



MEMORANDUM

TO: Bristol Town Council
cc. Mike Yoder

FROM: JPR Project Team

DATE: March 5, 2024

RE: **Town of Bristol Water Well Improvements Sole Sourcing Recommendations**

During the design process of the development of the Town of Bristol Water System Improvements Project, the Town elected to pursue sole sourcing of Peerless Midwest for construction of Proposed Water Well No. 6 and upgrades to Existing Water Wells No. 3 and No. 4.

Peerless Midwest has constructed water wells and provided maintenance services to the Town of Bristol for many years. The sole-sourcing process was undertaken in the interest of utilizing a contractor and well pump provider that has direct knowledge of the Town’s water system. The Town’s Public Works staff is sufficiently familiar and comfortable with services provided by Peerless Midwest to pursue this route. Peerless Midwest will supply and install all materials to complete the above described water well improvements.

Rather than having the Town directly purchase the equipment selected during the sole sourcing process, the Sole Source Proposal Packages (SSPP) were set up in such a way that the sole sourced equipment will be included in the bid packages for the project, and the general contractor will be required to purchase the preselected equipment and enter into a sub-contractor agreement with the preferred vendor for construction of proposed well improvements at the prices outlined in the selected proposal. As part of the Terms and Conditions of each SSPP, each offeror agreed to enter into an agreement with the eventual successful General Contractor(s) for the Town’s Project. It was made clear to all bidding parties that they would be required to hold preselected prices for at least nine (9) months from the date of the SSPP submittal.

After review and negotiations, the list below presents a summary of the proposals.

Sole Source Package	Manufacturer/Local Rep Submittal	Total Cost of Quote
Proposed Well No. 6 Material and Installation	Peerless Midwest	\$153,000.00
Proposed Improvements at Wells No. 3 and No. 4 Material and Installation	Peerless Midwest	\$93,290.00

Prices as submitted by the vendors in the preselection packages will be held for determination of their final equipment package.

JPR and Town Staff recommend that the Town Council take formal action to accept these proposals as presented to be included in the Town of Bristol Water System Improvements Project Bidding Documents.

Sincerely,



Brett Konarski, PE
Utilities Division Leader – South Bend

j:\projects\2023 projects\2023-0005\05_coordination\prefered vendor - peerless\2024-03-05 - sole source recommendation memo.docx



TOWN OF BRISTOL, INDIANA WATER SYSTEM IMPROVEMENTS EQUIPMENT SOLE SOURCE PACKAGE FOR: PRODUCTION DRINKING WATER WELL PUMP



Chad Plummer
Peerless-Midwest Inc.
February 14, 2024

Town of Bristol, Indiana
Water System Improvements

Equipment Sole Source Package for:
Production Drinking Water Well Pump

TOWN COUNCIL MEMBERS

Jeff Beachy– Council President
Cathy Burke
Dean Rentfrow
Gregg Tuholski
Doug DeSmith

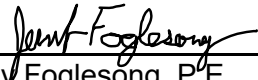
Mike Yoder – Town Manager
Jill Swartz - Assistant Town Manager
Cathy Antonelli – Clerk/Treasurer

PREPARED BY:



I hereby certify that these plans and/or specifications were prepared by me, or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Indiana.

Date: February 2, 2024



Jenny Foglesong, P.E.
Registered Professional Engineer
State of Indiana

1. Provide a separate cost for each component indicated in the proposal form. Cost to include delivery to project site.
 2. Detailed list of items included and not included in your proposal.
 3. Shipping and delivery schedule
 4. Payment terms, including acknowledgement of 5% retainage requirements
5. Offeror will provide equipment and services on the various items set forth on the following pages on the price proposals. The cost quoted below shall cover and be considered full compensation for all equipment and services described in this proposal package.

Production Drinking Water Well and Pump - Equipment Pre-Selection					
Item No.	Estimated Quantity	Unit	Description	Unit Price	Extension
1	1	LSUM	Production Drinking Water Well and Pump	\$153,000.00	\$153,000.00
Total Bid					\$153,000.00

6. Offeror certifies the following:

- A. The equipment and services listed in the proposal comply with the project specifications.
- B. The pricing and terms of the proposal will be valid for the General Contractor/contractors who will be awarded the Water System Improvements Project.
- C. The pricing and terms of the proposal will be valid for at least twelve (12) months from the date of this Pre-Selection Proposal Package (PSPP) submittal.
- D. Each supplier shall be subject to five percent (5%) retainage with respect to progress payments.

Proposal submitted on _____ February 14, 2024.

By Peerless Midwest, Inc.
(Corporation) (Partnership) (Individual)

By 

Chad Plummer, Project Manager
(Name & Title of Person Authorized to Sign)

Business Address: 55860 Russell Industrial Pkwy.
Mishawaka, IN 46545

Phone Number: 574 254 9050

SECTION 33 11 13 – POTABLE WATER SUPPLY WELLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Drilling and casing of water well.
 - 2. Pump and controller.
 - 3. Water and system testing and certification.
- B. This specification describes a complete operational system to be furnished by a single responsible equipment manufacturer.
- C. It is the intent of this specification that the testing, sizing, and drilling be the same vendor that will be providing the pump, motor, and associated appurtenances to provide a complete system as described in this specification.

1.2 DEFINITIONS

- A. Suspended Solids: Small solid particles that do not dissolve in water.
- B. IDEM: Indiana Department of Environmental Management

1.3 REFERENCE STANDARDS

- A. American Society of Mechanical Engineers:
- B. ASTM International:
 - 1. ASTM A53/.
 - 2. ASTM C150/C150M - Standard Specification for Portland Cement.
 - 3. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- C. American Water Works Association:
 - 1. AWWA A100 - Water Wells.
 - 2. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
- D. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.
 - 2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 PREINSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit manufacturer information regarding well pump and controller, including rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
 - 2. Submit information regarding well depth, screen, and materials.
 - 3. Submit anticipated electrical requirements.
 - 4. Submit recommended accessories and appurtenances provided by vendor and recommended to be provided by others.
 - 5. Submit final production performance and quality after testing is completed.
- C. Manufacturer's Certificate:
 - 1. Certify that products meet or exceed specified requirements.
 - 2. Certify that installation has been completed and that pump and well have been properly installed and tested and are ready for operation.
- D. Manufacturer Instructions:
 - 1. Submit detailed instructions on installation requirements, including storage and handling procedures.
 - 2. Indicate rigging and assembly.
- E. Field Quality-Control Submittals: Indicate tests to be performed and results of Contractor-furnished tests and inspections.
- F. Qualifications Statements:
 - 1. Submit qualifications for manufacturer and drilling firm.

1.6 WARRANTY

- A. Manufacturer shall warrant the Pump, Motor, casing, and screen for a period of one (1) year from the date of startup.

1.7 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of well, depth, subsoil strata, and drilling difficulties encountered.
- B. Submit signed copy of driller's log book statements.

- C. Submit executed certification of well pump after performance testing.
- D. Submit documents required by IDEM.
- E. Provide certificate of compliance & permits from IDEM, indicating that water quality meets requirements.

1.8 QUALITY ASSURANCE

- A. Perform Work according to AWWA A100.
- B. Perform Work according to Indiana IDEM standards.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Drilling Firm: Company specializing in performing Work of this Section with minimum 3 years' documented experience and licensed in State of Indiana.

1.10 COORDINATION

- 1. Coordinate with Contractor for installation of building and supports surrounding well and for installation of the pump.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Protect, transport, handle, and store products according to manufacturer instructions.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage. Notify Owner and Engineer if products are damaged as soon as damage is identified.
- C. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Water well with following characteristics:
 - 1. Minimum Water Production: 700 gpm.

2. Well casing: 12 inches.
3. Total Well Depth: 55 feet.

B. Performance and Design Criteria:

1. Based on the Criteria developed and presented in the Test Well Log, New Well Site Survey, and as required by IDEM.
2. Delivered water shall meet the quality requirements of the Town's current permit.
3. Well Pump:
 - a. Design Flow Rate: 700 gpm.
 - b. Design Flow Total Dynamic Head: 180 feet.
 - c. Pump Discharge Size: 8 inch.
 - d. Pump Depth: As determined by well testing.
 - e. Screen Material: Stainless Steel

2.2 WELL PUMPS

A. Manufacturers:

1. As Provided by Peerless Midwest

B. Description:

1. Type: Vertical Turbine, 4 stage, enclosed.
2. Shaft: Vertical.
3. Meeting AWWA A100 standards.

C. Operation:

1. Electrical Characteristics:
 - a. Motor: 40 hp.
 - b. Voltage: 230/460 V, three phase, 60 Hz.
 - c. Continuous Duty
 - d. Minimum Service Factor: 1.15 percent at rated load.
2. Pump Controller:
 - a. NEMA 250 Type 3R enclosure with main disconnect interlocked with door.
 - b. Single-point power connection and grounding lug.
 - c. Across-the-line electric motor starter with starting relay.
 - d. HAND-OFF-AUTO selector switches.
3. Controls and Alarms:
 - a. By others.

D. Pump and Motor Removal:

1. Lifting lugs suitable for motor, pump, and shaft assembly.

2. Roof hatch located over well, by others.

E. Screen Material: Stainless steel.

2.3 WELL CASINGS

A. Steel Pipe as recommended by Driller.

2.4 WELL SCREENS

A. Stainless Steel slots in accordance with lithology identified at the test well.

2.5 MIXES

A. Grout: Mixture of bentonite clay with minimum amount of clean water required to facilitate placement.

1. Follow AWWA A100.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that Site conditions are capable of supporting equipment for performing drilling operations and testing.

3.2 PREPARATION

A. Protect structures near well from damage.

3.3 INSTALLATION

A. Drilling:

1. Record accurate log of materials penetrated to determine depths and thicknesses of underlying formations.
2. Record caliper, temperature, fluid conductivity, and optical or acoustic televiewer logs to total depth of borehole.
3. Casing and Screen:
 - a. Place well casing and screen assembly immediately after drilling.
 - b. Keep casing and screen under tension during filter packing.
4. Test borehole for plumbness according to AWWA A100.
5. Remove loose material from shaft bottom.

6. Maintain well opening and casing free of contaminating materials.
- B. Disinfection: Disinfect well as specified in AWWA C654 Disinfection of Wells.
- C. Disinfection Standards: Perform Work according to IDEM standards.
- D. Well Pump:
 1. Follow manufacturer's instructions.
 2. Install electrical connections.
 3. Perform start-up procedures following manufacturer's instructions.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: Comply with AWWA A100.

3.5 FIELD QUALITY CONTROL

- A. Performance Testing:
 1. Notify Architect/Engineer and Owner at least 1 week prior to flow-rate testing.
 2. Coordinate discharge volume with RPR/Inspector, Contractor, and Owner.
 3. Inform IDEM as required.
 4. Test flow rate and certify.
 5. Collect sample and submit to qualified lab, submit results to IDEM as required.
- B. Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

END OF SECTION 33 11 13

Cost

- A. Detailed list of items included and not included in your proposal

See attached specification: Section #33 11 13 – Potable Water Supply Wells

- B. Shipping and delivery schedule

Scheduling of well drilling field activities is weather and demand dependent. Currently there is a 4-6 week back-log of drilling activity. After the field work is complete, including installation of the vertical turbine pumping equipment, it will take up to 3-weeks to compile and prepare a report that summarizes these activities.

- C. Payment terms

Terms are net, not subject to discount, and invoices are to be paid in full within 30 days of presentation. All invoices not paid within 30 days will be subject to 2% per month service and handling fees, plus any court and/or attorney fees required for collection.

Constructability

- A. Describe installation guidelines.

Per Manufacturer Guidelines

- B. Describe how the components are to be delivered to site.

Components will be delivered to site via Peerless Midwest vehicles as required.

Product Analysis/Reliability

- A. Manufacturer name and model number
See following submittals for well drilling construction materials and pump design.
- B. Detailed description of proposed equipment
Drill a 24" borehole down to 55 ft. in depth. Install 20' of 12" Alloy High Flow S.S.W.W. 0.035" slot screen (35' – 55'). Install 12" Steel Casing from 2' – 35'. Benseal material from 0' – 25' and Northern #0 Gravel Pack (25' – 55'). Install National J11LC Vertical Turbine Pump with a design rating of 700 GPM @ 180' TDH. Install 40 HP US Motor.
- C. Life expectancy of the components.
Average recommended overhaul/repair of pumping equipment's components is recommended at 8-12 years based on normal wear and tear. Life expectancy of a new well is approximately 50 years.
- D. Describe if the equipment is factory tested after assembly and before shipping.
Performance testing is conducted after installation to confirm equipment meets rated design conditions.
- E. Describe type and time period of standard warranty offered with the equipment. Include description of items not covered by warranty.
One (1) Year Parts/Labor Warranty will be provided from date of installation.

Service

- A. Location of nearest service centers.

55806 Russell Industrial Pkwy.
Mishawaka, IN 46545

886 W. Jefferson Street
Tipton, IN 46072

505 Apple Tree Drive
Ionia, MI 48846

- B. Describe availability of replacement parts.

We stock all basic components for National Pump and have a repair shop at our Mishawaka location. We also stock inline shafting, column pipe and VHS motors.

- C. Describe quantity, types, and cost of spare parts and tools recommended to be available for routine maintenance.

Routine maintenance is defined as “normal wearing parts” for a pump such as bowl bearings, impeller shaft, shaft couplings, sleeves, neoprene lineshaft bearings, gauges, bolting, and motor overhaul.

Experience

- A. Describe the quantity of similar items manufacturer has in service.

We have drilled thousands of wells and installed thousands of well pumps over the course of being in business for the last 51 years.

- B. Provide references for the four (4) most recently installed systems in the Midwest of comparable size.

Ceres Farms – St. Joseph County, Indiana 12" x 63'

Gene Miller Farms – Constantine, MI 12" x 59'

Hills @ St. Joe Farm, St. Joseph County, IN 12" x 96'

Ceres Farms – Waverly, OH 12" x 87'

Training

- A. Describe construction/start up services provided.

Field Crew will install the vertical turbine pumping equipment and motor upon completion of well drilling and development. A Instrumentation & Controls technician will install the controller and program as required.

- B. Describe operator maintenance training services provided.

On-site foreman installing pump and motor will go over any necessary training needed to maintain pump & motor and put in operation. The Instrumentation & Controls technician on site installing and programming the controller will go over operation procedure of controller upon completion of set-up.

WELL CONSTRUCTION MATERIALS

Type text here

City/Town : Bristol
 State : Indiana
 Location : 710' E of SR 15 &
 390' S of Kesco Dr.

County : Elkhart
 Twp. (T/R) : Washington (T38N/R6E)
 1/4, 1/4, 1/4, Sec.# : NW, NE, SE, 27
 UTM Coordintaes : NAD 1927 16N
 : 4,618,604 N; 598,587 E

Pumping Rate : n/a
 Static Water Level : n/a
 Pumping Level : n/a
 Specific Capacity : n/a
 Test Length (hours) : n/a

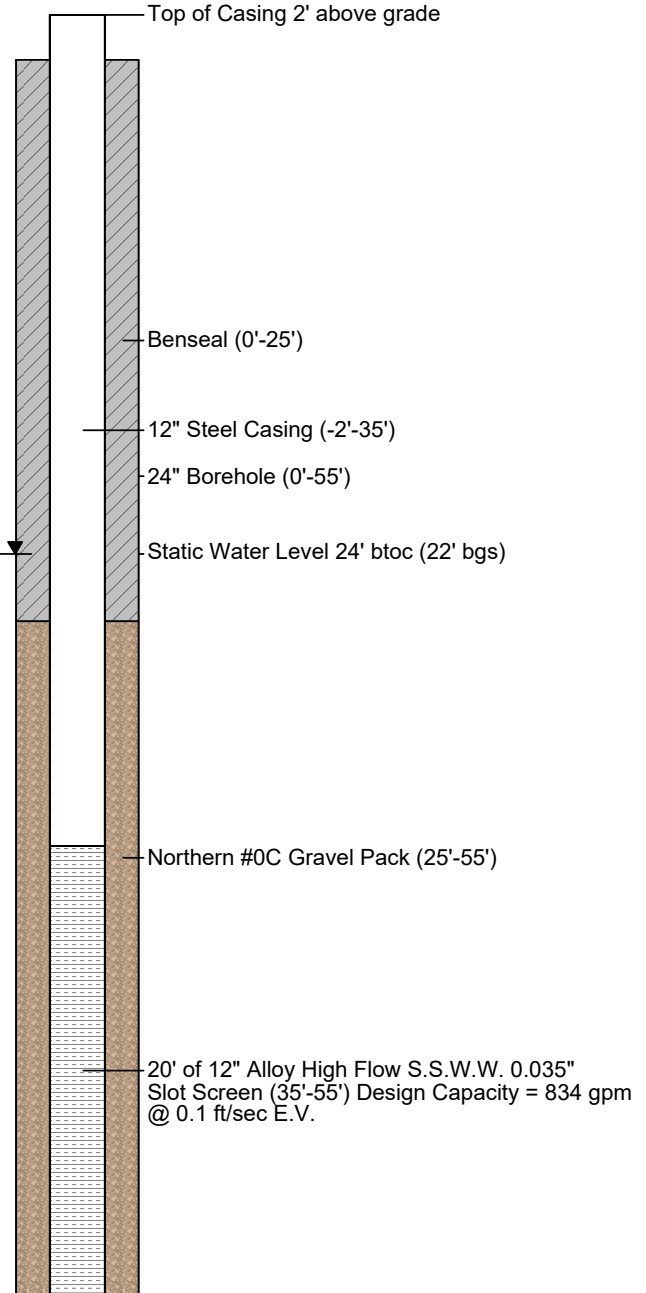
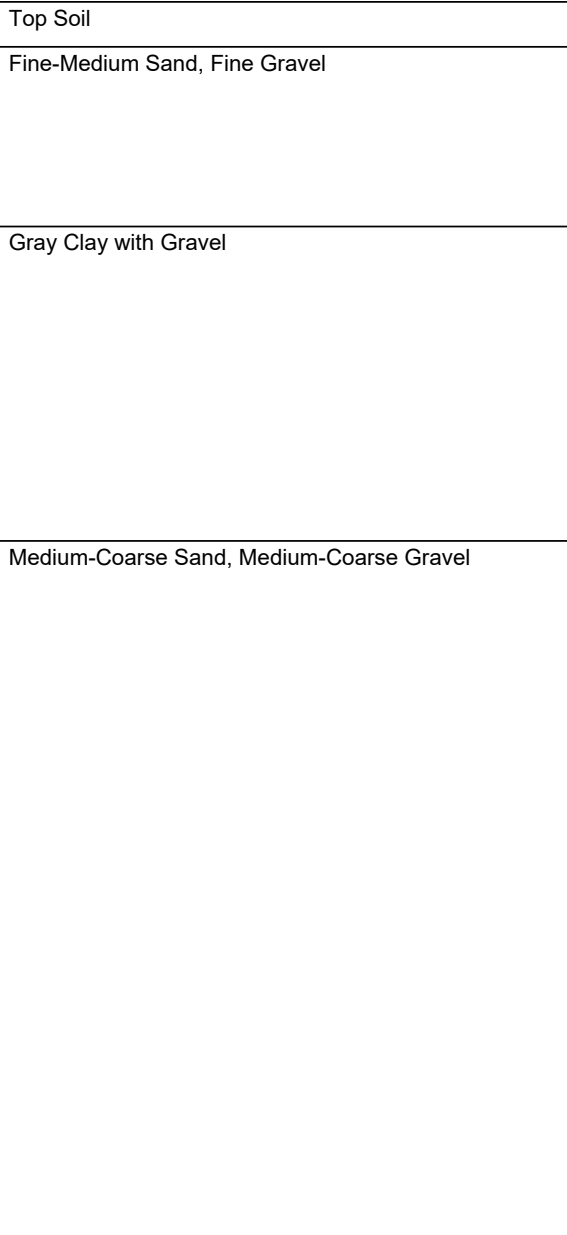
Drilling Method : Direct Rotary
 Driller : PMI
 Date Drilled : PROPOSED

Proposed: Well 6
 Elev.: 770' amsl

LITHOLOGY

Depth in Feet

0
10
20
30
40
50
60



01-22-2024 S:\JOB FILES\A-C\Bristol, IN\Hydro\2023-Test Drilling Locations\2023-Downtown Wellfield\58914_Bristol_ProposedWell6_WellLog.bor

Town of Bristol, IN
 PROPOSED WELL 6
 58914



PIPE SPECS

ERW - ELECTRIC RESISTANCE WELD
SMLS - SEAMLESS
DSAW - DOUBLE SUB. ARC WELD

Pipe Size	O.D. / in.	Schedule	Wall / in.	I.D. / in.	Description	Wt. / Ft.	Section Modulus
11"	11.750	STD	.375	11.000	SMLS	45.600	36.942
11"	11.750	XH	.500	10.750	SMLS	60.131	47.6923
11"	11.750		.593	10.564	SMLS	70.726	55.2186
11"	11.750	XXH	.844	10.062	SMLS	98.073	73.6369
11"	11.750		.906	9.938	SMLS	105.025	77.7824
11"	11.750		1.000	9.750	SMLS	114.918	83.7782
11"	11.750		1.250	9.250	SMLS	140.306	98.1190
11"	11.750		1.500	8.750	SMLS	164.359	110.3136
11"	11.750		1.750	8.250	SMLS	187.075	120.5875

12"	12.750		.105	12.540	ERW	14.193	13.0818
12"	12.750		.135	12.480	ERW	18.205	16.7008
12"	12.750	10	.188	12.374	ERW	25.246	22.9680
12"	12.750		.203	12.344	ERW	27.228	24.7060
12"	12.750		.219	12.312	ERW	29.336	26.5240
12"	12.750	20	.250	12.250	ERW & SMLS	33.406	30.0900
12"	12.750		.281	12.188	ERW & SMLS	37.456	33.6020
12"	12.750		.312	12.126	ERW & SMLS	41.484	37.0600
12"	12.750	30	.330	12.090	ERW & SMLS	43.814	38.9730
12"	12.750	STD	.375	12.000	ERW & SMLS	49.608	43.8170
12"	12.750	40	.406	11.938	ERW & SMLS	53.575	47.1040
12"	12.750	XH	.500	11.750	ERW & SMLS	65.476	56.7130
12"	12.750	60	.562	11.626	SMLS	73.223	62.8280
12"	12.750	80	.688	11.374	SMLS	88.713	74.6360
12"	12.750	100	.844	11.062	SMLS	107.420	88.2090
12"	12.750	120	1.000	10.750	SMLS	125.608	100.6500
12"	12.750	140	1.125	10.500	SMLS	139.805	109.9190
12"	12.750	160	1.312	10.126	SMLS	160.421	122.5610
12"	12.750		1.500	9.750	SMLS	180.394	133.9347
12"	12.750		1.750	9.250	SMLS	205.783	147.1508
12"	12.750		2.000	8.750	SMLS	229.835	158.3889
12"	12.750		2.250	8.250	SMLS	252.551	167.8570

13-3/8"	13.375		.500	12.375	SMLS	68.817	62.7731
13-3/8"	13.375		.750	11.875	SMLS	101.221	88.9596
13-3/8"	13.375		1.000	11.375	SMLS	132.289	112.0392
13-3/8"	13.375		1.250	10.875	SMLS	162.020	132.2679
13-3/8"	13.375		1.500	10.375	SMLS	190.416	149.8907
13-3/8"	13.375		1.750	9.875	SMLS	217.475	165.1416
13-3/8"	13.375		2.000	9.375	SMLS	243.198	178.2438
13-3/8"	13.375		2.500	8.375	SMLS	290.634	198.8387

PHONE 800-548-7473 FAX 618-635-8720

www.livingstonpipeandtube.com

ASW ALPHA™

Rod-based, wire-wrapped sand screens for water well, environmental and industrial applications

The Alpha rod-based, wedge-wire wrapped, all-welded sand screen provides more open area than any other well-screen design and allows better access to the entire formation. This screen is very versatile and is easily adapted to many types of industrial and water well applications.

The mass of the wrap wire and support rods combined with efficient welding techniques during the manufacturing process dictate the strength and durability of this screen. Our Alpha screens feature an all-welded V-shaped wire that produces a self-

cleaning action for greater flow. The manufacturing process includes a sophisticated, electronically controlled fusion-welding process. These screens are custom-built to exact specifications and expected well conditions using a wide range of alloys. They provide maximum flow area, high well efficiencies and superior tensile strength for dependability and long well life.

The Alpha's continuous slot design allows lower entrance velocity of the water, which reduces encrustation rates. It also helps the screen to resist plugging and prevents sand from damaging pumps.

When considering screens of equal length, diameter and slot size, the Alpha's wire-wrapped design produces flow rates almost three times higher than bridge-slot screens and almost ten times higher than slotted pipe. This greatly enhances well life and filtration capacity. Alpha screens come in a full range of sizes with ODs from 0.75 in. to 24.0 in.

Alloy Screen Works manufactures all products in accordance with the requirements of the ISO 9001:2008 International Standard.



A. Support rods:

the unique structure and number of support rods provide tensile and collapse strength. These rods are of the same material as the wrap wire to prevent electrolytic corrosion when abnormal environmental conditions are present down hole.

B. Screen wrap wire:

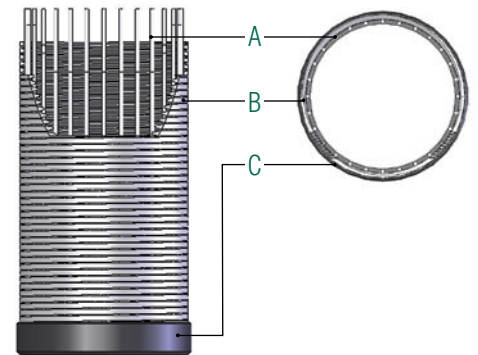
V-shaped wire, welded at each junction with a support rod, provides a self-cleaning action for greater flow and less chance of plugging (alloy and dimensions per customer specs). In-plant design and manufacturing of wire shapes ensures that tolerances are within rigid specifications.

C. End fittings:

All standard and custom-made fittings are rigidly secured to the screen body.

Materials of Construction

- Stainless-steel types 304 and 316
- Low carbon steel
- Galvanized steel
- Special alloys.



ALLOY SCREEN WORKS

▲▲▲ A division of Alloy Machine Works, Inc.

Well Pack

 northernfiltermedia.com/well-pack/



Well Pack gravel is used for deep bed in-ground wells to form a barrier between the screens and the natural deposit of the land, which in turn, allows for the well to provide very clean water. Other applications can include dewatering well and monitoring wells.

All of our Well Pack products meet or exceed AWWA Standard B100-09 and NSF/ANSI Standard 61.

Physical Characteristics

- Color: multi-color
- Bulk Density: 100 lbs./cu. ft.
- Specific Gravity: 2.65+
- Effective Size: .40 mm – ¼ in.
- Uniformity Coefficient: 1.6
- Hardness: 7.0 (Mohs scale)

Standard Gradation

- 0.35–0.45mm Well Pack (formerly #000)
- 0.45–0.55mm Well Pack (formerly #00)
- 0.60–0.80mm Well Pack (formerly #0)
- 0.80–1.20mm Well Pack (formerly Course #0)
- 1/8 x #16 Well Pack (formerly #1)
- 1/8 x #12 Well Pack (formerly #2)
- 3/16 x #10 Well Pack (formerly #3)
- 1/4 x 1/8 Well Pack

Typical Gradation

			1/4x1/8	3/16x#10	1/8x#12	1/8x#16	.80-1.20	.60-.80	.45-.55	.35-.45
Mesh Size	Open Inch	Millimeters								
1/4	1/4	6.3	98.3							
#4	0.187	4.75		98.1						
#5	.157	4		82.6						
#6	0.132	3.35	3.7	49	98.2	99.9				
#7	.111	2.8		23.9	87.3	97.3				
#8	0.093	2.36		3.8	35.9	70.1	98.4			
#10	.078	2		1.2	12.9	42.8	93.3			
#12	.066	1.7		0.1	1.6	13.4	80.5	96.7		
#14	.055	1.4			0.1	2.9	57.6	84.2		
#16	.046	1.18			0	0.06	38.6	58.3	99.7	
#18	.039	1					17.9	26.9	96.8	
#20	.033	0.85					6.4	13.3	85.7	96.4
#25	.027	0.71					1.9	6.1	57.8	89
#30	.023	0.6						2.8	25.7	71.9
#35	.019	0.5						1.4	11	47.1
#40	.016	0.42							3	19.8
#45	.013	0.35							0.8	7.3
#60	.009	0.25								1
Effective Size			3.31	2.48	1.91	1.59	0.89	0.78	0.49	0.36
Uniformity Coefficient			1.490	1.302	1.577	1.371	1.262	1.317	1.383	1.427
Acid Solubility %			<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
MOH Hardness			7	7	7	7	7	7	7	7
Specific Gravity			>2.6%	>2.6%	>2.6%	>2.6%	>2.6%	>2.6%	>2.6%	>2.6%

[Download Northern Filter Well Pack Gradation Chart](#) [Download SDS](#)



BENSEAL[®]

Sealing and Plugging Agent

Description

BENSEAL[®] granular (8-mesh), natural Wyoming sodium bentonite is used in the sealing and grouting of well casings and earthen structures. BENSEAL is not recommended for use as a drilling mud.

Applications/ Functions

BENSEAL sealing and plugging agent assists or promotes the following:

- Seal or grout plastic or steel casings in monitor and water well construction
- Seal or plug abandoned boreholes
- Seal leaking ponds, ditches and dams
- Soil stabilization
- Prepare BENSEAL and EZ-MUD[®] grouting system
- Aid in controlling loss of circulation

Advantages

- High swelling capacity
- Uniform particle size
- No heat of hydration
- Prevents commingling of aquifers and contamination from surface
- Forms a flexible seal to protect casing from corrosive contaminants
- Allows for hole re-entry
- NSF/ANSI Standard 60 certified

Typical Properties

- | | |
|---------------------------------|--|
| • Appearance | Bluish to gray granules |
| • Dry screen analysis | 85% as 8 mesh |
| • Volume, ft ³ /sack | 0.7 (as packaged) |
| • Specific gravity | 2.6 |
| • Permeability | less than 1×10^{-8} cm/sec (in fresh water) |

Recommended Treatment

As a casing drill and drive operation:

1. Dig a cone-shaped depression around casing. Depression should be 6 - 8 inches (152-203 mm) larger than the outside diameter of the casing and 2 - 3 feet (60-75 cm) deep.
2. Keep cone-shaped depression filled with dry BENSEAL while driving the casing.

**Recommended
Treatment
(continued)**

Note:

When drilling and driving a 4" (102mm) pipe, expect to use 2.5 pounds of BENSEAL[®] sealing and plugging agent per foot of hole or 3.7 kilograms per meter of hole.

Sealing ponds or earthen structures:

Depending on the native soil, disc in or mix 3 to 5 pounds of BENSEAL sealing and plugging agent per square foot (14-24 kg/m²) uniformly over the area to be sealed so that a 6-inch (~152 mm) blanket of soil and BENSEAL sealing and plugging agent is formed. Do not neglect the edges of the dam or the sides/walls of the pond. This sealing blanket should then be compacted in place. As added protection to the sealing blanket, 2 to 4 inches (51-102 mm) of local soil or sand should cover the sealing blanket and be compacted.

If the leaking area can be identified and isolated, an attempt can be made to broadcast BENSEAL uniformly at 4 to 6 pounds of BENSEAL per square foot (20-30 kg/m²) of surface area into the water over the area of concern.

Note: Bentonite is more effective as a sealing agent when confined. Therefore, every effort should be made to cover the BENSEAL after it is broadcast with a 2-3 inch (51-76 mm) layer of sand. This will reduce the potential for dispersion into the water and un-yielded bentonite particles interfering with the gill action of fish.

Lost returns (moderate):

1. Begin with the pit full of mud.
2. Raise the pump suction off bottom and place a shovel next to it and slightly under suction.
3. Pour dry BENSEAL slowly into the space between shovel and suction and pump it down the hole.

**Additional
Information**

- The grouting material and method selected will depend upon the specific subsurface environment including all prevailing geological and hydrological factors and any existing regulatory requirements. The grouting process may not be complete until the grout is static at the desired level.
 - The use of bentonite may not be appropriate in environments where the formation water chemistry has a total hardness greater than 500 parts per million and/or a chloride content of greater than 1500 parts per million.
 - If questions arise regarding subsurface environments it is always best to consult your local Baroid IDP representative to determine if the Baroid product of choice is appropriate for the given conditions.
-

Packaging BENSEAL is packaged in 50-lb (22.7 kg) multiwall paper bags, containing 0.7 ft³ (0.02 m³).

Availability BENSEAL sealing and plugging agent can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

**Baroid Industrial Drilling Products,
Product Service Line, Halliburton**

3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613



EZ-MUD[®] GOLD

Clay/Shale Stabilizer

Description

EZ-MUD[®] GOLD clay and shale stabilizer provides inhibition of clay and shale formations in water-based drilling fluids without substantially increasing viscosity. EZ-MUD GOLD stabilizer, when added to a QUIK-GEL[®] or BORE-GEL[®] slurry, yields an inhibitive drilling fluid system while maintaining manageable and effective fluid properties. EZ-MUD GOLD stabilizer can be mixed easily at minimal shear thereby eliminating the need for liquid emulsions.

Applications/Functions

The use of EZ-MUD GOLD stabilizer aids or promotes the following:

- Enhanced rheological properties of a low-solids drilling mud
- Clay and shale stabilization to prevent swelling and/or dispersion
- Borehole stability in water sensitive formations
- Minimized rotational torque and circulating pressure
- Enhancement of air-foam system capabilities
- Enhanced core recovery in continuous wireline coring operations

Advantages

- NSF/ANSI Standard 60 certified
- Easy dispersion and mixing with minimal shear
- Can be used at increased concentrations to gain inhibition without producing excess viscosity
- No petroleum distillates present
- Breaks down chemically with bleach (sodium hypochlorite)
- Compatible with other Baroid drilling fluid additives when added in proper sequence
- Non-fermenting

Typical Properties

- | | |
|------------------------------------|---------------------------|
| • Appearance | White, free-flowing beads |
| • Bulk density, lb/ft ³ | 52 |
| • pH (1% aqueous solution) | 7.75 |

Recommended Treatment

- Using a Venturi Mixer, or into vortex of a high-speed stirrer, add slowly and uniformly to the entire circulating system.

Recommended Treatment (continued)

Approximate Amounts of EZ-MUD [®] GOLD stabilizer Added to Water Based Fluids			
Drilling Application/Desired Property	lb/bbl	lbs/100 gal	kg/m ³
<i>Added to fresh water (to formulate a clay-free drilling fluid)</i>			
• To help stabilize water sensitive formation	0.25 - 1.0	0.6 – 2.4	0.7 – 2.9
• To help reduce torque and lower circulating pressure			

Added to QUIK-GEL® or BORE-GEL® drilling fluids			
• To help retard reactive shale and clay and enhance lubricity	0.1 - 0.3	0.25 – 0.75	0.3 – 0.9
Added to injection liquid in air/foam drilling applications			
• To help improve foam performance and hole conditions	0.25 - 1.0	0.6 – 2.4	0.7 – 2.9

- **Note:**

Make-up water used to mix EZ-MUD GOLD stabilizer should meet the following quality:

total chloride less than 1500 ppm (mg/L)

total hardness less than 100 ppm as calcium

total chlorine less than 50 ppm

water pH between 8.5-9.5

- Reduce total hardness of make-up water by adding soda ash (sodium carbonate) at 0.5 to 1 pound per 100 gallons (0.6 - 1.2 kg/m³) of make-up water.

EZ-MUD GOLD stabilizer can be chemically broken down with regular household liquid bleach (5% sodium hypochlorite). Use one gallon of liquid bleach per 100 gallons (10 liters/m³) of fluid formulated with EZ-MUD GOLD stabilizer.

Do not use perfumed liquid bleach or solid calcium hypochlorite.

Packaging

EZ-MUD GOLD stabilizer is packaged in 10-lb (4.54-kg) and 40-lb (18.1-kg) plastic containers with re-sealable flip top lids.

Availability

EZ-MUD GOLD clay and shale stabilizer can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

**Baroid Industrial Drilling Products
Product Service Line, Halliburton**

3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613



QUIK-GEL®

Viscosifier

Description QUIK-GEL® viscosifier is an easy-to-mix, finely ground (200-mesh), premium-grade, high-yielding Wyoming sodium bentonite. QUIK-GEL viscosifier imparts viscosity, fluid loss control and gelling characteristics to freshwater-based drilling fluids.

Applications/Functions *The use of QUIK-GEL viscosifier promotes or assists the following:*

- Mix with fresh water to form a low-solids drilling fluid for general drilling applications
- Viscosify water-based drilling fluids
- Reduce filtration by forming a thin filter cake with low permeability
- Improve hole-cleaning capability of drilling fluids
- Mix with foaming agents to make "gel/foam" drilling fluids for air/foam drilling applications

Advantages

- NSF/ANSI Standard 60 certified
- Single-sack product and cost effective
- Can provide lubricity for drilling fluids
- Can mix easily and quickly reach maximum viscosity
- Can yield more than twice as much mud of the same viscosity as an equal weight of API oilfield grades of bentonite

Typical Properties

- Appearance Grey to tan powder
- Bulk density, lb/ft³ 68 to 72 (compacted)
- pH (3% solution) 8.9

Recommended Treatment Mix slowly through a jet mixer or sift slowly into the vortex of a high-speed stirrer.

Approximate Amounts of QUIK-GEL viscosifier Added to Freshwater			
Application/Desired Result	lb/100 gal	lb/bbl	kg/m ³
Normal Drilling Conditions	15-25	6-10	18-30
Unconsolidated Formations	35-50	15-21	42-60
Make-Up For Gel/Foam Systems	12-15	5-7	14-18

- 1 bbl = 42 U.S. gallons

Additional Information *Note:*

- For optimum yield, pre-treat make-up water with 1-2 pounds of soda ash per 100 gallons of water (1.2-2.4 kg/m³).

Packaging QUIK-GEL viscosifier is packaged in 50-lb (22.7-kg) multiwall paper bags.

Availability QUIK-GEL viscosifier can be purchased through any Baroid Industrial Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products

Product Service Line, Halliburton

3000 N. Sam Houston Pkwy. E.

Houston, TX 77032

Customer Service (800) 735-6075 Toll Free (281) 871-4612

Technical Service (877) 379-7412 Toll Free (281) 871-4613



QUIK-TROL® GOLD LV

Highly Dispersible Low Viscosity Filtration Control Additive

Description QUIK-TROL® GOLD LV highly dispersible, low viscosity grade, polyanionic cellulosic (PAC) polymer provides enhanced filtration control in most water-based drilling fluids. QUIK-TROL GOLD LV low viscosity PAC polymer, when added to a bentonite based drilling fluid, yields a low filtrate drilling fluid system with manageable viscosity suitable for drilling in water sensitive and unstable formations.

Applications/Functions *The use of QUIK-TROL GOLD LV low viscosity filtration control additive promotes:*

- Filtration control in fresh or brackish water-based drilling fluids
- Borehole stability in water sensitive formations
- Encapsulation of shale to prevent swelling and disintegration
- Minimized rod chatter, rotational torque and circulating pressure
- Improved hole cleaning and core recovery
- Enhanced foam properties to improve cuttings transport in air/foam drilling

Advantages

- Disperses readily at low shear rates
- Effective in fresh, salt and brackish water-based drilling fluids
- Tolerant of harsh environments and contaminants
- Non-fermenting
- Compatible with other Baroid drilling fluid additives
- NSF/ANSI Standard 60 certified

Typical Properties

- Appearance Off-white powder
- pH (1% aqueous solution) 6.0 – 8.0

Recommended Treatment

- Using a Venturi Mixer, or into vortex of a high-speed stirrer, add slowly and uniformly to the entire circulating system. See treatment chart below or contact your local Baroid IDP Field Representative for dosing assistance.

Approximate Amounts of QUIK-TROL® GOLD LV Filtration Control Polymer Added to Water-Based Fluids		
lbs/bbl	lbs/100 gallons	kg/m ³
0.25 – 3.0	0.6 – 7.0	0.7 – 8.4

Note:

- It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK-TROL GOLD LV highly dispersible polyanionic cellulose polymer for reduction of excess calcium and pH adjustment.
- The above are generalized concentration ranges of QUIK-TROL GOLD LV filtration control additive to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. For further information or assistance please contact your local Baroid IDP representative.
- Very salty water may require twice as much QUIK-TROL GOLD LV additive as fresh water. Preferably, QUIK-TROL GOLD LV filtration control additive should be mixed in fresh water before it is added to very salty water.

Packaging QUIK-TROL® GOLD LV highly dispersible low viscosity filtration control additive is packaged in 40-lb (18.2-kg) plastic pails and in 20-lb (9.1-kg) plastic pails containing 10 airtight sealed plastic bags. Each bag contains 2-lb (0.91- kg).

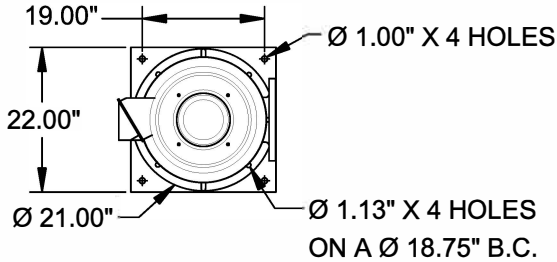
Availability QUIK-TROL GOLD LV highly dispersible low viscosity filtration control additive can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

**Baroid Industrial Drilling Products
Product Service Line, Halliburton**
3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

WELL PUMP DESIGN

VERTICAL TURBINE PUMP



MOTOR

MFGR US HP 40 ENCLOSURE WP1 RPM 1800
 TYPE VHS PHASE 3 HERTZ 60 VOLTS 230/460
 S.F. 1.15 EFF. INV BD 16.50" BX 1.00"
 KWY 0.25" CPLG NRR THRUST 5700 FRAME 324TPH
 MODEL NO. HO40V2BLG CD 28.22"

DISCHARGE HEAD

MODEL HH30 W/16.5" BD
8" - ANSI CLASS 125-FF DISCHARGE FLANGE
X PACKING BOX SPLIT BRZ PACKING GLAND
N/A MECHANICAL SEAL N/A
N/A TENSION ASSEMBLY YES SOLE PLATE

COLUMN

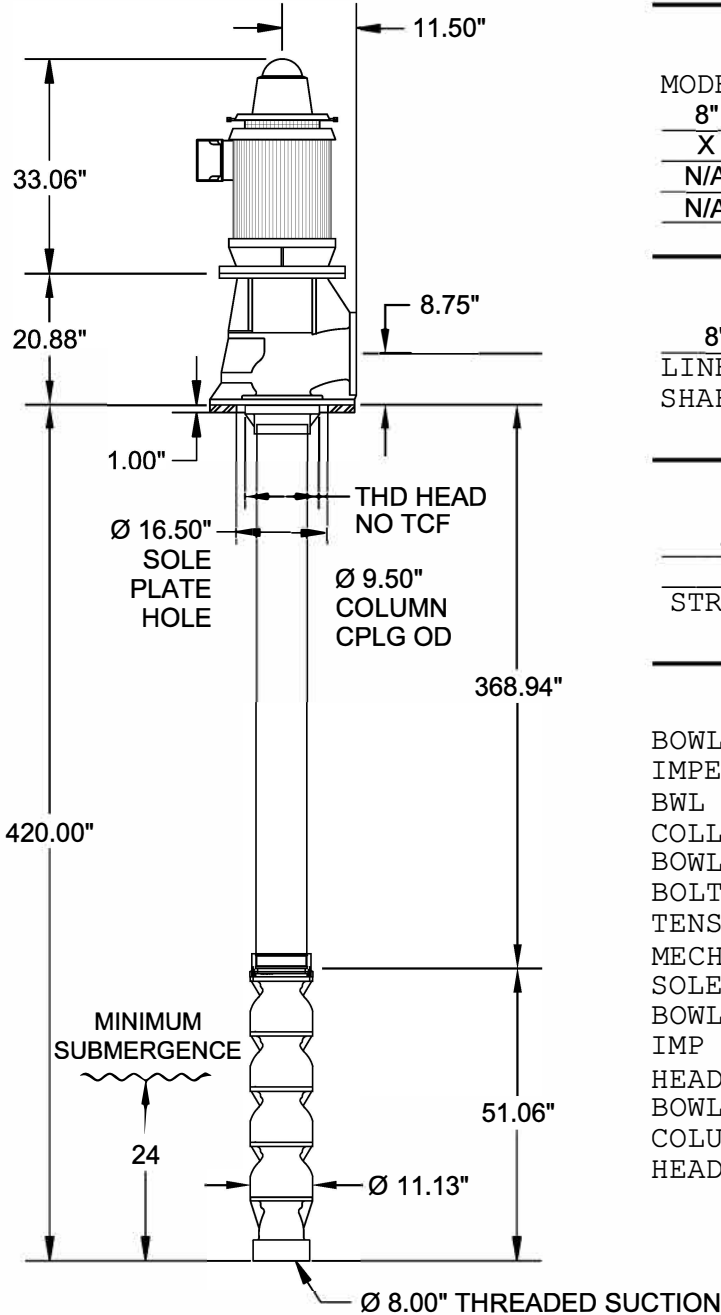
8" X 0.277" WALL X THD N/A FLG'D
 LINESHAFT X OPEN (N/A) ENCLOSED
 SHAFT DIA 1.00" TPI 10 TPI TUBE DIA N/A

BOWL

4 STAGE J11LC BOWL ASSEMBLY
700 US GPM FLOW 180 FT. HEAD
 STRAINER YES X NO TYPE NONE

MATERIALS

BOWLS CIEN COLUMN A53, GR B
 IMPELLERS 876 BZ (STD) COLUMN CPLG DI
 BWL SFT 416 SS SHAFT TUBE N/A
 COLLETS 316 SS BRG RET 304 SS
 BOWL BRG BOWL DWG LINE SFT BRGS RUBBER
 BOLTING SS LINE SHAFT SS (416)
 TENSION BRG N/A SHAFT SLEEVES SS (304)
 MECH SEAL N/A SHAFT CPLG SS (304)
 SOLE PLATE A-36 PACKING GRAPHITE
 BOWL WR N/A STRAINER N/A
 IMP WR N/A HEAD CI
 HEAD SHAFT 416 SS HEAD SHAFT CPG SS (304)
 BOWL SURFACE FINISH STD PAINT; OD
 COLUMN SURFACE FINISH STD PAINT; OD
 HEAD SURFACE FINISH STD PAINT; OD



PROJECT NAME

Bristol, IN - Proposed Well #6

WEIGHT & THRUST ESTIMATES

BOWL 510 LBS COLUMN 829 LBS HEAD 490 LBS
 SHAFT 89 LBS TUBE 0 LBS DRIVER 600 LBS
 HYD THRUST 1438 LBS DRIVER MAX THRUST 5700 LBS

SPECIAL NOTE: **DO NOT ASSEMBLE AS A SCVT PUMP**

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SHOWN.

FOUR STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-186125
BUILD - 1

MFG. BY NATIONAL PUMP COMPANY

Company: Peerless Midwest, Inc.
 Name: Ryan Odynski
 Date: 1/23/2024

Bristol, IN - Proposed Well #6



Pump:

Size: J11LC (4 stage)
 Type: VERT.TURB.ENCLOSED
 Synch Speed: 1800 rpm
 Curve: CVJ11LC4P6CY
 Specific Speeds:
 Dimensions:
 Vertical Turbine:
 Speed: 1770 rpm
 Dia: 7.98 in
 Impeller: J11LC (1/16)
 Ns: 2300
 Nss: 6400
 Suction: ---
 Discharge: ---
 Bowl Size: 11.1 in
 Max Lateral: 1 in
 Thrust K Factor: 7.9 lbf/ft

Search Criteria:

Flow: 700 US gpm Head: 180 ft

Fluid:

Water
 Density: 62.32 lb/ft³
 Viscosity: 0.9946 cP
 NPSHa: ---
 Temperature: 68 °F
 Vapor Pressure: 0.3391 psi a
 Atm Pressure: 14.7 psi a

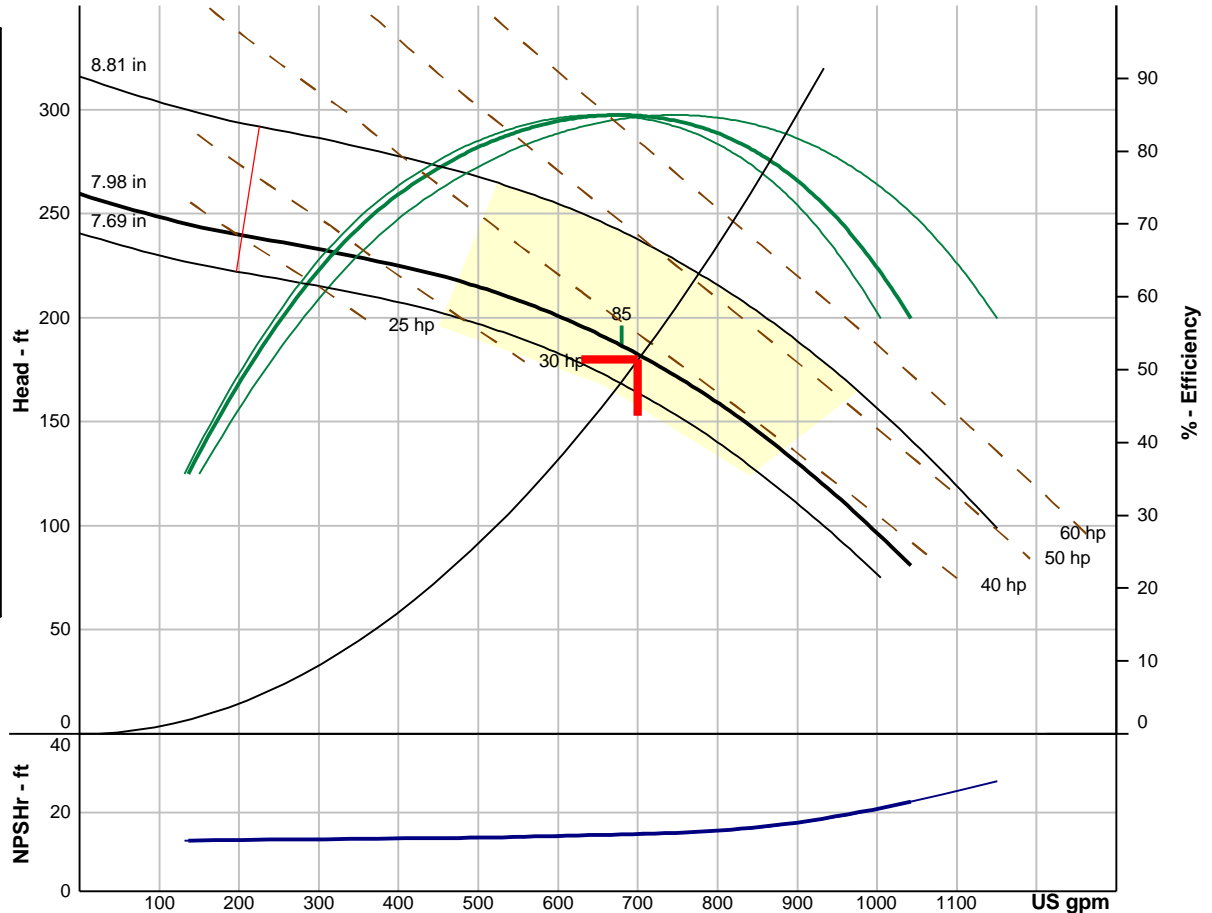
Motor:

Standard: NEMA
 Enclosure: WP-I
 Sizing Criteria: Max Power on Design Curve
 Size: 40 hp
 Speed: 1800 rpm
 Frame: 324

Pump Limits:

Temperature: 180 °F
 Pressure: 340 psi g
 Sphere Size: 0.5 in
 Power: 417 hp
 Eye Area: 15.5 in²

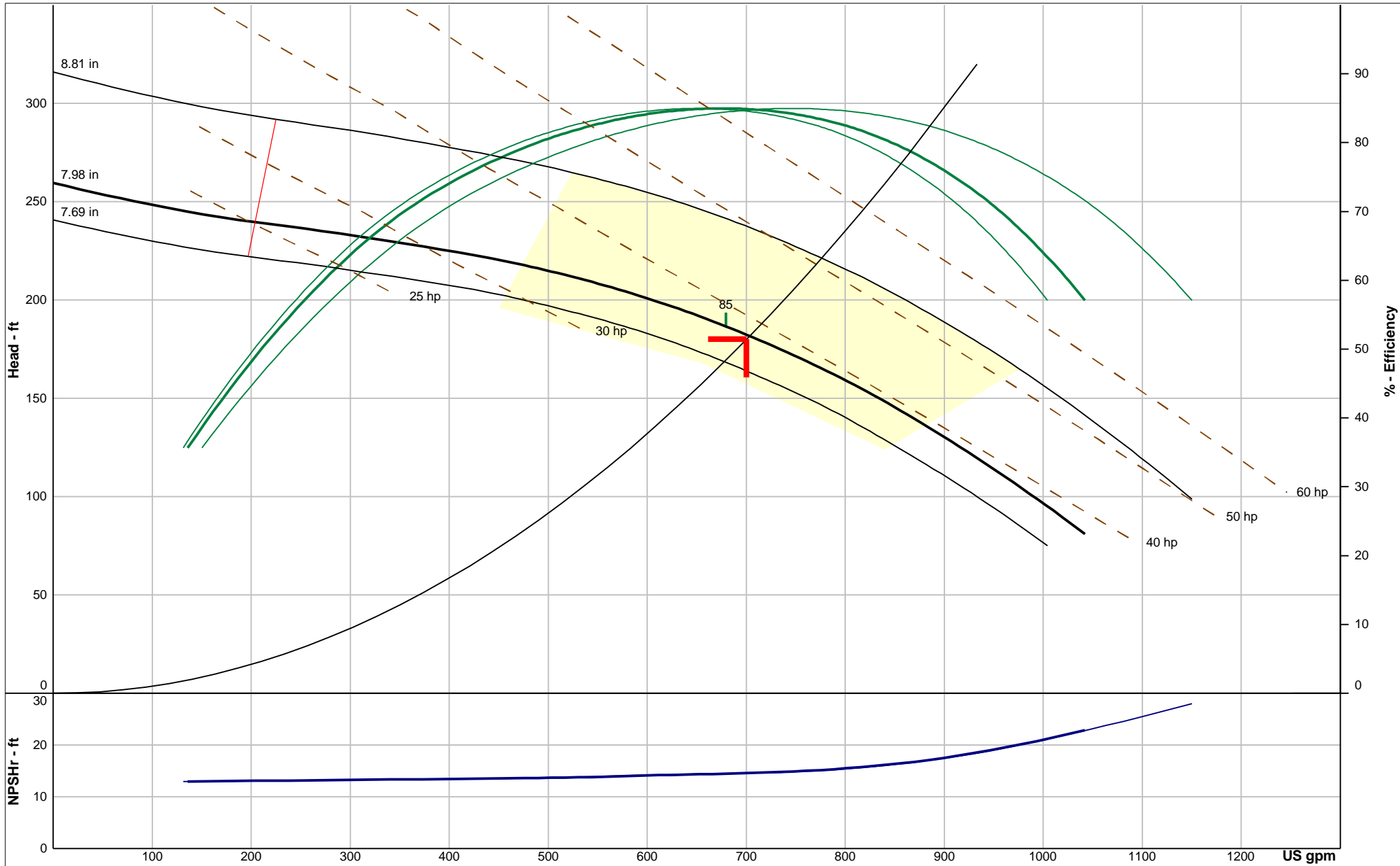
---- Duty Point ----	
Flow:	700 US gpm
Head:	182 ft
Eff:	85%
Power:	37.9 hp
NPSHr:	14.6 ft
---- Design Curve ----	
Shutoff Head:	260 ft
Shutoff dP:	112 psi
Min Flow:	204 US gpm
BEP:	85% @ 679 US gpm
NOL Power:	39 hp @ 816 US gpm
-- Max Curve --	
Max Power:	52.5 hp @ 975 US gpm



UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
840	1770	148	80	39	16.3
700	1770	182	85	37.9	14.6
560	1770	207	83	35.2	13.9
420	1770	223	74	31.3	13.5
280	1770	234	60	27.2	13.3



UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

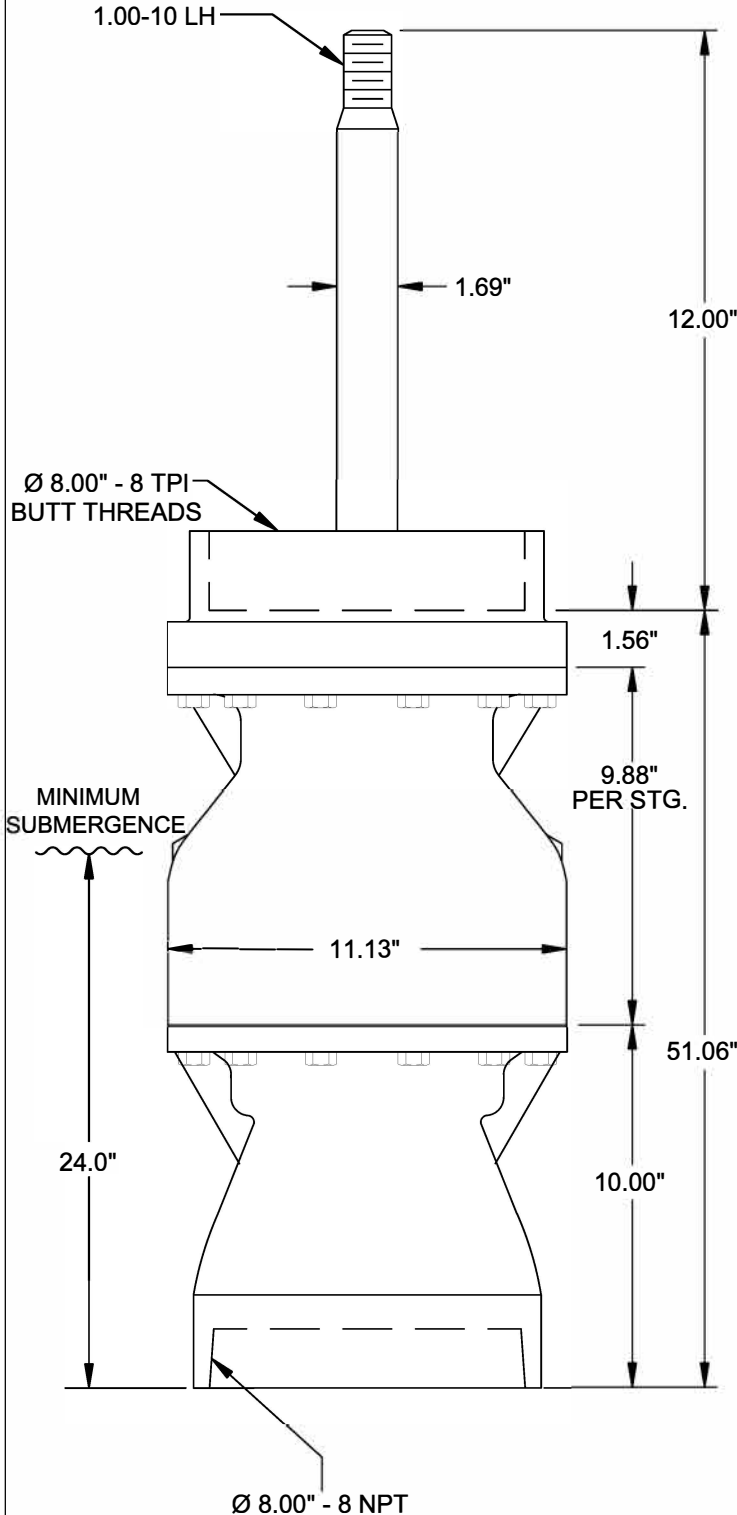
Company: Peerless Midwest, Inc.
 Name: Ryan Odynski
 1/23/2024

National Pump Company
 Catalog: NPC.60, Vers 6c230825
 VERT.TURB.ENCLOSED - 1800 rpm
 Design Point: 700 US gpm, 180 ft

Size: J11LC (4 stage)
 Speed: 1770 rpm
 Dia: 7.98 in
 Curve: CVJ11LC4P6CY
 Impeller: J11LC (1/16)



VERTICAL TURBINE PUMP



4		STAGE		BOWL		J11LC		BOWL ASSEMBLY	
700 US GPM		FLOW		180 FT.		HEAD			
STRAINER		YES		X		NO		TYPE	
								N/A	

MATERIALS

BOWL	GEN
IMPELLER	876 BZ (STD); STATIC BAL.
COLUMN ADAPTER	CAST IRON
SUCTION BELL/CASE	CAST IRON
BOWL SHAFT	416 SS
COLLETS	SS (316)
SAND COLLAR	C876 BRONZE
SUCTION BEARING	C898 35 (STD BZ)
INTERMEDIATE BEARING	C89835 (STD BZ)
TOP BEARING	C89835 (STD BZ)
BOLTING	SS
STRAINER	N/A
BOWL O-RING	NONE
WEAR RING (B)	N/A
WEAR RING (I)	N/A
BOWL ID SURFACE FINISH	VITREOUS ENAMEL
BOWL OD SURFACE FINISH	STD PAINT - OD

PROJECT NAME:
Bristol, IN - Proposed Well #6

FURNISHED BY:
Peerless Midwest, Inc.

BOWL WEIGHT: 510 LBS
 DRAWING NOT TO SCALE.
 ALL DIMENSIONS IN INCHES.
 SINGLE STAGE ASSEMBLY SHOWN.
 NOT FOR CONSTRUCTION UNLESS CERTIFIED.

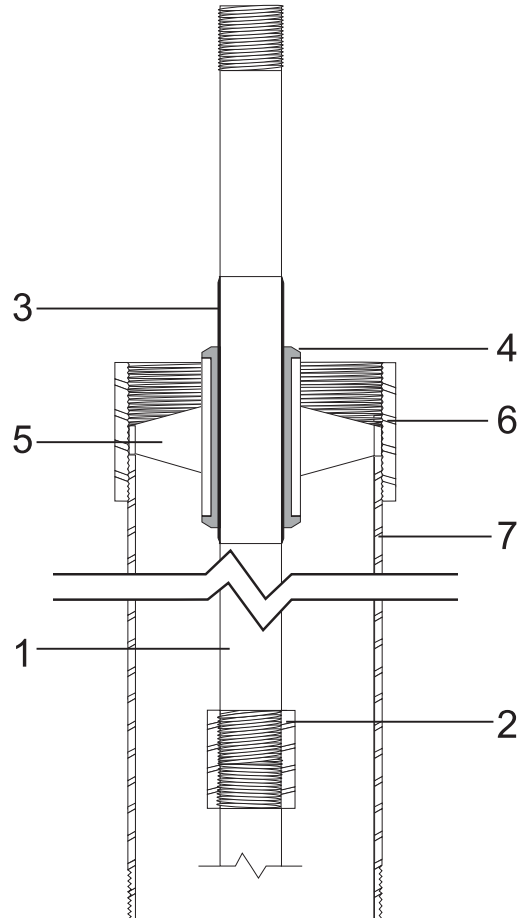
MFG. BY NATIONAL PUMP COMPANY

C-186125
 BUILD - 1

COLUMN ASSEMBLY PRODUCT LUBRICATED TYPE FOR LINESHAFT TURBINE PUMPS

COLUMN SIZE SCH. WALL THICKNESS	SHAFT SIZE	WEIGHT IN LBS.		MAX. AWWA RECMD. GPM	O.D. PIPE CPLG.
		5 FT.	10 FT.		
4" SCH. 40 0.237"	1"	71	139	150	5.20"
	1-3/16"	77	150	100	
	1-1/4"	79	154	100	
5" SCH. 40 0.258"	1"	95	182	325	6.30"
	1-3/16"	101	193	250	
	1-1/4"	103	197	250	
6" SCH. 40 0.280"	1"	118	227	600	7.39"
	1-3/16"	124	238	500	
	1-1/4"	126	242	500	
	1-1/2"	136	261	400	
8" SCH. 40 0.277"	1"	172	329	1350	9.63"
	1-3/16"	178	340	1300	
	1-1/4"	180	344	1300	
	1-1/2"	190	363	1150	
	1-11/16"	198	379	1150	
10" SCH. 40 0.279"	1"	245	461	2800	11.75"
	1-3/16"	251	472	2600	
	1-1/4"	253	474	2600	
	1-1/2"	263	495	2450	
	1-11/16"	271	511	2450	
	1-15/16"	285	538	2000	
12" SCH. 30 0.330"	1"	304	565	4700	14.00"
	1-3/16"	310	577	4300	
	1-1/4"	312	581	4300	
	1-1/2"	322	602	4000	
	1-11/16"	330	616	4000	
	1-15/16"	344	642	3600	
	2-3/16"	359	671	3400	

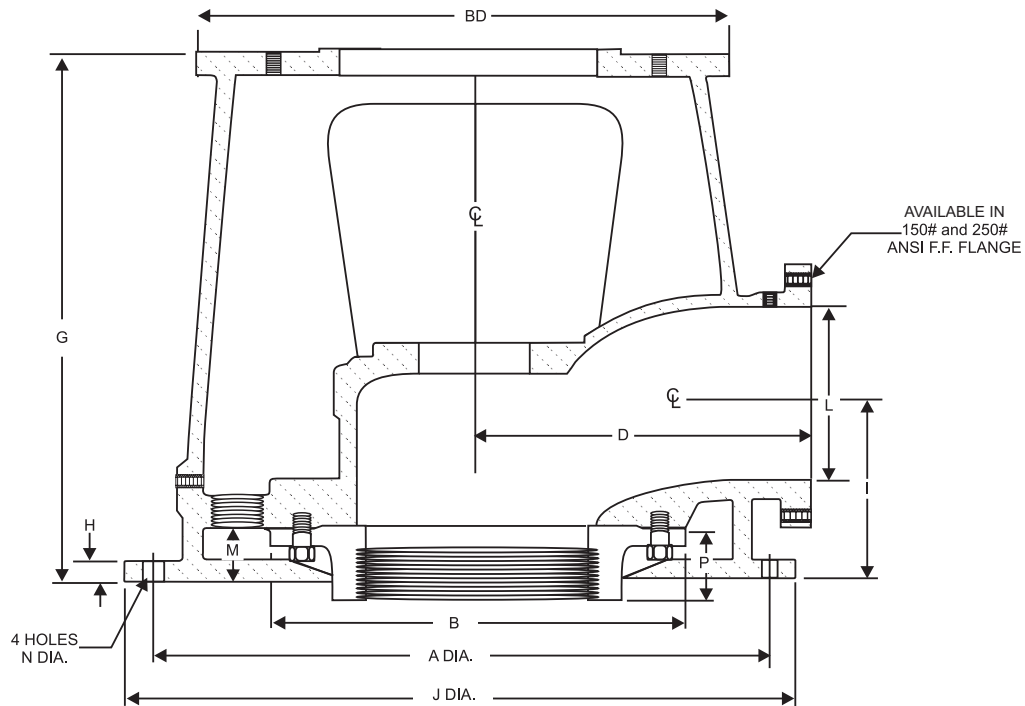
**THREADED COLUMN ASSEMBLY
PRODUCT LUBRICATED (PRL)**



**TYPICAL COLUMN ASSEMBLY
CONSISTS OF:**

1. 416 SS LINESHAFT
2. 304 STEEL SHAFT COUPLING
3. 304 SS SLEEVE
4. NEOPRENE LINESHAFT BEARING
5. 304 STAINLESS STEEL RETAINER
6. DUCTILE IRON PIPE COUPLINGS
7. A53 GRADE B STEEL PIPE

DIMENSIONS "HI - PROFILE" DISCHARGE HEAD



MODEL	BD	A	B	D	G	H	I	J	L	M	N	WEIGHT
16 X 6	16-1/2, 20	20-1/2	11	13	21-1/2	1"	9	22	6	2-1/4	7/8	400
16 X 8	16-1/2, 20	23	15	13-1/2	22-1/2	1"	9	24-1/2	8	2-1/4	7/8	450
16 X 10	16-1/2, 20	25	17	14-7/8	24-1/2	1"	10-1/2	26-1/2	10	2-1/4	7/8	560
20 X 12	20	24	17	15	29	1-1/8"	12	27	12	2-3/4	1-1/4	685

MODEL	DISCH. SIZE	COLUMN	P	MIN. WELL CASING (3)	MAX. SETTING D.I.TCF	MAX. SHAFT SIZE	RPM	HORSE POWER	MAX. THRUST
16 X 6	6"	5"	3-15/16	10"	1100'	2-3/16"	3600	800	20,000
		6"	3-15/16	10"	1000'		1800	700	20,000
							1200	475	20,000
16 X 8	8"	6"	3-15/16	10"	1000'	2-3/16"	3600	800	20,000
		8"	4-3/16	12"	800'		1800	700	20,000
		10"	4-15/16	16"	700'		1200	475	20,000
16 X 10	10"	8"	2-5/16	12"	800'	2-3/16"	3600	800	20,000
		10"	3-1/16	14"	700'		1800	700	20,000
		12"	3-1/16	16"	500'		1200	475	20,000
20 X 12	12"	12"	3-1/16	16"	500'	2-3/16"	3600	500	13,000
							1800	435	13,000
							1200	300	13,000

- 16" min. casing required when allowing casing to stick up 1-7/8" max. above foundation pad without grout plate for 16 x 8.
- 18" min. casing required when allowing casing to stick up 1-7/8" max. above foundation pad without grout plate for 16 x 10.
- Referring to chart; min. casing size when casing is flush with foundation pad.
- Head should be raised by lifting lugs ONLY. If necessary to insure stabilization, secure lifting strap to top of base to prevent tilting.

40 HP MOTOR

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136



DATE: 6/14/2022

P.O. NO.: HF94
Order/Line NO.: 26870 MN 100

TO:

Model Number: HF94
Catalog Number: HO40V2BLF
VHS Weather Protected
CONF,MOTOR,VHS WPI

REVISIONS:
(NONE)

**ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY NIDEC MOTOR CORPORATION.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.**

Features:

Horsepower 00040.00~00000.00 ~ KW: 29.84
Enclosure WPI
Poles 04~00 ~ RPM: 1800~0
Frame Size 324~TPH
Phase/Frequency/Voltage.. 3~060~230/460
Winding Type Random Wound
Service Factor 1.15
Insulation Class Class "F" ~ Insulife 2000
Altitude In Feet (Max) .. 3300 Ft.(1000 M) ~ +40 C
Efficiency Class Premium Efficiency
Application Vertical Centrifugal Pump
Inverter Duty NEMA MG1 Part 31
Customer Part Number
12" Base ~ Coupling Size: 1-1/4" Bore, 1/4" Key
Non-Reverse Ratchet ~ Steady Bushing Not Requested
Pricebook Thrust Value (lbs).. 5700
Customer Down Thrust (lbs) ... 5700
Customer Shutoff Thrust (lbs).
Up Thrust (lbs): ~
Inverter Duty Rating Details:
Load Type (Base Hz & Below) .. Variable Torque
Speed Range (Base Hz & Below). 10:1
VFD Service Factor 1.00
Temperature Rise (Sine Wave): "B" Rise @ 1.0 SF (Resist)
Starting Method Direct-On-Line Start
Duty Cycle Continuous Duty
Efficiency Value 94.1 % ~ Typical
Load Inertia: NEMA ~ Standard Inertia: 189.00 LB-FT²
Number Of Starts Per Hour: NEMA
Motor Type Code RUSI
Rotor Inertia (LB-FT²) 6.37 LB-FT²
Qty. of Bearings PE (Shaft) 1
Qty. of Bearings SE (OPP) 1
Bearing Number PE (Shaft) 6211-J
Bearing Number SE (OPP) 7220-BEP

Nidec trademarks followed by the ® symbol are registered with the U.S. Patent and Trademark Office.

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136



DATE: 6/14/2022

P.O. NO.: HF94
Order/Line NO.: 26870 MN 100

TO:

Model Number: HF94
Catalog Number: HO40V2BLF
VHS Weather Protected
CONF,MOTOR,VHS WPI

REVISIONS:
(NONE)

**ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY NIDEC MOTOR CORPORATION.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.**

Accessories:

Counter CW Rotation FODE
Aegis Ground Ring (SGR)
115 Volt Space Heaters
Special Balance
Thermostats - Normally Closed
Shipping Weight in lbs: 635
Shipping Mass in KG: 290
Standard Leadtime: NA
Est. Weight (lbs ea): 635 ~ F.O.B.:

USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT

Horsepower	40
Pole(s)	04
Voltage(s)	460-230
Frame Size	324TPH
Outlet Box AF	4.25
Outlet Box AA	3.00

Nidec trademarks followed by the ® symbol are registered with the U.S. Patent and Trademark Office.

EFFECTIVE:
06-NOV-19

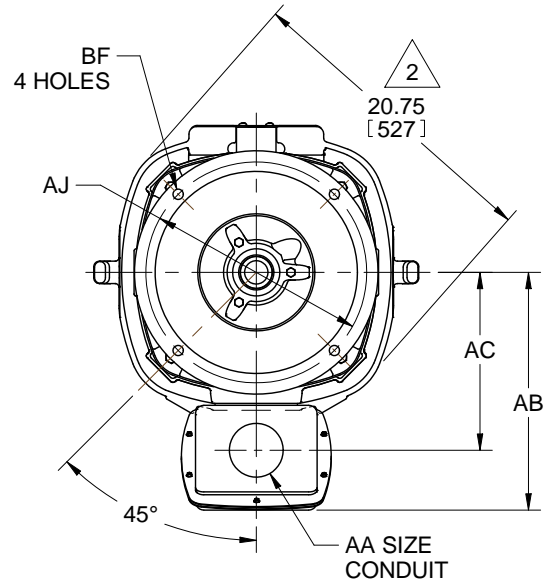
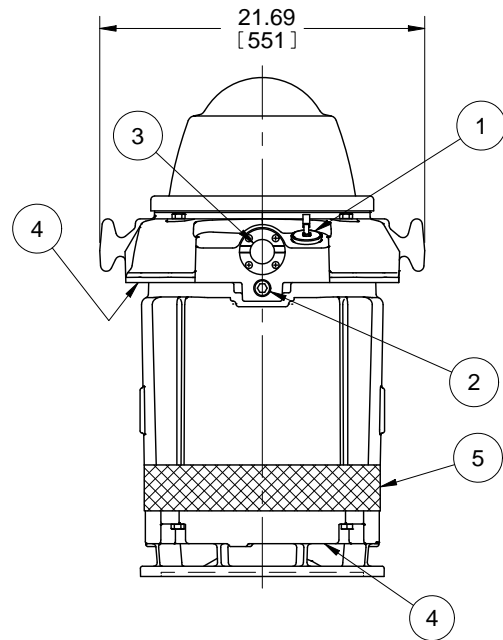
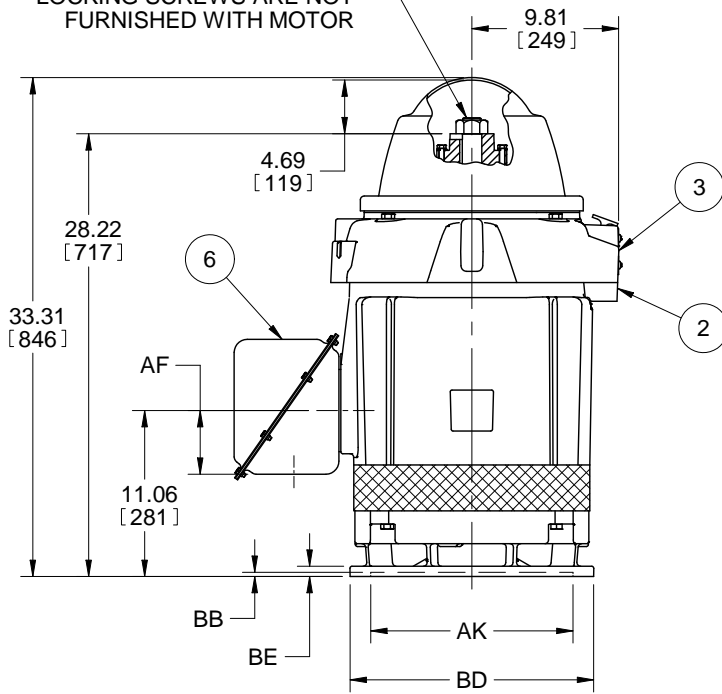
DIMENSION PRINT
WEATHER PROTECTED TYPE I
FRAME: 320TP, TPH
BASIC TYPE: RU

PRINT:
09-3419

SUPERSEDES:
NEW

SHEET:
1 OF 1

PUMP SHAFT, ADJUSTING NUT AND LOCKING SCREWS ARE NOT FURNISHED WITH MOTOR



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS
(TOLERANCES ARE IN INCHES)

UNITS	C/BOX VOLUME (CU. IN.)	AA	AB	AC	AF
IN	470	3.00	15.88	11.88	4.25
MM			403	302	108

FRAME	UNITS	AJ	AK +0.005	BB MIN	BD MAX	BE	BF
324, 326TP	IN	14.750	13.500	.25	16.50	.69	.688
	MM	374.65	342.9	6	419	18	17.48
324, 326TPH	IN	9.125	8.250	.19	12.00	.69	.438
	MM	231.78	209.55	5	305	18	11.13

1. CONDUIT OPENING MAY BE LOACTED IN STEPS OF 90 DEGREES. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

2. LARGEST MOTOR WIDTH.

FEATURE LISTING

NO.	DESCRIPTION	NO.	DESCRIPTION
1	UPPER SUMP OIL FILL	6	MAIN CONDUIT BOX
2	UPPER SUMP OIL DRAIN		
3	UPPER SUMP SIGHT WINDOW		
4	AIR INTAKE		
5	AIR EXHAUST, 360° AROUND		

TOLERANCES	8.250 AK	13.500 AK
FACE RUNOUT	.004 TIR	.007 TIR
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.004 TIR	.007 TIR
TOLERANCE ON AK DIMENSION	+0.003	+0.005
NON-MACHINED DIMENSIONS MAY VARY BY ±.25		

09-3419/-

Nidec Motor Corporation
St. Louis, Missouri

INFORMATION DISCLOSED ON THIS DOCUMENT IS CONSIDERED PROPRIETARY AND SHALL NOT BE REPRODUCED OR DISCLOSED WITHOUT WRITTEN CONSENT OF NIDEC MOTOR CORPORATION



ISSUED BY
K. FRIEDMAN
APPROVED BY
T. KIRKLEY

IHP_DP_NMCA (MAR-2011) SOLIDEDGE

NAMEPLATE DATA

CATALOG NUMBER: <input style="width: 100%;" type="text" value="HO40V2BLF"/>	NAMEPLATE PART #: <input style="width: 100%;" type="text" value="422707-005"/>
MODEL <input style="width: 15%;" type="text" value="HF94"/> <input style="width: 15%; margin-left: 20px;" type="text" value="FR"/> <input style="width: 15%; margin-left: 20px;" type="text" value="324TPH"/>	TYPE <input style="width: 15%;" type="text" value="RUSI"/> ENCL <input style="width: 15%; margin-left: 20px;" type="text" value="WPI"/>
SHAFT END BRG <input style="width: 100%;" type="text" value="6211-J - QTY 1"/>	OPP END BRG <input style="width: 100%;" type="text" value="7220-BEP - QTY 1"/>
PH <input style="width: 10%;" type="text" value="3"/> MAX AMB <input style="width: 15%; margin-left: 20px;" type="text" value="40 C"/>	ID# <input style="width: 100%;" type="text"/>
INSUL CLASS <input style="width: 10%;" type="text" value="F"/> Asm. Pos. <input style="width: 100%;" type="text"/>	DUTY <input style="width: 100%;" type="text" value="CONT"/>
HP <input style="width: 10%;" type="text" value="40"/> <input style="width: 15%; margin-left: 10px; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> RPM <input style="width: 10%;" type="text" value="1785"/> <input style="width: 15%; margin-left: 10px; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>	HP <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> RPM <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>
VOLTS <input style="width: 15%; margin-left: 10px;" type="text" value="460"/> <input style="width: 15%; margin-left: 10px;" type="text" value="230"/> <input style="width: 15%; margin-left: 10px; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>	VOLTS <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>
FL AMPS <input style="width: 15%; margin-left: 10px;" type="text" value="49.0"/> <input style="width: 15%; margin-left: 10px;" type="text" value="97.0"/> <input style="width: 15%; margin-left: 10px; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>	FL AMPS <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>
SF AMPS <input style="width: 15%; margin-left: 10px;" type="text" value="55.0"/> <input style="width: 15%; margin-left: 10px;" type="text" value="111.0"/> <input style="width: 15%; margin-left: 10px; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>	SF AMPS <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>
SF <input style="width: 10%; margin-left: 10px;" type="text" value="1.15"/> DESIGN <input style="width: 10%; margin-left: 10px;" type="text" value="B"/> CODE <input style="width: 10%; margin-left: 10px;" type="text" value="G"/>	SF <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> DESIGN <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> CODE <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>
NEMA NOM EFFICIENCY <input style="width: 10%; margin-left: 10px;" type="text" value="94.1"/> NOM PF <input style="width: 10%; margin-left: 10px;" type="text" value="82.2"/> KiloWatt <input style="width: 10%; margin-left: 10px;" type="text" value="29.84"/>	NEMA NOM EFFICIENCY <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> NOM PF <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>
GUARANTEED EFFICIENCY <input style="width: 10%; margin-left: 10px;" type="text" value="93.0"/> MAX KVAR <input style="width: 10%; margin-left: 10px; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> HZ <input style="width: 10%; margin-left: 10px;" type="text" value="60"/>	GUARANTEED EFFICIENCY <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> MAX KVAR <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/> HZ <input style="width: 15%; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>

HAZARDOUS LOCATION DATA (IF APPLICABLE):

DIVISION <input style="width: 100%;" type="text"/>	CLASS I <input style="width: 100%;" type="text"/>	GROUP I <input style="width: 100%;" type="text"/>
TEMP CODE <input style="width: 100%;" type="text"/>	CLASS II <input style="width: 100%;" type="text"/>	GROUP II <input style="width: 100%;" type="text"/>



VFD DATA (IF APPLICABLE):

VOLTS <input style="width: 15%; margin-left: 10px;" type="text" value="460"/> <input style="width: 15%; margin-left: 10px;" type="text" value="230"/> <input style="width: 15%; margin-left: 10px; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>	AMPS <input style="width: 15%; margin-left: 10px;" type="text" value="51.5"/> <input style="width: 15%; margin-left: 10px;" type="text" value="101.9"/> <input style="width: 15%; margin-left: 10px; border: none; border-bottom: 1px solid black; border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black;" type="text"/>
TORQUE 1 <input style="width: 100%;" type="text" value="117.70LB-FT"/>	TORQUE 2 <input style="width: 100%;" type="text"/>
VFD LOAD TYPE 1 <input style="width: 100%;" type="text" value="VT/PWM"/>	VFD LOAD TYPE 2 <input style="width: 100%;" type="text"/>
VFD HERTZ RANGE 1 <input style="width: 100%;" type="text" value="6-60"/>	VFD HERTZ RANGE 2 <input style="width: 100%;" type="text"/>
VFD SPEED RANGE 1 <input style="width: 100%;" type="text" value="180-1800"/>	VFD SPEED RANGE 2 <input style="width: 100%;" type="text"/>
SERVICE FACTOR <input style="width: 100%;" type="text" value="1.00"/>	FL SLIP <input style="width: 100%;" type="text"/>
NO. POLES <input style="width: 100%;" type="text"/>	MAGNETIZING AMPS <input style="width: 100%;" type="text"/>
VECTOR MAX RPM <input style="width: 100%;" type="text"/>	Encoder PPR <input style="width: 100%;" type="text"/>
Radians / Seconds <input style="width: 100%;" type="text"/>	Encoder Volts <input style="width: 100%;" type="text"/>

TEAO DATA (IF APPLICABLE):

HP (AIR OVER) <input style="width: 100%;" type="text"/>	HP (AIR OVER M/S) <input style="width: 100%;" type="text"/>	RPM (AIR OVER) <input style="width: 100%;" type="text"/>	RPM (AIR OVER M/S) <input style="width: 100%;" type="text"/>
FPM AIR VELOCITY <input style="width: 100%;" type="text"/>	FPM AIR VELOCITY M/S <input style="width: 100%;" type="text"/>	FPM AIR VELOCITY SEC <input style="width: 100%;" type="text"/>	

ADDITIONAL NAMEPLATE DATA:

Decal / Plate	WD=109145	Customer PN	
Notes		Non Rev Ratchet	NRR
Max Temp Rise	80C RISE/RES@1.00SF	OPP/Upper Oil Cap	3 QT/2.8 L
Thermal (WDG)	OVER TEMP PROT 2	SHAFT/Lower Oil Cap	GREASE
Altitude		Usable At	
Regulatory Notes		Regulatory Compliance	
COS		Marine Duty	
Balance	0.08 IN/SEC	Arctic Duty	
3/4 Load Eff.	93.8	Inrush Limit	
Motor Weight (LBS)	635	Direction of Rotation	
Sound Level		Special Note 1	
Vertical Thrust (LBS)	5700	Special Note 2	
Thrust Percentage	100% HT	Special Note 3	
Bearing Life		Special Note 4	
Starting Method		Special Note 5	
Number of Starts		Special Note 6	
200/208V 60Hz Max Amps		SH Max. Temp.	
190V 50 hz Max Amps		SH Voltage	SH VOLTS=115V
380V 50 Hz Max Amps		SH Watts	SH WATTS= 96W
NEMA Inertia		Load Inertia	
Sumpheater Voltage		Sumpheater Wattage	
Special Accessory Note 1		Special Accessory Note 16	
Special Accessory Note 2		Special Accessory Note 17	
Special Accessory Note 3		Special Accessory Note 18	
Special Accessory Note 4		Special Accessory Note 19	
Special Accessory Note 5		Special Accessory Note 20	
Special Accessory Note 6		Special Accessory Note 21	
Special Accessory Note 7		Special Accessory Note 22	
Special Accessory Note 8		Special Accessory Note 23	
Special Accessory Note 9		Special Accessory Note 24	
Special Accessory Note 10		Special Accessory Note 25	
Special Accessory Note 11		Special Accessory Note 26	
Special Accessory Note 12		Special Accessory Note 27	
Special Accessory Note 13		Special Accessory Note 28	
Special Accessory Note 14		Special Accessory Note 29	
Special Accessory Note 15		Special Accessory Note 30	
Heater in C/B Voltage		Heater in C/B Watts	
Zone 2 Group		Division 2 Service Factor	
Note 1		Note 2	
Note 3		Note 4	
Note 5		Note 6	
Note 7		Note 8	
Note 9		Note 10	
Note 11		Note 12	
Note 13		Note 14	
Note 15		Note 16	
Note 17		Note 18	
Note 19		Note 20	
Note 21		Note 22	

NIDEC MOTOR CORPORATION
ST. LOUIS, MO

TYPICAL NAMEPLATE DATA
ACTUAL MOTOR NAMEPLATE LAYOUT MAY VARY
SOME FIELDS MAY BE OMITTED



Nidec trademarks followed by the © symbol are registered with the U.S. Patent and Trademark Office.

MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
HF94	HO40V2BLF	3	RUSI	324TPH
ORDER NO.		26870	LINE NO.	
MPI:			287863	287864
HP:			40	40
POLES:			4	4
VOLTS:			460	230
HZ:			60	60
SERVICE FACTOR:			1.15	1.15
EFFICIENCY (%):				
S.F.			93.4	93.4
FULL			93.6	93.6
3/4			93.8	93.8
1/2			92.9	92.9
1/4			88.8	88.8
POWER FACTOR (%):				
S.F.			83.3	83.3
FULL			82.2	82.2
3/4			78.1	78.1
1/2			68.8	68.8
1/4			47.3	47.3
NO LOAD			5.3	5.3
LOCKED ROTOR			38.1	38.1
AMPS:				
S.F.			55	111
FULL			49	97
3/4			38	77
1/2			29.3	59
1/4			22.3	45
NO LOAD			19.6	39.2
LOCKED ROTOR			301.8	604.6
NEMA CODE LETTER			G	G
NEMA DESIGN LETTER			B	B
FULL LOAD RPM			1785	1785
NEMA NOMINAL / EFFICIENCY (%)			94.1	94.1
GUARANTEED EFFICIENCY (%)			93	93
MAX KVAR			13.3	13.3
AMBIENT (°C)			40	40
ALTITUDE (FASL)			3300	3300
SAFE STALL TIME-HOT (SEC)			26	26
SOUND PRESSURE (DBA @ 1M)			65	65
TORQUES:				
BREAKDOWN{% F.L.}			249	249
LOCKED ROTOR{% F.L.}			209	209
FULL LOAD{LB-FT}			117.7	117.7

NEMA Nominal and Guaranteed Efficiencies are up to 3,300 feet above sea level and 25 ° C ambient.

The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

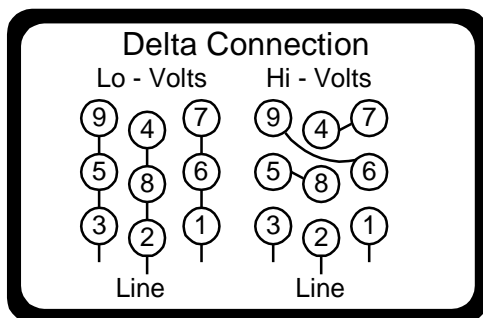
NIDEC MOTOR CORPORATION
ST. LOUIS, MO





A109145

Motor Wiring Diagram 9 Lead, Dual Voltage (DELTA Conn.)



To reverse direction of rotation interchange connections L1 and L2.

Each lead may have one or more cables comprising that lead.
In such case each cable will be marked with the appropriate lead number.

THERMOSTATS

1. MOTOR IS EQUIPPED WITH QTY-3 (1 PER PHASE) NORMALLY CLOSED THERMOSTATS. THERMOSTATS ARE SET TO OPEN AT HIGH TEMPERATURE.
2. CONTACT RATINGS FOR THERMOSTATS: 120-600 VAC, 720 VA

N. C. THERMOSTATS



NOTE: THERMOSTATS LEADS MAY BE LOCATED IN EITHER THE MAIN OUTLET BOX OR IF SO EQUIPPED, AN AUXILIARY BOX.

ACCESSORY LISTING
QTY-3 N.C. THERMOSTATS

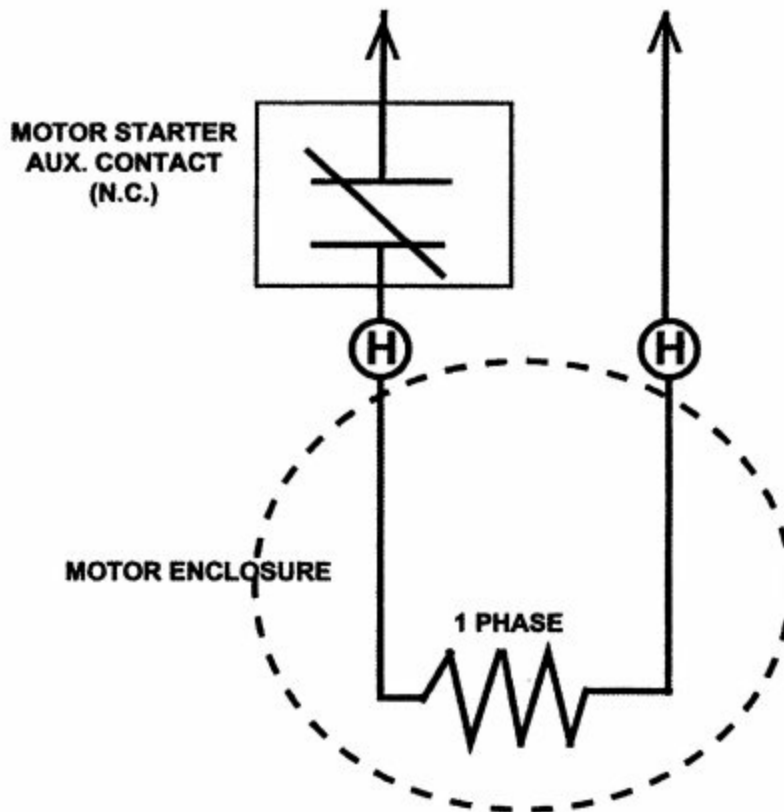
REVISION DESCRIPTION FOR: MISC		SCALE	UNITS	TITLE		NIDEC MOTOR CORPORATION		
STL0211 - UPDATED FORMAT .		NONE	IN	CUSTOMER CONNECTION DIAGRAM				
		TOLERANCES ON DIMENSIONS (UNLESS OTHERWISE SPECIFIED)						
MATERIAL:		<u>INCHES</u>	<u>mm</u>	ISSUED BY	APPROVED BY	REVISION DATE		
---				R. KING	C. CADE	24-FEB-11		
MUST BE COMPLIANT TO RoHS DIRECTIVE EU 2002/95/IEC AND REGULATION EC 1907/2006 (REACH) AS AMENDED		ANGLES X°= ±1°		CODE	DWG NO.	REV	SHEET NUMBER	DWG SIZE
					0834066	G	1 OF 1	A



970798

SPACE HEATER CONNECTION DIAGRAM

SPACE HEATER LEADS MAY BE LOCATED IN EITHER THE MAIN OUTLET BOX
OR IF SO EQUIPPED, AN AUXILIARY BOX



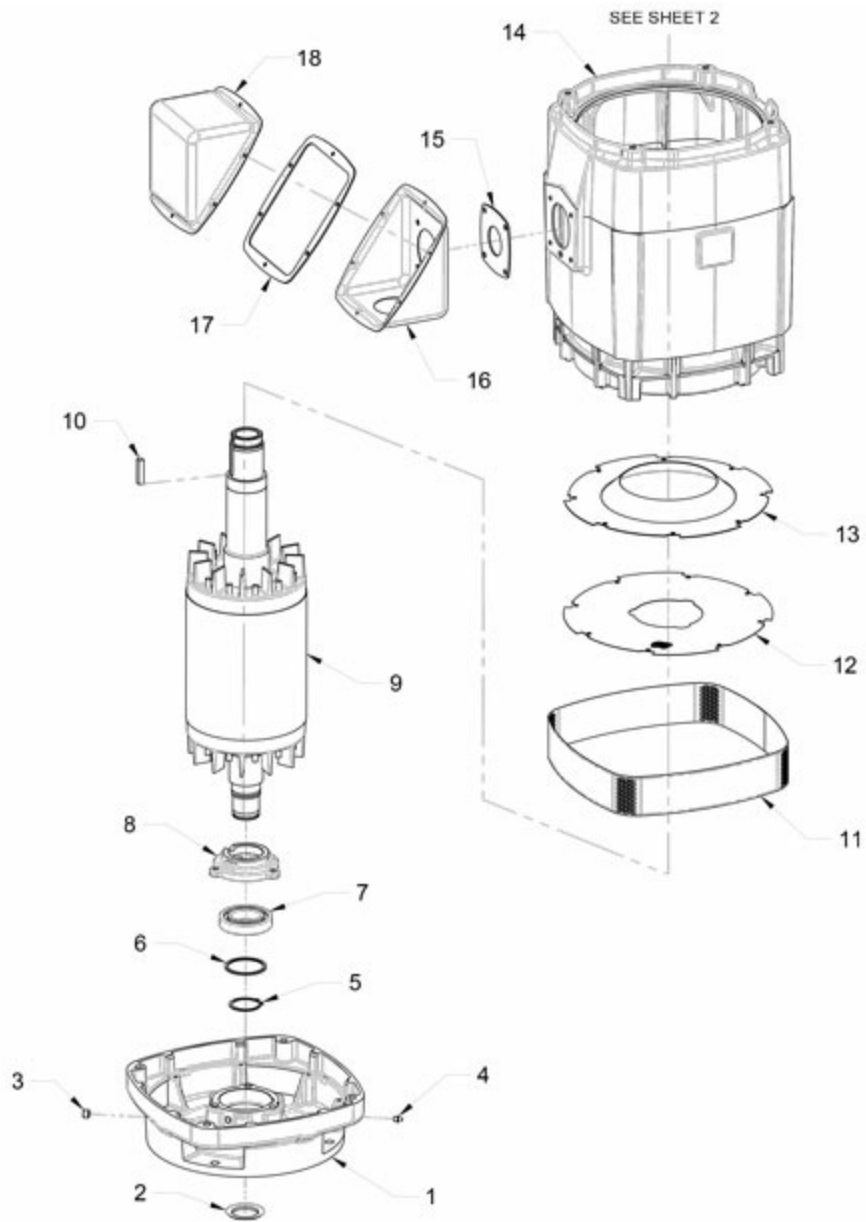
THIS EQUIPMENT IS SUPPLIED WITH ANTI-CONDENSATION HEATERS. HEATERS SHOULD BE ENERGIZED WHEN EQUIPMENT IS NOT OPERATING TO PROTECT UNIT BY PREVENTING INTERNAL CONDENSATION. CONNECT THE "H" OR HEATER LEADS TO

115V VOLTS	96W WATTS RATING
-------------------	-------------------------

SPACE HEATER NAMEPLATE (ON MOTOR)

RENEWAL PARTS

FRAME 400
TYPES: RU, RUE, RUEI, RUS, RUSI

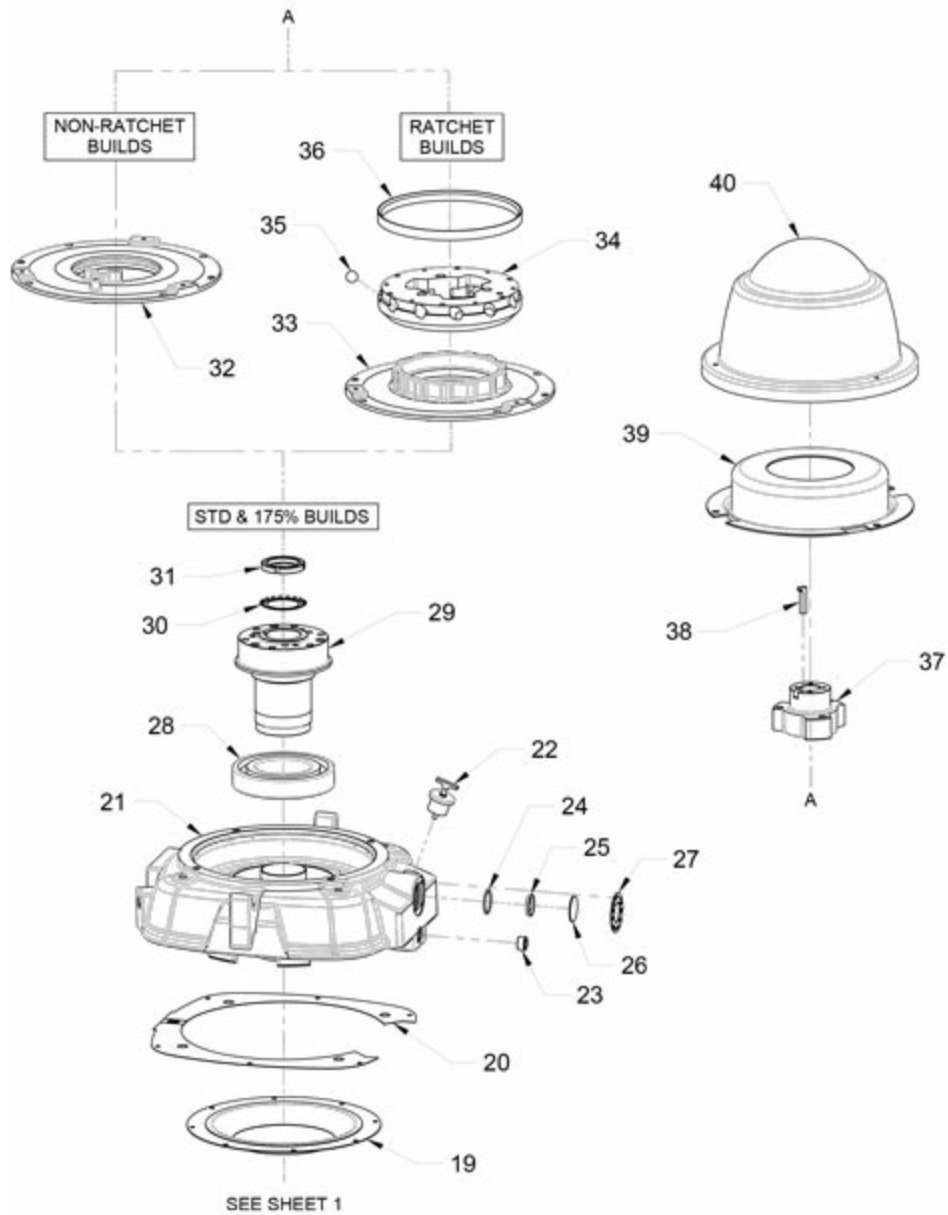


BEARINGS:
Refer to motor nameplate for the bearing numbers.

PRICES:
Parts stocking distributors: refer to renewal parts numerical index. All Others: refer to your nearest parts distributor.
reference: Renewal Parts Section 700 - 270

RENEWAL PARTS

FRAME 400
TYPES: RU, RUE, RUEI, RUS, RUSI



BEARINGS:
Refer to motor nameplate for the bearing numbers.

PRICES:
Parts stocking distributors: refer to renewal parts numerical index. All Others: refer to your nearest parts distributor.
reference: Renewal Parts Section 700 - 270

RENEWAL PARTS

FRAME 400
TYPES: RU, RUE, RUEI, RUS, RUSI

ITEM NO.	QTY.	NAME OF PART	ITEM NO.	QTY.	NAME OF PART
1	1	Lower Bracket	21	1	Upper Bracket
2	1	Water Deflector	22	1	Oil Fill Plug (Expanding)
3	1	Pipe Plug	23	1	Upper Plug (Oil Drain)
4	1	Zerk Fitting Grease	24	1	O-Ring Sight Gauge Window
5	1	Spacer Washer	25	1	Deflector Sight Gauge Window
6	1	Snap Ring	26	1	Glass Sight Gauge Window
7	1	Lower Bearing	27	1	Cover Sight Gauge Window
8	1	Lower Bearing Cap	28	-	Upper Bearing (Qty 1 or 2)
9	1	Rotor Assembly	29	1	Bearing Mount
10	1	Key	30	1	Upper Lockwasher
11	1	Lower Screen Intake (External)	31	1	Upper Lock Nut
12	1	Lower Screen Intake (Internal)	32	1	Dust Cover (Only on Units Without Ratchet)
13	1	Lower Air Deflector	33	1	Ratchet Adaptor (Only on Units With Ratchet)
14	1	Stator Assembly	34	1	Stationary Ratchet (Only on Units With Ratchet)
15	1	Gasket Outlet Box (Frame and Box)	35	1	Ratchet Ball (Only on Units With Ratchet)
16	1	Outlet Base	36	1	Ball Retaining Ring (Only on Units With Ratchet)
17	1	Gasket Outlet Box (Base and Cover)	37	1	Thrust Coupling (Only on Hollowshaft)
18	1	Cover Outlet Box	38	1	Gib Key (Only on Hollowshaft)
19	1	Upper Air Deflector	39	1	Upper Baffle
20	1	Upper Screen	40	1	Canopy Cap

BEARINGS:

Refer to motor nameplate for the bearing numbers.

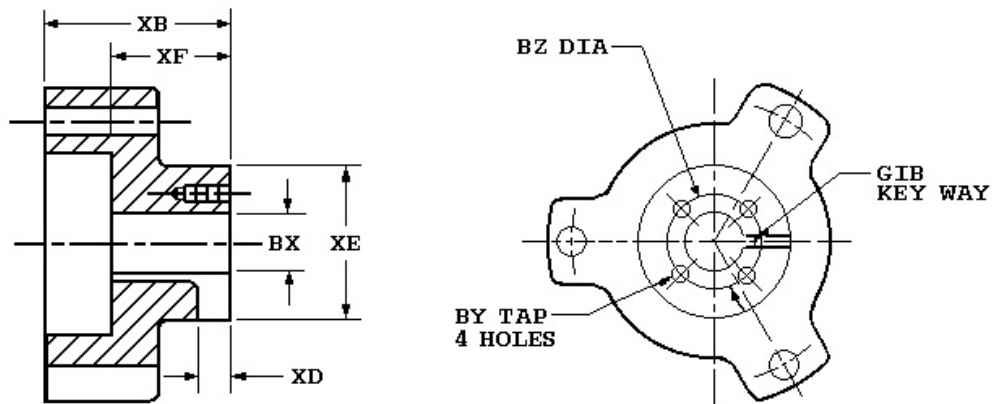
PRICES:

Parts stocking distributors: refer to renewal parts numerical index. All Others: refer to your nearest parts distributor.

reference: Renewal Parts Section 700 - 270

Vertical HOLLOSHAFT Coupling Dimensions

Standard Coupling Dimensions



Coupling Part Number	162458
BX Nominal	1 1/4
Actual Bore	1.251
BY	1/4-20
BZ	1 3/4
XB	2 15/16
XD	17/32
XE	2 7/8
XF	1 15/16
SQ. KEY	1/4

Notes:

1. All Rough casting dimensions may vary by 0.25" due to casting variations.
2. All tapped holes are Unified National Course, Right Hand thread.
3. Coupling bore dimension "BX" is machined with a tolerance of - .000", +.001" up to 1.50" bore inclusive. Larger bores: -.000", +.002".



Copyright © 2010 Nidec Motor Corporation. All rights reserved.

TYPICAL REED CRITICAL FREQUENCY DATA

Note: Motor RCF Test Data can be provided at time of motor shipment through special test.
Please contact your Nidec Motor Corporation representative for more information.

MODEL NO: HF94
CATALOG NO: HO40V2BLF

Frame: 324TPH Type: RUSI

REED CRITICAL FREQUENCY:	57	HZ
CENTER OF GRAVITY:	13	IN
DEFLECTION @ CENTER OF GRAVITY:	0.00301	IN
UNIT WEIGHT:	690	LBS
BASE DIAMETER:	ALL	IN
TOLERANCE ON RCF VALUE:	10%	
DATE:	6/14/2022	



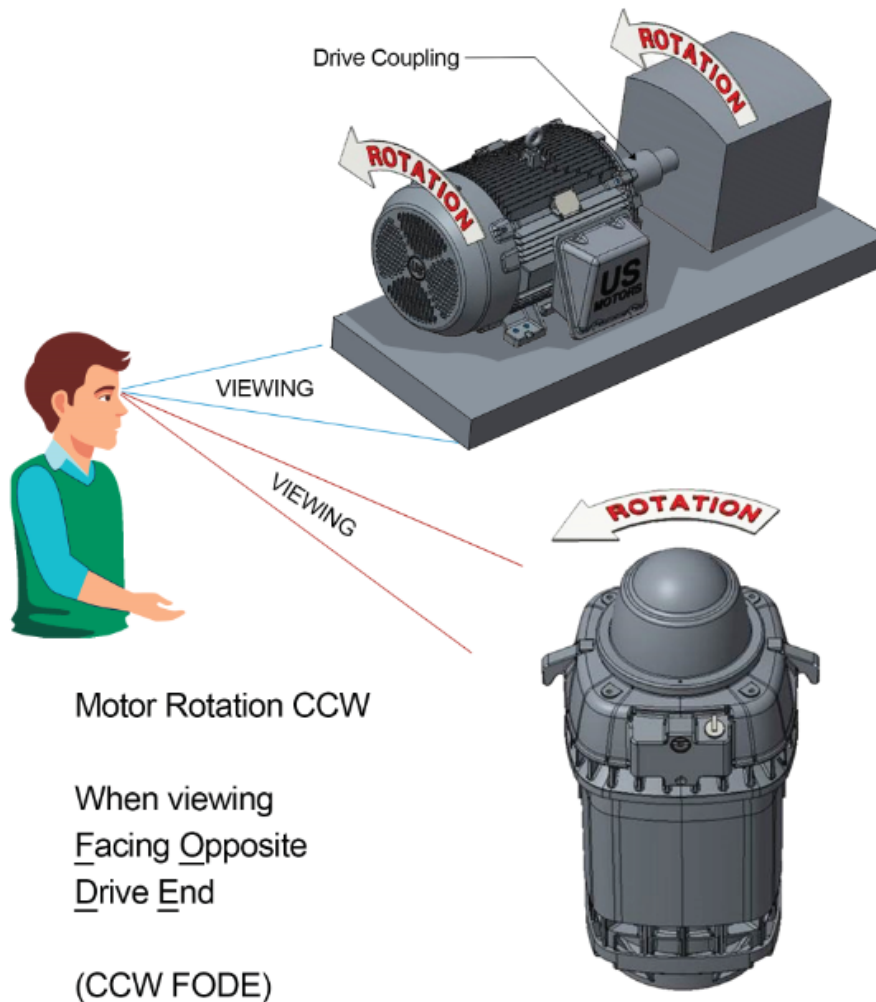
Copyright © 2010 Nidec Motor Corporation. All rights reserved.



DIRECTION OF ROTATION

This motor is unidirectional and can only be operated in one direction to ensure proper cooling.

The motor will be supplied with the industry standard CCW (counter clockwise) rotation as shown below. CW rotation is available upon request.



NIDEC MOTOR CORPORATION
ST. LOUIS, MISSOURI

80-289

General Information for Integral Horsepower (IHP) Motors on Variable Frequency Drives (VFDs)

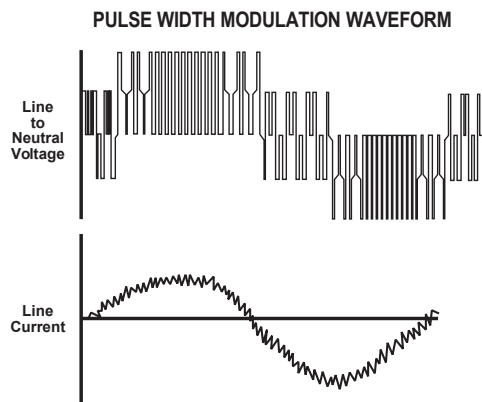
Variable Frequency Drives (VFD)

A VFD is a type of controller used to vary the speed of an electric motor. The VFD takes a fixed AC voltage and frequency and allows it to be adjusted in order to get different speeds from the motor. Motor speed can be varied by changing the frequency of the input power waveform. The equation below shows how the frequency affects the speed of a three phase induction motor.

$$\text{Speed} = \frac{120 * \text{Fundamental Input Frequency}}{\text{Number of Motor Poles}}$$

How does a VFD work?

A VFD takes the fixed frequency and voltage sine wave from the power grid or power station and puts it through a few steps in order to allow the VFD user to vary the frequency and in turn control the motor speed. First it rectifies the AC power into DC Power. Because of this step, a term commonly used instead of VFD is inverter. This only describes one step of what the VFD does to the power waveform. Once rectified into a DC voltage the drive sends the power through a set of transistors or switches. These switches can take the DC waveform and by opening and closing at certain speeds and durations can create an output waveform that mimics the sine wave that is required to drive a three phase electric motor. The output wave form is known as a Pulse Width Modulation (PWM) waveform because the waveform is created by multiple pulses of the switches at short intervals.



What variables should be considered when deciding whether to power a motor with a VFD?

VFD compatibility with motors is complex. As a result, many variables must be considered when determining the suitability of a particular motor for use with a VFD. These variables include:

- Torque requirements (Constant or Variable)
- Speed Range
- Line / System Voltage
- Cable length between the VFD and the motor
- Drive switching (carrier) frequency
- Motor construction

- VFD dv/dt - winding end turn differential in voltage versus differential in time
- High temperatures or high humidity
- Grounding system

Wider speed ranges, higher voltages, higher switching frequencies, insufficient grounding and increased cable lengths all add to the severity of the application and, therefore, the potential for premature motor failure.

How does a VFD affect the motor?

There are many things to consider when a motor is powered using a VFD or PWM power. When a motor is powered by a PWM waveform the motor windings very often see a large differential voltage, either from phase to phase or turn to turn. When the voltage differential becomes large enough it creates a reaction at the molecular level that converts available oxygen into O₃. This phenomenon is called partial discharge or corona. This reaction creates energy in the form of light and heat. This energy has a corrosive effect on the varnish used to protect the motor windings. PWM waveforms can also magnify shaft voltages which lead to arcing across the bearing and causing premature bearing failure. Corrective action must be taken to mitigate these issues that arise when using an electric motor with a VFD.

How do I protect the motor?

Nidec Motor Corporation (NMC) has developed specific motor designs to decrease the harmful affects that a VFD can have on a motor. NMC's INVERTER GRADE[®] insulation system is the first line of defense against corona and phase to phase faults that can be common when a motor is powered using a PWM waveform. The INVERTER GRADE[®] insulation system is standard on all of NMC's Inverter Duty products. Along with the INVERTER GRADE[®] insulation, thermostats are installed as a minimum protection against over heating the motor. Special consideration must also be given to bearings in motors powered by VFD's. In order to create a low resistance path to ground for built up shaft voltages a shaft grounding device can be used. On larger horsepower motors an insulated bearing system should be used in conjunction with the shaft grounding device when installed, to force the stray shaft voltages to ground. The bearing failures are more prominent on motors with thrust handling bearings. NMC has created an Inverter Duty vertical motor line that not only uses the INVERTER GRADE[®] insulation system, but that also comes standard with a shaft grounding device. On motors that are 100 HP and greater the thrust bearing is also insulated for additional protection.

What does "Inverter Duty" mean?

An Inverter Duty motor should describe a motor that helps mitigate potential failure modes of a motor that is powered by a VFD. Inverter duty motor windings should be able to withstand the voltage spikes per NEMA MG1 Part 31.4.4.2 and protect against overheating when the motor is run at slow speeds. On thrust handling bearings it is apparent that the bearings require additional protection. Inverter Duty vertical motors should have a shaft grounding device to protect the motor bearings from fluting due to voltage discharge through the bearing. On larger motors (100HP and larger) the shaft should also be electrically isolated from the frame in order to aid the shaft grounding ring in discharging the shaft voltages to ground.

*This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL[®] & CSA[®] listings where indicated.

Thermal Overloads and Single Phase Motors

Motors with thermal overloads installed may not operate properly on a VFD. The current carrying thermal overload is designed for sine wave power. Operation on a VFD may cause nuisance tripping or potentially not protect the motor as would be expected on line power. Thermostats or thermistors installed in the motor and connected properly to the VFD may provide suitable thermal overload protection when operating on a VFD. (consult codes for installation requirements)

Single phase motors and other fractional horsepower ratings are not designed to be operated on a VFD. Within Nidec Motor Corporation standard products, all motors NEMA^{®†} 48 frame (5.5" diameter) and smaller are not suitable for VFD applications. Three phase 56 and 143/145 frame applications should be noted on the catalog price page; or if in doubt ask a Nidec Motor Corporation technical representative for recommendations on compatibility with a VFD.

Slow Speed Motors

Motors with a base design of slower than six poles require special consideration regarding VFD sizing and minimizing harmonic distortion created at the motor terminals due to cable installation characteristics. Additional external PWM waveform filters and shielded motor cables designed for PWM power may be required to provide acceptable motor life. Harmonic distortion on the output waveform should be kept to a minimum level (less than 10%) mismatch impedance.

690V Applications

Motors that are rated for 690VAC and that will be powered by 690VAC PWM VFDs require the use of an external filter to limit peak voltage spikes and the use of an INVERTER GRADE[®] motor. Where available, an alternative to using an output filter is to upgrade to a 2300V insulation system.

Low Voltage TITAN[®] Motors

When using 449 frame and larger motors on PWM type VFDs consider the use of an external filter and shielded motor cables designed for PWM power to minimize harmonic distortion and peak voltages at the motor terminals. Harmonic distortion on the output waveform should be kept to a minimum level (less than 10%).

Bearing Currents Related to PWM Waveforms

Protection of the motor bearings from shaft currents caused by common mode voltages is becoming a standard feature on Inverter Duty motor products. Some installations may be prone to a voltage discharge condition through the motor bearings called Electrical Discharge Machining (EDM) or fluting. Vertical HOLLOWSHAFT and HOSTILE DUTY World Motor come with grounding devices installed as standard. EDM damage is related to characteristics of the PWM waveform, and the VFD programming, and installations factors.

Bearing Protection on Inverter Duty Vertical Motors

All U.S. MOTORS[®] brand "Inverter Duty" vertical products have a shaft grounding system that allows damaging shaft currents a low resistance path to ground. **Bearings on vertical motors fed by VFD power without this bearing protection are not covered under any warranty.** All other bearing failure is covered per NMC's standard warranty. An electric motor repair shop approved to service U.S. MOTORS[®] brand motors must verify that the cause of the bearing failure was not due to EDM damage.

Guideline For Insulated Anti-Friction Bearings

Bearing insulation is required to prevent circulating shaft currents which can damage bearings. Circulating shaft current can be caused by use of improper power and/or ground cables, improper grounding systems and higher switching frequencies. Finding and correcting the external condition(s) is the responsibility of the system designer or specifying engineer. To prevent circulating shaft current in motors with anti-friction bearings, Nidec Motor Corporation's standard practice is to insulate the non-drive end bearing.

Adjustable Speed Drives produce a common mode voltage condition. To interrupt common mode voltage on induction motors of all sizes, NEMA MG1-2018 Part 31 recommends insulating both bearings. In cases where both anti-friction bearings are insulated, the system designer or specifying engineer should determine whether to apply one or more of the following options to prevent or reduce shaft currents: sinewave filters, line reactors or mechanical devices, such as shaft grounding or an insulated half coupling. Motors with shaft grounding devices are not suitable for installation in hazardous locations unless housed in an enclosure suitable for the specified Division (or Zone), Class and Group(s).

Multiple Motors on a Single VFD

Special considerations are required when multiple motors are powered from a single VFD unit. Most VFD manufacturers can provide guidelines for proper motor thermal considerations and starting/stopping of motors. Cable runs from the VFD and each motor can create conditions that will cause extra stress on the motor winding. Filters may be required at the motor to provide maximum motor life.

Grounding and Cable Installation Guidelines

Proper output winding and grounding practices can be instrumental in minimizing motor related failures caused by PWM waveform characteristics and installation factors. VFD manufacturers typically provide detailed guidelines on the proper grounding of the motor to the VFD and output cable routing. Cabling manufacturers provide recommended cable types for PWM installations and critical information concerning output wiring impedance and capacitance to ground.

Integrated Motor and Inverter

By integrating the motor and inverter at NMC's manufacturing facility, many of the motor compatibility problems are minimized or eliminated. During the manufacturing process, the motor is matched to the inverter characteristics which ensures the winding temperature and torque levels meet the design specification. Since the inverter output wiring to the motor is nearly eliminated, bearing currents are rarely experienced. When the unit is properly grounded, reducing the output cable lengths in conjunction with an inverter grade insulation system and low factory setting of the switching frequency of the inverter drive, results in low risk of voltage peaks produced by the PWM waveform.

Vertical Motors on VFDs

Vertical motors operated on VFD power present unique conditions that may require consideration by the user or installation engineer:

- Locked rotor and drive tripping caused by non-reversing-ratchet operation at low motor speeds. It is not recommended to operate motors at less than 1/4 of synchronous speed. If slow speeds are required contact NMC engineering.
- Unexpected / unacceptable system vibration and or noise levels caused by the torque pulsation characteristics of the PWM waveform, a system critical frequency falling inside the variable speed range of the process or the added harmonic content of the PWM waveform exciting a system component
- Application related problems related to the controlled acceleration/deceleration and torque of the motor on VFD power and the building of system pressure/ load.
- The impact the reduction of pump speed has on the down thrust reflected to the pump motor and any minimum thrust requirements of the motor bearings
- Water hammer during shutdown damaging the non-reversing ratchet

Humidity and Non-operational Conditions

The possible build-up of condensation inside the motor due to storage in an uncontrolled environment or non-operational periods in an installation, can lead to an increased rate of premature winding or bearing failures when combined with the stresses associated with PWM waveform characteristics. Moisture and condensation in and on the motor winding over time can provide tracking paths to ground, lower the resistance of the motor winding to ground, and lower the Corona Inception Voltage (CIV) level of the winding.

Proper storage and maintenance guidelines are important to minimize the potential of premature failures. Space heaters or trickle voltage heating methods are the common methods for drying out a winding that has low resistance readings. **Damage caused by these factors are not covered by the limited warranty provided for the motor unless appropriate heating methods are properly utilized during non-operational periods and prior to motor start-up.**

NEMA^{®†} Application Guide for AC Adjustable Speed Drive Systems: <http://www.nema.org/stds/acadjustable.cfm#download>

* This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL^{®†} & CSA^{®†} listings where indicated.

Warranty Guidelines for Integral Horsepower (IHP)* Motors on Variable Frequency Drives

Warranty Guidelines

The information in the following section refers to the motor and drive application guidelines and limitations for warranty.

Hazardous Location Motors

Use of a variable frequency drive with the motors in this catalog, intended for use in hazardous locations, is only approved for Division 1, Class I, Group D hazardous location motors with a T2B temperature code, with a limitation of 2:1 constant torque or 10:1 variable torque output. **No other stock hazardous location motors are inherently suitable for operation with a variable frequency drive.** If other requirements are needed, including non-listed Division 2, please contact your Nidec Motor Corporation territory manager to conduct an engineering inquiry.

575 Volt Motors

575 volt motors can be applied on Inverters when output filters are used. Contact the drive manufacturer for filter selection and installation requirements.

Applying INVERTER GRADE® Insulated Motors on Variable Frequency Drives (2, 4, 6 pole)

The products within this catalog labeled “Inverter Duty” or “Vector Duty” are considered INVERTER GRADE® insulated motors. INVERTER GRADE® motors exceed the NEMA®† MG-1 Part 31 standard. Nidec Motor Corporation provides a three-year limited warranty on all NEMA®† frame INVERTER GRADE® insulated motors and allows long cable runs between the motor and the VFD (limited to 400 feet without output filters). Cable distance can be further limited by hot and humid environments and VFD manufacturers cable limits. These motors may be appropriate for certain severe inverter applications or when the factors relating to the end use application are undefined (such as spares).

Nidec Motor Corporation’s U.S. Motors® brand is available in the following INVERTER GRADE® insulated motors:

- Inverter Duty NEMA®† frame motors good for 20:1 Variable Torque & 5:1 Constant Torque, including Vertical Type RUSI (10:1 V.T.)
- Inverter Duty motors rated for 20:1 Constant Torque
- ACCU-Torq® and Vector Duty Motors with full torque to 0 Speed or 5000:1
- 841 Plus® NEMA®† Frame Motors

Applying Premium Efficient motors (that do not have INVERTER GRADE® insulation) on Variable Frequency Drives (2, 4, 6 pole)

Premium efficient motors without INVERTER GRADE insulation meet minimum NEMA®† MG-1, Section IV, Part 31.4.4.2. These motors can be used with Variable Frequency Drives (with a reduced warranty period) under the following parameters:

- On NEMA®† frame 447 and smaller motors, 20:1 speed rating on variable torque loads & 4:1 speed range on constant torque loads.
- On TITAN® 449 and larger frame motors, 10:1 speed rating on variable torque loads.

- On TITAN® frame motors, inquiry required for suitability on constant torque loads.

Cable distances are for reference only and can be further limited by hot and humid environments (refer to Table 1). Refer to specific VFD

Table 1 - Cable Distances			
Maximum Cable Distance VFD to Motor			
Switching Frequency	460 Volt	230 Volt	380 Volt
3 KHz	127 ft	400 ft	218 ft
6 KHz	90 ft	307 ft	154 ft
9 KHz	73 ft	251 ft	126 ft
12 KHz	64 ft	217 ft	109 ft
15 KHz	57 ft	194 ft	98 ft
20 KHz	49 ft	168 ft	85 ft

manufacturers cable limits. Refer to the Motor/ Inverter Compatibility page for special consideration of vertical motor bearings.

Warranty Period Clarifications and Exceptions

Standard Energy Efficient Exclusion

Applying Standard & Energy Efficient Motors on Variable Frequency Drives is not recommended. VFD related failures on standard and energy efficient motors will not be covered under warranty.

Vertical Motor Windings

Premium efficient vertical motors without INVERTER GRADE® insulation that are installed using the criteria described in this document and applied in the correct applications shall have a warranty while powered by a VFD for 12 months from date of installation or 18 months from date of manufacturing whichever comes first. See limited warranty page for horizontal motor warranty periods.

Bearing Exclusion for Thrust Handling Bearings

Bearings used in premium efficient vertical motors, and all thrust handling bearings, that are powered by VFDs without shaft grounding devices or insulated bearings (when required) will not be covered under any warranty for damages caused from being powered by a VFD. All other bearing failure is covered per NMC’s standard warranty. An electric motor repair shop approved to service U.S. MOTORS® brand motors must verify that the cause of the bearing failure was not due to Electrical Discharge Machining.

Medium Voltage and Slow Speed Considerations

Motors that are rated above 700 VAC or that are eight pole and slower require special consideration and installation and are not covered under the warranty guidelines in this document. Motors that are rated above 700VAC have special cable length and voltage differential issues that are specific to the VFD type and manufacture. The motor construction and cost may vary dramatically depending on the VFD topology and construction. Contact your NMC representative with VFD manufacturer name and model type for application and motor construction considerations. Motors that are designed eight pole and slower also require special installation and filters per the drive manufacturer.

* This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL®† & CSA®† listings where indicated.

CONTROLLER



Standard Features

- Type 3R enclosure for use outdoors. Rain and sleet resistant. Fully welded steel construction with hinged door and provisions for padlocking
- Light Gray powder-coating finish suitable for use in outdoors environments
- Choice of power disconnect type: Fusible Switch, or Circuit Breaker
- Fusible Disconnect Switches include factory-installed J-Class time-delay dual-element current-limiting power fuses
- Through the door rotary disconnect operator with provisions for padlocking in the off position
- Full Voltage Magnetic Motor Starter with optional choice of coil voltage
- Solid State Class 10 Overload Relay with adjustable trip point and inherent protection against loss of phase
- Suitable for use with submersible and above ground motors
- Fast-Acting Supplementary Fuses for protection of internal and external control circuit wiring against damage due to short circuits and ground faults
- 30mm Hand-Off-Auto Selector Switch
- UL 508 Listed Industrial Controls
- Suitable for use as Service Equipment

Product Description

An Across-the-Line pump control panel is a “combination starter” which combines a full voltage magnetic starter along with a fusible switch or a circuit breaker disconnect.

AMC pump panel line offers protection against short circuit faults, protection against motor overload faults, and means of disconnecting the controller and the motor from the supply power.

Across-the-Line starters are designed to connect motors directly to the full motor voltage and provide the maximum torque in those applications where inrush current restrictions do not prevent their use.

Since the current drawn from the power lines by a motor started across-the-line is typically 600% of normal full load amps (running current), power companies are increasingly limiting the use of full voltage starters to specific HP ranges.



TOWN OF BRISTOL, INDIANA
WATER SYSTEM IMPROVEMENTS
EQUIPMENT SOLE SOURCE PACKAGE FOR:
PRODUCTION DRINKING WATER WELL PUMPS #3 & #4



Chad Plummer
Peerless-Midwest Inc.
February 26, 2024

Town of Bristol, Indiana
Water System Improvements

Equipment Sole Source Package for:
Production Drinking Water Well Pumps

TOWN COUNCIL MEMBERS

Jeff Beachy– Council President
Cathy Burke
Dean Rentfrow
Gregg Tuholski
Doug DeSmith

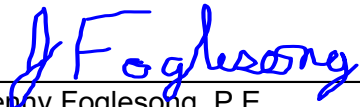
Mike Yoder – Town Manager
Jill Swartz - Assistant Town Manager
Cathy Antonelli – Clerk/Treasurer

PREPARED BY:



I hereby certify that these plans and/or specifications were prepared by me, or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Indiana.

Date: February 20, 2024



Jenny Foglesong, P.E.
Registered Professional Engineer
State of Indiana

REQUEST FOR PROPOSALS

Notice is hereby given, that the Town Council of the Town of Bristol, hereinafter referred to as the Owner, will receive proposals for certain water system equipment via a pre-selection process. The Owner will evaluate proposals and select equipment for inclusion in the proposed water system improvements project.

The selected equipment will be included in the bid package for the project. The general contractor will be required to purchase the selected equipment according to the terms and conditions of the selected procurement proposal. The project is planned to be under construction from 2024 through 2026.

The Owner is requesting proposals for the following equipment:

- Upgrade of Production Drinking Water Pump for Well 3 and Well 4.

Proposals should be emailed or mail, addressed to the Owner, c/o Jones Petrie Rafinski Corp, at 325 S Lafayette Blvd, South Bend, IN 46601 until 5:00 p.m. ET on Monday, February 26th, 2024. Proposals received after such date and hour may be rejected.

Jones Petrie Rafinski (JPR) has prepared a Pre-Selection Proposal Package (PSPP) which includes the operational requirements to be met. The PSPP documents can be obtained upon request to the Engineer. The Engineer for the project is:

Jenny Foglesong, P.E.
Jones Petrie Rafinski Corp.
325 S Lafayette Blvd
South Bend, IN 46601
Phone: (574) 232-4388
Email: jfoglesong@jpr1source.com

Proposals must be submitted on the forms found in the PSPP and must contain the information requested to evaluate the proposals as outlined in the PSPP. Each proposal must be enclosed in a sealed envelope bearing the title of the project as well as the name and address of the company submitting the proposal. One copy of the proposal package shall be submitted as a combined bound printed document, electronic copy shall be submitted on a flash drive or by email if the document is sufficiently small in size. Proposals that are not submitted in this fashion may not be accepted.

All applicable laws, ordinances, and any rules and regulations of any authority having jurisdiction over construction of the project shall apply. No sales or use taxes are applicable.

The Owner reserves the right to reject and/or cancel any and all proposals, solicitations and/or offers in whole or in part as specified in the solicitation when it is not in the best interest of the Owner, as determined by the Owner in accordance with IC 5-22-18-2. The Owner also reserves the right to waive irregularities in any Proposal, call the manufacturers for clarifications and to accept any Proposal which is deemed most favorable to the Owner.

Each supplier shall honor their bid prices for at least twelve (12) months from the date of PSPP submittal.

1. Provide a separate cost for each component indicated in the proposal form. Cost to include delivery to project site.
 2. Detailed list of items included and not included in your proposal.
 3. Shipping and delivery schedule
 4. Payment terms, including acknowledgement of 5% retainage requirements
5. Offeror will provide equipment and services on the various items set forth on the following pages on the price proposals. The cost quoted below shall cover and be considered full compensation for all equipment and services described in this proposal package.

Production Drinking Water Well Pumps #3 & #4					
Item No.	Estimated Quantity	Unit	Description	Unit Price	Extension
1	1	LSUM	Production Drinking Water Pumps #3 & #4	\$93,290.00	\$93,290.00
Total Bid					\$93,290.00

6. Offeror certifies the following:

- A. The equipment and services listed in the proposal comply with the project specifications.
- B. The pricing and terms of the proposal will be valid for the General Contractor/contractors who will be awarded the Water System Improvements Project.
- C. The pricing and terms of the proposal will be valid for at least twelve (12) months from the date of this Pre-Selection Proposal Package (PSPP) submittal.
- D. Each supplier shall be subject to five percent (5%) retainage with respect to progress payments.

Proposal submitted on _____ February 26, 2024.

By Peerless Midwest, Inc.
(Corporation) X (Partnership) ___ (Individual) ___

By 

(Chad Plummer, Project Manager)

Business Address: 55860 Russell Industrial Pkwy.
Mishawaka, IN 46545

Phone Number: 574-254-9050

SECTION 33 11 13 – POTABLE WATER SUPPLY WELLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Replacement of two pumps and controllers within existing wells.
 - 2. Water and system testing and certification.
- B. This specification describes a complete operational system to be furnished by a single responsible equipment manufacturer.
- C. It is the intent of this specification that the testing, sizing, and drilling be the same vendor that will be providing the pump, motor, and associated appurtenances to provide a complete system as described in this specification.

1.2 DEFINITIONS

- A. Suspended Solids: Small solid particles that do not dissolve in water.
- B. IDEM: Indiana Department of Environmental Management

1.3 REFERENCE STANDARDS

- A. American Society of Mechanical Engineers:
- B. ASTM International:
 - 1. ASTM A53.
 - 2. ASTM C150/C150M - Standard Specification for Portland Cement.
 - 3. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- C. American Water Works Association:
 - 1. AWWA A100 - Water Wells.
 - 2. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
- D. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.
 - 2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 PREINSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit manufacturer information regarding well pump and controller, including rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
 - 2. Submit information regarding pump depth based on current pump statistics.
 - 3. Submit anticipated electrical requirements.
 - 4. Submit recommended accessories and appurtenances provided by vendor and recommended to be provided by others.
 - 5. Submit final production performance and quality after testing is completed.
- C. Manufacturer's Certificate:
 - 1. Certify that products meet or exceed specified requirements.
 - 2. Certify that installation has been completed and that pump has been properly installed and tested and are ready for operation.
- D. Manufacturer Instructions:
 - 1. Submit detailed instructions on installation requirements, including storage and handling procedures.
 - 2. Indicate rigging and assembly.
- E. Field Quality-Control Submittals: Indicate tests to be performed and results of Contractor-furnished tests and inspections.
- F. Qualifications Statements:
 - 1. Submit qualifications for manufacturer and drilling firm.

1.6 WARRANTY

- A. Manufacturer shall warrant the Pump, Motor, casing, and screen for a period of one (1) year from the date of startup.

1.7 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual well properties discovered during pump replacement.
- B. Submit executed certification of well pump after performance testing.
- C. Submit documents required by IDEM.

- D. Provide certificate of compliance & permits from IDEM, indicating that water quality meets requirements.

1.8 QUALITY ASSURANCE

- A. Perform Work according to AWWA A100.
- B. Perform Work according to Indiana IDEM standards.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Drilling Firm: Company specializing in performing Work of this Section with minimum 3 years' documented experience and licensed in State of Indiana.

1.10 COORDINATION

- 1. Coordinate with Contractor for installation of building and supports surrounding well and for installation of the pump.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Protect, transport, handle, and store products according to manufacturer instructions.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage. Notify Owner and Engineer if products are damaged as soon as damage is identified.
- C. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Water well with following characteristics:
 - 1. Replacement of Pumps 3 and 4 in separate well houses located downtown.
 - 2. Minimum Water Production: 700 gpm.
 - 3. Well casing: 12 inches.
 - 4. Total Well Depth: 55 feet.

B. Performance and Design Criteria:

1. Based on the Criteria developed and presented in the Well Logs and Testing Reports.
2. Delivered water shall meet the quality requirements of the Town's current permit.
3. Well Pump:
 - a. Design Flow Rate: 700 gpm.
 - b. Design Flow Total Dynamic Head: 180 feet.
 - c. Pump Discharge Size: 6 inch.
 - d. Static water level (as reported in Inspection Report) 20 feet
 - e. Depth to top of screen 40 feet
 - f. Depth to bottom of well 50 feet
 - g. Screen Material: Stainless Steel
 - h. Available power: 3-phase, 203/460 V

2.2 WELL PUMPS

A. Manufacturers:

1. As Provided by Peerless Midwest

B. Description:

1. Type: Vertical Turbine, 4 stage, enclosed.
2. Shaft: Vertical.
3. Meeting AWWA A100 standards.

C. Operation:

1. Electrical Characteristics:
 - a. Motor: 40 hp.
 - b. Voltage: 230/460 V, three phase, 60 Hz.
 - c. Continuous Duty
 - d. Minimum Service Factor: 1.15 percent at rated load.
2. Pump Controller:
 - a. NEMA 250 Type 3R enclosure with main disconnect interlocked with door.
 - b. Single-point power connection and grounding lug.
 - c. Across-the-line electric motor starter with starting relay.
 - d. HAND-OFF-AUTO selector switches.
3. Controls and Alarms:
 - a. To be identified in submittal package.

D. Pump and Motor Removal:

1. Lifting lugs suitable for motor, pump, and shaft assembly.
2. Roof hatch located over well, by others.

2.3 WELL PROPERTIES

- A. As identified in Well Inspection Report on record with Peerless Midwest.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that Site conditions are capable of supporting equipment for pump replacement and testing.

3.2 PREPARATION

- A. Protect structures near well from damage.

3.3 INSTALLATION

- A. Disinfection: Disinfect well as specified in AWWA C654 Disinfection of Wells.
- B. Disinfection Standards: Perform Work according to IDEM standards.
- C. Well Pump:
 - 1. Follow manufacturer's instructions.
 - 2. Install electrical connections.
 - 3. Perform start-up procedures following manufacturer's instructions.

3.4 TOLERANCES

- A. Maximum Variation from Plumb: Comply with AWWA A100.

3.5 FIELD QUALITY CONTROL

- A. Performance Testing:
 - 1. Notify Architect/Engineer and Owner at least 1 week prior to flow-rate testing.
 - 2. Coordinate discharge volume with RPR/Inspector, Contractor, and Owner.
 - 3. Inform IDEM as required.
 - 4. Test flow rate and certify.
 - 5. Collect sample and submit to qualified lab, submit results to IDEM as required.
- B. Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

END OF SECTION 33 11 13

Cost

- A. Detailed list of items included and not included in your proposal

See attached specification: Section #33 11 13 – Potable Water Supply Wells

- B. Shipping and delivery schedule

Scheduling of field activities is weather and demand dependent. Currently there is a 3-4 week back-log. Each well/pump installation will need to be done one at a time to keep the Town in water. After the field work is complete, it will take up to 3-weeks to compile and prepare a report that summarizes these activities.

- C. Payment terms

Terms are net, not subject to discount, and invoices are to be paid in full within 30 days of presentation. All invoices not paid within 30 days will be subject to 2% per month service and handling fees, plus any court and/or attorney fees required for collection.

Constructability

- A. Describe installation guidelines.

Per Manufacturer Guidelines

- B. Describe how the components are to be delivered to site.

Components will be delivered to site via Peerless Midwest vehicles as required.

Product Analysis/Reliability

- A. Manufacturer name and model number
See following submittals for well pump design.
- B. Detailed description of proposed equipment
Install National J11LC Vertical Turbine Pump with a design rating of 700 GPM @ 180' TDH.
Install 40 HP US Inverter-Duty Motor.
- C. Life expectancy of the components.
Average recommended overhaul/repair of pumping equipment's components is recommended at 8-12 years based on normal wear and tear.
- D. Describe if the equipment is factory tested after assembly and before shipping.
Performance testing is conducted after installation to confirm equipment meets rated design conditions.
- E. Describe type and time period of standard warranty offered with the equipment. Include description of items not covered by warranty.
One (1) Year Parts/Labor Warranty will be provided from date of installation.

Service

- A. Location of nearest service centers.

55806 Russell Industrial Pkwy.
Mishawaka, IN 46545

886 W. Jefferson Street
Tipton, IN 46072

505 Apple Tree Drive
Ionia, MI 48846

- B. Describe availability of replacement parts.

We stock all basic components for National Pump and have a repair shop at our Mishawaka location. We also stock inline shafting, column pipe and VHS motors.

- C. Describe quantity, types, and cost of spare parts and tools recommended to be available for routine maintenance.

Routine maintenance is defined as “normal wearing parts” for a pump such as bowl bearings, impeller shaft, shaft couplings, sleeves, neoprene lineshaft bearings, gauges, bolting, and motor overhaul.

Experience

- A. Describe the quantity of similar items manufacturer has in service.

We have drilled thousands of wells and installed thousands of well pumps over the course of being in business for the last 51 years. We currently maintain several thousands of well & pump installations annually throughout Indiana, Michigan, Illinois & Ohio.

- B. Provide references for the four (4) most recently installed systems in the Midwest of comparable size.

Ceres Farms – St. Joseph County, Indiana 12” x 63’

Gene Miller Farms – Constantine, MI 12” x 59’

Hills @ St. Joe Farm, St. Joseph County, IN 12” x 96’

Ceres Farms – Waverly, OH 12” x 87’

Training

A. Describe construction/start up services provided.

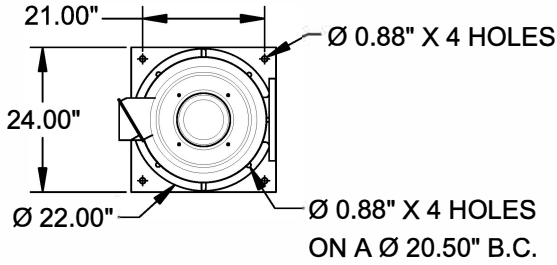
Field Crew will install the vertical turbine pumping equipment and motor. A Instrumentation & Controls technician will install the controller and program as required.

B. Describe operator maintenance training services provided.

On-site foreman installing pump and motor will go over any necessary training needed to maintain pump & motor and put in operation. The Instrumentation & Controls technician on site installing and programming the controller will go over operation procedure of controller upon completion of set-up.

WELL #3 & #4 PUMP DESIGN

VERTICAL TURBINE PUMP



MOTOR

MFGR US HP 40 ENCLOSURE WP1 RPM 1800
 TYPE VHS PHASE 3 HERTZ 60 VOLTS 230/460
 S.F. 1.15 EFF. INV BD 16.50" BX 1.00"
 KWY 0.25" CPLG NRR THRUST 5700 FRAME 324TPH
 MODEL NO. HO40V2BLG CD 28.22"

DISCHARGE HEAD

MODEL REUSE EXISTNG
6" - ANSI CLASS 125-FF DISCHARGE FLANGE
X PACKING BOX STD BRZ PACKING GLAND
N/A MECHANICAL SEAL N/A
N/A TENSION ASSEMBLY YES SOLE PLATE

COLUMN

6" X 0.280" WALL X THD N/A FLG'D
 LINESHAFT X OPEN (N/A) ENCLOSED
 SHAFT DIA 1.00" TPI 10 TPI TUBE DIA N/A

BOWL

4 STAGE J11LC BOWL ASSEMBLY
700 US GPM FLOW 180 FT. HEAD
 STRAINER YES X NO TYPE NONE

MATERIALS

BOWLS CIEN COLUMN A53, GR B
 IMPELLERS 876 BZ (STD) COLUMN CPLG DI
 BWL SFT 416 SS SHAFT TUBE N/A
 COLLETS 316 SS BRG RET 316 SS
 BOWL BRT BOWL DWG LINE SFT BRG RUBBER
 BOLTING SS LINE SHAFT SS (416)
 TENSION BRG N/A SHAFT SLEEVES SS (304)
 MECH SEAL N/A SHAFT CPLG SS (304)
 SOLE PLATE A-36 PACKING GRAPHITE
 BOWL WR N/A STRAINER N/A
 IMP WR N/A HEAD CI
 HEAD SHAFT 416 SS HEAD SHAFT CPG SS (304)
 BOWL SURFACE FINISH STD PAINT; OD
 COLUMN SURFACE FINISH NO COA TNG
 HEAD SURFACE FINISH STD PAINT; OD

PROJECT NAME

Bristol, IN - Well #3 & #4

WEIGHT & THRUST ESTIMATES

BOWL 510 LBS COLUMN 609 LBS HEAD 525 LBS
 SHAFT 86 LBS TUBE 0 LBS DRIVER 600 LBS
 HYD THRUST 1438 LBS DRIVER MAX THRUST 5700 LBS

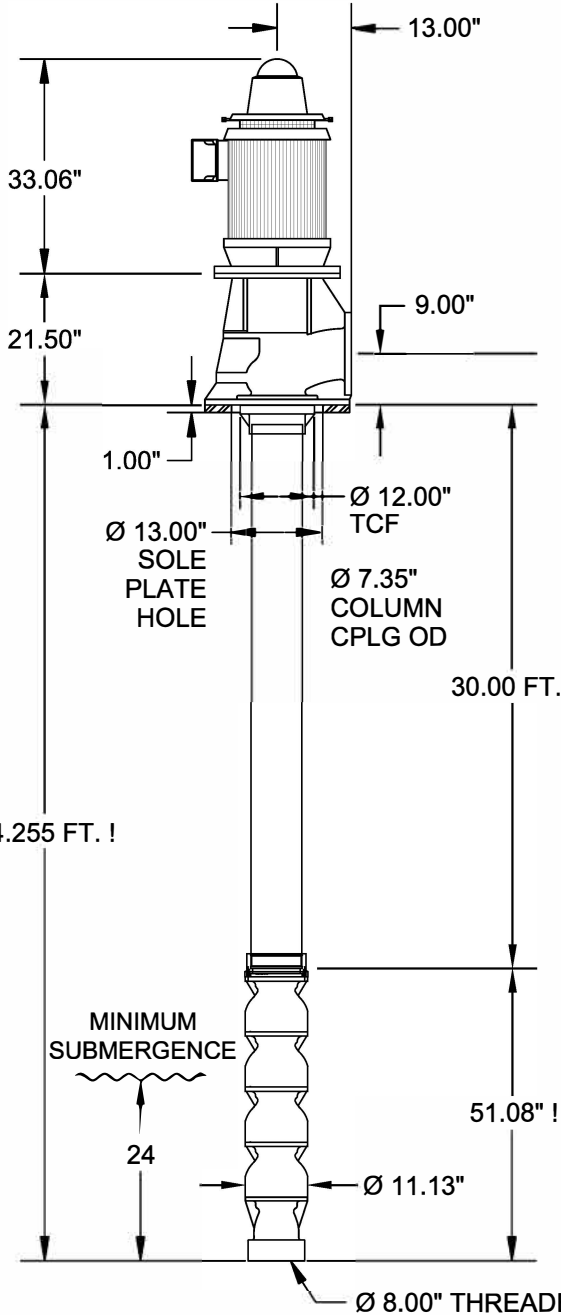
SPECIAL NOTE: **DO NOT ASSEMBLE AS A SCVT PUMP**

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SHOWN.

FOUR STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-187301
BUILD - 1



! OPTIONAL SUCTION PIPE LENGTH OF 10 FT. NOT INCLUDED IN TPL OR BOWL LENGTH DIMENSIONS

MFG. BY NATIONAL PUMP COMPANY

Company: Peerless Midwest, Inc.
 Name: Ryan Odynski
 Date: 2/22/2024

Bristol, IN - Well #3 & #4



Pump:

Size: J11LC (4 stage)
 Type: VERT.TURB.ENCLOSED
 Synch Speed: 1800 rpm
 Curve: CVJ11LC4P6CY
 Specific Speeds:
 Dimensions:
 Vertical Turbine:
 Speed: 1770 rpm
 Dia: 7.98 in
 Impeller: J11LC (1/16)
 Ns: 2300
 Nss: 6400
 Suction: ---
 Discharge: ---
 Bowl Size: 11.1 in
 Max Lateral: 1 in
 Thrust K Factor: 7.9 lbf/ft

Search Criteria:

Flow: 700 US gpm Head: 180 ft

Fluid:

Water
 Density: 62.32 lb/ft³
 Viscosity: 0.9946 cP
 NPSHa: ---
 Temperature: 68 °F
 Vapor Pressure: 0.3391 psi a
 Atm Pressure: 14.7 psi a

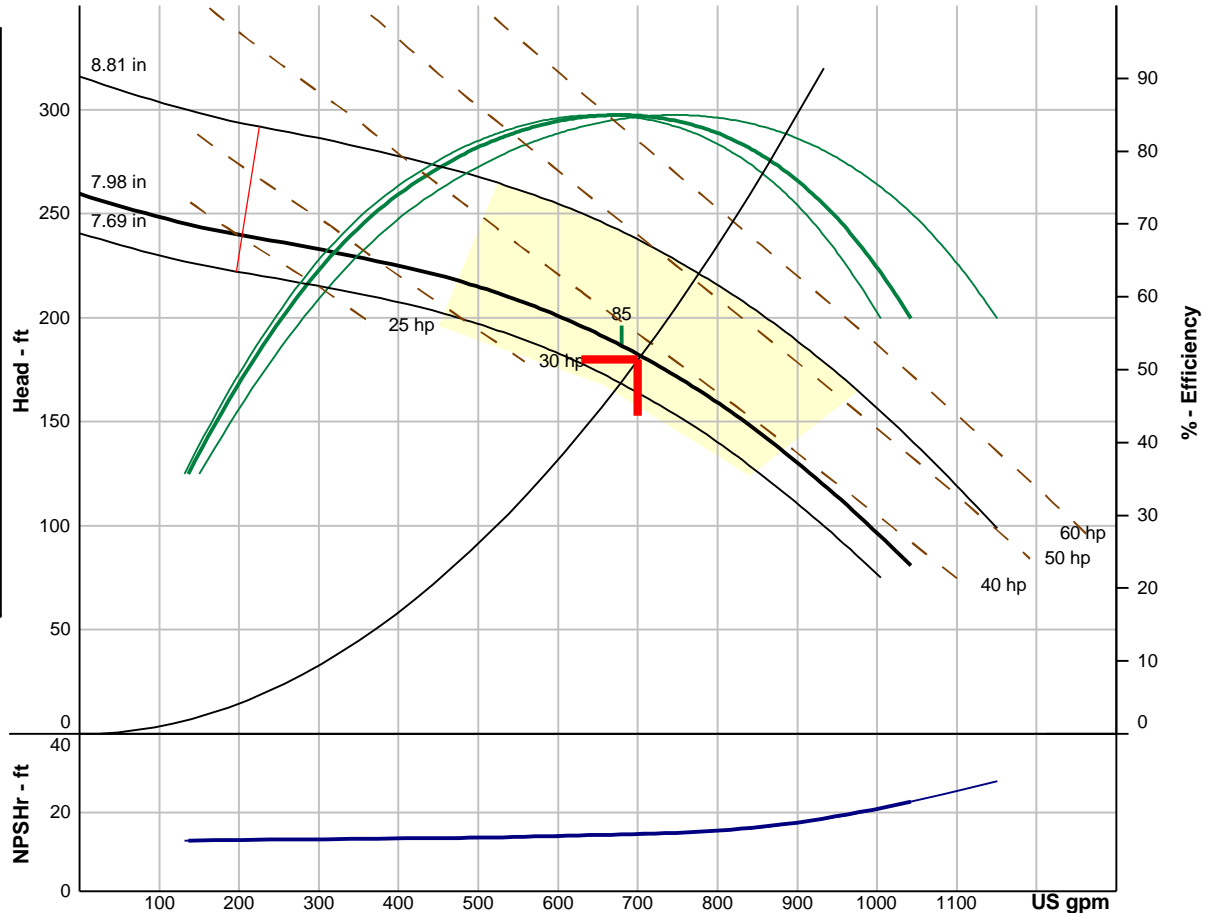
Motor:

Standard: NEMA
 Enclosure: WP-I
 Sizing Criteria: Max Power on Design Curve
 Size: 40 hp
 Speed: 1800 rpm
 Frame: 324

Pump Limits:

Temperature: 180 °F
 Pressure: 340 psi g
 Sphere Size: 0.5 in
 Power: 417 hp
 Eye Area: 15.5 in²

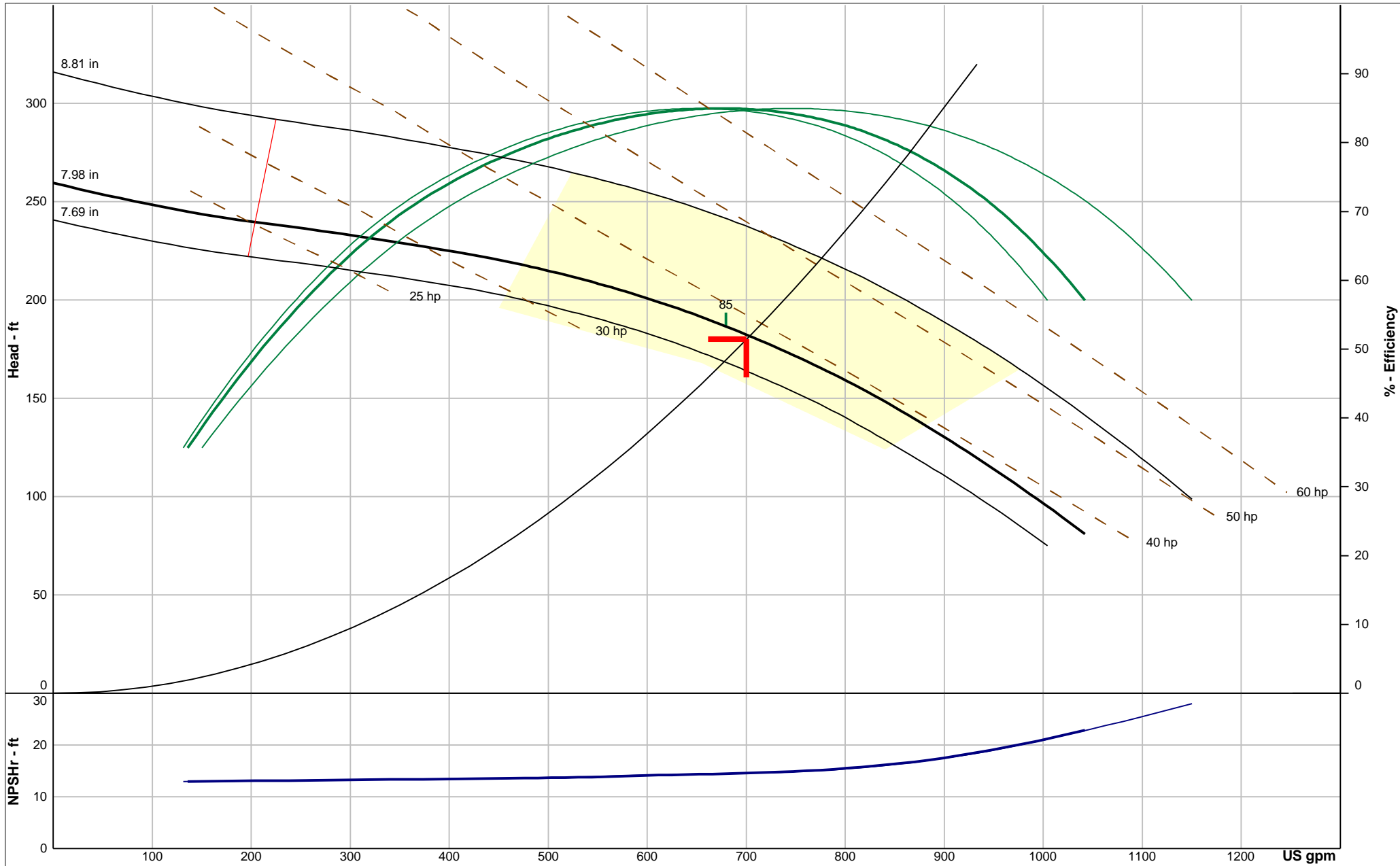
---- Duty Point ----	
Flow:	700 US gpm
Head:	182 ft
Eff:	85%
Power:	37.9 hp
NPSHr:	14.6 ft
---- Design Curve ----	
Shutoff Head:	260 ft
Shutoff dP:	112 psi
Min Flow:	204 US gpm
BEP:	85% @ 679 US gpm
NOL Power:	39 hp @ 816 US gpm
-- Max Curve --	
Max Power:	52.5 hp @ 975 US gpm



UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
840	1770	148	80	39	16.3
700	1770	182	85	37.9	14.6
560	1770	207	83	35.2	13.9
420	1770	223	74	31.3	13.5
280	1770	234	60	27.2	13.3



UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

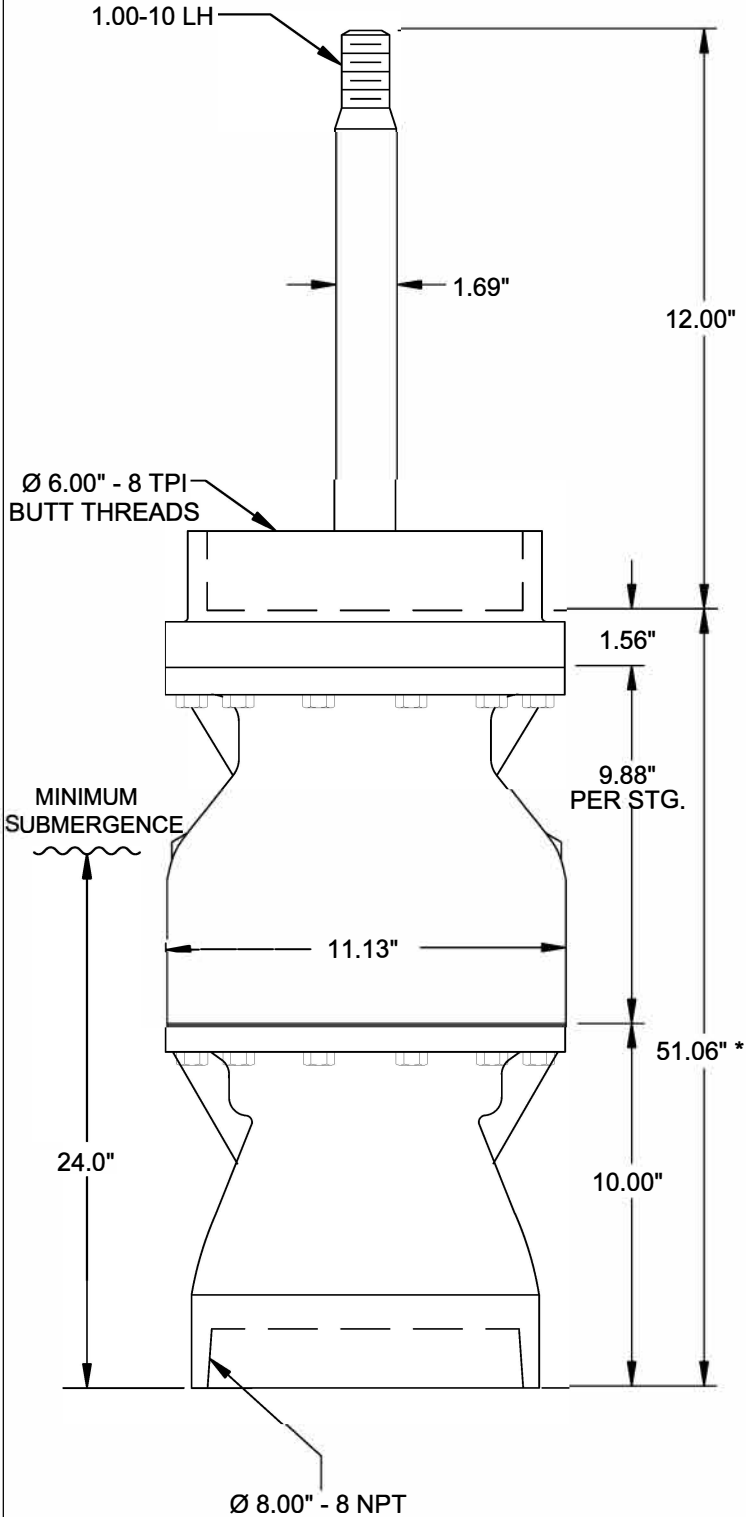
Company: Peerless Midwest, Inc.
 Name: Ryan Odynski
 2/22/2024

National Pump Company
 Catalog: NPC.60, Vers 6c230825
 VERT.TURB.ENCLOSED - 1800 rpm
 Design Point: 700 US gpm, 180 ft

Size: J11LC (4 stage)
 Speed: 1770 rpm
 Dia: 7.98 in
 Curve: CVJ11LC4P6CY
 Impeller: J11LC (1/16)



VERTICAL TURBINE PUMP



4		STAGE		BOWL		J11LC		BOWL ASSEMBLY	
700 US GPM		FLOW		180 FT.		HEAD			
STRAINER		YES		X		NO		TYPE	
								N/A	

MATERIALS

BOWL	GEN
IMPELLER	876 BZ (STD); STATIC BAL.
COLUMN ADAPTER	CAST IRON
SUCTION BELL/CASE	CAST IRON
BOWL SHAFT	416 SS
COLLETS	SS (316)
SAND COLLAR	C876 BRONZE
SUCTION BEARING	C898 35(STD BZ)
INTERMEDIATE BEARING	C89835 (STD BZ)
TOP BEARING	C89835 (STD BZ)
BOLTING	SS
STRAINER	N/A
BOWL O-RING	NONE
WEAR RING (B)	N/A
WEAR RING (I)	N/A
BOWL ID SURFACE FINISH	VITREOUS ENAMEL
BOWL OD SURFACE FINISH	STD PAINT - OD

* NOTE: OPTIONAL SUCTION PIPE LENGTH NOT INCLUDED IN TPL OR BOWL LENGTH DIMENSIONS

PROJECT NAME:
Bristol, IN - Well #3 & #4

FURNISHED BY:
Peerless Midwest, Inc.

BOWL WEIGHT: 510 LBS
 DRAWING NOT TO SCALE.
 ALL DIMENSIONS IN INCHES.
 SINGLE STAGE ASSEMBLY SHOWN.
 NOT FOR CONSTRUCTION UNLESS CERTIFIED.

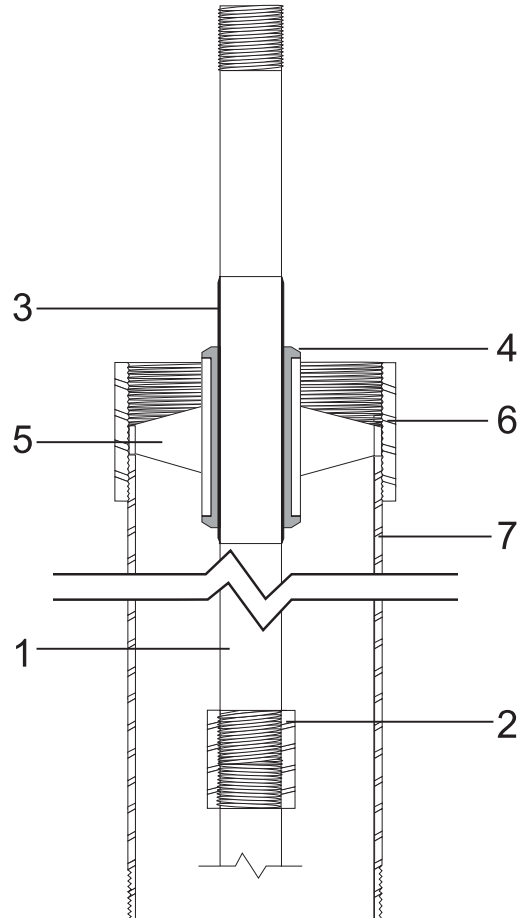
C-187301
 BUILD - 1

MFG. BY NATIONAL PUMP COMPANY

COLUMN ASSEMBLY PRODUCT LUBRICATED TYPE FOR LINESHAFT TURBINE PUMPS

COLUMN SIZE SCH. WALL THICKNESS	SHAFT SIZE	WEIGHT IN LBS.		MAX. AWWA RECMD. GPM	O.D. PIPE CPLG.
		5 FT.	10 FT.		
4" SCH. 40 0.237"	1"	71	139	150	5.20"
	1-3/16"	77	150	100	
	1-1/4"	79	154	100	
5" SCH. 40 0.258"	1"	95	182	325	6.30"
	1-3/16"	101	193	250	
	1-1/4"	103	197	250	
6" SCH. 40 0.280"	1"	118	227	600	7.39"
	1-3/16"	124	238	500	
	1-1/4"	126	242	500	
	1-1/2"	136	261	400	
	1-11/16"	144	277	400	
8" SCH. 30 0.277"	1"	172	329	1350	9.63"
	1-3/16"	178	340	1300	
	1-1/4"	180	344	1300	
	1-1/2"	190	363	1150	
	1-11/16"	198	379	1150	
	1-15/16"	212	405	950	
10" 0.279"	1"	245	461	2800	11.75"
	1-3/16"	251	472	2600	
	1-1/4"	253	474	2600	
	1-1/2"	263	495	2450	
	1-11/16"	271	511	2450	
	1-15/16"	285	538	2000	
12" SCH. 30 0.330"	1"	304	565	4700	14.00"
	1-3/16"	310	577	4300	
	1-1/4"	312	581	4300	
	1-1/2"	322	602	4000	
	1-11/16"	330	616	4000	
	1-15/16"	344	642	3600	
	2-3/16"	359	671	3400	

THREADED COLUMN ASSEMBLY
PRODUCT LUBRICATED (PRL)



**TYPICAL COLUMN ASSEMBLY
CONSISTS OF:**

1. 416 SS LINESHAFT
2. 304 STEEL SHAFT COUPLING
3. 304 SS SLEEVE
4. NEOPRENE LINESHAFT BEARING
5. 304 STAINLESS STEEL RETAINER
6. DUCTILE IRON PIPE COUPLINGS
7. A53 GRADE B STEEL PIPE

40 HP MOTOR

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136



DATE: 6/14/2022

P.O. NO.: HF94
Order/Line NO.: 26870 MN 100

TO:

Model Number: HF94
Catalog Number: HO40V2BLF
VHS Weather Protected
CONF,MOTOR,VHS WPI

REVISIONS:
(NONE)

**ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY NIDEC MOTOR CORPORATION.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.**

Features:

Horsepower 00040.00~00000.00 ~ KW: 29.84
Enclosure WPI
Poles 04~00 ~ RPM: 1800~0
Frame Size 324~TPH
Phase/Frequency/Voltage.. 3~060~230/460
Winding Type Random Wound
Service Factor 1.15
Insulation Class Class "F" ~ Insulife 2000
Altitude In Feet (Max) .. 3300 Ft.(1000 M) ~ +40 C
Efficiency Class Premium Efficiency
Application Vertical Centrifugal Pump
Inverter Duty NEMA MG1 Part 31
Customer Part Number
12" Base ~ Coupling Size: 1-1/4" Bore, 1/4" Key
Non-Reverse Ratchet ~ Steady Bushing Not Requested
Pricebook Thrust Value (lbs).. 5700
Customer Down Thrust (lbs) ... 5700
Customer Shutoff Thrust (lbs).
Up Thrust (lbs): ~
Inverter Duty Rating Details:
Load Type (Base Hz & Below) .. Variable Torque
Speed Range (Base Hz & Below). 10:1
VFD Service Factor 1.00
Temperature Rise (Sine Wave): "B" Rise @ 1.0 SF (Resist)
Starting Method Direct-On-Line Start
Duty Cycle Continuous Duty
Efficiency Value 94.1 % ~ Typical
Load Inertia: NEMA ~ Standard Inertia: 189.00 LB-FT²
Number Of Starts Per Hour: NEMA
Motor Type Code RUSI
Rotor Inertia (LB-FT²) 6.37 LB-FT²
Qty. of Bearings PE (Shaft) 1
Qty. of Bearings SE (OPP) 1
Bearing Number PE (Shaft) 6211-J
Bearing Number SE (OPP) 7220-BEP

Nidec trademarks followed by the ® symbol are registered with the U.S. Patent and Trademark Office.

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136



DATE: 6/14/2022

P.O. NO.: HF94
Order/Line NO.: 26870 MN 100

TO:

Model Number: HF94
Catalog Number: HO40V2BLF
VHS Weather Protected
CONF,MOTOR,VHS WPI

REVISIONS:
(NONE)

**ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY NIDEC MOTOR CORPORATION.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.**

Accessories:

Counter CW Rotation FODE
Aegis Ground Ring (SGR)
115 Volt Space Heaters
Special Balance
Thermostats - Normally Closed
Shipping Weight in lbs: 635
Shipping Mass in KG: 290
Standard Leadtime: NA
Est. Weight (lbs ea): 635 ~ F.O.B.:

USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT

Horsepower	40
Pole(s)	04
Voltage(s)	460-230
Frame Size	324TPH
Outlet Box AF	4.25
Outlet Box AA	3.00

Nidec trademarks followed by the ® symbol are registered with the U.S. Patent and Trademark Office.

EFFECTIVE:
06-NOV-19

DIMENSION PRINT

WEATHER PROTECTED TYPE I

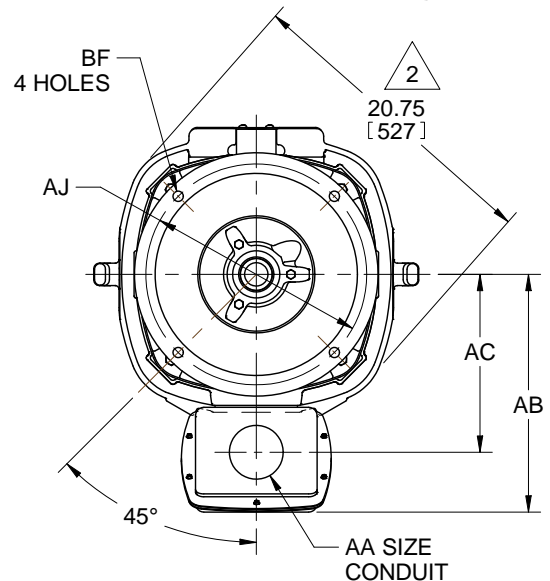
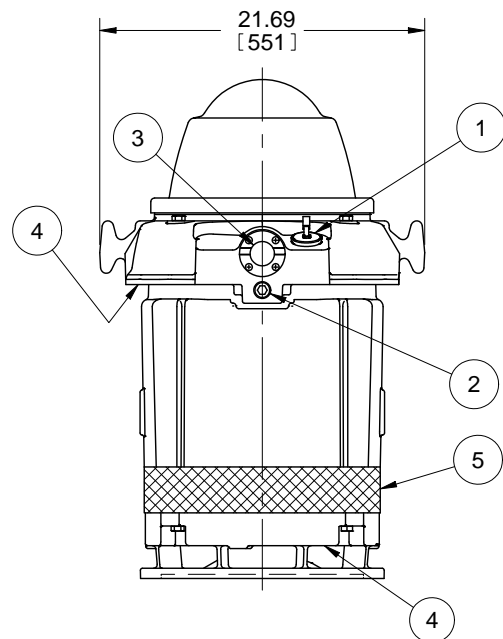
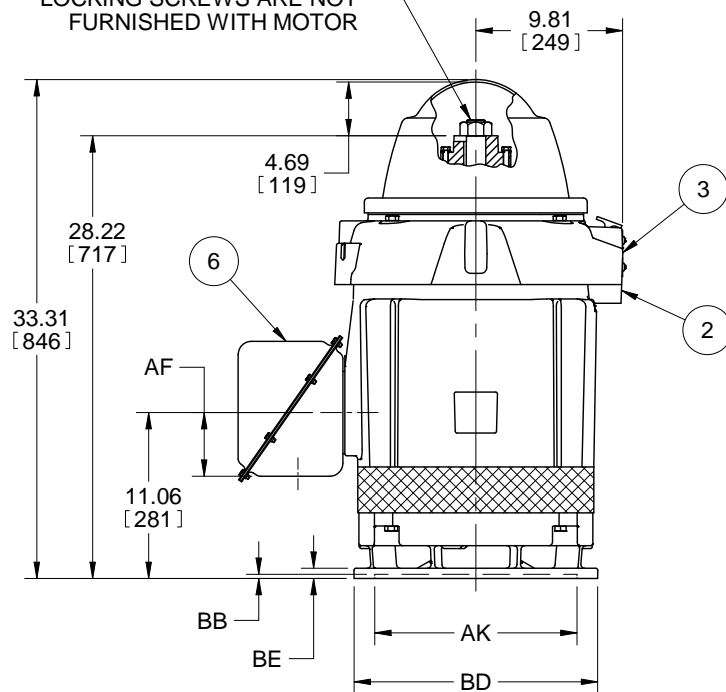
PRINT:
09-3419

SUPERSEDES:
NEW

FRAME: 320TP, TPH
BASIC TYPE: RU

SHEET:
1 OF 1

PUMP SHAFT, ADJUSTING NUT AND LOCKING SCREWS ARE NOT FURNISHED WITH MOTOR



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS
(TOLERANCES ARE IN INCHES)

UNITS	C/BOX VOLUME (CU. IN.)	AA	AB	AC	AF
IN	470	3.00	15.88	11.88	4.25
MM			403	302	108

FRAME	UNITS	AJ	AK +0.005	BB MIN	BD MAX	BE	BF
324, 326TP	IN	14.750	13.500	.25	16.50	.69	.688
	MM	374.65	342.9	6	419	18	17.48
324, 326TPH	IN	9.125	8.250	.19	12.00	.69	.438
	MM	231.78	209.55	5	305	18	11.13

1. CONDUIT OPENING MAY BE LOACTED IN STEPS OF 90 DEGREES. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

2. LARGEST MOTOR WIDTH.

FEATURE LISTING

NO.	DESCRIPTION	NO.	DESCRIPTION
1	UPPER SUMP OIL FILL	6	MAIN CONDUIT BOX
2	UPPER SUMP OIL DRAIN		
3	UPPER SUMP SIGHT WINDOW		
4	AIR INTAKE		
5	AIR EXHAUST, 360° AROUND		

TOLERANCES	8.250 AK	13.500 AK
FACE RUNOUT	.004 TIR	.007 TIR
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.004 TIR	.007 TIR
TOLERANCE ON AK DIMENSION	+0.003	+0.005
NON-MACHINED DIMENSIONS MAY VARY BY ±.25		

09-3419/-

Nidec Motor Corporation
St. Louis, Missouri

INFORMATION DISCLOSED ON THIS DOCUMENT IS CONSIDERED PROPRIETARY AND SHALL NOT BE REPRODUCED OR DISCLOSED WITHOUT WRITTEN CONSENT OF NIDEC MOTOR CORPORATION



ISSUED BY
K. FRIEDMAN
APPROVED BY
T. KIRKLEY

IHP_DP_NMCA (MAR-2011) SOLIDEDGE

NAMEPLATE DATA

CATALOG NUMBER: <input style="width: 100%;" type="text" value="HO40V2BLF"/>	NAMEPLATE PART #: <input style="width: 100%;" type="text" value="422707-005"/>
MODEL <input style="width: 100%;" type="text" value="HF94"/> <input style="width: 100%;" type="text" value="FR"/> <input style="width: 100%;" type="text" value="324TPH"/>	TYPE <input style="width: 100%;" type="text" value="RUSI"/> ENCL <input style="width: 100%;" type="text" value="WPI"/>
SHAFT END BRG <input style="width: 100%;" type="text" value="6211-J - QTY 1"/>	OPP END BRG <input style="width: 100%;" type="text" value="7220-BEP - QTY 1"/>
PH <input style="width: 100%;" type="text" value="3"/> MAX AMB <input style="width: 100%;" type="text" value="40 C"/>	ID# <input style="width: 100%;" type="text"/>
INSUL CLASS <input style="width: 100%;" type="text" value="F"/> Asm. Pos. <input style="width: 100%;" type="text"/>	DUTY <input style="width: 100%;" type="text" value="CONT"/>
HP <input style="width: 100%;" type="text" value="40"/> RPM <input style="width: 100%;" type="text" value="1785"/>	HP <input style="width: 100%;" type="text"/> RPM <input style="width: 100%;" type="text"/>
VOLTS <input style="width: 100%;" type="text" value="460"/> <input style="width: 100%;" type="text" value="230"/>	VOLTS <input style="width: 100%;" type="text"/> <input style="width: 100%;" type="text"/>
FL AMPS <input style="width: 100%;" type="text" value="49.0"/> <input style="width: 100%;" type="text" value="97.0"/>	FL AMPS <input style="width: 100%;" type="text"/> <input style="width: 100%;" type="text"/>
SF AMPS <input style="width: 100%;" type="text" value="55.0"/> <input style="width: 100%;" type="text" value="111.0"/>	SF AMPS <input style="width: 100%;" type="text"/> <input style="width: 100%;" type="text"/>
SF <input style="width: 100%;" type="text" value="1.15"/> DESIGN <input style="width: 100%;" type="text" value="B"/> CODE <input style="width: 100%;" type="text" value="G"/>	SF <input style="width: 100%;" type="text"/> DESIGN <input style="width: 100%;" type="text"/> CODE <input style="width: 100%;" type="text"/>
NEMA NOM EFFICIENCY <input style="width: 100%;" type="text" value="94.1"/> NOM PF <input style="width: 100%;" type="text" value="82.2"/> KiloWatt <input style="width: 100%;" type="text" value="29.84"/>	NEMA NOM EFFICIENCY <input style="width: 100%;" type="text"/> NOM PF <input style="width: 100%;" type="text"/>
GUARANTEED EFFICIENCY <input style="width: 100%;" type="text" value="93.0"/> MAX KVAR <input style="width: 100%;" type="text"/> HZ <input style="width: 100%;" type="text" value="60"/>	GUARANTEED EFFICIENCY <input style="width: 100%;" type="text"/> MAX KVAR <input style="width: 100%;" type="text"/> HZ <input style="width: 100%;" type="text"/>

HAZARDOUS LOCATION DATA (IF APPLICABLE):

DIVISION <input style="width: 100%;" type="text"/>	CLASS I <input style="width: 100%;" type="text"/>	GROUP I <input style="width: 100%;" type="text"/>
TEMP CODE <input style="width: 100%;" type="text"/>	CLASS II <input style="width: 100%;" type="text"/>	GROUP II <input style="width: 100%;" type="text"/>



VFD DATA (IF APPLICABLE):

VOLTS <input style="width: 100%;" type="text" value="460"/> <input style="width: 100%;" type="text" value="230"/>	AMPS <input style="width: 100%;" type="text" value="51.5"/> <input style="width: 100%;" type="text" value="101.9"/>
TORQUE 1 <input style="width: 100%;" type="text" value="117.70LB-FT"/>	TORQUE 2 <input style="width: 100%;" type="text"/>
VFD LOAD TYPE 1 <input style="width: 100%;" type="text" value="VT/PWM"/>	VFD LOAD TYPE 2 <input style="width: 100%;" type="text"/>
VFD HERTZ RANGE 1 <input style="width: 100%;" type="text" value="6-60"/>	VFD HERTZ RANGE 2 <input style="width: 100%;" type="text"/>
VFD SPEED RANGE 1 <input style="width: 100%;" type="text" value="180-1800"/>	VFD SPEED RANGE 2 <input style="width: 100%;" type="text"/>
SERVICE FACTOR <input style="width: 100%;" type="text" value="1.00"/>	FL SLIP <input style="width: 100%;" type="text"/>
NO. POLES <input style="width: 100%;" type="text"/>	MAGNETIZING AMPS <input style="width: 100%;" type="text"/>
VECTOR MAX RPM <input style="width: 100%;" type="text"/>	Encoder PPR <input style="width: 100%;" type="text"/>
Radians / Seconds <input style="width: 100%;" type="text"/>	Encoder Volts <input style="width: 100%;" type="text"/>

TEAO DATA (IF APPLICABLE):

HP (AIR OVER) <input style="width: 100%;" type="text"/>	HP (AIR OVER M/S) <input style="width: 100%;" type="text"/>	RPM (AIR OVER) <input style="width: 100%;" type="text"/>	RPM (AIR OVER M/S) <input style="width: 100%;" type="text"/>
FPM AIR VELOCITY <input style="width: 100%;" type="text"/>	FPM AIR VELOCITY M/S <input style="width: 100%;" type="text"/>	FPM AIR VELOCITY SEC <input style="width: 100%;" type="text"/>	

ADDITIONAL NAMEPLATE DATA:

Decal / Plate	WD=109145	Customer PN	
Notes		Non Rev Ratchet	NRR
Max Temp Rise	80C RISE/RES@1.00SF	OPP/Upper Oil Cap	3 QT/2.8 L
Thermal (WDG)	OVER TEMP PROT 2	SHAFT/Lower Oil Cap	GREASE
Altitude		Usable At	
Regulatory Notes		Regulatory Compliance	
COS		Marine Duty	
Balance	0.08 IN/SEC	Arctic Duty	
3/4 Load Eff.	93.8	Inrush Limit	
Motor Weight (LBS)	635	Direction of Rotation	
Sound Level		Special Note 1	
Vertical Thrust (LBS)	5700	Special Note 2	
Thrust Percentage	100% HT	Special Note 3	
Bearing Life		Special Note 4	
Starting Method		Special Note 5	
Number of Starts		Special Note 6	
200/208V 60Hz Max Amps		SH Max. Temp.	
190V 50 hz Max Amps		SH Voltage	SH VOLTS=115V
380V 50 Hz Max Amps		SH Watts	SH WATTS= 96W
NEMA Inertia		Load Inertia	
Sumpheater Voltage		Sumpheater Wattage	
Special Accessory Note 1		Special Accessory Note 16	
Special Accessory Note 2		Special Accessory Note 17	
Special Accessory Note 3		Special Accessory Note 18	
Special Accessory Note 4		Special Accessory Note 19	
Special Accessory Note 5		Special Accessory Note 20	
Special Accessory Note 6		Special Accessory Note 21	
Special Accessory Note 7		Special Accessory Note 22	
Special Accessory Note 8		Special Accessory Note 23	
Special Accessory Note 9		Special Accessory Note 24	
Special Accessory Note 10		Special Accessory Note 25	
Special Accessory Note 11		Special Accessory Note 26	
Special Accessory Note 12		Special Accessory Note 27	
Special Accessory Note 13		Special Accessory Note 28	
Special Accessory Note 14		Special Accessory Note 29	
Special Accessory Note 15		Special Accessory Note 30	
Heater in C/B Voltage		Heater in C/B Watts	
Zone 2 Group		Division 2 Service Factor	
Note 1		Note 2	
Note 3		Note 4	
Note 5		Note 6	
Note 7		Note 8	
Note 9		Note 10	
Note 11		Note 12	
Note 13		Note 14	
Note 15		Note 16	
Note 17		Note 18	
Note 19		Note 20	
Note 21		Note 22	

NIDEC MOTOR CORPORATION
ST. LOUIS, MO

TYPICAL NAMEPLATE DATA
ACTUAL MOTOR NAMEPLATE LAYOUT MAY VARY
SOME FIELDS MAY BE OMITTED



Nidec trademarks followed by the © symbol are registered with the U.S. Patent and Trademark Office.

MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
HF94	HO40V2BLF	3	RUSI	324TPH
ORDER NO.		26870	LINE NO.	
MPI:			287863	287864
HP:			40	40
POLES:			4	4
VOLTS:			460	230
HZ:			60	60
SERVICE FACTOR:			1.15	1.15
EFFICIENCY (%):				
S.F.			93.4	93.4
FULL			93.6	93.6
3/4			93.8	93.8
1/2			92.9	92.9
1/4			88.8	88.8
POWER FACTOR (%):				
S.F.			83.3	83.3
FULL			82.2	82.2
3/4			78.1	78.1
1/2			68.8	68.8
1/4			47.3	47.3
NO LOAD			5.3	5.3
LOCKED ROTOR			38.1	38.1
AMPS:				
S.F.			55	111
FULL			49	97
3/4			38	77
1/2			29.3	59
1/4			22.3	45
NO LOAD			19.6	39.2
LOCKED ROTOR			301.8	604.6
NEMA CODE LETTER			G	G
NEMA DESIGN LETTER			B	B
FULL LOAD RPM			1785	1785
NEMA NOMINAL / EFFICIENCY (%)			94.1	94.1
GUARANTEED EFFICIENCY (%)			93	93
MAX KVAR			13.3	13.3
AMBIENT (°C)			40	40
ALTITUDE (FASL)			3300	3300
SAFE STALL TIME-HOT (SEC)			26	26
SOUND PRESSURE (DBA @ 1M)			65	65
TORQUES:				
BREAKDOWN{% F.L.}			249	249
LOCKED ROTOR{% F.L.}			209	209
FULL LOAD{LB-FT}			117.7	117.7

NEMA Nominal and Guaranteed Efficiencies are up to 3,300 feet above sea level and 25 ° C ambient.

The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

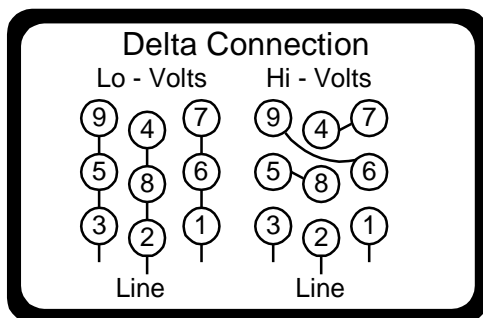
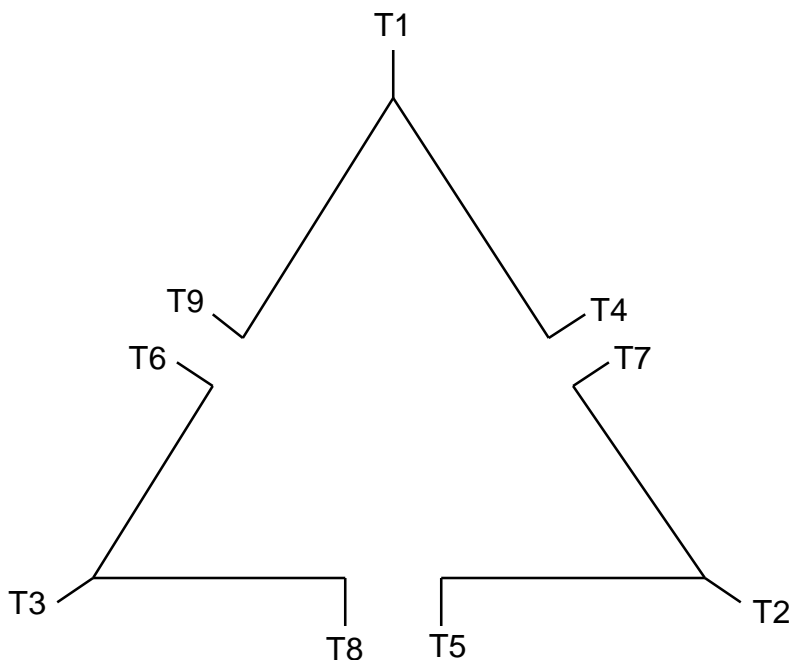
NIDEC MOTOR CORPORATION
ST. LOUIS, MO





A109145

Motor Wiring Diagram 9 Lead, Dual Voltage (DELTA Conn.)



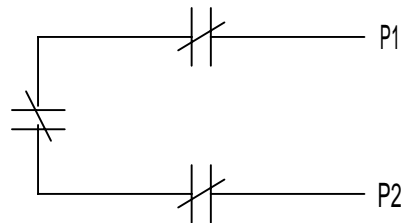
To reverse direction of rotation interchange connections L1 and L2.

Each lead may have one or more cables comprising that lead.
In such case each cable will be marked with the appropriate lead number.

THERMOSTATS

1. MOTOR IS EQUIPPED WITH QTY-3 (1 PER PHASE) NORMALLY CLOSED THERMOSTATS. THERMOSTATS ARE SET TO OPEN AT HIGH TEMPERATURE.
2. CONTACT RATINGS FOR THERMOSTATS: 120-600 VAC, 720 VA

N. C. THERMOSTATS



NOTE: THERMOSTATS LEADS MAY BE LOCATED IN EITHER THE MAIN OUTLET BOX OR IF SO EQUIPPED, AN AUXILIARY BOX.

ACCESSORY LISTING
QTY-3 N.C. THERMOSTATS

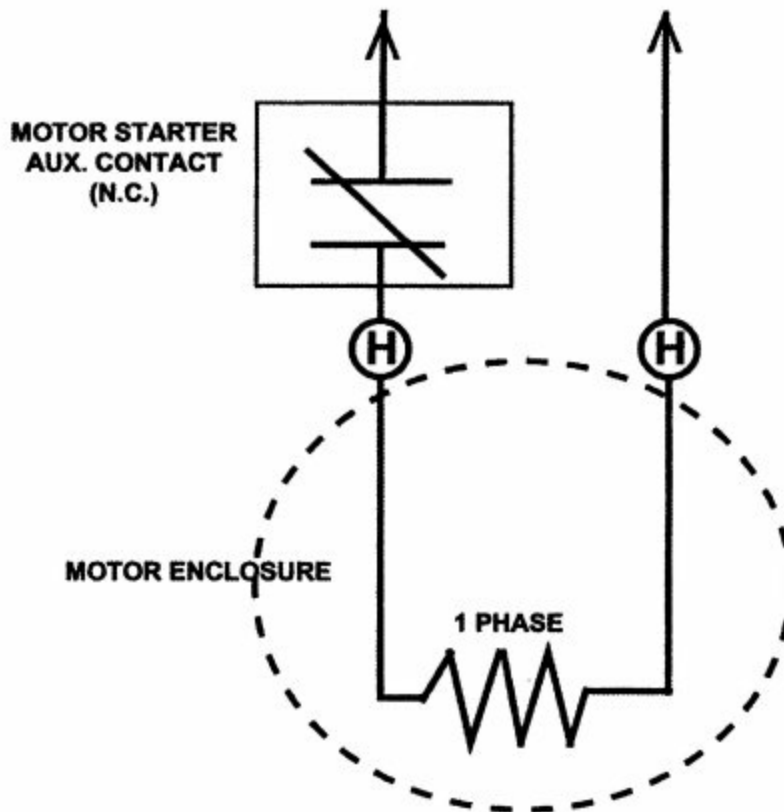
REVISION DESCRIPTION FOR: MISC	SCALE	UNITS	TITLE		NIDEC MOTOR CORPORATION
STL0211 - UPDATED FORMAT .	NONE	IN	CUSTOMER CONNECTION DIAGRAM		
	TOLERANCES ON DIMENSIONS (UNLESS OTHERWISE SPECIFIED)		ISSUED BY	APPROVED BY	REVISION DATE
MATERIAL:	<u>INCHES</u>	<u>mm</u>	R. KING	C. CADE	24-FEB-11
---	ANGLES X°= ±1°		CODE	DWG NO.	REV
MUST BE COMPLIANT TO RoHS DIRECTIVE EU 2002/95/IEC AND REGULATION EC 1907/2006 (REACH) AS AMENDED				0834066	G
					SHEET NUMBER 1 OF 1
					DWG SIZE A



970798

SPACE HEATER CONNECTION DIAGRAM

SPACE HEATER LEADS MAY BE LOCATED IN EITHER THE MAIN OUTLET BOX
OR IF SO EQUIPPED, AN AUXILIARY BOX



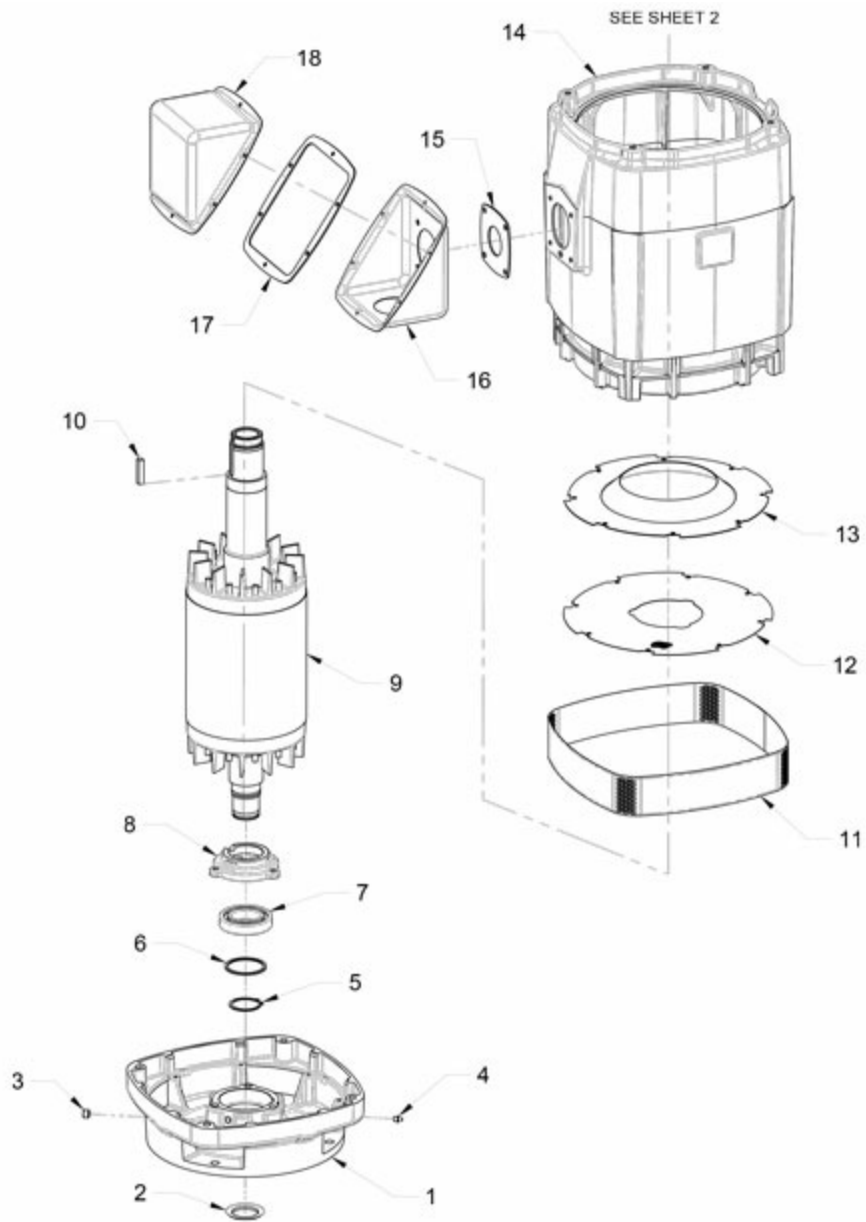
THIS EQUIPMENT IS SUPPLIED WITH ANTI-CONDENSATION HEATERS. HEATERS SHOULD BE ENERGIZED WHEN EQUIPMENT IS NOT OPERATING TO PROTECT UNIT BY PREVENTING INTERNAL CONDENSATION. CONNECT THE "H" OR HEATER LEADS TO

115V VOLTS	96W WATTS RATING
-------------------	-------------------------

SPACE HEATER NAMEPLATE (ON MOTOR)

RENEWAL PARTS

FRAME 400
TYPES: RU, RUE, RUEI, RUS, RUSI

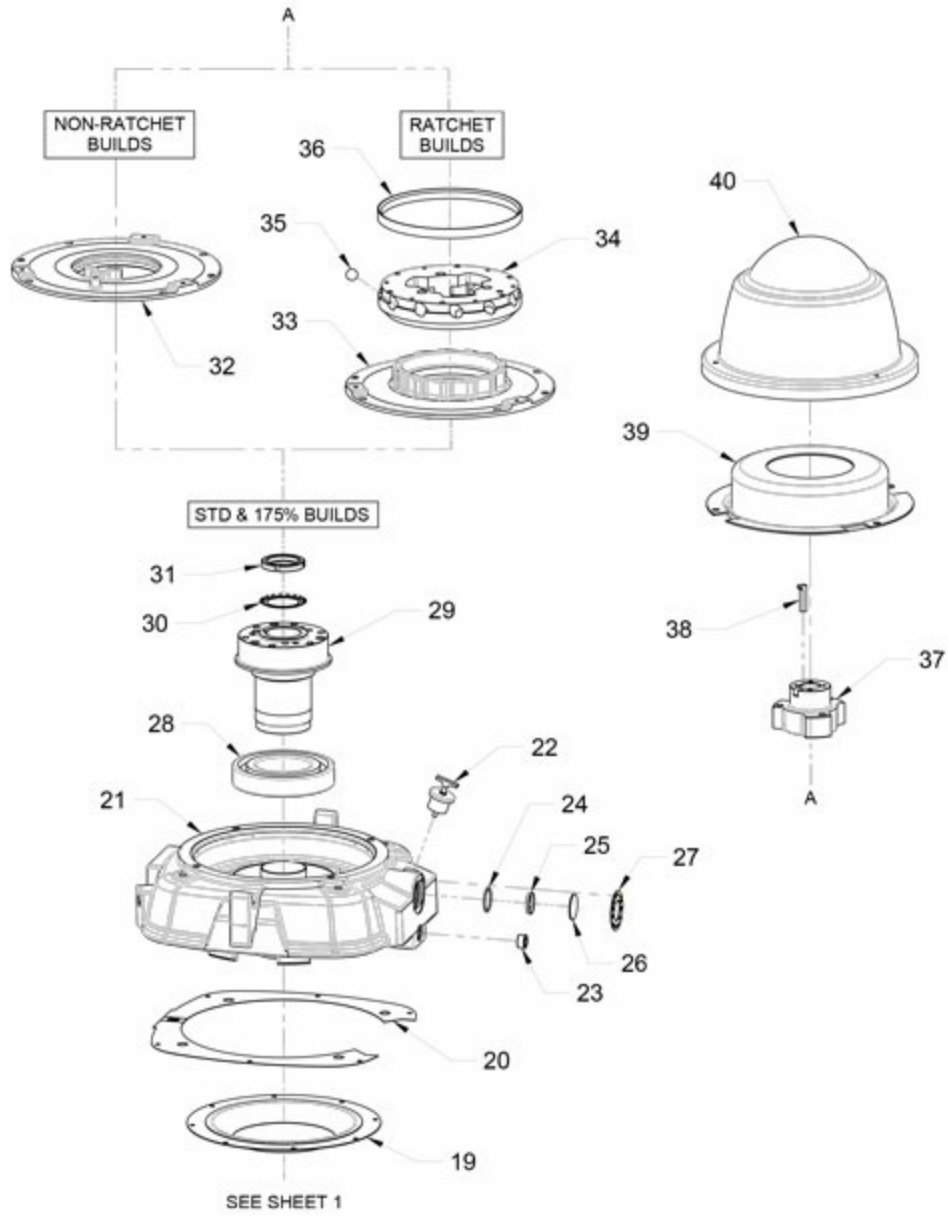


BEARINGS:
Refer to motor nameplate for the bearing numbers.

PRICES:
Parts stocking distributors: refer to renewal parts numerical index. All Others: refer to your nearest parts distributor.
reference: Renewal Parts Section 700 - 270

RENEWAL PARTS

FRAME 400
TYPES: RU, RUE, RUEI, RUS, RUSI



BEARINGS:
Refer to motor nameplate for the bearing numbers.

PRICES:
Parts stocking distributors: refer to renewal parts numerical index. All Others: refer to your nearest parts distributor.
reference: Renewal Parts Section 700 - 270

RENEWAL PARTS

FRAME 400
TYPES: RU, RUE, RUEI, RUS, RUSI

ITEM NO.	QTY.	NAME OF PART	ITEM NO.	QTY.	NAME OF PART
1	1	Lower Bracket	21	1	Upper Bracket
2	1	Water Deflector	22	1	Oil Fill Plug (Expanding)
3	1	Pipe Plug	23	1	Upper Plug (Oil Drain)
4	1	Zerk Fitting Grease	24	1	O-Ring Sight Gauge Window
5	1	Spacer Washer	25	1	Deflector Sight Gauge Window
6	1	Snap Ring	26	1	Glass Sight Gauge Window
7	1	Lower Bearing	27	1	Cover Sight Gauge Window
8	1	Lower Bearing Cap	28	-	Upper Bearing (Qty 1 or 2)
9	1	Rotor Assembly	29	1	Bearing Mount
10	1	Key	30	1	Upper Lockwasher
11	1	Lower Screen Intake (External)	31	1	Upper Lock Nut
12	1	Lower Screen Intake (Internal)	32	1	Dust Cover (Only on Units Without Ratchet)
13	1	Lower Air Deflector	33	1	Ratchet Adaptor (Only on Units With Ratchet)
14	1	Stator Assembly	34	1	Stationary Ratchet (Only on Units With Ratchet)
15	1	Gasket Outlet Box (Frame and Box)	35	1	Ratchet Ball (Only on Units With Ratchet)
16	1	Outlet Base	36	1	Ball Retaining Ring (Only on Units With Ratchet)
17	1	Gasket Outlet Box (Base and Cover)	37	1	Thrust Coupling (Only on Hollowshaft)
18	1	Cover Outlet Box	38	1	Gib Key (Only on Hollowshaft)
19	1	Upper Air Deflector	39	1	Upper Baffle
20	1	Upper Screen	40	1	Canopy Cap

BEARINGS:

Refer to motor nameplate for the bearing numbers.

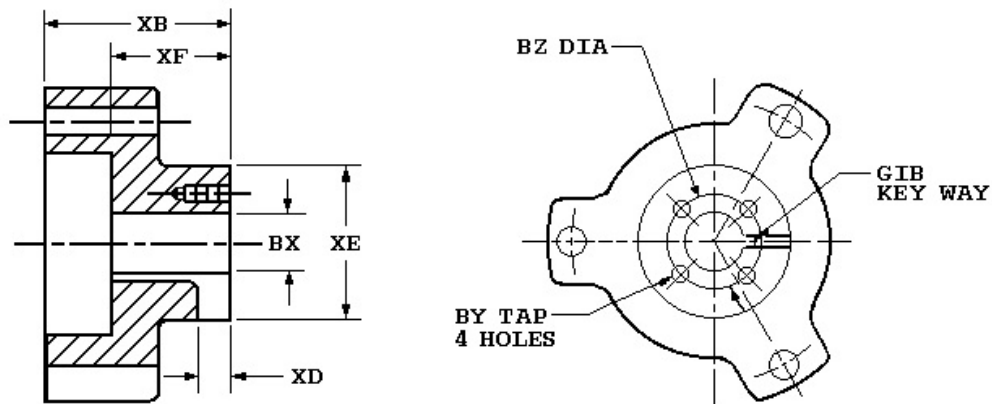
PRICES:

Parts stocking distributors: refer to renewal parts numerical index. All Others: refer to your nearest parts distributor.

reference: Renewal Parts Section 700 - 270

Vertical HOLLOSHAFT Coupling Dimensions

Standard Coupling Dimensions



Coupling Part Number	162458
BX Nominal	1 1/4
Actual Bore	1.251
BY	1/4-20
BZ	1 3/4
XB	2 15/16
XD	17/32
XE	2 7/8
XF	1 15/16
SQ. KEY	1/4

Notes:

1. All Rough casting dimensions may vary by 0.25" due to casting variations.
2. All tapped holes are Unified National Course, Right Hand thread.
3. Coupling bore dimension "BX" is machined with a tolerance of - .000", +.001" up to 1.50" bore inclusive. Larger bores: -.000", +.002".



Copyright © 2010 Nidec Motor Corporation. All rights reserved.

TYPICAL REED CRITICAL FREQUENCY DATA

Note: Motor RCF Test Data can be provided at time of motor shipment through special test.
Please contact your Nidec Motor Corporation representative for more information.

MODEL NO: HF94
CATALOG NO: HO40V2BLF

Frame: 324TPH Type: RUSI

REED CRITICAL FREQUENCY:	57	HZ
CENTER OF GRAVITY:	13	IN
DEFLECTION @ CENTER OF GRAVITY:	0.00301	IN
UNIT WEIGHT:	690	LBS
BASE DIAMETER:	ALL	IN
TOLERANCE ON RCF VALUE:	10%	
DATE:	6/14/2022	



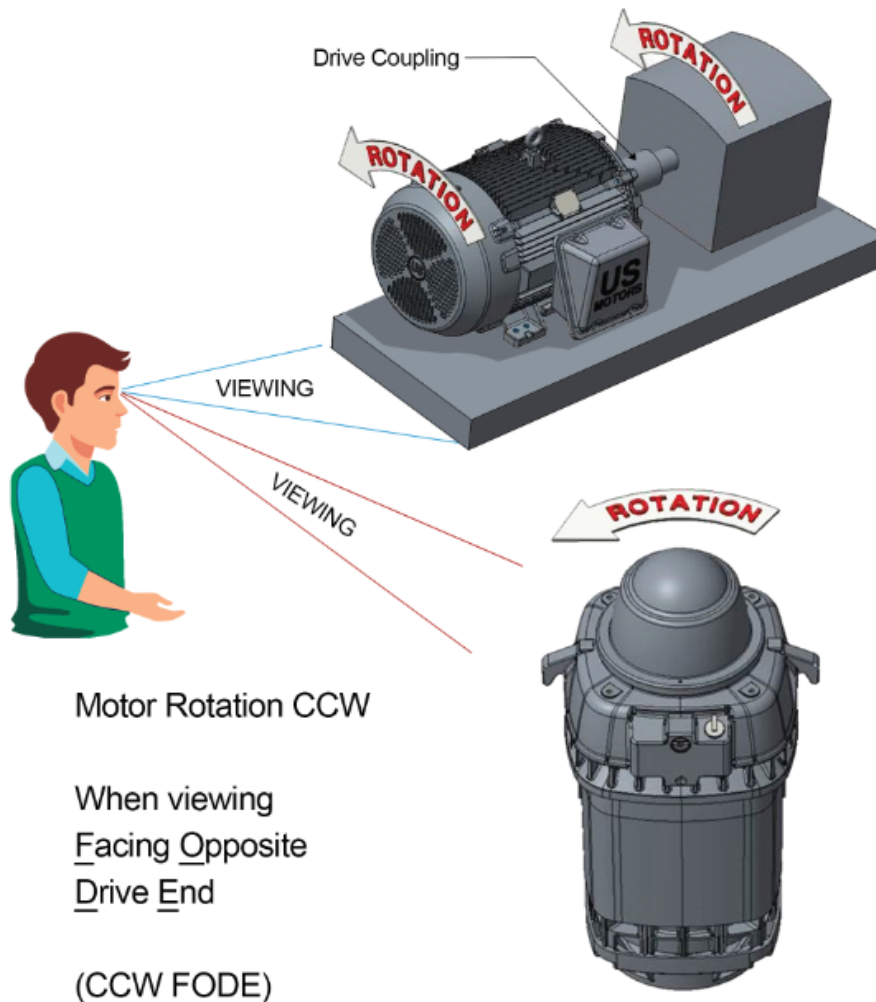
Copyright © 2010 Nidec Motor Corporation. All rights reserved.



DIRECTION OF ROTATION

This motor is unidirectional and can only be operated in one direction to ensure proper cooling.

The motor will be supplied with the industry standard CCW (counter clockwise) rotation as shown below. CW rotation is available upon request.



NIDEC MOTOR CORPORATION
ST. LOUIS, MISSOURI

80-289

General Information for Integral Horsepower (IHP) Motors on Variable Frequency Drives (VFDs)

Variable Frequency Drives (VFD)

A VFD is a type of controller used to vary the speed of an electric motor. The VFD takes a fixed AC voltage and frequency and allows it to be adjusted in order to get different speeds from the motor. Motor speed can be varied by changing the frequency of the input power waveform. The equation below shows how the frequency affects the speed of a three phase induction motor.

$$\text{Speed} = \frac{120 * \text{Fundamental Input Frequency}}{\text{Number of Motor Poles}}$$

How does a VFD work?

A VFD takes the fixed frequency and voltage sine wave from the power grid or power station and puts it through a few steps in order to allow the VFD user to vary the frequency and in turn control the motor speed. First it rectifies the AC power into DC Power. Because of this step, a term commonly used instead of VFD is inverter. This only describes one step of what the VFD does to the power waveform. Once rectified into a DC voltage the drive sends the power through a set of transistors or switches. These switches can take the DC waveform and by opening and closing at certain speeds and durations can create an output waveform that mimics the sine wave that is required to drive a three phase electric motor. The output wave form is known as a Pulse Width Modulation (PWM) waveform because the waveform is created by multiple pulses of the switches at short intervals.



What variables should be considered when deciding whether to power a motor with a VFD?

VFD compatibility with motors is complex. As a result, many variables must be considered when determining the suitability of a particular motor for use with a VFD. These variables include:

- Torque requirements (Constant or Variable)
- Speed Range
- Line / System Voltage
- Cable length between the VFD and the motor
- Drive switching (carrier) frequency
- Motor construction

- VFD dv/dt - winding end turn differential in voltage versus differential in time
- High temperatures or high humidity
- Grounding system

Wider speed ranges, higher voltages, higher switching frequencies, insufficient grounding and increased cable lengths all add to the severity of the application and, therefore, the potential for premature motor failure.

How does a VFD affect the motor?

There are many things to consider when a motor is powered using a VFD or PWM power. When a motor is powered by a PWM waveform the motor windings very often see a large differential voltage, either from phase to phase or turn to turn. When the voltage differential becomes large enough it creates a reaction at the molecular level that converts available oxygen into O₃. This phenomenon is called partial discharge or corona. This reaction creates energy in the form of light and heat. This energy has a corrosive effect on the varnish used to protect the motor windings. PWM waveforms can also magnify shaft voltages which lead to arcing across the bearing and causing premature bearing failure. Corrective action must be taken to mitigate these issues that arise when using an electric motor with a VFD.

How do I protect the motor?

Nidec Motor Corporation (NMC) has developed specific motor designs to decrease the harmful affects that a VFD can have on a motor. NMC's INVERTER GRADE[®] insulation system is the first line of defense against corona and phase to phase faults that can be common when a motor is powered using a PWM waveform. The INVERTER GRADE[®] insulation system is standard on all of NMC's Inverter Duty products. Along with the INVERTER GRADE[®] insulation, thermostats are installed as a minimum protection against over heating the motor. Special consideration must also be given to bearings in motors powered by VFD's. In order to create a low resistance path to ground for built up shaft voltages a shaft grounding device can be used. On larger horsepower motors an insulated bearing system should be used in conjunction with the shaft grounding device when installed, to force the stray shaft voltages to ground. The bearing failures are more prominent on motors with thrust handling bearings. NMC has created an Inverter Duty vertical motor line that not only uses the INVERTER GRADE[®] insulation system, but that also comes standard with a shaft grounding device. On motors that are 100 HP and greater the thrust bearing is also insulated for additional protection.

What does "Inverter Duty" mean?

An Inverter Duty motor should describe a motor that helps mitigate potential failure modes of a motor that is powered by a VFD. Inverter duty motor windings should be able to withstand the voltage spikes per NEMA MG1 Part 31.4.4.2 and protect against overheating when the motor is run at slow speeds. On thrust handling bearings it is apparent that the bearings require additional protection. Inverter Duty vertical motors should have a shaft grounding device to protect the motor bearings from fluting due to voltage discharge through the bearing. On larger motors (100HP and larger) the shaft should also be electrically isolated from the frame in order to aid the shaft grounding ring in discharging the shaft voltages to ground.

*This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL[®] & CSA[®] listings where indicated.

Thermal Overloads and Single Phase Motors

Motors with thermal overloads installed may not operate properly on a VFD. The current carrying thermal overload is designed for sine wave power. Operation on a VFD may cause nuisance tripping or potentially not protect the motor as would be expected on line power. Thermostats or thermistors installed in the motor and connected properly to the VFD may provide suitable thermal overload protection when operating on a VFD. (consult codes for installation requirements)

Single phase motors and other fractional horsepower ratings are not designed to be operated on a VFD. Within Nidec Motor Corporation standard products, all motors NEMA[®] 48 frame (5.5" diameter) and smaller are not suitable for VFD applications. Three phase 56 and 143/145 frame applications should be noted on the catalog price page; or if in doubt ask a Nidec Motor Corporation technical representative for recommendations on compatibility with a VFD.

Slow Speed Motors

Motors with a base design of slower than six poles require special consideration regarding VFD sizing and minimizing harmonic distortion created at the motor terminals due to cable installation characteristics. Additional external PWM waveform filters and shielded motor cables designed for PWM power may be required to provide acceptable motor life. Harmonic distortion on the output waveform should be kept to a minimum level (less than 10%) mismatch impedance.

690V Applications

Motors that are rated for 690VAC and that will be powered by 690VAC PWM VFDs require the use of an external filter to limit peak voltage spikes and the use of an INVERTER GRADE[®] motor. Where available, an alternative to using an output filter is to upgrade to a 2300V insulation system.

Low Voltage TITAN[®] Motors

When using 449 frame and larger motors on PWM type VFDs consider the use of an external filter and shielded motor cables designed for PWM power to minimize harmonic distortion and peak voltages at the motor terminals. Harmonic distortion on the output waveform should be kept to a minimum level (less than 10%).

Bearing Currents Related to PWM Waveforms

Protection of the motor bearings from shaft currents caused by common mode voltages is becoming a standard feature on Inverter Duty motor products. Some installations may be prone to a voltage discharge condition through the motor bearings called Electrical Discharge Machining (EDM) or fluting. Vertical HOLLOWSHAFT and HOSTILE DUTY World Motor come with grounding devices installed as standard. EDM damage is related to characteristics of the PWM waveform, and the VFD programming, and installations factors.

Bearing Protection on Inverter Duty Vertical Motors

All U.S. MOTORS[®] brand "Inverter Duty" vertical products have a shaft grounding system that allows damaging shaft currents a low resistance path to ground. **Bearings on vertical motors fed by VFD power without this bearing protection are not covered under any warranty.** All other bearing failure is covered per NMC's standard warranty. An electric motor repair shop approved to service U.S. MOTORS[®] brand motors must verify that the cause of the bearing failure was not due to EDM damage.

Guideline For Insulated Anti-Friction Bearings

Bearing insulation is required to prevent circulating shaft currents which can damage bearings. Circulating shaft current can be caused by use of improper power and/or ground cables, improper grounding systems and higher switching frequencies. Finding and correcting the external condition(s) is the responsibility of the system designer or specifying engineer. To prevent circulating shaft current in motors with anti-friction bearings, Nidec Motor Corporation's standard practice is to insulate the non-drive end bearing.

Adjustable Speed Drives produce a common mode voltage condition. To interrupt common mode voltage on induction motors of all sizes, NEMA MG1-2018 Part 31 recommends insulating both bearings. In cases where both anti-friction bearings are insulated, the system designer or specifying engineer should determine whether to apply one or more of the following options to prevent or reduce shaft currents: sinewave filters, line reactors or mechanical devices, such as shaft grounding or an insulated half coupling. Motors with shaft grounding devices are not suitable for installation in hazardous locations unless housed in an enclosure suitable for the specified Division (or Zone), Class and Group(s).

Multiple Motors on a Single VFD

Special considerations are required when multiple motors are powered from a single VFD unit. Most VFD manufacturers can provide guidelines for proper motor thermal considerations and starting/stopping of motors. Cable runs from the VFD and each motor can create conditions that will cause extra stress on the motor winding. Filters may be required at the motor to provide maximum motor life.

Grounding and Cable Installation Guidelines

Proper output winding and grounding practices can be instrumental in minimizing motor related failures caused by PWM waveform characteristics and installation factors. VFD manufacturers typically provide detailed guidelines on the proper grounding of the motor to the VFD and output cable routing. Cabling manufacturers provide recommended cable types for PWM installations and critical information concerning output wiring impedance and capacitance to ground.

Integrated Motor and Inverter

By integrating the motor and inverter at NMC's manufacturing facility, many of the motor compatibility problems are minimized or eliminated. During the manufacturing process, the motor is matched to the inverter characteristics which ensures the winding temperature and torque levels meet the design specification. Since the inverter output wiring to the motor is nearly eliminated, bearing currents are rarely experienced. When the unit is properly grounded, reducing the output cable lengths in conjunction with an inverter grade insulation system and low factory setting of the switching frequency of the inverter drive, results in low risk of voltage peaks produced by the PWM waveform.

Vertical Motors on VFDs

Vertical motors operated on VFD power present unique conditions that may require consideration by the user or installation engineer:

- Locked rotor and drive tripping caused by non-reversing-ratchet operation at low motor speeds. It is not recommended to operate motors at less than 1/4 of synchronous speed. If slow speeds are required contact NMC engineering.
- Unexpected / unacceptable system vibration and or noise levels caused by the torque pulsation characteristics of the PWM waveform, a system critical frequency falling inside the variable speed range of the process or the added harmonic content of the PWM waveform exciting a system component
- Application related problems related to the controlled acceleration/deceleration and torque of the motor on VFD power and the building of system pressure/ load.
- The impact the reduction of pump speed has on the down thrust reflected to the pump motor and any minimum thrust requirements of the motor bearings
- Water hammer during shutdown damaging the non-reversing ratchet

Humidity and Non-operational Conditions

The possible build-up of condensation inside the motor due to storage in an uncontrolled environment or non-operational periods in an installation, can lead to an increased rate of premature winding or bearing failures when combined with the stresses associated with PWM waveform characteristics. Moisture and condensation in and on the motor winding over time can provide tracking paths to ground, lower the resistance of the motor winding to ground, and lower the Corona Inception Voltage (CIV) level of the winding.

Proper storage and maintenance guidelines are important to minimize the potential of premature failures. Space heaters or trickle voltage heating methods are the common methods for drying out a winding that has low resistance readings. **Damage caused by these factors are not covered by the limited warranty provided for the motor unless appropriate heating methods are properly utilized during non-operational periods and prior to motor start-up.**

NEMA[®] Application Guide for AC Adjustable Speed Drive Systems: <http://www.nema.org/stds/acadjustable.cfm#download>

* This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL[®] & CSA[®] listings where indicated.

Warranty Guidelines for Integral Horsepower (IHP)* Motors on Variable Frequency Drives

Warranty Guidelines

The information in the following section refers to the motor and drive application guidelines and limitations for warranty.

Hazardous Location Motors

Use of a variable frequency drive with the motors in this catalog, intended for use in hazardous locations, is only approved for Division 1, Class I, Group D hazardous location motors with a T2B temperature code, with a limitation of 2:1 constant torque or 10:1 variable torque output. **No other stock hazardous location motors are inherently suitable for operation with a variable frequency drive.** If other requirements are needed, including non-listed Division 2, please contact your Nidec Motor Corporation territory manager to conduct an engineering inquiry.

575 Volt Motors

575 volt motors can be applied on Inverters when output filters are used. Contact the drive manufacturer for filter selection and installation requirements.

Applying INVERTER GRADE® Insulated Motors on Variable Frequency Drives (2, 4, 6 pole)

The products within this catalog labeled “Inverter Duty” or “Vector Duty” are considered INVERTER GRADE® insulated motors. INVERTER GRADE® motors exceed the NEMA® MG-1 Part 31 standard. Nidec Motor Corporation provides a three-year limited warranty on all NEMA® frame INVERTER GRADE® insulated motors and allows long cable runs between the motor and the VFD (limited to 400 feet without output filters). Cable distance can be further limited by hot and humid environments and VFD manufacturers cable limits. These motors may be appropriate for certain severe inverter applications or when the factors relating to the end use application are undefined (such as spares).

Nidec Motor Corporation’s U.S. Motors® brand is available in the following INVERTER GRADE® insulated motors:

- Inverter Duty NEMA® frame motors good for 20:1 Variable Torque & 5:1 Constant Torque, including Vertical Type RUSI (10:1 V.T.)
- Inverter Duty motors rated for 20:1 Constant Torque
- ACCU-Torq® and Vector Duty Motors with full torque to 0 Speed or 5000:1
- 841 Plus® NEMA® Frame Motors

Applying Premium Efficient motors (that do not have INVERTER GRADE® insulation) on Variable Frequency Drives (2, 4, 6 pole)

Premium efficient motors without INVERTER GRADE insulation meet minimum NEMA® MG-1, Section IV, Part 31.4.4.2. These motors can be used with Variable Frequency Drives (with a reduced warranty period) under the following parameters:

- On NEMA® frame 447 and smaller motors, 20:1 speed rating on variable torque loads & 4:1 speed range on constant torque loads.
- On TITAN® 449 and larger frame motors, 10:1 speed rating on variable torque loads.

- On TITAN® frame motors, inquiry required for suitability on constant torque loads.

Cable distances are for reference only and can be further limited by hot and humid environments (refer to Table 1). Refer to specific VFD

Table 1 - Cable Distances			
Maximum Cable Distance VFD to Motor			
Switching Frequency	460 Volt	230 Volt	380 Volt
3 KHz	127 ft	400 ft	218 ft
6 KHz	90 ft	307 ft	154 ft
9 KHz	73 ft	251 ft	126 ft
12 KHz	64 ft	217 ft	109 ft
15 KHz	57 ft	194 ft	98 ft
20 KHz	49 ft	168 ft	85 ft

manufacturers cable limits. Refer to the Motor/ Inverter Compatibility page for special consideration of vertical motor bearings.

Warranty Period Clarifications and Exceptions

Standard Energy Efficient Exclusion

Applying Standard & Energy Efficient Motors on Variable Frequency Drives is not recommended. VFD related failures on standard and energy efficient motors will not be covered under warranty.

Vertical Motor Windings

Premium efficient vertical motors without INVERTER GRADE® insulation that are installed using the criteria described in this document and applied in the correct applications shall have a warranty while powered by a VFD for 12 months from date of installation or 18 months from date of manufacturing whichever comes first. See limited warranty page for horizontal motor warranty periods.

Bearing Exclusion for Thrust Handling Bearings

Bearings used in premium efficient vertical motors, and all thrust handling bearings, that are powered by VFDs without shaft grounding devices or insulated bearings (when required) will not be covered under any warranty for damages caused from being powered by a VFD. All other bearing failure is covered per NMC’s standard warranty. An electric motor repair shop approved to service U.S. MOTORS® brand motors must verify that the cause of the bearing failure was not due to Electrical Discharge Machining.

Medium Voltage and Slow Speed Considerations

Motors that are rated above 700 VAC or that are eight pole and slower require special consideration and installation and are not covered under the warranty guidelines in this document. Motors that are rated above 700VAC have special cable length and voltage differential issues that are specific to the VFD type and manufacture. The motor construction and cost may vary dramatically depending on the VFD topology and construction. Contact your NMC representative with VFD manufacturer name and model type for application and motor construction considerations. Motors that are designed eight pole and slower also require special installation and filters per the drive manufacturer.

* This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL® & CSA® listings where indicated.

CONTROLLER



Product Description

An Across-the-Line pump control panel is a “combination starter” which combines a full voltage magnetic starter along with a fusible switch or a circuit breaker disconnect.

AMC pump panel line offers protection against short circuit faults, protection against motor overload faults, and means of disconnecting the controller and the motor from the supply power.

Across-the-Line starters are designed to connect motors directly to the full motor voltage and provide the maximum torque in those applications where inrush current restrictions do not prevent their use.

Since the current drawn from the power lines by a motor started across-the-line is typically 600% of normal full load amps (running current), power companies are increasingly limiting the use of full voltage starters to specific HP ranges.

Standard Features

- Type 3R enclosure for use outdoors. Rain and sleet resistant. Fully welded steel construction with hinged door and provisions for padlocking
- Light Gray powder-coating finish suitable for use in outdoors environments
- Choice of power disconnect type: Fusible Switch, or Circuit Breaker
- Fusible Disconnect Switches include factory-installed J-Class time-delay dual-element current-limiting power fuses
- Through the door rotary disconnect operator with provisions for padlocking in the off position
- Full Voltage Magnetic Motor Starter with optional choice of coil voltage
- Solid State Class 10 Overload Relay with adjustable trip point and inherent protection against loss of phase
- Suitable for use with submersible and above ground motors
- Fast-Acting Supplementary Fuses for protection of internal and external control circuit wiring against damage due to short circuits and ground faults
- 30mm Hand-Off-Auto Selector Switch
- UL 508 Listed Industrial Controls
- Suitable for use as Service Equipment