

# MODIFIABLE PRICING INSTRUCTIONS



## 45. SURGE PROTECTION

- Available for, WPI, WPIL and TEFC enclosures in 447 through the 9600 frame as motor mounted.
- Do not use this accessory on applications where motor is driven by an inverter. Serious damage to the VFD will result. Consult your drive supplier.
- Suitable oversized main conduit box is included in price adders shown.
- Hazardous location motors require a special conduit box and mandatory approval by the Inquiry Group. When approved, add \$39,366 list (for suitable conduit box only) in addition to the price adders shown on the next page.

Surge capacitors and lightning arrestors protect the motor winding from transient voltage spikes and from the incoming distribution system. Distribution system conditions likely to cause turn-to-turn or turn-to-ground winding damage include lightning strikes, capacitor switching, and opening or closing of the system circuit breaker, among others. Should the magnitude of stresses imposed on the winding from system voltage transients exceed the surge limits the motor can withstand, the insulation system will fail.

Lightning arrestors limit the magnitude of the transient voltage spike. This is achieved by the arrestor conducting to ground when the voltage reaches a given value. Surge capacitors limit the rate of rise of the voltage. This is achieved by the capacitor momentarily absorbing the steep wave front.

Surge protection is most effective when it is mounted directly from the main conduit box at the motor leads. Increasing this distance beyond 3 feet significantly reduces its effectiveness. Fusing the capacitors or arrestors is not recommended due to the difficulty in determining if or when the fuse is blown.

To provide surge protection, make the appropriate list price adder from below:

MOTOR VOLTAGE	SURGE CAPACITORS AND LIGHTNING ARRESTORS
460	\$8,554
2300	\$21,568
4160	\$28,317
6600	\$36,796

## 46. TEMPERATURE RISE -- STANDARD AND OPTIONAL

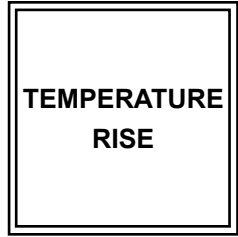
- This option may not be available on the maximum HP rating in a given frame size. Consult the Inquiry Group for availability.
- This option may change motor frame size and performance characteristics. Consult the Inquiry Group for confirmed data.
- Combined with other design altering modifications (high ambient, high altitude, VFD use, etc.), this option will significantly change listed product performance described in this catalog. Consult the Inquiry Group for confirmed frame size, performance data, etc.
- The description of this product feature assumes the motor is applied to sine wave power and in accordance with NEMA standards (standard ambient, altitude, balanced voltage, etc.).

The standard insulation system supplied on all Nidec Motor Corporation products described in this catalog is Class F. When our Class F system is subjected to insulation life testing as described in IEEE 275, it significantly exceeds the thermal capabilities required to classify it as capable of providing 20,000 hours of design life when operated at the Class F thermal limit of 155°C. Chart 47-1 indicates the thermal capabilities of our standard insulation system, which is shown as the diagonal line slightly below Class H.



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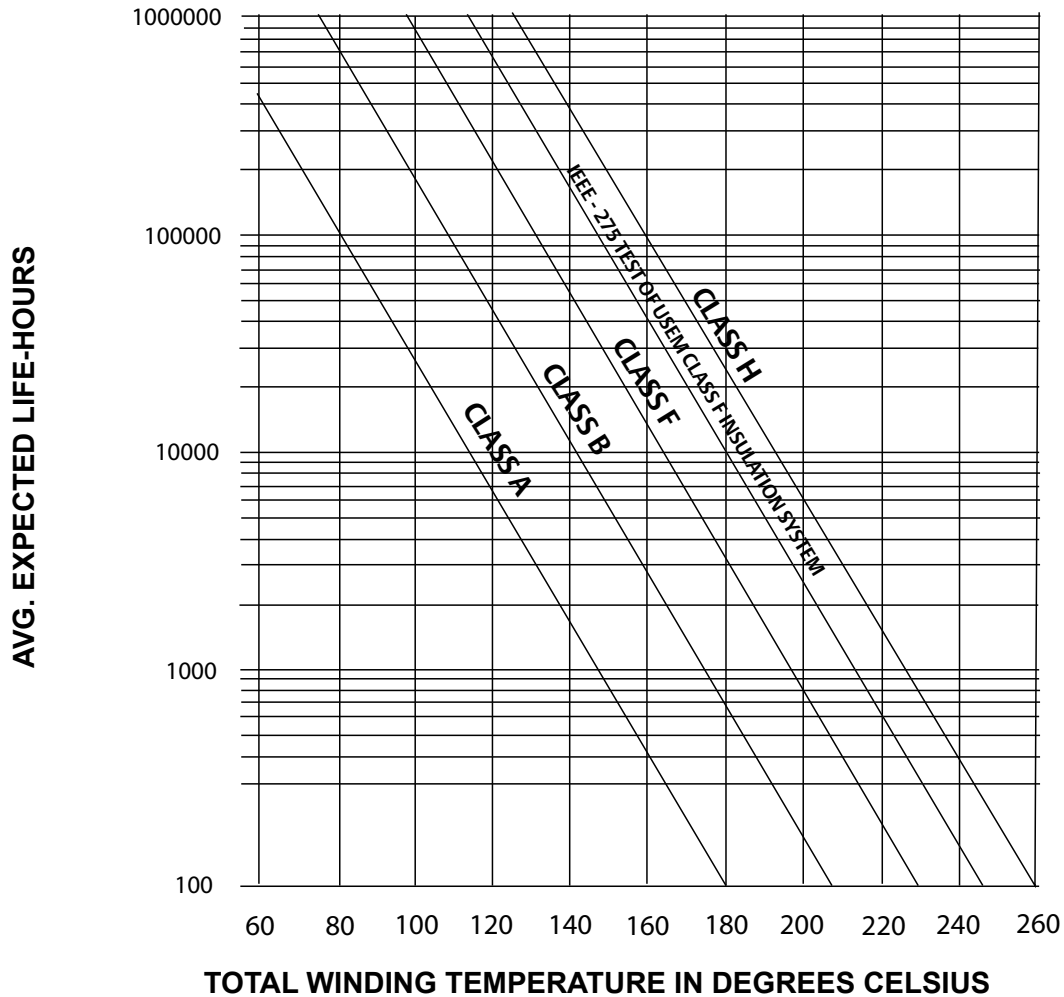
# MODIFIABLE PRICING INSTRUCTIONS



## 46. TEMPERATURE RISE (continued)

CHART 47-1

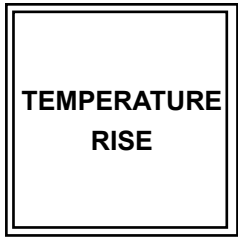
TYPICAL TEMPERATURE VERSUS LIFE CURVES FOR INSULATION SYSTEMS



Most products described in this catalog are designed to operate at Class B temperature rise (80°C measured by resistance) when loaded to nameplate HP in a 40°C ambient under sine wave power. When the motor is run up to the 1.15 SF load point, standard temperature rise is Class F. Generally, products that deviate from this basic design philosophy are so noted on their perspective pricebook pages. This information is stated in general terms due to the wide variety of products and modifications listed in this catalog.



# MODIFIABLE PRICING INSTRUCTIONS



## 46. TEMPERATURE RISE (continued)

IEEE standards assume winding design life doubles with a 10°C decrease in temperature rise and is halved with a 10°C increase. An insulation system operating at its thermal limit has a design life of 20,000 hours (about 2.3 years). Considering the standard thermal limits for Class F for 155°C and our design practice of 130°C total temperature rise under load, Nidec Motor Corporation provides about 100,000 hours -- 5 times the industry standard -- of winding life. This is one reason there are so many old U.S. MOTORS® verticals still in operation today.

INSULATION CLASS:	A <sup>(1)</sup>	B	F	H
Ambient temperature (for options see item 3 on page M-5)	40°C	40°C	40°C	40°C
Temperature rise at nameplate H.P. (for options see item 46 page M-68)	60°C	80°C	105°C	125°C <sup>(2)</sup>
Hot spot or service factor allowance (for service factor see item 37 page M-51)	10°C	10°C	10°C	15°C
Thermal limit of insulation system (3)	105°C	130°C	155°C	180°C
NOTES: <sup>(1)</sup> Class A insulation is shown for reference only and is not commercially available from Nidec Motor Corporation. <sup>(2)</sup> Class H insulation is offered for special ambient conditions, life requirements, etc. Class H temperature rise is not available or used by Nidec Motor Corporation. <sup>(3)</sup> Each insulation class provides the same winding design life when operated at its thermal limit.				

Any deviation from Insulation Class standards stated on individual pricebook pages requires the appropriate modification adder and may impact frame size and performance characteristics.

### OPTIONAL TEMPERATURE RISE ADDITIONS

- Class B temperature rise at 1.15 SF measured by the resistance method.

FRAME SIZE	182 184	213 215	254 256	284 286	324 326	364 365	404 405	444 445, 447	449	5000-9600
LIST PRICE	\$164	\$469	\$469	\$728	\$939	\$1,878	\$2,559	\$3,521	\$5,664	12%*

\*Without frame series jump (5000 to 5800) confirm with the Inquiry Group. If frame jump is required, build price from confirmed frame size without above price adder.

- Class B temperature rise at 1.0 SF measured by the embedded detector method (Class F rise at 1.15 SF -- follow above price guidelines).



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# MODIFIABLE PRICING INSTRUCTIONS

TEMPERATURE  
RISE  
TESTING

## 46. TEMPERATURE RISE (continued)

- Class B temperature rise at 1.15 SF measured by the embedded detector method -- Build entire motor price from next larger HP rating and add for 1.15 SF as shown above. Confirm frame and performance with the Inquiry Group. Confirm net price with St. Louis Marketing Services.
- Class A temperature rise -- NEMA<sup>®†</sup> frame size only -- 60°C measured by resistance at nameplate HP price as premium efficiency (RUS/TUS) and add 7% list. For TITAN<sup>®</sup> motors-- Refer to the Inquiry Group.
- All other requirements -- Consult the Inquiry Group.

## 47. TERMINAL CONNECTORS (LEAD LUGS)

- 182 through 286 frame sizes are supplied with motor leads arranged (stripped back) to accommodate but less terminal connectors. Should a customer require factory-installed, ring-type lead lugs on a production motor, add \$178 list.
- 324 through 9600 frames are equipped with ring-type compression lead lugs as standard.
- Consult the Inquiry Group with other requirements.

## 48. TESTING (LIST PRICING)

All completely assembled motors receive a production test prior to shipment from the factory. This test confirms conformance to Nidec Motor Corporation design and no specific values are recorded. The exact nature of this test varies by motor type, but as a minimum, the motor is run at no load and visually inspected. There is no extra charge for a production test, and this test requirement does not need to be noted at order entry. Other testing is available as follows:

- Short Commercial Test (meets NEMA MG1-12.55 or Part 20 for Titan motors) -- This test consists of no-load current, locked rotor current, winding resistance, and high potential.
- Short Commercial Test Witnessed -- A short commercial test, as described above, performed in the presence of a witness.
- Complete Initial Test -- Nidec Motor Corporation tests per IEEE Standard 112, method B, dynamometer test. This test consists of full-load heat run, percent slip, no-load current, full-load current, locked rotor current, lock rotor torque, breakdown torque (calculated), efficiency and power factor at 100%, 75%, and 50% full load, insulation resistance per IEEE Standard 43, winding resistance and high potential. (For 460V ratings, testing limited to 700 HP and less.)
- Sound Test -- This is a no-load test performed in accordance with ANSI S12.51 and NEMA MG-1. For details on how this is performed, refer to Product Facts.



# MODIFIABLE PRICING INSTRUCTIONS

TESTING

## 48. TESTING (LIST PRICING) (continued)

- Sound Test Witnessed -- A sound test, as described above, performed in the presence of a witness.
- Vibration and Special Testing -- Refer to the Inquiry Group for details and capabilities.
- Polarization Index -- In accordance with IEEE Standard 43. Dielectric absorption ratio.
- Spray test -- Form wound stator with Everseal Insulation System. Requires prior engineering approval.
- Inverter with motor -- Refer to the Inquiry Group for engineering and plant approval.
- Calibrated Test -- Same as complete initial but curves are provided to customer.

DESCRIPTION TESTS (LIST PRICING PER MOTOR):	182 184	213 215	254 256	284 286	324 326	364 365	404 405	444 445	447
Short commercial, unwitnessed	\$235	\$235	\$235	\$235	\$235	\$235	\$235	\$235	\$235
Short commercial, witnessed	\$675	\$675	\$675	\$675	\$675	\$675	\$675	\$675	\$675
Complete initial, unwitnessed @	\$1,385	\$1,385	\$1,385	\$1,385	\$2,136	\$2,770	\$3,263	\$4,531	\$4,531
Complete initial, witnessed @	\$2,113	\$2,113	\$2,113	\$2,113	\$3,263	\$4,155	\$4,906	\$6,784	\$6,784
Sound test, unwitnessed @	\$1,502	\$1,502	\$1,502	\$1,502	\$1,502	\$1,878	\$2,113	\$2,347	\$2,347
Sound test witnessed @	\$2,254	\$2,254	\$2,254	\$2,254	\$2,254	\$2,817	\$3,169	\$3,521	\$3,521
RCF Test unwitnessed	\$1,502	\$1,502	\$1,502	\$1,502	\$1,502	\$1,878	\$2,113	\$2,347	\$2,347
RCF Test witnessed	\$2,254	\$2,254	\$2,254	\$2,254	\$2,254	\$2,817	\$3,169	\$3,521	\$3,521
Vibration (2x witnessed)	\$704	\$704	\$704	\$704	\$704	\$704	\$704	\$704	\$704
Polarization test, unwitnessed	\$1,502	\$1,502	\$1,502	\$1,502	\$1,502	\$1,878	\$2,113	\$2,347	\$2,347
Polarization test, witnessed	\$2,113	\$2,113	\$2,113	\$2,113	\$2,113	\$2,817	\$3,169	\$3,521	\$3,521
Sealed Winding Immersion Test*	Not Available								
Inverter with motor	Refer to the Inquiry Group								

DESCRIPTION TESTS (LIST PRICING PER MOTOR):	449	5000	5800	6812 (TE)	6800-8000	9600
Short commercial, unwitnessed	\$235	\$235	\$235	\$235	\$235	\$235
Short commercial, witnessed	\$675	\$675	\$1,000	\$1,350	\$1,350	\$1,350
Complete initial, unwitnessed @	\$8,350	\$8,350	\$8,350	\$11,700	\$11,700	\$11,700
Complete initial, witnessed @	\$16,700	\$16,700	\$16,700	\$23,350	\$23,350	\$23,350
Sound test, unwitnessed @	\$2,347	\$2,347	\$3,852	\$4,270	\$4,270	\$5,129
Sound test witnessed @	\$3,521	\$3,521	\$6,406	\$6,406	\$6,406	\$7,981
RCF Test unwitnessed	\$2,347	\$2,347	\$3,852	\$4,270	\$4,270	\$6,608
RCF Test witnessed	\$3,521	\$3,521	\$6,406	\$6,406	\$6,406	\$7,981
Vibration test, unwitnessed	\$3,592	\$3,592	\$3,592	\$3,592	\$3,991	\$3,991
Vibration test, witnessed	\$5,986	\$5,986	\$5,986	\$5,986	\$7,981	\$7,981
Polarization index, unwitnessed	\$2,347	\$2,347	\$2,347	\$2,347	\$2,347	\$2,347
Polarization index, witnessed	\$3,521	\$3,521	\$3,521	\$3,521	\$3,521	\$3,521
Sealed Winding Immersion Test* (+50% witnessed)	\$9,272	\$9,272	\$9,272	\$9,272	\$9,272	\$9,272
Inverter with motor	Refer to Inquiry Group					

**NOTE:**

@ Multiply net test charge by 1.50 for multispeed motors tested at both speeds.

\* Form wound motors with Everseal only.



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# MODIFIABLE PRICING INSTRUCTIONS



## 49. THERMAL PROTECTION

Selection of an accessory designed to provide thermal protection of bearings or windings depends upon the desired function the device is to perform. The table below provides a comparison of their various characteristics.

	SWITCH (RELAY)	INDICATOR & SWITCH	THERMOMETER	THERMOSTATS	RTD	THERMOCOUPLE	THERMISTOR
				KLIXON			
BRAND REF.	1	2	3	4	5	6	7
WHERE USED	BRG	BRG	BRG	WDG	BOTH	BOTH	WDG
ALARM	YES	YES	NO	YES	YES <sup>2</sup>	YES <sup>2</sup>	YES
SHUT DOWN	YES <sup>a</sup>	YES <sup>a</sup>	NO	YES <sup>a</sup>	YES <sup>b</sup>	YES <sup>b</sup>	YES <sup>a</sup>
AUTO RESET	YES	YES	NO	YES	NO	NO	NO
TEMPERATURE INDICATING	NO	YES	YES	NO	YES <sup>b</sup>	YES <sup>b</sup>	NO
RANDOM WOUND	---	---	---	YES	YES <sup>c</sup>	YES	YES
FORM WOUND	---	---	---	YES	YES	YES	LIMITED EFFECTIVENESS
OPERATE AUXILLARY EQUIPMENT	YES	YES	YES	YES	YES <sup>b</sup>	YES <sup>b</sup>	YES <sup>b</sup>
TYPE OF PROTECTION	I	I	I	B-G	A-H	A-H	A-H

**NOTES:**

Brand reference - typical factory choice as follows:

- 1 - Barksdale MT1H<sup>†</sup> or equal (Applicable to oil lubricated bearings only)
- 2 - United Electric Controls Series 800<sup>†</sup> or equal  
(Applicable to oil lubricated bearings only)
- 3 - Rochester gauges<sup>†</sup> - 3 inches stainless-steel dial or equal  
(Applicable to oil lubricated bearings only)
- 4 - Texas Instruments<sup>†</sup> or equal
- 5 - MINCO, RTD Co.<sup>†</sup> or equal
- 6 - MINCO, RTD Co.<sup>†</sup> or equal
- 7 - USEM Therma Sentry<sup>†</sup>

**QUALIFICATION FOOTNOTES**

- a) Requires connection to motor control relay
- b) Requires auxiliary monitor or controller not (normally) supplied with motor
- c) Limited availability



# MODIFIABLE PRICING INSTRUCTIONS

THERMAL  
PROTECTION

## 49. THERMAL PROTECTION (continued)

### • TYPE OF PROTECTION PROVIDED

#### A. Locked Rotor

This type of protection is only available for random wound motors and is dependent on two variables. 1) The response time of the circuits beyond our detectors (or in the case of THERMA SENTRY®, beyond our controller), and 2) The particular motor design.

#### B. Running Overload (thermal considerations only)

#### C. Abnormally High Ambient

#### D. Voltage Unbalance

#### E. High or Low Voltage

#### F. Ventilation Failure

#### G. Single Phasing

#### H. Starting Overload

#### I. Alarm or Shutdown to Prevent Catastrophic Failure

## A. BEARING THERMAL PROTECTION

### THERMOWELLS

Thermowells are not an available option on NEMA®† or TITAN® motors. Thermowells are specifically designed to protect probes from pressure, flow and corrosion when the probe is submerged in this environment. None of these conditions exist in their application to NEMA®† or TITAN® motors.

### NEMA® FRAME

One bearing protective device is available on the upper bracket and one on the lower bracket of WPI, high-thrust motors in the 320 through 447 frames and 404 through 447 frame TEFC (non-Hazardous location). Refer to the Inquiry Group for availability on other motor types and enclosures.

### TITAN® FRAME

One bearing protective device is available on each bracket of TEFC, high-thrust motors in the 449 through 6812 frames. One bearing protective device is available on each bracket of open, high-thrust motors in the 5008 through 9608 frames. One bearing RTD is available on each end bracket of hazardous location, high-thrust motors in the 449 through 6812 frames. Bearing protective devices are not available on hazardous location normal-thrust TITAN® motors. Refer to the Inquiry Group for availability on other motor types and enclosures.



# MODIFIABLE PRICING INSTRUCTIONS

**THERMAL  
PROTECTION  
(BEARINGS)**

## 49. THERMAL PROTECTION (continued)

### A. BEARING THERMAL PROTECTION

TYPE OF DETECTOR	LIST PRICE ADDERS	
	ONE BEARING	TWO BEARINGS
Arrange for - but less detector	\$525	\$1,050
Thermocouple*		
- Copper-Constantan (Type T)	\$590	\$1,180
- Iron-Constantan (Type J)	\$590	\$1,180
- Chromel-Constantan (Type E)	\$590	\$1,180
- Chromel-Alumel (Type K)	\$590	\$1,180
Bearing Temperature Switch (Relay)*	\$590	\$1,180
- Barksdale Standard Enclosure		
Bearing Temperature Indicator and Switch*	\$1,340	\$2,680
- UE dial type with or without alarm contacts		
Stem Type Thermometer*	\$1,340	\$2,680
Resistance Temperature Detector		
- 10 OHM Copper RTD	\$1,340	\$2,680
- 120 OHM Nickel RTD	\$1,340	\$2,680
- 100 OHM Platinum RTD (TCR of .00392)	\$2,150	\$4,300
- 100 OHM Precision Platinum RTD (TCR of .00385)	\$2,910	\$5,820
BEARING RTD SET POINTS	FOSSIL OIL	SYNTHETIC OIL
WARNING	80°C	110°C
ALARM	90°C	120°C
SHUT-DOWN	100°C	130°C

*\*Not available on hazardous location*





# MODIFIABLE PRICING INSTRUCTIONS

**THERMAL  
PROTECTION  
(WINDINGS)**

## 49. THERMAL PROTECTION (continued)

### B. WINDINGS

- Not all options are available on all frame sizes
- For two winding multispeed motors, double list price adder shown below.
- For air temperature sensor (RTD) in WP11 6800, 8000 or 9600 frame motors, add \$1,897 list (NEMA 4 conduit head).

#### 1. Winding Thermostats

Snap action, bimetallic, temperature actuated switches installed in the connection end-turns of the motor winding. Their purpose is to activate a warning device (N.O.) or shut down the motor (N.C.) upon excessive winding temperatures. Leads are normally brought out to the main conduit box on 460 volt motors. They are available with normally closed contacts for automatic reset. Overheat protectors with normally open contacts, for use in alarm or warning circuits, are available when specified at time of order. Double for hazardous location.

<b>FRAME SIZE</b>	<b>182</b>	<b>213</b>	<b>254</b>	<b>284</b>	<b>324</b>	<b>364</b>	<b>404</b>	<b>444</b>	<b>447</b>	<b>449</b>
	<b>184</b>	<b>215</b>	<b>256</b>	<b>286</b>	<b>326</b>	<b>365</b>	<b>405</b>	<b>445</b>		
<b>LIST PRICE</b>	\$89	\$89	\$89	\$146	\$207	\$308	\$308	\$308	\$308	\$408

<b>FRAME SIZE</b>	<b>5000</b>	<b>5800</b>	<b>6812 (TE)</b>	<b>6800-8000</b>	<b>9600</b>
<b>LIST PRICE</b>	\$408	\$725	\$725	\$725	\$725

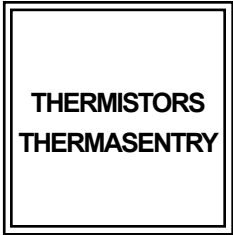
#### 2. Winding Thermistors (Embedded in winding)

- This accessory will not work without a control module. Our standard thermistors are SIEMENS<sup>®†</sup> type B59155. Three thermistors are installed in the winding with 6 leads brought to the main conduit box. Control module is by others.
- To prevent nuisance tripping when this accessory is applied to reduced voltage starters, a timer in the control circuit should be added in the control circuit and set for 1-2 seconds. This will allow the motor to start when the auto signal is received (see diagram under THERMA SENTRY<sup>®</sup> description).
- This accessory provides NEMA<sup>®†</sup> Type 1 (winding - running and locked rotor over temperature) protection for motors in the 182 through 447 frame size.
- This accessory provides NEMA<sup>®†</sup> Type 2 (winding - running over temperature) protection only for TITAN<sup>®</sup> large frame (449 - 9608) motors.
- Thermistors are embedded in the winding end turns during manufacturing and cannot be easily added through conversion.



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# MODIFIABLE PRICING INSTRUCTIONS



## 49. THERMAL PROTECTION (continued)

### B. WINDINGS

Winding thermistors are a nonlinear resistance temperature detector made of semiconductor material and embedded in the end turns of the motor winding, one per phase. Nidec Motor Corporation offers only SIEMENS® PTC type (Positive Temperature Coefficient) thermistors. NTC type thermistors are not available.

#### LIST PRICE ADDERS FOR THREE THERMISTORS ONLY

DESCRIPTION	FRAME SIZE									
	182 184	213 215	254 256	284 286	324 326	364 365	404 405	444 445	447	449 THROUGH 9600
THERMISTOR	\$472	\$472	\$472	\$669	\$669	\$876	\$876	\$876	\$876	\$1,303

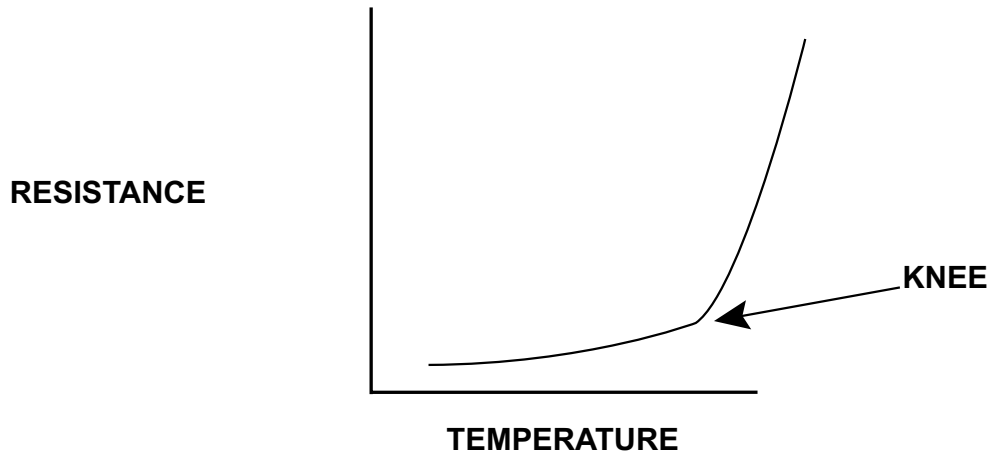
*Control module is not included.*

### 3. THERMA SENTRY® SYSTEM

- Refer to notes listed under B.2 thermistors (disregard first note - THERMA SENTRY® includes control module).

#### THERMA SENTRY® Mode of Operation

The temperature sensor in the THERMA SENTRY® is a PTC thermistor. Its resistance increases non-linearly with temperature. When the motor winding reaches the critical shutdown point (knee of curve), there is a sharp rise in resistance.



# MODIFIABLE PRICING INSTRUCTIONS

**THERMAL  
PROTECTION  
WINDINGS**

## 49. THERMAL PROTECTION (continued)

### B. WINDINGS

The THERMA SENTRY® winding protection consists of three Positive Temperature Coefficient (PTC) thermistors, one per phase, embedded in the end turns with six leads brought to the motor conduit box and a control for remote mounting by the customer. It protects against the most common causes of motor failure, including: high or low supply voltage, unbalanced line voltage, single phase conditions, abnormally high ambient temperatures, blocked ventilation, starting overload, and running overloads. The control module is supplied with one normally open and normally-closed contact (N/C). **The control module must be separately excited by a 24 to 240 AC/DC voltage source.**

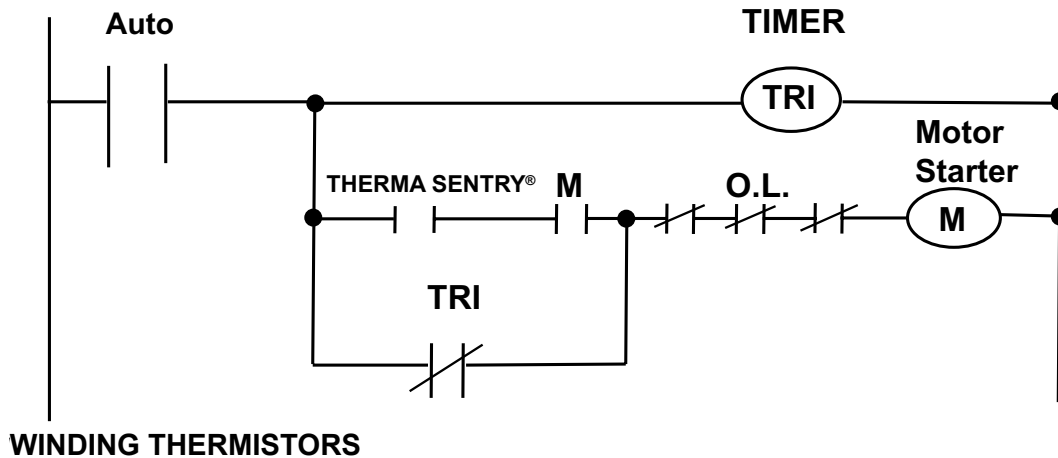
The THERMA SENTRY® control module is available for remote mounted in the customer's control panel.

List price adders:

THERMA SENTRY® OPTIONS	Frame Size		
	180-360	400-447	449 & up
THERMA SENTRY® system (separately mounted / separately excited)	\$1,410	\$1,410	\$1,755
THERMA SENTRY® system (motor mounted / separately excited)	N/A	\$2,880	\$2,880

- Time-out circuit for THERMA SENTRY® used with reduce voltage starting.

There are many possible ways to provide a time-out scheme to the starting circuit. One simple, inexpensive option is shown below:



# MODIFIABLE PRICING INSTRUCTIONS



## 49. THERMAL PROTECTION (continued)

### B. WINDINGS

#### 4. WINDING THERMOCOUPLES

- Winding thermocouples are available in the 324 through 9608 frame sizes.

A thermocouple consists of two dissimilar conductors welded together into a junction. This is inserted into the motor winding -- 2 per phase / 6 per motor. Thermocouple leads are brought out to terminal strip connections in an accessory conduit box, which is included in its price. These accessory signal wires leads are connected to an input instrument (supplied by others) to form a reference junction. Heating of the thermocouple imbedded in the winding generates a thermoelectric potential (EMF) proportional to the temperature difference between the two points, indicating the temperature of the embedded thermocouple.

**LIST PRICE ADDITION FOR WINDING THERMOCOUPLES**

THERMOCOUPLE TYPE	PRICE ADDITION	
	320-447 Frame	449-9600 Frame
- Copper-Constantan (Type T)	\$2,545	\$3,440
- Iron-Constantan (Type J)	\$2,545	\$3,440
- Chromel-Constantan (Type E)	\$2,545	\$3,440
- Chromel-Alumel (Type K)	\$2,545	\$3,440

- Control monitor is not furnished by Nidec Motor Corporation.
- This accessory may impact motor efficiency levels on premium efficiency products due to the extremely high stator slot fill of specific designs. Consult the Inquiry Group if questions exist.

#### 5. WINDING RESISTANCE TEMPERATURE DETECTORS (RTDs)

Winding RTDs are available in the 324 through 9608 frame sizes (non-Hazardous location).

An RTD is a sensing element consisting of a precision wound wire coil of pure metal. Recognized for their accuracy, the RTD's resistance increases with temperature rise in a known and highly repeatable manner. Two RTDs per phase/6 per motor are our standard offering. Accessory lead (signal) wires are connected to terminal strip connectors in an accessory conduit box. When connected to an input instrument or monitor, RTD temperature can be monitored. A variety of RTDs are offered to industry standard curves as shown below. Must be specified at time of order entry.

RTD ELEMENT	NO. OF WIRES	RESISTANCE	PRICE ADDITION	
			320-447 Frame	449-9600 Frame
NICKEL (1)	2	120 OHMS @ 0°C	\$2,545	\$3,440
COPPER	3	10 OHMS @ 25°C	\$2,545	\$3,440
PLATINUM (2)	3	100 OHMS @ 0°C	\$3,825	\$5,165
PRECISION PLATINUM (3)	3	100 OHMS @ 0°C	\$4,955	\$6,690
NICKEL/IRON	2	676 OHMS @ 25°C	\$2,545	\$3,440

- (1) USEM standard supply if not specified at time of order.
- (2) TCR rating of .00392
- (3) TCR rating of .00385 (DIN & IEC STD.)

- Monitor or control module is not furnished by Nidec Motor Corporation.
- This accessory may impact motor efficiency levels on certain premium efficiency products due to their extremely high stator slot fills. Consult the Inquiry Group if questions exist.



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# MODIFIABLE PRICING INSTRUCTIONS

TOLERANCES

## 50. (SPECIAL) TOLERANCES

Nidec Motor Corporation can provide special mounting tolerances on vertical solid shaft motors as opposed to those noted on standard dimension prints supplied in this catalog. The following tables summarize the standard and special tolerances available.

### Vertical Solid Shaft Special Mounting Tolerances

#### STANDARD TOLERANCES

	Through 447 Frame		449 Frame and Larger			
Bracket "AK" dimension	8.25"	13.50"	13.50"	22.00"	26.00"	33.75"
Shaft Runout	0.002	0.002	0.003	0.003	0.003	0.003
Face Runout	0.004	0.007	0.007	0.007	0.009	0.009
Register Runout	0.004	0.007	0.007	0.007	0.009	0.009
End Play	*	*	0.010	0.010	0.010	0.010

#### SPECIAL "1/2 NEMA" Tolerances

	Through 447 Frame		449 Frame and Larger			
Bracket "AK" dimension	8.25"	13.50"	13.50"	22.00"	26.00"	33.75"
Shaft Runout	0.001	0.001	0.0015	0.0015	0.0015	0.0015
Face Runout	0.002	0.0035	0.003	0.0035	0.0045	0.0045
Register Runout	0.002	0.0035	0.0035	0.0035	0.0045	0.0045
End Play	*	*	0.010	0.010	0.010	0.010

#### List price additions for special tolerances on vertical solid shaft motors

FRAME SIZE	182	213	254	284	324	364	404	444	449	5800	6812	6800	9600
	184	215	256	286	326	365	405	445	5000		(TE)	8000	
LIST ADDER	\$704	\$704	\$704	\$704	\$939	\$1,232	\$1,408	\$1,761	\$3,521	\$4,401	\$5,282	\$7,512	\$7,512

#### API-610 TOLERANCES

	Through 447 Frame		449 Frame and Larger			
Bracket "AK" dimension	8.25"	13.50"	13.50"	22.00"	26.00"	33.75"
Shaft Runout	0.001	0.001	0.001	0.001	0.001	0.001
Face Runout	0.001	0.001	0.001	0.001	0.001	0.001
Register Runout	0.004	0.004	0.004	0.004	0.004	0.004
End Play	*	*	0.005	0.005	0.005	0.005



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# MODIFIABLE PRICING INSTRUCTIONS



## 50. (SPECIAL) TOLERANCES (continued)

List price additions for API-610 tolerances on vertical solid shaft motors

FRAME SIZE	182 184	213 215	254 256	284 286	324 326	364 365	404 405	444 445 447	449 5000	5800	6812 (TE)	6800 8000	9600
LIST ADDER	\$939	\$939	\$939	\$939	\$1,291	\$1,643	\$1,878	\$2,347	\$4,695	\$5,869	\$7,042	\$9,977	\$9,977

\*End play on high-thrust motors varies depending on the location of the thrust bearing.  
 End play on motors with the thrust bearing in the lower bracket is typically set at .015" to .025"  
 End play on motors with the thrust bearing in the upper bracket is typically set at .005" to .008"  
 Note: API-610 requires the motor thrust bearing on the upper end of the motor. In frame sizes where the thrust bearing is on the lower end, take exception on the bearing location and end play requirements.

## 51. THRUST -- MOMENTARY AND CONTINUOUS UPTHRUST

Upthrust -- High-thrust motors. 30% momentary upthrust protection (of standard high-thrust value -- NOT extra-high-thrust value) can be provided at no extra charge and should be specified on order when desired. When upthrust protection is supplied on vertical HOLLOSHAFT® motors, the drive couplings must be bolted together and the self release feature will not apply; however, the nonreverse ratchet can be furnished (see price additions on standard price sheets).

For continuous upthrust in any amount, all frames, refer thrust values to the Inquiry Group for mandatory prior approval. When approved, add 7% list.

## 52. VIBRATION DETECTORS

- Nidec Motor Corporation offers a wide variety of seismic type vibration switches and transducers. However, we do not offer the corresponding monitoring equipment. The engineer or end user normally has well-defined monitoring system requirements that are the province of custom panel shops, not Nidec Motor Corporation. These are most effective when mounted on the upper bracket.
- Proximity probes or transducers are designed for use with horizontal sleeve bearing motors and are not available for use on vertical motors.
- Monitors and control units, cables, etc., are not included in prices. These are not supplied by Nidec Motor Corporation.
- Nidec Motor Corporation's standard vibration detector for non-classified areas is the Robertshaw®† model #366
- Nidec Motor Corporation's standard vibration detector for hazardous location ratings is the Metrix®† Model M5550
- Arrange to accommodate but less vibration detector -- add \$1,056 list each.
- Available on NEMA®† frame WPI motors in the 324-447 frames, upper bracket only.
- Available on NEMA®† frame TEFC motors in the 324 through 447 frame size, upper bracket only.
- Available on all TITAN® motor 449 through 9608 frame, upper bracket mounting.



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# MODIFIABLE PRICING INSTRUCTIONS

## VIBRATION DETECTORS

### 52. VIBRATION DETECTORS (continued)

Switches are normally self-contained (with internal contacts) and require no transmitter. Quantity-1 supplied as standard.

**Group 1:                    Seismic switches, mechanical, acceleration sensitive.  
                                  Units of measure: Peak Gs (gravity units)**

(STD) Robertshaw<sup>®†</sup> model 366A8, and \$2,653 list each; for description see footnotes: A-D-H-J-K enclosure meets NEMA 4 specs.

Robertshaw<sup>®†</sup> model 365A8, add \$5,235 list each; for description see footnotes: A-D-G-J-K

Robertshaw<sup>®†</sup> model 376A, add \$6,573 list each; for description see footnotes: A-D-H-I-K enclosure meets NEMA 4 specs. (Must note desired time delay requirement on order)

Metrix<sup>®†</sup> model 5550 add \$5,235 list each; for description see footnotes: A-D-G-J-L options: I (add \$320 list), K (add \$751 list).

**Group 2:                    Seismic switches, electronic solid-state, Piezo-Electric velocity sensitive  
                                  Units of measure: IPS (inches/second)**

Metrix<sup>®†</sup> model 440S-R, add \$6,385 list each; for description see footnotes: A-C-H-I-K. Has 4-20 MA output for remote readout or computer interface.

Metrix<sup>®†</sup> model 440D-R, add \$8,146 list each; for description see footnotes: B-C-H-I-K. Has 4-20 MA output for remote readout or computer interface.

All above detectors are available with hazardous location enclosures as indicated by a 450 model number. For this option add \$1,819 list to above price.

**Group 3:                    Seismic probes, electronic solid-state, Piezo-Electric displacement sensitive  
                                  Units of measure: inches, peak to peak**

Normally used on machines at 720 rpm and below where measurements in the acceleration or velocity mode may be low even for large displacement values.

This method is available as an alternate to all PMC/Beta detectors listed in Group 2. To include this feature in a detector listed above, use the same price structure noting on order the displacement requirement.

Seismic Transducers send signals to a transmitter that in turn sends the signals to relay, monitor, or control unit (not supplied by Nidec Motor Corporation).

**Group 4:                    Seismic transducers, velocity sensitive  
                                  Units of measure: IPS (inches/second), see footnote F**

IRD model 544M, add \$7,688 list each, cable not included.



# MODIFIABLE PRICING INSTRUCTIONS

VIBRATION  
DETECTORS

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## 52. VIBRATION DETECTORS (continued)

Metrix<sup>®†</sup> model ST 5484, add \$4,643 list each.

Metrix<sup>®†</sup> model 162VTS, add \$4,643 list each.

Bently-Nevada<sup>®†</sup> 330500 (Piezo-Electric) velomitor, add \$4,941 list each.

Bently-Nevada<sup>®†</sup> 9200 seismoprobe, add \$5,235 list each.

**Group 5:            Seismic transducers, electronic, Piezo-Electric accelerometers**  
**Units of measure: Peak Gs (gravity units), see Footnote E**

Metrix<sup>®†</sup> model SA6200, add \$5,669 list each.

Bently Nevada<sup>®†</sup> model 330400, add \$5,094 list each.

Footnotes to the above:

- A. Alarm or shutdown -- not both
- B. Alarm and shutdown -- both
- C. Has indicating capacity
- D. Does not have indicating capability
- E. Transmitter required
- F. No transmitter required
- G. Hazardous location housing
- H. Weatherproof housing
- I. Time delay prevents nuisance tripping
- J. Does not have time delay capability
- K. Remote reset capability
- L. Does not have remote reset capability





# MODIFIABLE PRICING INSTRUCTIONS

VOLTAGE

## 53. VOLTAGE, STANDARD AND SPECIAL

Standard voltages are described below. Price additions are shown below for special voltage options.

HP	PRICE ADDITIONS (PERCENT OF BASIC MOTOR PRICE)					
	198 TO 329 VOLTS	330 TO 600 VOLTS	601 TO 3000 VOLTS	3001 TO 4200 VOLTS	4201 TO 5000 VOLTS	5001 TO 7000 VOLTS
	% OF 460 BASE MOTOR PRICE			% OF 2300 VOLT BASE MOTOR PRICE		
100 & SMALLER	4% ◇	4% ◇	---	---	---	---
101 TO 200	4% ◇	4% ◇	---	---	---	---
201 TO 300	8%	4%	---	---	19%	48%
301 TO 700	12%	4%	4%	19%	19%	45%
701 TO 1000	19%	4%	4%	15%	15%	42%
1001 TO 1250	---	---	8%	13%	13%	39%
1251 TO 1750	---	---	12%	12%	12%	36%
1751 TO 5000	---	---	15%	11%	11%	33%

◇ For 50 hertz, 220/380 volt motors, use price of 440 volts, 50 hertz motor.

A. 60 cycle, 3 phase: 200, 230, 230/460, 460 and 575 volts are considered standard for ratings of 100 H.P. and below in maximum frame size of 405TP.

B. 60 cycle, 3 phase: 460, 575 volts -- both are considered standard for ratings listed on pricebook pages.

C. 50 cycle, 3 phase: 190, 220, 190/380, 380 and 415 volts are all considered standard for ratings of 100 H.P. and below and in a maximum frame size of 405 TP.

D. 50 cycle, 3 phase: 380, 415 volts -- both are considered standard voltage equivalents to those 60 cycle low voltage motors listed on pricebook pages noted above in item "B".

E. 200, 208, or 230 (60HZ); 190, 220 or 240 (50HZ) volts are not available without prior approval from the Inquiry Group on motors 200 H.P. and above. When approved, an oversize conduit box is also required in addition to a special voltage adder.

F. 60 cycle, 3 phase, medium voltage: 2300 and 2400 volts are considered base standard ratings. 4000 and 4160 are also standard at prices shown on modifiable pricebook pages.

G. Dual voltage ratings are available as either 2300/4000V or 2400/4160V. To price as dual voltage, use list price of 4000 or 4160 volt motor and specify dual voltage on face of order.

H. 60 cycle, 3 phase, 2300 volt motors are not available on ratings below 150 H.P.

I. 60 cycle, 3 phase, 4000 volt motors are not available on ratings below 150 H.P.

J. 60 cycle, 3 phase, 6000 to 6900 volt motors are not available below 200 H.P. Obtain Inquiry Group approval before quoting motors less than 350 H.P.

K. Voltages above 6900 volt are not available.



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