Pillar Multistage Centrifugal Pumps

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Introduction

Pillar Multistage Centrifugal Pumps are engineered for reliable, high-pressure water transfer in industrial, agricultural, and municipal applications. This manual covers the full lifecycle of the pump, from selection and installation to operation, maintenance, and troubleshooting.

Read this manual before installing or operating the pump. Keep it accessible to all personnel who work with the equipment.

Pump Nomenclature

Pillar pumps are identified by a model code that encodes the key design parameters. The code is stamped on the nameplate and on the pump casing.

Model Code Structure

The model code follows the pattern **PMC-S-NNN-MM**, where:

- **PMC** — Pillar Multistage Centrifugal
- **S** — Stage count (2 to 9)
- **NNN** — Nominal flow rate in liters per minute
- **MM** — Material code (CI, SS, BR)

Material Codes

- **CI** — Cast iron casing, bronze impellers, stainless shaft
- **SS** — Stainless steel casing and impellers, stainless shaft
- **BR** — Bronze casing and impellers, stainless shaft

Example

A pump coded **PMC-5-120-SS** is a five-stage pump rated for 120 L/min with a stainless steel wetted end.

Pump Selection

Select the pump that delivers the required flow at the required head with the highest practical efficiency. Operating far from the best efficiency point shortens bearing and seal life.

Duty Point

Define the duty point before selecting a model:

- Required flow rate (L/min or m³/h)
- Total dynamic head (m)
- Suction lift or submergence
- Fluid temperature and viscosity
- Fluid clean or abrasive

Selection Chart

Use the selection chart in the appendix to match the duty point to a model code. Choose a pump whose best efficiency point falls within ±10% of the duty flow.

Net Positive Suction Head

Check that the available net positive suction head (NPSHa) exceeds the pump's required NPSH (NPSHr) by at least 0.5 m. Cavitation damages the impeller and reduces flow.

Pump Construction

Casing

The casing is a radially split, multistage volute. It contains the diffusers that guide flow between stages. Casing wall thickness is rated for the maximum working pressure.

Impellers

Impellers are closed, enclosed type. They are pressed onto the shaft and secured with a lock nut. Impeller balance is checked to ISO 1940 grade G6.3.

Shaft

The shaft is ground and polished to a surface finish of 0.4 µm Ra. It runs in two bearings: a deep groove ball bearing at the drive end and a sleeve bearing at the pump end.

Mechanical Seal

The standard seal is a single cartridge mechanical seal with a carbon face and a ceramic seat. Optional seals include double seals and packed glands for abrasive duties.

Coupling

The pump is coupled to the motor with a flexible jaw coupling. Maintain the coupling gap and alignment as specified in the installation section.

Pump Performance

Performance Curve

The performance curve plots head, efficiency, power, and NPSHr against flow. Read the curve at the duty flow to find the head and power.

Efficiency

Efficiency peaks at the best efficiency point (BEP). Operating within the preferred operating region (POR) between 70% and 120% of BEP flow gives the best life.

Power Consumption

Shaft power rises with flow. Size the motor for the maximum power on the curve, not only for the duty point.

Speed Variation

Pump speed can be varied with a variable frequency drive. Affinity laws apply: flow varies with speed, head with speed squared, power with speed cubed.

Pump Installation

Foundation

Mount the pump on a rigid foundation that absorbs vibration. Use anchor bolts sized for the base plate. Grout the base plate after leveling.

Alignment

Align the pump and motor shafts before connecting the coupling. Misalignment causes bearing failure and seal leakage. Check alignment with a dial indicator or laser tool.

Suction Piping

Keep suction piping short and straight. Avoid high points that trap air. Install a foot valve with strainer on open suction sources.

Discharge Piping

Install a check valve and an isolation valve on the discharge line. Support the piping independently of the pump casing.

Electrical Connection

Wire the motor per the nameplate and the wiring diagram. Install overload protection sized for the motor full-load current.

Pump Commissioning

Pre-Start Checks

Before first start, verify:

- Shaft rotates freely by hand
- Coupling guard is in place
- Suction valve is open
- Discharge valve is closed
- Motor rotation direction is correct

Priming

Fill the pump and suction line with clean water. Vent all air from the casing. Never run the pump dry.

Start-Up

Start the pump with the discharge valve closed. Open the discharge valve slowly until the duty flow is reached.

Initial Run

Run the pump for 30 minutes and check for leaks, vibration, and abnormal noise. Record pressure, flow, and motor current.

Pump Operation

Routine Operation

Operate the pump within the preferred operating region. Avoid frequent starts; limit to six starts per hour.

Monitoring

Monitor suction and discharge pressure, motor current, bearing temperature, and vibration. Log readings weekly.

Shutdown

Close the discharge valve before stopping the pump. Stop the motor, then close the suction valve.

Long-Term Storage

Drain the pump and dry the internals. Coat machined surfaces with rust preventive. Store in a dry, frost-free location.

Pump Maintenance

Maintenance Schedule

Interval	Task
Weekly	Check leaks, vibration, noise
Monthly	Check bearing temperature, motor current
Quarterly	Check coupling alignment
Annually	Replace bearings and seal
Annually	Inspect impellers and casing

Bearing Replacement

Replace bearings when vibration rises or temperature exceeds 80 °C. Use the bearing puller tool to avoid damaging the shaft.

Seal Replacement

Replace the mechanical seal when leakage appears. Clean the seal chamber and inspect the shaft sleeve before fitting the new seal.

Impeller Inspection

Inspect impellers for erosion and cavitation damage. Replace impellers that have lost more than 5% of their original diameter.

Lubrication

Grease the bearings with lithium-based grease every 2,000 hours. Do not overfill the bearing housing.

Pump Troubleshooting

No Flow

Possible causes: suction valve closed, air in the pump, blocked impeller, wrong rotation direction.

Low Flow

Possible causes: worn impellers, partially closed valve, suction lift too high, leaking seal.

Low Pressure

Possible causes: worn impellers, too few stages, wrong speed, air in the pump.

Excessive Vibration

Possible causes: misalignment, worn bearings, unbalanced impeller, cavitation, loose foundation.

Overheating

Possible causes: operating far from BEP, dry running, bearing failure, insufficient cooling.

Seal Leakage

Possible causes: worn seal faces, damaged shaft sleeve, dry running, misalignment.

Pump Spares

Recommended Spares

Stock the following spares for critical duties:

- Mechanical seal
- Bearing set
- Impeller
- Shaft sleeve
- O-ring kit

Ordering Spares

Order spares by part number and pump serial number. Genuine Pillar spares guarantee fit and performance.

Pump Accessories

Base Plate

A fabricated steel base plate is available for skid mounting. It includes drip rim and lifting lugs.

Pressure Gauge

Install a pressure gauge on the discharge line to monitor operating pressure.

Flow Meter

An inline flow meter records delivered flow for duty verification.

Variable Frequency Drive

A variable frequency drive matches pump speed to demand and reduces energy use.

Pump Applications

Water Supply

Pillar pumps supply water for municipal distribution, irrigation, and industrial process.

Boiler Feed

Multistage pumps feed boilers at the required pressure. Use stainless steel wetted ends for treated water.

Fire Protection

Pillar pumps are listed for fire protection duty. Size the pump for the hydraulically most demanding sprinkler zone.

Reverse Osmosis

Pillar pumps supply feed water to reverse osmosis membranes. Use a pump with a flat head curve for stable membrane flux.

Pump Safety

Personal Safety

Wear eye protection and gloves when working on the pump. Isolate power before any maintenance.

Hot Surfaces

Allow the pump to cool before touching the casing. Surface temperature can exceed 60 °C.

Pressurized Systems

Relieve pressure before opening any flange or plug. Stored energy can cause injury.

Lifting

Use lifting lugs or eyebolts for pumps above 25 kg. Never lift by the shaft or coupling.

Pump Warranty

Warranty Terms

Pillar pumps carry a 12-month warranty from the date of commissioning or 18 months from shipment, whichever comes first.

Warranty Exclusions

The warranty excludes damage from misuse, dry running, abrasive duties, and unauthorized repairs.

Warranty Claims

Submit warranty claims with the pump serial number, operating hours, and a description of the failure.