

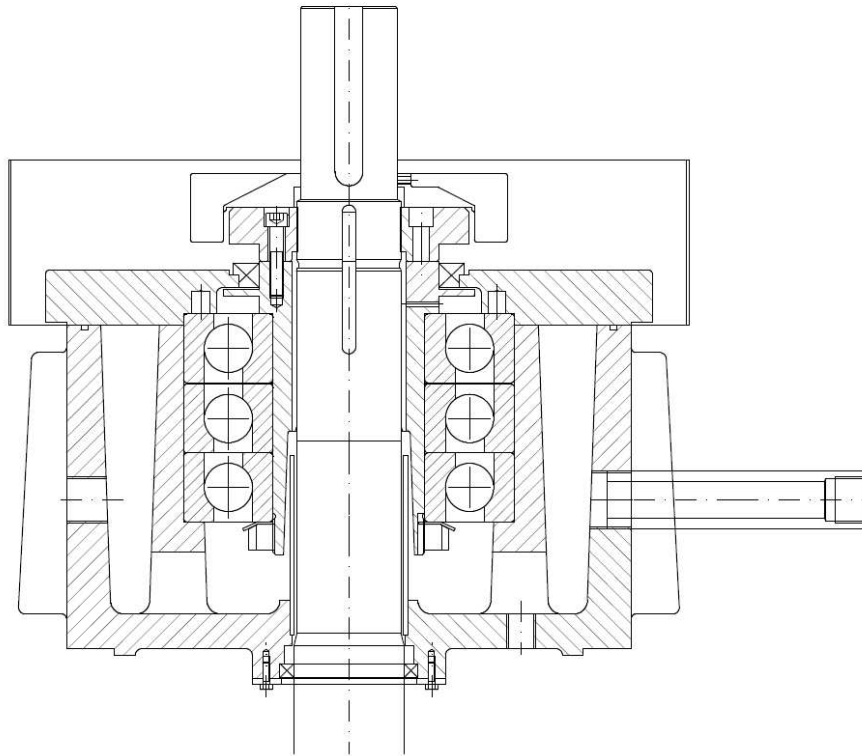



USER INSTRUCTIONS

Worthington® N-Series of Thrust Pot for Vertical, Multistage Pumps

Installation Operation Maintenance

Original Instructions
PCN= 26999948 07-14 (E)



 ***These instructions should be read prior to installing, operating, using and maintaining this equipment.***

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1.0 INTRODUCTION AND SAFETY

1.1 General



These Instructions must always be kept close to product's operating location or directly with the product.

Flowserve's products are designed, developed and manufactured with state-of-the-art technologies in modern facilities. The unit is produced with great care and commitment to continuous quality control, utilizing sophisticated quality techniques, and safety requirements.

Flowserve is committed to continuous quality improvement and being at service for any further information about the product in its installation and operation or about its support products, repair and diagnostic services.

These instructions are intended to facilitate familiarization with the product and its permitted use. Operating the product in compliance with these instructions is important to help ensure reliability in service and avoid risks. The instructions may not take into account local regulations; ensure such regulations are observed by all, including those installing the product. Always coordinate repair activity with operations personnel, and follow all plant safety requirements and applicable safety and health laws/regulations.



These instructions must be read prior to installing, operating, using and maintaining the equipment in any region worldwide. The equipment must not be put into service until all the conditions relating to safety, noted in the instructions, have been met. Failure to follow and apply the present user instructions is considered to be misuse. Personal injury, product damage, delay or failure caused by misuse are not covered by the Flowserve warranty.

1.2 CE marking and approvals

It is a legal requirement that machinery and equipment put into service within certain regions of the world shall conform with the applicable CE Marking Directives covering Machinery and, where applicable, Low Voltage Equipment, Electromagnetic Compatibility (EMC), Pressure Equipment Directive (PED) and Equipment for Potentially Explosive Atmospheres (ATEX).

Where applicable the Directives, and any additional Approvals, cover important safety aspects relating to machinery and equipment and the satisfactory provision of technical documents and safety

instructions. Where applicable this document incorporates information relevant to these Directives. To establish Approvals and if the product itself is CE Marked check the serial number plate and the Certification.

1.3 Disclaimer

Information in these User Instructions is believed to be complete and reliable. However, in spite of all of the efforts of Flowserve Corporation to provide comprehensive instructions, good engineering and safety practice should always be used.

Flowserve manufactures products to exacting International Quality Management System Standards as certified and audited by external Quality Assurance organizations. Genuine parts and accessories have been designed, tested and incorporated into the products to help ensure their continued product quality and performance in use. As Flowserve cannot test parts and accessories sourced from other vendors the incorrect incorporation of such parts and accessories may adversely affect the performance and safety features of the products. The failure to properly select, install or use authorized Flowserve parts and accessories is considered to be misuse. Damage or failure caused by misuse is not covered by Flowserve's warranty. In addition, any modification of Flowserve products or removal of original components may impair the safety of these products in their use.

1.4 Copyright

All rights reserved. No part of these instructions may be reproduced, stored in a retrieval system or transmitted in any form or by any means without prior permission of Flowserve.

1.5 Duty conditions

This product has been selected to meet the specifications of your purchaser order. The acknowledgement of these conditions has been sent separately to the Purchaser. A copy should be kept with these instructions.



The product must not be operated beyond the parameters specified for the application. If there is any doubt as to the suitability of the product for the application intended, contact Flowserve for advice, quoting the serial number.

If the conditions of service on your purchase order are going to be changed (for example liquid pumped, temperature or duty) it is requested that the user seeks Flowserve's written agreement before start up.

1.6 Safety

1.6.1 Summary of safety markings

These user instructions contain specific safety markings where non-observance of an instruction would cause hazards. The specific safety markings are:



DANGER

This symbol indicates electrical safety instructions where non-compliance will involve a high risk to personal safety or the loss of life.



This symbol indicates safety instructions where non-compliance would affect personal safety and could result in loss of life.



This symbol indicates "hazardous and toxic fluid" safety instructions where non-compliance would affect personal safety and could result in loss of life.



CAUTION

This symbol indicates safety instructions where non-compliance will involve some risk to safe operation and personal safety and would damage the equipment or property.



This symbol indicates "strong magnetic field" safety instructions where non-compliance would affect personal safety, pacemakers, instruments or stored data sensitive to magnetic fields.



This symbol indicates explosive atmosphere marking according to ATEX. It is used in safety instructions where non-compliance in the hazardous area would cause the risk of an explosion.



This symbol is used in safety instructions to remind not to rub non-metallic surfaces with a dry cloth; ensure the cloth is damp. It is used in safety instructions where non-compliance in the hazardous area would cause the risk of an explosion.

Note:

The sign is not a safety symbol but indicates an important instruction in the assembly process.



This symbol indicates potential risks connected with extremely high temperatures.



This symbol indicates potential risks connected with extremely low temperatures.

1.6.2 Personnel qualification and training

All personnel involved in the operation, installation, inspection and maintenance of the unit must be qualified to carry out the work involved. If the personnel in question do not already possess the necessary knowledge and skill, appropriate training and instruction must be provided. If required the operator may commission the manufacturer / supplier to provide applicable training.

Always co-ordinate repair activity with operations and health and safety personnel, and follow all plant safety requirements and applicable safety and health laws/regulations.

1.6.3 Safety action

This is a summary of conditions and actions to help prevent injury to personnel and damage to the environment and to equipment. For products used in potentially explosive atmospheres section 1.6.4 also applies.



DANGER

NEVER DO MAINTENANCE WORK WHILST THE UNIT IS CONNECTED TO POWER



GUARDS MUST NOT BE REMOVED WHILE PUMP IS OPERATIONAL



CAUTION

ONLY CHECK DIRECTION OF MOTOR ROTATION WITH COUPLING ELEMENT/ PINS REMOVED

Starting in reverse direction of rotation will damage the pump.



CAUTION

ENSURE CORRECT LUBRICATION (See section 3.0, *Commissioning, startup, operation and shutdown.*)



CAUTION

NEVER RUN THE PUMP DRY



CAUTION

DO NOT RUN THE PUMP AT ABNORMALLY HIGH OR LOW FLOW RATES
Operating at a flow rate higher than normal or at a flow rate with no back pressure on the pump may overload the motor and cause cavitation. Low flow rates may cause a reduction in pump/bearing life, overheating of the pump, instability and cavitation/vibration.



HANDLING COMPONENTS

Many precision parts have sharp corners and the wearing of appropriate safety gloves and equipment is required when handling these components. To lift heavy pieces above 25 kg (55 lbs) use a crane

corresponding to the mass and in accordance with current local regulations.



HOT AND COLD PARTS

If hot or freezing components or auxiliary heating supplies can present a danger to operators, they must be shielded to avoid accidental contact. If complete protection is not possible, the machine access must be limited to maintenance staff only.

Note: Bearing housings must not be insulated and drive motors and bearings may be hot.

If the temperature is greater than 80 °C (175 °F) or below -5 °C (20 °F) in a restricted zone, or exceeds local regulations, action as above shall be taken.

1.6.4 Products used in potentially explosive atmospheres



Measures are required to:

- Avoid excess temperature
- Prevent dry running
- Prevent the generation of sparks
- Maintain the pump to avoid hazard

The following instructions for pumps and pump units when installed in potentially explosive atmospheres must be followed to help ensure explosion protection. For ATEX, both electrical and non-electrical equipment must meet the requirements of European Directive 94/9/EC. Always observe the regional legal Ex requirements eg Ex electrical items outside the EU may be required certified to other than ATEX eg IECEx, UL.

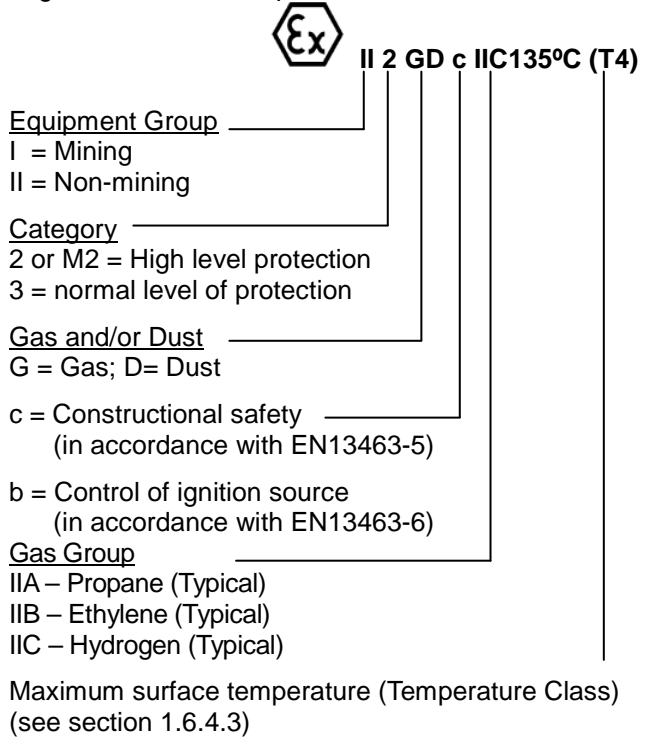
1.6.4.1 Scope of compliance



Use equipment only in the zone for which it is appropriate. Always check that the driver, drive coupling assembly, seal and pump equipment are suitably rated and/or certified for the classification of the specific atmosphere in which they are to be installed.

1.6.4.2 Marking

An example of ATEX equipment marking is shown below. The actual classification of the pump will be engraved on the nameplate.



1.6.4.3 Avoiding excessive surface temperatures



ENSURE THE EQUIPMENT TEMPERATURE CLASS IS SUITABLE FOR THE HAZARD ZONE

Pumps have a temperature class as stated in the ATEX Ex rating on the nameplate. These are based on a maximum ambient of 40 °C (104 °F); refer to Flowserve for higher ambient temperatures.

The surface temperature on the pump is influenced by the temperature of the liquid handled. The maximum permissible liquid temperature depends on the temperature class and must not exceed the values in the table that follows.

Temperature class to EN13463-1	Maximum surface temperature permitted	Temperature limit of liquid handled *
T6	85 °C (185 °F)	Consult Flowserve
T5	100 °C (212 °F)	Consult Flowserve

* The table only takes the ATEX temperature class into consideration. Pump design or material, as well as component design or material, may further limit the maximum working temperature of the liquid.

The temperature rise at the seals and bearings and due to the minimum permitted flow rate is taken into account in the temperatures stated.

The responsibility for compliance with the specified maximum liquid temperature is with the plant operator.

Temperature classification “Tx” is used when the liquid temperature varies and the pump could be

installed in different hazardous atmospheres. In this case the user is responsible for ensuring that the pump surface temperature does not exceed that permitted in the particular hazardous atmosphere.

If an explosive atmosphere exists during the installation, do not attempt to check the direction of rotation by starting the pump unfilled. Even a short run time may give a high temperature resulting from contact between rotating and stationary components.

Where there is any risk of the pump being run against a closed valve generating high liquid and casing external surface temperatures, fit an external surface temperature protection device.

Avoid mechanical, hydraulic or electrical overload by using motor overload trips, temperature monitor or a power monitor and make routine vibration monitoring checks.

In dirty or dusty environments, make regular checks and remove dirt from areas around close clearances, bearing housings and motors.

1.6.4.4 Preventing dry running



ENSURE THAT THE THRUST POT IS PROPERLY FILLED AND DOES NOT RUN DRY

Ensure that the oil level is as per section 3.1.4. The bearing temperature shall be monitored by means of a PT 100, surface contact type.

1.6.4.5 Preventing sparks



To prevent a potential hazard from mechanical contact, the coupling guard must be non-sparking.

To avoid the potential hazard from random induced current generating a spark, the baseplate must be properly grounded.



Avoid electrostatic charge: do not rub non-metallic surfaces with a dry cloth; ensure cloth is damp.

For ATEX application the coupling must be selected to comply with 94/9/EC. Correct coupling alignment must be maintained.

1.6.4.6 Maintenance to avoid the hazard



CORRECT MAINTENANCE IS REQUIRED TO AVOID POTENTIAL HAZARDS WHICH GIVE A RISK OF EXPLOSION

The responsibility for compliance with maintenance instructions is with the plant operator.

To avoid potential explosion hazards during maintenance, the tools, cleaning and painting materials used must not give rise to sparking or

adversely affect the ambient conditions. Where there is a risk from such tools or materials, maintenance must be conducted in a safe area.

It is recommended that a maintenance plan and schedule is adopted. (See section 4.0, *Maintenance*.)

2.0 TRANSPORT AND STORAGE

2.1 Consignment receipt and unpacking

Immediately after receipt of the equipment it must be checked against the delivery/shipping documents for its completeness and that there has been no damage in transportation. Any shortage and/or damage must be reported immediately to Flowserve Pump Division and must be received in writing within one month of receipt of the equipment. Later claims cannot be accepted.

Check any crate, boxes or wrappings for any accessories or spare parts that may be packed separately with the equipment or attached to side walls of the box or equipment.

Each product has a unique serial number. Check that this number corresponds with that advised and always quote this number in correspondence as well as when ordering spare parts or further accessories.

2.2 Handling

Boxes, crates, pallets or cartons may be unloaded using fork lift vehicles or slings dependent on their size and construction.

2.3 Lifting



A crane must be used for all pump sets in excess of 25 kg (55 lb.). Fully trained personnel must carry out lifting, in accordance with local regulations.

Before lifting the driver alone, refer to the manufacturer's instructions.

2.4 Storage



Store the unit in a clean, dry location away from vibration. Leave protective covers and plugs in place to keep dirt and other foreign material out of the unit. Turn shaft at intervals to prevent false brinelling of the bearings.

The unit may be stored as above for up to 6 months. Consult Flowserve for preservative actions when a longer storage period is needed.

2.5 Recycling and end of product life

At the end of the service life of the product or its parts, the relevant materials and parts should be recycled or disposed of using an environmentally acceptable method and local requirements. If the product contains substances that are harmful to the environment, these should be removed and disposed of in accordance with current regulations. This also includes the liquids and/or gases that may be used in the "seal system" or other utilities.



Make sure that hazardous substances are disposed of safely and that the correct personal protective equipment is used. The safety specifications must be in accordance with the current regulations at all times.

3.0 COMMISSIONING START-UP, OPERATION AND SHUTDOWN



CAUTION *These operations must be carried out by fully qualified personnel.*

3.1 Pump Lubricants

3.1.1 Lubrication

The bearing housing shall be filled with proper lubricating oil prior to start up. If the pump will be started after a longer storage period, the bearing housing should be first flushed and cleaned with gasoline. It is not necessary to remove the preservation oil as this will mix up thoroughly with the lubrication oil.

Lubrication is provided by the pumping effect of the rotating ball bearings. Maintaining the correct oil level (middle of the oil sight glass) ensures that the lower ball bearing is covered with oil.

As option a 1/4" NPT connection for a purge oil mist lubrication is provided (refer to General Arrangement Drawing).

For recommended lubricating oils refer to the lubrication table.

3.1.2 Purge oil mist lubrication

For preventing, that dirt or humidity get into the bearing housing, this pump is equipped with a 1/4" NPT connection for air or nitrogen supply.

Also at standstill the air or nitrogen supply shall be maintained.



The pressure shall be between **0.01 bar (0.14 psi) and 0.02 bar (0.29 psi)**, otherwise you have to consider an oil leakage and as a result a bearing damage .

The provided flow rate shall be 0,1 SCFM.

The supplied air or nitrogen shall be clean and dry.

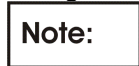
3.1.3 Oil change

After first start up, the oil shall be changed after 200 service hours.

Every further oil change shall take place after about 2000 service hours or at least every 6 month.

3.1.4 Oil level

The correct oil level is in the middle of the oil sight glass and shall be checked when pump is not in operation. Periodically check if the lubricating oil is mixed with any condensed water. Careful opening of the oil drain during a stop of the pump will show any water.



Note: During operation the level will decrease due to circulation of the oil through the bearings.



A too high oil level will result in higher bearing temperatures and therefore poorer lubrication.

3.1.5 Oil quality

Oil used for lubrication should only be of high quality. The viscosity of the oil at working temperature must be at least 10 cSt. The pouring point of the oil must be in accordance with the lowest expected temperature of the bearing housing during a stop of the pump. For recommended lubricating oils refer to the lubrication table.

Having selected the corresponding oil quality the actual oil temperature at the bearing housing must be checked after two service hours of the pump.

Considering this measured oil temperature the actual viscosity must be determined by using the data sheet of the oil, to verify the minimum required viscosity of 10 cSt. Do not forget, the oil temperature in the bearing itself is about 10 °C (Δ 18°F) higher than the oil temperature at the bearing housing. On the following table the oil viscosity is given at 40 °C (104 °F). Determining the correct lubricating oil one must take into consideration that all bearings will have higher temperatures during the first 20 service hours. In constant operation the bearing temperature will decrease about 10 °C (50 °F). The oil temperature shall be lower than 85 °C (185 °F) after this running-in time. The bearing outer race temperature should not exceed 95°C (204°F). If the temperature is higher, the reason may be a wrong oil quality, wrong oil level or overload of the pump because of excessive wear.

If the humidity at the site is high, the roller bearings become easily rusty during stand still periods. To avoid that, we recommend mixing the lubricating oil with a corrosion inhibitor contact your lubrication oil supplier for proper additives inhibitors.

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3.1.6 Oil quantity

Bearing size is shown on the name plate of the pump, and with this the correct thrust bearing frame can be selected according to the following table.

Thrust bearing No.	Oil quantity l (Fl.oz.)	Bearing size
0 N	0.5 (16.9)	7210 BECBJ
1 N	1.5 (50.7)	7313 BECBJ
3 N	2 (67.6)	7315 BECBJ
4 N	2.5 (84.5)	7317 BECBJ
5 N	3 (101.4)	7318 BECBJ
6 N	5 (169)	7322 BECBM
7 N	6.5 (219.8)	7326 BCBM
8 N	6.5 (219.8)	7232 BCBM 7330 BCBM

3.1.7 Lubrication Table

Centrifugal Pump Lubrication	Oil	Oil Bath and Purge Oil Mist Lubrication			Pure Oil Mist Lubrication
	Lubrication service	Ball bearing			
	Type	Mineral Oil (Petroleum Based)			Mineral Oil (Petroleum Based)
	Ambient temperature °C (°F)	-20 to 35 (-4 to 95)	35 to 60 (95 to 140)		-5 to 60 (23 to 140)
	Oil temperature range* °C (°F)	-5 to 65 (23 to 149)	up to 85 (up to 185)	up to 100 (up to 212)	15 and above (59 and above)
	Viscosity mm ² /s 40°C [cSt]	32	46	68	100
	First Oil Change	200 hours	200 hours	200 hours	200 hours
	Further Oil Changes	2000 hours or at least every 6 months	2000 hours or at least every 6 months	2000 hours or at least every 6 months	2000 hours or at least every 6 months
	Designation according to DIN51502 ISO VG	32	46	68	100
Oil Companies and Lubricants	BP	BP Energol HL32 BP Energol HLP32	BP Energol HL46 BP Energol HLP46	BP Energol HL68 BP Energol HLP68	-
	CASTROL	Hyspin AWS 32 Perfecto T32**	Hyspin AWS 46 Perfecto T46**	Hyspin AWS 68 Perfecto T68	-
	OMV	OMV turb HTU 32**	OMV turb HTU 46**	OMV turb HTU 68	-
	Aral	Aral Vitam GF 32	Aral Vitam GF 46	Aral Vitam GF 68	-
	Esso	NUTO H32	NUTO H46	NUTO H68	-
	LSC (for oil mist)	LSO 32 Synthetic oil	LSO 46 Synthetic oil	LSO 68 Synthetic oil	LSO 100 Synthetic oil
	Mobil	Mobil Nuto H32 Mobil DTE13M Mobil DTE24	Mobil Nuto H46 Mobil DTE15M Mobil DTE25	Mobil Nuto H68 Mobil DTE16M Mobil DTE26	-
	Shell	Shell Tellus 32 Shell Turbo T32**	Shell Tellus 46 Shell Turbo T46**	Shell Tellus 68 Shell Turbo T68	-
	Texaco	Rando HD 32	Rando HD 46	Rando HD 68	-
	Total	Azolla ZS32	Azolla ZS46	Azolla ZS68	-
	Wintershall (BASF Group)	Wiolan HN32 Wiolan HS32	Wiolan HN46 Wiolan HS46	Wiolan HN68 Wiolan HS68	-

* Note that it normally takes 2 hours for bearing temperature stabilize and the final temperature will depend on the ambient, r/min, pumpage temperature and pump size. Viscosity index shall be at least 95.

** For ambient temperature from -12°C (10 °F) up wards

For temperatures below -5 °C (-23 °F) use lubrication oil class SAE 5W-50 or API-SJ.

	Seal System / Pumped Liquid	Quench-Oil	General Features
Barrier/Buffer Fluid for Mech. Seal	Tandem Seal to -40 °C (-40 °F) Back to back Seal with gascoffer-dam Conventional back to back Seal	- Raffinated Hydraulic Oil - Synthetic Oil - Mixture of water / glykol ATTENTION: <u>Do not use Methanol</u>	appr. 10-15 cST at 40°C (104 °F) below -40°C (-40 °F) Pourpoint vaporization above 80°C (176 °F)
	Tandem Seal to -60°C (-76 °F)	Ethanol/Propanol	

The sequence of the suppliers of the lubricants does not represent any indication of their superiority.

¹ Viscosity at 40 °C (104 °F) in cSt [mm²/s] DIN 5 1562

3.2 Operation

- a) The bearing housing temperature shall not exceed 80 °C (176 °F). If higher bearing temperature is observed, check the viscosity grade of the used lubrication oil.



The minimum viscosity is 10 cSt at the expected oil temperature.

(Oil temperature = bearing gland temperature + 10°C (18°F))

4.0 MAINTENANCE

4.1 General



It is the plant operator's responsibility to ensure that all maintenance, inspection and assembly work is carried out by authorized and qualified personnel who have adequately familiarized themselves with the subject matter by studying this manual in detail.

Any work on the machine must be performed when it is at a standstill.

On completion of work all guards and safety devices must be re-installed and made operative again.

Oil and grease leaks may make the ground slippery. Machine maintenance must always begin and finish by cleaning the ground and the exterior of the machine.

If platforms, stairs and guard rails are required for maintenance, they must be placed for easy access to areas where maintenance and inspection are to be carried out. The positioning of these accessories must not limit access or hinder the lifting of the part to be serviced.

When air or compressed inert gas is used in the maintenance process, the operator and anyone in the vicinity must be careful and have the appropriate protection.

Do not spray air or compressed inert gas on skin.

Do not direct an air or gas jet towards other people.

Never use air or compressed inert gas to clean clothes.

Before working on the pump, take measures to prevent an uncontrolled start. Put a warning board on the starting device with the words: **"Machine under repair: do not start"**.

With electric drive equipment, lock the main switch open and withdraw any fuses. Put a warning board on the fuse box or main switch with the words: **"Machine under repair: do not connect"**.

Never clean equipment with inflammable solvents or carbon tetrachloride. Protect yourself against toxic fumes when using cleaning agents.

4.2 Maintenance schedule

- a) Check bearing lubricant level, and if the hours run show a lubricant change is required.
- b) Check vibration, noise level and surface temperature at the bearings to confirm satisfactory operation.
- c) Check dirt and dust is removed from areas around close clearances, bearing housings and motors.

Our specialist service personnel can help with preventative maintenance.

If any problems are found the following sequence of actions should take place:

- a) Ensure equipment complies with the recommendations in this manual.
- b) Contact Flowserve if the problem persists.

4.2.1 Routine Inspection (daily/weekly)



The following checks should be made and the appropriate action taken to remedy any deviations.

- a) Check operating behavior; ensure noise, vibration and bearing temperatures are normal.

4.3 Spare parts

4.3.1 Storage of spares

Spares should be stored in a clean dry area away from vibration. Inspection and retreatment of metallic surfaces (if necessary) with preservative is recommended at a 6 monthly interval.

4.4 Recommended spares

	Spares Recommended
Part	Normal Maintenance
Bearings complete (antifriction, radial)	1
Bearings complete (antifriction, thrust)	1
Bearing pads only (hydrodynamic, thrust)	1
Gaskets, O-rings (set)	1

4.5 Fastener torques

Tightening torque M_A Nm (lbf.ft)		
Size of screw	Carbon Steel (NACE) (A 193 Gr.B7M, A 320 Gr. L7M)	Carbon Steel (A 193 Gr. B7, A 320 Gr. L7, 8.8)
M 4	2,4 (1,8)	2,8 (2,1)
M 5	4,8 (3,6)	5,6 (4,1)
M 6	8,3 (6,1)	9,7 (7,1)
M 8	19,8 (14,6)	23,1 (17)
M 10	39 (28,8)	45,4 (33,5)
M 12	67,8 (50)	78,8 (58,2)
M 14	107,5 (79,3)	125,1 (92,3)
M 16	164,5 (121,4)	191,4 (141,3)
M 18	230 (170)	267 (197)
M 20	321 (237)	373 (276)
M 22	431 (318)	502 (370)
M 24	553 (408)	644 (475)

Above mentioned torques are for all screwed unions, which works under dynamical load. For all other connections you can use a corresponding smaller torque.

4.6 Disassembly

4.6.1 Dismantling of the thrust bearing

Thrust bearing No.	Bearing size
0 N	7210 BECBJ
1 N	7313 BECBJ
3 N	7315 BECBJ
4 N	7317 BECBJ
5 N	7318 BECBJ
6 N	7322 BECBM
7 N	7326 BCBM
8 N	7232 BCBM 7330 BCBM

4.6.1.1 Bearing housing 3N – 8N

- 1) Remove the bearing assembly consisting of the thrust ball bearing [3013.1], bearing adaptor sleeve [2471], spacer ring [2510] and the bearing lock nut [3712] as a cartridge.
- 2) Open the bearing lock nut [3712] and pull off the thrust ball bearing [3013.1]

4.6.1.2 Bearing housing 0N – 1N

- 1) Remove the bearing assembly consisting of the thrust ball bearing [3013.1], bearing adaptor sleeve [2471] and the bearing lock nut [3712] as a cartridge.
Open the bearing lock nut [3712] and pull off the thrust ball bearing [3013.1].

4.7 Assembly

Ensure threads, gasket and O-ring mating faces are clean.

4.7.1 Assembly of the thrust bearing

Thrust bearing No.	Bearing size
0 N	7210 BECBJ
1 N	7313 BECBJ
3 N	7315 BECBJ
4 N	7317 BECBJ
5 N	7318 BECBJ
6 N	7322 BECBM
7 N	7326 BCBM
8 N	7232 BCBM 7330 BCBM

4.7.1.1 Bearing housing 3N – 8N

- 1) Heat up the first angular contact bearing, and put it on the bearing adaptor sleeve [2471] as shown in the section drawing.
- 2) Install the spacer ring [2510]. Warm up the other two bearings and install it according to the section drawing. Put on the lockwasher [6541] for bearing nut and the bearing lock nut [3712]. After tightening secure the bearing lock nut [3712] with the lockwasher [6541] for bearing nut.

4.7.1.2 Bearing housing 0N – 1N

- 1) Heat up the two bearings and install it according to the section drawing.
- 2) Put on the lockwasher [6541] for bearing nut and the bearing lock nut [3712]. After tightening secure the bearing lock nut [3712] with the lockwasher [6541] for bearing nut.

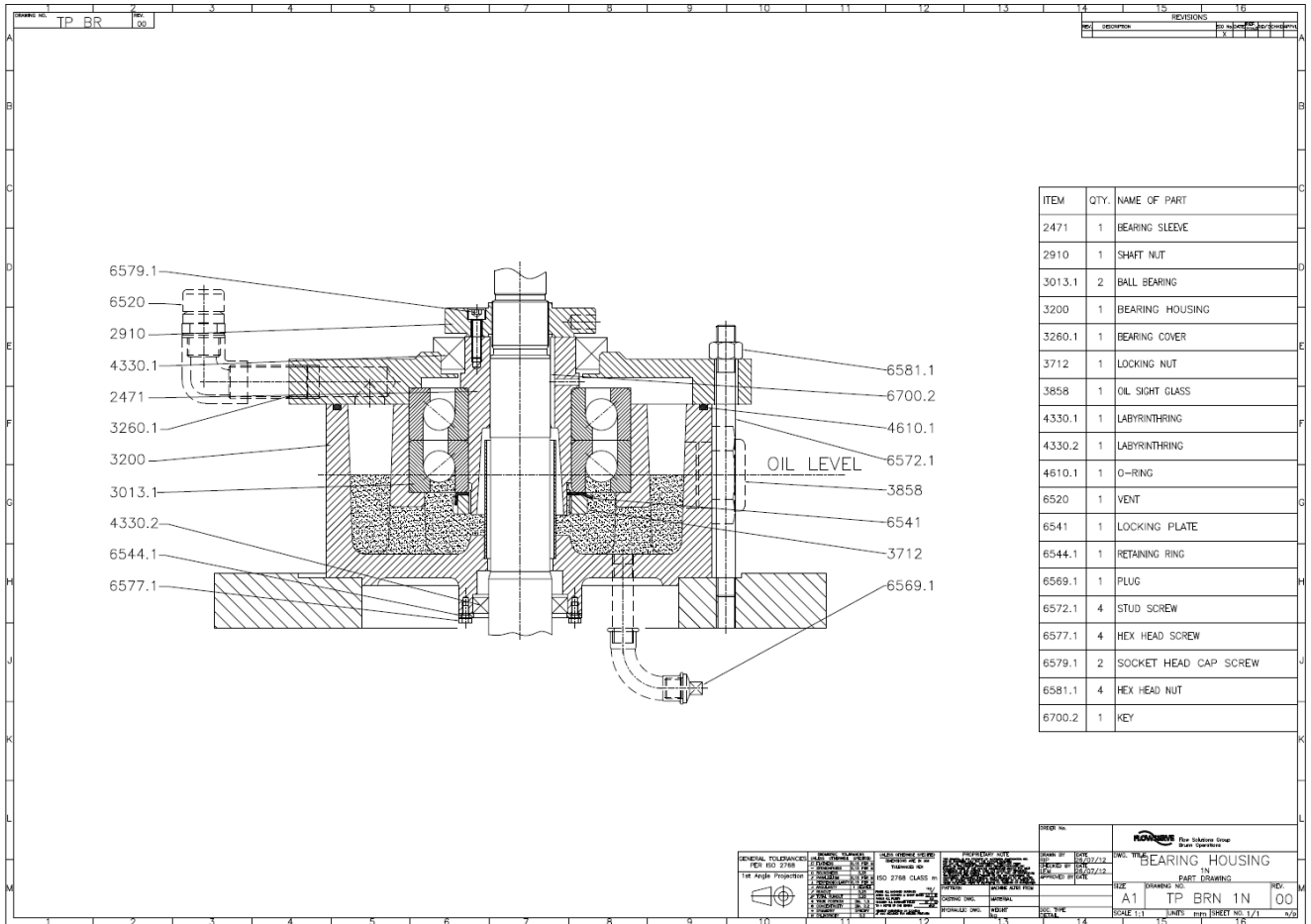
5.0 FAULTS; CAUSES AND REMEDIES

FAULT SYMPTOM

↓	Bearings have short life	
	PROBABLE CAUSES	POSSIBLE REMEDIES
	MECHANICAL TROUBLES	
●	Shaft bent.	Check shaft runouts within acceptable values
●	Rotating part rubbing on stationary part internally.	Check for signs of this and consult Flowserve if necessary
●	Bearings worn	Replace bearings
●	Shaft running off center because of worn bearings or misalignment.	Check misalignment and correct if necessary. If alignment satisfactory check bearings for excessive wear
●	Excessive grease in ball bearings.	Check method of regreasing
●	Lack of lubrication for bearings.	Check hours run since last change of lubricant, the schedule and its basis
●	Improper installation of bearings	Check method of assembly, possible damage or state of cleanliness during assembly and type of bearing used
●	Damaged bearings due to contamination.	Check contamination source and replace damaged bearings
●	ELECTRICAL TROUBLES	
●	Motor running too slow,	Check motor terminal box connections

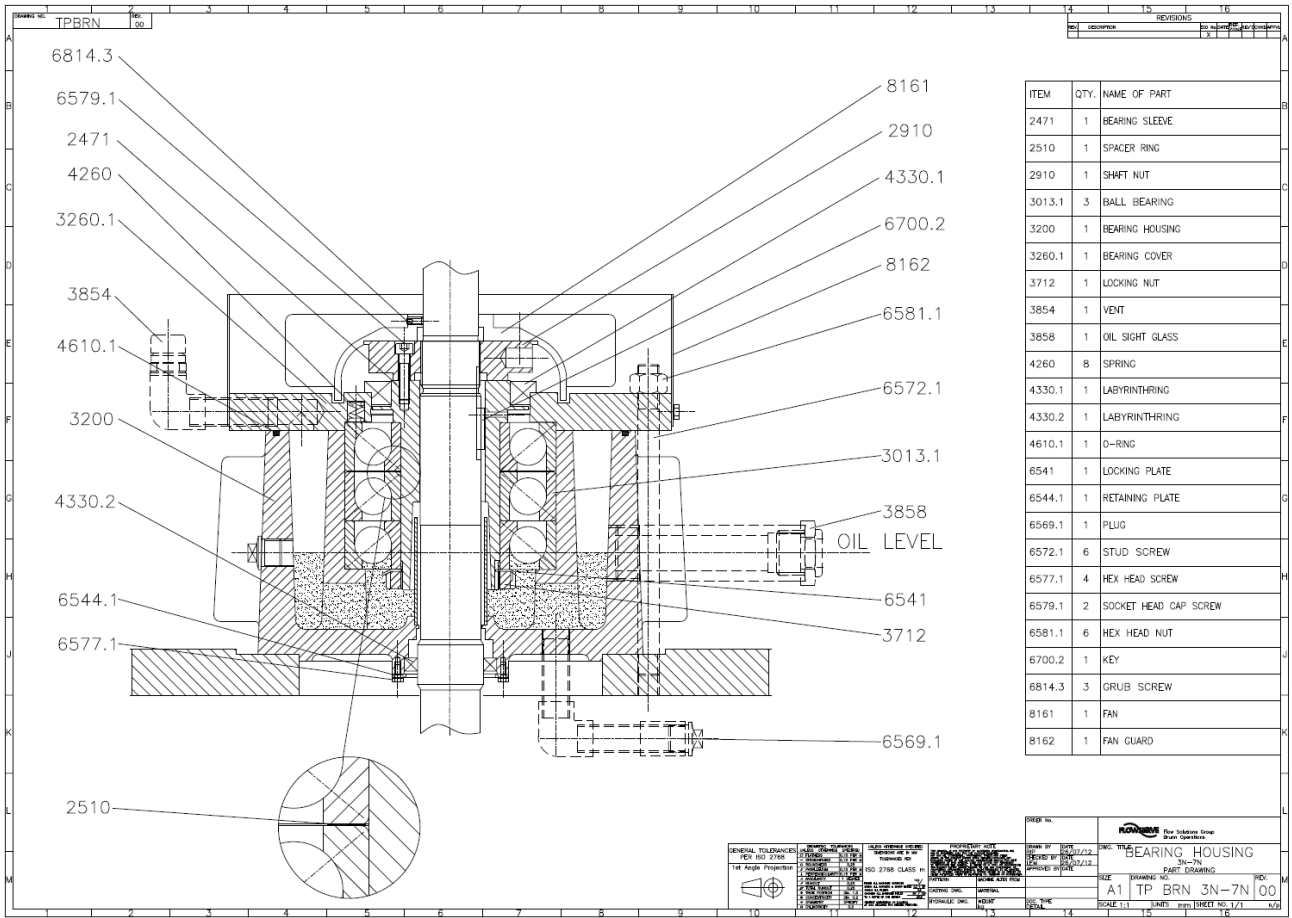
6.0 PARTS LIST AND DRAWINGS

6.1 Assembly 0N-1N



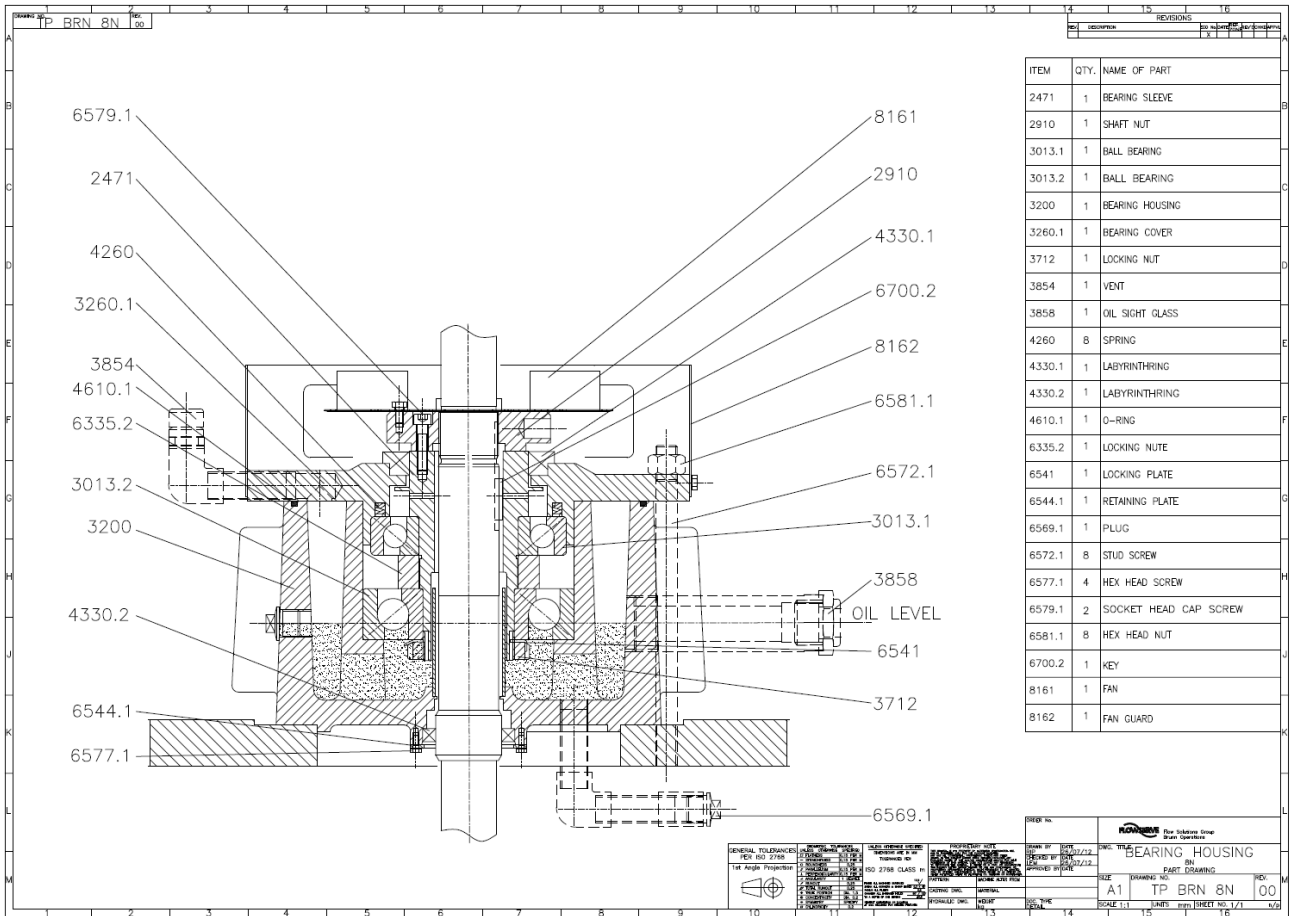
Note: For 2 pole speed the bearing assembly is delivered with axial fan. No cowl is required.

6.2 Assembly 3N-7N



Note: The standard design is delivered with radial fan. For that design a cowl is necessary. For special customer requirements (e.g. temperature limits below the API 610 limits) axial fan may be installed that do not require cowl.

6.3 Assembly 8N



Note:

The standard design is delivered with radial fan. For that design a cowl is necessary. For special customer requirements (e.g. temperature limits below the API 610 limits) axial fan may be installed that do not require cowl.

7.0 CERTIFICATION

Certificates determined from the contract requirements are provided with these instructions where applicable. Examples are certificates for CE marking, ATEX marking etc. If required, copies of other certificates sent separately to the Purchaser should be obtained from the Purchaser for retention with these User Instructions.

8.0 OTHER RELEVANT DOCUMENTATION AND MANUALS

8.1 Supplementary user instructions

Supplementary instructions determined from the contract requirements for inclusion into user Instructions such as for a driver, instrumentation, controller, sub-driver, seals, sealant system, mounting component etc are included in the Data Book. If further copies of these are required they should be obtained from the supplier for retention with these user instructions.

Where any pre-printed set of user instructions are used, and satisfactory quality can be maintained only by avoiding copying these, they are included at the end of these user instructions such as within a standard clear polymer software protection envelope.

8.2 Change notes

If any changes, agreed with Flowserve, are made to the product after its supply, a record of the details should be maintained with these User Instructions.

8.3 Additional sources of information

Reference 1:

NPSH for Rotodynamic Pumps: a reference guide, Europump Guide No. 1, Europump & World Pumps, Elsevier Science, United Kingdom, 1999.

Reference 2:

Pump Handbook, 2nd edition, Igor J. Karassik et al, McGraw-Hill Inc., New York, 1993.

Reference 3:

ANSI/HI 1.1-1.5
Centrifugal Pumps - Nomenclature, Definitions,
Application and Operation.

Reference 4:

ANSI B31.3 - Process Piping.

8.4 Abbreviations

Quantity	ISO unit	ISO unit abbreviation	Multiplication Factor ¹	US unit	US unit Abbreviation
Area	square meter	m ²	10.764	square feet	ft ²
	square centimeter	cm ²	0.155	square inch	in. ²
Capacity or Flow rate	Cubic meter/hour	m ³ /h	4.4033	US Gallons/minute	US gpm
Force	Newton	N	0.2248	Pound force	lbf
Head	meter	m	3.28084	feet	ft
Heat Energy	kilo joule	kJ	0.9478	British thermal unit	Btu
Length	meter	m	3.28084	feet	ft
	millimeter	mm	0.03937	inch	in.
	micrometer	µm	0.00003937	inch	in.
Mass	kilogram	kg	2.20462	pounds	lb.
	gram	g	0.035274	ounces	oz.
Moment of Inertia	kilogram square meter	kg.m ²	23.73	pounds square feet	lb.ft ²
Noise ⁴	decibel	dBA			
Power	kilowatt	kW	1.34102	horsepower	hp
Pressure ²	bar	bar	14.5	pounds/in. ²	psi
Rotational Speed	revs per minute	r/min			
Stress	Newton/square millimetre	N/mm ²	145.0	pounds/in. ²	psi
Temperature	degrees Celsius	°C	(1.8 x °C) + 32	degrees Fahrenheit	°F
Torque	Newton meter	Nm	0.7376	pound.feet	lbf.ft
Unbalance	gram millimeter	g.mm	0.001389	ounce-inch	oz-in.
Velocity	meter/second	m/s	3.28084	feet/second	ft/sec
	millimeter/second	mm/s	0.03937	inches/second	in./sec
Vibration ³	millimetre/second	mm/s	0.03937	inches/second	in./sec
Viscosity	square millimetre/second or centiStoke	cSt			
Volume	cubic meter	m ³	264.2	US Gallons	US gal.
	liter	l	33.81	fluid ounce	Fl.oz.

¹ multiply the ISO unit by the multiplication factor to obtain US units

² where pressure is not stated to be absolute it is gauge

³ where not stated to be peak it is r.m.s.

⁴ sound pressure level LpA, re 1m - 20microPa, or sound power level LwA re 1 pW when sound power is applicable

AFTERSERVICE DIRECTORY

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MESSAGES CAN BE LEFT ALSO ON OUR ANSWERING MACHINE

IMPORTANT NOTES:

PLEASE NOTE, THAT WARRANTY EXPIRES:

- USE OF NON GENUINE FLOWSERVE AUSTRIA PARTS FOR MAINTENANCE AND REPAIRS
- NO USE OF OUR SERVICE PERSONAL IN CASE OF REPAIRS DURING WARRANTY PERIOD

RECOMMENDATION:

- PLEASE ASK FOR OUR SPECIAL RATES
- PLEASE ALSO ASK OUR SERVICE PERSONAL ABOUT REPAIRING AND SERVICING YOUR PUMPS AFTER THE WARRANTY PERIOD

Please quote your service:

Name of Company:
Contact person:.....
Telephone:
Fax:
e-mail:
Country:

Pumpdata:
Type:
Serialno.:

Your Flowserve factory contacts:

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Austria

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