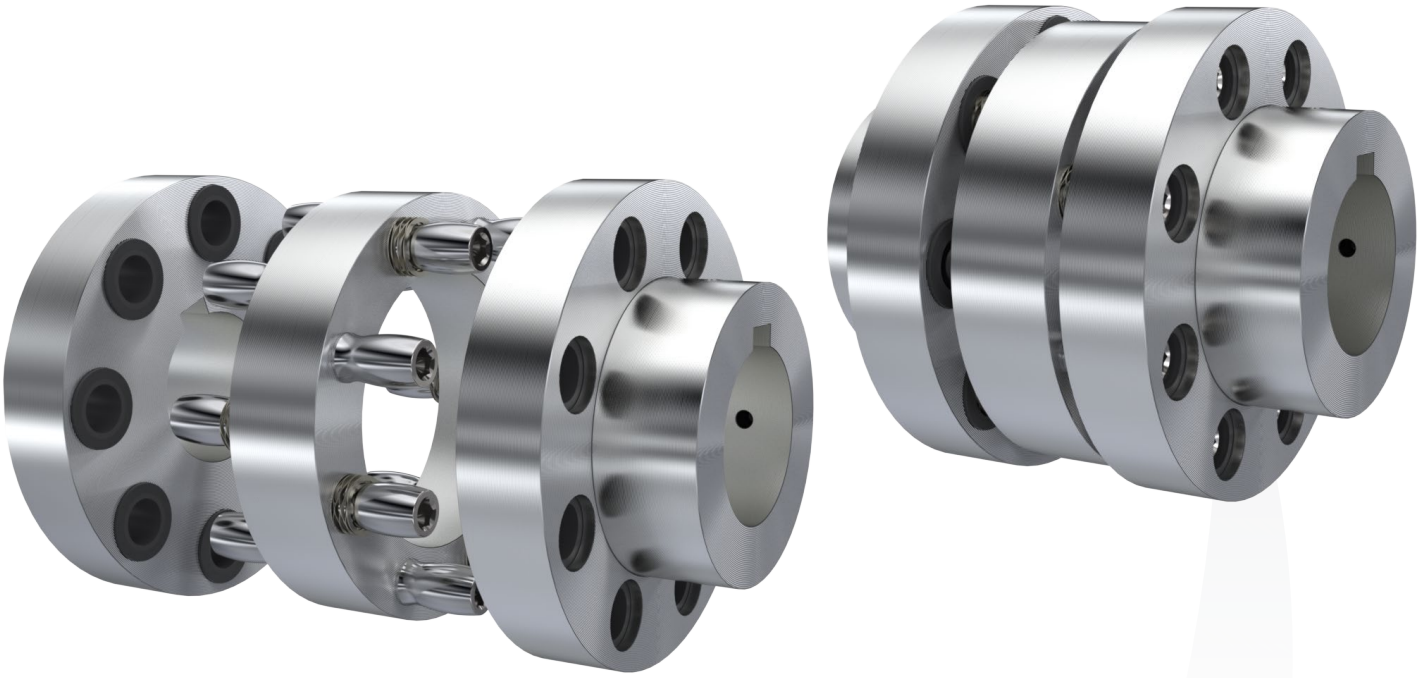
FRONTLINE
COUPLINGS

FOR THE PULP & PAPER INDUSTRY



ENGINEERED SOLUTIONS FOR YOUR **TOUGHEST APPLICATIONS**

FRONTLINE INDUSTRIES, INC

frontlinecouplings.com

ABOUT FRONTLINE INDUSTRIES, INC.

EXCEEDING INDUSTRY STANDARDS SINCE 1980

Frontline Industries, Inc. is an industrial service and manufacturing company, specializing in rotating equipment and located in Irvington, NJ.

Since its founding in 1980, Frontline has been marked by its quality service of Pumps, Motors, Fans and other related equipment for various industries throughout the Northeast.

During that time, our organization has experienced firsthand the many shortcomings of couplings available to the market. By combining this hands-on experience with innovative engineering and a strong desire to better serve our customers, we at Frontline have developed a unique coupling design that navigates past the most common coupling problems and provides unparalleled, cutting-edge efficiency.

Industries Served

Although Frontline Couplings were designed mainly to tackle the various challenges of Paper Mills' Equipment, they are also widely used in other industries:

Chemical
Food & Beverage
Industrial
Marine
Municipalities
Petro Chemical
Pharmaceutical
Power Plants
Pulp & Paper
Utilities
Hotels
Hospitals

FRONTLINE COUPLINGS

Now, more than 50% of Frontline Industries is exclusively dedicated to manufacturing Couplings & Drive Shafts.

OUR MISSION

To partner with our customers, as an extension of their maintenance & reliability team, to drastically reduce Coupling & Drive Shaft maintenance tasks and save them money.

FLEXIBLE SHAFT COUPLINGS
FOR THE PULP & PAPER INDUSTRY

CHALLENGE

UNAVOIDABLE SHAFT MISALIGNMENT

The Pulp & Paper Industry, with equipment such as Vacuum Pump Trains, Wire Dryers, Bark Bin Screws, Hydro Pulpers, Thick Stock Pumps & Winders, has more challenges than any other industry regarding unavoidable misalignment.

SOLUTION

HIGH MISALIGNMENT TOLERANCE

1

The "Free Floating" Double Engagement Model allows the Frontline Coupling to accommodate unavoidable misalignment while greatly reducing the adverse effect of lateral reactionary forces on the driver and driven equipment.

VERY SHORT PLANNED OUTAGES

Due to the extremely high cost of outages, and the limited availability of maintenance personnel, the servicing of shaft couplings must occur at a very fast pace, over a short period of time and at the lowest frequency possible.

MINIMAL MAINTENANCE REQUIREMENT

2

The replacement of Pins & Bushings can be accomplished in a fraction of the time it would take to re-lubricate a Gear or Grid Coupling. For example, a Series 2 Size "J" Double Engagement Coupling on an 800 HP Motor/ Vacuum Pump application could be serviced with new pins & bushings (12 on each side) in less than one hour.

COSTLY UNSCHEDULED OUTAGES

When a shaft coupling fails between planned outages, the cost of downtime is estimated at several thousands of dollars per hour.

SCHEDULED MAINTENANCE ONLY

3

Due to its design, the Frontline Coupling will always maintain a positive engagement between the two Hubs and prevent a forced outage. The only factor to consider is the degree of wear of the Pins & Bushings.

HIGH MAINTENANCE COST OF LUBRICATED COUPLINGS

Due to their high power density, Grid & Gear Couplings are widely used and relied upon in the Pulp & Paper Industry. The periodically required inspection and re-lubrication, however, drastically increases the cost of ownership. After several re-lubrications, the entire coupling needs to be replaced.

CONSIDERABLE LOWER OVERALL COST

4

A correctly sized, properly installed and aligned Frontline Coupling will provide several years of maintenance-free service. Considering that the hubs never need to be replaced, the total cost of ownership of the Frontline Coupling is considerably lower than other competing lines.

UNPREDICTABILITY OF IMPENDING COUPLING FAILURE

Generally, Grid & Gear style couplings fail abruptly without giving any sign of temperature rise, increased noise or higher vibration levels.

VISUAL INDICATION OF RELATIVE WEAR

5

A strobe light can be used while the coupling is in service to monitor relative wear of pins & bushings by checking a line marked axially across both hubs' O.D. at the time of installation, allowing for maintenance to be condition-based, not time-based.

BENEFITS

Frontline Couplings transmit torque through precision machined barrel shaped pins, which ride within rubber coated self-lubricated fiber-reinforced polymer bushings. This patented "free-floating" double engagement design provides several major **benefits**.

NO LUBRICATION REQUIRED

The only maintenance on these couplings is the sporadic replacement of Pins & Bushings.

The frequency of parts replacement depends on application and field conditions. Many applications do not require any maintenance until after three years.

FAIL-SAFE DESIGN

The Frontline Coupling will never cause a forced outage.

Even if a Frontline Coupling is allowed to run until all the bushings are worn out and there is metal-to-metal contact, the Coupling will always maintain a positive engagement.

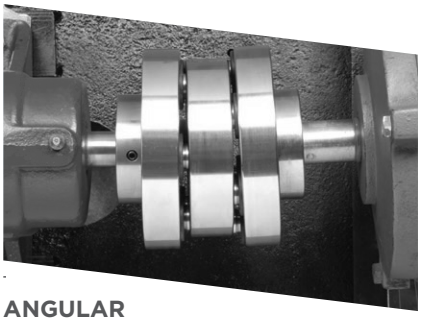
RAPID DELIVERY & CUSTOMIZATION

All design and manufacturing is done in the U.S.A.

Our large inventory of standard sizes and raw material allows us to make very fast deliveries in emergency situations. Because of our complete control of the design and manufacturing process, we can quickly accommodate custom installations.

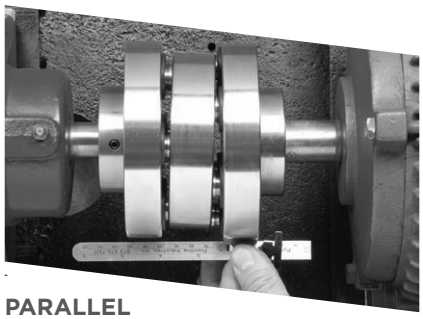
HIGH MISALIGNMENT TOLERANCE

Although precision alignment should be accomplished whenever possible to maximize equipment life, it is reassuring to know that in those situations when alignment is lost or obstructions prevent proper alignment, our coupling will greatly reduce the damage caused by lateral reactionary forces.

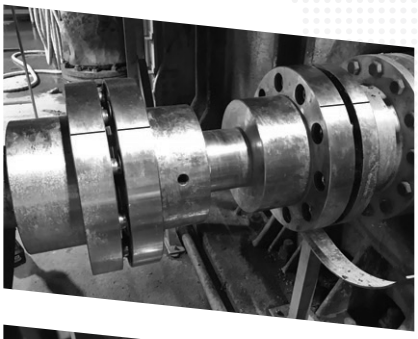


ANGULAR MISALIGNMENT

AXIAL MISALIGNMENT



PARALLEL MISALIGNMENT



EASY TO INSPECT/VISUAL INDICATION OF RELATIVE WEAR

A strobe light can be used while the coupling is in service to monitor relative wear of pins & bushings by checking a line marked axially across both hubs' O.D. at time of installation.

VIBRATION DAMPENING

The rubber coated bushings provide shock & vibration dampening leading to longer equipment life.

ELECTRICALLY ISOLATED

The rubber coated bushings also prevent stray current from traveling across hubs and damaging bearings on the driven equipment.

CHEMICALLY RESISTANT

Chemically resistant to various PH levels common to Pulp & Paper processes.

LOW INVENTORY COST

The only Spare Parts required are Pins & Bushings. The SS Hubs, Center Ring, Spacer & Drive Shafts never need to be replaced.

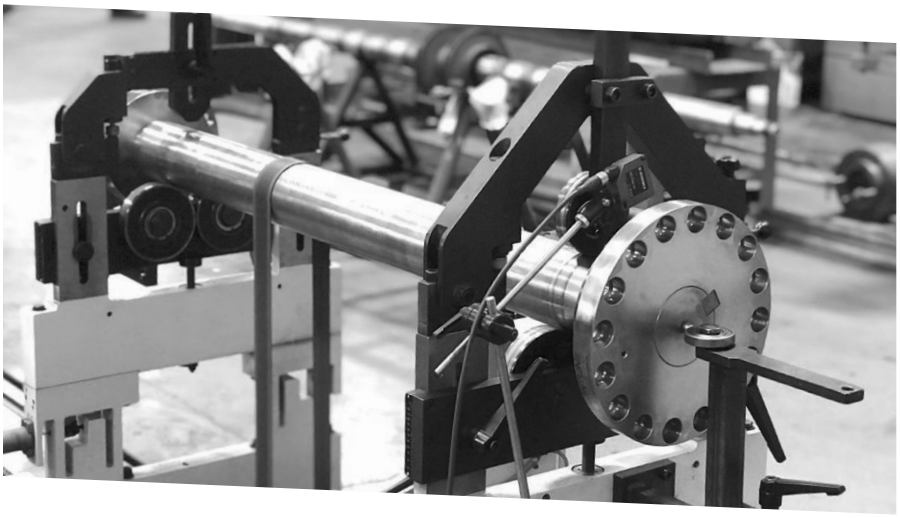
All sizes of Frontline Couplings are organized by 4 “Series,” allowing customers to use the same Pins & Bushings for multiple size couplings, decreasing inventory costs and simplifying storeroom management.

SERIES	SIZE COUPLING	NOMINAL TORQUE (in-lbs.)	MAX. BORE	BUSHINGS PER HUB	HUB OD	HP @ 1200 RPM	HP @ 1800 RPM	HP @ 3600 RPM
1	FC-1-200	67,769	2.000"	6	5.250"	1,291	1,936	3,873
	FC-1-300	155,666	3.000"	10	6.750”	2,965	4,448	8,895
	FC-1-400	230,241	4.000"	12	8.000"	4,386	6,578	13,157
	FC-1-500	446,003	5.000"	16	11.000"	8,495	12,743	25,486
2	FC-2-400	547,344	4.000"	10	10.000"	10,426	15,638	31,277
	FC-2-500	737,108	5.000"	12	11.000"	14,040	21,060	42,120
	FC-2-600	953,636	6.000”	14	12.000”	18,164	27,247	54,493
	FC-2-700	1,303,990	7.000”	16	14.000”	24,838	37,257	74,514
3	FC-3-600	1,737,693	6.000”	12	15.000”	33,099	49,648	99,297
	FC-3-700	2,189,494	7.000”	14	16.000”	41,705	62,557	125,114
	FC-3-800	2,872,987	8.000”	16	18.000”	54,724	82,085	164,171
	FC-3-900	3,649,156	9.000”	18	20.000”	69,508	104,262	208,523
	FC-3-1000	4,518,003	10.000”	20	22.000”	86,057	129,086	258,172
4	FC-4-800	3,323,104	8.000”	12	20.000”	63,297	94,946	189,892
	FC-4-900	4,344,057	9.000”	14	22.000”	82,744	124,116	248,232
	FC-4-1000	5,498,469	10.000”	16	24.000”	104,733	157,099	314,198
	FC-4-1100	6,786,339	11.000”	18	26.000”	129,264	193,895	387,791
5	FC-5-1000	4,931,770	10.000”	12	22.000”	93,938	140,908	281,815
	FC-5-1100	6,675,600	11.000”	14	24.000”	127,154	190,731	381,463
	FC-5-1300	7,025,275	13.000”	14	26.000”	133,815	200,722	401,444
	FC-5-1400	8,755,481	14.000”	16	28.000”	166,771	250,157	500,313
	FC-5-1600	11,076,047	16.000”	18	31.000”	210,972	316,458	632,917
	FC-5-1700	13,214,964	17.000”	20	33.000”	251,714	377,570	755,141

EASY TO INSTALL & ALIGN

With only 3 main components, 2 hubs & 1 floating piece, Frontline Coupling installations are simple & straightforward.

The precision machined hubs also accelerate the following rough alignment prior to laser alignment.



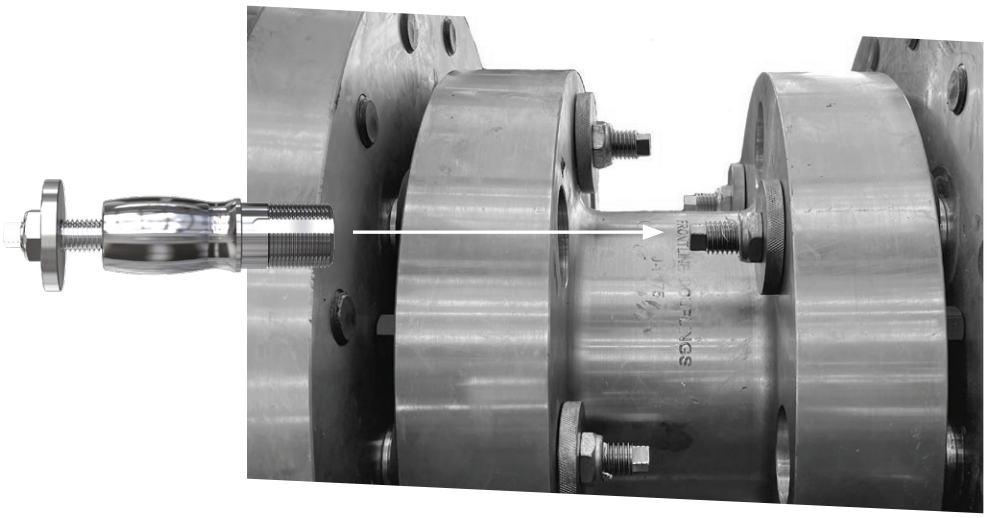
DYNAMICALLY BALANCED

Balancing to ISO 1940/1 Grade 2.5. G1.0 available upon request.

LIMITED END FLOAT APPLICATIONS

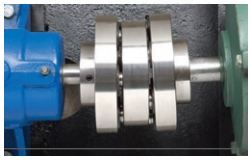
Due to the free-floating nature of the centerpiece, the Frontline Coupling is ideally suited for Limited End Float Applications.

The L.E.F. Pins (2 for each hub) keep the rotor within the allowable float, preventing it from hitting the motor bearings' thrust faces.



FRONTLINE COUPLING MODELS

Series	Max. Shaft Diameter	Nominal Torque
1	3.75 in	137,141 in/lb
2	5.0 in	495,085 in/lb
3	8.5 in	1,654,498 in/lb
4	12.0 in	4,738,008 in/lb



Angular Misalignment

Axial Misalignment

Parallel Misalignment

Applications

Paper Machines
Blenders
Calendars
Refiners
Dryers
Slitters
Vacuum Pump Trains
Wind & Unwind Stands
Wind Assist
Bark Bin Screws
Hydro Pulpers
Dump Conveyors
Fans
Fan Pumps
Thick Stock Pumps

MODEL SE

Single Engagement Coupling

The Single Engagement Model is comprised of two hubs—one fitted with pins and one fitted with bushings. This arrangement can only accommodate Angular and Axial Misalignment.

SEE PAGES 10–11

MODEL DE

Double Engagement Coupling

The Double Engagement Model consists of Two Hubs with Bushings and a Free Floating Drive Ring with Pins on each side. This arrangement can accommodate Parallel, Axial and Angular Misalignment.

SEE PAGES 12–13

MODEL SP

Spacer Coupling

The Spacer Model consists of Two Hubs with Bushings and a Spacer Cylinder with Pins on each side. This arrangement can accommodate Parallel, Axial and Angular Misalignment.

For applications where weight and size are an issue, this model can be modified by placing the Pins in the Hubs and the Bushings in the Spacer.

SEE PAGES 14–15

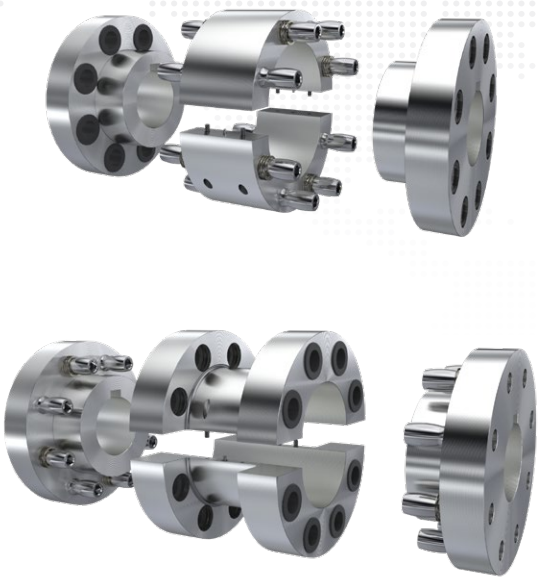
MODEL SD-SP-INV

Split Drop-Out Spacer With Inverted Hubs

The Split Drop-Out Spacer with Inverted Hubs Models offer double engagement misalignment capabilities while accommodating minimal distance between shaft ends.

MODEL SD-SP-INV-A
This configuration of hubs carrying bushings and a split spacer with pins allows for pin removal/installation through the inverted hubs.

MODEL SD-SP-INV-B
This configuration of hubs carrying pins and a split spacer with bushings, used when there is minimal clearance between the coupling and the driver/ driven equipment, allows for pin removal/ installation through the split spacer.



SEE PAGES 16-17

MODEL SHP

Shear Pin Coupling

The Double Engagement Shear Pin Model consists of a drive ring made of two detachable sections held together by a predetermined size and number of Stainless Steel or Bronze Pins, designed to shear at a certain torque. This arrangement can accommodate Parallel, Axial and Angular Misalignment.

SEE PAGES 18–20

MODEL CT

Cooling Tower Drive Shaft

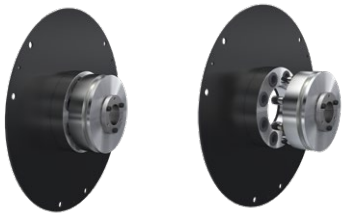
Designed specifically for Cooling Tower Applications, two single engagement couplings are placed one on each end of a tubular carbon fiber drive shaft.

SEE PAGES 21–22

MODEL FLW

Flywheel Coupling

A ring with bushings is fitted onto a flywheel and a hub with pins is fastened to the driven shaft.



SEE PAGE 23

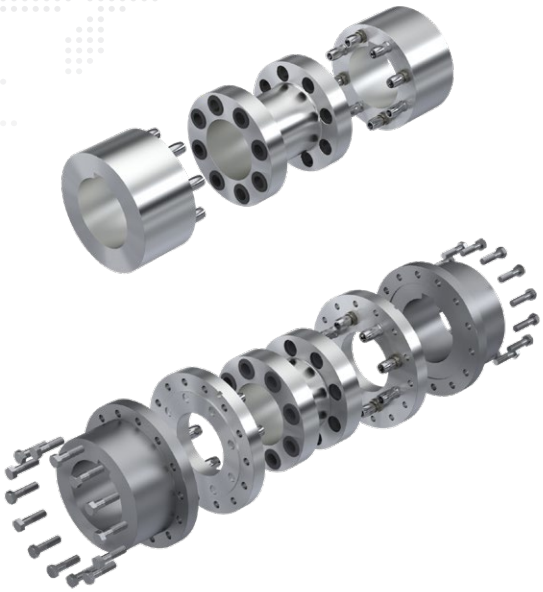
MODEL VPT
Vacuum Pump Train

Designed specifically for Vacuum Pump Trains, two Hubs with Pins engage with a cylindrical spacer with bushings on each side.

Customization options available to install a Frontline Pin & Bush Coupling using the existing Gear/Grid Coupling Rigid Hubs with Frontline Adapters.

MODEL VPT-A
All Frontline Components

MODEL VTP-B
Use existing Rigid Hubs with Frontline Adapters



SEE PAGES 24–25

MODEL FDS
Floating Drive Shaft

Two single engagement couplings are placed one on each side of a tubular drive shaft.

Customization options available to install a Frontline Pin & Bush Drive Shaft using the existing Gear/Grid Drive Shaft Rigid Hubs with Frontline Adapters.

MODEL FDS-A
All Frontline Components

MODEL FDS-B
Use existing Rigid Hubs with Frontline Adapters

MODEL FDS-C
Various customization options based on customer needs.

SEE PAGES 26–28

CUSTOMIZATION OPTIONS

PARTIALLY SPLIT HUBS

This option combines the ease of installation of a clearance fit with the reliability of an interference fit—goes in as a clearance fit, stays on as an interference fit.

SPLIT DROP OUT SPACER

To accommodate applications where a solid spacer could not be taken out to service the coupling.

NON-STANDARD DIAMETER HUBS

Custom diameter hubs can be designed and manufactured to fit the required coupling envelope.

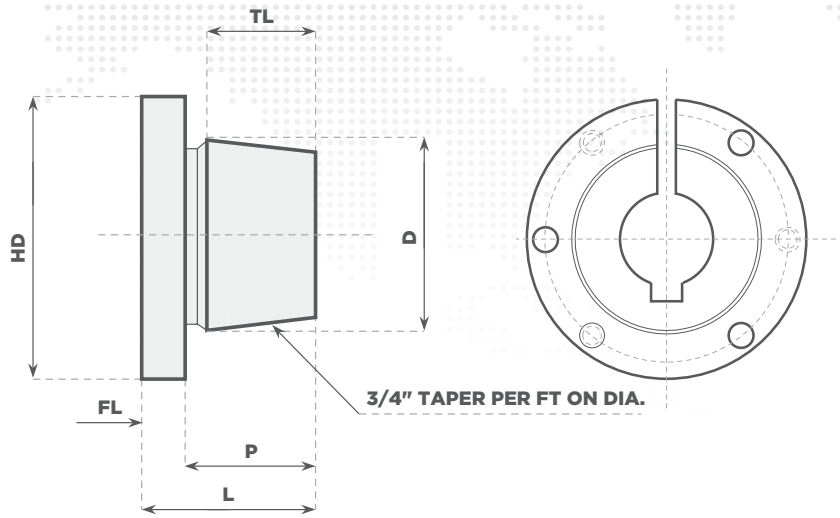
NON-STANDARD LENGTH HUBS

To meet specific design requirements, non-standard length hubs can be provided.

QD BUSHING

QD bushings are fitted on Series 1 hubs only. Taper lock bushings available upon request.

Contact Frontline for details.



BUSHING	COUPLING	HD	FL	D	P	TL	L	MIN.	MAX. BORE		SIZE OF CAP	TORQUE	WT.
SIZE	SIZE							BORE	STD. KEY	SHALLOW KEY	SCREW REQD	FT-LB	LBS
JA	A	2	5/16	1 3/8	11/16	5/8	1	0.500	1.000	1.190	(3) 10-24 X 1	5.000	0.4
SH	B	2-11/16	3/8	1-7/8	7/8	3/4	1-1/4	0.500	1.380	1.630	(3) 1/4 X 1-3/8	9.000	0.9
SD	C	3-3/16	7/16	2-3/16	1-3/8	1-1/4	1-13/16	0.500	1.630	1.940	(3) 1/4 X 1-7/8	9.000	1.6
SK	D	3-7/8	1/2	2-13/16	1-3/8	1-1/4	1-7/8	0.500	2.130	2.500	(3) 5/16 X 2	15.000	2.7
SF	E	4-5/8	1/2	3-1/8	1-1/2	1-1/4	2	0.500	2.310	2.810	(3) 3/8 X 2	30.000	3.9
F	F	6-5/8	13/16	4-7/16	2-13/16	2-1/2	3-5/8	1.000	3.250	3.940	(3) 9/16 X 3-5/8	75.000	13.3
J	G & H	7-1/4	1	5 5/32	3-1/2	3-3/16	4-1/2	1.440	3.750	4.500	(3) 5/8 X 4-1/2	135.000	20.8

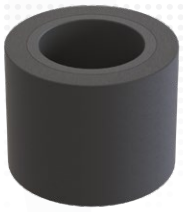
FIELD BUSHING INSTALLATION & REMOVAL TOOL KITS

Although common tools can be used to remove and install bushings, using our custom tools will greatly speed up the process, especially when gap between hubs is limited.

FOR SERIES 1&2
Part No. BUSH-RI-1-2-KIT

FOR SERIES 3&4
Part No. BUSH-RI-3-4-KIT

SPARE PARTS



Bushings

STANDARD RUBBER COATED (ST) 400°F

- Coated with Viton 85A
- Greatly reduces torsional vibration
- Ideal for applications where torsional vibration is an issue

Ordering Example BUSH 2 ST

Part
Series
Type

Pins

STANDARD PIN (ST)

- Barrel shaped engagement area allows for constant transfer of power at a broader range of angles.
- Standard Pins are made out of 17-4 PH Hard Chromed
- Clean up grooves to remove leftover residue from prior pins.
- Higbee shoulder to facilitate initial thread engagement

LIMITED END FLOAT PIN (LEF)

- Small flange on the drive side of the pin restrains the hubs from moving axially.
- Made out of 17-4 PH Hard Chromed

WIRE SECURED PIN (WS)

- Hexagonally shaped head has a hole on each side for wire to be threaded through each pin to keep them secured in place.
- Made out of 17-4 PH Hard Chromed

ST LEF WS

Ordering Example PIN 1 LEF

Part
Series
Type

AXIAL FLOAT OF CENTER PIECE

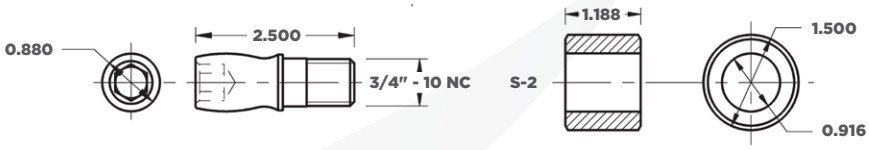
- Series 1: 0.300 in
- Series 2: 0.500 in
- Series 3: 0.650 in
- Series 4: 0.900 in

NOTE: The Rubber Coated Bushings for all (4) Four Series are rated for 400°F.

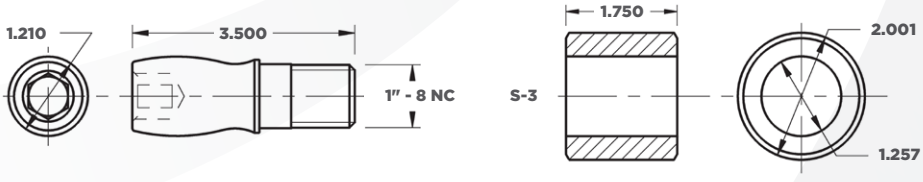
NOTE: The entire pin is flash hard chromed.

SERIES 1 **3/8" SOCKET**

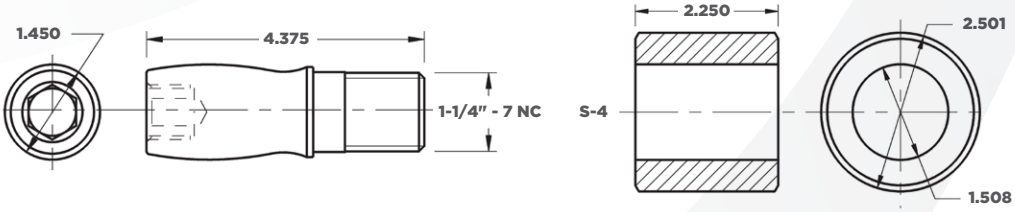
SERIES 2 **1/2" SOCKET**



SERIES 3 **5/8" SOCKET**



SERIES 4 **3/4" SOCKET**



SERVICE FACTORS

	ELECTRIC MOTOR W/ STANDARD TORQUE	ELECTRIC MOTOR W/ HIGH TORQUE	STEAM TURBINES & ENGINES W/ 4 OR MORE CYL.*	RECIPROCATING ENGINES*	
				1-CYL.	2-CYL.
AGITATORS	1.00	1.30	1.00	1.70	1.30
BAND RESAW (LUMBER)	1.50	1.75	1.50	2.20	1.80
BARGE HAUL PULLER	2.00	2.25	2.00	2.70	2.30
BEATERS	1.50	1.75	1.50	2.20	1.80
BLOWERS					
CENTRIFUGAL	1.00	1.25	1.00	1.70	1.30
LOBE, VANE	1.25	1.50	1.25	2.00	1.60
BOTTLING MACHINERY	1.25	1.50	1.25	2.00	1.60
BREW KETTLES (DISTILLED)	1.25	1.50	1.25	2.00	1.60
CAN FILLING MACHINE	1.00	1.25	1.00	1.70	1.30
CAR DUMPERS	2.50	2.75	2.50	3.20	2.80
CAR PULLERS	1.50	1.75	1.50	2.20	1.80
CARD MACHINE	1.75	2.00	1.75	2.50	2.00
CHILLER (OIL)	1.50	2.00	1.25	2.00	2.00
COMPRESSORS					
CENTRIFUGAL	1.00	1.25	1.00	1.70	1.30
SCREW, LOBE	1.25	1.50	1.25	2.00	1.60
CONVEYERS, UNIFORMLY FED					
ASSEMBLY, BELT, SCROLL	1.00	1.25	1.00	1.70	1.30
BUCKET, SAWDUST	1.25	1.50	1.25	2.00	1.60
LIVE ROLL, SHAKER, RECIPROCATING	3.00	3.25	3.00	3.70	3.30
CONVEYORS, NOT UNIFORMLY FED					
ASSEMBLY, BELT, SCREW, OVEN, SCREW	1.20	1.45	1.20	1.90	1.50
RECIPROCATING	2.50	2.75	2.50	3.20	2.80
SHAKER	3.00	3.25	3.00	3.70	3.30
COOKERS—BREWING, DISTILLING, FOOD	1.25	1.50	1.25	2.00	1.60
CRANES & HOIST	2.00	2.25	2.00	2.70	2.30
CRUSHERS--CANE (SUGAR, STONE, OR ORE)	3.00	3.25	3.00	2.70	3.30
DREDGES					
CABLE REELS	2.00	2.25	2.00	2.70	2.30
CONVEYORS, PUMPS, MANEUVERING WIN	1.50	1.75	1.50	2.20	1.80
CUTTER HEAD DRIVES	2.50	2.75	2.50	3.20	2.80
DYNAMOMETER	1.50	1.75	1.50	2.20	1.80
EVAPORATORS	1.00	1.25	1.00	1.70	1.30
FANS					
CENTRIFUGAL	1.00	1.25	1.00	1.70	1.30
COOLING TOWER	2.00	2.25	2.00	2.70	2.30
FORCED DRAFT, PROPELLER	1.50	1.75	1.50	2.20	1.80
INDUCED DRAFT W/DAMPER CONTROL	2.00	2.25	2.00	2.70	2.30
INDUCED DRAFT W/O DAMPER CONTROL	2.00	1.50	1.25	2.00	1.60

	ELECTRIC MOTOR W/ STANDARD TORQUE	ELECTRIC MOTOR W/ HIGH TORQUE	STEAM TURBINES & ENGINES W/ 4 OR MORE CYL.*	RECIPROCATING ENGINES*	
				1-CYL.	2-CYL.
FEEDERS					
BELT, SCREW	1.00	1.25	1.00	1.70	1.30
RECIPROCATING	2.50	2.75	2.50	3.20	2.80
FILTER, PRESS-OIL GENERATORS	1.50	1.75	1.50	2.20	1.80
NOT WELDING	1.00	1.25	1.00	1.70	1.30
WELDING	2.00	2.25	2.00	2.70	2.30
HOIST	1.50	1.75	1.50	2.20	1.80
HAMMERMILLS	2.00	2.25	2.00	2.70	2.30
KILNS	1.50	1.75	1.50	2.20	1.80
LAUNDRY WASHERS					
REVERSING	2.00	2.25	2.00	2.70	2.30
LUMBER MACHINERY					
BARKERS, EDGER FEEDER, LIVE ROLL	2.00	2.25	2.00	2.70	2.30
PLANER, SLAB CONVEY	2.00	2.25	2.00	2.70	2.30
MACHINE TOOLS					
PUNCH PRESS-GEAR DRIVEN, PLATE PLANER	2.00	2.25	2.00	2.70	2.30
TAPPING MACHINERY BENDING ROLL	2.00	2.25	2.00	2.70	2.30
MAIN DRIVE	1.50	1.75	1.50	2.20	1.80
AUXILIARY DRIVES	1.00	1.25	1.00	1.70	1.30
METAL FORMING MACHINES					
DRAW BENCH-CARRIAGE & MAIN DRIVE EXTRUDER, FORMING MACHINE, WIRE DRAWING	2.00	2.25	2.00	2.70	2.30
TABLE CONVEYORS	2.50	2.75	2.50	3.20	2.80
WIRE WINDING, COILERS, SLITTERS	1.50	1.75	1.50	2.20	1.80
MILLS ROTARY TYPE					
BALL, KILNS, PEBBLE, ROLLING, TUBE	2.00	2.25	2.00	2.70	2.30
CEMENT KILNS DRYERS, COOLERS	2.00	2.25	2.00	2.70	2.30
TUMBLING	1.50	1.75	1.50	2.20	1.80
MIXERS					
CONCRETE, CONTINUOUS	1.75	2.00	1.75	2.50	2.00
MULLER	1.50	1.75	1.50	2.20	1.80
PAPER MILLS					
AGITATOR (MIXERS) REEL, WINDER	1.20	1.45	1.20	1.90	1.50
WINDER	1.20	1.45	1.20	1.90	1.50
BARKER (MECHANICAL) LOG HAUL, CHIPPER	2.00	2.25	2.00	2.70	2.30
BARKING DRUM (SPUR GEAR)	2.50	2.75	2.50	3.20	2.80

	ELECTRIC MOTOR W/ STANDARD TORQUE	ELECTRIC MOTOR W/ HIGH TORQUE	STEAM TURBINES & ENGINES W/ 4 OR MORE CYL.*	RECIPROCATING ENGINES*	
				1-CYL.	2-CYL.
BEATER, PULPER, JORDANS, DRESSES	2.00	2.25	2.00	2.70	2.30
CALANDERS, DRYERS, WASHERS, THICKENER	1.50	1.75	1.50	2.20	1.80
CONVERTING MACHINES, CONVEYORS	1.20	1.45	1.20	1.90	1.50
PRINTING PRESSES	1.50	1.75	1.50	1.70	1.30
PUG MILL	1.75	2.00	1.75	2.00	1.60
PUMPS					
CENTRIFUGAL	1.00	1.25	1.00	1.70	1.30
GEAR, ROTARY, VANE	1.25	1.50	1.25	2.00	1.60
RECIPROCATING*					
1-CYL. SINGLE OR DOUBLE ACTING	2.00	2.25	2.00	2.70	2.70
2-CYL. SINGLE ACTING	2.00	2.25	2.00	2.70	2.30
2-CYL. DOUBLE ACTING	1.75	2.00	1.75	2.50	2.00
3 OR MORE CYL.	1.50	1.80	1.50	2.20	1.80
RUBBER MACHINERY					
MIXERS	2.50	2.75	2.50	3.20	2.80
RUBBER CALENDER	2.00	2.25	2.00	2.70	2.30
SCREENS					
AIR WASHING, WATER	1.00	1.25	1.00	1.70	1.30
ROTARY—STONE OR GRAVEL, DEWATERING	1.50	1.75	1.50	2.20	1.80
VIBRATING	2.50	2.75	2.50	3.20	2.80
GRIZZLY	2.00	2.25	2.00	2.70	2.30
SHREDDERS	1.50	1.75	1.50	2.20	1.80
STEERING GEARS	1.00	1.25	1.00	1.70	1.30
STOKERS	1.00	1.25	1.00	1.70	1.30
SUCTION ROLL (PAPER)	1.50	1.75	1.50	2.20	1.80
TEXTILE MACHINERY					
DRYERS, DYEING MACHINERY, MANGLE	1.20	1.45	1.20	2.00	1.60
LOOM, SPINNER, TENTER FRAMES	1.50	1.75	1.50	2.20	1.80
TUMBLING BARRELS	1.75	2.00	1.75	2.50	2.00
WINDLASS	2.00	2.25	2.00	2.70	2.30
WOODWORKING MACHINE	1.00	1.25	1.00	1.70	1.30

SELECTION GUIDE & RATING CHART

RATING CHART

SERIES	SIZE COUPLING	NOMINAL TORQUE (in-lbs.)	MAX. BORE	BUSHINGS PER HUB	HUB OD	HP @ 1200 RPM	HP @ 1800 RPM	HP @ 3600 RPM
1	FC-1-200	67,769	2.000"	6	5.250"	1,291	1,936	3,873
	FC-1-300	155,666	3.000"	10	6.750"	2,965	4,448	8,895
	FC-1-400	230,241	4.000"	12	8.000"	4,386	6,578	13,157
	FC-1-500	446,003	5.000"	16	11.000"	8,495	12,743	25,486
2	FC-2-400	547,344	4.000"	10	10.000"	10,426	15,638	31,277
	FC-2-500	737,108	5.000"	12	11.000"	14,040	21,060	42,120
	FC-2-600	953,636	6.000"	14	12.000"	18,164	27,247	54,493
	FC-2-700	1,303,990	7.000"	16	14.000"	24,838	37,257	74,514
3	FC-3-600	1,737,693	6.000"	12	15.000"	33,099	49,648	99,297
	FC-3-700	2,189,494	7.000"	14	16.000"	41,705	62,557	125,114
	FC-3-800	2,872,987	8.000"	16	18.000"	54,724	82,085	164,171
	FC-3-900	3,649,156	9.000"	18	20.000"	69,508	104,262	208,523
	FC-3-1000	4,518,003	10.000"	20	22.000"	86,057	129,086	258,172
4	FC-4-800	3,323,104	8.000"	12	20.000"	63,297	94,946	189,892
	FC-4-900	4,344,057	9.000"	14	22.000"	82,744	124,116	248,232
	FC-4-1000	5,498,469	10.000"	16	24.000"	104,733	157,099	314,198
	FC-4-1100	6,786,339	11.000"	18	26.000"	129,264	193,895	387,791
5	FC-5-1000	4,931,770	10.000"	12	22.000"	93,938	140,908	281,815
	FC-5-1100	6,675,600	11.000"	14	24.000"	127,154	190,731	381,463
	FC-5-1300	7,025,275	13.000"	14	26.000"	133,815	200,722	401,444
	FC-5-1400	8,755,481	14.000"	16	28.000"	166,771	250,157	500,313
	FC-5-1600	11,076,047	16.000"	18	31.000"	210,972	316,458	632,917
	FC-5-1700	13,214,964	17.000"	20	33.000"	251,714	377,570	755,141

NOTE: Due to the high power density of Frontline Couplings, in most cases you can select the right coupling, based solely on max. shaft diameter of your application. Always consult Frontline if you are unsure about your choice.

SELECTION GUIDE

1. Determine the nominal torque (Tn) in "in-lb" as follows:

NOMINAL TORQUE =
(HP x 63025) / RPM

2. Refer to "Service Factors" chart on the previous page and select the appropriate service factor for your application.
3. Calculate the "Design Torque" as follows:

DESIGN TORQUE =
NOMINAL TORQUE x SERVICE FACTOR

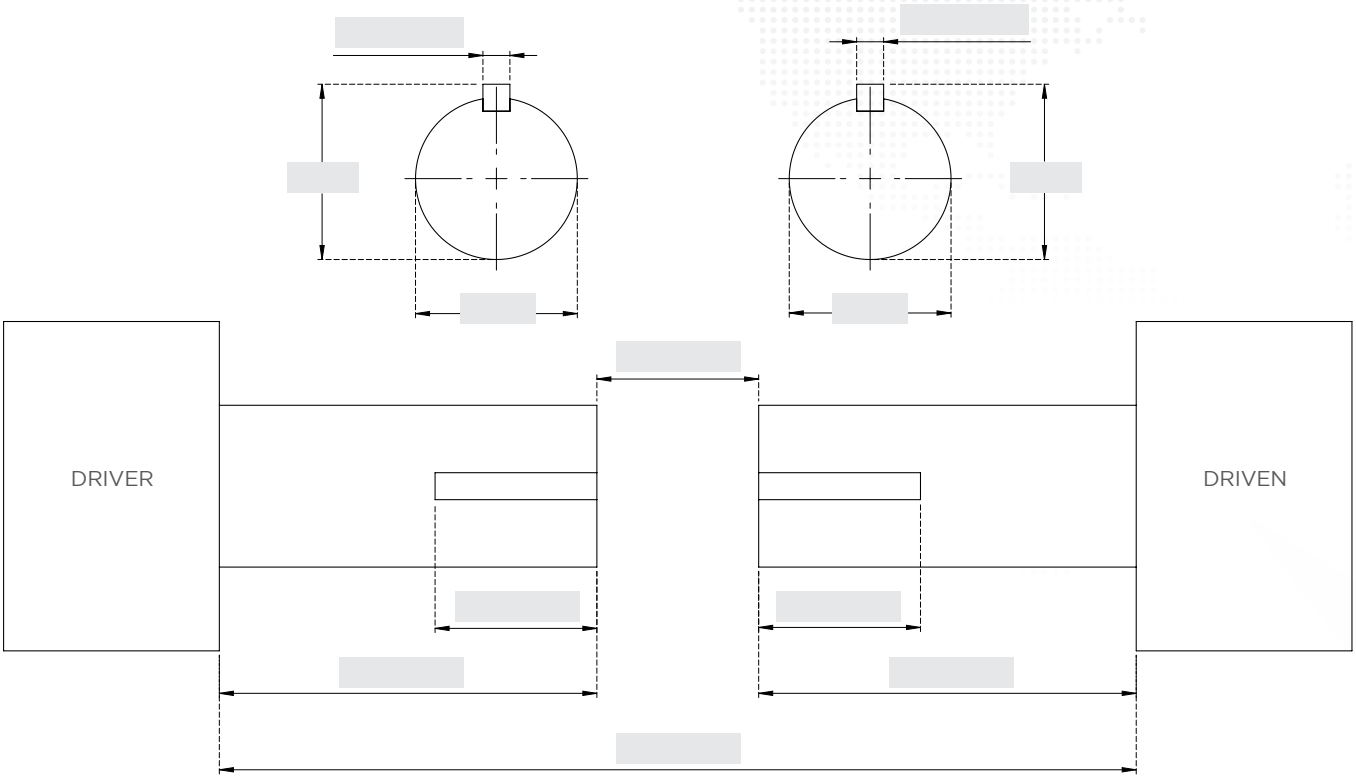
4. Using the "Coupling Rating Chart," compare the calculated Design Torque with the Nominal Torque column, locate the nearest higher rating and find the corresponding coupling size to the left.
5. Compare the driver/driven shaft size to the maximum bore available for the coupling selected. If it is smaller than the driver/driven shaft sizes, then go further down the "max.bore" column to select the coupling that can accommodate these shaft sizes.

Although the performance and useful life of Frontline Couplings are greatly enhanced by their unique features and advantages, there is no substitute for:

1. Accurately sizing the Coupling for the specific application.
2. Proper installation and setting.
3. Precision shaft alignment.
4. Taking into consideration the proper service factor.
5. Allowing for environmental conditions such as extreme temperature, excessive dust and humidity.
6. Periodic Inspections.

For information on Ordering & Part Numbers, see page 34.

COUPLING DATA SHEET — "A"
CYLINDRICAL SHAFTS



PLEASE COMPLETE THIS FORM AND EMAIL OR FAX FOR A PROMPT QUOTE

TYPE OF FIT*: ☐ Clearance Class I ☐ Clearance Class II ☐ Interference

TYPE OF MOUNT:** ☐ Horizontal ☐ Vertical ☐ Spacer ☐ Floating Shaft

DRIVER _____ **DRIVEN** _____ **HORSE POWER** _____

RPM _____ **QUANTITY** _____

* For Details of Fits, refer to the table, "Coupling Bore Clearances."

** For Vertical Mount, the upper bearing of the Driven Equipment must be independently supported.

Name _____ Title _____

Company _____

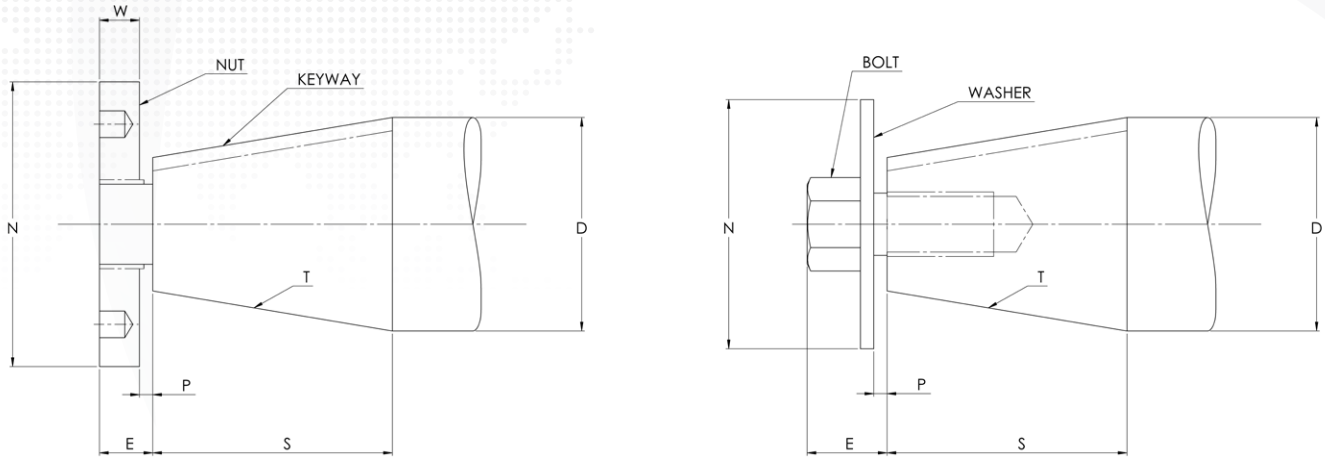
Address _____

Phone Number _____ Fax Number _____ Date _____

Email Address _____

COUPLING DATA SHEET — "B"

TAPERED SHAFT DETAILS



PLEASE COMPLETE THIS FORM AND EMAIL OR FAX IT TOGETHER WITH COUPLING DATA SHEET "A"

(D) Large Diameter _____

(T) Taper per Foot _____

(S) Length of Taper, measured parallel to Shaft Centerline _____

(P) Clearance Space for drawing Hub up on Tapered Shaft _____
Usually 1/8" to 1/4" depending on Shaft size and Taper.

(N) Locknut/Washer Diameter _____

(W) Locknut/Washer Width _____

KEYWAY Width _____ **KEYWAY** Depth _____

Specify whether Keyway is parallel to taper or shaft centerline.
Specify Depth at larger diameter of taper if Keyway is parallel to shaft centerline.

Name _____ Title _____

Company _____

Address _____

Phone Number _____ Fax Number _____ Date _____

Email Address _____

INSTALLATION INSTRUCTIONS

CLEARANCE FIT

Model DE (Double Engagement)
Model SP (Spacer)
Model SD-SP-INV (Split Drop-Out Spacer with Inverted Hubs)
Model FDS (Floating Drive Shaft)

FOR SERIES 1 THROUGH 4

1. Inspect and clean the driver and driven shafts and the keys.
2. Verify that the coupling bores and keyway details match driver and driven shafts.
3. Mount the hubs on the respective shafts and do not tighten set screws.
4. Apply a few drops of Loctite 242 or equivalent non-permanent thread locking compound to the threaded portion of each pin.
5. Insert the Ring between the two (2) hubs, install pins through the hubs into the ring from both sides and ensure that the spacing springs are installed on every other pin. See wave springs installation instructions on following pages for more information.
6. Torque down pins as per chart below:

Series 1	**35 ft-lb**
Series 2	**120 ft-lb**
Series 3	**220 ft-lb**
Series 4	**350 ft-lb**

7. Insert provided Setting Clips on bushings, one clip on either side of the floating center piece.
8. Slide the Hubs together until both Setting Clips make contact with the floating center piece. If setting clips are unavailable, refer to below gap chart and set appropriate distance between hubs and center piece.

Series 1	**0.250″**	**+0.062″ -0.000″**
Series 2	**0.375″**	**+0.062″ -0.000″**
Series 3	**0.562″**	**+0.125″ -0.000″**
Series 4	**0.687″**	**+0.125″ -0.000″**

9. Lightly tighten Set Screws on both Hubs without any use of Loctite or equivalent thread locking compound and remove Setting Clips.
10. Move floating center piece axially several times to ensure it is free to float*.
11. Align the driver and the driven shafts to the specifications provided by the equipment manufacturer. Laser alignment is recommended to get the best coupling performance. If no specifications are available, then the following values may be used for general-purpose machines like centrifugal pumps and motors.

SPEED RPM	PARALLEL MISALIGNMENT	ANGULAR MISALIGNMENT Per 10″ Dia. Of Coupling
600	within 0.005″ to 0.009″	within 0.010″ to 0.015″
900	within 0.003″ to 0.006″	within 0.007″ to 0.010″
1200	within 0.0025″ to 0.004″	within 0.005″ to 0.008″
1800	within 0.002″ to 0.003″	within 0.003″ to 0.005″
3600	within 0.001″ to 0.0015″	within 0.002″ to 0.003″
7200	within 0.0005″ to 0.001″	within 0.001″ to 0.002″

12. Check the coupling setting dimensions once again to ensure that the gap between each hub and the ring is correct for the given series.
13. Tighten set screws using 242 Loctite or equivalent non-permanent Thread Locking Compound.
14. Install the Coupling Guard in place.
15. Start equipment and check for any unusual noise or vibration.

*If the center piece does not freely float with the designated gap settings between the center piece and hubs, the Coupling will not be able to accommodate misalignment and may lead to accelerated wear.

INSTALLATION INSTRUCTIONS

CLEARANCE FIT

Model SE (Single Engagement)

FOR SERIES 1 THROUGH 4

1. Inspect and clean the driver and driven shafts of any burrs, rust, deposits or sharp edges.
2. Check the dimensions of the shafts and the keys.
3. Mount pins on the ring using a few drops of Loctite 242 or any equivalent thread locking compound. Torque down pins as per chart below.
4. Mount the hubs on the respective shafts. Carefully adjust hubs until there is a metal to metal, gap between the hubs that corresponds to the appropriate coupling series:

Series 1	**0.250″**	**+0.062″ -0.000″**
Series 2	**0.375″**	**+0.062″ -0.000″**
Series 3	**0.562″**	**+0.125″ -0.000″**
Series 4	**0.687″**	**+0.125″ -0.000″**

To facilitate this process please use the plastic setting clips provided with every coupling.

5. Rough align and tighten the foundation bolts on the drive equipment.
6. Tighten the set screws on the hubs. Use any non-permanent thread locking compound such as Loctite® 242.
7. Align the driver and driven shafts to the specifications provided by the equipment manufacturer. Laser alignment is recommended to get the best coupling performance. If no specifications are available then the following values may be used for general-purpose machines like centrifugal pumps and motors.

SPEED RPM	PARALLEL MISALIGNMENT	ANGULAR MISALIGNMENT Per 10″ Dia. Of Coupling
600	within 0.005″ to 0.009″	within 0.010″ to 0.015″
900	within 0.003″ to 0.006″	within 0.007″ to 0.010″
1200	within 0.0025″ to 0.004″	within 0.005″ to 0.008″
1800	within 0.002″ to 0.003″	within 0.003″ to 0.005″
3600	within 0.001″ to 0.0015″	within 0.002″ to 0.003″
7200	within 0.0005″ to 0.001″	within 0.001″ to 0.002″

8. Apply a few drops of Loctite® 242 or equivalent thread locking compound on the threaded portion of the pins and insert them from the back of the hubs, torquing them down to about the appropriate value.

PINS TORQUE DOWN VALUES

Series 1	**35 ft-lb**
Series 2	**120 ft-lb**
Series 3	**220 ft-lb**
Series 4	**350 ft-lb**

9. Check the coupling setting dimensions once again to ensure that the gap between hubs is correct for the given series.
10. Put the Coupling guard in place.
11. Start and check for any unusual sound or vibration.
12. Take vibration readings and record the same for future reference.

NOTE: For couplings with interference fit, it is essential that accurate field measurements be taken to establish the exact position of the hubs on the shaft. Also the bushings are provided separately, so that they can be “pressed in” after the hubs have cooled down.

INSTALLATION INSTRUCTIONS

INTERFERENCE FIT

Model SE (Single Engagement)

FOR SERIES 1 THROUGH 4

1. Inspect and clean the driver and driven shafts of any burrs, rust, deposits or sharp edges.
2. Measure and record shafts' diameters, keyway details and distance between shaft ends.
3. Ensure that both the driver and the driven equipment are in their operating positions.
4. Refer to the approved drawing of the coupling to be installed and make note of the overall length of the assembled coupling.
5. Scribe a line on both shafts to denote the back end of both hubs when installed.
6. Heat shrink both hubs on the shafts so that the back of the hubs match the scribed lines. If the DBSE (distance between shaft ends) is less than the length of a hub, then the driver or driven equipment will need to be backed out enough to allow the hubs to be installed.
7. Allow the hubs to cool and install the bushings in the one hub.
8. Align the driver and driven shafts to the specifications provided by the equipment manufacturer. Laser alignment is recommended to get the best coupling performance. If no specifications are available then the following values may be used for general-purpose machines like centrifugal pumps and motors.

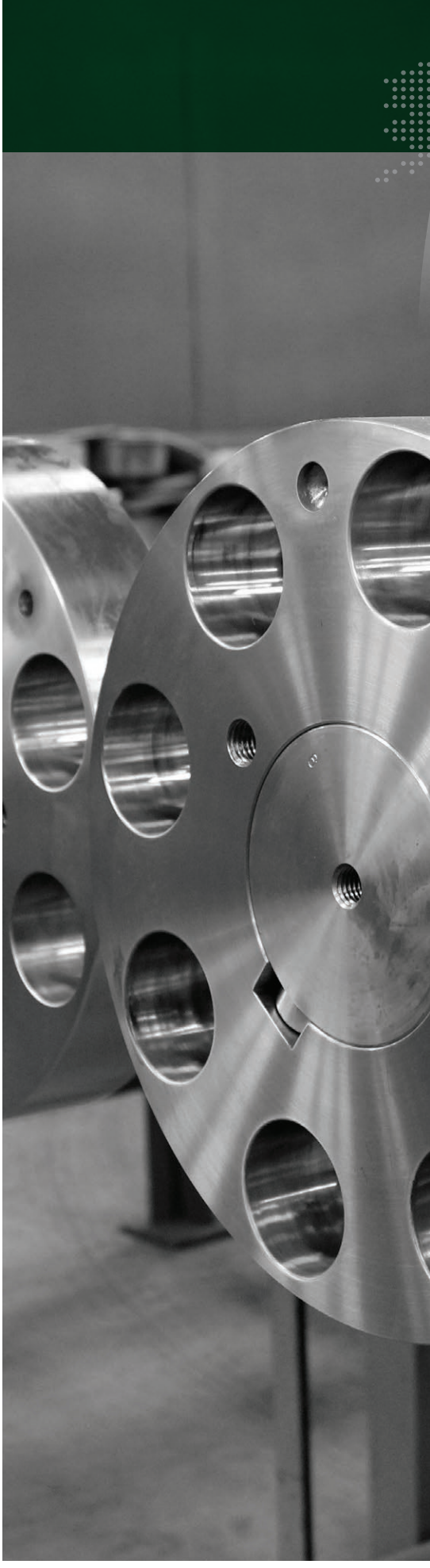
SPEED RPM	PARALLEL MISALIGNMENT	ANGULAR MISALIGNMENT Per 10" Dia. Of Coupling
600	within 0.005" to 0.009"	within 0.010" to 0.015"
900	within 0.003" to 0.006"	within 0.007" to 0.010"
1200	within 0.0025" to 0.004"	within 0.005" to 0.008"
1800	within 0.002" to 0.003"	within 0.003" to 0.005"
3600	within 0.001" to 0.0015"	within 0.002" to 0.003"
7200	within 0.0005" to 0.001"	within 0.001" to 0.002"

9. Ensure that the metal to metal gap between the (2) two hubs corresponds to the appropriate Coupling Series.

Series 1	0.250"	+0.062" -0.000"
Series 2	0.375"	+0.062" -0.000"
Series 3	0.562"	+0.125" -0.000"
Series 4	0.687"	+0.125" -0.000"

10. Apply a few drops of Loctite® 242 or equivalent thread locking compound on the threaded portion of the pins and insert them from the back of the hubs, torquing them down to about the appropriate value.
11. Put the Coupling guard in place.
12. Start and check for any unusual sound or vibration.
13. Take vibration readings and record the same for future reference.

NOTES: Due to the fact that Single Engagement Couplings can only accommodate Angular Misalignment, we encourage end-users to only use these Couplings at both ends of a Drive Shaft, or when the driver and driven equipment mount to each other through a Rabetted Fit.



INSTALLATION INSTRUCTIONS

INTERFERENCE FIT

Model DE (Double Engagement)
Model SP (Spacer)
Model SD-SP-INV (Split Drop-Out Spacer with Inverted Hubs)
Model FDS (Floating Drive Shaft)

FOR SERIES 1 THROUGH 4

1. Inspect and clean the driver and driven shafts of any burrs, rust, deposits or sharp edges.
2. Measure and record shafts' diameters, keyway details and distance between shaft ends.
3. Ensure that both the driver and the driven equipment are in their operating positions.
4. Refer to the approved drawing of the coupling to be installed and make note of the overall length of the assembled coupling.
5. Scribe a line on both shafts to denote the back end of both hubs when installed.
6. Heat shrink both hubs on the shafts so that the back of the hubs match the scribed lines. If the DBSE (distance between shaft ends) is less than the length of a hub, then the driver or driven equipment will need to be backed out enough to allow the hubs to be installed.
7. Allow the hubs to cool and install bushings.
8. Align the driver and driven shafts to the specifications provided by the equipment manufacturer. Laser alignment is recommended to get the best coupling performance. If no specifications are available then the following values may be used for general-purpose machines like centrifugal pumps and motors.
9. Apply a few drops of Loctite®242 or equivalent thread locking compound on the threaded portion of the pins and insert them from the back of the hubs, making sure to install the provided wave springs on every other pin. These springs will keep the floating ring/spacer properly centered, allowing for maximum misalignment tolerance. See Wave Springs installation instructions on following pages for more information. Torque pins down to the appropriate value.

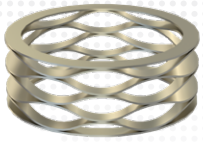
PINS TORQUE DOWN VALUES	
Series 1	35 ft-lb
Series 2	120 ft-lb
Series 3	220 ft-lb
Series 4	350 ft-lb

10. Check the coupling setting dimensions once again to ensure that the gap between each hub and the ring is correct for the given series.
11. Put the Coupling guard in place.
12. Start and check for any unusual sound or vibration.
13. Take vibration readings and record the same for future reference.

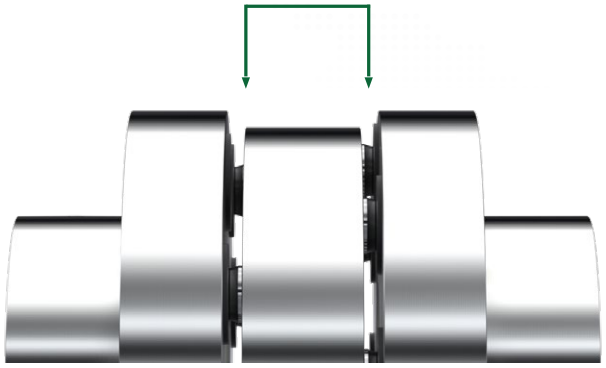
NOTE: For couplings with interference fit, it is essential that accurate field measurements be taken to establish the exact position of the hubs on the shaft. Also, the bushings are provided separately, so that they can be "pressed in" after the hubs have cooled down.

INSTALLATION INSTRUCTIONS

Wave Springs on Frontline Couplings & Driveshafts



The double engagment design of Frontline Couplings and Driveshafts allows for high misalignment tolerance by maintaining gaps between the hubs and floating centerpiece.



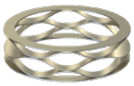
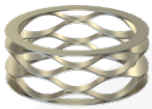
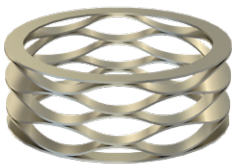
When the floating centerpiece of a Double Engagement Coupling or Driveshaft moves axially allthe way to one side, eliminating one of the gaps, it functions as a single engagement coupling andthe misalignment tolerance is greatly reduced.

By installing wave springs on each side of a Frontline Coupling's Floating Centerpiece, we allow for anyresidual misalignment to be shared equally by both Engagements.

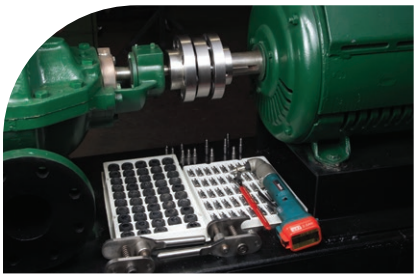
INSTALLATION INSTRUCTIONS

Wave Springs on Frontline Couplings & Driveshafts

All Frontline Rings, Spacers and Floating Driveshafts have an even number of pins & bushings. Wave Springs should be evenly distributed by installing one on every other pin as shown below.

SERIES	PART NUMBER	
SD-1	SPRING-SD1	
SD-2	SPRING-SD2	
SD-3	SPRING-SD3	
SD-4	SPRING-SD4	

FIELD REPLACEMENT
PINS & BUSHINGS



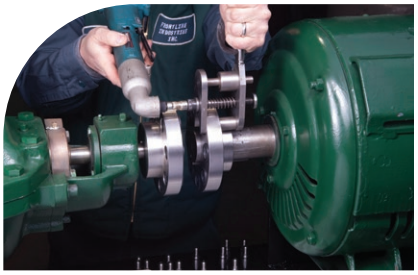
Preparation of field replacement of pins and bushings

Removal of pins with ratchet

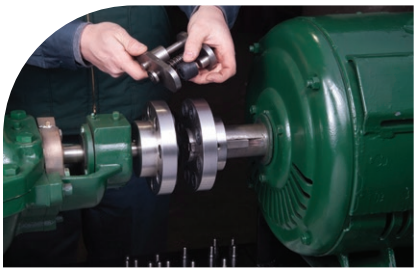
Removal of pins with cordless angle ratchet wrench

Lowering of power ring*

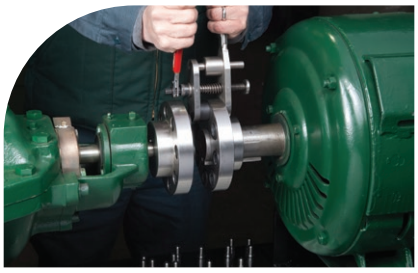
Removal of bushings using tool and ratchet wrench



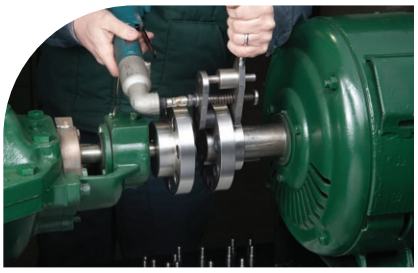
Removal of bushing using tool and angle ratchet wrench



Loading of a bushing in tool

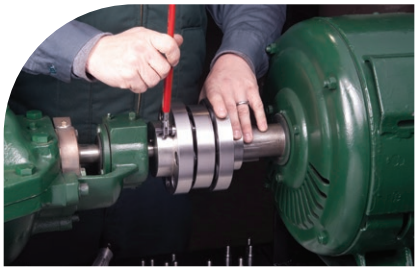


Installation of bushings using tool and ratchet wrench



Installation of bushings using tool and battery operated angle ratchet wrench

Raising of ring and engaging all pins from both sides by hand (thread locker already applied)



Installation of pins using ratchet wrench

Final torquing of pins

*In the event that there is not enough clearance between the shafts to completely remove the power ring, simply “rest it” on the shafts.

STOCK BORES & CLEARANCES
FRONTLINE COUPLINGS

Coupling Bore Clearances

SHAFT DIA.	CLEARANCE FIT (CF)		INTERFERENCE FIT (IF)	SHAFT DIA.	CLEARANCE FIT (CF)		INTERFERENCE FIT (IF)
	CLASS I	CLASS II			CLASS I	CLASS II	
0.500	0.500-0.501	0.500-0.502	0.4490-0.4995	4.000	4.0000-4.0015	4.000-4.003	3.9970-3.9985
0.625	0.625-0.626	0.625-0.627	0.6240-0.6245	4.500	4.500-4.502	4.500-4.504	4.4965-4.4980
0.750	0.750-0.751	0.750-0.752	0.7490-0.7495	5.000	5.000-5.002	5.000-5.004	4.9965-4.998
0.875	0.875-0.876	0.875-0.877	0.8740-0.8745	5.500	5.500-5.502	5.500-5.504	5.4960-5.4975
1.000	1.000-1.001	1.000-1.002	0.9990-0.9995	6.000	6.000-6.002	6.000-6.004	5.9960-5.9975
1.125	1.125-1.126	1.125-1.127	1.1240-1.1245	6.500	6.500-6.502	6.000-6.504	6.4960-6.4975
1.250	1.250-1.251	1.250-1.252	1.2490-1.2495	7.000			6.9960-6.9975
1.375	1.375-1.376	1.375-1.377	1.3740-1.3745	7.500			7.4950-7.4970
1.500	1.500-1.501	1.500-1.502	1.4990-1.4995	8.000			7.9950-7.9970
1.625	1.625-1.626	1.625-1.627	1.623-1.624	8.500			8.4945-8.4965
1.750	1.750-1.751	1.750-1.752	1.748-1.749	9.000			8.9945-8.9965
1.875	1.875-1.876	1.875-1.877	1.873-1.874	9.500			9.4940-9.4960
2.000	2.000-2.001	2.000-2.002	1.998-1.999	10.000			9.9940-9.9960
2.125	2.125-2.1265	2.125-2.127	2.123-2.124	10.500			10.4935-10.4950
2.250	2.2500-2.2515	2.250-2.252	2.248-2.249	11.000			10.9935-10.9955
2.375	2.3750-2.3765	2.375-2.377	2.373-2.374	11.500			11.4930-11.4950
2.500	2.5000-2.5015	2.500-2.502	2.498-2.499	12.000			11.9930-11.9950
2.625	2.6250-2.6265	2.625-2.627	2.623-2.624				
2.750	2.7500-2.7515	2.750-2.752	2.748-2.749				
2.875	2.8750-2.8765	2.875-2.877	2.873-2.874				
3.000	3.0000-3.0015	3.000-3.002	2.998-2.999				
3.250	3.2500-3.2515	3.250-3.253	3.2470-3.2485				
3.500	3.5000-3.5015	3.500-3.503	3.4970-3.4985				
3.625	3.6250-3.6265	3.625-3.628	3.6220-3.6235				
3.750	3.7500-3.7515	3.750-3.753	3.7470-3.7485				

COUPLING IDENTIFICATION
IDENTIFY AN EXISTING COUPLING

Due to the large number of custom sizes produced and to help customers identify the size and models of their existing couplings, starting June 2019 Frontline has been engraving a Job # on the back of each hub. This Job # will enable Frontline to trace all details of the application and the drawing # of that specific coupling.

NEMA
Shaft Details

NEMA FRAME	SHAFT DIAMETER	KEY WAY	NEMA FRAME	SHAFT DIAMETER	KEY WAY
42	3/8″	FLAT	324T	2-1/8″	1/2″
48	1/2″	FLAT	326T	2-1/8″	1/2″
56	5/8″	3/16″	324TS	1-7/8″	1/2″
56H	5/8″	3/16″	326TS	1-7/8″	1/2″
143T	7/8″	3/16″	364U	2-1/8″	1/2″
145T	7/8″	3/16″	365U	2-1/8″	1/2″
182	7/8″	3/16″	364T	2-3/8″	5/8″
184	7/8″	3/16″	365T	2-3/8″	5/8″
182T	1-1/8″	1/4″	364TS	1-7/8″	1/2″
184T	1-1/8″	1/4″	365TS	1-7/8″	1/2″
213	1-1/8″	1/4″	404U	2-3/8″	5/8″
215	1-1/8″	1/4″	405U	2-3/8″	5/8″
213T	1-3/8″	5/16″	404T	2-7/8″	3/4″
215T	1-3/8″	5/16″	405T	2-7/8″	3/4″
254U	1-3/8″	5/16″	404TS	2-1/8″	1/2″
256U	1-3/8″	5/16″	405TS	2-1/8″	1/2″
254T	1-5/8″	3/8″	444U	2-7/8″	3/4″
256T	1-5/8″	3/8″	445U	2-7/8″	3/4″
284U	1-5/8″	3/8″	444T	3-3/8″	7/8″
286U	1-5/8″	3/8″	445T	3-3/8″	7/8″
284T	1-7/8″	1/2″	447T	3-3/8″	7/8″
286T	1-7/8″	1/2″	449T	3-3/8″	7/8″
284TS	1-5/8″	3/8″	444TS	2-3/8″	5/8″
286TS	1-5/8″	3/8″	445TS	2-3/8″	5/8″
324U	1-7/8″	1/2″	447TS	2-3/8″	5/8″
326U	1-7/8″	1/2″	449TS	2-3/8″	5/8″

FRAMES PRIOR TO 1963

FRAME	SHAFT DIAMETER	KEY WAY	FRAME	SHAFT DIAMETER	KEY WAY
66	3/4″	3/16″	364	1-7/8″	1/2″
203	3/4″	3/16″	365	1-7/8″	1/2″
204	3/4″	3/16″	404	2-1/8″	1/2″
224	1″	1/4″	405	2-1/8″	1/2″
225	1″	1/4″	444	2-3/8″	5/8″
254	1-1/8″	1/4″	445	2-3/8″	5/8″
284	1-1/4″	1/4″	504	2-7/8″	3/4″
324	1-5/8″	3/8″	505	2-7/8″	3/4″
326	1-5/8″	3/8″			

TECHNICAL INFORMATION
FORMULAE

Fan & Blower Motor Application

$$\text{Horsepower} = \frac{\text{CFM x Pressure (lb /sq. ft.)}}{\text{33000 x Efficiency}}$$

Power / AC Circuits

$$\text{Efficiency} = \frac{\text{746 x Output Horsepower}}{\text{Input Watts}}$$

$$\text{Three-Phase Kilowatts} = \frac{\text{Volts x Amperes x Power Factor x 1.732}}{\text{1000}}$$

$$\text{Three-Phase Volt-Amperes} = \text{Volts x Amperes x 1.732}$$

$$\text{Three-Phase Amperes} = \frac{\text{746 x Horsepower}}{\text{1.732 x Volts x Efficiency x Power Factor}}$$

$$\text{Three-Phase Efficiency} = \frac{\text{746 x Horsepower}}{\text{Volts x Amperes x Power Factor x 1.732}}$$

$$\text{Three-Phase Power Factor} = \frac{\text{Input Watts}}{\text{Volts x Amperes x 1.732}}$$

$$\text{Single-Phase Kilowatts} = \frac{\text{Volts x Amperes x Power Factor}}{\text{1000}}$$

$$\text{Single-Phase Amperes} = \frac{\text{746 x Horsepower}}{\text{Volts x Efficiency x Power Factor}}$$

$$\text{Single-Phase Efficiency} = \frac{\text{746 x Horsepower}}{\text{Volts x Amperes x Power Factor}}$$

$$\text{Single-Phase Power Factor} = \frac{\text{Input Watts}}{\text{Volts x Amperes}}$$

$$\text{Horsepower (3 Phase)} = \frac{\text{Volts x Amperes x Power Factor x 1.732 x Efficiency}}{\text{746}}$$

$$\text{Horsepower (1 Phase)} = \frac{\text{Volts x Amperes x Power Factor x Efficiency}}{\text{746}}$$

Power / DC Circuits

$$\text{Watts} = \text{Volts x Amperes } (W = E \bullet I)$$

$$\text{Amperes} = \frac{\text{Watts}}{\text{Volts}} \quad (I = W/E)$$

$$\text{Horsepower} = \frac{\text{Volts x Amperes x Efficiency}}{\text{746}}$$

Pump Motor Application

$$\text{Horsepower} = \frac{\text{GPM x Head in Feet x Specific Gravity}}{\text{3960 x Efficiency of Pump}}$$

$$\text{Head in Feet} = \text{2.31 PSIG}$$

Motor Application

$$\text{Torque (in-lb)} = \frac{\text{Horsepower x 5250}}{\text{RPM}}$$

$$\text{Horsepower} = \frac{\text{Torque (lb-ft) x RPM}}{\text{5250}}$$

Shaft Stress

$$\text{(PSI)} = \frac{\text{HP x 321,000}}{\text{RPM x Shaft Diam.}^3}$$

OHMs Law

Ohm = Volts/Amperes (R = E/I)

Amperes = Volts/Ohms (I = E/R)

Volts = Amperes x Ohms (E= IR)

Temperature Conversion

Deg C = (Deg. F – 32) x 5/9

Deg F = (Deg. C x 9/5) + 32

Conversions

HP x 0.745 = KW

KW x 1.341 = HP

NM x 0.7376 = FT-LB

NM x 8.850 = IN-LB

FT-LB x 1.356 = NM

IN-LB x 0.113 = NM

HP x 550 = FT-LB/sec

$$\text{Torque (in-lb)} = \frac{\text{63,025 x HP}}{\text{RPM}}$$

$$\text{Torque (ft-lb)} = \frac{\text{5,252 x HP}}{\text{RPM}}$$

$$\text{Torque NM} = \frac{\text{KW x 9,550}}{\text{RPM}}$$

TECHNICAL INFORMATION
DEFINITIONS

COLD ALIGNMENT
Intentional and calculated misalignment of the shafts of two machines to compensate for the anticipated thermal growth

DAMPING
The ability of a material to absorb vibrational energy

ENDURANCE LIMIT
The maximum level of stress at which failure due to fatigue will not occur

FATIGUE
Failure of metal parts by progressive cracking caused by cyclic application of stress

FRETTING
A process by which small amounts of surface particles are removed by an opposing rubbing component through fatigue

POTENTIAL UNBALANCE
The variation of unbalance measured after every disassembly and reassembly of a coupling

POWER DENSITY
The ratio between the rated torque of a coupling and its size or weight

SAFETY FACTOR
The ratio between the rated torque of a coupling and the value at which failure would occur

SERVICE FACTOR
The ratio between the design torque and the nominal torque

TORSIONAL STIFFNESS
The torque required to produce angular displacement of the coupling hubs with respect to each other

UNBALANCE
The net unbalance of a coupling after installation

TORQUE
The effectiveness of a force in setting a body into rotation

DESIGN TORQUE
The torque required for a specific application, calculated by multiplying nominal torque by the service factor

NOMINAL TORQUE
The torque continuously transmitted by a gear head over a long period of time, ie in continuous operation

PEAK TORQUE
The maximium torque a machine can exert, achieved at a certain RPM

SHEAR TORQUE
The point of mechanical failure

WARRANTY
PRODUCT WARRANTY

Frontline warrants all products it manufactures to be of good material and workmanship and to be free of defects if properly installed and operated. Remedy for breach of this warranty is expressly limited to replacement of defective parts, as hereinafter set forth. Frontline expressly disclaims all claims for incidental and consequential damages arising from any breach of this warranty.

Any product which, under normal use and service, is proven to breach the warranty contained herein within ONE YEAR from the date of sale will, upon examination by Frontline, be replaced free F.O.B Irvington, New Jersey. In all cases, transportation costs and charges for return goods shall be paid for by the purchaser. Frontline hereby disclaims all responsibility for such transportation costs and charges. This warranty will not be breached, and Frontline will give no credit for products it manufactures that shall have received normal wear and tear, been damaged, improperly installed, repaired or altered outside Frontline's factory.

The above-described warranty is expressly in lieu of all other warranties expressed or implied, and all other warranties are hereby expressly disclaimed, including without limitation the implied warranty of merchantability and the implied warranty of fitness for a particular purpose. Frontline expressly disclaims all liability for special, consequential or incidental damages, whether arising in tort or by contract. Frontline further disclaims all liability from personal injury relating to its products to the extent permitted by law.

By accepting any of Frontline's equipment or products, the purchaser assumes all liability for the consequences arising from their use or misuse. No person, firm or corporation is authorized to assume for Frontline any other liability in connection with the sale of its products. Furthermore, no person, firm or corporation is authorized to modify or waive the terms of this paragraph, unless done in writing and signed by a duly authorized agent of Frontline.

NOTE: Specifications are subject to change without Notice, and without liability there off. The information in this catalog was accurate to the best of our knowledge, at the time of printing. For current updated information please visit our website frontlinecouplings.com.

FREQUENTLY ASKED QUESTIONS

1

Q: What kind of misalignment can the Frontline Coupling Tolerate?

A: There is always a price to pay for shaft misalignment; we recommend keeping the angular misalignment to within 1 degree per engagement. For a more specific parallel & angular misalignment recommendation, see our installation instructions on pages 38–41.

Note: The accurate setting of the gap on each side of the floating center piece is essential for the proper operation of the Frontline Coupling.

2

Q: What is the maximum temperature that the Coupling can run at under full load?

A: The only item that would limit the temperature rating of the coupling is the Bushing, which is rated for 400F. We recommend not exceeding operating conditions of 350F.

3

Q: Are Frontline Couplings dynamically balanced?

A: Since all the components are manufactured from bar stock on high precision CNC Equipment, all the hubs, rings and spacers are inherently manufactured to meet AGMA 12.

For Finished Bore Coupling applications above 3600 RPM we can provide coupling balancing to G1 grade.

4

Q: How important is the gap setting on each side of the floating centerpiece?

A: It is extremely important. Reducing the recommended gap setting will adversely affect the Coupling performance and greatly reduce its useful life.

5

Q: What is the lead time for any Frontline standard Couplings / Drive Shafts?

A: Any standard Model SE & DE finished bore couplings from Series 1 through Series 4 is about 5–7 business days. Custom drive shafts can be shipped within 7–10 business days. Expediting options are available upon request.

6

Q: Why were the VPT-A & VPT-B Models developed?

A: These Vacuum Pump Train Models were specifically designed to reduce weight, cost and installation time while increasing the power density. Model VPT-B allows the mill to keep the existing rigid hubs and quickly retrofit their grid or gear couplings to a Frontline Pin & Bush design.

7

Q: What is the lead time for Cooling Tower Carbon Fiber Drive Shafts?

A: We stock 4", 6" and 8" diameter 15 ft. long carbon fiber tubes and can ship a custom drive shaft within 5–7 business days. Shipping in 3–5 business days or faster is available upon request.

8

Q: What is the life expectancy of the Pins and Bushings?

A: Every application is different. In most cases, the pins outlast the bushings, but there are several factors that influence the life of the Pins & Bushings, such as:

1. Properly sizing the coupling for the specific application.
2. Alignment conditions.
3. The number of stops & starts in a given period of time.
4. Environmental conditions, such as temperature, oily atmosphere containing soot and grime.
5. Initial setting of the gap on each side of the floating center piece.

9

Q: Can this Coupling fail abruptly, causing unscheduled downtime?

A: No. The Frontline Coupling will maintain a positive engagement, even if the bushings are worn completely through. The relative wear of the bushings can be monitored during operation with a strobe light and replacement of spare parts can be scheduled accordingly.

10

Q: Would this Coupling allow stray current to travel from the motor to the driven equipment?

A: No. The rubber coated bushings isolate the (2) two shafts and prevent stray currents from traveling across the coupling and causing bearing damage.

11

Q: What is the age of the oldest Frontline Coupling still in service?

A: Over 25 years on a (1500 HP / 3600 RPM) Motor & Boiler Feed Pump Application utilizing the original Hubs & Spacer. The customer just changes Pins & Bushings every few years.

12

Q: Does Frontline Couplings offer any customization options:

A: Yes. Custom Couplings & Drive Shafts, built to accommodate challenging field conditions, can be rapidly engineered, and manufactured upon request.

13

Q: Where are Frontline Couplings manufactured?

A: All Frontline Couplings & Drive Shafts are manufactured in the U.S.A.

14

Q: What materials are Frontline Couplings/Spare Parts made from?

A: The Hubs, Rings & Spacers are made from 304 SS. The Pins are made from 17-4 PH Hard Chromed and the Bushings are made from a Filament Wound Core coated with Viton Rubber.

FRONTLINE COUPLINGS

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