

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136



DATE: 2/24/2015

P.O. NO.: BH46
Order/Line NO.: 17327 MN 100

TO:

Model Number: BH46
Catalog Number: 8P32P1CCR
841 Plus Configuration
CONF,MOTOR,841 PLUS

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 00001.50 ~ KW: 1.119
Enclosure TEFC
Poles 02 ~ RPM: 3600
Frame Size 143~TC
Phase/Frequency/Voltage.. 3~060~460 ~ Random Wound
Service Factor 1.15
Insulation Class Class "F" ~ Insulife 2000
Altitude In Feet (Max) .. 3300 Ft.(1000 M)
Ambient In Degree C (Max) +40 C
Assembly Position F0, Ftls, Flng Mnt, Shaft Horz
Efficiency Class Premium Efficiency
Application Unknown
Customer Part Number
"AK" Dimension (Inches).. 4.500
Temperature Rise (Sine Wave): "B" Rise @ SF (Resist)
Starting Method Direct-On-Line Start
Duty Cycle Continuous Duty
Efficiency Value 82.5 % ~ NEMA Nominal
Load Inertia (lb-ft²): NEMA ~ NEMA Inertia: 1.80 ~ 1.00
Number Of Starts Per Hour: NEMA
Motor Type Code CEF
Rotor Inertia (LB-FT²)043 LB-FT²
Qty. of Bearings PE (Shaft) 1
Qty. of Bearings SE (OPP) 1
Bearing Number PE (Shaft) 35BC02JPP3
Bearing Number SE (OPP) 17BC02JPP3

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

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Accessories:

Inpro Seal - Pulley End
Corro-Duty
Footless (Round Frame)
Ground Lug In Conduit Box
Precision Balance

.
Standard Leadtime: REFER TO OFFICE
Est. Weight (lbs ea): 65 ~ F.O.B.: St. Louis, MO
Horsepower 00001.50 ~ KW: 1.119
Enclosure TEFC
Poles 02 ~ RPM: 3600
Frame Size 143~TC
Phase/Frequency/Voltage.. 3~060~460 ~ Random Wound
Service Factor 1.15
Insulation Class Class "F" ~ Insulife 2000
Altitude In Feet (Max) .. 3300 Ft.(1000 M)
Ambient In Degree C (Max) +40 C
Assembly Position F0, Ftls, Flng Mnt, Shaft Horz
Efficiency Class Premium Efficiency
Application Unknown
Customer Part Number
"AK" Dimension (Inches).. 4.500
Temperature Rise (Sine Wave): "B" Rise @ SF (Resist)
Starting Method Direct-On-Line Start
Duty Cycle Continuous Duty
Efficiency Value 82.5 % ~ NEMA Nominal
Load Inertia (lb-ft2): NEMA ~ NEMA Inertia: 1.80 ~ 1.00
Number Of Starts Per Hour: NEMA
Motor Type Code CEF
Inpro Seal - Pulley End
Corro-Duty
Footless (Round Frame)
Ground Lug In Conduit Box
Precision Balance

.
Standard Leadtime: REFER TO OFFICE
Est. Weight (lbs ea): 65 ~ F.O.B.: St. Louis, MO

USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT

Horsepower 1.5
Pole(s) 02
Voltage(s) 460
Frame Size 143TC
Shaft U Diameter 0.875
Outlet Box AF 2.13
Outlet Box AA 0.75

NAMEPLATE DATA

| | | | |
|--|--|--|--|
| CATALOG NUMBER: <input style="width: 150px;" type="text" value="8P32P1CCR"/> | | NAMEPLATE PART #: <input style="width: 150px;" type="text" value="422696-002"/> | |
| MODEL: <input style="width: 50px;" type="text" value="BH46"/> <input style="width: 50px;" type="text" value="FR"/> <input style="width: 50px;" type="text" value="143TC"/> | TYPE: <input style="width: 50px;" type="text" value="CEF"/> <input style="width: 50px;" type="text" value="ENCL"/> <input style="width: 50px;" type="text" value="TEFC"/> | | |
| SHAFT END BRG: <input style="width: 150px;" type="text" value="35BC02JPP3 - QTY 1"/> | | OPP END BRG: <input style="width: 150px;" type="text" value="17BC02JPP3 - QTY 1"/> | |
| PH: <input style="width: 30px;" type="text" value="3"/> MAX AMB: <input style="width: 50px;" type="text" value="40 C"/> | ID#: <input style="width: 150px;" type="text"/> | | |
| INSUL CLASS: <input style="width: 30px;" type="text" value="F"/> Asm. Pos: <input style="width: 150px;" type="text"/> | DUTY: <input style="width: 150px;" type="text" value="CONT"/> | | |
| HP: <input style="width: 30px;" type="text" value="1.5"/> <input style="width: 50px;" type="text"/> RPM: <input style="width: 30px;" type="text" value="3505"/> <input style="width: 50px;" type="text"/> | HP: <input style="width: 30px;" type="text"/> <input style="width: 50px;" type="text"/> RPM: <input style="width: 30px;" type="text"/> <input style="width: 50px;" type="text"/> | | |
| VOLTS: <input style="width: 30px;" type="text" value="460"/> <input style="width: 50px;" type="text"/> | VOLTS: <input style="width: 30px;" type="text"/> <input style="width: 50px;" type="text"/> | | |
| FL AMPS: <input style="width: 30px;" type="text" value="1.9"/> <input style="width: 50px;" type="text"/> | FL AMPS: <input style="width: 30px;" type="text"/> <input style="width: 50px;" type="text"/> | | |
| SF AMPS: <input style="width: 30px;" type="text" value="2.2"/> <input style="width: 50px;" type="text"/> | SF AMPS: <input style="width: 30px;" type="text"/> <input style="width: 50px;" type="text"/> | | |
| SF: <input style="width: 30px;" type="text" value="1.15"/> DESIGN: <input style="width: 30px;" type="text" value="B"/> CODE: <input style="width: 30px;" type="text" value="L"/> | SF: <input style="width: 30px;" type="text"/> DESIGN: <input style="width: 30px;" type="text"/> CODE: <input style="width: 30px;" type="text"/> | | |
| NEMA NOM EFFICIENCY: <input style="width: 30px;" type="text" value="84.0"/> NOM PF: <input style="width: 30px;" type="text" value="86.7"/> KiloWatt: <input style="width: 30px;" type="text" value="1.1"/> | NEMA NOM EFFICIENCY: <input style="width: 30px;" type="text"/> NOM PF: <input style="width: 30px;" type="text"/> | | |
| GUARANTEED EFFICIENCY: <input style="width: 30px;" type="text" value="81.5"/> MAX KVAR: <input style="width: 30px;" type="text" value=".6"/> HZ: <input style="width: 30px;" type="text" value="60"/> | GUARANTEED EFFICIENCY: <input style="width: 30px;" type="text"/> MAX KVAR: <input style="width: 30px;" type="text"/> HZ: <input style="width: 30px;" type="text"/> | | |

HAZARDOUS LOCATION DATA (IF APPLICABLE):

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

VFD DATA (IF APPLICABLE):

| | | |
|--|--|---|
| VOLTS: <input style="width: 150px;" type="text"/> | TORQUE 1: <input style="width: 150px;" type="text"/> | TORQUE 2: <input style="width: 150px;" type="text"/> |
| AMPS: <input style="width: 150px;" type="text"/> | VFD LOAD TYPE 1: <input style="width: 150px;" type="text"/> | VFD LOAD TYPE 2: <input style="width: 150px;" type="text"/> |
| | VFD HERTZ RANGE 1: <input style="width: 150px;" type="text"/> | VFD HERTZ RANGE 2: <input style="width: 150px;" type="text"/> |
| | VFD SPEED RANGE 1: <input style="width: 150px;" type="text"/> | VFD SPEED RANGE 2: <input style="width: 150px;" type="text"/> |
| SERVICE FACTOR: <input style="width: 150px;" type="text"/> | FL SLIP: <input style="width: 150px;" type="text"/> | |
| NO. POLES: <input style="width: 50px;" type="text" value="2"/> | MAGNETIZING AMPS: <input style="width: 50px;" type="text" value=".9"/> | |
| VECTOR MAX RPM: <input style="width: 150px;" type="text"/> | Encoder PPR: <input style="width: 150px;" type="text"/> | |
| Radians / Seconds: <input style="width: 50px;" type="text" value="1"/> | Encoder Volts: <input style="width: 150px;" type="text"/> | |

TEAO DATA (IF APPLICABLE):

| | | | |
|---|---|---|---|
| HP (AIR OVER): <input style="width: 50px;" type="text"/> | HP (AIR OVER M/S): <input style="width: 50px;" type="text"/> | RPM (AIR OVER): <input style="width: 50px;" type="text"/> | RPM (AIR OVER M/S): <input style="width: 50px;" type="text"/> |
| FPM AIR VELOCITY: <input style="width: 50px;" type="text"/> | FPM AIR VELOCITY M/S: <input style="width: 50px;" type="text"/> | FPM AIR VELOCITY SEC: <input style="width: 50px;" type="text"/> | |

ADDITIONAL NAMEPLATE DATA:

| | | | |
|---------------------------|---------------------|---------------------------|---------|
| Decal / Plate | WD=499495 | Customer PN | |
| Notes | | Non Rev Ratchet | |
| Max Temp Rise | 90C RISE/RES@1.15SF | 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. | 83.5 | Inrush Limit | |
| Motor Weight (LBS) | 65 | 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 |
|-----------|-------------|-------|------|-------|
| BH46 | 8P32P1CCR | 3 | CEF | 143TC |

| ORDER NO. | 17327 | LINE NO. |
|-----------|-------|----------|
| | | |

| | |
|-----------------------------|-------|
| MPI: | 28605 |
| HP: | 1.5 |
| POLES: | 2 |
| VOLTS: | 460 |
| HZ: | 60 |
| SERVICE FACTOR: | 1.15 |
| EFFICIENCY (%): | |
| S.F. | 83.8 |
| FULL | 84 |
| 3/4 | 83.5 |
| 1/2 | 80.5 |
| 1/4 | 70.4 |
| POWER FACTOR (%): | |
| S.F. | 88.4 |
| FULL | 86.7 |
| 3/4 | 81.7 |
| 1/2 | 71.8 |
| 1/4 | 52 |
| NO LOAD | 15.6 |
| LOCKED ROTOR | 68.2 |
| AMPS: | |
| S.F. | 2.2 |
| FULL | 1.9 |
| 3/4 | 1.5 |
| 1/2 | 1.2 |
| 1/4 | 1 |
| NO LOAD | 0.9 |
| LOCKED ROTOR | 18.6 |
| NEMA CODE LETTER | L |
| NEMA DESIGN LETTER | B |
| FULL LOAD RPM | 3505 |
| NEMA NOMINAL EFFICIENCY (%) | 84 |
| GUARANTEED EFFICIENCY (%) | 81.5 |
| MAX KVAR | 0.6 |
| AMBIENT (°C) | 40 |
| ALTITUDE (FASL) | 3300 |
| SAFE STALL TIME-HOT (SEC) | 11 |
| SOUND PRESSURE (DBA @ 1M) | 67 |
| TORQUES: | |
| BREAKDOWN{% F.L.} | 429 |
| LOCKED ROTOR{% F.L.} | 324 |
| FULL LOAD{LB-FT} | 2.2 |

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

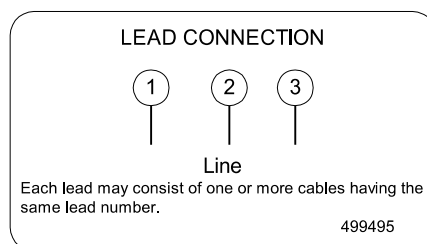
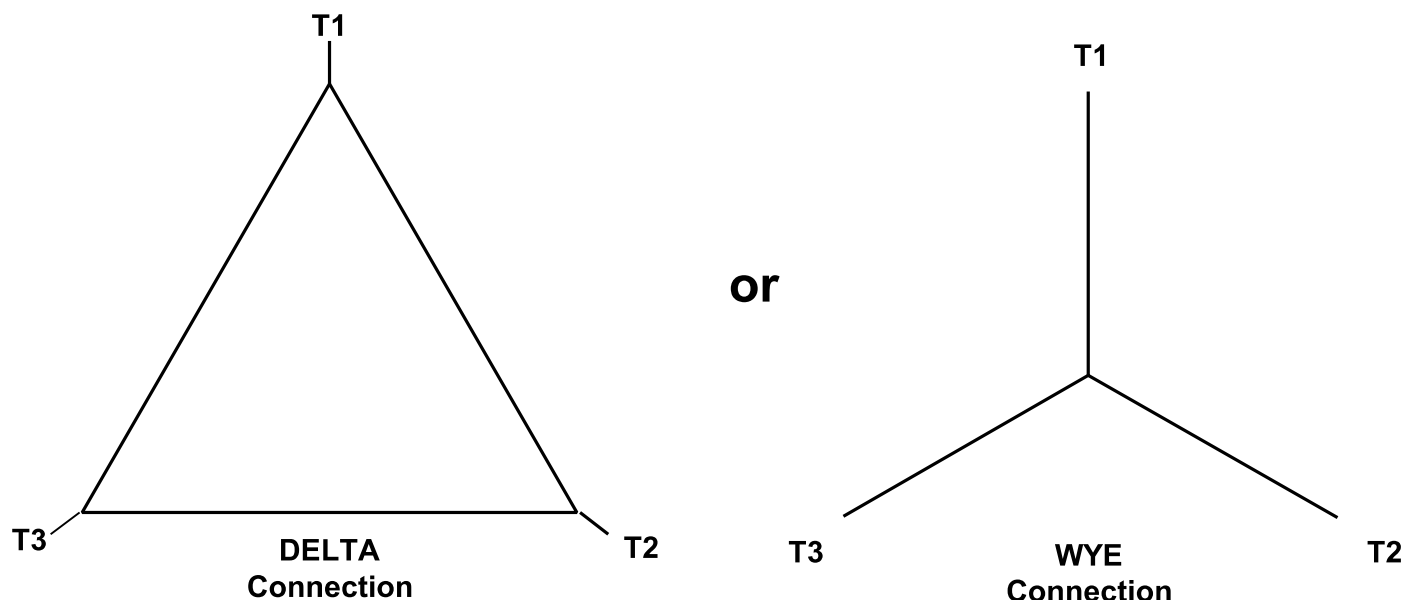


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499495

Motor Wiring Diagram



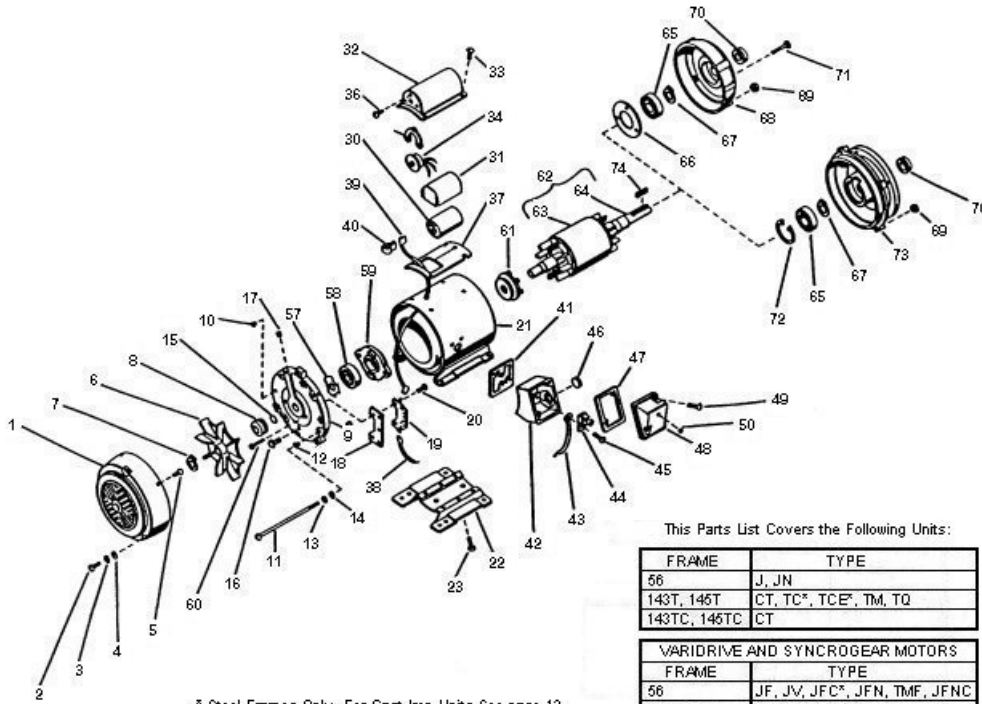
To reverse direction of rotation interchange connections L1 and L2.

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

RENEWAL PARTS

56 thru 145 - TOTALLY ENCLOSED MOTORS

Types: CE, CEF, CEF4, CT, CT4, CTC, CTE, CTE4, CTEF, CTF, CTFI, CTFNI, CTI, CTN, FCT, FCTF, FTC, FTFC, J, JCE, JF, JFC, JFN, JFNC, JFNI, JN, JV, TC, TC1, TC4, TCE, TCEF, TCEN, TCE1, TCF, TCF1, TCF4, TCFI, TCI, TCN, TF, TFN, TFNI, TM, TMF, TMQ



This Parts List Covers the Following Units:

| FRAME | TYPE |
|--------------|-----------------------|
| 56 | J, JN |
| 143T, 146T | CT, TC*, TCE*, TM, TQ |
| 143TC, 146TC | CT |

| VARIDRIVE AND SYNCROGEAR MOTORS | |
|---------------------------------|------------------------------|
| FRAME | TYPE |
| 56 | JF, JV, JFC*, JFN, TMF, JFNC |
| 143T, 146T | TF, TFC, TMF |

| ITEM NO. | QTY | NAME OF PART |
|----------|-----|---|
| 1 | 1 | Fan Cover Guard (Not used on types JN, JFN & JFNC) |
| 2 | 3 | Self Tapping Screw (Used on frame 56 types J, JF, JFC, TMF & frames 143 & 145T, type TF, TM, TFC, TMF, TMQ) Round Head Machine Screw (Qty 2 frame 56 type J) |
| 3 | 3 | Lockwasher (Used on frame 56 types J, JF, JFC, TMF, and frames 143T & 145T, types TF, TM, TFC, TMF, TMQ) (Qty 2 frame 56 type J) |
| 4 | 3 | Plain Washer (Used on frame 56 types J, JF, JFC and frames 143T & 145T type TFC) |
| 5 | 4 | Hex Head Cap Screw (Types CT, TC, & TCE) |
| 6 | 1 | Fan (Not used on types JN, JFN & JFNC) |

| ITEM NO. | QTY | NAME OF PART |
|----------|-----|---|
| 7 | 1 | Retaining Snap Ring (Not used on types J, JN, JV, JFN & JFNC) |
| 8 | 1 | Water Deflector (Types JFC & TFC only) |
| 9 | 1 | Bracket |
| 10 | 4 | Plastic Plug (Not used on types CT, JN, TC, JFN, TCE) |
| 11 | 4 | Screw |
| 12 | 4 | Bushing (Not used on types J, JV, CT, JN, TC, JFN, TCE) |
| 13 | 4 | Lockwasher (Used on types J, JN, JV, TMF) |
| 14 | 4 | Plain Washer (Used on type TMF) |
| 15 | 1 | Bracket Plug (Types JN & JFNC) |
| 16 | 2 | Vent Plug (Types TC & TCE) |
| 17 | 4 | Hex Countersunk Pipe Plug (Types TC & TCE) |
| 18 | 1 | Switch Insulator (Types TM, TMF, TMQ) |

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.

RENEWAL PARTS

56 thru 145 - TOTALLY ENCLOSED MOTORS

Types: CE, CEF, CEF4, CT, CT4, CTC, CTE, CTE4, CTEF, CTF, CTFI, CTFNI, CTI, CTN, FCT, FCTF, FTC, FTFC, J, JCE, JF, JFC, JFN, JFNC, JFNI, JN, JV, TC, TC1, TC4, TCE, TCEF, TCEN, TCE1, TCF, TCF1, TCF4, TCFI, TCI, TCN, TF, TFN, TFNI, TM, TMF, TMQ

| ITEM NO. | QTY | NAME OF PART |
|----------|-----|--|
| 19 | 1 | Starting Switch Assembly (Types TM, TMF, TMQ) |
| 20 | 3 | Self Tapping Screw (Types TM, TMF, TMQ) |
| 21 | 1 | Wound Stator Assembly (Mounting Base Included on types CT, TC, TCE, TM, TMQ) |
| 22 | 1 | Mounting Bases (Types J & JN) |
| 23 | 2 | Screws (Types J & JN) |
| 24-29 | - | Not Used |
| 30 | 1 | Starting Capacitor (Types TM, TMF, TMQ) |
| 31 | 1 | Capacitor Insulator (Types TM, TMF, TMQ) |
| 32 | 1 | Capacitor Box (Types TM, TMF, TMQ) |
| 33 | 4 | Self Tapping Screws (Types TM, TMF, TMQ) |
| 34 | 1 | Thermal Protector (Type TMQ) |
| 35 | 1 | Clamping Plate (Type TMQ) |
| 36 | 3 | Self Tapping Screw (Type TMQ) |
| 37 | 1 | Gasket (Type TMQ) |
| 38 | 1 | Connection Lead Assembly No. 5 (Included with Wound Stator Assembly item 20) (Types TM & TMQ) |
| 39 | 1 | Connection Lead Assembly No. 10 (Included with Wound Stator Assembly item 20) (Types TM & TMQ) |
| 40 | 4 | Sleeving Insulation (Included with Items No. 38 & 39) |
| 41 | 1 | Gasket (Not used on J, JN, JV) |
| 42 | 1 | Outlet Box Base |
| 43 | 1 | Connection Lead Assembly Ground (Type TMQ) |
| 44 | 1 | Grounding Lug (Types TC, TCE) |
| 45 | 2 | Self Tapping Screw (Qty. 4 Round Head Screw on types J, JN, JV) |
| 46 | 1 | Plastic Plug (Types CT, TC, TCE) |
| 47 | 1 | Gasket (Types CT, TC, TCE) |

| ITEM NO. | QTY | NAME OF PART |
|--|-----|---|
| 48 | 1 | Outlet Box Cover |
| 49 | 2 | Screw (Qty. 4 Round Head Screws on types J, JN, JV) |
| 50 | 3 | Plastic Plug (Types JFC, JFNC, TFC) |
| 51-56 | - | Not Used |
| 57 | 1 | Wave Spring Washer (Type CT without "C" Bracket, TC, TCE, TM, TMQ, TMF) |
| 58 | 1 | Ball Bearing |
| 59 | 1 | Bearing Cap (Type JV only) |
| 60 | 2 | Round Head Screw (Type JV only) |
| 61 | 1 | Rotary Actuator (Types TM, TMQ, TMF) |
| 62 | 1 | Rotor Assembly (Includes items 63 & 64) |
| 63 | 1 | Rotor Core |
| 64 | 1 | Rotor Shaft |
| ITEMS 65 THRU 74 ARE FOR TYPES J, CT, JN, TC, TCE, TM, TMQ | | |
| 65 | 1 | Ball Bearing (Refer to section 775) |
| 66 | 1 | Retaining Cap (Type TMQ) |
| 67 | 1 | Retaining Snap Ring (Types CT with "C" Bracket, & TMQ) |
| 68 | 1 | Bracket (Not used with "C" Bracket) |
| 69 | 4 | Hex Nut |
| 70 | 1 | Water Deflector (Types CT with "C" Bracket, TC, TCE) |
| 71 | 3 | Round Head Machine Screw (Type TMQ) |
| 72 | 1 | Retaining Snap Ring (Type CT with "C" Bracket) |
| 73 | 1 | "C" Bracket |
| 74 | 1 | Square Key |

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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 10 & 11

841 PLUS[®] Motors

Horizontal A.C. Motors, Totally Enclosed Fan Cooled



Horsepower: 1 – 200 HP

Frame Sizes: 143 – 447

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. Inertiaload 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.



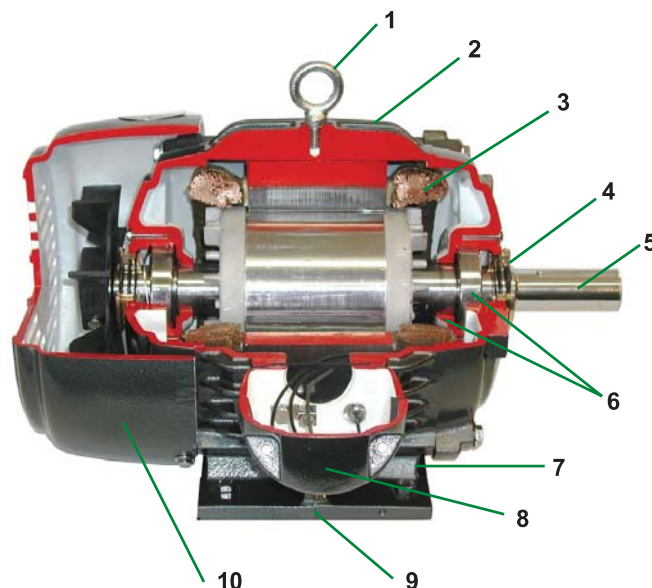
841 PLUS[®]



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 runouts for ball bearing motors of 0.0010 inches for shafts up to 1.625 inches and 0.0015 inches for larger shafts.
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 500-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

841 Plus Stock Motors

- 1 – 200 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.

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

Variable Frequency Drives (VFD)

All Nidec Motor Corporation inverter duty 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.

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 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 in all Premium 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
- VFD dv/dt
- High Temperatures High Humidity

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.

575 Volt Motors

575 volt motors can be applied on inverters when output filters are used.

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 typical 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 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 NEMA^{®†} frame motors good for 10:1 Variable Torque & 5:1 Constant Torque, including Vertical Type RUSI
- Inverter Duty motors rated for 10:1 Constant Torque
- ACCU-Torq[®] and Vector Duty Motors with full torque to 0 Speed
- 841 Plus[®] NEMA^{®†} Frame Motors

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

Meet NEMA^{®†} MG-1, Section IV, Part 31.4.4.2. They can be used with adjustable frequency drives under the following parameters: On NEMA^{®†} frame motors, 10:1 speed rating on variable torque loads & 4:1 speed range on constant torque loads. On TITAN[®] 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 specific VFD manufacturers cable limits.

| 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 |

Applying Standard & Energy Efficient Motors on Variable Frequency Drives is not recommended. VFD related failures on standard and energy efficient motors 444 frame and above will not be covered under warranty.

*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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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. Thermo-stats 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 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%).

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

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 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 sine wave 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 waveform 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. Insulated bearing(s) may be required. VFD filters may be needed if bearing fluting is to be avoided.

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:

- Non-reversing-ratchet operation can interfere at low speeds (up to 300 RPM) causing locked rotor and drive tripping.
- 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>

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