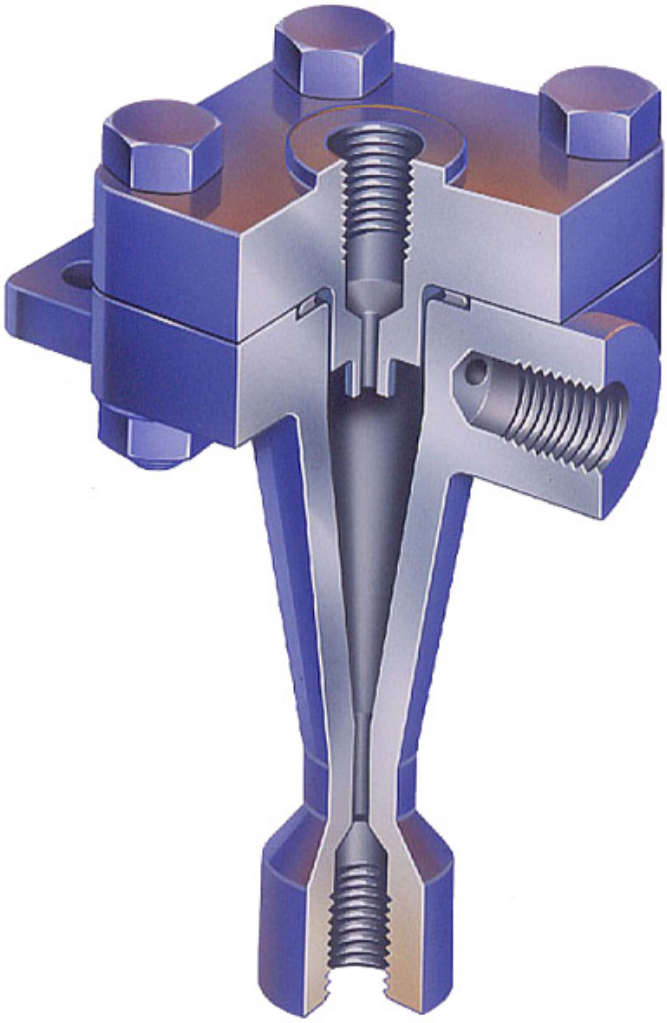
FLOWSERVE

USER INSTRUCTIONS

Installation
Operation
Maintenance

Flowserve Cyclone Separators



Experience In Motion

Brief Description:

Cyclone Separators are devices used to separate solids particles from a fluid stream and are designed to keep dirt and abrasives from the mechanical seal faces.

The Cyclone Separator takes flow from a high pressure point on the pump case, routes it through a Cyclone Separator which removes the abrasives from the fluid, and then splits the flows with the cleaner flow going to the seal chamber and the flow with solids and particles being returned to pump suction. This continuous cleaning and recycling eliminates the maintenance cost associated with filtering system.

Purpose:

Flowserve Cyclone Separators efficiently remove up to 99% of sand, pipe scale, and other abrasive particles from injection flow (API Plan 31 or 41) to a mechanical seal.

Safety:

Please read these instructions carefully.

The ultimate user must ensure that personnel assigned to handle, install and operate the system and related equipment is well acquainted with the design and operating requirements of such equipment.

Damage to any of the systems components may result in unsatisfactory performance which can eventually result in (excessive) seal leakage. The degree of hazard depends on the sealed product and may have an effect on people and/or the environment.

Plant regulations concerning work safety, accident prevention and pollution must be strictly adhered to:

- Wear designated personal safety equipment
- Isolate equipment and relieve any pressure in the system
- Lock out equipment driver and valves
- Consult plant Material Safety Data Sheet (MSDS) files for hazardous material regulations installation in hazardous areas is dependent on the explosion protection of the instrumentation. The ultimate user must judge in case of conflicting standards

Storage:

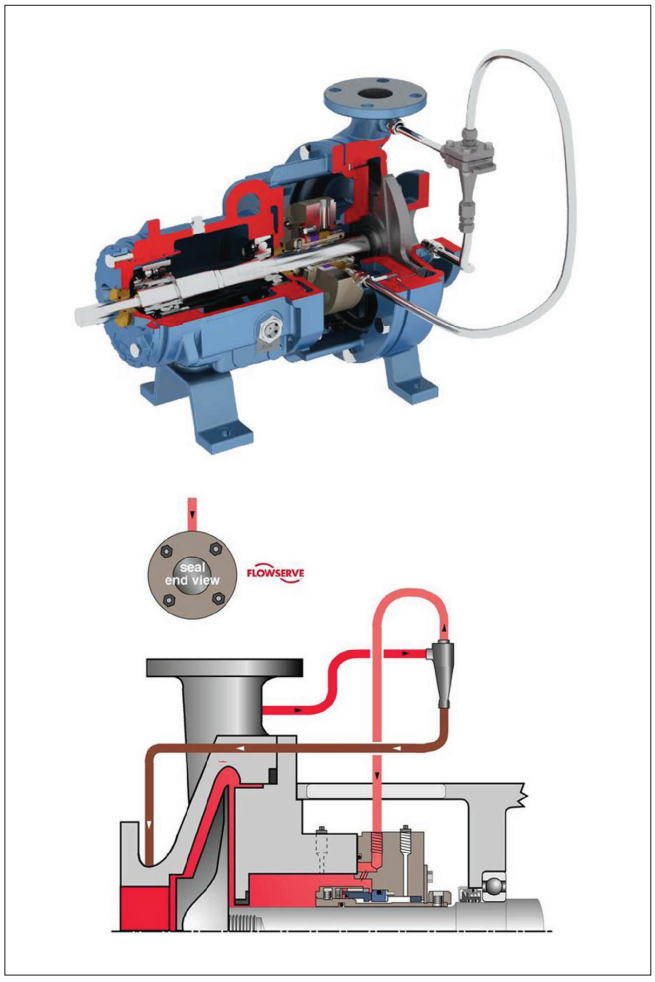
The Cyclone Separator must be transported and stored in the unopened, original shipping box. The warehouse in which the separator stored must be dry and free of dust. Avoid exposing equipment to large temperature fluctuations, high humidity and radiation.

Cyclone separators that have been dropped or have otherwise been subjected to heavy impacts during transport must not be installed. An inspection by Flowserve or its appointed representative is strongly advised.

Installation:

Installation is to be done by a (certified) professional. Each Flowserve Cyclone Separator is designed to service one mechanical seal. Incorrect installation may result in injuries. Interconnection piping must be designed to ensure that complete venting of the system is achieved. Use smooth, large radius bends; do not use elbows, tees, etc. Pipe runs should be sloped continuously up or down to allow adequate circulation, proper venting and draining of the system. Do Not Use ‘thread seal tape’ [i.e. Plumbers tape / DuPont™ Teflon® tape / PTFE tape] on NPT connections, use thread sealant (Loctite® 567™ or equivalent).

The high pressure point on the pump case is piped to the inlet of the Cyclone, which is drilled tangent to the Cyclone bore. The top outlet port “Clean fluid” of the Cyclone should be piped to the seal chamber. The bottom outlet port “solids” of the Cyclone should be directed downward and piped to point in the system having the same pressure as seal chamber pressure to ensure maximum separation efficiency.



Operation:

Cyclone Separator operate as a continuous-flow centrifuge. Fluid is introduced tangentially into cylindrical chamber which causes the fluid to spin rapidly. This action causes the solid particles to move to the outside of the cavity while the clean fluid moves to the inside. The shape of the cavity in the cyclone separator is designed to allow the particles to migrate to the bottom of the cyclone and exit out of the separator. The clean fluid migrates to the top of the cyclone where it exits the separator. The inlet on the side of the cyclone separator contains the contaminated fluid. The outlet out of the top cyclone separator contains the clean fluid. The outlet out of the bottom contains the particles along with a minor amount of the fluid.

Each cyclone separator is designed for a minimum and maximum injection flow rate. An orifice in the supply line is required to achieve the correct flow rate. Consult your sales representative if additional information about sizing the orifice is needed.

Be aware the Flowserve Cyclone Separators can be working at high pressure, no maintenance allowed if not fully depressurized!

To operate properly, a Cyclone Separator must have a differential pressure between the inlet and the outlets. This differential pressure is required to create the velocity in the cyclone to separate the particles. In most seal applications, this will require a differential pressure between 20 – 125 PSI (1.4 – 8.6 bar).

System and Troubleshooting:

Checking of the system, limits itself to monitoring temperature, the table below to add in troubleshooting.

	Inlet to Cyclone	Clean Fluid Outlet to Seal	Dirty Outlet From Cyclone to Suction	At Seal Gland	Cause	Remedy
Moderate Temperature Application	Moderate	Moderate	Low	High	The Cyclone dirty outlet to suction is clogged	Clean the Cyclone & dirty outlet line
Moderate Temperature Application	Moderate	Low	Moderate	High	No (or) Insufficient Flow to Seal. High differential pressure b/w Pump Seal chamber & Suction	Minimise diiferential pr b/w Seal chamber & Suction to increase flow to Seal
Low Temperature Application	Low	Low	Low	High	No (or) Insufficient Flow to Seal. High differential pressure b/w Pump Seal chamber & Suction	Minimise diiferential pr b/w Seal chamber & Suction to increase flow to Seal

Shut-Down, disassembly

The equipment can be shut down at any time. Before the system can be removed the equipment in which the seal is installed must be de-pressurized.

For (re)-installation, removal and maintenance work, the complete system must be depressurized (and drained if required).

Product may be released during removal of the system. Safety measures and protective equipment is required as per the plant's safety regulations.

Maintenance:

Disassemble and inspect Flowserve Cyclone Separator internal components 1 time per year. Replace any components that are corroded and/or eroded. Once all necessary parts are replaced reassemble the Flowserve Cyclone Separator using a new gland gasket.

Torque the ½-13 UNC Bolt (cap screw, quantity 4) in four steps, crosswise, to 370 lbf/in (42 Nm).

General:

All illustrations and details in this installation and operating instruction are subject to changes that are necessary to improve product performance without prior notice.

It should be understood that Flowserve does not accept any liability for instances of damage and/or malfunction incurred through non-adherence to these installation instructions.

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