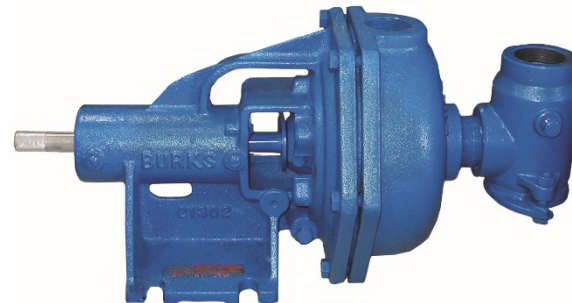


CRANE®

Crane Pumps & Systems

Regenerative Turbine Product Training



CRANE®
PUMPS & SYSTEMS

- Overview & Features
- Options
- Maintenance
- Applications
- Sales & Marketing Tools
- Key Takeaways

Product Overview

Types

- Close Coupled CR, CT, CS Series
- Base Mounted ET, ES, EC and ED Series

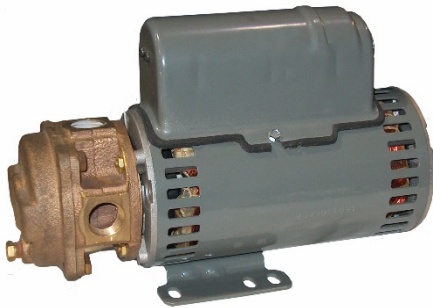
Materials of Construction

- Cast Iron, Bronze Fitted
- All Bronze
- All Stainless Steel
- Single Type 21 Mechanical Seal Carbon/Ceramic/Buna-N®

Regenerative Turbine Pumps

Everyone. Everywhere. On Time Every Time.

Model Numbers



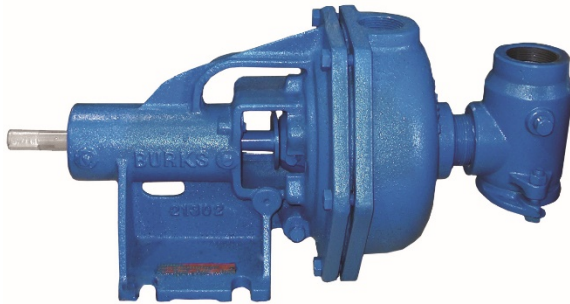
CR



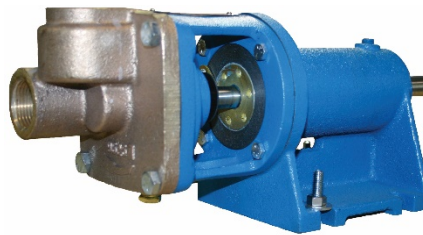
CT



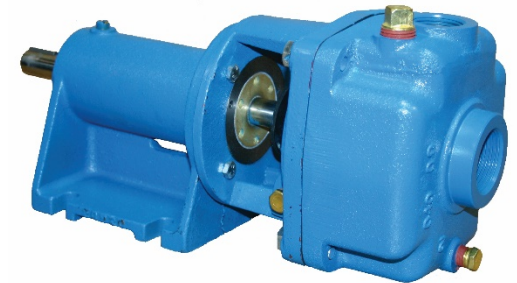
CS



EC & ED



ET

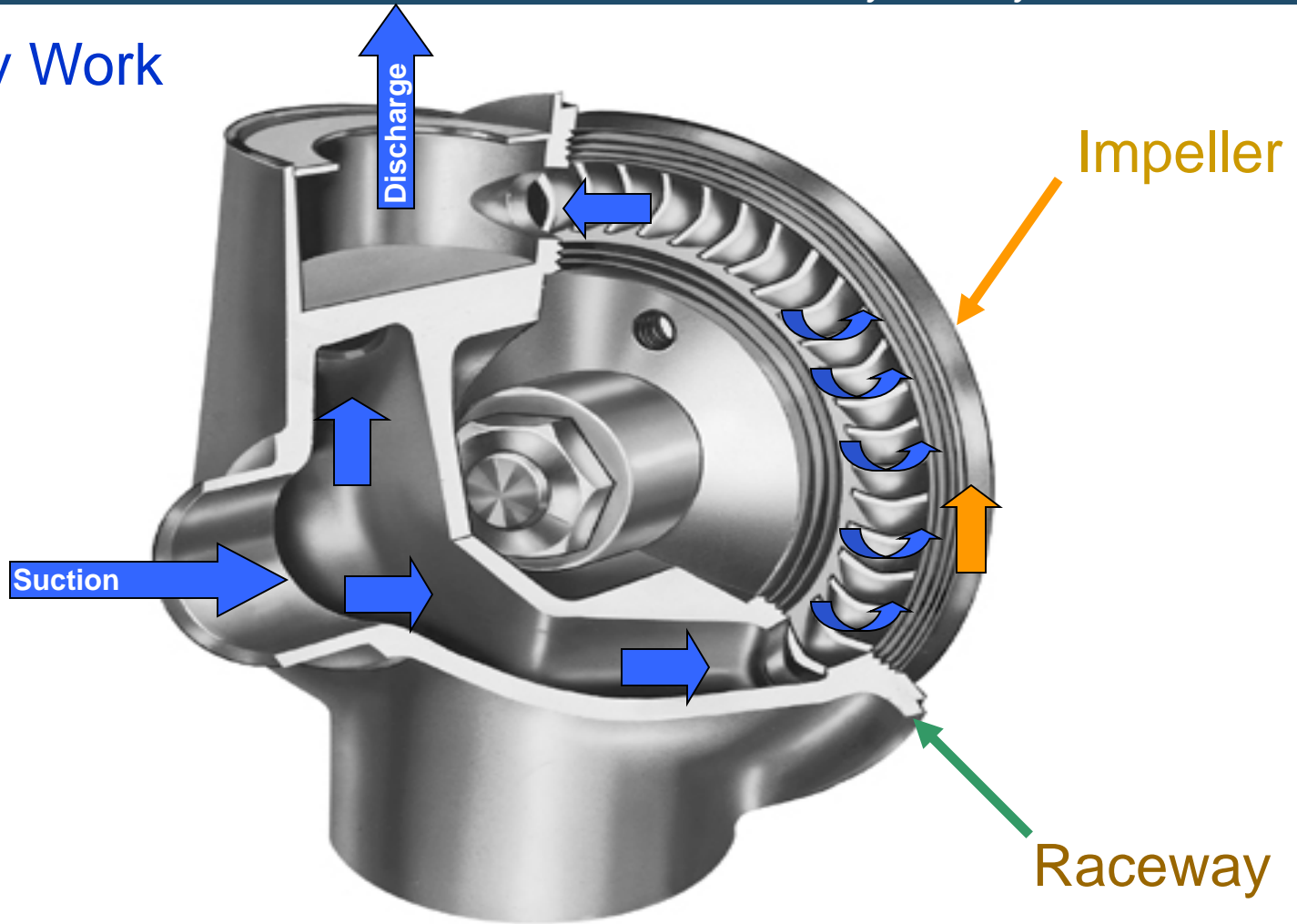


ES

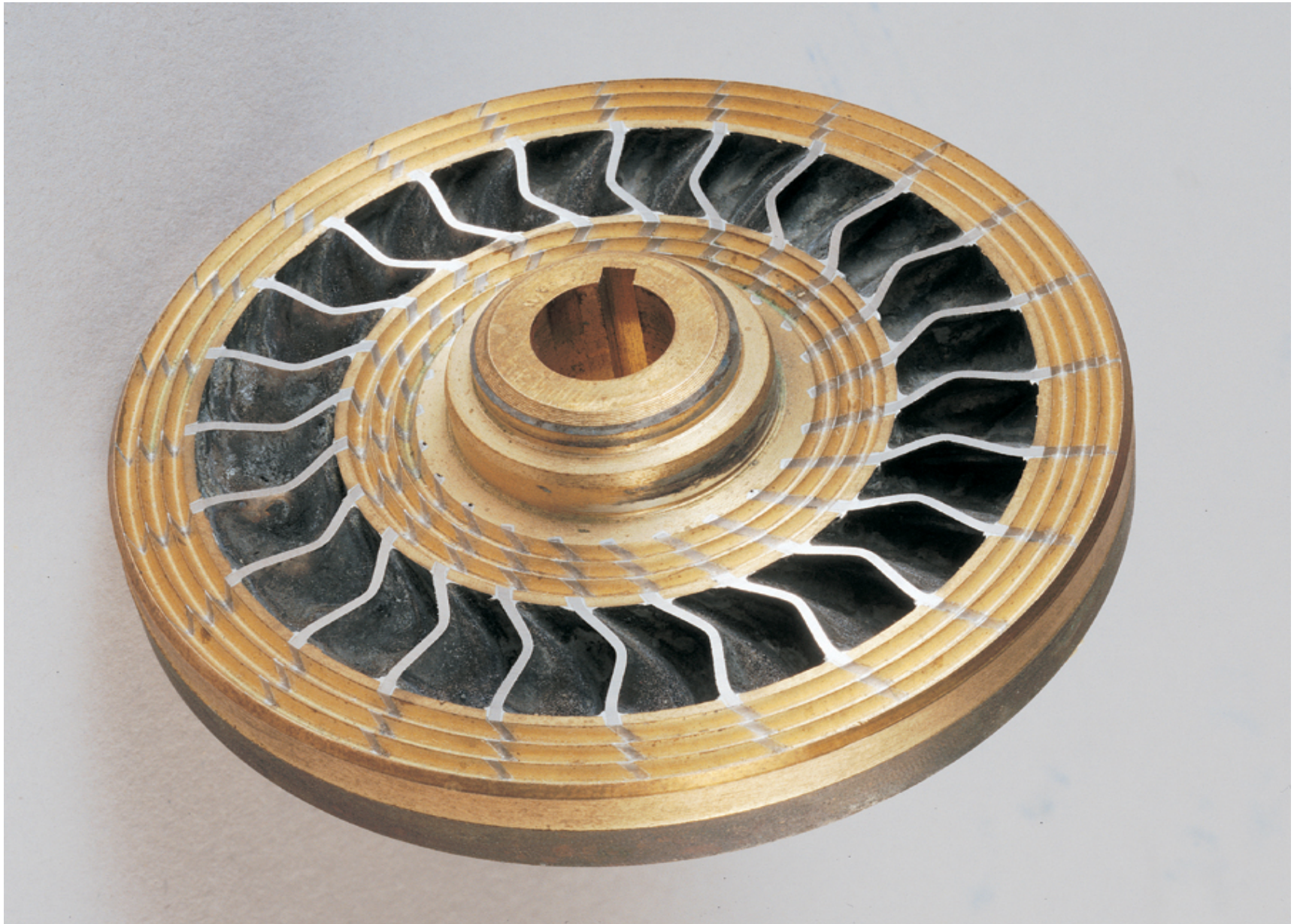
Regenerative Turbine Pumps

Everyone. Everywhere. On Time Every Time.

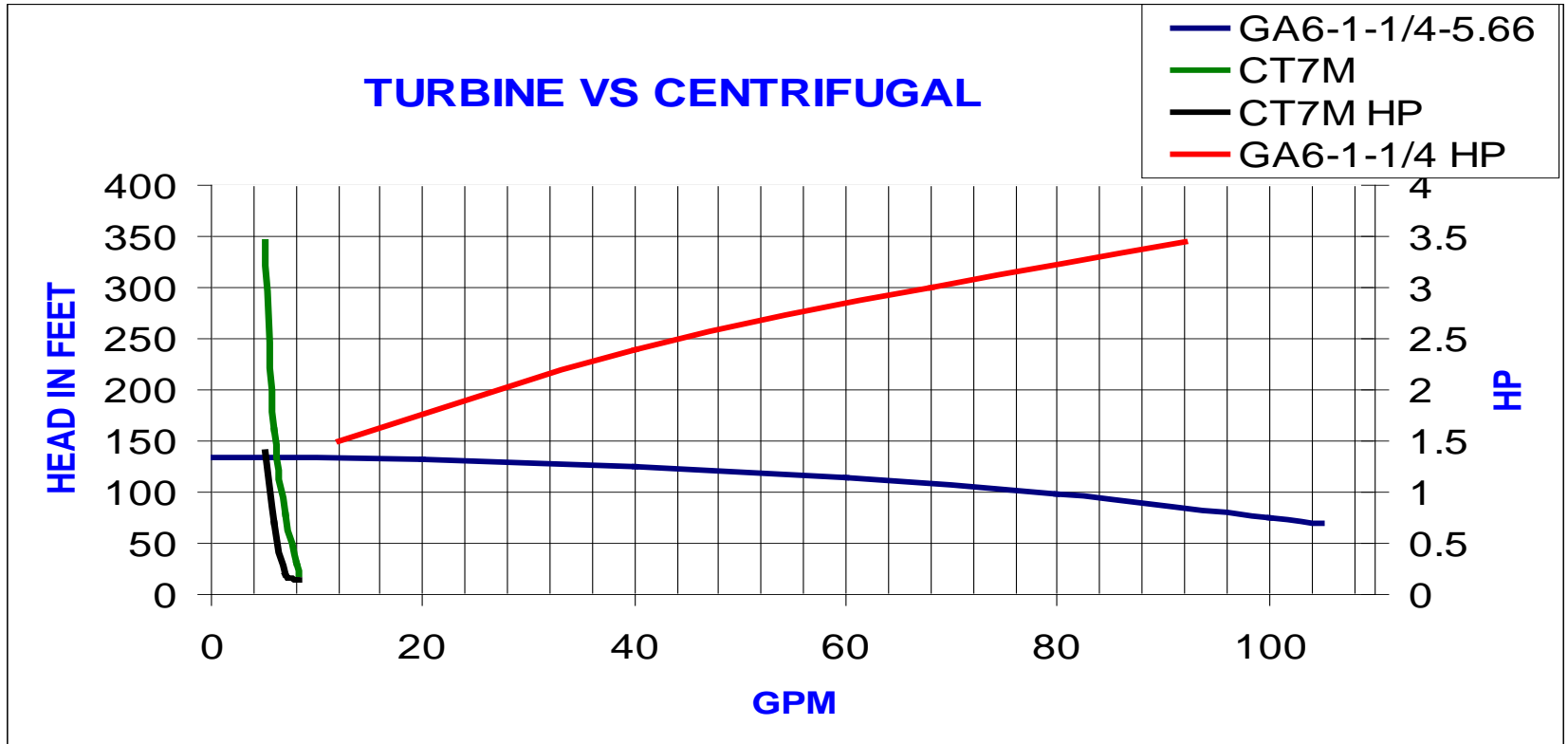
How They Work



CR - Regenerative Turbine Impeller



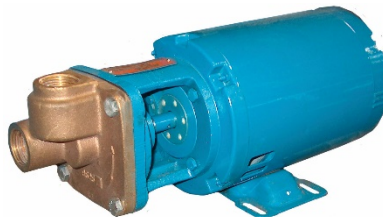
Concept



Close-Coupled Turbine Pumps

Everyone. Everywhere. On Time Every Time.

Series	RPM	HP Range	Capacity (GPM)	Head (Ft) [psi]	Construction
CR	3450	1/3	2.8 to 4.3	200 [87 psi]	Standard Cast Iron/Bronze Fitted, All Bronze or Stainless Steel
CT		1/3 to 3/4	2.4 to 12.7	350 [152 psi]	
4CT	1725	1/4	0.3 To 3.4	300 [130 psi]	
CS	3450	1 to 5	7.1 to 32.5	350 [152 psi]	
4CS	1725	1/3 to 1/2	1.6 to 12.2	275 [119 psi]	

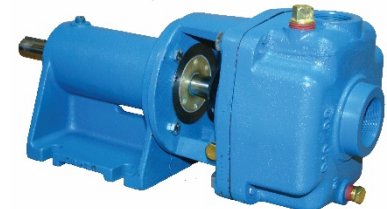


Base - Mounted Turbine Pumps

Everyone. Everywhere. On Time Every Time.

Series	RPM	Capacity (GPM)	Head (Ft) [psi]	Construction
ET	1725	0.2 to 3.4	300 [130 psi]	Cast Iron Bronze Fitted, All Bronze, All Stainless Steel
	3450	2.4 to 11.7		
EC†	1750	3.6 To 35.3	350 [152 psi]	Cast Iron Bronze Fitted, All Bronze
ED†		17.1 to 91.0		
ES	1725	1.0 to 14.5		
	3450	7.0 to 32.0		

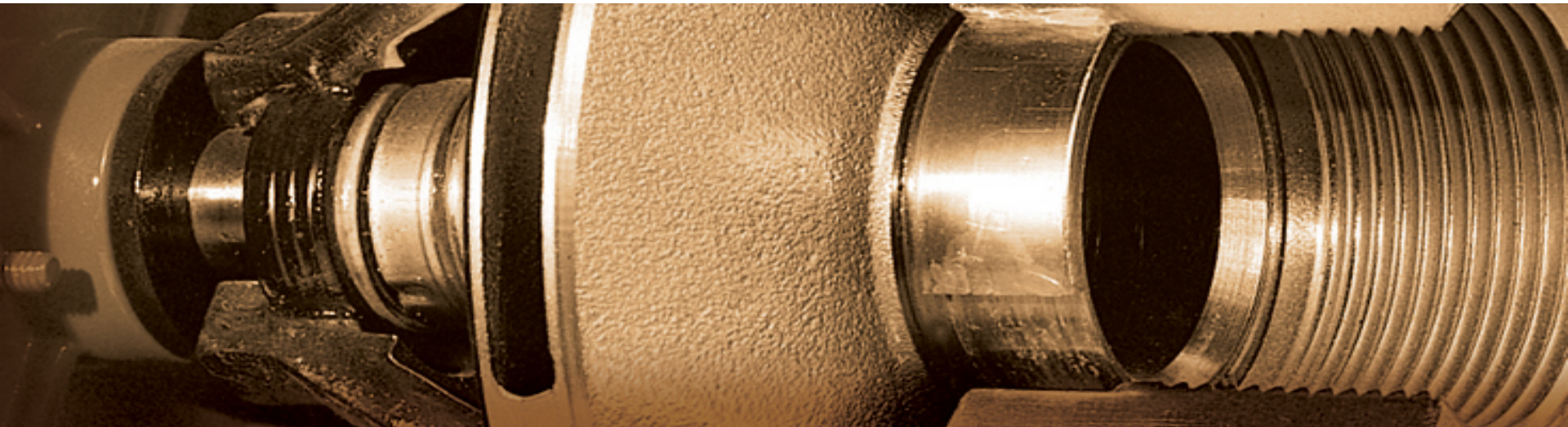
†Suction strainer furnished as standard



Working Pressure

PUMP SERIES	MAX. WORKING PRESSURE	MAX. INLET PRESSURE
CR (Close Coupled)	150 PSI	50 PSI
CT, CS (Close Coupled)	250 PSI	100 PSI
ET, ES (Base Mounted)	250 PSI	100 PSI
EC, ED (Base Mounted)	200 PSI	50 PSI

Seal Options



Seal Options Ratings

- Standard – Carbon/Ceramic/Buna-N® Rated to 225°F
- MV Option – Carbon/Ceramic/Viton™ Rated to 250°F
- EPT Option – Carbon/Ceramic/EPT Rated to 285°F
 - Good for Hot Water & Caustic Service
- MJ Option – Carbon/Ni-Resist/Viton™ – with Cooling Jacket
 - Rated to 250°F ~ 300°F Water Service
 - Rated to 400°F Heat Transfer Fluids
- MJK Option – Carbon/Ni-Resist/Viton™ with Kalrez™ Gasket – with Cooling Jacket
 - Rated to 500°F Heat Transfer Fluids



Available on G and GN Series End Suction Centrifugals Except Sizes G7-2½, G9-1½, G9-2 And G9-2½.

Available On All Turbine Pumps (Except CR)

Features

- Simple Jacketed Seal Design Eliminates Complex Seal Box Designs And High Cost Mechanical Seals.
- Type 21, Viton™-fitted Rotary Type Seal With Carbon/Ni-Resist Faces.
- Surrounds The Seal Cavity With Cooling Fluid Extending Seal Life

Benefits

- Extends Seal Life By Reducing Seal Cracking and Distortions Due to Heat
- Eliminates Complicated Jacketing Arrangements
- Does Not Require High Cost Shaft Seals
- Handles Temperatures 200-500° F

Centrifugal Pump Models

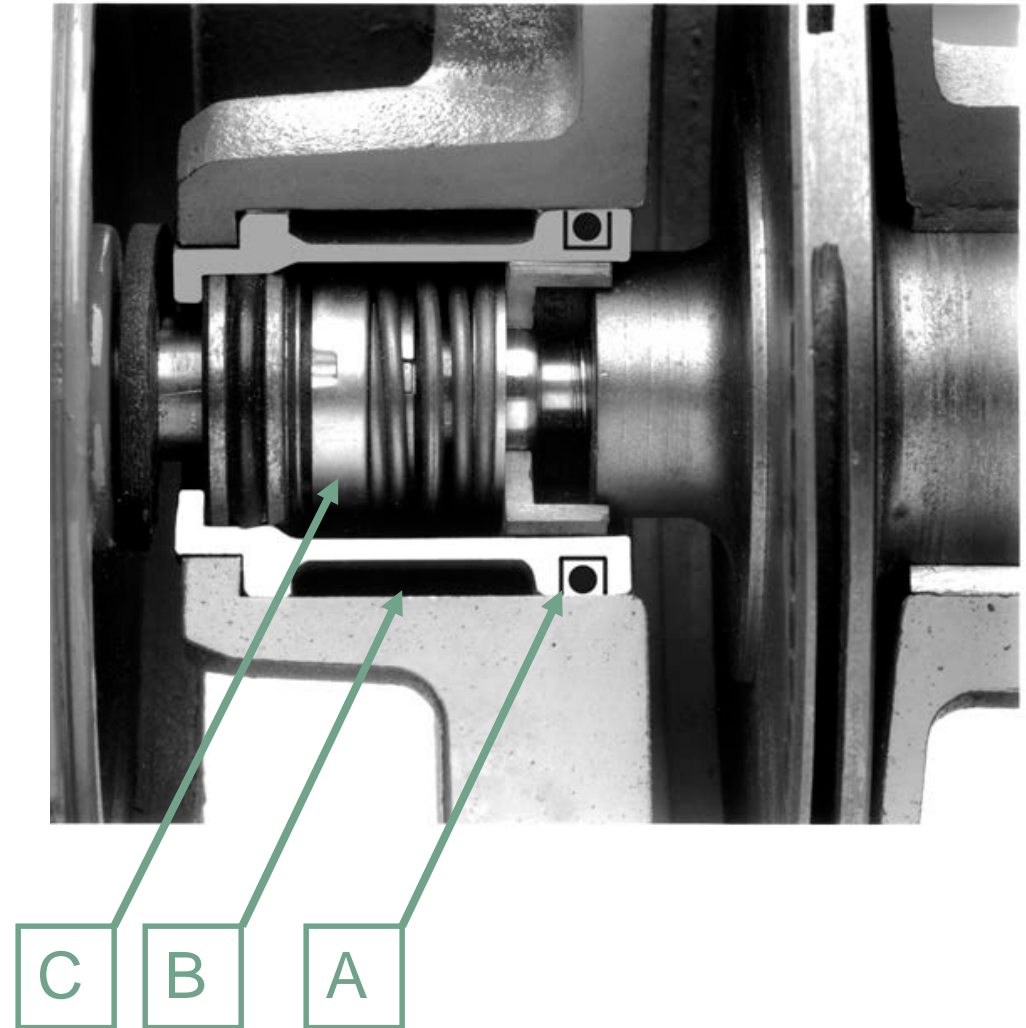
Exchange Of Liquid Between The Seal Cavity And The Pump Casing Is Restricted By The Throttle Bushing. A

The Throttle Bushing Also Serves As A Cooling Jacket. B

On Centrifugal Pumps, The Cooling Jacket Surrounds The Seal Cavity. C

“MJ” Suffix < 400°F

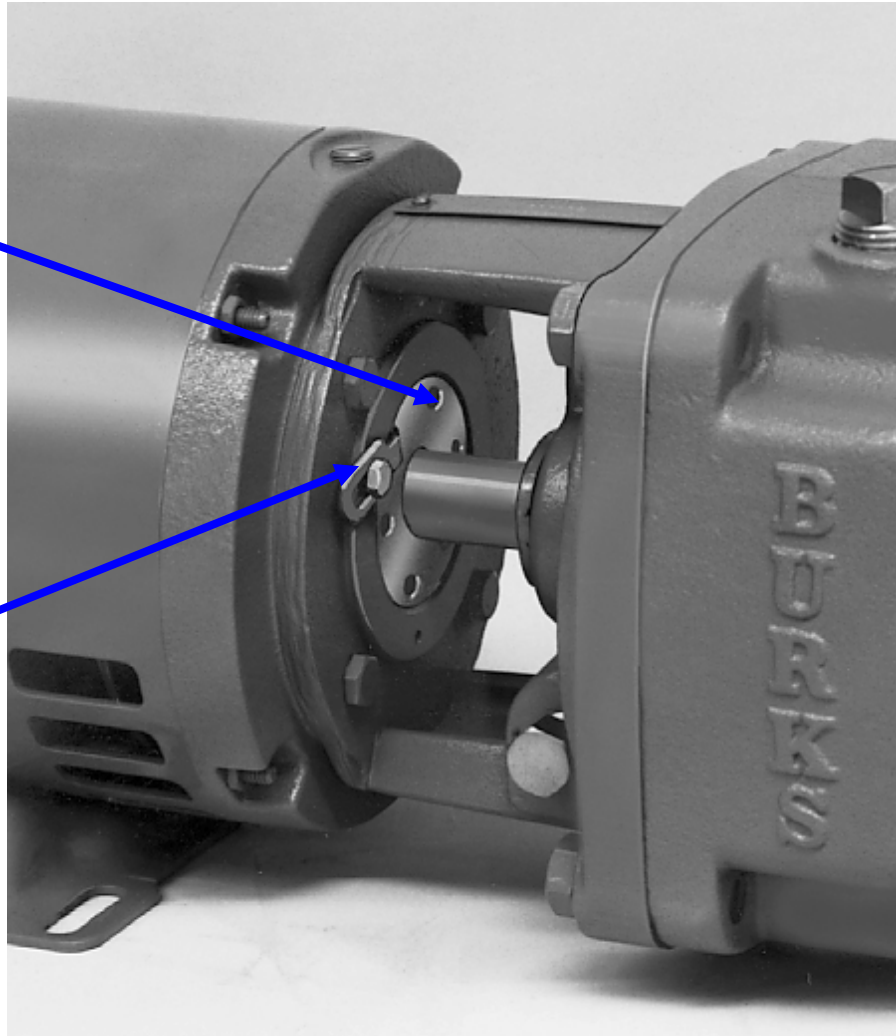
“MJK” Suffix to 500°F (Kalrez and Viton elastomers)



Maintenance

Adjusting
Screw

Slide
Lock



**Patented feature
found only on
Burks Turbine
Pumps**

**LIFE-LOK[®] extends
pump life and
allows external
impeller adjustment
to renew or match
system pressures**

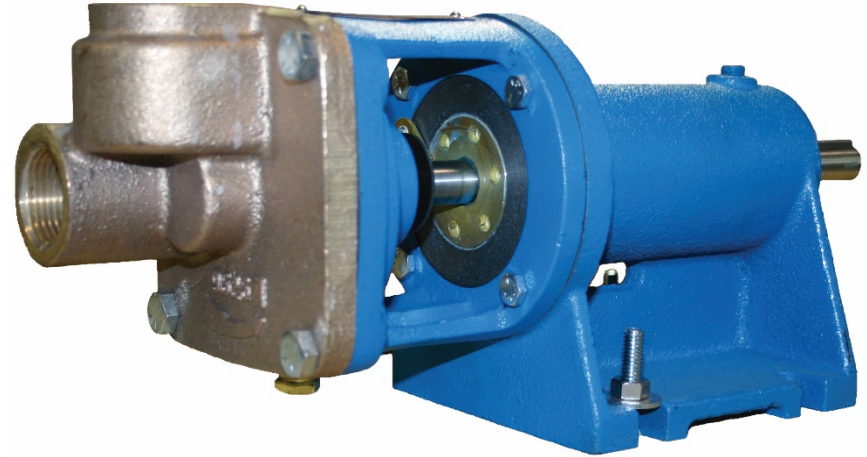
Replacement Parts

- Impellers and raceways must be ordered and replaced as a set.
- Standard impellers are suitable for fluid temperatures to 250°F. High temperature impellers are also available. This includes all “MJ jacketed seal pumps.”
- Turbine pump repair kits include: impeller, raceway, shaft seal, o-ring gasket, impeller locknut and instructions.



Applications

- Clean Fluids
- Non-Abrasive
- Lower Viscosity
- High Pressure – Low Capacity
- Self-Priming
- To 250°F (500°F with Jacket Seal)



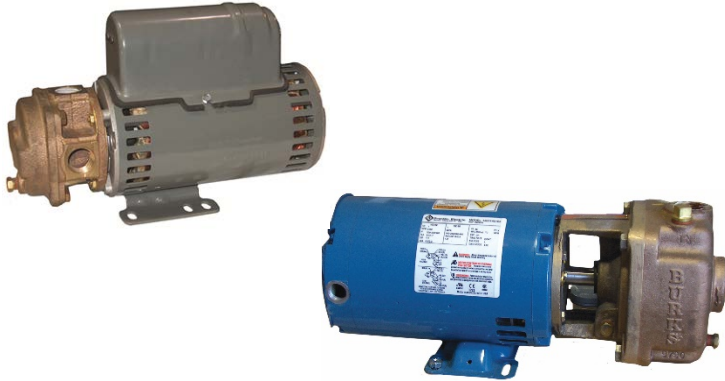
Anywhere there is a need for **Low Flow - High Head** such as:

- Boiler Feed Applications
- Dry Cleaning Sector
- Chiller Applications
- Temperature Control
- Semiconductor Sector
- Chemical Feed
- De-icing



Regen Turbine or Vertical Multistage?

Everyone. Everywhere. On Time Every Time.



Cost effective
Self priming (i.e. low NPSH ok)
90 degree flanged
Typically uses less space

GPM 2

32



GPM 10

450

Grundfos of Similar

Higher flow rates available

Stainless steel standard



Sales & Marketing Tools

Everyone. Everywhere. On Time Every Time.

- Burks brochures
- Product images
- Training presentation



Regenerative Turbine Pumps Close-Coupled & Base-Mounted Models

Capacities to 91 GPM
Heads to 350 Feet

Burks Turbine Pumps...

Designed for Low Maintenance and Long Service Life
Burks Turbine Pumps are unique in design and different from all other regenerative turbine pumps. An integral part of their unique design is the Life-Lok® feature that provides a way to externally adjust the clearance between the impeller and raceway. Burks is the only regenerative turbine pump that has this feature. This adjustment is used for precise setting of pump performance during production testing.

Life-Lok® makes the Burks Turbine Pump field adjustable. Because of the low-flow, high head characteristics of the regenerative turbine, the pump pressure may be adjusted when necessary to match critical system requirements without appreciably changing the flow rate. Life-Lok® also allows pump performance to be restored to "like new" after years of service, greatly extending pump life.

Burks Regenerative Turbine Pumps offer high pressures and low-flow capacities impossible for other single-stage pumps of similar size.

Life-Lok® External Adjustment

The adjusting screw is located in the bearing frame on Base-Mounted Pumps and in the shaft extension end of the motor on Close-Coupled Pumps. A positive pre-load spring pressure is applied to the pump shaft bearing and, in turn, is transmitted to the adjusting screw. This controlled pressure eliminates bearing end play and provides a means for external adjustment of the clearance between the impeller and raceway.



Series EC & ED



Series CR



Series CS

- FEATURES:**
- Standard Bronze Fitted
 - All Bronze
 - Stainless Steel

High Temperature Centrifugal and Turbine Pumps

For Temperatures to 500°F



Series G6-11 & G8-11

Series CT

Series ES

Burks High Temperature Pumps with "MJ" Jacketed Seal Option

The Burks Jacketed seal is a unique, field proven design for handling heat transfer fluids at temperatures of 200°F to 500°F. It employs a Viton-fitted, rotary face-type, shaft seal with carbon face and Ni-Resist stationary seat. This simplified design eliminates the need for complicated jacketing arrangements and expensive exotic shaft seals.

Furnish and Install as Specified:

Turbine Pump are furnished with cast iron case and adapter of 30,000 PSI tensile strength; bronze raceway and bronze impeller with monel blades; single inside unbalanced Viton mechanical shaft seal.

Centrifugal Pump are furnished with cast iron casing and adapter of 30,000 PSI tensile strength; bronze or cast iron impeller; bronze or steel casing wear ring; single inside unbalanced Viton mechanical shaft seal.

Jacketed Seal configuration to cool mechanical shaft seal while pumping heat transfer fluids up to 500°F.

Other models available with the "MJ" High Temperature option include:
Series G6-11's thru G7-2, Series G9A, Series G9B, Series CS, Series EC & ED and Series ET

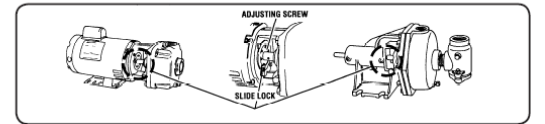


burks® Impeller Adjustment Instructions

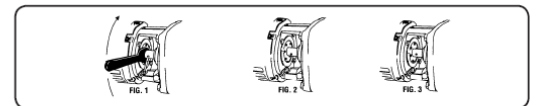
Turbine Pumps

CAUTION!
IMPROPER ADJUSTMENT OF A NEW BURKS TURBINE PUMP WILL INVALIDATE THE WARRANTY.
We are placing a wax over the adjusting screws on all turbine models (excluding the CR models). The wax on the CR model is placed in the socket head of the allen screw. This change has been placed to ensure that the adjustments are to factory settings when we ship them out. If these pumps are returned for a warranty claim, Crane Pumps & Systems will be able to tell if the adjustment has been tampered with. If the unit has been tampered with, the pump may not be covered under Crane Pumps & Systems warranty policy.

LIFE-LOK® External Impeller Adjustment is a patented feature found exclusively on BURKS Turbine Pumps. It allows for precise setting of pump performance during production testing. Every BURKS Turbine Pump is factory tested for optimum performance, and the impeller position is locked in. Any further adjustment of a new pump is not required or recommended. LIFE-LOK® may be used for field readjustment to match systems pressure requirements if necessary. LIFE-LOK® also provides a means of restoring pump performance without disturbing piping, disassembling pump, or costly parts replacement.



- TO ADJUST IMPELLER:**
1. Disconnect electrical power. Adjustment should never be attempted while pump is running. Serious damage could occur.
 2. Loosen side lock and remove tab from hole in adjusting screw.
 3. Turn the Adjusting Screw with a Spanner Wrench. (Do Not Use A Screwdriver, Punch or Other Tool.) At the same time, rotate the shaft back and forth with a common nail or other object placed through the hole provided for that purpose on close-coupled pumps. The shaft on base mounted pumps may be rotated by turning at the coupling end. (An Adjustable Spanner Wrench - Part No. 7425 - is available from BURKS.)
 4. Rotate Adjusting Screw in a clockwise direction (Fig. 1). A drag will be felt as the impeller comes into contact with the raceway. At this point, make a mark on the pump frame and adjusting screw, across one of the spanner wrench holes (Fig. 2).
 5. Rotate Adjusting Screw in the opposite direction (counter-clockwise) to back the impeller off and provide clearance between it and the raceway. The proper clearance may be obtained by moving the adjusting screw approximately one half the distance between two of the spanner wrench holes as indicated by the reference marks made in Step 4 (Fig. 3).
 6. Lock the Adjusting Screw in place. Insert the tab of the Slide Lock in the nearest spanner wrench hole and tighten the lock screw.
 7. Re-connect electrical power and start pump.
- If pump seems to labor unduly when coming up to pressure, a slight additional adjustment to increase the clearance between the impeller and raceway will be necessary. Do not allow pump to operate with insufficient clearance between those two parts. If adjustment does not restore desired performance, replacement of the impeller and raceway may be necessary. These are matching parts and must be replaced as a set. Repair kits are available for BURKS Turbine Pumps.



■ Pump Sizing for Boiler Applications



Boiler Rating & Pump Capacity Required

Engineering Information

EQUIVALENT BOLIER HP	BTU/hr. (1000's)	STREAM Lb/per hr.	EDR RATING Sq., Ft.	Cond. Rate GPM	PUMP Cap. * Reqd. GPM
20	670	690	2790	1.38	3
30	1005	1035	4185	2.07	6
40	1340	1380	5580	2.76	9
50	1675	1725	6975	3.45	9
60	2010	2070	8370	4.14	12
70	2345	2415	9765	4.38	15
80	2680	2760	11160	5.52	15
100	3350	3450	13950	6.90	22.5
125	4185	4313	17438	8.62	22.5
150	5025	5175	20935	10.40	30
200	6695	6900	27915	13.80	45
250	8370	8625	34895	17.30	45
300	10045	10350	41875	20.70	60
350	11720	12075	48825	24.20	75
400	13390	13800	55830	27.60	75
450	15064	15520	63000	31.10	97.5
500	16740	17250	69790	34.50	97.5
550	18411	18975	77000	37.95	120
600	20085	20700	83750	41.40	120
650	21759	22425	91000	44.85	150
700	23432	24150	98000	48.30	150
750	25106	25875	105000	51.75	150
800	26780	27600	112000	55.20	187.5
1000	33475	34500	140000	69.00	200

(*) NOTE: Boiler HP x .069 GPM of feed water required to maintain boiler water level at 100% load. Pumps should be selected to provide two to three times the condensate rate shown in the above Table.
Pump capacity listed in the Table are based on an approximate 3 to 1 ratio.

Applications

<p>Liquid List</p> <p>Engineering Information</p> <p>Capacity, discharge pressure, suction conditions, temperature and duty cycle are determined by the application and installation.</p> <p>Name, viscosity, abrasiveness, specific gravity, vapor pressure, materials of construction - are properties of liquid to be handled.</p> <p>The following list of liquids are known to be handled by BURKS pumps. Some liquids require special consideration depending on the liquid, its concentration, temperature, ambient conditions, etc. We have attempted to be as thorough as possible but it is not to be considered infallible.</p> <ul style="list-style-type: none"> Acetone Admixtures for concrete - WRDA, Daratard, Darex AEA Alcohol Ammonia Beer Carbon Tetrachloride Caustrics Condensate Cooking Oil Cutting Oil Deionized water Demineralized water Deodorants Delegterents Diesel Fuel Dimethyl formamide Distilled water Electrolytes - EDM machine tools Ethylene Glycol - antifreeze Freon - with limitations Heat transfer fluids (oils) - Dowtherm, Thermal, Ucon Mobiltherm, Cellultherm and others Hexane Hydraulic fluid Ink Insecticides Jet fuel Kerosene Liquid car wax Methyl ethyl ketone - MEK Mineral Spirits Naptha Oakle products Perchloroethylene Rust inhibitors Salt brine Sea water Stoddard solvent Tea Toluene Transformer oil Transmission fluid Trichloroethane (Clorothene) Trichloroethylene Water Turpentine Vegetable oil Water soluble oils Whiskey Xylene, Xylol <p>SECTION 11 PAGE 12 DATE 1/06</p> <p>CRANE PUMPS & SYSTEMS A Crane Co. Company USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598</p>	<p>burks www.cranepumps.com</p> <p>Pump Applications</p> <p>We can generalize by saying BURKS Pumps are sold everywhere. There definitely is a wide range of applications within major industries. We have listed some of the industries and applications below for your consideration as you search for the industrial pump market in your area.</p> <p>AERONAUTICAL & SPACE INDUSTRY Wash down Cooling</p> <p>AGRICULTURE INDUSTRY Insecticide - grain processing Liquid fertilizer Brooder houses High pressure cleaning Weed killers Irrigation Commercial farms Fish farms Dewatering Disinfecting</p> <p>AIR CONDITIONING & REFRIGERATION INDUSTRY Cooling towers Circulating Brine handling Mist cooling for greenhouses</p> <p>AUTOMOBILE INDUSTRY Solvents - transfer & circulating Anti-freeze Radiator cleaning Pressure testing Flushing Car wash Transmission fluid Liquid car wax</p> <p>BOATS & BARGES (MARINE) Fresh water Wash down Sanitary system Bilge Fire</p> <p>CHEMICAL INDUSTRY Soaps Cleaners Solvents Detergents Agricultural chemicals</p> <p>CHILLER & HEATER EXCHANGER Radar, sonar, TV and radio transmitter cooling TV tube manufacturing - gun cooling Slicing & sawing blade cooling Hot water, hot oil, ethylene glycol Chillers - brine handling Laser beam cooler Automobile welding Deicing</p> <p>CONCRETE AND PAVING INDUSTRIES Additives (admixture) metering Wash down - spray pumps Booster Circulating</p> <p>CONSTRUCTION Heat pump - well source Dewatering Solar heating Condensate return</p> <p>FOOD PROCESSING INDUSTRIES Can & bottle warmers Can & bottle washers Bakeries Circulating Dairies Creameries Canneries Bottling Meat Packing Seafood processing Transferring & circulating Boiler feed for sterilizing Condensate return for cooking Soft drink and beverage bottling Heat transfer Brine injection (pickling) Breweries Caustic handling</p> <p>FOUNDRIES Scrubbers Spraying</p> <p>LAUNDRY & DRY CLEANING Boiler feed Condensate return Transfer Filtration Washing machines Water reclamation Coin-op laundries Car wash Circulating hot & cold water Perc & solvent pumping Pressing establishments Carpet cleaning - hot water Commercial throw rug washing Institutional laundries Department stores Alteration shops</p> <p>LUMBER INDUSTRY Plywood curing</p> <p>SECTION 11 PAGE 14 DATE 1/06</p> <p>CRANE PUMPS & SYSTEMS A Crane Co. Company USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598</p>	<p>Pump Applications By Industry</p> <p>Engineering Information</p> <p>MACHINE INDUSTRY EDM (electrical discharge machines) electrolyte Circulating cutting & cooling oils Hydraulic press operation Slicing & sawing blades cooling Filtering Welding (plasma arc)</p> <p>MANUFACTURING - GENERAL Sprinkler systems Air conditioning Transfer Booster Condensation return Dewatering Testing valves, water lines, etc. Blows the whistle @D.P.Co.</p> <p>MEAT PACKING Brine injection - pickling hams Wash down Circulation Booster service</p> <p>MEDICAL, DENTAL & HOSPITALS & HEALTH SERVICES Sterilizers Electric boiler Nursing homes</p> <p>MINING INDUSTRY Dewatering</p> <p>MUNICIPALITIES Industrial & Commercial Park Development Water works Water treatment facilities Testing equipment for water mains Jockey pumps for fire pumps Deicing ponds, boat areas, etc.</p> <p>PAPER & PULP INDUSTRY Paper mills Coating</p> <p>PLASTICS & RUBBER INDUSTRY High transfer in molding - high temperature heating & cooling Tire recapping Boiler Feed</p> <p>PLATING INDUSTRY Circulation Dewatering</p> <p>PRINTING INDUSTRY Photo engraving Plate making</p> <p>RECREATION INDUSTRY Water falls Balloon making Hydraulic motors for animation Shooting galleries Ice rinks Golf courses Deicing marinas Ski lodges & lifts Race tracks Weed killers (ily pads)</p> <p>REFINERIES & STORAGE PLANTS Process Transfer Cooling - heat exchanger Loading & unloading</p> <p>SEWAGE PLANTS Wash down Screen cleaning</p> <p>TEXTILE INDUSTRY Dyeing, washing</p> <p>WATER & WASTEWATER TREATMENT Scrubbers - anti-pollution equipment Froth spray pumps Brine circulation Chlorine injector system Water reclamation Water softener regenerating plants Filtration Circulating Booster Dewatering Car wash Aspirators</p> <p>SECTION 11 PAGE 14 DATE 1/06</p> <p>CRANE PUMPS & SYSTEMS A Crane Co. Company USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598</p>
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Key Takeaways

- Designed for Low Maintenance and Long Service Life
- Broad range of performance in three popular metallurgies
- Outstanding performance for small package
- Range includes both close coupled and base mounted units
- Cost effective solutions for many applications (high pressure/low flow)
- Field adjustable to maintain performance
- High temperature (up to **500°F**) available

Q&A



Thank You!