

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136



DATE: 4/13/2012

P.O. NO.:

Order/Line NO.: 21040 MN

TO:

Model Number: DG74
Catalog Number: 8P5P1C
8P5P1C, TEFC, PRE, AC MTR
60HZ, 460V
CE 5HP, 2P, 184T, IEEEE841

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	5
Enclosure	TE
Poles	02
RPM (Full Load)	3520
Motor Frame Size	184T
Phase	3
Frequency	60
Voltage	460
Motor Type Code	CE
Rotor Inertia (LB-FT ²)174 LB-FT ²
Qty. of Bearings PE (Shaft)	1
Qty. of Bearings SE (OPP)	1
Bearing Number PE (Shaft)	30BC02J3
Bearing Number SE (OPP)	30BC02J3

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EFFECTIVE:
03-MAR-11

SUPERSEDES:
02-APR-09

HORIZONTAL MOTORS

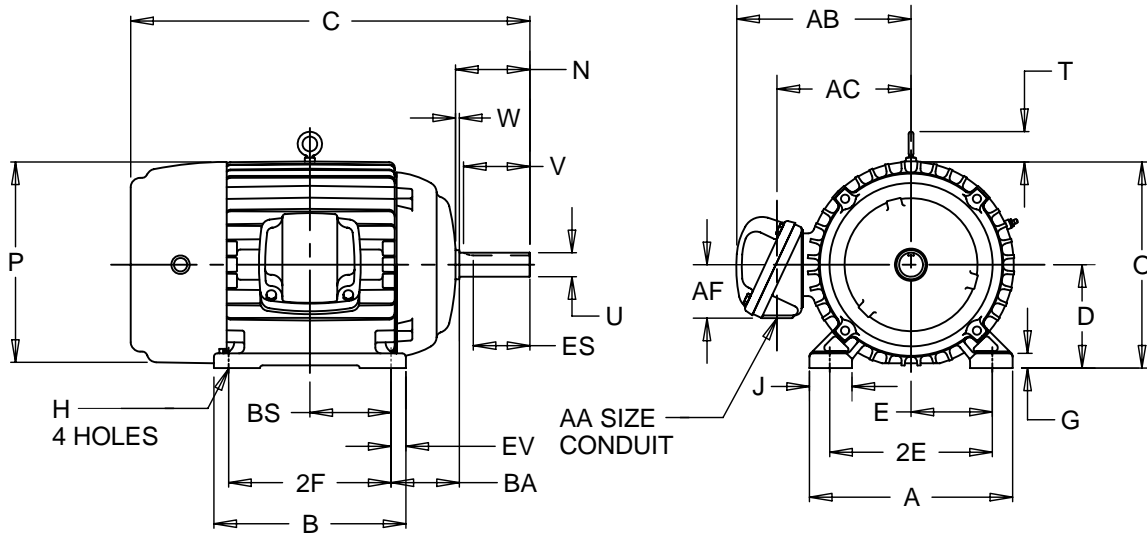
TEFC - CORRODUTY

FRAME: 182, 184T

BASIC TYPE: TC, CE

PRINT:
07-2807

SHEET:
1 OF 1



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	C	D -.06	E	2E ±.03	G	H +.05	J	N
IN	8.88	6.75	16.13	4.50	3.75	7.50	.50	.41	1.50	2.91
MM	226	171	410	114	95	191	13	10	38	74

UNITS	O	P ²	T	U -.0005	V MIN	W	AA	AB	AC	AF	BA
IN	9.22	9.13	1.75	1.1250	2.50	.16	.75 NPT	8.06	5.75	2.13	2.75
MM	234	232	44	28.575	64	4		205	146	54	70

UNITS	BS	ES MIN	EV	SQ KEY
IN	2.75	1.78	.63	.250
MM	70	45	16	6.35

FRAME	UNITS	2F ±.03
182T	IN	4.50
	MM	114
184T	IN	5.50
	MM	140

1: ALL ROUGH CASTING DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2: LARGEST MOTOR WIDTH.
3: TOLERANCES SHOWN ARE IN INCHES ONLY.

4: STANDARD ASSEMBLY POSITION F-1 IS SHOWN F-2 IS PROVIDED WHEN SPECIFIED. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

07-2807/A ECO 46385-00

Nidec Motor Corporation
St. Louis, Missouri

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ISSUED BY
R. KING
APPROVED BY
K. POTTER

IHP_DP_NMCA (MAR-2011) SOLIDEDGE

NAMEPLATE DATA

CATALOG NUMBER:	8P5P1C	NAMEPLATE PART #:	422696-002
MODEL:	DG74	FR:	184T
SHAFT END BRG:	30BC02J3 - QTY 1		
PH:	3	MAX AMB:	40 C
INSUL CLASS:	F	Asm. Pos:	F1
HP:	5	RPM:	3520
VOLTS:	460		
FL AMPS:	6.1		
SF AMPS:	7.0		
SF:	1.15	DESIGN:	B
NEMA NOM EFFICIENCY:	88.5	NOM PF:	87.0
GUARANTEED EFFICIENCY:	86.5	MAX KVAR:	1.4
		CODE:	J
		KiloWatt:	3.7
		HZ:	60

TYPE:	CE	ENCL:	TE
OPP END BRG:	30BC02J3 - QTY 1		
ID#:			
DUTY:	CONT		
HP:		RPM:	
VOLTS:			
FL AMPS:			
SF AMPS:			
SF:		DESIGN:	
NEMA NOM EFFICIENCY:		NOM PF:	
GUARANTEED EFFICIENCY:		MAX KVAR:	
		CODE:	
		HZ:	

UL DATA (IF APPLICABLE):

DIVISION:		CLASS I:		GROUP I:	
TEMP CODE:		CLASS II:		GROUP II:	

VFD DATA (IF APPLICABLE):

VOLTS:			
AMPS:			
TORQUE 1:		TORQUE 2:	
VFD LOAD TYPE 1:		VFD LOAD TYPE 2:	
VFD HERTZ RANGE 1:		VFD HERTZ RANGE 2:	
VFD SPEED RANGE 1:		VFD SPEED RANGE 2:	
SERVICE FACTOR:			
NO. POLES:	2		
VECTOR MAX RPM:			
Radians / Seconds:	1		
FL SLIP:			
MAGNETIZING AMPS:	2.1		
Encoder PPR:			
Encoder Volts:			

TEAO DATA (IF APPLICABLE):

HP (AIR OVER):		HP (AIR OVER M/S):		RPM (AIR OVER):		RPM (AIR OVER M/S):	
FPM AIR VELOCITY:		FPM AIR VELOCITY M/S:		FPM AIR VELOCITY SEC:			

ADDITIONAL NAMEPLATE DATA:

Decal / Plate	WD=499495	Customer PN	
Notes		Non Rev Ratchet	
Max Temp Rise	80C RISE/RES@1.00SF	OPP/Upper Oil Cap	GREASE
Thermal (WDG)		SHAFT/Lower Oil Cap	GREASE
Altitude			
Regulatory Notes		Regulatory Compliance	CC 030A
COS		Marine Duty	
Balance	0.05 IN/SEC	Arctic Duty	
3/4 Load Eff.	89.8	Inrush Limit	
Motor Weight (LBS)	110	Direction of Rotation	
Sound Level		Special Note 1	
Vertical Thrust (LBS)		Special Note 2	
Thrust Percentage		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	
380V 50 Hz Max Amps		SH Watts	
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	

**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
DG74	8P5P1C	3	CE	184T

ORDER NO.	21040	LINE NO.

MPI:		30638
HP:		5
POLES:		2
VOLTS:		460
HZ:		60
SERVICE FACTOR:		1.15
EFFICIENCY (%):		
	S.F.	88.1
	FULL	88.5
	3/4	89.8
	1/2	89
	1/4	83.8
POWER FACTOR (%):		
	S.F.	87.9
	FULL	87
	3/4	83.6
	1/2	75.7
	1/4	56.2
	NO LOAD	9.6
	LOCKED ROTOR	56.2
AMPS:		
	S.F.	7
	FULL	6.1
	3/4	4.7
	1/2	3.5
	1/4	2.5
	NO LOAD	2.1
	LOCKED ROTOR	46
NEMA CODE LETTER		J
NEMA DESIGN LETTER		B
FULL LOAD RPM		3520
NEMA NOMINAL EFFICIENCY (%)		88.5
GUARANTEED EFFICIENCY (%)		86.5
MAX KVAR		1.4
AMBIENT (°C)		40
ALTITUDE (FASL)		3300
SAFE STALL TIME-HOT (SEC)		10
SOUND PRESSURE (DBA @ 1M)		64
TORQUES:		
	BREAKDOWN{% F.L.}	300
	LOCKED ROTOR{% F.L.}	237
	FULL LOAD{LB-FT}	7.5

The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

NIDEC MOTOR CORPORATION
ST. LOUIS, MO

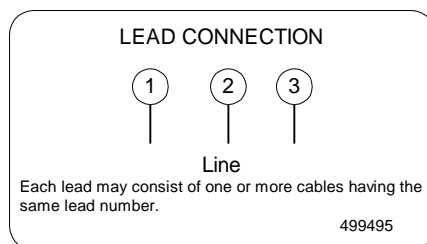
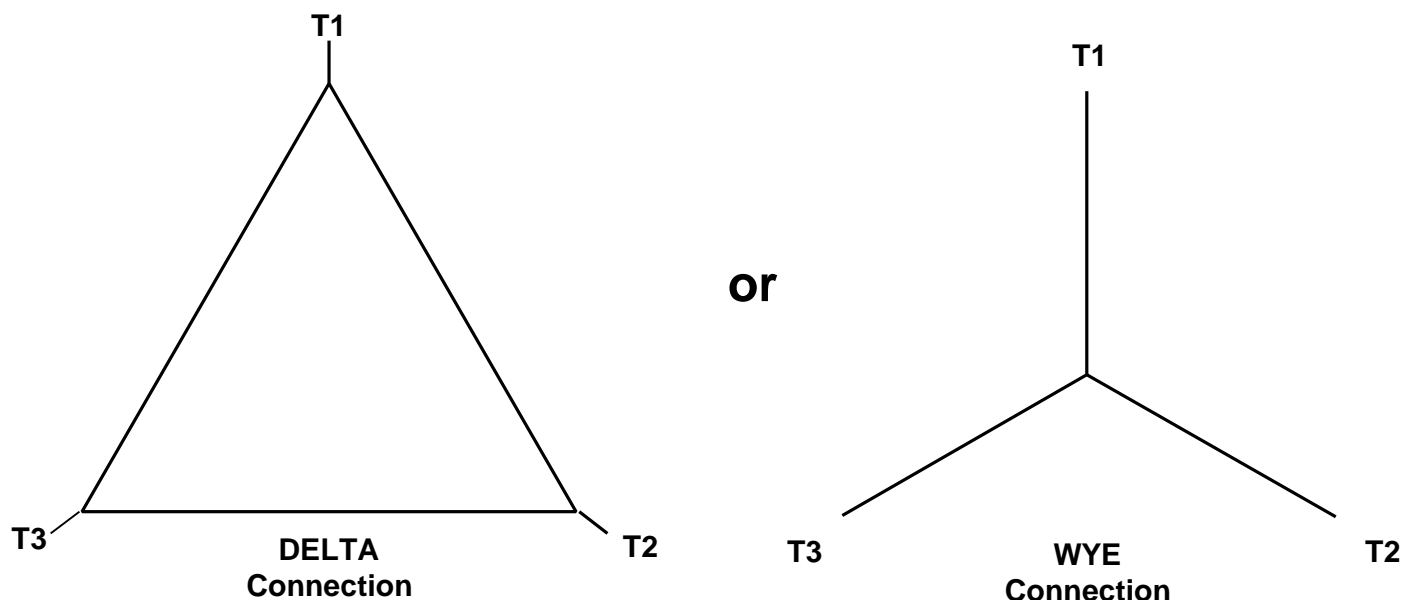


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499495

Motor Wiring Diagram



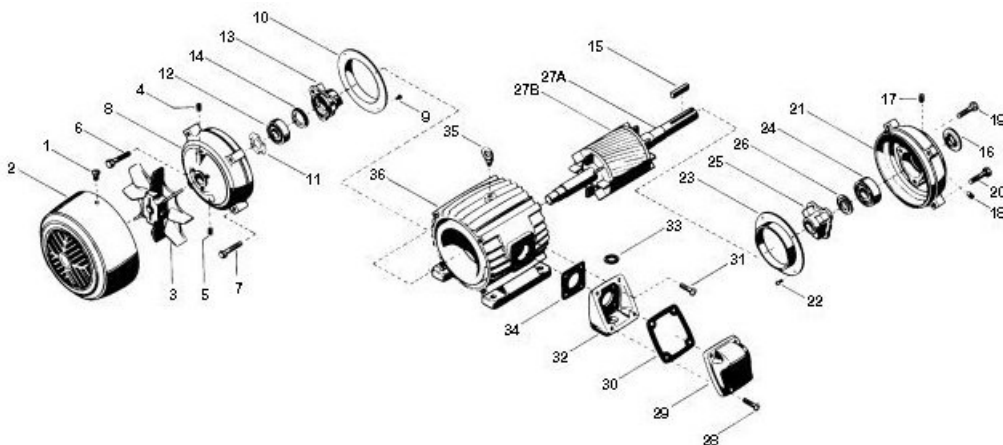
To reverse direction of rotation interchange connections L1 and L2.

Each lead may be comprised of one or more cables.
Each cable will be marked with the appropriate lead number.

RENEWAL PARTS

FRAMES 182 THRU 215 - TOTALLY ENCLOSED AND EXPLOSION PROOF MOTORS

TYPES: CE, CEF, CEF4, CT, CT2, CT4, CTC, CTE, CTE4, CTEF, CTF, CTF1, CTF4, CTFI, CTI, CTI4, CTN, CTNI, FCT, FCT4, FCTF, FCTN, FL, FLC, FLCA, FLCF, FLF, FN, FNC, FTC, FTCF, JAD, JDE, L, L1, L4, LC, LC4, LCA, LCAE, LCE, LCE4, LCEF, LCF, LCF1, LCFI, LCI, LE, LE1, LEF, LF, LF1, LF4, LFI, LFN, LI, LI4, LN, N, NC, NCE, NCEF, NCF, NI, T, TC, TC1, TC2, TC3, TC4, TCAE, TCE, TCE1, TCE2, TCE3, TCE4, TCEF, TCEFN, TCEN, TCEP, TCF, TCF1, TCF4, TCFI, TCFN, TCI, TCI3, TCN, TCNI, TF, TFN



ITEM NO.	QTY	NAME OF PART
1	4	Screw (Omit for Type TFN)
2	1	Fan Cover Guard (Omit for Type TFN)
3	1	Vent Fan (Omit for Type TFN)
4	1	Slotted Headless Pipe Plug
5	1	Slotted Headless Pipe Plug
6	3	Screw (Types L & LF only)
7	4	Screw
8	1	Bracket
9	4	Screw (Used only on Frame 184T)
10	1	Air Deflector (Used Only on Frame 184T)
11	1	Loading Spring (Types T, TF, TC, TCE & TFN only)
12	1	Ball Bearing (Short End) (Refer to section 775)
13	1	Bearing Cap (Types L & LF only)
14	1	Slinger (Frames 213T & 215T, Types T, TF, TC, TCE & TFN only)
15	1	Key
16	1	Water Deflector
17	1	Slotted Headless Pipe Plug
18	1	Slotted Headless Pipe Plug
19	3	Screw (Types L & LF only)
20	4	Screw
21	1	Bracket (Not used on Types TF, LF, & TFN)

ITEM NO.	QTY	NAME OF PART
22	4	Screw (Used only on frame 184T)
23	1	Air Deflector (Used only on frame 184T)
24	1	Ball Bearing (Refer to section 775)
25	1	Bearing Cap (Type L only)
26	1	Slinger
27	1	Rotor Assembly (Includes Items 27A & 27B)
27A	1	Motor Shaft
27B	1	Rotor Core
28	4	Screw
29	1	Outlet Box Cover
30	1	Gasket (Types T, TC, TCE, TF, & TFN only)
31	2	Screw
32	1	Outlet Box Base
33	1	Washer
34	1	Gasket (Types T, TC, TCE, TF, & TFN only)
35	1	Eyebolt
36	1	Wound Stator Assembly
37	1	Thermal Protectors (Used on Wheel Drive units only) (Not Illustrated)
38	2	Round Head Machine Screw (Thermal Protectors)
39	2	Hex Nut (Thermal Protectors)

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, Page 18

841 PLUS® Motors

Horizontal A.C. Motors, Totally Enclosed Fan Cooled



Horsepower: 1 – 400 HP

Frame Sizes: 143 – 449

Pole Designs: 2, 4, 6, 8

Design Voltages: 460 and 575 Volts at 60 Hz

Requirements: Meets or exceeds Energy Independence and Security Act of 2007 (EISA);
Meets or exceeds IEEE 841 Standard-2009;
Meets vibration requirements of GM7E-TA

Warranty: 5-year limited warranty



Product Overview and Options

Designed to exceed the industry's most stringent IEEE 841 standards, the U.S. MOTORS® brand 841 PLUS® motors are commonly used in severe duty environments for pumps, compressors, fans, blowers, and other material processing applications. These rugged motors are ideal for constant speed or inverter duty applications typically found in the petroleum, chemical, pulp and paper, wastewater, automotive and mining industries.

U.S. MOTORS brand 841 PLUS motors are rated NEMA Premium® efficient. Low-loss silicone steel construction and streamlined design enables the motor to operate at lower temperatures resulting in lower energy costs. This motor is designed to operate in ambient temperatures of -30°C to 40°C, in altitudes of up to 1,000 meters above sea level and with NEMA Design B torque-current characteristics. Inertia-load acceleration capabilities for the 841 Plus motor meet the stringent requirements of NEMA MG 1-2009, Section 12.54.

Product Features:

- NEMA Premium® efficient
- 1.15 Service Factor on sine wave power; 1.0 Service Factor on Inverter Duty
- Class B temperature rise at 1.0 Service Factor by resistance with sine wave power
- Class F insulation materials to increase motor life
- Exceeds NEMA MG1 Part 31 Inverter Duty
- Polyurea grease
- Stainless-steel nameplate
- Variable frequency drive or full voltage, across-the-line starting
- Ground on frame

- Division 2 suitable per NEC article 500 (NFPA 70)
- AFBMA bearing numbers on nameplate
- Protective coating on each rotor and shaft from bearing journal to bearing journal

Inverter Duty

Nidec Motor Corporation's patented inverter grade insulation system allows the U.S. MOTORS brand 841 PLUS motor to withstand spike and transient voltages induced by insulated bipolar gate transistor drives, making it fully compliant with NEMA MG-1, Part 31. This is made possible through:

- Pulse-resistant magnetic wire that provides protection against high-voltage spikes
- Additional lacing on the end turns improve coil rigidity
- Multiple bake cycles to help prevent coil-to-coil circuits
- Phase paper to help prevent phase-to-phase arcs
- Adjustable frequency of 5:1 constant torque or 10:1 variable torque for the full product line.



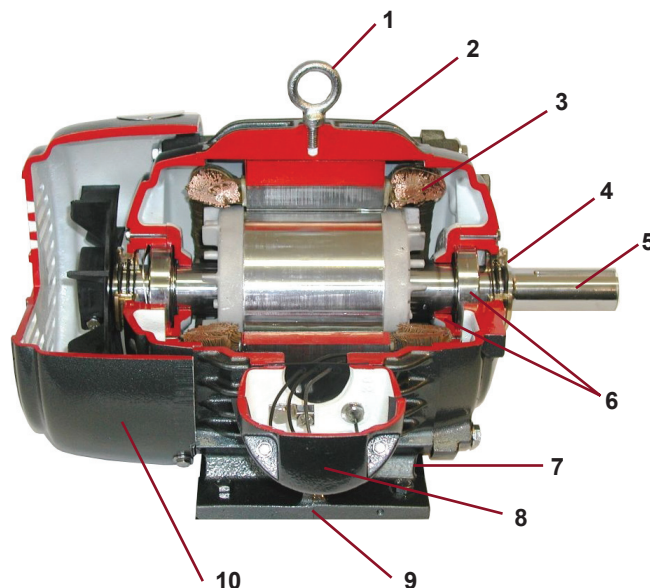
841 PLUS®



Product Overview and Options *continued*

Typical 841 PLUS® Motor Construction:

1. Corrosion resistant zinc dichromate-plated hardware
2. Heavy duty cast-iron enclosure for long life and reduced vibration
3. Inverter grade insulation
4. Inpro/Seal™ “VBXX” on both ends provides IP56 protection and prolongs motor life by shielding bearings from contaminants in even the harshest environments
5. Special shaft runout of 0.0010 inches for motors 200 HP and less; runout of 0.0015 inches for motors with 250 HP and up
6. Same size oversized bearings on each end. Cast iron inner bearing caps
7. Brass breather drains
8. Oversized, double-gasketed and rotatable conduit box to protect against contaminants and correctly position non-braided, non-wicking motor leads
9. Foot flatness machined to within 0.005 inch tolerance ensures easy installation and proper alignment
10. Corrosion-resistant mill and chemical duty paint capable of withstanding a 250-hour salt spray test



Options and Accessories

Nidec Motor Corporation offers the following custom-design options on the U.S. MOTORS brand 841 PLUS motor:

- SKF CARB™ roller bearings where applicable
- Horizontal or vertical mounting
- Vibration detectors
- Sealed insulation treatments, available on form wound, medium voltage motors above 200 HP, to help shield motor windings
- Winding and bearing thermal protection for motors 250 HP and up
- Inpro/Seal™ MGS grounding shaft rings
- API 661 Duty

Stock Motors

- 1–400 HP
- 2, 4, 6 pole designs
- 460 and 575 Volts
- Constant or variable torque
- 1–10 HP C-Face Footless

Custom and Conversion Motors

- 1–500 HP
- 2, 4, 6, 8 pole designs
- 200, 230, 460, 575, 2300, 4000 Volts
- Constant or variable torque
- C & D flange kits available 140 – 440 frame

Testing and Inspection

Nidec Motor Corporation conducts extensive testing and inspections on each of its U.S. MOTORS brand 841 PLUS motors.

- No load current, power and speed
- High-potential test on stator windings

- Insulation resistance test by megohmmeter and polarization index
- Precision balanced to typical vibration levels of less than 0.05 inches per second
- Optional complete test, including full load test

For additional information, please refer to our Full Line Standard Motor Catalog (FL600) or contact your Nidec Motor Corporation representative.

† All marks shown within this document are properties of their respective owners.
For more information about the U.S. MOTORS brand, visit www.nidec-motor.com or www.usmotors.com.

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Nidec
NIDEC MOTOR CORPORATION

8050 W. Florissant Avenue | St. Louis, MO 63136
Phone: 888-637-7333 | Fax: 314-553-2087

Suitability of Integral Horsepower (IHP)* Motors on Variable Frequency Drives

Variable Frequency Drives (VFD)

Nidec Motor Corporation's Inverter Grade[®] insulated motors exceeded NEMA^{®†} MG-1 Part 30 & 31 before the standards were established.

We are a leader in the development of electric motors to withstand pulse width modulated (PWM) drives evolution from power transistors to higher switching frequency insulated gate bipolar transistors (IGBTs).

Today, as the need for light and medium duty motor inverter applications grows, Nidec Motor Corporation provides products to meet these demands.

Through continued research and development, Nidec Motor Corporation has included the insulation wire from its Inverter Grade[®] motors on all Premium, Energy and Standard Efficient motors, enhancing their potential inverter compatibility.

Inverter compatibility with motors is complex. As a result, many variables must be considered when determining the suitability of certain types of motors. These variables include:

- Torque requirements (Constant or Variable)
- Speed Range
- Line/System Voltage
- Cable Length between VFD & Motor
- Drive Switching (Carrier) Frequency
- Motor Construction

Wider speed ranges, higher voltages, higher switching frequencies and increased cable lengths all add to the severity of the application and therefore the potential for premature motor failure. Nidec Motor Corporation has differentiated its products into families for your ease of selection for various inverter applications.

Warranty Guidelines

The information within this 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.

Applying Inverter Grade[®] Insulated Motors on Variable Frequency Drives

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 (see page ix) on all Inverter Grade[®] insulated motors and allows long cable runs between the motor and the VFD (limited to 400 feet without output filters). These motors may be appropriate for certain severe inverter application 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 motors good for 10:1 Variable Torque & 5:1 Constant Torque, including Vertical Type RUSI
- Inverter Duty motors good for 10:1 Constant Torque
- ACCU-Torq[®] and Vector Duty Motors with full torque to 0 Speed & 1024 PPR, 5-28VDC Encoder
- 841 Plus[®] motors that meet IEEE^{®†} 841 Standards and are suitable for 5:1 Constant Torque

Applying Premium Efficient Motors on Variable Frequency Drives

Meet NEMA^{®†} MG-1, Section IV, Part 31.4.4.2. They can be used with adjustable frequency drives under the following parameters: Up to 4:1 speed range on constant torque loads, standard two-year limited warranty (see page ix).

Cable Distances for Applying Premium Motors			
Maximum Cable Distance VFD to Motor			
Switching Frequency	460 Volt	230 Volt	380 Volt
3 KHz	196 ft	481 ft	295 ft
6 KHz	168 ft	340 ft	209 ft
9 KHz	113 ft	278 ft	170 ft
12 KHz	98 ft	241 ft	148 ft
15 KHz	88 ft	215 ft	132 ft
20 KHz	76 ft	186 ft	114 ft

Applying Standard & Energy Efficient Motors on Variable Frequency Drives

Meet NEMA^{®†} MG-1, Section IV, Part 30.2.2.8. They can be used with adjustable frequency drives under the following parameters: Up to 2:1 speed range on constant torque loads, one year limited warranty (see page ix).

Cable Distances for Applying EPAct & Standard Motors			
Maximum Cable Distance VFD to Motor			
Switching Frequency	460 Volt	230 Volt	380 Volt
3 KHz	103 ft	435 ft	218 ft
6 KHz	73 ft	307 ft	154 ft
9 KHz	59 ft	251 ft	126 ft
12 KHz	51 ft	217 ft	109 ft
15 KHz	46 ft	194 ft	98 ft
20 KHz	40 ft	168 ft	85 ft

All Nidec Motor Corporation motors have 40°C ambient, 1.0 SF on Inverter Power, 3300 ft. max altitude, 460 voltage or less line power, up to 10:1 speed range on Variable Torque and Class F Insulation. 575-volt motors can be applied on inverters when output filters are used.

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

† All marks shown within this document are properties of their respective owners



Motor/ Inverter Compatibility

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)

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%).

690V Applications

Motors that will be applied to 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

The use of 449 frame and larger motors on PWM type VFDs should use the cable length limits of the second chart from the previous page as a guide for inverter application or 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 waveform

Due to the uniqueness of this condition occurring in the field, protection of the motor bearings from shaft currents caused by common mode voltages is not a standard feature on sinewave or Inverter Duty motor products, unless explicitly noted. Some installations may be prone to a voltage discharge condition through the motor bearings called fluting.

Fluting damage is related to characteristics of the PWM waveform, VFD programming and characteristics and installation.

Bearing fluting as a result of VFD sine wave characteristics may be prevented by the installation of a shaft grounding device such as a brush or ring and/or correction of the installation characteristics causing the shaft voltage condition.

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:

- Slowest rpm that can be utilized and not cause the non-reversing ratchet to operate properly (in the range of 200 –300 rpm)
- 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 Megohm resistance of the motor winding to ground and lower the Corona Inception Voltage 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 preferred methods for drying out a winding that has low megaohm readings. Damage caused by these factors are not covered by the limited warranty provided 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.

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