Variable Speed Transmissions

for General Purpose Applications

fans ♦ pumps ♦ compressors ♦ blowers ♦ gear driven equipment

Minimize

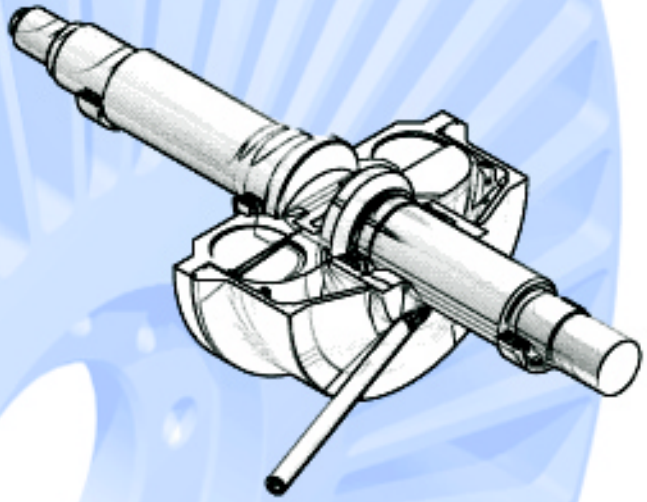
Capital costs
Operating costs
Downtime
Maintenance
Vibration
Starting torque
Motor size
Noise

Improve

Reliability
Efficiency
Turndown
Process control
Stepless speed changes
Space requirements
Start-up / warm-up

Replace

Steam turbines
Flow control valves
Louvers/Inlet guide vanes
Pressure reducing valves
Expensive VFDs
Hot or radioactive piping



TRI Catalog: Model RAH Fluid Drives

Power to 4,000 HP (3 MW) ♦ Speeds to 3,600 RPM

Transmission & Bearing Corp.
A Division of Turbo Research, Inc.

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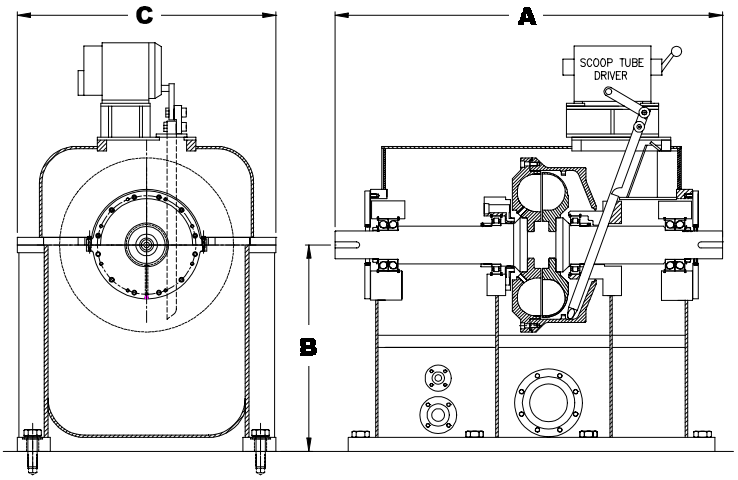
Model RAH Fluid Drives

Typical Limits: 4000 HP (3000 KW) or 3600 rpm
Based on Advanced Rolling Element Bearing Technology



Comparable vertical models are available

Size Designation	Element Diameter	Max Motor Speed	Max Load Power	Typical Dimensions			Shaft Diameter
				A	B	C	
	inches	RPM	HP	inches	inches	inches	inches
104	10.4	3,600	110	28	14	20	1.75
123	12.3	3,600	250	31	16	24	2.00
141	14.1	3,600	500	36	18	27	2.25
162	16.2	3,600	1,000	42	24	30	2.75
176	17.6	3,600	1,500	48	26	33	3.25
186	18.6	3,600	2,000	48	26	33	3.25
202	20.2	3,000	1,750	50	27	35	3.50
230	23.0	3,000	3,250	55	27	35	4.00
270	27.0	1,800	1,750	64	30	41	4.50
315	31.5	1,800	3,500	66	30	45	5.00
370	37.0	1,500	4,000	72	36	55	6.00
400	40.0	1,200	3,500	74	36	55	6.00
450	45.0	1,200	4,000	76	42	59	6.50
500	50.0	900	4,000	79	48	64	6.50

R1

Fourteen standard sizes are shown. Other element (Impeller/Runner) sizes can be manufactured to suit specific applications. Overall dimensions and shaft heights can be adjusted as required. Many oil system arrangements are available – from basic to full API. TRI also provides high power–high speed transmissions to 40,000 hp and 15,000 rpm. Refer to the TRI Catalog: Model FH Fluid Drives for further information about high powered transmissions.

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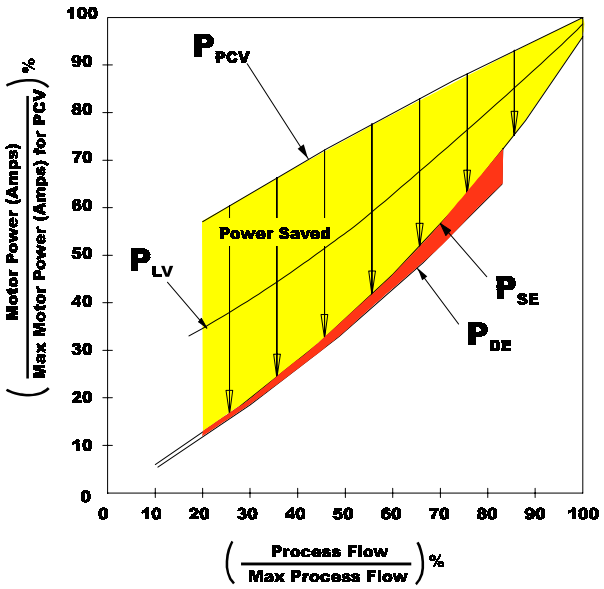
Improved Power Efficiency

Comparison of electrical power consumed by standard electrical motors driving the same pump with two different arrangements.



P_{PCV}: Electric power to a motor, flow controlled by a discharge flow control valve

P_{LV}: Electric power to a motor, flow controlled by louvers or inlet guide vanes

P_{SE}: Electric power to a motor, flow controlled by a TRI single element (standard) fluid drive transmission

P_{DE}: Electric power to a motor, flow controlled by a TRI dual element (high efficiency) fluid drive transmission

↓ Power saved using a single element fluid drive

Additional power saved using a dual element fluid drive

1. A standard motor is directly coupled to a pump, both rotating together at constant speed. A discharge pressure control valve (PCV) is used to control downstream pressure or flow. In this case, substantial power is consumed by throttling losses of the flow through the PCV.

2. A standard motor is driving a fluid drive transmission, which drives the same pump at variable speed with ***no*** discharge PCV. Varying the speed of the pump varies the downstream pressure/flow. In this case, because there is no PCV, there are no throttling losses.

Clearly, the electrical power consumed by the motor for the pump with PCV is much higher than when a fluid drive transmission is used. There are some losses in the fluid drive transmission, but these are small compared to the throttling losses across a discharge pressure control valve.

The difference between the two power consumption lines represents the power saved by using a fluid drive transmission – typically above 30% of the motor nameplate rating. Additional savings result from the use of a smaller motor.

TRI offers high-efficiency fluid drive transmissions that reduce the power consumed over most of the operating range. As shown here, the high efficiency point occurs at 83% of the maximum flow, which is the normal operating point for the process represented here.

Fans, compressors, and pumps have similar power reduction when TRI fluid drive transmissions are used.

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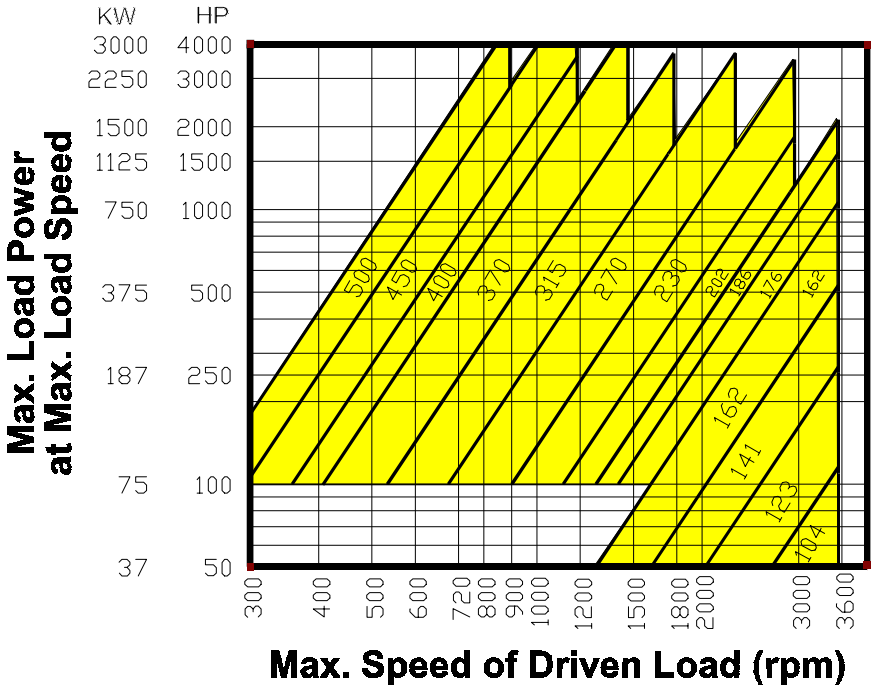
TRI Packaged Equipment Trains

TRI supplies packaged equipment trains including the drive motor, a variable speed fluid drive transmission, load equipment (pump, fan, blower, compressor), couplings and either a basic or full API oil system. TRI provides design, manufacturing, assembly, testing and installation supervision.

Sizing Chart - Standard Model RAH Fluid Drives



Example: A fan is to be driven initially at 900 hp and 1400 rpm. After an expansion of the plant, the fans normal operating point will be 1600 hp and 1700 rpm. Select a standard size 315 fluid drive and a standard size induction motor: 1750 HP, 1800 rpm.

The sizing chart is to be used as a guide in selecting the proper size fluid drive transmission. To optimize the efficiency and installation spacing, fluid drive sizes other than those shown can be manufactured and supplied by TRI.

Contact TRI for final selection of fluid drive transmissions, motors, oil systems, and load equipment.

Engineering Services and Products for Large Rotating Machinery
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