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# 1. GENERAL INFORMATION

## 1.1 Supplied documents

### 1.1.1 Manual

#### Data

Instruction manual  
Issue 1  
Version 1105  
Code 253P7530

#### Recipients

This manual is dedicated to the operators charged of the machine management during all the phases of its technical life

#### Contents

This manual includes the following information:

- Manufacturer declaration
- Information on safety
- Sales information
- Information on documents
- Machine description
- Transport information
- Storage information
- Installation information
- Adjustment information
- Use information
- Maintenance information
- Dismantling information

These pieces of information are subdivided into the following chapters and appendixes of this manual:

- Chapter 1** : General information
- Chapter 2** : Description
- Chapter 3** : Installation
- Chapter 4** : Use
- Chapter 5** : Maintenance
- Chapter 6** : Operating troubles
- Chapter 7** : Dismantling
- Appendix** : Product specification

## 1.2 Information ownership

The information contained in this manual is owned by PENTAIR WATER ITALY Srl

The reproduction, also partial, of this manual is forbidden without the express authorisation of PENTAIR WATER ITALY Srl

The information contained in this manual only concerns the machine specified in the "Product specification" section.

PENTAIR WATER ITALY reserves the right to make to the machines the changes not specified in "Machine identification data" whenever deemed right.

## 1.3 Machine identification data

Machine acronym	VLR	VLRI	VLRX	4 -	80	/ 7	(A)	(F)
Centrifugal electric pump Vertical multistage with "in line" mouth ----- VLR cast iron base								
VLRI steel base AISI 304								
VLRX steel base AISI 316								
Nominal delivery in m <sup>3</sup> /h								
Number of stages (= nr. of impellers x 10)								
Number of impellers (used when lower than the number of stages only)								
Version with oval flanges								
Version with round flanges.								

## 1.4 EC declaration of conformity

See page 2

## 1.5 General information on safety

We recommend to carefully following the instructions contained in this manual, paying special attention to notes, attention and danger warnings.

**Attention** The user must always comply with the accident prevention local prescriptions in force in the Country where the product is installed.



**Danger** When carrying out repair or maintenance operations on the motor-pump, remove the plug from the outlet and/or turn off the switch (if existing) disconnecting in this way the power supply to the motor-pump. This will prevent the accidental starting which may cause damages to people and/or things.



**Danger** Never carry out maintenance, installation or handling operations on the motor-pump with the electric system live: this may cause serious accidents to people, even their death.



**Attention** During operation, do not remove or handle the motor-pump.



**Danger** Before using the motor-pump, check every time that the cable and all the electric devices are efficient, repaired and protected.



**Danger** When starting the motor-pump (by connecting the plug to the outlet and/or turning off the switch) make sure not to be barefoot and that your hand are not wet.




**NOTA** The non-compliance to the procedures and safety precautions contained in the supplied documents causes the exclusion of PENTAIR WATER ITALY from any liability.




## 1.5.1 Personnel qualification

Qualification and protection restrictions foreseen for the operators

OPERATOR	QUALIFICATION	RECOMMENDED INDIVIDUAL PROTECTION MEANS
Carrier	Knowledge and command of the chapters: - "General information" - "Description" - "Installation"	Protective shoes and gloves
Installer	Qualification complying with the provisions of the Country of installation, knowledge and command of the chapters: - "General information" - "Description" - "Installation"	Protective shoes and gloves
User	Knowledge and command of the chapters: - "General information" - "Description" - "Use"	Protective shoes and gloves, high temperature protecting overall and gloves
Maintenance man	Fitness acknowledged by PENTAIR WATER ITALY, knowledge and command of the chapters: - "General information" - "Description" - "Maintenance"	Protective shoes and gloves
Demolisher	Knowledge and command of the chapters: - "General information" - "Description" - "Dismantling"	Protective shoes and gloves

**Danger**  The machine safely operates when used by personnel qualified according to the instructions contained in this manual and on board the machine. All the operations shown by this manual must only be carried out by qualified personnel equipped with the protecting means provided for by this manual

 PENTAIR WATER ITALY is not liable in case of accidents deriving from the use of non qualified and non authorised personnel and by the non compliance to the instructions present in this manual and on board the machine.

## 1.5.2 Special compliance

The use of personnel having a qualification different from the specified one may involve risks for people and/or the machine.


## 1.6 Conventions


### 1.6.1 Word conventions


The manual adopts the following conventions

- **Machine** : motor-pumps specified in the "Product specification"
- **Authorised technician** : person authorised by PENTAIR WATER ITALY to carry out on the machine operations not documented by this manual
- **Skilled technician** : person authorised to carry out on the machine operations not documented by this manual after contacting PENTAIR WATER ITALY

### 1.6.2 Typographical conventions

**Danger**  **Danger indications show the procedure whose non or partial compliance may cause physical damages to the operator**

**Attention**  **Attention indications show the procedures whose non or partial compliance may cause damages to the machine or to the equipment connected to it**

 **Note indications contain important information highlighted outside the text to which they refer**

## 1.7 Expected uses

### 1.7.1 Expected uses

The machine has been designed, manufactured and protected to allow the conveying, circulation and the increase in pressure of the following types of fluids:

- Water having a -15 °C to 120 °C temperature (for temperature lower than 0°C the addition of a fit quantity of ice-preventing agent is expected)
  - Water glycol mixtures (or ice-preventing products having chemical physical characteristics similar to glycol) with a glycol percentage up to 50%
  - Liquids and waters chemically compatible with the materials that are part of the machine
  - Neutral, non explosive fluids having a viscosity similar to water
- The machine has been designed, manufactured and protected to allow a fluid delivery depending on the required head (see "Product specification")

### 1.7.2 Expected modes of installation

The machine has been designed, manufactured and protected to be installed both:

- Indoor
- Outdoor with a protection from atmospheric agents

The machine has been designed, manufactured and protected to be used under the following atmospheric conditions:

- Temperature range: -15 °C to +40 °C
- Allowed relative humidity range: 30 to 90%

The machine has been designed, manufactured and protected to be installed in a vertical position with the motor in the upper part. The machine has been designed, manufactured and protected to be:

- Fixed on foundations having the characteristics shown in the appendix "Product specification" paragraph "Foundations".
- Connected to pipes able to bear the machine weight.

The machine has been designed, manufactured and protected to be fed by electric power having one of the following characteristics:

- 230 V, 50 Hz, single phase
- 230 V, 50 Hz, three-phase
- 400 V, 50 Hz, three-phase

Different voltages and frequencies are available on request.

## 1.8 Non expected uses

The machine has not been designed, manufactured, nor protected for all the uses not expressly specified in "Expected uses". In particular, the machine has not been designed, manufactured, nor protected for the conveying, circulation and increase in pressure of the following fluids:

- Explosive
- Corrosive
- Oil-derivatives and mixtures containing oil-derivatives.
- Mixtures containing material or fibres in suspension
- Sea water

For special uses, please contact our technical office

### 1.8.1 Liabilities resulting from non expected uses

**NOTA** PENTAIR WATER ITALY is not liable for possible damages to people, animals or things resulting from a non-expected use of the machine.

## 1.9 Warranty

**NOTA** Non authorised installation, adjustment and maintenance operations and/or operations carried out by non qualified personnel imply the termination of the warranty

## 1.10 Service

### 1.11 How to use the supplied documents

We recommend the operators to carefully read the supplied documents before carrying out any operation on the machine. The supplied documents must be kept for the whole life of the machine so that it can be easily found when necessary. If the machine is sold as second-hand, it must be sold together with the supplied documents.

## 2. DESCRIPTION

### 2.1 Description

#### 2.1.1 Architecture and operating principles

VLR motor-pumps are centrifugal, vertical multistage motor-pumps with "in-line" suction inlets and delivery.

VLR motor-pumps are directly coupled to an asynchronous single or three-phase motor with closed casing and external ventilation. VLR motor-pumps are not self-priming and need a priming procedure. VLR motor-pumps can be equipped with oval or round flanges.

### 2.1.2 Machine structure

Components	VLR	VLR32
Base	EN GJL 200 Cast iron	EN GJS 500 Cast iron
Headatock	EN GJL 200 Cast iron	EN GJL 200 Cast iron
Shaft	AISI 316	AISI 431
Impellers and choke	AISI 304	AISI 304
External cylinder	AISI 304	AISI 304
Tie rods	Steel zincate	AISI 316
Mechanical seal	rotating	Tungsten
	fixer	Tungsten
O-ring	EPDM	EPDM
Seals	Paper	---

Componenti	VLRI	VLRX
Base	AISI 316	AISI 316
Headatock	See note 1	See note 1
Shaft	AISI 316	AISI 316
Impellers and choke	AISI 304	AISI 316
External cylinder	AISI 304	AISI 316
Tie rods	AISI 316	AISI 316
Mechanical seal	rotating	Tungsten
	fixer	Tungsten
O-ring	EPDM	EPDM
Seals	Paper	Paper

NOTA: EN GJL 200 (ex G220) cast iron with internal steel drivehead

## 2.2 Technical features

### Machine size and weights

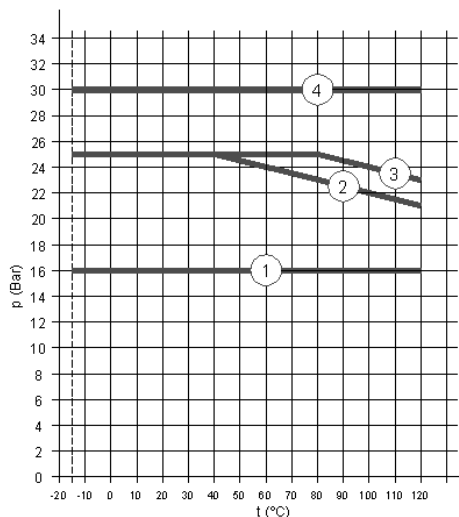
See "Product specification"

### Electrical data

See "Product specification" and identification plate.

### Pressure

- maximum operating pressure



Num.	Machine VLR – VLRI - VLRX
①	2B - 30/2 A ÷ 2B - 150 A 4 - 20 A ÷ 4 - 160 A 8 - 20 A ÷ 8 - 120 A
②	2B - 180 F ÷ 2B - 160 F 4 - 190 F ÷ 4 - 260 F
③	8 - 140 F ÷ 8 - 200 F 16 - 30/2 F - 100 F ÷ 16 - 160 F
④	32 - 1 ÷ 32 - 14

Machine VLR - VLRI - VLRX	Pressure (bar)				
	3	4	6	10	15
2B-30/2A			x		
2B-30 ÷ 2B-110 A				x	
2B-130 ÷ 2B-260 F					x
4-20A ÷			x		
4-30 ÷ 4-100 A				x	
4-120 ÷ 4-260 F					x
8-20 A ÷ 8-30 A			x		
8-40 ÷ 8-200 F				x	
16-30/2 ÷ 16-30 F			x		
16-40 ÷ 16-160 F				x	
32-1 ÷	x				
32-2 ÷ 32-4		x			
32-5 ÷ 32-10				x	
32-11 ÷ 32-14					x

### 2.2.1 Noise

Sound pressure weighed equivalent continuous maximum level A issued by the machine: 82 dB (A)

### 2.2.2 Liability

PENTAIR WATER ITALY is not liable if the values shown in this paragraph are not complied with.

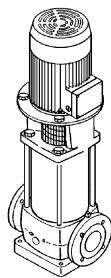
## 3. INSTALLATION

### 3.1 Hoisting

The machine hoisting can be made under one of the following conditions:

- Machine free from any type of packaging
- Machine packaged in a cardboard box
- Machine packaged in a wooden crate
- Machine secured on a supporting surface

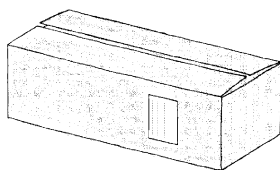
#### 3.1.1 Machine free from any type of packaging



It is possible to hoist one machine at a time only:

- for machines having a weight lower than 25 kg: hand hoisting made by one person
- for machines having a weight between 25 and 50 kg: hand hoisting made by two persons
- for machines having a weight exceeding 50 kg: hoisting using hoisting means and sling

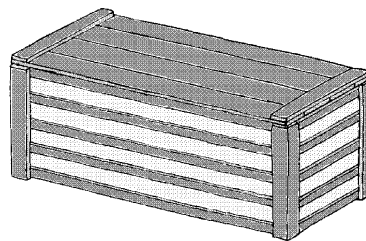
#### 3.1.2 Machine packed in cardboard box



It is possible to hoist more than one machine packed in a cardboard box depending on the machine weight. The packed machines are kept in position using filling inert material used to fill the box.

- for machines having a weight lower than 25 kg: hand hoisting made by one person
- for machines having a weight between 25 and 50 kg: hand hoisting made by two persons
- for machines having a weight exceeding 50 kg: hoisting using hoisting means and sling

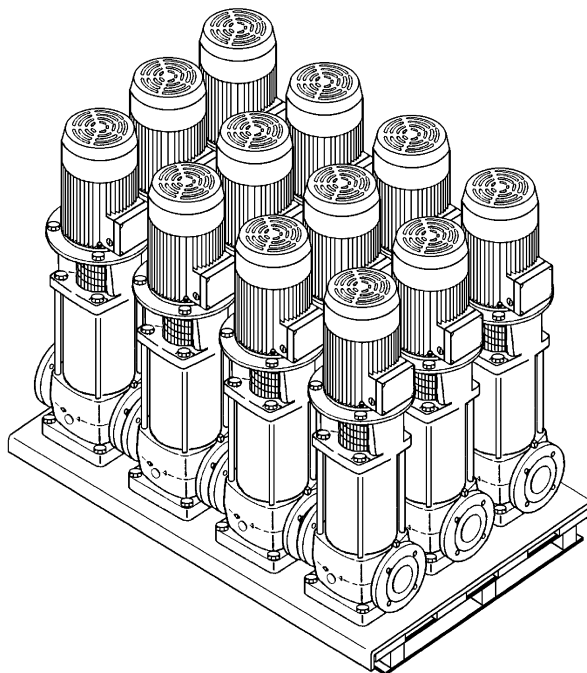
#### 3.1.3 Machine packed in a wooden crate



It is possible to hoist more than one machine packed in a wooden crate depending on the machine weight. Packed machines are kept in position using wooden spacers

- for machines having a weight lower than 25 kg: hand hoisting made by one person
- for machines having a weight between 25 and 50 kg: hand hoisting made by two persons
- for machines having a weight exceeding 50 kg: hoisting using hoisting means and sling

#### 3.1.4 Machines secured on a supporting surface



It is possible to hoist more than one machine secured by means of fixing nuts on a surface having bent sides. The packed machines are kept in position using wooden spacers. Position on a suitably sized pallet and hoist using hoisting means.

**Danger**



**Risk of machine fall.**

**Do not stand under the machine during hoisting.**

**Attention**





**Make sure that during hoisting the machine is kept in vertical position with the motor in the upper part.**

## 3.2 Transport

The machine transport must be made under the following conditions:

- Machine vertical position with the motor in the upper part
- Machine in fixed position without possibility of movements
- Machine protected from atmospheric agents.

<b>Danger</b>	<b>Make sure that the above listed conditions are complied with during transportation.</b>
	
<b>Attention</b>	
	

## 3.3 Storage

### 3.3.1 Characteristics of the storage area


The storage area must have the following physical characteristics:


- An extent fit for containing the machine and the possible packaging and allowing the hoisting by means of the foreseen hoisting means.
- Even and horizontal resting surface.
- Resting surface having a carrying capacity exceeding the weight of the number of stored machines.
- Protection from possible accidental bumps.

### 3.3.2 Environmental characteristics of the storage area

The storage area must have the following environmental characteristics:

- Allowed temperature range:  $-15\text{ °C} \div +50\text{ °C}$
- Relative humidity range:  $30 \div 90\%$
- Protection from atmospheric agents


<b>Danger</b>	<b>Possibility of machine fall. Secure the machine or store it in an inaccessible place Do not put the machines one on top of the other</b>
	

<b>Attention</b>	<b>Keep the machine in vertical position with the motor in the upper part</b>
	

## 3.4 Preliminary checks

### 3.4.1 Check for damages

- Check the integrity of the packaging if present
- Open the packaging, if present, and extract the machine
- Check that the received machine matches the ordered one
- Check that the machine is not damaged, in particular check the integrity of:
  - Motor fan cover
  - Terminal box cover
  - External lining
  - Cast iron parts

<b>Attention</b>	<b>Keep the original packaging, if present, for a possible future transport of the machine</b>
	

## 3.4.2 Damage signalling


In case of non-compliance or damages, signal to PENTAIR WATER ITALY or to the seller the problem within 8 (eight) days from the purchase date.

## 3.5 Preparation of the installation area

### 3.5.1 Characteristics of the installation area

The machine installation area must have the following characteristics:

- Facilitate the positioning and access to the machine
- Allow a safe connection to the electric system
- Allow safe connections to piping
- Presence of a fit natural and/or artificial lighting allowing safe operation
- A minimum distance of 150mm between any machine point and any obstacle
- Ensure sufficient ventilation for the motor fan

<b>Attention</b>	<b>Do not cover or obstructs the motor fan covering grid</b>
	

### Environmental conditions

- Allowed temperature range:  $-15\text{ °C} \div +40\text{ °C}$
- Allowed relative humidity range:  $30 \div 90\%$
- Protection from atmospheric agents

### Connection

The piping to which the machine must be connected must have the following characteristics:

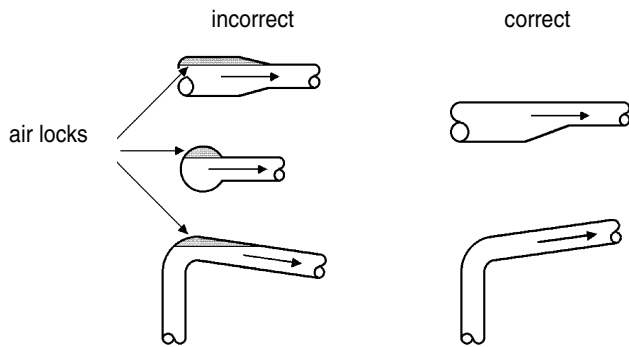
- Axiality among the delivery and suction piping with minimum diameters fit for the machine
- Distance between the two pipelines as shown in the "Product specification" paragraph "Foundations"
- Fastening to a fixed support, in order not to discharge stresses and/or vibrations on the machine
- Absence of air locks, as shown in the piping figure
- Suction piping length reduced as much as possible
- Load losses in the suction piping minimised (if the machine works in suction mode. See "Machines installed above head")
- Gates on delivery and suction pipe lines
- If the machine is installed above head, check valve on the suction piping
- If the machine feeds a boiler, check valve on the delivery piping
- If the fluid circulating in the piping has a temperature exceeding  $65\text{ °C}$ , protection against high temperatures

- If the machine can work with a valve closed on the delivery piping, recycling piping for safeguarding the machine with the following characteristics:

- Connection between:
  - Delivery and suction pipe lines
  - Delivery and drain pipe lines

- Control by means of:
  - Thermostatic valve
  - Solenoid valve controlled by pressure gauge or thermostat

## PIPING ASSEMBLY



### Power supply

The power supply mains must have the following characteristics:

- A differential protection
- Voltage and frequency values matching the ones shown on the machine motor rating plate
- A power output not lower than the value shown on the machine motor rating plate
- An electromagnetic switch having a fit thermal protection
- A self-balanced thermal relay adjusted on the basis of the actual absorbed current
- A cut-off switch with protecting fuses
- Cables having a section fit for the current absorbed by the motor.

### Access

Connect the machine in a place that can be easily accessed for maintenance operations

### Support

The machine fastening system can match one of the following systems:

- The machine can be connected to fixed piping able to keep the machine in its position.
- The machine can be connected to a pipeline and positioned on a surface having the characteristics shown in "Product specification" paragraph "Foundations"
- The machine can be connected to a pipe line secured by means of nuts to a surface having the characteristics shown in "Product specification" paragraph "Foundations"

## 3.6 Installation

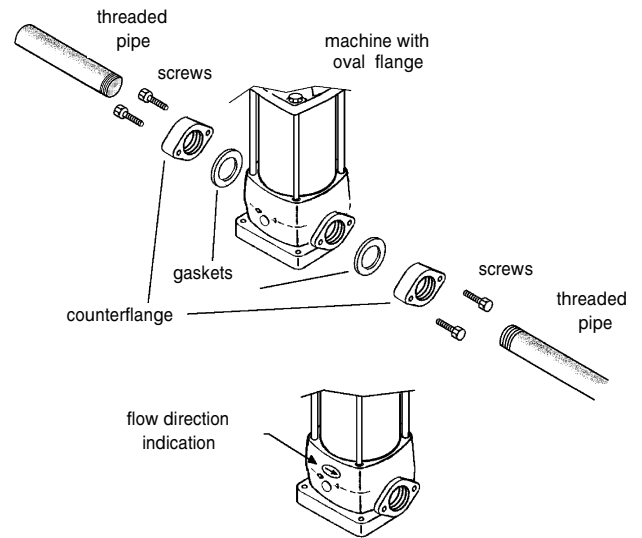
### 3.6.1 Connection to piping

#### Machines with oval flanges

Carry out the following operations to connect the machine to piping:

- Unscrew the screws fastening the counterflanges to the machines.
- Remove the two counterflanges
- Remove the two gaskets present between counterflanges and machine base

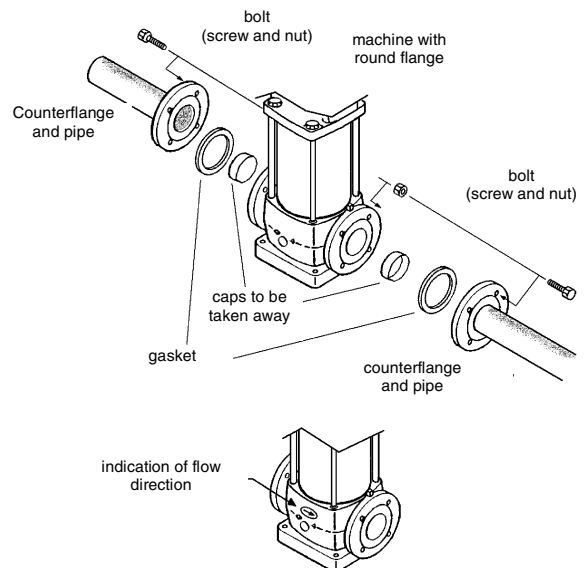
- Brake the protecting central disks along the marked lines to get two gaskets with central holes.
- Screw the two counterflanges at the threaded ends of the piping.
- Position the machine so that the arrows on the base match the fluid flow direction.
- Position the two circular gaskets between counterflanges and machine
- Alternatively tighten the screws fastening the counterflanges to the machine



#### Machine with round flanges

Carry out the following operations to connect the machine to piping:

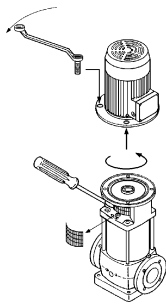
- Fit two counterflanges having a size matching those of the machine flanges to the pipe ends
- Remove the two protecting caps on the machine flanges
- Position the machine so that the arrows on its base match the fluid flow direction
- Fit the two circular gaskets between counterflanges and flanges
- Fit the screws in the flange and counterflange holes
- Alternatively tighten the nuts on the screws



#### 3.6.2 Terminal box position

Carry out the following operations to direct the terminal box in the required position:

- Remove the connection covering grids
- Unscrew the assembly bolts of motor and machine body
- Rotate the motor of 90° or 180° or 270° (in relation to the initial position)
- Screw the bolts alternatively and in a uniform way
- Refit the connection covering grids



### 3.6.3 Connection to the electric system

#### Machines with three-phase motors

**Danger**



The installer shall make sure that the power supply system is fitted with an efficient ground system according to the provisions in force.

**Danger**



Make sure that the power supply system is fitted with a high-sensitiveness differential switch  $\Delta = 30 \text{ mA}$  (DIN VDE 0100T739).

**Danger**



Before removing the terminal box cover and before making any operation on the motor-pump, make sure that the power supply line has been cut-off.

Carry out the following operations to connect the machine to the power supply system:

- Make sure that the motor is fit for the mains voltage
- Cut-off the electric system by means of the cut-off switch
- Unscrew the screws securing the terminal box cover
- Fit the power supply cable in the fairlead
- Connect the phases and the ground to the terminals
- Refit the terminal box cover with the gasket
- Tighten the screws securing the terminal box cover
- Connect the power supply by means of the cut-off switch
- Give a current pulse to the machine
- Check the motor rotation direction

A- If the rotation direction matches the one shown by the arrows on the machine head, the connections are correct

B- If the rotation direction is the opposite to the one shown by the arrows on the machine head, carry out the following operations:

- Cut-off the electric system by means of the cut-off switch
- Unscrew the screws fastening the terminal box cover
- Change the connection of two phases
- Refit the terminal box with the gasket
- Tighten the screws of the terminal box cover

#### Machine with single-phase motors

Carry out the following operations to connect the machine to the power supply system:

- Make sure that the motor is fit for the voltage mains
- Cut-off the electric system by means of the cut-off switch
- Unscrew the screws of the terminal box
- Fit the power supply cable in the fairlead
- Connect the lines and the ground
- Refit the terminal box cover with the gasket
- Tighten the screws of the terminal box cover
- Connect the power supply by means of the cut-off switch
- Give a current pulse to the machine
- Check the rotation direction

A- If the rotation direction matches the rotation direction shown by the arrows on the machine head, the connections are correct

B- If the rotation direction is the opposite to the one shown by the arrows on the machine head, carry out the following operations:

- Cut-off the electric system by means of the cut-off switch
- Unscrew the screws fastening the terminal box cover
- Using a jumper, temporarily short-circuit the condenser terminals
- Change the jumper positions
- Remove the jumper
- Refit the terminal box cover with the gasket
- Tighten the screws of the terminal box cover

### 3.7 Adjustment

#### 3.7.1 Machine motor coupling adjustment

Carry out the following operations to adjust the machine-motor coupling:

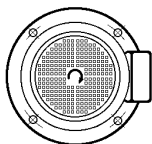
- Cut-off the power supply system by means of the cut-off switch
- Unscrew the screws fastening the joint protection
- Remove the joint protection
- Manually rotate the joint
- Check that the joint freely rotates

A- If it freely rotates, carry out the following operations:

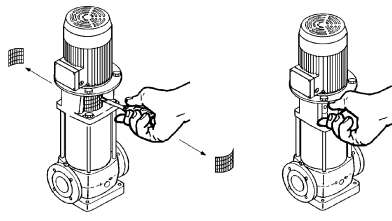
- Refit in place the joint protection
- Tighten the screws securing the joint protection

B- If the joint does not rotate easily, carry out the following operations:

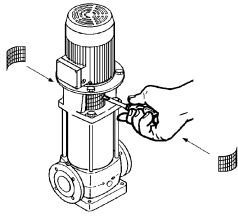
- Loosen the socket-head screws joining the two half-joints
- Adjust the distance between motor and impeller centres using a screwdriver as a lever
- Tighten the socket-head screws joining the two half joints
- Refit the joint protection
- Tighten the screws fastening the joint protection



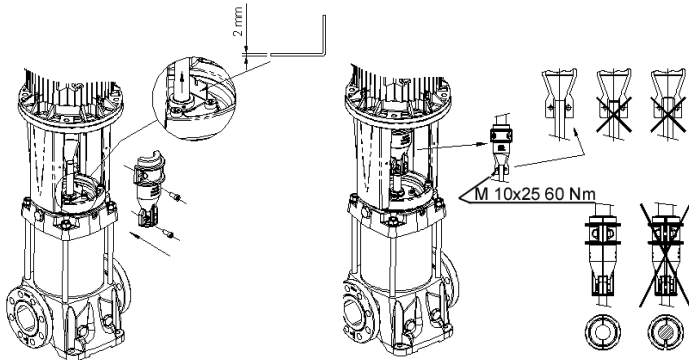
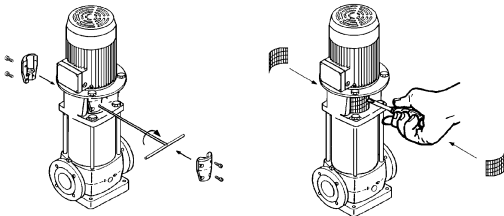
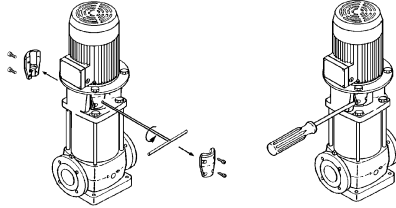




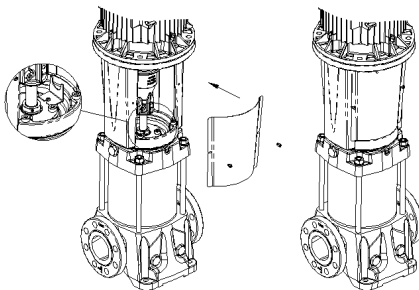
A



B



VLR 32



VLR 32

## 4. USE

**Attention** Never start the machine before filling it with fluid as shown in "Use", "Priming".



## 4.1 Priming

NOTA

A machine is considered under head if, in closed circuit systems, the level of the fluid to be pumped is above the suction inlet of the machine

### 4.1.1 Machines installed under head

Carry out the following operations to fill a machine under head:

- Close the gate on the delivery piping
- Unscrew the priming cap
- Loosen the air valve (if present)
- Slowly open the gate on the suction piping
- When the fluid comes out in a continuous way from the priming cap, carry out the following operations:
  - Screw the priming cap
  - Tighten the air valve (if present)
  - Completely open the gate on the suction piping
  - Open the gate on the delivery piping

**Danger**



Make sure that the priming cap and the air valve are perfectly tightened

**Danger**



If the fluid flowing in the pipes and circulating in the machine has a temperature higher than 65 °C, Use overall and gloves protecting against high temperatures

### 4.1.2 Machines installed above head (suction mode)

NOTA

A machine is considered above head if, in open circuit systems, the level of the fluid to be pumped is under the machine suction inlet

Carry out the following operation to fill the machine above head:

- Open the gate on the suction piping
- Close the gate on the delivery piping
- Open the priming cap
- Loosen the air valve (if present)
- Rotate the drain and/or discharge cap counterclockwise (if present)
- Pour the liquid in the machine through the priming cap until it comes out from it
- When it is no more possible to further fill the machine, carry out the following operations:
  - Tighten the air cap
  - Tighten the drain and discharge cap (if present)
  - Tighten the air valve (if present)
  - Start the machine
  - Open the gate on the delivery piping
  - Loosen the air valve
  - When the fluid comes, tighten the air valve (if present) or open the priming cap
  - Stop the machine

**Danger** If the fluid flowing in the pipes and circulating in the machine has a temperature higher than 65 °C, Use overall and gloves protecting against high temperatures



**Danger** Make sure that the priming cap and the air valve are perfectly tightened

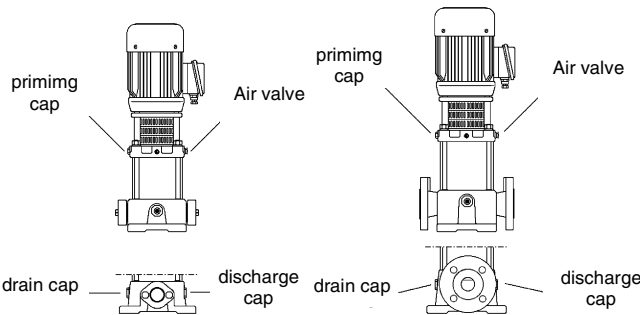


- If air comes out from the air valve, carry out a new priming operation
- Tighten the air valve (if present) or open the priming cap
- Open the gate on the delivery piping
- Start the machine
- Slowly open the gate on the delivery piping in order to prevent water hammering on the delivery piping
- Adjust the thermal relay depending on the current absorbed by the machine
- Adjust the start and stop pressure of the pressure gauge controlling the machine operation, if present

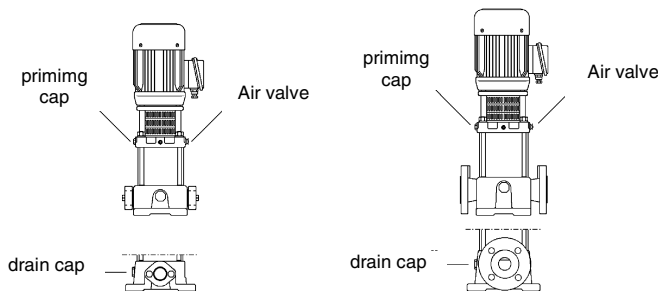
### 4.3 Start and stop frequency control

Carry out the following operations to control the frequency of starts and stops:

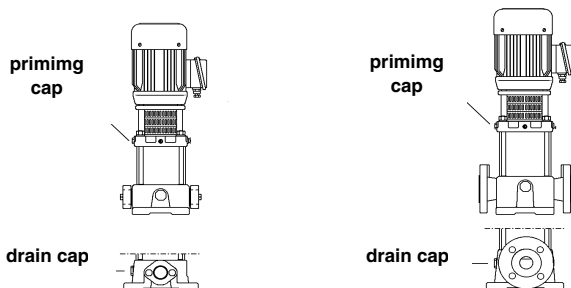
- Control the machine operation for one hour
  - A- For machines fitted with a motor having an absorbed power up to 4 kW, if the number of starts/hour is higher than 40, adjust the machine control equipment so that the frequency is reduced
  - B- For machines fitted with a motor having an absorbed power higher than 4 kW, if the number of starts/hour is higher than 30, adjust the machine control equipment so that the frequency is reduced



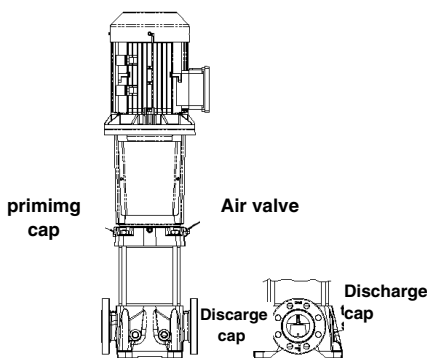
VLR 2B – VLR 4



VLR 8 – VLR 16



VLRI – VLRX



VLR 32

**Danger** In case of high temperature fluids, wait for an adequate time for the fluid contained in the machine to cool before unscrewing the screws securing the machine to piping



**Attention** Always check the machine filling. Never start the machine before filling it up with fluid as shown in "Use", "Priming"



## 5. MAINTENANCE

### 5.1 Lubrication

The seal on the shaft is self-adjusting. The seal surfaces are wear-resistant and are lubricated by the pumped fluid. The machine plain bearings are lubricated by the pumped fluid. The motor ball bearings are self-lubricated by heat-resistant grease  
**Electric motors with grease cup: lubricate every 1500 functioning hours with bearing grease**

**Attention** If the machines are installed, used and maintained according to the instructions contained in this manual, they do not need lubrication. Comply with the instructions of this manual



### 5.2 Temporarily quiescing

Carry out the following operations to set the machine to quiescing for a long period of time


- Cut-off the power supply system by means of the cut-off switch
  - Carry out the following operations if it is possible that ambient temperature falls under the pumped fluid freezing temperature:
  - 
  -
- A- If the whole system must be set to quiescing:
  - Empty the system


### 4.2 Starting

We suggest carrying out the following operations for the first starting:

- Loosen the air valve (if present) or open the priming cap

- B- If the whole system must not be set to quiescing:
- Close the gates on the delivery and suction piping
  - Remove the priming cap and the drain and discharge cap (if present)
  - Discharge all the fluid from the machine
  - Hold the priming cap and the drain and discharge cap for a new machine employment without refitting them.

	<b>Danger</b> In case of high temperature fluids, wait for an adequate time for the fluid contained in the machine to cool before unscrewing the screws securing the machine to piping
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	<b>Attention</b> Before restarting the machine fill it as shown in "Use", "Priming".
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### 5.3 Periodical inspection

Carry out the following checks at regular time intervals:

- Hydraulic performances
- No fluid leakage
- Motor overheating
- Relay intervention time
  
- Start frequency
- Automatic control correct operation
- Vibrations
- Noise


A- If the checks do not find malfunctions, keep on using the machine up to another inspection.

B- If the checks find malfunctions, carry out the following operations:

- Make reference to the table "Defect/Cause" in "Operation troubles".
- If the defect and the cause are listed in the table "Defect/Cause" in "Operation troubles", contact an authorised technician or a skilled technician and show them the cause of the found defect.
- If the defect and the cause are not listed in the table "Defect/Cause" in "Operation troubles", contact an authorised technician or a skilled technician

### 5.4 Extraordinary maintenance

For extraordinary maintenance operations, following malfunctions, faults, breaking or technical upgrading only contact an authorised technician or a skilled technician.

	<b>PENTAIR WATER ITALY is not liable and cancels every warranty contract in case of:</b> - Operations carried out on the machine and not documented by this manual - Extraordinary maintenance operations carried out by personnel different from authorised or skilled technicians.
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## 6. OPERATION TROUBLES


Make reference to the table "Defect/Cause".

## 7. DISMANTLING


### 7.1 Disconnecting the machine

- Cut-off the power supply system by means of the cut-off switch
- Close the gates on the suction and delivery piping
- Unscrew the screws fastening the terminal box cover
- Disconnect the wires from the terminals
- Remove the power supply cable from the fairlead
- Remove the priming cap and the drain and discharge cap
- Discharge all the fluid from the machine
- Unscrew the screws fastening the machine to the pipes
- Unscrew the screws possibly fastening the machine to the resting surface
- Hoist the machine as shown in "Installation", "Hoisting"
- Transport the machine as shown in "Installation", "Transport"
- If the machine is reused, carry out the following operations:
  - Screw the priming cap and the drain and discharge cap on the machine
  - Refit the terminal box cover with the gasket
  - Tighten the screws securing the terminal box cover
  - If the machine has oval flanges, carry out the following operations:
    - Unscrew the counterflanges from the pipes
    - Assemble the counterflanges with the gaskets on the machine
- Close the delivery and suction holes so that dirt cannot enter in the machine
- Store the machine as shown in "Installation", "Storage"

	<b>Danger</b> If the fluid flowing in the piping and circulating in the machine has a temperature higher than 65 °C, arrange a protection against high temperatures around the machine
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	<b>PENTAIR WATER ITALY is not liable in case of recycling or reuse of machine parts</b>
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### 7.2 Residual risks after disconnection

	<b>Attention</b> The machine is manufactured using non-biodegradable materials. Carry the machine in a deposit equipped for its disposal
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## Defect/Causes

Defect	Causes
<b>A - At starting, the motor does not run</b>	<ol style="list-style-type: none"> <li>1 - Mains voltage is cut-off</li> <li>2 - Blown fuse</li> <li>3 - Intervention of the thermal relay</li> <li>4 - Either the motor starter contacts do not conduct or the coil is faulty</li> <li>5 - The auxiliary circuit fuses are blown</li> <li>6 - The machine motor is faulty</li> </ol>
<b>B - The motor starter thermal relay intervenes when voltage is connected</b>	<ol style="list-style-type: none"> <li>1 - Blown fuse</li> <li>2 - The motor starter contacts are faulty</li> <li>3 - The electric connections are faulty</li> <li>4 - The motor windings are faulty</li> <li>5 - The machine is mechanically blocked</li> <li>6 - The thermal relay calibration is too low</li> </ol>
<b>C - The thermal relay sometimes intervenes without any special reason</b>	<ol style="list-style-type: none"> <li>1 - The thermal relay calibration is too low</li> <li>2 - Mains voltage periodically lacks</li> <li>3 - During peak hours mains voltage is too low</li> </ol>
<b>D - The thermal relay intervention has not occurred by the machine does not work</b>	<ol style="list-style-type: none"> <li>1 - Mains voltage is cut-of</li> <li>2 - Blow fuse</li> <li>3 - Either the motor starter contacts do not conduct or the coil is faulty</li> <li>4 - The auxiliary circuit fuses are blown</li> </ol>
<b>E - The machine delivery is not constant</b>	<ol style="list-style-type: none"> <li>1 - The suction pipe is undersized</li> <li>2 - The availability of sucked fluid is not enough</li> <li>3 - The fluid level is too low</li> <li>4 - The head pressure is not enough</li> <li>5 - The suction pipe is partially obstructed</li> </ol>
<b>F - The machine runs but does not deliver fluid</b>	<ol style="list-style-type: none"> <li>1 - The suction pipe or the pump are obstructed</li> <li>2 - The foot valve (or check valve) is blocked in closed position</li> <li>3 - Leakage is present in the suction pipe</li> <li>4 - Air is present in the suction pipe or in the pump</li> </ol>
<b>G - At stop the machine runs in the opposite direction</b>	<ol style="list-style-type: none"> <li>1 - The suction pipe or the pump are obstructed</li> <li>2 - The foot valve (or check valve) is faulty</li> <li>3 - The foot valve (or check valve) is blocked in partial or total opening position</li> </ol>



Only for EU countries

Do not dispose of electric tools together with household waste material!

In observance of European Directive 2002/96/EC on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.