

CUP-FK

HIGH ENERGY, MULTI-STAGE, DIFFUSER TYPE, BARREL CASE, BOILER FEED 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 -
Drysdale - 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

ClydeUnion Pumps, an SPX Brand, is committed to delivering market leading products and services which meet the technical and commercial challenges of our customers operating across the full spectrum of power industry activities.

ClydeUnion Pumps experience in manufacturing boiler feed pumps dates back to 1893. Our boiler feed pump design philosophy is underpinned by decades of experience of providing highly reliable boiler feed pumps that offer assured generating capacity. This design required a very reliable, incredibly robust, boiler feed pump that assured generating capacity.

CONVENTIONAL POWER PLANTS

The ClydeUnion Pumps CUP-FK boiler feed pump is a world class product designed for sub and supercritical applications, meeting the demands of modern power plants, regardless of fuel type or pressure requirements. ClydeUnion Pumps understands the demands of the latest generating plants and our CUP-FK pumps are designed to exceed these requirements. We are committed to quality throughout the company.

COMMITMENT TO QUALITY

Our Quality Management System is fully approved to ISO 9001:2008 and independently verified to comply with the latest quality standards. ClydeUnion Pumps is an environmentally responsible firm. In recognition of efforts considering the environment and surroundings, ClydeUnion Pumps Glasgow facility has been awarded the ISO 14000:2004 series of international standards.



RESEARCH + DEVELOPMENT

ClydeUnion Pumps recognises the importance of cleaner energy and the significant impact a boiler feed pump can have on the overall plant output.

Our efforts are focused on continuously improving and developing our technology to ensure we deliver the most reliable, efficient and low life-cycle cost products.

CUP-FK - High energy, multi-stage, diffuser type, barrel case, boiler feed pump

Our extensive engineering, manufacturing and operational experience has been incorporated in the design of the CUP-FK, a radially split, barrel case, multi-stage diffuser pump designed for high pressure, high temperature and high speed applications.

The CUP-FK range boasts optimum hydraulic design, sustainable efficiency, full cartridge withdrawal, and the inherent ability to withstand thermal shock. Features such as these ensure this world leading product offers reliable operation and low through life cost of ownership.

PROVEN PRODUCT INTEGRITY

The ClydeUnion Pumps CUP-FK range encompasses optimal hydraulic designs from our heritage product ranges. The design integrity of our products is demonstrated with operational boiler feed pumps that have achieved performance of up to 75,000 hours mean time between overhauls.

MECHANICALLY STIFF ROTOR DESIGN - THE HEART OF THE MACHINE

ClydeUnion Pumps mechanically stiff, large-shaft rotor design differentiates our boiler feed pump. Our rotor design is based on achieving maximum sustainable efficiency, extended mean time between overhauls and reliability in operation. Designed to low K factors, the resulting high critical speed margins and low static deflections reduce internal wear and increase reliability. The ability to accommodate thermal transients without the need for warm up and superior start-stop capability ensure a breadth of requirements can be serviced.

CARTRIDGE WITHDRAWAL

ClydeUnion Pumps experience in full cartridge design dates back to the early 1970s when an advanced class of pump was produced where all the pump internals can be withdrawn without disturbing pump alignment or pipe work. This reduces outage time and increases the ease of maintenance and inspection.

NO WARM-UP REQUIREMENT

Without the need for expensive warming through, CUP-FK pumps can accept full thermal shock without damage hence the pump is always available for start-up. No warming through can reduce plant power consumption and increase overall plant thermal efficiency.

OPERATING PARAMETERS:

- **Capacities** - up to 2,800 m³/hr / 12,300 USgpm
- **Head** - up to 5,000 m / 16,400 ft
- **Speeds** - up to 7,000 rpm
- **Temperatures** - up to 250°C / 480°F



CUP-FK - Features

1 MECHANICALLY STIFF SHAFT

- Large shaft-to-impeller diameter proportions
- Short span between bearings
- High critical speeds and low static deflection

2 OPTIMUM NPSH PERFORMANCE

- Optimised by Computational Fluid Dynamics
- First stage impeller with improved suction performance

3 OPTIMISED HYDRAULIC PERFORMANCE

- Proven range
- Precision cast components, repeatable performance and advanced manufacturing techniques

4 REPLACEABLE WEARING PARTS

- Available for ease of maintenance
- Casing wear rings material and geometry is selected for anti-galling properties

5 HYDRAULIC THRUST BALANCE

- Full radial clearance
- Long operating life
- Extended pump performance with ability to handle transients and flow changes without wear

6 SEALING OPTIONS

Mechanical seals and Labyrinth glands are interchangeable within the same housing

Mechanical seal

- Cartridge style, no seal setting
- Reduced capital cost
- Gain in overall feed pumping thermal efficiency
- Long seal lives achievable
- Optional dosing system based on water quality

Labyrinth gland

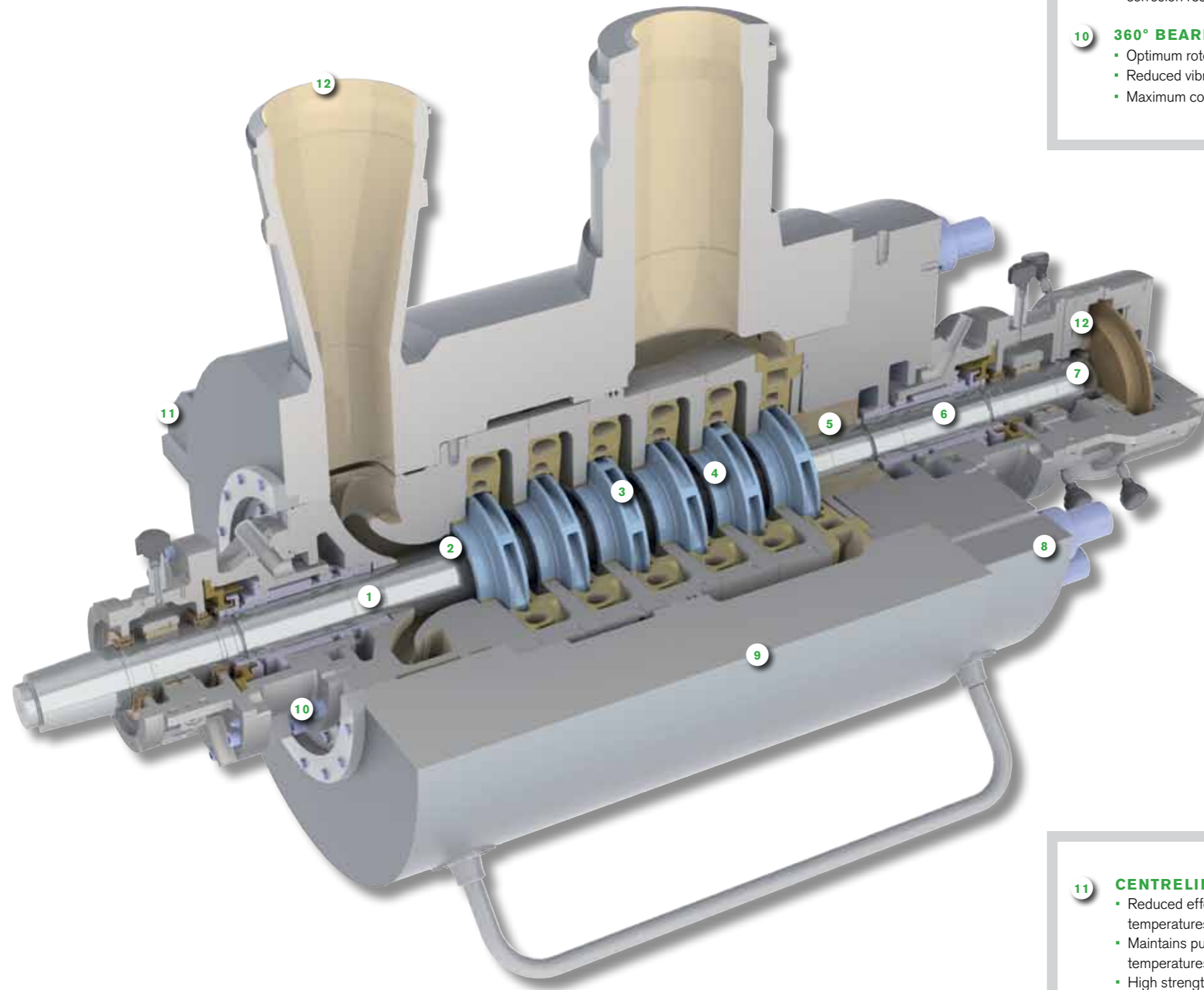
- Non contacting components for extended reliability
- Does not suffer from system transients i.e. thermal shocks
- Low maintenance
- Designed for infinite life

7 HYDRODYNAMIC BEARINGS (JOURNAL + TILTING PAD THRUST)

- Hydrodynamic double-acting thrust
- White metal lined hydrodynamic journal bearing
- Optimum rotor stability
- Infinite life dependant on oil cleanliness

8 REMOVABLE CARTRIDGE DESIGN

- Allows rapid overhaul within one working shift
- Entire cartridge can be withdrawn from the barrel as one component, complete with bearings, seals and half coupling



9 FORGED BARREL

- The barrel casing forms the pressure boundary
- Key-blocks maintain alignment under thermal growth
- 2¼% chrome material, as standard, providing strength and corrosion resistance

10 360° BEARING SUPPORT

- Optimum rotor alignment and support
- Reduced vibration levels
- Maximum component life

11 CENTRELINE MOUNTING

- Reduced effect of thermal growth at elevated process temperatures
- Maintains pump to driver alignment at all operating temperatures
- High strength fabricated steel baseplate accommodates all static and dynamic loads and reduces noise transmission
- Capable of supporting pumpsets grout free

12 CONNECTION OPTIONS

- Flanged branch
- Welded branch
- Interstage tapping
- Orientation to suit station pipework

Optional arrangements + features

MECHANICAL SEAL

- Cartridge design for easy installation, no seal setting, leak-free design option
- Gain in overall feed pumping thermal efficiency (especially where warming through is not required)
- Long seal lives achievable
- Lower capital cost compared to other options
- Lower cooling water quality (station cooling water system)
- Fewer external components

LABYRINTH GLAND

- Long lasting, wear-free, sealing that controls hot leakage from the pump
- Non contacting components for extended reliability
- Does not suffer from system transients i.e. thermal shocks
- Low maintenance
- Designed for infinite life

IMPELLER OPTIONS

- Low NPSHr single entry first stage as standard offering
- Double entry first stage available
- Reliable performance and long impeller life
- Proven and optimised inlet design criteria assures cavitation-free operation
- Designs are optimised by Computational Fluid Dynamics
- Commonly tested in cavitation-visualisation rigs
- Routinely NPSH tested

INTER-STAGE TAPPING

- Available at various stages to serve project requirements

KICKER STAGE

- Placed after the final stage to generate additional pressure

BALANCE DRUM

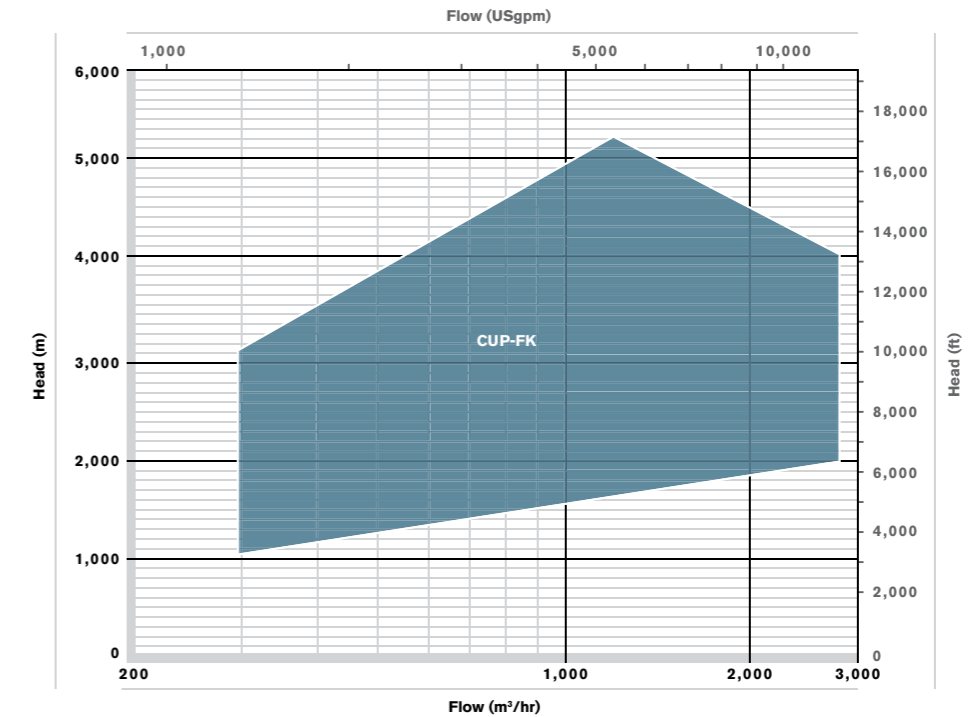
- A balance drum is the most robust and rugged axial thrust balancing system
- Balance drum arrangement absorbs up to 90% of hydraulic thrust loads, the remainder being compensated by generously rated thrust bearings
- No axial clearance therefore no risk of axial contact
- Pump withstands transients and flow changes without wear
- Long operating life

HYDRODYNAMIC BEARINGS

- Used in conjunction with balance drum hydrodynamic double-acting thrust white metal lined journal bearing
- Capable of higher load, higher speed operation
- Force-fed or self-contained options available
- Infinite life dependant on oil cleanliness
- Optimum rotor stability

Standard hydraulic range - coverage charts

RANGE COVERAGE CHART



Above: Mechanical seal/labyrinth gland/impeller options/hydrodynamic bearings

Below: Balance drum

These charts cover the CUP-FK standard pump range. Other engineering designs exist for extreme applications



Global aftermarket capability best in service + response

Our customer focused aftermarket organisation 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 maximised irrespective of a pump's length of service.

GENUINE HIGH QUALITY

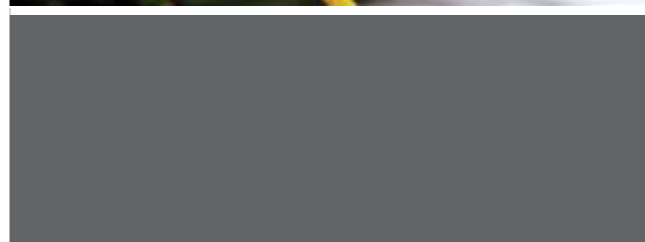
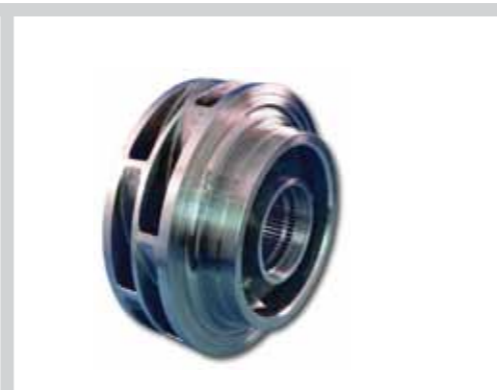
Original or upgraded specification spare parts, coupled with full engineering design capability, enables longevity of reliable operation. Highly skilled and experienced service engineers ensure accuracy in build and optimised performance. The worldwide presence of ClydeUnion Pumps offers local service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

Parts + maintenance:
Any brand, any material, anytime. Heritage products, upgrades + improvements



CUP-FK

HIGH ENERGY, MULTI-STAGE,
DIFFUSER TYPE, BARREL CASE,
BOILER FEED PUMP



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CUP-03-FK-UK

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