FLOWSERVE

VCT

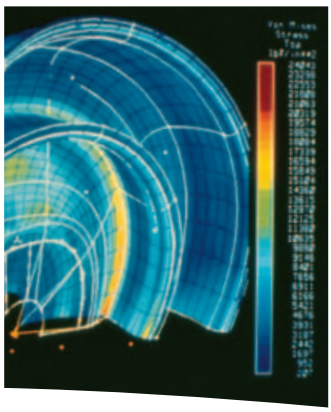
Vertical Mixed Flow Circulating Pumps



Experience In Motion









Pump Supplier to the World

Flowserve is the driving force in the global industrial pump marketplace. No other pump company in the world has the depth or breadth of expertise in the successful application of pre-engineered, engineered and special purpose pumps and systems.

Life Cycle Cost Solutions

Flowserve is providing pumping solutions which permit customers to reduce total life cycle costs and improve productivity, profitability and pumping system reliability.

Market Focused Customer Support

Product and industry specialists develop effective proposals and solutions directed toward market and customer preferences. They offer technical advice and assistance throughout each stage of the product life cycle, beginning with the inquiry.

Broad Product Lines

Flowserve offers a wide range of complementary pump types, from pre-engineered process pumps, to highly engineered and special purpose pumps and systems. Pumps are built to recognized global standards and customer specifications.

Pump designs include:

- Single stage process
- Between bearing single stage
- Between bearing multistage
- Vertical
- Submersible motor
- Rotary
- Reciprocating
- Nuclear
- Specialty

Product Brands of Distinction

ACEC™ Centrifugal Pumps

Aldrich™ Pumps

Byron Jackson® Pumps

Calder™ Energy Recovery Devices

Cameron™ Pumps

Durco® Process Pumps

Flowserve® Pumps

IDP® Pumps

Lawrence Pumps®

Niigata Worthington™ Pumps

Pacific® Pumps

Pleuger® Pumps

Scienco™ Pumps

Sier-Bath® Rotary Pumps

TKL™ Pumps

United Centrifugal® Pumps

Western Land Roller™ Irrigation Pumps

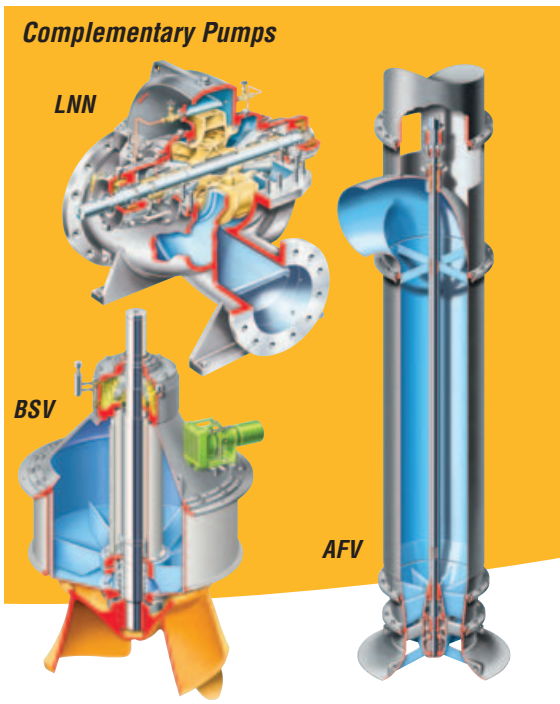
Wilson-Snyder® Pumps

Worthington® Pumps

Worthington Simpson™ Pumps

VCT
Vertical Mixed Flow Circulating Pumps





Unequaled Hydraulic Coverage and Design Flexibility

VCT pumps are designed for extended operation in services where large capacities are required at relatively low pressures. Ideal for wet-pit installations, VCTs offer multiple hydraulic combinations and design features to suit application needs. Additionally, they provide trouble-free, high-capacity capabilities with outstanding operating efficiency.

A Legacy of Excellence

Flowserve VCT pumps combine the proven hydraulics and preferred mechanical features long provided under the Byron Jackson and IDP heritage names. The heritage pumps comprising the VCT family are:

- Byron Jackson: PMR, RX, KX and VX
- IDP: APH, APM and APMA
- Also: VOA, VSO, sVSO

Engineered Solutions

Engineered to customer specifications, VCT pumps offer a high degree of design flexibility to meet installation requirements.

- Above- or below-grade discharge configurations
- Pullout and non-pullout construction
- Grease, fresh water or self-lubricating column construction

To ensure proper pump design, Flowserve additionally offers extensive testing and analytical capabilities, including finite element analysis as well as torsional, lateral, seismic and vibrational modeling, to ensure proper pump design.

VCT Advantages

The VCT offers numerous inherent advances over other pump types. These include:

- Efficient operation over entire specific speed range
- First stage NPSHA can be increased by extending the column length
- Accurate alignment due to male and female rabbet fits at all critical flanged joints

Applications

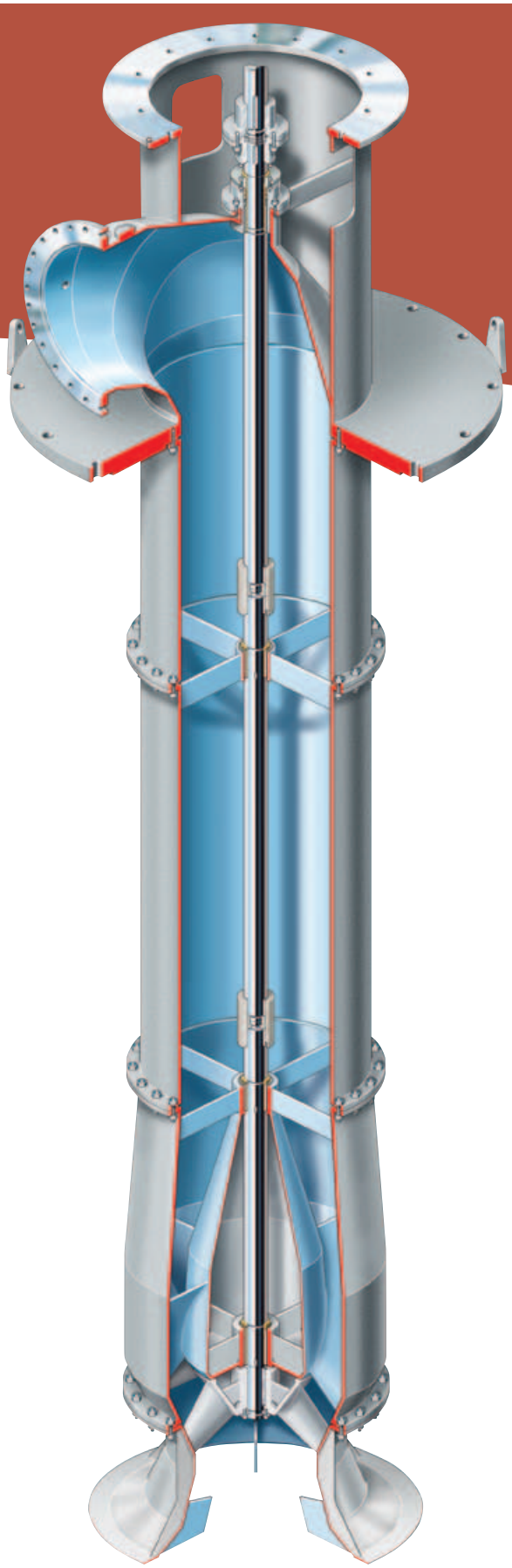
- Condenser cooling
- Cooling water
- Drainage
- Flood protection
- Water supply
- Recirculation
- Desalination sea water intake

Complementary Pump Designs

Flowserve also can provide the following pumps:

- AFV vertical axial flow pumps
- BSV and BCV concrete volute pumps
- LNN between bearing, axially split, single stage, double-suction pump
- SUBM oil- or water-filled, submersible motor pumps
- QL vertical, double-suction, twin volute, wet-pit pump
- VPC (VTP-Can) vertical turbine, double casing pump
- VTP vertical turbine, wet-pit pump
- WUJ API 610 (VS1) vertical wet-pit pump

VCT Vertical Mixed Flow Circulating Pumps



The VCT family of vertical mixed flow circulating pumps is designed for continuous duty in high capacity, low pressure services. Available in single or multistage heavy-duty configurations, VCT pumps are engineered in accordance with Hydraulic Institute and AWWA standards. Additionally, stringent Flowserve testing capabilities ensure industry leading performance and reliability.

Operating Parameters

- Flows to 181 700 m^3/h (800 000 gpm)
- Heads to 110 m (350 ft)
- Sizes from 1200 mm (48 in) to 3380 mm (133 in)

Five-Mitered Elbow Discharge Head *is designed to accept the continuous, system reaction forces and reduce friction loss*

Three-Piece, Rigid Adjustable Motor Coupling *provides a convenient means of maintaining optimum impeller clearance*

Seal Chamber *accepts packing or a mechanical seal to suit service requirements*

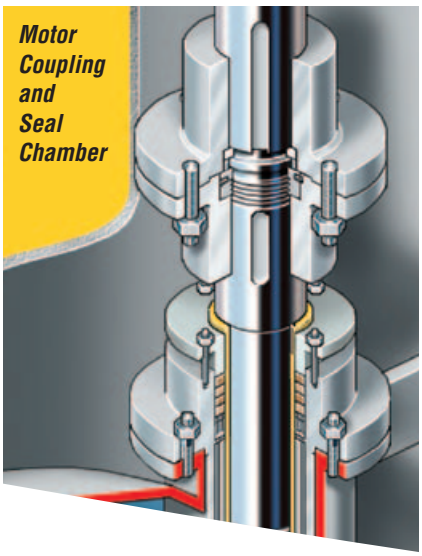
Outer Flanged Column *utilizes precision rabbet fits to ensure proper alignment of each section and is fabricated to meet customer materials requirements*

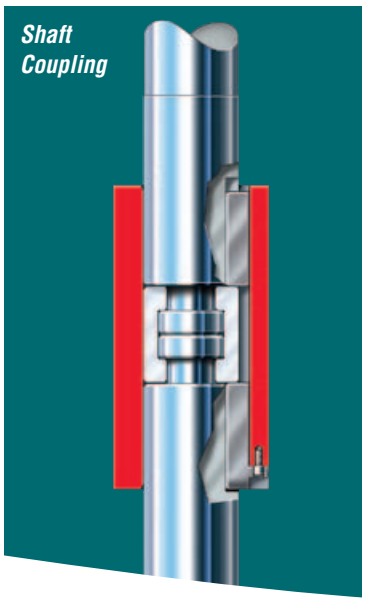
Inner Column *(Enclosing Tube) is internally pressurized to lubricate bearings and prevent shaft and bearing damage during operation*

Shafting *is designed for maximum torque and horsepower conditions*

Semi-Open Impeller and Shroud Design *offer easily renewable clearances for optimum efficiency. Dynamic balancing of the finish machined impeller ensures low vibration levels. Optional enclosed impeller design and multistage configuration available*

Suction Bell *has straightening vanes to minimize flow disturbances at the impeller eye*







Rigid Adjustable Motor Coupling

The VCT's three-piece, rigid adjustable motor coupling incorporates the best features of the Byron Jackson, IDP and other heritage designs.

- Motor hub – slip fit with split ring
- Adjusting nut
- Pump hub – slip fit

Outer Column Designs

The VCT's fabricated outer column features an integrated bearing bracket. It also uses precision rabbet fits to ensure proper alignment of the pump sections. The outer column's diameter is designed for a maximum fluid velocity of 4.6 m/s (15 ft/s). Maximum column length is 6.1 m (20 ft).

The VCT is available with multiple outer column designs: straight and tapered; with and without bearing holders; and with and without dowell pins.

Advanced Seal Chamber Design

The VCT's versatile seal chamber accepts packing or a mechanical seal to suit customer preference and application need. It accommodates 10.3 bar (150 psi) maximum working pressures as well as wet and dry start applications. Its well thought-out design includes the following features for improved performance and reduced maintenance:

- Fabricated split gland
- Bleed water catch basin

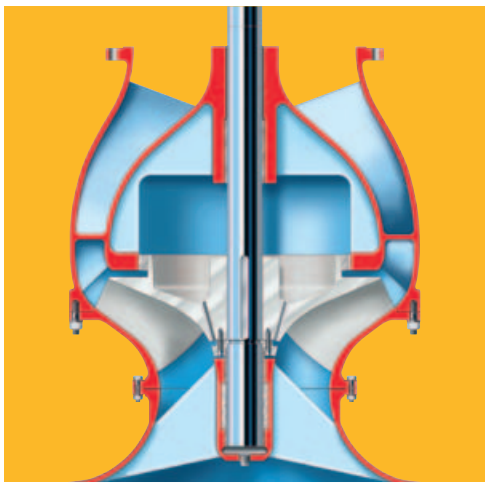
Precision Machined Shaft Coupling

The VCT line shaft coupling utilizes keys and lock collars to ensure accurate alignment and also to efficiently transmit torque and axial thrust between shaft sections. An optional axial split design is available for services requiring strict tolerances.

Optional Liquid End Configurations

Flowserve offers numerous optional performance and reliability enhancing features for the VCT liquid end.

- Cast or fabricated bowl assembly
- Axially balanced wear rings for reduced thrust loads
- Enclosed impeller designs
- Integrated suction bell bearing bracket
- Multiple stages

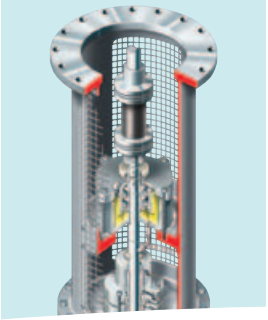


Liquid end with optional back rings and bottom bearings

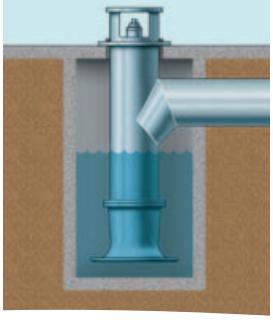
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Options and Technical Data

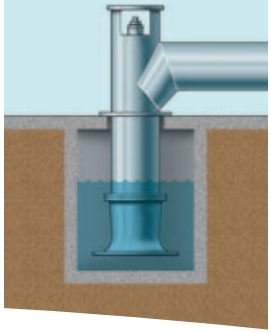
Integral Thrust Bearing Design



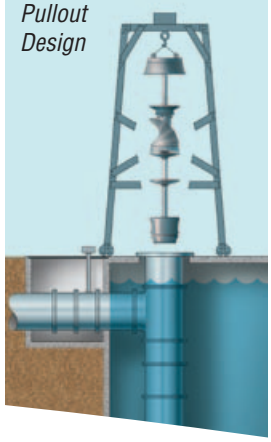
Below Ground Discharge



Above Ground Discharge



Pullout Design



Standard Materials of Construction*

Component	Material*
Suction Bell	Carbon Steel or Cast Iron
Shroud	304 SS
Casing (Bowl)	Carbon Steel or Cast Iron
Impeller	410 SS
Shafting/Coupling	410 SS
Bearings	Rubber with Bronze Backing
Shaft Sleeve	410 SS
Discharge Head	Carbon Steel
Outer Column	Carbon Steel
Inner Column (Enclosing Tube)	Carbon Steel
Drive Coupling Assembly	Carbon Steel

* Higher alloys – including stainless steels, Monel,® duplex stainless steels and super duplex stainless steels – are available upgrades

® Monel is a registered trademark of the International Nickel Co.

Additional Design Configurations

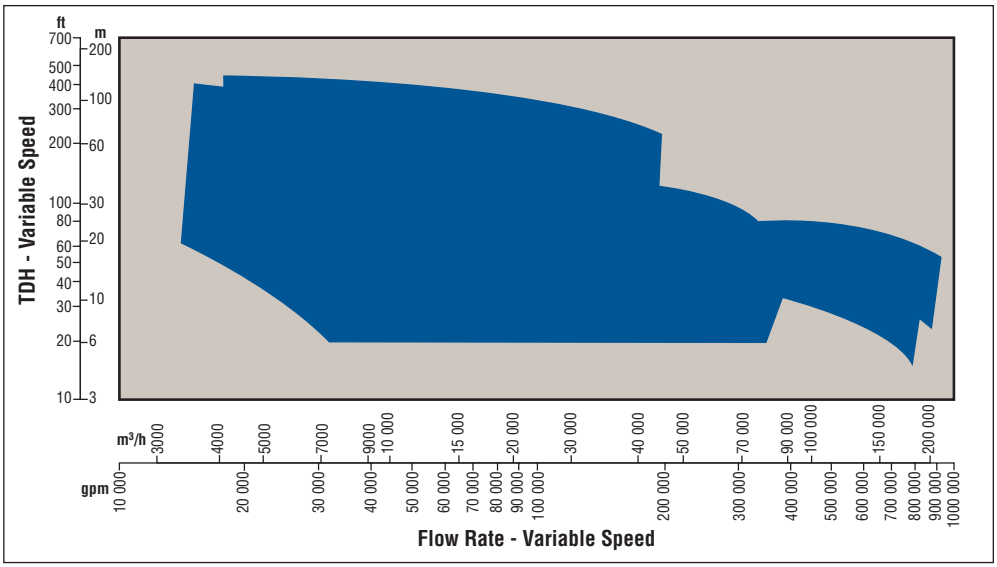
VCT pumps are available in several designs to suit site conditions and application needs. In addition to above and below ground discharge configurations, VCTs are available in an optional pullout design. This option allows the rotating element and the critical non-rotating wear components to be quickly and easily removed without removing the entire pump.

Discharge Head With Integral Axial Thrust Bearing Assembly

An axial thrust bearing assembly is available for use with IEC motors. Integral to the pump, the bearing assembly is designed to withstand total hydraulic thrust and rotor weight.

- Self-contained oil lubricated anti-friction bearings for standard applications
- Tilting pad thrust bearings for high horsepower or high thrust applications
- Separate motor stand for larger sizes

VCT Range Chart



Global Service and Technical Support







Life Cycle Cost Solutions

Typically, 90% of the total life cycle cost (LCC) of a pumping system is accumulated after the equipment is purchased and installed. Flowserve has developed a comprehensive suite of solutions aimed at providing customers with unprecedented value and cost savings throughout the life span of the pumping system. These solutions account for every facet of life cycle cost, including:

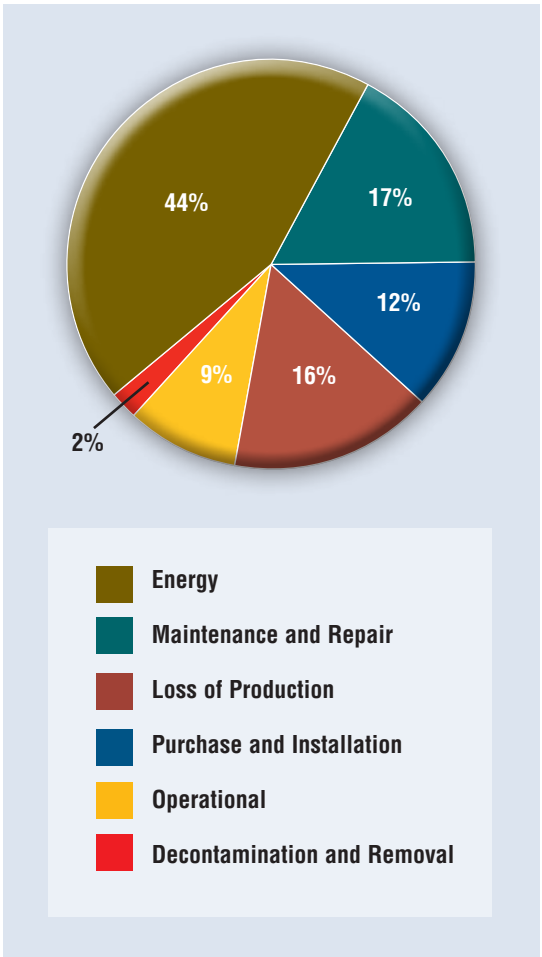
Capital Expenses
- Initial purchase
- Installation

Operating Expenses
- Energy consumption
- Maintenance
- Production losses
- Environmental
- Inventory
- Operating
- Removal

Innovative Life Cycle Cost Solutions

- New Pump Selection
- Turnkey Engineering and Field Service
- Energy Management
- Pump Availability
- Proactive Maintenance
- Inventory Management

Typical Pump Life Cycle Costs[1]



[1] While exact values may differ, these percentages are consistent with those published by leading pump manufacturers and end users, as well as industry associations and government agencies worldwide.



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