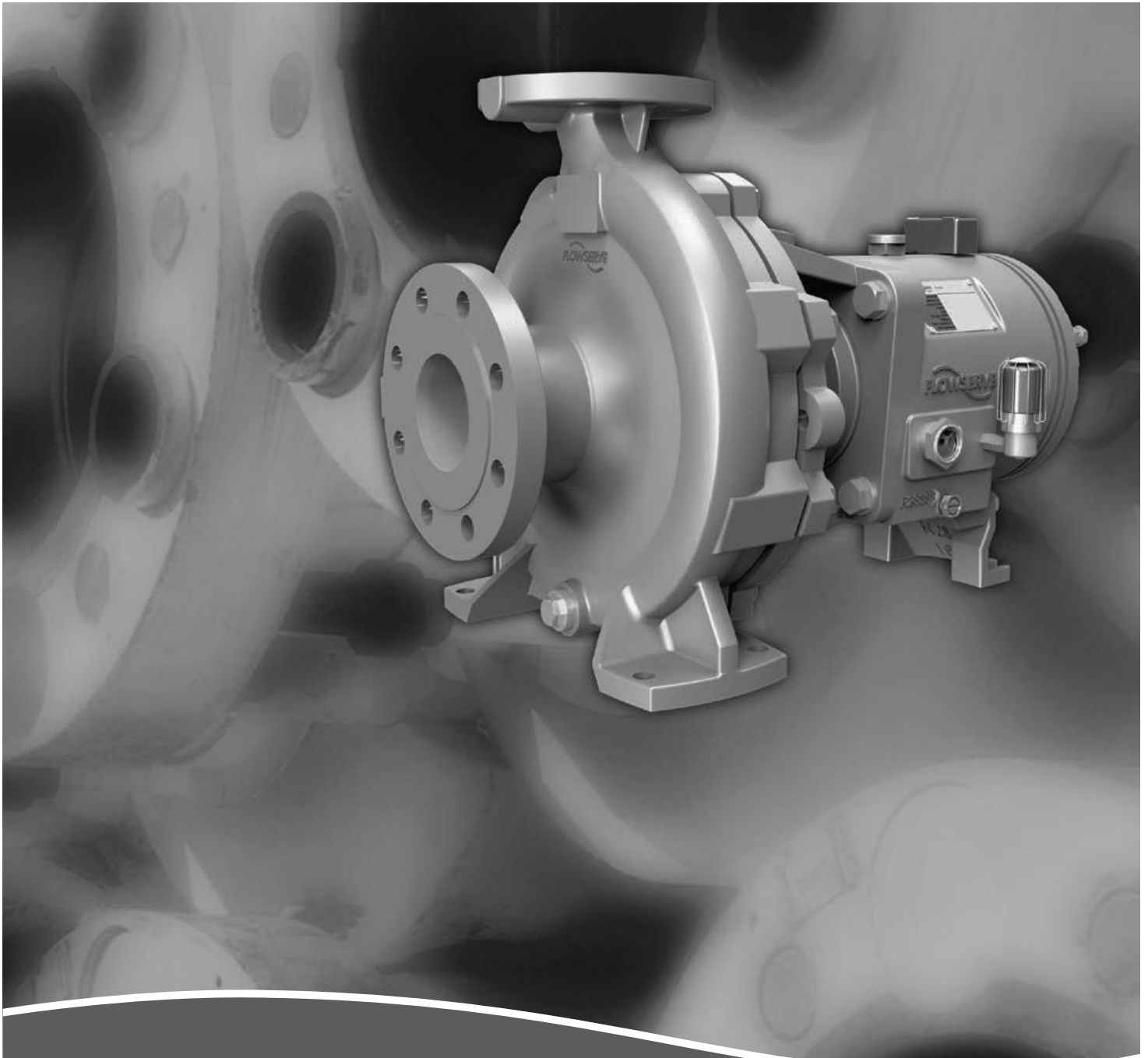


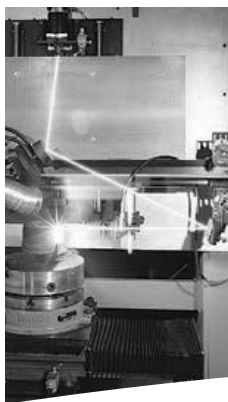


## ***Durco® Mark 3™ ISO Chemical Process Pump***

ISO 2858/5199



*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 provides pumping solutions that 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 initial 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 bearings single-stage
- Between bearings multistage
- Vertical
- Submersible motor
- Positive displacement
- 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*

*INNOMAG® Sealless 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*

## Durco Mark 3 ISO Chemical Process Pump



## The Premier Name in Chemical Process Pumps

*The Durco Mark 3 ISO chemical process pump provides outstanding hydraulic performance, unrivaled reliability and low total cost of ownership. Conforming to ISO 2858 and ISO 5199 design criteria, the Durco Mark 3 ISO incorporates many proven reliability- and performance-enhancing features. The resultant benefits are:*

- *Renewable, high-efficiency performance over the life of the pump with the reverse vane impeller*
- *Optimal, predictable seal chamber pressures that are re-established after every impeller setting*
- *Maximal mechanical seal life due to an ideal seal environment created by the SealSentry seal chamber*
- *Two-piece bearing bracket reduces inventory cost and facilitates retrofit for ISO 2858 compliant pumps*
- *Robust shaft and bearing designs that minimize shaft deflection and extend mechanical seal and bearing life*
- *Fast and accurate impeller setting with the industry's most innovative external impeller adjustment mechanism*
- *In-shop reverse vane impeller adjustment with the only pump that takes full advantage of the back pull-out design*

### **Global Design, Unmatched Performance**

Durco Mark 3 ISO chemical process pumps are available in many designs to meet the needs of the process industries:

- Open or reverse vane impeller
- Recessed impeller
- Unitized self priming
- Close coupled

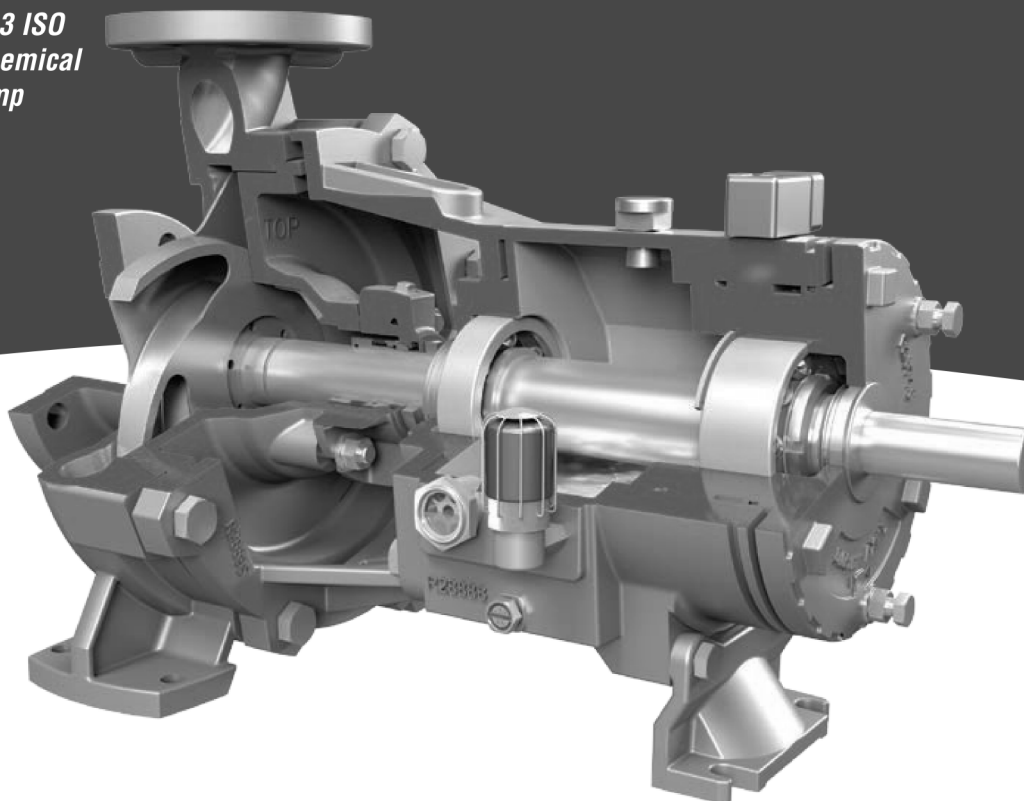
### **Typical Applications**

- Acid transfer
- Brine
- Chemical processing
- Petrochemical processing
- Corrosive services
- Food and beverage processing
- Hydrocarbon processing
- Pharmaceuticals
- Polymers
- Pulp and paper
- Sea water
- Slurries
- Solvents
- Steel and primary metals
- Water and wastewater treatment

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***Durco Mark 3 ISO  
Standard Chemical  
Process Pump***



*Conforming to ISO 2858 and ISO 5199 design criteria and incorporating advanced design features, the Durco Mark 3 ISO chemical process pump provides unmatched performance and reliability. The ruggedly designed Durco Mark 3 ISO offers significant operational and maintenance enhancing benefits that help users to minimize the total cost of pump ownership.*

***Operating Parameters***

- Flows to 1400 m<sup>3</sup>/h (6160 US gpm)
- Heads to 220 m (720 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -80°C (-110°F) to 400°C (752°F)
- Discharge sizes from 20 mm (0.75 in) to 200 mm (8 in)

***Standards Compliance***

The Durco Mark 3 ISO is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

***Features and Benefits***

**Heavy-duty Casing** with integral foot and multi-ribbed discharge flange provides superior resistance to pipe loads and improves reliability.

**Precision Cast Reverse Vane Impeller** is the only impeller design that offers repeatable pump performance throughout the life of the pump. Open impellers available.

**SealSentry™ Seal Chamber** extends seal life and provides advanced self-flushing capability.

**Standard Non-contacting Labyrinth Seals** keep lubricant in and contaminants out.

**Heavy-duty Radial and Thrust Bearings** selected for long life and reliability.

**External Micrometer Impeller Adjustment Mechanism** accurately sets impeller clearance in 20 seconds, in the shop or the field.

**Two-piece, Ductile Iron Bearing Housing** is designed for safety, strength, interchangeability and retrofit capability.

**Back Pull-out Design** allows removal of rotating element without removing casing, piping or motor.



### **Typical Applications**

- Acid transfer
- Caustic and chlor-alkali
- Man-made fibers
- Polymers
- Slurry processing
- Solvents
- Volatile organic compounds
- Waste processing



### **Reverse Vane Impeller Lowers Total Cost of Pump Ownership**

The Durco Mark 3 ISO pump features a reverse vane impeller for unequalled efficiency and performance. This exclusive Durco design lowers the total cost of pump ownership by easing maintenance and extending bearing and seal life.

- Optimal, predictable seal chamber pressure and thrust loads
- Abrasive wear is on the rear cover rather than the more expensive casing.
- In-shop impeller adjustment with the only impeller design that takes full advantage of the back pull-out feature
- Repeatable performance assurance

### **SealSentry Seal Chamber Technology Helps the Bottom Line**

The Mark 3 ISO pump incorporates Durco SealSentry seal chamber technology. This Vaalar Award-winning seal chamber features unique flow modifiers that reduce pump operating costs and increase pump availability:

- Improves mechanical seal performance, reliability and life
- Reduces maintenance and repair costs
- Permits the use of less expensive seals and flush plans

### **Power End Lowers Inventory Costs**

Assembled in a specially constructed clean environment, the Mark 3 ISO power end boasts a rugged two-piece bearing frame to mitigate the risk of mechanical failure under even the harshest operating conditions. The Mark 3 ISO power end also features a high degree of parts interchangeability and may be retrofitted to ISO 2858 compliant pumps, offering an opportunity to standardize equipment and lower inventory costs.

### **Reliability-Enhancing Construction**

- Precision machined, metal-to-metal, inter-connecting faces at the casing, seal chamber, adapter, and bearing housing provide reliable sealing and optimum concentricity.
- Robust, solid shaft ensures less than 0.05 mm (0.002 in) deflection at the seal face and low  $L^3/D^4$  ratio, thereby extending mechanical seal life.
- Elimination of gaskets avoids leakage and crevice corrosion.

### **45 Sizes Available**

- 15 Frame 1
- 15 Frame 2
- 11 Frame 3
- Four Frame 4

The Durco Mark 3 ISO standard pump boasts considerable parts interchangeability and is offered in a wide range of materials to meet application needs. Refer to page 6 for more information.

### **Optional Casing Designs**

- **A Jacketed Casing** is available for those applications in which the pumped fluid must be heated or cooled to maintain optimal fluid viscosity.
- **A Centerline Mounted Casing** is available for applications in which loads caused by thermal expansion need to be reduced.

## Durco Mark 3 ISO

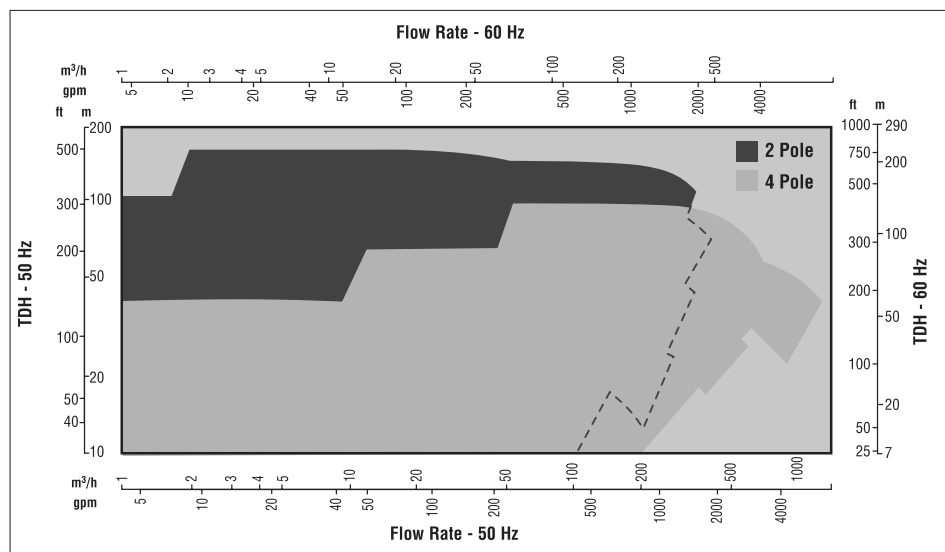
### Materials of Construction and Range Chart

#### Standard Materials of Construction\*











Construction	Casing and Seal Housing	Impeller	Solid Shaft	Sleeved Shaft		Bearing Housing/ Adapter
				Shaft	Sleeve	
Ductile Iron	Ductile Iron	RV: 316 Stainless Steel  OP: Duplex Stainless Steel	316 Stainless Steel	Carbon Steel	316 Stainless Steel	Ductile Iron
Carbon Steel	Carbon Steel					
304 Stainless Steel	304 Stainless Steel					
316 Stainless Steel	316 Stainless Steel					
Duplex Stainless Steel	Duplex Stainless Steel	Duplex Stainless Steel	Duplex Stainless Steel		Duplex Stainless Steel	
Alloy 20	Alloy 20	Alloy 20	Alloy 20		Alloy 20	
Chlorimet 3 (Alloy C-276)	Chlorimet 3 (Alloy C-276)	Chlorimet 3 (Alloy C-276)	Chlorimet 3 (Alloy C-276)	316 Stainless Steel	Chlorimet 3 (Alloy C-276)	
Chlorimet 2 (Alloy B-2)	Chlorimet 2 (Alloy B-2)	Chlorimet 2 (Alloy B-2)	Chlorimet 2 (Alloy B-2)		Chlorimet 2 (Alloy B-2)	
Nickel	Nickel	Nickel	N/A		Nickel	
Titanium	Titanium	Titanium			Titanium	
Titanium-Pd	Titanium-Pd	Titanium-Pd			Titanium-Pd	
Zirconium	Zirconium	Zirconium			Zirconium	











\*Specialty materials available. Consult your Flowserve sales engineer for details.











#### Range Chart













## Durco Mark 3 ISO Parts Interchangeability

Frame 1					
 BEARING HOUSING	 ADAPTER	 SEAL CHAMBER	 REVERSE VANE OR OPEN IMPELLER	 CASING	PUMP SIZE
					1K40-25-125
					1K50-32-125
					1K65-40-125
					1K80-50-125
					1K100-80-125
					1K32-20-160
					1K40-25-160
					1K50-32-160
					1K65-40-160
					1K80-50-160
					1K32-20-200
					1K40-25-200
					1K50-32-200
					1K65-40-200
					1K80-50-200

Frame 2					
 BEARING HOUSING	 ADAPTER	 SEAL CHAMBER	 REVERSE VANE OR OPEN IMPELLER	 CASING	PUMP SIZE
					2K100-65-160
					2K125-80-160
					2K125-100-160
					2K100-65-200
					2K125-80-200
					2K125-100-200
					2K40-25-250
					2K50-32-250
					2K65-40-250
					2K80-50-250
					2K100-65-250
					2K125-80-250
					2K50-32-315
					2K65-40-315
					2K80-50-315

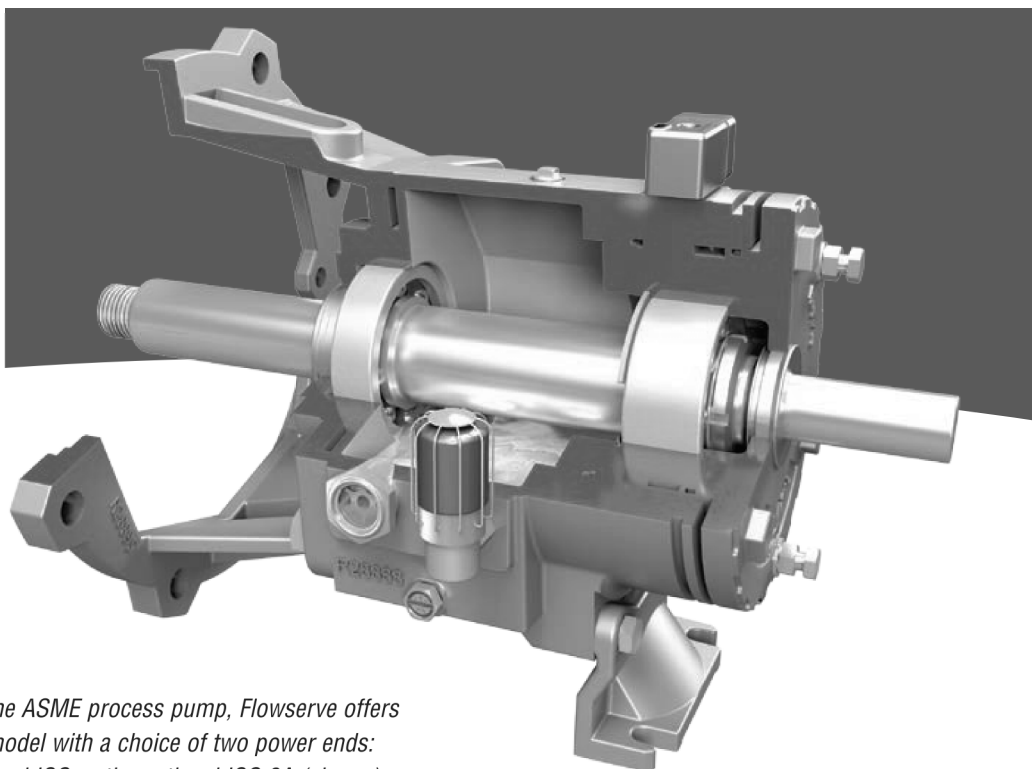
Frame 3					
 BEARING HOUSING	 ADAPTER	 SEAL CHAMBER	 REVERSE VANE OR OPEN IMPELLER	 CASING	PUMP SIZE
					3K125-100-250
					3K150-125-250
					3K200-150-250
					3K100-65-315
					3K125-80-315
					3K125-100-315
					3K150-125-315
					3K100-65-400
					3K125-80-400
					3K125-100-400
					3K150-125-400

Frame 4					
 BEARING HOUSING	 ADAPTER	 SEAL CHAMBER	 REVERSE VANE OR OPEN IMPELLER	 CASING	PUMP SIZE
					4K200-150-315
					4K200-150-400
					4K250-200-400
					4K200-150-500

**Please Note:**

1. Standard and high output hydraulics available.
2. Reverse Vane Impellers are not available on all sizes.
3. Please request more detailed information if required.

***Durco Mark 3 ISO  
Power Ends***



*As with the ASME process pump, Flowserve offers the ISO model with a choice of two power ends: the standard ISO or the optional ISO 3A (shown).*

***Standard ISO Power End***

The standard power end features numerous reliability-, maintenance- and performance-enhancing features, including:

- Double-row angular contact outboard and single-row, deep groove inboard bearings provide excellent axial and radial load support.
- External micrometer enables accurate impeller clearance setting in 20 seconds, restoring pump efficiency.
- Two-piece ductile iron bearing housing provides strength and facilitates interchangeability.
- Metal-to-metal construction assures a true running and concentric shaft, extending bearing and mechanical seal life.
- Non-contacting labyrinth oil seals and flingers
- Top-mounted vent and oil filler
- Magnetic drain plug
- Optional oil slinger
- Optional constant level oiler

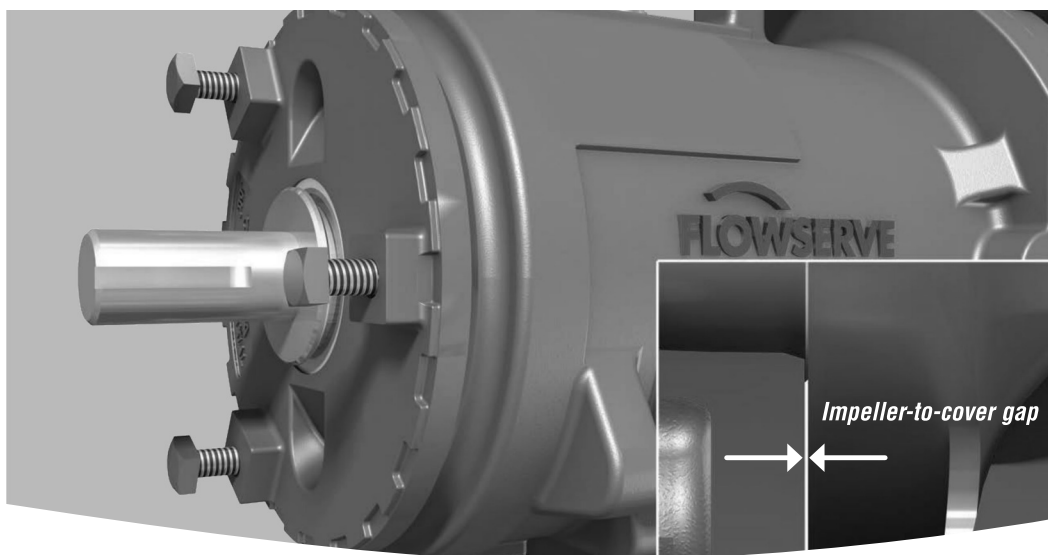
***Optional ISO 3A Power End***

The ISO 3A power end is so advanced it carries a lifetime warranty.<sup>4</sup> It offers the same reliability and performance-enhancing features as the standard power end but also includes:

- Clean environment assembly
- Non-contact assembly vapor block bearing isolators keep lubricants in and contaminants out.
- Plugged top vent
- Lubrication options
  - Oil mist systems
  - Shielded and grease-lubricated bearings (three-year bearing guarantee)
- Rigid foot design

4. Adherence to proper installation, operation and maintenance procedures is necessary for lifetime warranty. Contact your Flowserve representative for detailed terms and conditions.

## Micrometer Impeller Adjustment



### Unique External Micrometer Reduces Maintenance Time and Costs

Durco's innovative external micrometer impeller adjustment mechanism<sup>5</sup> is simple to use and reduces maintenance time and costs. Most importantly, though, it is precisely accurate.



**Step 1:** Loosen the setscrews. Using a wrench, rotate the bearing carrier counterclockwise until the impeller lightly touches the rear cover plate.



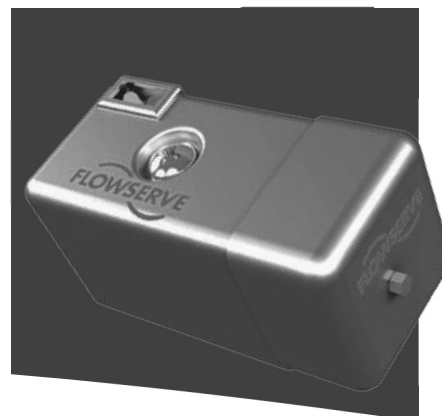
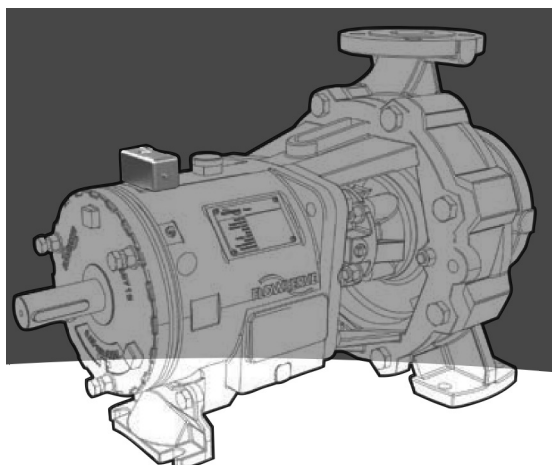
**Step 2:** Select the impeller setting. Each notch on the carrier ring represents exactly 0.10 mm (0.004 in) of clearance. For an impeller setting of 0.5 mm (0.020 in), count five notches counterclockwise.



**Step 3:** Move the carrier clockwise the selected number of notches. Tighten the setscrews and check the impeller clearance with the feeler gauge.

5. Applicable for reverse vane impellers. Consult user instructions for pumps fitted with front vane open-style impellers.

***Durco Mark 3 ISO  
IPS Beacon Power End  
Condition Monitor***



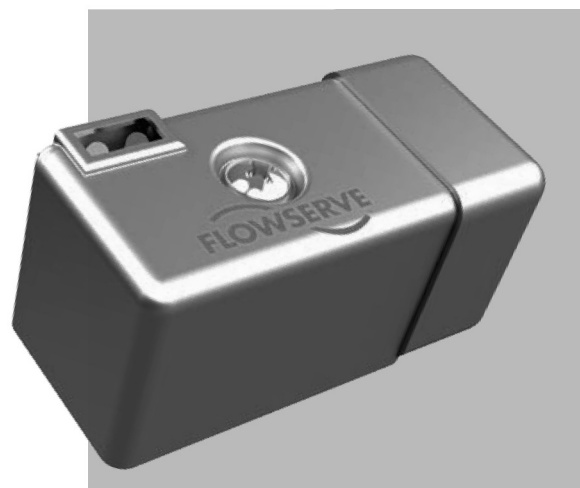
***Continuous Monitoring for Improved Pump  
Reliability and Availability***

All new Mark 3 ISO pumps incorporate the IPS Beacon power end condition monitor. Mounted on top of the bearing housing, IPS Beacon is a light fault device that continuously monitors the bearings and provides a visual signal that a current or past alert condition has occurred. Borosilicate glass-protected LEDs indicate when thrust bearing temperature or vibration levels exceed set-point limits.

Specific capabilities include:

- Three-axis vibration measurement (velocity or acceleration)
- Temperature sensor – 0.01% full scale
- 14-day visual fault indication
- LED indications for normal operation, current alert condition and past alert condition
- Extended battery life – four years typical
- Certified design – CE Marked, ATEX/IECEX, CSA

IPS Beacon may be retrofitted to all existing Durco Mark 3 and Mark 3 ISO pumps as well as most process pumps.

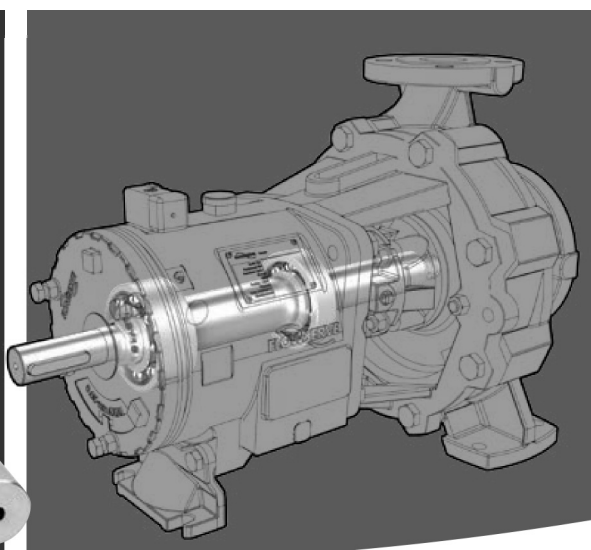


***Expansion Capabilities for More Advanced  
Monitoring Needs***

IPS Beacon is available with a take away memory (TAM) device that has the ability to log and store monitoring data locally as well as adjust set-point limits. When used in combination with the accompanying docking device which interfaces with a customer's local PC, the TAM enables stored data to be displayed in Microsoft® Excel® for analysis.

Further expansion capabilities include integration of a multi-point monitoring device and continuous wireless monitoring functionality. Please refer to bulletin PS-90-11 for additional information.

## Durco Mark 3 ISO Shafts and Bearings



The Durco Mark 3 ISO shaft and bearings system is designed to improve pump performance and reliability.

### Solid Shaft Design

The robust and stiff solid shaft ensures less than 0.05 mm (0.002 in) shaft deflection at the seal face and provides a low  $L^3/D^4$  shaft stiffness ratio<sup>6</sup> to maximize mechanical seal life.

#### Durco Mark 3 ISO Shaft Stiffness Ratio ( $L^3/D^4$ )

Frame Size	$L^3/D^4$ (Solid Shaft)	
	Open Impeller	Reverse Vane Impeller
1	3.5	3.06
2	1.8	1.64
3	0.94	0.85
4	1.07	0.92

A sleeved shaft is available with the Durco Mark 3 ISO pump, though Flowserve recommends using a solid shaft because it better mitigates the harmful effects of deflection and vibration. While a shaft sleeve may simplify maintenance, a solid shaft reduces it. Furthermore, the proper selection of the shaft material and mechanical seal design will offset the positive features of the shaft sleeve option.

To meet application requirements, shafts are available in a wide range of corrosion-resistant materials, including:

- 316 stainless steel
- Duplex stainless steel
- Alloy 20
- Alloy C-276
- Alloy B-2

### Robust Bearing System

As standard, the Durco Mark 3 ISO is supplied with a deep groove ball bearing and double row angular contact thrust bearing, providing life in excess of the minimum specified by ISO 5199.

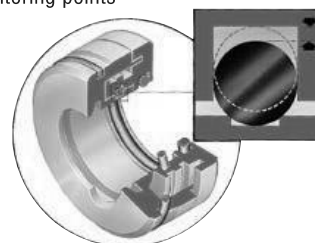
As an optional upgrade, the Durco Mark 3 ISO can be supplied with a deep groove ball bearing and reinforced duplex, back-to-back angular contact thrust bearings, providing  $L_{10}$  bearing life in excess of 50 000 hours.

### Lubrication Options

- **Oil-lubricated Bearing Housing Splash Bath** uses a bull's-eye sight glass with magnetic drain plug as standard with constant level oiler as an option.
- **Grease-lubricated Bearing Housing** facilitates maintenance by using grease nipples fitted at the pump end and drive end. Alternatively, sealed-for-life bearings can be fitted.

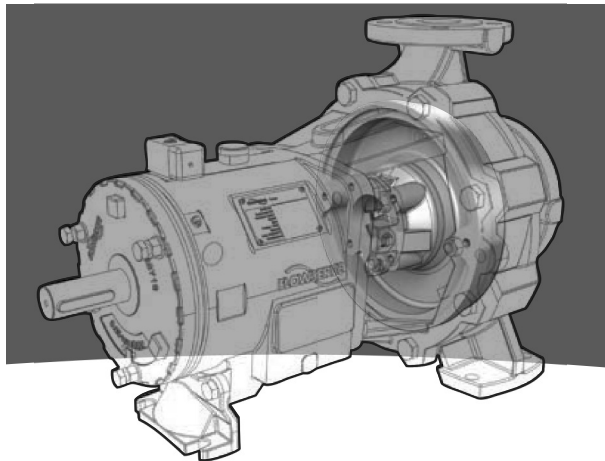
### Additional Options

- Sealed-for-life bearings
- Additional condition monitoring points
- Non-contacting bearing isolators
- Oil mist lubrication technologies



6. The formula  $I = L^3/D^4$  offers an index of deflection to compare pump designs where: I = index of deflection; L = length of shaft overhang from bearing; and D = rigid shaft diameter. While this index can provide an approximate comparison of shaft stiffness, a detailed analysis should be made to determine actual shaft deflection.

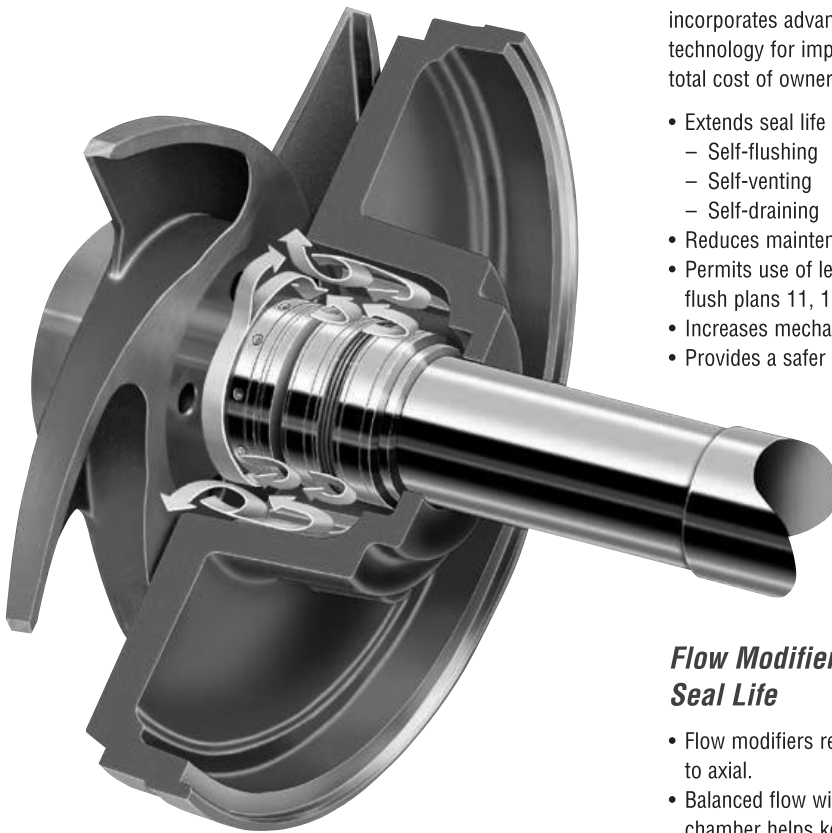
***Durco Mark 3 ISO  
SealSentry  
Seal Chambers***



***Advanced Seal Chamber Technology***

The Durco Mark 3 ISO chemical process pump incorporates advanced SealSentry seal chamber technology for improved pump reliability and reduced total cost of ownership.

- Extends seal life
  - Self-flushing
  - Self-venting
  - Self-draining
- Reduces maintenance and repair costs
- Permits use of less expensive seals and flush plans; flush plans 11, 12, 31, 32, etc., can be eliminated.
- Increases mechanical seal life
- Provides a safer environment for personnel

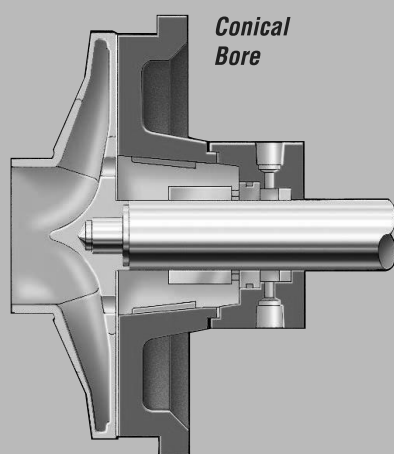


***Flow Modifiers Extend Mechanical Seal Life***

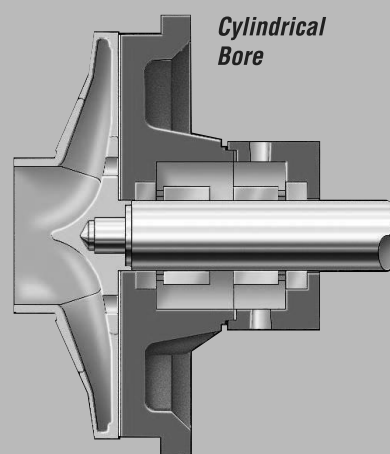
- Flow modifiers redirect flow from circumferential to axial.
- Balanced flow with low-pressure drop in the chamber helps keep solids in suspension, minimizing erosion.
- The mechanical seal creates a centrifuging action away from its parts.
- Solids and slurry merge into the returning flow path and are flushed out of the seal chamber.



*Durco SealSentry seal chambers extend seal life, improve pump reliability and reduce the total cost of pump ownership.*



**Conical Bore**



**Cylindrical Bore**

### ***Multiple SealSentry Designs to Suit Application Requirements***

The Durco Mark 3 ISO is available with several seal chamber configurations:

#### **Conical Bore**

The conical bore SealSentry seal chamber is preferred for most applications. This innovative design features flow modifiers to redirect flow out of the seal chamber. Available in several bore sizes and gland bolt circles, the conical design is ideal for:

- Single internal cartridge seals
- Dual internal/external cartridge seals
- Single internal component seals with flexible mounted seats
- Dual internal “true” tandem design cartridge seals
- Single seals with all seat mounting configurations

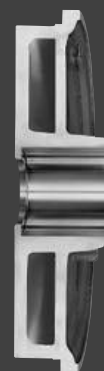
#### **Cylindrical Bore**

With both oversized and standard bores available, the cylindrical seal chamber is ideal for seals with large and small gland bolt and gasket circles. The cylindrical design may be used with:

- Dual internal component seals that isolate the seal chamber from the process with external barrier fluid
- Single seal with throttle bushing and flush to boost pressure over the flash point
- Packing arrangements and conventional seals with small gland bolt and gasket circles



**Conical Bore**

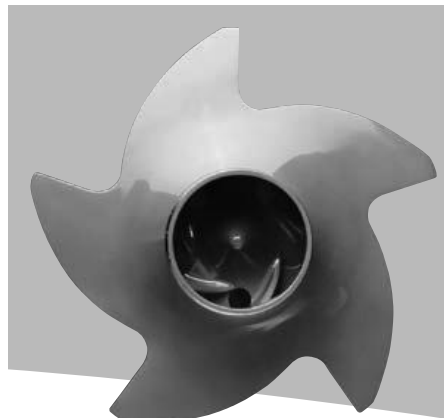
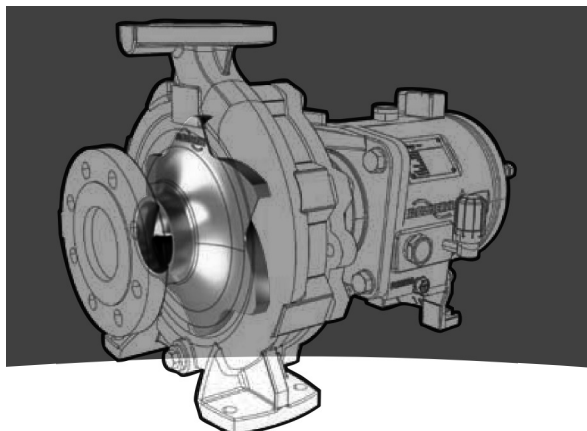


**Cylindrical Bore**

### ***Jacketed SealSentry Seal Chambers Available***

Jacketed SealSentry seal chambers are available for those applications in which maintaining the process temperature is important. Jacketed seal chambers are designed for effective heat transfer in the seal chamber area or across the entire surface area in contact with the process fluid.

## *Durco Mark 3 ISO Impellers*



### ***Reverse Vane Impeller Delivers Efficiency and Performance***

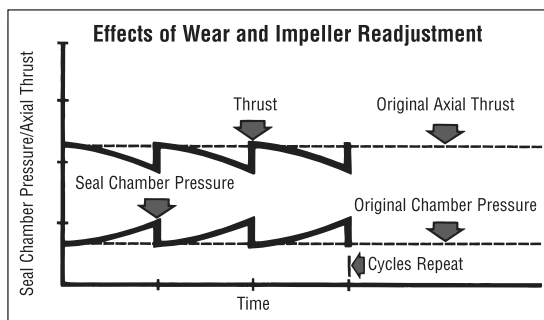
The Durco reverse vane impeller delivers excellent efficiency and performance, while extending bearing and seal life. The result is reduced total cost of pump ownership.

- **Predictable, Repeatable Seal Chamber Pressure and Thrust Loads** mean the mechanical seals last longer.
- **Rear Cover** takes the abrasive wear instead of the more expensive casing.
- **Easy Impeller Adjustment** — whether in the shop or in the field — with the only impeller design that takes full advantage of the back pull-out feature

### ***Predictable, Repeatable Performance***

The exclusive Durco reverse vane impeller has only one set of pumping vanes and one critical tolerance.

Wear on most impeller types causes axial thrust loads to decrease as the seal chamber gap widens. Seal chamber pressure also increases. By re-setting the reverse vane impeller against the cover, however, the original seal chamber pressure and axial thrust loads are re-established. The result is consistent, like-new performance.



### ***External Micrometer Enables In-shop Impeller Adjustment***

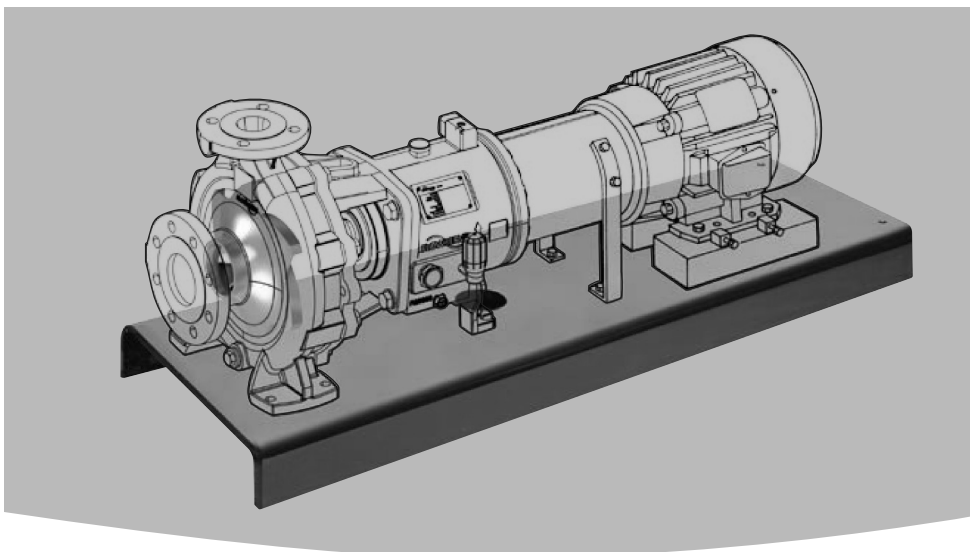
Durco's unique external micrometer impeller adjustment mechanism is simple to use and reduces maintenance time. Most importantly, it is precisely accurate.



### ***Available Front Vane Open-Style Impeller***

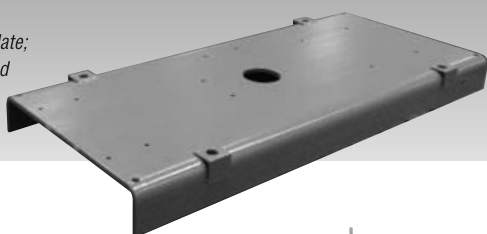
The Durco Mark 3 ISO also is available with a precision-cast front vane open-style impeller with a single shroud and Francis vane. Fully interchangeable with the reverse vane impeller, it is an excellent choice for applications containing fibrous or stringy materials and services requiring high shear against the casing.

## ***Durco Mark 3 ISO Pre-Engineered Baseplate Designs***



### **Type A**

*Standard ISO 3661 baseplate;  
foundation or stilt mounted*



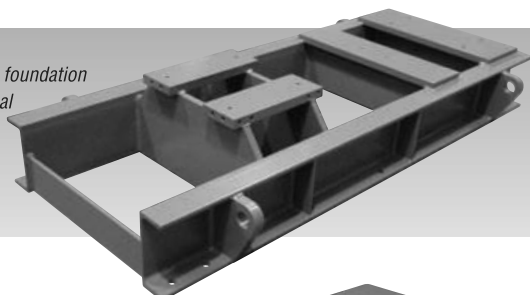
### **Type B**

*Polybase™ baseplate; foundation  
or stilt mounted*

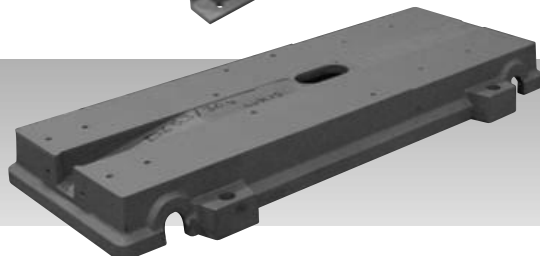


### **Type H**

*Reinforced baseplate; foundation  
mounted (with optional  
drip rim)*



### **Cast Iron**



## ***Four Pre-Engineered Baseplates Available***

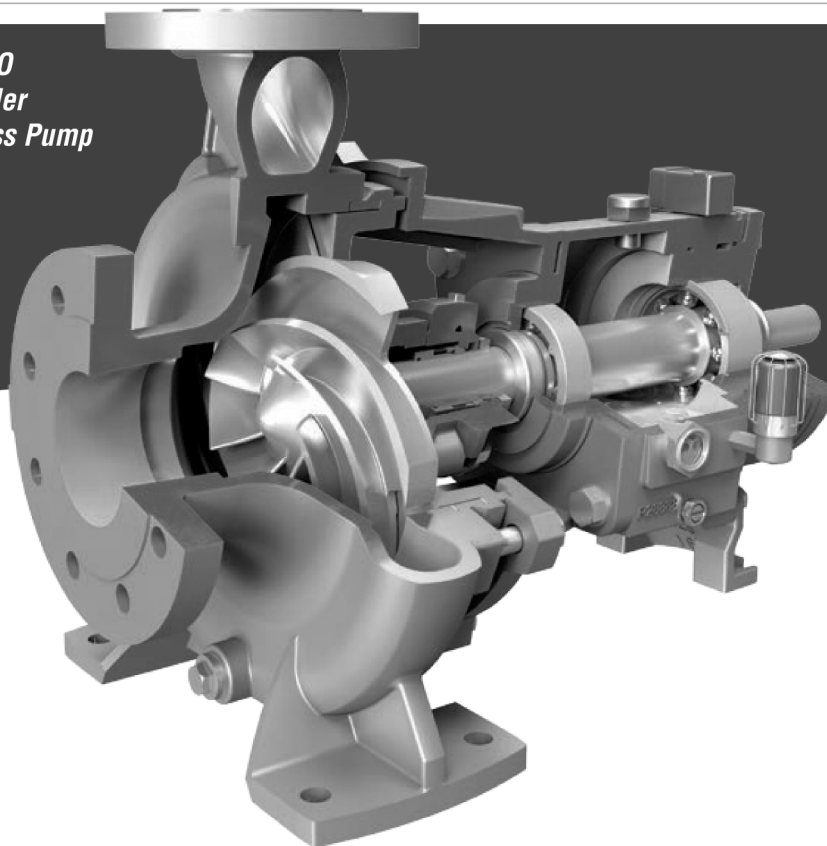
Flowserve offers four pre-engineered baseplate designs to improve pump performance while reducing costs. This provides versatility in choosing the baseplate that best meets application needs and operating budget.

## ***Reducing Internal Stress and Vibration Extends the Life of Pump and Motor Packages***

Pump users specify rigid baseplate designs to:

- Provide torsional lateral and longitudinal rigidity
- Improve vibration dampening
- Protect against transit damage
- Resist twisting during installation
- Maintain shaft alignment
- Reduce installation and shaft alignment time
- Reduce diaphragming or separation from grout
- Improve pump, motor and seal reliability
- Reduce total life cycle pump, motor and seal costs

***Durco Mark 3 ISO  
Recessed Impeller  
Chemical Process Pump***



*The Durco Mark 3 ISO Recessed Impeller pump provides low-shear pumping of friable solids and trouble-free pumping of stringy or fibrous slurries. It combines the state-of-the-art hydraulics of the standard Mark 3 ISO pump with the vortex action of a recessed impeller.*

The Durco Mark 3 ISO Recessed Impeller pump boasts a wide clearance at the front of the impeller, allowing passage of larger particles. Solids are drawn into the vortex of swirling liquid and discharged by centrifugal force through the open area in front of the impeller with little contact, minimizing particle degradation. Furthermore, the air and gas-handling capability of the pump is improved.

***Operating Parameters***

- Flows to 750 m<sup>3</sup>/h (3300 US gpm)
- Heads to 100 m (330 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -80°C (-110°F) to 400°C (752°F)

***Standards Compliance***

The Durco Mark 3 ISO Recessed Impeller is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

***Features and Benefits***

**Vortex Action** causes only a fraction of the media to contact the impeller, minimizing abrasive wear and maintaining solids integrity.

**Heavy-duty Casing** with integral foot and multi-ribbed discharge flange provides superior resistance to pipe loads and improves reliability.

**Precision Cast, Front Vane Open-style Impeller** in CD4MCuN duplex stainless steel (standard) provides excellent corrosion and wear resistance.

**SealSentry Seal Chamber** extends seal life and provides advanced self-flushing capability.

**External Micrometer Impeller Adjustment Mechanism** accurately sets impeller clearance in 20 seconds, in the shop or the field.

**Standard Non-contacting Labyrinth Seals** keep lubricant in and contaminants out.

**Heavy-duty Pump End and Drive End Bearings** selected for long life and reliability.

**Two-piece, Ductile Iron Bearing Housing** is designed for safety, strength, interchangeability and retrofit capability.

**Back Pull-out Design** allows removal of rotating element without removing casing, piping or motor.

### ***Typical Applications***

- Light slurries
- Corrosive/erosive services
- Large diameter solids
- Waste streams
- Shear-sensitive fluids
- Friable solids
- Fibrous materials



### ***Vortex Pumping Action***



### ***Benefits of the Durco Mark 3 ISO Recessed Impeller Pump***

- Improved solids handling
- Improved air and gas handling
- Improved ability to pass fibrous or stringy substances
- Reduced wear
- Low NPSHR

### ***High-Efficiency, Front Vane Open-Style Impeller***

The Durco Mark 3 ISO Recessed Impeller pump comes standard with a precision cast front vane open-style impeller to ensure peak energy efficiency and low NPSHR. The design incorporates pump-out vanes and shroud cut-outs that prolong mechanical seal or packing life by:

- Ensuring low, positive seal chamber pressure
- Expelling solids from critical seal areas
- Providing axial hydraulic balance

### ***Vortex Pumping Action***

The vortex created by the spinning impeller does the pumping with less than 20% of media contacting the impeller. Abrasive wear is minimized and solids integrity maintained.

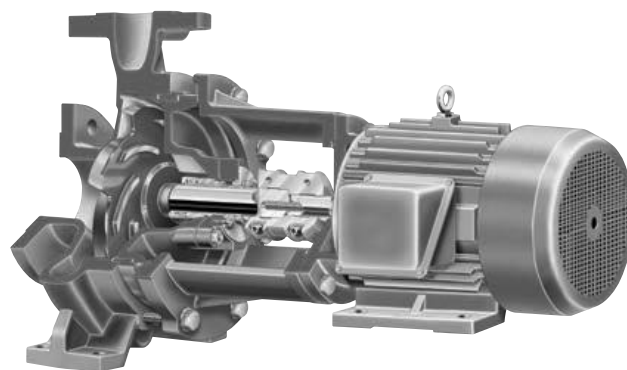
### ***10 Sizes Available***

- Four Frame 1
- One Frame 2
- Four Frame 3
- One Frame 4

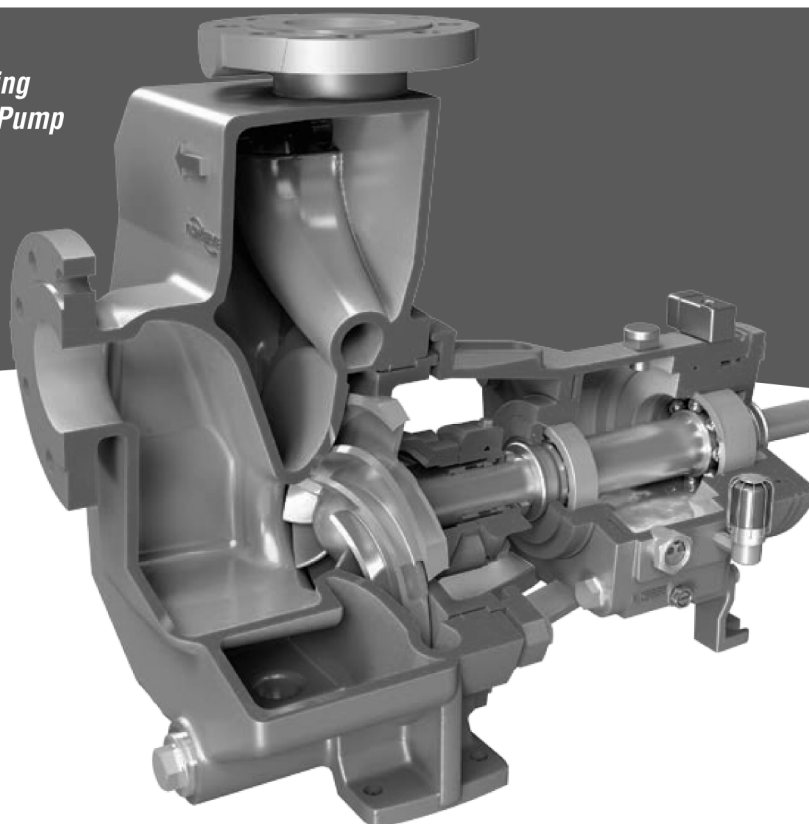
Offered in a wide range of materials to meet application needs. Refer to page 6 for more information.

### ***Additional Configurations***

- Recessed impeller, vertical sump pump
- Recessed impeller, close coupled



***Durco Mark 3 ISO  
Unitized Self-Priming  
Chemical Process Pump***



*Costing less to buy, install and maintain than submersible pumps, the Durco Mark 3 ISO Self-Priming pump is designed to draw liquid from sources below ground level or with no positive pressure to naturally prime the pump. Its compact design enables it to fit in tight clearance locations. It can be easily mounted on a trailer for movement to various pumping locations such as wastewater lagoon service.*

***Operating Parameters***

- Flows to 100 m<sup>3</sup>/h (440 US gpm)
- Heads to 100 m (330 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -80°C (-110°F) to 400°C (752°F)

***Standards Compliance***

The Durco Mark 3 ISO Self-Priming is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

***Features and Benefits***

**Unitized One-piece Casing** has large priming chamber, air separator and volute in one integral component, keeping components to a minimum.

**Front Vane Open-style Impeller** delivers high efficiency performance, provides low NPSHR and offers good solids handling.

**Reflux Priming Principle** eliminates the need for internal valves and external priming devices.

**Run Dry Capability** allows for minimal supervision.

**Two-piece, Ductile Iron Bearing Housing** is designed for safety, strength, interchangeability and retrofit capability.

**SealSentry Seal Chamber** extends seal life and provides advanced self-flushing capability.

**External Micrometer Impeller Adjustment Mechanism** accurately sets impeller clearance in 20 seconds, in the shop or the field.

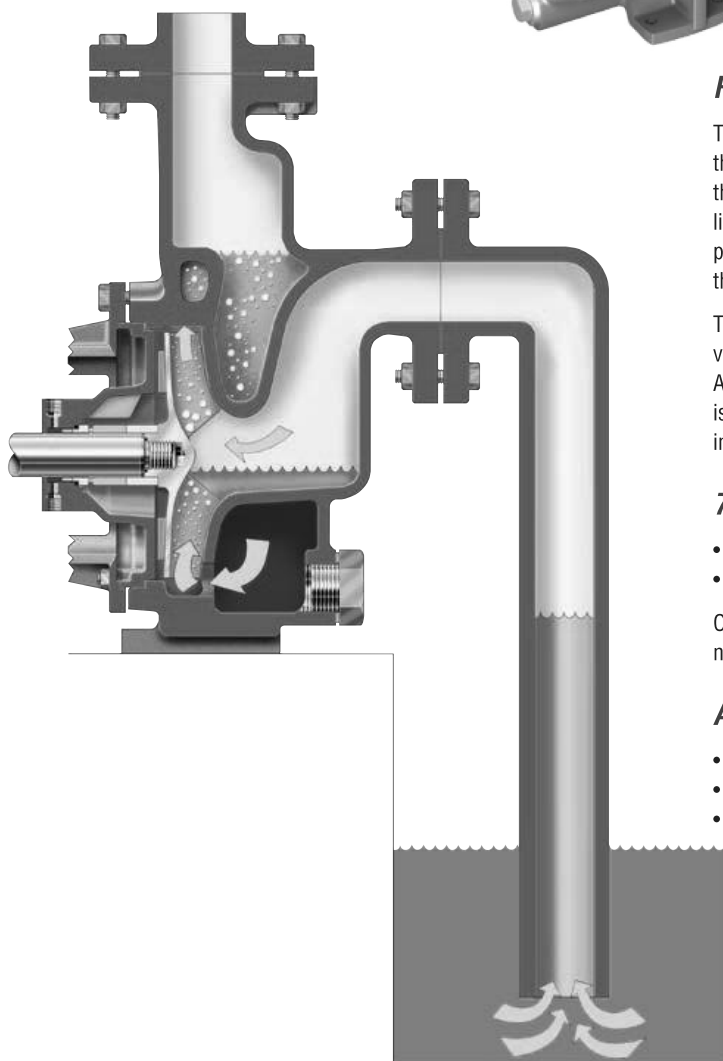
**Standard Non-contacting Labyrinth Seals** keep lubricant in and contaminants out.

**Heavy-duty Pump End and Drive End Bearings** selected for long life and reliability.

**Back Pull-out Design** allows removal of rotating element without removing casing, piping or motor.

### **Typical Applications**

- Sump service
- Tanker unloading
- Marine and river extraction
- Wastewater and effluent
- Dewatering
- Vessel transfer



### **Reflux Priming Principle**

The Durco Mark 3 ISO Self-Priming pump operates on the reflux principle, using liquid recirculation to prime the pump. The pressure differential between the aerated liquid at the impeller and the non-aerated liquid in the priming chamber creates a vacuum that pulls liquid up the pipe.

This principle eliminates the need for both internal valves and external priming devices or foot-valves. As a result, the Durco Mark 3 ISO Self-Priming pump is ideal for suction lift applications or where a process involves pumping a liquid with air or gas phases.

### **7 Sizes Available**

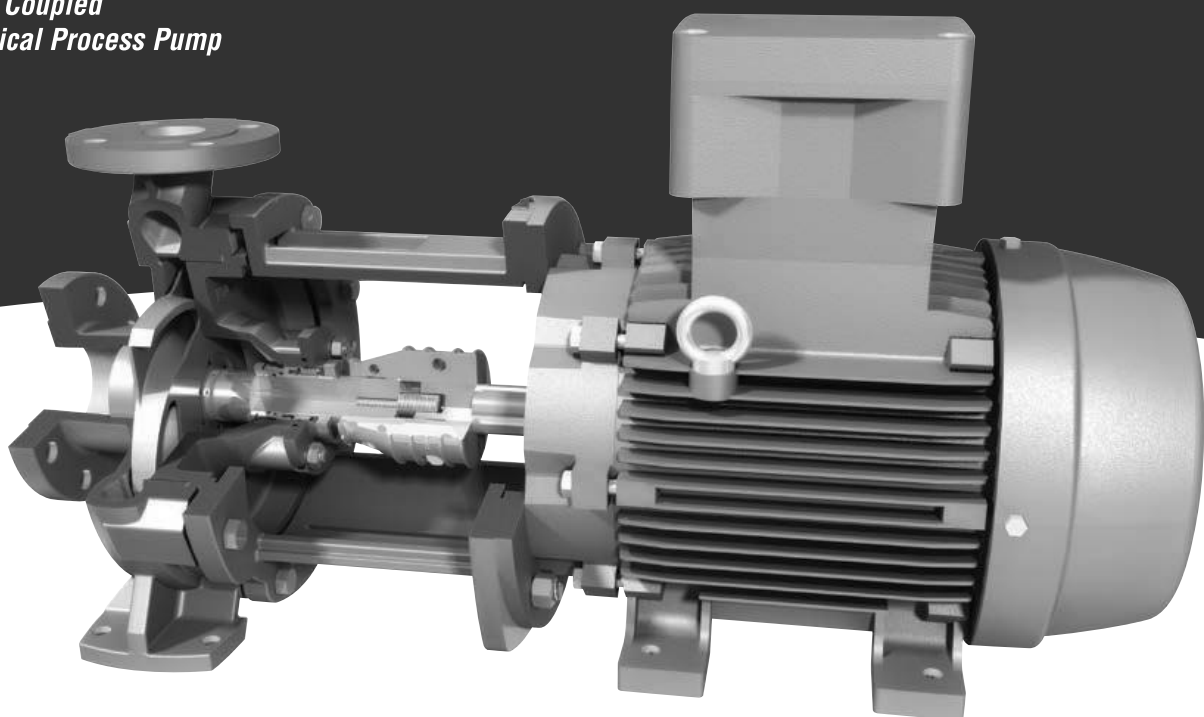
- Six Frame 1
- One Frame 2

Offered in a wide range of materials to meet application needs. Refer to page 6 for more information.

### **Additional Configurations**

- Close coupled, self-priming pump
- Magnetically driven, self-priming pump
- Close coupled, magnetically driven, self-priming pump

***Durco Mark 3 ISO  
Close Coupled  
Chemical Process Pump***



*With pump ends conforming to ISO 2858 and ISO 5199 design criteria, the Durco Mark 3 ISO Close Coupled pump provides a compact, space-saving arrangement ideal for industrial processes or installations where space is at a premium. Durco Mark 3 ISO Close Coupled pumps are fitted with standard, readily available electric motors so the user can choose an enclosure to suit the application.*

***Operating Parameters***

- Flows to 570 m<sup>3</sup>/h (2500 US gpm)
- Heads to 100 m (330 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -20°C (-5°F) to 160°C (320°F)

***Standards Compliance***

The Durco Mark 3 ISO Close Coupled is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

***Features and Benefits***

**Close Coupling** eliminates influence of the baseplate and foundation on alignment.

**Radiating Surfaces** dissipate heat and extend bearing and mechanical seal life.

**External Impeller Adjustment Mechanism** can be carried out without taking measurements (micrometer on coupling).

**Heavy-duty Casing** with integral foot and multi-ribbed discharge flange offers superior resistance to pipe loads.

**Reverse Vane Impeller** is the only impeller design that offers repeatable pump performance throughout the life of the pump. Front vane open-style impellers available.

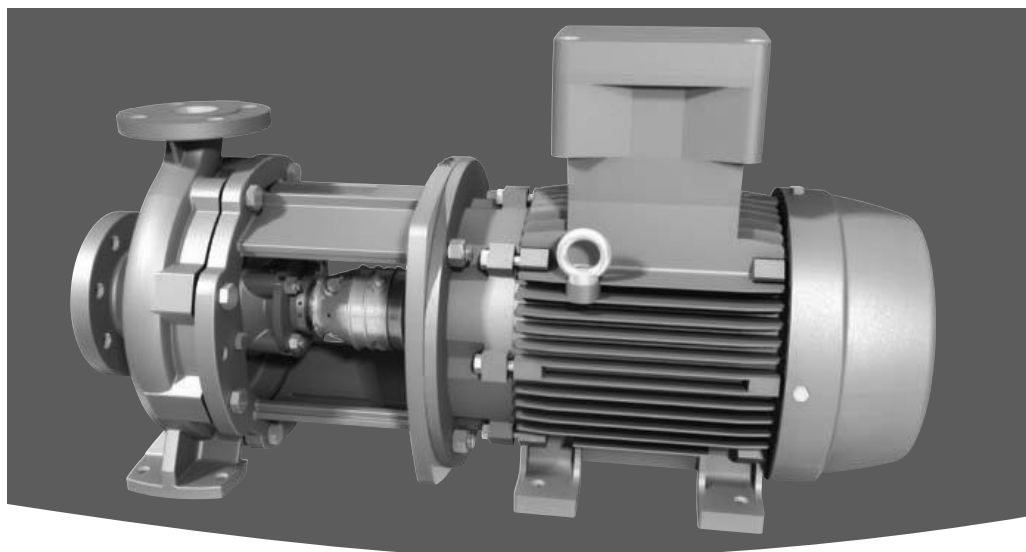
**SealSentry Seal Chamber** extends seal life and provides advanced self-flushing capability.

**Back Pull-out Design** allows removal of rotating element without removing the casing or the piping.



### ***Typical Applications***

- Acid transfer
- Caustic and chlor-alkali
- Man-made fibers
- Polymers
- Slurry processing
- Solvents
- Volatile organic compounds
- Waste processing

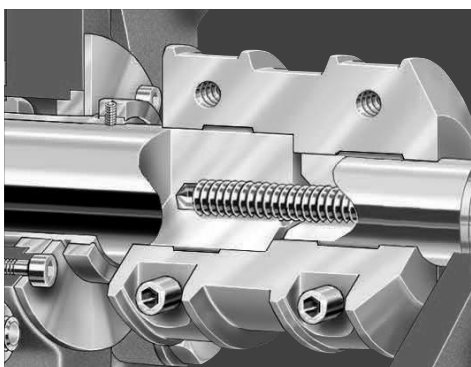


### ***Benefits of the Durco Mark 3 ISO Close Coupled Pump***

- Permits use of readily available standard electric motors
- Provides a thermal barrier between the pump and motor
- Reduces installation cost by eliminating pump to motor alignment
- Incorporates a muff coupling which serves as an additional deflector between the mechanical seal and motor

### ***Muff Coupling***

The muff coupling is investment cast in two halves (WCB steel). Notches at 30° increments around the circumference of the coupling assist in setting the impeller face clearance.



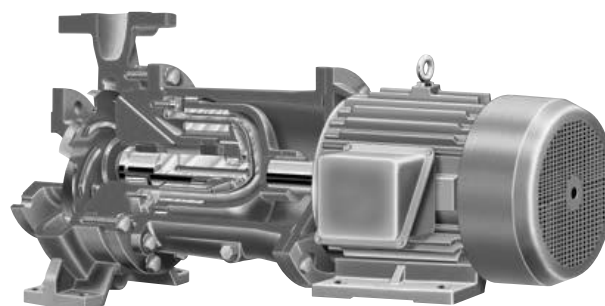
### ***37 Sizes Available***

- 15 Frame 1
- 15 Frame 2
- Seven Frame 3

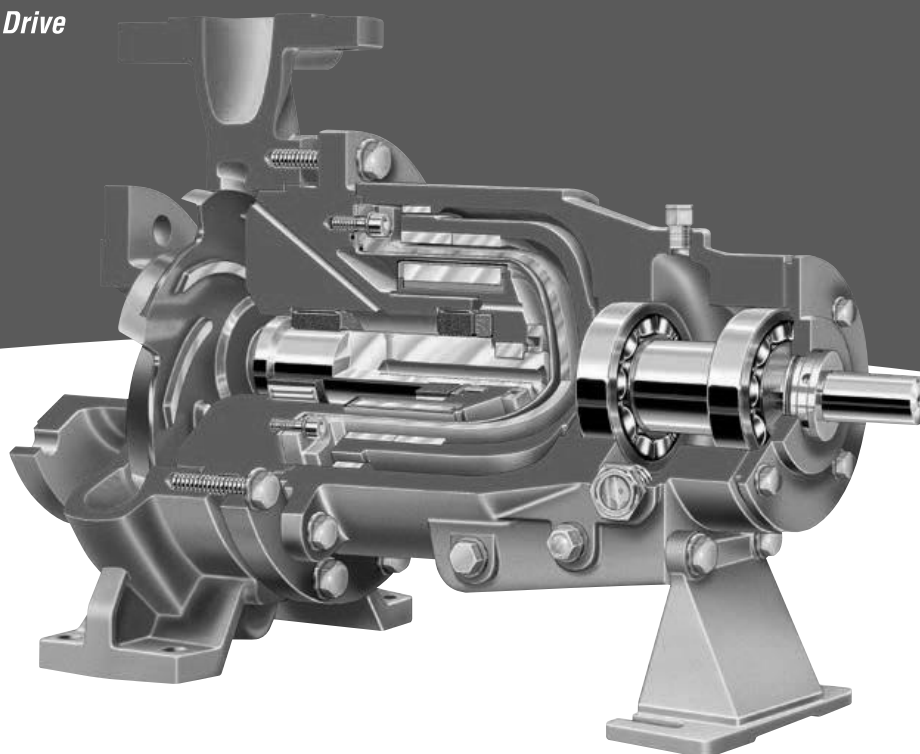
Offered in a wide range of materials to meet application needs. Refer to page 6 for more information.

### ***Additional Configurations***

- Close coupled, recessed impeller pump
- Close coupled, self-priming pump
- Close coupled, magnetic drive pump



**CPXS Magnetic Drive  
ISO Chemical  
Process Pump**



*The CPXS Magnetic Drive pump provides leak-free pumping of hazardous, toxic, flammable, explosive or valuable liquids. Conforming to ISO 2858 dimensional and ISO 15783 design criteria, the CPXS Magnetic Drive pump is found wherever reliability in severe services is a requirement. Also, upgrading mechanically sealed pumps to magnetically driven, sealless pumps is easy due to ISO 2858 interchangeability.*

**Operating Parameters**

- Flows to 420 m<sup>3</sup>/h (1850 US gpm)
- Heads to 160 m (525 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -40°C (-40°F) to 250°C (480°F)

**Standards Compliance**

The CPXS is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

**Features and Benefits**

**High-performance Rare Earth Magnets** possess superior permanent strength and proven reliability.

**Large Inner Magnet Clearances** of 1.5 mm (0.06 in) between shell and inner magnet assembly ensure effective cooling.

**Reinforced PEEK Primary Containment Shell** eliminates eddy current losses, enhancing efficiency.

**Hastelloy® Primary Containment Shell** may be specified.

**Heavy-duty Casing** with integral foot and multi-ribbed discharge flange provides outstanding resistance to pipe loads.

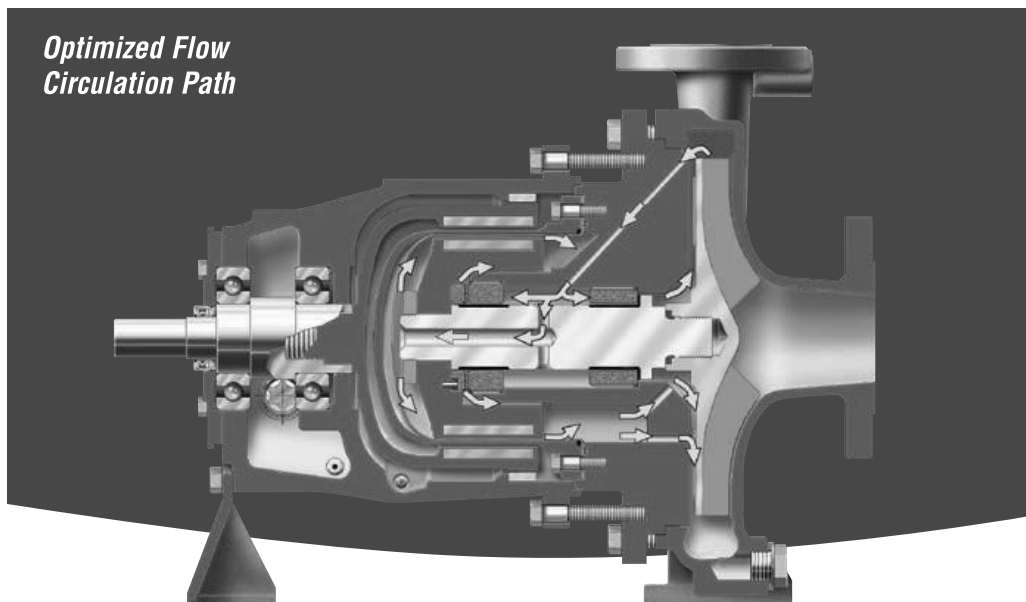
**Front Vane Open-style Impeller** delivers high-efficiency performance and provides low NPSHR.

® Hastelloy is a registered trademark of Haynes International, Inc.

### Typical Applications

- Sodium hydroxide
- Solvents
- Difficult-to-seal liquids
- Flammable liquids
- Ultrapure liquids
- Valuable liquids
- Toxic services

### Optimized Flow Circulation Path



### Optimized Flow Circulation Path Analysis

The CPXS pump design features an optimized internal flow circulation path to ensure adequate bearing lubrication and cool the magnets. This design also prevents vaporization in the drive unit and its associated damage.

### Optional Secondary Containment Shell

A hydroformed Hastelloy secondary containment shell is available for added security.



### 20 Sizes Available

- 14 Frame 1
- Six Frame 2

Offered in a wide range of materials to meet application needs.

### Additional Configurations

- Close coupled, magnetic drive pump
- Self-priming, magnetic drive pump

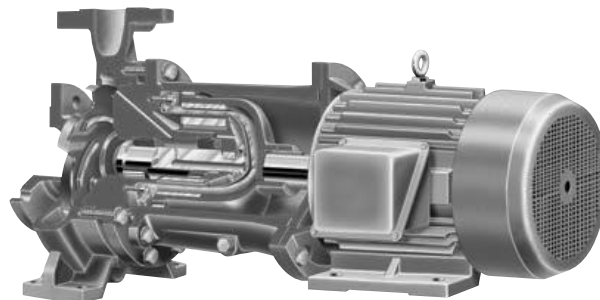
### Standard or Contained Back Pull-out



**Standard Back Pull-out** is used for general maintenance and inspection. The casing stays in-line and piping connections remain intact.



**Contained Back Pull-out** is used for drive end maintenance. The process fluid is fully contained; no draining, purging or exposure to harmful process fluids.



## CPXV ISO and API Vertical Sump Pump

The Flowserve CPXV is a vertical sump pump incorporating state-of-the-art hydraulic design for efficient and reliable service. The CPXV can be customized to meet a wide range of needs. Compliant with ISO 5199, the CPXV is available in more than 40 hydraulic wet-ends and numerous materials of construction. It is also available with multiple mechanical seal options and sump depths. Also, for oil and gas installations, the CPXV is available with many ISO 13709/API 610 compliant features.

### Operating Parameters

- Flows to 1400 m<sup>3</sup>/h (6160 US gpm)
- Heads to 250 m (820 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -40°C (-40°F) to 400°C (752°F)

### Standards Compliance

The CPXV is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification. A configuration that is suitable for zone Ø hazardous area beneath the soleplate is available.

### Features and Benefits

**Heavy-duty Casing** with integral foot and multi-ribbed discharge flange provides superior resistance to pipe loads.

**Standard Front Vane Open-style Impeller** design delivers high-efficiency performance. Reverse vane impeller available.

**Additional Column Lengths** are provided up to a maximum of 10 m (32 ft).

**Heavy-duty Thrust Bearings** with axial adjustment made above soleplate level.

**Recessed Impeller** version is available for enhanced solids-handling capability.

**Suction Strainer** is optional.

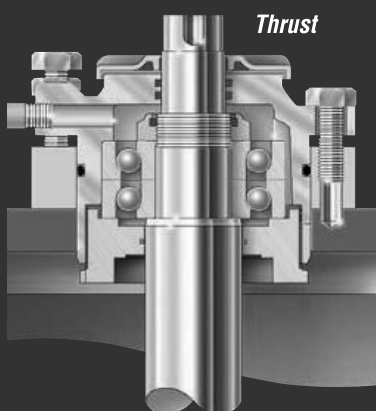
**Fully Jacketed** version available for molten sulfur applications.



### Typical Applications

- Drain pit
- Slop tank
- Lift pump
- Sump pump

### Bearing Arrangements



Thrust



Radial

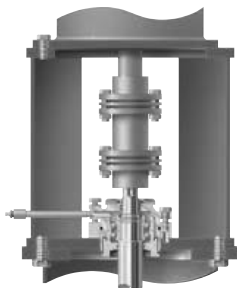
### Robust Bearing System

The thrust bearing on the CPXV is a back-to-back angular contact arrangement. Grease lubrication is standard, with a grease nipple provided for relubrication. Oil lubrication is an option.

The CPXV's radial line bearings are a sleeve arrangement and are available in a number of material options, offering compatibility across a whole spectrum of liquids. The standard material for radial bearings on the CPXV is Fluorosint®, a mica filled and stabilized PTFE. This material possesses broad chemical resistance and offers a low wear rate. It is suitable for pumped liquids up to 100°C (212°F) with standard clearances. Other options include PEEK®, alpha-sintered silicon carbide and Graphalloy®. Radial bearings can be flushed by product or an external source. Strainers can be fitted as an option.

### Couplings

The standard coupling on the CPXV is an elastometric split-element coupling. This coupling provides a maintenance-free solution. An optional spacer coupling (shown at right) is available. Other coupling types are also available upon request.



### Mechanical Seal Options

A variety of mechanical seal options are available for shaft sealing at the soleplate. Choices range from simple vapor sealing designs to tandem cartridge configurations.

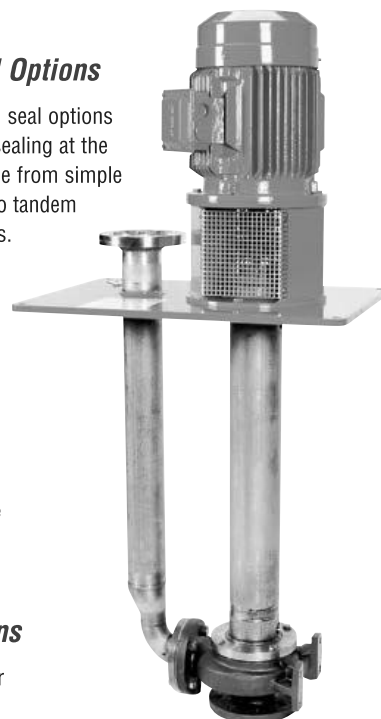
### 40 Sizes Available

- 15 Frame 1
- 12 Frame 2
- Nine Frame 3
- Four Frame 4

Offered in a wide range of materials to meet application needs.

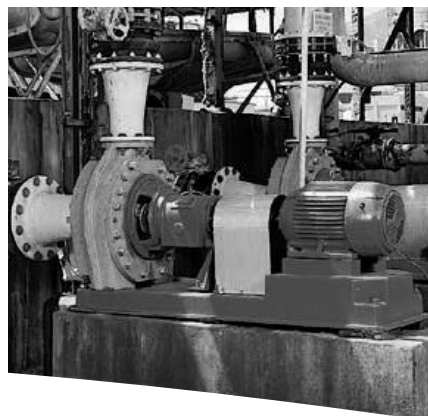
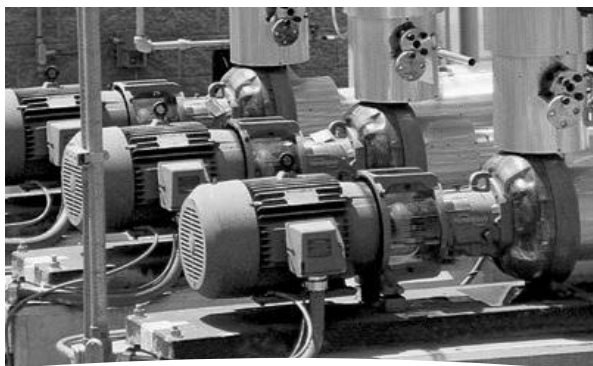
### Additional Options

- Recessed impeller for additional hydraulics
- Vapor/mechanical seal
- Fully jacketed version
- Motor enclosures
- Rectangular or circular soleplates
- Circular ASME (ANSI) Class 150/300 RF soleplate
- Spacer coupling
- Oil lubrication to thrust bearing
- Molten salt and molten metal configurations



© Fluorosint is a registered trademark of Quadrant EPP.  
 © Graphalloy is a registered trademark of the Graphite Metallizing Corporation.  
 © PEEK is a registered trademark of Victrex PLC.

## Complementary Pumps

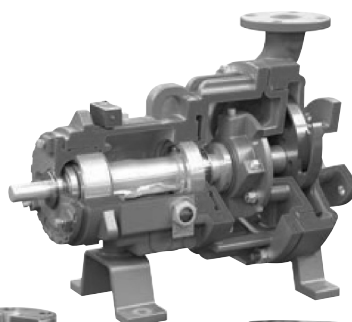


### ***Durco Mark 3 ASME Chemical Process Pumps***

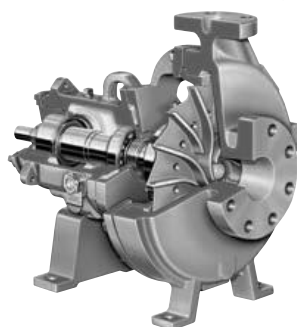
Conforming to ASME B73.1, the Durco Mark 3 is recognized worldwide as the premier name in ASME (ANSI) chemical process pumps. Its reverse vane impeller, SealSentry seal chambers and optional ANSI 3A™ power end provide unmatched performance and reliability in countless applications throughout the process industries. The Mark 3 ASME pump product family includes numerous designs to suit specific application needs:

- Mark 3 ASME Standard
- Mark 3 Sealmatic
- Mark 3 Recessed Impeller
- Mark 3 Unitized Self-Priming
- Mark 3 Lo-Flo™
- Mark 3 In-Line

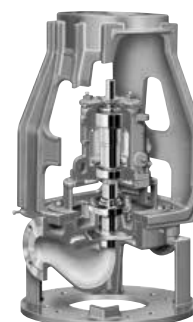
See bulletins PS-10-13 and PS-10-15 for more details.



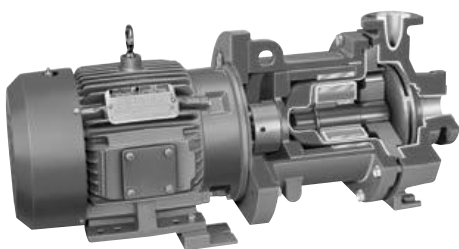
***Mark 3  
Standard***



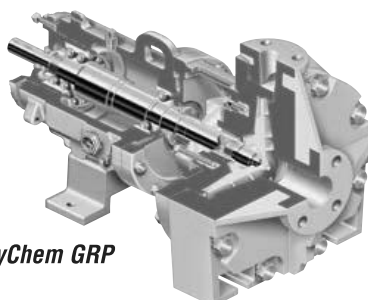
***Mark 3  
Lo-Flo***



***Mark 3  
In-Line***



***PolyChem  
M-Series***



***PolyChem GRP***

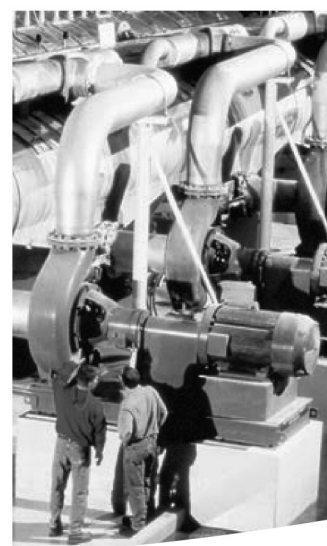
### ***PolyChem™ Non-Metallic Chemical Process Pumps***

Embracing a global approach to pump design, Flowserve offers sealed and sealless PolyChem non-metallic pumps engineered to ASME (ANSI) and ISO design criteria and JIS drilling specifications. The fluoropolymer lined M-Series and S-Series pumps and the GRP engineered polymer composite pump are well suited for highly corrosive applications in the worldwide process industries.

- PolyChem M-Series: fluoropolymer lined, magnetic drive
- PolyChem S-Series: fluoropolymer lined, mechanically sealed
- PolyChem GRP engineered composite

See bulletin PS-10-17 for more details.

**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

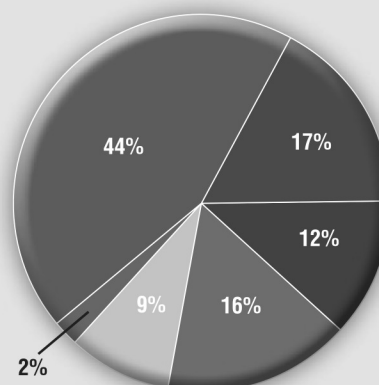
### Operating Expenses

- 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<sup>1</sup>



- Energy
- Maintenance and Repair
- Loss of Production
- Purchase and Installation
- Operational
- Decontamination and Removal

<sup>1</sup> 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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***To find your local Flowserve representative:***

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