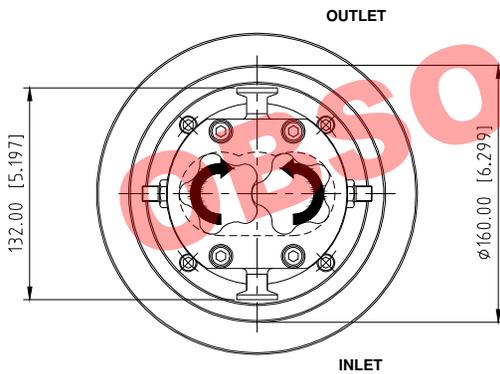
**NEMA MOTOR MOUNTED ASSY
INSTALLATION DIMENSIONS
(3:1 REDUCTION RATIO)**
1/2" & 3/4" OD PORTS



STAGE 2
INSTALL NEMA MOTOR &
FLANGE ASSEMBLY ONTO
PUMP BODY ASSEMBLY



STAGE 1
INSTALL FLANGE ADAPTER
TO NEMA MOTOR



7.9 Trouble Shooting.

No FLOW	IRREGULAR FLOW	UNDER CAPACITY	PUMP OVERHEATS	MOTOR OVERHEATS	EXCESSIVE ROTOR WEAR	EXCESSIVE SEAL WEAR	NOISE / VIBRATION	SEIZURE	STALLS ON START UP	Causes	ACTION
										INCORRECT DIRECTION OF ROTATION.	REVERSE MOTOR.
										PUMP NOT PRIMED.	EXPUL GAS FROM SUCTION LINE / PUMP CHAMBER & PRIME.
										INSUFFICIENT NPSH AVAILABLE.	INCREASE SUCTION LINE & STATIC SUCTION HEAD DIAMETER. SIMPLIFY SUCTION LINE & REDUCE LENGTH. REDUCE PUMP SPEED & PRODUCT TEMPERATURE.
										PRODUCT VAPORIZING IN SUCTION LINE.	
										AIR ENTERING SUCTION LINE.	REMAKE PIPEWORK JOINTS.
										GAS IN SUCTION LINE.	EXPUL GAS FROM SUCTION LINE / PUMP CHAMBER.
										INSUFFICIENT STATIC SUCTION HEAD.	RAISE PRODUCT LEVEL TO INCREASE STATIC SUCTION HEAD.
										PRODUCT VISCOSITY TOO HIGH.	DECREASE PUMP SPEED / INCREASE PRODUCT TEMPERATURE.
										PRODUCT VISCOSITY TOO LOW.	INCREASE PUMP SPEED / INCREASE PRODUCT TEMPERATURE.
										PRODUCT TEMPERATURE TOO HIGH.	COOL PRODUCT / PUMPING CHAMBER.
										PRODUCT TEMPERATURE TOO LOW.	HEAT PRODUCT / PUMPING CHAMBER.
										UNEXPECTED SOLIDS IN PRODUCT	CLEAN SYSTEM / FIT STRAINER ON SUCTION SIDE OF PUMP.
										DISCHARGE PRESSURE TOO HIGH	CHECK FOR BLOCKAGES / SIMPLIFY DISCHARGE LINE.
										ROTORCASE STRAINED BY PIPEWORK.	CHECK PIPE ALIGNMENT / SUPPORT PIPEWORK.
										PUMP SPEED TOO HIGH	DECREASE PUMP SPEED.
										PUMP SPEED TOO LOW	INCREASE PUMP SPEED
										SEAL FLUSH INADEQUATE	INCREASE SEAL FLUSH TO REQUIRED PRESSURE / FLOW.
										BEARING / TIMING GEAR WEAR	REPLACE WORN COMPONENTS.

7.11 Notes

**OBSOLETE PRODUCT
2007**

The information contained in this document is correct at the time of issue, but may be subject to change without prior notice.