

# NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.  
ST. LOUIS, MO 63136



**DATE:** 6/10/2019

**P.O. NO.:** 28NIDEC GUA310519  
**Order/Line NO.:** PRONICO  
20190498 SO 100

**TO:** Motores Electricos de Guatemala \*  
Aguilar Batres 45-99  
Zona 12  
Guatemala  
Guatemala  
**ATTN:**JULIO MESA

**Model Number:** NA  
**Catalog Number:**  
Titan VSS-HT TEFC  
CONF,MOTOR,TITAN VSS-HT TEFC

**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 ..... 00450.00~00000.00 ~ KW: 335.7  
Enclosure ..... TEFC  
Poles ..... 08~00 ~ RPM: 900~0  
Frame Size ..... 5811~VP  
Phase/Frequency/Voltage.. 3~060~4160  
Winding Type ..... Form Wound  
Service Factor ..... 1.00  
Insulation Class ..... Class "F" ~ Insulife 5000  
Altitude In Feet (Max) .. 3300 Ft.(1000 M)  
Ambient In Degree C (Max) +40 C  
Efficiency Class ..... Standard Efficiency  
Application ..... Vertical Centrifugal Pump  
Customer Part Number ....  
Base Diameter (Inches) ..... 30.5  
Pricebook Thrust Value (lbs).. 12300  
Customer Down Thrust (lbs) ... 7833.3  
Customer Shutoff Thrust (lbs). 14389.1  
Up Thrust (lbs) .....  
Momentary Up Thrust  
Max Shaft Runout = 0.0015 TIR  
"AK" Dimension (Inches).. 22.000  
Shaft Dimensions:~U=3.125 ~ AH/V=7.000  
KEYWAY=0.750 ~ ES=5.000  
Temperature Rise (Sine Wave): "F" Rise @ 1.0 SF (Resist)  
Design Letter ..... N/A  
KVA Code Letter ..... "H"  
Starting Method ..... Direct-On-Line Start  
Duty Cycle ..... Continuous Duty  
Load Inertia: 270.1 ~ Standard Inertia: 9456 LB-FT<sup>2</sup>  
Number Of Starts Per Hour: NEMA  
Motor Type Code ..... JV4  
Rotor Inertia (LB-FT<sup>2</sup>) ..... 556. LB-FT<sup>2</sup>  
Qty. of Bearings PE (Shaft) ..... 1  
Qty. of Bearings SE (OPP) ..... 1  
Bearing Number PE (Shaft) ..... 6226-J/C3  
Bearing Number SE (OPP) ..... 7228 BCBM

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**Accessories:**

17,600 Hours L-10 Bearing Life  
Insul. Bearing - Upper Bracket  
Synthetic Lubrication  
Special Features Plate  
Conduit Box Information: ~ Size 3 Conduit Box-Cast Iron  
Conduit Opening Size (AA) .. 3.5" NPT  
2 Conduit Openings ~ Bottom Of Conduit Box  
Special Features Plate Info:  
ATOE

**USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT**

<b>Horsepower</b>	450
<b>Pole(s)</b>	08
<b>Voltage(s)</b>	4160
<b>Frame Size</b>	5811VP
<b>Shaft U Diameter</b>	3.125
<b>Outlet Box AF</b>	10.94
<b>Outlet Box AA</b>	3.5

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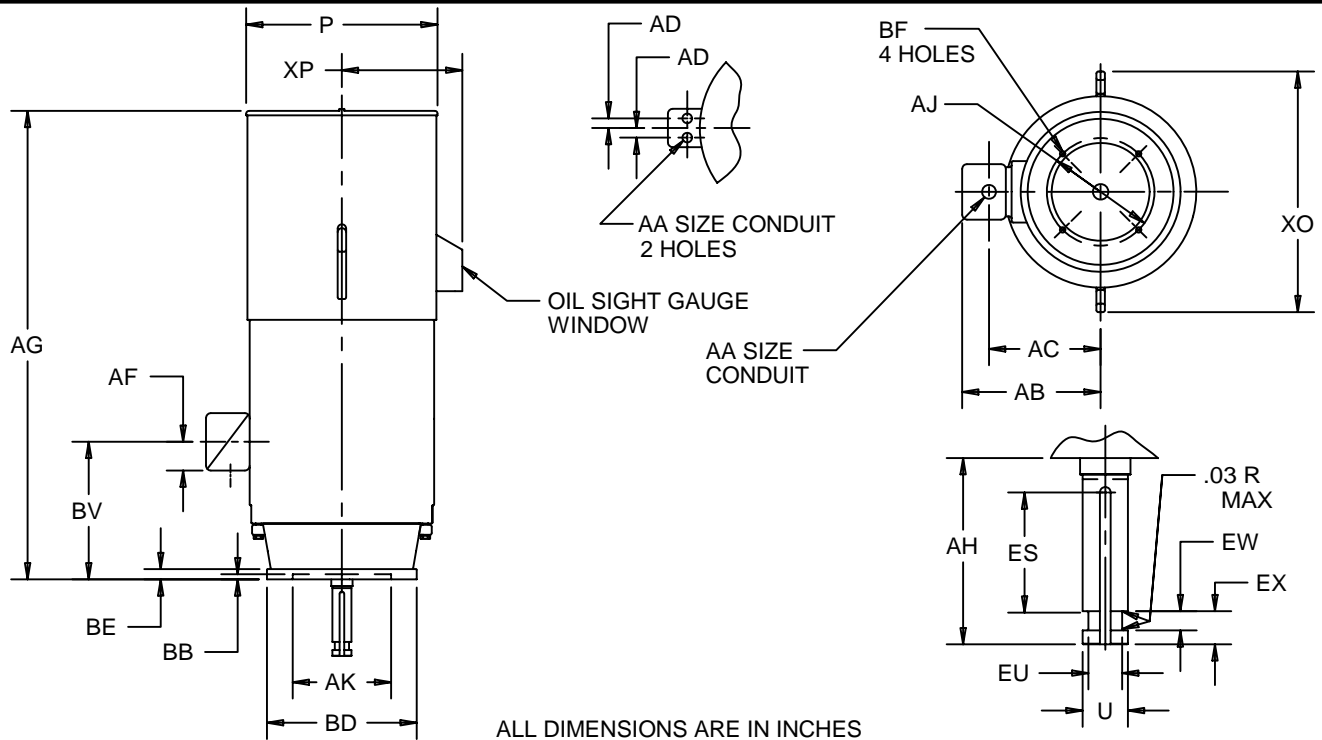
EFFECTIVE:  
20-JUL-11

SUPERSEDES:  
06-AUG-04

**VERTICAL MOTORS**  
TEFC/EXPLOSION PROOF  
FRAME: 5800  
BASIC TYPE: JV4, EV4

PRINT:  
09-1875-46

SHEET:  
1 OF 2



FRAME	HP	TYPE	VOLTS	AB	AC	AD	AF
5800	THRU 500	JV-4	460	26.13	20.63	-	8.06
	ALL	JV-4	2300				
	OVER 500	JV-4	460	32.38	23.75	3.00	10.94
	ALL	JV-4	4000	27.13	21.63	-	10.00
	THRU 500	EV-4	460	26.13	19.44	-	5.63
	ALL	EV-4	2300				
	OVER 500	EV-4	460	32.00	21.63	3.00	8.63
	ALL	EV-4	4000				

AA
2 1/2 NPT
3 NPT
3 1/2 NPT
4 NPT

	FRAME	AG
	5807	73.69
	5809	80.69
	5811	88.69

	FRAME	P 3	AJ	AK +.005	BB MIN	BD MAX	BE	BF	BV	XO	XP
	5800P	31.13	26.000	22.000	.25	30.50	1.25	.81	16.75	38.50	17.63
	5800PH		14.750	13.500		.69					
			22.000			.94					

	POLES(RPM)				U -.001	AH ±.062	ES MIN	EU -.005	EW +.002	EX -.005	SQ KEY
	2(3600)	4(1800)	6(1200)	8(900)							
HP	ALL THRU 600	ALL THRU 300	ALL THRU 200	ALL THRU 150	2.125	4.500	3.000	1.750	.375	.750	.500
	---	350 THRU 450	250 THRU 300	200	2.375	5.000	3.500	2.000	.375	.750	.625
	---	500 THRU 600	350 THRU 400	250 THRU 300	2.625	5.000	3.500	2.250	.375	.750	.625
	---	700 THRU 800	450 THRU 500	350 THRU 400	2.875	7.000	5.000	2.375	.500	1.000	.750
	---	---	600	450 THRU 500	3.125	7.000	5.000	2.625	.500	1.000	.750

	POLES(RPM)				U -.001	AH ±.062	ES MIN	EU -.005	EW +.002	EX -.005	SQ KEY
	10(720)	12(600)	14(514)	16(450)							
HP	ALL THRU 125	ALL THRU 100	ALL THRU 75	ALL THRU 75	2.125	4.500	3.000	1.750	.375	.750	.500
	150	125 THRU 150	100 THRU 125	100	2.375	5.000	3.500	2.000	.375	.750	.625
	200	200	150	125 THRU 150	2.625	5.000	3.500	2.250	.375	.750	.625
	250 THRU 300	250	200	200	2.875	7.000	5.000	2.375	.500	1.000	.750
	350 THRU 400	300	250	250	3.125	7.000	5.000	2.625	.500	1.000	.750

- 1: ROUGH DIMENSIONS MAY VARY BY  $\pm .25"$  DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF  $90^\circ$ . STANDARD IS AS SHOWN WITH CONDUIT OPENING DOWN.
- 3: LARGEST MOTOR WIDTH.

TOLERANCES	
FACE RUNOUT	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.0015 T.I.R.
SHAFT END PLAY	.010 MAX.

09-1875/B

**Nidec Motor Corporation**  
St. Louis, Missouri

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CONSENT OF NIDEC MOTOR CORPORATION



ISSUED BY  
**R. KING**  
APPROVED BY  
**K. POTTER**

IHP\_DP\_NMCA (MAR-2011) SOLIDEDGE

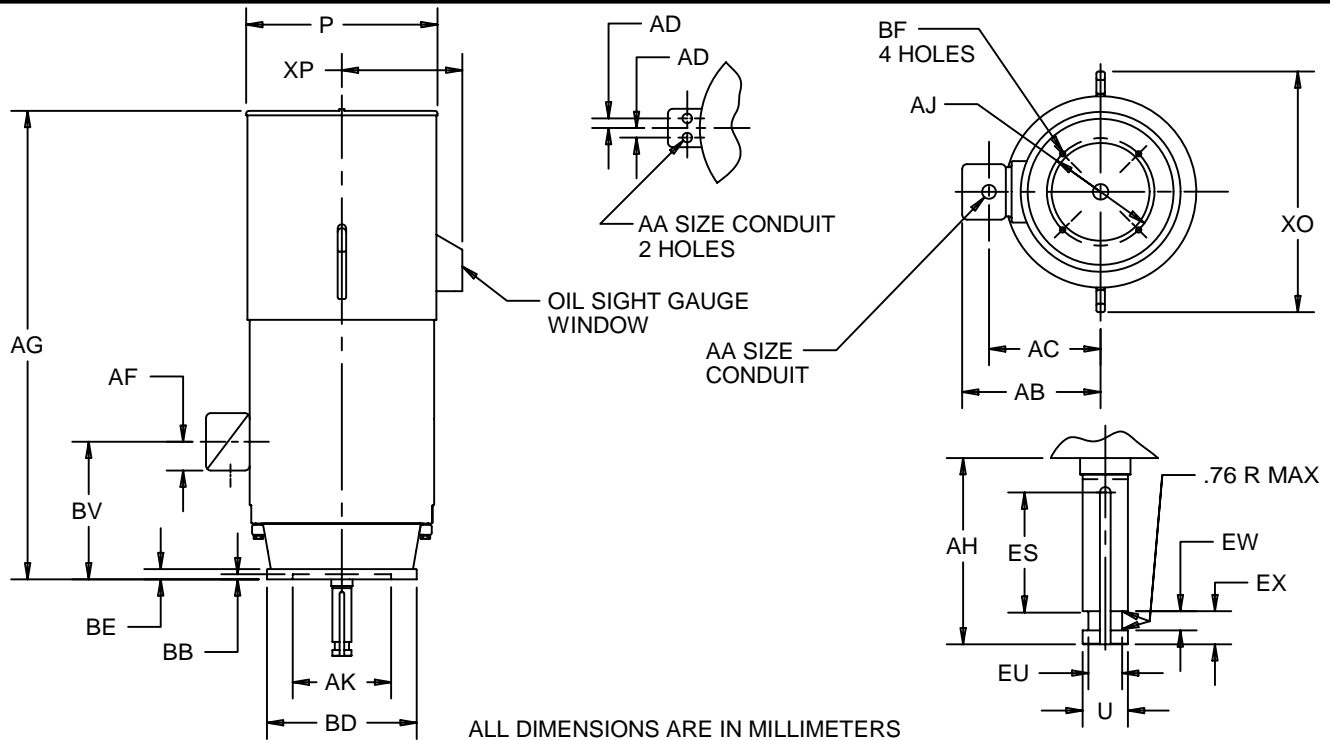
EFFECTIVE:  
20-JUL-11

SUPERSEDES:  
06-AUG-04

**VERTICAL MOTORS**  
TEFC/EXPLOSION PROOF  
FRAME: 5800  
BASIC TYPE: JV4, EV4

PRINT:  
09-1875-46

SHEET:  
2 OF 2



ALL DIMENSIONS ARE IN MILLIMETERS

FRAME	HP	TYPE	VOLTS	AB	AC	AD	AF
5800	THRU 500	JV-4	460	664	524	-	205
	ALL	JV-4	2300				
	OVER 500	JV-4	460				
	ALL	JV-4	4000	813	549	76	219
	THRU 500	EV-4	460				
	ALL	EV-4	2300				
	OVER 500	EV-4	460				
	ALL	EV-4	4000				

AA
2 1/2 NPT
3 NPT
3 1/2 NPT
4 NPT

	FRAME	AG
	5807	1871
	5809	2050
	5811	2253

	FRAME	P 3	AJ	AK +.005	BB MIN	BD MAX	BE	BF	BV	XO	XP
	5800P	791	660.40	558.80	6	775	32	21	425	978	448
	5800PH		374.65	342.90		622		18			
			558.80			24					

	POLES(RPM)				U	AH	ES	EU	EW	EX	SQ
	2(3600)	4(1800)	6(1200)	8(900)	-.03	±1.57	MIN	-.13	+.05	-.13	KEY
HP	ALL THRU 600	ALL THRU 300	ALL THRU 200	ALL THRU 150	53.98	114.30	76.20	44.45	9.53	19.05	12.70
	---	350 THRU 450	250 THRU 300	200	60.33	127.00	88.90	50.80	9.53	19.05	15.88
	---	500 THRU 600	350 THRU 400	250 THRU 300	66.68	127.00	88.90	57.15	9.53	19.05	15.88
	---	700 THRU 800	450 THRU 500	350 THRU 400	73.03	177.80	127.00	60.33	12.70	25.40	19.05
	---	---	600	450 THRU 500	79.38	177.80	127.00	66.68	12.70	25.40	19.05

	POLES(RPM)				U	AH	ES	EU	EW	EX	SQ
	10(720)	12(600)	14(514)	16(450)	-.03	±1.57	MIN	-.13	+.05	-.13	KEY
HP	ALL THRU 125	ALL THRU 100	ALL THRU 75	ALL THRU 75	53.98	114.30	76.20	44.45	9.53	19.05	12.70
	150	125 THRU 150	100 THRU 125	100	60.33	127.00	88.90	50.80	9.53	19.05	15.88
	200	200	150	125 THRU 150	66.68	127.00	88.90	57.15	9.53	19.05	15.88
	250 THRU 300	250	200	200	73.03	177.80	127.00	60.33	12.70	25.40	19.05
	350 THRU 400	300	250	250	79.38	177.80	127.00	66.68	12.70	25.40	19.05

- 1: ROUGH DIMENSIONS MAY VARY BY ±6 DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90°. STANDARD IS AS SHOWN WITH CONDUIT OPENING DOWN.
- 3: LARGEST MOTOR WIDTH.

TOLERANCES	
FACE RUNOUT	.18 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.18 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.038 T.I.R.
SHAFT END PLAY	.25 MAX.

09-1875/B

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St. Louis, Missouri

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ISSUED BY  
**R. KING**  
APPROVED BY  
**K. POTTER**

IHP\_DP\_NMCA (MAR-2011) SOLIDEDGE

EFFECTIVE:  
**26-OCT-12**

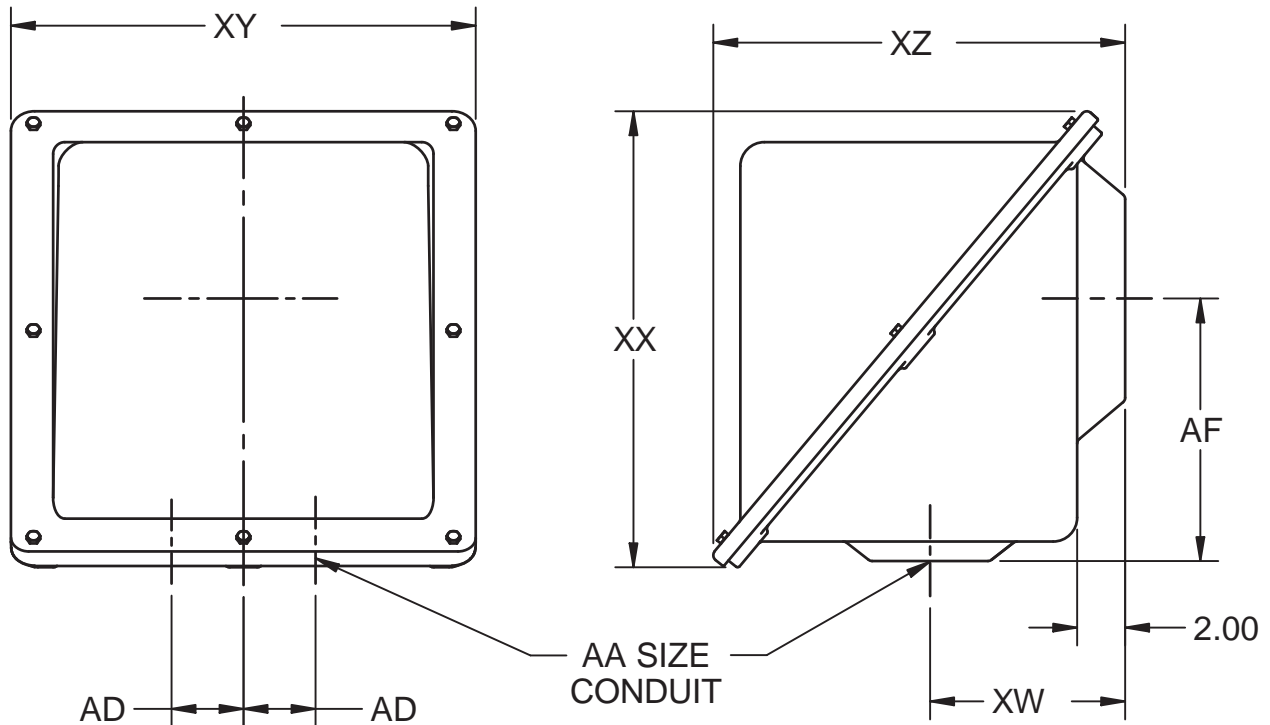
SUPERSEDES:  
**28-APR-11**

## SIZE #3 MAIN OUTLET BOX

CAST IRON CONSTRUCTION  
INTERNAL VOLUME = 3,400 CU. IN.

PRINT:  
**475628-DP**

SHEET:  
**1 OF 1**



ALL DIMENSIONS ARE IN INCHES

					EXTERIOR			INTERIOR		
AA*	QTY OF CONDUIT	AD	AF	XW	XX	XY	XZ	XX	XY	XZ
3-1/2 NPT	2	3.00	10.94	8.13	19.00	19.38	17.16	16.13	15.38	13.63

\* STANDARD CONDUIT SIZE, QUANTITY AND LOCATIONS SHOWN.  
CONFIRM ACTUAL VALUES ON THE DIMENSION PRINT AND  
SUBMITTAL COVER LETTER.

BASE# 475628, COVER# 475629

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ISSUED BY  
**K. FRIEDMAN**  
APPROVED BY  
**J. O'BRIEN**

# NAMEPLATE DATA

CATALOG NUMBER: <input type="text"/>		NAMEPLATE PART #: <input type="text" value="422705-006"/>	
MODEL <input type="text"/>	FR <input type="text" value="5811VP"/>	TYPE <input type="text" value="JV4"/>	ENCL <input type="text" value="TEFC"/>
SHAFT END BRG <input type="text" value="6226-J/C3 - QTY 1"/>		OPP END BRG <input type="text" value="7228 BCBM - QTY 1"/>	
PH <input type="text" value="3"/>	MAX AMB <input type="text" value="40 C"/>	ID# <input type="text" value="(ref: Order#: 20190498, Type: SO, Line#: 100)"/>	
INSUL CLASS <input type="text" value="F"/>	Asm. Pos. <input type="text"/>	DUTY <input type="text" value="CONT"/>	
HP <input type="text" value="450"/>	RPM <input type="text" value="890"/>	HP <input type="text"/>	RPM <input type="text"/>
VOLTS <input type="text" value="4160"/>		VOLTS <input type="text"/>	
FL AMPS <input type="text" value="61.0"/>		FL AMPS <input type="text"/>	
SF AMPS <input type="text"/>		SF AMPS <input type="text"/>	
SF <input type="text" value="1.00"/>	DESIGN <input type="text" value="#"/>	CODE <input type="text" value="H"/>	
NEMA NOM EFFICIENCY <input type="text" value="94.5"/>	NOM PF <input type="text" value="80.8"/>	KiloWatt <input type="text" value="335.7"/>	
GUARANTEED EFFICIENCY <input type="text" value="93.6"/>	MAX KVAR <input type="text" value="158.6"/>	HZ <input type="text" value="60"/>	

**HAZARDOUS LOCATION DATA (IF APPLICABLE):**

DIVISION <input type="text"/>	CLASS I <input type="text"/>	GROUP I <input type="text"/>
TEMP CODE <input type="text"/>	CLASS II <input type="text"/>	GROUP II <input type="text"/>

**VFD DATA (IF APPLICABLE):**

VOLTS <input type="text"/>	Specification/Logo plate: <input type="text" value="NA"/>
AMPS <input type="text"/>	
TORQUE 1 <input type="text"/>	TORQUE 2 <input type="text"/>
VFD LOAD TYPE 1 <input type="text"/>	VFD LOAD TYPE 2 <input type="text"/>
VFD HERTZ RANGE 1 <input type="text"/>	VFD HERTZ RANGE 2 <input type="text"/>
VFD SPEED RANGE 1 <input type="text"/>	VFD SPEED RANGE 2 <input type="text"/>
SERVICE FACTOR <input type="text"/>	FL SLIP <input type="text"/>
NO. POLES <input type="text" value="8"/>	MAGNETIZING AMPS <input type="text" value="25.9"/>
VECTOR MAX RPM <input type="text"/>	Encoder PPR <input type="text"/>
Radians / Seconds <input type="text"/>	Encoder Volts <input type="text"/>

**TEAO DATA (IF APPLICABLE):**

HP (AIR OVER) <input type="text"/>	HP (AIR OVER M/S) <input type="text"/>	RPM (AIR OVER) <input type="text"/>	RPM (AIR OVER M/S) <input type="text"/>
FPM AIR VELOCITY <input type="text"/>	FPM AIR VELOCITY M/S <input type="text"/>	FPM AIR VELOCITY SEC <input type="text"/>	

**ADDITIONAL NAMEPLATE DATA:**

Decal / Plate	WD=499495	Customer PN	
Notes		Non Rev Ratchet	
Max Temp Rise		OPP/Upper Oil Cap	37 QT/35 L
Thermal (WDG)		SHAFT/Lower Oil Cap	4 QT/3.8 L
Altitude		Usable At	
Regulatory Notes		Regulatory Compliance	
COS		Marine Duty	
Balance		Arctic Duty	
3/4 Load Eff.	94.6	Inrush Limit	
Motor Weight (LBS)	7460	Direction of Rotation	
Sound Level		Special Note 1	ATOE
Vertical Thrust (LBS)	12300	Special Note 2	
Thrust Percentage		Special Note 3	
Bearing Life	17.6K	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	
380V 50 Hz Max Amps		SH Watts	
NEMA Inertia		Load Inertia	270.1 LB-FT2
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			

**NIDEC MOTOR CORPORATION**  
ST. LOUIS, MO



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

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# MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
NA	NA	3	JV4	5811VP
ORDER NO.		20190498	LINE NO.	100
MPI:				131253
HP:				450
POLES:				8
VOLTS:				4160
HZ:				60
SERVICE FACTOR:				1.00
EFFICIENCY (%):				
S.F.				
FULL				94.5
3/4				94.6
1/2				93.9
1/4				90.3
POWER FACTOR (%):				
S.F.				
FULL				80.8
3/4				76.3
1/2				66.4
1/4				44.3
NO LOAD				3.9
LOCKED ROTOR				23.8
AMPS:				
S.F.				
FULL				61
3/4				48
1/2				37
1/4				29.1
NO LOAD				25.9
LOCKED ROTOR				406
NEMA CODE LETTER				H
NEMA DESIGN LETTER				#
FULL LOAD RPM				890
NEMA NOMINAL / EFFICIENCY (%)				94.5
GUARANTEED EFFICIENCY (%)				93.6
MAX KVAR				158.6
AMBIENT (°C)				40
ALTITUDE (FASL)				3300
SAFE STALL TIME-HOT (SEC)				26
SOUND PRESSURE (DBA @ 1M)				92
TORQUES:				
BREAKDOWN{% F.L.}				175
LOCKED ROTOR{% F.L.}				60
FULL LOAD{LB-FT}				2651.6

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

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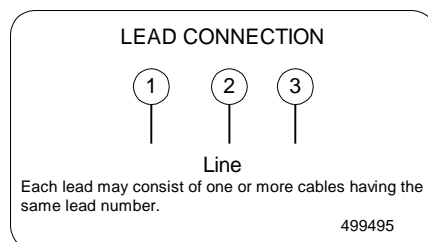
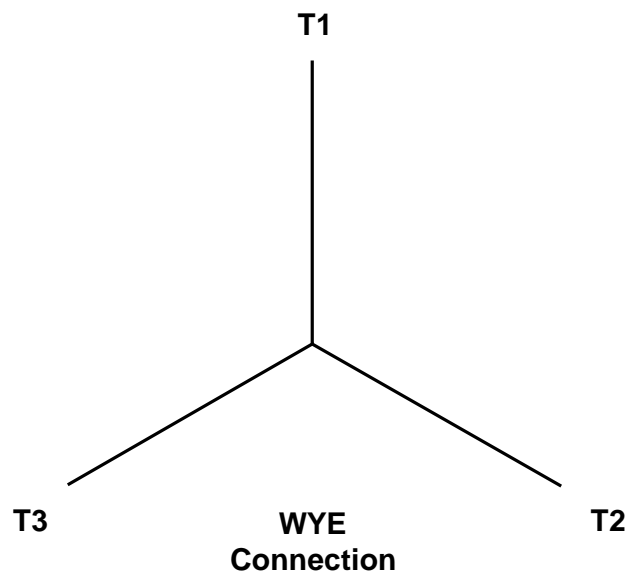
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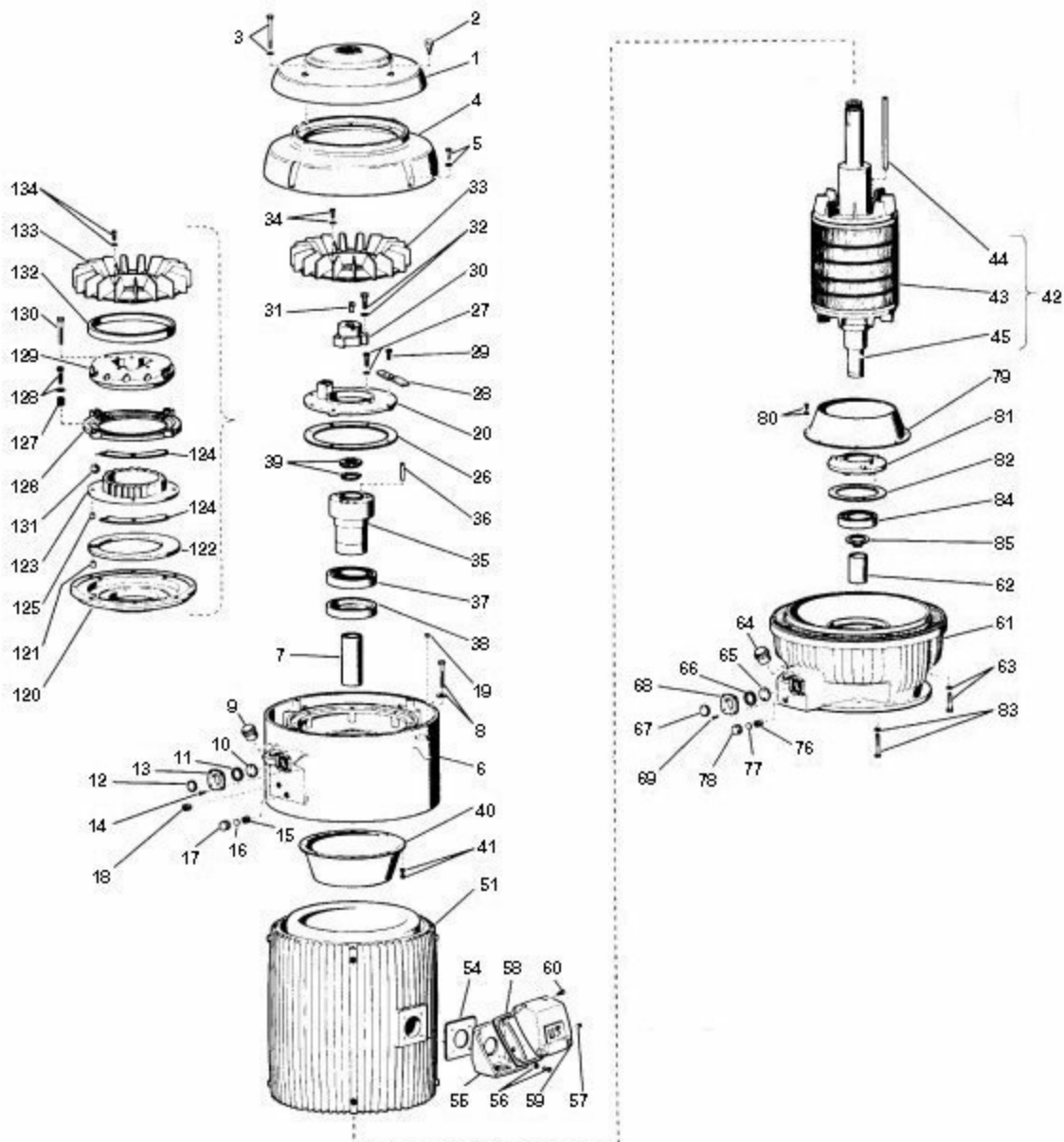
## Motor Wiring Diagram



To reverse direction of rotation interchange connections L1 and L2.  
Each lead may be comprised of one or more cables.  
Each cable will be marked with the appropriate lead number.

## RENEWAL PARTS

FRAMES 5008P THRU 5811PH - TOTALLY ENCLOSED AND EXPLOSION PROOF MOTORS  
 TYPES: EU, EV4, EVC4, JU, JUC, JUCE, JUCEI, JUCI, JUE, JUEI, JV, JV4, JVC, JVC4, JVC9, JVCE, JVCE4, JVCEI, JVC14, JVC1, JVE, JVEI, JVE4, JVE14, JVI, JVI4, NVC4, NVCE4, NVE4  
 HOLLOSHAFT & SOLIDSHAFT MOTORS (EXCEPT 3600 RPM)



### WARNING:

Any disassembly or repair work on explosionproof motors will void the Underwriters Laboratories, Inc. label unless done by the manufacturer, or a facility approved by the Underwriters Laboratories, Inc. Refer to your nearest sales office for assistance.

### 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, Pages 159 & 160

## RENEWAL PARTS

FRAMES 5008P THRU 5811PH - TOTALLY ENCLOSED AND EXPLOSION PROOF MOTORS  
 TYPES: EU, EV4, EVC4, JU, JUC, JUCE, JUCEI, JUCI, JUE, JUEI, JV, JV4, JVC, JVC4, JVC9, JVCE, JVCE4, JVCEI, JVCi4, JVCi, JVE, JVEI, JVE4, JVEI4, JVI, JVI4, NVC4, NVCE4, NVE4  
 HOLLOSHAFT & SOLIDSHAFT MOTORS (EXCEPT 3600 RPM)

ITEM NO.	QTY	NAME OF PART
1	1	Canopy Cap
2	2	Eyebolt
3	3	Hex Head Cap Screw / Split Lockwasher
4	1	Fan Cover
5	4	Hex Head Cap Screw / Split Lockwasher
6	1	Upper Bracket Assembly (Includes item 7)
7	1	Oil Retaining Tube
8	8	Hex Head Cap Screw / Split Lockwasher
9	1	Special Plug
10	1	Reflector Disc
11	2	Gasket
12	1	Sight Gauge Window
13	1	Special Housing
14	4	Oval Head Screw
15	1	Nipple Fitting
16	1	Gasket
17	1	Drain Cap
18	1	Pipe Plug
19	2	Caplug
20	1	Dust Ring
21-25	-	NOT USED IN THIS ASSEMBLY
26	1	Gasket
27	8	Hex Head Cap Screw / Split Lockwasher
28	1	Locking Arm
29	1	Hex Head Cap Screw
30	1	Coupling EU & JU Only
31	1	Gib Key
32	3	Headless Slot Screw or Hex Head Cap Screw / Split Lockwasher
33	1	Fan
34	6	Hex Head Cap Screw / Lockwasher
35	1	Bearing Mounting
36	1	Square Key
37	1	Ball Bearing (Refer to Section 775)
38	1	Bearing Spacer
39	1	Locknut and Lockwasher
40	1	Upper Air Deflector
41	8	Hex Head Cap Screw / Lockwasher
42	1	Rotor Assembly (Includes item 43-45)
43	1	Rotor Core
44	1	Square Key
45	1	Shaft
46-50	-	NOT USED IN THIS ASSEMBLY
51	1	Wound Stator Assembly
52	1	Shroud (Not Illustrated)

ITEM NO.	QTY	NAME OF PART
53	8	Hex Head Cap Screw (Shroud) (Not Illustrated) Plain Washer (Not Illustrated) Lockwasher (Not Illustrated)
54	1	Gasket (Outlet Box Assembly) (JU Only)
55	1	Outlet Box Base
56	4	Hex Head Cap Screw / Lockwasher
57	1	Hex Countersunk Pipe Plug (JU Only)
58	1	Gasket (Outlet Box Cover) (JU Only)
59	1	Outlet Box Cover
60	4	Hex Head Cap Screws (Outlet Box Cover)
61	1	Lower Bracket Assembly
62	1	Oil Retaining Tube
63	8	Hex Head Cap Screw / Lockwasher
64	1	Special Plug
65	1	Reflector Disc
66	2	Gasket
67	1	Sight Gauge Window
68	1	Special Housing
69	4	Oval Head Screw
70-75	-	NOT USED IN THIS ASSEMBLY
76	1	Nipple Fitting
77	1	Gasket
78	1	Drain Cap
79	1	Lower Air Deflector
80	8	Hex Head Cap Screw / Lockwasher
81	1	Bearing Cap
82	1	Gasket
83	3	Hex Head Cap Screw / Lockwasher
84	1	Ball Bearing (Refer to Section 775)
85	1	Snap Ring
86	1	Baffle Plate
FOR UNITS WITH NRR - OMIT ITEMS 20, 2829, 33, 34, & ADD:		
120	1	Ratchet Adaptor Assembly (Includes Items 121)
121	1	Dowel Pin
122	1	Expansion Spring
123	1	Stationary Ratchet Assembly (Includes items 124 & 125)
124	8	Friction Plate
125	1	Dowel Pin
126	1	Pressure Plate Assembly
127	4	Compression Spring
128	4	Hex Head Cap Screw & washer
129	1	Rotating Ratchet
130	3	Hex Head Cap Screw
131	12	Steel Ball
132	1	Ball Retaining Ring
133	1	Fan
134	6	Hex Head Cap Screw / Lockwasher

### WARNING:

Any disassembly or repair work on explosionproof motors will void the Underwriters Laboratories, Inc. label unless done by the manufacturer, or a facility approved by the Underwriters Laboratories, Inc. Refer to your nearest sales office for assistance.

### 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, Pages 159 & 160

## 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: NA  
CATALOG NO: NA

Frame: 5811VP Type: JV4

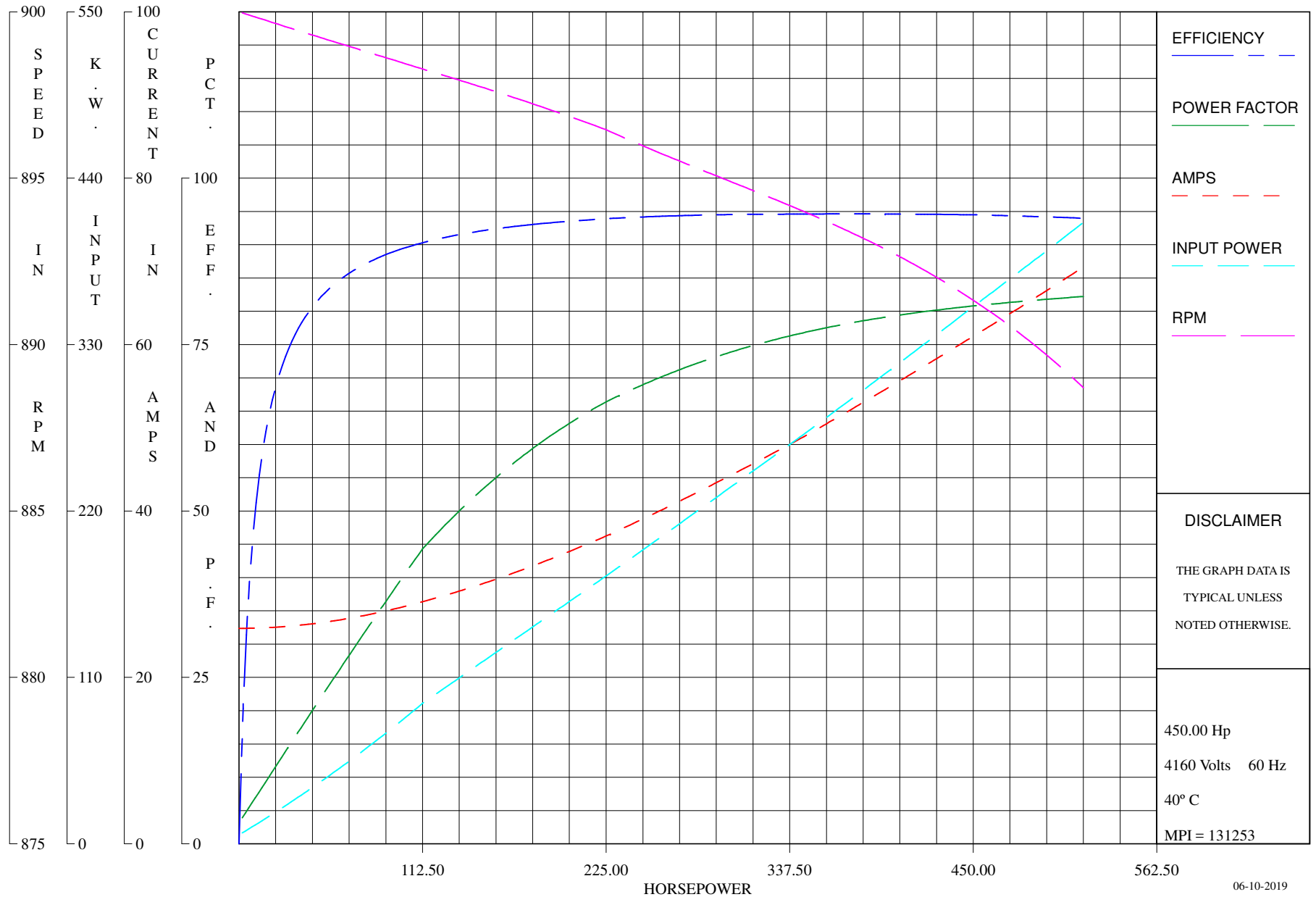
REED CRITICAL FREQUENCY:	27	HZ
CENTER OF GRAVITY:	37	IN
DEFLECTION @ CENTER OF GRAVITY:	0.0134	IN
UNIT WEIGHT:	7460	LBS
BASE DIAMETER:	30.5	IN
TOLERANCE ON RCF VALUE:	10%	
DATE:	6/10/2019	



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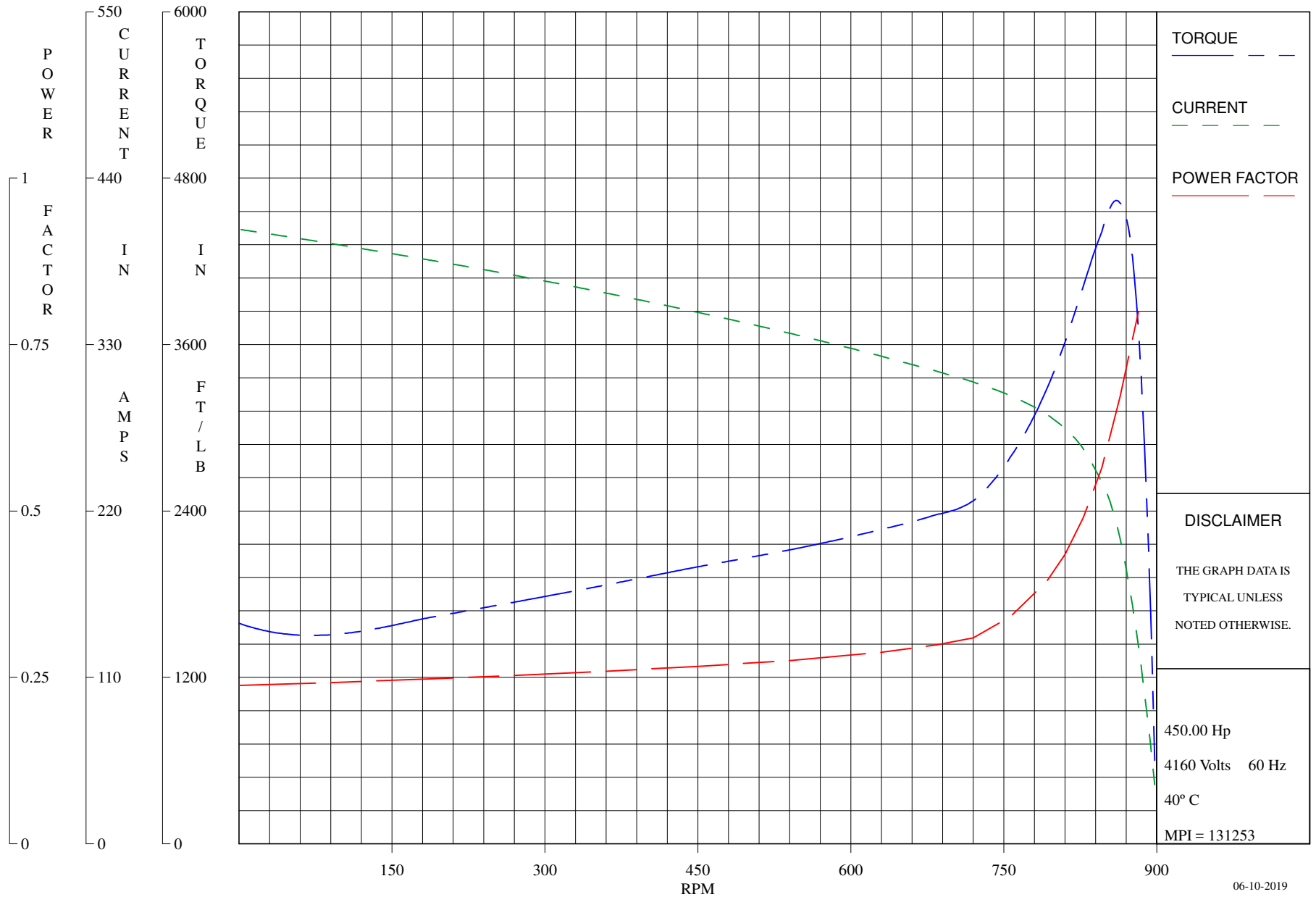


## Performance vs Horsepower





Torque, Current, PF vs RPM



# 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.

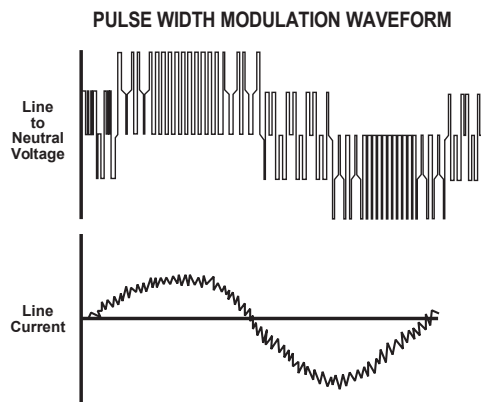


Figure 1 PWM Waveform

## 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 O<sub>3</sub>. 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 an 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 HOLLOSHAFT 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.

### 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.

### 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>

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\* 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.