VLW Series

Vertical Inline Centrifugal Pump — Long-Coupled, Single-Stage Pump

Installation, Operation and Maintenance Manual

1. 1. Foreword

Thank you for choosing our product. This manual should be read carefully prior to installation. This manual has been carefully prepared to provide instructions on installation, operation, and maintenance of the Winflo VL series vertical inline centrifugal pump.

This manual is intended to be used in conjunction with other literature provided with the Winflo-EauTechnik products. Installation should be made in accordance with the regulations of the authority having jurisdiction, local code authorities, and utility companies which pertain to this type of equipment. Authority having jurisdiction (AHJ) may be federal, state, local government, or individuals such as fire department, labor department, health department, building official, electrical inspector, or others having statutory authority. In some circumstances, the property owner or his/her agent assumes the role, and at government installations, the commanding officer or departmental official may be the AHJ.

Installation and maintenance of Winflo-EauTechnik products must be performed by qualified professionals where civil, mechanical, and electrical work is required.

This document is intended to provide information only and does not form a contract with third parties.

Intended use: the VL series is intended for circulation and transfer of clean, non-explosive liquids without abrasive solids or fibres, within the limits of technical data, in commercial and industrial building-services and process applications. Any use beyond this — including non-approved fluids, operation outside the specified limits, or unauthorised conversion — is misuse and voids all warranty and liability claims.

Note: EauTechnik reserves the right to modify and update product technical specifications, components, and documentation without notice and without obligation to update existing equipment. It is the user's responsibility to ensure that the latest version of this manual is being used that is available by contacting EauTechnik GmbH or any of its authorized distributors.

Note: The texts and drawings in this manual are correct to the best of our knowledge. Your own calculations and plans, under consideration of the current standards and directions should be the only basis for your projects. We do not offer a guarantee for the completeness of the drawings and texts of this manual - they only represent some examples. They can only be used at your own risk. No liability is assumed for incorrect, incomplete, or false information and / or the resulting damages. The design and the specifications can be changed without notice. The illustrations may differ from the original product.

2. 2. Table of Contents

3. 3. General Instructions

1. Read these instructions and warnings carefully. Instructions contain vital information regarding the safe installation, operation, and maintenance of this product. Failure to comply with the instructions in this manual can cause product/property damage, severe personal injury, and/or loss of life for which the manufacturer shall not be liable.
2. This manual must be kept in a suitable place with easy access for users and operators, protected from dust and damp. The manual must accompany the unit during the entire life cycle.
3. Examine the product when it is received to be sure that there is no damage in shipping. If any damage is evident, report it to the transportation company and have it inspected by them. Check the nameplate to verify the correct unit has been received.
4. The responsibility of installation lies with the installer and must be performed by an authorized and qualified professional.
5. Using the product for reasons other than those specified in this manual are strictly prohibited. The manufacturer shall not be held liable for any damage caused by improper or unjustifiable use or by failure to comply with the instructions in the manual.
6. Incorrect handling, installation, operation, and maintenance of the product may cause personal injury or damage to property. The manufacturer shall not be held liable for such damage.
7. Installation, maintenance, and other special work on the product must be performed by an authorized professional, always in compliance with instructions provided in this manual and any other further instructions provided by the manufacturer.
8. Keep all packaging materials out of reach of children.
9. All repairs must be performed exclusively by an authorized specialist, using only the appropriate parts. Failure to comply with the instructions above may endanger your safety and relieves the manufacturer of all responsibility.
10. The product is for its intended use only.

Symbols

⚠	DANGER – These instructions must be strictly followed and indicate a hazardous situation which, if not avoided, will result in death or serious personal injury.
ϟ	ELECTRICAL HAZARD – Indicates an electrical hazard that can result in fatal injury. These instructions must be followed and carried out by a qualified electrician or electrical engineer.
!	NOTICE – These instructions are highly recommended and indicate the product's general and specific cautions, instructions and standards.

Note: Failure to follow the procedures and instructions in this manual will void the warranty and EauTechnik may not be held liable for any damages to property nor injury or death.

4. 4. Safety Standards

4.1. Personnel

- Electrical work only by a qualified electrician: a person with appropriate technical education, knowledge, and experience who can identify and prevent electrical hazards.
- Installation, dismantling, and maintenance only by technicians trained in the necessary tools, fixing materials, and the pumped fluid; operation only by persons instructed in the system.
- The operator must confirm the authority, competence, and monitoring of all personnel, ensure untrained personnel are trained before working on the unit, provide the required PPE (safety shoes, gloves, goggles; helmet under suspended loads), and keep all signs on the unit legible (warnings, nameplate, rotation arrow).

4.2. General Safety Standards

1. Observe the national regulations for working at heights; cordon off the fall zone below the working position.
2. Avoid danger of burning and scalding: with fluid above ~68 °C, accessible surfaces can cause burns. Guard or insulate hot surfaces (casing only).
3. The product is not to be used by persons under 8 years of age / persons with reduced physical, sensory or mental capacity, or lacking experience and familiarity, unless supervised or instructed. Do not permit children to play with the appliance.

4. Do not leave flammable materials in contact with or in the vicinity of the product.
5. Do not place anything under the product which may be damaged by a leak.
6. Operate only with the coupling guard fitted; never insert objects through fan-cover or terminal-box openings.
7. Guard hot, cold, and rotating components against contact; additional guards are to be provided by the customer.
8. DO NOT leave the packaging materials (staples, plastic bags, expanded polystyrene, etc.) within the reach of children.

4.3. Residual Risks

Even after all design-level safeguards, residual risks remain. Operators, maintainers, and electricians must remain aware of these at all times: hot surfaces, pressurised system, rotating shaft and coupling, stored energy in mechanical-seal springs, lifting loads greater than 300 kg, electrical supply greater than 400 V, and possible contained-fluid release in the event of a seal or gasket failure.

⚠	Never lift the unit by the motor eyebolts, coupling guard, or flange bolt holes. Lift only as described in Section 5.2 (slings to pump flanges / motor circumference).

5. 5. Transport, Handling & Storage

5.1. Delivery Inspection

On receipt of the pump:

1. Inspect the shipping crate visually. Photograph any damage before opening.
2. Verify the packing list against physical items. Tick-off each item.
3. Confirm the nameplate matches the datasheet (model code, serial number, duty conditions).
4. Check for loose coupling hubs, bent flanges, or missing blanks on ports.
5. Check the motor: housing and fan-cover damage, eyebolt condition and seating, junction box; verify the accompanying documents (manual, conformity certificate, warranty card).

Any damage or discrepancy must be notified to the carrier within **48 hours** and to EauTechnik GmbH / Winflo Service within **10 days** of receipt, in writing, to preserve warranty entitlement.

5.2. Lifting & Handling

⚠	WARNING — Suspended load. Lifting a pump incorrectly can cause serious injury. Use only rated rigging, operated by qualified personnel. Never stand under a suspended load.

1. Lift loads greater than 30 kg with rated hoisting gear. Attach slings to the pump flanges and, if necessary, around the outer motor circumference in self-tightening loops, secured against slipping — never by the motor eyebolts (motor only) and never around the shaft.
2. Maintain a sling angle ≤ 45° from vertical; protect slings from sharp edges; prevent swinging.
3. To upend from horizontal to vertical, motor eyebolts may be used only to rotate the unit with ropes and a sling bar.
4. The support feet are anchoring points only — a free-standing pump on its feet is not stable; secure against tipping until anchored.
5. Unit weight: 43 – 1,890 kg depending on model — see the specific datasheet. Motors ≤ 4 kW have no lifting eye: lift with nylon webbing slings (protect the fan cover from deformation).

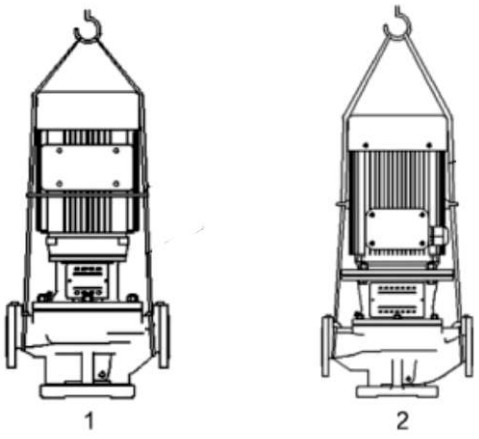

Fig: Lifting Schematic

5.3. Short-Term Storage (< 6 months)

Store in a dry, clean, indoor environment:

1. Ambient temperature: −20 °C to +60 °C.
2. Relative humidity < 70 % (ideal).
3. All openings (suction, discharge, vents, ports) covered with the factory blanks. no loads stacked on the unit.

5.4. Long-Term Storage (> 6 months)

In addition to the short-term storage requirements:

1. Rotate the shaft two full revolutions every two weeks to prevent false-brinelling of the stationary-load contact areas of the bearings. Missed rotation rounds can cause latent bearing failure months after commissioning.
2. The pump is factory wet-tested; residual water may remain. Remove the top and bottom casing plugs, drain, and air-blow all water out (prevents rust and freezing); reinstall the plugs. Alternatively place a VCI desiccant pack inside the casing — remove it before return to service.
3. Monthly visual inspection: check for condensation, rodent damage, seal dribble around plugs.
4. Re-apply preservation oil every 12 months through the casing ports.

6. 6. Product Description

6.1. General Overview

The Winflo VL series is a vertical, single-stage, inline centrifugal pump of long-coupled construction: a standard IEC motor mounted on a lantern (motor stool) drives the pump shaft through a rigid spacer-type coupling. Suction and discharge ports are in line, allowing installation directly in a straight pipe run. The factory-set rigid coupling eliminates on-site alignment; the spacer construction allows mechanical-seal replacement without removing the motor (Section 12).

Typical applications:

- Chilled-water primary and secondary circulation.
- Condenser-water circulation for chilled-water plants and cooling towers.
- Heating hot-water (LTHW) circulation.
- High-rise pressurisation, clean-water supply and transfer.
- Industrial process-water circulation.

6.2. Design Features

1. High-grade ductile iron construction for frost resistance and high-pressure durability.
2. Efficient hydraulic model with IE3 / IE4 / IE5 motor technology (induction or permanent-magnet with VFD).
3. Anti-corrosion electrophoretic coating on all cast components.
4. Rigid spacer coupling — factory-set, no on-site alignment; seal replaceable without removing the motor.
5. Targeted discharge of condensed water in air-conditioning and cooling duty via the lantern drain.
6. Securely fixed pump support feet for easy installation and enhanced stability.
7. Scope of delivery: pump unit with motor, coupling, coupling guard, and support feet; this manual. Accessories (separate order): foundation base / mounting brackets, counter-flanges, condensate drain kit, PTC tripping unit, anti-condensation heater (factory-fitted).

6.3. Type Key / Model Code

Product can be identified using the model, for example:

VLW 100/160 - 30/240 - 30/2

Series Name = VLW (Vertical inline, Long-coupled)

Suction / Discharge DN = 100 (mm)

Impeller Nominal Ø = 160 (mm; actual trimmed diameter is recorded on the nameplate)

Rated head / rated flow = 30 (m) / 240 (m^3/h) — Motor power / poles = 30 (kW) / 2 (2-pole, 2,900 r/min). Variant suffixes: E = with VFD, EP = PM motor with VFD.

6.4. Nameplate

The pump carries a stamped-metal nameplate affixed to the casing. Fields include:

- Winflo® logo with “An EauTechnik GmbH Brand” lockup.
- Type (model code) — P/N (Winflo part number) — S/N (serial number).
- Ø imp. (actual trimmed impeller diameter, mm) — n (rated speed, r/min).
- Q (duty flow) — H (duty head, m) — T liq. (permissible fluid temperature range, °C).
- PN (pressure rating, bar — flange rating per DIN EN 1092).
- Date (MM/YYYY) — CE mark — WEEE symbol — EauTechnik contact block and country-of-origin mark.

The nameplate governs over this manual wherever unit-specific values differ.

7. 7. Technical Data

7.1. Performance Envelope

Parameter	Range
Capacity Q	Up to 1,300 m^3/h
Head H	Up to 85 m
Suction / discharge flange	DN 40 – DN 300
Max working pressure	16 bar (optional 25 bar)
Liquid temperature	−25 °C to +110 °C
Max ambient temperature	−20 °C to +40 °C (derate motor above 40 °C or 1,000 m altitude)
Duty type	S1 (continuous)
Motor	IP55, Class F, 400 V / 3~ / 50 Hz; IE3 / IE4 / IE5

Every VL production unit undergoes (a) dimensional and visual conformance inspection and (b) hydrostatic casing test at 1.5 × PN at ambient temperature. Hydraulic performance is validated by periodic type-test on reference samples per ISO 9906:2012; individual-unit hydraulic test is available on request. For unit-specific performance (duty flow, duty head, efficiency, NPSHr), refer to the pump datasheet supplied with each order.

Additional service conditions (design basis): maximum kinematic viscosity 20 cSt; relative humidity ≤ 95 %; minimum efficiency index MEI ≥ 0.7; flanges to DIN 2501 / GB/T 17241.6 PN16 (PN25 optional); hydrostatic test pressure 2.5 MPa.

Pressure limit: the maximum suction pressure plus the pump shut-off head must never exceed the nameplate PN rating. The system, valves, and fittings must withstand the maximum pump pressure.

7.2. Materials of Construction

Part	Standard	Options
Casing	Ductile iron	-
Impeller	AISI 316L	-
Shaft	AISI 316L	-
O-Rings	EPDM	-
Mechanical Seal	SiC/SiC	eSiC/eSiC

Permitted fluids: heating water (VDI 2035 practice), chilled/cooling water, process and potable water; glycol mixtures ≤ 40 vol% (higher power draw — check motor sizing; inhibited mixtures only). Fluid must be sediment-free. Seal-face TDS limits: SiC/carbon ≤ 2,000 ppm; SiC/SiC ≤ 4,000 ppm. Fluids that attack EPDM require alternative elastomers — specify at order.

7.3. Vibration & Bearing Limits

Per DIN ISO 10816-7 Category II, Zone A boundaries, measured at the motor flange / lantern at rated speed:

Field acceptance at commissioning: ≤ 3.8 mm/s RMS (< 200 kW) / ≤ 4.8 mm/s (≥ 200 kW) per HI 9.6.4. The values below are alarm / trip levels in operation.

Motor power	Warning (mm/s RMS)	Trip (mm/s RMS)
< 200 kW	6.4	10.6
≥ 200 kW	7.6	11.9

Motor-Bearing temperature limits (at bearing-housing exterior):

Condition	Limit
Normal continuous operation	≤ 80 °C, or 40 °C above ambient (whichever lower)
Warning alarm	85 °C
Trip	90 °C

7.4. Permissible Nozzle Loads

Permissible nozzle forces and torques per flange, per EN ISO 5199 Class II (2002), Appendix B, adapted for vertical inline installation. Forces in N; moments in N·m.

DN	Fx	Fy	Fz	ΣF	Mx	My	Mz	ΣM
40	1100	1100	1600	2200	110	110	160	220
50	1500	1500	2200	3000	150	150	220	300
65	2100	2100	3000	4200	210	210	300	420
80	2700	2700	3900	5400	270	270	390	540
100	3600	3600	5200	7200	360	360	520	720
125	4700	4700	6700	9400	470	470	670	940
150	5800	5800	8300	11600	580	580	830	1160
200	8100	8100	11600	16200	810	810	1160	1620
250	10400	10400	14800	20800	1040	1040	1480	2080
300	12700	12700	18100	25400	1270	1270	1810	2540

Forces in N; moments in N·m. Values are per nozzle (suction and discharge).

Axis convention: Fz is vertical (casing weight axis); Fx and Fy are horizontal. Mx, My, Mz are the corresponding moment components. Compensation for combined loading: individual components may exceed the single-component maximum provided $(\Sigma F_{eff}/\Sigma F_{max})^2 + (\Sigma M_{eff}/\Sigma M_{max})^2 \leq 2$ (EN ISO 5199 Annex B), and no individual component exceeds 1.4 × its tabulated maximum. Σ values are arithmetic sums across both flanges; signs are not considered.

7.5. Noise Levels

Anticipated mean sound-pressure level LpA at 1 m from the motor surface:

Motor power (kW)	2,900 r/min, dB(A)	1,450 r/min, dB(A)
≤ 7.5	64 – 70	—
11 – 37	71 – 80	<71
45 – 110	86 -92	78 - 88
132 – 250	92	88

8. 8. Installation

ϟ	WARNING — Electrical, pressurised system, rotating machinery. Perform LOTO on all electrical supplies before starting installation work. Only qualified personnel may perform installation. Full PPE is mandatory.

8.1. Pump Location

1. Weather-protected, frost-free, dust-free, well-ventilated, non-explosive environment (typically a technical room — not occupied rooms). Outdoor installation only as a special version with anti-condensation heater and protective cover.
2. Accessible for maintenance: headroom above the motor fan cowl ≥ 300 mm (motors ≤ 4 kW) or ≥ 1,000 mm (motors > 4 kW) for hoisting and motor removal; keep a free wall clearance around the unit for ventilation and service access; hoisting attachment point above the pump.
3. In closed hydronic systems, install immediately downstream of the expansion-tank / make-up connection (point of no pressure change); never more than one expansion connection per closed circuit.
4. Not at the lowest point of the system (sediment); automatic air vent at the system high point.
5. Floor drain or bund nearby; unit raised so leakage cannot flood or submerge it. Pump-room ambient 5 – 40 °C.
6. NPSHa ≥ NPSHr + 1.0 m or NPSHa ≥ 1.5 × NPSHr, whichever is greater (per ANSI/HI 9.6.1).
7. No direct sunlight on the motor terminal box.

8.2. Installation Position & Mounting

- Installation position: vertical, shaft vertical, motor on top — only. The motor must never be below the pump. The air-vent valve must point upward; the terminal box must not face downward.
- Foundation installation (standard): all sizes mount on a solid, flat, rigid foundation via the support feet, using the standard bolt-on base plate selected by the pump-foot dimension (260×260 / 320×320 / 420×420 / 470×470 mm, 5 mm steel — see the dimension sheet). For noise-critical buildings use a concrete inertia base on elastomer or spring isolators; a channel-steel frame may be used on weak floors. Level the unit with a spirit level; tighten anchors evenly. Foundation defects are not covered by the warranty.

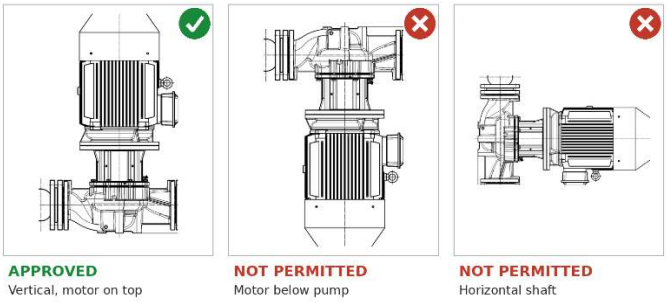

Fig: Installation Position

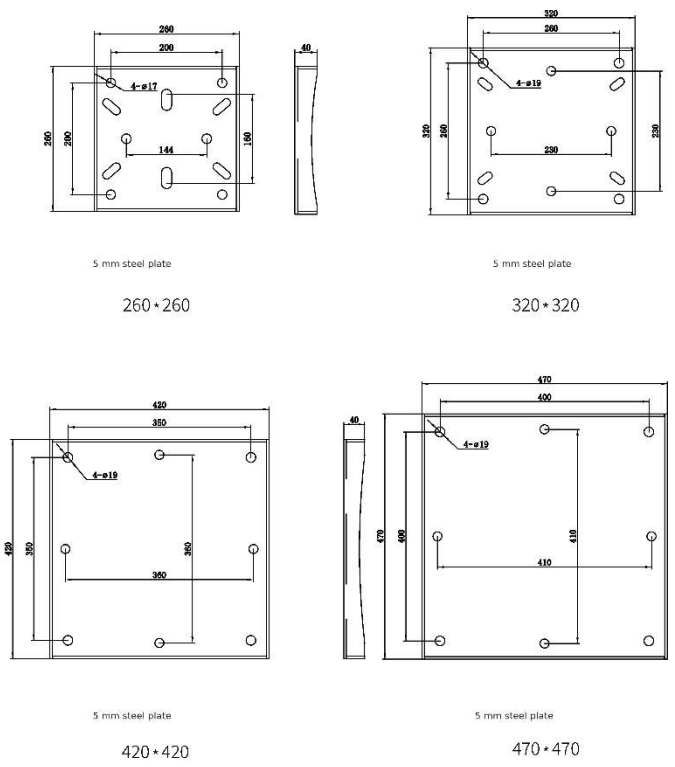

Fig: Foundation Base Plates

8.3. Piping

General rules:

Check	Reason
Pipe supports independent of pump body	Prevents pipe strain from transferring to casing and flanges
Piping aligned to the pump, not pump to piping	Avoids permanent casing distortion
Isolation valves on suction and discharge	Enables pump service without draining the system
Suction pressure gauge — vacuum-capable	Diagnoses suction-side issues
Discharge pressure gauge ≥ 120 % shutoff head	Captures startup transients
Drain valve at lowest system point	Allows full drain for freeze protection and service
Non-slam check valve between pump and discharge isolation valve	Prevents reverse flow and water hammer
Flange loads within Section 7.4, incl. thermal expansion	Casing strain

Suction piping: diameter ≥ pump-suction nozzle size; max velocity 2 m/s; straight suction length ≥ 10 × pipe diameter at the pump; suction and discharge piping typically sized 1 – 2 DN larger than the pump ports, and long suction lines upsized. Eccentric reducer on horizontal suction: flat side up. Foot-valve port area ≥ 1.5 × suction pipe area; strainer net area ≥ 3 × pipe area; max mesh 1.6 mm for cold clean water, 3 mm for light-service water. When pumping from an open tank or cooling tower, maintain liquid level above the suction port and observe the minimum inlet pressure.

Discharge piping: max velocity 3 m/s; expansion joint ≥ 2 × DN from pump flange, anchored against line thrust; no reducer closer than 5 × DN to the pump flange. Bleed/drain valve for pressure relief before service. Anti-vibration joints both sides and isolation dampers under the base where structure-borne noise matters (only with the pump rigidly founded).

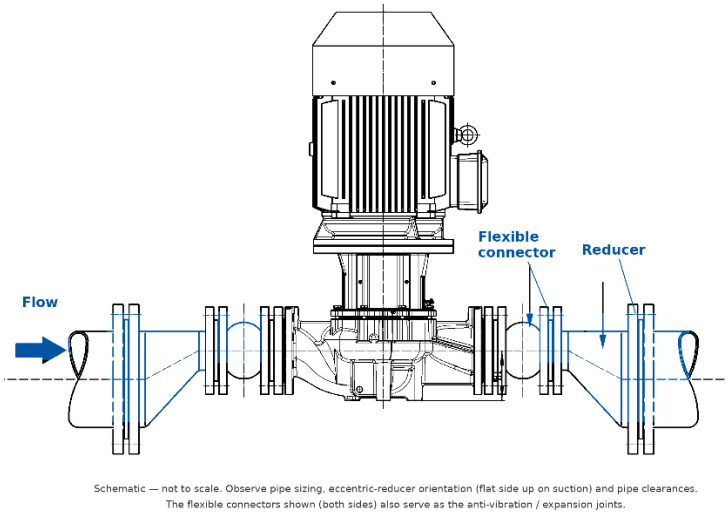

Fig: Installation Schematic

8.4. Condensate Drainage & Insulation

In air-conditioning / cooling duty, condensate drains from the lantern through the drilled hole; a drain pipe can be connected to carry it to the floor drain.

!	Notice: In insulated systems, only the pump casing may be insulated. Never insulate the lantern or motor.

8.5. Electrical Installation

⚡	DANGER - Electric shock. Isolate, lock out, and verify dead (including volt-free contacts) before terminal-box work; where a frequency converter is fitted, wait 5 minutes for capacitor discharge.

1. Motor wiring per IEC 60204-1 and the diagram in the terminal-box cover; supply tolerance ±10 %.
2. Earthing mandatory: connect PE first and make it longer than the phase conductors; bond motor frame and pump.
3. Lockable all-pole disconnect switch (≥ 3 mm contact gap, EN 60204-1) within sight of the pump.
4. Motor protection: overload relay set to nameplate current (0.58 × In if in a Y-Δ phase leg); short-circuit protection per IEC 60947-2. PTC thermistors (standard ≥ 5.5 kW, DIN 44082) to a tripping unit — never apply more than 7.5 V DC across PTC terminals; route PTC cables separate from mains.
5. Cable workmanship: gland matched to cable for sealing and strain relief; drip loop below the gland; unused glands plugged; heat-resistant cable for fluid > 90 °C; size mains for all pumps running in multi-pump sets.
6. Star-delta: remove bridges; switch over only at full star speed, < 5 s for motors > 30 kW; soft starters recommended.

7. Anti-condensation heater (option): 1~230 V to terminals HE–HE; never energised while the motor runs.
8. VFD operation: comply with IEC TS 60034-25. dU/dt filter recommended for motor cable > 50 m (supply ≤ 500 V); sinusoidal filter above 500 V; 500/690 V supplies require reinforced-insulation motors (order option). Cable sized for ≤ 5 % voltage drop, shielded per the converter manual. Insulated non-drive-end bearing for large frames on VFD duty (typ. ≥ 45 kW 2-pole / 37 kW 4-pole). Minimum continuous speed ≈ 25 Hz (50 Hz supply); observe Qmin at all speeds. Integrated-drive (E/EP) variants: see the separate drive manual.
9. RCD protection (where required): time-delayed Type B (AC + DC sensitive) with converters, sized for total system leakage current.

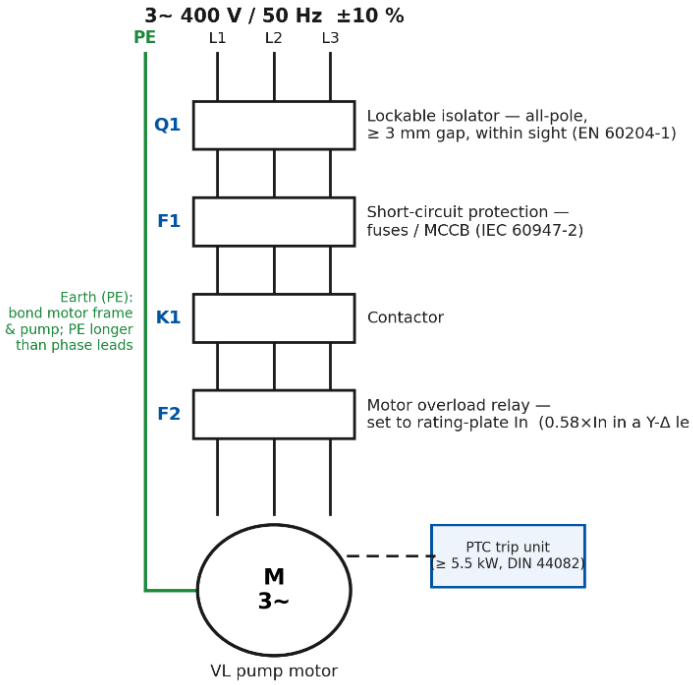

Fig: Power and Protection Schematic

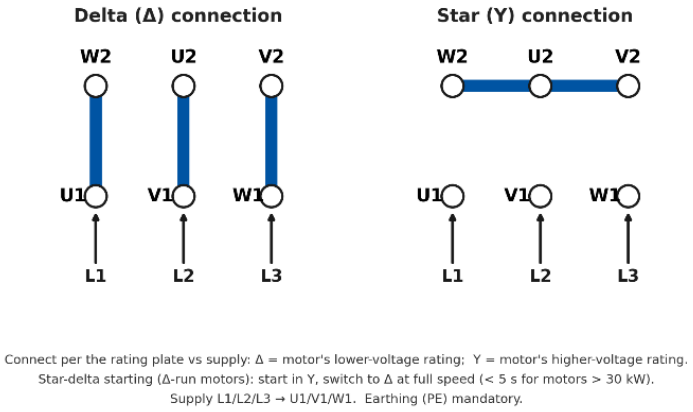

Fig: Motor Connections

9. 9. Commissioning, Startup & Shutdown

9.1. Pre-Start Checklist

#	Check	✓
1	Foundation / anchoring complete and torqued (or pipe-mount flanges fully bolted)	☐
2	Unit plumb / level verified	☐
3	Coupling correctly set (§12.3 / §12.4); shaft turns freely	☐
4	Piping aligned, independently supported, free of strain, flange loads within limits	☐
5	System flushed clean and refilled.	☐
6	Suction strainer installed, verified clear	☐
7	All auxiliary connections made (gauges, vent, drain)	☐
8	Motor voltage / frequency matches nameplate; phase-rotation verified by meter	☐
9	Coupling guard installed	☐
10	Shaft rotates freely 360° by hand — no rub, no tight spot	☐
11	Pump and system filled and vented; unit at ambient temperature	☐
12	Mechanical seal wetted from pumped fluid (pump primed)	☐
13	Motor rotation direction verified	☐
14	Motor lubrication per motor nameplate (large frames only)	☐
15	Dry-run / minimum-flow protection operational	☐
16	Protective devices (thermal, flow, pressure switches) wired, tested, set	☐
17	System and area around pump clean; tools removed	☐

9.2 9.2. System Cleanliness

!	Notice: Before starting, the system must be thoroughly cleaned, flushed, drained, and replenished with clean liquid. Welding slag, debris, stop-leak compounds, cleaning chemicals, and improper or excessive water treatment are detrimental to the pump internals and the seal. The use of the pump for chemical flushing immediately invalidates the warranty.

Potable-water duty: keep the unit packed until installation; flush out preservatives and test-liquid residues with clean water before connection to the network.

9.3 9.3. Priming

⚠	WARNING - Never start a dry pump — even momentarily; dry running destroys the mechanical seal. Open venting devices cautiously: hot or cold pressurised fluid can escape as a jet. Orient vents so escaping fluid cannot injure persons or enter the motor.

A — Positive-head (flooded) installation: close discharge valve; fully open suction valve; open pump vent until liquid flows steadily without air, then close vent; rotate the shaft by hand to distribute fluid through the seal chamber.

B — Suction-lift installation: close discharge valve; use a vacuum pump, foot valve, or external priming line to evacuate air; fill casing

and suction line completely; open vent and close when steady discharge is seen.

9.4 9.4. Rotation Direction Check

1. Check only after filling.
2. Bump motor ON / OFF briefly — observe the motor shaft.
3. Required rotation: as marked by the arrow on the fan cover / casing (observe from the motor fan end).
4. If reversed, swap any two phases at the motor terminal - (DOL); for Y-Δ, swap the start and end of two windings -- retest.
5. Reverse rotation is strictly prohibited — even briefly it can damage the mechanical seal.

9.5 9.5. Startup Sequence

1. Fully open the suction valve; discharge valve closed (high-flow / high-head pumps: leave it ~10 % open to avoid valve seizure after water hammer).
2. Confirm priming is complete.
3. Start motor; observe no abnormal noise.
4. As the motor reaches rated speed, open the discharge valve promptly and gradually to about one-third (pass quickly through the low-flow stage), then open slowly and trim to the duty point by gauge indication.
5. Maximum 3 minutes at zero flow (closed discharge valve). If casing temperature climbs during this time, open discharge immediately.
6. Monitor pressure, vibration, temperature, and noise for the first 15 minutes.
7. Verification: briefly close the discharge valve and compare the gauge differential with the shut-off head (verifies priming and the PN margin). If the running pump is noisy because the actual system head is far below design, throttle the discharge until gauge head matches the nameplate and notify the system designer (impeller trim / speed). Cycle the discharge valve and restart 2–3 times (shake-down); confirm vibration within field limits; record results in Appendix C.
8. Seal run-in: a slight initial weep is normal and stops when bedding-in is complete; a new run-in period follows every change of operating conditions. A slight weep during the first days is normal; if leakage persists or worsens after 3 – 5 working days of operation, the seal was installed incorrectly or is defective — have qualified personnel disassemble, inspect, and renew it.

9.6 9.6. Shutdown & Freeze Protection

1. Slowly close the discharge valve to prevent water hammer (under 30 s for small systems, over 60 s for long discharge lines). Stop the motor and let it coast down completely and smoothly.
2. Never close the suction valve to stop the pump — close it only for extended shutdown, after the unit has stopped. Avoid fast-closing valves (water-hammer peaks > 1.5 × nominal pressure damage the pump).
3. For freeze risk or long standstill, drain casing via the bottom drain and drain suction and discharge lines, blow out residual water.
4. Insulate exposed casing and piping sections where ambient may fall below 0 °C.
5. Do not use antifreeze in potable-water or food-service systems.

10. 10. Operation

10.1. Operating Envelope

Region	Flow range	Permitted duration
Preferred operating region (POR)	70 % to 120 % BEP	Continuous
Allowable operating region (AOR)	Qmin (§10.2) to max curve flow	Continuous, increased wear
Outside AOR	Below Qmin / above max curve flow	Not permitted

Operation outside the AOR accelerates wear on the seal and bearings, and may induce cavitation damage on the impeller. Refer to the individual pump performance curve for the BEP flow and the duty point.

10.2. Minimum Flow & Dry-Run Protection

1. Minimum flow: Qmin = 10 % × Qmax of the pump.
2. Do not operate below Qmin continuously: the fluid overheats and the shaft, impeller, and seal can be damaged.
3. Dry running is strictly prohibited — even momentarily, with no time allowance. Maximum 3 minutes at zero flow (closed discharge).
4. Where operation below Qmin is possible, fit a bypass line sized ≈ 10 % of Qmax and/or a low-flow / low-suction-pressure cut-out; use a float switch or probes when fed from a tank.

10.3. Maximum Closed-Valve Run Time

3 minutes maximum at zero flow. Beyond 3 minutes, fit a bypass line or a thermal cut-off on the discharge piping to prevent casing thermal damage.

10.4. NPSH Margin

1. NPSHa ≥ NPSHr + 1.0 m or NPSHa ≥ 1.5 × NPSHr (whichever greater).
2. Evaluate at maximum flow (NPSHr is highest) and at maximum fluid temperature (highest vapour pressure gives the lowest NPSHa margin).
3. Signs of insufficient NPSH: rattling / gravel noise (cavitation), vibration, head drop at constant speed, impeller erosion found at service.

10.5. Frequency of Starts and VFD Operation

Starts per hour: maximum 10 starts per hour, evenly distributed (design-basis rule). Observe any lower motor-manufacturer limit for large frames.

VFD minimum continuous frequency: approx. 25 Hz for a non-inverter-duty IE3 induction motor on a 50 Hz supply (≈ 50 % of rated speed); ~ 30 Hz for 60 Hz supply. Below these thresholds, derate the motor or fit forced ventilation (IC416).

10.6. Duty / Standby

Exercise the standby pump at least once a week (run 15 – 20 minutes) and alternate duty regularly; for hot-water recirculation alternate daily (automatic changeover recommended). Routine monitoring: smooth running, gauge readings, seal area (slight weep only), motor cooling path clear. Shut down immediately on any hazardous defect (Section 4).

11. 11. Maintenance

11.1. Maintenance Schedule

> ⚠ WARNING - Before any maintenance: isolate, lock out and tag the supply; verify dead (5-minute capacitor wait with converters); close both isolation valves; relieve pressure via the bleed/vent valve and allow cooling (hot-water scalding hazard); refit guards and remove tools before restart.

General preventive-maintenance matrix for continuous chilled-water service at BEP ± 10 %. Intervals should be shortened for off-BEP, cycling, or elevated-temperature service. Intervals apply to clean-water duty near BEP; shorten for off-BEP, cycling, or elevated temperatures.

Task	1 Day	1 Wk	1 Mo	3Mo	6-Mo	4000 h/1 Yr	10000 h/2 Yr
Visual leak check	•						
Read pressure gauges	•						
Verify bearing temperature ≤ 80 °C	•						
Listen for abnormal noise	•						
Mechanical-seal visual check	•						
Vibration check by hand		•					
Vibration measurement (accelerometer)			•				
Clean motor cooling-air path (fan cover, lantern openings)				•			
condensate drain clear (cooling duty)				•			
*Foundation-bolt retightening				•			
Coupling screw torque / shaft-adjustment check					•		
Shaft-adjustment check (turn by hand)						•	
Mechanical-seal inspection						•	
Internal clearance / performance check							•
Shaft runout measurement						•	
Bearing replacement							•

*If foundation applies for system install.

11.2. Mechanical Seal

- Expected steady-state behavior: near-zero visible leakage; a light mist or very occasional drop is normal.
- Never run dry — even momentarily. A seal cannot be re-tightened: replace on any persistent drip, steam plume, or crystalline deposit.
- Never apply mineral oil, petroleum jelly, or silicone products to seal elastomers — use water, mild soap solution, or a proprietary rubber lubricant for assembly.
- Full replacement at each major overhaul, or sooner on persistent visible leakage.

11.3. Motor, Bearings & Anti-Stick

- Increased bearing noise and vibration indicate wear: replace bearings or motor (Section 12.4). Motors ≤ 11 kW are typically greased for life; larger motors per the motor nameplate (lithium grease, DIN 51825 K3N or better).
- If the pump is drained for a long standstill, apply a few drops of seal lubricant to the shaft between lantern and coupling; run standby pumps ≥ 5 minutes monthly.
- Re-align nothing — but re-verify the shaft adjustment (§12.4) after any motor disturbance; investigate if vibration increases > 25 % vs baseline.

11.4. Corrective Maintenance

1. Re-verify the shaft adjustment (§12.4) if vibration increases > 25 % vs the commissioning baseline.
2. Casing wear ring (fitted): on light scoring, dress the impeller running surface and casing ring with an oilstone or fine file. On deep grooves or excessive clearance: machine the impeller running surface true, press a new blank ring into the casing ring seat, and bore it to fit (service-centre repair). The ring is repaired / machined to fit — it is not a catalogued spare part.
3. Replace mechanical seal on any persistent visible leakage.

11.5. Flood-Damaged Pump Recovery

1. Drain and disassemble.
2. Inspect and replace bearings, seals, and gaskets.
3. Clean and dry internals.
4. Check motor insulation resistance (minimum 1 MΩ to earth).
5. Recommission per §9.

12. 12. Disassembly & Reassembly

12.1. Pre-Work

1. LOTO electrical supply.
2. Allow pump to cool to ambient.

3. Drain casing and auxiliary piping.
4. Disconnect suction and discharge piping (full strip-down only).
5. Relieve pressure by opening the casing air-vent/vent plug and confirm zero pressure before loosening any joint.
6. Tag all disconnected parts with their position and orientation.

12.2. Tools Required

- Metric socket and hex-key sets; calibrated torque wrench 5 – 250 N·m.
- Feeler gauges; soft-jaw strap wrench; levers; hoisting gear for the motor.
- New mechanical seal, O-rings, and locking screws (replace without exception — never re-use).

12.3. Mechanical Seal Replacement – Without Removing the Motor

Removal

1. Remove the coupling-guard plates.
2. Mark the two coupling halves for orientation. With a hex key, evenly slacken and remove the coupling clamp screws; lift off both halves. The pump shaft is now free of the drive and rests at its running position (impeller seated in the casing).
3. Remove the shaft key; note the locating pin.
4. Unscrew the seal-cover/gland fixing screws; lift the cover with its stationary seat clear of the casing neck.
5. Slide the rotating seal element up off the shaft. Remove the stationary seat from the cover.
6. Clean the shaft, the cover bore and the seat register. Inspect the shaft seal-running surface — replace the shaft if scored (there is no shaft sleeve). Renew the O-ring.

Refit

7. Press the new stationary seat squarely into the cover; wet the elastomer with clean water or mild soap only — never grease/oil; keep the lapped faces clean and untouched.
8. Slide the new rotating element onto the shaft to its seated position.
9. Refit the seal cover to the casing neck with a new O-ring; tighten the cover screws evenly.
10. Refit the shaft key.
11. Refit the two coupling halves in their marked positions; keep the gap even on both sides; tighten the clamp screws evenly
12. Turn the shaft by hand — it must rotate freely with no rub.
13. Refit the coupling-guard plates.
14. Recommission per §9; treat the new seal as running-in (a light initial weep is normal).

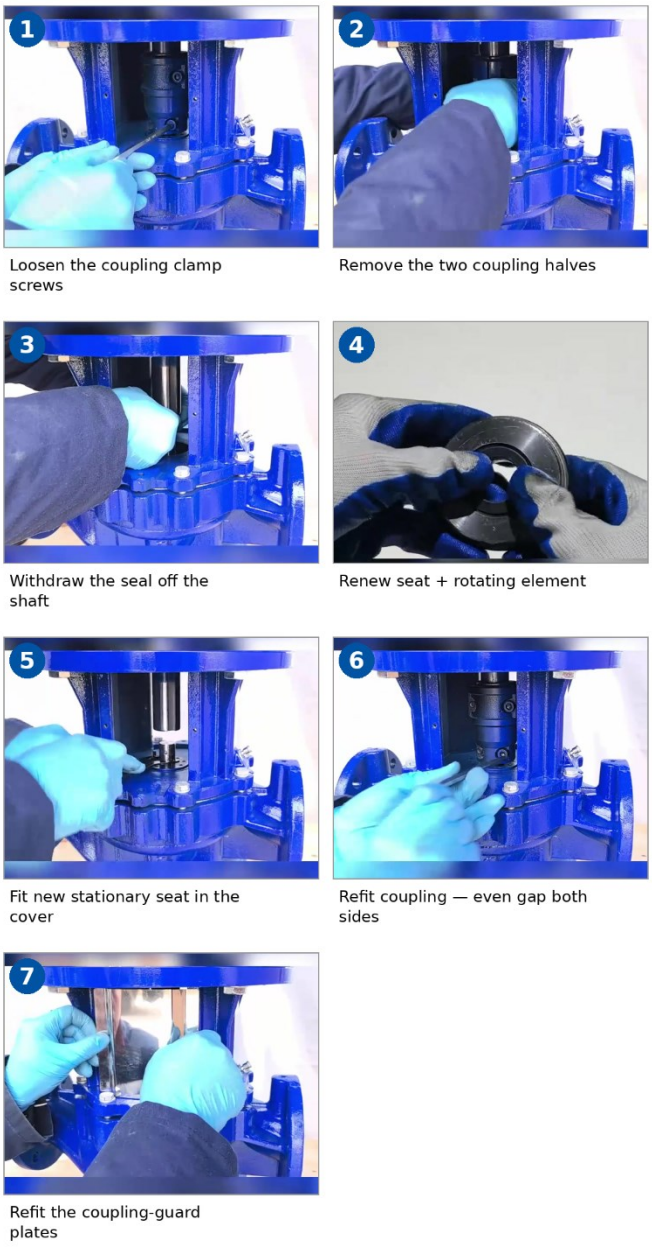

Fig: Mechanical Seal replacement steps

12.4. Motor Replacement

!	Notice: Motor replacement must be carried out only by Winflo-qualified service personnel. Removal, refitting, and re-coupling of the motor affect shaft setting, seal integrity, and electrical safety; incorrect work can damage the pump and voids the warranty.

Removal

1. Disconnect and label the motor supply cables; protect the cable ends.
2. Remove the coupling-guard plates from the bracket windows.
3. Mark the coupling halves for orientation. With a hex key, evenly slacken and remove the coupling clamp screws and lift off both halves.
4. Attach hoisting gear to the motor and take up its weight, with no side load on the shaft.
5. Evenly slacken and remove the bracket-to-motor flange screws.

6. Using the motor eyebolt, lift the motor (only) vertically clear of the bracket, keeping it square so the shaft does not catch in the register bore. Set it down safely — never on its shaft.

Refit

!	Notice: Confirm the new motor matches the original: frame size, mounting flange, shaft dimensions, power, voltage, speed, and efficiency class. Clean the bracket register and both mating faces; remove any burrs or paint.

7. Lower the new motor squarely onto the bracket with hoisting gear, engaging the register fully so the joint self-centres - do not force it.
8. Fit the bracket-to-motor flange screws and tighten evenly, in a diagonal sequence.
9. Check the coupling and shaft sliding surfaces; clean and lightly oil if needed.
10. Lift the pump shaft to its running position and refit the coupling halves in their marked positions over both shafts; keep the gap even on both sides; tighten the clamp screws evenly.
11. Turn the shaft by hand — it must rotate freely, with no rub.
12. Refit the coupling-guard plates.
13. Reconnect the motor supply; verify the winding connection, supply voltage, and motor-protection/overload setting against the new motor's rating plate.
14. With the system filled, briefly check the direction of rotation against the arrow; correct the phasing if reversed. Never run dry.
15. Recommission per §9.

12.5. Torque Table

Joint-specific torques (all ± 10 %):

Joint	Thread	Torque (N·m)
Pump casing – lantern	M16 / M20	330 / 640
Lantern – motor	M16 / M20	330 / 640
Coupling screws (grade 10.9; even gap both sides)	M10 / M12 / M14 / M16 (10.9)	80 / 140 / 220 / 330
Seal cover – lantern (re-tighten each screw separately)	M8 / M10	40 / 80
Impeller nut + washer	M20/M30	640 / 1900
Support feet / base; drain & vent plugs	M6 – M24	330

12.6. Inspection before Reassembly

- Shaft: no scoring on seal and coupling surfaces; replace if damaged.
- Casing and lantern mating faces and spigots: clean, no pitting or fretting.
- Impeller: no erosion > 10 % of vane thickness; no significant cavitation pitting.
- Replace without exception: all O-rings, gaskets, seal faces, and any disturbed locking screws.

12.7. Final Check after Installation

- Re-verify level and anchor torque; connections correct
- Shaft/coupling must turn freely by hand
- Escalation if it grinds: loosen & re-torque the coupling evenly if still bad, remove the motor, clean the spigot and flange, reinstall.

13. 13. Troubleshooting

Each cause is listed with the symptoms (A – M) it commonly produces. See Remedy Reference below for the corrective action.

#	Cause	Symptoms
1	Pump not primed; air in suction	A, B, C, H
2	NPSHa insufficient — cavitation	B, C, F, G, H
3	Wrong rotation direction	B, C, F, H
4	Suction / discharge valve partially closed; check valve stuck	B, C
5	Internal running clearances worn	B, C
6	Impeller worn / damaged	B, C, G
7	System head higher than design	B, C
8	Air leak on suction piping	A, B, C, H
9	Bent pump shaft	F, G, H, I
10	Motor-bearing wear or lubrication fault	G, H, I
11	Coupling defect (loose screws, damaged halves)	F, G, H
12	Inadequate foundation / anchoring (incl. pipe-mount)	G, H
13	Pipe strain on flanges	G, H, L
14	Fouled casing / impeller	B, C, F, G
15	Electrical supply fault (phase loss, voltage, star not delta)	A, B, C, E, F
16	Motor fault / protection set incorrectly	E, F
17	Casing–lantern or seal-cover bolt torque insufficient	L
18	Seal face damage	J
19	O-ring / gasket failure	L
20	Fluid overheated (> T liq. limit)	I, J
21	Operation below Qmin	F, G, H, I, J
22	Operation above AOR — system head lower than design, pump runs out on curve	C, D, F, G, I
23	Dry running	E, J

Symptom key: A. No liquid delivered · B. Insufficient flow · C. Insufficient pressure · D. Excessive flow/pressure · E. Pump runs then stops · F. Motor overload · G. Excessive vibration · H. Unusual noise · I. Bearing overheating · J. Excessive seal leakage · L. Leakage at casing joint

13.1. Remedy Reference

Cause #	Remedy
1	Re-prime per §9.3; vent the pump.
2	Increase NPSHa — raise suction level, subcool fluid, pressurise tank, reduce suction losses; verify margin per §10.4.

Cause #	Remedy
3	Swap any two motor phases; recheck per §9.4.
4	Open valves; check actuator; free the check valve.
5	Service-centre overhaul of internal running clearances.
6	Replace impeller.
7	Review system curve; resize or re-select (consult Winflo).
8	Pressure-test suction line; reseal flanges and joints.
9	Replace the shaft (replace also if seal or coupling surfaces are scored).
10	Regrease per the motor nameplate, or replace bearings / motor (§12.4).
11	Inspect coupling halves and screws; replace damaged parts; re-set and torque per §12.4.
12	Re-grout / reinforce; re-torque anchors; verify pipe-mount anchoring (§8.2).
13	Add pipe supports; re-align piping to the pump; verify flange loads per §7.4.
14	Disassemble; clean impeller and casing (§12).
15	Check phase sequence, voltage, frequency, and terminal bridging (star vs delta) at the motor terminals.
16	Check protection setting (nameplate current; 0.58 × In in a Y-Δ phase leg) and PTC circuit (never megger it); refer to the motor IOM.
17	Re-torque casing–lantern and seal-cover bolts per §12.5, diagonal pattern.
18	Replace mechanical seal (§12.3).
19	Replace O-rings / gasket.
20	Cool process fluid; reduce duty; observe the T liq. limit (§7.1).
21	Open bypass to bring flow above Qmin; fit low-flow protection (§10.2).
22	Throttle discharge until gauge head matches nameplate (§9.5); verify system curve; notify the designer.
23	Stop immediately; replace the seal (§12.3); restore priming and dry-run protection.

13.2. Escalation

If, after applying the Remedy Reference, the pump does not reach duty performance within ± 5 %, contact Winflo Service with: serial number and complete nameplate data; operating conditions at failure (Q, H, fluid T, rotation, power draw); symptom letter(s); photographs of any visible damage; running hours since commissioning. Contact: info@eautek.com.

14. 14. Spare Parts

14.1. Parts List (Primary)

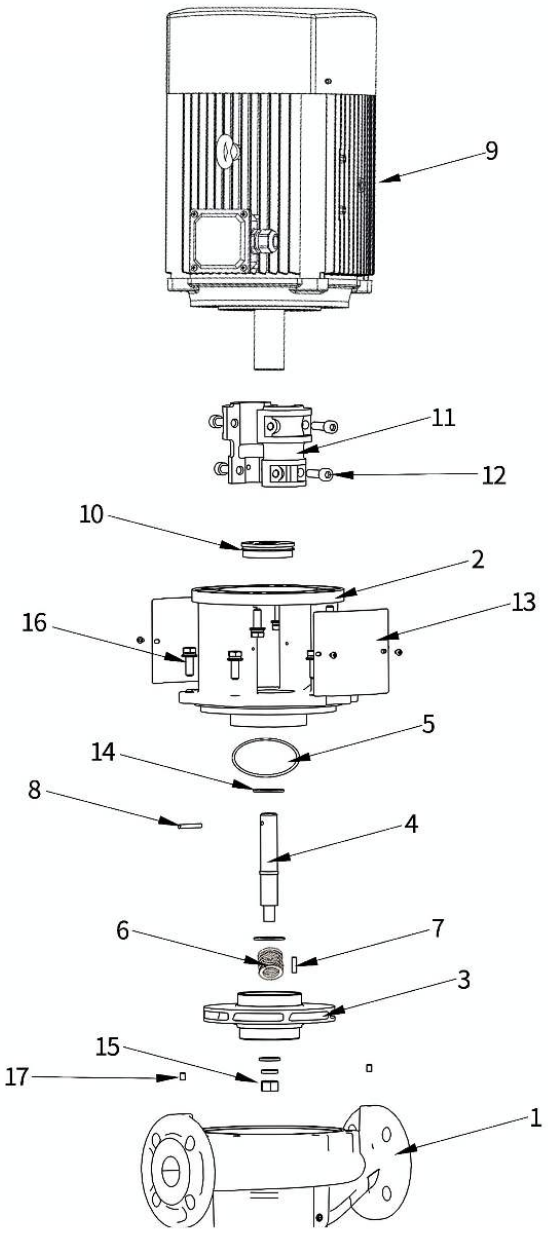

Fig: VLW Exploded View

Item	Name	Qty	Standard material
01	Pump casing (volute)	1	Ductile iron
02	Bracket / lantern	1	Ductile iron
03	Impeller	1	AISI 316L
04	Pump shaft	1	AISI 316L
05	O-ring (casing – bracket joint)	1	EPDM
06	Mechanical seal	1	SiC / SiC
07	Keys (coupling; impeller)	2	AISI 304
08	Locating pin	1	AISI 304
09	Motor (IE3 std; IE4 / IE5 / PM / VFD 25–50 Hz options)	1	—

Item	Name	Qty	Standard material
10	Mechanical-seal gland	1	-
11	Coupling (two-piece split clamp)	1	-
12	Coupling clamp screws (hex socket)	set	AISI 1045
13	Coupling guard plates	set	Steel
14	Impeller washer	1	Steel
15	Impeller nut	1	AISI 304
16	Bracket – casing hex screws	set	AISI 1045
17	G 1/4 plugs (gauge / drain taps)	set	AISI 304

14.2. Recommended Spares per DIN 24296

DIN 24296 recommended-spares structure: mechanical seal, O-ring set, coupling screw set, bearing set (or a spare motor for critical duty) are the items for which site stock is recommended. Wear parts (seal, O-rings, bearings) are excluded from warranty after their service life. Stock quantities scale with the number of identical pumps installed at a site. Contact Winflo Service with the project pump count and site operating profile for a project-specific spare-parts matrix.

14.3. Spare-Parts Ordering

Required information with every spares order: Type (from nameplate), P/N and S/N, Item number (from §14.1), Material option (if not standard), and Quantity. Use genuine parts only. Typical lead time: 4 – 8 weeks. Contact: info@eautek.com.

15. 15. Decommissioning & Disposal

15.1. Temporary & Long-Term Decommissioning

1. Flush the pump with clean water to remove process fluid.
2. Drain all cavities completely.
3. Apply preservation oil to internal surfaces via the casing ports.
4. Cover all flanges and ports with their factory blanks; tag "Out of Service" with the date.
5. For long-term decommissioning, in addition: rotate the shaft two revolutions every two weeks; re-apply preservation oil every 12 months.

15.2. Contaminated Pumps

A pump that has handled fluids injurious to health is classified as contaminated. Drain, flush, and decontaminate before return, and complete the Certificate of Decontamination (Appendix B); EauTechnik may refuse a pump without it.

15.3. Disposal

The crossed-out wheelie-bin symbol on the nameplate means the product must be disposed of separately from household waste. When the product reaches end of life, take it to a collection point designated by the local waste-disposal authorities. Separate collection and recycling protect the environment and human health.

1. Disconnect and remove the motor and all electrical components; recycle per WEEE 2012/19/EU.
2. Drain and collect all fluids per local hazardous-waste regulation.
3. Separate and recycle by material class: cast iron, bronze, stainless steel, rubber, oil/grease.
4. Recycling portal and support: www.eautek.com/contact/contact-us/

Appendix A — EU Declaration of Conformity

Manufacturer: EauTechnik GmbH, Frankfurt am Main, Germany.

Authorised Representative: _____

Product: Winflo VL Series Vertical Inline Centrifugal Pump (long-coupled, single-stage).

Type: _____ **P/N:** _____ **S/N:** _____ **Year:** _____

The above-described product complies with the following EU directives and harmonised standards:

1. Machinery Directive 2006/42/EC, Annex II-A.
2. Low Voltage Directive 2014/35/EU (motor component).
3. EMC Directive 2014/30/EU (motor controls).
4. RoHS Directive 2011/65/EU.
5. Harmonised standards: EN ISO 12100, EN 809, ISO 9906:2012 Grade 3B, ISO 5199, ISO 21049, DIN ISO 10816-7, IEC 60034-1, IEC 60034-30-1.

Signed on behalf of EauTechnik GmbH:

Name: _____ Position: _____

Place: _____ Date: _____

Signature: _____

Appendix B — Certificate of Decontamination

To be completed by the operator before returning a pump to EauTechnik / Winflo for service or warranty.

Product Type: _____ Order: _____ Serial: _____

Fluid handled: _____

Hazard classification (tick all that apply):

☐ None / safe ☐ Corrosive ☐ Oxidising ☐ Flammable ☐ Explosive

☐ Hazardous to health ☐ Toxic ☐ Radioactive ☐ Bio-hazardous

Cleaning procedure applied: _____

I confirm that the above product has been thoroughly cleaned and is safe for handling by receiving personnel without additional PPE.

Name: _____ Position: _____

Company: _____ Date: _____

Signature and stamp: _____

Appendix C — Commissioning Record

Serial Number: _____ Installation Site: _____ Date: _____

Checks completed (per §9.1):

#	Check	✓
1	Foundation / anchoring complete and torqued (or pipe-mount flanges fully bolted)	☐
2	Unit plumb / level verified	☐
3	Coupling correctly set (§12.3 / §12.4); shaft turns freely	☐
4	Piping aligned, independently supported, free of strain, flange loads within limits	☐
5	System flushed clean and refilled.	☐
6	Suction strainer installed, verified clear	☐
7	All auxiliary connections made (gauges, vent, drain)	☐
8	Motor voltage / frequency matches nameplate; phase-rotation verified by meter	☐
9	Coupling guard installed	☐
10	Shaft rotates freely 360° by hand — no rub, no tight spot	☐
11	Pump and system filled and vented; unit at ambient temperature	☐
12	Mechanical seal wetted from pumped fluid (pump primed)	☐
13	Motor rotation direction verified	☐
14	Motor lubrication per motor nameplate (large frames only)	☐
15	Dry-run / minimum-flow protection operational	☐
16	Protective devices (thermal, flow, pressure switches) wired, tested, set	☐
17	System and area around pump clean; tools removed	☐

Startup observations (at 1 h running):

Q (flow): _____ m^3/h H (head): _____ m I (current): _____ A

Vibration: _____ mm/s RMS Motor brg T: _____ °C
Shut-off head check: _____ m Noise (baseline ref): _____

Signatures — Installer: _____ Operator: _____
Winflo Rep: _____

Appendix D — Maintenance Log Template

Date	Operator	Run h	Brg T (°C)	Vib (mm/s)	Flow Q	Press P	Actions

Appendix E — Warranty & Contact

Warranty Terms: 18 months from date of shipment or 12 months from date of commissioning, whichever occurs first.

Exclusions:

1. Normal wear parts (seals, wear rings, bearings after their rated life).
2. Misuse, improper installation, operation outside the Intended Use clause.
3. Modification of the product without written approval, non-genuine spare parts.
4. Damage from improper storage or handling prior to installation.
5. Damage from chemical flushing using the pump, system debris, improper water treatment, or a faulty foundation.
6. Damage from chemical attack by fluids not covered by Intended Use.

Contact: EauTechnik GmbH — Winflo Service — Email: info@eautek.com — Website: www.eautek.com.