

# Three Phase Modifiable NEMA®† Horizontal Motors Accessories and Modifications

## 38. Paint (continued)

The motor will be painted with Nidec Motor Corporation's standard paint used for CORRO-DUTY® motors (unless Special Paint is specified), including:

- On Open Motors: exterior of motor, interior unmachined surfaces of brackets, bracket grills (if any), exterior unmachined surfaces of bearing caps (if any) and air deflectors (if any)
  - On Enclosed Motors: exterior of motor, exterior unmachined surfaces of Short End bracket, interior unmachined surfaces of fan cover, metal fans (if used) and sheet metal parts exposed to exterior atmosphere (if any)
- Only applicable to Non-CORRO-DUTY® motors.

### B. Special Paint

<b>Frame:</b>	56	140	180	210	250	280	320	360	400	444-445	447	449
<b>Adder:</b>	150	150	225	300	375	450	525	600	675	750	750	750

Special paint must be approved by the plant prior to quoting. A Material Safety Data Sheet (MSDS) must be sent to the plant for their review. Special paint can be furnished (once approved) if compatible with our standard primer, is commercially available, and suitable for air drying (paints containing lead or zinc cannot be used, and sand blasting is not available). Motors can be supplied with just the standard primer at no charge, if requested at time of order.

## 39. Prints & Data (Submittals) (Net Adders)

<b>Frame:</b>	56	140	180	210	250	280	320	360	400	444-445	447	449
<b>Adder:</b>	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)

Refer to Quick Pick List for pricing. Submittals adders are NET ADDERS. The following submittals are considered Standard Submittals, and are available at no charge if requested at the time of motor order:

- Certified Dimension Print
- Bearing Life Calculation
- Instruction Manual
- Wiring Diagram
- Rotor Inertia
- Performance Data
- Conduit Box Details
- Parts List
- Recommended Spare Parts
- Cut Sheets for Accessories
- Nameplate Data
- Major Component Weights
- Paint Specification
- Rotor Air Gap (Calculated)

## 40. Purge Ports

<b>Frame:</b>	56	140	180	210	250	280	320	360	400	444-445	447	449
<b>Adder:</b>	375	375	375	375	375	570	570	975	1650	1650	2025	2025

Arrange motor to accommodate Air Purging Systems. Drilled and tapped holes in each end of the motor. Used in applications where the air must be purged out of the motor prior to startup.

## 41. Screens

### A. Standard Material

<b>Frame:</b>	56	140	180	210	250	280	320	360	400	444-445	447	449
<b>Adder:</b>	N/A	N/A	N/A	N/A	N/A	255	308	375	555	578	578	578

Corrosion-Resistant rodent screens provided over the air inlet and air outlet openings. Available on Open Drip Proof (ODP) motors. Available on 280 frame and above.

### B. Stainless Steel

<b>Frame:</b>	56	140	180	210	250	280	320	360	400	444-445	447	449
<b>Adder:</b>	N/A	N/A	N/A	N/A	N/A	275	378	549	828	864	864	864

Stainless Steel rodent screens provided over the air inlet and air outlet openings. Available on Open Drip Proof (ODP) motors. Available on 280 frame and above.

## 42. Sealant

### A. Rotor Assembly Treatment Used On CORRO-DUTY® Motors

<b>Frame:</b>	56	140	180	210	250	280	320	360	400	444-445	447	449
<b>Adder:</b>	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%

Coating of rotor assembly, standard on CORRO-DUTY® motors.

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## 42. Sealant (continued)

### B. Internal Sealer for Washdown

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	50	50	65	102	131	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Internal components treated with a red-colored moistureproof sealer, including inside of frame, stator core endcoils, stator bore and rotor core. Available on 56-250 Frames. Standard (no charge) on Washdown Duty motors and motors with Washdown Features (56-250 Frame).

### C. RTV<sup>†</sup> Sealant or Loctite<sup>®†</sup>

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	90	90	90	128	173	173	218	218	240	300	375	450

Silicon sealant applied to registers between the end brackets and frame and/or under bolt heads to prevent contaminants from entering the motor. Not available on Hazardous Location motors. The following sealant options are available:

- "RTV<sup>†</sup>" sealant on registers between brackets and frame
- Loctite<sup>®†</sup> on bolts

## 43. Seals (Price Each)

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)

Refer to Quick Pick Chart for pricing.

Shaft Slinger: Installed on the shaft at the bracket face to prevent the ingress of dirt and liquid. Usually made of rubber. Standard (no charge) on Cast Iron Frame motors and all C-Face and D-Flange motors.

Inpro/Seal<sup>®†</sup> Bearing Isolators: This is a permanent, metallic, non-contact, non-wearing, radial-axial labyrinth pattern isolator. This design permanently retains the lubricant in the bearing housing and prevents entry of foreign material in the bearing environment.

- Inpro/Seal<sup>®†</sup> Bearing Isolators on both ends are standard (no charge) on 841 PLUS<sup>®</sup> motors
- Only available on CORRO-DUTY<sup>®</sup> and Hostile Duty motors.
- Not available on 140 Frame Hazardous Location motors or Class II Hazardous Location motors.

Protec<sup>®†</sup> Seal: Graphite reinforced Teflon seal. Same restrictions as for Bearing Isolators by Inpro/Seal<sup>®†</sup>.

- Not available on 140 Frame Hazardous Location motors or Class II Hazardous Location motors.

Taconite Service: Motor for dust atmospheres of taconite cement in mild concentrations. For higher concentrations of dust, refer to office.

- Not available on UNIMOUNT<sup>®</sup> motors, Open Drip Proof (ODP) motors, or Washdown Duty motors.
- Not available on 140 Frame Hazardous Location motors or Class II Hazardous Location motors.

Lip Seals: These seals provide a rubber shaft seal to exclude contaminants such as oil, water and dust from entering the bearing cavity.

- Not available on 440 Frame motors, 140 Frame Hazardous Location motors or Class II Hazardous Location motors.

## 44. Service Factor

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	57	57	80	96	126	210	276	354	512	726	1574	1574

Service Factor adder is only used where motor does not have service factor as standard. Make the Service Factor adder for the following:

- 50 Hertz with Service Factor
- Dual Label Hazardous Location with Service Factor
- Multi-Speed with Service Factor
- Service Factor greater than 1.15 (except for UNIMOUNT<sup>®</sup>)

This option may influence frame size and performance characteristics. Published or guaranteed data will change when product is operated over nameplate HP. Motors will be Class B temperature rise at nameplate HP, Class F temperature rise at 1.15 S.F. For temperature rise options, refer to item 49 on page 94 of this section. Frame and performance characteristics may change.

Contact your Nidec Motor Corporation Technical Representative for 1.15 S.F. on motors installed in a Division 1 and Division 2 locations.

Contact your Nidec Motor Corporation Technical Representative for service factor requirements greater than 1.15 S.F.

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# Three Phase Modifiable NEMA®† Horizontal Motors Accessories and Modifications

## 45. Shaft Extensions

### A. Close Coupled Pump (If No Base List Price for Close Coupled Pump)

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	128	128	180	188	245	381	536	758	1104	1127	N/A	N/A

This Adder is only used when there is no Close Coupled Pump (CCP) Base List Price. Refer to Base List Price section. These motors are designed for the specific application of Close Coupled Centrifugal Pumps. Available with "JM," "JP," "JPZ" and "JPY" Shaft Extensions. NEMA®† defines "JM" Shafts through 320 Frame and "JP" Shafts through 360 Frame. Larger frame sizes are labeled "TCZ," and the customer must supply the shaft dimension details.

### B. Base Adder (Q-1 Motor)

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	438	438	438	525	567	638	690	813	953	1127	1197	1197

This is the Base Adder to cover engineering and manufacturing costs of a special shaft. The quantity breaks are quantity per order. The adders for Locknut, Tapered Shaft, Tapped Hole and/or Threaded Shaft must also be made, where applicable. This adder is not required for Standard Double Shaft Extension, Special Shaft Material and/or Rust Preventative, if those are the only things special about the shaft. Customer should supply a shaft drawing whenever possible.

### C. Base Adder (Q-2 to Q-4 Motors)

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	200	200	206	210	219	254	288	327	384	464	498	498

### D. Base Adder (Q-5 or More Q-4 Motors)

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	53	53	62	75	87	123	153	188	227	279	279	279

### E. Special Material, 303 Stainless Steel

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	110	110	110	245	345	516	939	1202	1748	1887	1983	1983

This adder covers 303 Stainless Steel Shaft material. 303 Stainless Steel Shaft is standard (no charge) on Washdown Duty motors. For 50 HP and smaller, 2 Pole, refer to office for frame size.

### G. Special Material, 416 Stainless Steel Or Special Material, Other

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	219	219	219	489	690	1032	1878	2403	3495	3774	3966	3966

This adder covers other Stainless Steel or High Tensile Steel Shaft material. For 50 HP and smaller, 2 Pole, refer to office for frame size.

### H. Special Shaft Runout

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	438	438	438	525	567	638	690	813	953	1127	1197	1197

### I. Standard Double End Extension

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	54	54	54	87	105	156	246	333	393	480	507	507

### J. Tapped Hole

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	45	45	45	68	68	83	105	113	128	150	158	158

Customer must specify thread size and depth.

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# Three Phase Modifiable NEMA®† Horizontal Motors Accessories and Modifications

## 45. Shaft Extensions *(continued)*

### K. Threaded Shaft (External Thread)

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	45	45	45	68	68	83	105	113	128	150	158	158

Customer must specify thread size and length.

### L. Locknut On End

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	38	38	38	38	38	38	38	38	38	38	38	38

A locknut can be supplied by Nidec Motor Corporation when an external thread on the shaft extension is requested. Also requires the adder for Threaded Shaft.

### M. Rust Preventative (Non-Standard)

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	38	38	38	38	38	38	38	38	38	38	38	38

A solvent soluble coating applied to the shaft extension to prevent rust from forming on the metal. Use this adder for Rust Preventatives other than the Nidec Motor Corporation standard. Non-Standard Rust Preventative requires approval prior to quoting.

### N. Tapered Shaft

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	60	60	75	90	105	135	1580	165	195	210	210	210

Customer must supply the length and pitch of the taper at order entry. The pitch can be defined in multiple ways:

- Degrees
- Rise over run
- Length, with the starting and ending diameter

## 46. Space Heaters

### A. Standard Silicone Strip Heaters (Double For Hazardous Location & Division 2)

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	219	219	219	219	219	327	327	393	480	569	642	642

Space Heaters are installed to prevent moisture condensation in the motor during times the motor is not running. Nidec Motor Corporation uses Silicon Rubber Strip-Type heaters manufactured by sandwiching a resistance wire network between two pieces of high-temperature silicon rubber and bonding the pieces together. Heaters are sized to provide approximately 10°C temperature rise above the ambient temperature. Heaters are placed on the end turns of the motor winding. Heaters are of the low-density type, which yields low surface temperature and long life. Heaters are single phase, rated 60 or 50 Hertz.

Space Heaters are available in the following voltages:

- 115, 200, 208, 230, 380, 460 & 575 Volt
- 227 Volt operated at 300 Volt
- 230 Volt operated at 115 Volt
- 460 Volt operated at 230 Volt

Double the adder for Hazardous Location motors or Division 2. Double the adder for half-voltage space heaters. (For Hazardous Location or Division 2 motors with half-voltage heaters, the adder is 4 times.)

### B. Thermostatically Controlled Space Heater with Pilot Light

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	N/A	N/A	N/A	N/A	2441	2441	2441	2441	2441	2441	2441	2441

This adder is in addition to the Space Heater adder. Calibrated (preset) thermostatic control accessory is mounted in the motor conduit box. A Pilot Light is located on the space heater conduit box to indicate space heater operation. Not available on Hazardous Location motors.

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## 47. Starting Current, Lower Than Standard

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%

Adder is percent of Base List Price. The starting current varies with each rating based on the NEMA®† KVA Code Letter and the exact electrical design that is used. This adder covers any starting current limit (inrush limit) that is not the standard value for the rating.

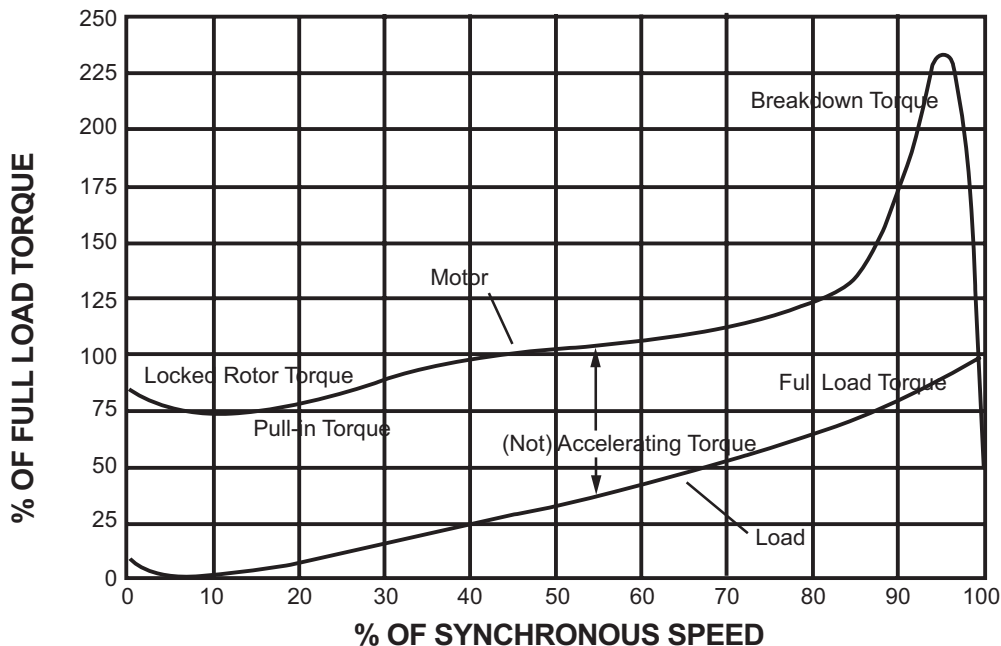
CAUTION: Not all starting current limits can be met on all ratings. Confirm that the limit can be met prior to quoting.

## 48. Starting Method

- Products described in this catalog are assumed to be used with the full voltage across the line starting method.
- Nameplate (HP) ratings assume product is applied to a power distribution system with balanced line voltage. Distribution systems using an asymmetrical transformer bank (typically open Wye, open Delta connection) almost always produce unbalanced line voltage conditions leading to premature motor failure.
- Standard products described in this catalog may be capable of alternative starting methods, provided certain basic requirements are met:
  - > Motor must be capable of accelerating the load under the specified starting method without exceeding the allowable temperature rise of the rotor or stator.
  - > Motor must produce adequate torque at all points along the driven equipment load curve so as not to stall at an intermediate load point.

Products described in this catalog can be connected directly across the line without damage to the motor. However, the typical motor draws 6 to 7 times its full load current during starting. These are situations where this starting or in-rush current can cause excessive voltage disturbance on the power supply system, potentially causing operational problems with other equipment. Reducing voltage to the motor during starting is a common method of controlling in-rush current. Reducing volt-age to the motor during starting also reduces the starting torque and breakdown torque, which increases the time it takes the motor to accelerate.

**TYPICAL SPEED-TORQUE CURVE**



Should the starting torque be reduced at some point along the speed torque curve to where there is no longer a net accelerating torque value, the motor will stall and can be damaged if not taken offline within its safe stall time window. Comparing the load speed torque curve with the motor's capabilities under reduced voltage starting conditions -- is recommended, particularly when 50% of nameplate voltage is used to start the motor (50% tap on auto transformer). Motors started by auto-transformer or solid-state soft-starting methods require customer to provide speed torque curve of driven equipment, voltage tap on transformer and WR2 of load.

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# Three Phase Modifiable NEMA<sup>®†</sup> Horizontal Motors Accessories and Modifications

## 48. Starting Method (continued)

TYPICAL COMPARISON OF COMMON STARTING METHODS (%)					
STARTING METHOD	MOTOR			LINE	NOTES
	TERMINAL VOLTAGE	STARTING TORQUE	STARTING CURRENT	STARTING CURRENT	
Full Voltage	100	100	100	100	Standard Motor
PWS (High Speed)	100	50	70	70	Special Winding
PWS 514 RPM + Below	100	50	50	50	Special Winding
Wye-Delta	100	33	37	33	Special Winding
AUTOTRANSFORMER					
80% TAP	80	64	80	67 *	*Includes Transformer magnetizing current
65% TAP	65	42	65	45 *	
50% TAP	50	25	50	28 *	
PRIMARY RESISTOR AND PRIMARY REACTOR ARE SIMILAR TO AUTOTRANSFORMER METHOD					

### Starting Method

Frame:	56	140	180	210	250	280	320	360	400	444-445	447	449
Adder:	N/A	78	78	78	110	131	158	231	363	603	633	633

There are a number of ways to start squirrel cage induction motors, and each method has its own characteristics and place of correct application. It is important to understand that applications requiring any of these starting methods necessitate careful consideration of the motor torque and load torque to insure that the motor can accelerate the load.

- Direct On Line (Across The Line) Start: Considered the Standard Starting Method except on Energy Efficient Motors in 250-449 Frames. Available at no charge.
- Part Winding Start: This method uses only a portion (usually 1/2, but sometimes 2/3) of the motor winding when starting the motor. It is to be used only for voltage recovery and must not be left on the start connection for more than 1 to 2 seconds. The motor is not expected to accelerate on the start connection, and may not even turn.
  - Available at no charge on Single Voltage Motors rated 277 Volts & down
  - Use the Starting Method Adder for all other ratings.
  - On Dual Voltage Motors, you get Part Winding Start only on the low voltage. If Part Winding Start is required on the high voltage, then Single Voltage must be specified.
- Wye Start/Delta Run: A method of reduced voltage starting. This method uses a special Motor Starter to start the motor using a “wye” connection, then switch to “delta” connection for running.
  - Available at no charge on Energy Efficient Motors and Fire Pump Motors in 250-440 Frames.
  - Make the Starting Method Adder for all other ratings.
- Reduced Voltage Starting: This method applies a reduced voltage during motor starting in order to lower the starting current (also lowers the starting torque). Common methods are Solid State Soft Start and Autotransformer.
  - The application details (load torque, load inertia and percent starting voltage) must be reviewed prior to order entry to insure that the motor has adequate starting torque.
  - There is no adder for Reduced Voltage Starting, however, if a High Torque Design is required, the “Torque, High” Adder must be used.
  - Wye Start/Delta Run connection should be requested to insure suitable lead configuration.

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