

ATLANTIC
FLUIDICS®



LIQUID RING PUMPS AND SYSTEMS



TUTHILL
Vacuum & Blower Systems

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LIQUID RING VACUUM PUMPS -A PRIMER

Liquid ring vacuum pumps remove gases by means of an impeller rotating freely in an eccentric casing. The pumping is done by a liquid, usually water, that is fed into the pump and thrown by centrifugal force into a moving ring along the internal casing wall.

When gas or vapor enters the suction port of the pump, it is trapped by the whirling impeller blades and a liquid piston that expands in the eccentric lobe of the casing. As the impeller rotates, the liquid is then pushed inward by the narrowing space between rotor and casing, compressing the trapped pocket of gas. Finally, the compressed gas is released through a discharge port as the impeller completes the revolution.

The direct contact between the liquid ring and the gas makes the pump ideal for wet applications and for handling condensibles that are discharged with the gas and liquid. Unlike oil sealed rotary pumps, the operation of a liquid ring vacuum pump is nearly isothermal and without vibration. There is no oil to be changed or pollutant released into the environment. Because there are no valves or rubbing parts, a liquid ring pump is virtually maintenance free.

Sealants other than water, such as oil, may be used to reduce vapor pressure for higher vacuum, or for improved compatibility with specific process gases. In some applications, distillate or another fluid is introduced directly into the suction port of the pump and used as the seal liquid.

Liquid ring vacuum pumps are also commonly staged with vacuum boosters, air and steam ejectors for greater capacity and higher vacuum.

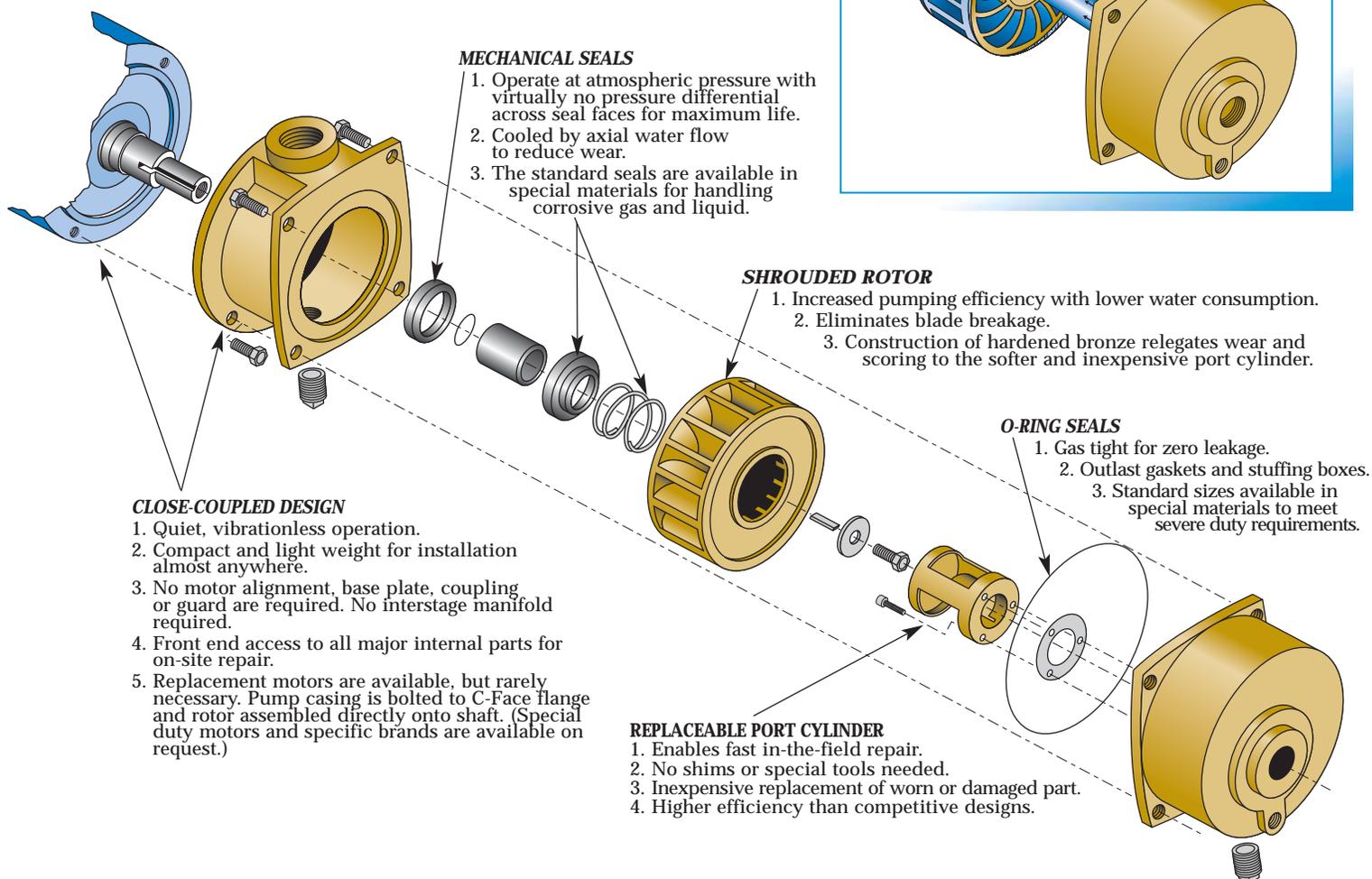
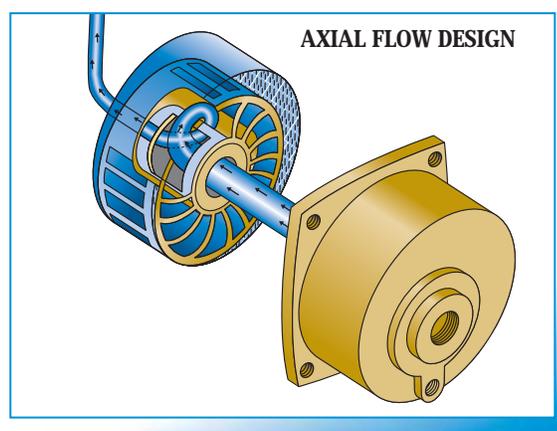
THE REVOLUTIONARY ATLANTIC FLUIDICS® PUMP DESIGN

Introducing the Atlantic Fluidics Liquid Ring Vacuum Pump, featuring the proprietary Fluid-Vac® axial flow design. This rugged, compact-design pump generates the highest vacuum of any comparable liquid ring pump. A fixed port cylinder, concentric with the rotor bore, directs the gas along the shaft axis, into the suction ports of the rotor and finally back through the rotor and rear of the pump for discharge. Because the gas flow is along the motor shaft (and not at right angles), the pump can start flooded, without damage. The use of a shrouded rotor increases pumping efficiency for high vacuum and low water consumption.



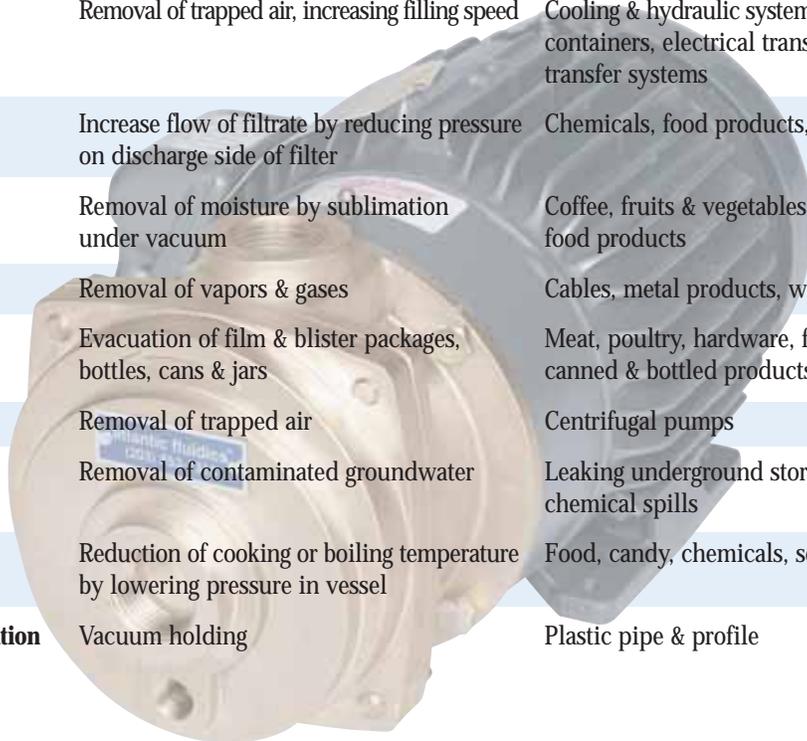
FLUID-VAC AXIAL FLOW ADVANTAGES:

- Flat power curve over entire vacuum range prevents motor overload
- Reduced stress on motor shaft and bearings
- Increased water handling capability prevents heat build-up, extends life of mechanical seals
- Compact, close-coupled design eliminates need for interstage manifold or motor alignment



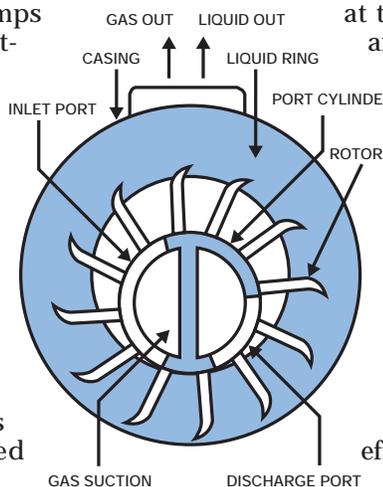
4 APPLICATIONS

Application	Function of Atlantic Fluidics® Liquid Ring Vacuum Pump	Examples of Use
Casting, Molding and Forming	Evacuation of molds, degassification of molten materials	Rubber, plastics, metals, wood products, veneers
Chucking	Vacuum pickup, handling, positioning and holding	Glass, sheet products, small parts, auto windshields, aircraft surfaces, beverage cans, sawmill operations
Cooling & Chilling	Rapid evaporation of moisture content	Fruits & vegetables, potato salad
Deaeration & Degassification	Removal of gases	Water, rubber products, oils, plastics, molten metals, beverages
Dehydration	Removal of condensable vapors	Transformers, refrigeration systems, foods, chemicals, electrical cables & conduits, grain, textiles, ink & dyes, rotary dryers
Deodorization	Removal of offensive gases	Chemicals, food products, effluent processing
Distillation	Vacuum extraction of fractions	Chemicals, petroleum, petrochemicals, pharmaceuticals, food products
Evacuation	Removal of vapors & gases	Environmental chambers, steam condensers, lasers, leak test chambers, reactors, process vessels, central vacuum systems
Evisceration	Removal of viscera	Poultry, fish, shellfish
Filling	Removal of trapped air, increasing filling speed	Cooling & hydraulic systems, food & beverage containers, electrical transformers, liquid transfer systems
Filtration	Increase flow of filtrate by reducing pressure on discharge side of filter	Chemicals, food products, pharmaceuticals
Freeze Drying	Removal of moisture by sublimation under vacuum	Coffee, fruits & vegetables, pharmaceuticals, food products
Impregnation	Removal of vapors & gases	Cables, metal products, wood products
Packaging & Sealing	Evacuation of film & blister packages, bottles, cans & jars	Meat, poultry, hardware, food products, canned & bottled products
Priming	Removal of trapped air	Centrifugal pumps
Soil Remediation	Removal of contaminated groundwater	Leaking underground storage tanks, chemical spills
Vacuum Cooking	Reduction of cooking or boiling temperature by lowering pressure in vessel	Food, candy, chemicals, solvent recovery
Vacuum Sizing & Calibration	Vacuum holding	Plastic pipe & profile



PRINCIPLE OF OPERATION

Atlantic Fluidics® Vacuum Pumps consist of a shrouded motor rotating freely within an eccentric casing. There is no metal-to-metal contact between the rotor and the casing. Centrifugal force acting on liquid within the pump causes the liquid to form a ring inside the casing. A fixed port cylinder concentric with the rotor directs the gas into the suction ports. Gas is trapped between the blades by the liquid pistons formed by centrifugal force as the liquid recedes from the port cylinder. It is trapped



at the point of maximum eccentricity and is then compressed by the liquid ring as it is forced radially inward toward the central port cylinder. After each revolution the compressed gas and accompanying liquid are discharged.

During the pumping cycle the gas is in intimate contact with the sealing liquid and compression is nearly isothermal. When handling saturated vapor-gas mixtures the liquid ring acts as a condenser, greatly increasing the effective capacity of the pump.

MATERIALS OF CONSTRUCTION:

Casing, Cover, Rotor, Port Cylinder

OPTIONS

All Bronze

All Stainless Steel (316)

All Cast Iron

All Ni Resist

All Alloy 20

All Hastelloy

Cast Iron Casing & Cover,
Bronze Rotor & Cylinder

MODEL SIZES

A5 to A130,
All "T" Series Sizes

All "A" Sizes

A200 & A300

All "A" Sizes

All "A" Sizes

All "A" Sizes

A75 to A130

Mechanical Seals

BUNA Seals Standard

OPTIONS: Viton, Kalrez, Teflon & EPR to Suit
Application. Consult Factory.

DRIVE OPTIONS:

Close-coupled Motor

TEFC Motors Standard, 60 Hz or 50 Hz

OPTIONS: Explosion-proof, Mill & Chem,
Wash Down, High Efficiency.
Consult Factory.

PEDESTAL MOUNT

All Atlantic Fluidics Liquid Ring Pumps are available mounted on pedestal bodies for applications which require alternative drive styles. The pedestal frames are rugged designs, with oversized bearings in heavy-duty cast iron housings. The drive shaft can easily accommodate any standard flexible coupling or it can be belt driven to increase or decrease speeds. Pedestal pumps are also available mounted to base plates and coupled to the drive style of your choice, with any guards and piping as required. Consult the factory for design and application assistance.

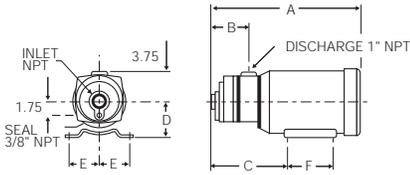


Pedestal Mount

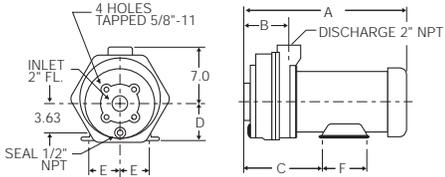
6 PUMP SPECIFICATIONS

"A" SERIES SINGLE-STAGE PUMPS

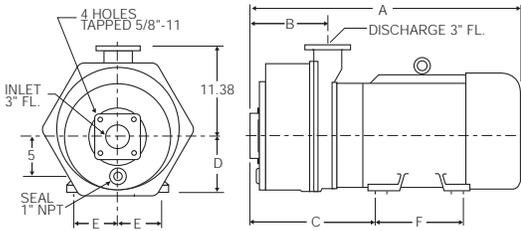
Closed-coupled Designs



MODEL	FRAME	INLET	A	B	C	D	E	F	MOTOR HP	WEIGHT lbs./kg
A5	56CZ	3/4	14.0	2.9	6.7	3.5	2.44	3.0	1	45/20
A10	145TCZ	1	16.6	3.6	8.0	3.5	2.75	5.0	1 1/2	55/25
A15	145TCZ	1	17.0	3.8	8.3	3.5	2.75	5.0	2	60/27
A20	182CZ	1	18.5	4.6	9.6	4.5	3.75	5.5	3	80/36

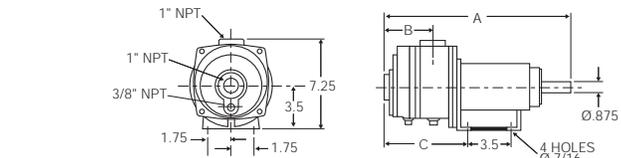


MODEL	FRAME	INLET	A	B	C	D	E	F	MOTOR HP	WEIGHT lbs./kg
A75	184TCZ	2	20.2	5.8	9.8	4.50	3.75	5.5	5	180/82
A100	213TCZ	2	23.1	7.1	12.1	5.25	4.25	7.0	7 1/2	195/89
A130	215TCZ	2	25.3	8.1	13.1	5.25	4.25	7.0	10	250/114

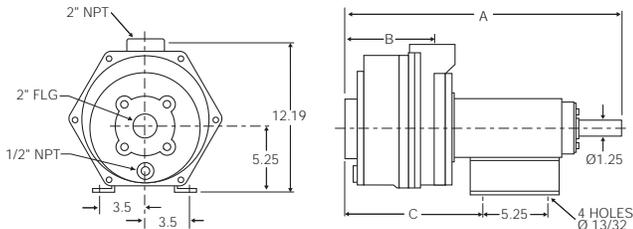


MODEL	FRAME	INLET	A	B	C	D	E	F	MOTOR HP	WEIGHT lbs./kg
A200	284TYZ	3	32.4	8.3	14.2	7.0	5.50	11.0	15	560/254
A300	284TYZ	3	33.7	9.7	15.6	7.0	5.50	11.0	20	600/272

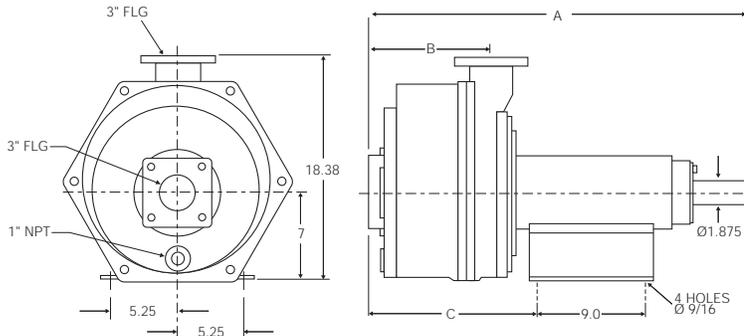
Pedestal Mount



MODEL	A In	B In	C In	WEIGHT lbs./kg
A10	14.52	3.52	6.20	42/19
A15	14.83	3.83	6.51	44/20
A20	15.60	4.60	7.28	48/22



MODEL	A In	B In	C In	WEIGHT lbs./kg
A75	20.57	5.75	9.44	125/57
A100	21.88	7.07	10.75	130/59
A130	22.88	8.07	11.75	145/66



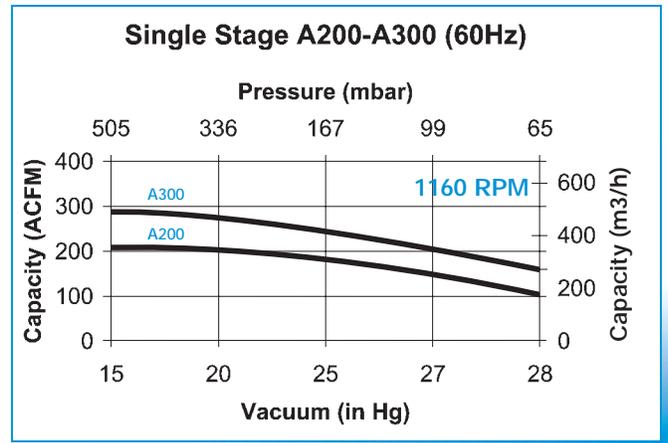
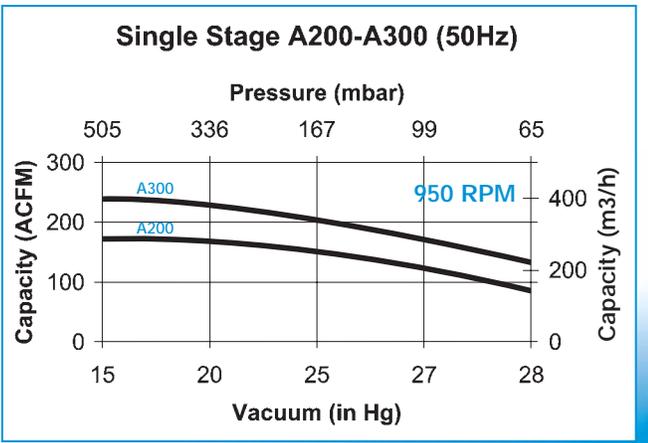
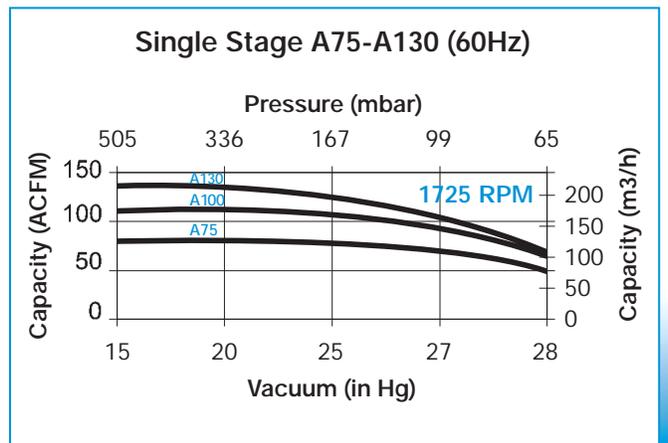
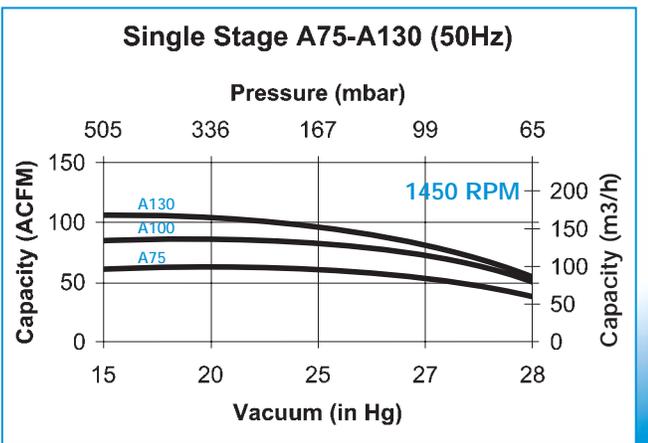
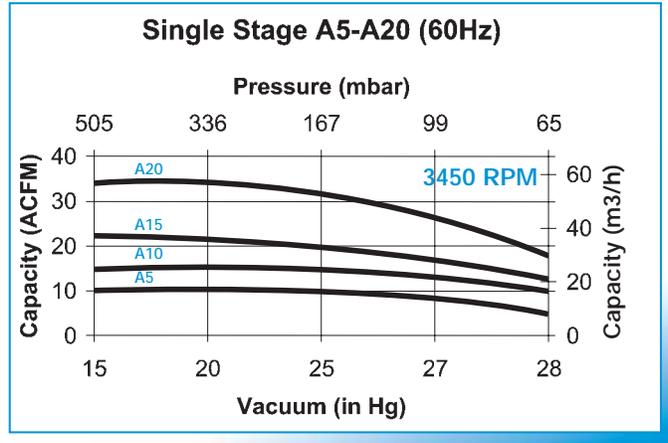
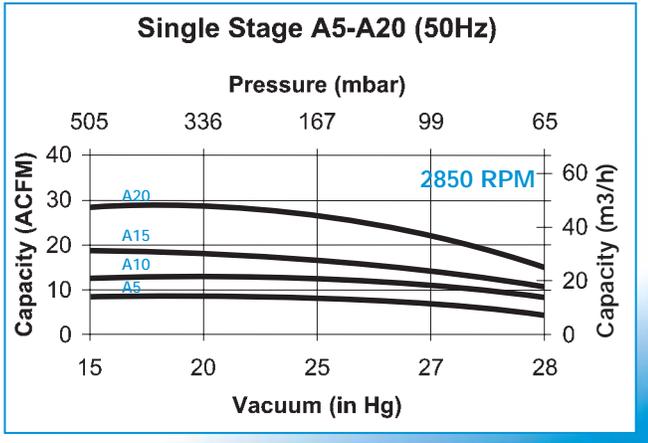
MODEL	A In	B In	C In	WEIGHT lbs./kg
A200	28.81	8.31	11.88	250/114
A300	30.19	9.69	13.25	325/148

“A” SERIES SINGLE-STAGE PUMPS

PERFORMANCE CURVES

PERFORMANCE CURVES 50 Hz

PERFORMANCE CURVES 60 Hz

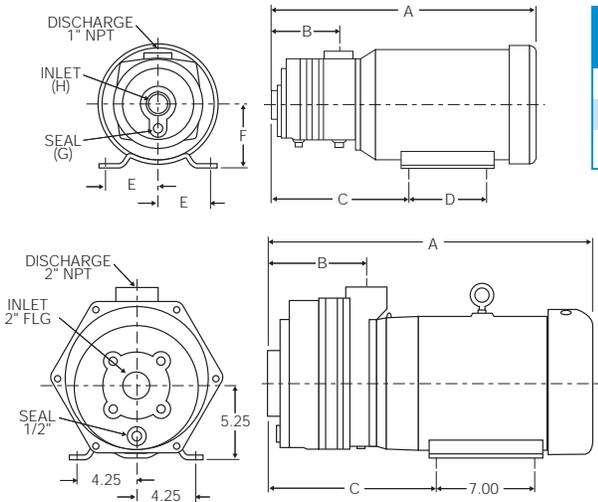


Performance curves are based on dry air at 68°F (20°C), 60°F (15°C) seal water, and 29.92 inches of mercury (760 torr) barometric pressure.

8 PUMP SPECIFICATIONS

"T" SERIES MULTI-STAGE PUMPS

Atlantic Fluidics® "T" Series Multi-stage Liquid Ring Vacuum Pumps utilize the same axial flow design as the "A" Series Single-stage pumps, but with an additional stage to provide deeper vacuum levels. This patented pump style is designed for high wet vacuum applications where they can operate with the lowest partial gas pressure without cavitation. Ideally suited for evaporators, deaerators, autoclaves, dryers and other applications requiring vacuum higher than 27 In. Hg. When packaged in oil sealed systems, "T" Series pumps can operate in dry gas applications with vacuum as low as 4 Torr. Available in close-coupled motor configuration.

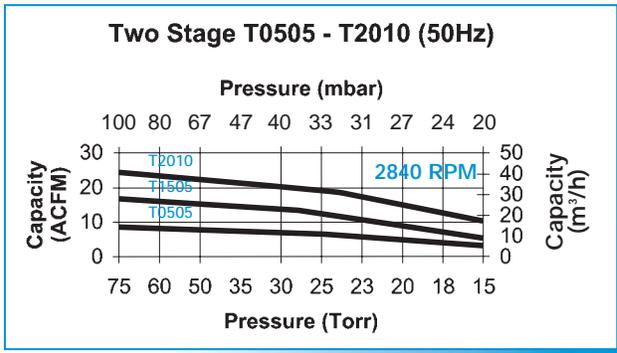


MODEL	A	B	C	D	E	F	G	H	MOTOR HP	WEIGHT lbs./kg
T0505	17.3	4.13	8.5	5.0	2.75	3.50	1/4	3/4	2	65/29
T1505	18.8	4.75	9.7	5.5	3.75	4.50	3/8	1	3	80/36
T2010	21.0	5.75	10.7	5.5	3.75	4.50	3/8	1	5	100/45

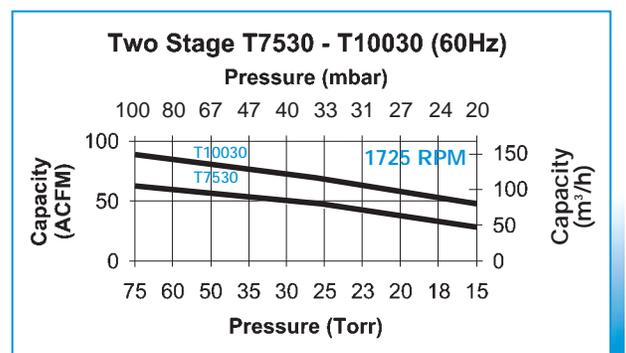
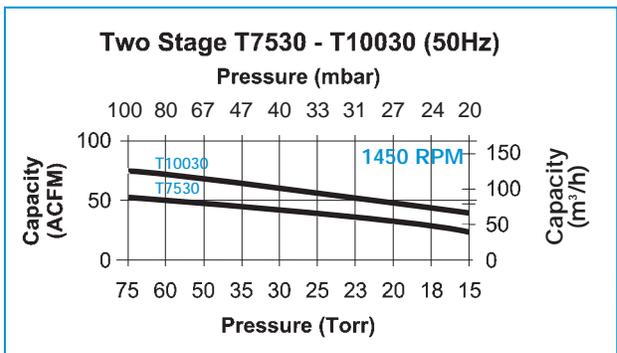
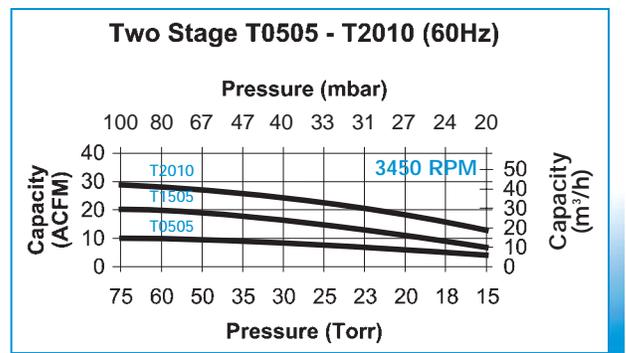
MODEL	A	B	C	MOTOR HP	WEIGHT lbs./kg
T7530	23.1	7.0	12.1	7 1/2	200/91
T10030	25.6	8.3	13.4	10	230/105



PERFORMANCE CURVES 50 Hz



PERFORMANCE CURVES 60 Hz



An important consideration in planning a liquid ring vacuum pump installation is the design of the sealant system and its effect on the performance of the pump. TVS recommends early consideration be given to sealant system design because there are several elements of pump sizing, selection and system design that will be affected by the choice of the sealant system.

- **Operating pressure** is affected by sealant temperature, flow rate, specific heat, density and viscosity
- The **gas load** may influence the selection of the sealant and the sealant system
- The **economic priorities** may indicate a system where process recovery can be accomplished or where water conservation can be achieved
- The **operating costs**, in terms of horsepower and water costs, will almost always have an influence on design decisions

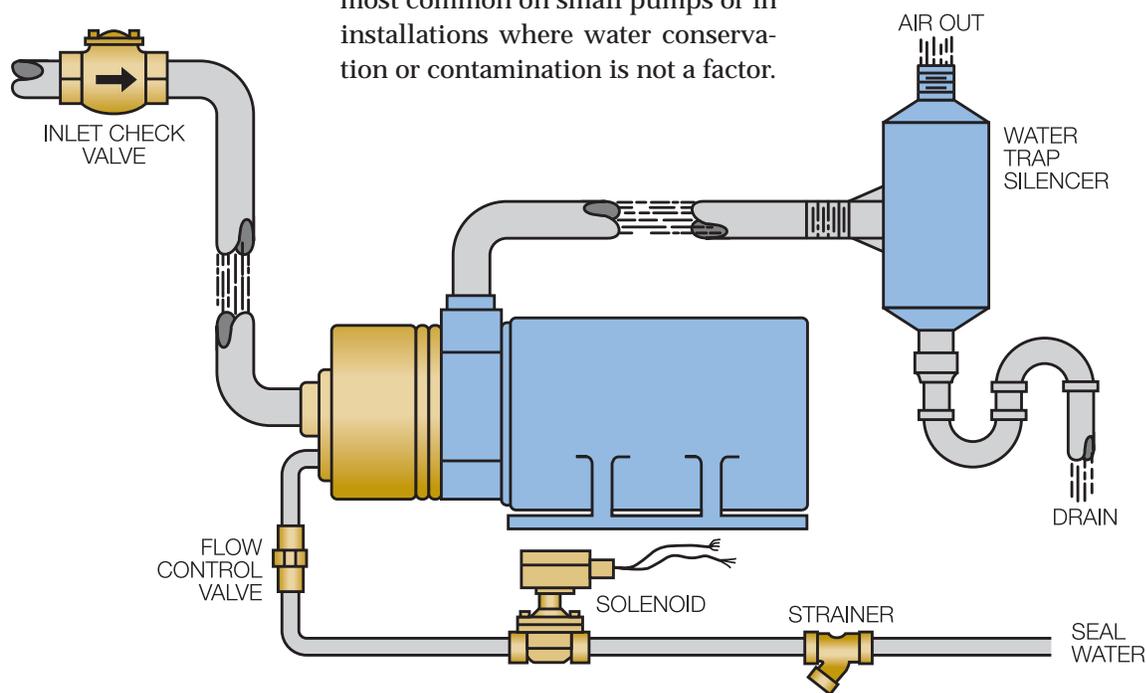
Although there are variations, there are three basic types of sealant systems from which to choose:

a. Once-through Systems

b. Partial-sealant Systems

c. Full-sealant Systems

The **Once-through System** takes water directly from the water main and discharges it to drain without re-circulation. This arrangement is most common on small pumps or in installations where water conservation or contamination is not a factor.



Once-through seal water (minimum pressure 10 PSIG).

The **Partial-sealant Recovery System** discharges water and gas into a gas/liquid separator tank. The gas vents from the top of the tank, while the water is retained. Approximately half of the water is disposed through an overflow; the remainder re-circulates back through the pump. Fresh water is added to maintain proper sealing water temperature. In order to keep the amount of make-up water to a minimum, the system may be fitted with a temperature modulation valve.

The **Full-sealant Recovery System** (pictured) is a closed-loop system. The sealant is re-circulated through a heat exchanger and cooled by air or a separate cooling water source. Since there is no contact between the sealant and the cooling water, there is no contaminated water to go into the waste system.



CUSTOM ENGINEERED VACUUM SYSTEMS

Tuthill Vacuum Systems can size, design and build custom vacuum pump systems to meet specific customer application requirements. The Atlantic Fluidics® Liquid Ring Pump can be configured in engineered systems which include a wide range of components and accessories including full electrical control panels. All custom systems are subjected to rigorous testing and supported by a global network of sales and service personnel. Consult the TVS factory in Norwalk, Connecticut, your local TVS sales representative or one of the TVS sales offices listed on the back of this brochure.



Since 1981, Atlantic Fluidics® Vacuum Pump Systems have been used in demanding environmental remediation applications around the world. In 1988, the Series EWP Fluid-Vac® Environmental Remediation System was developed to address the logistical challenges of engineering and installing a liquid ring system on-site in the field. This pioneering design effort has made Tuthill Vacuum Systems a leader in the use of liquid ring vacuum pump technology in environmental restoration applications. Today, Tuthill Vacuum Systems offers two styles of Fluid-Vac Environmental Remediation Systems, oil sealed and water sealed.

Oil Sealed System (EOP)

The Fluid-Vac Oil Sealed Remediation System consists of the Series OSR System described on page 9, with the following additional features:

- Vacuum rated knock-out tank
- Full length site tube
- 4 level float switches
- Transfer pump
- Vacuum line to pump with water trap separator
- Particulate filter
- All piping, and mounted to a steel base plate

Optional Accessories:

- Electrical controller
- Explosion-proof configuration



Water Sealed System (EWP)

The Fluid-Vac Water Sealed Remediation System features the Atlantic Fluidics close-coupled liquid ring pump, with TEFC motor, mounted on a steel base plate with a stainless steel separator/reservoir tank. The tank includes clean out access and mist condenser pad on the air discharge and a full-length sight tube with level switches. Other features:

- Transfer pump
- Re-circulation line with isolation valve
- Flow control valve & strainer
- Copper discharge piping
- Inlet strainer
- Vacuum gauge

Optional Accessories:

- Electrical controller
- Explosion-proof configuration
- Vacuum rated knock-out tank
- Heat exchanger

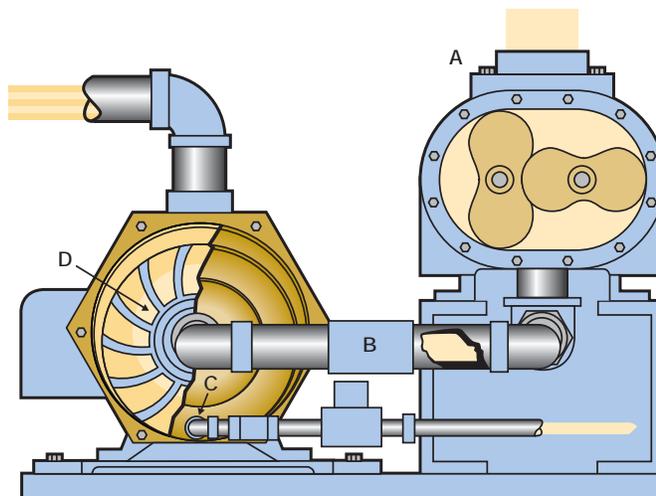


Atlantic Fluidics® Liquid Ring Pumps may be staged with lobe-type mechanical boosters to deliver higher pumping speeds at deeper vacuum. These standard package configurations with single motor drives are more cost effective than jet steam or air ejectors, high horsepower multi-stage liquid ring pumps or higher maintenance oil sealed piston or vane pumps.

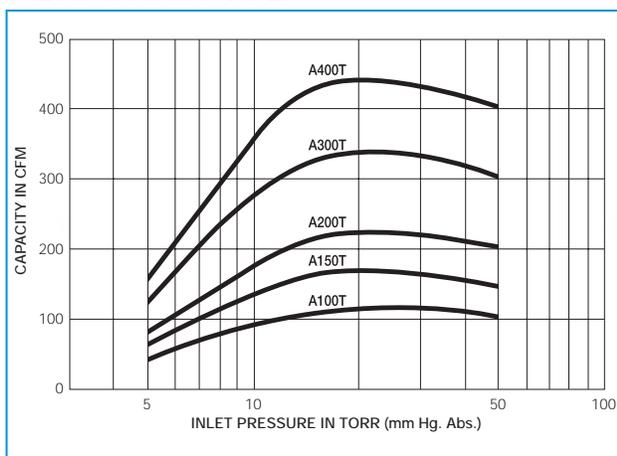
PRINCIPLE OF OPERATION

The mechanical booster, as first stage, features high volumetric efficiency when displacing light density gas or vapors over a low-pressure differential. Backed by the condensing power of the Atlantic Fluidics Liquid Ring Pump, its throughput is increased by the compression of gas at ratios of up to ten to one. Gas or air entering the inlet (A) of the booster is trapped by counter-rotating lobes which discharge through a port on the underside of the booster. The tight clearances of the mating parts maintain the high volumetric efficiency.

The gas enters the suction port of the liquid ring pump via the interstage piping (B) and is trapped by the rotating impeller blades and the ring of sealant water that is fed into the pump through a separate inlet (C). As the impeller rotates inside the lobe of the casing, the water acts as a liquid piston, compressing the pocket of gas (D) until both water and gas are discharged together. The contact between water and gas acts as a direct condenser, making the booster/pump operation nearly isothermal.



PERFORMANCE



SPECIFICATIONS

MODEL	A100T	A150T	A200T	A300T	A400T
RPM	3500	1750	1750	1750	1750
HP	5	7.5	10	15	20
Water (gpm)	2-4	3-5	3-6	4-8	5-10
Weight (lb)	400	500	520	680	900
Length (in)	28	33	33	40	44
Width (in)	26	31	31	30	34
Height (in)	28	30	30	34	37

Referred to 760mm Hg barometer; 15°C (60°F) sealing water.

14 CENTRAL VACUUM SYSTEMS

Atlantic Fluidics® Series CVP Central Vacuum Systems provide a remote supply of plant vacuum which can be located away from the production area or vacuum outlets, thus reducing noise and heat in the work area. The systems feature the “A” Series single-stage liquid ring pumps in either a simplex (one pump) or duplex (two pumps) design. The energy-efficient systems are designed to operate automatically, with the pump(s) starting when the plant vacuum demand increases and stopping when the demand is met. Vacuum is maintained by means of pressure switches which cycle the pump(s). The Atlantic Fluidics Central Vacuum Systems require only water and electric power connections. A solenoid valve on the seal water line provides water whenever the pump(s) cycle.

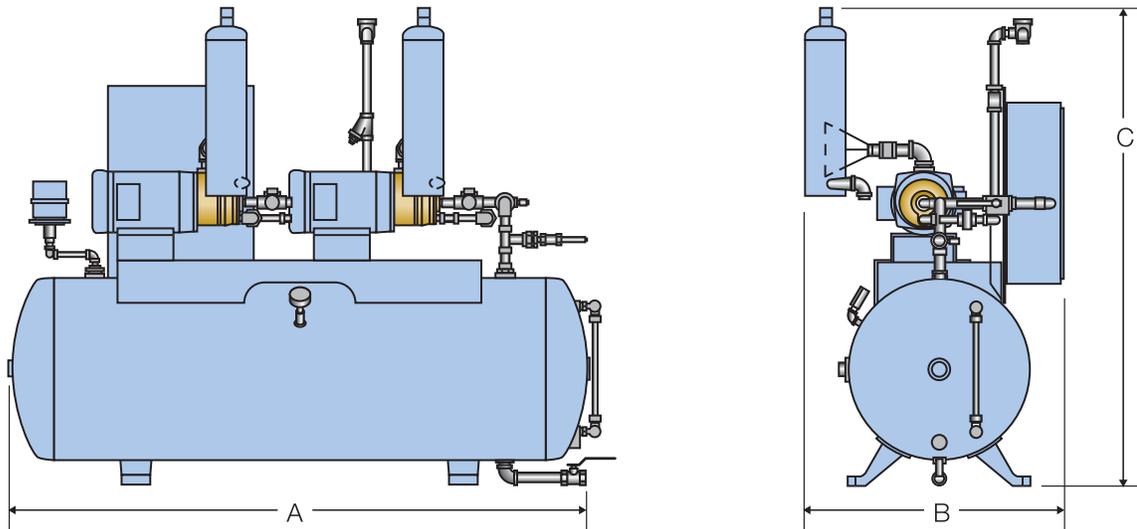
APPLICATIONS:

- Medical & Dental – surgical suction, extraction of fluids
- Laboratories – vacuum dryers, gas transfer, evacuation of vapors, autoclaves
- Metal Fabrication – chucking of parts, vacuum packing, impregnation of castings
- Food Processing – packing, blending, rotary chambers, conveyor feed, evisceration

STANDARD FEATURES:

- Bronze construction Atlantic Fluidics Liquid Ring Pump(s), TEFC motor(s)
- ASME coded 100 psig receiver tank, galvanized steel
- Air discharge water separator/silencer(s)
- Solenoid & flow control valves, vacuum gauge, “y” strainer
- Control Panel – starters, fuses, relays, main disconnect, thermal & overcurrent protection, Hand-Off-Auto switch(es), adjustable pressure switch(es), running lights, NEMA 4 enclosure
- Sight tube and all interconnecting piping between the tank and the pump(s)

DIMENSIONS:



MODEL	CFM at vacuum in Hg				Simplex or Duplex	Motor		Tank Cap-Gals	Dimensions - Inches			Wt. lbs./kg
	15	20	25	28		HP	RPM		A	B	C	
CVP-A10S	15	15	14	10	S	1 1/2	3550	80	63	30	58	335/152
CVP-A15S	20	20	20	13	S	2	3550	80	63	30	58	345/157
CVP-A20S	32	32	32	17	S	3	3550	80	63	30	58	350/159
CVP-A75S	72	72	72	45	S	5	1750	120	69	33	62	550/250
CVP-A100S	105	105	102	60	S	7 1/2	1750	120	69	33	62	590/268
CVP-A130S	125	125	118	65	S	10	1750	120	69	33	62	620/282
CVP-A10D	30	30	28	20	D	2 x 1 1/2	3550	80	63	30	58	410/186
CVP-A15D	40	40	40	26	D	2 x 2	3550	80	63	30	58	430/195
CVP-A20D	64	64	64	34	D	2 x 3	3550	120	69	33	62	570/259
CVP-A75D	144	144	144	90	D	2 x 5	1750	120	69	33	62	710/323
CVP-A100D	210	210	204	120	D	2 x 7 1/2	1750	200	72	36	68	1000/454
CVP-A130D	250	250	236	130	D	2 x 10	1750	200	72	36	68	1060/482

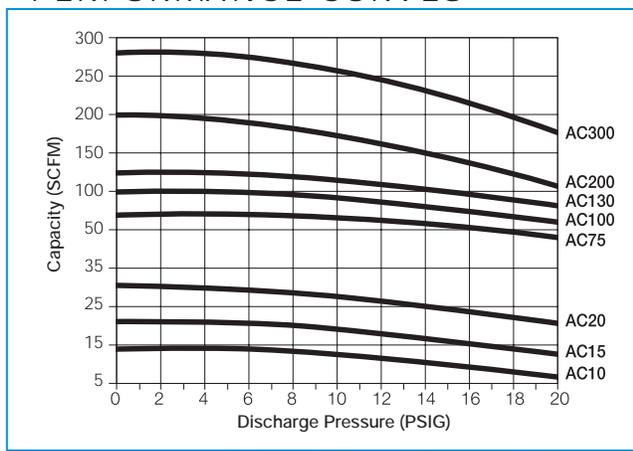
The Atlantic Fluidics® Liquid Ring Compressor is a reliable, cost-effective alternative to oil sealed and dry screw compressors in applications where the required discharge pressure is 20 psig or less. Ideal for waste treatment applications, such as sparging, filter flushing, aeration and sewage ejection. Atlantic Fluidics Compressors are available in complete package designs including the compressor, gas/liquid separator, silencer, control panel, valves and piping, and base plate.



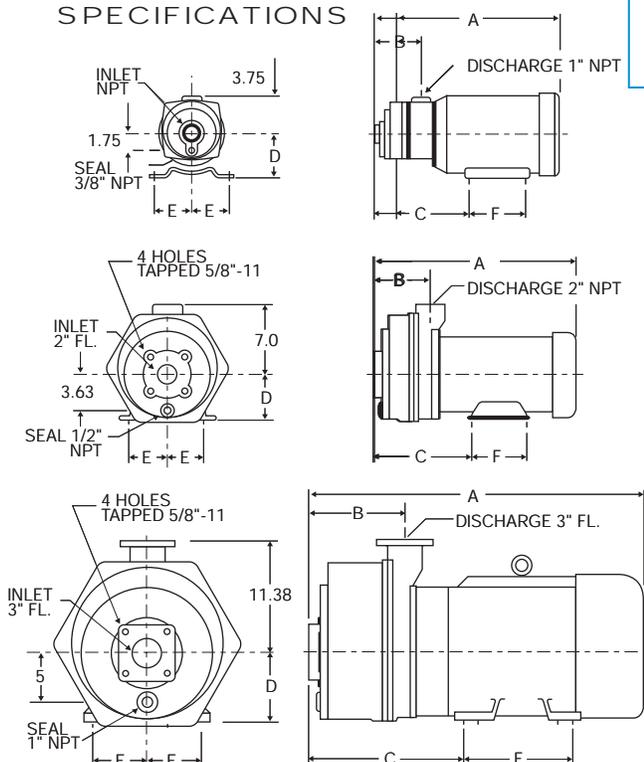
FEATURES:

- **Cool Gas Discharge** – seal water absorbs the heat of compression. No aftercoolers required
- **Environmentally Friendly** – no carry-over of oil vapors, carbon or other compounds in discharge air
- **Low Maintenance** – compressors have no valves, vanes or other parts in rubbing contact
- **Handles Corrosive Gases** – standard bronze or stainless steel construction

PERFORMANCE CURVES



SPECIFICATIONS



3450 RPM								
MODEL	FRAME	HP	A	B	C	D	E	F
AC10	145TCZ	2	16.6	3.6	8.0	3.5	2.75	5.0
AC15	182CZ	3	17.6	3.8	8.8	4.5	3.75	5.5
AC20	184CZ	5	19.8	4.6	9.6	4.5	3.75	5.5

1725 RPM								
MODEL	FRAME	HP	A	B	C	D	E	F
AC75	213TCZ	7.5	21.9	5.8	10.8	5.25	4.25	7.0
AC100	215TCZ	10	24.3	7.1	12.1	5.25	4.25	7.5
AC130	254TCZ	15	26.5	8.1	13.4	6.25	5.00	8.25

1160 RPM								
MODEL	FRAME	HP	A	B	C	D	E	F
AC200	284TYZ	20	32.4	8.3	14.2	7.0	5.50	11.0
AC300	324TCZ	25	35.8	9.7	16.1	8.0	6.25	12.0

All dimensions are in inches. Dimensions are based on 3-phase TEFC BALDOR motors.

LOCATIONS WORLDWIDE

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Americas

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Tuthill Vacuum & Blower Systems (TVBS) is a pioneer in the development of vacuum pump technology. Introduced in 1926, the Kinney® rotary piston vacuum principle still sets the industry standard for high performance, reliability, low maintenance and quiet operation in a mechanical vacuum pump design. These same performance features are demonstrated in all the TVBS vacuum pump product lines: liquid ring pumps, dry pumps, vane pumps and our main line of rotary piston pumps. In addition, all pump designs can be incorporated in complete TVBS-engineered vacuum systems.



For information and specifications on Kinney Dry Pumps, Liquid Ring Pumps, Vacuum Boosters and Rotary Piston Vacuum Pumps, contact us to request a copy of our brochures.



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