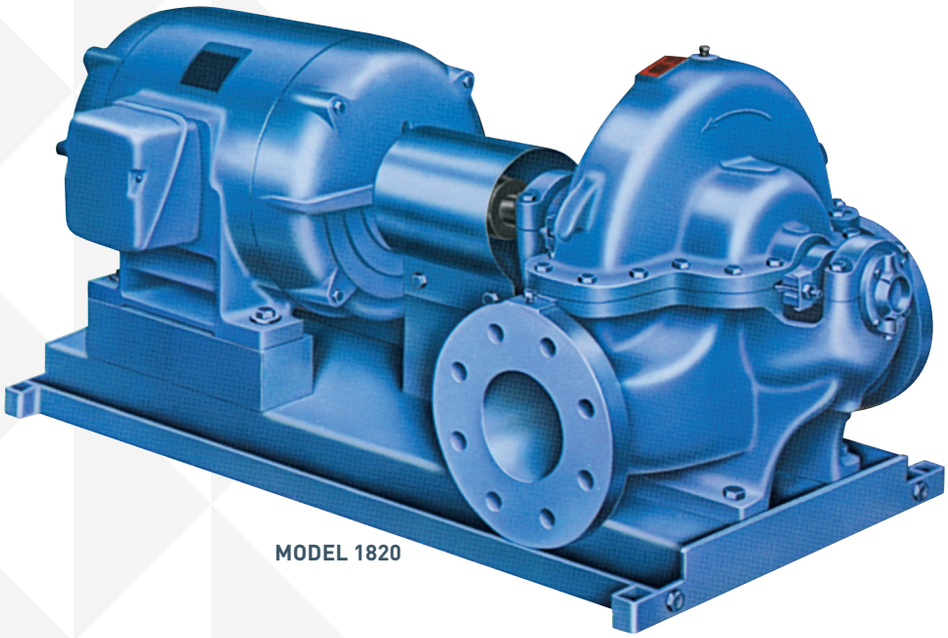
PENTAIR



MODEL 1820

FAIRBANKS NIJHUIS™ 1820 MODEL
SINGLE STAGE SPLIT CASE PUMPS

www.FairbanksNijhuis.com

FAIRBANKS NIJHUIS™ 1820 MODEL
Single Stage Split Case Pumps

Capacities to 15000 GPM (3407 m^3/hr)
Heads to 663 Ft. (202 m)
Temperatures to 275˚F (135˚C)

Introduction

The horizontal split case pump has long and properly been used for the handling of liquids where the utmost in reliability and accessibility are paramount. Billions of gallons of liquid have been pumped by split case double suction pumps and billions more will be pumped considering the rapid industrial, agricultural and commercial expansion. The Fairbanks Nijhuis 1820 Model pumps make a significant contribution to the customer requirements for pumps on this type of service. The 1820 Models is a modern design based on Fairbanks Nijhuis's over 130 years of experience with the design, sales and manufacturing of split case pumps. Look through this bulletin and see what real accomplishments can be made when an imaginative approach is taken to the customer's problem of moving liquids within a piping system.

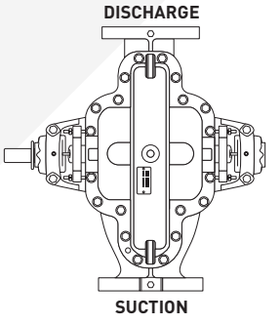
Models 1820 are horizontally baseplate mounted with a driver flexibly coupled to the pump. This design is recommended where floor space is readily available and where flooding of the installation is not possible.

Standard Features

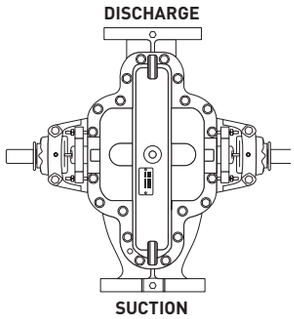
- Stainless Steel (AISI 316) impellers
- Bronze shaft sleeves
- Dynamically balanced impellers
- Bronze case wearing rings
- Twin volute on 10" and larger pumps
- Stainless steel impeller key
- Regreaseable ball bearings
- Single row ball bearing (inboard)
- Double row ball bearing (outboard)
- Mechanical seals...single unbalanced
- Internal bypass between casing and stuffing box
- 125# ASA flanges
- 250 psi case working pressure
- Carbon steel shaft
- Stuffing box bushings
- Lifting lugs
- Hydrostatic test
- Cast integral bearing arms
- Water slingers and grease seals
- Coupling guard
- Fabricated steel base

Optional Features

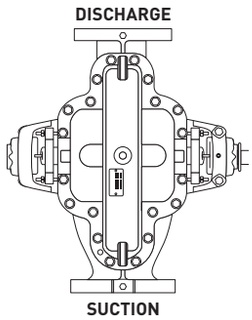
- All iron, bronze fitted or special alloy pump construction
- Hardened 440C stainless steel shaft sleeves (packing only)
- 316 stainless steel shaft sleeves (mechanical seal)
- Impeller wearing rings
- Oil lubricated ball bearings
- Mechanical seals – single balanced (all models)
- Gland Packing
- Stainless steel or Monel® shaft
- External bypass between casing and stuffing box
- Double extended shaft
- Right- or left-hand rotation
- Certified performance test
- Packing with lantern ring
- 250# ASA suction and discharge flanges
- Water cooled cartridge caps



STANDARD
RIGHT-HAND ROTATION

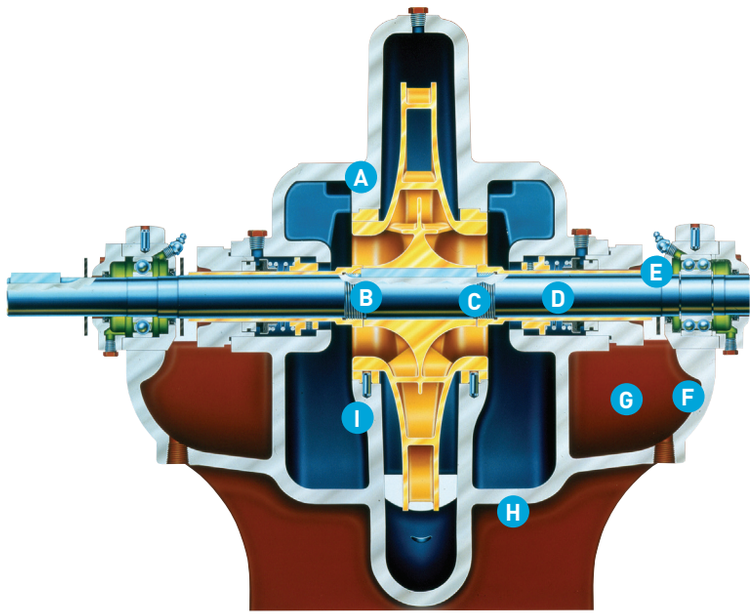


OPTIONAL DUAL DRIVE
RIGHT-HAND ROTATION



OPTIONAL
LEFT-HAND ROTATION

Horizontal Pump Features



A. Split Case Design

simplifies disassembly. The suction and discharge piping and alignment is not disturbed. Simply remove the upper casing for service or inspection. Cast lifting lugs are provided. Computer-machined major components with 360 degree registered fits assure concentricity of all parts. Twin volute design balances out radial hydraulic thrust loads on larger split case pumps (see Range Charts).

B. Dynamically Balanced Impeller

is keyed to the shaft and secured by adjustable shaft sleeves. Double suction design balances out hydraulic thrust loads. Vacuum cast process and proven design provides high efficiency and performance.

C. Bronze Shaft Sleeve

prevents shaft wear, is slip fit over the shaft, keylocked, and extends the entire length of each stuffing box. Shaft sleeves and impeller are O-ring sealed to eliminate corrosion of the shaft by the pumped liquid. This eliminates the need for high cost, special stainless steel or Monel® shafts.

D. Interchangeable Stuffing Box

for mechanical seals or packing. Mechanical seals is standard on horizontal pumps. Optional packing with lantern rings have internal water seal passages between the casing and stuffing box and cannot be damaged. Mechanical seals have carbon against Ceramic face. Long life is assured with 18-8 stainless steel metal parts and Buna-N elastomers. Several optional mechanical seals are available.

E. Grease Lubrication

purges old grease from bearing. Oil lubrication is optional on horizontal pumps. Lube fittings are conveniently located for quick access and provide positive bearing lubrication. Oil seals and non-sparking neoprene rotating slingers protect both bearings during pump operation and washdowns.

F. Bearings

selected for 50,000 hour minimum life at maximum load. Average bearing life 5 x minimum. Double row thrust ball bearing is standard on all models. Short bearing span holds shaft deflection to .002" at face of stuffing box at maximum load. Integral bearing arms eliminate bearing misalignment and simplify service.

G. Left-Hand Rotation

can be readily provided with standard parts. Tandem drive pumps require only a different shaft.

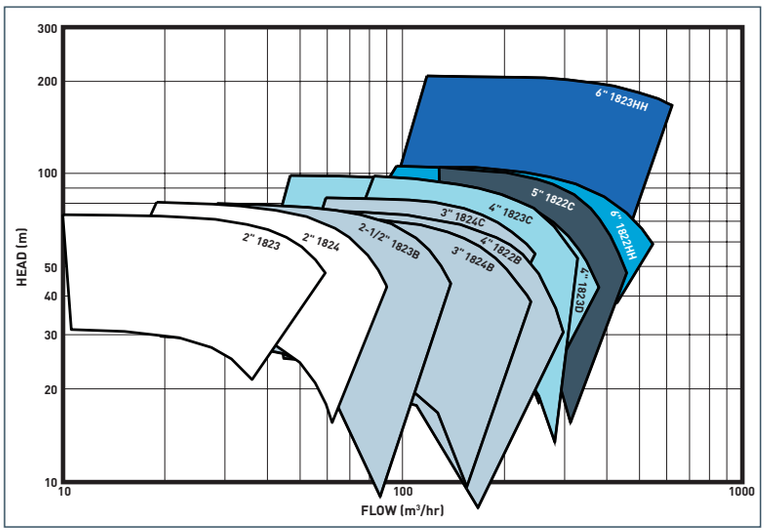
H. Certified Performance

with positive suction pressure or with a suction lift is available on each pump for customer approval. Pumps are all hydrostatically tested.

I. Case Wearing Rings

and throttle bushings prevent wear on the pump casing and are easily and inexpensively replaced.

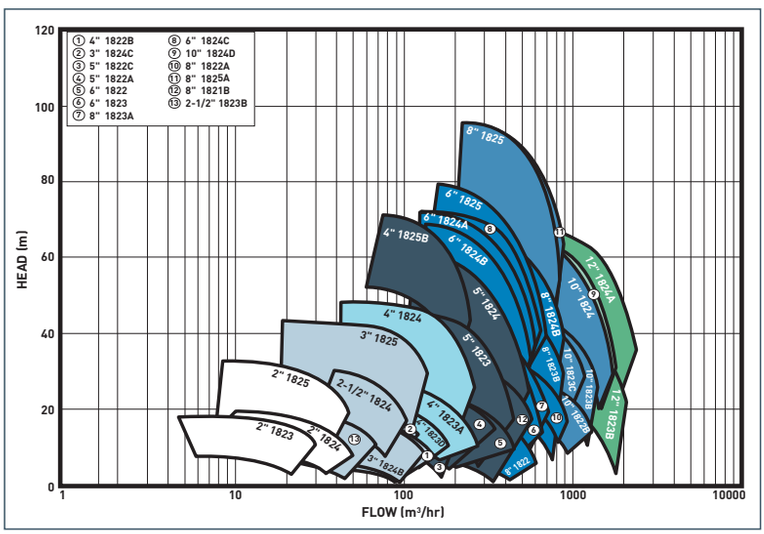
Range Charts (50Hz)



3000 RPM

Individual performance curves should be checked for final selection.
For selections not shown on this chart, please refer to the factory.

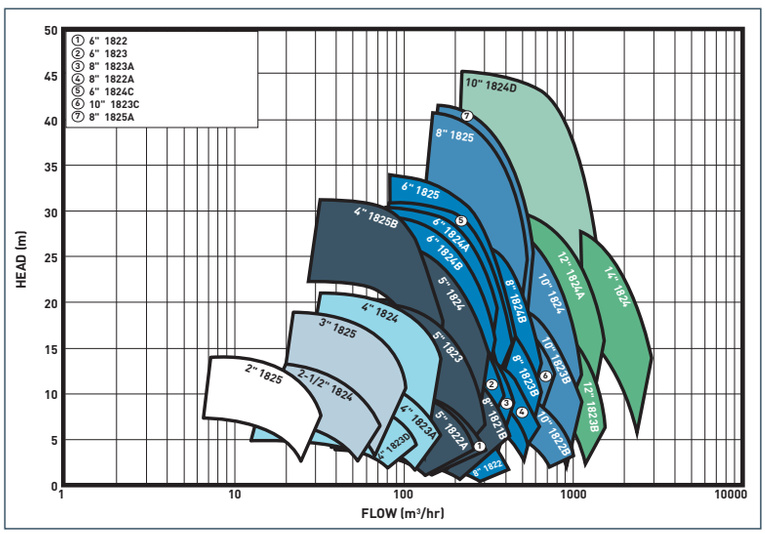
- Power Frame No. 1
- Power Frame No. 2
- Power Frame No. 3
- Power Frame No. 4
- Power Frame No. 4A
- Power Frame No. 5A



1500 RPM

Individual performance curves should be checked for final selection.
For selections not shown on this chart, please refer to the factory.

- Power Frame No. 1
- Power Frame No. 2
- Power Frame No. 3
- Power Frame No. 4
- Power Frame No. 5
- Power Frame No. 6B
- Power Frame No. 7
- Power Frame No. 7A

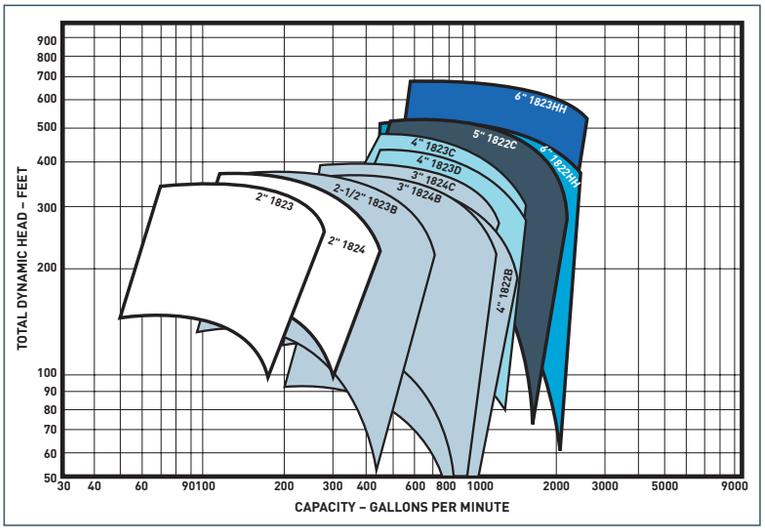


1000 RPM

Individual performance curves should be checked for final selection.
For selections not shown on this chart, please refer to the factory.

- Power Frame No. 1
- Power Frame No. 2
- Power Frame No. 3
- Power Frame No. 4
- Power Frame No. 5
- Power Frame No. 6B
- Power Frame No. 7
- Power Frame No. 7A

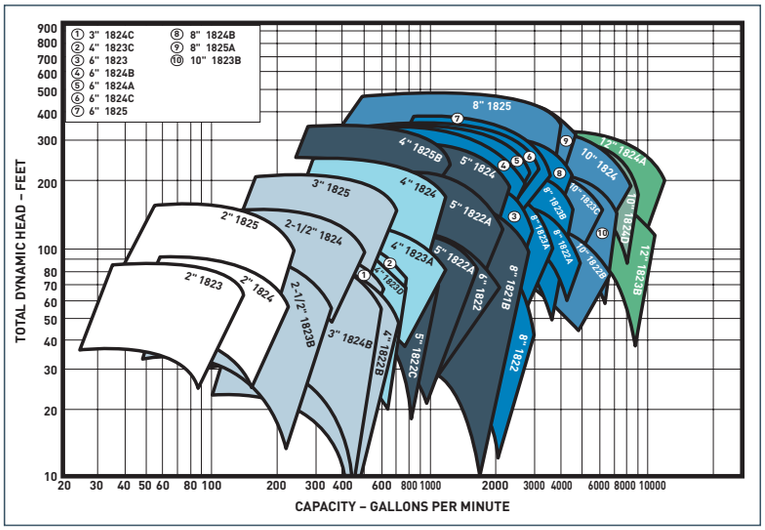
Range Charts (60Hz)



Single Volute 3500 RPM

Individual performance curves should be checked for final selection.
For selections not shown on this chart, please refer to the factory.

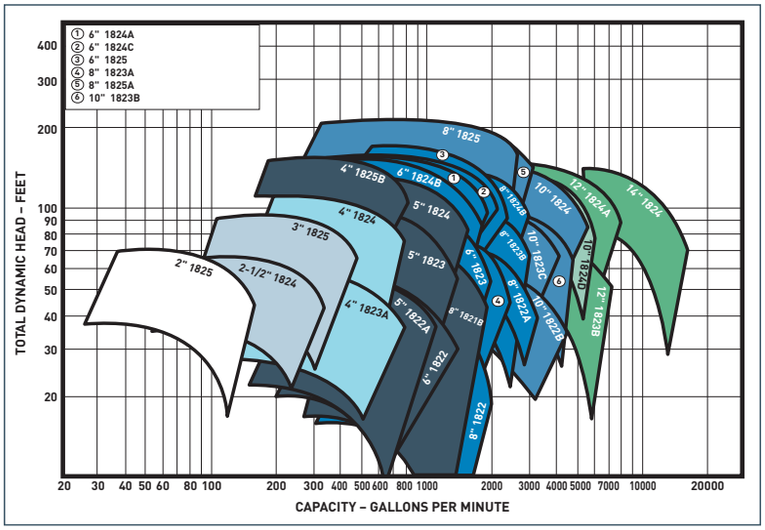
- Power Frame No. 1
- Power Frame No. 2
- Power Frame No. 3
- Power Frame No. 4
- Power Frame No. 4A
- Power Frame No. 5A



1750 RPM

Individual performance curves should be checked for final selection.
For selections not shown on this chart, please refer to the factory.

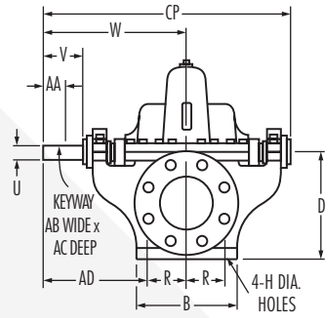
- Power Frame No. 1
- Power Frame No. 2
- Power Frame No. 3
- Power Frame No. 4
- Power Frame No. 5
- Power Frame No. 6B
- Power Frame No. 7
- Power Frame No. 7A

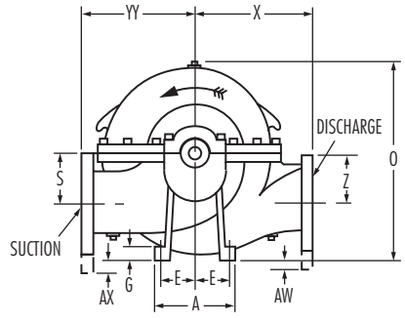


1150 RPM

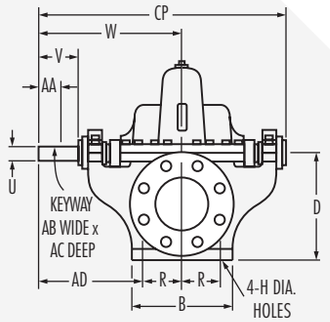
Individual performance curves should be checked for final selection.
For selections not shown on this chart, please refer to the factory.

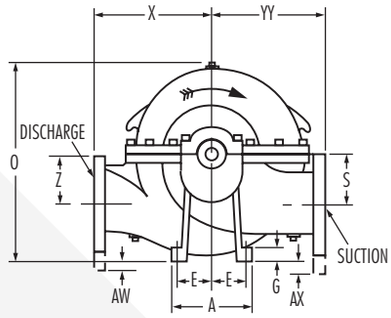
- Power Frame No. 1
- Power Frame No. 2
- Power Frame No. 3
- Power Frame No. 4
- Power Frame No. 5
- Power Frame No. 6B
- Power Frame No. 7
- Power Frame No. 7A





RIGHT-HAND ROTATION



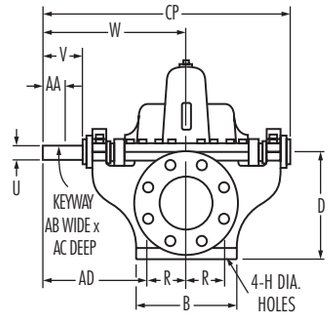


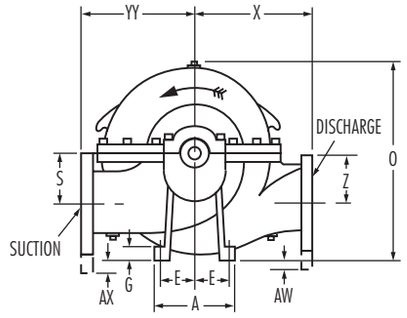
LEFT-HAND ROTATION

PUMP SIZE																								
PUMP MODEL	DISCH.	SUCT	POWER SERIES	A	B	D	E	G	H	O	R	S	U	V	W	X	Z	AA	AB	AC	AD	AW	AX	CP	YY
2" 1823	2	2-1/2	1	6-1/2 (165)	8 (203)	7 (178)	2-3/4 (70)	5/8 (16)	1/2 (13)	13-3/8 (340)	3-1/4 (83)	3-1/2 (89)	3/4 (19)	3-1/2 (89)	11-5/8 (295)	8-1/2 (216)	3-1/2 (89)	2 (51)	3/16 (5)	3/32 (2)	8-3/8 (213)	- -	1/4 (6)	20-1/2 (521)	9 (229)
2" 1824	2	2-1/2	1	6-1/2 (165)	8 (203)	7 (178)	2-3/4 (70)	5/8 (16)	1/2 (13)	13-1/2 (343)	3-1/4 (83)	3-1/2 (89)	3/4 (19)	3-1/2 (89)	11-5/8 (295)	8-1/2 (216)	3-1/2 (89)	2 (51)	3/16 (5)	3/32 (2)	8-3/8 (213)	- -	1/4 (6)	20-1/2 (521)	9 (229)
2" 1825	2	2-1/2	1	6-1/2 (165)	8 (203)	8 (203)	2-3/4 (70)	5/8 (16)	1/2 (13)	15-7/8 (403)	3-1/4 (83)	4 (102)	3/4 (19)	3-1/2 (89)	11-5/8 (295)	10 (254)	4 (102)	2 (51)	3/16 (5)	3/32 (2)	8-3/8 (213)	- -	- -	20-1/2 (521)	10-3/4 (273)
2-1/2" 1823	2-1/2	3	2	8 (203)	10 (254)	8 (203)	3-1/2 (89)	3/4 (19)	5/8 (16)	16 (406)	4 (102)	4 (102)	1-1/8 (29)	2-7/8 (73)	13-1/2 (343)	9-3/4 (248)	4 (102)	2-1/8 (54)	1/4 (6)	1/8 (3)	9-1/2 (241)	- -	- -	24 (610)	10 (254)
2-1/2" 1824	2-1/2	3	2	8 (203)	10 (254)	9 (229)	3-1/2 (89)	3/4 (19)	5/8 (16)	17-1/4 (438)	4 (102)	4-1/2 (114)	1-1/8 (29)	2-7/8 (73)	13-1/2 (343)	11 (343)	4-1/2 (114)	2-1/8 (54)	1/4 (6)	1/8 (3)	9-1/2 (241)	- -	- -	24 (610)	11-1/2 (292)
3" 1824	3	4	2	8 (203)	10 (254)	9 (229)	3-1/2 (89)	3/4 (19)	5/8 (16)	16-1/4 (413)	4 (102)	4-1/2 (114)	1-1/8 (29)	2-7/8 (73)	13-1/2 (343)	10 (254)	4-1/2 (114)	2-1/8 (54)	1/4 (6)	1/8 (3)	9-1/2 (241)	- -	1/2 (13)	24 (610)	11 (343)
3" 1825	3	4	2	8 (203)	10 (254)	10 (254)	3-1/2 (89)	3/4 (19)	5/8 (16)	19-3/8 (492)	4 (102)	5 (127)	1-1/8 (29)	2-7/8 (73)	13-1/2 (343)	12 (305)	5 (127)	2-1/8 (54)	1/4 (6)	1/8 (3)	9 (241)	- -	- -	24 (610)	13 (330)
4" 1822	4	5	2	8 (203)	10 (254)	9 (229)	3-1/2 (89)	3/4 (19)	5/8 (16)	16-1/4 (413)	4 (102)	4-5/8 (117)	1-1/8 (29)	2-7/8 (73)	13-1/2 (343)	10 (254)	4-1/2 (114)	2-1/8 (54)	1/4 (6)	1/8 (3)	9 (241)	1/2 (13)	1-1/8 (29)	24 (610)	11-1/4 (286)
4" 1823C	4	5	3	10 (254)	12 (305)	10 (254)	4-1/4 (108)	7/8 (22)	3/4 (19)	18-3/8 (467)	5 (127)	5 (127)	1-3/8 (35)	3 (76)	14-1/2 (368)	11-1/4 (286)	5 (127)	2-3/8 (60)	3/8 (10)	3/16 (5)	9 (241)	- -	1/2 (13)	26 (660)	12-3/4 (324)
4" 1823D	4	5	3	10 (254)	12 (305)	10 (254)	4-1/4 (108)	7/8 (22)	3/4 (19)	18-3/8 (467)	5 (127)	5 (127)	1-3/8 (35)	3 (76)	14-1/2 (368)	12 (305)	5 (127)	2-3/8 (60)	3/8 (10)	3/16 (5)	9 (241)	- -	1/2 (13)	26 (660)	12-3/4 (324)
4" 1824	4	5	3	10 (254)	12 (305)	11 (279)	4-1/4 (108)	7/8 (22)	3/4 (19)	21-1/8 (537)	5 (127)	5-1/2 (140)	1-3/8 (35)	3 (76)	14-1/2 (368)	13 (330)	5-1/2 (140)	2-3/8 (60)	3/8 (10)	3/16 (5)	9-1/2 (241)	- -	- -	26 (660)	14 (356)
4" 1825	4	6	4	10 (254)	12 (305)	12-1/2 (318)	4-1/4 (108)	3/4 (19)	3/4 (19)	24-1/4 (616)	5 (127)	6-1/4 (159)	1-1/2 (38)	3-1/2 (89)	16 (406)	14 (356)	6-1/4 (159)	2-7/8 (73)	3/8 (10)	3/16 (5)	11 (279)	- -	- -	28-1/2 (724)	16 (406)
5" 1822	5	6	4	10 (254)	12 (305)	11 (279)	4-1/4 (108)	7/8 (22)	3/4 (19)	19-3/4 (502)	5 (127)	5-1/2 (140)	1-1/2 (38)	3-1/2 (89)	16 (406)	11-1/4 (286)	5-1/2 (140)	2-7/8 (73)	3/8 (10)	3/16 (5)	11 (279)	- -	3/4 (19)	28-1/2 (724)	13-1/4 (337)
5" 1823	5	6	4	10 (254)	12 (305)	12-1/2 (318)	4-1/4 (108)	7/8 (22)	3/4 (19)	22-1/2 (572)	5 (127)	6-1/4 (159)	1-1/2 (38)	3-1/2 (89)	16 (406)	13-1/4 (337)	6-1/4 (159)	2-7/8 (73)	3/8 (10)	3/16 (5)	11 (279)	- -	- -	28-1/2 (724)	15 (343)
5" 1824	5	6	4	10 (254)	12 (305)	12-1/2 (318)	4-1/4 (108)	7/8 (22)	3/4 (19)	22-1/2 (572)	5 (127)	6-1/4 (159)	1-1/2 (38)	3-1/2 (89)	16 (406)	14 (356)	6-1/4 (159)	2-7/8 (73)	3/8 (10)	3/16 (5)	11 (279)	- -	- -	28-1/2 (724)	15 (343)
6" 1822	6	8	4	10 (254)	12 (305)	12-1/2 (318)	4-1/4 (108)	7/8 (22)	3/4 (19)	21-7/8 (556)	5 (127)	6-1/4 (159)	1-1/2 (38)	3-1/2 (89)	16 (405)	11-3/4 (298)	6-1/4 (159)	2-7/8 (73)	3/8 (10)	3/16 (5)	11 (279)	- -	1-1/4 (32)	28-1/2 (724)	14-1/2 (368)
6" 1822HH	6	8	4A	12 (305)	14-1/2 (368)	16-1/2 (419)	5 (127)	1-1/4 (32)	7/8 (22)	25-1/2 (648)	6 (152)	8-5/8 (159)	1-1/2 (38)	3-1/2 (89)	18-1/8 (461)	10 (254)	8-5/8 (219)	2 (51)	3/8 (10)	3/16 (5)	12-1/8 (308)	- -	- -	32-3/4 (832)	15 (381)
8" 1821	8	8	4	10 (254)	12 (305)	12-1/2 (318)	4-1/4 (108)	7/8 (22)	3/4 (19)	21-3/4 (552)	5 (127)	6-1/4 (159)	1-1/2 (38)	3-1/2 (89)	16 (406)	12 (305)	6-1/4 (159)	2-7/8 (73)	3/8 (10)	3/16 (5)	11 (279)	1-1/4 (32)	1-1/4 (32)	28-1/2 (724)	14-1/2 (368)

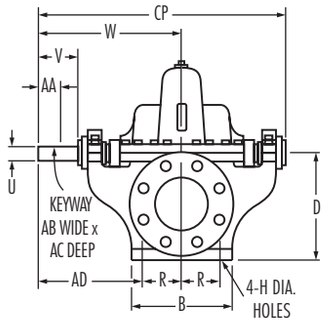
NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 3/8" (10).
3. Not for construction purposes unless certified.
4. Discharge and suction flanges – ANSI Standard flat face.
5. 1/4" NPT gauge tap on top of suction/ discharge flanges.

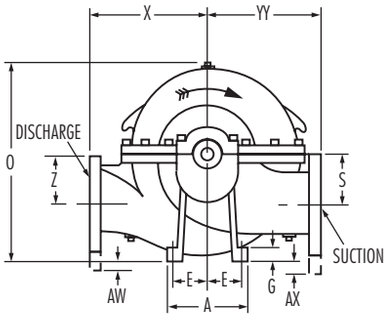
STD. 125# FLANGES	OPT. 250# FLANGES





RIGHT-HAND ROTATION





LEFT-HAND ROTATION

PUMP SIZE			POWER SERIES	A	B	D	E	G	H	O	R	S	U	V	W	X	Z	AA	AB	AC	AD	AW	AX	CP	YY
PUMP MODEL	DISCH	SUCT																							
6" 1823HH	6	8	5A	12 (305)	14-1/2 (368)	16-1/2 (351)	5 (127)	1-1/4 (32)	7/8 (22)	26-21/32 (609)	6 (152)	7-1/2 (191)	1-3/4 (44)	4-1/8 (105)	20-7/16 (519)	15 (381)	7-1/2 (191)	2-7/8 (73)	3/8 (10)	3/16 (5)	14-7/16 (367)	–	–	36-3/4 (933)	17 (432)
6" 1823	6	8	5	12 (305)	14 (356)	13-1/2 (343)	5 (127)	1 (25)	7/8 (22)	24-7/8 (632)	6 (152)	6-3/4 (171)	1-3/4 (44)	4 (102)	18 (457)	14-1/4 (362)	6-3/4 (171)	2-7/8 (73)	3/8 (10)	3/16 (5)	12 (305)	–	3/4 (19)	32 (813)	16-3/4 (425)
6" 1824	6	8	5	12 (305)	14 (356)	14-3/4 (375)	5 (127)	3/4 (19)	7/8 (22)	27-1/4 (692)	6 (152)	8 (203)	1-3/4 (44)	4 (102)	18 (457)	16 (406)	8 (203)	2-7/8 (73)	3/8 (10)	3/16 (5)	12 (305)	–	3/4 (19)	32 (813)	18 (457)
6" 1825	6	8	5	12 (305)	14 (356)	14-3/4 (375)	5 (127)	1 (25)	7/8 (22)	27-3/4 (705)	6 (152)	8 (203)	1-3/4 (44)	4 (102)	18 (457)	15-3/4 (400)	8 (203)	2-7/8 (73)	3/8 (10)	3/16 (5)	12 (305)	–	3/4 (19)	32 (813)	18 (457)
8" 1822	8	10	5	12 (305)	14 (356)	14-3/4 (375)	5 (127)	1-1/4 (32)	7/8 (22)	26-3/8 (670)	6 (152)	8 (203)	1-3/4 (44)	4 (102)	18 (457)	17 (432)	9 (229)	2-7/8 (73)	3/8 (10)	3/16 (5)	12 (305)	1-3/4 (44)	2 (51)	32 (813)	17-3/4 (451)
8" 1823	8	10	5	12 (305)	14 (356)	14-3/4 (375)	5 (127)	1-1/4 (32)	7/8 (22)	26-5/8 (676)	6 (152)	8 (203)	1-3/4 (44)	4 (102)	18 (457)	17 (432)	9 (229)	2-7/8 (73)	3/8 (10)	3/16 (5)	12 (305)	1-3/4 (44)	2 (51)	32 (813)	17-3/4 (451)
8" 1824	8	10	5	12 (305)	14 (356)	14-3/4 (375)	5 (127)	1-1/4 (32)	7/8 (22)	27-1/8 (689)	6 (152)	8 (203)	1-3/4 (44)	4 (102)	18 (457)	17 (432)	8 (203)	2-7/8 (73)	3/8 (10)	3/16 (5)	12 (305)	3/4 (19)	2 (51)	32 (813)	17-3/4 (451)
8" 1825	8	10	6B	20 (508)	17 (432)	18-1/2 (470)	9 (229)	1 (25)	7/8 (22)	32-1/2 (826)	7-1/2 (191)	9-1/2 (241)	2-1/8 (54)	5-7/16 (138)	21-7/8 (556)	18 (457)	9-1/2 (241)	4-3/4 (121)	1/2 (13)	1/4 (6)	14-3/8 (365)	–	–	38 (965)	21 (533)
10" 1822B	10	12	6B	15 (381)	22 (559)	23 (584)	6-1/2 (165)	1 (25)	7/8 (22)	35-1/2 (902)	10 (254)	12 (305)	2-1/8 (54)	5-7/16 (138)	21-7/8 (556)	16 (406)	12 (305)	4-3/4 (121)	1/2 (13)	1/4 (6)	11-7/8 (302)	–	–	38 (965)	19 (483)
10" 1822B&C	10	12	6B	15 (381)	22 (559)	25 (635)	6-1/2 (165)	1 (25)	7/8 (22)	38-1/2 (978)	10 (254)	13-1/2 (343)	2-1/8 (54)	5-7/16 (138)	21-7/8 (556)	17 (432)	13-1/2 (343)	4-3/4 (121)	1/2 (13)	1/4 (6)	11-7/8 (302)	–	–	38 (965)	20 (508)
10" 1824	10	12	6B	15 (381)	22 (559)	25 (635)	6-1/2 (165)	1 (25)	7/8 (22)	39-1/2 (1003)	10 (254)	13-1/2 (343)	2-1/8 (54)	5-7/16 (138)	21-7/8 (556)	18 (457)	13-1/2 (343)	4-3/4 (121)	1/2 (13)	1/4 (6)	11-7/8 (302)	–	–	38 (965)	22 (559)
10" 1824D	10	12	7A	15 (381)	22 (559)	25 (635)	6-1/2 (165)	1.1/4 (32)	7/8 (22)	40-3/8 (1026)	10 (254)	12-1/4 (311)	2-1/8 (53)	5-3/4 (146)	24-5/16 (618)	20 (508)	12-1/4 (311)	4-3/4 (121)	1/2 (13)	1/4 (6)	14-5/16 (364)	–	–	42-15/16 (1090)	24 (610)
8" 1826	8	12	7	15 (381)	22 (559)	26 (660)	6-1/2 (165)	1-1/8 (29)	7/8 (22)	43-7/8 (1114)	10 (254)	15 (381)	2-1/2 (64)	6-5/8 (168)	25-1/4 (641)	20 (508)	15 (381)	5 (127)	5/8 (16)	5/16 (8)	15-1/4 (387)	–	–	43-7/8 (1114)	25 (635)
12" 1823B	12	14	7	15 (381)	22 (559)	24 (610)	6-1/2 (165)	1 (25)	7/8 (22)	39 (991)	10 (254)	15 (343)	2-1/2 (64)	6-5/8 (168)	25-1/4 (641)	17 (432)	15 (381)	5 (127)	5/8 (16)	5/16 (8)	15-1/4 (387)	1-1/4 (32)	2-1/2 (64)	43-7/8 (1114)	22 (559)
12" 1824	12	14	7	15 (381)	22 (559)	24 (610)	6-1/2 (165)	1 (25)	7/8 (22)	40-1/8 (1019)	10 (254)	15 (381)	2-1/2 (64)	6-5/8 (168)	25-1/4 (641)	18 (457)	15 (381)	5 (127)	5/8 (16)	5/16 (8)	15-1/4 (387)	1-1/4 (32)	2-1/2 (64)	43-7/8 (1114)	23 (584)
14" 1824	14	16	7	15 (381)	22 (559)	29-1/4 (743)	6-1/2 (165)	1 (25)	7/8 (22)	47-1/2 (1207)	10 (254)	16 (406)	2-1/2 (64)	6-5/8 (168)	25-1/4 (641)	22 (559)	16 (406)	(127)	5/8 (16)	5/16 (8)	15-1/4 (387)	–	–	43-7/8 (1114)	27 (686)

NOTES:
1. All dimensions in inches (mm).
2. Dimensions may vary ± 3/8" (10).
3. Not for construction purposes unless certified.
4. Discharge and suction flanges – ANSI Standard flat face.
5. 1/4" NPT gauge tap on top of suction/discharge flanges.

STD. 125# FLANGES	OPT. 250# FLANGES

Engineering Specifications

Models 1820
Split Case Base Mounted

Furnish and install as shown on the plans ____ Right-hand (Left-hand) Fairbanks Nijhuis™ Model (Horizontal – 1820) (Flexible Coupled) type Split Case, Double Suction, Single Stage centrifugal pump, size ____x____x____ of AISI 316 stainless steel impeller, bronze fitted (all bronze) (all iron) (stainless steel) construction. The pump shall be capable of delivering at design conditions a capacity of ____ GPM when operating against a Total Dynamic Head of ____ feet, with a temperature of ____ °F, specific gravity ____. Pump shall have minimum guaranteed efficiency at design capacity of ____%. Pump must also be capable of delivering a maximum of ____ GPM when operating against a head of ____ feet, and at this condition shall have a minimum efficiency of ____%. Minimum shut off head acceptable will be ____ feet. Pump shall operate at a maximum synchronous speed of ____ RPM.

A unit operating at a lesser rotative speed will be considered, but in no event will a pump operating at more then the maximum speed specified be acceptable. The pump casing halves shall be of the inline piping design and will be constructed of Class 30 Cast Iron having a minimum tensile strength of 30,000 psi and shall be of sufficient thickness to withstand stresses and strains at full operating pressures.

Casings shall be subject to a hydrostatic pressure test at 150% of the specified duty point. Bearing housing supports, suction and discharge flanges shall be integrally cast with the lower half of the casing. Removal of the upper half of the casing must allow the rotating element to be removed without disconnecting the suction and discharge flanges. The upper casing is to be dowel aligned to the lower casing.

Pump sizes 10" and larger are to be of the twin volute design. Drain openings must be provided in the bearing arms for removal of lubricating liquid. Impeller shall be of the enclosed double suction type and shall be investment cast stainless steel AISI 316 (____). Impeller shall be dynamically balanced and securely fastened to the shaft by key and screw locked shaft sleeves. The vanes shall be designed to reduce noise. The pump shaft shall be made of high grade SAE 1045 Steel or equal, accurately machined to give a true running rotating element. The minimum dia. acceptable will be ____". The shaft shall be protected from wear by bronze (____) sleeves which are key locked and threaded so that the sleeves tighten with the rotation of the shaft. Buna O-rings must be provided between the impeller hub and the shaft sleeves to prevent pumped liquid from corroding the shaft.

Pump shall be equipped with easily renewable bronze (____) casing rings (impeller wearing rings) so designed that hydraulic pressure will seat them against a shoulder in the pump case around the full periphery of the wearing ring. The wear rings will be locked in place by the doweling to prevent rotation. The rotating element shall be mounted in heavy duty grease lubricated ball bearings and shall be equipped with water strainers on side next to pump glands.

Bearing housings shall be so designed to flush lubricant through and provide continuous cleaning of bearing surfaces and maximum protection against overheating. The pump shall be supplied with a single row inboard bearing primarily for radial loads and double row outboard bearing primarily for thrust loads. Both bearings shall be regreaseable lubrication ball type, designed for 250,000 hours average life. Each bearing shall be mounted in a machined housing that is moisture and dust proof. The housing shall have registered fits to assure alignment, pinned to prevent rotation, and bolted to the bearing arms. Each housing shall be supplied with a grease fitting and a plugged relief port.

Stuffing boxes shall be placed on both sizes of the pump centerline to seal the pump shaft. Shaft sealing shall be accomplished by means of a mechanical seal with a ceramic seat, carbon washer, Buna-N elastomers and 18-8 stainless steel parts. All packed pumps having a suction lift shall be provided with lantern rings connected to the pressure side of the pump by cored passages in the parting flange of the pump. The stuffing boxes shall be equipped with heavy, cast, split glands with extra length, for easy removal for packing inspection and maintenance. Pump and motor shall be mounted on a common heavy base plate of (structural steel). Pump and motor must be checked for alignment after the pump base has been installed and grouted in place, in accordance with the standards of the Hydraulic Institute. There shall be no strain transmitted to the pumps.

The pumps shall be flexible coupled to a standard (horizontal) IEC, ____ HP, ____ phase, ____ Hertz, ____ volts, ____ RPM (drip-proof) (tot. encl.) (hazardous location) motor.