

# CUP-CVP

CONCRETE VOLUTE COOLING WATER PUMP





## SPX - An introduction

SPX is a Fortune 500 multi-industry manufacturing leader, headquartered in Charlotte, North Carolina. SPX manufactures and markets products, components, services and technologies that are integral to meeting today's challenges and tomorrow's needs. We are a place where innovation is fostered, and the real needs of business are understood. We transform ideas into powerful solutions to help our customers meet their goals, overcome business challenges and thrive in a complex, always changing marketplace.

SPX's Flow Technology segment designs, manufactures and markets engineering solutions and products used to process, blend, meter and transport fluids. We also offer equipment for air and gas filtration and dehydration. Our leading brands have global operations which service the food + beverage, power + energy, and industrial processes.



### CLYDEUNION PUMPS, AN SPX BRAND - GENERATIONS OF EXPERIENCE

Whilst the name is relatively new, the ClydeUnion Pumps brand is known worldwide for supplying reliable and robust engineered pumping solutions stemming from over 140 years of industry expertise. Our experience spans across several complex industries including oil and gas, nuclear and conventional power generation, desalination and other key markets relevant to our product portfolio.

### › ClydeUnion Pumps



Weir Pumps - Clyde Pumps - Mather & Platt -  
Drysedale - WH Allen - Girdlestone -  
Allen Gwynnes - Harland



Union Pump - David Brown Pumps  
DB Guinard Pumps - American Pump - Pumpline



› ClydeUnion Pumps

# High technology pumps for the most demanding services

Concrete volute pumps are designed for high flow applications, resulting in fewer pumps. Minimizing the number of pumps reduces overall civil dimensions considerably.

The CUP-CVP is predominantly produced in concrete, eliminating potential corrosion problems often experienced in corrosive environments. The pump is constructed as an integral part of the pumphouse – ensuring consistent civil and mechanical interfaces. After installation almost 100% availability is achieved due to the effective combination of the slower running speed, minimal wear and exceptional reliability, eliminating the need for stand-by units.

Concrete volute designs boast a minimum of 10 years between internal inspections. These inspections can be performed within the volute without removal of the pump cartridge.

## COMMITMENT TO QUALITY

We are committed to quality throughout our organization. Our Quality Management System is fully approved to ISO 9001:2008 and independently verified to comply with the latest quality standards. ClydeUnion Pumps understands the challenges faced to acquire or maintain the high standards required to design and build nuclear coded pumps, and the company has three coded facilities with a long history of excellence.



## PUMP + DRIVE ARRANGEMENTS

The concrete volute pump and drive arrangements comprise of:

- **DIRECT DRIVE** - The motor is directly coupled to the pump shaft, meaning the pump arrangement requires only two major components. This simplifies installation, maintenance and auxiliary equipment, and reduces overall noise levels.
- **EPICYCLIC DRIVE** - The motor drives the pump through a speed reducing gearbox, designed to suit motor and pump interfaces. The gear case can be designed to support weight of drive motor. This arrangement reduces overall package size and offers a high mechanical efficiency of 99%. The coaxial drive train (motor/gearbox/pump) eliminates the need for a low speed coupling.
- **OFFSET GEARED DRIVE** - A diesel engine drives the pump through a speed reducing bevel gear. This arrangement uses a higher speed motor which is lighter, smaller and generally operates at higher overall efficiency. This reduces the cost of the complete pump set, and the cost of the overhead crane for the station may also be lower because of a reduced lifting capacity.

# Creating the volute

The complete rotating assembly consisting of shaft, impeller, bearings, seal, coupling and optional gearbox, together with the top cover and bearing bracket, are manufactured and delivered to site ready for installation into the built-in seating ring.

The finished machined seating ring is supplied at an early stage for building into the concrete. It forms a permanent structure around which the shuttering is located to reproduce the volute and discharge passage shape.

## STAGE 1

The draught tube is formed using accurately made shuttering, and concrete is poured up to a level approximately 50mm below the mounting position of the underside of the seating ring.

## STAGE 2

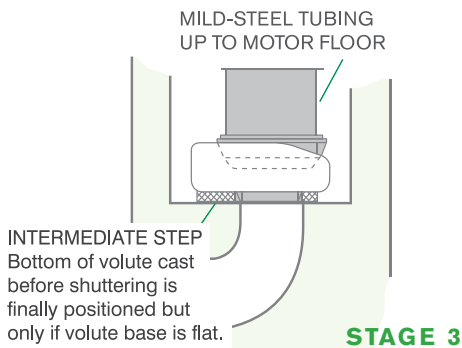
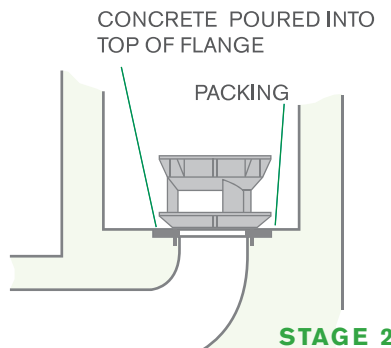
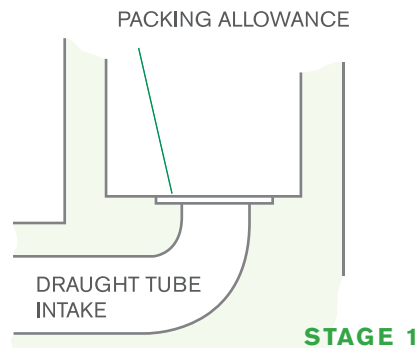
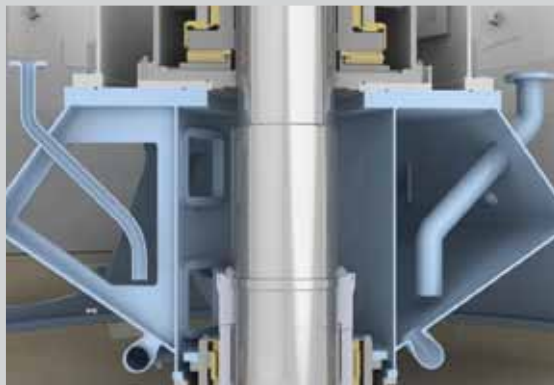
The seating ring is then positioned above the draught tube. Care is taken to ensure correct orientation and that it is perfectly level before the holding-down bolts are tightened and concrete is poured to the top of the seating ring mounting flange.

## STAGE 3

When the seating ring is rigidly secured in its final position the volute shuttering can be assembled around it. The discharge piping is then positioned to ensure correct alignment. Where mild-steel tubing is included it should be mounted on top of the seating ring at this stage. Concrete can then be poured, in accordance with good civil engineering practice, up to motor-room floor level.

The volute shuttering is normally made by the civil engineering contractor to specified dimensions and can be re-used for further pumps on the same contract. The shuttering will be inspected in position by a ClydeUnion Pumps engineer, prior to the reinforcing bars being positioned and concrete pouring commences.

The passages formed in the concrete should be within a tolerance of  $\pm 0.3\%$ , and have a surface finish equal to good quality commercial cast-iron. This standard presents no difficulties and is necessary to ensure guaranteed hydraulic performance. Wear and life expectancy are excellent and pumps over 35 years old show little sign of wear.





# CUP-CVP - Features

- 1

**CARTRIDGE DESIGN**
  - Compact and easily removed pump cartridge
  - Pull-out assembly includes; impeller, pump cover, shaft/sleeve, bearings, seal assembly, bearing support bracket, drive coupling
  - Integral oil tank for gear bearing lubrication
- 2

**CIVIL DESIGN**
  - Cast-in casing; intelligent sub-assembly designed to assure perfect installation
  - Volute is fully integrated into site construction and designed to ease the job of the civil contractor
  - Volute shape designed in conjunction with civil consultants maximizes concrete material properties
  - Pump casing is predominantly produced in concrete, eliminating corrosion problems often experienced with suspended bowl pumps (especially in hot sea water)
  - Volute design is simplified, using flat surfaces where possible and minimizing the number of concrete pours
- 3

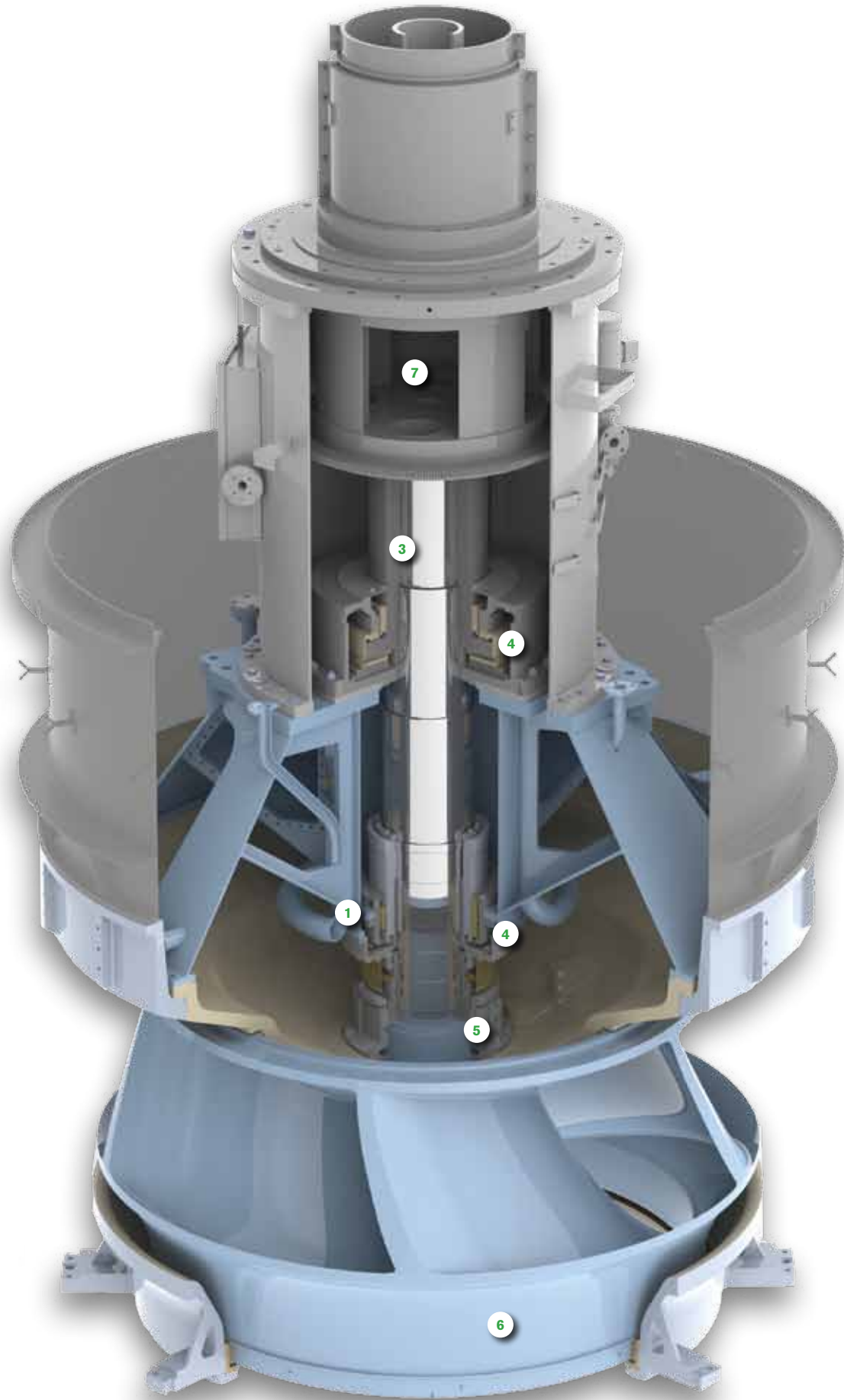
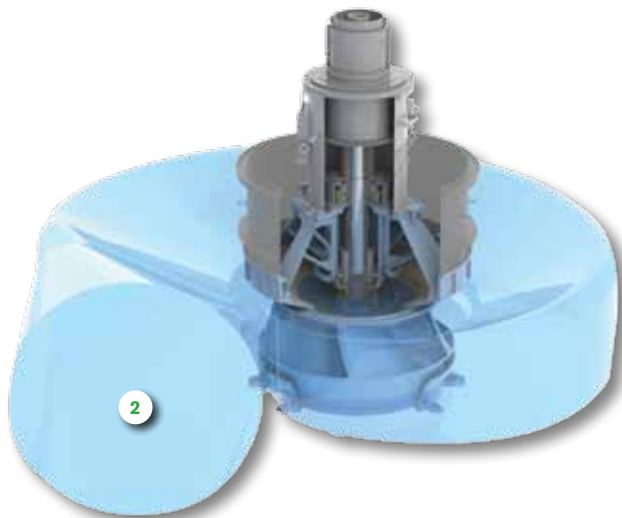
**ROTOR DESIGN**
  - Mechanically stiff, low speed operation results in exceptional reliability
  - 10 to 12 year service life
  - Approaching 100% reliability achieved across all installations
- 4

**BEARINGS**
  - Journal and thrust tilting pad bearings are used to improve reliability and increase bearing life
- 5

**PACKED GLAND + INFLATABLE SEAL**
  - Packed glands offer higher levels of reliability on concrete volute pumps
  - Gland packing materials are selected to suit pumped fluid and pump materials
  - Inflatable seal is provided to assist maintenance
- 6

**BALANCED IMPELLER**
  - Reduced thrust and increased stability
  - Exceptional installed efficiency (in the region of 91.5%)
  - Hydraulic model tests assure site performance
- 7

**GEARBOX (OPTION)**
  - Rigid fabricated construction
  - Avoids need to use large, expensive, multi-pole motors
  - Pump bearing maintenance in situ
  - Reduced overall package size



From top: Preparing the concrete volute, installing the CUP-CVP and pump performance measurement during test



## CUP-CVP benefits

### GLOBAL INSTALLED BASE

- Vast experience with over 200 concrete volute pumps supplied to date

### HIGH FLOW RATE

- Concrete volute option will be suitable for a higher flow per pump, resulting in fewer pumps being required

### LOW SPECIFIC SPEED

- Slower running speed and shorter submerged setting depth
- Lower rise to closed valve head, resulting in reduced system pressure rating

### CONCURRENT CIVIL ENGINEERING

- Pump construction is concurrent with intake and pumphouse structures, ensuring correctness of mechanical and civil interfaces

### LOW WEAR RATES

- Low wear leads to negligible spares usage
- Slower running speed, minimal wear and exceptional reliability eliminates the need for stand-by units

### HIGH AVAILABILITY

- Approaching 100% availability is achieved on all installations

### HIGH EFFICIENCY

- Installed efficiency is higher than conventional bowl pumps - concrete volute pumps are larger, more efficient and do not encounter column or bend losses
- Efficiency levels are maintained over long operating periods, reducing overall power consumption over life of plant
- Real long term power savings leading to high value cost savings over plant life

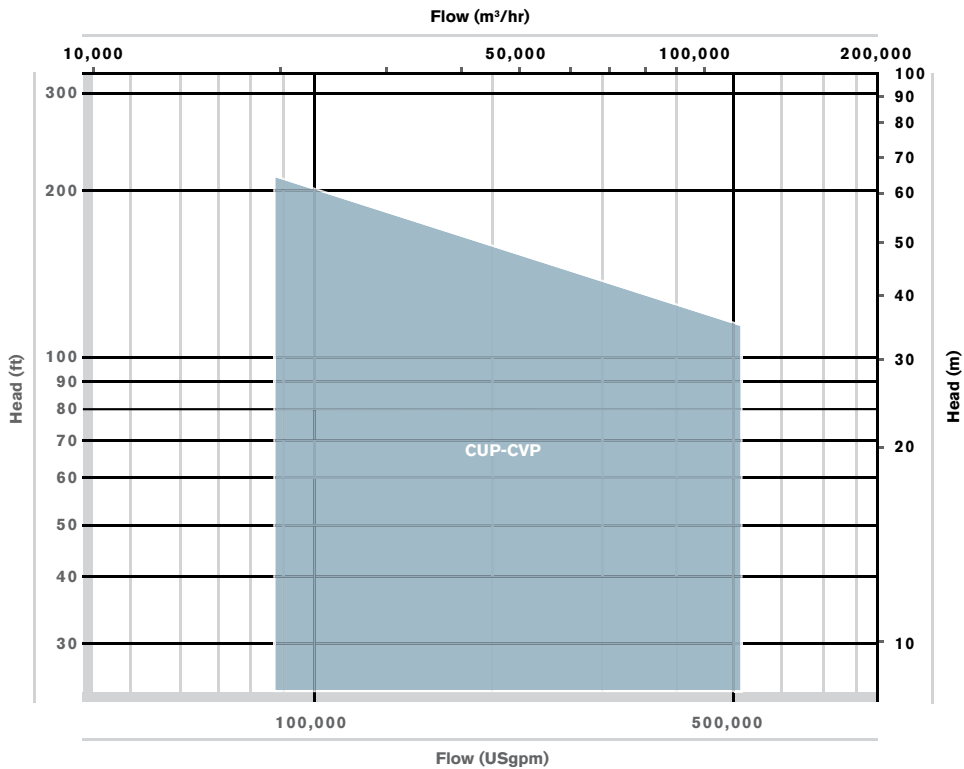
### INDUSTRY EXPERIENCE

- ClydeUnion Pumps has actual experience of pumps operating in the power industry for more than 100,000 hours with no noticeable change in efficiency
- The concrete volute design boasts a minimum of 10 - 12 years between internal inspections. Bowl pumps require maintenance after 3 years

### VERSATILITY

- Common discharge manifold allows exceptional versatility between pumps and system

## Standard hydraulic range - coverage chart



### TYPICAL APPLICATIONS

- Large scale cooling water duties
- High flow water intake systems
- High flow transfer duties
- Land irrigation schemes
- Land drainage schemes
- Dry dock de-watering duties
- Flood control systems

### CUP-CVP OPERATING PARAMETERS

- Capacities - up to 530,000 USgpm / 120,000 m³/hr
- Delivery heads - up to 230 ft / 70 m (related to application speed /flow)
- Speeds - 100 to 350 rpm
- Temperature - up to 120 °F (50 °C) in standard configuration

This chart covers the CUP-CVP standard pump range. Other engineering designs exist for extreme applications





## Global aftermarket capability best in service + response

Our customer focused aftermarket organization is positioned to provide comprehensive care for our varied and diverse product lines. Heritage and obsolete products benefit from the same level of attention and expertise ensuring that reliability and availability is maximized irrespective of a pump's length of service.

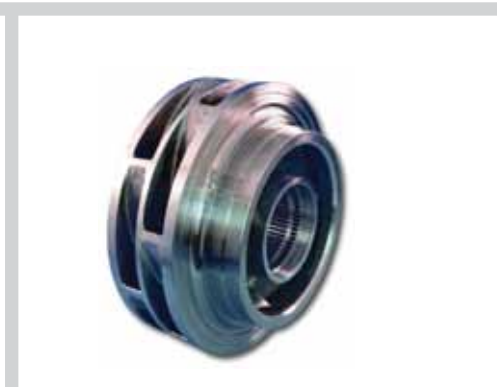
### GENUINE HIGH QUALITY

Original or upgraded specification spare parts, coupled with full engineering design capability, enables longevity of reliable operation. Highly skilled and experienced service engineers ensure accuracy in build and optimized performance. The worldwide presence of ClydeUnion Pumps offers local service facilities in over 40 countries.

### SERVICE SOLUTIONS

ClydeUnion Pumps is committed to supporting our installed base wherever it may be. Depending on your location we will provide either direct service support or support via our local authorized service partners. Whichever option is provided, you can be assured of the best attention from fully qualified and experienced engineers.

- Upgrades + re-rates
- Service + overhaul
- Installation + commissioning
- Technical support
- Inventory management
- 3rd party equipment



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