



Operating Instruction
for vertical Segmental Type
Pumps CV · ECV



Please keep your Operating Instruction in a safe place! Translation of the original operating instructions!

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Translation

When shipping to EEA Countries, the operating instructions are to be translated into the respective language of the country where the device is to be used. In the event that discrepancies arise in the translated text, the original operating instructions (German) are to be consulted or the manufacturer is to be contacted in order to clarify the discrepancy.

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1 General information

The most important operating data can be found on the identification plate. **It must be ensured that the pump type and all technical data correspond to the system / machine project data.** It must be observed that the electric motor is provided with its own identification plate complete with additional technical data. The motor data must also correspond with the system / machine project data.

The separately enclosed operating instructions are also to be observed when dealing with pumps in accordance with EC Directive 94/9/EC (ATEX). These instructions contain additional instructions and requirements with regards to the correct and proper use of pumps in potentially explosive areas.

The pumps may not be commissioned until the following points have been observed / ensured:

- Inappropriate physical and mental strain placed upon the operation staff must be reduced to an absolute minimum level by taking ergonomic principles in to account.
- A safe working environment must be guaranteed. Controls are to be designed and constructed in such a manner that no hazardous situations can occur. Furthermore, such situations may not occur even in the event of faults / breakdown of the control. In particular, the pump may not be unintentionally started. It must also be the case that the supply / discharge lines to and from the pump can also be closed.
- It must be guaranteed that the pump can be safely stopped. Irrespective of the type of operation, the EMERGENCY STOP function must be available and ready for operation at all times. In doing so, it must be taken into consideration that equipment connected to the pump can also be stopped in the event that a hazard can occur if such equipment continues to be operated.
- The supply / discharge lines must be able to withstand the possible internal and external pressure loads
- By implementing suitable precautions, it must be ensured that no injuries can occur by touching the pumps, e.g. with regards to extreme temperatures.

- When conveying materials that pose a hazard to health / environment, it must be ensured that these materials can also be collected and taken away safely. Any risk with regards to inhalation, ingestion as well as contact with the eyes, skin and mucus membranes must be prevented.

1.1 Manufacturer

EDUR - Pumpenfabrik
Eduard Redlien GmbH & Co. KG

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1.2 Design

Your product is a vertical multi-stage non-self-priming pump designed for coupling to standard electric motors.

The abbreviations CV/ECV identify a wide range of vertical multistage pumps with in-line ports, sized for nine nominal flow rates (CV 1, 3, 5, 10, 15 and 20 and ECV 32, 45, 64 m³/h), and a various number of stages, designed to satisfy the most varied requirements for pressure; they are available either as an electric pump (pump and motor) or pump alone.

1.3 Use for which Pumps are designed

The pump is designed for:

- civil and industrial water distribution systems
- washing systems
- water treatment
- fire systems
- cooling systems
- pressurisation systems
- irrigation systems

1.3.1 Use of drinking Water

The product is constructed with materials suited for pumping drinking water. Before being used, the pump must be run with clean water at its nominal flow rate for the time indicated in the following table:

CV 1+3	min.60min.	ECV 32	min.15min.
CV 5+10	min.30min.	ECV 45	min.15min.
CV 15+20	min.15min.	ECV 64	min.15min.

1.4 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.

The most important operational data are mentioned on the type label.

Pump Specifications

	U.M.	CV	ECV
Max. temperature of liquid pumped	°C	depends on the mechanical seal	
Max. qty. / max. size of solids	Ppm/mm	50 / 0,1 ÷ 0,25	
Max. working pressure	MPa ¹⁾	1,6 ÷ 2,5	1,6 ÷ 3,0
Delivery diameter	*	G 1" ÷ ø100mm	
Suction diameter			

¹⁾ 1MPa = 10bar

* = threading according to ISO 228

Motor Specifications

	U.M.	CV	ECV
Type		asynchronous motor	
IP rating	IP	55	
Max. starts per hour		N. ° 100 60 30 15 8	kW ≤ 0.55 0.75÷3.0 4÷9.2 11÷22 30÷37 30÷37
Insulation class and temperature rise		F (classe B for temperature rise)	
Type of duty		Continuous S1	
Ratings		See motor rating plate	

Information on Airborne Noise

Power [kW]	Motor size	50Hz		60Hz	
		LpA [dB]**	LwA [dB]*	LpA [dB]**	LwA [dB]*
0,37	71	<70	-	<70	-
0,55	71	<70	-	<70	-
0,75	80	<70	-	<70	-
1,1	80	<70	-	<70	-
1,5	90S	<70	-	<70	-
2,2	90L	<70	-	<70	-
3,0	100L	<70	-	71	81
4,0	112M	<70	-	73	83
5,5	132S	72	82	77	88
7,5	132S	72	82	77	88
11,0	160M	74	84	79	90
15,0	160M	74	84	79	90
18,5	160L	74	84	79	90
22,0	180M	78	89	82	93
30,0	200L	78	89	83	94
37,0	200L	78	89	83	94

The table gives maximum sound emission values for motor-driven pumps.

* Sound pressure level - Mean value of measurements taken one metre from the pump. Tolerance ± 2.5 dB.

** Sound power level. Tolerance ± 2.5 dB.

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.

Increased noise emissions may be caused by cavitation, faulty / worn bearings or vibrations. Installation, maintenance and service instructions are to be observed.

2 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.

Important Protections and Cautions



All products are designed with guards over their moving parts. The manufacturer declines any responsibility in the event of damages caused by the removal of said protections.

Each conductor or powered part is electrically insulated with regards to earth. Extra security is also added by connecting the accessible conducting parts to an earth conductor. This ensures that accessible parts cannot become dangerous should the main insulation become faulty.



In electric pumps, possible restart without warning due to automatic rearming of the motor protection device, should the latter have been tripped due to motor overheating.

2.1 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:



see DIN 4844-W9

or where electrical safety is involved, with



see DIN 4844-W8

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.

2.2 Qualification and Training of Operating 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.

2.3 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.



Injuries to hands can occur during maintenance and repair works. Ensure that all safety instructions are observed.

Danger areas on the pump

During maintenance and cleaning work, an area measuring approximately 1 m around the pump will serve as a danger area. This area may also be increased in size in the event of faults. The operating area is only located at the operation elements.

2.4 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.

2.5 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)

2.6 Sicherheitshinweise für Inspektions-, Wartungs- und Montagearbeiten

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.

Replacement parts that have not been supplied by the manufacturer are not tested and not approved for use. The installation and usage of such replacement parts can have a negative impact upon the pump characteristics.

CAUTION

The manufacturer is not liable for any damages caused by the usage of non-original parts.

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.

2.7 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.

2.8 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. The pump may only be operated in the authorised curve range.



Improper use of the pump is hazardous and can result in personal injury and damage to property.

Improper use of the product may void the warranty.

The pumps may not be used for:

- dirty water
- highly acidic water
- corrosive fluids
- water at temperatures higher than indicated in "TEC HNICAL DATA"
- sea water
- flammable/explosive fluids
- fluids incompatible with the pump's materials
- installation outdoors without protection against atmospheric agents
- dry running

3 Transport

The pump unit must be transported in a level or horizontal manner.

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.



A pump that is insufficiently secured can lead to persons being seriously injured.

Hoisting equipment and slinging belts are to be sufficiently measured for the entire weight of the pump. If necessary, ensure that the pump is secured during transport with the use of appropriate slinging equipment. The pump is only to be positioned on a surface that is sufficiently solid and is level in all directions.



Apply established accident prevention regulations. Crushing hazard. The product may be heavy; use proper lifting equipment and work apparel.

The product is packed in a cardboard box, with handles on request. If its weight and size demand it, it will be packed on a wooden pallet.

Handling the electric pump:

To move the pump from its horizontal packed position, simply attach a suitable strap securely to the motor and lift it slowly with a hoist while checking that the load remains balanced.

Check that the product is properly secured to the motor and that it cannot tip over or fall.

Handling the pump alone:

Follow the same procedure as for the electric pump; in this case, the strap must be attached to the motor mount.

3.1 Storage

- The product must be stored in a covered and dry place, far away from heat sources and protected against dirt and vibrations.
- Protect the product against damp conditions, heat sources and mechanical damage.
- Do not place heavy objects on the packaging.
- The product must be stored at an ambient temperature between +5°C and +40°C (41°F – 104°F) with a relative humidity of 60%.

4 Assembling the Motor to the Pump



Installation must be carried out by a qualified engineer.

Free the pump from the packaging and lift it and lower it with suitable lifting gear in compliance with safety rules. Note that the motor's lifting hooks are not suitable for lifting the motor-driven pump.



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

CAUTION

The following procedure must be done with the unit disconnected from its electrical power supply.

- Position and secure the pump vertically on a flat, rigid surface.
- Unscrew the 4 bolts, remove the two coupling protections and the locking insert.
- Slacken off the half-coupling bolts.
- Remove the motor key.
- Fit the half-key into the slot in the motor shaft.

The half-key should not protrude from the slot in the motor shaft.

- Set the motor vertically with its shaft downwards and place it over the pump
- Insert and evenly tighten down the 4 motor bolts
- Use two screwdrivers to lever between the coupling and motor mount so that the coupling is snug against the shaft
- Tighten the coupling bolts evenly down to the specified torque
- Rotate the coupling by hand to check that the gap between the two half-couplings is even
- Provisionally hook up the suction and delivery lines, then open the delivery valve
- Charge the pump with water as described in Chapter 6
- Assemble the two coupling protections (4 bolts)
- Hook the motor up to its power supply as described in Chapter 5
- Run the electric pump for a few minutes
- Check that its running noise and vibration are normal
- Shut off power to the motor and wait for the coupling to come to a standstill.

18. Unscrew the 4 bolts and remove the two coupling protections.
19. Inspect the interior of the mount for water. If you find any water, drain the pump and reposition the coupling.
20. Assemble the two coupling protections (4 bolts)
21. Hook up the delivery and suction lines definitively.
22. The electric pump is now installed

4.1 General Installation Precautions

CAUTION Remove the delivery and suction caps before hooking the product up to the lines.

- a) Use metal or rigid plastic pipes in order to avoid their yielding because of the depression created at suction;
- b) support and align pipes so that they do not put any stress on the pump;
- c) avoid throttlings caused by bending suction and delivery hoses;
- d) seal any piping connections: air infiltration in the suction pipe negatively affects pump operation;
- e) we recommend that a non-return valve and a gate are installed on the delivery pipe at the motor-driven pump outlet;
- f) fix the piping to the reservoir or to any fixed parts so that it is not supported by the pump;
- g) do not use a lot of bends (goosenecks) and valves;
- h) on PUM PS installed above head, the suction pipe should be fitted with a foot valve and filter in order to prevent foreign matter from entering and its end should be immersed at a depth that is at least twice the diameter of the pipe; its distance from the bottom of the reservoir should also be one and a half times its diameter. For suction longer than 4 metres use an oversized pipe (1/4" wider at suction for improved efficiency).

4.1.1 Installation

- a) Position the pump on a flat surface that is as close as possible to the water source. Leave enough space around the pump to allow safe use and maintenance. A free space of at least 100 mm must be kept in front of the cooling fan of surface pumps in all cases;
- b) use pipes of suitable diameters fitted with threaded sleeves that must be screwed onto the pump suction and delivery unions or its threaded counterflanges.

4.1.2 Positioning the Product

CAUTION

Install the pump in a ventilated area protected from the elements (rain, frost.....).

Bear in mind the ambient temperature and altitude ranges given in chap 11.2.

Place the pump away from walls, the ceiling or other obstacles so that the pump can be fastened, operated and serviced safely. The pump must be installed upright only.

4.1.3 Fastening Down

Bolt the pump on to a concrete base or suitable metal structure. If the concrete base is an integral part of the reinforced concrete structure of buildings with occupants, we recommend using anti-vibration supports so as not to disturb anybody. When fastening, use a drill bit to mark the centres of the 4 holes in the base of the pump on the surface it is due to be installed on. Move the electric pump temporarily and use a drill to make 4 holes (dia. 12 for CV 1, 3, 5, 10, 15, 20 pumps and dia. 14 for ECV 32,45, 64 pumps). Move the pump back into position, line it up with the pipes and tighten the screws all the way. The position of the fastening holes is also illustrated in chap. 11.6.

4.1.4 Pipework

In addition to the instructions given below, also comply with the general instructions found in sect. 11.7 of the manual and with the directions in the fig. 1.



Pipework must be sized to withstand the pump's maximum working pressure.

CAUTION

Observe the conveying and connection direction (suction / pressure flange) of the pump. An incorrect conveying direction of the pump can lead to system faults.

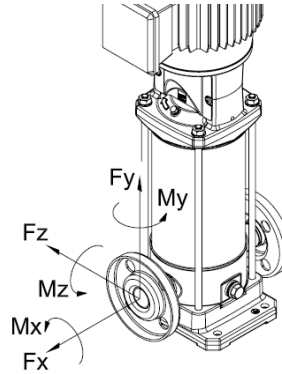
CAUTION

Hot and discharged conveyed materials pose a risk to life. Do not exceed the permitted pipe line forces

On the delivery line, before the nonreturn valve and isolating valve, we recommend you also install a pressure gauge. Use suitable supports for the suction and delivery lines so that they do not subject the pump's flange to too much stress. If the pump is installed with a suction lift arrangement (level of liquid lower than the pump) and it feeds an open circuit, you will need to install a foot valve at the end of the suction line. In this case it is advisable to use a hose connected to the pump.

CAUTION Make sure that the sum of the difference in height between the water and suction port and pressure losses along the suction line is lower than the pump's theoretical suction lift. Water temperature and altitude also have a negative effect on the pump's theoretical suction lift. If the sum of the various factors affecting suction lift exceeds the actual pump's theoretical suction lift, we are faced with the cavitation problem, which compromises hydraulic performance and results in damage to some of the pump's vital parts. Chap. 11.5 Gives specific information on how to check that the pump's operation is not being affected by cavitation.

4.2 Flange Loading and Tightening Torques



Flange tightening torques

Model			Flange DN	Bolt	n. Bolt	Tightening torque [Nm]
CV	1	N	25	M10	2	30
CV	1	F	25	M12	4	50
CV	1	LF	25	M12	4	50
CV	3	N	25	M10	2	30
CV	3	F	25	M12	4	50
CV	3	LF	25	M12	4	50
CV	5	N	32	M10	2	30
CV	5	F	32	M16	4	70
CV	5	LF	32	M16	4	70
CV	10	N	40	M12	2	50
CV	10	F	40	M16	4	70
CV	10	LF	40	M16	4	70
CV	15	N	50	M12	2	50
CV	15	F	50	M16	4	70
CV	15	LF	50	M16	4	70
CV	20	N	50	M12	2	50
CV	20	F	50	M16	4	70
CV	20	LF	50	M16	4	70
ECV	32	F	65	M16	4/8	80
ECV	45	F	80	M16	8	80
ECV	64	F	100	M16	8	80
ECV	64	F	100	M20	8	100

Admissible strain on the flange

Model			Flange DN	Strain X [N]	Strain Y [N]	Strain Z [N]
CV	1	N	25	230	200	180
CV	1	F	25	230	200	180
CV	1	LF	25	230	200	180
CV	3	N	25	230	200	180
CV	3	F	25	230	200	180
CV	3	LF	25	230	200	180
CV	5	N	32	270	230	210
CV	5	F	32	270	230	210
CV	5	LF	32	270	230	210
CV	10	N	40	370	330	300
CV	10	F	40	370	330	300
CV	10	LF	40	370	330	300
CV	15	N	50	490	450	400
CV	15	F	50	490	450	400
CV	15	LF	50	490	450	400
CV	20	N	50	490	450	400
CV	20	F	50	490	450	400
CV	20	LF	50	490	450	400
ECV	32	N	65	1050	925	850
ECV	32	Cr	65	2100	1850	1700
ECV	45	N	80	1250	1125	1025
ECV	45	Cr	80	2500	2250	2050
ECV	64	N	100	1675	1500	1350
ECV	64	Cr	100	3350	3000	2700

Admissible torque on the flange

Model			Flange DN	Torque X [N]	Torque Y [N]	Torque Z [N]
CV	1	N	25	190	240	160
CV	1	F	25	190	240	160
CV	1	LF	25	190	240	160
CV	3	N	25	190	240	160
CV	3	F	25	190	240	160
CV	3	LF	25	190	240	160
CV	5	N	32	230	280	190
CV	5	F	32	230	280	190
CV	5	LF	32	230	280	190
CV	10	N	40	310	390	270
CV	10	F	40	310	390	270
CV	10	LF	40	310	390	270
CV	15	N	50	340	420	300
CV	15	F	50	340	420	300
CV	15	LF	50	340	420	300
CV	20	N	50	340	420	300
CV	20	F	50	340	420	300
CV	20	LF	50	340	420	300
ECV	32	N	65	600	750	550
ECV	32	Cr	65	1200	1500	1100
ECV	45	N	80	650	800	575
ECV	45	Cr	80	1300	1600	1150
ECV	64	N	100	725	875	625
ECV	64	Cr	100	1450	1750	1250

5 Electrical Connection

- Electrical Connection must be carried out by a qualified Engineer.
- It is advisable to install a high intensity differential switch (0,03 A) on both the Threephase and Single Phase Versions.

CAUTION Motor-driven pumps not equipped with a plug must be powered by connecting them permanently to the electrical cabinet equipped with a switch, fuses and thermal cut-out calibrated to the pump's absorbed current.



Overheating damages the three-phase alternating current motor. Ensure that a sufficient supply of cool air is in place during operation.



Electrical power can lead to death. Ensure that a potential equalisation connection is in place between the pump housing and the building earthing.



Incorrect electrical switching modes will lead to the breakdown of the three-phase alternating current motor. Observe the switching mode!

The mains must be reliably earthed, according to the electrical regulations in force in the user's country: this is the installer's responsibility.

If the motor-driven pump is supplied without a power cable, use a cable that complies with the regulations in force and the necessary section according to length, power and mains voltage.



If present, the plug of the single phase version must be connected to the mains far from sprays, water jets or rain and it must be accessible.

The three phase version does not have an internal motor protector, therefore overload protection must be provided by the user.

While Connecting, make sure that both the Terminal Board and the Motor do not get wet.

- Connection of the single phase versions must be made on the basis of whether thermoamperometric protection "P" is internal or external.

5.1 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.

CAUTION The switching on / operation of opened pumps (outside of the pipe line network) is forbidden.



A rotating impeller can cut or crush hands and arms. Do not reach into the pressure or suction sockets of the pump housing. Secure the pump appropriately when carrying out a rotational direction check.



The dry operation of the pump destroys / damages the mechanical seal and leads to leakage and the discharge of the conveyed material. Ensure that the pump is switched off again immediately after the warm-up phase.



The incorrect rotational direction of the pump destroys / damages the mechanical seal and leads to leakage and the discharge of the conveyed material.

Motor Driven ECV-Series

Before starting to make electrical connections, make sure that line voltage and frequency match the motor's values given on the rating plate. You must insert a control panel between the line and the motor-driven pump featuring the following devices (unless otherwise specified by local standards):

- Switch with at least a 3mm gap between contacts
- Short-circuit protection device (fuse or thermal magnetic circuit breaker);
- High-sensitivity (0.03 A) residual current circuit breaker;
- We recommend installing a device to protect against dry running, which must be connected to a float, sensors or other such equipment;

Connect the yellow/green wire to the PE terminal first, leaving it longer than the others so that it will be the last wire to be pulled out if accidentally tugged.

If the terminal box is in an awkward position for connecting the cable, you can change its position by turning the motor 90° or 180° or 270°. To do this, you will need to remove the 4 screws fastening the motor to the sleeve, lift the motor just enough to allow rotation, without removing the coupling between the motor shaft and pump shaft. Then screw the 4 screws back in.

6 Filling the Pump

CAUTION



Do not start the pump until it has been positioned and installed in its final place of operation to be performed with the motor's terminal strip fully closed.

The pump and suction line must be filled with water. As specified earlier, running the pump without water inevitably causes serious damage to a number of the pump's internal parts. Fill the pump with the terminal box closed and the power supply disconnected.

6.1 Filling Pump in Suction Lift Arrangement

- Unscrew the hexagonal cap located above the outer jacket on a level with the upper mount (remove coupling covers if necessary);
- With the aid of a funnel, fill the suction line and pump casing with water to overflowing;
- Screw the hexagonal cap back on until it is locked tight;
- Areas that have become wet as a result of water leaks must be dried thoroughly;
- Refit the coupling covers if they have been removed;

7 Use, Starting and Running

CAUTION

Never allow the Motor-Driven Pump to operate without Water. Doing so can seriously Damage the Internal Components.

7.1 General Warnings

- Our surface pumps are designed to operate at a temperature no higher than 40°C and a level no higher than 1000 metres;
- our motor-driven pumps cannot be used in swimming pools or similar plants;
- prolonged motor pump operation with the delivery pipe closed can cause damage;
- avoid switching the motor pump on and off too frequently (check the maximum number in Chap. 11.4);
- during power cuts, it is advisable to disconnect the power to the pump.

7.2 Starting

Once the unit has been hooked up electrically and to the water circuit and charged with water, check its direction of rotation before using it!

- Start the electric pump with the delivery valve closed.
- Check that the motor rotates clockwise (starting from the fan end – the direction is also marked by an arrow on the top mount) by looking through the slots in the fan cover. This is best seen when starting or stopping the motor.
- If it is rotating in the wrong direction (counter clockwise), shut off power and swap two of the motor's power phases in the electrical enclosure or terminal block.
- Start the pump two or three times to check system conditions;
- restrict the delivery to cause a rapid pressure increase for a few times;
- make sure that the noise, vibration, pressure and electrical voltage levels are normal.

7.3 Running

Start the pump with the isolating valve on the delivery line closed, then open it gradually. The pump must operate smoothly and quietly. Close the isolating valve again and make sure that the reading on the delivery line's pressure gauge is close to the Hmax value as indicated on the rating plate. (This approximation is mainly attributable to tolerances and to possible suction lift). If the pressure gauge reading is much lower than Hmax, repeat filling (air in pump).

If the two values are close, it means the pump is working properly and any trouble with the isolating valve open is almost always a result of motor system problems of an electrical or mechanical nature or, much more commonly, of pump cavitation due to:

- excessive difference in height or excessive pressure loss along suction line,
- delivery line backpressure too low
- problems associated with liquid temperature.

For more information on the factors that reduce and/or compromise suction lift and hence the pump's performance, see the troubleshooting section in chap. 10.

Note that for temperatures and altitudes higher than those specified, the motor's output is reduced and you will need to have a motor with greater output. See chap. 11.2 on the subject.

Make sure there is no water hammer or pressure peaks in the system caused by fast-closing valves exceeding 1.5 times the pump's nominal pressure. In the long run, they can cause damage to the actual pump.

Avoid operating the pump with the isolating valve on the delivery line closed for any more than a few seconds.

You should also avoid using the pump for continuous duty with a flow rate below the minimum rate indicated on the rating plate as this may result in the liquid being pumped overheating and in the unnecessary overloading of pump or motor bearings.

7.4 Stopping

- a) Gradually interrupt water circulation in the delivery section to avoid overpressure in the piping and pump caused by water hammering;
- b) Cut off the power supply.

8 Maintenance and Repairs



Before commencing any maintenance work on the motordriven pump, turn off the power.

CAUTION

The pump is to be secured against being unintentionally switched on during maintenance and cleaning work. Work may only be carried out provided that the system / pump is in a pressure-free condition.

The electric pump has no need of scheduled maintenance; however, you should periodically check that it is running properly depending on the fluid being pumped and the operating conditions; check in particular for abnormal running noise and vibration.

Said checks may give you a rough idea of what preventive repairs are required, if any, instead of having to perform repairs following sudden problems.

The main and most common special maintenance operations are generally as follows:

- replacement of mechanical seals
- replacement of grommets
- replacement of bearings
- replacement of capacitors

Nonetheless, even these parts typically subject to wear may last a very long time if the pump is used correctly.

When the pump remains inactive for a long period, it should be emptied completely, removing the discharge and filling caps, washed carefully with clean water then emptied. Do not leave water deposits inside. This operation must always be carried out whenever there is a chance of frost in order to avoid the breakdown of the pump components.



When performing repair work, order original spare parts from our sales and customer support network.

Non-original spare parts can damage the product and are a hazard for persons and property.

9 Disposal

When scrapping the product, observe local waste disposal regulations, and do not leave any treated fluid inside it. Most of our pumps do not contain hazardous polluting material.

The user is responsible for disposing of the equipment by taking it to a collection and recycling facility authorized to dispose of electrical waste.

For further information on equipment collection points, contact your local waste disposal authority or the store that you purchased the product from.

10 Troubleshooting

Displayed Fault	Cause	Solution
<p>The Pump does not work.</p> <p>The motor does not turn.</p>	Float sticking	Check that the float reaches the level ON
	Thermal protection activated (single phase)	It reactivates automatically (single phase only)
	Incorrect electrical connection	Check the terminal board and the electrical panel
	Automatic switch triggered or fuses blown (*)	Reset the switch or replace the fuses and verify the cause
	No electricity	Check the electrical supply meter
	Plug not inserted	Check the connection to the power supply
	Built-in thermal overload protection device (if fitted) or thermal cutout in control panel tripped (*)	Wait for built-in thermal overload protection device to reset or reset thermal cutout in control panel
	Device protecting against dry running tripped (*)	Check water level and/ or correct connection of system devices

(*) If you encounter the same trouble again, call our Servicing Department

Displayed Fault	Cause	Solution	
<p>The Pump does not work.</p> <p>The motor turns.</p>	Decrease in the line voltage	Wait for voltage to return to normal	
	Suction filter / hole blocked	Pulire il filtro/foro	
	Foot valve blocked (**)	Release or clean the valve and check that it works properly	
	Pump has not been filled (**)	Fill the Pump	
	Water level low (if no protection system is fitted) (**)	Restore water level	
	Pump not primed	Prime the pump.	Check any delivery non-return valves Check the liquid level.
		Pressure too low	Restrict the delivery gate

(**) Caution: mechanical seal could be damaged

Displayed Fault	Cause	Solution
<p>The Pump works with a reduced flow rate</p>	System undersized	System undersized
	System dirty	Clean the piping, valves, filters
	Water level too low	Switch off the pump or immerse the foot valve
	Incorrect rotational direction (threephase only)	Invert the two phases
	Incorrect supply voltage	Supply the pump with the voltage indicated on the ate

Displayed Fault	Cause	Solution
The Pump works with a reduced flow rate	Leaks from piping	Check the joints
	Pressure too high	Recheck the system
PUMP STOPS AFTER RUNNING FOR SHORT TIME as a result of thermal overload protection tripping	Supply voltage outside motor's accepted range	Check whether there are excessive drops in voltage due to undersized line or cables
	Inadequate thermal cutout setting	Adjust setting to motor's rated current (see rating plate)
	Motor overload due to dense and/or viscous liquid	<ul style="list-style-type: none"> - Reduce flow rate, throttling the delivery line or replace motor with more powerful one - Check actual power absorbed by the pump based on liquid pumped
	Pump delivers liquid at higher rate than max. flow rate on rating plate	Reduce flow rate by throttling delivery line
	Panel exposed to sun or other sources of heat	Protect panel from sun or sources of heat.
	Foreign matter brakes impeller rotation	<ul style="list-style-type: none"> - Disassemble and clean pump - Call our nearest Servicing Department to do the job
	Motor bearings worn	<ul style="list-style-type: none"> - Replace bearings - In this case, motor is noisy, too

Displayed Fault	Cause	Solution
THE PUMP STOPS AFTER WORKING FOR BRIEF PERIODS	Liquid temperature too high	The temperature exceeds the technical limits of the pump
	Internal fault	Contact the nearest retailer
THE PUMP STOPS AFTER WORKING FOR BRIEF PERIODS	The difference between maximum and minimum pressure is minimal	Increase the difference between the two pressures
Pressure applications		
THE PUMP DOES NOT STOP	Maximum pressure too high	Set maximum pressure at a lower value
THE PUMP VIBRATES	Flow rate too high	Reduce the flow rate
	Cavitation	Contact the nearest retailer
	Irregular piping	Fix in a better way
	Noisy bearing	Contact the nearest retailer
	Foreign bodies sliding along the motor fan	Remove the foreign bodies
	Incorrect priming	Bleed the pump and/ or fill it again
Or is too noisy during operation		

Displayed Fault	Cause	Solution
When the switch closes, the pump does not manage to complete even one turn or struggles to turn the odd half turn before the circuit breaker trips or fuses blow	Motor short-circuited	Check and replace.
	Short-circuit due to incorrect connection	Check and reconnect correctly
Residual current circuit breaker trips as soon as switch closes	Leakage current owing to damaged insulation of motor, cables or other electric components	Check and replace electric component with ground fault
Pump performs a few turns in opposite direction when stopping	Foot valve leaking	Check, clean or replace
	Suction pipe leaking	Check and repair
Pump vibrates and is unusually noisy	Motor bearings worn	Replace bearings
	Foreign matter between fixed and rotating parts	- Disassemble and clean pump - Call our nearest Servicing Department to do the job

Displayed Fault	Cause	Solution
Pump vibrates and is unusually noisy	Pump operation affected by cavitation	Reduce flow rate by throttling delivery line. If cavitation persists, check: - Suction height - Pressure loss along suction line (diameter of pipe, elbows etc.) - Liquid temperature - Delivery line backpressure

11 Technical Documentation

11.1 Standard Voltages shown on the Plate with their respective Tolerances:

Frequency [Hz]	Phase [-]	UN [V] ± %
50	1	230 Δ ± 10%
	3	230 Δ / 400 Y ± 10%
		400 Δ / 690 Y ± 10%
60	3	220 Δ / 380 Y - 5% + 10%
		460 Y - 10% + 5%
		380 Δ - 5% + 10%
		460 Δ - 10% + 5%

11.2 Motor output Reduction Factors

When the motor-driven pump is installed in a site where the ambient temperature is higher than 40°C and/or its altitude is over 1000 m above sea level, the motor's output decreases.

The table attached features the reduction factors based on temperature and altitude. To prevent overheating, you must replace the motor with a different version whose rated output multiplied by the factor corresponding to the temperature and altitude is greater than or equal to that of the standard motor.

The standard motor can only be used if the relevant application can accept a reduction in flow rate, achieved by throttling the delivery line so as to reduce the current absorbed by an amount equal to the correction factor.

Altitude (m)	Temperature °C								
	0	10	20	30	40	45	50	55	60
0						0.95	0.90	0.85	0.80
500						0.95	0.90	0.85	0.80
1000						0.95	0.90	0.85	0.80
1500	0.97	0.97	0.97	0.97	0.97	0.92	0.87	0.82	0.78
2000	0.95	0.95	0.95	0.95	0.95	0.90	0.85	0.80	0.76

Maximum Working pressure Chart

Maximum working pressure MPa ¹⁾	Pump model					
	CV 1		CV 3		CV 5	
	Hz					
	50	60	50	60	50	60
1,6	2-26	2-18	2-21	2-15	2-17	2-12
2,5	27-39	20-29	23-33	16-23	19-27	13-19

Maximum working pressure MPa ¹⁾	Pump model					
	CV 10		CV 15		CV 20	
	Hz					
	50	60	50	60	50	60
1,6	2-15	1-10	1-11	1-7	1-9	1-7
2,5	16-23	11-16	12-17	8-12	10-16	8-10

¹⁾ 1MPa = 10bar

Maximum working pressure MPa ¹⁾	Pump model					
	ECV 32		ECV 45		ECV 64	
	Hz					
	50	60	50	60	50	60
1,6	1-7	1-5	1-3	1-4	1-6	1-4
2,5	8-12	6-8	4-9	5-6	6-7	-
3,0	13-14	8-10	10	-	-	-

11.3 Maximum Number of Starts/ Stops per Hour

Nominal motor power (P2) [kW]	CV / ECV series [N.°]
≤ 1,85	35
2,2 ÷ 4	30
5,5 - 7,5	20
9,2 ÷ 13	15
15 - 18,5	15
22 - 30	12
37 - 45	8
55	4

11.4 Avoiding Cavitation

Cavitation, as you may know, is a destructive problem for pumps, a phenomenon that is encountered when the water drawn in is transformed into steam inside the pump. CV/ECV pumps, fitted with internal hydraulic parts made from stainless steel, suffer less than other pumps built with materials of poorer quality, though they are not entirely immune to the damage that cavitation brings.

Hence pumps must be installed in compliance with the laws of physics and with rules relating to fluids as well as to the actual pumps. Below we give you just the practical results of the above-mentioned rules and laws of physics.

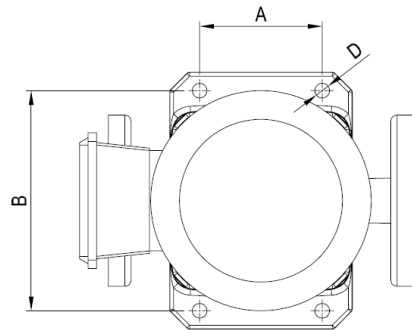
Under standard environmental conditions (15°C, at sea level), water turns into steam when subjected to a negative pressure greater than 10.33 m. Hence 10.33 m is the water's maximum theoretical suction height. CV/ECV pumps, like all centrifugal pumps, cannot exploit theoretical suction height to the full owing to their internal loss, known as NPSHr, which has to be deducted. Hence the theoretical suction lift of each CV/ECV pump is 10.33 m less its NPSHr at the work point in question.

The NPSHr can be determined by consulting the standard curves featured in the brochures and must be taken into consideration when first selecting the pump.

When the pump is part of a flooded installation or has to draw cold water from 1 or 2 m with a short pipe with one or more wide bends, NPSHr can be disregarded. Consequently, the more difficult the installation, the more the NPSHr value has to be taken into consideration. Installation becomes difficult when:

- a) Suction height is high
- b) Suction line is long and/or has lots of bends and/or has several valves (high pressure losses along suction line)
- c) Foot valve has high flow resistance (high pressure losses along suction line);
- d) Pump is used with a flow rate close to the maximum rated flow rate (NPSHr increases as flow rate increases over the rate where efficiency is highest);
- e) Water temperature is high. (It is likely you will have to install the pump with a flooded arrangement where values approach 80-85°C);
- f) Altitude is high (in the mountains)

11.5 Positioning of Holes for Fastening Down



Pump model	D mm	A mm	B mm
CV 1	12	100	180
CV 3			
CV 5			
CV 10		130	215
CV 15			
CV 20	14	170	240
ECV 32			
ECV 45		190	266
ECV 64			

11.6 Warnings for correct Operation of CV/ECV Motor-Driven Pumps (Fig.1-Fig.2)

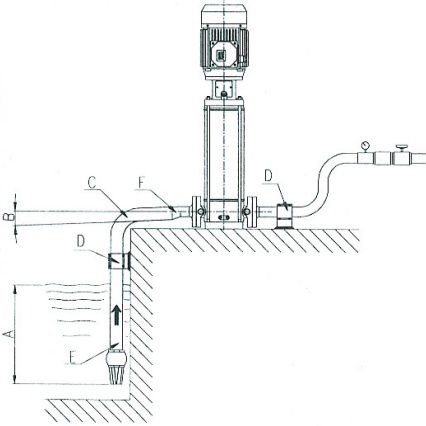


Fig.1

- a) Good immersion;
- b) Positive slope;
- c) Wide-radius bend
- d) Pipework with independent supports;
- e) Suction pipe diameter \geq pump port diameter;
- f) Reducing coupling for eccentric pipes.

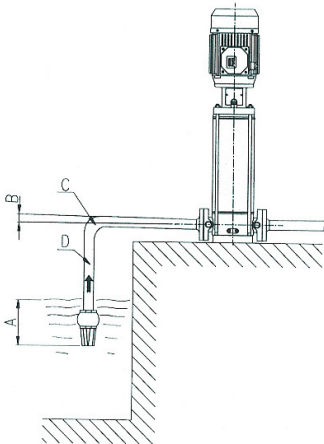


Fig..2

- a) Insufficient immersion;
- b) Negative slope, air pockets created;
- c) Tight bend, pressure loss;
- d) Pipe diameter $<$ pump port diameter, pressure loss.

EG Declaration of Conformity
In accordance with EC Machinery Directive 2006/42 EC, Appendix II, 1 A

We, EDUR Pumpenfabrik Eduard Redlien GmbH & Co. KG
Edisonstrasse 33
D-24145 Kiel

That the multi-stage centrifugal pump, model see cover sheet,

Is in compliance with all relevant provisions of the EC Machinery Directive 2006/42 / EC, Low Voltage Directive 2006/95 / EC, Directive on Electromagnetic Compatibility 2004/108 / EC, RoHS Directive 2011/65 / EC.

Person responsible for the documentation: Herr A.Weiss