

# VLC, VLSC

Vertical, inline, centrifugal pumps with CUE (variable frequency drive)

Installation and operating instructions

VLC



VLSC



## Original installation and operating instructions.

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## 1. Symbols used in this document

The following symbols may be used in this document.

**Warning**

*If these safety instructions are not observed, it may result in personal injury.*

**Warning**

*If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.*

**Warning**

*When pumping hazardous liquids, special attention must be paid to the risk of personal injury.*

**Warning**

*The surface of the product may be so hot that it may cause burns or personal injury.*

**Warning**

*The sound pressure level is so high that hearing protection must be used.*

**Caution**

*If these safety instructions are not observed, it may result in malfunction or damage to the equipment.*

**Note**

*Notes or instructions that make the job easier and ensure safe operation.*

## 2. Limited warranty

Products manufactured in this manual by GRUNDFOS CBS INC. (Grundfos) are warranted to the original user only to be free of defects in material and workmanship for a period of 24 months from date of installation, but not more than 30 months from date of manufacture. Grundfos' liability under this warranty shall be limited to repairing or replacing at Grundfos' option, without charge, F.O.B. Grundfos' factory or authorized service station, any product of Grundfos' manufacture. Grundfos will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim.

Products which are sold but not manufactured by Grundfos are subject to the warranty provided by the manufacturer of said products and not by Grundfos' warranty. Grundfos will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with Grundfos' printed installation and operating instructions. To obtain service under this warranty, the defective product must be returned to the distributor or dealer of Grundfos' products from which it was purchased together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, the distributor or dealer will contact Grundfos or an authorized service station for instructions. Any defective product to be returned to Grundfos or a service station must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Material Authorization must be included if so instructed.

GRUNDFOS WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE, OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limit actions on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

## 3. Receipt of product

Check pump for missing parts and damage immediately upon receipt of the pump. Accessories, when required, are packed in a separate container and shipped with the pump. If equipment is damaged in transit, promptly report this to the carrier's agent. Make complete notations on the freight bill to speed satisfactory adjustment by the carrier.

Unload and handle the pump with a sling.



### Warning

**Do not lift the pump assembly by the motor eyebolts alone. Motor eyebolts are not designed to support the weight of the entire pump assembly.**

### 3.1 Temporary storage

If the pump is not to be installed and operated immediately after receipt, store it in a clean, dry area with moderate ambient temperature. Rotate the shaft by hand monthly to coat bearings with lubricant to retard oxidation and corrosion. Follow motor manufacturer's storage recommendations where applicable.

## 3.2 Identification

All Grundfos pumps are identified by catalog and serial numbers. These numbers are stamped on the pump nameplate affixed to the pump volute, and should be referred to in all correspondence with Grundfos.

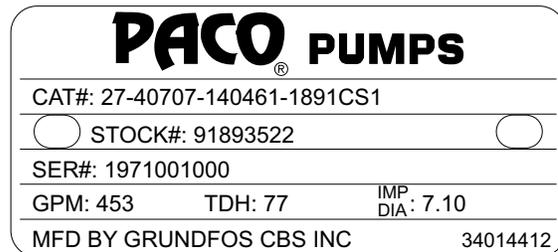


Fig. 1 Sample nameplate

TM06 2111 3714

## 4. Mechanical installation

### 4.1 Location

Locate the pump as close to the liquid supply as possible. Use the shortest and most direct suction piping practical. See section [4.3.1 Suction piping](#). Locate the pump below system level wherever possible. This will facilitate priming, assure a steady liquid flow, and provide a positive suction head. Make sure sufficient NPSH (Net Positive Suction Head) is provided by considering the pump's location in relation to the entire system. Available NPSH must always be equal to or exceed required NPSH specified on the pump performance curve. Always allow sufficient accessibility for maintenance and inspection. Provide free space with ample head room for use of a hoist strong enough to lift pump and motor. Make sure a suitable power source is available for the motor. Electrical characteristics should match those specified on the motor nameplate and be within the limits covered in sections [5. Electrical installation](#) and [6. Operation](#). Avoid exposing the pump to sub-freezing temperatures to prevent pumped liquid from freezing. If freezing conditions exist during shutdown periods. See sections [6.6.1 Short duration shutdown](#) and [6.6.2 Extended period shutdown](#) for specific recommendations.

### 4.2 Mounting of pump

Grundfos in-line pumps are designed to be mounted in horizontal pipe runs with the motor positioned vertically upward. The pumps may be mounted on the equipment room floor or suspended in the piping, depending on the size and configuration of the pump. Follow these instructions:

#### 4.2.1 Floor mounted pumps (VLC, VLSC)

Pumps mounted on equipment room floors should be permanently installed on a firm, concrete foundation, mounting pad or spring isolation base of sufficient size to dampen any vibration and prevent any deflection. Use suitable anchor bolts to secure the pump to the pad or floor.

#### 4.2.2 Suspended pumps (VLC, VLSC)

Pumps suspended in the system piping must be properly supported. Use pipe supports on piping immediately adjacent to the pump. Pipe supports must be adequately sized to support the weight of pump and piping, when full of liquid, and must be designed to eliminate transmission of noise or vibrations.

### 4.3 Piping

**Do not use pump as a support for piping!**  
**Use pipe hangers or other supports at proper intervals to provide complete piping support near the pump.**

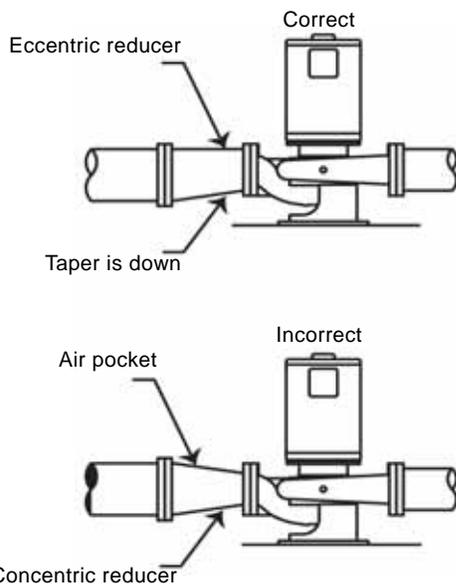
**Caution**

Make sure that both suction and discharge piping are independently supported and properly aligned so that no strain is transmitted to the pump when flange bolts are tightened. Make sure piping is as straight as possible by avoiding unnecessary bends and fittings. Where necessary, use 45 ° or long-sweep 90 ° pipe bends to decrease friction loss. Where flanged joints are used, make sure that inside diameters match properly and that mounting holes are aligned. Do not spring or force piping when making any connections.

#### 4.3.1 Suction piping

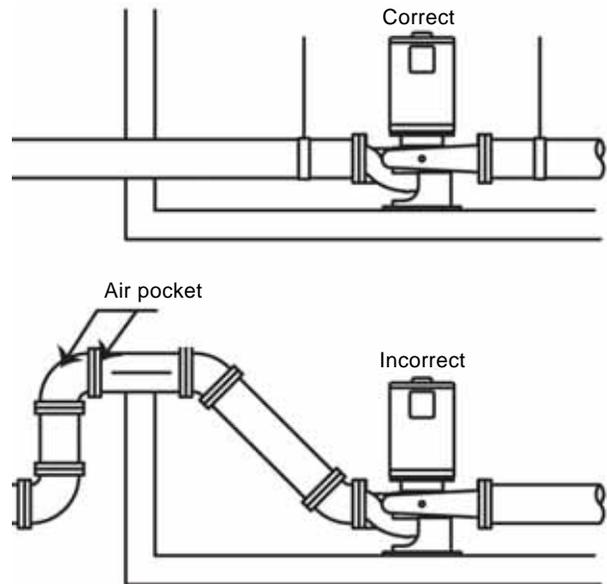
The sizing and installation of suction piping is particularly important. It must be selected and installed in a manner that minimizes pressure loss and permits sufficient liquid flow into the pump during startup and operation. Many NPSH problems can be traced directly to improper design of suction piping. Observe the following precautions when installing the suction piping:

Make suction piping as direct as possible. Ideally, the length should be at least ten times the pipe diameter. Short suction piping can be the same diameter as the suction port. Long piping should be one or two sizes larger (depending on length), ending with a reduction to the diameter of the pump suction port. Use an eccentric reducer, with the eccentric side down (see fig. 2) when reducing the pipe diameter to the diameter of the suction port.



**Fig. 2** Correct use of eccentric reducer

At no point should suction piping be smaller in diameter than the pump suction port. Avoid any high points, such as pipe loops (see fig. 3), that may create air pockets and throttle the system or produce erratic pumping.



**Fig. 3** Correct suction piping

Install a gate valve in the suction line to isolate the pump during shutdown and maintenance and to facilitate pump removal. Where two or more pumps are connected to the same suction line, install a gate valve for each pump. Always install gate valves in positions that avoid air pockets. Do not use ball valves, particularly when NPSH is critical. During pumping operation, gate valves in the suction line must always be at fully open.

Properly sized pressure gauges can be installed in tappings on the pump suction and discharge nozzles. Pressure gauges will enable the operator to monitor pump performance and determine whether the pump conforms to the parameters of the performance curve. If cavitation, vapor binding, or other unstable operating conditions occur, pressure gauges will indicate wide fluctuation in suction and discharge pressures. We recommend that you use gauge cocks with the pressure gauges to protect gauges from constant wear and vibrations when not in use.

#### 4.3.2 Discharge piping

Short discharge piping can be the same diameter as the pump discharge port. Longer piping should be one or two sizes larger depending on length. An even gradient is best for long horizontal runs of discharge piping. Install a valve near the discharge port to prime and start the pump. The discharge gate valve is also used to isolate the pump during shutdown and maintenance and to facilitate pump removal. Any high points in the discharge piping may cause air or gas pockets and thus retard pump operation.

#### 4.4 Mechanical shaft seals

VLC and VLSC pumps are equipped with mechanical shaft seals which are matched to conditions for which the pump was sold. Unlike stuffing boxes, mechanical shaft seals require no field adjustments. Observe the following precautions to avoid shaft seal damage and obtain maximum shaft seal life: Do not exceed temperature or pressure limitations for the mechanical shaft seal used.

**Caution**

**Do not let the pump run dry or against a closed valve. Dry running will cause shaft seal failure within minutes.**

Clean and purge suction piping in new installations before installing and operating the pump. Pipe scale, welding slag and other abrasive particles can cause rapid shaft seal failure.

## 5. Electrical installation



### Warning

**Electrical installation and maintenance must be done by qualified electricians.**

**Refer to manuals provided with electrical accessories and disconnect power supply as recommended for servicing.**



### Warning

**Make sure the power supply to the pump has been switched off and that it cannot be accidentally switched on.**

### 5.1 Motor

The motor control circuit must have the following components in order to comply with the National Electrical Code.

- **Motor disconnecting device**  
the disconnecting device must be capable of disconnecting both the controller (motor starter) and the motor from their source of power;
  - the disconnecting device must be located so that the controller (motor starter) can be seen from the disconnecting device location.
  - in all cases, the distance from the disconnecting device to the controller must be less than 50 ft.
  - in most installations, the disconnecting device will be a circuit breaker or fusible disconnecting switch.
- **Motor short circuit and ground fault protection**  
Short circuit and ground fault protection are usually provided by means of a circuit breaker or fusible disconnecting switch. The selection of the size of the circuit breaker or fuse must be in accordance with section 430-52 and table 430-152 of the National Electrical Code.
- **Motor controller**  
The motor controller must have running over-current protection (magnetic starter) and must be installed in accordance with applicable local and state electrical codes in addition to the National Electrical Code.

Make sure the motor is properly mounted for easy access to the terminal box, grease fittings and drain plugs. The motor may be rotated upon the motor bracket to achieve a satisfactory position. Starting and overload control devices should match the electrical characteristics of motor. For safety and convenience, these devices may require installation some distance away from the pump. Always follow controller manufacturer's instructions for proper installation and connection of the motor controller.

Grease lubricated motors are fully lubricated from factory and do not require further lubrication if prompt installation follows. If motor has been in local storage for six months or longer, see section [7.1 Motor lubrication](#), and lubricate the motor before starting it.

## 5.2 Installation wiring



### Warning

**Motor wiring must be performed by trained, qualified electricians only.**

**Make sure the power supply to the pump has been switched off and that it cannot be accidentally switched on.**

Mount the CUE control panel or motor starter(s) close to the pump to provide convenient control and ease of installation. Wire panel or starter(s) to motor(s) and pilot device(s). Wires to each motor must be sized for at least 125 % of the motor nameplate full load amps. We recommend AWG16 type THW stranded wire for wiring of pilot devices such as float switches. Check incoming power supply to ensure that it corresponds to the voltage, phase and frequency of the motors. Verify that the starters are suitable for operating the motors on the voltage, phase and frequency that are available.

## 6. Operation

### 6.1 Priming

The Grundfos in-line centrifugal pumps are not self priming, and must be completely primed (filled with liquid) before starting. If the pump will operate with a positive suction head, prime by opening the suction valve and allowing liquid to enter pump casing. Open all air vents at the high points of pump and piping to ensure air is forced from pump by liquid. Disconnect the recirculation line at the seal housing and bleed completely of all air. Re-connect the line prior to start-up. Rotate the shaft by hand to free entrapped air from impeller passageways. If pump has a suction lift, priming must be accomplished by other methods. The use of foot valves or ejectors, or manual filling of the pump casing and suction line with liquid are possible methods suggested for this purpose.

### Caution

**Never run the pump dry in the hope that it will prime itself! Serious damage to the mechanical seal will result.**

### 6.2 Pre-start checklist

Make the following inspections before starting your Grundfos in-line centrifugal pump: Make sure all wiring connections to the motor (and starting device) match the wiring diagram and produce clockwise rotation as viewed from the end of the motor. If the motor has been in storage for an extended length of time, either before or after installation, refer to motor instructions before starting. Check voltage, phase, and line circuit frequency with the motor data plate. Turn rotating element by hand to make sure it rotates freely. Tighten plugs in gauge and drain taps. If pump is fitted with pressure gauges, keep gauge cocks closed when not in use. Check suction and discharge piping for leaks, and make sure all flange bolts are securely tightened.

### 6.3 Motor rotation

**Caution**

**Verify driver rotation prior to startup and operation. Failure to do so can result in serious damage to pump and driver if rotation is wrong.**

After the unit has been wired and checked to insure that all components in the system (disconnect device, magnetic starters, pilot devices and motors) are properly connected, check motor rotation as follows: For 3 phase units only-momentarily energize the motors to ensure that the rotation is correct as indicated by the arrow cast into the pump volute. If rotation is incorrect, interchange two wires at the motor starter terminals T1 and T2.

**Caution**

**The pumps must not be operated while dry. Energize motors only momentarily to determine proper rotation.**

### 6.4 Starting the pump

1. Install coupling guard on split coupled units.
2. Fully open gate valve (if any) in suction line, and close gate valve in discharge line.
3. Fill suction line with liquid and completely prime pump.
4. Start the motor (pump).
5. Immediately make a visual check of pump and suction piping for pressure leaks.
6. Immediately after pump reaches full operating speed, slowly open the discharge gate valve until complete system flow is achieved.
7. Check discharge piping for pressure leaks.
8. If pump is fitted with pressure gauges, open gauge cocks and record pressure reading for future reference. Verify that the pump is performing in accordance with parameters specified on performance curve.
9. Check and record voltage, amperage per phase, and kilowatts, if a wattmeter is available.

### 6.5 Voltage regulation

The motor will operate satisfactorily under the following conditions for voltage and frequency variation, but not necessarily in accordance with the standards established for operation under rated conditions: The voltage variation may not exceed 10 % above or below rating specified on the motor data plate. The frequency variation may not exceed 5 % above or below motor rating. The sum of the voltage and frequency variations may not exceed 10 % above or below motor rating, provided the frequency variation does not exceed 5 %.

### 6.6 Pump shutdown

The following shutdown procedures will apply in most normal shutdowns for the Grundfos in-line pump. If pump will be inoperative for an extended length of time, follow storage procedures in Section IC. Always close the discharge gate valve before stopping pump. Close valve slowly to prevent hydraulic shock. Cut power to motor.

#### 6.6.1 Short duration shutdown

For overnight or temporary shutdown periods under nonfreezing conditions, the pump may remain filled with liquid. Make sure the pump is fully primed before restarting. For short or frequent shutdown periods under freezing conditions, keep fluid moving within pump casing and insulate or heat pump exterior to prevent freezing.

#### 6.6.2 Extended period shutdown

For long shutdown periods, or to isolate the pump for maintenance, lock-out power to pump and close suction gate valve. If no suction valve is used and the pump has positive suction head, drain all liquid from suction line to terminate liquid flow into pump suction nozzle. Remove plugs in pump drain and vent taps, as required, and drain all liquid from the pump volute casing. If freezing conditions will exist during long shutdown periods, completely drain the pump and blow out all liquid passages and pockets with compressed air. Freezing of pump liquid can also be prevented by filling the pump with antifreeze solution.

## 7. Maintenance

**Warning**

**Do not attempt any maintenance, inspection, repair or cleaning in the vicinity of rotating equipment. Before attempting any inspection or repair on the pump, the driver controls must be in the "OFF" position, locked and tagged to prevent injury to personnel performing service on the pump. Inspection, maintenance and repair should be performed by trained, qualified personnel only.**



### 7.1 Motor lubrication

To lubricate the motor while running or at rest, remove grease drain plug (if any) and filler plug on grease fitting. Grease with clean lubricant until grease appears at drain hole or along motor shaft. One-half to one cubic inch of grease is sufficient for motors 5 hp and under, with proportionately more grease for greater hp motors.

Recommended lubrication periods				
Motor rpm	Motor hp	Operating conditions		
		Standard	Severe	Extreme
1750 and below	10-40	1-3 yrs	6 mo - 1 yr	6 mo - 1 yr
	50-150			
	200 and Up	1 yr	3 mo	6 mo
Above 1750	All hp	1 yr	3 mo	6 mo
		1 yr	3 mo	3 mo

#### 7.1.1 Standard conditions

Eight hours per day operation, normal or light loading, clean air, 100 °F, maximum ambient temperature.

#### 7.1.2 Severe conditions:

Continuous 24-hour operation, shock loading or vibration, poor ventilation, 100-150 °F, ambient temperature.

### 7.1.3 Extreme conditions

The following are considered Extreme conditions: Continuous operation, heavy shock or vibration, dirt or dust in air, extreme ambient temperature.

To lubricate motor while running or at rest, remove grease drain plug (if any) and filler plug on grease fitting. Grease with clean lubricant until grease appears at drain hole or along motor shaft.

One-half to one cubic inch of grease is sufficient for motors 5 hp and under, with proportionately more grease for greater hp motors. Most fractional and some integral frame motors have "sealed-for-life" bearings, and do not require further lubrication throughout motor life. Always follow motor manufacturer's lubrication instructions, and periodically check grease fittings and drain plugs for leaks. If lubricating instructions do not accompany motor, refer to the following table for recommended lubrication periods.

Recommended bearing Grease for pumps	
Manufacturer	Lubricant
Shell	Dolium
Exxon	Polyrex
Chevron	SRI Grease NLGI 22
	Black Pearl NLGI 2
Phillips	Polytrac
Texaco	Polystar RB

This table lists recommended types of grease for both pump and motor lubrication. These types have all been thoroughly tested and should be used whenever possible.

**Caution**

**Do not lubricate with lithium based grease. Equipment damage will result.**

## 8. Disassembly

### 8.1 Preparation for disassembly



#### Warning

**Turn off power, lock-out electrical breaker and provide appropriate "Do Not Operate" or equivalent signage prior to any work on equipment. Verify all power is off at pump using appropriate electrical instrumentation. Work should be performed only by qualified and trained personnel.**

Complete disassembly instructions are outlined below. Proceed only as far as required to perform the maintenance work needed. Close valves on suction and discharge side of pumps and drain pump, taking precautions as necessary based on fluid being pumped. Flush, if necessary. Allow adequate working area around pump for maintenance or disassembly. To disassemble the CUE, remove the CUE and the mounting plate. It is recommended not to remove the CUE unless required.

### 8.2 Seal replacement (VLC)

1. Complete preparations noted in section [8.1 Preparation for disassembly](#), above.
2. Unscrew tubing connector from pipe tee of Air Vent assembly if equipped.
3. Remove Casing Bolts.
4. Back-pull rotating assembly away from Volute. Make sure external wiring will not be torn from motor leads before pulling.
5. Remove Volute Gasket from outer face of back plate/bracket, and discard. New sealing gaskets should always be used whenever pump is reassembled.
6. For replacement of Wear Ring, refer to section [8.5 Wear ring replacement](#) at this time.
7. For replacement of Seal, Sleeve or for general disassembly, continue with the following instructions
8. Impeller removal procedures vary depending on motor type. Follow appropriate instructions as follows:

**Caution**

**Do not insert screwdriver between impeller vanes to prevent rotation. Use strap wrench around the impeller or shaft to prevent rotation.**

#### Impeller Removal

Impeller is keyed onto motor shaft. Slide impeller axially off of shaft. If impeller can not be removed by hand, additional leverage may be necessary. Using a gear puller or two pry bars, position the tongs in close proximity to impeller vanes and carefully apply smooth, even force to the impeller. Excessive force will distort and damage the impeller.

1. Remove and discard spring and retainer from seal assembly.
2. Remove seal head assembly manually from Shaft Sleeve. Water-soluble lubricant may be applied to shaft to ease removal of Shaft Seal. Pull seal head assembly manually from shaft, using slight twisting motion (as necessary) to loosen bellows from shaft sleeve.
3. Remove and discard seal seat from Bracket. Thoroughly clean the inside cavity of bracket or cap.
4. For replacement of Shaft Sleeve, refer to section [8.4 Sleeve Replacement \(VLC\)](#) at this time.
5. Interior surface of bellows on new seal head is coated with bonding agent that adheres to motor shaft. When old seal head is removed, bonding agent no longer exists and bellows may crack or split during removal. Installation of new mechanical seal is always recommended if it becomes necessary to remove existing seal from shaft.
6. Clean and lubricate shaft sleeve with water-soluble lubricant and make sure no sharp edges exist which could cut bellows of new seal.
7. Press new seal seat firmly into bracket or cap. Avoid direct contact of seal face with metallic or abrasive objects and wipe clean after installation to ensure abrasive-free sealing surface.
8. Slide new seal head assembly onto shaft by applying even pressure to base of assembly. Make sure sealing faces fit snugly.
9. See Reassembly instructions, section [8.6 Reassembly of pumps](#).

### 8.3 Seal replacement (VLSC)

1. Complete preparations noted.
2. Remove coupling guard.
3. Remove coupling bolts. Pry apart the coupling halves, remove keys and set aside.

**Note**

**Mark or measure the original position of the pump coupling on the motor side.**

4. Unscrew tubing connector from pipe tee of air vent assembly. Pipe dope is applied to threads during factory assembly, and resulting bond may retard but will not prevent manual disassembly.
5. Remove seal cap bolts and slide seal cap up shaft to remove.
6. Remove seal head assembly manually from shaft. Water-soluble lubricant may be applied to shaft to ease removal of shaft seal. Pull seal head assembly manually from shaft, using slight twisting motion (as necessary) to loosen bellows from shaft.
7. Remove and discard seal spring and retainer.
8. remove and discard seal seat from seal cap and thoroughly clean the inside cavity of seal cap.
9. Interior surface of bellows on new seal head is coated with bonding agent that adheres to motor shaft. When old seal head is removed, bonding agent no longer exists and bellows may crack or split during removal. Installation of new mechanical seal is always recommended if it becomes necessary to remove existing seal from shaft.
10. Clean and lubricate shaft with water-soluble lubricant and make sure no sharp edges exist to cut or scratch bellows of new seal.
11. Press new seal seat firmly into seal cap. Avoid direct contact of seal face with metallic or abrasive objects and wipe clean after installation to ensure abrasive free sealing surface.
12. Slide new seal head assembly onto shaft by applying even pressure to base of assembly.
13. Install seal cap down shaft.
14. See reassembly instructions.

### 8.4 Sleeve Replacement (VLC)

1. Remove impeller key from shaft.
2. Sleeves are bonded to shaft using Loctite. Loctite adhesive compound is a liquid resin that produces a tough bond when applied to threaded and close-fitting connections during assembly. It is used by Grundfos on shaft sleeves to secure sleeve to shaft.
3. Apply light torch heat axially along shaft sleeve exterior to break the Loctite bond and loosen sleeve for removal. Excessive heating is not necessary, and should be avoided to protect bearings. Remove sleeve.
4. Wipe or brush clean all adhesive surfaces before reapplying Loctite. Use LocQuic Primer or equivalent for preparation of surface. LocQuic Primer is a degreasing agent recommended for use in preparing mating surfaces for Loctite application. Do not use gasoline or other petroleum products for cleaning, because an oily surface will remain. Assemble shaft sleeves with twisting motion to ensure an even hold, and always make sure sleeve is firmly in place against shaft shoulder. Allow a few minutes for Loctite to bond prior to completing assembly.

### 8.5 Wear ring replacement

1. Complete preparations
2. Back-pull rotating assembly,
3. It may be necessary to remove volute from piping, to facilitate easy access to interior of volute. If necessary, remove flange bolts at piping.

4. To remove worn Case Wear Ring, drill two holes slightly smaller than width of ring into exposed edge of ring. Once holes are drilled, a chisel may be used to completely sever ring at holes and break ring into two halves for easy removal.
5. Clean the ring cavity in the volute prior to installing wear ring to ensure a properly aligned fit.
6. To reassemble, press fit new wear ring squarely into volute casing cavity. Ring may be tapped into place to make sure it is completely impressed into cavity.

**Caution**

**Do not use metal tooling against wear ring surfaces. Use only rubber, rawhide, wood or other soft material to prevent damage to ring.**

### 8.6 Reassembly of pumps

1. Clean all parts prior to reassembly, ensuring all contacting surfaces and threads are free of debris. Reassemble pump by following the above instructions in reverse. Inspect and ensure the following:
  - All mechanical seal components and shaft sleeve must be in good condition or leakage may result.
  - Replacement of complete seal assembly is recommended.
  - Appropriate Loctite is used in re-assembly of shaft sleeves.
  - Appropriate Loctite is used in re-assembly of threaded impellers.
2. Re-install coupling guards on coupled pumps.
3. Re-install CUE between the motor and mounting plate (if disassembled).



**Warning**

**Type VLSC pump is a split coupled pump. Coupling guard must be reinstalled and in place prior to operation.**

## 9. Ordering parts

Grundfos commitment to state-of-the-art pump design and quality manufacturing assures maximum user benefits with optimum equipment life at lower cost.

Grundfos commitment to their customers continues through an extensive service organization. Highly trained technicians can assist customers with initial startup, troubleshooting, repair, and system analysis. Grundfos maintains an extensive stock of replacement parts and parts kits for our most popular model pumps. Shipment of these parts is normally made within three days after receipt of an order.

On larger pumps, where it is impractical for our factory to inventory low usage parts, replacement parts are normally manufactured and shipped within 15 working days of receipt of an order. In order to reduce pump repair time and shorten inconvenient pump service interruptions, it is suggested that the pump user stock spare parts.

Since spare parts requirements and quantities vary for specific pump constructions, allow your Grundfos Representative to help in defining your spare part requirements. To ensure that the proper replacement parts are ordered for your particular pump model, when you call: Identify all pertinent data from the pump name plate (see Pump Identification). This should always include the pump Catalog or Model Number, and the pump Serial Number. For replacement impellers, also include from the nameplate the operating conditions (GPM and TDH) and the impeller diameter. Identify all parts by item number and description as indicated by the appropriate assembly drawing in this manual, for your particular pump model.

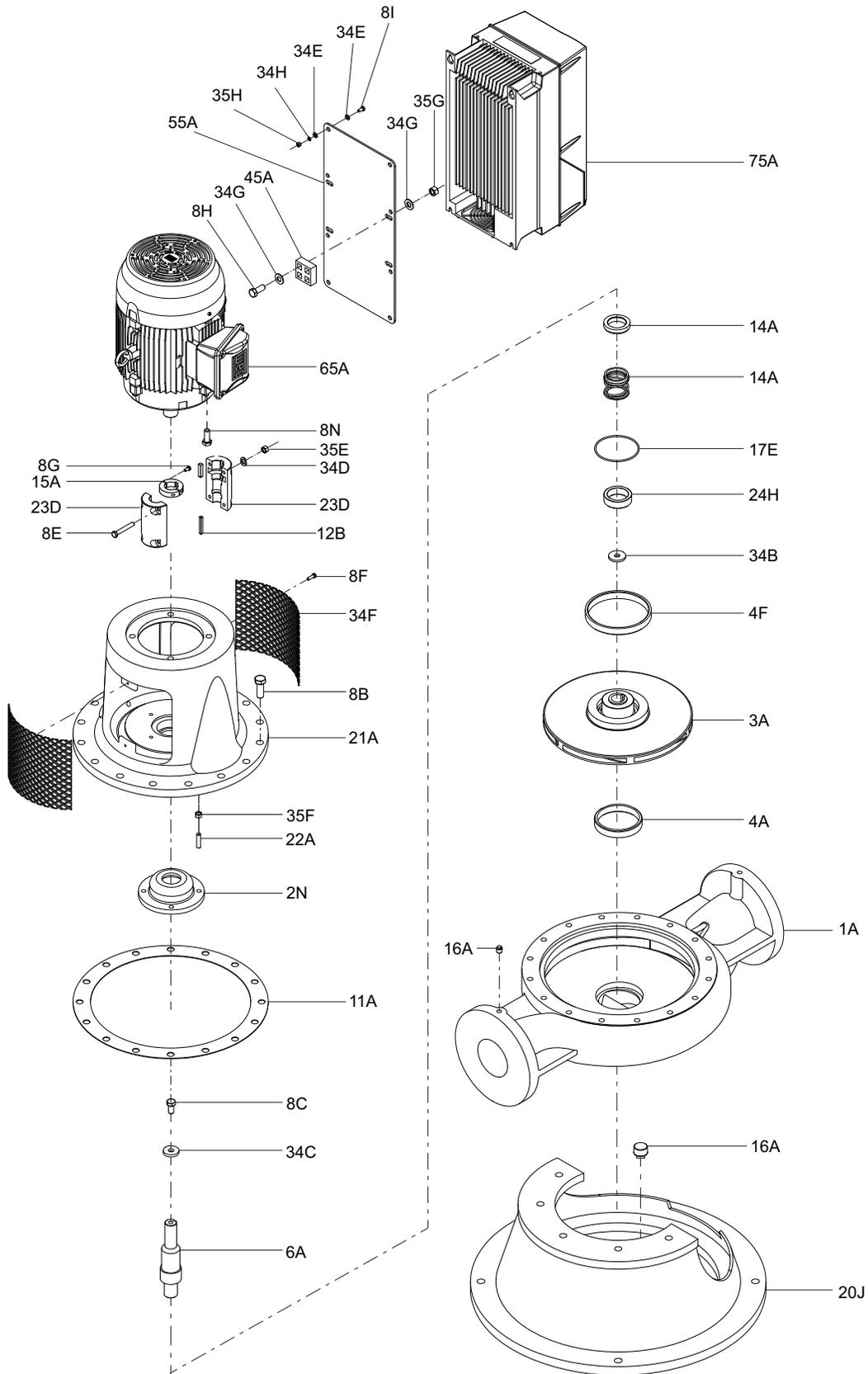


## 10.2 Type VLC parts list

Pos.	Description
1A	Volute
2K	Backplate
3A*	Impeller
4A*	Case wear ring
4F	Balance ring
5A*	Shaft sleeve
8A*	Impeller screw
8B	Volute screw
8H	Plate screw
8I	CUE screw
8N	Motor screw
11A*	Volute gasket
11F*	Bracket gasket
12A*	Impeller key
13G	Slinger
14A*	Seal assembly
16A	Pipe plug
20J	Cast iron stand
21A	Motor bracket
34B	Impeller washer
34D	Plate washer
34E	CUE flat washer
34F	CUE lock washer
35G	Plate nut
35H	CUE nut
45A	Shock isolator
55A	Mounting plate
65A	Motor
75A	CUE

\* Recommended spare parts

### 10.3 Type VLSC, exploded view



TM06 2110 3714

## 10.4 Type VLSC parts list

Pos.	Description
1A	Volute
2N	Seal cap
3A*	Impeller
4A*	Case wear ring
4F	Balance ring
6A	Pump shaft
8B	Volute screw
8C	Pump shaft screw
8E	Coupling screw
8F	Coupling guard
8G	Locating ring screw
8H	Plate screw
8N	Motor screw
8I	CUE screw
11A*	Volute gasket
12B	Coupling key
14A*	Seal assembly
15A	Locating ring
16A	Pipe plug
17E	Seal cap o-ring
20J	Cast iron stand
21A	Motor bracket
22A	Seal cap studs
23D	Coupling halves
24H	Bushing
34B*	Impeller washer
34C	Pump shaft washer
34D	Coupling Washer
34G	Plate washer
34E	CUE flat washer
34F	Coupling guard
34H	CUE lock washer
35E	Coupling nut
35F	Seal cap nut
35G	Plate nut
35H	CUE nut
45A	Shock isolator
55A	Mounting plate
65A	Motor
75A	CUE

\* Recommended spare parts

## 11. Troubleshooting

### 11.1 Cause codes

Symptoms	Cause code
Pump does not deliver any liquid at start-up	1*2*3*4*5*6*7*8*9*10*11*14*16*17*22*23*24*34
Pump stops delivering liquid after start-up	2*3*4*5*6*7*8*9*10*11*12*13*22*23*24*34
Pump overheats and/or ceases to deliver liquid	1*3*9*10*11*21*22*27*29*30*31*33*34*40*41
Insufficient flow rate	2*3*4*5*6*7*8*9*10*11*14*16*17*20*21*22*23*24*25*26*34
Excessive flow rate	15*18*20*34
Discharge pressure is too high	4*14*16*18*20*22*23*24*25*26*34
Shaft seal leaks appreciably, or the packing leaks excessively	27*28*29*30*33*34*35*36*39
Shaft seal or packing fails prematurely	12*13*27*28*29*30*33*34*35*36*37*38*39
Pump uses too much power	15*16*18*19*20*23*25*27*28*31*33*34*35*37*38
Pump runs rough and noisily	2*3*4*5*6*7*8*9*10*11*15*17*18*21*23*24*27*28*29*30*31*32*33*34*40

### 11.2 Possible causes

- The pump has not been properly bled of air.
- The pump suction line has not been completely primed.
- The suction head (NPSHR) required by the pump is too high, or the net positive suction head available (NPSHA) at your facility is too low.
- The fluid pumped contains too much entrained air or gas.
- There are air pockets in the suction line.
- An entry of air has suddenly occurred in the suction line.
- An entry of air past the shaft seal into the pump has occurred.
- The inlet of the suction line is insufficiently submerged.
- The suction valve is closed or only partially open.
- The suction strainer is clogged with dirt or debris.
- The foot valve is clogged or undersized.
- Little or no cooling fluid supplied to the shaft seals.
- The lantern ring is not positioned opposite the flushing inlet thereby restricting fluid flow.
- Pump drive rotational speed too low.
- Pump drive rotational speed too high.
- Pump rotation wrong or impeller installed backwards.
- Total head of installation (back pressure) higher than rated total head of the pump.
- Total head of installation (back pressure) lower than rated total head of the pump.
- Density of fluid pumped differs from that specified when the pump was purchased.
- Viscosity of fluid pumped differs from that specified when the pump was purchased.
- The pump is operating at too low a rate of flow. The discharge valve may be throttled too much.
- If pumps are operating in parallel, the pump characteristics may not be suitable for parallel operation.
- The impeller may be clogged with debris.
- The impeller may be damaged.
- The casing and impeller wear rings may be excessively worn.
- There may be internal leakage from the discharge to the suction compartments as the result of internal gasket failure.
- There may be a misalignment of the pump shaft.
- The shaft may chatter because it is bent.
- The pump may run rough due to improper balancing of the impeller.
- The shaft may not be running due to worn bearings.
- The impeller may be rubbing against the inside of the case.
- The concrete pad might not be of sufficient size to provide pump stability.
- The pump may have become misaligned during installation.
- The operating conditions of the installation do not agree with the data specified when the pump was purchased.
- The shaft seal may be incorrectly installed, or the stuffing box has not been packed correctly.
- The shaft sleeve may be scored or pitted in the region of the packing due to dirt or abrasive matter in the flushing fluid.
- Excessive tightening of the packing gland may block the flushing port thereby diminishing the sealing fluid flow.
- Packing material may have become wedged or extruded between the shaft and the bottom of the stuffing housing due to excessive clearance on the packing backup washer.
- The mechanical seal may have been damaged by running dry. There may be excessive axial thrust (side loading) due to improper impeller central alignment.



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