

# MODIFIABLE PRICING INSTRUCTIONS

**INVERTER  
DUTY  
MARINE**

## 19. INVERTER DUTY (continued)

TITAN® PRODUCTS IN 449 - 9600 FRAME

VARIDYNE® Motors include:

- INVERTER GRADE® Class F insulation system
- Insulife VPI 5000 -- form wound
- Insulife VPI 2000 -- random wound
- Refined balance
- Shaft grounding ring
- Insulated thrust bearing
- Premium efficiency
- Special dual use nameplate
- N/C Thermostats unless other thermal protective devices are ordered

PRICING -- Price as premium efficiency motor and add 5%.

## 20. LEADS

The standard length of our leads is six inches inside the conduit box. Adder \$500 for up to 5 Ft. longer than standard -- single voltage only. For dual voltage, double adder.

## 21. MARINE MOTORS

CORRO-DUTY® motors meet IEEE 45 specifications, both above and below deck, in both enclosed and hazardous location enclosures. Add an Inpro/Seal®† for above deck service. Open motors are approved for below deck. When high-thrust motors are located onboard ship, bearing lubrication may be affected by the pitch and roll (1 degree maximum allowable) of the vessel. If motor is to be used as dockside transfer (not on ship/barge), use standard motor with CORRO-DUTY® features plus a space heater. For ship board applications and bow thruster drives, refer to the Inquiry Group.

*NOTE: IEEE 45 requires that motors exposed to the weather, seas, splashing or other severe moisture conditions either be watertight or protected by watertight enclosures. Since electric motors "breathe" during operation, they cannot be constructed as watertight. Above-deck motors must be protected by suitable watertight enclosures*

## 22. MULTISPEED MOTORS

- Available as single voltage ratings only
- This option will change published performance characteristics
- This option is likely to change published motor frame size
- Review product requirements with the Inquiry Group to confirm frame size and availability

Multispeed vertical motors are available for variable torque (turbine, mixed flow, propeller pumps) and constant torque (typically aerator use) applications.

2 speed / 1 winding machines are available when the no-load high speed vs. low speed RPM is a 2-to-1 speed ratio (1800/900, 1200/600 etc.).

2 speed / 2 winding machines must be used when this ratio is not 2-to-1. A completely independent winding is used to obtain the second speed. Some customers prefer to use a 2 speed / 2 winding design even though the speed ratio is 2 to 1, and they could potentially choose the lower cost 1 winding alternative.



# MODIFIABLE PRICING INSTRUCTIONS

MULTISPEED

## 22. MULTISPEED MOTORS (continued)

### COMMON MULTISPEED RATINGS - CONSTANT TORQUE

1800	1200	1800	900	1200	900	1200	600
2 WINDING H.P.		1 OR 2 WINDING H.P.		2 WINDING H.P.		1 OR 2 WINDING H.P.	
3	2.00	3	1.50	3	2.25	3	1.50
5	3.30	5	2.50	5	3.75	5	2.50
7.5	5.00	7.5	3.75	7.5	5.62	7.5	3.75
10	6.60	10	5.00	10	7.50	10	5.00
15	10.00	15	7.50	15	11.25	15	7.50
20	13.30	20	10.00	20	15.00	20	10.00
25	16.60	25	12.50	25	18.75	25	12.50
30	20.00	30	15.00	30	22.50	30	15.00
40	26.60	40	20.00	40	30.00	40	20.00
50	33.30	50	25.00	50	37.50	50	25.00
60	40.00	60	30.00	60	45.00	60	30.00
75	50.00	75	37.50	75	56.20	75	37.50
100	66.60	100	50.00	100	75.00	100	50.00
125	83.30	125	62.50	125	94.00	125	62.50
150	100.00	150	75.00	150	112.00	150	75.00
200	133.00	200	100.00	200	150.00	200	100.00
250	167.00	250	125.00	250	187.50	250	125.00

### LIST ADDITIONS TO BASE HP/FRAME

CONSTANT TORQUE - ADDER TO BASE HP AT HIGH SPEED		
FRAME SIZE	182 - 447	449 - 9610
2 Speed / 1 Winding	95%	100%
2 Speed / 2 Winding	160%	160%

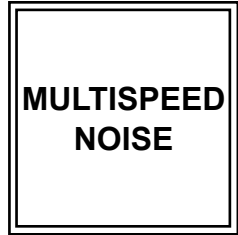
### COMMON MULTISPEED RATINGS -- VARIABLE TORQUE

1800	1200	1800	900	1200	900	1200	600
2 WINDING H.P.		1 OR 2 WINDING H.P.		2 WINDING H.P.		1 OR 2 WINDING H.P.	
3	1.33	3	.75	3	1.68	3	.75
5	2.22	5	1.25	5	2.81	5	1.25
7.5	3.30	7.5	1.88	7.5	4.21	7.5	1.88
10	4.44	10	2.50	10	5.62	10	2.50
15	6.66	15	3.75	15	8.43	15	3.75
20	8.88	20	5.00	20	11.25	20	5.00
25	11.11	25	6.25	25	14.06	25	6.25
30	13.13	30	7.50	30	16.87	30	7.50
40	17.17	40	10.00	40	22.50	40	10.00
50	22.22	50	12.50	50	28.12	50	12.50
60	26.66	60	15.00	60	33.75	60	15.00
75	33.33	75	18.75	75	42.18	75	18.75
100	44.44	100	25.00	100	56.00	100	25.00
125	55.55	125	31.25	125	70.00	125	31.25
150	66.66	150	37.50	150	84.00	150	37.50
200	89.00	200	50.00	200	112.50	200	50.00
250	111.00	250	62.50	250	140.60	250	62.50



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# MODIFIABLE PRICING INSTRUCTIONS



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## 22. MULTISPEED MOTORS (continued)

### LIST ADDITIONS TO BASE HP/FRAME

VARIABLE TORQUE - ADDER TO BASE HP AT HIGH SPEED		
FRAME SIZE	182 - 447	449 - 9608
2 Speed / 1 Winding	45%	60%
2 Speed / 2 Winding	130%	140%

## 23. NAMEPLATES, SPECIAL

- **ADDITIONAL STAMPING ON STANDARD NAMEPLATE** -- Add \$47 to the list price for stamping limited customer information on the standard motor nameplate
- **SPECIAL IDENTIFICATION** -- Where purchaser requires the company to furnish and/or mount separate special identification plates on the motor, make the list price addition for each motor of \$340 list.
- **SUPPLEMENTAL** -- Nameplates for mounting on customer equipment will be furnished at no charge when specified on original order. Note these supplemental nameplates cannot be supplied with the CSA logo.
- **ROTATION ARROW** -- add \$47 list.

## 24. NOISE -- TYPICAL VALUES

Typically, noise levels are quoted as dB (A) sound pressure overall. Customers normally require certain overall levels to comply with OSHA exposure levels. Example: 85 dB (A) limit for 8 hours exposure. This seemingly straightforward approach deserves severe cautions.

We are unable to include the driven equipment into our guarantee simply because we do not know how loud or how many decibels it must contribute. The surroundings can also significantly affect the observed readings. The same motor can show 6 dB(A) changes due to surroundings.



# MODIFIABLE PRICING INSTRUCTIONS

# NOISE

## 24. NOISE -- TYPICAL VALUES (continued)

### NOISE LEVELS: VERTICAL MOTORS 180-9600

The following are the Nidec Motor Corporation noise levels for vertical motors. The levels are measurements in dB(A) per ANSI 12.51 and NEMA MG-1, corrected to a free field under 60 Hz sine wave power at a reference level of 0.0002 dyne/cm<sup>2</sup>. These are average expected values based on no-load testing and should not be guaranteed.

FRAME	RPM	WP-I		WP-II		TEFC/XP		TEFC/XP	
		Sound Pressure	Sound Power	Sound Pressure	Sound Power	Standard & Energy Efficient		Premium Efficient	
						Sound Pressure	Sound Power	Sound Pressure	Sound Power
180	3600	70	78	n/a	n/a	75	83	75	83
	1800	60	68	n/a	n/a	65	73	60	68
	1200 & slower	55	63	n/a	n/a	60	68	60	68
210	3600	75	78	n/a	n/a	75	83	75	83
	1800	60	68	n/a	n/a	65	73	65	73
	1200 & slower	55	63	n/a	n/a	60	68	60	68
250	3600	75	83	n/a	n/a	80	88	75	83
	1800	70	78	n/a	n/a	70	78	65	73
	1200 & slower	60	68	n/a	n/a	60	68	60	68
280	3600	75	84	n/a	n/a	80	89	80	89
	1800	70	79	n/a	n/a	70	79	70	79
	1200 & slower	60	69	n/a	n/a	65	74	65	74
320	3600	75	84	n/a	n/a	80	89	80	89
	1800	65	74	n/a	n/a	70	79	70	79
	1200 & slower	65	74	n/a	n/a	65	74	65	74
360	3600	75	84	n/a	n/a	85	94	80	89
	1800	65	74	n/a	n/a	75	84	75	84
	1200 & slower	65	74	n/a	n/a	70	79	65	74
400	3600	80	90	n/a	n/a	85	95	80	80
	1800	70	80	n/a	n/a	75	85	75	85
	1200 & slower	65	75	n/a	n/a	70	80	65	75
440	3600	80	90	n/a	n/a	90	100	80	90
	1800	70	80	n/a	n/a	80	90	75	85
	1200 & slower	70	80	n/a	n/a	75	85	65	75
447	3600	n/a	n/a	n/a	n/a	90	100	85	95
	1800	85	95	n/a	n/a	80	90	75	85
	1200 & slower	80	90	n/a	n/a	75	85	70	80
449	3600	n/a	n/a	n/a	n/a	90	102	92	105
	1800	n/a	n/a	-	-	90	102	92	105
	1200 & slower	n/a	n/a	-	-	85	97	87	100
5000	3600	91	103	91	103	90	103	91	103
	1800	86	98	86	93	90	103	86	103
	1200 & slower	80	93	80	93	85	98	80	93
5800	3600	n/a	n/a	n/a	n/a	97	109	97	109
	1800	n/a	n/a	n/a	n/a	92	104	92	104
	1200 & slower	n/a	n/a	n/a	n/a	92	104	92	104
6812 (TE)	3600	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1800	n/a	n/a	n/a	n/a	92	108	92	108
	1200 & slower	n/a	n/a	n/a	n/a	92	108	92	108
6800-8000	3600	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1800	90	105	85	100	n/a	n/a	n/a	n/a
	1200 & slower	85	100	80	95	n/a	n/a	n/a	n/a
9600	3600	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1800	REFER TO OFFICE	REFER TO OFFICE	REFER TO OFFICE	REFER TO OFFICE	n/a	n/a	n/a	n/a
	1200 & slower	90	105	85	100	n/a	n/a	n/a	n/a

Measurements are reported at 3 feet for NEMA<sup>®</sup> frames, 5 feet for TITAN<sup>®</sup> frames (449 and larger). Refer to the Inquiry Group for Noise Quotation Guidelines and Octave Band Analysis Chart.



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# MODIFIABLE PRICING INSTRUCTIONS



## 24. NOISE (continued)

### Sound Abatement Treatment

Sound abatement treatment is available on Titan® totally enclosed fan cooled vertical motors. The treatment provides a motor with lower than standard sound level. Use the following list price adders for this feature.

Frame:	449	5000	5800	6812
Adder:	\$3,865	\$4,400	\$5,000	\$9,550

Please contact the Inquiry Group for actual sound level data on TEFC motors and for the availability on motors with WP11 enclosure.

## 25. NON-REVERSE RATCHET

Our non-reverse ratchet provides immediate protection against reversing due to phase reversals or from backspin at shutdown. Nidec Motor Corporation's standard non-reverse ratchet is a ball type ratchet for counter-clockwise shaft rotation when viewed from the top of the motor. Counter-clockwise non-reverse ratchets are available wherever a non-reverse ratchet list price is shown on the corresponding motor list price page.

A special non-reverse ratchet for clockwise rotation is available for 4-pole and slower WPI units on frames 320 through 9600 and TEFC units on frames 400 through 6812.

Nidec Motor Corporation's ratchets are non-sparking and do not require special materials for hazardous location applications. The following charts provide additional non-reverse ratchet information on larger vertical motors.

### VERTICAL NRR AVAILABILITY (6)

#### A. Open (WPI, WP11)

(4) Dir. of Rotation	449		5000		5800		6800		8000		9600	
	2P	4P & Slower	2P	4P & Slower	2P	4P & Slower	2P	4P & Slower	2P	4P & Slower	2P	4P & Slower
CCW (STD)	N/A	1	N/A	1	N/A	1	N/A	1	N/A	3	N/A	2
CW	N/A	1	N/A	1	N/A	1	N/A	1	N/A	3	N/A	2

#### B. TEFC and Hazardous Location (449 Frame Hazardous Location is not available) (5)

(4) Dir. of Rotation	444, 445, 447		449		5000		5800		6800	
	2P	4P & Slower	2P	4P & Slower	2P	4P & Slower	2P	4P & Slower	2P	4P & Slower
CCW (STD)	1	1	N/A	1	N/A	1	N/A	1	N/A	1
CW	N/A	1	N/A	1	N/A	1	N/A	1	N/A	1



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# MODIFIABLE PRICING INSTRUCTIONS



## 25. NON-REVERSE RATCHET (continued)

1. Ball Type
2. Pin Type
3. Ball Type is standard -- some higher thrust ratings may require Pin Type R/O.
4. Make nonreverse ratchet addition as shown for equivalent high-thrust, vertical solid shaft, totally enclosed, fan-cooled motor. Clockwise rotation where available, add to the basic NRR price \$880 list through 5811 frame \$1,761 list for 6808 and above.
5. Hazardous location NRR's are non-sparking.
6. NRR's are not available on normal thrust designs. Motors can be furnished nameplated as normal thrust and have an NRR, but it requires high-thrust construction (including oil lube) and high-thrust pricing.

## 26. OIL SUMP HEATERS

- Available for WPI, WP11, TEFC enclosures
- Available for upper bracket, oil-lubricated products in 320 through 9608 frame sizes with WPI enclosures, 5008 through 9608 frame with WP11 enclosures, and 447 through 6812 frames with TEFC enclosures
- Lower bracket **AND** Hazardous Location applications require mandatory Inquiry Group approval
- Please specify single phase: 115, 230, 460 or 575 volts at order entry

Oil sump heaters are recommended for applications where the ambient temperature is consistently below -5°C (23°F) and required with consistent to ambients or -15°C (5°F) and below.

### LIST PRICE ADDER

#### Standard

Frame	182 184	213 215	254 256	284 286	324 326	364 365	404 405	444 447	449	5000	5800	6812 (TE)	6800-8000	9600
Adder	N/A	N/A	N/A	N/A	\$469	\$469	\$563	\$563	\$2,202	\$2,202	\$2,495	\$2,789	\$2,934	\$3,110

#### Thermostatically Controlled

Frame	182 184	213 215	254 256	284 286	324 326	364 365	404 405	444 447	449	5000	5800	6812 (TE)	6800-8000	9600
Adder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$3,669	\$3,669	\$3,962	\$4,256	\$4,460	\$4,843



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# MODIFIABLE PRICING INSTRUCTIONS



## 27. OIL SUPPLIED WITH MOTOR

Oil-lubricated products **CANNOT** be shipped with oil in the bearing sumps. Nidec Motor Corporation **DOES NOT** offer an option to ship suitable oil (or other lubricants) with motor orders. We have selected brands that facilitate local availability and convenience for the end user. Should a question arise, please suggest one of the following products:

### Nidec Motor Corporation Recommended Oil Viscosities

Angular Contact Thrust Bearing (7XXX Series)					
Motor Enclosure	Frame Size	Speed (RPM)	Ambient Temperature	ISO VG	Base Oil Type
Open Dripproof or Weather Protected	324 and larger	ALL	-15°C thru 40°C (5-104°F)	32	Mineral or Synthetic
			41°C thru 50°C (105-122°F)	68	Synthetic Only
Totally Enclosed or Hazardous Location	404 thru 447		-15°C thru 40°C (5-104°F)	32	Mineral or Synthetic
			41°C thru 50°C (105-122°F)	68	Synthetic Only
	449 thru 6812		1801 - 3600	32	Synthetic Only
			1800 & Below	68	Synthetic Only
All	41°C thru 50°C (105-122°F)	Refer to Office			
Spherical Roller Thrust Bearing (29XXX Series)					
Motor Enclosure	Frame Size	Speed (RPM)	Ambient Temperature	ISO VG	Base Oil Type
Open Dripproof or Weather Protected	444 and larger	1800 and Below	-15°C thru 25°C (5-77°F)	68	Mineral or Synthetic
			6°C thru 40°C (42-104°F)	150	
			41°C thru 50°C (105-122°F)		Synthetic Only
Totally Enclosed or Hazardous Location	449 and larger		-15°C thru 25°C (5-77°F)	68	Mineral or Synthetic
			6°C thru 40°C (42-104°F)	150	Synthetic Only
			41°C thru 50°C (105-122°F)	Refer to Office	

**Notes:**

1. If lower guide bearing is oil lubricated, it should use the same oil as the thrust bearing.
2. If lower guide bearing is grease lubricated, refer to TABLE 2 for recommended greases.
3. Refer to Nidec Motor Corporation for ambient temperatures other than those listed.



# MODIFIABLE PRICING INSTRUCTIONS

**OVERSPEED  
PAINT  
PLATFORMS**

## 28. OVERSPEED

Percent overspeed above synchronous speed. Refer to the Inquiry Group with application details if energized or above standard speed. Standard unenergized on two poles is 20% and 25% on 4 poles and slower speeds. Applies to all thrust types.

## 29. PAINT

Special paint may be furnished on modified products with the prior plant approval. A special paint can be furnished if compatible with our standard primer, is commercially available, and suitable for air drying. (Zinc or lead cannot be used, and sand blasting is not available). Motors can also be supplied with just the standard primer coat at no charge, if requested at time of order. All special paints are for outside surfaces only. A safety data sheet is required on special paint and should be forwarded to the plant prior to quotation. CORRO-DUTY® paint applied to WPI motors does not include cast-iron components. See tables below.

**Special Paint List Adders (when approved)**

Frame Size	182 184	213 215	254 256	284 286	324 326	364 365	404 405	444 445	447
List Price	\$352	\$469	\$587	\$704	\$822	\$939	\$1,056	\$1,174	\$1,174

Frame Size	449/5000	5800	6812 (TE)	6800-8000	9600
List Price	\$1,878	\$3,756	\$5,634	\$5,634	\$5,634

## 30. PLATFORMS, LADDERS AND RAILINGS

Inherent to their design, vertical motors are more susceptible to sympathetic vibration due to mechanical resonance or reed critical frequency within the pumping system. Adding motor-mounted maintenance platforms, ladders and railings can excite this condition. Nidec Motor Corporation does not recommend or supply motor-mounted maintenance platforms.

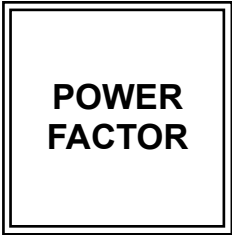
Should maintenance platforms, ladders and railings be a customer requirement, we suggest using a free-standing design.



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# MODIFIABLE PRICING INSTRUCTIONS



## 31. POWER FACTOR

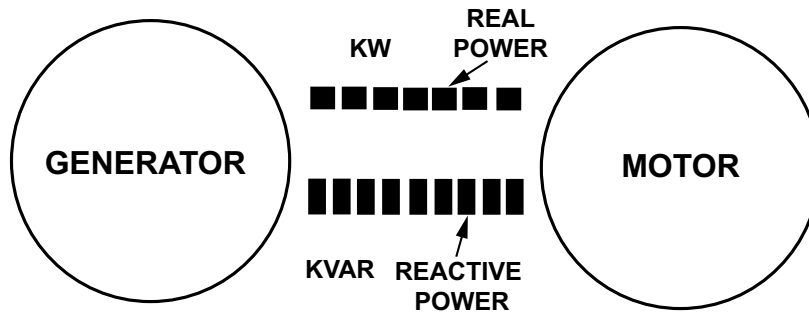
- CAUTION -- DO NOT over correct the power factor of products described in this catalog. Correcting full-load power factor beyond approximately 95% will potentially result in severe non-warranty damage to the motor and driven equipment.
- Seek assistance from the Inquiry Group to apply this product to multispeed motors.
- On single voltage motors with part winding (PWS), Double Delta or WYE Delta starting connections, Nidec Motor Corporation recommends the capacitor be connected to the motor side of contactors 1-2-3 in the motor starter.
- If this is unacceptable, you must supply two separate capacitors each with one half of the desired KVAR rating. One capacitor should be connected to the 1-2-3 motor leads, the second connected to 4-5-6 (or 7-8-9 as applicable).
- Do not apply this accessory to a variable frequency drive. Serious damage to the VFD will result if capacitors are used in between drive and motor. Consult your drive supplier.
- Seek assistance from the Inquiry Group if any questions exist.

Application of power factor correction capacitors to three-phase squirrel cage induction motors (SCIM) is beneficial because the power used by industrial and municipal facilities has two components:

1. Real power (KW), which produces work.
2. Reactive power (KVAR) needed to generate the rotating magnetic field required for the operation of electric motors. No useful work is performed by this component.

Reactive power is sometimes called wattless power because inductive electrical equipment, such as a motor, must take from the electrical distribution system more current than is necessary to do work involved. The ratio of working current to total current is called power factor. The function of power factor correction capacitors is to increase the power factor by supplying the wattless power when installed at or near inductive electrical equipment.

Here, the power feeder line must supply useful real power and reactive or magnetizing currents.



*Illustration of an SCIM under partially loaded conditions without Power Factor Correction Capacitors (PFCC).*

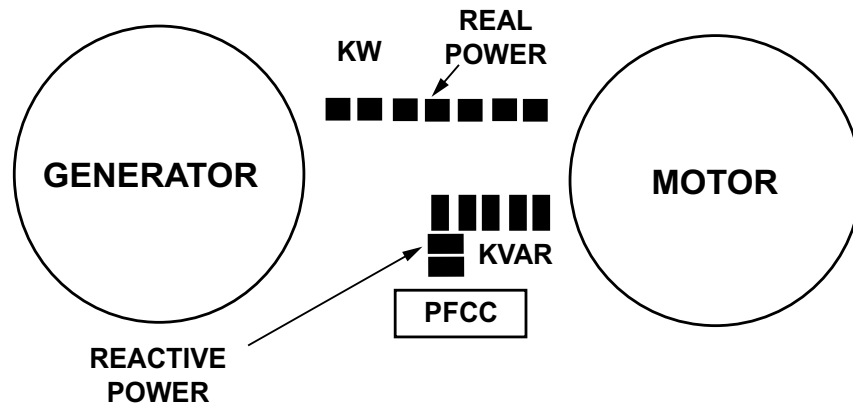


# MODIFIABLE PRICING INSTRUCTIONS

## POWER FACTOR

### 31. POWER FACTOR (continued)

Installing a PFCC near the same motor will supply the reactive or magnetizing current required to operate it. The total current required of the power feeder line is reduced to the value of the useful real current only.



Power factor correction capacitors can lower electrical costs. In many areas, the cost of electricity includes a penalty charge for low power factor. Installation of power factor correction capacitors on the distribution system within the plant makes it unnecessary for the utility to supply the wattless or the non-working power required by the inductive electrical equipment connected to it. Savings in reduced generation, transmission, and distribution costs are passed on to the plant in the form of lower electrical bills.

Savings are also possible through the use of power factor correction capacitors in the form of increased KVA capacity of plant electrical distribution system. Power factor correction capacitors furnish the non-productive current requirements of the plant and make it possible to increase the plant connected load, as much as 15 to 20%, without a corresponding increase in the size of transformers, conductors and protective devices making up the distribution system servicing the load.

Listed in the engineering data section of this catalog is the maximum amount of KVAR allowed to be applied to the specific product described. This generally corrects the motor's full-load power factor of 95%. Should a customer require correction to a lower value, apply the following formula to obtain the required KVAR. KVAR is the unit for rating PFCC and is equal to 1000 volt-amperes of reactive power. This indicates how much reactive power the capacitor will provide.

To determine KVARs needed to improve the motor's existing full-load power factor to 92%:

$$\text{Actual Power} = \frac{\text{Volts} \times \text{Amps} \times \% \text{ P.F} \times 1.732}{1000}$$

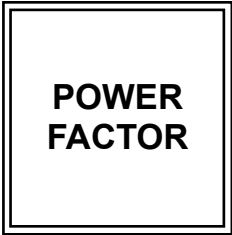
Motor is 100 HP, 1200 RPM, 460 volts with 79.1% full-load power factor TEFC VHS premium efficient type TVS with 124 full load amps

$$\text{Actual Power} = \frac{460 \times 124 \times 0.791 \times 1.732}{1000}$$

$$\text{Actual Power} = 78.15 \text{ KW}$$



# MODIFIABLE PRICING INSTRUCTIONS



## 31. POWER FACTOR (continued)

- Obtain from table 32-1 the KW multiplier at the intersection of 79% original PF and 92% desired PF multiplier = 0.35. KVAR = 78.15 x 0.35 = 27.4
- Performance data indicates 33 KVAR is maximum, 27.4 is needed, correction to 92% is possible.

**Table 31-1**

ORIGINAL POWER FACTOR	KW MULTIPLIERS TO DETERMINE CAPACITOR KVAR REQUIRED															
	CORRECTED POWER FACTOR															
	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.95
0.60	0.583	0.609	0.635	0.661	0.687	0.713	0.740	0.766	0.793	0.821	0.849	0.877	0.907	0.938	0.970	1.044
0.61	0.549	0.575	0.601	0.627	0.653	0.679	0.706	0.732	0.759	0.787	0.815	0.843	0.873	0.904	0.936	0.970
0.62	0.516	0.542	0.568	0.594	0.620	0.646	0.673	0.699	0.726	0.754	0.782	0.810	0.840	0.871	0.903	0.937
0.63	0.483	0.509	0.535	0.561	0.587	0.613	0.640	0.666	0.693	0.721	0.749	0.777	0.807	0.838	0.870	0.904
0.64	0.451	0.477	0.503	0.529	0.555	0.581	0.608	0.634	0.661	0.689	0.717	0.745	0.775	0.806	0.838	0.872
0.65	0.419	0.445	0.471	0.497	0.523	0.549	0.576	0.602	0.629	0.657	0.685	0.713	0.743	0.774	0.806	0.840
0.66	0.388	0.414	0.440	0.466	0.492	0.518	0.545	0.571	0.598	0.626	0.654	0.682	0.712	0.743	0.775	0.809
0.67	0.358	0.384	0.410	0.436	0.462	0.488	0.515	0.541	0.568	0.596	0.624	0.652	0.682	0.713	0.745	0.779
0.68	0.328	0.354	0.380	0.406	0.432	0.458	0.485	0.511	0.538	0.566	0.594	0.622	0.652	0.683	0.715	0.749
0.69	0.299	0.325	0.351	0.377	0.403	0.429	0.456	0.482	0.509	0.537	0.565	0.593	0.623	0.654	0.686	0.720
0.70	0.270	0.296	0.322	0.348	0.374	0.400	0.427	0.453	0.480	0.508	0.536	0.564	0.594	0.625	0.657	0.691
0.71	0.242	0.268	0.294	0.320	0.346	0.372	0.399	0.425	0.452	0.480	0.508	0.536	0.566	0.597	0.629	0.663
0.72	0.214	0.240	0.266	0.292	0.318	0.344	0.371	0.397	0.424	0.452	0.480	0.508	0.538	0.569	0.601	0.635
0.73	0.186	0.212	0.238	0.264	0.290	0.316	0.343	0.369	0.396	0.424	0.452	0.480	0.510	0.541	0.573	0.607
0.74	0.159	0.185	0.211	0.237	0.263	0.289	0.316	0.342	0.369	0.397	0.425	0.453	0.483	0.514	0.546	0.580
0.75	0.132	0.158	0.184	0.210	0.236	0.262	0.289	0.315	0.342	0.370	0.398	0.426	0.456	0.487	0.519	0.553
0.76	0.105	0.131	0.157	0.183	0.209	0.235	0.262	0.288	0.315	0.343	0.371	0.399	0.429	0.460	0.492	0.526
0.77	0.079	0.105	0.131	0.157	0.183	0.209	0.236	0.262	0.289	0.317	0.345	0.373	0.403	0.434	0.466	0.500
0.78	0.052	0.078	0.104	0.130	0.156	0.182	0.209	0.235	0.262	0.290	0.318	0.346	0.376	0.407	0.439	0.473
0.79	0.026	0.052	0.078	0.104	0.130	0.156	0.183	0.209	0.236	0.264	0.292	0.320	0.350	0.381	0.413	0.447
0.80	0.000	0.026	0.052	0.078	0.104	0.130	0.157	0.183	0.210	0.238	0.266	0.294	0.324	0.355	0.387	0.421
0.81		0.000	0.026	0.052	0.078	0.104	0.131	0.157	0.184	0.212	0.240	0.268	0.298	0.329	0.361	0.395
0.82			0.000	0.026	0.052	0.078	0.105	0.131	0.158	0.186	0.214	0.242	0.272	0.303	0.335	0.369
0.83				0.000	0.026	0.052	0.079	0.105	0.132	0.160	0.188	0.216	0.246	0.277	0.309	0.343
0.84					0.000	0.026	0.053	0.079	0.106	0.134	0.162	0.190	0.220	0.251	0.283	0.317
0.85						0.000	0.027	0.053	0.080	0.108	0.136	0.164	0.194	0.225	0.257	0.291
0.86							0.000	0.026	0.053	0.081	0.109	0.139	0.167	0.198	0.230	0.264
0.87								0.000	0.027	0.055	0.083	0.111	0.141	0.172	0.204	0.238
0.88									0.000	0.028	0.056	0.084	0.114	0.145	0.177	0.211
0.89										0.000	0.028	0.056	0.086	0.117	0.149	0.183
0.90											0.000	0.028	0.058	0.089	0.121	0.155
0.91												0.000	0.030	0.061	0.093	0.127
0.92													0.000	0.031	0.063	0.097
0.93														0.000	0.032	0.066
0.94															0.000	0.034
0.95																0.000



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# MODIFIABLE PRICING INSTRUCTIONS

PRINTS  
ROTOR

## 32. PRINTS AND DATA

When requested at time of order entry, Nidec Motor Corporation will supply at no charge a standard submittal package consisting of 5 sets of the following: motor description, features, dimension print, nameplate data and performance data. For non-standard products, data, those requiring engineering content, refer to the following chart for applicable charges (per rating). Note that pricing is net.

CODE	DESCRIPTION	NET/EACH
B/N/B	USEM AND BEARING MANUFACTURER'S PART NUMBERS	N/C
	BEARING LIFE CIRCULATION	\$150
CP	CERTIFIED DIMENSION PRINT (USEM STANDARD 8-1/2 X 11)	N/C
D/S	CUSTOMER DATA SHEET FILLED OUT BY NIDEC	\$60
• I/M	GENERAL INSTALLATION, OPERATION & MAINTENANCE MANUAL . QTY-5 PER ORDER ADDITIONAL COPIES (MINIMUM QTY. 5)	N/C \$5
L/N	SOUND POWER IN WATTS	\$60
L/P	SOUND PRESSURE IN db AT FIVE FEET	\$30
N/P	NAMEPLATE DATA	N/C
N/Y	CITY OF (NEW YORK) DATA SHEET	\$60
P/AA	ACCELERATION TIME VS. AMPS CURVE (REQUIRES CUSTOMER'S LOAD WK <sup>2</sup> AND LOAD SPEED TORQUE CURVE)	\$170
P/C	PERFORMANCE CURVE (SLIP OR RPM, AMPS, EFF, PF, KW VS. HP)	\$170
P/D	PERFORMANCE DATA (SAME AS ABOVE EXCEPT IN DATA FORM)	N/C
P/E	EQUIVALENT CIRCUIT PARAMETERS	\$60
P/L	PARTS LIST (EXPLODED VIEW) FROM PRICE BOOK SECTION 700	N/C
P/N	STANDARD NOISE DATA VS. CENTER BAND	\$60
P/ST	SPEED VS. TORQUE & AMPS CURVE	\$60
P/TA	SAFE STALL TIME CURVE (TIME VS. AMPS)	\$170
RCF	REED CRITICAL FREQUENCY DATA	N/C
S/P	RECOMMENDED SPARE PARTS (BEARINGS, SEALS) SEE P/L	N/C
S/S	SHAFT STIFFNESS/MODULUS OF ELASTICITY	\$170
SP	SHAFT PRINT	\$60
CRS	LATERAL ANALYSIS, ROTOR DETAIL, AND SHAFT PRINT	\$330
MED	MASS ELASTIC DATA	\$170
W/D	EXTERNAL WIRING (CONNECTION) DIAGRAM (INCLUDES ACCESSORY CONNECTION DIAGRAMS WHEN APPLICABLE)	N/C
R/I	ROTOR INERTIA	N/C
RCS	ROTOR DYNAMIC ANALYSIS (ROTOR CRITICAL SPEED)	\$2500

NOTE: Requests for data after order has been entered, for additional data, additional copies or resubmittal after changes will carry a basic charge of \$50 net per rating in addition to the charges noted above.

Submittals requiring express mailing (at customer request) will be sent prepaid and the cost of the mailing added to the order price.

- When requested, Nidec Motor Corporation will fill in data on customer data sheets. Original sheets must be supplied by customer at time of order entry. Data sheets must be originals or first-generation copies on standard 8-1/2 x 11 paper, completely legible and have standard font spacing. Data sheets that do not meet Nidec Motor Corporation criteria will not be completed. For data not listed above, refer to the Inquiry Group for availability.
- Above represents software requirements of most heavy-industrial customers. In some cases, this is but a small portion of the data requirements of highly specialized and controlled environments. Nidec Motor Corporation recognizes our customers with these concerns and can provide software that supports their needs. Pricing varies by requirement; refer to the Inquiry Group for special software.
- Request for detailed information for motors that are 5 years or older will be charged \$300 net per motor.
- CE Mark — not required for motors rated above 1000 volts. Contact the Inquiry Group regarding the CE Mark for motors rated at or below 1000 volts.



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# MODIFIABLE PRICING INSTRUCTIONS



## 32. PRINTS AND DATA (continued)

- UL Certificate -- “Motor Certificate” is available for UL-listed motors only. This certificate from Underwriters Laboratories states that a specific product (model / I.D. ) conforms with specific UL standards. Add \$1000 net each rating.

## 33. REED CRITICAL

Vertical pump systems have natural frequencies which are a function of system stiffness, mass and mounting. Natural frequency is the frequency at which a structure vibrates with the presence of a minimal forcing function. Reed Critical Frequency (RCF) is the first bending mode lateral natural frequency of a vertical structure. When a natural frequency is excited by a driving force, such as a small residual unbalance, vibration problems can result.

To avoid vibration problems, pump manufacturers determine the pumping system RCF to avoid operation on or near the RCF. This is particularly important when a pump/motor system is driven at variable speed with inverter power. Pump manufacturers can make their discharge heads either stiff or flexible or purchase a motor with a larger or smaller mounting flange to change the system RCF.

Motor RCF data is required in order to assist the pump manufacturer in determining the system RCF. Nidec Motor Corporation will provide typical Reed Critical Frequency data at no extra charge when requested.

Typical motor RCF data may be verified by performing a RCF test after the motor has been manufactured. See Testing, Item 48, for the applicable witnessed or un-witnessed RCF test charge.

## 34. ROTOR, STANDARD AND OPTIONAL CONSTRUCTION

- Standard rotor construction of NEMA®† frame products in the 182 through 447 frame series is die-cast aluminum. Optional rotor construction is not available.
- Standard rotor construction of 449, 5000 and 5800 frame TITAN® products is typically die-cast aluminum. 720 RPM and slower is typically fabricated aluminum. Optional rotor construction is available as shown below.
- Standard rotor construction of the 6800, 8000 and 9600 frame products is fabricated aluminum. Optional rotor construction is shown below.
- Nidec Motor Corporation reserves the right to deviate from the above as good engineering practice dictates.
- Optional rotor designs will change published performance characteristics.
- Fabricated copper bar rotor construction is available in the 449 through 9600 frame series. Centrifugally cast end rings are fully brazed to each rotor bar. Rotor bars are swagged, preventing in-slot movement and tight bar construction. Heavy finger plates tightly hold the rotor cove together, controlling internal stress and maintaining dimension stability under all loads.

LIST PRICE ADDITIONS FOR OPTIONAL CONSTRUCTION					
ROTOR	449/5000	5800	6812 (TE)	6800-8000	9600
2 pole copper	\$38,732	\$42,254	N/A	N/A	N/A
4 pole and slower copper	\$32,277	\$35,211	\$37,559	\$39,906	\$42,254
Fabricated aluminum	\$2,750	\$4,500	STD	STD	STD

