Operating Instruction Pumps

Туре

Serial No.



EDUR-Pumpenfabrik Eduard Redlien GmbH & Co. KG Postfach 1949 · D-24018 Kiel Tel. (+431) 689868 · Fax (+431) 6898800 E-mail: <u>info@edur.de</u> · http://www.edur.de

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General

The most important operational data are mentioned on the type label. The sound pressure L_{pA} following VDI-guidelines 3743 sheet 1 depending on the nominal pump power input P will be seen



from the diagram underneath.

Fig. Noise emission

The actual sound level ascertained at place of installation will possibly differ considerably from these values due to the operating conditions and the conditions of installation.

1 Security

This operating manual gives basic instructions which are to be observed during installation, operation and maintenance of the pump. it is therefore imperative that this manual be read by the responsible personnel/operator prior to assembly and commissioning. It is always to be kept available at the installation site.

It is not only the general safety instructions contained under this main heading safety that are to be observed but also the specific information provided under the other main headings.

1.1 Identification of Safety Instructions in the Operating Manual

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





Instructions non-compliance with which would give rise to malfunctioning of the machinery are identify by the word

CAUTION

It is imperative that signs affixed to the machine, e. g.

- arrow indicating the direction of rotation
- symbols indicating fluid connections

be observed and kept legible.

1.2 Qualification and Training of Operation Personnel

The personnel responsible for operation, maintenance, inspection and assembly must be adequately qualified. Scope of responsibility and supervision of the personnel must be exactly defined by the plant operator. If the staff does not have the necessary knowledge, they must be trained and instructed, which may be performed by the machine manufacturer or supplier on behalf of the plant operator. Moreover the plant operator is to make sure that the contents of the operating manual are fully understood by the personnel.

1.3 Hazards in the Event of Non-Compliance with the Safety Instructions

Non-compliance with the safety instructions may produce a risk to the personnel as well as to the environment and the machine and results in a loss of any right to claim damages.

For example, non-compliance may involve the following hazards:

- Failure of important functions of the machine/plant
- Failure of specified procedures of maintenance and repair
- Exposure of people to electrical, mechanical and chemical hazards
- Endangering the environment owing to hazardous substances being released

1.4 Compliance with Regulations Pertaining to Safety at Work

When operating the pump, the safety instructions contained in this manual, the relevant national accident prevention regulations and any other service and safety instructions issued by the plant operator are to be observed.

1.5 Safety Instructions relevant for Operation

- If hot or cold machine components involve hazards, they must be guarded against accidental contact.
- Guards for moving parts (e.g. coupling) must not be removed from the machine while in operation.
- Any leakage of hazardous (e.g. explosive, toxic, hot) fluids (e.g. from the shaft seal) must be drained away so as to prevent any risk occurring to persons or the environment. Statutory regulations are to be complied with.
- Hazards resulting from electricity are to be precluded (see, for example, the VDE Specifications and the bye-laws of the local power supply utilities).

1.6 Safety Instructions relevant for Maintenance, Inspection and Assembly Work

It shall be the plant operator's responsibility to ensure that all maintenance, inspection and assembly work is performed 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 shall only be performed when it is at a standstill, it being imperative that the procedure for shutting down the machine described in this manual be followed.

Pumps and pumps units which convey hazardous media must be decontaminated.

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

Prior to restarting the machine, the instructions listed under Initial commissioning are to be observed.

1.7 Unauthorized Alterations and Production of Spare Parts

Any modifications may be made to the machine only after consultation with the manufacturer. Using spare parts and accessories authorised by the manufacturer is in the interest of safety. Use of other parts may exempt the manufacturer from any liability.

1.8 Unauthorized Modes of Operation

The reliability of the machine delivered will be only guaranteed if it is used in the manner intended, in accordance with our order documentation, especially with the order confirmation.

The limit values specified in the data sheet must under no circumstances be exceeded.

2 Transport and Intermediate Storage

2.1 Transport

When transporting the complete pump unit by crane, mount the ropes as shown in the figure.

CAUTION The crane facility and the ropes must be of sufficient capacity. The ring loop of the motor must not be used for transport of the complete pump unit.



Fig. 2.1a Pump and Motor

2.2 Intermediate Storage

On delivery, all pumps are preserved. Thus, they can be stored for 6-12 months. If the storage time is longer or the pumps are not in operation, they must receive additional preservation on the inside. The preservation means (please consult us) depends on the used materials and conditions of operation.

The storage room must be roofed and well ventilated. Avoid temperatures below zero and high humidity.

2.2.1 Internal Preservation

Close the suction branch securely. Fill the pump with the preservation means and slowly turn the rotor manually. Close the pressure branch securely.



2.2.2 Preservation Control

Check the filling level of the pump and turn the rotor by hand at regular intervals of 3 months. Refill preservation means, if necessary.

2.2.3 Removal of Preservation

Prior to operation, the pump must be rinsed thoroughly. In the case of additional preservation, the preservation means on the inside must at first be removed.

3 Description

3.1 Design

Pump in unit-construction with or without an electric drive unit, with a common or rigidly coupled pump/motor shaft of different materials, sizes and with different shaft sealings. Self-priming pumps are provided with an inlet bend fitted at the suction branch.

3.2 Place of Operation

The pump unit must be freely accessible for the purpose of supervision, servicing, maintenance, mounting and dismounting.

Avoid using it in corrosive and very dusty surroundings.

The limiting values of the electric drive unit with regard to the insulation material class and the types of protection must be observed.

For other drive units supplied, see the enclosed separate operating instructions.

4 Mounting

4.1 Installation

In principle unit-construction type pumps can be fixed to the foundation by means of a footing. An installation by means of a mounting flange at the reservoir or the direct installation into the pipe system, independent of the position, is only permitted for pump types NUB.. and FUB... The only restrictions are the size of the pump units and the load capacity of the connecting elements. The installation position "motor faced down" is only permitted with the manufacturer's approval.

The pedestal must be even with sufficient load capacity and must have fasteners. In the case of self-priming pumps, the inlet bend must not be removed or turned around.

4.2 Connected Loads



Work must only be executed when electricity is switched off. Make sure that the system cannot be powered on accidentally.

CAUTION Prior to connecting the pump to the power system, fill it with pumped liquid. The pump must by no means be operated without liquid!

The pump must be connected according to international national requirements as well as according to the requirements of the local mains system. Voltage and frequency must correspond to the winding of the electric drive. For details of the respective winding, see the type label.

The motor must not be operated without motor protection facility.

For motors with explosion protection, the range of temperature of the motor indicated on the type label must correspond to the range of the fuel gas.

4.3 Direction

Switch on the motor briefly in order to check the direction of rotation. The motor must not reach its operational speed. The direction of rotation must correspond to the arrow indicating the direction of rotation on top of the pump. If the direction of rotation is not correct, perform the relevant modifications at the phase-sequence

4.4 Coupling Protection

The pump must not be operated if coupling protection is not fitted. If this coupling protection is not supplied by the manufacturer, the operator of the pump must supply it himself.

4.5 Piping

4.5.1 General Remarks

The nominal widths of the pipes must be at least as wide as those of the pump connection joints.

For adapters, use extension angles of 8° , if possible.

The pipes must be gathered and secured right in front of the pump so that their weight does not affect the pump. The negative effects of variations in temperature and occurring oscillation may be reduced by installing a suitable bellow expansion joint (see section 4.6).

Measuring equipment for supervision of the pump operation is required.Prior to operation, all parts in contact with liquids must be thoroughly cleaned.

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4.5.2 Suction Pipeline

The suction pipeline must be as short as possible. Variations in diameter and additional piping must be kept to a minimum. The suction pipeline towards the pump must be rising, the inlet must be descending to prevent an air pocket from being formed. For non-self-priming pumps, installation of a foot valve into the suction pipeline is compulsory in order to avoid that, in case of a standstill, the pump and the suction pipeline run out of liquid during suction operation.

Contamination of the pumped liquid is to be avoided by using a suction hose or a filter. By no means must air penetrate through the liquid level via the suction hose or dirt be whirled up from the liquid pool. Clean the suction hose and filter regularly.

To close the suction pipeline in the case of mounting or maintenance work, a stop valve must be provided near the pump. The stop valve must not be used for adjustment and must be completely open during operation.

453 Pressure Pipeline

For adjustment, repair and mounting of the pump, a stop valve is to be provided near the pressure ioint.

4.5.4 Additional Connections

For the position and dimension of required additional connections as e.g. for rinse, stop and guench liquid, refer to the labels supplied with the pump or to the drawings in the operating instructions. The rinse, stop and quench liquids must be checked at regular intervals.

Connections for ventilation and release of the leakage liquid are also described in the drawings.

4.6 Low-Noise Installation

A reduction in noise can be achieved by isolating the pedestal (2) from the ground by means of an appropriate insulation board (3) and by using suitable bellow expansion joints (4) between the piping (5) and the pump (1) (fig. 4.6a). The pedestal (2) must not be secured to the around or to the walls.



Fig. 4.6a Low-Noise Installation

Another possibility to reduce the noise is the use of oscillation absorbers. In this case, you need to install a frame under the base of the pump.



Bellow expansion joints must be checked regularly for brittle and cracks.

Starting Operation/ Stopping Opera-5 tion

5.1 Preparations for Initial

Prior to the start, the pump and the suction pipeline must be drained of air and be completely filled with the pumped liquid. The stop valve in the suction or inlet pipeline must be completely open, if there is one. For self-priming pumps, the pump must only be completely drained of air and filled with the pumped liquid.

52 **Initial Starting**

The pump must not be started until the outlet stop valve is closed so as to avoid overload of the motor. Immediately after reaching the operational speed, slowly open the stop valve of the pressure pipeline and adjust the operating point.

Until the liquid starts moving against atmospheric pressure, the hydrostatic pressure for self-priming pumps must not exceed 1 bar with reference to the difference in height between suction and outlet liquid level and to the density of the pumped liauid.



The pump must never be operated for a longer period if the outlet stop valve is closed. The pump unit will be damaged if the pumped liquid exceeds the permitted temperature.

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5.3 Restarting

Do not restart the pump until the pump shaft stands still.

CAUTION Backflow of liquid must not result in a change of direction of rotation of the pump. If this is the case, mechanical seals dependent on direction of rotation may be damaged.

5.4 Stopping Operation

Close stop valve of the pressure pipeline. If there is a backflow stop and sufficient counter pressure in the pipeline, the stop valve can remain open. Switch off the motor and observe that it slows down smoothly. Close stop valve of the pressure pipeline.

If the pumped liquid reaches temperatures below zero and/or if longer periods of standstill occur, the pump must be drained completely and be preserved (see section 2.2.1).

6 Service/Maintenance

6.1 Supervision of Operation

Ensure that the pump runs free of vibration and smoothly

The pump must by no means be operated without liquid.

There is only a minimal or invisible loss of leakage (steam) if the mechanical seals function correctly. Do not operate the pump for a longer period with a closed stop valve.

The maximum permitted environmental temperature is 40° C. The storing temperature measured at the motor or pump casing may exceed the environmental temperature by 50°C. It must not exceed 90°C. Only operate the pump at a higher temperature with the manufacturer's approval.

We have to point out that an increased wear may occur in case of transport of abrasive / corrosive media.

CAUTION In case of corrosive / abrasive media to be pumped pressurized components have to be checked regularly in order to detect wear in time - before a damage occurs. The intervals have to comply with the liquids to be pumped and initially have to be carried out more frequently, until perceptions about the progress of wear are attained.

Installed pumps must be powered on and off briefly once a week in order to guarantee that they are ready for operation.

6.1.1 Shaft Bearing

Under normal operation conditions, replace the motor bearings after 20.000 hours of operation or at the latest after 2,5 years. In the case of bad operation conditions, as e.g. a high environmental temperature or a corrosive and dusty environment, the motor bearings must be checked at an earlier date and, if necessary, be replaced.

6.1.2 Mechanical Seal

The mechanical seals are maintenance-free. If leakages occur after a longer period of operation, replace the complete seal.

6.2 Maintenance

6.2.1 Preparation



In order to make sure that the pump cannot be started, separate the power cable from the motor. Secure the unit against accidental switch-on.

Close the stop valve of the pressure and suction pipelines. The pump casing must have reached the environmental temperature and be drained of liquid and pressure. In the case of pumps in unit-construction with mounting flange, the container must be drained completely.

6.2.2 Dismounting

By no means use force while dismounting the pump.

It is possible that the pump casing (100) remains in the pipe system. For this the nuts (920) from types NUB../FUB.. resp. The hexagon screws (901) from types CB.. have to be screwed and the motor with the other pumps part has to be pulled off from the casing cover. For motors with a base or pumps with mounting flange, the mounting screws must also be loosened.

Torque-flow impellers and closed impellers are fixed at the shaft in axial direction by means of a left-hand thread hexagon screw.

For fixed parts of the casings, impellers and couplings, use appropriate dismounting facilities.

Impellers, which cannot easily be removed from the shaft, can be pushed back from the shaft by means of two hexagon screws.

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Pump

For further dismounting of the pump note the drawings on pages 11 to 17 (only pump types NUB.. and FUB..) or the separate insert. Mark the position and sequence of the pump parts for later mounting.

Dismounting of Mechanical Seal

When replacing the mechanical seal, the pump must be dismounted.

After removal of the impeller (230), of a sealing chamber (177), if there is one, and of the shaft circlip (932) or the shaft sleeve for mechanical seal (516) for pumps with closed impellers, the complete mechanical seal is to be removed from the shaft with its cover (160) and/or mounting cover (166).

Motor

To dismount the motor, the pump must normally be completely dismounted.

For pumps with coupling, it is not necessary to dismount the pump. The complete pump can remain in the piping. First of all, remove the coupling protection (681) and loosen the hexagon screws (901.4) of the coupling. After having loosened the hexagon screws (901.1), remove the motor from the pump.

6.2.3 Mounting

General Remarks

Prior to mounting, all parts must be cleaned thoroughly. Remove remaining parts of the seals. Slight scratches and grooves on the shaft near the shaft seal and on other sealing surfaces of the casings are to be polished with linen. If this is not possible, replace the parts. Gaskets must always be renewed. Check O-rings for damage and replace them, if necessary.

Mounting is effected in the reverse order of dismounting. Heat up the coupling joints of rigid couplings to approximately 250°C prior to mounting them onto the shaft.

The starting torques for the tie bolts and locking screws non lubricated condition are displayed in fig. 6.2.3.1a.

Thread	M 10	M 12	M 14
torque Nm	30	50	75

Abb. 6.2.3.1a Starting torque

Mounting of the Motor

For initial mounting of motor and pumps with rigid coupling, first of all, remove the transport safeguards of the lantern (341) or of the intermediate flange (722), then remove the motorside coupling half (844).

Subsequently, put this part onto the motor shaft. This coupling half must be next to the motor shaft collar. Tighten screws (904.1), join motor and pump centrically without tilting them. Tighten screws (901.1) between motor and lantern (341) or intermediate flange (722) and then coupling screws (901.4).

The inner parts of the pump will CAUTION be damaged if motor and pump are connected and the motorside or pumpside coupling half has been installed incorrectly or not at all

Mounting of Mechanical Seal

CAUTION

When mounting the mechanical seals, you must proceed very carefully and with precision.

Do not touch the surfaces of the seal. Do not damage the sealing parts. To facilitate the mounting, moisten elastomer with low-surface tension water.



Mechanical seals and sealing parts with elastomer made of EP rubber must by no means come in contact with oil or grease.

The shape of spare mechanical seals may differ

from those of the installed mechanical seal. However, the dimensions of the spare mechanical seal are the same and for that reason it can be replaced.

To avoid distortion of the counter-ring, mechanical seals with double PTFE-wrapped sealing rings are additionally secured by a leading pin inside the casing. The pin must be removed when replacing the type of mechanical seals and when using a type with different O-ring material. For details of the individual types of mechanical seals observe the following procedures.

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CAUTION

Observe the enclosed, separate mounting instructions for those types of mechanical seals which

- are not listed.
- Stressed mechanical seal independent of direction of rotation with elastomer bellows (fig. 6.2.3.3a)



Fig. 6.2.3.3a

Carefully press angle collar (1) together with counter ring (2) into the counter ring fit. Twist the rotating unit (3,4,5) onto the shaft as far as the counter ring. Put on supporting ring and mount circlip (932) and/or push shaft sleeve for mechanical seal (516) onto the shaft. Stressed mechanical seal dependent on direction of rotation with conical springs (fig. 6.2.3.3b)





Insert O Ring (1) into counter ring fit and carefully press counter ring (2) into it. Push mechanical seal (3) onto the shaft as far as the counter ring. Press O Ring (4) into the mechanical seal by means of the supporting ring. The pivot of the pressure spring (6) must be situated in the groove of the mechanical seal ring. Put on locking ring (7). Mount circlip (932) and/or shaft sleeve for mechanical seal (516).

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7 Disturbance

CAUTION

To eliminate disturbance, the pump must have reached the environmental temperature and must be drained of air and pressure.

1	1 1	1 1		1	1	1 1	1	I I	I I	1	be dramed	for all and pressure.
											The chart shows a list of potentia errors which are not listed here consult us.	l errors and their possible causes. For or which have other reasons, please
Pump is blocked	Coupling fault	Heads too low	Rates of flow too low	Bearing temperature too high	Pump operates badly	Leakages at the casings	Overload of the drive	Shaft seal leaks badly	Motor protection activated	Pump is becoming too hot	Cause	Elimination
		٠	٠								completely drained of air/filled	
		•	•		•					•	Suction level too high, NPSH value of the unit too high	Completely open stop slide in the suction pipeline, check suction bag/footing valve, if necessary, increase liquid level, if neces- sary
		•	•							•	Air inclusion in the pumped liquid too high	Seal suction pipeline once again, check suction bag, increase liquid level, if neces- sary
		•	•		٠					•	Formation of air bag in suction pipeline	Change suction pipeline/attach drain valve
		•	•								Direction of rotation incorrect	Check and change phase sequence, if necessary
										٠	Rates of flow too low	Readjust operating point
		•	٠								Wear of inner parts	Replace inner parts
					٠		٠		•		Pump operates out of tolerance	Readjust operating point
								٠			Shaft seal damaged	Replace shaft seal
		•	٠								Speed too low	Increase speed ¹⁾
							٠		•		Speed too high	Reduce speed ¹⁾
						•					Connecting screws, seals	Tighten connecting screws, replace seals
				•							Pump/motor not adjusted	Replace defective parts, adjust pump/motor
											Problems via piping	Check pipe connections/pump fasten-
-				Ē	Ē		-			-	Defective bearing	ers/bearing distance of pipe clips Replace bearing
F		•	•				•		•		Density/viscosity of pumped liquid	1)
									•		Motor protection unit set incorrectly or defective	Check motor protection unit, replace it, if necessary
•											Impeller blocked	Clean interior parts from particles and impurities

¹⁾ Please consult us



8 Pump View and List of Spare Parts



When ordering spare parts, please indicate serial no., type no. and parts no. by all means.

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A: Screwed plug G¼ for vent connection and pressure gauge connection B: Screwed plug G¼ for drain C: Screwed plug G¼ for pressure gauge connection D: Screwed plug G¼ for leakage drain

indicate serial no., type no. and parts no. by all means.



8.3 NUBL 300-700





part no. designation	918 slotted countersunk head screw 920/.2 nut 930/.14 tooth lock washer 932 circlip 940/.1 key	When ordering spare parts, please indicate serial no., type no. and parts no. by all means.
rt no. designation	 2 intermediate flange 4/.1 disc type coupling 1/.14 hexagon screw 1/.6/.7 hexagon screw 2 stud 3 screwed plug 4/.1 hexagon socket set 	
bai	7 8 6 6 6 6 6 7 8 8 6 6 6 6 6	_
designation	gasket joint ring o-ring mechanical seal shaft sleeve for mechanical seal washer coupling guard	sure gauge connection on
part no.	400 411 412 433 516 554/.1/.2 681	in and pres
designation	casing cover mounting cover mounting flange sealing chamber shaft impeller lantern	ved plug G% for vent connectic ved plug G% for drain ved plug G% for pressure gaug ved plug G% for leakage drain
part no.	100 160 167 177 210 341	A: Screw B: Screw C: Screw D: Screw

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part no. designation

part no. designation

12 o-ring	33 mechanical seal	54/.1 washer	32 underlay	31 coupling guard	22/.1 intermediate flar	14/.1 disc type couplir
casing 4	cover 4.	foot 5i	shaft 51	impeller 6	lantern 7	ioint rina
100	160	182	210	230	341	111

A: Screwed plug G¼ for vent connection and pressure gauge connection B: Screwed plug G¼ for drain C: Screwed plug G¼ for pressure gauge connection D: Screwed plug G¼ for vent connection lange Ipling Ś ת 2

part no.	designation	part no.	designation
901/.14 901/.6/.7 903 904/.1 905	hexagon screw hexagon screw screw plug hexagon socket set screw tie bolt	914 920 930/.14 932 940/.1	hexagon socket h cap screw nut tooth lock washer circlip key

hexagon socket head

When ordering spare parts, please indicate serial no., type no. and parts no. by all means.

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Declaration of Conformity As defined by machinery directive 98/37/EC Annex II A

Herewith we declare that the pump unit supplied with mounted electric drive¹⁾ complies with the following provisions applying to it

EC-machinery directive (98/37/EC, Annex I No. 1)

EC-low voltage directive (73/23/EEC)

Applied harmonized standards

EN 809 EN 292-1 EN 292-2 EN 294 EN 953 EN 60204-1 section 16 EN 60034-5

In case of a modification of the pump unit without being coordinated with us this declaration will not longer be valid.

i.A. (QM-Supervisor)

1) other driving motor see separate declaration of conformity

Declaration by the manufacturer As defined by machinery directive 98/37/EC, Annex II B

Herewith we declare that the pump supplied without driving motor is intended to be incorporated into machinery or assembled with other machinery to constitute machinery covered by this directive and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the directive, version 98/37/EC.

Applied harmonized standards

EN 809 EN 292-1 EN 292-2

Incase of a modification of the pump without being coordinated with us this declaration will not longer be valid.

i.A.

(QM-Supervisor)