

Modified TITAN® Horizontal Motors

Hardworking. Dependable. Rugged Reliability

ODP | WPI | WP2 | TEFC | HAZLOC | TEAAC | TEWAC

Countless Solutions. Expert Support.



NIDEC MOTOR CORPORATION



a successful combination of technology and engineering...

Since 1922 we have been the number one choice in the vertical pump motor marketplace. All motors are designed, manufactured and tested in facilities certified to ISO 9001.9002 standards.

...backed by extensive world-class testing facilities

Our exclusive Motor Technology Center, a \$30 million, 130,000-square-foot facility is the world's premier motor engineering center, supporting our companies and their customers in developing advanced motors and electronic controls. Located in St. Louis, it offers comprehensive design, analysis, prototyping and testing services, and features state-of-the-art laboratories and test facilities. No other manufacturer offers these extensive world-class designated testing facilities.

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General Information

Product Overview

Important Information

Nidec Motor Corporation has made every effort to ensure the integrity of the contents of this catalog. However, Nidec Motor Corporation cannot accept responsibility for errors that may have been caused by changing model/catalog numbers, or for typographical or clerical errors in the preparation of this catalog. The motor data and dimensions are provided for reference only. Certified dimensions and performance data will be furnished upon request. Prices are subject to change without notification.

Nidec Motor Corporation does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for the proper selection, use and maintenance of any product within this catalog remains solely with the purchaser and end-user.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, except for Nidec Motor Corporation's standard Limited Warranty stated herein, they are not to be constructed as warranties or guarantees, expressed or implied, regarding the products described herein or their use or applicability. Nidec Motor Corporation reserves the right to modify or improve the designs or specifications of such products at any time without notice.

The following is a list of Nidec Motor Corporation's U.S. trademarks for products and services in this catalog. The trademarks followed by the ® symbol are registered with the U.S. Patent and Trademark Office.

ALLGUARD®	U.S. MOTORS®
CORRO-DUTY®	VARIDYNE™
INVERTER GRADE®	HOSTILE DUTY®
THERMA SENTRY®	EVERSEAL™
TITAN®	INSULIFE™



General Information for Integral Horsepower (IHP) Motors on Variable Frequency Drives (VFDs)

Variable Frequency Drives (VFD)

A VFD is a type of controller used to vary the speed of an electric motor. The VFD takes a fixed AC voltage and frequency and allows it to be adjusted in order to get different speeds from the motor. Motor speed can be varied by changing the frequency of the input power waveform. The equation below shows how the frequency affects the speed of a three phase induction motor.

$$\text{Speed} = \frac{120 * \text{Fundamental Input Frequency}}{\text{Number of Motor Poles}}$$

How does a VFD work?

A VFD takes the fixed frequency and voltage sine wave from the power grid or power station and puts it through a few steps in order to allow the VFD user to vary the frequency and in turn control the motor speed.

First it rectifies the AC power into DC Power. Because of this step, a term commonly used instead of VFD is inverter. This only describes one step of what the VFD does to the power waveform. Once rectified into a DC voltage the drive sends the power through a set of transistors or switches. These switches can take the DC waveform and by opening and closing at certain speeds and durations can create an output waveform that mimics the sine wave that is required to drive a three phase electric motor. The output wave form is known as a Pulse Width Modulation (PWM) waveform because the waveform is created by multiple pulses of the switches at short intervals.

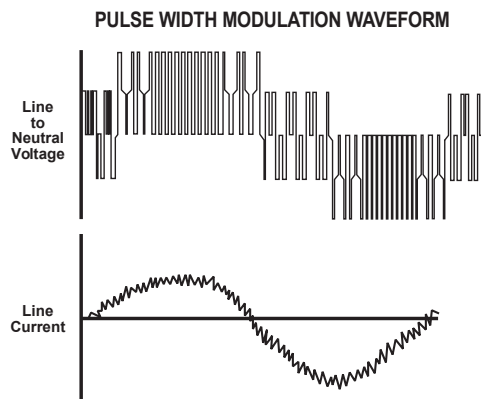


Figure 1 PWM Waveform

What variables should be considered when deciding whether to power a motor with a VFD?

VFD compatibility with motors is complex. As a result, many variables must be considered when determining the suitability of a particular motor for use with a VFD. These variables include:

- Torque requirements (Constant or Variable)
- Speed Range
- Line / System Voltage
- Cable length between the VFD and the motor
- Drive switching (carrier) frequency
- Motor construction

- VFD dv/dt
- High temperatures or high humidity
- Grounding system

Wider speed ranges, higher voltages, higher switching frequencies, insufficient grounding and increased cable lengths all add to the severity of the application and, therefore, the potential for premature motor failure.

How does a VFD affect the motor?

There are many things to consider when a motor is powered using a VFD or PWM power. When a motor is powered by a PWM waveform the motor windings very often see a large differential voltage, either from phase to phase or turn to turn. When the voltage differential becomes large enough it creates a reaction at the molecular level that converts available oxygen into O₃. This phenomenon is called partial discharge or corona. This reaction creates energy in the form of light and heat. This energy has a corrosive effect on the varnish used to protect the motor windings. PWM waveforms can also magnify shaft voltages which lead to arcing across the bearing and causing premature bearing failure. Corrective action must be taken to mitigate these issues that arise when using an electric motor with a VFD.

How do I protect the motor?

Nidec Motor Corporation (NMC) has developed specific motor designs to decrease the harmful affects that a VFD can have on a motor. NMC's INVERTER GRADE[®] insulation system is the first line of defense against corona and phase to phase faults that can be common when a motor is powered using a PWM waveform. The INVERTER GRADE[®] insulation system is standard on all of NMC's Inverter Duty products. Along with the INVERTER GRADE[®] insulation, thermostats are installed as a minimum protection against over heating the motor. Special consideration must also be given to bearings in motors powered by VFD's. In order to create a low resistance path to ground for built up shaft voltages a shaft grounding device can be used. On larger horsepower motors an insulated bearing system should be used in conjunction with the shaft grounding device when installed, to force the stray shaft voltages to ground. The bearing failures are more prominent on motors with thrust handling bearings. NMC has created an Inverter Duty vertical motor line that not only uses the INVERTER GRADE[®] insulation system, but that also comes standard with a shaft grounding device. On motors that are 100 HP and greater the thrust bearing is also insulated for additional protection.

What does "Inverter Duty" mean?

An Inverter Duty motor should describe a motor that helps mitigate potential failure modes of a motor that is powered by a VFD. Inverter duty motor windings should be able to withstand the voltage spikes per NEMA MG1 Part 31.4.4.2 and protect against overheating when the motor is run at slow speeds. On thrust handling bearings it is apparent that the bearings require additional protection. Inverter Duty vertical motors should have a shaft grounding device to protect the motor bearings from fluting due to voltage discharge through the bearing. On larger motors (100HP and larger) the shaft should also be electrically isolated from the frame in order to aid the shaft grounding ring in discharging the shaft voltages to ground.

*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. Thermostats or thermistors installed in the motor and connected properly to the VFD may provide suitable thermal overload protection when operating on a VFD. (consult codes for installation requirements)

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%) mismatch impedance.

690V Applications

Motors that are rated for 690VAC and that will be powered by 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 Waveforms

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 Electrical Discharge Machining (EDM) or fluting.

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

Bearing EDM 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 used if bearing fluting is to be mitigated.

Bearing Protection on Inverter Duty Vertical Motors

All U.S. MOTORS[®] brand "Inverter Duty" vertical products have a shaft grounding system that allows damaging shaft currents a low resistance path to ground. **Bearings on vertical motors fed by VFD power without this bearing protection are not covered under any warranty.** All other bearing failure is covered per NMC's standard warranty. An electric motor repair shop approved to service U.S. MOTORS[®] brand motors must verify that the cause of the bearing failure was not due to EDM damage.

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:

- Locked rotor and drive tripping caused by non-reversing-ratchet operation at low motor speeds. It is not recommended to operate motors at less than 1/4 of synchronous speed. If slow speeds are required contact NMC engineering.
- 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 resistance of the motor winding to ground, and lower the Corona Inception Voltage (CIV) 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 common methods for drying out a winding that has low resistance readings. **Damage caused by these factors are not covered by the limited warranty provided for the motor 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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Warranty Guidelines for Integral Horsepower (IHP)* Motors on Variable Frequency Drives

Warranty Guidelines

The information in the following 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. Contact the drive manufacturer for filter selection and installation requirements.

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 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 applications 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 Premium Efficient motors (that do not have INVERTER GRADE® insulation) on Variable Frequency Drives (2, 4, 6 pole)

Premium efficient motors without INVERTER GRADE insulation meet minimum NEMA® MG-1, Section IV, Part 31.4.4.2. These motors can be used with Variable Frequency Drives (with a reduced warranty period) 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 Table 1). Refer to specific VFD manufacturers cable limits. Refer to the Motor/ Inverter Compatibility page for special consideration of vertical motor bearings.

Table 1 - 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

Warranty Period Clarifications and Exceptions

Standard Energy Efficient Exclusion

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

Vertical Motor Windings

Premium efficient vertical motors without INVERTER GRADE® insulation that are installed using the criteria described in this document and applied in the correct applications shall have a warranty while powered by a VFD for 12 months from date of installation or 18 months from date of manufacturing whichever comes first. See limited warranty page for horizontal motor warranty periods.

Bearing Exclusion for Thrust Handling Bearings

Bearings used in premium efficient vertical motors, and all thrust handling bearings, that are powered by VFDs without shaft grounding devices or insulated bearings (when required) will **not** be covered under any warranty for damages caused from being powered by a VFD. All other bearing failure is covered per NMC's standard warranty. An electric motor repair shop approved to service U.S. MOTORS® brand motors must verify that the cause of the bearing failure was not due to Electrical Discharge Machining.

Medium Voltage and Slow Speed Considerations

Motors that are rated above 700 VAC or that are eight pole and slower require special consideration and installation and are **not** covered under the warranty guidelines in this document. Motors that are rated above 700VAC have special cable length and voltage differential issues that are specific to the VFD type and manufacture. The motor construction and cost may vary dramatically depending on the VFD topology and construction. Contact your NMC representative with VFD manufacturer name and model type for application and motor construction considerations. Motors that are designed eight pole and slower also require special installation and filters per the drive manufacturer.

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Classifications

For your assistance, below is a comparison of environmental protection classifications of IEC 34-5 and NEMA^{®†} MG 1 - 1.25 and 1.26. Because direct correlation is not always possible, the following represents the more common interpretations.

NEMA ^{®†}	IEC
Open Machines An open machine is one having ventilating openings which permit passage of external cooling air over and around the windings of the machine. The term "open machine," when applied to large apparatus without qualification, designates the machine having no restriction to ventilation other than that necessitated by mechanical construction.	
Drip proof Machines A drip proof machine is an open machine in which the ventilating openings are so constructed that successful operation is not interfered with when drops of liquid or solid particles strike or enter the enclosure at any angle from 0 degrees to 15 degrees downward from the vertical.	IP 12 Protection against accidental or inadvertent contact with live and moving parts inside the enclosure by a large surface of the human body (for example, a hand) but no protection against deliberate access to such parts. Protection against ingress of large solid foreign bodies (diameter greater than 50 mm). Machine protected against drops of water falling up to 15 percent from the vertical.
Drip proof Guarded A guarded machine is an open machine in which all openings giving direct access to live metal or rotating parts (except smooth rotating surfaces) are limited in size by the structural parts or by screens, baffles, grilles, expanded metal or other means to prevent accidental contact with hazardous parts. Openings giving direct access to such live or rotating parts shall not permit the passage of a 3/4-inch diameter cylindrical rod.	IP 22 IP 22 protection against contact by finger with live or moving parts inside the enclosure. Protection against ingress of small, solid foreign bodies (diameter greater than 50 mm). Machine protected against drops of water falling up to 15 degrees from the vertical.

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Classifications *(continued)*

NEMA ^{®†}	IEC
<p>Weather Protected Machines</p> <p>A Weather Protected Type I machine is a guarded machine with ventilating passages constructed to minimize the entrance of rain, snow and airborne particles to the electric parts. Ventilating openings are constructed to prevent the passage of a cylindrical rod 3/4 diameter.</p> <p>A Weather Protected Type II machine has its ventilating passages at both intake and discharge so arranged that high-velocity air and airborne particles blown into the machine by storms or high winds can be discharged without entering the internal ventilating passages leading directly to the electric parts of the machine itself. The normal path of ventilating air which enters the electric parts of the machine shall be so arranged by baffling or separate housings as to provide at least three abrupt changes in direction, none of which shall be less than 90 degrees. In addition, an area of low velocity not exceeding 600 feet per minute shall be provided in the intake air path to minimize the possibility of moisture or dirt being carried into the electric parts of the machine.</p>	<p>IP 23</p> <p>Machine protected against spraying water. A machine is weather protected when its design reduces the ingress of rain, snow and airborne particles, under specified conditions, to an amount consistent with correct operation.</p> <p>IPW 23</p> <p>Protection against contact by finger with live or moving parts inside the enclosure.</p> <p>Protection against ingress of small, solid foreign bodies (diameter greater than 12mm). Water falling as a spray at an angle equal to or smaller than 60°C with respect to the vertical shall have no harmful effect.*</p> <p>IPW 24</p> <p>Protection against contact by finger or live or moving parts inside the enclosure.*</p> <p>Protection against ingress of small solid, foreign bodies (diameter greater than 12mm). Water splashed against the machine from any direction shall have no harmful effect.</p>
<p>Totally Enclosed Machines</p> <p>A Totally Enclosed machine is enclosed to prevent the free exchange of air between the inside and outside of the case, but not sufficiently enclosed to be termed airtight.</p> <p>A Totally Enclosed non-ventilated machine is a frame surface cooled totally enclosed machine only equipped for cooling by free convection.</p> <p>A Totally Enclosed fan-cooled machine is a frame-surface cooled totally enclosed machine equipped for self-exterior cooling by means of a fan or fans integral with the machine but external to the enclosing parts.</p>	

* For machines cooled by an external cooling fan, the fan shall be protected to prevent contact with the blades or spokes of the fan with a standard test finger. However, at the outlet of the fan, the test finger is not inserted past the 50mm diameter guard.

Classifications *(continued)*

NEMA ^{®†}	IEC
<p>Totally Enclosed Fan Cooled Guarded</p> <p>A Totally Enclosed Fan Cooled Guarded machine is a totally enclosed fan cooled machine in which all openings giving direct access to the fan are limited in size by the design of the structural parts or screens, grilles, expanded metal, etc., to prevent accidental contact with the fan. Such openings shall not permit the passage of a cylindrical rod .75 inch in diameter and a probe shall not contact the blades, spokes or other irregular fan surfaces.</p> <p><i>Standard WP II with filters meets the intent of IP-44</i></p>	<p>IP 44</p> <p>Protection against contact with live or moving parts inside the enclosure by tools, wires or such objects of thickness greater than 1mm.</p> <p>Protection against ingress of small, solid foreign bodies (diameter greater than 1mm), excluding ventilation openings (intake and discharge of external fans) and the drain hole of enclosed machine, which may have degree of 2 protection.</p> <p>Water splashed against the machine from any direction shall have no harmful effect.</p>
<p>WPI and WP II on TITAN[®] frames may be utilized in place of IP-54. In extremely dusty areas WP II motors with filters should be used. TEFC is an acceptable enclosure.</p>	<p>IP 54</p> <p>Complete protection against contact with live or moving parts inside the enclosure.*</p> <p>Protection against harmful deposits of dust. The ingress of dust is not totally prevented, but dust cannot enter in an amount sufficient to interfere with satisfactory operation of the machine.</p> <p>Water splashed against the motor from any direction shall have no harmful effects.</p>
<p>Totally Enclosed Fan Cooled Waterproof Machine</p> <p>A waterproof machine is a totally enclosed machine constructed to exclude water applied in the form of a stream from a hose, except that leakage may occur around the shaft, provided it is prevented from entering the reservoir and a provision is made for automatically draining the machine. The means for automatic draining may be a check valve or a tapped hole at the lowest part of the frame which will serve for application of a drain pipe.</p>	<p>IP 55</p> <p>Complete protection against contact with live or moving parts inside the enclosure.*</p> <p>Protection against harmful deposits of dust. The ingress of dust is not totally prevented, but dust cannot enter in an amount sufficient to interfere with satisfactory operation of the machine.</p> <p>Water projected by a nozzle against the machine from any direction shall have no harmful effect.</p>

* For machines cooled by an external cooling fan, the fan shall be protected to prevent contact with the blades or spokes of the fan with a standard test finger. However, at the outlet of the fan, the test finger is not inserted past the 50mm diameter guard.



Agency Approvals

ISO9001 Certified

By British Standards Institute of America

CSA International (CSA®†)

Formally the Canadian Standards Association

CSA®† sets safety standards for motors and other electrical equipment used in Canada. The motors that meet the CSA®† standards display the CSA®† logo on the nameplate.

Underwriters Laboratories, Inc. (UL®†)

UL®† is an independent testing organization that sets safety standards for motors and other equipment.

Conformité Européenne European Community (CE Certification)

The CE marking indicates that the product complies with the essential requirements for health, safety, environmental and consumer protection. The CE mark can only to non-hazardous location motors rated 1000 volts or less, frame 180 through 449, Dripproof and Totally Enclosed Fan Cooled enclosures. Many Nidec Motor Corporation motors can have the CE logo applied. For information on CE logo availability, contact your Nidec Motor Corporation representative.

UL®† & CSA®† Listings

	UL®†		CSA®†	
	IHP	FHP	IHP	FHP
General Construction	E51488	E22922	191252	156060
Hazardous Location	E10336	E29183		
Thermal Protection	E38946	E10073		
Fire Pump	EX5189	-	-	-

*For details on VFD for these motors, refer to Suitability of IHP Motors on Variable Frequency Drives (VFD), page I-3.

TITAN® Horizontal Motors

Typical Construction Materials

Windings: Copper

Rotor Bar: Aluminum (Copper Bar option available on most ratings)

Laminations: High Silicone content steel with C5 core plate

Shafts: 1045 Hot Rolled Steel (High-tensile steel option available)

Frames:

Enclosure	Frame Size	Frame Material
TEFC	449-6800	Cast Iron
Div. 1 Hazardous Location	5000-5800	Cast Iron
ODP, WPI	447, 449	Cast Iron
ODP, WPI, WPIL	5000	Cast Iron
ODP, WPI, WPIL, TEAAC, TEWAC	5800-9600	Fabricated Steel

Brackets: Cast Iron

Fan Cover:

Frame	449	5000	5800	6800
Standard	Steel	Steel	Steel	Steel
Optional	Cast Iron	Cast Iron	Cast Iron	-

Note: Cast Iron is standard on 449-5812 Frame CORRO-DUTY® Motors

Bearings: Radial Ball (Roller or Sleeve Bearings available on most ratings)

Bearing Cap: Cast Iron (Standard on all TITAN® Horizontal Motors)

Fan, External:

Frame	449 (TEFC)			5000 (TEFC)			5807/8/9 (TEFC)		
Poles	2	4	6 & Slower	2	4	6 & Slower	2	4	6 & Slower
Fan Type	2	1,3	1	2	1,3	1	2	1,3	1
Standard Material	B	A	B	B	B	B	B	B	B
Optional Material	C	B,C	C	C	C	C	C	C	C

Frame	5810/12 (TEFC)			6800 (TEFC)			5800, 6800 & 8000 (TEAAC)		
Poles	2	4	6 & Slower	2	4	6 & Slower	2	4	6 & Slower
Fan Type	2	1,4	1	-	4	1	2	4	1
Standard Material	B	B	B	-	B	B	B	B	B
Optional Material	C	C	-	-	C	-	C	C	-

Note: Due to continuing product improvement programs, some of the information shown may change without notice.

Fan Types		Materials	
1	Radial – Bi-Directional	A	Plastic or Aluminum
2	Propeller – Unidirectional – Cannot be reversed in field, requires different fan	B	Aluminum
3	Sirocco – Unidirectional – Can be reversed in field	C	Aluminum
4	Sirocco – Unidirectional – Cannot be reversed in field; requires different fan		



Limited Warranty

Refer to usmotors.com website for the most up-to-date warranty information.

All Nidec Motor Corporation products shall carry the limited warranty of 12 months from the date of installation, not to exceed 18 months from date of manufacture as specified in Section 5 of the Nidec Motor Corporation's Terms and Conditions of Sale except those specifically listed below, or noted within individual product family pages within this catalog.

	Installed / Manufactured	Installed / Manufactured
TITAN Motors - 449 Frame and Larger	Sine Wave Power	VFD Power
Standard Efficient & Energy Efficient	12 / 18 months	12 / 18 months (low voltage only)
Premium Efficient	24 / 30 months	18 / 24 months (low voltage only)
Inverter Duty	24 / 30 months	24 / 30 months

Deferred & Extended Warranty Information

DEFERRED AND EXTENDED WARRANTIES (OPTIONAL WARRANTIES)

Deferred and extended warranties, defined as follows, apply only to 449 frame and larger horizontal and vertical motors, for use in the continental United States only. All optional warranties must be approved in writing by Nidec Motor Corporation. Contact Marketing for Approval.

Deferred Warranty

Nidec Motor Corporation's limited warranty, as set forth in the standard terms and conditions of sale, page I-12, shall apply subject to the following modification: for a 5% addition to the net price of the motor ("Net Adder"), the warranty period on the motor will be for a period of one year (or more for applicable products) from that date of initial operation, but not in excess of 60 months from the date of shipment subject to the following conditions:

1. That within thirty days prior to initial operation, a Nidec Motor Corporation (NMC) Service Engineer, or authorized NMC Service Station, be hired by the Buyer at Buyer's expense, to thoroughly inspect the motor to ascertain that the motor is in "as shipped" condition. This inspection will include but not be limited to:
 - a. Megger test of winding insulation.
 - b. Internal inspection to determine that the winding has not been damaged and that the motor is clean and dry.
 - c. Inspection of the bearings to determine they have not been damaged and there is no water in the oil reservoirs.
 - d. External inspection to determine that no damage has been made.
2. Make any corrections which this inspection shows to be needed because the motor has been in storage or standing idle. These corrections will be made at Buyer's expense if corrections required are due to causes other than defects in material or workmanship.
3. That an affidavit certifying that the motor has successfully passed the inspection and is in "as shipped" condition be supplied to NMC by Buyer. Failure to provide NMC with the affidavit certifying that the motor has passed inspection and is in "as shipped" condition will result in voiding the warranty.

Extended Warranty

When Buyer's specification requires a warranty period longer than the limited warranty set forth in Nidec Motor Corporation's standard terms and conditions of sale, page I-12, the net price of each motor will be increased according to the schedule, which follows. Nidec Motor Corporation may accept an order with up to 60 months coverage.

From Mfg. Date	From Install	Net Adder
30 months	24 months	2%
42 months	36 months	3%
54 months	48 months	5%
66 months	60 months	6%



Terms & Conditions of Sale

Nidec Motor Corporation, referred to herein as the "Seller" and the customer or person or entity purchasing goods ("Goods") from Seller is referred to as the "Buyer." These Terms and Conditions, any price list or schedule, quotation, acknowledgment or invoice from Seller relevant to the sale of the Goods and all documents incorporated by specific reference herein or therein, constitute the complete and exclusive statement of the terms of the agreement governing the sale of Goods by Seller to Buyer. Seller's acceptance of Buyer's purchase order is expressly conditional on Buyer's assent to all of Seller's terms and conditions of sale, including terms and conditions that are different from or additional to the terms and conditions of Buyer's purchase order. Buyer's acceptance of or payment for the Goods will manifest Buyer's assent to these Terms and Conditions. Seller reserves the right in its sole discretion to refuse orders.

1. **PRICES:** Prices for Goods, whether specified in Seller's price list or schedule, acknowledgment or written quotation, are subject to change without notice. Such prices shall be adjusted to reflect Seller's prices for Goods as in effect at the time of requested shipment date, and each shipment will be invoiced at such prices. All prices are exclusive of taxes, transportation and insurance, which are to be borne by Buyer.

2. **TAXES:** Any current or future tax or governmental charge (or increase in same) affecting Seller's costs of production, sale, or delivery or shipment, or which Seller is otherwise required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods, shall be for Buyer's account and shall be added to the price or billed to Buyer separately, at Seller's election.

3. **TERMS OF PAYMENT:** Unless otherwise specified by Seller, terms are net thirty (30) days from date of Seller's invoice in U.S. currency. Seller shall have the right, among other remedies, either to terminate this agreement or to suspend further performance under this and/or other agreements with Buyer in the event Buyer fails to make any payment when due, which other agreements Buyer and Seller hereby amend accordingly. Buyer shall be liable for all expenses, including attorneys' fees, relating to the collection of past due amounts. If any payment owed to Seller is not paid when due, it shall bear interest, at a rate to be determined by Seller, which shall not exceed the maximum rate permitted by law, from the date on which it is due until it is paid. Should Buyer's financial responsibility become unsatisfactory to Seller, cash payments or security satisfactory to Seller may be required by Seller for future deliveries and for the Goods theretofore delivered. If such cash payment or security is not provided, in addition to Seller's other rights and remedies, Seller may discontinue deliveries. Buyer hereby grants Seller a security interest in all Goods sold to Buyer by Seller, which security interest shall continue until all such Goods are fully paid for in cash, and Buyer, upon Seller's demand, will execute and deliver to Seller such instruments as Seller requests to protect and perfect such security interest.

4. **SHIPMENT AND DELIVERY:** While Seller will use all reasonable commercial efforts to maintain the delivery date(s) acknowledged or quoted by Seller, all shipping dates are approximate and not guaranteed. Seller reserves the right to make partial shipments. Seller, at its option, shall not be bound to tender delivery of any Goods for which Buyer has not provided shipping instructions and other required information. If the shipment of the Goods is postponed or delayed by Buyer for any reason, Buyer agrees to reimburse Seller for any and all storage costs and other additional expenses resulting therefrom. Risk of loss and legal title to the Goods shall transfer to Buyer for sales in which the end destination of the Goods is outside of the United States immediately after the Goods have passed beyond the territorial limits of the United States. For all other shipments, risk of loss for damage and responsibility shall pass from Seller to Buyer upon delivery to and receipt by carrier at Seller's shipping point. All shipments are F.O.B. Seller's shipping point. Any claims for shortages or damages suffered in transit are the responsibility of Buyer and shall be submitted by Buyer directly to the carrier. Shortages or damages must be identified and signed for at the time of delivery.

5. **LIMITED WARRANTY:** Subject to the limitations of Section 6, Seller warrants that the Goods manufactured by Seller, other than those specifically identified below, will be free from defects in material and workmanship and meet Seller's published specifications at the time of shipment under normal use and regular service and maintenance for a period of twelve (12) months from the date of shipment of the Goods by Seller or eighteen (18) months from the date of manufacture, whichever occurs sooner, unless otherwise specified by Seller in writing. Partial Motors of any kind not fully assembled by Seller shall carry no warranty of any kind, express or implied. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. **THE WARRANTY SET FORTH IN THIS SECTION 5 AND THE WARRANTY SET FORTH IN SECTION 7, ARE THE SOLE AND EXCLUSIVE WARRANTIES GIVEN BY SELLER WITH RESPECT TO THE GOODS AND ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO SELLER IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT SELLER'S PRODUCTS ARE SPECIFICALLY DESIGNED AND/OR MANUFACTURED BY SELLER FOR BUYER'S USE OR PURPOSE.**

This warranty does not extend to any losses or damages due to misuse, accident, abuse, neglect, normal wear and tear, negligence (other than Seller's), unauthorized modification or alteration, use beyond rated capacity, unsuitable power sources or environmental conditions, improper installation, repair, handling, maintenance or application or any other cause not the fault of Seller. To the extent that Buyer or its agents has supplied specifications, information, representation of operating conditions or other data to Seller in the selection or design of the Goods and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

If within thirty (30) days after Buyer's discovery of any warranty defects within the warranty period, Buyer notifies Seller thereof in writing, Seller shall, at its option and as Buyer's exclusive remedy, repair, correct or replace or refund the purchase price for, that portion of the Goods found by Seller to be defective. Failure by Buyer to give such written notice within the applicable time period shall be deemed an absolute and unconditional waiver of Buyer's claim for such defects. Seller shall have the right to require the Buyer to deliver the Goods to Seller's designated repair center or manufacturing facility. All costs associated with dismantling, reinstallation and transportation to and from Seller's designated repair center or manufacturing facility and the time and expense of Seller's personnel and representatives for site travel and diagnosis under this warranty shall be borne by the Buyer. Goods repaired or replaced during the warranty period shall be covered by the foregoing warranty for the remainder of the original warranty period or ninety (90) days from the date of shipment, whichever is longer. Buyer assumes all other responsibility for any loss, damage, or injury to persons or property arising out of, connected with, or resulting from the use of Goods, either alone or in combination with other products/components.

Section 5 applies to any entity or person who may buy, acquire or use the Goods, including any entity or person who obtains the Goods from Buyer, and shall be bound by the limitations therein, including Section 6. Buyer agrees to provide such subsequent transferee conspicuous, written notice of the provisions of Sections 5 and 6.

6. **LIMITATION OF REMEDY AND LIABILITY: THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY HEREUNDER (OTHER THAN THE WARRANTY PROVIDED UNDER SECTION 7) SHALL BE LIMITED TO REPAIR, CORRECTION OR REPLACEMENT, OR REFUND OF THE PURCHASE PRICE UNDER SECTION 5.**

SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE AND THE REMEDIES OF BUYER SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE PAID BY BUYER FOR THE SPECIFIC GOODS PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, business interruption, loss of use, revenue, reputation and data, costs incurred, including without limitation, for capital, fuel, power and loss or damage to property or equipment.

It is expressly understood that any technical advice furnished by Seller with respect to the use of the Goods is given without charge, and Seller assumes no obligation or liability for the advice given, or results obtained, all such advice being given and accepted at Buyer's risk.

7. **PATENTS AND COPYRIGHTS:** Subject to the limitations of the second paragraph of Section 6, Seller warrants that the Goods sold, except as are made specifically for Buyer according to Buyer's specifications, do not infringe any valid U.S. patent or copyright in existence as of the date of shipment. This warranty is given upon the condition that Buyer promptly notifies Seller of any claim or suit involving Buyer in which such infringement is alleged and cooperates fully with Seller and permit Seller to control completely the defense, settlement or compromise of any such allegation of infringement. Seller's warranty as to use patents only applies to infringement arising solely out of the inherent operation according to Seller's specifications and instructions (i) of such Goods, or (ii) of any combination of Goods acquired from Seller in a system designed by Seller. In the event such Goods are held to infringe such a U.S. patent or copyright in such suit, and the use of

such Goods is enjoined, or in the case of a compromise or settlement by Seller, Seller shall have the right, at its option and expense, to procure for Buyer the right to continue using such Goods, or replace them with non-infringing Goods, or modify same to become non-infringing, or grant Buyer a credit for the depreciated value of such Goods and accept return of them. In the event of the foregoing, Seller may also, at its option, cancel the agreement as to future deliveries of such Goods, without liability. No license or rights in any of Seller's intellectual property associated with the Goods is granted hereby.

8. **EXCUSE OF PERFORMANCE:** Seller shall not be liable for delays in performance or for non-performance due to acts of God, acts of Buyer, war, fire, flood, weather, sabotage, strikes or labor disputes, civil disturbances or riots, governmental requests, restrictions, allocations, laws, regulations, orders or actions; unavailability of or delays in transportation; default of suppliers; or unforeseen circumstances or any events or causes beyond Seller's reasonable control. Deliveries or other performance may be suspended for an appropriate period of time or canceled by Seller upon notice to Buyer in the event of any of the foregoing, but the balance of the agreement shall otherwise remain unaffected as a result of the foregoing.

If Seller determines that its ability to supply the total demand for the Goods, or to obtain material used directly or indirectly in the manufacture of the Goods, is hindered, limited or made impracticable due to causes set forth in the preceding paragraph, Seller may allocate its available supply of the Goods or such material (without obligation to acquire other supplies of any such Goods or material) among itself and its purchasers on such basis as Seller determines to be equitable without liability for any failure of performance which may result therefrom.

9. **CANCELLATION:** Buyer may cancel orders only upon reasonable advance written notice and upon payment to Seller of Seller's cancellation charges which include, among other things, all costs and expenses incurred, and, to cover commitments made, by the Seller and a reasonable profit thereon. Seller's determination of such termination charges shall be conclusive.

10. **CHANGES:** Buyer may request changes or additions to the Goods consistent with Seller's specifications and criteria. In the event such changes or additions are accepted by Seller, Seller may revise the price and dates of delivery. Seller reserves the right to change designs and specifications for the Goods without prior notice to Buyer, except with respect to Goods being made-to-order for Buyer. Seller shall have no obligation to install or make such change in any Goods manufactured prior to the date of such change.

11. **NUCLEAR/MEDICAL: GOODS SOLD HEREUNDER ARE NOT FOR USE IN CONNECTION WITH ANY NUCLEAR, MEDICAL, LIFE-SUPPORT AND RELATED APPLICATIONS.** Buyer accepts Goods with the foregoing understanding, agrees to communicate the same in writing to any subsequent purchasers or users and to defend, indemnify and hold harmless Seller from any claims, losses, suits, judgments and damages, including incidental and consequential damages, arising from such use, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability.

12. **ASSIGNMENT:** Buyer shall not assign its rights or delegate its duties hereunder or any interest herein without the prior written consent of Seller, and any such assignment, without such consent, shall be void.

13. **QUANTITY:** Buyer agrees to accept overruns of up to ten percent (10%) of the order on "made-to-order" goods, including parts. Any such additional items shall be priced at the price per item charged for the specific quantity ordered.

14. **REPLACEMENT / SERVICE GOODS:** Upon the cancellation or fulfillment of this order, Seller will have no obligation to sell and Buyer will have no obligation to purchase the Goods sold hereunder, including, but not limited to, the supply of replacement parts for Goods or Goods for Buyer's consumer service division. Seller is not obligated to sell Buyer or its consumer service divisions Goods: (i) for any fixed period of time after production of the Goods supplied hereunder ceases or after the last date of shipment made under this order; or (ii) at any pre-established price to fulfill Buyer's or its consumer service divisions requirements during or after production of the Goods ceases or after the last date of shipment under this order. Seller shall have the absolute right to revise the price of Goods and the terms of sale and to modify or discontinue the sale of the Goods, and such action shall not form the basis of any claim by Buyer against Seller.

15. **TOOLING:** Tool, die, and pattern charges, if any, are in addition to the price of the Goods and are due and payable upon completion of the tooling. All such tools, dies and patterns shall be and remain the property of Seller. Charges for tools, dies, and patterns do not convey to Buyer, title, ownership interest in, or rights to possession or removal, or prevent their use by Seller for other purchasers, except as otherwise expressly provided by Seller and Buyer in writing with reference to this provision.

16. **INSPECTION/TESTING:** Buyer, at its option and expense, may inspect and observe the testing by Seller of the Goods for compliance with Seller's standard test procedures prior to shipment, which inspection and testing shall be conducted at Seller's plant at such reasonable time as is specified by Seller. Any rejection of the Goods must be made promptly by Buyer before shipment. Tests shall be deemed to be satisfactorily completed and the test fully met when the Goods meet Seller's criteria for such procedures.

17. **DRAWINGS:** Seller's prints and drawings (including without limitation, the underlying technology) furnished by Seller to Buyer in connection with this agreement are the property of Seller and Seller retains all rights, including without limitation, exclusive rights of use, licensing and sale. Possession of such prints or drawings does not convey to Buyer any rights or license, and Buyer shall return all copies (in whatever medium) of such prints or drawings to Seller immediately upon request therefor.

18. **EXPORT/IMPORT:** Buyer agrees that all applicable import and export control laws, regulations, orders and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and Buyer are established or from which Goods may be supplied, will apply to their receipt and use. In no event shall Buyer use, transfer, release, import, export, Goods in violation of such applicable laws, regulations, orders or requirements.

19. **INSURANCE:** Seller shall carry adequate product liability and commercial general liability insurance. Seller shall, upon written request from Buyer, furnish Buyer with certificates of insurance confirming the existence of such insurance. Seller does not waive its, or its insurers', rights of subrogation.

20. **GENERAL PROVISIONS:** These terms and conditions supersede all other communications, negotiations and prior oral or written statements regarding the subject matter of these terms and conditions. No change, modification, rescission, discharge, abandonment, or waiver of these terms and conditions shall be binding upon the Seller unless made in writing and signed on its behalf by a duly authorized representative of Seller. No conditions, usage of trade, course of dealing or performance, understanding or agreement purporting to modify, vary, explain, or supplement these terms and conditions shall be binding unless hereafter made in writing and signed by the party to be bound, and no modification or additional terms shall be applicable to this agreement by Seller's receipt, acknowledgment, or acceptance of purchase orders, shipping instruction forms, or other documentation containing terms at variance with or in addition to those set forth herein. Any such modifications or additional terms are specifically rejected and deemed a material alteration hereof. If this document shall be deemed an acceptance of a prior offer by Buyer, such acceptance is expressly conditional upon Buyer's assent to any additional or different terms set forth herein. No waiver by either party with respect to any breach or default or of any right or remedy, and no course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default or of any other right or remedy, unless such waiver be expressed in writing and signed by the party to be bound. All typographical or clerical errors made by Seller in any quotation, acknowledgment or publication are subject to correction.

The validity, performance, and all other matters relating to the interpretation and effect of this agreement shall be governed by the law of the state of Missouri without regard to its conflicts of laws principles. Buyer and Seller agree that the proper venue for all actions arising in connection herewith shall be only in Missouri and the parties agree to submit to such jurisdiction. No action, regardless of form, arising out of transactions relating to this contract, may be brought by either party more than two (2) years after the cause of action has accrued. The U.N. Convention on Contracts for the International Sales of Goods shall not apply to this agreement.



Pricing Guidelines

Select the Base List Price from the appropriate section.

Price Adders for Accessories and Modifications that are not part of the standard product offering can be found in the following sections. Note that not all Accessories and Modifications are available on all product types or frame sizes. Refer to the detailed description for restrictions and guidelines of each Accessory and Modification.

All List Price Adders carry the same Discount Symbol as the Base List Price.

Percentage Adders are percent of the Base List Price, unless otherwise noted.

Some Accessories/Modifications will require a larger than standard Frame Size. All adders are to be made based on the confirmed Frame Size.

Round Total List Price to the nearest dollar.

Note that some adders are Net Adders.

Refer to office for product lead-times.

Refer to Nidec Motor Corporation's Terms and Conditions of Sale.

All prices are in U.S. Dollars.

Prices and information subject to change without notice.

This catalog covers Horizontal Motors in Frame Sizes 449-9600. For smaller Motors, refer to the Custom Motor Catalog (PB202).

For Vertical Motors, refer to the Vertical Motor Catalog (PB500).

For a wide range of products from stock, refer to the Full Line Standard Motor Catalog (FL600).

Pricing Example:

Wanted: 1000 HP, 1000 RPM, 3300 Volt, 50 Hertz, 1.15 Service Factor, Standard Efficient, Horizontal Motor, with a WP11 Enclosure, Bearing RTD's on both ends (100 Ohm Platinum) and a Space Heater.

Start with the Base List Price of a 1000HP 1200 RPM (60Hz) Motor from the "WP11" Base List Price Section: \$85,866 (4000 Volt Base List Price), 5813 Frame Size

Then, add the modifications:

50 Hertz	15%	$85866 \times 0.15 =$	12879.90
Service Factor	5%	$85866 \times 0.05 =$	4293.30
Bearing RTD's	$\$1435 \times 2$	Double for both ends =	2870.00
Space Heater	N/C	No Charge on WP11	0.00
3300 Volt	N/C	No Charge for 3300 Volt, 50 Hz	0.00
Total List Price			\$ 105,909 Round To Nearest Dollar



TITAN® Horizontal Motors

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



Modifiable TITAN® Horizontal Motors

Horizontal Open Drip Proof

Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6DM)

FEATURES:

- Cast Iron & Fabricated Steel Construction
- Class F VPI Epoxy Insulation
- 1.15 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
150	3600*	----	----	447	\$16,802	447	\$18,342	5010	\$32,484
	1800	----	----	447	\$17,050	449	\$17,006	----	----
	1200	----	----	449	\$20,192	449	\$22,212	----	----
	900	----	----	5008	\$27,476	5008	\$28,300	----	----
	720	5008	\$23,630	5010	\$29,872	5010	\$30,768	----	----
	600	5010	\$26,135	5010	\$31,444	5010	\$32,387	----	----
	514	5012	\$32,423	5012	\$38,536	5012	\$42,390	----	----
200	3600*	----	----	447	\$18,482	447	\$20,331	----	----
	1800	----	----	447	\$17,171	449	\$18,342	----	----
	1200	----	----	449	\$21,346	449	\$23,481	----	----
	900	----	----	5008	\$28,575	5008	\$29,432	----	----
	720	5008	\$24,658	5010	\$28,915	5010	\$31,807	----	----
	600	5010	\$29,988	5012	\$33,136	5012	\$36,450	----	----
	514	5012	\$35,827	5012	\$43,332	5012	\$47,664	----	----
250	3600*	----	----	449	\$20,700	449	\$22,770	5010	\$32,484
	1800	----	----	449	\$18,342	449	\$20,176	5008	\$31,081
	1200	----	----	449	\$21,988	5008	\$27,053	5010	\$33,604
	900	5008%	\$25,644	5008	\$27,952	5008	\$30,748	5012	\$40,530
	720	5008	\$26,557	5010	\$32,610	5010	\$35,871	----	----
	600	5012	\$37,096	5012	\$40,246	5012	\$44,271	----	----
	514	5810	\$47,077	5810	\$49,500	5810	\$54,450	----	----
300	3600*	----	----	5008	\$28,054	5008	\$28,922	5010	\$33,907
	1800	----	----	5008	\$24,427	5008	\$25,160	5010	\$32,644
	1200	----	----	5008	\$28,096	5008	\$28,939	5012	\$35,249
	900	5008	\$26,670	5008	\$30,897	5010	\$33,987	5810	\$52,442
	720	5010	\$30,448	5010	\$35,271	5010	\$38,798	----	----
	600	5810	\$47,365	5810	\$51,808	5810	\$56,988	----	----
	514	5811	\$50,446	5811	\$54,519	5811	\$59,971	----	----
350	3600*	----	----	5008	\$29,176	5010	\$30,658	5010	\$37,692
	1800	----	----	5008	\$28,199	5008	\$29,044	5010	\$33,950
	1200	----	----	5008	\$29,025	5008	\$29,896	5810	\$53,929
	900	5010	\$27,736	5010	\$33,421	5010	\$36,764	5811	\$56,481
	720	5012	\$34,209	5012	\$39,519	5012	\$43,471	----	----
	600	5811	\$51,738	5811	\$53,423	5811	\$58,765	----	----
	514	5812	\$55,535	5812	\$57,732	5812	\$63,504	----	----
400	3600*	----	----	5008	\$30,343	5010	\$31,669	5010	\$41,673
	1800	----	----	5008	\$29,130	5008	\$30,004	5012	\$35,897
	1200	5010	\$27,500	5008	\$29,983	5008	\$31,185	5811	\$55,558
	900	5010	\$29,728	5010	\$35,428	5010	\$38,970	5812	\$60,923
	720	5810	\$47,192	5810	\$48,288	5810	\$53,117	----	----
	600	5811	\$54,115	5811	\$57,681	5811	\$63,449	----	----
	514	5812	\$60,127	5812	\$62,538	5812	\$68,792	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

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Modifiable TITAN® Horizontal Motors

Horizontal Open Drip Proof

Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6DM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
450	3600*	----	----	5010	\$31,344	5010	\$34,368	5012	\$45,303
	1800	5008%	\$25,685	5008	\$30,091	5010	\$31,084	5012	\$38,585
	1200	5010	\$29,453	5008	\$30,972	5010	\$33,749	5812	\$58,731
	900	5010	\$32,527	5012	\$38,469	5012	\$42,316	5812	\$66,231
	720	5810	\$48,346	5810	\$52,427	5811	\$56,985	----	----
	600	5812	\$56,792	5812	\$60,462	5812	\$66,508	----	----
	514	5813	\$62,751	5813	\$67,334	5813	\$74,068	----	----
500	3600*	----	----	5010	\$33,893	5010	\$37,282	5012	\$49,145
	1800	5010%	\$28,119	5010	\$31,084	5010	\$32,016	5012	\$41,080
	1200	5010	\$32,432	5010	\$35,652	5010	\$39,217	5812	\$62,654
	900	5810	\$49,269	5810	\$51,692	5810	\$56,862	5812	\$70,500
	720	5811	\$52,962	5811	\$54,522	5812	\$59,973	----	----
	600	5812	\$60,912	5812	\$63,415	5813	\$69,757	----	----
	514	8007	\$102,808	8007	\$102,808	8007	\$113,135	----	----
600	3600*	5010	\$33,993	5010	\$37,385	5010	\$41,123	----	----
	1800	5010	\$28,576	5010	\$32,110	5010	\$34,927	5811	\$54,544
	1200	5012	\$37,131	5012	\$40,258	5012	\$44,283	5813	\$69,115
	900	5810	\$52,385	5810	\$55,212	5811	\$60,733	6811	\$86,141
	720	5812	\$53,155	5812	\$57,928	5812	\$63,720	----	----
	600	5813	\$68,308	5813	\$74,031	8006	\$108,704	----	----
	514	8007	\$106,962	8007	\$106,962	8007	\$117,658	----	----
700	3600*	5012	\$40,154	5012	\$40,154	5012	\$44,169	----	----
	1800	5010	\$34,830	5010	\$34,830	5010	\$38,313	5812	\$58,962
	1200	5012	\$41,827	5012	\$41,827	5012	\$46,010	5813	\$71,769
	900	5811	\$57,577	5811	\$57,577	5811	\$63,335	6811	\$86,481
	720	5812	\$64,552	5812	\$64,552	5813	\$71,008	----	----
	600	8007	\$103,985	8007	\$103,985	8008	\$114,383	----	----
	514	8008	\$113,342	8008	\$113,342	8008	\$124,673	----	----
800	3600*	5012	\$43,154	5012	\$43,154	5012	\$47,469	5813	\$71,712
	1800	5012	\$37,908	5012	\$37,908	5012	\$41,699	5813	\$64,500
	1200	5810	\$54,173	5810	\$54,173	5811	\$59,590	6811	\$86,704
	900	5811	\$61,293	5812	\$61,293	5812	\$67,423	8008	\$118,459
	720	5813	\$71,192	6810	\$77,023	6810	\$80,712	----	----
	600	8008	\$109,731	8008	\$109,731	8008	\$120,711	----	----
	514	8009	\$123,542	8009	\$123,542	8009	\$135,900	----	----
900	3600*	5012	\$50,654	5012	\$50,654	5012	\$55,719	----	----
	1800	5012	\$41,760	5012	\$41,760	5012	\$45,936	5813	\$71,077
	1200	5811	\$57,001	5811	\$57,001	5812	\$62,701	6811	\$88,674
	900	5812	\$66,810	5812	\$66,810	5812	\$73,491	8009	\$123,395
	720	8008	\$109,947	8008	\$109,947	8008	\$113,596	----	----
	600	----	----	8008	\$116,158	8009	\$127,765	----	----
	514	----	----	8010	\$142,281	8010	\$156,462	----	----
1000	3600*	5012	\$54,115	5012	\$54,115	5012	\$59,527	----	----
	1800	5012	\$44,896	5012	\$44,896	5012	\$49,386	5813	\$79,604
	1200	5811	\$61,333	5811	\$61,333	5813	\$67,467	8008	\$116,980
	900	5813	\$72,346	5813	\$72,346	6810	\$79,581	8010	\$136,965

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

% Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016

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



Modifiable TITAN® Horizontal Motors

Horizontal Open Drip Proof

Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6DM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
1000	720	8008	\$112,191	8008	\$112,191	8009	\$121,465	----	----
	600	----	----	8009	\$127,350	8009	\$140,077	----	----
	514	----	----	9604	\$169,548	9604	\$175,292	----	----
1250	3600*	----	----	5812	\$66,808	5812	\$73,488	----	----
	1800	----	----	5812	\$60,653	5812	\$66,719	6811	\$87,947
	1200	----	----	5813	\$72,141	5813	\$79,355	8009	\$115,500
	900	----	----	6811	\$82,510	6811	\$90,762	9604	\$142,038
	720	----	----	8009	\$121,165	8010	\$133,282	----	----
	600	----	----	8009	\$140,885	8010	\$154,973	----	----
	514	----	----	9605	\$172,939	9606	\$184,050	----	----
1500	3600*	----	----	5813	\$77,423	5813	\$85,165	----	----
	1800	----	----	5812	\$66,644	5812	\$73,308	8009	\$107,192
	1200	----	----	6811	\$79,491	6811	\$87,440	8010	\$123,808
	900	----	----	8008	\$106,258	8008	\$116,883	9605	\$153,402
	720	----	----	8010	\$128,423	8011	\$141,265	----	----
	600	----	----	9606	\$157,788	9607	\$173,596	----	----
	514	----	----	9606	\$175,673	9607	\$193,235	----	----
1750	3600*	----	----	5813	\$85,269	5813	\$93,796	----	----
	1800	----	----	5813	\$73,308	5813	\$80,639	8010	\$117,912
	1200	----	----	8008	\$103,615	8008	\$113,977	9606	\$148,673
	900	----	----	8008	\$112,615	8009	\$123,877	9606	\$164,135
	720	----	----	8010	\$142,004	9606	\$156,204	----	----
	600	----	----	9607	\$165,681	9607	\$182,238	----	----
	514	----	----	9607	\$182,700	9607	\$200,885	----	----
2000	1800	----	----	5813	\$83,901	5813	\$92,290	8011	\$135,369
	1200	----	----	8009	\$109,096	8009	\$120,006	9607	\$159,923
	900	----	----	8009	\$116,988	8010	\$128,687	9607	\$176,112
	720	----	----	9607	\$160,200	9607	\$176,215	----	----
	600	----	----	9607	\$173,965	9607	\$191,354	----	----
2250	1800	----	----	8009	\$106,327	8009	\$116,960	8011	\$142,673
	1200	----	----	8009	\$117,277	8010	\$129,005	9608	\$163,846
	900	----	----	8010	\$130,327	9606	\$160,246	9608	\$199,615
	720	----	----	9607	\$168,208	9607	\$185,031	----	----
2500	1800	----	----	8009	\$113,538	8010	\$124,892	8011	\$156,940
	1200	----	----	8010	\$133,269	8011	\$146,596	----	----
	900	----	----	9605	\$148,962	9606	\$163,858	----	----
3000	1800	----	----	8010	\$128,365	8011	\$141,202	----	----
	1200	----	----	9607	\$159,531	9607	\$175,488	----	----
	900	----	----	9607	\$167,423	9607	\$184,165	----	----
3500	1200	----	----	9607	\$167,513	9607	\$184,265	----	----
	900	----	----	9608	\$182,654	9608	\$200,919	----	----
4000	1200	----	----	9608	\$178,235	9608	\$196,062	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Open Drip Proof

Anti-Friction Ball Bearings - Premium Efficient (DS-6DM)

FEATURES:

- Cast Iron & Fabricated Steel Construction
- Class F VPI Epoxy Insulation
- 1.15 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings
- Department of Energy Compliance Certification Number CC030A

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
150	3600*	----	----	447	\$19,322	447	\$21,003	----	----
	1800	----	----	447	\$18,332	449	\$18,882	----	----
	1200	----	----	449	\$23,221	449	\$25,240	----	----
	900	----	----	5008	\$30,223	5008	\$31,130	----	----
	720	5008	\$25,993	5010	\$32,859	5010	\$33,845	----	----
	600	5010	\$30,055	5010	\$34,017	5010	\$36,975	----	----
	514	5012	\$37,287	5012	\$44,317	5012	\$48,171	----	----
200	3600*	----	----	447	\$21,255	447	\$23,103	----	----
	1800	----	----	447	\$19,176	449	\$20,843	----	----
	1200	----	----	449	\$24,548	449	\$26,683	----	----
	900	5008@	\$25,953	5008	\$31,432	5008	\$32,375	----	----
	720	5008	\$27,124	5010	\$33,253	5010	\$36,144	----	----
	600	5010	\$34,487	5012	\$38,107	5012	\$41,421	----	----
	514	5012	\$41,202	5012	\$49,831	5012	\$54,165	----	----
250	3600*	----	----	5008	\$30,272	5010	\$31,701	5010	\$33,120
	1800	----	----	5008	\$29,263	5008	\$30,375	5008	\$34,189
	1200	----	----	5008	\$31,111	5010	\$32,355	5010	\$36,964
	900	5008@	\$28,208	5008	\$32,145	5010	\$34,940	5012	\$44,723
	720	5008	\$30,540	5010	\$37,501	5010	\$40,763	----	----
	600	5012	\$42,661	5012	\$46,283	5012	\$50,308	----	----
	514	5810	\$54,138	5810	\$56,925	5810	\$61,875	----	----
300	3600*	----	----	5010	\$31,857	5010	\$32,813	5010	\$37,415
	1800	----	----	5008	\$30,901	5010	\$31,857	5010	\$35,908
	1200	449	\$27,315	5010	\$32,740	5010	\$33,722	5012	\$38,895
	900	5008	\$29,337	5010	\$35,532	5010	\$38,620	5810	\$57,865
	720	5010	\$35,015	5010	\$40,561	5010	\$44,088	----	----
	600	5810	\$54,471	5810	\$59,579	5810	\$64,760	----	----
	514	5811	\$58,013	5811	\$62,698	5811	\$68,150	----	----
350	3600*	----	----	5010	\$32,094	5010	\$33,724	5010	\$41,590
	1800	----	----	5008	\$31,614	5010	\$32,562	5010	\$37,345
	1200	5008@	\$26,228	5010	\$33,820	5010	\$34,835	5810	\$59,322
	900	5010	\$30,535	5010	\$38,435	5010	\$41,776	5811	\$62,319
	720	5012	\$39,340	5012	\$45,448	5012	\$49,400	----	----
	600	5811	\$59,499	5811	\$61,437	5811	\$66,779	----	----
	514	5812	\$63,865	5812	\$66,391	5812	\$72,165	----	----
400	3600*	----	----	5010	\$33,377	5010	\$35,925	5010	\$45,984
	1800	----	----	5010	\$32,706	5010	\$33,687	5012	\$39,612
	1200	5010	\$30,248	5010	\$34,936	5012	\$35,984	5811	\$61,188
	900	5010	\$34,187	5010	\$40,742	5012	\$44,285	5812	\$67,223
	720	5810	\$54,271	5810	\$55,532	5810	\$60,361	----	----
	600	5811	\$62,233	5811	\$66,333	5811	\$72,102	----	----
	514	5812	\$69,147	5812	\$71,919	5812	\$78,173	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)
 @ 60Hz motor complies with U.S. D.O.E.'s Efficiency regulation 10 CFR Section 431 Subpart B – electric motors (see Appendix D for Nominal Efficiency Table)

Motor Includes Sleeve Bearings
 & Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Open Drip Proof

Anti-Friction Ball Bearings - Premium Efficient (DS-6DM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
450	3600*	5012@	\$34,134	5010	\$35,931	5010	\$39,055	5012	\$49,990
	1800	5010@	\$28,966	5010	\$33,038	5010	\$34,383	5012	\$42,576
	1200	5012	\$34,225	5012	\$35,283	5012	\$38,352	5812	\$64,731
	900	5010	\$37,407	5012	\$44,240	5012	\$48,087	5812	\$72,692
	720	5810	\$55,598	5810	\$60,192	5811	\$65,425	----	----
	600	5812	\$65,311	5812	\$69,531	5812	\$75,577	----	----
	514	5813	\$72,164	5813	\$77,433	5813	\$84,167	----	----
500	3600*	5012@	\$37,028	5010	\$38,977	5010	\$42,367	5012	\$54,228
	1800	5010@	\$29,598	5010	\$34,029	5010	\$35,415	5012	\$45,330
	1200	5012	\$39,770	5012	\$41,000	5012	\$44,565	5812	\$69,115
	900	5810	\$56,660	5810	\$59,446	5810	\$64,615	5812	\$77,769
	720	5811	\$60,906	5811	\$62,700	5812	\$68,152	----	----
	600	5812	\$70,049	5812	\$72,928	5813	\$79,269	----	----
	514	8007	\$118,229	8007	\$118,229	8007	\$128,510	----	----
600	3600*	5010	\$39,092	5012	\$42,992	5012	\$46,731	5812	\$68,769
	1800	5010	\$32,863	5010	\$36,515	5010	\$39,690	5811	\$60,009
	1200	5012	\$42,700	5012	\$46,297	5012	\$50,323	5813	\$76,258
	900	5810	\$60,242	5810	\$63,494	5811	\$69,015	6811	\$94,755
	720	5811	\$61,128	5812	\$66,617	5812	\$72,410	----	----
	600	5813	\$78,554	5813	\$85,137	8006	\$123,525	----	----
	514	8007	\$123,006	8007	\$123,006	8007	\$133,702	----	----
700	3600*	5012	\$46,177	5012	\$46,177	5012	\$50,192	5812	\$73,327
	1800	5010	\$40,055	5012	\$40,055	5012	\$43,538	5812	\$65,065
	1200	5012	\$48,102	5012	\$48,102	5012	\$52,284	5813	\$79,188
	900	5811	\$66,213	5811	\$66,213	5811	\$71,971	6811	\$95,423
	720	5812	\$74,235	5812	\$74,235	5813	\$80,690	----	----
	600	8007	\$119,585	8007	\$119,585	8008	\$129,981	----	----
	514	8008	\$130,338	8008	\$130,338	8008	\$141,669	----	----
800	3600*	5012	\$49,627	5012	\$49,627	5012	\$53,942	5813	\$79,131
	1800	5012	\$43,595	5012	\$43,595	5012	\$47,386	5813	\$71,181
	1200	5810	\$62,300	5810	\$62,300	5811	\$67,717	6811	\$95,374
	900	5811	\$70,487	5812	\$70,487	5812	\$76,617	8008	\$130,305
	720	5813	\$81,871	6810	\$84,725	6811	\$88,990	----	----
	600	8008	\$126,190	8008	\$126,190	8008	\$137,163	----	----
	514	8009	\$142,073	8009	\$142,073	8009	\$154,431	----	----
900	3600*	5012	\$58,252	5012	\$58,252	5012	\$63,317	----	----
	1800	5012	\$48,024	5012	\$48,024	5012	\$52,200	5813	\$78,438
	1200	5811	\$65,551	5811	\$65,551	5812	\$71,251	6811	\$97,541
	900	5812	\$76,831	5812	\$76,831	5812	\$83,513	8009	\$135,734
	720	----	----	8007	\$118,760	8008	\$129,087	----	----
	600	----	----	8008	\$133,581	8009	\$145,200	----	----
	514	----	----	8010	\$163,615	8010	\$177,842	----	----
1000	3600*	5012	\$62,233	5012	\$62,233	5012	\$67,644	----	----
	1800	5012	\$51,631	5012	\$51,631	5012	\$56,121	5813	\$87,842
	1200	5811	\$70,532	5811	\$70,532	5813	\$76,666	8008	\$128,678
	900	5813	\$83,198	5813	\$83,198	6811	\$90,433	8010	\$150,661
	720	----	----	8008	\$126,987	8009	\$138,029	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

@ 60Hz motor complies with U.S. D.O.E.'s Efficiency regulation 10 CFR Section 431 Subpart B – electric motors (see Appendix D for Nominal Efficiency Table)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Open Drip Proof

Anti-Friction Ball Bearings - Premium Efficient (DS-6DM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
1000	600	----	----	8009	\$146,452	8009	\$159,185	----	----
	514	----	----	9604	\$183,248	9604	\$199,183	----	----
1250	3600*	----	----	5812	\$76,829	5812	\$83,510	----	----
	1800	----	----	5812	\$69,751	5812	\$75,817	6811	\$97,045
	1200	----	----	5813	\$82,962	5813	\$90,177	8009	\$127,442
	900	----	----	6811	\$94,887	6811	\$103,138	9604	\$161,527
	720	----	----	8009	\$139,341	8010	\$151,457	----	----
	600	----	----	8009	\$162,017	8010	\$176,106	----	----
	514	----	----	9605	\$192,410	9606	\$209,135	----	----
1500	3600*	----	----	5813	\$89,037	5813	\$96,779	----	----
	1800	----	----	5812	\$76,641	5812	\$83,305	8009	\$118,281
	1200	----	----	6811	\$91,415	6811	\$99,363	8010	\$136,615
	900	----	----	8008	\$122,197	8009	\$132,823	9605	\$171,946
	720	----	----	8010	\$147,687	8011	\$160,529	----	----
	600	----	----	9606	\$181,454	9607	\$197,233	----	----
	514	----	----	9606	\$202,015	9607	\$219,588	----	----
1750	3600*	----	----	5813	\$98,060	5813	\$106,587	----	----
	1800	----	----	5813	\$84,305	5813	\$91,636	8010	\$130,108
	1200	----	----	8009	\$119,158	8010	\$129,519	9606	\$164,054
	900	----	----	8009	\$129,508	8010	\$140,769	9606	\$181,108
	720	----	----	8010	\$163,305	9606	\$177,505	----	----
	600	----	----	9607	\$190,535	9607	\$207,104	----	----
	514	----	----	9607	\$210,104	9607	\$228,375	----	----
2000	1800	----	----	5813	\$96,486	5813	\$104,877	----	----
	1200	----	----	8010	\$125,461	8010	\$136,371	9607	\$176,469
	900	----	----	8010	\$134,537	8010	\$146,236	9607	\$194,331
	720	----	----	9606	\$184,223	9607	\$200,250	----	----
	600	----	----	9607	\$191,362	9607	\$210,489	----	----
2250	1800	----	----	8009	\$116,960	8010	\$128,656	----	----
	1200	----	----	8010	\$129,005	8010	\$141,905	----	----
	900	----	----	8010	\$143,360	9606	\$176,271	----	----
	720	----	----	9607	\$185,028	9607	\$203,534	----	----
2500	1800	----	----	8010	\$124,892	8010	\$137,382	----	----
	1200	----	----	8011	\$146,596	8011	\$161,256	----	----
	900	----	----	9606	\$163,858	9607	\$180,243	----	----
	720	----	----	----	----	9608	\$217,409	----	----
3000	1800	----	----	8010	\$141,202	8011	\$155,323	----	----
	1200	----	----	9607	\$175,484	9607	\$193,037	----	----
	900	----	----	9607	\$184,165	9607	\$202,582	----	----
3500	1200	----	----	9607	\$184,265	9607	\$202,692	----	----
	900	----	----	9608	\$200,919	9608	\$221,011	----	----
4000	1200	----	----	9608	\$196,058	9608	\$215,668	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Open Drip Proof

Anti-Friction Ball Bearings - Standard Efficient (DS-6DM)

Cannot Be Used For Motors Covered by EISA-2007 / IHP Motor Final Rule 2016

FEATURES:

- Cast Iron & Fabricated Steel Construction
- Class F VPI Epoxy Insulation
- 1.15 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings

HP	RPM @ 60 Hz	Voltage @ 60 Hertz	
		460 or 575V	
		Frame	List
450	3600*	5010%	\$30,721
	1800	5008%	\$24,401
500	3600*	5010%	\$33,326
	1800	5010%	\$28,876

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

% Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016

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



Modifiable TITAN® Horizontal Motors

Horizontal Weather Protected Type II

Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6PM)

FEATURES:

- Cast Iron & Fabricated Steel Construction
- Class F VPI Epoxy Insulation
- 1.15 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings
- Provisions For Air Filters

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
150	3600*	----	---	5008	\$30,564	5008	\$31,481	----	---
	1800	----	---	5008	\$28,992	5008	\$29,862	----	---
	1200	----	---	5008	\$28,922	5008	\$29,789	----	---
	900	----	---	5008	\$30,564	5008	\$31,481	----	---
	720	5008	\$27,203	5010	\$34,122	5010	\$35,146	----	---
	600	5010	\$33,975	5010	\$38,454	5010	\$41,412	----	---
	514	5012	\$34,044	5012	\$50,097	5012	\$53,950	----	---
200	3600*	----	---	5008	\$30,886	5008	\$31,813	----	---
	1800	----	---	5008	\$29,227	5008	\$30,104	----	---
	1200	----	---	5008	\$30,097	5008	\$31,000	----	---
	900	5008%	\$27,489	5008	\$33,099	5008	\$35,645	----	---
	720	5008	\$29,094	5010	\$37,590	5010	\$40,482	----	---
	600	5010	\$38,985	5012	\$43,077	5012	\$46,390	----	---
	514	5012	\$46,575	5012	\$56,331	5012	\$60,665	----	---
250	3600*	5008%	\$27,021	5008	\$31,967	5008	\$32,926	5010	\$39,906
	1800	5008%	\$26,009	5008	\$30,250	5008	\$31,157	5008	\$34,977
	1200	5008%	\$26,084	5008	\$31,150	5008	\$32,085	5012	\$41,217
	900	5008%	\$28,928	5008	\$36,338	5008	\$39,133	5810	\$60,939
	720	5008	\$34,524	5010	\$42,393	5010	\$45,654	----	---
	600	5012	\$48,225	5012	\$52,320	5012	\$56,345	----	---
	514	5810	\$61,200	5810	\$64,350	5810	\$69,300	----	---
300	3600*	5008%	\$30,072	5008	\$32,988	5008	\$35,528	5010	\$44,410
	1800	5008%	\$26,718	5008	\$31,309	5008	\$32,248	5010	\$39,459
	1200	5008%	\$30,216	5008	\$32,241	5008	\$33,208	5810	\$62,138
	900	5008	\$30,930	5008	\$40,165	5010	\$43,255	5810	\$65,023
	720	5010	\$39,582	5010	\$45,852	5010	\$49,379	----	---
	600	5810	\$61,575	5810	\$67,350	5810	\$72,531	----	---
	514	5811	\$65,580	5811	\$70,875	5811	\$76,327	----	---
350	3600*	5008%	\$31,156	5008	\$33,792	5010	\$36,391	5010	\$45,489
	1800	5008%	\$28,595	5008	\$32,404	5008	\$33,783	5010	\$42,230
	1200	5010%	\$31,417	5008	\$34,974	5008	\$37,664	5810	\$65,078
	900	5010	\$34,518	5010	\$43,448	5010	\$46,790	5811	\$68,158
	720	5012	\$44,472	5012	\$51,375	5012	\$55,327	----	---
	600	5811	\$67,260	5811	\$69,450	5811	\$74,792	----	---
	514	5812	\$72,195	5812	\$75,051	5812	\$80,825	----	---
400	3600*	5010%	\$35,451	5008	\$37,362	5010	\$40,236	5010	\$50,295
	1800	5008%	\$29,341	5008	\$33,539	5008	\$34,659	5012	\$43,325
	1200	5010	\$34,194	5008	\$36,855	5008	\$39,690	5811	\$63,577
	900	5010	\$38,646	5010	\$46,056	5012	\$49,599	5812	\$73,500
	720	5810	\$61,350	5810	\$62,775	5810	\$67,604	----	---
	600	5811	\$70,350	5811	\$74,985	5811	\$80,753	----	---
	514	5812	\$78,150	5812	\$81,300	5812	\$87,554	----	---

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

% Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016

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



Modifiable TITAN® Horizontal Motors
Horizontal Weather Protected Type II
Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6PM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
450	3600*	5012	\$39,399	5010	\$40,617	5010	\$43,741	5012	\$54,677
	1800	5008	\$30,216	5008	\$34,713	5010	\$37,254	5012	\$46,568
	1200	5010	\$38,289	5010	\$39,885	5010	\$42,953	5812	\$70,881
	900	5010	\$42,285	5012	\$50,010	5012**	\$53,857	5812	\$79,933
	720	5810	\$62,850	5811	\$65,850	5811	\$70,915	----	---
	600	5812	\$73,830	5812	\$78,600	5812	\$84,646	----	---
	514	5813	\$81,576	5813	\$87,534	5813	\$94,267	----	---
500	3600*	5012	\$42,739	5010	\$44,061	5010	\$47,451	5012	\$59,313
	1800	5010	\$35,454	5010	\$36,831	5010	\$39,665	5811	\$61,962
	1200	5010	\$42,162	5010	\$46,347	5010	\$49,912	5812	\$75,612
	900	5810	\$64,050	5810	\$67,200	5810	\$72,369	5812	\$85,038
	720	5811	\$68,850	5811	\$70,878	5812	\$76,330	----	---
	600	5813	\$79,185	5813	\$82,440	5813	\$88,782	----	---
	514	8007	\$118,229	8007	\$118,229	8007	\$128,510	----	---
600	3600*	5010	\$44,191	5010	\$48,600	5010	\$52,338	5812	\$74,042
	1800	5010	\$37,149	5010	\$41,277	5010	\$44,452	5811	\$66,115
	1200	5012	\$48,270	5012	\$52,335	5012	\$56,361	5813	\$83,308
	900	5810	\$68,100	5810	\$71,775	5811	\$77,296	6811	\$100,517
	720	5812	\$69,102	5812	\$75,306	5812	\$81,099	----	---
	600	5813	\$88,800	5813	\$96,231	8006	\$123,531	----	---
	514	8007	\$123,006	8007	\$123,006	8007	\$133,702	----	---
700	3600*	5012	\$52,200	5012	\$52,200	5012	\$56,215	5813	\$78,231
	1800	5010	\$45,279	5010	\$45,279	5010	\$48,762	5812	\$71,077
	1200	5012	\$54,375	5012	\$54,375	5012**	\$58,124	5813	\$86,608
	900	5811	\$74,850	5811	\$74,850	5811	\$80,608	6811	\$103,474
	720	5812	\$83,918	5812	\$83,918	5813	\$90,369	----	---
	600	8007	\$119,585	8007	\$119,585	8008	\$129,981	----	---
	514	8008	\$130,338	8008	\$130,338	8008	\$141,681	----	---
800	3600*	5012	\$56,100	5012	\$56,100	5012	\$60,415	5813	\$87,231
	1800	5012	\$49,281	5012	\$49,281	5012	\$53,072	5813	\$77,769
	1200	5810	\$70,425	5810	\$70,425	5811	\$75,842	6811	\$101,174
	900	5811	\$79,681	5812	\$79,681	5812	\$85,810	8008	\$130,220
	720	5813	\$92,550	5813	\$92,550	6810	\$102,808	----	---
	600	8008	\$126,190	8008	\$126,190	8008	\$137,077	----	---
	514	8009	\$142,073	8009	\$142,073	8009	\$154,431	----	---
900	3600*	5012	\$65,850	5012	\$65,850	5012	\$70,915	----	---
	1800	5012	\$54,288	5012	\$54,288	5012	\$58,464	5813	\$82,038
	1200	5811	\$74,101	5811	\$74,101	5812	\$79,801	6811	\$103,474
	900	5812	\$86,853	5812	\$86,853	5812	\$93,534	8009	\$145,378
	720	----	---	8008	\$118,760	8008	\$129,087	----	---
	600	----	---	8009	\$133,581	8009	\$145,200	----	---
	514	----	---	8010	\$163,615	8010	\$177,854	----	---
1000	3600*	5012	\$70,350	5012	\$70,350	5012	\$75,762	----	---
	1800	5012	\$61,013	5012	\$61,013	5012	\$64,404	5813	\$88,731
	1200	5812	\$79,733	5812	\$79,733	5813	\$85,866	8008	\$135,661
	900	5813	\$94,050	5813	\$94,050	6810	\$104,423	8010	\$158,717

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

** Motor is Suitable for 1.0 SF, Class F Rise Only

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Weather Protected Type II

Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6PM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
1000	720	----	---	8009	\$126,987	8009	\$138,029	----	---
	600	----	---	8009	\$146,452	8009	\$159,185	----	---
	514	----	---	9604	\$183,248	9604	\$199,183	----	---
1250	3600*	----	---	5812	\$86,850	5812	\$93,531	----	---
	1800	----	---	5812	\$78,849	5812	\$84,914	6811	\$97,500
	1200	----	---	5813	\$93,783	5813	\$100,997	8009	\$140,409
	900	----	---	6811	\$99,013	6811	\$107,264	9604	\$161,758
	720	----	---	8009	\$139,341	8010	\$151,457	----	---
	600	----	---	8009	\$162,017	8010	\$176,106	----	---
	514	----	---	9605	\$192,410	9606	\$209,146	----	---
1500	3600*	----	---	5813	\$100,650	5813	\$108,392	----	---
	1800	----	---	5812	\$86,637	5812	\$93,301	8009	\$122,296
	1200	----	---	6811	\$100,800	6811	\$109,200	8010	\$145,323
	900	----	---	8008	\$122,197	8008	\$132,823	9605	\$174,704
	720	----	---	8010	\$147,687	8011	\$160,529	----	---
	600	----	---	9606	\$181,869	9607	\$197,238	----	---
	514	----	---	9606	\$202,027	9607	\$219,594	----	---
1750	3600*	----	---	5813	\$110,850	5813	\$119,377	----	---
	1800	----	---	5813	\$95,301	5813	\$102,632	8010	\$134,192
	1200	----	---	8008	\$119,158	8008	\$129,519	9606	\$168,496
	900	----	---	8009	\$129,508	8009	\$140,769	9606	\$186,000
	720	----	---	9606	\$163,305	9606	\$177,505	----	---
	600	----	---	9607	\$190,535	9607	\$207,104	----	---
	514	----	---	9607	\$210,104	9607	\$228,375	----	---
2000	1800	----	---	5813	\$109,071	5813	\$117,462	----	---
	1200	----	---	8009	\$125,461	8009	\$136,371	9607	\$182,135
	900	----	---	8010	\$134,537	8010	\$146,236	9607	\$200,538
	720	----	---	9606	\$184,229	9606	\$200,250	----	---
	600	----	---	9607	\$200,060	9607	\$217,454	----	---
2250	1800	----	---	8009	\$122,277	8009	\$132,909	----	---
	1200	----	---	8009	\$134,868	8010	\$146,596	----	---
	900	----	---	8010	\$149,877	9606	\$182,100	----	---
	720	----	---	9607	\$193,437	9607	\$210,260	----	---
2500	1800	----	---	8009	\$130,569	8010	\$141,923	----	---
	1200	----	---	8010	\$153,260	8011	\$166,587	----	---
	900	----	---	9605	\$171,306	9606	\$186,202	----	---
3000	1800	----	---	8011	\$147,621	8011	\$160,457	----	---
	1200	----	---	9606	\$183,462	9606	\$199,413	----	---
	900	----	---	9607	\$192,537	9607	\$209,279	----	---
3500	1800	----	---	8011**	\$177,148	8011**	\$192,548	----	---
	1200	----	---	9607	\$192,640	9607	\$209,392	----	---
	900	----	---	9608	\$210,052	9608	\$228,317	----	---
4000	1200	----	---	9609	\$204,969	9609	\$222,796	----	---

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

** Motor is Suitable for 1.0 SF, Class F Rise Only

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Weather Protected Type II

Anti-Friction Ball Bearings - Premium Efficient (DS-6PM)

FEATURES:

- Cast Iron & Fabricated Steel Construction
- Class F VPI Epoxy Insulation
- 1.15 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings
- Provisions For Air Filters
- Department of Energy Compliance Certification Number CC030A

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
150	3600*	----	---	5008	\$31,965	5008	\$32,924	----	---
	1800	----	---	5008	\$31,920	5008	\$32,878	----	---
	1200	----	---	5008	\$33,970	5008	\$35,021	----	---
	900	----	---	5008	\$31,109	5008	\$33,255	----	---
	720	5008	\$28,604	5010	\$34,525	5010	\$36,907	----	---
	600	5010	\$37,896	5010	\$42,891	5010	\$45,849	----	---
	514	5012	\$47,014	5012	\$55,877	5012	\$59,731	----	---
200	3600*	----	---	5008	\$33,084	5008	\$34,077	----	---
	1800	----	---	5008	\$33,037	5008	\$34,028	----	---
	1200	----	---	5008	\$35,159	5008	\$36,214	----	---
	900	5008@	\$28,905	5008	\$36,918	5008	\$39,464	----	---
	720	5008	\$32,451	5010	\$41,927	5010	\$44,819	----	---
	600	5010	\$43,484	5012	\$48,047	5012	\$51,361	----	---
	514	5012	\$51,950	5012	\$62,830	5012	\$67,164	----	---
250	3600*	5008@	\$28,442	5008	\$34,242	5010	\$36,147	5010	\$39,330
	1800	5008@	\$29,106	5008	\$34,193	5008	\$35,390	5008	\$34,848
	1200	5008@	\$27,456	5008	\$36,390	5010	\$37,481	5012	\$41,776
	900	5008@	\$30,450	5008	\$40,530	5010	\$43,326	5810	\$59,654
	720	5008	\$38,507	5010	\$47,285	5010	\$50,545	----	---
	600	5012	\$53,790	5012	\$58,357	5012	\$62,382	----	---
	514	5810	\$68,262	5810	\$71,775	5810	\$76,725	----	---
300	3600*	5008@	\$31,655	5010	\$36,325	5010	\$37,415	5010	\$44,429
	1800	5008@	\$28,125	5008	\$35,390	5010	\$36,325	5010	\$39,260
	1200	5010@	\$31,806	5010	\$37,663	5010	\$38,793	5810	\$61,246
	900	5008	\$34,499	5010	\$44,800	5010	\$47,889	5810	\$66,323
	720	5010	\$44,150	5010	\$51,143	5010	\$54,669	----	---
	600	5810	\$68,680	5810	\$75,121	5810	\$80,302	----	---
	514	5811	\$73,147	5811	\$79,053	5811	\$84,505	----	---
350	3600*	5008@	\$32,796	5010	\$37,692	5010	\$40,290	5010	\$49,388
	1800	5010@	\$30,099	5010	\$32,525	5010	\$37,728	5010	\$42,618
	1200	5010@	\$33,070	5010	\$39,009	5010	\$41,700	5810	\$64,269
	900	5010	\$38,500	5010	\$48,460	5010	\$51,803	5811	\$73,996
	720	5012	\$49,604	5012	\$57,303	5012	\$61,255	----	---
	600	5811	\$75,021	5811	\$77,463	5811	\$82,806	----	---
	514	5812	\$80,526	5812	\$83,710	5812	\$89,484	----	---
400	3600*	5010@	\$37,317	5010	\$41,673	5010	\$44,547	5010	\$54,606
	1800	5010@	\$33,103	5010	\$35,897	5010	\$39,048	5012	\$47,038
	1200	5010	\$38,139	5010	\$41,108	5012	\$43,943	5811	\$69,115
	900	5010	\$43,105	5010	\$51,370	5012	\$54,913	5812	\$79,800
	720	5810	\$68,429	5810	\$70,019	5810	\$74,848	----	---
	600	5811	\$78,467	5811	\$83,638	5811	\$89,406	----	---
	514	5812	\$87,185	5812	\$90,681	5812	\$96,935	----	---

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

& Motor Requires The Use Of A Flood Oil Lubrication System

@ 60Hz motor complies with U.S. D.O.E.'s Efficiency regulation 10 CFR Section 431 Subpart B – electric motors (see Appendix D for Nominal Efficiency Table)

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



Modifiable TITAN® Horizontal Motors

Horizontal Weather Protected Type II

Anti-Friction Ball Bearings - Premium Efficient (DS-6PM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
450	3600*	5012@	\$43,038	5010	\$45,303	5010	\$48,428	5012	\$59,363
	1800	5010@	\$34,090	5010	\$38,585	5010	\$41,245	5012	\$50,559
	1200	5012	\$42,707	5012	\$44,488	5012	\$47,556	5812	\$76,962
	900	5010	\$47,165	5012	\$55,780	5012**	\$59,627	5812	\$86,769
	720	5810	\$70,102	5811	\$73,448	5811	\$78,513	----	---
	600	5812	\$82,349	5812	\$87,669	5812	\$93,715	----	---
	514	5813	\$90,989	5813	\$97,634	5813	\$104,368	----	---
500	3600*	5012@	\$46,687	5010	\$49,145	5010	\$52,535	5012	\$64,397
	1800	5010@	\$37,320	5010	\$41,080	5010	\$43,914	5811	\$67,269
	1200	5012	\$47,027	5012	\$51,695	5012	\$55,260	5812	\$82,038
	900	5810	\$71,440	5810	\$74,954	5810	\$80,123	5812	\$92,319
	720	5811	\$76,794	5811	\$79,056	5812	\$84,509	----	---
	600	5813	\$88,322	5813	\$91,952	5813	\$98,294	----	---
	514	8007	\$133,650	8007	\$133,650	8007	\$143,931	----	---
600	3600*	5010	\$49,290	5012	\$54,208	5012	\$57,946	5812	\$80,388
	1800	5010	\$41,436	5010	\$46,040	5010	\$49,215	5811	\$71,781
	1200	5012	\$53,840	5012	\$58,374	5012	\$62,400	5813	\$90,450
	900	5810	\$75,958	5810	\$80,057	5811	\$85,578	6811	\$104,926
	720	5812	\$77,076	5812	\$83,995	5812	\$89,788	----	---
	600	5813	\$99,046	5813	\$107,342	8006	\$138,346	----	---
	514	8007	\$139,050	8007	\$139,050	8007	\$149,746	----	---
700	3600*	5012	\$58,223	5012	\$58,223	5012	\$62,238	5813	\$84,946
	1800	5010	\$50,504	5012	\$50,504	5012	\$53,986	5812	\$77,169
	1200	5012	\$60,650	5012	\$60,650	5012**	\$64,832	5813	\$94,038
	900	5811	\$83,487	5811	\$83,487	5811	\$89,244	6811	\$108,598
	720	5812	\$93,600	5812	\$93,600	5813	\$100,056	----	---
	600	8007	\$135,179	8007	\$135,179	8008	\$145,581	----	---
	514	8008	\$147,346	8008	\$147,346	8008	\$158,679	----	---
800	3600*	5012	\$62,573	5012	\$62,573	5012	\$66,888	5813	\$94,708
	1800	5012	\$54,967	5012	\$54,967	5012	\$58,758	5813	\$84,462
	1200	5810	\$78,552	5810	\$78,552	5811	\$83,969	6811	\$105,612
	900	5811	\$88,875	5812	\$88,875	5812	\$95,005	8008	\$130,927
	720	5813	\$103,229	5813	\$103,229	6811	\$110,348	----	---
	600	8008	\$142,650	8008	\$142,650	8008	\$153,623	----	---
	514	8009	\$160,604	8009	\$160,604	8009	\$172,962	----	---
900	3600*	5012	\$73,448	5012	\$73,448	5012	\$78,513	----	---
	1800	5012	\$60,552	5012	\$60,552	5012	\$64,728	5813	\$89,077
	1200	5811	\$82,651	5811	\$82,651	5812	\$88,352	6811	\$109,308
	900	5812	\$96,875	5812	\$96,875	5812	\$103,555	8009	\$150,961
	720	----	---	8008	\$134,250	8008	\$144,577	----	---
	600	----	---	8009	\$151,004	8009	\$162,623	----	---
	514	----	---	8010	\$184,967	8010	\$199,193	----	---
1000	3600*	5012	\$78,467	5012	\$78,467	5012	\$83,879	----	---
	1800	5012	\$67,549	5012	\$67,549	5012	\$71,305	5813	\$96,346
	1200	5812	\$88,933	5812	\$88,933	5813	\$95,065	8008	\$131,792
	900	5813	\$104,902	5813	\$104,902	6811	\$112,137	8010	\$155,469

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

** Motor is Suitable for 1.0 SF, Class F Rise Only

@ 60Hz motor complies with U.S. D.O.E.'s Efficiency regulation 10 CFR Section 431 Subpart B – electric motors (see Appendix D for Nominal Efficiency Table)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Weather Protected Type II

Anti-Friction Ball Bearings - Premium Efficient (DS-6PM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
1000	720	----	----	8009	\$143,550	8009	\$154,592	----	---
	600	----	---	8009	\$165,554	8009	\$178,292	----	---
	514	----	---	9604	\$207,467	9604	\$223,085	----	---
1250	3600*	----	----	5812	\$96,871	5812	\$103,552	----	---
	1800	----	----	5812	\$87,947	5812	\$94,012	6811	\$103,408
	1200	----	----	5813	\$104,604	5813	\$111,818	8009	\$139,731
	900	----	----	6811	\$111,389	6811	\$119,640	9604	\$171,808
	720	----	----	8009	\$157,515	8010	\$169,632	----	---
	600	----	----	8009	\$183,150	8010	\$197,238	----	---
	514	----	----	9605	\$217,506	9605	\$234,232	----	---
1500	3600*	----	----	5813	\$112,263	5813	\$120,006	----	---
	1800	----	----	5812	\$96,633	5812	\$103,298	8009	\$129,923
	1200	----	----	6811	\$113,400	6811	\$121,800	8010	\$149,077
	900	----	----	8008	\$138,135	8009	\$148,761	9605	\$185,538
	720	----	----	8011	\$166,950	8011	\$179,792	----	---
	600	----	----	9606	\$205,125	9607	\$220,904	----	---
	514	----	----	9606	\$228,375	9607	\$245,942	----	---
1750	3600*	----	----	5813	\$123,640	5813	\$132,167	----	---
	1800	----	----	5813	\$106,297	5813	\$113,628	8010	\$142,581
	1200	----	----	8009	\$134,700	8010	\$145,062	9606	\$179,019
	900	----	----	8010	\$146,400	8010	\$157,662	9606	\$197,619
	720	----	----	9606	\$184,605	9606	\$198,805	----	---
	600	----	----	9607	\$215,383	9607	\$231,952	----	---
	514	----	----	9607	\$237,508	9607	\$255,779	----	---
2000	1800	----	----	5813	\$121,656	5813	\$130,047	----	---
	1200	----	----	8010	\$141,825	8010	\$152,735	9607	\$193,512
	900	----	----	8010	\$152,085	8010	\$163,784	9607	\$213,000
	720	----	----	9606	\$208,258	9607	\$224,279	----	---
	600	----	----	9607	\$226,154	9607	\$243,554	----	---
2250	1800	----	----	8009	\$134,504	8010	\$146,200	----	---
	1200	----	----	8010	\$148,356	8010	\$161,256	----	---
	900	----	----	9605	\$186,000	9606	\$200,310	----	---
	720	----	----	9607	\$212,781	9607	\$231,286	----	---
2500	1800	----	----	8010	\$143,626	8010	\$156,115	----	---
	1200	----	----	8011	\$168,586	8011	\$183,246	----	---
	900	----	----	9606	\$188,437	9607	\$204,823	----	---
3000	1800	----	---	8011	\$162,383	8011	\$176,503	----	---
	1200	----	---	9606	\$201,808	9606	\$219,355	----	---
	900	----	---	9607	\$211,791	9607	\$230,207	----	---
3500	1800	----	---	8011**	\$194,859	8011**	\$211,800	----	---
	1200	----	---	9607	\$211,905	9607	\$230,331	----	---
	900	----	---	9608	\$231,058	9608	\$251,150	----	---
4000	1200	----	---	9609	\$225,466	9609	\$245,076	----	---

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

** Motor is Suitable for 1.0 SF, Class F Rise Only

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Weather Protected Type II

Anti-Friction Ball Bearings - Standard Efficient (DS-6PM)

Cannot Be Used For Motors Covered by EISA-2007 / IHP Motor Final Rule 2016

FEATURES:

- Cast Iron & Fabricated Steel Construction
- Class F VPI Epoxy Insulation
- 1.15 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings
- Provisions For Air Filters

HP	RPM @ 60 Hz	Voltage @ 60 Hertz	
		460 or 575V	
		Frame	List
200	900	5008%	\$26,664
250	3600*	5008%	\$26,210
	1800	5008%	\$25,229
	1200	5008%	\$25,301
	900	5008%	\$28,060
300	3600*	5008%	\$29,170
	1800	5008%	\$25,916
	1200	5008%	\$29,310
350	3600*	5008%	\$30,221
	1800	5008%	\$27,737
	1200	5010%	\$30,474
400	3600*	5010%	\$34,387
	1800	5008%	\$28,461
450	3600*	5010%	\$38,217
	1800	5008%	\$31,225
500	3600*	5010%	\$41,457
	1800	5010%	\$34,390

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

% Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016

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



Modifiable TITAN® Horizontal Motors

Horizontal Totally Enclosed Fan Cooled - TEFC

Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6TM)

FEATURES:

- Cast Iron Frame & Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
150	3600*	----	----	449	\$25,203	449	\$26,883	----	----
	1800	----	----	449	\$22,533	449	\$24,035	----	----
	1200	----	----	449	\$30,288	449	\$39,981	----	----
	900	449%	\$20,935	449	\$38,618	5010	\$40,764	----	----
	720	449	\$22,190	5012	\$42,860	5012	\$45,240	----	----
	600	5010	\$39,560	5810	\$45,115	5810	\$47,619	----	----
	514	5810	\$54,590	----	----	----	----	----	----
200	3600*	----	----	449	\$27,723	449	\$29,572	5010	\$47,963
	1800	----	----	449	\$25,012	449	\$26,679	5010	\$44,937
	1200	449%	\$20,801	449	\$32,019	449	\$41,112	5012	\$50,948
	900	449%	\$23,030	5010	\$45,830	5010	\$48,375	----	----
	720	449	\$26,856	5012	\$52,048	5012	\$54,939	----	----
	600	5010	\$47,469	5810	\$54,785	5810	\$57,831	----	----
250	3600*	449%	\$22,920	449	\$31,050	449	\$33,120	5010	\$50,715
	1800	449%	\$20,250	449	\$27,512	449	\$29,347	5010	\$44,937
	1200	449%	\$22,808	5008	\$39,578	5008	\$41,776	5012	\$53,870
	900	449%	\$26,334	5010	\$50,313	5010	\$53,109	5810	\$68,482
	720	5012	\$42,492	5810	\$58,698	5810	\$61,959	----	----
	600	5012	\$50,792	5810	\$62,423	5810	\$65,890	----	----
300	3600*	449%	\$24,763	449	\$35,076	5010	\$46,300	5012	\$65,146
	1800	449%	\$20,665	449	\$30,995	5008	\$40,913	5012	\$50,625
	1200	449%	\$24,642	5010	\$43,756	5010	\$46,187	5012	\$59,558
	900	5010	\$38,068	5010	\$55,614	5012	\$58,703	5812	\$77,811
	720	5810	\$48,717	5810	\$63,487	5810	\$67,014	----	----
	600	5810	\$60,865	5810	\$66,912	5810	\$70,627	----	----
350	3600*	449%	\$28,363	5010	\$46,788	5010	\$49,388	5012	\$67,844
	1800	449%	\$22,806	5010	\$40,375	5010	\$42,618	5012	\$61,165
	1200	5010%	\$38,134	5010	\$48,426	5010	\$51,115	5810	\$72,519
	900	5010	\$42,483	5012	\$60,158	5012	\$63,501	5812	\$84,171
	720	5810	\$59,856	5812	\$71,135	5812	\$75,087	----	----
	600	5812	\$71,968	5812	\$83,950	5812	\$88,148	----	----
400	3600*	449%	\$32,273	5010	\$51,732	5010	\$54,606	5810	\$69,678
	1800	449%	\$23,302	5010	\$44,563	5010	\$47,038	5012	\$64,615
	1200	5010	\$42,085	5010	\$51,030	5010	\$53,865	5812	\$77,481
	900	5012	\$47,564	5810	\$63,770	5810	\$67,313	----	----
	720	5810	\$60,834	5812	\$76,622	5812	\$80,271	----	----
	600	5812	\$76,394	6808	\$137,739	6808	\$140,875	----	----
450	3600*	5010%	\$43,871	5012	\$56,238	5012	\$59,363	5810	\$76,010
	1800	5010%	\$36,675	5010	\$47,898	5010	\$50,559	5810	\$69,452
	1200	5012	\$47,125	5012	\$55,225	5012	\$58,293	5812	\$82,424
	900	5810	\$52,043	5810	\$69,245	5810	\$73,092	----	----
	720	6808	\$134,471	6808	\$134,471	6808	\$140,875	----	----
	600	6809	\$144,988	6809	\$144,988	6809	\$151,893	----	----

Notes:

- * Motor is Uni-Directional (CCW Rotation F.O.D.E.)
 % Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016
 ^ High Inrush Design

6808 Frame Also Available as 450MLA Frame or 7007 Frame
 6809 Frame Also Available as 450LAB Frame or 7008 Frame
 6811 Frame Also Available as 450BCD Frame or 7010 Frame

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



Modifiable TITAN® Horizontal Motors
Horizontal Totally Enclosed Fan Cooled - TEFC
Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6TM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
500	3600*	5012%	\$58,239	5012	\$61,007	5012	\$64,397	5810	\$80,394
	1800	5010%	\$43,035	5012	\$50,997	5012	\$53,830	5810	\$73,460
	1200	5012	\$51,892	5012	\$64,172	5012	\$67,738	5812	\$86,994
	900	5812	\$66,938	5812	\$72,990	5812	\$77,046	----	----
	720	6808	\$141,074	6808	\$141,074	6808	\$147,792	----	----
	600	6811	\$152,108	6811	\$152,108	6811	\$166,372	----	----
600	3600*	5012	\$62,798	5012	\$67,292	5012	\$76,770	5812	\$90,598
	1800	5012	\$56,337	5012	\$63,503	5012	\$66,678	5812	\$78,706
	1200	5810	\$59,409	5810	\$72,464	5810	\$76,490	----	----
	900	5812	\$78,837	5812	\$85,965	5812	\$90,816	----	----
	720	6811	\$157,919	6811	\$157,919	6811	\$164,236	----	----
	600	6811	\$170,270	6811	\$170,270	6811	\$177,082	----	----
700	3600*	5812	\$80,174	5812	\$80,174	5812	\$82,456	5812	\$96,445
	1800	5012	\$69,660	5012	\$69,660	5012	\$73,143	5812	\$85,553
	1200	5812	\$83,551	5812	\$83,551	5812	\$87,729	----	----
	900	6809	\$145,929	6809	\$145,929	6809	\$152,878	----	----
	720	6811	\$164,238	6811	\$164,238	6811	\$170,807	----	----
	600	6811	\$182,600	6811	\$182,600	6811**	\$189,905	----	----
800	3600*	5812	\$86,163	5812	\$86,163	5812	\$88,617	----	----
	1800	5812	\$74,930	5812	\$74,930	5812	\$78,675	----	----
	1200	5812	\$88,731	5812	\$88,731	5812	\$93,167	----	----
	900	6811	\$160,495	6811	\$160,495	6811	\$168,138	----	----
	720	6811	\$181,133	6811	\$181,133	6811**	\$188,378	----	----
900	1800	5812	\$84,967	5812	\$84,967	5812	\$89,215	----	----
	1200*	6809	\$153,071	6809	\$153,071	6809	\$161,637	----	----
	900	6811	\$170,007	6811	\$170,007	6811	\$176,782	----	----
1000	1800	5812	\$90,992	5812	\$90,992	5812	\$95,234	----	----
	1200*	6809	\$157,380	6809	\$157,380	6809	\$166,372	----	----
	900	6811	\$184,068	6811	\$184,068	6811	\$191,431	----	----
1250	1800*	----	----	6811	\$154,123	6811	\$161,461	----	----
	1200*	----	----	6811	\$171,005	6811^	\$177,845	----	----
1500	1800*	----	----	6811	\$161,828	6811	\$171,077	----	----
1750	1800*	----	----	6811^	\$171,533	6811^	\$181,336	----	----
2000	1800*	----	----	6811**^	\$185,542	6811**^	\$196,141	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

** Motor is Suitable for 1.0 SF, Class F Rise Only

% Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016

^ High Inrush Design

6808 Frame Also Available as 450MLA Frame or 7007 Frame

6809 Frame Also Available as 450LAB Frame or 7008 Frame

6811 Frame Also Available as 450BCD Frame or 7010 Frame

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



Modifiable TITAN® Horizontal Motors

Horizontal Totally Enclosed Fan Cooled - TEFC

Anti-Friction Ball Bearings - Premium Efficient (DS-6TM)

FEATURES:

- Cast Iron Frame & Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings
- Department of Energy Compliance Certification Number CC030A

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
150	3600*	----	----	449	\$27,724	449	\$29,572	----	----
	1800	----	----	449	\$24,787	449	\$26,438	----	----
	1200	----	----	449	\$33,317	449	\$43,979	----	----
	900	449@	\$22,037	449	\$42,480	5010	\$44,841	----	----
	720	449	\$24,409	5012	\$47,146	5012	\$49,764	----	----
	600	5010	\$43,516	5810	\$49,627	5810	\$52,381	----	----
	514	5810	\$60,049	----	----	----	----	----	----
200	3600*	----	----	449	\$30,496	449	\$32,529	5010	\$52,760
	1800	----	----	449	\$27,513	449	\$29,347	5010	\$49,431
	1200	449@	\$21,895	5008	\$35,221	5008	\$45,223	5012	\$59,257
	900	449@	\$24,241	5010	\$50,413	5010	\$53,212	----	----
	720	449	\$29,541	5012	\$57,252	5012	\$60,433	----	----
	600	5010	\$52,216	5810	\$60,263	5810	\$63,614	----	----
250	3600*	449@	\$24,126	5010	\$44,046	5010	\$46,494	5010	\$55,786
	1800	449@	\$21,314	449	\$30,264	449	\$32,282	5010	\$49,431
	1200	449@	\$24,006	5008	\$43,536	5008	\$45,954	5012	\$59,257
	900	449@	\$27,720	5010	\$55,345	5010	\$58,420	5810	\$75,330
	720	5012	\$46,741	5810	\$64,568	5810	\$68,155	----	----
	600	5012	\$55,872	5810	\$68,665	5810	\$72,479	----	----
300	3600*	449@	\$26,066	5010	\$48,249	5010	\$50,930	5012	\$71,661
	1800	449@	\$21,752	5008	\$42,635	5008	\$45,004	5012	\$55,688
	1200	449@	\$25,938	5010	\$48,132	5010	\$50,806	5012	\$65,514
	900	5010	\$41,874	5010	\$61,176	5012	\$64,573	5812	\$85,592
	720	5810	\$53,588	5810	\$69,836	5810	\$73,716	----	----
	600	5810	\$66,952	5810	\$73,603	5810	\$77,690	----	----
350	3600*	449@	\$29,855	5010	\$51,467	5010	\$54,327	5012	\$74,628
	1800	449@	\$24,006	5010	\$44,413	5010	\$46,880	5012	\$67,282
	1200	5010@	\$40,141	5010	\$53,268	5010	\$56,227	5810	\$79,760
	900	5010	\$46,732	5012	\$66,174	5012	\$69,851	5812	\$92,588
	720	5810	\$65,841	5812	\$78,248	5812	\$82,595	----	----
	600	5812	\$79,164	5812	\$92,345	5812	\$96,963	----	----
400	3600*	449@	\$33,971	5010	\$56,905	5010	\$60,066	5810	\$76,645
	1800	449*@	\$24,528	5010	\$49,019	5010	\$51,741	5012	\$71,077
	1200	5010	\$46,294	5010	\$56,133	5010	\$59,251	5812	\$85,229
	900	5012	\$52,320	5810	\$70,147	5810	\$74,044	----	----
	720	5810	\$66,918	5812	\$84,285	5812	\$88,298	----	----
	600	5812	\$84,033	6808	\$147,917	6808	\$154,960	----	----
450	3600*	5010@	\$46,180	5012	\$61,862	5012	\$65,299	5810	\$83,611
	1800	5010@	\$38,605	5010	\$52,688	5010	\$55,615	5810	\$76,397
	1200	5012	\$51,838	5012	\$60,748	5012	\$64,123	5812	\$90,666
	900	5810	\$57,247	5810	\$76,169	5810	\$80,401	----	----
	720	6808	\$147,917	6808	\$147,917	6808	\$154,960	----	----
	600	6809	\$159,486	6809	\$159,486	6809	\$167,080	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)
 @ 60Hz motor complies with U.S. D.O.E.'s Efficiency regulation 10 CFR Section 431 Subpart B – electric motors (see Appendix D for Nominal Efficiency Table)

^ High Inrush Design
 6808 Frame Also Available as 450MLA Frame or 7007 Frame
 6809 Frame Also Available as 450LAB Frame or 7008 Frame
 6811 Frame Also Available as 450BCD Frame or 7010 Frame

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



Modifiable TITAN® Horizontal Motors
Horizontal Totally Enclosed Fan Cooled - TEFC
Anti-Friction Ball Bearings - Premium Efficient (DS-6TM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
500	3600*	5012@	\$61,304	5012	\$67,108	5012	\$70,837	5810	\$88,434
	1800	5010@	\$45,299	5012	\$56,096	5012	\$59,213	5810	\$80,806
	1200	5012	\$57,081	5012	\$70,590	5012	\$74,511	5812	\$95,694
	900	5812	\$73,631	5812	\$80,289	5812	\$84,750	----	----
	720	6808	\$155,180	6808	\$155,180	6808	\$162,569	----	----
	600	6811	\$167,317	6811	\$167,317	6811	\$175,284	----	----
600	3600*	5012	\$69,078	5012	\$74,022	5012	\$84,447	5812	\$99,658
	1800	5012	\$61,970	5012	\$69,853	5012	\$73,346	5812	\$86,577
	1200	5810	\$65,350	5810	\$79,710	5810	\$84,139	----	----
	900	5812	\$86,720	5812	\$94,561	5812	\$99,897	----	----
	720	6811	\$173,709	6811	\$173,709	6811	\$180,657	----	----
	600	6811	\$187,295	6811	\$187,295	6811	\$194,788	----	----
700	3600*	5812	\$88,191	5812	\$88,191	5812	\$90,702	5812	\$106,090
	1800	5012	\$76,626	5012	\$76,626	5012	\$80,458	5812	\$94,108
	1200	5812	\$91,906	5812	\$91,906	5812	\$96,502	----	----
	900	6809	\$160,521	6809	\$160,521	6809	\$168,164	----	----
	720	6811	\$180,660	6811	\$180,660	6811	\$187,886	----	----
	600	6811	\$200,858	6811	\$200,858	6811**	\$208,893	----	----
800	3600*	5812	\$94,780	5812	\$94,780	5812	\$97,478	----	----
	1800	5812	\$82,423	5812	\$82,423	5812	\$86,542	----	----
	1200	5812	\$97,604	5812	\$97,604	5812	\$102,484	----	----
	900	6811	\$176,542	6811	\$176,542	6811	\$184,950	----	----
	720	6811	\$199,244	6811	\$199,244	6811**	\$207,214	----	----
900	1800	5812	\$93,464	5812	\$93,464	5812	\$98,137	----	----
	1200*	6809	\$168,376	6809	\$168,376	6809	\$177,798	----	----
	900	6811	\$187,005	6811	\$187,005	6811	\$194,458	----	----
1000	1800	5812	\$100,090	5812	\$100,090	5812	\$104,855	----	----
	1200*	6809	\$173,117	6809	\$173,117	6809	\$183,007	----	----
	900	6811	\$202,473	6811	\$202,473	6811	\$210,572	----	----
1250	1800*	6811	---	6811	\$169,533	6811	\$177,605	----	----
	1200*	6811	---	6811	\$188,103	6811^	\$195,627	----	----
1500	1800*	6811	---	6811	\$178,009	6811	\$188,182	----	----
1750	1800*	6811^	---	6811^	\$188,685	6811^	\$199,467	----	----
2000	1800*	6811**^	---	6811**^	\$204,094	6811**^	\$215,752	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

** Motor is Suitable for 1.0 SF, Class F Rise Only

@ 60Hz motor complies with U.S. D.O.E.'s Efficiency regulation 10 CFR Section 431 Subpart B – electric motors (see Appendix D for Nominal Efficiency Table)

^ High Inrush Design

6808 Frame Also Available as 450MLA Frame or 7007 Frame

6809 Frame Also Available as 450LAB Frame or 7008 Frame

6811 Frame Also Available as 450BCD Frame or 7010 Frame

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



Modifiable TITAN® Horizontal Motors

Horizontal Totally Enclosed Fan Cooled - TEFC

Anti-Friction Ball Bearings - Standard Efficient (DS-6TM)

Cannot Be Used For Motors Covered by EISA-2007 / IHP Motor Final Rule 2016

FEATURES:

- Cast Iron Frame & Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings

HP	RPM @ 60 Hz	Voltage @ 60 Hertz	
		460 or 575V	
		Frame	List
150	900	449%	\$20,935
200	900	449%	\$22,037
250	3600*	449%	\$21,932
	1800	449%	\$19,377
	1200	449%	\$19,905
	900	449%	\$25,200
300	3600*	449%	\$23,697
	1800	449%	\$19,775
	1200	449%	\$23,580
350	3600*	449%	\$27,141
	1800	449%	\$21,824
	1200	5010%	\$36,492
400	3600*	449%	\$30,883
	1800	449%	\$22,298
450	3600*	5010%	\$41,982
	1800	5010%	\$35,095
500	3600*	5012%	\$55,731
	1800	5010%	\$41,181

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

% Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016

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



Modifiable TITAN® Horizontal Motors

Horizontal Totally Enclosed Air-to-Air Cooled - TEAAC

Anti-Friction Ball Bearings - Standard Efficient (DS-6TM)

FEATURES:

- Fabricated Steel Frame
- Cast Iron Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- Re-Greasable Ball Bearings

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
300	514	8007	\$159,988	8007	\$159,988	8007	\$169,121	----	----
350	600	5812	\$103,634	5812	\$113,334	5812	\$119,001	----	----
	514	8007	\$162,439	8007	\$162,439	8007	\$171,695	----	----
400	900	5811	\$73,724	5812	\$86,090	5812	\$90,873	5812	\$116,704
	720	5811	\$82,127	5812	\$103,442	5812	\$108,367	----	----
	600	5812	\$110,008	8007	\$142,668	8007	\$146,948	----	----
	514	8007	\$164,840	8007	\$164,840	8007	\$174,233	----	----
450	900	5811	\$80,667	5812	\$93,481	5812	\$98,675	5813	\$124,148
	720	5812	\$101,225	5812	\$109,623	5812	\$114,843	----	----
	600	5812	\$118,613	8007	\$154,372	8007	\$159,004	----	----
	514	8007	\$167,277	8008	\$167,277	8008	\$176,808	----	----
500	900	5812	\$88,476	5812	\$98,537	5812	\$104,013	8007	\$165,316
	720	5812	\$110,627	5812	\$116,590	5812	\$122,142	----	----
	600	8007	\$159,775	8007	\$159,775	8007	\$164,569	----	----
	514	8007	\$169,562	8008	\$169,562	8008	\$179,241	----	----
600	3600*	5812	\$97,337	5812	\$104,305	5812	\$107,275	5812	\$122,309
	1800	5810	\$87,322	5810	\$98,430	5810	\$103,352	5812	\$106,255
	1200	5811	\$92,084	5811	\$109,476	5811	\$112,423	5813	\$125,064
	900	5812	\$106,430	5812	\$116,053	5812	\$122,602	8008	\$171,102
	720	5813	\$117,458	5813	\$130,512	5813	\$136,726	8011	\$224,744
	600	8008	\$192,405	8008	\$192,405	8008	\$200,102	----	----
	514	8008	\$203,017	8008	\$203,017	8008	\$214,590	----	----
700	3600*	5812	\$108,236	5812	\$108,236	5812	\$111,317	5813	\$130,203
	1800	5811	\$102,140	5811	\$102,140	5811	\$107,247	5812	\$115,497
	1200	5811	\$112,795	5811	\$112,795	5811	\$118,436	5813	\$131,645
	900	5812	\$120,603	5812	\$120,603	5812	\$126,346	8008	\$222,846
	720	8007	\$185,589	8007	\$185,589	8007	\$193,012	8011	\$242,750
	600	8008	\$206,338	8008	\$206,338	8008	\$214,592	----	----
800	3600*	5812	\$112,565	5812	\$112,565	5812	\$115,770	5813	\$135,475
	1800	5811	\$106,226	5811	\$106,226	5811	\$111,537	5813	\$120,173
	1200	5813	\$119,788	5813	\$119,788	5813	\$125,777	5813	\$136,974
	900	5813	\$132,640	5813	\$132,640	5813	\$138,957	8009	\$245,086
	720	8008	\$204,680	8008	\$204,680	8008	\$212,867	8011	\$283,089
	600	8009	\$220,604	8009	\$220,604	8009	\$229,428	----	----
900	3600*	5812	\$118,878	5812	\$118,878	5812	\$122,445	----	----
	1800	5812	\$114,707	5812	\$114,707	5812	\$120,442	5813*	\$131,659
	1200	5813	\$126,505	5813	\$126,505	5813	\$133,584	8009	\$214,891
	900	8007	\$192,107	8007	\$192,107	8007	\$199,764	8011	\$259,947
	720	8009	\$222,892	8009	\$222,892	8009	\$231,808	8011	\$299,802
	600	8010	\$234,537	8010	\$234,537	8010	\$243,918	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors
Horizontal Totally Enclosed Fan Cooled - TEAAC
Anti-Friction Ball Bearings - Standard Efficient (DS-6TM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
1000	3600*	5812	\$127,308	5812	\$127,308	5812	\$131,127	----	----
	1800	5812	\$122,839	5812	\$122,839	5812	\$128,687	5813*	\$152,808
	1200	5813	\$130,066	5813	\$130,066	5813	\$137,498	8011	\$223,483
	900	8008	\$207,997	8008	\$207,997	8008	\$216,317	8011	\$284,144
	720	8010	\$233,839	8010	\$233,839	8010	\$243,193	----	----
	600	8010	\$242,199	8010	\$242,199	8010	\$251,887	----	----
1250	3600*	----	----	5813	\$153,403	5813	\$157,769	----	----
	1800	----	----	5813*	\$127,374	5813*	\$133,439	8008*	\$208,709
	1200	----	----	8008	\$193,235	8008	\$200,965	8011	\$233,754
	900	----	----	8008	\$221,731	8008	\$230,601	9606	\$308,340
	720	----	----	8010	\$251,819	8010	\$261,892	----	----
1500	3600*	----	----	5813	\$167,970	5813	\$173,029	----	----
	1800	----	----	5813*	\$133,742	5813*	\$141,386	8010*	\$224,359
	1200	----	----	8009	\$214,864	8009	\$223,459	9606	\$257,309
	900	----	----	8009	\$235,631	8009	\$245,056	9608	\$316,124
1750	1800	----	----	5813*	\$141,763	5813*	\$149,864	8011*	\$238,766
	1200	----	----	8010	\$232,181	8010	\$241,468	9606	\$278,047
	900	----	----	8010	\$264,724	8010	\$275,313	9609	\$342,761
2000	1800	----	----	8011*	\$209,663	8011*	\$221,639	8011*	\$258,322
	1200	----	----	8011	\$265,719	8011	\$276,348	9609	\$320,901
2250	1800	----	----	8011*	\$226,038	8011*	\$235,080	----	----
	1200	----	----	8011	\$288,006	8011	\$299,527	----	----
2500	1800	----	----	8011*	\$238,268	8011*	\$247,799	----	----
	1200	----	----	9607	\$310,088	9607	\$322,491	----	----
3000	1800	----	----	9607*	\$264,838	9607*	\$275,431	----	----
	1200	----	----	9607	\$325,672	9607	\$338,699	----	----
3500	1200	----	----	9610	\$333,592	9610	\$346,936	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Totally Enclosed Air-to-Air Cooled - TEAAC

Anti-Friction Ball Bearings - Premium Efficient (DS-6TM)

FEATURES:

- Fabricated Steel Frame
- Cast Iron Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- Re-Greasable Ball Bearings

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
300	514	8007	\$175,985	8007	\$175,985	8007	\$186,031	----	----
350	600	5812	\$113,996	5812	\$124,666	5812	\$130,900	----	----
	514	8007	\$178,681	8007	\$178,681	8007	\$188,862	----	----
400	900	5811	\$81,096	5812	\$94,698	5812	\$99,959	5812	\$128,373
	720	5811	\$90,339	5812	\$113,785	5812	\$119,202	----	----
	600	5812	\$121,008	8007	\$156,933	8007	\$161,641	----	----
	514	8007	\$181,322	8007	\$181,322	8007	\$191,654	----	----
450	900	5811	\$88,733	5812	\$102,828	5812	\$108,541	5813	\$136,561
	720	5812	\$111,346	5812	\$120,584	5812	\$126,326	----	----
	600	5812	\$130,473	8007	\$169,808	8007	\$174,902	----	----
	514	8008	\$184,003	8008	\$184,003	8008	\$194,487	----	----
500	900	5812	\$97,323	5812	\$108,390	5812	\$114,413	8007	\$181,846
	720	5812	\$121,688	5812	\$128,248	5812	\$134,355	----	----
	600	8007	\$175,751	8007	\$175,751	8007	\$181,024	----	----
	514	8007	\$186,516	8008	\$186,516	8008	\$197,163	----	----
600	3600*	5812	\$107,071	5812	\$114,734	5812	\$118,001	5812	\$134,538
	1800	5810	\$96,054	5810	\$108,272	5810	\$113,686	5812	\$116,879
	1200	5811	\$101,293	5811	\$120,422	5811	\$123,664	5813	\$137,569
	900	5812	\$117,072	5812	\$127,657	5812	\$134,861	8008	\$188,210
	720	5813	\$129,204	5813	\$143,561	5813	\$150,397	8011	\$247,216
	600	8008	\$211,644	8008	\$211,644	8008	\$220,110	----	----
	514	8008	\$223,302	8008	\$223,302	8008	\$236,049	----	----
700	3600*	5812	\$119,058	5812	\$119,058	5812	\$122,448	5813	\$143,222
	1800	5811	\$112,353	5811	\$112,353	5811	\$117,970	5812	\$127,046
	1200	5811	\$124,073	5811	\$124,073	5811	\$130,278	5813	\$144,808
	900	5812	\$132,662	5812	\$132,662	5812	\$138,979	8008	\$245,128
	720	8007	\$204,146	8007	\$204,146	8007	\$212,311	8011	\$267,022
	600	8008	\$226,970	8008	\$226,970	8008	\$236,049	----	----
800	3600*	5812	\$123,820	5812	\$123,820	5812	\$127,346	5813	\$149,020
	1800	5811	\$116,847	5811	\$116,847	5811	\$122,689	5813	\$132,189
	1200	5813	\$131,765	5813	\$131,765	5813	\$138,353	5813	\$150,670
	900	5813	\$145,903	5813	\$145,903	5813	\$152,851	8009	\$269,591
	720	8008	\$225,146	8008	\$225,146	8008	\$234,152	8011	\$311,395
	600	8009	\$242,662	8009	\$242,662	8009	\$252,368	----	----
900	3600*	5812	\$130,765	5812	\$130,765	5812	\$134,688	----	----
	1800	5812	\$126,176	5812	\$126,176	5812	\$132,485	5813*	\$144,823
	1200	5813	\$139,154	5813	\$139,154	5813	\$146,941	8009	\$236,378
	900	8007	\$211,316	8007	\$211,316	8007	\$219,737	8011	\$285,938
	720	8009	\$245,179	8009	\$245,179	8009	\$254,986	8011	\$329,779
	600	8010	\$257,988	8010	\$257,988	8010	\$268,307	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Totally Enclosed Air-to-Air Cooled - TEAAC

Anti-Friction Ball Bearings - Premium Efficient (DS-6TM)

FEATURES:

- Fabricated Steel Frame
- Cast Iron Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- Re-Greasable Ball Bearings

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
1000	3600*	5812	\$140,037	5812	\$140,037	5812	\$144,238	----	----
	1800	5812	\$135,122	5812	\$135,122	5812	\$141,554	5813*	\$168,087
	1200	5813	\$143,072	5813	\$143,072	5813	\$151,246	8011	\$245,829
	900	8008	\$228,795	8008	\$228,795	8008	\$237,947	8011	\$312,555
	720	8010	\$257,221	8010	\$257,221	8010	\$267,510	----	----
	600	8010	\$266,416	8010	\$266,416	8010	\$277,073	----	----
1250	3600*	----	----	5813	\$168,742	5813	\$173,545	----	----
	1800	----	----	5813*	\$140,110	5813*	\$146,781	8008*	\$229,577
	1200	----	----	8008	\$212,557	8008	\$221,059	8011	\$257,126
	900	----	----	8008	\$243,901	8008	\$253,658	9606	\$339,171
	720	----	----	8010	\$276,998	8010	\$288,078	----	----
1500	3600*	----	----	5813	\$184,765	5813	\$190,330	----	----
	1800	----	----	5813*	\$147,115	5813*	\$155,523	8010*	\$246,792
	1200	----	----	8009	\$236,348	8009	\$245,802	9606	\$283,037
	900	----	----	8009	\$259,192	8009	\$269,559	9608	\$347,732
1750	1800	----	----	5813*	\$155,938	5813*	\$164,849	8011*	\$262,639
	1200	----	----	8010	\$255,397	8010	\$265,612	9606	\$305,848
	900	----	----	8010	\$291,194	8010	\$302,841	9609	\$377,033
2000	1800	----	----	8011*	\$230,627	8011*	\$243,800	8011*	\$284,151
	1200	----	----	8011	\$292,287	8011	\$303,980	9609	\$352,987
2250	1800	----	----	8011*	\$248,639	8011*	\$258,586	----	----
	1200	----	----	8011	\$316,803	8011	\$329,476	----	----
2500	1800	----	----	8011*	\$262,092	8011*	\$272,575	----	----
	1200	----	----	9607	\$341,093	9607	\$354,736	----	----
3000	1800	----	----	9607*	\$291,319	9607*	\$302,971	----	----
	1200	----	----	9607	\$358,235	9607	\$372,564	----	----
3500	1200	----	----	9610	\$366,948	9610	\$381,625	----	----

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Motor Includes Sleeve Bearings

& Motor Requires The Use Of A Flood Oil Lubrication System

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



Modifiable TITAN® Horizontal Motors

Horizontal Div. 1 Hazardous Location

Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6TM)

FEATURES:

- Cast Iron Frame & Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- Class I Group D, T2B Temp Code
- NEMA®† Design B
- Re-Greasable Ball Bearings
- UL®† Listed Per File No. E10336 & CSA®† Certified

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
150	3600*	----	---	5008	\$32,765	5008	\$34,445	----	---
	1800	----	---	5008	\$29,293	5008	\$30,795	----	---
	1200	----	---	5008	\$39,375	5807	\$41,394	----	---
	900	----	---	5008	\$41,836	5807	\$43,982	----	---
	720	5807	\$39,757	5807	\$46,431	5807	\$48,812	----	---
	600	5807	\$50,965	5807	\$57,681	5807	\$60,635	----	---
200	3600*	----	---	5008	\$36,040	5008	\$37,889	----	---
	1800	----	---	5008	\$32,514	5008	\$34,183	----	---
	1200	5008%	\$33,585	5008	\$41,625	5807	\$43,760	----	---
	900	5008%	\$40,301	5807	\$49,649	5807	\$52,194	----	---
	720	5807	\$48,117	5809	\$56,385	5809	\$59,277	----	---
	600	5809	\$58,477	5809	\$64,615	5809	\$67,927	----	---
250	3600*	----	---	5008	\$40,365	5008	\$42,435	----	---
	1800	----	---	5008	\$35,766	5807*	\$37,600	----	---
	1200	5807%	\$41,565	5807	\$42,876	5807	\$45,075	----	---
	900	5807%	\$47,182	5807	\$54,507	5807	\$57,301	----	---
	720	5807	\$57,097	5809	\$63,590	5809	\$66,850	----	---
	600	5809	\$62,862	5811	\$71,827	5811	\$75,508	----	---
300	3600*	5008%	\$43,335	5008	\$45,599	5809	\$47,937	----	---
	1800	5008%	\$39,236	5807*	\$40,293	5807*	\$42,359	----	---
	1200	5807%	\$44,149	5807	\$47,403	5807	\$49,833	----	---
	900	5807	\$51,153	5807	\$60,248	5809	\$63,338	----	---
	720	5809	\$65,462	5811	\$68,778	5811	\$72,305	----	---
	600	5811	\$69,848	5811	\$77,648	5811	\$81,635	----	---
350	3600*	5807%	\$50,817	5809	\$53,234	5809	\$55,963	----	---
	1800	5807**	\$40,862	5807*	\$43,740	5807*	\$45,983	----	---
	1200	5809%	\$51,242	5809	\$52,461	5809	\$55,152	----	---
	900	5809	\$57,088	5809	\$65,172	5809	\$68,513	----	---
	720	5811	\$73,550	5811	\$77,063	5811	\$81,015	----	---
400	3600*	5807%	\$57,821	5809	\$58,846	5809	\$61,863	----	---
	1800	5807**	\$41,748	5809*	\$48,276	5809*	\$50,752	----	---
	1200	5809	\$49,492	5809	\$55,283	5809	\$58,118	----	---
	900	5809	\$63,915	5809	\$69,084	5811	\$72,627	----	---
	720	5811***	\$86,652	----	---	----	---	----	---
450	3600*	5809%	\$58,951	5809	\$60,925	5811	\$64,050	----	---
	1800	5807**	\$49,282	5809*	\$51,890	5809*	\$54,550	----	---
	1200	5809	\$57,678	5809	\$59,828	5809	\$62,896	----	---
	900	5809	\$69,933	5811	\$75,015	----	---	----	---
500	3600*	5811%	\$63,185	5811	\$66,091	5811	\$69,481	----	---
	1800	5809**	\$57,858	5809*	\$59,850	5811*	\$62,919	----	---
	1200	5809	\$65,492	5809	\$69,520	5811	\$73,086	----	---
	900	5811	\$75,773	5811	\$79,110	----	---	----	---

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

*** Form Wound

% Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016

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



Modifiable TITAN® Horizontal Motors
Horizontal Div. 1 Hazardous Location
Anti-Friction Ball Bearings - Standard (Energy) Efficient (DS-6TM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
600	3600*	5811	\$67,298	5811	\$72,900	----	----	----	---
	1800	5811*	\$61,439	5811*	\$66,555	5811*	\$69,968	----	---
	1200	5811	\$75,540	5811	\$78,503	5811**	\$82,529	----	---
700	1800	5811**	\$71,415	5811**	\$71,415	5811* **	\$75,077	----	---

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

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



Modifiable TITAN® Horizontal Motors

Horizontal Div. 1 Hazardous Location

Anti-Friction Ball Bearings - Premium Efficient (DS-6TM)

FEATURES:

- Cast Iron Frame & Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- Class I Group D, T2B Temp Code
- NEMA®† Design B
- Re-Greasable Ball Bearings
- UL®† Listed Per File No. E10336 & CSA®† Certified
- Department of Energy Compliance Certification Number CC030A

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
150	3600*	----	---	5008	\$36,040	5008	\$37,889	----	---
	1800	----	---	5008	\$32,222	5008	\$33,875	----	---
	1200	----	---	5008	\$43,313	5807	\$45,534	----	---
	900	----	---	5008	\$46,020	5807	\$48,380	----	---
	720	5807	\$43,732	5807	\$51,074	5807	\$53,693	----	---
	600	5807	\$56,060	5807	\$63,450	5807	\$66,698	----	---
200	3600*	5008@	\$40,090			5008	\$41,678	----	---
	1800	5008@	\$31,303			5008	\$37,600	----	---
	1200	5008@	\$35,352	5008	\$45,788	5807	\$48,136	----	---
	900	5807@	\$42,422	5807	\$54,614	5807	\$57,414	----	---
	720	5807	\$52,929	5809	\$62,024	5809	\$65,204	----	---
	600	5809	\$64,327	5809	\$71,077	5809	\$74,717	----	---
250	3600*	5008@	\$40,090	5008	\$44,401	5008	\$46,679	----	---
	1800	5008@	\$38,067	5008	\$39,343	5807*	\$41,360	----	---
	1200	5807@	\$43,752	5807	\$47,163	5807	\$49,582	----	---
	900	5807@	\$49,665	5807	\$59,957	5807	\$63,031	----	---
	720	5807	\$62,807	5809	\$69,948	5809	\$73,536	----	---
	600	5809	\$69,150	5811	\$79,010	5811	\$83,060	----	---
300	3600*	5008@	\$45,615	5008	\$50,159	5809	\$52,731	----	---
	1800	5008@	\$41,195	5807*	\$44,323	5807*	\$46,596	----	---
	1200	5807@	\$46,472	5807	\$52,143	5807	\$54,817	----	---
	900	5807	\$56,268	5807	\$66,273	5809	\$69,672	----	---
	720	5809	\$72,009	5811	\$75,655	5811	\$79,536	----	---
	600	5811	\$76,835	5811	\$85,413	5811	\$89,798	----	---
350	3600*	5807@	\$53,491	5809	\$55,757	5809	\$58,617	----	---
	1800	5807*@	\$43,012	5807*	\$48,114	5807*	\$50,581	----	---
	1200	5809@	\$53,939	5809	\$57,707	5809	\$60,667	----	---
	900	5809	\$62,796	5809	\$71,688	5809	\$75,365	----	---
	720	5811	\$80,905	5811	\$84,768	5811	\$89,116	----	---
400	3600*	5807@	\$60,864	5809	\$61,648	5809	\$64,809	----	---
	1800	5807*@	\$43,945	5809*	\$53,103	5809*	\$55,827	----	---
	1200	5809	\$54,441	5809	\$60,811	5809	\$63,929	----	---
	900	5809	\$70,306	5809	\$75,992	5811	\$79,890	----	---
	720	5811***	\$95,315	----	---	----	---	----	---
450	3600*	5809@	\$62,054	5809	\$67,018	5811	\$70,455	----	---
	1800	5807*@	\$51,876	5809*	\$57,078	5809*	\$60,006	----	---
	1200	5809	\$63,445	5809	\$65,811	5809	\$69,185	----	---
	900	5809	\$76,926	5811	\$82,516	----	---	----	---
500	3600*	5811@	\$66,510	5811	\$72,700	5811	\$76,428	----	---
	1800	5809*@	\$60,870	5809*	\$65,835	5811*	\$69,211	----	---
	1200	5809	\$72,042	5809	\$76,472	5811	\$80,394	----	---
	900	5811	\$83,350	5811	\$87,021	----	---	----	---

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

** Motor is Suitable for 1.0 SF, Class F Rise Only

*** Form Wound

@ 60Hz motor complies with U.S. D.O.E.'s Efficiency regulation 10 CFR Section 431 Subpart B – electric motors (see Appendix D for Nominal Efficiency Table)

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



Modifiable TITAN® Horizontal Motors
Horizontal Div. 1 Hazardous Location
Anti-Friction Ball Bearings - Premium Efficient (DS-6TM)

(continued)

HP	RPM @ 60 Hz	Voltage @ 60 Hertz							
		460 or 575V		2300V		4000V		6600V	
		Frame	List	Frame	List	Frame	List	Frame	List
600	3600*	5811	\$74,028	5811	\$80,190	5811	\$84,303	----	---
	1800	5811*	\$67,583	5811*	\$73,210	5811*	\$76,965	----	---
	1200	5811	\$83,093	5811	\$86,353	5811**	\$90,781	----	---
700	1800*	5811**	\$78,556	5811**	\$78,556	5811* **	\$82,585	----	---

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

** Motor is Suitable for 1.0 SF, Class F Rise Only

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



Modifiable TITAN® Horizontal Motors

Horizontal Div. 1 Hazardous Location

Anti-Friction Ball Bearings - Standard Efficient (DS-6TM)

Cannot Be Used For Motors Covered by EISA-2007 / IHP Motor Final Rule 2016

FEATURES:

- Cast Iron Frame & Brackets
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- Class I Group D, T2B Temp Code
- NEMA®† Design B
- Re-Greasable Ball Bearings
- UL®† Listed Per File No. E10336 & CSA®† Certified

HP	RPM @ 60 Hz	Voltage @ 60 Hertz	
		460 or 575V	
		Frame	List
250	1200	5807%	\$38,035
300	3600*	5008%	\$41,468
	1800	5008%	\$34,606
	1200	5807%	\$42,248
350	3600*	5807%	\$48,628
	1800	5807**%	\$39,102
	1200	5807%	\$49,035
400	3600*	5807%	\$55,332
	1800	5807**%	\$39,951
450	3600*	5809%	\$56,413
	1800	5809**%	\$47,160
500	3600*	5811%	\$60,464
	1800	5809**%	\$55,336

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

% Cannot be used for motors covered by EISA-2007 / IHP Motor Final Rule 2016

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



TITAN® 841 Horizontal Motors

TEFC Severe Duty

Anti-Friction Bearings – Premium Efficient (DS-6TM)

FEATURES:

- Cast Iron Frame and Brackets
- Division 2 Suitable
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings
- INPRO/SEALS®† on Both Ends
- Non-Witnessed IEEE-841™ Enhanced No Load Test
- 2 Year Warranty (18 Months on Inverter Power)
- Department of Energy Compliance Certification Number CC030A

HP	RPM @ 60 Hz	Frame	Voltage	List	Full Load NNE	Typ. Sound Pressure Level @ 1M (dBA)	Fan Cover Material	Main Box Size	Div. 2 T-Code	Ship Weight	MN Reference	Notes
150	900	449@	460	\$32,434	94.1%	79	Cast Iron	2	T3	2400	23270	
200	900	449@	460	\$34,748	94.5%	79	Cast Iron	2	T3	2400	23272	
250	1200	449@	460	\$34,901	95.8%	81	Cast Iron	2	T3	2400	23275	
	900	5010@	460	\$48,349	95.0%	82	Cast Iron	3	T3	4800	23277	
300	3600*	449@	460	\$37,929	95.8%	85	Cast Iron	2	T3	2400	23278	
	1200	449@	460	\$37,680	95.8%	81	Cast Iron	2	T3	2400	23281	
	900	5010	460	\$54,013	95.0%	82	Cast Iron	3	T3	4800	23283	
350	3600*	5008@	460	\$50,336	95.8%	85	Fab. Steel	3	T3	4000	23285	17
	1800	449@	460	\$36,956	96.2%	85	Cast Iron	2.5	T3	2400	23286	
	1200	5010@	460	\$52,193	95.8%	80	Cast Iron	3	T3	4800	23287	
	900	5010	460	\$59,114	95.0%	82	Cast Iron	3	T3	4800	23288	
400	3600*	5008@	460	\$54,510	95.8%	85	Fab. Steel	3	T3	4000	23290	17
	1800	5008@	460	\$46,617	96.2%	85	Cast Iron	3	T3	4000	23292	
	1200	5010	460	\$58,654	95.8%	80	Cast Iron	3	T3	4800	23293	
	900	5810	460	\$69,304	95.0%	85	Cast Iron	3	T3	7700	23295	
450	3600*	5010@	460	\$61,074	95.8%	85	Fab. Steel	3	T3	4800	23296	17
	1800	5010@	460	\$52,325	96.2%	85	Cast Iron	3	T3	4800	23297	
	1200	5012	460	\$64,475	95.8%	80	Cast Iron	3	T3	6000	23298	
	900	5810	460	\$71,079	95.0%	85	Cast Iron	3	T3	7700	23299	
500	3600*	5012@	460	\$75,569	95.8%	85	Fab. Steel	3	T3	6000	23300	17
	1800	5010@	460	\$57,969	96.2%	85	Cast Iron	3	T3	4800	23301	
	1200	5810	460	\$69,170	95.8%	80	Cast Iron	3	T3	7700	23303	
	900	5812	460	\$86,548	95.0%	85	Cast Iron	3	T3	9300	23304	

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Pricing above can be used for 575V. Please contact your Nidec Motor Technical Representative for 575V performance data

@ 60Hz motor complies with U.S. D.O.E.'s Efficiency regulation 10 CFR Section 431 Subpart B – electric motors (see Appendix D for Nominal Efficiency Table)

Note 17 Fabricated steel sound abate fan cover guard

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



TITAN® 841 Horizontal Motors

TEFC Severe Duty

Anti-Friction Bearings – Premium Efficient (DS-6TM)

FEATURES:

- Cast Iron Frame and Brackets
- Division 2 Suitable
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings
- INPRO/SEALS®† on Both Ends
- Non-Witnessed IEEE-841™ Enhanced No Load Test
- 2 Year Warranty

HP	RPM @ 60 Hz	Frame	Voltage	List	Full Load NNE	Typ. Sound Pressure Level @ 1M (dBA)	Fan Cover Material	Main Box Size	Div. 2 T-Code	Ship Weight	MN Reference	Notes
250	3600*	5010	2300	\$60,243	95.0%	85	Fab. Steel	3	T3	4800	23305	17
	1800	449	2300	\$42,332	95.0%	85	Cast Iron	2	T3	2400	23306	
	1200	5008	2300	\$58,913	95.0%	77	Cast Iron	3	T3	4000	23307	
	900	5010	2300	\$69,567	94.1%	82	Cast Iron	3	T3	4800	23308	
300	3600*	5010	2300	\$64,656	95.0%	85	Fab. Steel	3	T3	4800	23309	17
	1800	5008	2300	\$57,967	95.0%	85	Cast Iron	3	T3	4000	23310	
	1200	5010	2300	\$61,994	95.0%	80	Cast Iron	3	T3	4800	23311	
	900	5010	2300	\$75,690	94.1%	82	Cast Iron	3	T3	4800	23312	
350	3600*	5010	2300	\$68,035	95.0%	85	Fab. Steel	3	T3	4800	23313	17
	1800	5010	2300	\$59,834	95.0%	85	Cast Iron	3	T3	4800	23314	
	1200	5010	2300	\$67,386	95.0%	80	Cast Iron	3	T3	4800	23315	
	900	5012	2300	\$80,938	94.1%	82	Cast Iron	3	T3	6000	23316	
400	3600*	5010	2300	\$73,745	95.0%	85	Fab. Steel	3	T3	4800	23317	17
	1800	5010	2300	\$64,670	95.0%	85	Cast Iron	3	T3	4800	23318	
	1200	5010	2300	\$70,395	95.0%	80	Cast Iron	3	T3	4800	23319	
	900	5810	2300	\$86,699	94.1%	85	Cast Iron	3	T3	7700	23320	
450	3600*	5012	2300	\$78,950	95.0%	85	Fab. Steel	3	T3	6000	23321	17
	1800	5010	2300	\$68,522	95.0%	85	Cast Iron	3	T3	4800	23322	
	1200	5012	2300	\$75,240	95.0%	80	Cast Iron	3	T3	6000	23323	
	900	5810	2300	\$93,022	94.1%	85	Cast Iron	3	T3	7700	23324	
500	3600*	5012	2300	\$84,458	95.0%	85	Fab. Steel	3	T3	6000	23225	17
	1800	5012	2300	\$72,101	95.0%	85	Cast Iron	3	T3	6000	23226	
	1200	5012	2300	\$85,575	95.0%	80	Cast Iron	3	T3	6000	23227	
	900	5812	2300	\$97,348	94.1%	85	Cast Iron	3	T3	9300	23228	

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Note 17 Fabricated steel sound abate fan cover guard

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



TITAN® 841 Horizontal Motors

TEFC Severe Duty

Anti-Friction Bearings – Premium Efficient (DS-6TM)

FEATURES:

- Cast Iron Frame and Brackets
- Division 2 Suitable
- Class F VPI Epoxy Insulation
- 1.00 S.F. with Class B Temperature Rise at Full Load
- 40°C Ambient, Max 3,300 F.A.S.L.
- NEMA®† Design B
- Re-Greasable Ball Bearings
- Insulated Bearing - Opposite Drive End
- INPRO/SEALS®† on Both Ends
- Non-Witnessed IEEE-841™ Enhanced No Load Test
- 2 Year Warranty

HP	RPM @ 60 Hz	Frame	Voltage	List	Full Load NNE	Typ. Sound Pressure Level @ 1M (dBA)	Fan Cover Material	Main Box Size	Div. 2 T-Code	Ship Weight	MN Reference	Notes
250	3600*	5010	4000	\$65,324	95.0%	85	Fab. Steel	3L	T3	4800	23329	17
	1800*	5008	4000	\$49,606	95.0%	85	Cast Iron	3L	T3	4000	23330	
	1200	5008	4000	\$62,217	95.0%	80	Cast Iron	3L	T3	4000	23331	
	900	5012	4000	\$75,306	94.1%	82	Cast Iron	3L	T3	4800	23332	
300	3600*	5010	4000	\$69,982	95.0%	85	Fab. Steel	3L	T3	4800	23333	17
	1800	5008	4000	\$62,964	95.0%	85	Cast Iron	3L	T3	4000	23334	
	1200	5010	4000	\$67,311	95.0%	80	Cast Iron	3L	T3	4800	23335	
	900	5012	4000	\$81,767	94.1%	82	Cast Iron	3L	T3	4800	23336	
350	3600*	5010	4000	\$73,548	95.0%	85	Fab. Steel	3L	T3	4800	23337	17
	1800	5010	4000	\$64,934	95.0%	85	Cast Iron	3L	T3	4800	23338	
	1200	5010	4000	\$73,003	95.0%	80	Cast Iron	3L	T3	4800	23339	
	900	5012	4000	\$87,309	94.1%	82	Cast Iron	3L	T3	6000	23340	
400	3600*	5010	4000	\$79,574	95.0%	85	Fab. Steel	3L	T3	4800	23341	17
	1800	5010	4000	\$70,038	95.0%	85	Cast Iron	3L	T3	4800	23342	
	1200	5010	4000	\$76,179	95.0%	80	Cast Iron	3L	T3	4800	23343	
	900	5812	4000	\$93,301	94.1%	85	Cast Iron	3L	T3	7700	23344	
450	3600*	5012	4000	\$85,069	95.0%	85	Fab. Steel	3L	T3	6000	23345	17
	1800	5010	4000	\$74,106	95.0%	85	Cast Iron	3L	T3	4800	23346	
	1200	5012	4000	\$81,294	95.0%	80	Cast Iron	3L	T3	6000	23347	
	900	5812	4000	\$99,976	94.1%	85	Cast Iron	3L	T3	7700	23348	
500	3600*	5012	4000	\$90,884	95.0%	85	Fab. Steel	3L	T3	6000	23349	17
	1800	5012	4000	\$77,884	95.0%	85	Cast Iron	3L	T3	6000	23350	
	1200	5012	4000	\$92,202	95.0%	80	Cast Iron	3L	T3	6000	23351	
	900	5812	4000	\$104,543	94.1%	85	Cast Iron	3L	T3	9300	23352	

Notes:

* Motor is Uni-Directional (CCW Rotation F.O.D.E.)

Note 17 Fabricated steel sound abate fan cover guard

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



TITAN® 547 Horizontal Motors

TEFC Severe Duty Sleeve Bearing - Premium Efficient

FEATURES:

- 1.0 service factor
- Premium Efficient
- Rated for operation in a 40°C ambient at 3300 feet altitude
- Division 2 suitable
- Class F rated EVERSEAL® insulation system (sealed per NEMA® MG1)
- 3.5 per unit surge withstand (IEEE-522™ Figure 1)
- F1 assembly position (convertible to F2)
- Class "B" rise at 1.0 Service Factor
- DOL Start (80% RVS on large motors in NEMA® MG1 Part 20)
- 650% maximum locked rotor current
- Aluminum rotor
- Dowel pin holes
- Vertical jack screws
- Spot face for hold-down bolts
- Feet coplanar to within .005 in.
- Automatic breather drains at both ends
- Renk® sleeve bearings
- Constant level oilers (OIL-RITE®)
- Insulated bearings with drive end shorting device
- Oil-resistant leads
- Permanent indicator to show float limits and magnetic center
- Ground pads on frame (qty. 2)
- CORRO-DUTY® with epoxy paint system
- Oversized conduit box with silver-plated bus bar connections
- 316 stainless-steel hardware
- 100 Ohm bearing RTDs (1/bearing)
- 100 Ohm winding RTDs (2/phase)
- 115V replaceable space heaters — T3
- Starting duty nameplate
- Non-witnessed API 547 routine test

HP	RPM @ 60Hz	Frame	Voltage	List	Discount Symbol	Rotor Material	FULL LOAD NNE @ 4000V	Div. 2 T-Code	Ship Weight
250	3600	5010	2300/4000	\$98,438	DS-547	Aluminum	95.0	T3	4800
250	1800	5008	2300/4000	\$94,578	DS-547	Aluminum	95.0	T3	4000
250	1200	5008	2300/4000	\$97,898	DS-547	Aluminum	95.0	T3	4000
250	900	5010	2300/4000	\$110,364	DS-547	Aluminum	93.6	T3	4800
300	3600	5010	2300/4000	\$102,875	DS-547	Aluminum	95.0	T3	4800
300	1800	5008	2300/4000	\$96,948	DS-547	Aluminum	95.0	T3	4000
300	1200	5010	2300/4000	\$102,750	DS-547	Aluminum	95.0	T3	4800
300	900	5012	2300/4000	\$116,518	DS-547	Aluminum	94.5	T3	6000
350	3600	5010	2300/4000	\$106,270	DS-547	Aluminum	95.0	T3	4800
350	1800	5010	2300/4000	\$98,825	DS-547	Aluminum	95.0	T3	4800
350	1200	5010	2300/4000	\$108,171	DS-547	Aluminum	95.0	T3	4800
350	900	5012	2300/4000	\$121,794	DS-547	Aluminum	94.5	T3	6000
400	3600	5010	2300/4000	\$112,011	DS-547	Aluminum	95.0	T3	4800
400	1800	5010	2300/4000	\$103,686	DS-547	Aluminum	95.0	T3	4800
400	1200	5010	2300/4000	\$111,195	DS-547	Aluminum	95.4	T3	4800
400	900	5812	2300/4000	\$131,181	DS-547	Aluminum	95.0	T3 ¹	9200
450	3600	5012	2300/4000	\$117,243	DS-547	Aluminum	95.0	T3	6000
450	1800	5010	2300/4000	\$107,559	DS-547	Aluminum	95.4	T3	4800
450	1200	5012	2300/4000	\$116,067	DS-547	Aluminum	95.4	T3	6000
450	900	5812	2300/4000	\$137,537	DS-547	Aluminum	95.0	T3 ¹	9200
500	3600	5012	2300/4000	\$122,781	DS-547	Aluminum	95.0	T3	6000
500	1800	5012	2300/4000	\$111,157	DS-547	Aluminum	95.8	T3	6000
500	1200	5012	2300/4000	\$126,456	DS-547	Aluminum	95.8	T3	6000
500	900	5812	2300/4000	\$141,886	DS-547	Aluminum	95.0	T3 ¹	9200
600	3600	5812	2300/4000	\$141,583	DS-547	Aluminum	95.8	T3	9200
600	1800	5012	2300/4000	\$125,290	DS-547	Aluminum	96.2	T3	6000
600	1200	5812	2300/4000	\$141,275	DS-547	Aluminum	95.4	T3	9200
700	3600	5812	2300/4000	\$147,838	DS-547	Aluminum	96.2	T3 ¹ /T2C ²	9200
700	1800	5012	2300/4000	\$132,402	DS-547	Aluminum	96.5	T3 ¹ /T2C ²	6000
700	1200	5812	2300/4000	\$175,879	DS-547	Copper	95.8	T2B ²	9200
800	1800	5812	2300/4000	\$143,679	DS-547	Aluminum	96.2	T3A ¹ /T3 ²	9200
900	1800	5812	2300/4000	\$155,273	DS-547	Aluminum	96.2	T3A ¹ /T2D ²	9200
1000	1800	5812	2300/4000	\$161,992	DS-547	Aluminum	96.5	T3A ¹ /T2C ²	9200

Notes:

¹ Aluminum Rotor / ² Copper Bar Rotor (Requires Adder)

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



TITAN® 547 Horizontal Motors

WPII Sleeve Bearing – Premium Efficient

FEATURES:

- 1.0 service factor
- Premium Efficient
- Rated for operation in a 40°C ambient at 3300 feet altitude
- Division 2 suitable
- Class F rated EVERSEAL® insulation system (sealed per NEMA® MG1)
- 3.5 per unit surge withstand (IEEE-522™ Figure 1)
- F1 assembly position (convertible to F2)
- Class "B" rise at 1.0 Service Factor
- DOL Start (80% RVS on large motors in NEMA® MG1 Part 20)
- 650% maximum locked rotor current
- Aluminum rotor
- Dowel pin holes
- Vertical jack screws
- Spot face for hold-down bolts
- Feet coplanar to within .005 in.
- Renk® sleeve bearings
- Constant level oilers (OIL-RITE®)
- Insulated bearings with drive end shorting device
- Oil-resistant leads
- Permanent indicator to show float limits and magnetic center
- Ground pads on frame (qty. 2)
- CORRO-DUTY® with epoxy paint system
- Oversized conduit box with silver-plated bus bar connections
- 316 stainless-steel filters
- 316 stainless-steel hardware
- 100 Ohm bearing RTDs (1/bearing)
- 100 Ohm winding RTDs (2/phase)
- 115V replaceable space heaters — T3
- Starting duty nameplate
- Non-witnessed API 547 routine test

HP	RPM @ 60Hz	Frame	Voltage	List	Discount Symbol	Rotor Material	FULL LOAD NNE @ 4000V	Div. 2 T-Code	Ship Weight
250	3600	5010	2300/4000	\$79,587	DS-547	Aluminum	94.5	T3	5250
250	1800	5008	2300/4000	\$78,830	DS-547	Aluminum	95.0	T3	4550
250	1200	5008	2300/4000	\$80,921	DS-547	Aluminum	95.0	T3	4550
250	900	5008	2300/4000	\$86,766	DS-547	Aluminum	93.6	T3	4550
300	3600	5010	2300/4000	\$80,855	DS-547	Aluminum	94.5	T3	5250
300	1800	5008	2300/4000	\$79,765	DS-547	Aluminum	95.0	T3	4550
300	1200	5008	2300/4000	\$82,233	DS-547	Aluminum	95.0	T3	4550
300	900	5010	2300/4000	\$91,329	DS-547	Aluminum	93.6	T3	5250
350	3600	5010	2300/4000	\$83,730	DS-547	Aluminum	94.5	T3	5250
350	1800	5008	2300/4000	\$81,168	DS-547	Aluminum	95.0	T3	4550
350	1200	5008	2300/4000	\$85,140	DS-547	Aluminum	95.0	T3	4550
350	900	5010	2300/4000	\$95,243	DS-547	Aluminum	93.6	T3	5250
400	3600	5010	2300/4000	\$87,987	DS-547	Aluminum	94.5	T3	5250
400	1800	5008	2300/4000	\$82,488	DS-547	Aluminum	95.0	T3	4550
400	1200	5010	2300/4000	\$87,383	DS-547	Aluminum	95.0	T3	5250
400	900	5012	2300/4000	\$98,353	DS-547	Aluminum	93.6	T3	5775
450	3600	5010	2300/4000	\$91,868	DS-547	Aluminum	94.5	T3	5250
450	1800	5008	2300/4000	\$84,685	DS-547	Aluminum	95.0	T3	4550
450	1200	5010	2300/4000	\$90,996	DS-547	Aluminum	95.0	T3	5250
500	3600	5012	2300/4000	\$95,975	DS-547	Aluminum	94.5	T3	5775
500	1800	5008	2300/4000	\$87,354	DS-547	Aluminum	95.0	T3	4550
500	1200	5010	2300/4000	\$98,700	DS-547	Aluminum	95.0	T3	5250
600	3600	5012	2300/4000	\$101,386	DS-547	Aluminum	95.0	T3	5775
600	1800	5010	2300/4000	\$92,655	DS-547	Aluminum	95.4	T3	5250
600	1200	5012	2300/4000	\$105,840	DS-547	Aluminum	95.0	T3	5775
700	3600	5012	2300/4000	\$105,678	DS-547	Aluminum	95.0	T2C	5775
700	1800	5010	2300/4000	\$97,426	DS-547	Aluminum	95.4	T3	5250
800	3600	5012	2300/4000	\$110,328	DS-547	Aluminum	95.0	T2B	5775
800	1800	5012	2300/4000	\$102,198	DS-547	Aluminum	95.4	T3	5775
900	3600	5012	2300/4000	\$121,953	DS-547	Aluminum	95.0	T2B	5775
900	1800	5012	2300/4000	\$108,168	DS-547	Aluminum	95.4	T3	5775
1000	3600	5012	2300/4000	\$127,319	DS-547	Aluminum	95.0	T2A	5775
1000	1800	5012	2300/4000	\$124,119	DS-547	Aluminum	95.4	T3	5775

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



TITAN® 547 Horizontal Motors

TEFC Severe Duty Accessories and Modifications

1. Altitude

Standard TITAN 547 motors are designed for 3300 feet altitude and 40°C ambient temperature. Atmospheric conditions at higher altitudes inhibit the motor's ability to dissipate heat, resulting in an increased temperature rise and a reduced motor capacity. NEMA[†] standards state motor temperature will increase 1% for each 330-foot increment above the standard 3300-foot altitude design point. Ambient temperatures generally drop with an increase in altitude and are normally less than 40°C, even when installed indoors. Motors can be specifically designed for higher altitudes or derated, either due to lower ambient temperatures or by reducing output capacity.

- TITAN 547 motors can be rated for high altitudes of 3301-8000 feet. Contact your Nidec Motor Corporation Technical Representative for frames, performance and pricing.

2. Ambient

Standard TITAN 547 designs described in this catalog are suitable for operation in ambient temperatures ranging from +40°C (104°F) to -25°C (-13°F). When standard designs are consistently exposed to ambient temperatures between -5°C (23°F) and -25°C (-13°F), special lubrication practices may be required.

- TITAN 547 motors can be rated for high and low ambient conditions. Contact your Nidec Motor Corporation Technical Representative for frames, performance and pricing.

3. Assembly Position

- The standard Assembly Position is considered "F1". "F2" Assembly Position is available at no charge when specified at time of Motor order.

4. Bearings

- Sleeve bearings are standard.
- For anti-friction ball bearings, deduct as follows:

Frame:	5000	5800
Adder:	17310	20195

5. Identification Nameplate

- A special identification nameplate can be mounted on motor with limited customer-specified tagging information.

Frame:	5000	5800
Adder:	115	115

6. Rotor, Optional Construction

- Standard rotor construction for 3600 RPM 5000 frame is die-cast aluminum. Standard rotor construction for 5000 frame 1800 RPM & slower and on 5800 frame is fabricated aluminum bar rotor. Optional rotor construction is available as shown below.
- Optional rotor designs will change performance characteristics.
- Fabricated copper bar rotor construction: Centrifugally cast end rings are fully brazed to each rotor bar. Rotor bars are swaged, preventing in-slot movement and tight bar construction. Heavy finger plates tightly hold the rotor core together, controlling internal stress and maintaining dimension stability under all loads.

Frame:	5000	5800
Adder:	19200	22240

7. Shims

- Stainless steel shim pack

Frame:	5000	5800
Adder:	2275	2275

TITAN® 547 Horizontal Motors

TEFC Severe Duty Accessories and Modifications

8. Testing

A. Non-Witnessed API 547 Routine Test

Frame:	5000	5800
Adder:	(N/C)	(N/C)

A non-witnessed routine test per API 547 comes standard (no charge) with the following:

- no-load current, power & speed
- locked rotor current
- high-potential test (stator, heaters, RTDs)
- insulation resistance test & polarization index
- stator resistance
- vibration measurement
- bearing insulation test
- bearing temperature rise

B. Witnessed API 547 Routine Test

Frame:	5000	5800
Adder:	18465	20135

A witnessed routine test per API 547 comes with the following:

- no-load current, power & speed
- locked rotor current
- high-potential test (stator, heaters, RTDs)
- insulation resistance test & polarization index
- stator resistance
- vibration measurement
- bearing insulation test
- bearing temperature rise

C. Non-Witnessed API 547/541 Complete Test

Frame:	5000	5800
Adder:	16270	19328

Performed per IEEE-112™ Method B

A non-witnessed complete test per API 547/541 comes with the following:

- full-load heat run
- percent slip
- full-load current
- locked rotor current and power factor
- speed-torque curve
- noise test
- locked rotor torque
- breakdown torque
- efficiency and power factor at 100%
75% and 50% of full load

D. Witnessed API 547/541 Complete Test

Frame:	5000	5800
Adder:	21925	26540

Performed per IEEE-112™ Method B

A witnessed complete test per API 547/541 comes with the following:

- full-load heat run
- percent slip
- full-load current
- locked rotor current and power factor
- speed-torque curve
- noise test
- locked rotor torque
- breakdown torque
- efficiency and power factor at 100%
75% and 50% of full load

E. Non-Witnessed Sealed Winding Conformance Test

Frame:	5000	5800
Adder:	6623	6623

F. Witnessed Sealed Winding Conformance Test

Frame:	5000	5800
Adder:	9935	9935

TITAN® 547 Horizontal Motors

TEFC Severe Duty Accessories and Modifications

9. Vibration Detectors

(QP) Refer to Modifiable TITAN® Quick Pick Chart For Pricing

Frame:	449	5000	5800	6800	8000	9600
Adder:	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)

- Nidec Motor Corporation offers a wide variety of 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.
- 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 Division 2 ratings is the METRIX™ Model M5550.
- Nidec Motor Corporation can also arrange to accommodate
- If the "Arrange-To-Accommodate" option is selected, the Manufacturer, Manufacturer's Part Number and Type must be specified at order entry.

10. Proximity Probes (Sleeve Bearing Motors Only)

A. Arrange-To-Accommodate Proximity Probes

Frame:	5000	5800
Adder:	1735	1735

- When requesting "Arrange-To-Accommodate". Customer must specify the series and size. Provision will include a drilled and tapped hole (mounting studs are not included).
- If customer supplied proximity probes are calibrated for "4140" shaft material, please also apply the Shaft Material, High Tensile Steel Adder.

B. BENTLY-NEVADA®† 3300 Series 8mm Proximity Probes

Frame:	5000	5800
Adder:	25135	25135

- BENTLY-NEVADA®† 3300 Series 8mm Proximity Probes are used for monitoring shaft position on a Sleeve Bearing Motor. Two probes are required per bearing. The price adder includes probes, proximiters, mounting studs and cables wired to a dedicated accessory conduit box.

C. BENTLY-NEVADA®† 3300 Series 8mm Proximity Probes With Qty. 1 Keyphaser

Frame:	5000	5800
Adder:	31955	31955

- BENTLY-NEVADA®† 3300 Series 8mm Proximity Probes are used for monitoring shaft position on a Sleeve Bearing Motor. Two probes are required per bearing. The price adder includes probes, proximiters, mounting studs and cables wired to a dedicated accessory conduit box.
- Includes Qty. 1 Keyphaser

Modifiable TITAN® Horizontal Motors

Accessories and Modifications Quick Pick Chart

ITEM	PG.	NOTE	DESCRIPTION	FRAME SIZE					
				449	5000	5800	6800	8000	9600
1	M-10	(1)	Altitude - 3301-6000 Feet	3%	3%	3%	3%	3%	3%
			- 6001-9900 Feet	6%	6%	6%	6%	6%	6%
			- 9901 Feet & Up	12%	12%	12%	12%	12%	12%
2	M-11	(1)	Ambient - 41°C-50°C	3%	3%	3%	3%	3%	3%
			- 51°C-60°C	6%	6%	6%	6%	6%	6%
			- 61°C & Up	12%	12%	12%	12%	12%	12%
			- Arctic Duty	25%	25%	25%	25%	25%	25%
3	M-12	(7)	Assembly Position	N/C	N/C	N/C	N/C	N/C	N/C
4	M-12	(3)	Automotive Duty	See Page M-12					
5	M-12		Balance, Special (Not Available with Roller Bearings)	2020	2020	2020	2020	2020	2020
6	M-12		Bases - Dowel Pin Holes	145	145	145	145	145	145
	M-13		- Slide Rails	3000	3700	4640	5780	N/A	N/A
			- Sole Plate	2540	3700	4640	5540	6480	6940
			- Vertical Jacking Provisions	350	350	350	350	350	350
7	M-13		Bearings - Roller Bearing on Drive End	1040	2080	2885	CO	N/A	N/A
			- Insulated, Ball Bearing (Adder Per End)	1040	1040	1040	1270	1270	1270
			- Spare Set, Ball/Roller Bearings	580	925	1155	1445	1620	1735
			- Sleeve Bearings (ODP/WPI/WPII/TEAAC/TEWAC 5800-9600)	N/A	17310	20195	23575	26900	28000
			- Sleeve Bearings, DIN Style (TEFC/ODP/WPI/WPII 5008/10/12 & TEFC 5810/12)	N/A	17310	20195	23575	N/A	N/A
	M-14		- Insulated, Sleeve Bearings (Adder Per End)	N/A	1965	1965	2540	2540	2540
			- Spare Set, Sleeve Bearings (ODP/WPI/WPII/TEAAC/TEWAC 5800-9600)	N/A	15100	17570	20515	23405	24360
			- Spare Set, DIN Style (TEFC 5008/10/12 & 5810/12)	N/A	15100	17570	20515	N/A	N/A
		(7)	- Oil Sump Heaters	N/A	920	920	920	920	920
		(7)	- Oil Sump Heaters with Thermostat Control	N/A	1490	1490	1490	1490	1490
8	M-15		Conduit Box – Accessory Conduit Box	465	465	465	465	465	465
			- Accessory Conduit Box with Terminal Board (Triple for Stainless Steel)	930	930	930	930	930	930
		(7)	- Oversized Main Conduit Box	See Page M-15					
	M-16	(7)	- NEMA [®] Type II Main Conduit Box	See Page M-16					
	M-17		- Bus Bar Connections with Standoff Insulators	6710	6710	6710	6710	6710	6710
			- Terminal Blocks for Main Power Leads (Low Voltage Motors ONLY)	1450	2050	2050	2900	N/A	N/A
			- Current Transformers – Wind Type CTs (460-4800 Volts)	5080	5080	5080	5080	5080	5080
			- Current Transformers – Wind Type CTs (5000-6900 Volts)	6595	6595	6595	6595	6595	6595
	M-18		- Arrange To Accommodate (Adder Per CT)	635	635	635	635	635	635
			- Drains/Breather In Main Conduit Box	350	350	350	350	350	350
			- Hinged Main Conduit Box	800	800	800	800	800	800
			- Hinged Door with Lock & Key	1210	1210	1210	1210	1210	1210
			- Lead Positioning Gasket	235	235	235	235	235	235
			- Servit Post In Conduit Box	128	128	128	128	128	128
			- Space Heater In Main Conduit Box (Double for Div. 2)	1330	1330	1330	1330	1330	1330
9	M-19		Crusher Duty (TEFC & TEAAC Only)	15%	15%	15%	15%	15%	15%
10	M-19		Drains And Breathers – Brass Drain	350	350	350	350	350	350
			- Stainless Steel Drain	531	531	531	531	531	531
11	M-19-20	(3)	Efficiency Class	See Page M-19					
12	M-20	(3)	Enclosure – Open Drip proof (ODP)	See Page M-20					
			- Drip proof Guarded	740	925	1155	1620	0	0
			- Weather Protected I (WPI)	1198	2135	3810	4850	0	0
	M-21	(3)	- Weather Protected II (WPII)	See Page M-21					
			- Air Filters – Standard Zinc Media	N/A	785	1180	1410	2080	2540
			- Air Filters – Stainless Steel Media	N/A	3130	4640	5655	6925	8080
			- Air Pressure Differential Switch	N/A	925	925	925	925	925
	M-22		- Air Temperature Sensor (Per Sensor)	N/A	680	680	680	680	680
			- Sound Abatement Treatment	N/A	1745	2245	3460	4340	4710

Definition of notes on page M-6

NOTE: This is a condensed version of the complete modification section used to qualify the availability of these options.

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Modifiable TITAN® Horizontal Motors

Accessories and Modifications Quick Pick Chart

ITEM	PG.	NOTE	DESCRIPTION	FRAME SIZE					
				449	5000	5800	6800	8000	9600
12	M-22		- Splash Proof Separately Ventilated (SPSV)	N/A	3235	4500	5540	6000	6465
			- Splash Proof Blower Ventilated (SPBV)	N/A	6000	7850	9235	10385	11425
		(3)	- Totally Enclosed Fan Cooled (TEFC)	See Page M-22					
	M-23		- CORRO-DUTY®	1350	1735	2310	4450	N/A	N/A
			- 841 PLUS® Modifications	7040	7445	8020	11490	N/A	N/A
			- Bronze Fan	1475	1560	1685	1995	N/A	N/A
			- Fabricated Steel Sound Abate Fan Cover	2195	2540	2885	5510	N/A	N/A
	M-24		- Sealant, RTV†	1125	1125	1775	2800	N/A	N/A
			- Totally Enclosed Blower Cooled (TEBC)	2540	3645	4040	5050	N/A	N/A
		(3)	- Totally Enclosed Air-To-Air Cooled (TEAAC)	See Page M-24					
			- Stainless Steel Tubes	N/A	N/A	14885	N/A	23080	27720
			- CORRO-DUTY®	N/A	N/A	2310	N/A	2885	3465
			- Totally Enclosed Separately Ventilated (TESV)	N/A	1725	2080	N/A	5540	6350
	M-25		- Totally Enclosed Water-To-Air Cooled (TEWAC)	N/A	N/A	75460	N/A	96925	105510
		(3)	- Hazardous Location, UL® Listed Division 1 & 2 Class I	See Page M-25					
			- CORRO-DUTY®	N/A	1735	2310	N/A	N/A	N/A
			- 841 PLUS® Modifications	N/A	7445	8020	N/A	N/A	N/A
			- Hazardous Location, UL® Listed Division 1 Class II	N/A	5%	5%	N/A	N/A	N/A
			- Division II Self Certified (Non-Listed) and CSA® Certified Division II	5%	5%	5%	5%	5%	5%
13	M-26		Encoders – Arrange-To-Accommodate Hollow Bore Encoder	1040	1040	1040	1040	1040	1040
			- Arrange-To-Accommodate Tachometer	1040	1040	1040	1040	1040	1040
			- AVTRON® M/N HS35A (Nidec Motor Corporation Standard)	1000	1000	1000	1000	1000	1000
			- AVTRON® M/N HS35M	2765	2765	2765	2765	2765	2765
			- AVTRON® M/N HS45	4985	4985	4985	4985	4985	4985
			- AVTRON® M/N AV685	7825	7825	7825	7825	7825	7825
			- DYNAPAR™ M/N HS35R	1735	1735	1735	1735	1735	1735
			- Encoder Products M/N 776	1735	1735	1735	1735	1735	1735
			- NORTHSTAR™ M/N HS56	4435	4435	4435	4435	4435	4435
			- NORTHSTAR™ M/N HS85	4848	4848	4848	4848	4848	4848
14	M-26	(7)	Endshields, C-Face/D-Flange (Ball Bearing Motors Only)	1468	2885	3808	N/A	N/A	N/A
15	M-27		Export Boxing	1900	2800	3365	5050	6150	7490
16	M-27		UL® Listed Fire Pump Label (500HP & Less)	5%	5%	N/A	N/A	N/A	N/A
17	M-27		Foot Flatness, Special	2885	2885	2885	2885	2885	2885
18	M-27		Frequency, 50 Hertz	15%	15%	15%	15%	15%	15%
19	M-27		Grease Fitting On Fill & Pressure Relief On Drain	150	150	150	150	150	150
20	M-28		Grounding – Ground On Frame	350	350	350	350	350	350
			- Grounding Strap (Sleeve Bearing Motors Only)	N/A	810	810	810	810	810
			- Shaft Grounding Ring Aegis® SGR® (Ball Brg. & Roller Brg. Motors Only)	1270	1270	1270	1850	1850	1850
			- Shaft Grounding Ring Inpro/Seal® CDR® (Ball Brg. & Roller Brg. Motors Only)	1270	1270	1270	1850	1850	1850
			- Shaft Grounding Brush Helwig Carbon® (Ball Brg. & Roller Brg. Motors Only)	2228	2228	2228	2808	2808	2808
			- Shaft Grounding Ring Inpro/Seal® MGS® (Ball Brg. & Roller Brg. Motors Only)	2540	2540	2540	3700	3700	3700
21	M-28		Hardware, Stainless Steel	350	580	1160	1825	2310	2770
22	M-28		High Inertia Loads	15%	15%	15%	15%	15%	15%
23	M-28	(4)	Horsepower, Non-Standard	See Page M-28					
24	M-29		Insulation Class – Class F	STD	STD	STD	STD	STD	STD
			- Class H	1175	1745	2245	3460	4340	4710
25	M-30	(R)	Insulation System – VPI-1000	STD	STD	STD	STD	N/A	N/A
			- VPI-2000	1155	1385	1735	2308	N/A	N/A
			- Insulife 5000	STD	STD	STD	STD	STD	STD
			- Premium EVERSEAL®	1900	2795	3810	4825	5715	6350
	M-31		- Abrasion Resistant Coating	235	350	450	695	870	945
			- Tropical Protection	590	880	1120	1735	2170	2355
26	M-32	(12)	Inverter Duty – 10:1 Variable Torque	1735	3235	4155	7195	7770	8350
		(12)	- 2:1 Constant Torque (10:1 Variable Torque)	1910	3560	4575	7915	8548	9185
		(10)	- 5:1 Constant Torque (10:1 Variable Torque)	See Page M-32					

Definition of notes on page M-6

NOTE: This is a condensed version of the complete modification section used to qualify the availability of these options.

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Modifiable TITAN® Horizontal Motors

Accessories and Modifications Quick Pick Chart

ITEM	PG.	NOTE	DESCRIPTION	FRAME SIZE					
				449	5000	5800	6800	8000	9600
26	M-32	(15)	- 10:1 Constant Torque (10:1 Variable Torque) (Totally Enclosed Fan Cooled)	See Page M-32					
		(12)	- 10:1 Constant Torque (10:1 Variable Torque) (Totally Enclosed Blower Cooled)	5200	6120	8200	9650	N/A	N/A
	M-33	(14)	- 10:1 Constant Torque (10:1 Variable Torque) (Totally Enclosed Separately Ventilated)	N/A	10735	13965	19080	21040	23350
		(13)	- 10:1 Constant Torque (10:1 Variable Torque) (Splash Proof Blower Ventilated)	N/A	9235	12000	16425	18155	19770
		(13)	- 10:1 Constant Torque (10:1 Variable Torque) (Splash Proof Separately Ventilated)	N/A	6465	8655	12735	13770	14810
			- Vector Duty	See Page M-33					
27	M-33		Leads – Longer Than Standard Leads (Adder Per Foot)	345	345	345	345	345	345
			- Sealed Leads (Potted)	870	870	870	870	N/A	N/A
			- Two-Hole Lead Lugs	235	235	235	235	235	235
28	M-34		Lubrication – Arrange-To-Accommodate Flood Oil Lube System (Sleeve)	N/A	1035	1035	1035	1035	1035
			- Constant Level Oiler (Standard Cage)(Sleeve)	N/A	985	985	985	985	985
			- Constant Level Oiler (Stainless Steel Cage)(Sleeve)	N/A	2370	2370	2370	2370	2370
			- Oil Mist Provision (Ball Bearing Motors Only)	1390	1390	1390	1390	N/A	N/A
29	M-34		Marine Duty (Ball Bearing Motors Only)	5%	5%	5%	5%	5%	5%
30	M-35	(+)	Multi-Speed Motors – One Winding, Variable Torque	70%	70%	70%	70%	70%	70%
			- One Winding, Constant Torque	80%	80%	80%	80%	80%	80%
			- One Winding, Constant Horsepower	90%	90%	90%	90%	90%	90%
			- Two Winding, Variable Torque	100%	100%	100%	100%	100%	100%
			- Two Winding, Constant Torque	140%	140%	140%	140%	140%	140%
			- Two Winding, Constant Horsepower	170%	170%	170%	170%	170%	170%
31	M-35		Nameplates – Additional Duplicate Nameplate	60	60	60	60	60	60
			- Additional Stamping On Main Nameplate	100	100	100	100	100	100
			- Phase Sequencing Nameplate	115	115	115	115	115	115
			- Rotation Arrow Plate	115	115	115	115	115	115
			- Shipping Tag (#6 Paper Tag)	N/C	N/C	N/C	N/C	N/C	N/C
			- Special Features (I.D.) Nameplate	115	115	115	115	115	115
	M-36		- Starting Duty Nameplate	115	115	115	115	115	115
32	M-36		Overspeed	See Page M-36					
33	M-36		Paint – CORRO-DUTY® Paint Job	2%	2%	2%	2%	2%	2%
			- Special Paint	1000	1000	2000	3000	3000	3000
34	M-36-39		Power Factor Correction Capacitors	See Page M-36					
35	M-40		Prints And Data (NET ADDERS) – Standard Submittals	N/C	N/C	N/C	N/C	N/C	N/C
			- Bearing Life Calculation	150	150	150	150	150	150
			- Current Pulsation Analysis	200	200	200	200	200	200
			- Customer Data Sheet Filled Out by Nidec Motor Corp.	60	60	60	60	60	60
			- Sound Power In Watts	60	60	60	60	60	60
			- Sound Pressure in dBA at 3 Feet	30	30	30	30	30	30
			- Mass Elastic Data	170	170	170	170	170	170
			- Acceleration Time vs. Amps Curve	170	170	170	170	170	170
			- Performance Curve	170	170	170	170	170	170
			- Equivalent Circuit Data (X/R)	60	60	60	60	60	60
			- Standard Noise Data vs. Center Band	60	60	60	60	60	60
			- Speed vs. Torque & Amps Curve	60	60	60	60	60	60
			- Safe Stall Time Curve (Thermal Limit Damage Curve)	170	170	170	170	170	170
			- Shaft Stiffness	170	170	170	170	170	170
			- Shaft Print	60	60	60	60	60	60
			- UL® Certificate	1000	1000	1000	1000	1000	1000
36	M-41		Rotor – Fabricated Copper Bar Rotor	15200	18240	20775	22300	25335	28368
			- Fabricated Aluminum Bar Rotor	1375	2250	3685	STD	STD	STD
			- Rotor Corrosion Protection	1750	1750	1750	1750	1750	1750
37	M-41		Screens – Standard Material	741	925	1155	1620	N/C	N/C
			- Stainless Steel	1185	1385	1620	2080	2600	2950

Definition of notes on page M-6

NOTE: This is a condensed version of the complete modification section used to qualify the availability of these options.

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Modifiable TITAN® Horizontal Motors

Accessories and Modifications Quick Pick Chart

ITEM	PG.	NOTE	DESCRIPTION	FRAME SIZE					
				449	5000	5800	6800	8000	9600
38	M-41		Seals – Shaft Slinger (Price Each)(Ball Bearing Only)	235	235	235	235	235	235
			- INPRO/SEAL® Seals (Price Each)(Ball Bearing Only)	1270	1270	1270	1850	1850	1850
	M-42		- Taconite Service (Price Each)(Ball Bearing Only)	1270	1270	1270	1850	1850	1850
			- IP55 Seal Drive End (ODP/WPI/WPII 5008/10/12 Sleeve Bearing, DIN Style Only)	-	1270	-	-	-	-
39	M-42		Service Factor	5%	5%	5%	5%	5%	5%
40	M-42		Shaft Extensions – Base Addition Adder	700	1045	1350	2075	2605	2825
			- Special Shaft Material, Stainless Steel, 303 or 304	2015	2015	2015	2900	2900	2900
			- Special Shaft Material, Stainless Steel, 316 or 416	4030	4030	4030	5800	5800	5800
			- Special Shaft Material, High Tensile Steel	2885	2885	2885	4040	4040	4040
	M-43		- Standard Double End Shaft Extension	925	1155	1155	1385	1735	1735
			- Locknut On End Of Shaft	235	235	235	235	235	235
			- Special Shaft Runout	1735	1735	1735	1735	1735	1735
			- Tapered Shaft	835	855	1040	1180	1250	1455
			- Tapped Hole	580	695	750	870	985	1100
			- Threaded Shaft (External Thread)	580	695	750	870	985	1100
41	M-43-44		Space Heaters (Double Adder for Div. 1 or Div. 2) – Std. Silicone Strip Heaters	1330	1330	1330	1330	1330	1330
			- Thermostat Controlled	1160	1160	1160	1160	1160	1160
			- Pilot (Indicator) Light	1310	1310	1310	1310	1310	1310
42	M-44		Starting Current, Lower Than Standard – 600%-650%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
			- 550%-599%	10%	10%	10%	10%	10%	10%
			- 450%-549%	15%	15%	15%	15%	15%	15%
43	M-45-47		Starting Method – Part Winding Start (PWS)	580	925	1155	1385	1965	2310
			- Wye Delta (Star-Delta) Starting	1155	1385	1735	2080	2540	2885
			- Reduced Voltage Starting – 69%-65% Tap	12%	12%	12%	12%	12%	12%
			- Reduced Voltage Starting – 80%-70% Tap	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
44	M-47		Surge Protection – Surge Capacitor & Lightning Arrestors – 600V & Below	4280	4280	4280	4280	4280	4280
			- 601-2400V	10920	10920	10920	10920	10920	10920
			- 2401-4800V	14160	14160	14160	14160	14160	14160
			- 4801-6900V	20285	20285	20285	20285	20285	20285
45	M-47-49		Temperature Rise – Class “B” Rise at 1.0 S.F.	STD	STD	STD	STD	STD	STD
			- Class “B” Rise at 1.15 S.F.	12%	12%	12%	12%	12%	12%
			- Class “A” Rise at 1.0 S.F.	25%	25%	25%	25%	25%	25%
46	M-50		Tests (List Pricing)	-	-	-	-	-	-
			- Short Commercial Test Un-Witnessed	145	145	145	145	145	145
			- Short Commercial Test Witnessed	450	450	675	900	900	900
		(8)	- Complete Initial Test Un-Witnessed	5,575	5,575	5,575	7,800	7,800	7,800
		(8)	- Complete Initial Test Witnessed	11,250	11,250	11,250	15,600	15,600	15,600
		(8)	- Calibration Test Un-Witnessed	6,740	6,740	12,935	14,905	14,905	15,655
		(8)	- Calibration Test Witnessed	10,045	10,045	18,855	22,550	22,550	22,550
		(8)	- Sound Test Un-Witnessed	1,355	1,355	2,225	2,465	2,465	2,960
		(8)	- Sound Test Witnessed	2,035	2,035	3,698	3,698	3,698	4,605
			- Vibration Test Un-Witnessed	2,075	2,075	2,075	2,075	2,305	2,305
			- Vibration Test Witnessed	3,455	3,455	3,455	3,455	4,605	4,605
			- Polarization Test Un-Witnessed	1,355	1,355	1,355	1,355	1,355	1,355
			- Polarization Test Witnessed	2,035	2,035	2,035	2,035	2,035	2,035
			- Spray Test Un-Witnessed	4,545	4,545	5,848	7,525	7,525	7,525
			- Spray Test Witnessed	6,818	6,818	8,772	11,288	11,288	11,288
			- Immersion Test Un-Witnessed	6,623	6,623	6,623	6,623	6,623	6,623
			- Immersion Test Witnessed	9,935	9,935	9,935	9,935	9,935	9,935
47	M-51-52		Thermal Protection, Bearings (Price Each)	-	-	-	-	-	-
	M-52		- Arrange-To-Accommodate BTDs (Not Available On Div. 1 Hazardous Location)	365	365	365	365	365	365
			- Bearing RTDs, 10 or 120 Ohm	895	895	895	895	895	895
			- Bearing RTDs, 100 Ohm	1435	1435	1435	1435	1435	1435

Definition of notes on page M-6

NOTE: This is a condensed version of the complete modification section used to qualify the availability of these options.

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Modifiable TITAN® Horizontal Motors

Accessories and Modifications Quick Pick Chart

ITEM	PG.	NOTE	DESCRIPTION	FRAME SIZE					
				449	5000	5800	6800	8000	9600
47	M-52		- Bearing RTDs, 100 Ohm Precision	1950	1950	1950	1950	1950	1950
			- Bearing RTDs, 10 or 120 Ohm, Dual Element	1345	1345	1345	1345	1345	1345
			- Bearing RTDs, 100 Ohm, Dual Element	2155	2155	2155	2155	2155	2155
	M-53		- Bearing RTDs, 100 Ohm Precision, Dual Element	2920	2920	2920	2920	2920	2920
			- Bearing Thermocouples	395	395	395	395	395	395
			- Bearing Temperature Relay (Sleeve)	520	520	520	520	520	520
			- Bearing Temperature Indicator & Switch (Sleeve)	1040	1040	1040	1040	1040	1040
			- Stem Type Thermometer (Sleeve)	1040	1040	1040	1040	1040	1040
			Thermal Protection, Winding	-	-	-	-	-	-
			- Winding Thermostats	320	320	320	320	320	320
			- Winding Thermostats, Hermetically Sealed	640	640	640	640	640	640
	M-54		- Winding Thermistors (Embedded In The Winding)	865	865	865	865	865	865
			- THERMA SENTRY® (Separately Mounted, Separately Excited)	1460	1460	1460	1460	1460	1460
			- THERMA SENTRY® (Motor Mounted, Separately Excited)	2425	2425	2425	2425	2425	2425
	M-55		- Winding Thermocouples	2190	2190	2190	2190	2190	2190
			- Winding RTDs, 10 or 120 Ohm	2190	2190	2190	2190	2190	2190
	M-56		- Winding RTDs, 100 Ohm	3288	3288	3288	3288	3288	3288
			- Winding RTDs, 100 Ohm Precision	4460	4460	4460	4460	4460	4460
			- Winding RTDs, 10 or 120 Ohm, Dual Element	3225	3225	3225	3225	3225	3225
			- Winding RTDs, 100 Ohm, Dual Element	4935	4935	4935	4935	4935	4935
			- Winding RTDs, 100 Ohm Precision, Dual Element	6690	6690	6690	6690	6690	6690
48	M-57		Torque, Special Locked Rotor or Breakdown Torque	15%	15%	15%	15%	15%	15%
49	M-57		Vibration Detectors (Price Each)	-	-	-	-	-	-
			- Arrange-To-Accommodate Vibration Detectors	958	958	958	958	958	958
			- BENTLY-NEVADA®† 16699 Transducer	6398	6398	6398	6398	6398	6398
			- BENTLY-NEVADA®† 21128 Transducer	4938	4938	4938	4938	4938	4938
			- BENTLY-NEVADA®† 23732 Transducer	3375	3375	3375	3375	3375	3375
			- BENTLY-NEVADA®† 330400 Accelerometer	3375	3375	3375	3375	3375	3375
			- BENTLY-NEVADA®† 9200 Seismoprobe Transducer	3465	3465	3465	3465	3465	3465
			- BENTLY-NEVADA®† Velomitor (Prizo-Electric)	2485	2485	2485	2485	2485	2485
			- IMI™ 685B00 Switch	4000	4000	4000	4000	4000	4000
			- IRD®† 544M Transducer	4945	4945	4945	4945	4945	4945
			- METRIX™ 5484E-121 Vibration Transmitter	3070	3070	3070	3070	3070	3070
			- METRIX™ 5484E-123 Vibration Transmitter	3070	3070	3070	3070	3070	3070
			- METRIX™ 5491E Vibration Transmitter	2908	2908	2908	2908	2908	2908
			- METRIX™ 5550 Vibration Switch (USEM Std. Div. 1 Hazardous Location)	3925	3925	3925	3925	3925	3925
			- METRIX™ 6000 Vibration Switch	4585	4585	4585	4585	4585	4585
			- METRIX™ 6300 Vibration Transmitter	2908	2908	2908	2908	2908	2908
			- METRIX™ 6917 Vibration Transmitter	2285	2285	2285	2285	2285	2285
			- METRIX™ 162VTS Vibration Transmitter	3070	3070	3070	3070	3070	3070
			- METRIX™ 440D-R Vibration Switch	4215	4215	4215	4215	4215	4215
			- METRIX™ 450D-R Vibration Switch	5158	5158	5158	5158	5158	5158
			- ROBERTSHAW®† 365A8 Vibration Switch	2875	2875	2875	2875	2875	2875
			- ROBERTSHAW®† 366A8 Vibration Switch (USEM Std.)	1455	1455	1455	1455	1455	1455
			- ROBERTSHAW®† 376A Vibration Switch	3610	3610	3610	3610	3610	3610
			- ROBERTSHAW®† 566 Vibration Switch	5475	5475	5475	5475	5475	5475
			- ROBERTSHAW®† 570B Vibration Switch	2550	2550	2550	2550	2550	2550
50	M-57		Proximity Probes (Sleeve Bearing Motors Only)	-	-	-	-	-	-
			- Arrange-To-Accommodate Proximity Probes	N/A	1735	1735	2078	2078	2078
			- BENTLY-NEVADA®† 3300 Series 8mm Proximity Probes	N/A	25135	25135	25135	25135	25135
			- BENTLY-NEVADA®† 3300 Series 8mm Prox. Probes w/ Keyphaser	N/A	31955	31955	31955	31955	31955
51	M-58		Voltage, Special	5%	5%	5%	5%	5%	5%

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Modifiable TITAN® Horizontal Motors

Accessories and Modifications Quick Pick Chart

(CO) CO = Contact Customer Service for availability

(F) F = Form Wound Motors. Insulife 5000 is the standard Insulation Treatment on Form Wound Motors.

(R) R = Random Wound Motors. VPI-1000 is the standard Insulation Treatment on Random Wound Motors.

(1) Will likely change performance characteristics and/or frame size of certain product.

(3) Refer to the Base List Price Section for pricing. Refer to the Accessories And Modifications Section for descriptions.

(4) For Non-Standard Horsepower ratings, price as the next higher standard horsepower rating of the same type and speed.

(7) Refer to the Accessories And Modifications Section for description.

(8) For Multi-Speed Motors, multiply the adder by 1.5.

(10) For Inverter Duty 5:1 Constant Torque, use the Premium Efficiency Base List Price of the next higher horsepower + the Inverter Duty 10:1 VT Adder.

(11) For Vector Duty, use the 10:1 CT pricing + Encoder Adder. For Nidec Motor Corporation's Standard (Optional) Encoder, Add \$1,000.00.

(12) Use Premium Efficiency Base List Price.

(13) Use ODP Premium Efficiency Base List Price.

(14) Use WP11 Premium Efficiency Base List Price.

(15) For Inverter Duty 10:1 Constant Torque TEFC, use the Premium Efficiency Base List Price of two (2) horsepowers larger + the Inverter Duty 10:1 VT Adder. Confirm Frame Size and availability prior to quoting.

(16) Sound power level exceeds IEEE-841™ 90dBA sound power requirement.

(17) Motor includes a fabricated steel sound abate fan cover guard.

(18) Exposed surface temperature exceeds IEEE-841™ 200 deg. C maximum temperature requirement.



Modifiable TITAN® Horizontal Motors

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



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

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

1. Altitude

Standard motors are designed for 3300 feet altitude and 40°C ambient temperature. Atmospheric conditions at higher altitudes inhibit the motor's ability to dissipate heat, resulting in an increased temperature rise and a reduced motor capacity. NEMA®† standards state motor temperature will increase 1% for each 330-foot increment above the standard 3300-foot altitude design point. Ambient temperatures generally drop with an increase in altitude and are normally less than 40°C, even when installed indoors. Motors can be specifically designed for higher altitudes or derated, either due to lower ambient temperatures or by reducing output capacity.

A. 3301-6000 Feet

Frame:	449	5000	5800	6800	8000	9600
Adder:	3%	3%	3%	3%	3%	3%

- To maintain motor service factor in altitudes of 3301 to 6000 feet (1006 to 1829 meters), make the altitude adder (percent of base list price) above for applications requiring higher altitude. Contact your Nidec Motor Corporation Technical Representative to confirm Frame Size.

B. 6001-9900 Feet

Frame:	449	5000	5800	6800	8000	9600
Adder:	6%	6%	6%	6%	6%	6%

- To maintain motor service factor in altitudes of 6001 to 9900 feet (1830 to 3017 meters), make the altitude adder (percent of base list price) above for applications requiring higher altitude. Contact your Nidec Motor Corporation Technical Representative to confirm Frame Size.

C. 9901 Feet & Up

Frame:	449	5000	5800	6800	8000	9600
Adder:	12%	12%	12%	12%	12%	12%

- To maintain motor service factor in altitudes of 9901 feet & Up (3018 meters & Up), make the altitude adder (percent of base list price) above for applications requiring higher altitude. Altitudes above 9900 feet require mandatory review by the Nidec Motor Corporation Technical Representative. Contact your Nidec Motor Corporation Technical Representative to confirm Frame Size.

Motors with oil lubricated sleeve bearings may also require flood oil lubrication for altitudes greater than 3,300 ft.

- **DERATING FACTORS** -- Standard designs may be operated at the following altitude by reducing the output capacity of the motor by the derating factor shown. Does not apply to UL®† Listed Hazardous Location motors. Nameplate will not acknowledge high-altitude use.

Altitude (ft.)	Derating Factor
3300-5000	0.97
5001-6600	0.94
6601-8300	0.91
8301-9900	0.88
9901-11500	0.85

- **ADJUSTMENT DUE TO REDUCED AMBIENT TEMPERATURE** -- Standard designs may be operated at the following altitudes due to reduced ambient temperatures. Does not apply to UL®† Listed Hazardous Location motors. Nameplate will not acknowledge high-altitude use.

Maximum Altitude (ft.)	Ambient (°C)
3300	40°C
6600	30°C
9900	20°C

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

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

2. Ambient

Standard designs described in this catalog are suitable for operation in ambient temperatures ranging from +40°C (104°F) to -30°C (-22°F). When standard designs are consistently exposed to ambient temperatures between -5°C (23°F) and -30°C (-22°F), special lubrication practices may be required. Additional precautions such as space heaters and/or oil sump heaters may be required depending on such factors as starting methods and duty cycle. Clearly state low ambient requirements on inquiries to your Nidec Motor Corporation Technical Representative and order documents if product will be consistently exposed to -50°C to -30°C ambients.

NOTE: The minimum ambient temperature for standard UL®† Listed Hazardous Location motors is - 25°C. See ARCTIC DUTY for ambient temperatures below - 25°C.

Arctic Duty - Low Ambient Application

- Available option for TEFC motors applied in ambients of -30°C (-22°F) to -56°C (-70°F). Add 25% to the list price to provide any required special electrical, lubrication and mechanical features (CORRO-DUTY® features are included). UL®† Listed Hazardous Location arctic duty motors require mandatory review by your Nidec Motor Corporation Technical Representative. When your inquiry is approved, add 25% to the base list price. Price does not include heaters for oil sump or motor winding.

High Ambient Application

- To provide motors suitable for installation in ambient temperatures between 41°C and 65°C, make the list price addition shown below. Motor temperature rise will change from stated price book values with ambient temperatures above 40°C. Price book stated efficiency levels, frame sizes and lubrication specifications are also subject to change. For confirmed data, refer to your Nidec Motor Corporation Technical Representative. Ambient temperature ratings over 65°C are not available.

A. 41°C to 50°C

Frame:	449	5000	5800	6800	8000	9600
Adder:	3%	3%	3%	3%	3%	3%

B. 51°C to 60°C

Frame:	449	5000	5800	6800	8000	9600
Adder:	6%	6%	6%	6%	6%	6%

C. 61°C to 65°C

Frame:	449	5000	5800	6800	8000	9600
Adder:	12%	12%	12%	12%	12%	12%

Motors with oil lubricated sleeve bearings may also require flood oil lubrication for ambient temperature greater than 40°C.

Motors with 1.15 SF may be derated to 1.0 SF for use in a 50°C ambient with no reduction in nameplate H.P. (Rated output). Non-Hazardous Location motors with 1.0 SF can be derated to accommodate ambient temperatures 40°C to 50°C by applying the following correction factors. Correction factors can be used, but actual performance will differ from published values.

AMBIENT TEMPERATURE	45°C	50°C
Rated Output reduced to	95 %	90 %

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

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

3. Assembly Position

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/C	N/C	N/C	N/C	N/C	N/C

- The standard Assembly Position is considered "F1". "F2" Assembly Position is available at no charge when specified at time of Motor order. "F3" Assembly Position is available on TITAN® ODP/WPI Motors in 5008/5010/5012 and TEFC Motors in 5008/5010/5012 & 5810/5812 Frames.
- Contact your Nidec Motor Corporation Technical Representative with Frame Size and Enclosure for availability of Wall or Ceiling Mounted Assembly Positions.

4. Automotive Duty (TEFC Only)

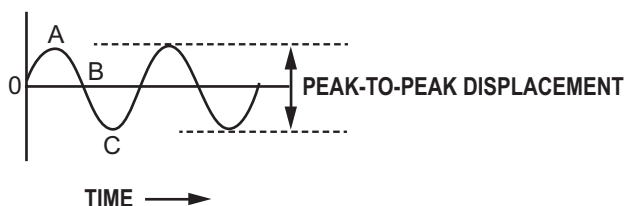
- Totally Enclosed Fan Cooled Automotive Duty motors are available in "U" frame construction. These motors meet frame, temperature rise and other electrical requirements for auto duty, meeting GENERAL MOTORS™ GM-7EH, FORD™ EM1, and CHRYSLER®† NPEM-105 specifications. For base list price, increase requested rating by two horsepower.

5. Balance, Special

(Not Available With Roller Bearings)

Frame:	449	5000	5800	6800	8000	9600
Adder:	2020	2020	2020	2020	2020	2020

NEMA®† standard MG1, Part 7, requires vibration readings to be measured in terms of velocity and stated as inches per second (IPS). Velocity is defined as the maximum speed at which displacement occurs. It takes into consideration both maximum displacement and time. To illustrate velocity, think of a point moving along a typical sine wave in a rising and falling fashion. As the point rises to its peak displacement (Point A), the velocity of movement is zero since it is about to change direction and must stop to do so. Changing direction, the point accelerates towards its peak displacement in the opposite direction (Point C). Midway between the peak displacement values (Point B), velocity is at its maximum. Since the velocity of motion is changing throughout its cycle, the highest peak is selected for measurement.



Nidec Motor Corporation balances all horizontal motors to meet the standard limits shown below. For special balance, make the list adder shown above.

VIBRATION LEVEL

Poles	Velocity (IPS-PEAK)	Velocity (IPS-PEAK)
	Standard	Special
2	0.12	0.10
4	0.12	0.06
6	0.12	0.06
8	0.09	0.06
10	0.08	0.05
12	0.06	0.04

6. Bases

A. Dowel Pin Holes

Frame:	449	5000	5800	6800	8000	9600
Adder:	145	145	145	145	145	145

- Includes Dowel Pin Pilot holes (pins supplied by others).
- Standard (no charge) on 5000 & 5800 Frame Motors with ODP/WPI/WPII/TEFC Enclosures.

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

6. Bases (continued)

B. Slide Rails

Frame:	449	5000	5800	6800	8000	9600
Adder:	3000	3700	4640	5780	N/A	N/A

- Slide Rails are Kits, and are shipped loose for Customer Mounting. The Kit includes quantity two rails and hardware.
- Available on 449-6800 Frame Motors used in belted applications.

C. Sole Plate

Frame:	449	5000	5800	6800	8000	9600
Adder:	2540	3700	4640	5540	6480	6940

- One piece Sole Plate

D. Vertical Jacking Provisions

Frame:	449	5000	5800	6800	8000	9600
Adder:	350	350	350	350	350	350

- Includes provision (holes) for Jacking Screws (screws to be provided by others)

7. Bearings

A. Roller Bearing On Drive End

Frame:	449	5000	5800	6800	8000	9600
Adder:	1040	2080	2885	CO	N/A	N/A

- Roller Bearings are only used on Belted or Chain Drive applications (not used on Direct Connected loads). Used for improved L-10 bearing life on Motors where high radial loads are present.
- Roller Bearings are available as open type only (no shields or seals).
- Belting data for the application is required when specifying Roller Bearings.
- Available on ODP/WPI/WPII/TEFC 449-6800 Frames.
 - Not available on 2-pole motors.
 - Contact your Nidec Motor Corporation Technical Representative for roller bearing availability on TEFC 6800.

B. Insulated, Ball Bearing (Adder Per End)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1040	1040	1040	1270	1270	1270

- Insulated Bearing on Opposite Drive End is standard (no charge) on:
 - Inverter Duty Motors
 - All 5800 Frame & larger motors

C. Spare Set, Ball/Roller Bearings

Frame:	449	5000	5800	6800	8000	9600
Adder:	580	925	1155	1445	1620	1735

- A Spare Set (Quantity 2) of bearings supplied loose, shipped with Motor, when entered with the Motor Order.

D. Sleeve Bearings

ODP/WPI/WPII/TEAAC/TEWAC

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	17310	20195	23575	26900	28000

- Anti-friction Ball Bearings are standard on TITAN® Motors, unless otherwise noted on the Base List Price page. For Sleeve Bearing Motors to be used on coupled applications, make the adder shown above.
- ODP/WPI 2 pole 5008, 5010, & 5012 frames are not available with sleeve bearings & must be supplied as WPII.
- Nidec Motor Corporation's unique Sleeve Bearing design offers a horizontally split case and is Spherically seated for self alignment. Each bearing includes oil ring lubrication, transparent oil level gauge, and fill and drain plugs.
- Sleeve Bearings cannot tolerate overhung load and must be used for coupled service only. Limited end float coupling must also be used to prevent possible damage to the Motor and/or driven equipment.
- Forced-feed oil lubrication system is required on 5800, 2 pole motors (JT) motors and 8000 2 pole ® motors. See A.T.A. Flood Oil Lube System adder on page M-34.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

7. Bearings (continued)

TEFC (5008/5010/5012/5810/5812/6808/6809/6811 Frames)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	17310	20195	23575	N/A	N/A

- Anti-friction Ball Bearings are standard on TITAN® Motors, unless otherwise noted on the Base List Price page. For Sleeve Bearing Motors to be used on coupled applications, make the adder shown above.
- Sleeve bearings on TEFC are DIN style bearings. Both sleeve bearings on TEFC are insulated & provided with a Grounding Strap.
- If base rating is shown on a 449 Frame, use Base List Price of the next higher HP falling on 5000 Frame to cover oversized frame.

E. Insulated, Sleeve Bearings (Adder Per End)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	1965	1965	2540	2540	2540

- Insulated Sleeve Bearing on Opposite Drive End is standard (no charge) on:
 - Inverter Duty Motors
 - All 5800 Frame & larger ODP/WPI/WPII/TEAAC/TEWAC Motors
- If both Sleeve Bearings are to be insulated, the Ground Strap adder must also be made. Refer to "Grounding Strap" Option.

F. Spare Set, Sleeve Bearing

ODP/WPI/WPII/TEAAC/TEWAC Motors

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	15100	17570	20515	23405	24360

- A Spare Set of standard sleeve bearings supplied loose, shipped with the Motor, when entered with the Motor Order.

TEFC (5008/5010/5012/5810/5812/6808/6809/6811 Frames)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	15100	17570	20515	N/A	N/A

- A Spare Set of DIN style sleeve bearings supplied loose, shipped with the Motor, when entered with the Motor Order.

G. Oil Sump Heaters

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	920	920	920	920	920

- Available on Sleeve Bearing Motors Only.
- 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 where the ambient temperature is consistently -15°C (5°F) and below.

H. Oil Sump Heaters with Thermostat Control

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	1490	1490	1490	1490	1490

- Available on Sleeve Bearing Motors Only.
- Please specify single phase: 115, 230, 460 or 575 volts at order entry.
- Thermostatically controlled oil sump heaters can only be used in an unclassified area. Oil sump heaters are recommended for applications where the ambient temperature is consistently below -5°C (23°F) and required where the ambient temperature is consistently -15°C (5°F) and below.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

8. Conduit Box

A. Accessory Conduit Box

Frame:	449	5000	5800	6800	8000	9600
Adder:	465	465	465	465	465	465

- Adder is per Accessory Box beyond what is supplied as standard.
- Accessory Conduit Box is supplied as standard (no charge) as follows:
 - When Winding RTDs are requested, on Motors of any voltage.
 - When internal accessories, such as Winding Temperature Detectors or Space Heaters, are requested on Medium Voltage Motors.
 - NOTE: External accessories, such as Bearing Temperature Detectors or Vibration Switches, are not included.
- For NEMA® 4X Stainless Steel Accessory Conduit Box, please triple adder above. NEMA® 4X boxes are not available on UL® Listed Hazardous Location motors.

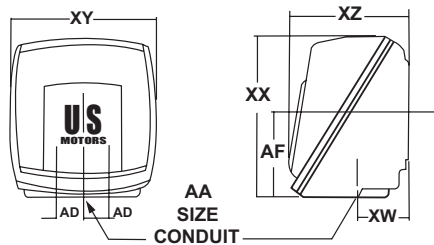
B. Accessory Conduit Box with Terminal Board

Frame:	449	5000	5800	6800	8000	9600
Adder:	930	930	930	930	930	930

- Adder is per Accessory Box beyond what is supplied as standard.
- Accessory Conduit Box is supplied as standard (no charge) as follows:
 - When Winding RTDs are requested, on Motors of any voltage.
 - When internal accessories, such as Winding Temperature Detectors or Space Heaters, are requested on Medium Voltage Motors.
 - NOTE: External accessories, such as Bearing Temperature Detectors or Vibration Switches, are not included.
- To prewire external accessories to this box, add \$590 each to the list price. Prewiring accessories is not available on UL® Listed Hazardous Location motors.
- For NEMA® 4X Stainless Steel Accessory Conduit Box with Terminal Board, please triple adder above. NEMA® 4X boxes are not available on UL® Listed Hazardous Location motors.

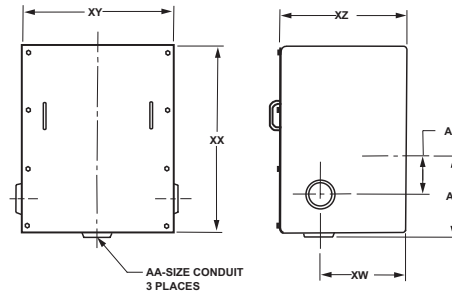
C. Oversized Main Conduit Box

TYPICAL PROFILE FOR
SIZES 1, 1.5, 2, 2.5, AND 3



Dimensions may vary up to 1/4" due to casting or fabrication variations.

TYPICAL PROFILE FOR
SIZES 3.5, 4.5, 5, 6 AND 8



The standard product is supplied with a large, single, main conduit box of cast iron or fabricated steel as shown in the table below. It typically has one usable 3-1/2 inch diameter threaded conduit hub (A-A dimension). If specified at order entry, Nidec Motor Corporation will provide up to three threaded hubs that are up to 4.0 inches in diameter available on size 3.5, 4.5, 5, 6 or 8 boxes. Most options can be rotated in 4 steps of 90 degrees to accept top, bottom or side feeder cable positions. When physical size will not allow the box to be rotated (size 3.5, 4.5, 5, 6 or 8), specify desired location of the hub(s). If not specified, the size and location will be as shown on the following pages. All conduit boxes meet NEMA® Type 4 enclosure requirements.

Standard conduit box assignments and available options are illustrated in the table on the following page. Certain accessories require an oversized main conduit box. The cost of this feature is not included in the accessory price unless otherwise stated. To interpret which conduit box is required to accommodate the desired features, refer to the index below before selecting the appropriate conduit box from the assignment table.

SELECTION INDEX

A-OPTION	Oversized terminal box for extra or larger leads or stress cones
B-OPTION	Accommodates stress cones with one of the following: lightning arrestors, surge capacitors, current transformer, or bus connection
C-OPTION	Accommodates stress cones with any two of the following: lightning arrestors, surge capacitors, current transformer, or bus connection
D-OPTION	Terminal box accommodates all components: stress cones, lightning arrestors, surge capacitors, current transformer, and bus connection

NOTE: Stress cones are not a Nidec Motor Corporation-supplied accessory but rather a method of connecting motor leads to shielded feeder cables often selected by the customer. Stress cones typically require an oversize box to simply make this connection.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

8. Conduit Box (continued)

MAIN CONDUIT BOX SELECTION TABLE

Enclosure	Frame	Voltage	Horsepower	Conduit Box Options				
				STD	A	B	C	D
Div. 1 Hazardous Location	5000	460 & 2300	ALL	1	1.5	N/A	N/A	N/A
	5800	4000		1.5	1.5	N/A	N/A	N/A
TEFC	449	460	UP TO 500	2	3	4.5	5	6
	H5000		501 & UP	3	4.5	4.5	5	6
	5807	2300	ALL	2	3	4.5	5	6
	5809	4000	ALL	2.5	3	4.5	5	6
	5811	>= 6000	ALL	3.5	4.5	6	8	8
	5008	460	ALL	3	3	4.5	5	6
	5010			3	3	4.5	5	6
	5012	2300	ALL	3	3	4.5	5	6
	5810	4000	ALL	3	3	4.5	5	6
	5812	>= 6000	ALL	3.5	4.5	6	8	8
	6808	460	ALL	3L	3L	4.5	5	6
	6809	2300	ALL	3L	3L	4.5	5	6
	6809	4000	ALL	3L	3L	4.5	5	6
	6811	>= 6000	ALL	3.5	4.5	6	8	8
ODP WPI WPII TEAAC TEWAC	449	460	UP TO 500	3	3	4.5	5	6
	5000		501 & UP	3	4.5	4.5	5	6
	5800	2300	ALL	3*	3	4.5	5	6
		4000	ALL	3*	3	4.5	5	6
		>= 6000	ALL	3.5	4.5	6	8	8
		2300	ALL	3	4.5	4.5	5	6
	6800		UP TO 1000	3	4.5	4.5	5	6
	8000	4000	1001 & UP	4.5	4.5	4.5	5	6
	9600							
		>= 6000	ALL	3.5	4.5	6	8	8

* SIZE 2.5 IS STANDARD ON ODP & WPI 449 FRAME

Motors rated 3300 Volt will follow same guidelines as 4000 Volt shown in the table above.

Motors rated for voltages above 4800 Volt will use a Size 3.5 box as standard.

Size 8 box is only available on motors with voltages above 5000 Volt.

LIST PRICES FOR OPTIONAL MOTOR MOUNTED MAIN CONDUIT BOXES

BOX SIZE	STD. LIST ADDER	NEMA 4X STAINLESS STEEL ADDER	QTY. HUBS	AF	AD	XW	EXTERIOR			INTERIOR			CONST. MAT'L	USABLE VOLUME
							XX (H)	XY (W)	XZ (D)	XX (H)	XY (W)	XZ (D)		
1	-	N/A	1	5-5/8	-	3-15/16	14	14	10-5/8	11-3/8	12	9-1/2	C.I.	900
1.5	\$ 2,115	N/A	2	8-5/8	3	6-1/8	19	18	16-1/2	17-1/2	15	15	C.I.	3200
2	-	N/A	1	8-1/16	-	5	15	14	10-1/2	13-1/2	11-1/2	9-1/2	C.I.	1300
2.5	\$ 1,940	\$ 4,850	1	10	-	6	17-3/4	18	11-1/2	16	15	10	C.I.	2000
3	\$ 2,510	\$ 6,275	2	10-15/16	3	8-1/8	19	19-3/8	17-5/32	16-1/8	15-3/8	13-5/8	C.I.	3400
3L	\$ 2,510	N/A	2	15-1/2	3	3-5/8	22-7/8	16-3/8	15-5/16	19-13/16	12-1/2	14-9/16	C.I.	3400
3.5	\$ 2,888	\$ 7,220	3	10-13/16	4	8	24	18	14	23-3/4	17-3/4	13-5/8	F.S.	5700
4.5	\$ 4,210	\$ 10,525	3	17-13/16	4	14	30	28	20-1/8	29-1/2	27-3/4	19-3/4	F.S.	16200
5	\$ 4,825	\$ 12,100	3	12-13/16	6	14	40	36	20	39-3/4	35-3/4	19-5/8	F.S.	28000
6	\$ 5,790	\$ 14,475	3	12-13/16	6	24-1/2	40	36	29	39-1/2	35-3/4	28-5/8	F.S.	40400
8	\$ 6,948	\$ 17,370	3	12-13/16	6	24-1/2	48	36	29	47-1/2	35-1/2	28-5/8	F.S.	48200

Notes: C.I. = Cast Iron, F.S. = Fabricated Steel

NEMA® Type II: To modify a standard main conduit box arrangement to NEMA® Type II requirements, Select Bus Bar Connections with Standoff Insulators adder. This will include a Ground Lug and a Size 4.5 Conduit Box. Phase segregated conduit box arrangements are not available.

NEMA® 4X CONDUIT BOXES (Not Available on UL® Listed Hazardous Location Motors)

Nidec Motor Corporation's standard main and accessory conduit boxes will meet NEMA® 4X requirements, if special paint option on page M-36 is selected.

NEMA® 4X requirement must be noted as a requirement at time of order placement. NEMA® 4X stainless-steel main or accessory conduit boxes are also available. Stainless steel boxes will not be factory painted. Adders for stainless steel main conduit boxes have been provided above. See page M-15 for NEMA® 4X stainless steel accessory conduit box adder and page M-56 for NEMA® 4X stainless steel bearing temperature detector conduit adders.

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

8. Conduit Box *(continued)*

D. Main Conduit Box Power Lead Termination Options

Bus Bar Connections with Standoff Insulators

Frame:	449	5000	5800	6800	8000	9600
Adder:	6710	6710	6710	6710	6710	6710

- Price includes an oversized Size 4.5 main conduit box. Bus bar material is copper.
- Not available on UL®† Listed Hazardous Location Motors.

Terminal Blocks for Main Power Leads (Low Voltage Motors ONLY)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1450	2050	2050	2900	N/A	N/A

- Available in Size 2.0, 2.5 & 3.0 Cast Iron Main Conduit Box ONLY.
 - Not available on UL®† Listed Hazardous Location Motors.
- Stud-Type Terminal Blocks for Main Power Leads are available when supplied with up to 9 Leads ONLY. Standard lead connection shall be supplied. If special lead connection is required, please contact Nidec Motor Corporation for availability prior to quoting

E. Current Transformers For Differential Protection

A healthy motor maintains the same magnitude of current flowing in and out of each phase of its winding. A breakdown in the insulation system alters this balance, resulting in a measurable difference when the current flowing in and out of each circuit is compared for symmetry. Any dissimilarity within an individual circuit is known as differential current and can be detected with current transformers that provide differential protection.

Differential protection is accomplished by bringing out both ends of the winding into the main motor conduit box. Both leads of each circuit pass through the center of a dedicated window-type current transformer. In a self-balancing system, the 3 CTs are located at the motor. When a fault is detected, a signal is sent to a relay (not provided by Nidec Motor Corporation) in the switchgear, taking the motor offline.

An alternate system includes 3 additional CTs in the switchgear and is commonly known as a conventional system. In most cases, the switchgear OEM provides all 6 CTs since their characteristics must be closely matched for maximum protection.

The conventional system provides a greater zone of protection (motor and cable run). However, it is significantly more expensive and less sensitive than the self-balancing method since it requires a higher fault current to trip the relay.

Window Type Current Transformers (460-4800 Volts)

Frame:	449	5000	5800	6800	8000	9600
Adder:	5080	5080	5080	5080	5080	5080

- For a quantity of 3 window-type (typically type IMC 50:5 ratio) current transformers supplied and mounted by Nidec Motor Corporation use adder above.
- Required oversize main conduit box is not included in the above list price adder.
- For 2 winding multispeed motors, double list price adder above.
- Not available on UL®† Listed Hazardous Location Motors.

Window Type Current Transformers (5000-6900 Volts)

Frame:	449	5000	5800	6800	8000	9600
Adder:	6595	6595	6595	6595	6595	6595

- For a quantity of 3 window-type (typically type IMC 50:5 ratio) current transformers supplied and mounted by Nidec Motor Corporation use adder above.
- Required oversize main conduit box is not included in the above list price adder.
- For other types of Current Transformers, refer complete details to your Nidec Motor Corporation Technical Representative.
- For 2 winding multispeed motors, double list price adder above.
- Not available on UL®† Listed Hazardous Location Motors.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

8. Conduit Box *(continued)*

Arrange-To-Accommodate (Per Current Transformer)

Frame:	449	5000	5800	6800	8000	9600
Adder:	635	635	635	635	635	635

- Arrange Motor to accommodate Customer supplied & jobsite installed Current Transformers.
- Must supply details of Current Transformers at time of order placement.

F. Drain/Breather In Main Conduit Box (Per Box)

Frame:	449	5000	5800	6800	8000	9600
Adder:	350	350	350	350	350	350

- The following options are available for Drains/Breathers in the Main Conduit Box or Accessory Conduit Box:
 - Breather/Drain In Conduit Box
 - 1/8" NPT Drain Hole in Conduit Box (Not Available On UL®† Listed Hazardous Location motors)
 - 1/2" NPT Drain Hole In Conduit Box (Not Available On UL®† Listed Hazardous Location motors)

G. Hinged Main Circuit Box

Frame:	449	5000	5800	6800	8000	9600
Adder:	800	800	800	800	800	800

- Hinged front cover on Size 4.5 or larger Conduit Box

H. Hinged Door with Lock & Key

Frame:	449	5000	5800	6800	8000	9600
Adder:	1210	1210	1210	1210	1210	1210

- Hinged front cover on Size 4.5 or larger Conduit Box, with key lock & 2 keys.

I. Lead Positioning Gasket

Frame:	449	5000	5800	6800	8000	9600
Adder:	235	235	235	235	235	235

- Standard (no charge) on CORRO-DUTY® Motors.
- Conduit Box Gaskets are not available on UL®† Listed Hazardous Location Motors, per UL®† restrictions.

J. Servit Post In Conduit Box

Frame:	449	5000	5800	6800	8000	9600
Adder:	128	128	128	128	128	128

- Make the above adder for Servit Post inside of the conduit box

K. Space Heater In Main Conduit Box

Frame:	449	5000	5800	6800	8000	9600
Adder:	1330	1330	1330	1330	1330	1330

- Space Heater available in the following voltages:
 - 115V, 230V & 460V
- Available on Size 3.5 box and larger.
- For Division 2 application, double adder above.
- For half voltage space heater (rated 240V operated on 120V), double adder above.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

9. Crusher Duty

(TEFC & TEAAC Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	15%	15%	15%	15%	15%	15%

- Adder is percent of Base List Price.
- Crusher Duty includes a special rotor design, increased locked rotor torque, increased breakdown torques and end turn bracing.
- Requires a review of load inertia and load curve for application.
- If application requires Roller Bearing and/or High Strength Steel Shaft, these adders must also be made.

10. Drains and Breathers

Standard enclosed-frame products described in this catalog include drain holes in the low point of the brackets to prevent condensation buildup. Optional drain and breather elements are available and will be installed by Nidec Motor Corporation for the following list prices. CORRO-DUTY® and severe-duty motors include the first option as standard. Drains/Breathers are not available on ODP/WPI/WPII motors.

Motor Enclosure	Description of Drain And Breather	List Price
TEFC	Drain Hole-Brass Breather Drain	\$350
TEFC / Hazardous Location	Stainless Steel Drain	\$531

11. Efficiency Class

Nidec Motor Corporation offers enhanced efficiency products that feature design optimization and premium grade materials. We recognize your need for increased motor performance is driven by the potentially significant operational cost savings associated with enhanced motor efficiency. Your power costs savings are determined by a number of factors (depending on which payback method you select), including the cost of power and hours of operation. Because not all motors run 24 hours a day, 7 days a week, we offer two pre-priced efficiency options for TITAN® products.

Certain modifications (high altitude, abnormal ambient temperature, 50HZ or other frequency, lower than standard temperature rise, multispeed products, copper bar rotors, low noise designs, etc.) will cause motor performance to vary from stated values. Individual modifications that have the tendency to impact motor performance are noted in their description. Individual modifications that have the tendency to impact motor performance are noted in their description. Should any question exist, refer to your Nidec Motor Corporation Technical Representative.

A number of methods are available to evaluate the potential cost savings obtained by premium efficiency motors. Nidec Motor Corporation sales engineers will be happy to assist you and apply some of the more rigorous tests that include the time value of money at various yield rates. However, you may want to get a general idea of the benefits possible, and this can be accomplished by the simple payback method (shown below). This provides annual power cost savings when the following items are known: Your cost / kilowatt hour of power, actual hours of operation and the full load efficiency level of a standard vs. premium efficiency motor.

PAYBACK ANALYSIS

$$S = .746 \times HP \times C \times N \left[\frac{100}{SE} - \frac{100}{PE} \right]$$

Where: S = Energy savings / year @ 100% load
C = Energy Cost \$/KWH
N = Hours / years running time
SE = Standard efficiency product at full load
PE = Premium efficiency product at full load

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

11. Efficiency Class (continued)

SIMPLE PAYBACK ANALYSIS EXAMPLE

RATING: 250HP - 1800 RPM - 460V
 POWER COST: 5 cents per KW hour
 OPERATION: Continuous duty - 8760 hours/year
 PRODUCTS: Energy Efficient 95% @ F.L.
 Premium Efficient 96.2% @ F.L.

ENERGY EFFICIENT

$$S = .746 \times 250 \times .05 \times 8760 [100/95 - 100/96.2]$$

$$S = 81687 [1.052632 - 1.039501]$$

Annual power cost savings (Premium Efficient) = \$1,072.63

- The difference in LIST price between the energy efficient (type J) and premium efficient (type JE) is \$968. Payback for this LIST price premium is less than a year.
- When you compare your actual net cost differences to the above illustrations this becomes a very attractive option.

12. Enclosures

A. Open Dripproof (ODP)

Frame:	449	5000	5800	6800	8000	9600
Adder:	(3)	(3)	(3)	(3)	(3)	(3)

- (3) See Base List Price Section for pricing.
- Open Dripproof (ODP): A machine in which the ventilating openings are so constructed that successful operation is not interfered with when drops of liquid or solid particles strike or enter the enclosure at any angle from 0 to 15 degrees downward from the vertical (NEMA® MG1). These motors with ventilating openings which permit passage of external cooling air over and around the winding.
- Available on TITAN® Motors in 449-9600 Frame. For low voltage 449 Frame & smaller ODP motors, refer to the NEMA® Horizontal Custom Motor Catalog (PB202).

B. Dripproof Guarded

Frame:	449	5000	5800	6800	8000	9600
Adder:	740	925	1155	1620	0	0

- Use ODP List Price plus above adder.
- Dripproof, Guarded: An Open Dripproof enclosure with all openings, including ventilated openings giving direct access to the live metal or rotating parts (except smooth rotating surfaces) are limited in size by the structural parts or by screens, baffles, grills, expanding metal or other means to prevent accidental contact with hazardous parts. Openings giving direct access to such live or rotating parts shall not permit the passage of a cylindrical rod of 0.75 inch diameter (NEMA® MG1).
- Available on TITAN® Motors in 449-9600 frame with the above adder; standard (no charge) on 8000 and 9600 Frames.

C. Weather Protected Type I (WPI)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1198	2135	3810	4850	0	0

- Use ODP List Price plus above adder.
- Weather Protected I (WPI): An open machine with its ventilating passages so constructed as to minimize the entrance of rain, snow and airborne particles to the electric part, and having its ventilated openings so constructed as to prevent the passage of a cylindrical rod 0.75 inch in diameter (NEMA® MG1).
- Available on TITAN® Motors in 449-9600 frame with the above adder; standard (no charge) on 8000 and 9600 Frames.
- CORRO-DUTY® paint and coatings are available (but not in all cast-iron construction) for WPI motors. Should a customer require CORRO-DUTY® internal and external protective treatments, add 3% for paint and coatings, and for cast-iron conduit box.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

12. Enclosures (continued)

D. Weather Protected Type II (WPII)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	(3)	(3)	(3)	(3)	(3)

- (3) See Base List Price Section for pricing.
- Weather Protected Type II: The same construction features described for the WPI motor are further refined to include protection against high velocity winds, severe storms, such as hurricanes, and airborne particles from entering directly into the electrical package of the machine. The cooling air intake velocity is reduced to 600 ft/min (maximum) and must make at least three 90° right angle turns before passing into the cooling circuit. Any contaminants entering the motor (dirt, dust, abrasives, etc.) are trapped into chambers at low points in the enclosure with clean-out ports for easy maintenance. This product is often applied to wet, corrosive, contaminated environments commonly found in heavy industries such as pulp and paper, electric utilities, petro-chem and steel mills as well as many municipal installations. Construction features include cast iron and heavy-fabricated steel, CORRO-DUTY® internal and external protective treatments and provisions for air filters. Space heaters are also furnished at no charge if specified at order entry.
- CORRO-DUTY® treatments are standard on WPII motors.
- Available on 5000-9600 Frames.

WPII Enclosure Options

Air Filters - Standard Zinc Media

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	785	1180	1410	2080	2540

- Removable dry-type air filters are available for use only on WPII motors. Zinc Electro-Plated mesh media provides a high dust holding capacity. Filters are of the oil-coated re-cleanable type. Disposable air filters are not recommended.
- Available only on WPII enclosures (5000 Frame & larger).

Air Filters - Stainless Steel Media

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	3130	4640	5655	6925	8080

- Removable dry-type air filters are available for use only on WPII motors. Stainless Steel mesh media provides a high dust holding capacity. Filters are of the oil-coated re-cleanable type. Disposable air filters are not recommended.
- Available only on WPII enclosures (5000 Frame & larger).

Air Pressure Differential Switch

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	925	925	925	925	925

- Nidec Motor Corporation's standard air pressure differential switch is DWYER®† Series 1950. This product is weatherproof and suitable for use in Division 2 applications. The electrical connection is through a single 1/2-inch NPT hub, the high/low pressure connection is through dual 1/8 inch NPT hubs. The list price shown above does not include a locally mounted air filter condition visual gauge. To include this feature, double the adder shown.
- When this accessory is applied to WPII motors with air filters, it guards against clogged filters that can starve the motor from cooling air. Air filters remove a wide variety of airborne particles. The concentration of these particles can vary greatly from hour to hour, week to week, season to season. Due to these fluctuations, using a preset time schedule can be an uncertain gauge of air filter condition. A widely accepted method of determining air filter condition is to measure the pressure drop across the air filters. This is accomplished with an accessory that allows the filter to be used until its maximum dust holding capacity is reached.
- Available only on WPII enclosures (5000 Frame & larger) with Air Filters

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

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

12. Enclosures (continued)

Air Temperature Sensor (Per Sensor)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	680	680	680	680	680

- The RTD monitoring the air flow should be the same rating as the winding RTD and will be wired to the same auxiliary terminal box.
 - Arrange To Accommodate Customer Supplied RTD
 - 10 Ohm RTD in Air Inlet
 - 120 Ohm RTD in Air Inlet
 - 100 Ohm RTD (.00392 TCR) in Air Inlet
 - 100 Ohm Precision RTD (.00385 TCR – DIN/IEC Std.) in Air Inlet
 - 100 Ohm RTD (.00392 TCR) in Inlet & Outlet (Double Adder for this option)
- Available only on WPII enclosures (5000 Frame & larger) with Air Filters.

Sound Abatement Treatment

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	1745	2245	3460	4340	4710

- Sound level varies for each individual rating, based on the exact electrical and mechanical design that is used.
- This adder covers any Sound Level that is not the "Standard Value For The Rating".
- CAUTION: Not all Sound Levels can be met on all ratings. Confirm that the value can be met before quoting.
- Refer to Appendix "E" for Typical Sound Levels.

E. Splash Proof Separately Ventilated (SPSV)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	3235	4500	5540	6000	6465

- Use ODP Base List Price plus adder above.
- Splash Proof Separately Ventilated (SPSV): This enclosure will meet NEMA®† Standards for splash proof protection and prevents liquid drops or particles from entering the motor up to 100 degrees downward from vertical. Utilizes a WPII Frame Assembly and Brackets, with a modified top hat with provisions for Customer supplied ducting.
- Available on 5000-9600 Frames.

F. Splash Proof Blower Ventilated (SPBV)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	6000	7850	9235	10385	11425

- Use ODP Base List Price plus adder above.
- Splash Proof Blower Ventilated (SPBV): This enclosure will meet NEMA Standards for splash proof protection and prevents liquid drops or particles from entering the motor up to 100 degrees downward from vertical. Utilizes a WPII Frame Assembly and Brackets, with a modified top hat for motor mounted blower.
- Available on 5000-9600 Frames.

G. Totally Enclosed Fan Cooled (TEFC)

Frame:	449	5000	5800	6800	8000	9600
Adder:	(3)	(3)	(3)	(3)	N/A	N/A

- (3) See Base List Price Section for pricing.
- Totally Enclosed Fan Cooled (TEFC): The TEFC enclosures do not allow a free exchange of air to take place between the external environment and internal motor components. Heat generated by the motor is dissipated when the external fan forces cool air over the surface of the frame and end brackets. TEFC motors are widely applied to dust laden, abrasive and corrosive environments where maximum internal component protection is required. Since there is no free exchange of air, TEFC motors can be susceptible to internal condensation. Areas of high humidity or where great swings in day to night temperatures frequently occur can experience internal condensation. Additionally, TEFC motors applied to intermittent-duty loads can be prone to condensation as the heating (run time) and cooling (down time) cycles tend to draw moisture into the motor as it cools down and remains idle.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

12. Enclosures (continued)

For TEFC installations concerned with condensation buildup, Nidec Motor Corporation suggests the addition of space heaters, drain and breather elements (all Nidec Motor Corporation TEFC motors have drain holes in the low point of the motor) and on a case-by-case basis, possibly oil sump heaters. Another concern of condensation-prone areas can be overhead feed of metal conduit to the TEFC motor. It is not uncommon for condensation to build up in the metal conduit, drain into the motor conduit box, and cause a failure. Where this is a concern, Nidec Motor Corporation recommends potting of the motor leads, and a conduit box drain/breather in the box cover. Requires a cast-iron or fabricated steel conduit box as well.

- Available on 449-5800 Frames.

TEFC Enclosure Options

CORRO-DUTY®

Frame:	449	5000	5800	6800	8000	9600
Adder:	1350	1735	2310	4450	N/A	N/A

- CORRO-DUTY® is the industry standard for heavy duty, corrosive environments. It consists of all cast-iron construction*, 1.0 SF, specialized internal and external protective treatments, treated rotor, ground lug in double gasketed conduit box, non-corrosive drain and breather, and a stainless-steel nameplate.

- Available on 449-6800 Frame.

- * 6800, 7000 & 450 Frames are not available with a cast iron fan cover guard.

841 PLUS® Modifications

Frame:	449	5000	5800	6800	8000	9600
Adder:	7040	7445	8020	11490	N/A	N/A

- Start with Premium Efficiency Base List Price.

- 841 PLUS® Modifications includes the following:

- | | |
|---------------------------------------|---|
| - CORRO-DUTY® | - Tapped Hole On Foot |
| - Special Balance | - Special Foot Flatness |
| - INPRO/SEAL®† on Both Ends | - Special Shaft Runout |
| for IP55 Protection | - Non-Witnessed IEEE-841™ Enhanced No Load Test |
| - Cast Iron Fan Cover (449-5800 ONLY) | |

- NOTE: 1) Form Wound Motors require a sealed insulation system. If rating is form wound, please apply EVERSEAL®† Insulation System Adder on page M-30.
2) Main conduit box is to be sized per NEMA®† MG-1 Table 20-3. If oversized main box is required, refer to page M-15 for conduit box sizes and adders.
3) Motors with sleeve bearings are excluded from the scope of the IEEE Std 841™-2021.
4) Contact your Nidec Motor Corporation Technical Representative for complete list of deviations to IEEE Std 841™-2021 and additional modification adders.

IEEE Std 841™-2021 General Comments:

- 1) 6.1 f) – On 3600 RPM motors, synthetic lubrication is recommended to meet IEEE-841™'s bearing temperature rise requirement of 50°C.
- 2) 6.4 – Fan may be non-sparking aluminum. IEEE-841™ requires fan to be non-sparking bronze alloy or conductive plastic.
For a bronze fan, please apply adder below.
- 3) 6.9 – On 3600 RPM, 5800 frame & larger motors, vibration may be up to .10 ips (rigid mount).

Bronze Fan

Frame:	449	5000	5800	6800	8000	9600
Adder:	1475	1560	1685	1995	N/A	N/A

- 3600 RPM motors will typically have a unidirectional fan and 1800 RPM & slower will typically have a bi-directional fan.
- Bronze fan option on 6800 frame is only available as unidirectional.

Fabricated Steel Sound Abate Fan Cover

Frame:	449	5000	5800	6800	8000	9600
Adder:	2195	2540	2885	5510	N/A	N/A

- This fabricated steel sound abate fan cover option will reduce Nidec Motor Corporation's typical sound pressure level at 1 meter by 4 to 5 dBA.
- This option is not offered or available on 5008/5807/5809/5811 Hazardous Location Frames or 5004/5008 Automotive Duty Frames.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

12. Enclosures (continued)

Sealant, RTV†

Frame:	449	5000	5800	6800	8000	9600
Adder:	1125	1125	1775	2800	N/A	N/A

- Silicone sealant applied to registers between the end brackets and frame and/or under bolt heads to prevent contaminants from entering the motor. If this option is added to an TITAN 841 motor from pages M-26 through M-28, IP enclosure will increase from IP55 to IP56.
- Not available on UL® Listed Hazardous Location Motors.

H. Totally Enclosed Blower Cooled (TEBC)

Frame:	449	5000	5800	6800	8000	9600
Adder:	2540	3645	4040	5050	N/A	N/A

- Use TEFC Base List Price plus adder above.
- Totally Enclosed Blower Cooled (TEBC): Totally Enclosed Motor with a motor mounted constant speed blower.
- Available on 449-6800 Frame.

I. Totally Enclosed Air-to-Air Cooled (TEAAC)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	N/A	(3)	N/A	(3)	(3)

- (3) See Base List Price Section for pricing.
- Totally Enclosed Air-To-Air Cooled (TEAAC): Also know as Tube Cooled (TETC). Motor is cooled by circulating the internal air through a heat exchanger which in turn, is cooled by circulating external air. It is provided with an air-to-air heat exchanger for cooling the ventilating air and a fan mounted on the rotor for circulating the internal air and a separate shaft mounted fan for circulating the external air.
- TEAAC Motors are supplied with steel tubes mounted in a top box and steel fans as standard.
 - Tubes are treated with an epoxy resin coating to prevent rust & corrosion.
- Available on 5800, 8000 & 9600 Frames.

TEAAC Enclosure Options

Stainless Steel Tubes

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	N/A	14885	N/A	23080	27720

- Use TEAAC Base List Price plus adder above.
- Same as standard TEAAC, except with Stainless Steel Tubes.
- Available on 5800, 8000 & 9600 Frames.

CORRO-DUTY®

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	N/A	2310	N/A	2885	3465

- CORRO-DUTY® is the industry standard for heavy duty, corrosive environments. It consists of 1.0 SF, specialized internal and external protective treatments, treated rotor, ground lug in conduit box and a stainless-steel nameplate.
- Available on 5800, 8000 & 9600 Frames.

J. Totally Enclosed Separately Ventilated (TESV)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	1725	2080	N/A	5540	6350

- Use WPIL Base List Price plus adder above.
- Totally Enclosed Separately Ventilated (TESV): A Totally Enclosed enclosure utilizing a WPIL Frame Assembly and Brackets, with a modified top hat with provisions for Customer supplied ducting.
- Available on 5000, 5800, 8000 & 9600 Frames.

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

12. Enclosures (continued)

K. Totally Enclosed Water-To-Air Cooled (TEWAC)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	N/A	75460	N/A	96925	105510

- Use WPII Base List Price plus adder above.
- Totally Enclosed Water-To-Air Cooled (TEWAC): A Totally Enclosed machine which is cooled by circulating internal air which, in turn, is cooled by circulating water. It is provided with a water-cooled heat exchanger mounted in the motor top hat for cooling the internal air and fans integral with the rotor shaft for circulating the internal air (NEMA® MG1-1.26.7).
 - The motor is supplied with a heat exchanger mounted in the top of the motor. The heat exchanger tubes are 90 percent copper, 10 percent nickel, tube sheets and headers are of steel and the fins are aluminum. Double wall tubes are standard. Cooler is designed for use with 80°F max, cooling water at a pressure not exceeding 50 psi (test at 75 psi) with a nominal fouling factor of 0.001.
 - Data required with the order:
 - > Inlet Water Temperature & Pressure
 - > Fouling Factor
 - > Any restrictions on water outlet temperature & pressure drop
- Available on 5800 & 8000-9600 Frame.

L. Hazardous Location, (UL®† Listed) Division 1 & 2 Class I

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	(3)	(3)	N/A	N/A	N/A

- (3) See Base List Price Section for pricing of Class I Group D T2B Temperature Code Product.
- Div. 1 Hazardous Location: A totally enclosed motor designed to withstand an explosion of a specified gas or vapor inside the motor casing and prevent the ignition outside the motor by sparks, flashing or explosion. Nidec Motor Corporation's motors are UL®†-approved for Class 1 (gas or vapor), Group D, which includes gasoline, hexane, naphtha, benzene, butane, propane, alcohol, lacquer solvent vapors and natural gas. Ignition temperature vs. temperature marking indicates a maximum temperature for all conditions including overload, locker rotor, singled phasing and burnout.
- When ordering, indicate class, group and temperature code requirements.
- Refer to Appendix "B" for definitions of Division, Class, Group and T-Codes.
- Group C is available on 5800 Frame.
- Available on 5000-5800 Frames.

M. Hazardous Location, (UL®† Listed) Division 1 Class II

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	5%	5%	N/A	N/A	N/A

- Make adder against the Division 1, Hazardous Location Class I Base List Price.
- 5000 Frame: Class I, Group D, Class II, Groups F&G, T3B is available.
- 5800 Frame: Class I, Groups C&D, Class II, Groups E,F&G, T3C is available.
- Refer to your Nidec Motor Corporation Technical Representative to confirm Frame Size.

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

12. Enclosures (continued)

UL®† Listed Hazardous Location Enclosure Options

CORRO DUTY®

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	1735	2310	N/A	N/A	N/A

- CORRO-DUTY® is the industry standard for heavy duty, corrosive environments. It consists of all cast-iron construction, 1.0 SF, specialized internal and external protective treatments, treated rotor, ground lug in conduit box, non-corrosive drain and breather, and a stainless-steel nameplate.
- Available on 5000-5800 Frame.

841 PLUS® Modifications (Available on Class I Hazardous Location motors ONLY)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	7445	8020	N/A	N/A	N/A

- Start with Premium Efficiency Base List Price.
- 841 PLUS® Modifications includes the following:
 - CORRO-DUTY®
 - Special Balance
 - Special Foot Flatness
 - AFMBA Bearing Numbers on Nameplate
 - Cast Iron Fan Cover
 - INPRO/SEAL®† on Both Ends for IP55 Bearing Protection
 - Special Shaft Runout
 - Non-Witnessed IEEE-841™ Enhanced No Load Test
- 841 PLUS® Modifications are only available on Class I motors.
- NOTE: 1) Form Wound Motors require a sealed insulation system. If rating is form wound, please apply EVERSEAL®† Insulation System Adder on page M-30.
 2) Explosion-proof Motors are excluded from the scope of the IEEE Std 841™-2021.
 3) Main conduit box will be Nidec Motor Corporation's standard size. Refer to page M-15 for available Hazardous Location conduit box sizes and adders.
 4) Contact your Nidec Motor Corporation Technical Representative for complete list of deviations to IEEE Std 841™-2021 and additional modification adders.

O. Division 2 Self Certified (Non-Listed) and CSA®† Certified Division 2

Frame:	449	5000	5800	6800	8000	9600
Adder:	5%	5%	5%	5%	5%	5%

- The NATIONAL ELECTRICAL CODE®† Section 501-8b allows the installation of non-explosion-proof enclosed & open motors without brushes, switching mechanisms or similar arc-producing devices in Class I, Division 2 locations. Nidec Motor Corporation can supply self-certified motors meeting the NEC®† Article 500 (NFPA®†-70) requirements under full load (1.0 service factor) running conditions. These motors are available for Class I, Groups A, B, C, & D and Class II, Groups F & G with Temperature codes T3 through T3C, with some restrictions. Group E is not available. Class II is not available on open motors.
- Temperature codes below T2B may result in an oversized frame. Confirm Frame Size with your Nidec Motor Corporation Technical Representative prior to quoting. T4 through T6 temperature codes are not available.
- Self-certified restrictions:
 - Not applicable to UL®† Listed Hazardous Location motors.
 - Use hazardous location adders for all accessories. Accessories not available on Division 1 Hazardous Location motors are not available on Division 2 motors.
 - Inverter duty is available with temperature codes T1-T3 only. Motors are limited to 1.0 SF on inverter power. Hermetically sealed thermostats will be provided.
- CSA Division 2 requires Nidec Motor Corporation Engineering approval prior to quote.

13. Encoders

(QP) Refer to Quick Pick Chart For Pricing & Available Options

Frame:	449	5000	5800	6800	8000	9600
Adder:	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)

- Standard offering is AVTRON® M/N HS35A (\$1,000.00 List Adder).
- Flange mounted encoders are not available.

14. Endshields, C-Face/D-Flange

Frame:	449	5000	5800	6800	8000	9600
Adder:	1468	2885	3808	N/A	N/A	N/A

- Make above adder for C-Face or D-Flange on Drive End.
- Flange construction: Cast Iron or Fabricated Steel, per Nidec Motor Corporation standards.
- For c-face/d-flange availability, please refer to Appendix F.

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

15. Export Boxing

Frame:	449	5000	5800	6800	8000	9600
Adder:	1900	2800	3365	5050	6150	7490

- Export packaging is available from our international warehouse in Southaven, MS. Material used to export box motors is 2 x 4s for the frame and 1/2" plywood for walls. The conduit box may be removed and placed in a box with the motor. Shipping marks are stenciled to the outside of the box. For other options, such as gang boxing and containerization, contact Nidec Motor Corporation.

16. UL®† Listed Fire Pump (500HP & Less, 600V & Less)

Frame:	449	5000	5800	6800	8000	9600
Adder:	5%	5%	N/A	N/A	N/A	N/A

- Adder is percent of Base List Price.
- Nidec Motor Corporation's UL®† Listed (File EX5189) Fire Pump Motors are designed per UL®†-1004-5 and meet the NFPA®†-20 "Standard for the Installation of Centrifugal Fire Pumps".
- Centrifugal Fire Pump Specifications.† Nidec Motor Corporation's UL®†-Listed Fire Pump motors meet the special design requirements listed below:†
 - > Designed to meet NEMA®† Design "B" parameters per NEMA®† MG1-2011
 - > Calculated Safe Stall Time must exceed 12 seconds (cold) / 8 seconds (hot)
 - > Motors designated for Canada must meet CSA-390 Table 2 efficiency values
 - > 600V or less
 - > 500HP and lower
 - > 5813 frame and smaller
 - > 1.15 service factor (max)
 - > Suitable for the following Starting Methods:
 - Across-The-Line Start
 - Also Suitable for Inverter Start
 - Also Suitable For Wye-Start/Delta Run
 - Dual Voltage Motors Also Suitable For Part Winding Start on Low Voltage
 - Single Voltage Motors Also Suitable For Part Winding Start
 - > Depicting UL®† Fire Number Fire Pump Tags.

17. Foot Flatness, Special

Frame:	449	5000	5800	6800	8000	9600
Adder:	2885	2885	2885	2885	2885	2885

- 0.005" Foot Flatness from mounting hole to mounting hole.
- Provided as standard (no charge) on motors with 841 PLUS® Modifications.

18. Frequency, 50 Hertz

Frame:	449	5000	5800	6800	8000	9600
Adder:	15%	15%	15%	15%	15%	15%

- Adder is a percent of Base List Price.
- The Frequency Adder includes 50 Hz, 1.0 service factor. If higher Service Factor is required, the Service Factor Adder must also be made.
- The Frequency Adder is used when the Primary Rating is 50 Hertz. Some motors can be built with a Dual Rating (60 Hertz Primary and 50 Hertz Secondary Rating). If 50 Hertz is specified as the Secondary Rating, this adder is not required. The Secondary Rating is always 1.0 service factor.
- Provisions for Why-Delta starting are no charge, if noted at time of order entry.

19. Grease Fitting On Fill & Pressure Relief On Drain

Frame:	449	5000	5800	6800	8000	9600
Adder:	150	150	150	150	150	150

- Grease Fitting On Fill and Plug On Drain is standard on Grease Lube TITAN® Motors.
- Make the above adder for Grease Fitting On Fill and Pressure Relief Fitting On Drain.
- Not available (not applicable) on Motors with Oil Lubricated Bearings.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

20. Grounding

A. Ground on Frame

Frame:	449	5000	5800	6800	8000	9600
Adder:	350	350	350	350	350	350

- Make the above adder for Ground provision on the motor frame.
- Grounding Pad (Standard on 5000-5800 Frame Open Motors)
- Tapped Hole On Foot (Standard on Motors with 841 PLUS® Modifications)

B. Grounding Strap (Sleeve Bearing Motors Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	810	810	810	810	810

- Required on Sleeve Bearing Motors when both bearings are insulated.
- Make the above adder for Grounding Strap on ODP/WPI/WPII/TEAAC/TEWAC Sleeve Bearing Motors. (Standard on TEFC Sleeve Bearing Motors).

C. Shaft Ground Ring or Shaft Ground Brush (Ball Bearing & Roller Bearings Motors Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)

- Not Available On UL Listed Hazardous Location Motors, Self-Certified Division 2 (Non-Listed) or CSA®† Certified Division 2.

D. Shaft Ground Ring with Labyrinth Seal (Ball Bearing & Roller Bearings Motors Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)

- Not Available On UL Listed Hazardous Location Motors, Self-Certified Division 2 (Non-Listed) or CSA®† Certified Division 2.

21. Hardware, Stainless Steel

Frame:	449	5000	5800	6800	8000	9600
Adder:	350	580	1160	1825	2310	2770

- All Motors are built with Corrosion Resistant Hardware.
- When Stainless Steel Hardware is specified, all hardware required for End Shields, Fan Cover, Bearing Caps and Conduit Box is changed to 316 Stainless Steel.

22. High Inertia Load

Frame:	449	5000	5800	6800	8000	9600
Adder:	15%	15%	15%	15%	15%	15%

- Refer to Appendix "A" for standard Load Inertia values.
- Make the High Inertia Load adder under the following conditions:
 - For 2 Pole Motors (3600 or 3000 RPM), make the adder if the Load Inertia is more than the Standard Inertia in Appendix "A".
 - For 4 Pole Motors & slower (1800 RRPM & slower), make the adder if the Load Inertia is more than twice the Standard Inertia in Appendix "A".
- Application details, including load inertia reflected to the motor shaft, must be reviewed prior to entering an order.
- Refer to Nidec Motor Corporation Marketing Department for the Net Price.

23. Horsepower, Non-Standard

Frame:	449	5000	5800	6800	8000	9600
Adder:	(4)	(4)	(4)	(4)	(4)	(4)

- (4) It is best to use a Standard Horsepower rating whenever possible, however Non-Standard Horsepower ratings can be designed. Use the Base List Price of the next higher standard horsepower of the same motor type and speed. Motors can be nameplated in KW units. For list price determination, divide KW by .746 to figure equivalent horsepower.

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

24. Insulation Class

A. Class F

Frame:	449	5000	5800	6800	8000	9600
Adder:	STD	STD	STD	STD	STD	STD

- Class F Insulation: A Class F (155°C) Insulation System is one which by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class F temperature specified in the temperature rise standard for the machine under consideration.
- All products described in this catalog are manufactured with copper magnet and lead wire. Aluminum wire is not available.
- All production-modified products are supplied with Class F insulation as standard.
- Inverter-duty products are supplied with a special insulation system that is described in item 26 of this section.
- Class H insulation is an available option for special ambient conditions, inverter duty applications, insulation life requirements, etc.
- Temperature-rise considerations are described in item 45 of this modification section.

INSULATION CLASS

Common designations include Class B, F, and H. These indicate the maximum thermal capability of each system based on providing a life expectancy in accordance with IEEE™ guidelines and industry standards. The following table illustrates the various elements and their contribution to the insulation systems.

INSULATION CLASS	A ⁽¹⁾	B	F	H
Ambient temperature (for options, see item 2 of this modification section)	40°C	40°C	40°C	40°C
Temperature rise at nameplate H.P. (for options see item 45 of this modification section)	60°C	80°C	105°C	125°C ⁽²⁾
Hot spot or service factor allowance (for service factor see item 39 of this modification section)	10°C	10°C	10°C	15°C
Thermal limit of insulation system ⁽³⁾	105°C	130°C	155°C	180°C
NOTES: ⁽¹⁾ Class A insulation is shown for reference only and is not commercially available from Nidec Motor Corporation. ⁽²⁾ 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. ⁽³⁾ Each insulation class provides the same winding design life when operated at its thermal limit.				

Any deviation from insulation class standards stated on individual price book pages requires the appropriate modification adder and may impact frame size and performance characteristics.

B. Class H

Frame:	449	5000	5800	6800	8000	9600
Adder:	1175	1745	2245	3460	4340	4710

- Class H Insulation: A Class H (180°C) Insulation System is one which by experience or accepted test can be shown to have suitable thermal endurance when operating at the limiting Class H temperature specified in the temperature rise standard for the machine under consideration.
- Contact your Nidec Motor Corporation Technical Representative for Ambients above 60°C.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

25. Insulation System

WINDING TREATMENTS

Availability of specialized insulation treatments depends upon the coil construction used in the wound stator assembly. Guidelines for random wound and form wound coil construction are:

Random wound coils are typically used on all low-voltage (600 volts and below) motors rated 600 HP and below, 5800 frame and smaller except 2-pole.

Form wound coils are used on all motors (regardless of voltage) in the 6800, 8000 and 9600 frames and on all products rated above 600 volts. Nidec Motor Corporation does not manufacture medium voltage (2300 - 7000 volts) random wound products.

- Specific applications (VFD, frequent starting duty, etc.) and other design complications may require deviation from the above guidelines. Consult the Inquiry Group if questions exist.
- Form wound coils are available for some low voltage ratings traditionally manufactured as random wound. This requires approval by the Inquiry Group; when approved, price as a 2300 volt motor.
- Nidec Motor Corporation reserves the right to modify these guidelines as required.

WINDING TYPE		
INSULATION CHOICE	RANDOM WOUND	FORM WOUND
VPI 1000	STD	N/A
VPI 2000	OPT*	N/A
Abrasion Resistant	OPT	N/A
Insulife 5000	N/A	STD
Premium EVERSEAL®†	N/A	OPT
Abrasion Resistant	N/A	OPT

* Standard on 500 through 600 horsepower, random wound, low voltage TITAN® motors.

A. VPI 1000

Frame:	449	5000	5800	6800	8000	9600
Adder:	STD (R)	STD (R)	STD (R)	STD (R)	N/A	N/A

- VPI 1000: One cycle of vacuum pressure impregnation of 100% solid epoxy resins. Standard on TITAN® motors with 600 volt maximum insulation (random wound).

B. VPI 2000

Frame:	449	5000	5800	6800	8000	9600
Adder:	1155	1385	1735	2308	N/A	N/A

- VPI 2000: Two cycles of vacuum pressure impregnation with 100% solid epoxy resins. Meets NEMA®† definition for moisture-resistant winding per NEMA®† MG1 - 1.27.1.

C. Insulife 5000

Frame:	449	5000	5800	6800	8000	9600
Adder:	STD (F)	STD (F)	STD (F)	STD (F)	STD (F)	STD (F)

- Insulife 5000: Two cycles of vacuum pressure impregnation. Standard process on TITAN® frame 2300 volt and up (Form Wound) motors. Provides 7 mils Insulation Build. 3 cycles are not available.

D. Premium EVERSEAL®† (SEALED)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1900	2795	3810	4825	5715	6350

- Premium EVERSEAL®†: Two cycles of VPI with the connection end receiving a special sealing treatment. Premium EVERSEAL®† provides additional strength and deflection protection to winding end turns. For form wound motors only. Meets requirements for "sealed" per NEMA®† MG1-1.27.2, spray test per NEMA®† MG1-20.18, or immersion test.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

25. Insulation System *(continued)*

E. Abrasion Resistant Coating

Frame:	449	5000	5800	6800	8000	9600
Adder:	235	350	450	695	870	945

• Abrasion Resistant Coating: Optional overcoat treatment available on any of the above systems. Protects against environments contaminated with abrasive dust such as fly ash, cement dust, etc. Highly resistant to all environmental forms of abrasion.

F. Tropical Protection

Frame:	449	5000	5800	6800	8000	9600
Adder:	590	880	1120	1735	2170	2355

- Anti-fungus insulation treatment.
- For ODP Motors, also add Screens.

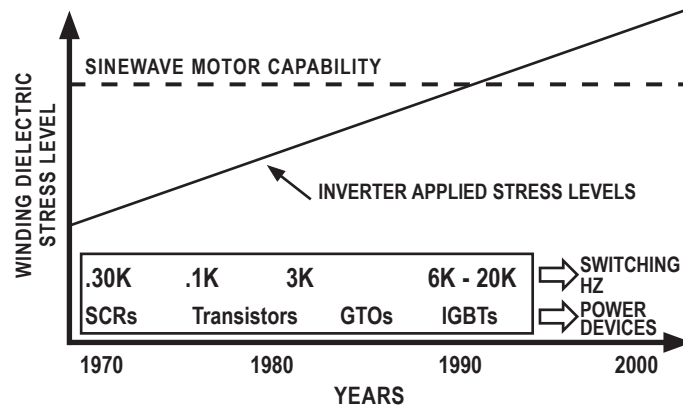
26. Inverter Duty

This modification will alter published performance characteristics when motor is operated on non-sinusoidal waveforms.

The application of motors to variable torque pump loads is an ideal candidate for process control through the use of a variable frequency drive (VFD). Significant operational cost savings are possible in many pumping systems.

Advances in microprocessors and power semiconductor technology have evolved to improve the performance, reliability and cost attributes of VFDs. This evolution has occurred over a 30 year period. With each power semiconductor milestone achieved, drive switching frequency increased.

WINDING DIELECTRIC STRESS VERSUS THE DEVELOPMENT OF TRANSISTORS



Increased switching frequency has created new challenges for existing insulation systems. Electric motor insulation systems have, for the most part, not changed in 30 years. It is no longer accurate to think that inverter-driven motors only have a thermal problem -- one which can be solved by using a premium efficiency motor. Today's drives produce a high rate of rise voltage waveforms that impose high impulse electrical stress on the motor insulation. Unfortunately most current insulation life standards do not specify the maximum repetitive voltage transients, the switching frequency (kHz), and rate of rise that the winding should be able to withstand and still maintain normal life expectations. Standard insulation systems are not designed to operate in this new electrical environment, and when they are, unpredictable motor performance is the result.

Nidec Motor Corporation was the first motor company to recognize this by introducing the first formal INVERTER GRADE® Insulation System. This system provides protection against the effects of IGBT power devices through the use of additional phase paper end-turn bracing as well as pulse resistant magnet wire. The benefit was clear: Under inverter fed applications, a significant improvement in winding life was achieved. Nidec Motor Corporation's INVERTER GRADE® Insulation System meets the stringent requirements outlined in NEMA® MG-1, Part 31.

Service factor - Sine wave vs. VFD power: Motors will be rated 1.15SF on sine wave and 1.0SF on VFD power. Inverters add harmonics to the waveform, which produce additional heat. Running the motor at 1.0SF while on the inverter assures that the winding temperature limits are within the insulation temperature capabilities.

Over-speed on VFD rated units: Motors will be capable of over-speed per NEMA® MG1 12.53.2. Note, even though motors are mechanically capable of over-speed, the pump will overload the motor if ran in over-speed.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

26. Inverter Duty (continued)

You can count on Nidec Motor Corporation to continue our design efforts aimed at maintaining a compatible product in light of advancing drive technology. We will automatically upgrade our VARIDYNE® inverter-duty product offering as technology advancements become available. For more information, contact your Nidec Motor Corporation Sales Representative.

If inverter to be used is a current source type drive, an input isolation transformer must be supplied on the inverter to mitigate common-mode voltage problems. Please advise make & model of VFD at time of order placement.

Bearing considerations for motors used with a variable frequency drive:

Pulse Width Modulated (PWM) drives generate common mode voltage which may cause motor shaft voltage and damaging bearing currents. Nidec's limited warranty does not cover bearing failure caused by shaft voltage or bearing currents. We recommend using a VFD output filter to mitigate common mode voltage and the resulting bearing currents. If a filter is not included, the user may consider insulating bearings or adding a shaft grounding system.

A. 10:1 Variable Torque (12)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1735	3235	4155	5925	6500	7080

- (12) Use Premium Efficiency Base List Price, and make the above adder.
- Inverter Duty includes:
 - > "Inverter Grade" Insulation
 - > Premium Efficiency
 - > Special Balance
 - > Thermostats (1 Per Phase)
 - > Insulated Opposite Drive-End Bearing
 - > Meets NEMA® MG1 Part 31
- Shaft Ground Ring On Drive End is included if motors is ball bearing or roller bearing and is to be installed in an unclassified area.

B. 2:1 Constant Torque (10:1 Variable Torque) (12)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1910	3560	4575	7915	8548	9185

- (12) Use Premium Efficiency Base List Price, and make the above adder.
- Inverter Duty includes:
 - > "Inverter Grade" Insulation
 - > Premium Efficiency
 - > Special Balance
 - > Thermostats (1 Per Phase)
 - > Insulated Opposite Drive-End Bearing
 - > Meets NEMA® MG1 Part 31
- Shaft Ground Ring On Drive End is included if motors is ball bearing or roller bearing and is to be installed in an unclassified area.
- Confirm Frame Size & availability prior to quoting.

C. 5:1 Constant Torque (10:1 Variable Torque) (10)

Frame:	449	5000	5800	6800	8000	9600
Adder:	(10)	(10)	(10)	(10)	(10)	(10)

- (10) For 5:1 Constant Torque, use the Premium Efficiency Base List Price of the next higher horsepower plus the adder for VFD Duty 10:1 Variable Torque.
- Confirm Frame Size & availability prior to quoting.

D. 10:1 Constant Torque (10:1 Variable Torque) (Totally Enclosed Fan Cooled) (15)

Frame:	449	5000	5800	6800	8000	9600
Adder:	(15)	(15)	(15)	(15)	N/A	N/A

- (15) For 10:1 Constant Torque TEFC, use the Premium Efficiency Base List Price of two horsepower larger plus the adder for VFD Duty 10:1 Variable Torque.
- Confirm Frame Size & availability prior to quoting.

E. 10:1 Constant Torque (10:1 Variable Torque) (Totally Enclosed Blower Cooled) (12)

Frame:	449	5000	5800	6800	8000	9600
Adder:	5200	6120	8200	9650	N/A	N/A

- (12) Use the TEFC Premium Efficiency Base List Price plus this adder.
- The adder includes the Enclosure Adder.



Modifiable TITAN® Horizontal Motors

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26. Inverter Duty (continued)

F. 10:1 Constant Torque (10:1 Variable Torque) (Totally Enclosed Separately Ventilated) (14)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	10735	13965	19080	21040	23350

- (14) Use the WPPI Premium Efficiency Base List Price plus this adder.
- The adder includes the Enclosure Adder.

G. 10:1 Constant Torque (10:1 Variable Torque) (Splash Proof Blower Ventilated) (13)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	9235	12000	16425	18155	19770

- (13) Use the ODP Premium Efficiency Base List Price plus this adder.
- The adder includes the Enclosure Adder.

H. 10:1 Constant Torque (10:1 Variable Torque) (Splash Proof Separately Ventilated) (13)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	6465	8655	12735	13770	14810

- (13) Use the ODP Premium Efficiency Base List Price plus this adder.
- The adder includes the Enclosure Adder.

I. Vector Duty (11)

Frame:	449	5000	5800	6800	8000	9600
Adder:	(11)	(11)	(11)	(11)	N/A	N/A

- (11) For Vector Duty, use the 10:1 Constant Torque pricing.
- Nidec Motor Corporation's standard Encoder offering is AVTRON® M/N HS35A (\$1,000.00 List Adder).
- The above optional adder covers the Nidec Motor Corporation's standard Encoder. Other Encoders available at an additional charge. Refer to "Encoders" Option.

27. Leads

A. Longer Than Standard Leads (Adder Per Foot)

Frame:	449	5000	5800	6800	8000	9600
Adder:	345	345	345	345	345	345

- The standard length of our leads is six inches inside the conduit box.
- Adder is per foot.
- Double the adder for:
 - Dual Voltage Motor
 - Motors designed for Part Winding Start (PWS)
 - Motors designed for Wye Start-Delta Run
- Special lead lengths available in one-foot increments from one to ten feet, and five-foot increments above that.
- The specified length is the total length from where the leads exit the Motor Frame.

B. Sealed Leads (Potted)

Frame:	449	5000	5800	6800	8000	9600
Adder:	870	870	870	870	N/A	N/A

- Sealing compound applied around the leads at the lead outlet opening to separate leads, and to seal outlet to prevent contamination from entering the Motor.
- Available on Enclosed Motors only (449-6800 Frame only)
 - Standard (no charge) on UL®† Listed Hazardous Location Motors.

C. Two-Hole Lead Lugs

Frame:	449	5000	5800	6800	8000	9600
Adder:	235	235	235	235	235	235

- TITAN® Motors are supplied with long barrel compression ring type lead lugs as standard (BURNDY®† Type YA is typical factory choice).
- Two Hole Lead Lugs (BURNDY®†, or equal) available at the adder shown above.

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

28. Lubrication

A. Arrange-To-Accommodate Flood Oil Lube System

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	1035	1035	1035	1035	1035

- Motor provided with all plumbing connections to accept a Customer supplied flood oil lubrication system.
- Available on Sleeve Bearing Motors only.

B. Constant Level Oiler (Standard Cage)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	985	985	985	985	985

- Standard oiler is TRICO®† brand, or equal, with 8 ounce reservoir.
- Standard Cage & Piping
- Available on Sleeve Bearing Motors only.

C. Constant Level Oiler (Stainless Steel Cage)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	2370	2370	2370	2370	2370

- Standard oiler is TRICO®† brand, or equal, with 8 ounce reservoir.
- Stainless Steel Cage & Piping
- Available on Sleeve Bearing Motors only.

D. Oil Mist Provision (Ball Bearing Motors Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1390	1390	1390	1390	N/A	N/A

- Includes providing the Motor with provisions to accommodate Oil Mist Lubrication. The Oil Mist Lubrication System is supplied by others.
- An Oil Mist Lubrication System (supplied by others) is a centralized system in which the energy of compressed gas, usually air taken from the plant supply, is used to atomize oil. The oil is then conveyed by air in a low pressure distribution system to application fittings on the Motor (mist fittings which meter oil to bearing housings).
- Available on Enclosed Motors only.

29. Marine Duty

(Ball Bearing Motors only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	5%	5%	5%	5%	5%	5%

CORRO-DUTY® motors meet IEEE-45™ specifications, both above and below deck, in both enclosed and hazardous location enclosures. Add INPRO/SEAL®† seals for above deck service. Open motors are approved for below deck. 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.



Modifiable TITAN® Horizontal Motors

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30. Multi-Speed Motors

(Ball Bearing Motors only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	(+)	(+)	(+)	(+)	(+)	(+)

(+) Multi-Speed Adders:	<u>Load Type</u>	<u>One Winding</u>	<u>Two Winding</u>
	Variable Torque	70%	100%
	Constant Torque	80%	140%
	Constant Horsepower	90%	170%

- Adder is percent of Base List Price. Use the Base List Price of the High Horsepower and Speed.
- Contact your Nidec Motor Corporation Technical Representative to confirm frame size.
- Contact Nidec Motor Corporation Marketing Department for Net Price.

31. Nameplates

A. Additional Duplicate Nameplate

Frame:	449	5000	5800	6800	8000	9600
Adder:	60	60	60	60	60	60

- An additional Duplicate Nameplate for mounting on Customer equipment can be furnished when specified at time of order placement.
- These additional Nameplates cannot be supplied with CSA®† or UL®† Logos.

B. Additional Stamping On Main Nameplate

Frame:	449	5000	5800	6800	8000	9600
Adder:	100	100	100	100	100	100

- Make the above adder for limited Customer tagging information (20 characters max) stamped on the main motor nameplate, if specified at time of Motor order.

C. Phase Sequencing Plate

Frame:	449	5000	5800	6800	8000	9600
Adder:	115	115	115	115	115	115

- Direction Of Rotation must be specified at order entry.

D. Rotation Arrow Plate

Frame:	449	5000	5800	6800	8000	9600
Adder:	115	115	115	115	115	115

- Metal plate mounted on Motor with arrow showing Direction Of Rotation.
- Customer must specify required direction of rotation:
 - Counter Clockwise Facing Opposite Drive End
 - Counter Facing Opposite Drive End
 - Dual Rotation (Not Available On All Ratings)
- Supplied as standard (no charge) on Motors with Uni-Directional Fans.

E. Shipping Tag (#6 Paper Tag)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/C	N/C	N/C	N/C	N/C	N/C

- A #6 Paper Shipping Tag, with Customer tagging information, can be supplied at No Charge when specified at time of Motor order.

F. Special Features (I.D.) Nameplate

Frame:	449	5000	5800	6800	8000	9600
Adder:	115	115	115	115	115	115

- Special Identification Plates can be mounted on the Motor with limited Customer specified tagging information (100 characters max).

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

31. Nameplates *(continued)*

G. Starting Duty Nameplate

Frame:	449	5000	5800	6800	8000	9600
Adder:	115	115	115	115	115	115

- Starting Duty Plate listing number of allowable starts in succession and required "off" time between subsequent starts.
- Customer's Load Inertia is required at order entry.
- A Starting Duty Plate is required if the Number Of Starts is anything other than "NEMA®† Standard".

32. 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.

33. Paint

A. CORRO-DUTY® Paint Job

Frame:	449	5000	5800	6800	8000	9600
Adder:	2%	2%	2%	2%	2%	2%

- Adder is percent of Base List Price.
- The Motor will be painted with Nidec Motor Corporation's standard CORRO-DUTY® Paint (unless Special Paint is specified) including:
 - > On Open Motors: Exterior Of Motor, Interior un-machined surfaces of brackets, bracket grills (if any), exterior un-machined surfaces of bearing caps (if any) and air deflectors (if any).
 - > On Enclosed Motors: Exterior Of Motor, Exterior un-machined surfaces of Short End Bracket, Interior un-machined 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 (CORRO-DUTY® Paint Job is standard on CORRO-DUTY® Motors).

B. Special Paint

Frame:	449	5000	5800	6800	8000	9600
Adder:	1000	1000	2000	3000	3000	3000

- Adder is percent of Base List Price. Adder is for 1 coat (2-4 mils). Please double adder for 2 coats.
- 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.
- For main and accessory conduit boxes to meet NEMA®† 4X requirements, please add \$1000 to the list price and note the NEMA®† 4X requirement at time of order placement. All conduit boxes will be painted internally and externally with an epoxy paint. Not available on UL®† Listed Hazardous Location Motors.

34. Power Factor Correction Capacitors

- 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.

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



Modifiable TITAN® Horizontal Motors Accessories and Modifications

34. Power Factor Correction Capacitors *(continued)*

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

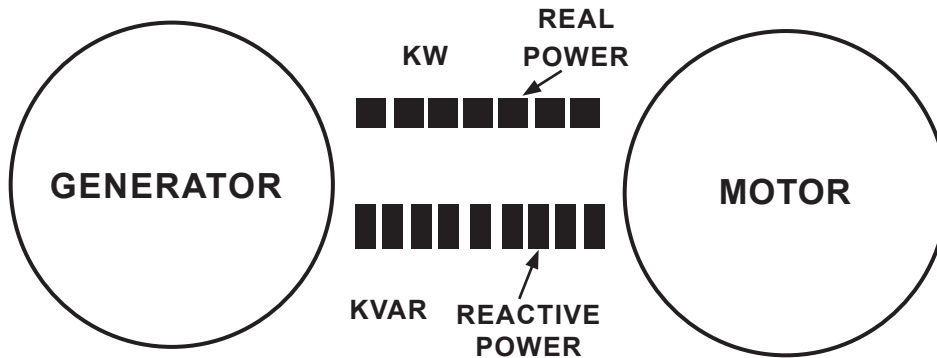
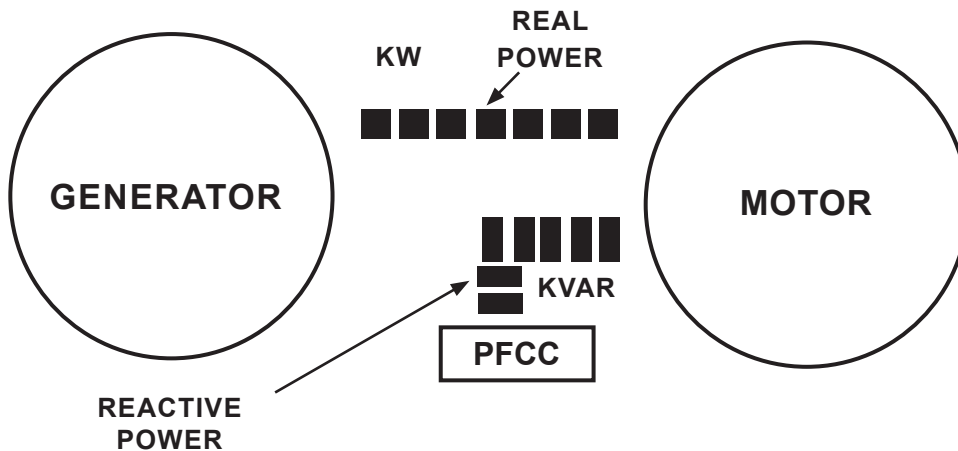


Illustration of an SCIM under partially loaded conditions without Power Factor Correction Capacitors (PFCC).

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.

Modifiable TITAN® Horizontal Motors Accessories and Modifications

34. Power Factor Correction Capacitors *(continued)*

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 250 HP, 900 RPM, 460 volts with 83.1% full-load power factor TEFC energy efficient type J with 298 full load amps

$$\text{Actual Power} = \frac{460 \times 298 \times 0.831 \times 1.732}{1000}$$

Actual Power = 197.30 KW

- Obtain from table 32-1 the KW multiplier at the intersection of 83% original PF and 92% desired PF multiplier = 0.246.
KVAR = 197.30 x 0.246 = 48.5
- Performance data indicates 63.6 KVAR is maximum, 48.5 is needed, correction to 92% is possible.
- From the 480 volt PFCC chart on page M-41 closest rating to 27.4 required KVAR but not exceeding 63.6 maximum KVAR is 50. Select catalog no. GMP20500F33 with \$2,479 list price, DS-3PC, to correct full-load power factor to 92%.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

34. Power Factor Correction Capacitors *(continued)*

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	0.474	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	0.503	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

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

35. 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
BLC	BEARING LIFE CALCULATION	\$150
C/P	CERTIFIED PRINT	N/C
C/P/A	CURRENT PULSATION ANALYSIS	\$200
D/S •	CUSTOMER DATA SHEET FILLED OUT BY USEM •	\$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 dBA AT THREE FEET	\$30
MED	MASS ELASTIC DATA	\$170
N/P	NAMEPLATE DATA	N/C
P/AA	ACCELERATION TIME VS. AMPS CURVE (REQUIRES CUSTOMER'S LOAD W_k^2 AND LOAD SPEED TORQUE CURVE)	\$170
P/C	PERFORMANCE CURVE (SLIP OR RPM, AMPS, EFF., PF, kW VS. HORSEPOWER	\$170
P/D	PERFORMANCE DATA (SAME AS ABOVE EXCEPT IN DATA FORMAT)	N/C
P/E	EQUIVALENT CIRCUIT PARAMETERS AT FULL LOAD, 3/4, 1/2 AND LOCK	\$60
P/L	PARTS LIST (EXPLODED VIEW)	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
R/I	ROTOR INERTIA	N/C
S/P	RECOMMENDED SPARE PARTS (BEARINGS, SEALS) SEE P/L	N/C
S/S	SHAFT STIFFNESS	\$170
S/P	SHAFT PRINT	\$60
S/P	EXTERNAL WIRING (CONNECTION) DIAGRAM (INCLUDES ACCESSORY CONNECTIONS DIAGRAMS WHEN APPLICABLE)	N/C
UL	UL®† Certificate	\$1,000

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 Nidec Motor Corporation Technical Representative 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 Nidec Motor Corporation Technical Representative 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.
- UL®† Certificate - "Motor Certificate" is available for UL®†-listed motors only. This certificate from Underwriters Laboratories states that a specific product (mode / I.D.) conforms with specific UL standards. Add \$1,000 net each rating.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

36. Rotor, Standard And Optional Construction

- 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. Centrifugally cast end rings are fully brazed to each rotor bar. Rotor bars are swaged, preventing in-slot movement and tight bar construction. Heavy finger plates tightly hold the rotor core together, controlling internal stress and maintaining dimension stability under all loads.

A. Fabricated Copper Bar Motor

Frame:	449	5000	5800	6800	8000	9600
Adder:	15200	18240	20775	22300	25335	28368

- Optional rotor construction is not available on ODP 447/449 Frame and WPI 447/449 Frame.

B. Fabricated Aluminum Bar Rotor

Frame:	449	5000	5800	6800	8000	9600
Adder:	1375	2250	3685	STD	STD	STD

- Optional rotor construction is not available on ODP 447/449 Frame and WPI 447/449 Frame.

C. Rotor Corrosion Protection

Frame:	449	5000	5800	6800	8000	9600
Adder:	1750	1750	1750	1750	1750	1750

37. Screens

A. Standard Material

Frame:	449	5000	5800	6800	8000	9600
Adder:	741	925	1155	1620	N/C	N/C

B. Stainless Steel

Frame:	449	5000	5800	6800	8000	9600
Adder:	1185	1385	1620	2080	2600	2950

38. Seals

Shaft slingers or seals may be installed to prevent the ingress of dirt and liquid.
Shaft slingers and/or seals are not available on the opposite drive end of ODP, WPI & WPII motors.

A. Shaft Slinger (Price Each) (Ball Bearing & Roller Bearings Motors Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	235	235	235	235	235	235

- Usually made of rubber.

B. INPRO/SEAL®† Seals (Price Each) (Ball Bearing & Roller Bearings Motors Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1270	1270	1270	1850	1850	1850

- 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 into the bearing environment.
- Not available on Class II UL®† Listed Hazardous Location motors.

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

38. Seals (continued)

C. Taconite Service (Price Each) (Ball Bearing Motors Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1270	1270	1270	1850	1850	1850

- Taconite Service: Motors for dust atmospheres of taconite cement in mild concentrations. For heavy concentrations of dust, please contact your Nidec Motor Corporation Technical Representative.
- Not available on ODP Motors.
- Not available on Class II Hazardous Location motors.

D. IP55 Seal Drive End (Sleeve Bearing, DIN Style Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	1270	N/A	N/A	N/A	N/A

- Available on ODP/WPI/WPII 5000 Frame Only.

39. Service Factor (Overload)

Frame:	449	5000	5800	6800	8000	9600
Adder:	5%	5%	5%	5%	5%	5%

- Adder is a percentage of Base List Price.
- Certain options (i.e., 50 Hz) can derate standard offering to 1.0 S.F. Use this adder to restore the 1.15 S.F.
- 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 45 on page M-51 of this section. Frame and performance characteristics may change.
- Contact your Nidec Motor Corporation Technical Representative for 1.15 S.F. on motors in 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.

40. Shaft Extensions

A. Base Addition Adder

Frame:	449	5000	5800	6800	8000	9600
Adder:	700	1045	1350	2075	2605	2825

- This is the base adder to cover Engineering and Manufacturing cost of a non-standard shaft extension.
- 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 or Special Shaft Material, if those are the only modifications special about the shaft.
- Customer should apply a shaft drawing whenever possible.

B. Special Shaft Material, Stainless Steel, 303 or 304

Frame:	449	5000	5800	6800	8000	9600
Adder:	2015	2015	2015	2900	2900	2900

- This adder covers "303" or "304" Stainless Steel Shaft Material.
- Refer to your Nidec Motor Corporation Technical Representative for availability on 2 Pole Motors.

C. Special Shaft Material, Stainless Steel, 316 or 416

Frame:	449	5000	5800	6800	8000	9600
Adder:	4030	4030	4030	5800	5800	5800

- This adder covers "316" or "416" Stainless Steel Shaft Material.
- Refer to your Nidec Motor Corporation Technical Representative for availability on 2 Pole Motors.

D. Special Shaft Material, High Tensile Steel

Frame:	449	5000	5800	6800	8000	9600
Adder:	2885	2885	2885	4040	4040	4040

- This adder covers "4140" or "4340" High Tensile Steel Shaft Material.
- Note: "4340" may need to be substituted for "4140" due to higher tensile requirements.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

40. Shaft Extensions *(continued)*

E. Standard Double End Shaft Extension

Frame:	449	5000	5800	6800	8000	9600
Adder:	925	1155	1155	1385	1735	1735

- Adder includes Standard Double Shaft Extension.
- Customer is required to insulate one of the half couplings.
- If the Double End Extension is special in anyway, including having a C-Face, the "Special Extensions, Base Adder" must also be made.

F. Locknut On End Shaft

Frame:	449	5000	5800	6800	8000	9600
Adder:	235	235	235	235	235	235

- A Locknut can be supplied by Nidec Motor Corporation when an external thread on the shaft extension is requested.

G. Special Shaft Runout

Frame:	449	5000	5800	6800	8000	9600
Adder:	1735	1735	1735	1735	1735	1735

- Standard offering is 0.003 inches measured with rotor turning freely from the opposite end.
- Special Runout of 0.0015 inches available with the adder above.

H. Tapered Shaft

Frame:	449	5000	5800	6800	8000	9600
Adder:	835	855	1040	1180	1250	1455

- Customer must supply the length and pitch of the taper shaft at order entry. The pitch can be defined in multiple ways:
 - Degrees of taper per side, with gauge line location and size (preferred method).
 - "Rise over Run"
 - Length, with the starting and ending diameter.

I. Tapped Hole

Frame:	449	5000	5800	6800	8000	9600
Adder:	580	695	750	870	985	1100

- Customer must specify thread size & depth.

J. Threaded Shaft (External Thread)

Frame:	449	5000	5800	6800	8000	9600
Adder:	580	695	750	870	985	1100

- Customer must specify thread size & depth.

41. Space Heaters

A. Standard Silicone Strip Heaters

Frame:	449	5000	5800	6800	8000	9600
Adder:	1330	1330	1330	1330	1330	1330

Nidec Motor Corporation recommends low-watt, density-type space heaters be used to prevent condensation within the motor during idle periods. Space heaters are silicone rubber "strip-type" wrapped around and bonded to the end turns. Unlike cartridge-type heaters, these provide even heating with 50°C to 100°C temperature rise within the motor and exceptionally long life. Nidec Motor Corporation no longer offers cartridge-type heaters due to concern about life expectancy. Heater leads are brought out to the main conduit box on ratings, 600 volts and below. A single accessory box is included at no charge for motors rated above 600 volts.

- Standard space heaters are single phase, 50 or 60Hz and available in 115V, 230V, 380V & 460V volt ratings. Please specify detail at order entry.
- Heaters are included at no charge (when specified at order entry) on all WP11 enclosures.
- For Div. 1 Hazardous Location or Division 2 applications, double adder above.
- For half voltage space heater (rated 240V operated on 120V) on unclassified area motors, double adder above.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

41. Space Heaters *(continued)*

Space Heater watts will be:

FRAME	NOMINAL WATTAGE		
	ODP/WPI/WPII	TEFC / Div. 1 Hazardous Location	TEAAC/TEWAC
449	288	288	-
5000	288	288	288
5800	384	384	384
6800	480	480	480
8000	700	-	700
9600	900	-	900

B. Thermostatically Controlled Space Heater

Frame:	449	5000	5800	6800	8000	9600
Adder:	1160	1160	1160	1160	1160	1160

- This adder is in addition to the Space Heater Adder.
- A calibrated (preset) thermostatic control accessory is mounted in motor conduit box. Not available on UL® Listed Hazardous Location or Division 2 motors.

C. Pilot (Indicator) Light

Frame:	449	5000	5800	6800	8000	9600
Adder:	1310	1310	1310	1310	1310	1310

- This adder is in addition to the Space Heater Adder.
- For pilot light located on space heater conduit box to indicate space heater operation. Not available on UL® Listed Hazardous Location or Division 2 motors.

42. Starting Current, Lower Than Standard

When motors are required to have starting current reduced from standard (NEMA®† Code G) to NEMA®† code F, make price additions. Starting torque and breakdown torque may be reduced to less than NEMA®† Design B limits. Efficiency will also be negatively effected. Other requirements must be referred to your Nidec Motor Corporation Technical Representative. Include Wk² of driven equipment load to see if practical to manufacture.

A. 600-650% Of Full Load Current

Frame:	449	5000	5800	6800	8000	9600
Adder:	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%

- Adder is a percentage of Base List Price.
- The Starting Current varies with each rating based on NEMA®† KVA Code Letter and the exact electrical design that is used.
- This adder covers any Starting Current Limit (Inrush Limit) between 600-650% of full load current, 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.

B. 550-599% Of Full Load Current

Frame:	449	5000	5800	6800	8000	9600
Adder:	10%	10%	10%	10%	10%	10%

- Adder is a percentage of Base List Price.
- The Starting Current varies with each rating based on NEMA®† KVA Code Letter and the exact electrical design that is used.
- This adder covers any Starting Current Limit (Inrush Limit) between 550-599% of full load current, 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.

C. 450-549% Of Full Load Current

Frame:	449	5000	5800	6800	8000	9600
Adder:	15%	15%	15%	15%	15%	15%

- Adder is a percentage of Base List Price.
- The Starting Current varies with each rating based on NEMA®† KVA Code Letter and the exact electrical design that is used.
- This adder covers any Starting Current Limit (Inrush Limit) between 450-549% of full load current, 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.

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



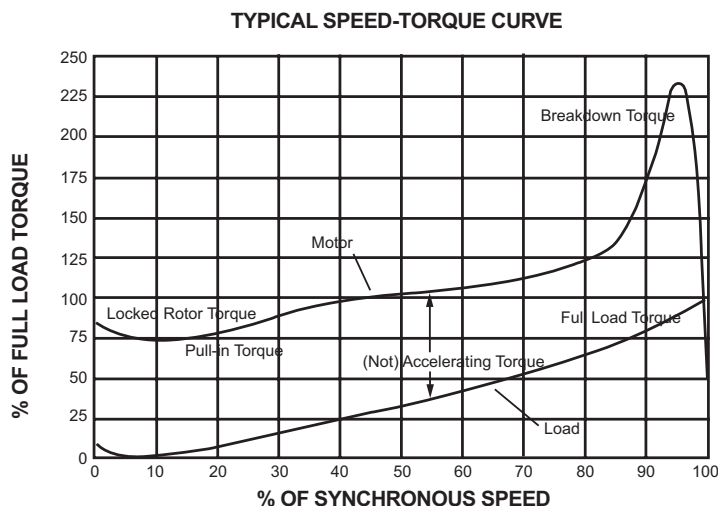
Modifiable TITAN® Horizontal Motors

Accessories and Modifications

43. 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 voltage to the motor during starting also reduces the starting torque and breakdown torque, which increases the time it takes the motor to accelerate.



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 pump 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.

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

43. 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					*IncludesTransformer magnetizing current
80% TAP	80	64	80	67 *	
65% TAP	65	42	65	45 *	
50% TAP	50	25	50	28 *	
PRIMARY RESISTOR AND PRIMARY REACTOR ARE SIMILAR TO AUTOTRANSFORMER METHOD					

A. Part Winding Start (PWS)

Frame:	449	5000	5800	6800	8000	9600
Adder:	580	925	1155	1385	1965	2310

- Maximum timed transition from part winding to full winding should never exceed 2 to 3 seconds.
- Do not attempt to accelerate load on part winding beyond 2 to 3 seconds (see note below).
- PWS motors can also be connected to the full voltage, across the line method.
- Use this adder (PWS) when double delta connection is specified.

Part winding start is only used to establish normal starting current in two steps rather than one. This allows the utilities automatic voltage regulators on the power distribution system time to adjust the voltage in order to compensate for the pull down due to the high initial current draw. Double Delta PWS uses all of the windings in series, then switches to two parallel delta for run mode. Starting connection produces insignificant starting torque.

SPECIAL NOTE:

When a motor is in the part winding start mode, the heating rate in the energized portion of the winding is 2.25 times the rate it is on full winding (full voltage). Two seconds on PWS is equivalent to 4.5 seconds on full winding, and the shaft may be barely turning if at all.

B. Wye Delta (Star-Delta) Starting

Frame:	449	5000	5800	6800	8000	9600
Adder:	1155	1385	1735	2080	2540	2885

- Wye-Delta start may also be used with the full voltage or DOL (Direct On-Line) methods

The Wye-Delta method, also known as Star-Delta, connects the motor winding to an external Wye configuration during starting, then quickly reconnects the winding to a Delta configuration for the run mode. This transition occurs internal to the starter. Open transition starters disconnect the motor momentarily; closed transition starters use resistors during this transition (Wye to Delta).



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

43. Starting Method *(continued)*

C. Reduced Voltage Starting

Standard motors are capable of accelerating Wk^2 loads per the published table as long as the motor terminal voltage does not drop below 80% for NEMA®† or 90% for TITAN® of the nominal motor voltage. For starting at lower than stated guidelines, make the following percentage additions:

Starting Voltage Percent	Price Addition
69%-65% TAP	12%
80%-70% TAP	7.5%

If the load inertia is 1/2 of the NEMA®† normal and load torque during acceleration does not exceed 60% of the motor rated torque, no price addition is required down to 75% voltage. Engineering verification of the motor capability is required prior to quotation. If the load inertia is greater than NEMA®†, both the inertia adder and the low voltage adder must be made.

NOTE: Motors designed for low-voltage starting may have higher than the standard in-rush current at full voltage.

44. Surge Protection

- Available 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.

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.

Motor Voltage	Surge Capacitors and Lightning Arrestors
600V & Below	\$4,280
601-2400V	\$10,920
2401-4800V	\$14,160
4801-6900V	\$20,285

45. Temperature Rise, Standard And Optional

- This option may not be available on the maximum HP rating in a given frame size. Consult your Nidec Motor Corporation Technical Representative for availability.
- This option may change motor frame size and performance characteristics. Consult your Nidec Motor Corporation Technical Representative 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 your Nidec Motor Corporation Technical Representative 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 44-1 indicates the thermal capabilities of our standard insulation system, which is shown as the diagonal line slightly below Class H.



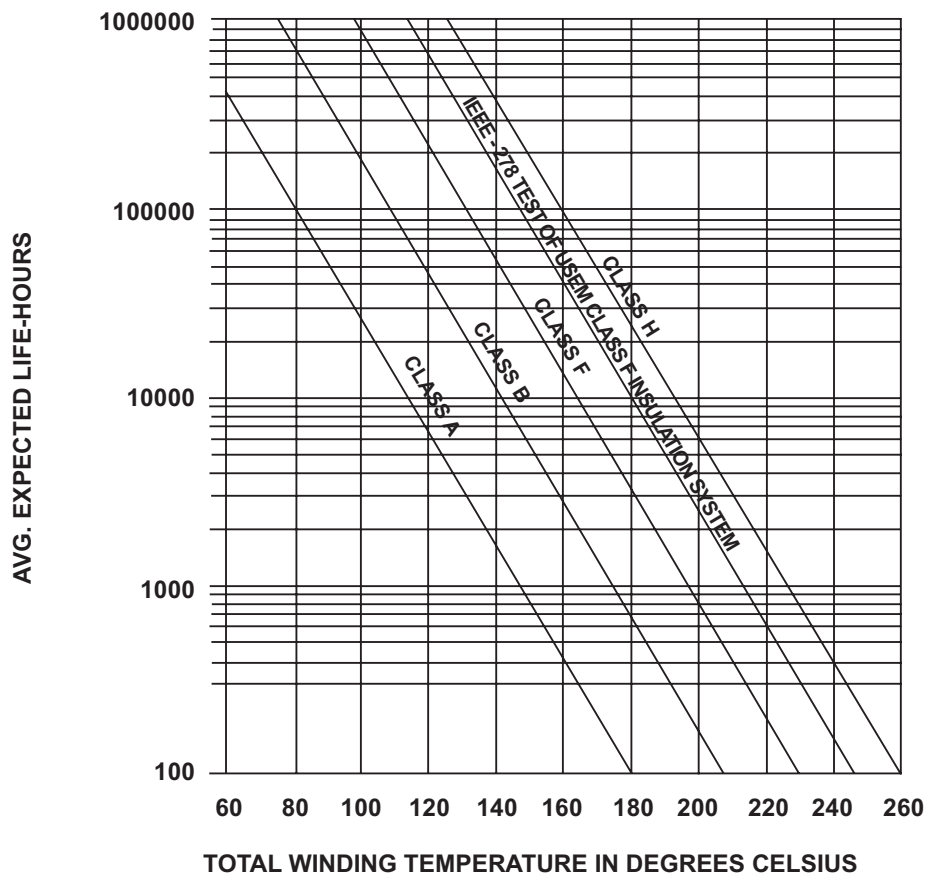
Modifiable TITAN® Horizontal Motors

Accessories and Modifications

45. Temperature Rise *(continued)*

CHART 45-1

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.

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® horizontal motors still in operation today.

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

45. Temperature Rise *(continued)*

INSULATION CLASS	A ⁽¹⁾	B	F	H
Ambient temperature (for options, see item 2 on page M-11)	40°C	40°C	40°C	40°C
Temperature rise at nameplate H.P. (for options, see item 45 on page M-29)	60°C	80°C	105°C	125°C ⁽²⁾
Hot spot or service factor allowance (for service factor, see item 39 on page M-29)	10°C	10°C	10°C	15°C
Thermal limit of insulation system ⁽³⁾	105°C	130°C	155°C	180°C
NOTES: ⁽¹⁾ Class A insulation is shown for reference only and is not commercially available from Nidec Motor Corporation. ⁽²⁾ 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. ⁽³⁾ 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.

A. Class "B" Rise at 1.0 S.F.

Frame:	449	5000	5800	6800	8000	9600
Adder:	STD	STD	STD	STD	STD	STD

- Class "B" Rise at 1.0 Service Factor (Full Load) is considered the Standard Temperature Rise.

B. Class "B" Rise at 1.15 S.F.

Frame:	449	5000	5800	6800	8000	9600
Adder:	12%	12%	12%	12%	12%	12%

- Adder is percent of Base List Price.
- Make this adder for Class "B" Rise at 1.15 Make this adder for Class "B" Rise at 1.15 service factor. This includes the following options based on a 40°C ambient:
 - "B" Rise at 1.15 Service Factor (By Resistance Method)
 - "B" Rise at 1.15 Service Factor (By Embedded Detector)
 - 90°C Rise at 1.15 Service Factor (By Resistance Method)
- CAUTION: Temperature Rise Below Normal may require a larger frame size. Confirm frame size prior to quoting.

C. Class "A" Rise at 1.0 S.F.

Frame:	449	5000	5800	6800	8000	9600
Adder:	25%	25%	25%	25%	25%	25%

- Adder is percent of Base List Price.
- Make this adder for Class "A" Rise at 1.0 service factor. This includes the following options based on a 40°C ambient:
 - "A" Rise at 1.0 Service Factor (By Resistance Method)
 - 60°C Rise at 1.0 Service Factor (By Resistance Method)
- CAUTION: Temperature Rise Below Normal may require a larger frame size. Confirm frame size prior to quoting.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

46. Tests (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.)
- Calibrated Test -- Same as complete initial but curves are provided to customer.
- 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.
- Sound Test Witnessed -- A sound test, as described above, performed in the presence of a witness.
- Vibration and Special Testing -- Refer to the Nidec Motor Corporation Technical Representative for details and capabilities.
- Polarization Index -- In accordance with IEEE Standard 43™. Dielectric absorption ratio.
- Spray test -- Form wound stator with EVERSEAL®† Insulation System.
- Immersion Test -- Form wound stator with EVERSEAL®† Insulation System.
- Inverter with motor -- Refer to the Inquiry Group for engineering and plant approval.

Description Tests (List Pricing Per Motor):	449	5000	5800	6800	8000	9600
Short Commercial Test, Un-Witnessed	\$145	\$145	\$145	\$145	\$145	\$145
Short Commercial Test, Witnessed	\$450	\$450	\$675	\$900	\$900	\$900
Complete Initial Test, Un-Witnessed (8)	\$5,575	\$5,575	\$5,575	\$7,800	\$7,800	\$7,800
Complete Initial Test, Witnessed (8)	\$11,250	\$11,250	\$11,250	\$15,600	\$15,600	\$15,600
Calibration Test, Un-Witnessed (8)	\$6,740	\$6,740	\$12,935	\$14,905	\$14,905	\$15,655
Calibration Test, Witnessed (8)	\$10,045	\$10,045	\$18,855	\$22,550	\$22,550	\$22,550
Sound Test, Un-Witnessed (8)	\$1,355	\$1,355	\$2,225	\$2,465	\$2,465	\$2,960
Sound Test, Witnessed (8)	\$2,035	\$2,035	\$3,698	\$3,698	\$3,698	\$4,605
Vibration Test, Un-Witnessed	\$2,075	\$2,075	\$2,075	\$2,075	\$2,305	\$2,305
Vibration Test, Witnessed	\$3,455	\$3,455	\$3,455	\$3,455	\$4,605	\$4,605
Polarization Test, Un-Witnessed	\$1,355	\$1,355	\$1,355	\$1,355	\$1,355	\$1,355
Polarization Test, Witnessed	\$2,035	\$2,035	\$2,035	\$2,035	\$2,035	\$2,035
Spray Test, Un-Witnessed *	\$4,545	\$4,545	\$5,848	\$7,525	\$7,525	\$7,525
Spray Test, Witnessed *	\$6,818	\$6,818	\$8,772	\$11,288	\$11,288	\$11,288
Immersion Test, Un-Witnessed *	\$6,623	\$6,623	\$6,623	\$6,623	\$6,623	\$6,623
Immersion Test, Witnessed *	\$9,935	\$9,935	\$9,935	\$9,935	\$9,935	\$9,935

• NOTE: (8) Multiply net test charge by 1.50 multi-speed motors tested at both speeds.

* Form wound motors with EVERSEAL®† Insulation System only.



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

47. 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 ²	YES ²	YES
SHUT DOWN	YES ^a	YES ^a	NO	YES ^a	YES ^b	YES ^b	YES ^a
AUTO RESET	YES	YES	NO	YES	NO	NO	NO
TEMPERATURE INDICATING	NO	YES	YES	NO	YES ^b	YES ^b	NO
RANDOM WOUND	-	-	-	YES	YES ^c	YES	YES
FORM WOUND	-	-	-	YES	YES	YES	LIMITED EFFECTIVENESS
OPERATE AUXILIARY EQUIPMENT	YES	YES	YES	YES	YES ^b	YES ^b	YES ^b
TYPE OF PROTECTION	I	I	I	B-G	A-H	A-H	A-H

• NOTE: Brand reference - typical factory choice as follows:

- 1 - BARKSDALE™ MT1H or equal
(Applicable to oil lubricated bearings only)
- 2 - UNITED ELECTRIC CONTROLS™ Series 800 or equal
(Applicable to oil lubricated bearings only)
- 3 - ROCHESTER™ gauges - 3 inches stainless-steel dial or equal
(Applicable to oil lubricated bearings only)
- 4 - TEXAS INSTRUMENTS™ or equal
- 5 - MINCO™, The RTD Co.™ or equal
- 6 - MINCO™, The RTD Co.™ or equal
- 7 - USEM THERMA SENTRY®

QUALIFICATION FOOTNOTES:

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

• 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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

47. Thermal Protection *(continued)*

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 TITAN® motors.

A. Arrange-To-Accommodate BTDs (Not Available On UL®† Listed Hazardous Location Motors)

Frame:	449	5000	5800	6800	8000	9600
Adder:	365	365	365	365	365	365

- Adder is per bearing.
- Arrange Motor to accommodate Customer supplied & jobsite installed Bearing Temperature Detectors.
 - ATA Arrange-To-Accommodate BTDs (Must specify details at order entry)

B. Bearing RTDs, 10 Ohm (Copper) or 120 Ohm (Nickel)

Frame:	449	5000	5800	6800	8000	9600
Adder:	895	895	895	895	895	895

- Adder is per bearing.
- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a know temperature-resistance characteristic.
 - RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.
- Standard bearing temperature detector condulets are cast iron. For Stainless Steel RTD Condulets, please add additional \$1500 per bearing.

C. Bearing RTDs, 100 Ohm (Platinum) TCR Rating of .00392

Frame:	449	5000	5800	6800	8000	9600
Adder:	1435	1435	1435	1435	1435	1435

- Adder is per bearing.
- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a know temperature-resistance characteristic.
 - RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.
- Standard bearing temperature detector condulets are cast iron. For Stainless Steel RTD Condulets, please add additional \$1500 per bearing.

D. Bearing RTDs, 100 Ohm Precision (Platinum) TCR Rating of .00385 (DIN)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1950	1950	1950	1950	1950	1950

- Adder is per bearing.
- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a know temperature-resistance characteristic.
 - RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.
- Standard bearing temperature detector condulets are cast iron. For Stainless Steel RTD Condulets, please add additional \$1500 per bearing.

E. Bearing RTDs, 10 Ohm Dual Element (Copper) or 120 Ohm Dual Element (Nickel)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1345	1345	1345	1345	1345	1345

- Adder is per bearing.
- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a know temperature-resistance characteristic.
 - RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.
- Standard bearing temperature detector condulets are cast iron. For Stainless Steel RTD Condulets, please add additional \$1500 per bearing.

F. Bearing RTDs, 100 Ohm Dual Element (Platinum) TCR Rating of .00392

Frame:	449	5000	5800	6800	8000	9600
Adder:	2155	2155	2155	2155	2155	2155

- Adder is per bearing.
- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a know temperature-resistance characteristic.
 - RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.
- Standard bearing temperature detector condulets are cast iron. For Stainless Steel RTD Condulets, please add additional \$1500 per bearing.

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



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

47. Thermal Protection *(continued)*

G. Bearing RTDs, 100 Ohm Dual Element Precision (Platinum) TCR Rating of .00385 (DIN)

Frame:	449	5000	5800	6800	8000	9600
Adder:	2920	2920	2920	2920	2920	2920

- Adder is per bearing.
- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a known temperature-resistance characteristic.
 - RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.
- Standard bearing temperature detector condulets are cast iron. For Stainless Steel RTD Condulets, please add additional \$1500 per bearing.

H. Bearing Thermocouples

Frame:	449	5000	5800	6800	8000	9600
Adder:	395	395	395	395	395	395

- Adder is per bearing. Not available on UL®† Listed Hazardous Location Motors.
- Thermocouple: A pair of dissimilar conductors so joined at one point that an electromotive force is developed by the thermoelectric effects.
 - Control monitor supplied by others, not Nidec Motor Corporation.
- The following options are available:
 - Copper-Constantan (Type T)
 - Iron-Constantan (Type J)
 - Chromel-Constantan (Type E)
 - Chromel-Alumel (Type K)
- Standard bearing temperature detector condulets are cast iron. For Stainless Steel RTD Condulets, please add additional \$1500 per bearing.

I. Bearing Temperature Relay (For Use With Oil Lubricated Bearings Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	520	520	520	520	520	520

- Adder is per bearing. Not available on UL®† Listed Hazardous Location Motors.
- Temperature Relay: Standard offering is BARKSDALE™ Model MT1H Bearing Temperature Switch (Standard Enclosure).

J. Bearing Temperature Indicator & Switch (For Use With Oil Lubricated Bearings Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1040	1040	1040	1040	1040	1040

- Adder is per bearing. Not available on UL®† Listed Hazardous Location Motors.
- Temperature Indicator & Switch: Standard offering is UE dial type with or without alarm contacts (Standard Enclosure).

K. Stem Type Thermometer (For Use With Oil Lubricated Bearings Only)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1040	1040	1040	1040	1040	1040

- Adder is per bearing. Not available on UL®† Listed Hazardous Location Motors.

Winding Thermal Protection

- For two winding multispeed motors, double list price adder shown below.

A. Winding Thermostats

Frame:	449	5000	5800	6800	8000	9600
Adder:	320	320	320	320	320	320

- All UL®† Listed Hazardous Location Motors must be supplied with Thermostats. On self-certified Division 2 motors, apply the Hermetically Sealed Thermostat Adder.
- 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.
 - Standard arrangement is Qty. 1 per phase. Double adder for Qty. 2 per phase.
- Normally Closed Thermostats are supplied as standard (no charge) on the following motors:
 - Inverter Duty Motors.
 - UL®† Listed Hazardous Location

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

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

47. Thermal Protection *(continued)*

B. Winding Thermostats, Hermetically Sealed

Frame:	449	5000	5800	6800	8000	9600
Adder:	640	640	640	640	640	640

- Hermetically sealed, 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.
- Standard arrangement is Qty. 1 per phase. Double adder for Qty. 2 per phase.

C. Winding Thermistors (Embedded in Winding)

Frame:	449	5000	5800	6800	8000	9600
Adder:	865	865	865	865	865	865

- 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.
- This accessory will not work without a control module. Our standard thermistors are SIEMENS®† type B59155. Three thermistors are installed in the winding with 6 leads brought to the main conduit box. With this adder, the control module is supplied by others, not Nidec Motor Corporation.
- 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® description).
- This accessory provides NEMA®† Type 2 (winding - running over temperature) protection.
- Thermistors are embedded in the winding end turns during manufacturing and cannot be easily added through conversion.

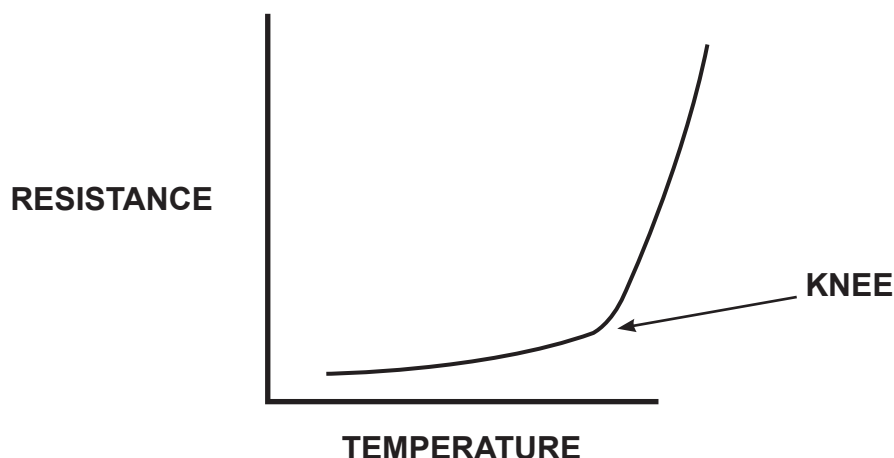
D. THERMA SENTRY® System (Separately Mounted / Separately Excited)

Frame:	449	5000	5800	6800	8000	9600
Adder:	1460	1460	1460	1460	1460	1460

- Refer to notes listed under thermistors above (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.



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

Modifiable TITAN® Horizontal Motors

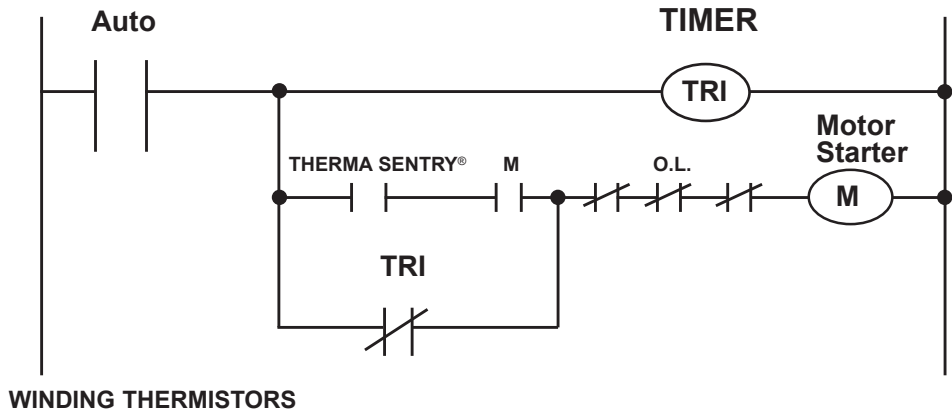
Accessories and Modifications

47. Thermal Protection *(continued)*

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 on this option is remote mounted in the customer's control panel.

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

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



E. THERMA SENTRY® System (Motor Mounted / Separately Excited)

Frame:	449	5000	5800	6800	8000	9600
Adder:	2425	2425	2425	2425	2425	2425

- Refer to notes listed under thermistors above (Note: THERMA SENTRY® includes control module).
- The THERMA SENTRY® control module on this option is motor mounted. Other winding accessory leads, with exception to stator RTD leads, can be directed to the THERMA SENTRY® accessory conduit box.
- Not Available on Hazardous Location Motors.

F. Winding Thermocouples

Frame:	449	5000	5800	6800	8000	9600
Adder:	2190	2190	2190	2190	2190	2190

- Thermocouple: A pair 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 thermo-electric potential (EMF) proportional to the temperature difference between the two points, indicating the temperature of the embedded thermocouple.
 - Control monitor supplied by others, not Nidec Motor Corporation.
- The following options are available:
 - Copper-Constantan (Type T)
 - Iron-Constantan (Type J)
 - Chromel-Constantan (Type E)
 - Chromel-Alumel (Type K)



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

47. Thermal Protection *(continued)*

Winding Resistance Temperature Detectors (RTDs)

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
Nickel (1)	2	120 Ohm @ 0°C
Copper	3	10 Ohm @ 25°C
Platinum	3	100 Ohm @ 0°C
Precision Platinum	3	100 Ohm @ 0°C

(1) Nidec Motor Corporation standard supply, if not specified at time of order entry.

G. Winding RTDs, 10 Ohm (Copper) or 120 Ohm (Nickel)

Frame:	449	5000	5800	6800	8000	9600
Adder:	2190	2190	2190	2190	2190	2190

- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a known temperature-resistance characteristic.
- RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.

H. Winding RTDs, 100 Ohm (Platinum) TCR Rating of .00392

Frame:	449	5000	5800	6800	8000	9600
Adder:	3288	3288	3288	3288	3288	3288

- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a known temperature-resistance characteristic.
- RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.

I. Winding RTDs, 100 Ohm Precision (Platinum) TCR Rating of .00385 (DIN)

Frame:	449	5000	5800	6800	8000	9600
Adder:	4460	4460	4460	4460	4460	4460

- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a known temperature-resistance characteristic.
- RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.

J. Winding RTDs, 10 Ohm Dual Element (Copper) or 120 Ohm Dual Element (Nickel)

Frame:	449	5000	5800	6800	8000	9600
Adder:	3225	3225	3225	3225	3225	3225

- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a known temperature-resistance characteristic.
- RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.

K. Winding RTDs, 100 Ohm Dual Element (Platinum) TCR Rating of .00392

Frame:	449	5000	5800	6800	8000	9600
Adder:	4935	4935	4935	4935	4935	4935

- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a known temperature-resistance characteristic.
- RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.

L. Winding RTDs, 100 Ohm Dual Element Precision (Platinum) TCR Rating of .00385 (DIN)

Frame:	449	5000	5800	6800	8000	9600
Adder:	6690	6690	6690	6690	6690	6690

- Resistance Temperature Detector (RTD): Precision, wire-wound resistors with a known temperature-resistance characteristic.
- RTD transmitters and monitor supplied by others, not Nidec Motor Corporation.

Modifiable TITAN® Horizontal Motors

Accessories and Modifications

48. Torque

Special Locked Rotor or Breakdown Torque

Frame:	449	5000	5800	6800	8000	9600
Adder:	15%	15%	15%	15%	15%	15%

- Adder is a percent of Base List Price.
- Make the High Torque Adder for higher than standard Locked Rotor Torque or Breakdown Torque, or for Design "C" characteristics (Design "C" characteristics are not available on all ratings. Confirm offering prior to quoting).
 - Refer to Appendix "C" for standard Locked Rotor & Breakdown Torque values.
 - Contact your Nidec Motor Corporation Technical Representative to confirm availability & Frame size.
- High Torque is included as standard (no charge) with Crusher Duty.

49. Vibration Detectors

(QP) Refer to Quick Pick Chart For Pricing

Frame:	449	5000	5800	6800	8000	9600
Adder:	(QP)	(QP)	(QP)	(QP)	(QP)	(QP)

- Nidec Motor Corporation offers a wide variety of 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.
- 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 RS366.
- Nidec Motor Corporation's standard vibration detector for Hazardous Location ratings is the METRIX™ Model M5550.
- Nidec Motor Corporation can also arrange to accommodate
- If the "Arrange-To-Accommodate" option is selected, the Manufacturer, Manufacturer's Part Number and Type must be specified at order entry.

50. Proximity Probes (Sleeve Bearing Motors Only)

A. Arrange-To-Accommodate Proximity Probes

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	1735	1735	2078	2078	2078

- When requesting "Arrange-To-Accommodate", Customer must specify the series and size. Provision will include a drilled and tapped hole (mounting studs are not included).
- If customer supplied proximity probes are calibrated for "4140" shaft material, please also apply the Shaft Material, High Tensile Steel Adder.

B. BENTLY-NEVADA® 3300 Series 8mm Proximity Probes

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	25135	25135	25135	25135	25135

- BENTLY-NEVADA® 3300 Series 8mm Proximity Probes are used for monitoring shaft position on a Sleeve Bearing Motor. Two probes are required per bearing. The price adder includes "4140" high tensile steel shaft, probes, proximeters, mounting studs and cables wired to a dedicated accessory conduit box.

C. BENTLY-NEVADA® 3300 Series 8mm Proximity Probes With Qty. 1 Keyphaser

Frame:	449	5000	5800	6800	8000	9600
Adder:	N/A	31955	31955	31955	31955	31955

- BENTLY-NEVADA® 3300 Series 8mm Proximity Probes are used for monitoring shaft position on a Sleeve Bearing Motor. Two probes are required per bearing. The price adder includes "4140" high tensile steel shaft, probes, proximeters, mounting studs and cables wired to a dedicated accessory conduit box.
- Includes Qty. 1 Keyphaser



Modifiable TITAN® Horizontal Motors

Accessories and Modifications

51. Voltage, Standard And Special

Frame:	449	5000	5800	6800	8000	9600
Adder:	5%	5%	5%	5%	5%	5%

- Motors will operate successfully, but not necessarily in accordance with all NEMA®† MG1 performance standards, at voltages 10% above or below nameplate stamping at maintained frequency.
- The Voltage Adder should be made for voltages other than those listed below:

Hertz	Standard Voltages						
60 Hz	460	575	2300	2400	4000	4160	6600
50 Hz	380	400	415	3300	6000	6900	

- For Special Voltages, use the following Base List Prices:
 - Up To 600 Volt Use 460V Base List
 - 601 To 3299 Volt Use 2300V Base List
 - 3300 To 4999 Volt Use 4000V Base List
 - 5000 To 6900 Volt Use 6600V Base List
- Voltages above 6900V are not available.
- 2300/4000V motors are not available on ratings below 150 H.P.



Quick Engineering Facts

Decimal Metric

A. Decimal and Metric Equivalents

Fraction	(Inch)	Decimal (Inch)	mm	Fraction	(Inch)	Decimal (Inch)	mm
1/32	1/64	0.01562	0.397	17/32	33/64	0.51562	13.097
		0.03125	0.794			0.53125	13.494
	3/64	0.04688	1.191		35/64	0.54688	13.891
1/16	5/64	0.06250	1.588	9/16	37/64	0.56250	14.288
		0.07812	1.984			0.57812	14.684
		0.09375	2.381			0.59375	15.081
1/8	7/64	0.10938	2.778	5/8	39/64	0.60938	15.478
		0.12500	3.175			0.62500	15.875
	9/64	0.14062	3.572		41/64	0.64062	16.272
5/32	11/64	0.15625	3.969	21/32	43/64	0.65625	16.669
		0.17188	4.366			0.67188	17.066
		0.18750	4.763			0.68750	17.463
7/32	13/64	0.20312	5.159	23/32	45/64	0.70312	17.859
		0.21875	5.556			0.71875	18.256
	15/64	0.23438	5.953		47/64	0.73438	18.653
1/4	17/64	0.25000	6.350	3/4	49/64	0.75000	19.050
		0.26562	6.747			0.76562	19.447
		0.28125	7.144			0.78125	19.844
5/16	19/64	0.29688	7.541	13/16	51/64	0.79688	20.241
		0.31250	7.938			0.81250	20.638
	21/64	0.32812	8.334		53/64	0.82812	21.034
11/32	23/64	0.34375	8.731	27/32	55/64	0.84375	21.431
		0.35938	9.128			0.85938	21.828
		0.37500	9.525			0.87500	22.225
13/32	25/64	0.39062	9.922	29/32	57/64	0.89062	22.622
		0.40625	10.319			0.90625	23.019
	27/64	0.42188	10.716		59/64	0.92188	23.416
7/16	29/64	0.43750	11.113	15/16	61/64	0.93750	23.813
		0.45312	11.509			0.95312	24.209
		0.46875	11.906			0.96875	24.606
1/2	31/64	0.48438	12.303	1/1	63/64	0.98438	25.003
		0.50000	12.303			1.00000	25.400



Quick Engineering Facts

Design Letter

B. Design Letter

The design letter that is assigned to a polyphase motor is defined by NEMA[†] in Section MG1-16-1. The letter is a function of torques and locked amps exhibited by the motor. NEMA[†] does not define values for every rating. If a rating is not contained within the NEMA[†] "envelopes" shown below, it cannot have a design letter on the nameplate. Voltage is not a factor, only HP and speed. Note that multispeed have no design letter.

60 Hz							
HP	SYNCHRONOUS SPEED, RPM						
	3600	1800	1200	900	720	600	514
1/2	-	-	-				
3/4	-	-					
1	-						
1-1/2							
2							
3							
5							
7-1/2							
10-125, INCLUSIVE							
150							-
200						-	-
250					-	-	-
300-350				-	-	-	-
400-500, INCLUSIVE			-	-	-	-	-

50 Hz				
HP	SYNCHRONOUS SPEED, RPM			
	3600	1500	1000	750
1/2	-	-	-	
3/4	-	-		
1	-			
1-1/2				
2				
3				
5				
7-1/2				
10-125, INCLUSIVE				
150				
200				

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



Quick Engineering Facts Supplemental Information





















C. Formulas

kW = HP x .746	
Torque in lb-ft	$\frac{\text{HP} \times 5250}{\text{RPM}}$
Motor synchronous speed in RPM	$\frac{120 \times \text{Hz}}{\text{number of poles}}$
Three-phase full-load amp	$\frac{\text{HP} \times .746}{1.73 \times \text{kV} \times \text{efficiency} \times \text{power factor}}$
Rated motor kVA	$\frac{\text{HP} (.746)}{\text{efficiency} \times \text{power factor}}$
kW loss	$\frac{\text{HP} (.746) (1.0 \text{ efficiency})}{\text{efficiency}}$
Wk ² referred to motor shaft speed	$\left[\frac{\text{driven machine Wk}^2 (\text{driven machine rpm})^2}{\text{motor RPM}} \right] + \text{gear Wk}^2 \text{ at motor speed}$
Accelerating time	$\frac{.462 (\text{Wk}^2 \text{ of motor and load}) \text{ RPM}^2}{\text{motor rated kW} \times 106 \times \text{per unit effective accelerating torque}}$
kVA in-rush	percent in-rush x rated kVA
Approximate voltage drop (%)	$\frac{\text{motor kVA in-rush}}{\text{transformer kVA}} \times \text{transformer impedance (normally 5\% to 7\%)}$
Stored kinetic energy in kW-sec	$2.31 \times (\text{total Wk}^2) \times \text{RPM}^2 \times 10^7$
Inertia constant (H) in seconds	$\frac{\text{stored kinetic energy in kW-seconds}}{\text{HP} (.746)}$
Conversion factors:	CV = (metric HP) = 735.5 watts = 75 kg-m/sec Wk ² (lb-ft) = 5.93 x GD ² (kg-m ²)
Ventilating-air requirements:	100-125 cfm of 400C air at 1/2-in. water pressure for each kW of loss
Degrees C	$(\text{Degrees F} - 32) \times \frac{5}{9}$
Degrees F	$\left[(\text{Degrees C}) \times \frac{9}{5} \right] + 32$

Quick Engineering Facts

Index of Protection

D. Index of Protection

Protection Against Solid Objects			Protection Against Liquids			Mechanical Protection		
No.	Tests	Definition	No.	Tests	Definition	No.	Tests	Definition
0		No protection	0		No protection	0		No protection
1	 Ø50mm	Protected against solid objects over 50mm (e.g. accidental hand contact)	1		Protected against vertically dripping water (condensation)	1	 150g 15cm	Impact energy: 0.225J
2	 Ø12mm	Protected against solid objects over 12mm (e.g. finger)	2	 15°	Protected against water dripping up to 15° from the vertical	2	 250g 15cm	Impact energy: 0.375J
3	 Ø2.5mm	Protected against solid objects over 2.5mm (e.g. tools, wire)	3	 60°	Protected against rain falling at up to 60° from the vertical	3	 150g 20cm	Impact energy: 0.500J
4	 Ø1mm	Protected against solid objects over 1mm (e.g. thin wire)	4		Protected against water splashes from all directions	4		
5		Protected against dust (no deposits of harmful material) [†]	5		Protected against jets of water from all directions ²	5	 500g 40cm	Impact energy: 2J
6		Totally protected against dust. Does not involve rotating machines	6		Protected against jets of water comparable to heavy seas	6		
			7	 0.15m 1m	Protected against the effects of immersion to depths of between 0.15 and 1m	7	 1.5kg 40cm	Impact energy: 6J ³
			8	 ..m ..m	Protected against the effects of prolonged immersion at depth	8		
						9	 5kg 40cm	Impact energy: 20J

Atmospheric Protection Index. Weatherproof construction reduces the penetration of rain, snow and airborne particles to a value compatible with the correction running of the machine. Indicated when the letter W is inserted between IP and index numbers.

1. Motor protected against dust and accidental contact.

Test result: No dust enters in harmful quantities; no risk of direct contact with rotating parts.

2. Motor protected against jets of water from all directions from hoses at 3 m distance with a flow rate of 12.5 l/min at 0.3 bar.

Test result: No damage from water projected onto the machine while in operation.

3. Motor resistant to impacts of 6 joules (impact of a 1.5 kg hammer from a height of 0.4 meters).

Test result: Damage caused by impacts does not affect the running of motor.

The conditions and severity of the tests must be subject to a specific agreement between the manufacturer and the end user.

E. Long-term Storage for Motors with Grease and Oil-lubricated Bearings

NOTE: DO NOT WRAP OR COVER MOTOR WITH PLASTIC!

1. When to put a motor in storage

If a motor is not put into immediate service (one month or less), or if it is taken out of service for a prolonged period, special storage precautions should be taken to prevent environmental damage. The following schedule is recommended as a guide to determine storage needs.

- Out of service in storage less than one month -- no special precautions except that space heaters, if supplied, must be energized any time the motor is not running.
- Out of service or in storage for more than one month but less than six months -- store per items 2A, B, C, D, E, F2 and G, items 3A, B and C, and item 4.
- Out of service or in storage for six months or more -- all recommendations.

2. Storage Preparation

- Where possible, motors should be stored indoors in a clean, dry area.
- When indoor storage is not possible, the motors must be covered with a tarpaulin. This cover should extend to the ground; however, it should not tightly wrap the motor. This will allow the captive air space to breathe, minimizing formation of condensation. Care must also be taken to protect the motor from flooding or from harmful chemical vapors.
- Whether indoors or out, the area of storage should be free from ambient vibration. Excessive vibration can cause bearing damage. A unit which must be stored in areas with high ambient vibration, such as from heavy construction equipment or other sources, must have the shaft locked to prevent any movement.
- Precautions should be taken to prevent rodents, snakes, birds, or other small animals from nesting inside the motors. In areas where they are prevalent, precautions must be taken to prevent insects, such as mud dauber wasps, from gaining access to the interior of the motor.
- Inspect the rust preventative coating on all external machined surfaces, including shaft extensions. If necessary, recoat the surfaces with a rust preventative material, such as Rusto Veto No. 342 (manufactured by E.F. Houghton Co.) or an equivalent. The condition of the coating should be checked periodically and surfaces recoated as needed.
- Bearings:
 - 1) Grease-lubricated cavities must be completely filled with lubricant during storage. Remove the drain plug and fill cavity with grease until grease begins to purge from the drain opening. Refer to the section on "LUBRICATION" in the U.S. MOTORS® Installation/Maintenance Instruction and/or review motor's lubrication nameplate for correct lubricant.

CAUTION

Do not attempt to grease bearings with drain closed or when unit is in operation.

- 2) Oil-lubricated motors are shipped without oil and must be filled to the maximum capacity as indicated on the oil chamber sight gauge window immediately upon receipt. Fill reservoir to maximum level with a properly selected oil containing rust and corrosion inhibitors such as TEXACO®† Regal Marine #77, MOBIL™ Vaprotec Light, or an equivalent.

NOTE: Motor must not be moved with oil in reservoir. Drain oil before moving to prevent sloshing and possible damage, then refill when at new location.

- To prevent moisture accumulation, some form of heating must be utilized to prevent condensation. This heating should maintain the winding temperature at a minimum of 50°C above ambient. If space heaters are supplied, they should be energized. If none are available, single phase or "trickle" heating may be utilized by energizing one phase of the motor's winding with a low voltage. Request the required voltage and transformer capacity from Nidec Motor Corporation. A third option is to use an auxiliary heat source and keep the winding warm by either convection or blowing warm air into the motor.

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

E. Long-term Storage for Motors with Grease and Oil-lubricated Bearings *(continued)*

3. Periodic Maintenance

- Oil should be inspected monthly for evidence of moisture or oxidation. The oil must be replaced whenever contamination is noted or every twelve months, whichever occurs first.
- Grease lubricated bearings must be inspected once a month for moisture and oxidation by purging a small quantity of grease through the drain. If any contamination is present, the grease must be completely removed and replaced.
- All motors must have the shaft rotated once a month to insure the maintenance of a coating lubricant film on the bearing races and journals.
- Insulation History:
The only accurate way to evaluate the condition of the winding insulation is to maintain a history of the insulation readings. Over a period of months or years these readings will tend to indicate a trend. If a downward trend develops, or if the resistance drops too low, thoroughly clean and dry the windings, retreating if necessary, by an authorized electrical apparatus service shop.

The recommended insulation resistance tests are as follows:

Two tests are used to evaluate the condition of the winding insulation. The first of these is the one minute insulation resistance test (IR1) and the second is the polarization index test (PI), which can also be referred to as a dielectric absorption test. The results of either of these tests can be skewed by factors such as the winding temperature and its relation to the dew point temperature at the time the test was conducted. The PI test is less sensitive to these factors than the IR test, but its results can still be affected significantly. Due to these factors, the most reliable method for evaluating the condition of the winding insulation is to maintain a record of periodic measurements, accumulated over months or years of service, for one or both of these tests. It is important that these tests be conducted under similar conditions of winding temperature, dew point temperature, voltage magnitude and duration, and relative humidity. If a downward trend develops in the historical data for either test, or if the readings from both tests drop below a minimum acceptable value, have an authorized electrical apparatus service shop thoroughly clean and dry the winding and re-treat if necessary.

1. The recommended procedure for the IR1 test is as follows:

- (1) Disconnect all external accessories or equipment that have leads connected to the winding and connect them to a common ground. Connect all other accessories that are in contact with the winding to a common ground.

WARNING

Failure to have accessories grounded during this test can lead to the accumulation of a hazardous charge on the accessories.

- (2) Using a megohmmeter, apply DC voltage at the level noted below for 1 minute and take a reading of the insulation resistance between the motor leads and ground.

<u>Rated Motor Voltage</u>	<u>Recommended DC Test Voltage</u>
UP to 1000 (inclusive)	500 VDC
1001 to 2500 (inclusive)	500 to 1000 VDC
2501 to 5000 (inclusive)	500 to 2500 VDC
5001 and up	500 to 5000 VDC

WARNING

Follow appropriate safety procedures during and after high voltage testing. Refer to the instruction manual for the test equipment. Make sure the winding insulation is discharged before beginning the test. The winding insulation will retain a potentially dangerous charge after the DC voltage source is removed, so use proper procedures to discharge the winding insulation at the end of the test. Refer to IEEE-43™ Standard for additional safety information.

E. Long-term Storage for Motors with Grease and Oil-lubricated Bearings *(continued)*

(3) The reading should be corrected to a 40°C base temperature by utilizing the formula:

$$R_{40C} = K_T R_T$$

Where:

R_{40C} = insulation resistance (in megohms) corrected to 40°C

K_T = insulation resistance temperature coefficient at temperature T°C

R_T = measured insulation resistance (in megohms) at temperature T°C

The value of K_T can be approximated by using the formula:

$$K_T = (0.5)^{(40-T)/10}$$

Where:

T = the winding temperature in °C that the insulation resistance was measured at

The recommended procedure for the PI test is as follows:

- (1) Perform steps 1 and 2 from the IR1 test procedure. Heed the safety warnings given in the IR1 test procedure.
- (2) With DC voltage still being applied by the megohmmeter, taken an additional reading of insulation resistance between the motor leads and ground 10 minutes after the DC voltage was initially applied. To minimize measurement errors, the variation in winding temperature between the 1 minute and 10 minute readings should be kept to a minimum.
- (3) Obtain the polarization index by taking the ratio of the 10 minute resistance reading to the 1 minute resistance reading.

If historical data from previous IR1 and / or PI tests is available, then a comparison of the present test result to previous tests can be used to evaluate the condition of the insulation. To minimize error, all readings that are compared should be taken at test voltages, winding temperatures, dew point temperatures, and relative humidities that are similar as possible. If a downward trend in the readings develops over time, have an authorized electrical apparatus service shop thoroughly clean and dry the winding and, if necessary, retreat the winding. Then, repeat the test and re-check results before returning the motor service. If historical data from previous IR1 or PI tests is not available, then compare readings from the present test to the recommended minimum values listed below. If the readings from both tests fall below the minimum, have an authorized electrical apparatus service shop thoroughly clean and dry the winding and, if necessary, retreat the winding. Then, repeat the tests and re-check results before returning the motor to service.

The recommended minimum value for the 1 minute insulation resistance reading corrected to 40°C is:

<u>Rated Motor Voltage</u>	<u>Minimum Insulation Resistance</u>
Up to 999 (inclusive)	5 Megohms
1000 and up	100 Megohms

The recommended minimum value for the polarization index is 2.0. if the 1 minute insulation resistance reading corrected to 40°C is above 5000 megohms, however, the polarization index may not be meaningful. In such cases, the polarization index may be disregarded as a measure of insulation condition.

Refer any question to the Nidec Motor Corporation Product Service Department.

For more information, refer to the IEEE-43™ Standard.

Quick Engineering Facts

Storage and Temperature Classification

E. Long-term Storage for Motors with Grease and Oil-lubricated Bearings *(continued)*

4. Start-up Preparations After Storage

- Motor should be thoroughly inspected and cleaned to restore to an "As Shipped" condition.
- Motors which have been subjected to vibration must be disassembled and each bearing inspected for damage.
- Oil and/or grease must be completely changed using lubricants and methods recommended on the motor's lubrication plate, or in the section titled "LUBRICATION" in the Installation/Maintenance manual.
- The winding must be tested to obtain insulation resistance and dielectric absorption ratio as described in section III, item 3.
- If storage has exceeded one year, the Nidec Motor Corporation Quality Assurance Department must be contacted prior to equipment startup.

F. Temperature Classification of Insulation Systems

Insulation System		Temperature Classification	
(1) Class A	Class 105	105°C	221°F
(2) Class E*	Class 120	120°C	248°F
Class B	Class 130	130°C	266°F
Class F	Class 155	155°C	311°F
Class H	Class 180	180°C	356°F
(1) Class N	Class 200	200°C	392°F
(1) Class R	Class 200	220°C	428°F
(1) Class S	Class 240	240°C	464°F
(1) Class C	Class over -- 240	Over 240°C	Over 464°F

* Used in European equipment

(1) Not an available motor insulation system.

The temperature classification indicates the maximum (hot-spot) temperature at which the insulation system can be operated for normal expected service life.

TITAN® Horizontal Motors

Dimension Print Index

ODP / WPI

Type R	447 Frame (T, TS)	Anti-Friction Ball Bearing	.....	E-3
Type R	447 Frame (TC, TSC)	Anti-Friction Ball Bearing	C-Face	Contact Nidec Motor Corporation
Type R	447 Frame (TD, TSD)	Anti-Friction Ball Bearing	D-Flange	Contact Nidec Motor Corporation
Type R	449 Frame (T, TM, TS)	Anti-Friction Ball Bearing	.....	E-4
Type R	449 Frame (TC, TSC)	Anti-Friction Ball Bearing	C-Face	Contact Nidec Motor Corporation
Type R	449 Frame (TD, TSD)	Anti-Friction Ball Bearing	D-Flange	Contact Nidec Motor Corporation
Type R	5000 Frame (S, MS, SS, L)	Anti-Friction Ball Bearing	.....	E-5
Type R	5000 Frame (SSC, SC, MSC)	Anti-Friction Ball Bearing	C-Face	E-6
Type R	5000 Frame (SSD, SD, MSD)	Anti-Friction Ball Bearing	D-Flange	E-7
Type R	5800 Frame (S, M, L)	Anti-Friction Ball Bearing	.....	E-8
Type H	6800 Frame (Blank Extension)	Anti-Friction Ball Bearing	4 Pole & Slower	E-9
Type H	6800 Frame (S)	Anti-Friction Ball Bearing	4 Pole & Slower	E-10
Type H	6800 Frame (MS)	Anti-Friction Ball Bearing	4 Pole & Slower	E-11
Type R	8000-9600 Frame (S, SS)	Anti-Friction Ball Bearing	.....	E-12
Type RS	5000 Frame (S, SS)	Sleeve Bearing	.....	E-13
Type RS	5800 Frame (S)	Sleeve Bearing	2 Pole	E-14
Type RS	5800 Frame (S, M)	Sleeve Bearing	.....	E-15
Type HS	6800 Frame (S)	Sleeve Bearing	4 Pole & Slower	E-16
Type HS	6800 Frame (MS)	Sleeve Bearing	.....	E-17
Type RS	8000-9600 Frame (S, SS)	Sleeve Bearing	.....	E-18

WPII

Type R	5000 Frame (S, MS, SS, L)	Anti-Friction Ball Bearing	.....	E-19
Type R	5800 Frame (S, M, L)	Anti-Friction Ball Bearing	.....	E-20
Type H	6800 Frame (Blank Ext., S, MS)	Anti-Friction Ball Bearing	4 Pole & Slower	E-21
Type R	8000-9610 Frame (S)	Anti-Friction Ball Bearing	.....	E-22
Type RS	5000 Frame (S, SS)	Sleeve Bearing	.....	E-23
Type RS	5800 Frame (S, M)	Sleeve Bearing	.....	E-24
Type HS	6800 Frame (S, MS)	Sleeve Bearing	4 Pole & Slower	E-25
Type HS	8000-9610 Frame (S, SS)	Sleeve Bearing	.....	E-26

TEFC

Type J	449 Frame (T, TL, TM TS)	Anti-Friction Ball Bearing	.....	E-27
Type J	449 Frame (TC)	Anti-Friction Ball Bearing	C-Face.....	E-28
Type J	449 Frame (TSC)	Anti-Friction Ball Bearing	C-Face.....	E-29
Type J	449 Frame (TMC)	Anti-Friction Ball Bearing	C-Face.....	E-30
Type J	449 Frame (TD)	Anti-Friction Ball Bearing	D-Flange.....	E-31
Type J	449 Frame (TSD)	Anti-Friction Ball Bearing	D-Flange.....	E-32
Type J	449 Frame (TMD)	Anti-Friction Ball Bearing	D-Flange.....	E-33
Type J	5008/10/12 Frame (S, ML)	Anti-Friction Ball Bearing	.....	E-34
Type J	5008/10/12 Frame (SC, MLC)	Anti-Friction Ball Bearing	C-Face.....	E-35
Type J	5008/10/12 Frame (SD, MLD)	Anti-Friction Ball Bearing	D-Flange.....	E-36
Type J	5810/12 Frame (S, SS, ML)	Anti-Friction Ball Bearing	.....	E-37
Type J	6808/09/11 Frame (S)	Anti-Friction Ball Bearing	.....	E-38
Type J	450 Frame	Anti-Friction Ball Bearing	.....	E-39
Type J	7007/08/10 Frame	Anti-Friction Ball Bearing	.....	E-40
Type J & E	5807/9/11 Frame (S, SS, ML)	Anti-Friction Ball Bearing	.....	E-41
Type J	5807/9/11 Frame (SD)	Anti-Friction Ball Bearing	D-Flange.....	E-42
Type E	5008 Frame (S, SS)	Anti-Friction Ball Bearing	.....	E-43
Type JS	5008/10/12 Frame (S)	Sleeve Bearing	E-44
Type JS	5810/12 Frame (S, SS)	Sleeve Bearing	E-45
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Type JS	450 Frame	Sleeve Bearing	E-47
Type JS	7007/08/10 Frame	Sleeve Bearing	E-48

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



TITAN® Horizontal Motors

Dimension Print Index

TEAAC

Type JT	5800 Frame (S, M, L)	Anti-Friction Ball Bearing	.....	E-49
Type JT	8000 Frame (S)	Anti-Friction Ball Bearing	4 Pole & Slower	E-50
Type JTS	5800 Frame (S, M)	Sleeve Bearing	.....	E-51
Type JTS	8000 Frame (S)	Sleeve Bearing	E-52

TEFC Auto Duty

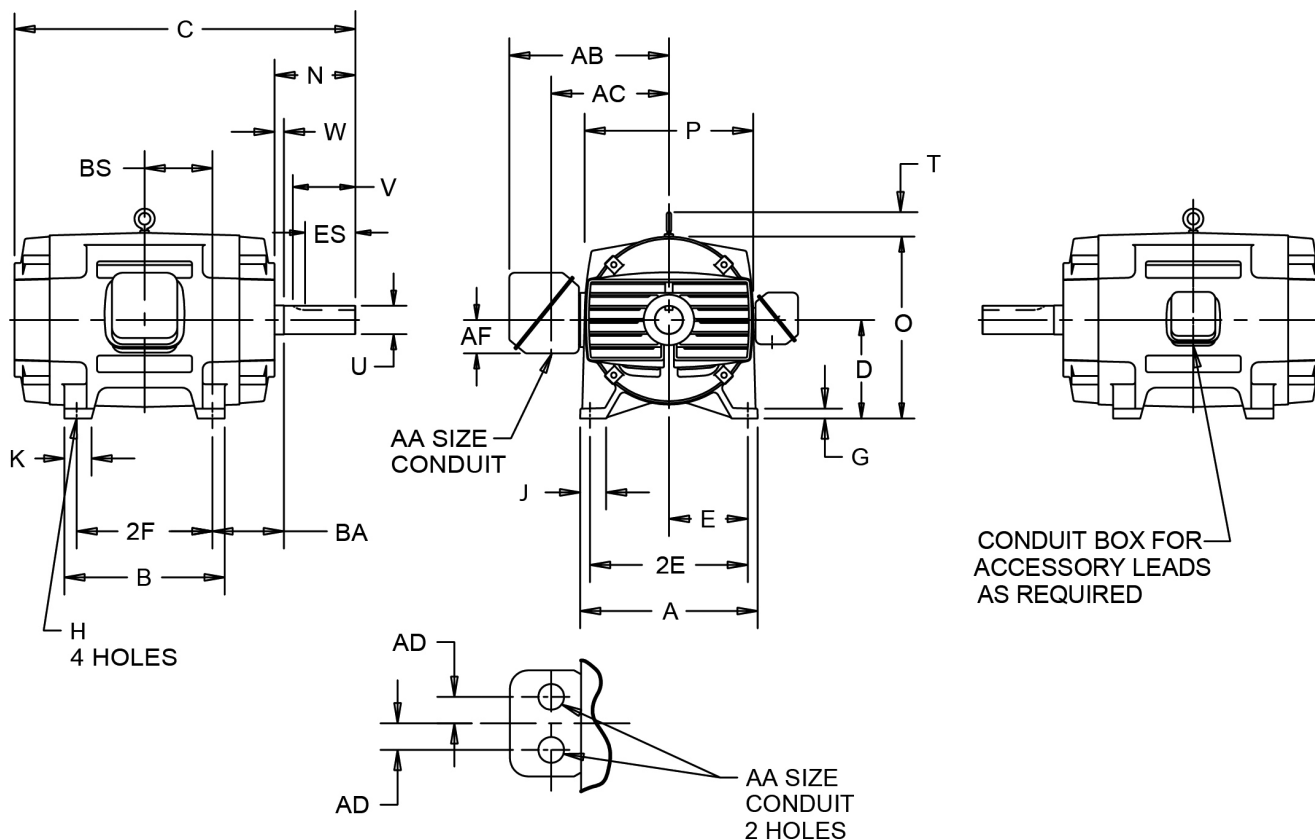
Type JAD & JDE	5000 Frame (S, SS, G)	Anti-Friction Bearing	E-53
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† All marks shown within this document are properties of their respective owners.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
FRAME: 447T, TS **TYPE R**

PRINT #07-1988



ALL DIMENSIONS ARE IN INCHES

A	D -.06	E	2E ±.03	G	H +.05	J	O	P ²	T	W	BA
22.00	11.00	9.00	18.00	1.38	.81	4.00	22.06	22.94	3.25	.25	7.50

FRAME	B	C	2F ±.03	K	N	U -.001	V MIN	BS	ES MIN	SQ KEY
447T	23.25	43.25	20.00	3.25	8.75	3.375	8.25	10.00	6.91	.875
447TS	23.25	39.50	20.00	3.25	5.00	2.375	4.50	10.00	3.03	.625

AA	AB	AC	AD	AF	DM
3 NPT	19.81	15.31	---	4.72	3/4 NPT
					1 NPT
					1 1/4 NPT
					1 1/2 NPT

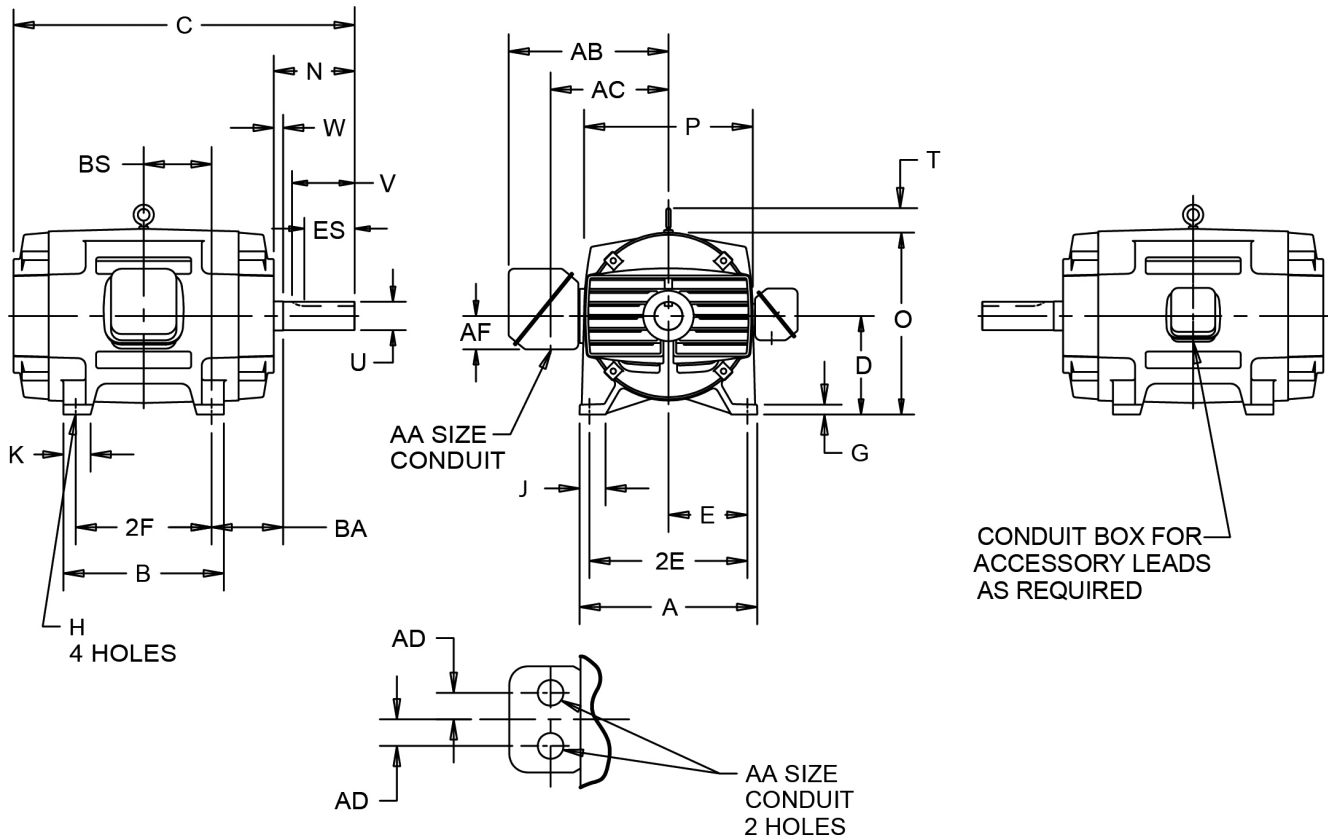
1: ALL ROUGH CASTING DIMENSIONS MAY VARY BY .25"
 DUE TO CASTING AND/OR FABRICATION VARIATIONS.
 2: LARGEST MOTOR WIDTH.

3: CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR.
 CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES
 REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT
 OPENING DOWN.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
FRAME: 449T, TM, TS **TYPE R**

PRINT #07-2009-52



ALL DIMENSIONS ARE IN INCHES

A	D -.06	E	2E ±.03	G	H +.05	J	O	P²	T	W	BA
22.00	11.00	9.00	18.00	1.38	.81	4.00	22.00	22.25	2.94	.25	7.50

FRAME	B	C	2F ±.03	K	N	U -.001	V MIN	BS	ES MIN	SQ KEY
449T	28.25	48.25	25.00	3.25	8.75	3.375	8.25	12.50	6.88	.875
449TM	28.25	44.50	25.00	3.25	5.00	2.875	4.50	12.50	3.50	.750
449TS	28.25	44.50	25.00	3.25	5.00	2.375	4.50	12.50	3.00	.625

AA
2 1/2 NPT
3 NPT
3 1/2 NPT
4 NPT

AB	AC	AD	AF
20.06	16.31	2.75	10.00

DM
3/4 NPT
1 NPT
1 1/4 NPT
1 1/2 NPT

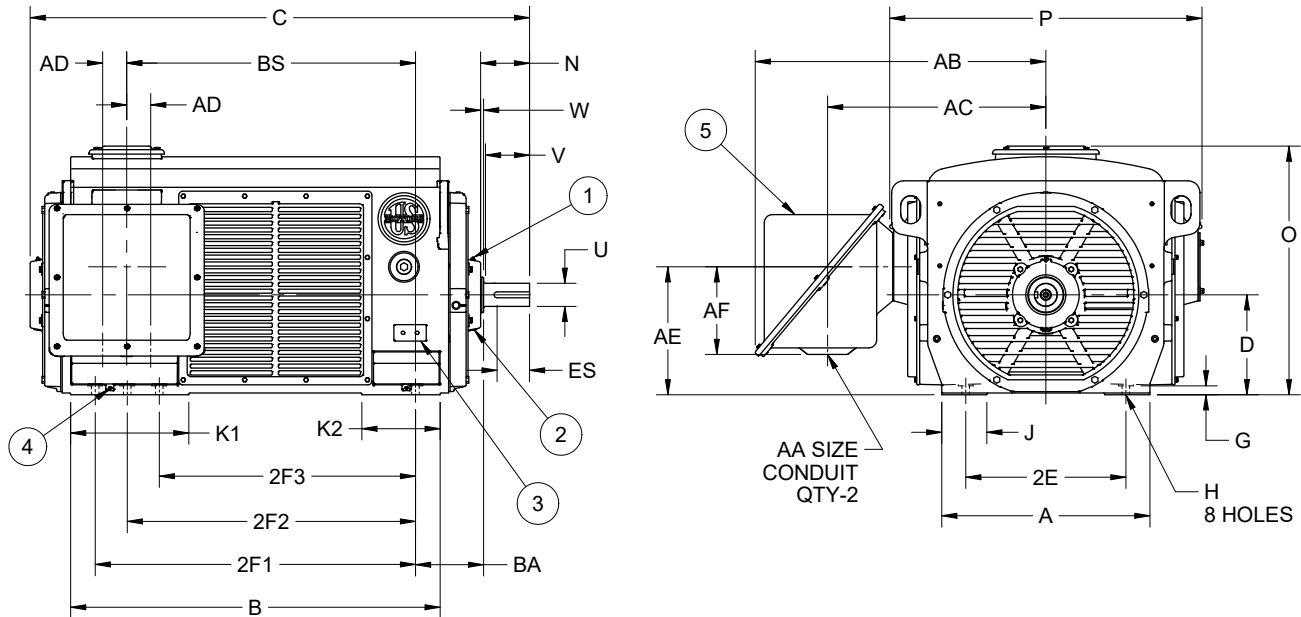
- 1: ALL ROUGH CASTING DIMENSIONS MAY VARY BY .25"
 DUE TO CASTING AND/OR FABRICATION VARIATIONS.
 2: LARGEST MOTOR WIDTH.

- 3: CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR.
 CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES
 REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT
 OPENING DOWN.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
ANTI-FRICTION BEARING
FRAME: 5000S, MS, SS, L **TYPE R**

PRINT #07-3224



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H +.05	J	K2	O
26.00	12.50	20.00	1.13	0.94	5.63	9.75	31.06

p²	T	AB	AC	AD	AE	AF	BA
39.00	.38	36.25	27.25	3.00	16.00	10.94	8.50

FRAME	N	U -.001	V MIN	ES MIN	SQ KEY
5000S	6.13	2.875	5.50	4.00	0.750
5000MS	7.13	3.375	6.50	5.00	0.875
5000SS	5.13	2.375	4.50	3.00	0.625
5000L	15.00	4.875	14.38	12.88	1.250

FRAME	B	C	2F1 .03	2F2 .03	2F3 .03	K1	BS
5008S	31.13	47.38	25.00	22.00	20.00	13.25	21.06
5008MS	31.13	48.38	25.00	22.00	20.00	13.25	21.06
5008SS	31.13	46.38	25.00	22.00	20.00	13.25	21.06
5008L	31.13	56.25	25.00	22.00	20.00	13.25	21.06
5010S	38.13	54.38	32.00	28.00	25.00	13.25	28.06
5010MS	38.13	55.38	32.00	28.00	25.00	13.25	28.06
5010SS	38.13	53.38	32.00	28.00	25.00	13.25	28.06
5010L	38.13	63.25	32.00	28.00	25.00	13.25	28.06
5012S	46.13	62.38	40.00	36.00	32.00	14.75	36.06
5012MS	46.13	63.38	40.00	36.00	32.00	14.75	36.06
5012SS	46.13	61.38	40.00	36.00	32.00	14.75	36.06
5012L	46.13	71.25	40.00	36.00	32.00	14.75	36.06

AA
3 NPT
3 1/2 NPT
4 NPT

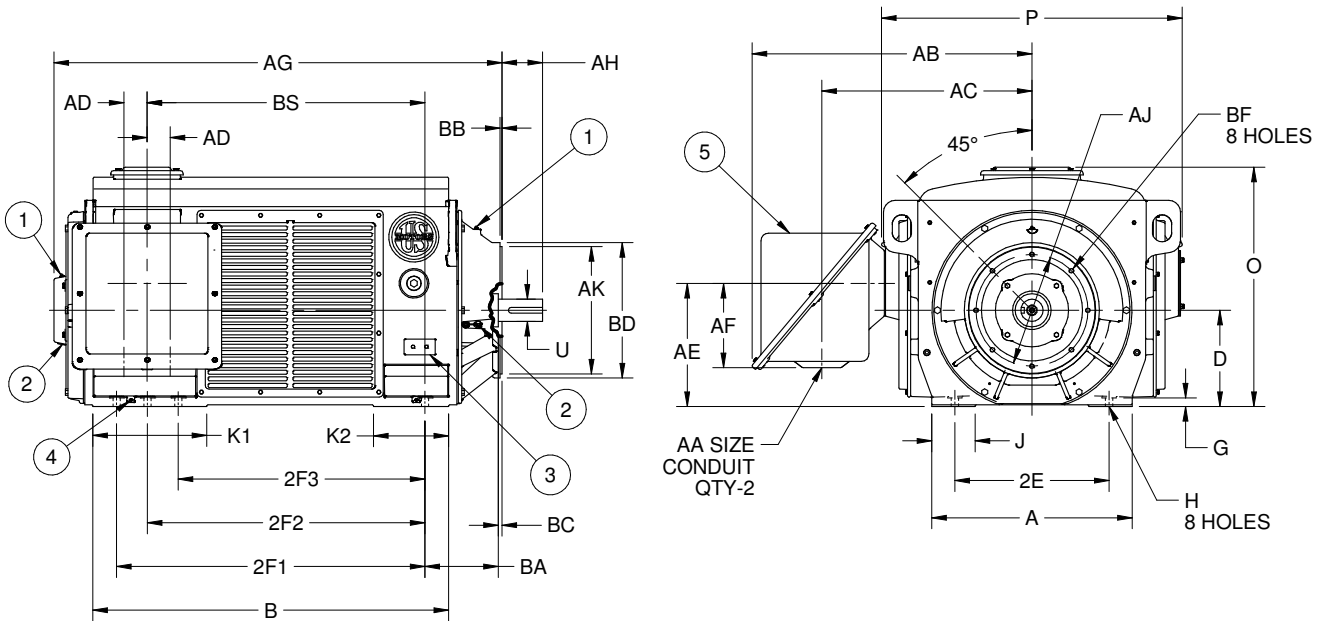
- 1: DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: LARGEST MOTOR WIDTH.
- 3: CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE ROTATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION STANDARD AS SHOWN WITH CONDUIT OPENINGS DOWN.

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



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
ANTI-FRICTION BEARING
FRAME: 5000SSC, SC, MSC **TYPE R**

PRINT #07-3228



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H +.05	J	K2	O	P ²	AB	AC
26.00	12.50	20.00	1.13	.94	5.63	9.75	31.06	39.00	36.25	27.25

AD	AE	AF	AJ	AK -.005	BA	BB MIN	BC	BD MAX	BF ⁴
3.00	16.00	10.94	14.500	16.500	9.50	.25	.50	18.00	5/8-11 x .94

FRAME	U -.001	AH	ES MIN	SQ KEY
5000SSC	2.375	4.25	3.00	.625
5000SC	2.875	5.25	4.00	.750
5000MSC	3.375	6.25	5.00	.875

FRAME	B	2F1 ±.03	2F2 ±.03	2F3 ±.03	K1	AG	BS	AA
5008	31.13	25.00	22.00	20.00	13.25	43.13	21.06	3 NPT
5010	38.13	32.00	28.00	25.00	13.25	50.13	28.06	3 1/2 NPT
5012	46.13	40.00	36.00	32.00	14.25	58.13	36.06	4 NPT

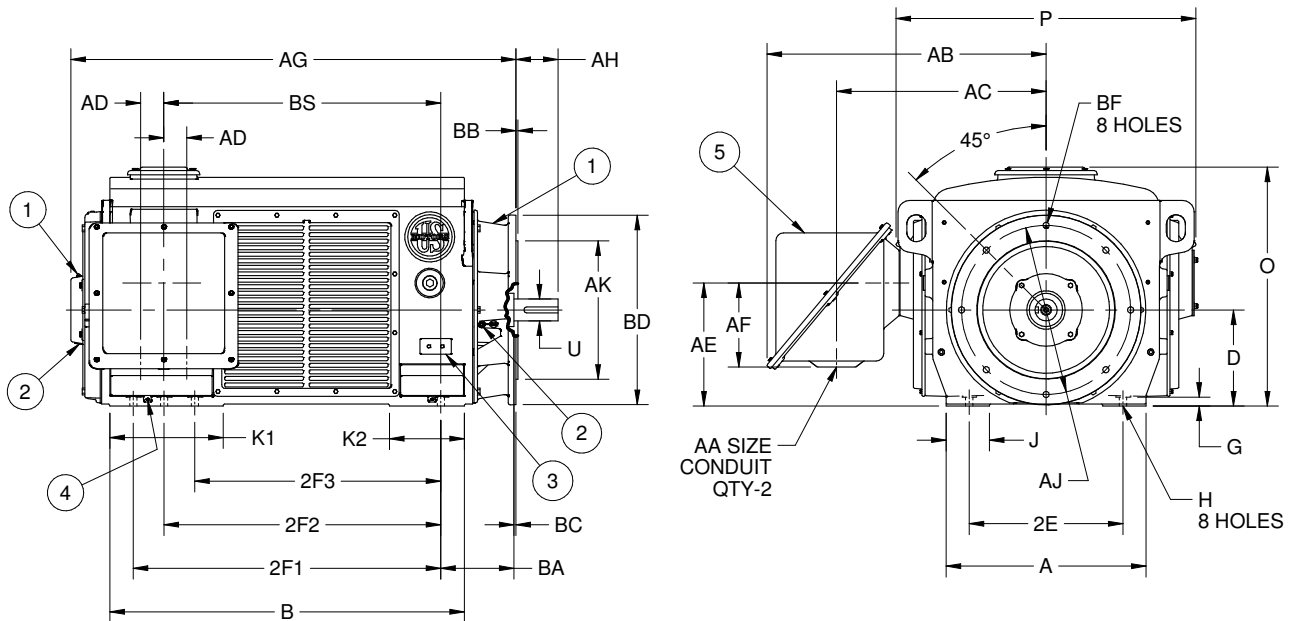
- DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- LARGEST MOTOR WIDTH.
- CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE ROTATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENINGS DOWN.
- TAP SIZE AND BOLT PENETRATION ALLOWANCE.
- ALL TAPPED HOLES ARE UNIFIED NATIONAL COARSE, RIGHT HAND THREAD.

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



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
ANTI-FRICTION BEARING
FRAME: 5000SSD, SD, MSD **TYPE R**

PRINT #07-3229



ALL DIMENSIONS ARE IN INCHES

FRAME	D -.06	2E ±.03	G	H +.05	J	K2	O	P ²	AB	AC
26.00	12.50	20.00	1.13	.94	5.63	9.75	31.06	39.00	36.25	27.25

AD	AE	AF	AJ	AK -.005	BA	BB MIN	BC	BD MAX	BF
3.00	16.00	10.94	22.000	18.000	9.50	.25	.25	25.00	.81

FRAME	U -.001	AH	ES MIN	SQ KEY
5000SSD	2.375	4.25	3.00	.625
5000SD	2.875	5.50	4.00	.750
5000MSD	3.375	6.50	5.00	.875

FRAME	B	2F1 ±.03	2F2 ±.03	2F3 ±.03	K1	AG	BS	AA
5008	31.13	25.00	22.00	20.00	13.25	42.88	21.06	3 NPT
5010	38.13	32.00	28.00	25.00	13.25	49.88	28.06	3 1/2 NPT
5012	46.13	40.00	36.00	32.00	14.75	57.88	36.06	4 NPT

1. DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE ROTATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENINGS DOWN.

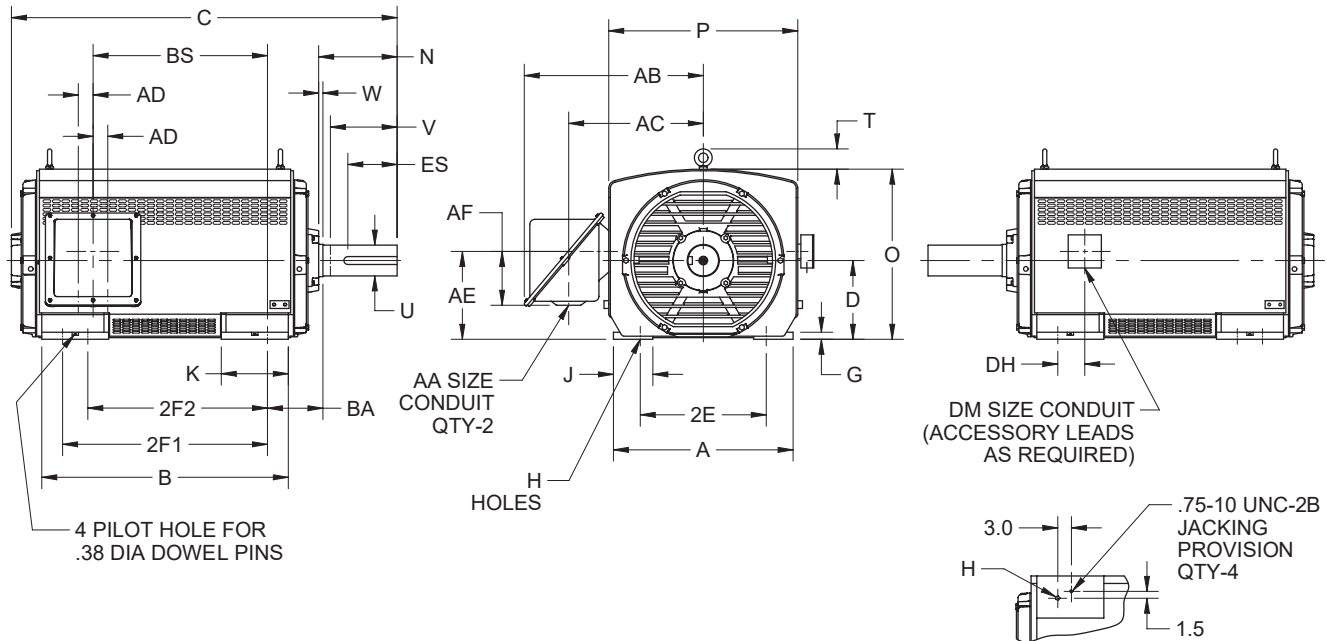
† All marks shown within this document are properties of their respective owners.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
ANTI-FRICTION BEARING
FRAME: 5800S, M, L

TYPE R

PRINT # 07-2314



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H +.05	J	K
36.50	14.50	23.00	1.25	1.09	9.25	10.88

O	P	T	W	AE	BA	DH
31.09	37.00	5.22	.38	15.94	10.00	5.69

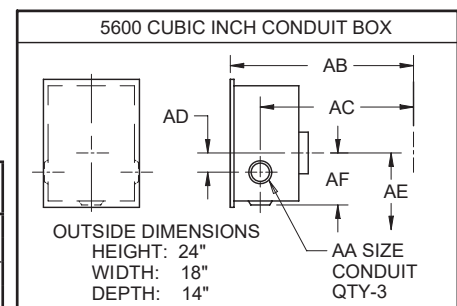
VOLTS	HP	C/BOX VOLUME (CU.IN.)	QTY AA	AB	AC	AD	AF
0-2400	ALL	6800	2	35.56	26.69	3.00	10.94
2401-4800	0-1000	5600	3	34.88	28.63	4.00	10.81
	1001 & UP						
4801-6900	ALL						

FRAME	N	U -.001	V MIN	ES MIN	SQ KEY
5800S	7.13	3.375	6.50	5.00	.875
5800M	8.63	4.125	8.00	5.50	1.000
5800L	14.88	4.875	14.25	12.88	1.250

FRAME	B	C	2F1 ±.03	2F2 ±.03	BS
5810S	43.13	62.75	36.00	32.00	29.31
5810M	43.13	64.25	36.00	32.00	29.31
5810L	43.13	70.50	36.00	32.00	29.31
5811S	47.13	66.75	40.00	36.00	33.31
5811M	47.13	68.25	40.00	36.00	33.31
5811L	47.13	74.50	40.00	36.00	33.31
5812S	52.13	71.75	45.00	40.00	38.31
5812M	52.13	73.25	45.00	40.00	38.31
5812L	52.13	79.50	45.00	40.00	38.31
5813S	57.13	76.75	50.00	45.00	43.31
5813M	57.13	78.25	50.00	45.00	43.31
5813L	57.13	84.50	50.00	45.00	43.31

AA
3 NPT
3 1/2 NPT
4 NPT

DM
3/4 NPT
1 NPT
1 1/4 NPT
1 1/2 NPT



- 1: DIMENSIONS MAY VARY +.25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 POSITION IS SUPPLIED WHEN SPECIFIED.
- 3: THE 5800S EXTENSION IS TYPICALLY FOR 2 POLE RATINGS.



HORIZONTAL TITAN® MOTORS

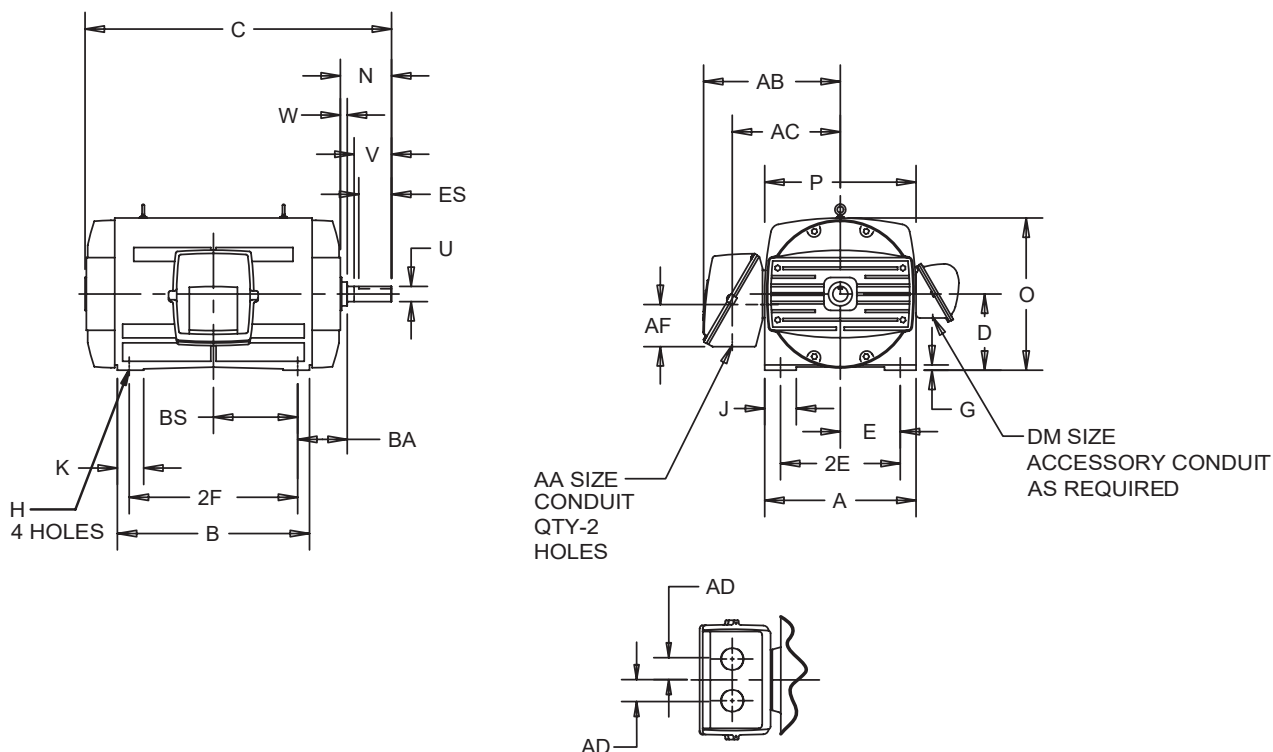
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I

ANTI-FRICTION BEARING

FRAME: 6800 (BLANK EXTENSION)

TYPE H, 4 POLE & SLOWER

PRINT # 07-2080



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	D ³ -.06	E	2E	H	N	O	P ²	U ³ -.001	V MIN
IN	17.00	13.50	27.00	1.38	15.88	34.13	34.25	5.125	15.13
MM	432	343	686	35	403	867	870	130.18	384

UNITS	W	AB	AC	AD	AF	BA	ES MIN	SQ KEY
IN	.50	34.25	27.13	3.00	10.94	11.50	13.38	1.250
MM	13	870	689	76	278	292	340	31.75

FRAME	UNITS	A	B	C	2F	G	J	K	BS
6809	IN	33.75	44.50	78.00	40.00	2.00	6.75	5.50	20.00
	MM	857	1130	1981	1016	51	171	140	508
6810	IN	31.00	48.63	83.00	45.00	1.63	5.00	4.00	22.50
	MM	787	1235	2108	1143	41	127	102	572
6811	IN	31.00	53.63	88.00	50.00	1.63	5.00	4.00	25.00
	MM	787	1362	2235	1270	41	127	102	635

AA	DM
3 NPT	3/4 NPT
3 1/2 NPT	1 NPT
4 NPT	1 1/2 NPT

1: ALL ROUGH CASTING DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2: LARGEST MOTOR WIDTH.

3: TOLERANCE UNITS ARE IN INCHES ONLY.

4: STANDARD ASSEMBLY POSITION F-1 IS SHOWN.

F-2 IS PROVIDED WHEN SPECIFIED ON ORDER. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

HORIZONTAL TITAN® MOTORS

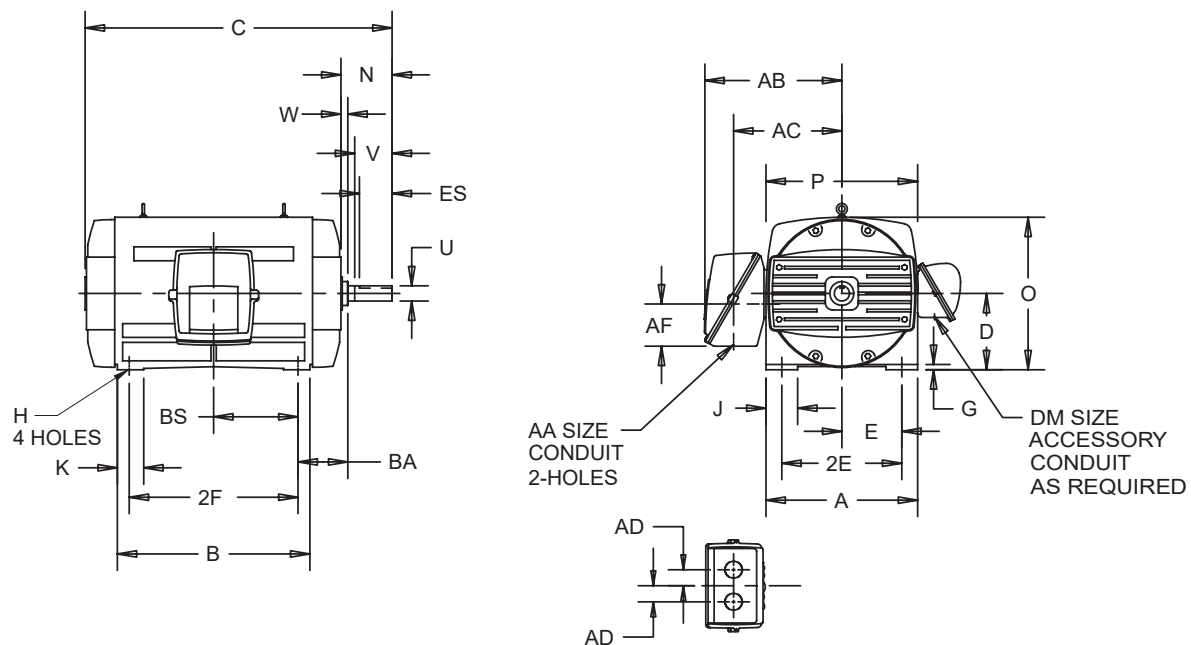
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I

ANTI-FRICTION BEARING

FRAME: 6800S

TYPE H, 4 POLE & SLOWER

PRINT # 07-2150



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	N	U ³ -.001	V MIN	W	ES MIN	SQ KEY
IN	8.25	3.875	7.25	.50	5.63	1.00
MM	210	98.43	184	13	143	25.40

UNITS	D ³ -.06	E	2E	H	O	P ²	AA	AB	AC	AD	AF	BA	DM
IN	17.00	13.50	27.00	1.38	34.13	34.25	3 1/2 NPT	34.25	27.13	3.00	10.94	11.50	1.00 NPT
MM	432	343	686	35	867	870		870	689	76	278	292	

FRAME	UNITS	B	C	2F	BS	A	G	J	K
6809S	IN	44.50	70.38	40.00	20.00	33.75	2.00	6.75	5.50
	MM	1130	1788	1016	508	857	51	171	140
6810S	IN	48.63	75.38	45.00	22.50	31.00	1.63	5.00	4.00
	MM	1235	1915	1143	572	787	41	127	102
6811S	IN	53.63	80.38	50.00	25.00	31.00	1.63	5.00	4.00
	MM	1362	2042	1270	635	787	41	127	102

1: ALL ROUGH CASTING DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2: LARGEST MOTOR WIDTH.

3: TOLERANCE UNITS ARE IN INCHES ONLY.

4: STANDARD ASSEMBLY POSITION F-1 IS SHOWN.

F-2 IS PROVIDED WHEN SPECIFIED ON ORDER. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

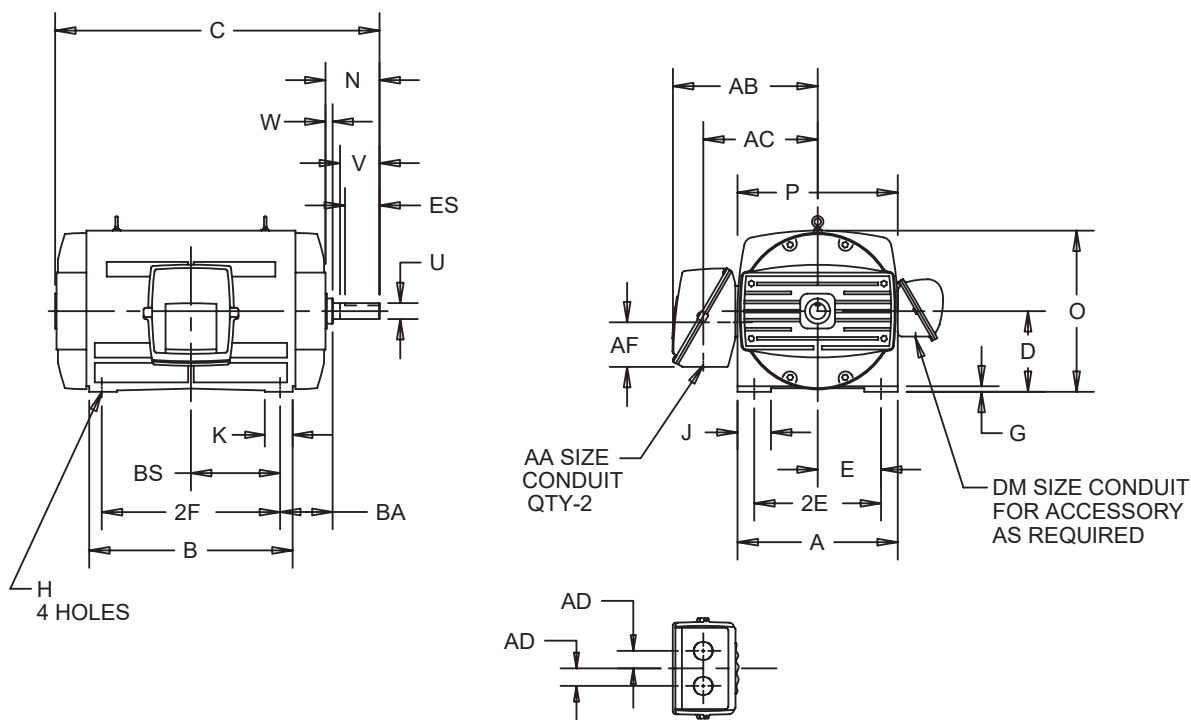
† All marks shown within this document are properties of their respective owners.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
ANTI-FRICTION BEARING
FRAME: 6800MS

TYPE H, 4 POLE & SLOWER

PRINT # 07-2151



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	D	E	2E ±.03	H	O	P ²	AA	AB	AC	AD	AF	BA	DM
IN	17.00	13.50	27.00	1.38	34.13	34.25	3 1/2 NPT	34.25	27.13	3.00	10.94	11.50	1.00 NPT
MM	432	343	686	35	867	870		870	689	76	278	292	

UNITS	N	U -.001	V MIN	W	ES MIN	SQ KEY
IN	8.25	4.375	7.25	.50	5.63	1.000
MM	210	111.13	184	13	143	25.40

FRAME	UNITS	A	B	C	G	J	K	2F ±.03	BS
6809MS	IN	33.75	44.50	70.38	2.00	6.75	5.50	40.00	20.00
	MM	857	1130	1788	51	171	140	1016	508
6810MS	IN	31.00	48.63	75.38	1.63	5.00	4.00	45.00	22.50
	MM	787	1235	1915	41	127	102	1143	572
6811MS	IN	31.00	53.63	80.38	1.63	5.00	4.00	50.00	25.00
	MM	787	1362	2042	41	127	102	1270	635

1: ALL ROUGH CASTING DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2: LARGEST MOTOR WIDTH.

3: TOLERANCES UNITS ARE IN INCHES ONLY.

4: STANDARD ASSEMBLY POSITION F-1 IS SHOWN.

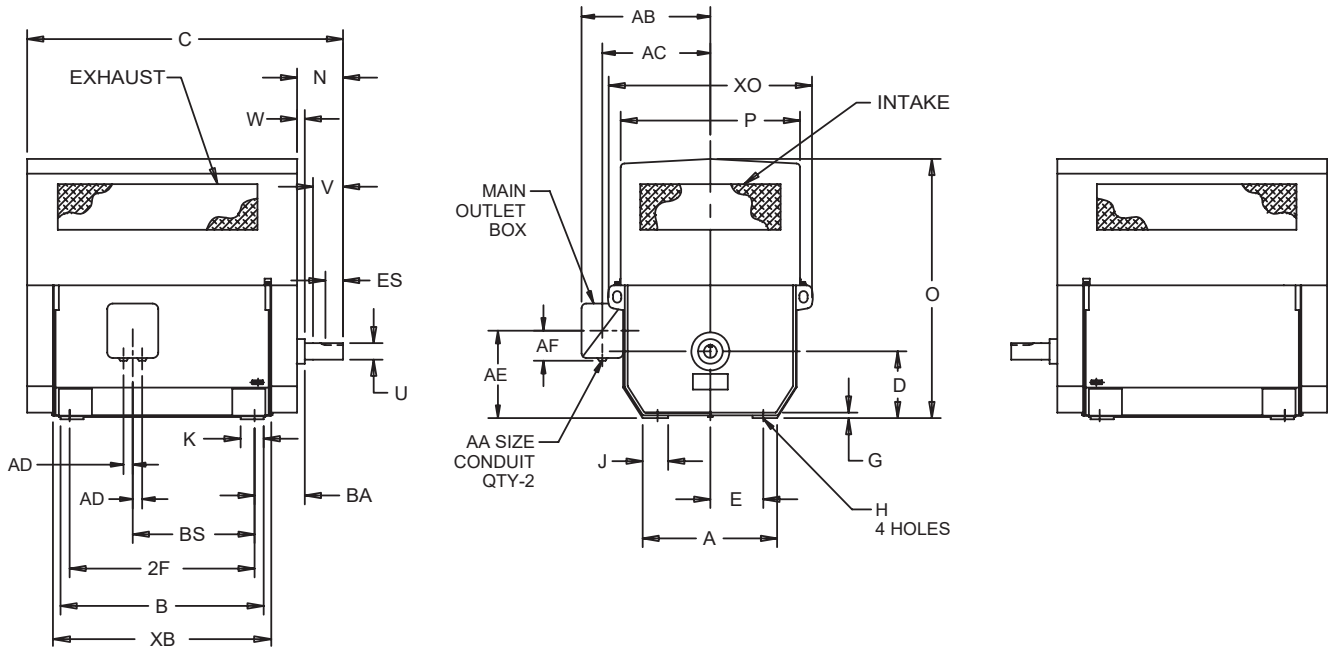
F-2 IS PROVIDED WHEN SPECIFIED ON ORDER. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

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

HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
ANTI-FRICTION BEARING
FRAME: 8000-9610S, SS

TYPE R

PRINT # 07-1870



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

BASIC FRAME	N	U -.001	V MIN	W	ES MIN	SQ KEY
IN	11.38	5.375	10.50	.63	8.63	1.250
MM	12.38	5.875	11.50	.63	9.13	1.500

BASIC FRAME	A	D -.06	E	G	H +.05	J	K	O	P	AB	AC	AD	AE	AF	BA	XO
8000	41.50	20.00	16.00	1.88	1.63	8.00	7.00	75.38	54.25	43.25	34.63	3.00	26.25	10.94	13.50	62.00
9600	50.00	24.00	19.00	2.31	1.63	10.00	9.00	87.38	64.25	48.25	39.63	3.00	32.50	10.94	16.00	74.25

FRAME	B	C	2F ±.03	BS	XB	AA
8005S	37.50	69.38	32.00	16.25	42.00	3 NPT
8006S	41.50	73.38	36.00	20.25	46.00	3 1/2 NPT
8007S	45.50	77.38	40.00	24.25	50.00	4 NPT
8008S	50.50	82.38	45.00	29.25	55.00	
8009S	55.50	87.38	50.00	34.25	60.00	
8010S	61.50	93.38	56.00	40.25	66.00	
8011S	68.50	100.38	63.00	47.25	73.00	
9603S	41.50	75.38	32.00	18.75	47.00	
9604S	45.50	79.38	36.00	22.75	51.00	
9605S	49.50	83.38	40.00	26.75	55.00	
9606S	54.50	88.38	45.00	31.75	60.00	
9607S	59.50	93.38	50.00	36.75	65.00	
9608S	65.50	99.38	56.00	42.75	71.00	
9609S	72.50	106.38	63.00	49.75	78.00	
9610S	80.50	114.38	71.00	57.75	86.00	

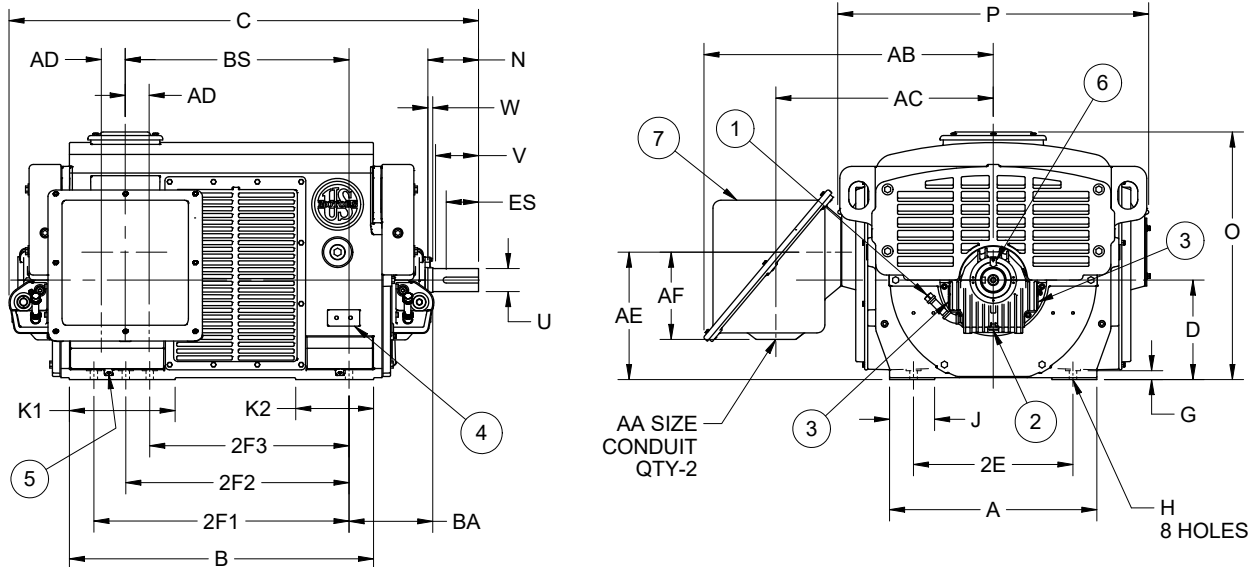
- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: CONDUIT BOXES MAY BE ROTATED IN STEPS OF 90 DEGREES. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- 3: "XB" IS THE DISTANCE BETWEEN SURFACES THAT MAY BE USED FOR HORIZONTAL JACKING.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
SLEEVE BEARING
FRAME: 5000S, SS

TYPE RS

PRINT # 07-3226



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H +.05 .94	J	K2	O
26.00	12.50	20.00	1.13		5.63	9.75	31.06

P ²	W	AB	AC	AD	AE	AF	BA ±.25
39.00	1.00	36.25	27.25	3.00	16.00	10.94	10.50

FRAME	N	U -.001	V MIN	ES MIN	SQ KEY
5000S	6.75	2.875	5.50	4.00	.750
5000SS	5.75	2.375	4.50	3.00	.625

FRAME	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03	K1	BS
5008S	31.13	51.88	25.00	22.00	20.00	13.25	21.06
5008SS	31.13	50.88	25.00	22.00	20.00	13.25	21.06
5010S	38.13	58.88	32.00	28.00	25.00	13.25	28.06
5010SS	38.13	57.88	32.00	28.00	25.00	13.25	28.06
5012S	46.13	66.88	40.00	36.00	32.00	14.75	36.06
5012SS	46.13	65.88	40.00	36.00	32.00	14.75	36.06

AA
3 NPT
3 1/2 NPT
4 NPT

COUPLING SELECTION:

SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE SHAFT POSITION INDICATOR DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS 0.50 INCHES, AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS 0.19 INCHES.

FEATURE LISTING

1 OIL FILL (1 EACH END)	6 SHAFT POSITION INDICATOR
2 OIL DRAIN (1 EACH END)	7 MAIN CONDUIT BOX
3 OIL LEVEL SIGHT GLASS (2 EACH END)	
4 GRD PADS, 1/2-13 (2 EACH SIDE)	
5 4-PILOT HOLES FOR .38 DIA DOWEL PINS	

1. DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2. LARGEST MOTOR WIDTH.

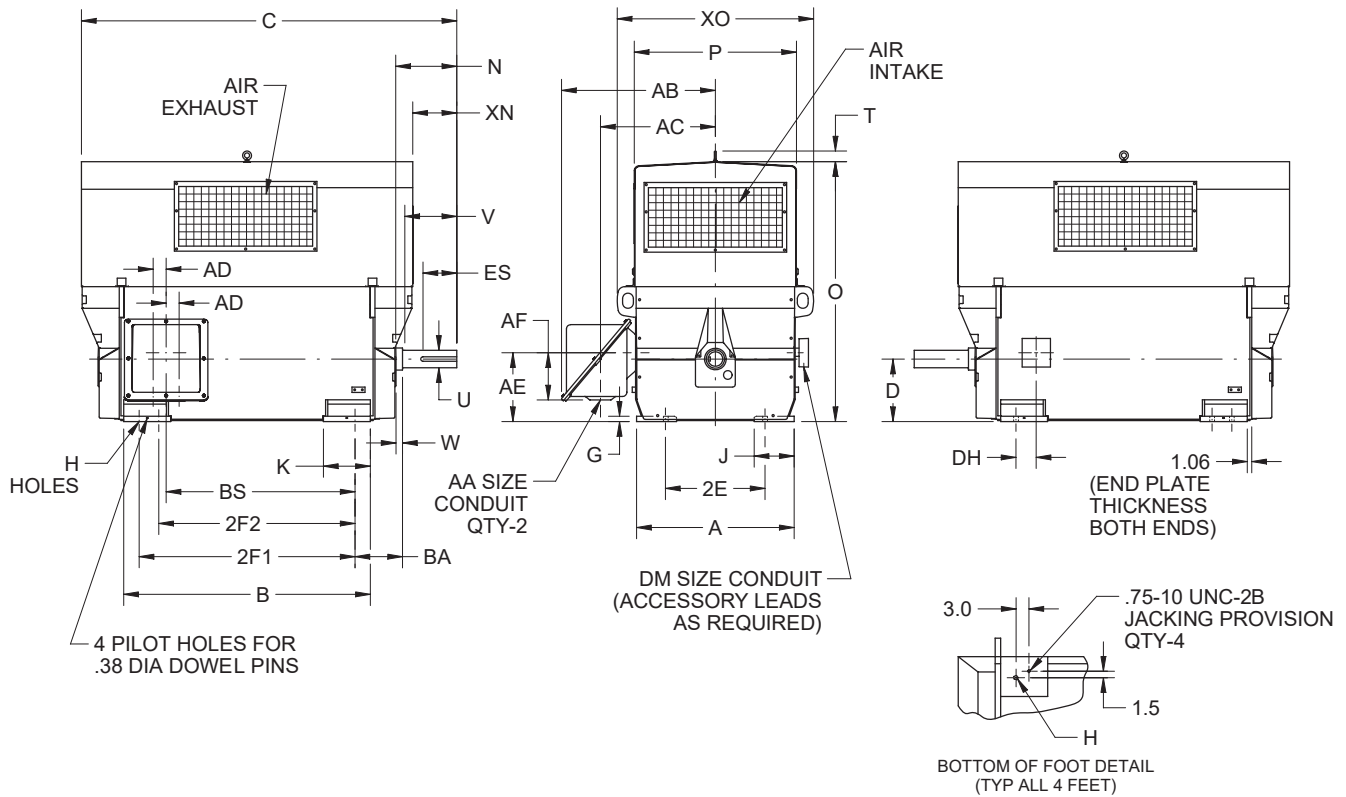
3. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE ROTATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENINGS DOWN.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
SLEEVE BEARING
FRAME: 5800S

TYPE RS, 2 POLE

PRINT # 07-2310



ALL DIMENSIONS ARE IN INCHES

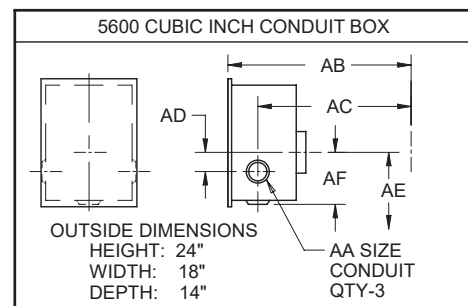
A	D	2E	G	H	J	K
36.50	14.50	23.00	1.25	1.09	9.25	10.88

N	O	P	T	U	V	W
7.13	57.41	37.50	2.47	3.375	6.50	.38

AE	BA	DH	ES	XN	XO	SQ
15.94	10.00	5.69	5.00	3.00	45.50	.875

VOLTS	HP	C/BOX VOLUME (CU.IN.)	QTY AA	AB	AC	AD	AF
0-2400	ALL	6800	2	35.56	26.69	3.00	10.94
2401-4800	0-1000	5600	3	34.88	28.63	4.00	10.81
4801-6900	1001 & UP						

FRAME	B	C	2F1 ± .03	2F2 ± .03	BS	A	DM
5810S	43.13	65.75	36.00	32.00	29.31	3 NPT	3/4 NPT
5811S	47.13	69.75	40.00	36.00	33.31	3 1/2 NPT	1 NPT
5812S	52.13	74.75	45.00	40.00	38.31	4 NPT	1 1/4 NPT
5813S	57.13	79.75	50.00	45.00	43.31		1 1/2 NPT



1. DIMENSIONS MAY VARY BY $\pm .25$ " DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 POSITION IS SUPPLIED WHEN SPECIFIED.

COUPLING SELECTION:

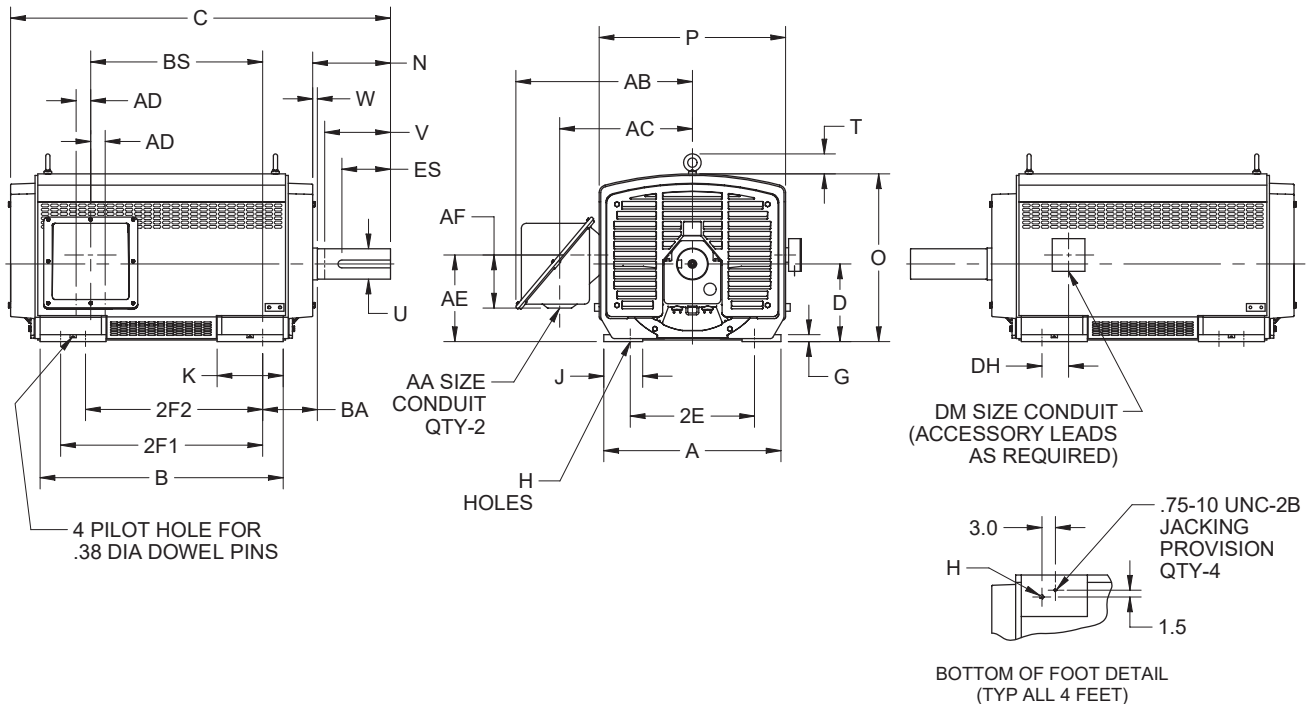
SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER SEAL FACE DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS 0.50 INCHES AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS 0.19 INCHES.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
SLEEVE BEARING
FRAME: 5800S, M

TYPE RS

PRINT # 07-2313



ALL DIMENSIONS ARE IN INCHES

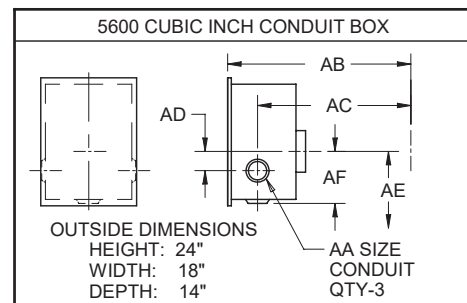
A	D -.06	2E ±.03	G	H +.05	J	K
36.50	14.50	23.00	1.25	1.09	9.25	10.88

O	P	T	W	AE	BA ±.25	DH
31.09	37.00	5.22	.38	15.94	10.00	5.69

VOLTS	HP	C/BOX VOLUME (CU.IN.)	QTY AA	AB	AC	AD	AF
0-2400	ALL	6800	2	35.56	26.69	3.00	10.94
2401-4800	0-1000	5600	3	34.88	28.63	4.00	10.81
4801-6900	1001 & UP						

FRAME	N	U -.001	V MIN	ES MIS	SQ KEY	AA	DM
5800S	7.13	3.375	6.50	5.00	.875	3 NPT	3/4 NPT
5800M	8.63	4.125	8.00	5.50	1.000	3 1/2 NPT	1 NPT
						4 NPT	1 1/4 NPT
							1 1/2 NPT

FRAME	B	C	2F1 ±.03	2F2 ±.03	BS
5810S	43.13	62.34	36.00	32.00	29.31
5810M	43.13	63.84	36.00	32.00	29.31
5811S	47.13	66.34	40.00	36.00	33.31
5811M	47.13	67.84	40.00	36.00	33.31
5812S	52.13	71.34	45.00	40.00	38.31
5812M	52.13	72.84	45.00	40.00	38.31
5813S	57.13	76.34	50.00	45.00	43.31
5813M	57.13	77.84	50.00	45.00	43.31



1. DIMENSIONS MAY VARY BY $\pm .25"$ DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 POSITION IS SUPPLIED WHEN SPECIFIED.

COUPLING SELECTION:

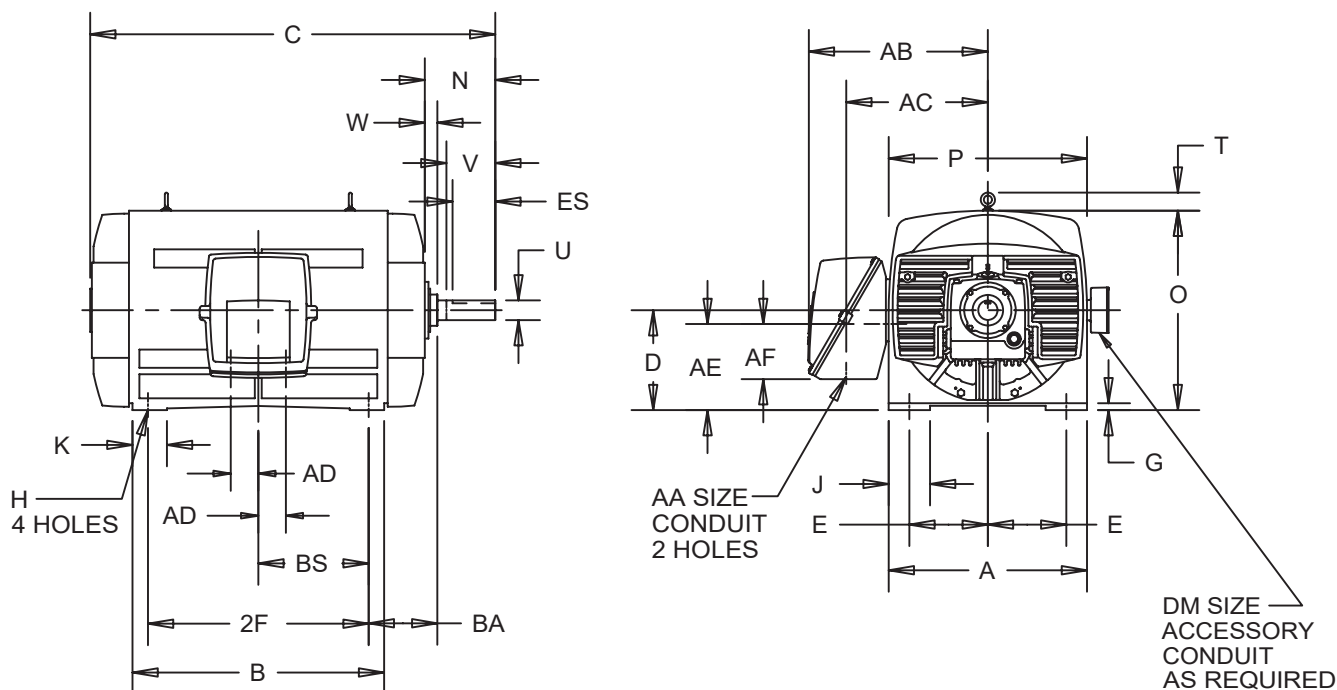
SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER SEAL FACE DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS 0.50 INCHES AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS 0.19 INCHES.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
SLEEVE BEARING
FRAME: 6800S

TYPE HS, 4 POLE & SLOWER

PRINT # 07-2154



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D ³ -.06	E	G	H	J	K	O	P ²	T	DM
IN	31.00	17.00	13.50	1.63	1.38	5.00	6.00	34.13	34.25	5.25	1 NPT
MM	787	431.8	343	41	35	127	152	867	870	133	

UNITS	AA	AB	AC	AD	AE	AF	BA	N	U ³ -.001	V MIN	W	ES MIN	SQ KEY
IN	3 1/2 NPT	34.13	27.00	3.00	17.00	10.94	11.50	8.25	3.875	7.50	.50	5.63	1.000
MM		867	686	76	432	278	292	210	98.43	191	13	133	25.40

FRAME	UNITS	B	C	2F	BS
6809S	IN	47.88	70.38	40.00	20.00
	MM	1216	1788	1016	508
6810S	IN	52.88	75.38	45.00	22.50
	MM	1343	1915	1143	572
6811S	IN	57.88	80.38	50.00	25.00
	MM	1470	2042	1270	635

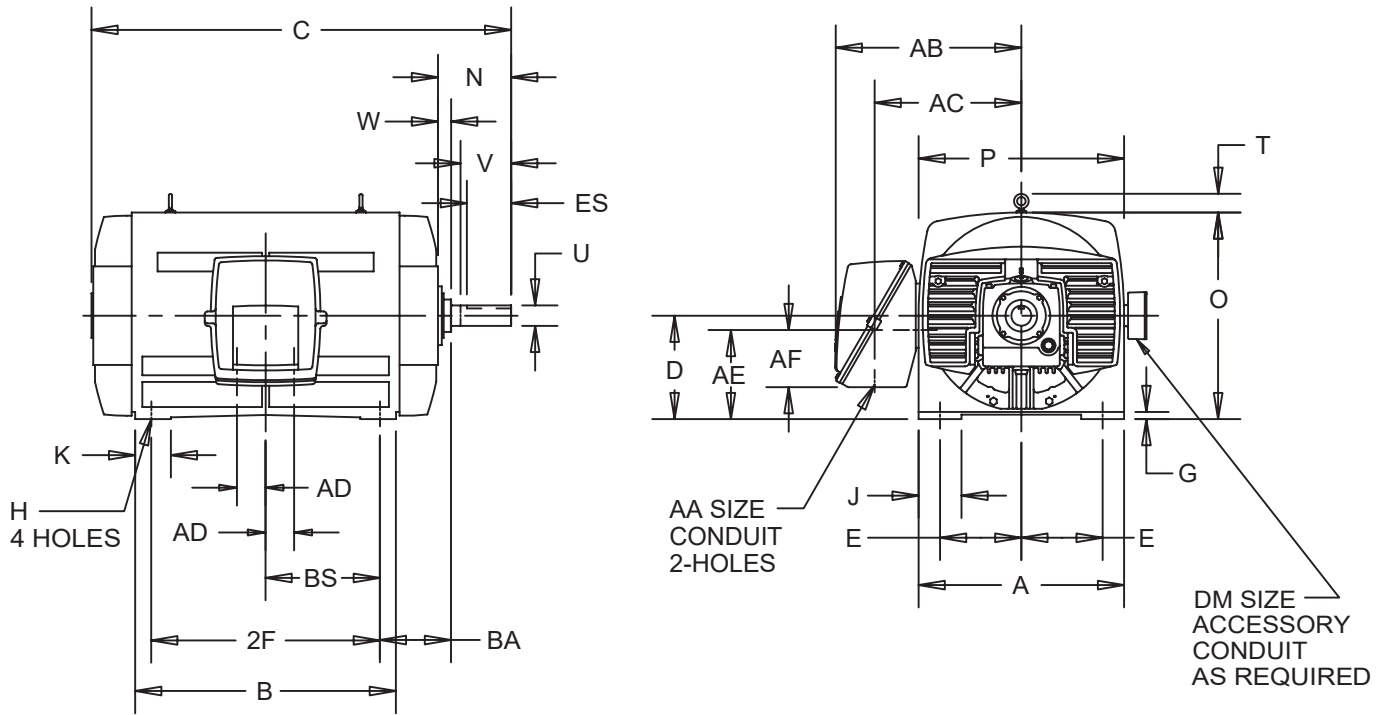
- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25"
DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: LARGEST MOTOR WIDTH.
- 3: TOLERANCE UNITS ARE IN INCHES ONLY.
- 4: STANDARD ASSEMBLY POSITION F-1 IS SHOWN.
F-2 IS PROVIDED WHEN SPECIFIED. CONDUIT OPENINGS
MAY BE LOCATED IN STEPS OF 90° REGARDLESS OF LOCATION.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

COUPLING SELECTION:
 SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND
 AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT
 SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE
 LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER
 SEAL FACE DURING OPERATING CONDITIONS. THE MOTOR
 ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER
 EXTREME END LIMIT. LIMITED END FLOAT TYPE COUPLINGS
 ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS
 0.50" AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT
 IS 0.19".



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
SLEEVE BEARING
FRAME: 6800MS **TYPE HS**

PRINT # 07-2155



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	E	G	H	J	K	O	P ²	T	DM
IN	31.00	17.00	13.50	1.63	1.38	5.00	6.00	34.13	34.25	5.25	1 NPT
MM	787	431.8	343	41	35	127	152	867	870	133	

UNITS	AA	AB	AC	AD	AE	AF	BA	N	U ³ -.001	V MIN	W	ES MIN	SQ KEY
IN	3 1/2 NPT	34.13	27.00	3.00	17.00	10.94	11.50	8.25	4.375	7.50	.50	5.63	1.000
MM		867	686	76	432	278	292	210	111.13	191	13	143	25.40

FRAME	UNITS	B	C	2F	BS
6809MS	IN	47.88	70.38	40.00	20.00
	MM	1216	1788	1016	508
6810MS	IN	52.88	75.38	45.00	22.50
	MM	1343	1915	1143	572
6811MS	IN	57.88	80.38	50.00	25.00
	MM	1470	2042	1270	635

- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25"
DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: LARGEST MOTOR WIDTH.
- 3: TOLERANCE UNITS ARE IN INCHES ONLY.
- 4: STANDARD ASSEMBLY POSITION F-1 IS SHOWN.
F-2 IS PROVIDED WHEN SPECIFIED. CONDUIT OPENINGS
MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

COUPLING SELECTION:
 SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND
 AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT
 SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE
 LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER
 SEAL FACE DURING OPERATING CONDITIONS. THE MOTOR
 ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER
 EXTREME END LIMIT. LIMITED END FLOAT TYPE COUPLINGS
 ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS
 0.50" AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT
 IS 0.19" .

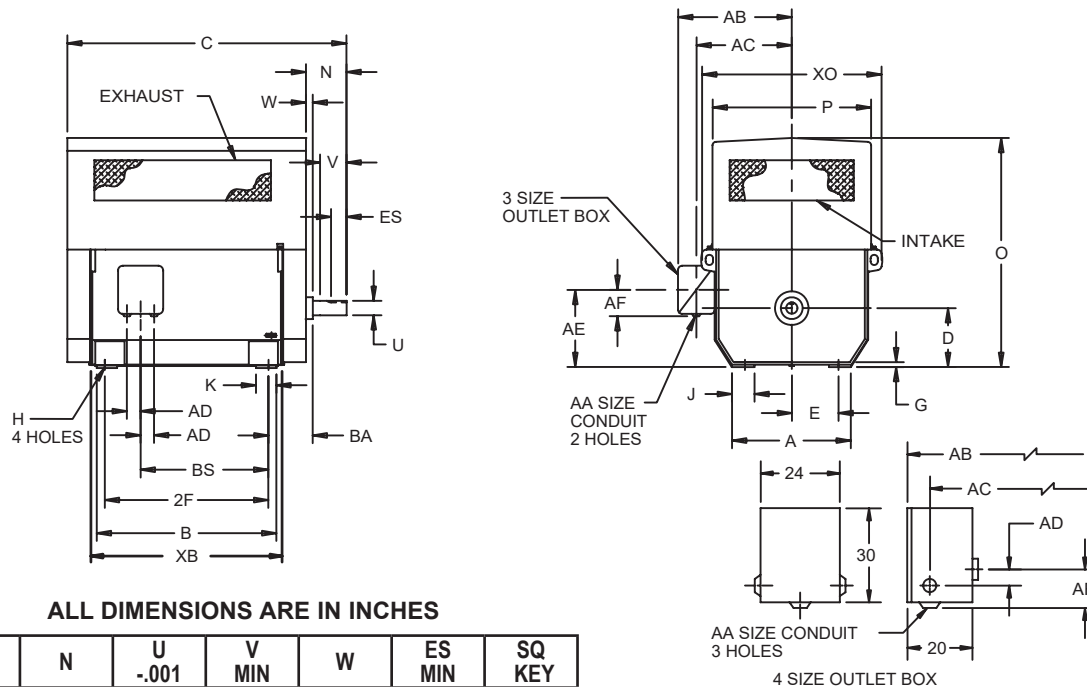
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HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE I
SLEEVE BEARING
FRAME: 8000-9610S, SS

TYPE RS

PRINT # 07-1871



ALL DIMENSIONS ARE IN INCHES

BASIC FRAME	N	U -.001	V MIN	W	ES MIN	SQ KEY
2 8000SS	8.50	3.875	7.50	.75	5.63	1.000
8000S	11.50	5.375	10.50	.75	8.63	1.250
9600S	12.50	5.875	11.50	.75	9.13	1.500

BASIC FRAME	A	D -.06	E	G	H +.05	J	K	O	P	BA	XO
8000	41.50	20.00	16.00	1.88	1.63	8.00	7.00	75.38	54.25	13.50	62.00
9600	50.00	24.00	19.00	2.31	1.63	10.00	9.00	87.38	64.25	16.00	74.25

FRAME	B	C	2F ±.03	BS	XB
8005S	38.50	69.38	32.00	16.25	42.00
8006S	42.50	73.38	36.00	20.25	46.00
8007S	46.50	77.38	40.00	24.25	50.00
2 8008SS	51.50	79.38	45.00	29.25	55.00
8008S	51.50	82.38	45.00	29.25	55.00
2 8009SS	56.50	84.38	50.00	34.25	60.00
8009S	56.50	87.38	50.00	34.25	60.00
2 8010S	62.50	90.38	56.00	40.25	66.00
8010S	62.50	93.38	56.00	40.25	66.00
2 8011SS	69.50	97.38	63.00	47.25	73.00

FRAME	B	C	2F ±.03	BS	XB
8011S	69.50	100.38	63.00	47.25	73.00
9603S	42.50	75.38	32.00	18.75	47.00
9604S	46.50	79.38	36.00	22.75	51.00
9605S	50.50	83.38	40.00	26.75	55.00
9606S	55.50	88.38	45.00	31.75	60.00
9607S	60.50	93.38	50.00	36.75	65.00
9608S	66.50	99.38	56.00	42.75	71.00
9609S	73.50	106.38	63.00	49.75	78.00
9610S	81.50	114.38	71.00	57.75	86.00

BASIC FRAME	VOLTAGE	HP	REFERENCE O.B. SIZE	AA SIZE CONDUIT	QTY-OF CONDUIT	AB	AC	AD	AE	AF
8000	2300, 2400	ALL	3	3.50	2	43.25	34.63	3.00	26.25	10.94
	3000 THRU 4160	THRU 1000 1001 AND UP			3	48.13	42.13	4.00		10.81
	6000, 6600	ALL	4							
9600	2300, 2400	ALL	3	3.50	2	48.25	39.63	3.00	31.50	10.94
	3000 THRU 4160	THRU 1000 1001 AND UP			3	53.13	47.13	4.00		10.81
	6000, 6600	ALL	4							

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2: SS SHAFT FOR 2-POLE UNITS ONLY.

3: XB IS THE DISTANCE BETWEEN SURFACES THAT MAY BE USED FOR HORIZONTAL JACKING.

COUPLING SELECTION:

SLEEVE BEARING MOTORS ARE NOT TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER SEAL FACE DURING OPERATING CONDITIONS. THE MOTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS 0.50 INCHES, AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS 0.19 INCHES.

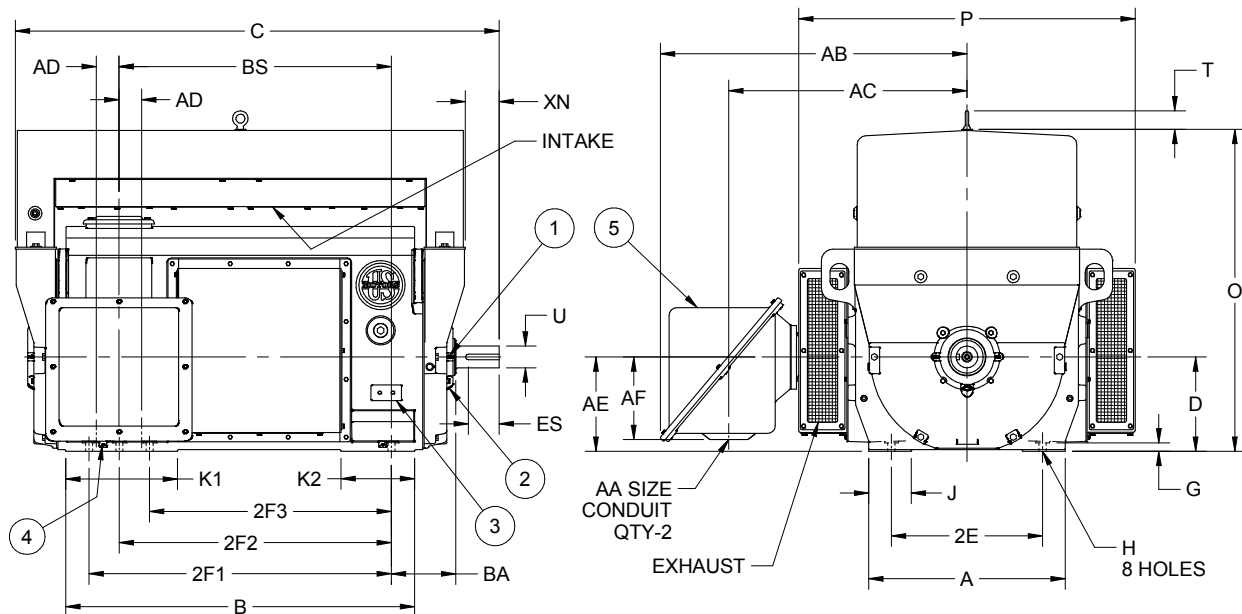
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HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE II
ANTI-FRICTION BEARING
FRAME: 5000S, MS, SS, L

TYPE R

PRINT # 07-3225



ALL DIMENSIONS ARE IN INCHES

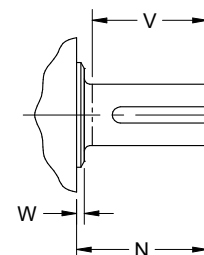
A	D	2E	G	H	J	K2	O	P
26.00	.06 12.50	±.03 20.00	1.13	+.05 .94	5.63	9.75	42.59	44.50

T	W	AB	AC	AD	AE	AF	BA
2.50	.38	40.53	31.50	3.00	12.50	10.94	8.50

FRAME	N	U	V	ES	XN	SQ
		-.001	MIN	MIN		KEY
5000S	6.13	2.875	5.50	4.00	4.50	.750
5000MS	7.13	3.375	6.50	5.00	5.50	.875
5000SS	5.13	2.375	4.50	3.00	3.50	.625
5000L	15.00	4.875	14.38	12.88	13.38	1.250

FRAME	B	C	2F1	2F2	2F3	K1	BS
			±.03	±.03	±.03		
5008S	31.13	49.00	25.00	22.00	20.00	13.25	21.06
5008MS	31.13	50.00	25.00	22.00	20.00	13.25	21.06
5008SS	31.13	48.00	25.00	22.00	20.00	13.25	21.06
5008L	31.13	58.00	25.00	22.00	20.00	13.25	21.06
5010S	38.13	56.00	32.00	28.00	25.00	13.25	28.06
5010MS	38.13	57.00	32.00	28.00	25.00	13.25	28.06
5010SS	38.13	55.00	32.00	28.00	25.00	13.25	28.06
5010L	38.13	65.00	32.00	28.00	25.00	13.25	28.06
5012S	46.13	64.00	40.00	36.00	32.00	14.75	36.06
5012MS	46.13	65.00	40.00	36.00	32.00	14.75	36.06
5012SS	46.13	63.00	40.00	36.00	32.00	14.75	36.06
5012L	46.13	73.00	40.00	36.00	32.00	14.75	36.06

AA
3 NPT
3 1/2 NPT
4 NPT



FEATURE LISTING

1	GREASE FILL (1 EACH END)
2	GREASE DRAIN (1 EACH END)
3	GRD PADS, 1/2-13 (2 EACH SIDE)
4	4-PILOT HOLES FOR .38 DIA DOWEL PINS
5	MAIN CONDUIT BOX

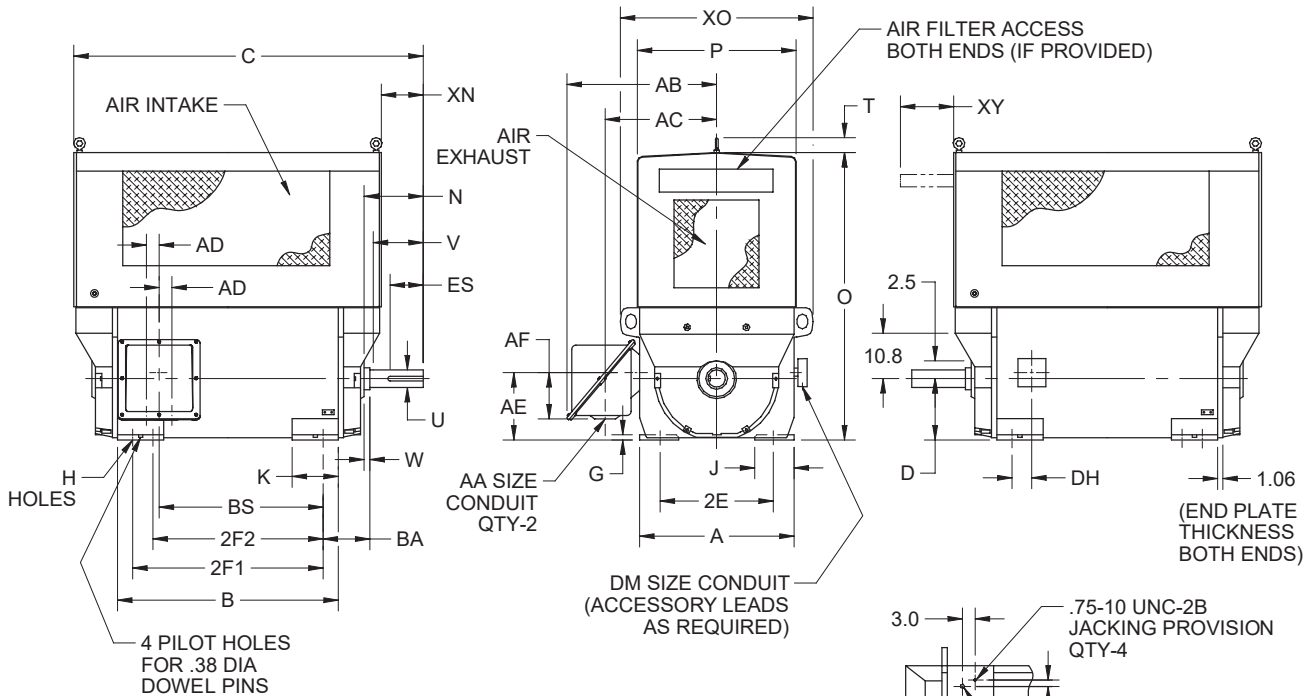
- DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- LARGEST MOTOR WIDTH.
- CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE ROTATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENINGS DOWN.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE II
ANTI-FRICTION BEARING
FRAME: 5800S, M, L

TYPE R

PRINT # 07-2311



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H +.05	J	K	O
36.50	14.50	23.00	1.25	1.09	9.25	10.88	71.22

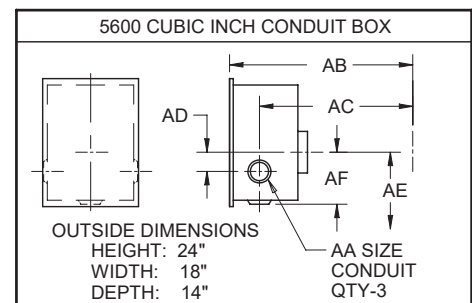
P	T	W	AE	BA	DH	XO
37.50	2.47	.38	15.94	10.00	5.69	45.50

VOLTS	HP	C/BOX VOLUME (CU.IN.)	QTY AA	AB	AC	AD	AF
0.2400	ALL	6800	2	35.56	26.69	3.00	10.94
2401 - 4800	0 - 1000	5600	3	34.88	28.63	4.00	10.81
4801 - 6900	1001 & UP						

FRAME	N	U -.001	V MIN	ES MIN	XN	SQ KEY
5800S	7.13	3.375	6.50	5.00	3.00	.875
5800M	8.63	4.125	8.00	5.50	4.50	1.000
5800L	14.88	4.875	14.25	12.88	10.75	1.250

FRAME	B	C	2F1 ±.03	2F2 ±.03	BS	XY ³
5810S	43.13	65.75	36.00	32.00	29.31	41.00
5810M	43.13	67.25	36.00	32.00	29.31	41.00
5810L	43.13	73.50	36.00	32.00	29.31	41.00
5811S	47.13	69.75	40.00	36.00	33.31	45.00
5811M	47.13	71.25	40.00	36.00	33.31	45.00
5811L	47.13	77.50	40.00	36.00	33.31	45.00
5812S	52.13	74.75	45.00	40.00	38.31	50.00
5812M	52.13	76.25	45.00	40.00	38.31	50.00
5812L	52.13	82.50	45.00	40.00	38.31	50.00
5813S	57.13	79.75	50.00	45.00	43.31	55.00
5813M	57.13	81.25	50.00	45.00	43.31	55.00
5813L	57.13	87.50	50.00	45.00	43.31	55.00

AA	DM
3 NPT	3 NPT
3 1/2 NPT	1 NPT
4 NPT	1 1/4 NPT
	1 1/2 NPT



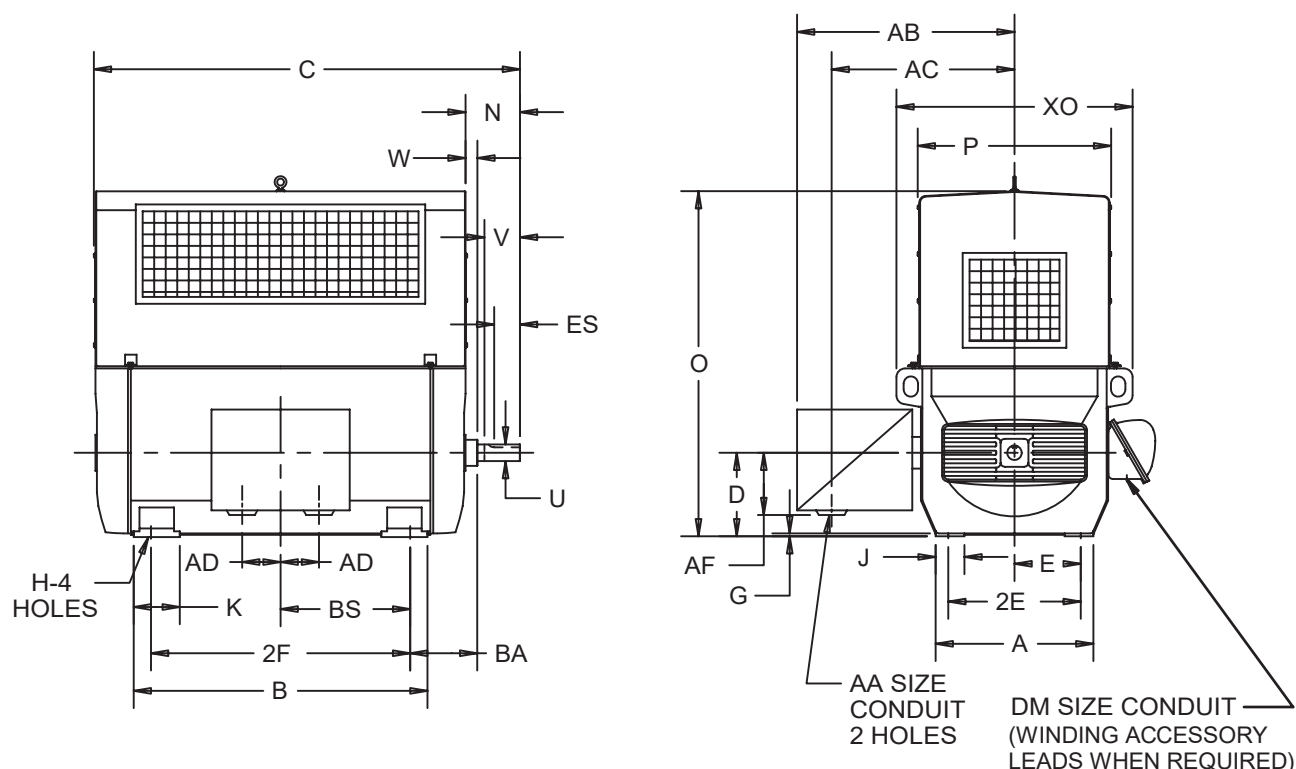
1. DIMENSIONS MAY VARY BY ±.25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 POSITION IS SUPPLIED WHEN SPECIFIED.
3. CLEARANCE REQUIRED TO REMOVE FILTER, EITHER END.
4. THE 5800S EXTENSION IS TYPICALLY FOR 2 POLE RATINGS.

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



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE II
ANTI-FRICTION BEARING
FRAME: 6800S, MS, BLANK EXT. TYPE H

PRINT # 07-2083



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	E	2E ±.03	G	H	J	K	O	P ²
IN	32.00	17.00	13.50	27.00	1.50	1.38	6.00	9.00	70.88	39.00
MIN	813	432	343	686	38	35	152	229	1800	991

UNITS	AA	AB	AC	AD	AF	BA	DM	XO
IN	3 1/2 NPT	36.00	27.38	3.00	10.94	11.50	3/4 NPT	47.00
MIN		914	695	76	278	292		1194

FRAME	UNITS	N	U -.001	V MIN	W	ES MIN	SQ KEY
6800	IN	15.88	5.125	15.13	.50	13.88	1.250
	MIN	403	130.18	384	13	340	31.75
6800S	IN	8.25	3.875	7.25	.50	5.63	1.000
	MIN	210	98.43	184	13	143	25.40
6800MS	IN	8.25	4.375	7.25	.50	5.63	1.000
	MIN	210	111.13	184	13	143	25.40

FRAME	UNITS	B	C	2F ±.03	BS
6809	IN	43.63	78.00	40.00	20.00
	MM	1108	1981	1016	508
6809S	IN	43.63	70.38	40.00	20.00
	MM	1108	1788	1016	508
6809MS	IN	43.63	70.38	40.00	20.00
	MM	1108	1788	1016	508
6810	IN	48.63	83.00	45.00	22.50
	MM	1235	2108	1143	572
6810S	IN	48.63	75.38	45.00	22.50
	MM	1235	1915	1143	572
6810MS	IN	48.63	75.38	45.00	22.50
	MM	1235	1915	1143	572

- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: LARGEST MOTOR WIDTH.
- 3: TOLERANCE SHOWN ARE IN INCHES ONLY.
- 4: CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.



TYPE R

[illegible]

BASIC FRAME	N	U -.001	V VIN	W	ES MIN	SQ KEY
8000S	11.38	5.375	10.50	.63	8.63	1.250
9600S	12.38	5.875	11.50	.63	9.13	1.500

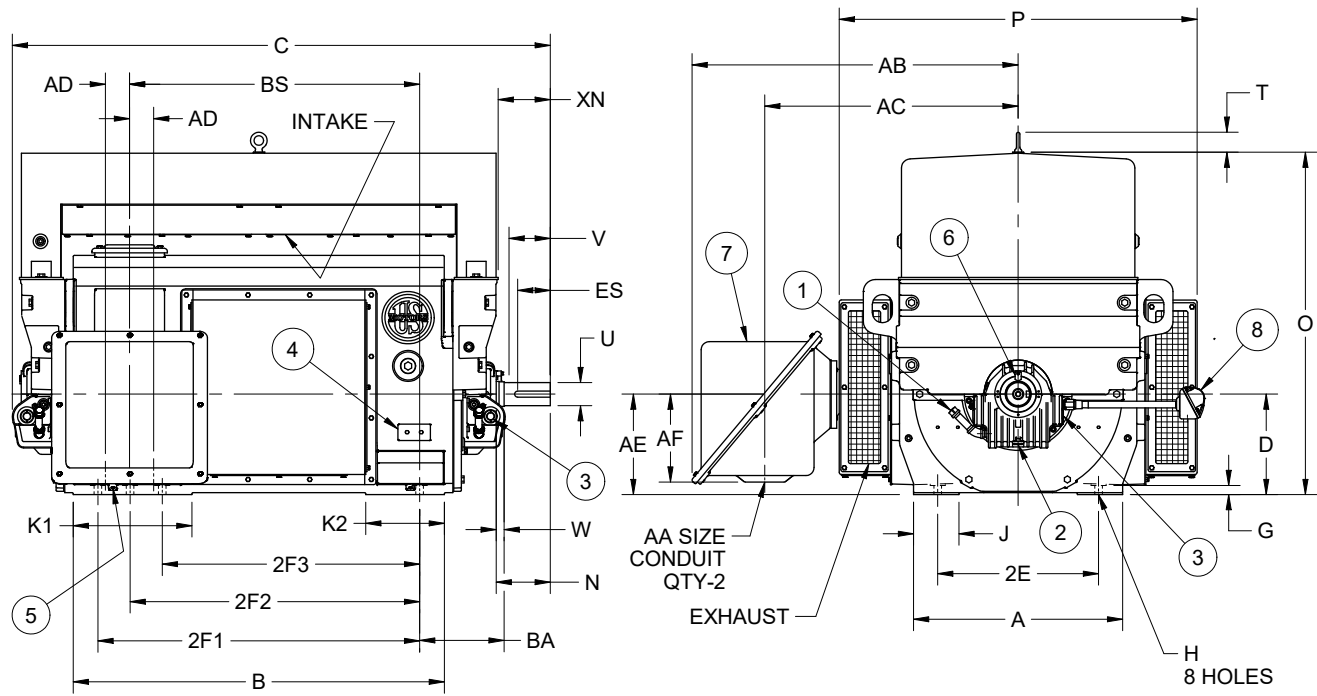
BASIC FRAME	A	D -.06	E	G	H +.05	J	K	O	P	AB	AC	AD	AE	AF	BA	XO
8000	41.50	20.00	16.00	1.88	1.63	8.00	7.00	92.38	54.25	48.38	42.13	4.00	26.25	10.81	13.50	62.00
9600	50.00	24.00	19.00	2.31	1.63	10.00	9.00	109.38	64.25	53.38	47.13	4.00	32.50	10.81	16.00	74.25

FRAME	B	C	2F ±.03	BS	DH	XB	AA
8005S	37.50	69.38	32.00	16.25	19.75	42.00	3 NPT
8006S	41.50	73.38	36.00	20.25	23.75	46.00	3 1/2 NPT
8007S	45.50	77.38	40.00	24.25	27.75	50.00	4 NPT
8008S	50.50	82.38	45.00	29.25	32.75	55.00	
8009S	55.50	87.38	50.00	34.25	37.75	60.00	
8010S	61.50	93.38	56.00	40.25	43.75	66.00	
8011S	68.50	100.38	63.00	47.25	50.75	73.00	
9603S	41.50	75.38	32.00	18.75	22.75	47.00	
9604S	45.50	79.38	36.00	22.75	26.25	51.00	
9605S	49.50	83.38	40.00	26.75	30.25	55.00	
9606S	54.50	88.38	45.00	31.75	35.25	60.00	
9607S	59.50	93.38	50.00	36.75	40.25	65.00	
9608S	65.50	99.38	56.00	42.75	46.25	71.00	
9609S	72.50	106.38	63.00	49.75	53.25	78.00	
9610S	80.50	114.38	71.00	57.75	61.25	86.00	

HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE II
SLEEVE BEARING
FRAME: 5000S, SS

TYPE RS

PRINT # 07-3227



ALL DIMENSIONS ARE IN INCHES

A	D	2E	G	H	J	K2	O	P ²
26.00	12.50	20.00	1.13	.94	5.63	9.75	42.59	44.50

T	W	AB	AC	AD	AE	AF	BA
2.50	1.00	40.53	31.50	3.00	12.50	10.94	10.50

FRAME	N	U	V	ES	XN	SQ
		-.001	MIN	MIN		KEY
5000S	6.75	2.875	5.50	4.00	6.50	.750
5000SS	5.75	2.375	4.50	3.00	5.50	.625

FRAME	B	C	2F1	2F2	2F3	K1	BS	AA
			±.03	±.03	±.03			
5008S	31.13	51.88	25.00	22.00	20.00	13.25	21.06	3 NPT
5008SS	31.13	50.88	25.00	22.00	20.00	13.25	21.06	3 1/2 NPT
5010S	38.13	58.88	32.00	28.00	25.00	13.25	28.06	4 NPT
5010SS	38.13	57.88	32.00	28.00	25.00	13.25	28.06	
5012S	46.13	66.88	40.00	36.00	32.00	14.75	36.06	
5012SS	46.13	65.88	40.00	36.00	32.00	14.75	36.06	

COUPLING SELECTION:

SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE SHAFT POSITION INDICATOR DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS 0.50 INCHES, AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS 0.19 INCHES.

FEATURE LISTING

1 OIL FILL (1 EACH END)	6 SHAFT POSITION INDICATOR
2 OIL DRAIN (1 EACH END)	7 MAIN CONDUIT BOX
3 OIL LEVEL SIGHT GLASS (2 EACH END)	8 BEARING TEMP. DETECTOR, 3/4 NPT
4 GRD PADS, 1/2-13 (2 EACH SIDE)	CONDUIT CONNECTION
5 4-PILOT HOLES FOR .38 DIA DOWEL PINS	

1. DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE ROTATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENINGS DOWN.

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



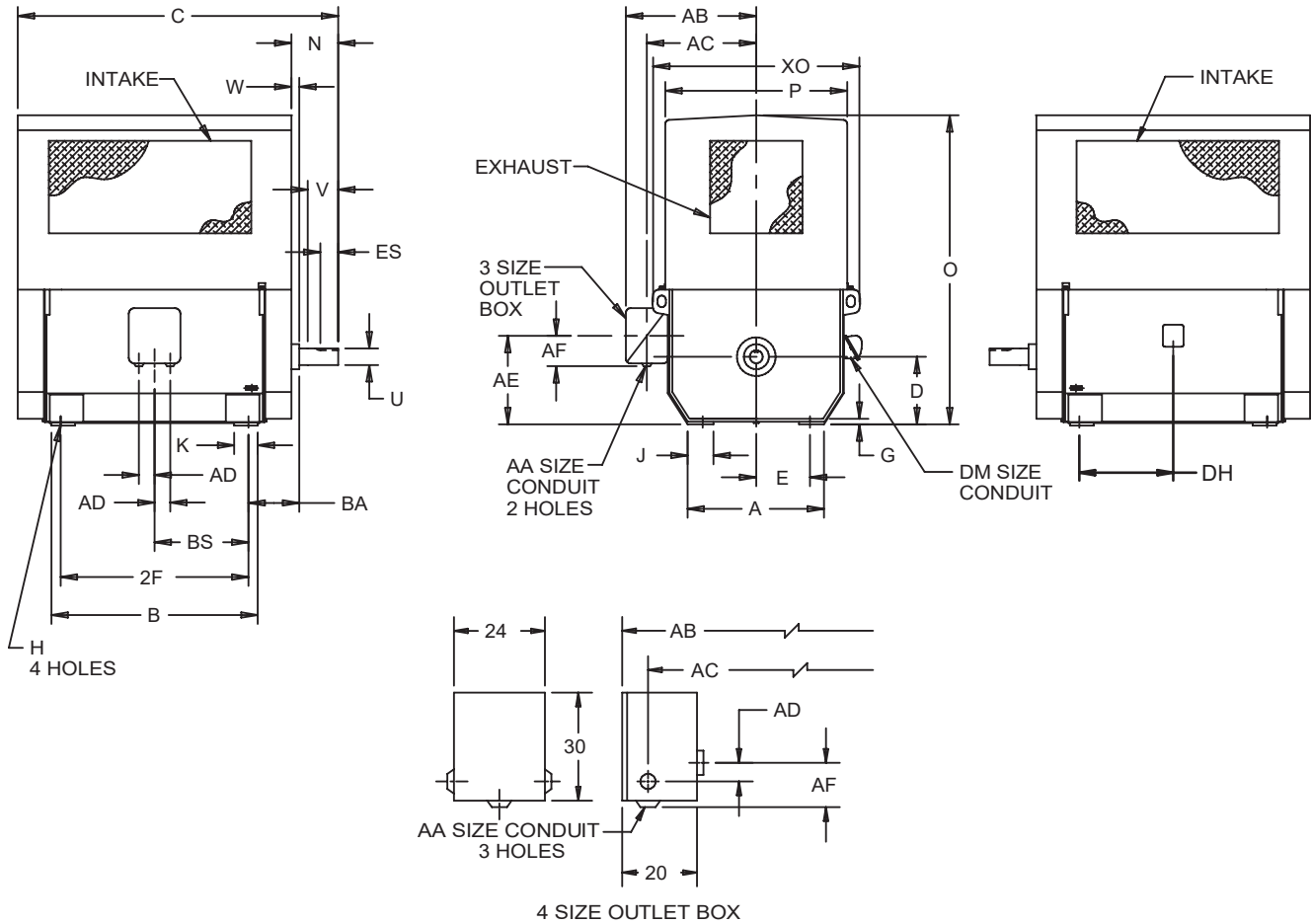
TYPE RS

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HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE II
SLEEVE BEARING
FRAME: 6800S, MS

TYPE HS, 4 POLE AND SLOWER

PRINT # 07-2362



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	E	2E ±.03	G	H +.05	J	K	O	P ²	BA	XO	DM
IN	32.00	17.00	13.50	27.00	1.50	1.38	6.00	9.00	70.88	39.00	11.50	47.00	3/4 NPT
MM	813	432	343	686	38	35	152	229	1800	991	292	1194	1 NPT
													1 1/4 NPT
													1 1/2 NPT

FRAME	UNITS	N	U ³ -.001	V MIN	W	ES MIN	SQ KEY	FRAME	UNITS	B	C	2F ±.03	BS	DH
6800S	IN	8.25	3.875	7.25	.50	5.63	1.000	6809	IN	47.88	70.88	40.00	20.00	20.00
	MM	210	98.43	184	13	143	25.40		MM	1216	1800	1016	508	508
6800MS	IN	8.25	4.375	7.25	.50	5.63	1.000	6810	IN	52.88	75.88	45.00	22.50	22.50
	MM	210	111.13	184	13	143	25.40		MM	1343	1927	1143	572	572
								6811	IN	57.88	80.88	50.00	25.00	25.00
									MM	1470	2054	1270	635	635

VOLTAGE	HP	REFERENCE O.B. SIZE	UNITS	AA	QTY OF CONDUIT	AB	AC	AD	AE	AF
2300, 2400	ALL	3	IN	3-1/2 NPT	2	36.00	28.88	3.00	17.00	10.94
	THRU 1000		MM			914	734	76	432	278
3000 THRU 4160	1001 AND UP	4	IN		3	40.88	36.38	4.00	17.00	10.81
6000, 6600	ALL		MM			1038	924	102	432	275

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

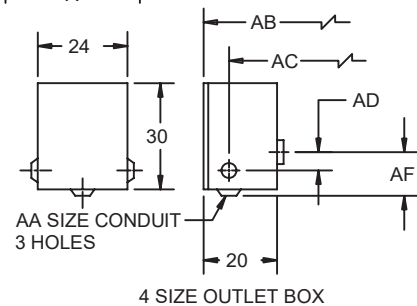
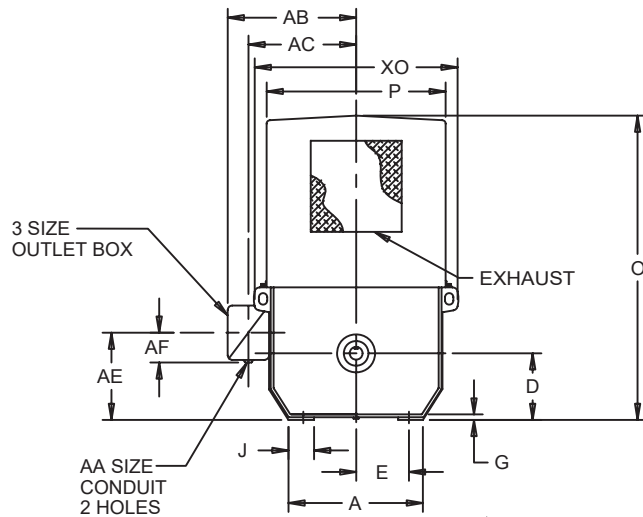
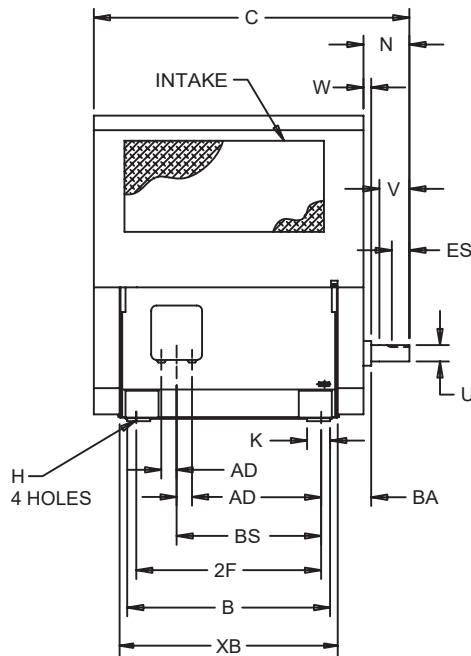
- 4: CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.



HORIZONTAL TITAN® MOTORS
OPEN DRIPPROOF – WEATHER PROTECTED TYPE II
SLEEVE BEARING
FRAME: 8000-9610S, SS

TYPE RS

PRINT # 07-1882



ALL DIMENSIONS ARE IN INCHES

BASIC FRAME	N	U -.001	V MIN	W	ES MIN	SQ KEY
8000SS ²	8.50	3.875	7.50	.75	5.63	1.000
8000S	11.50	5.375	10.50	.75	8.63	1.250
9600S	12.50	5.875	11.50	.75	9.13	1.500

AA
3 NPT
3 1/2 NPT
4 NPT

BASIC FRAME	A	D -.06	E	G	H	J	K	O	P	BA	XO
8000	41.50	20.00	16.00	1.88	1.63	8.00	7.00	92.38	54.25	13.50	62.00
9600	50.00	24.00	19.00	2.31	1.63	10.00	9.00	109.38	64.25	16.00	74.25

FRAME	B	C	2F	BS	XB
8005S	37.50	69.38	32.00	16.25	42.00
8006S	41.50	73.38	36.00	20.25	46.00
8007S	45.50	77.38	40.00	24.25	50.00
8008SS ²	50.50	79.38	45.00	29.25	55.00
8008S	50.50	82.38	45.00	29.25	55.00
8009SS ²	55.50	84.38	50.00	34.25	60.00
8009S	55.50	87.38	50.00	34.25	60.00
8010SS ²	61.50	90.38	56.00	40.25	66.00
8010S	61.50	93.38	56.00	40.25	66.00
8011SS ²	68.50	97.38	63.00	47.25	73.00

FRAME	B	C	2F	BS	XB
8011S	68.50	100.38	63.00	47.25	73.00
9603S	41.50	75.38	32.00	18.75	47.00
9604S	45.50	79.38	36.00	22.75	51.00
9605S	49.50	83.38	40.00	26.75	55.00
9606S	54.50	88.38	45.00	31.75	60.00
9607S	59.50	93.38	50.00	36.75	65.00
9608S	65.50	99.38	56.00	42.75	71.00
9609S	72.50	106.38	63.00	49.75	78.00
9610S	80.50	114.38	71.00	57.75	86.00

BASIC FRAME	VOLTAGE	HP	REF. OB SIZE	QTY OF CONDUIT	AB	AC	AD	AE	AF
8000	2300, 2400	ALL THRU 1000	3	2	43.25	34.63	3.00	26.25	10.94
	3000 THRU 4160	1001 AND UP	4	3	48.13	42.13	4.00		10.81
	6000, 6600	ALL							
9000	2300, 2400	ALL THRU 1000	3	2	48.25	39.63	3.00	31.50	10.94
	3000 THRU 4160	1001 AND UP	4	3	53.13	47.13	4.00		10.81
	6000, 6600	ALL							

- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25"
DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2: SS SHAFT FOR 2-POLE UNITS ONLY.

- 3: "XB" IS THE DISTANCE BETWEEN SURFACES
THAT MAY BE USED FOR HORIZONTAL JACKING.

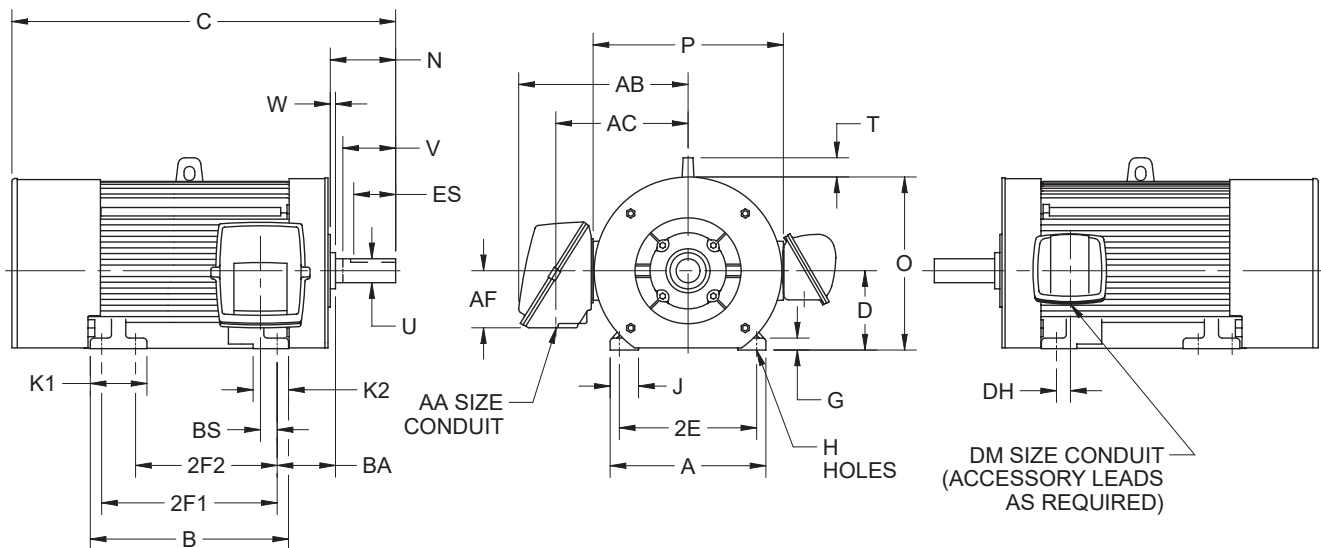
† All marks shown within this document are properties of their respective owners.



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 449T, TL, TM, TS

TYPE J

PRINT # 07-2044



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	D -.06	2E ±.03	2F1 ±.03	2F2 ±.03	G	H +.05	J
IN	22.00	28.00	11.00	18.00	25.00	20.00	1.50	.81	4.00
MM	559	711	279	457	635	508	38	21	102

UNITS	K1	K2	O	P ²	T	W	BA	BS
IN	8.00	5.00	24.06	26.50	2.88	.13	7.50	2.50
MM	203	127	611	673	73	3	191	64

UNITS	VOLTS	AB	AC	AF	DH
IN	460	24.25	18.53	8.06	2.50
MM		616	471	205	64
IN	2300	24.25	18.53	8.06	2.50
MM		616	471	205	64
IN	4000	24.75	20.63	10.00	2.50
MM		629	524	254	64

UNITS	FRAME	C	N	U -.001	V MIN	ES MIN	SQ KEY
IN	449T	55.13	8.63	3.375	8.25	7.00	.875
MM		1400	219	85.73	210	178	22.23
IN	449TL	57.13	10.63	4.375	10.25	8.50	1.000
MM		1451	270	111.13	260	216	25.40
IN	449TM	51.38	4.88	2.875	4.50	3.63	.750
MM		1305	124	73.03	114	92	19.05
IN	449TS	51.38	4.88	2.375	4.50	3.13	.625
MM		1305	124	60.33	114	80	15.88

AA	DM
2 NPT	3/4 NPT
2 1/2 NPT	1 NPT
3 NPT	1 1/4 NPT
3 1/2 NPT	
4 NPT	

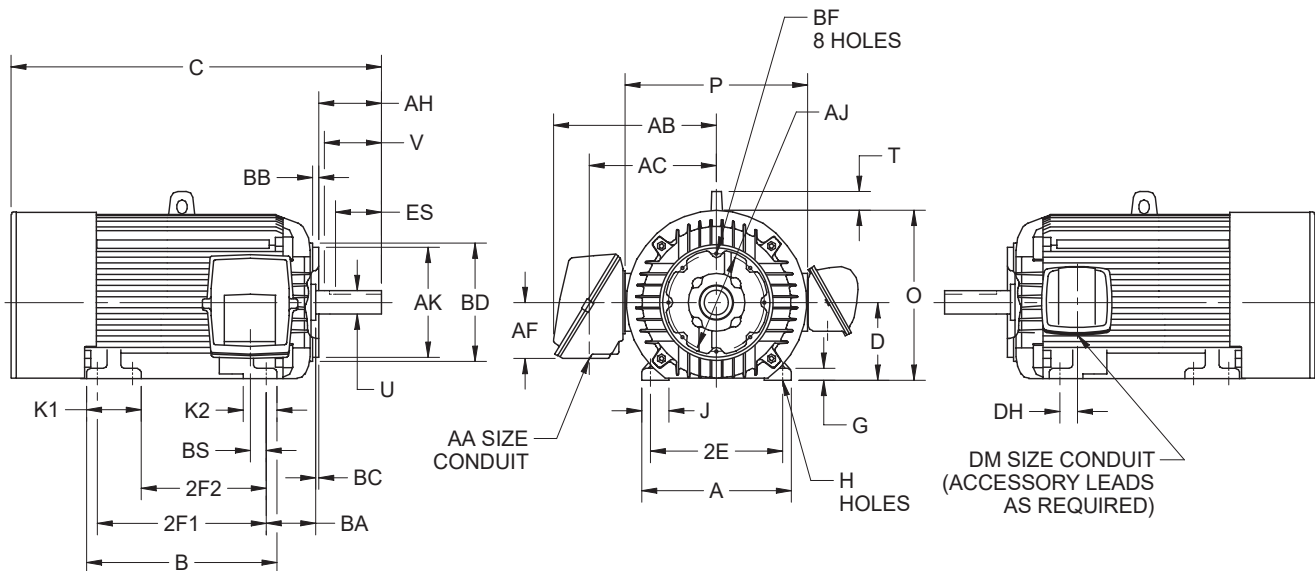
1. DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED.
CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS
OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
4. TOLERANCES SHOWN ARE IN INCHES ONLY.



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 449TC

TYPE J

PRINT # 07-2157



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	C	D -.06	2E ±.03	2F1 ±.03	2F2 ±.03	G	H ±.05	J	K1
IN	22.00	28.00	51.38	11.00	18.00	25.00	20.00	1.50	.81	4.00	8.00
MM	559	711	1305	279	457	635	508	38	21	102	203

UNITS	K2	O	P ²	T	U -.001	V MIN	AH	AJ	AK -.005	BA	BB MIN
IN	5.00	24.06	26.50	2.88	3.375	8.25	8.25	14.000	16.000	7.50	.25
MM	127	611	673	73	87.73	210	210	355.60	406.40	191	6

UNITS	BC	BD MAX	BF ³	BS	DH	ES MIN	SQ KEY
IN	.25	16.63	5/8-11 X .94	2.50	2.50	7.00	.875
MM	6	422		64	64	178	22.23

UNITS	VOLTS	AB	AC	AF	AA	DM
IN	460	24.25	18.53	8.06	2 NPT	3/4 NPT
MM		616	471	205	2 1/2 NPT	1 NPT
IN	2300	24.25	18.53	8.06	3 NPT	1 1/2 NPT
MM		616	471	205	3 1/2 NPT	
IN	4000	24.75	20.63	10.00	4 NPT	
MM		629	524	254		

1. DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. TAP SIZE AND BOLT PENETRATION ALLOWANCE.
4. ALL TAPPED HOLES ARE UNIFIED NATIONAL COARSE, RIGHT HAND THREAD.
5. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED.
CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
6. MOTOR MUST BE FOOT-MOUNTED AND SUPPORTED. FLANGE CANNOT SUPPORT MOTOR WEIGHT.
7. TOLERANCES SHOWN ARE IN INCHES ONLY.

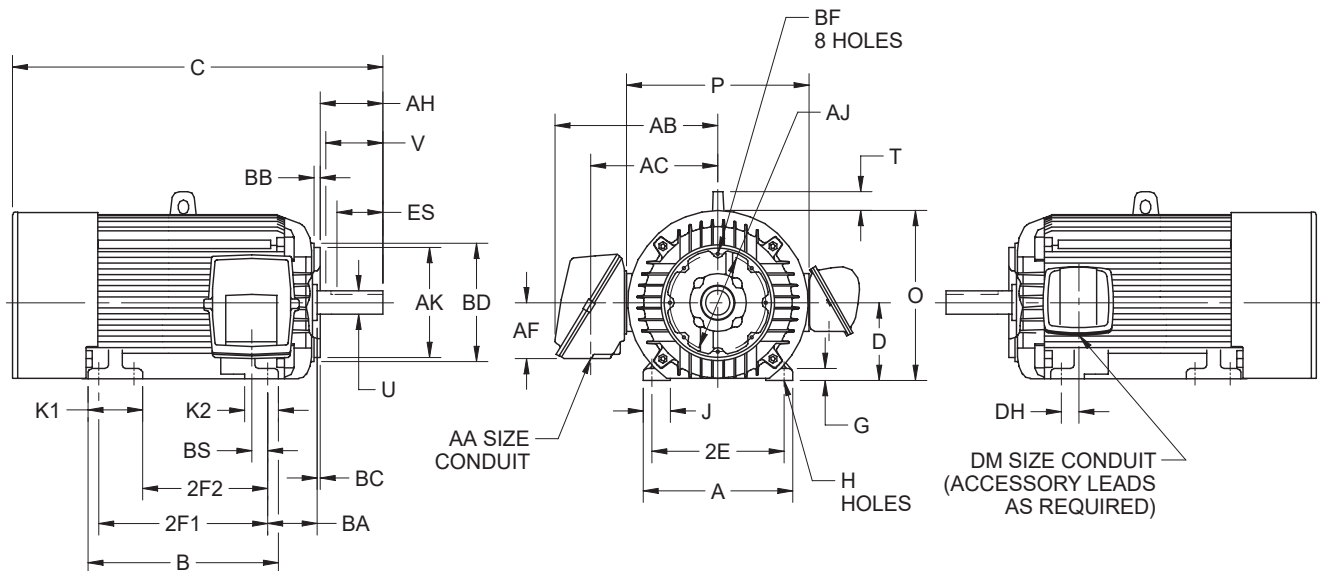
TOLERANCES	
FACE RUNOUT	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBIT	.007 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.003 T.I.R.



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 449TSC

TYPE J

PRINT # 07-2162



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	C	D -.06	2E ±.03	2F1 ±.03	2F2 ±.03	G	H ±.05	J	K1
IN	22.00	28.00	51.38	11.00	18.00	25.00	20.00	1.50	.81	4.00	8.00
MM	559	711	1305	279	457	635	508	38	21	102	203

UNITS	K2	O	P ²	T	U -.001	V MIN	AH	AJ	AK -.005	BA	BB MIN
IN	5.00	24.06	26.50	2.88	2.375	4.50	4.50	14.000	16.000	7.50	.25
MM	127	611	673	73	60.33	114	114	355.60	406.40	191	6

UNITS	BC	BD MAX	BF ³	BS	DH	ES MIN	SQ KEY
IN	.25	16.63	5/8-11 X .94	2.50	2.50	3.13	.625
MM	6	422		64	64	79	15.88

UNITS	VOLTS	AB	AC	AF	AA	DM
IN	460	24.25	18.53	8.06	2 NPT	3/4 NPT
MM		616	471	205	2 1/2 NPT	1 NPT
IN	2300	24.25	18.53	8.06	3 NPT	1 1/2 NPT
MM		616	471	205	3 1/2 NPT	
IN	4000	24.75	20.63	10.00	4 NPT	
MM		629	524	254		

- DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- LARGEST MOTOR WIDTH.
- TAP SIZE AND BOLT PENETRATION ALLOWANCE.
- ALL TAPPED HOLES ARE UNIFIED NATIONAL COARSE, RIGHT HAND THREAD.
- STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED.
CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- MOTOR MUST BE FOOT-MOUNTED AND SUPPORTED. FLANGE CANNOT SUPPORT MOTOR WEIGHT.
- TOLERANCES SHOWN ARE IN INCHES ONLY.

TOLERANCES	
FACE RUNOUT	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBIT	.007 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.003 T.I.R.

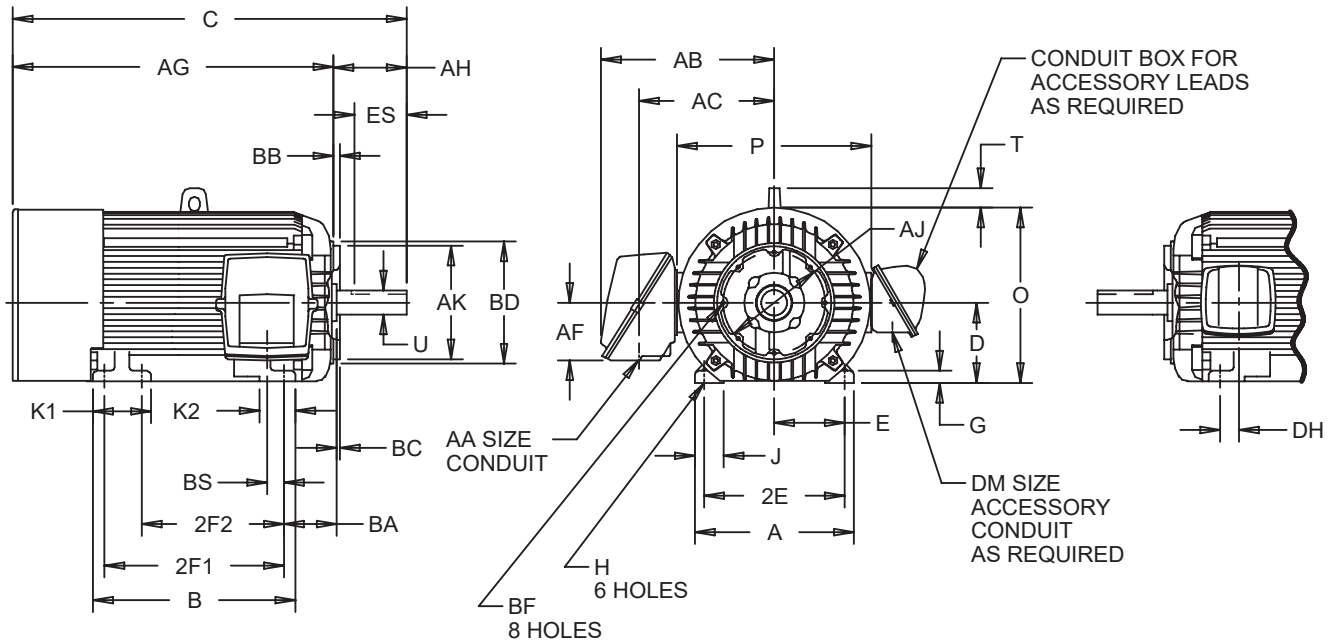
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 449TMC

TYPE J

PRINT # 07-2161



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	C	D -.06	E	2E ±.03	2F1 ±.03	2F2 ±.03	G	H ±.05	J
IN	22.00	28.00	51.38	11.00	9.00	18.00	25.00	20.00	1.50	.81	4.00
MM	559	711	1305	279	229	457	635	508	38	21	102

UNITS	K1	K2	O	P ⁶	T	U -.001	AG	AH	AJ	AK -.005
IN	8.00	5.00	24.06	26.50	2.88	2.875	46.88	4.50	14.000	16.000
MM	203	127	611	673	73	73.03	1191	114	355.60	406.40

UNITS	BA	BB MIN	BC	BD MAX	BF ⁶	BS	DH	ES MIN	SQ KEY
IN	7.50	.25	.25	16.63	5/8-11 X .94	2.50	2.50	3.63	.750
MM	191	6	6	422		64	64	92	19.05

UNITS	VOLTS	AA	AB	AC	AF	DM	TOLERANCES	
IN	460	3 1/2 NPT	23.44	17.94	8.06	3/4 NPT	FACE RUNOUT	.007 T.I.R.
MM			595	456	205		PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 T.I.R.
IN	2300		23.44	17.94	8.06		PERMISSIBLE SHAFT RUNOUT	.003 T.I.R.
MM			595	456	205			
IN	4000		24.31	19.06	10.00			
MM			618	484	254			

- DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- LARGEST MOTOR WIDTH.
- TAP SIZE AND BOLT PENETRATION ALLOWANCE.
- ALL TAPPED HOLES ARE UNIFIED NATIONAL COARSE, RIGHT HAND THREAD.
- STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED.
CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- MOTOR MUST BE FOOT-MOUNTED AND SUPPORTED. FLANGE CANNOT SUPPORT MOTOR WEIGHT.
- TOLERANCES SHOWN ARE IN INCHES ONLY.

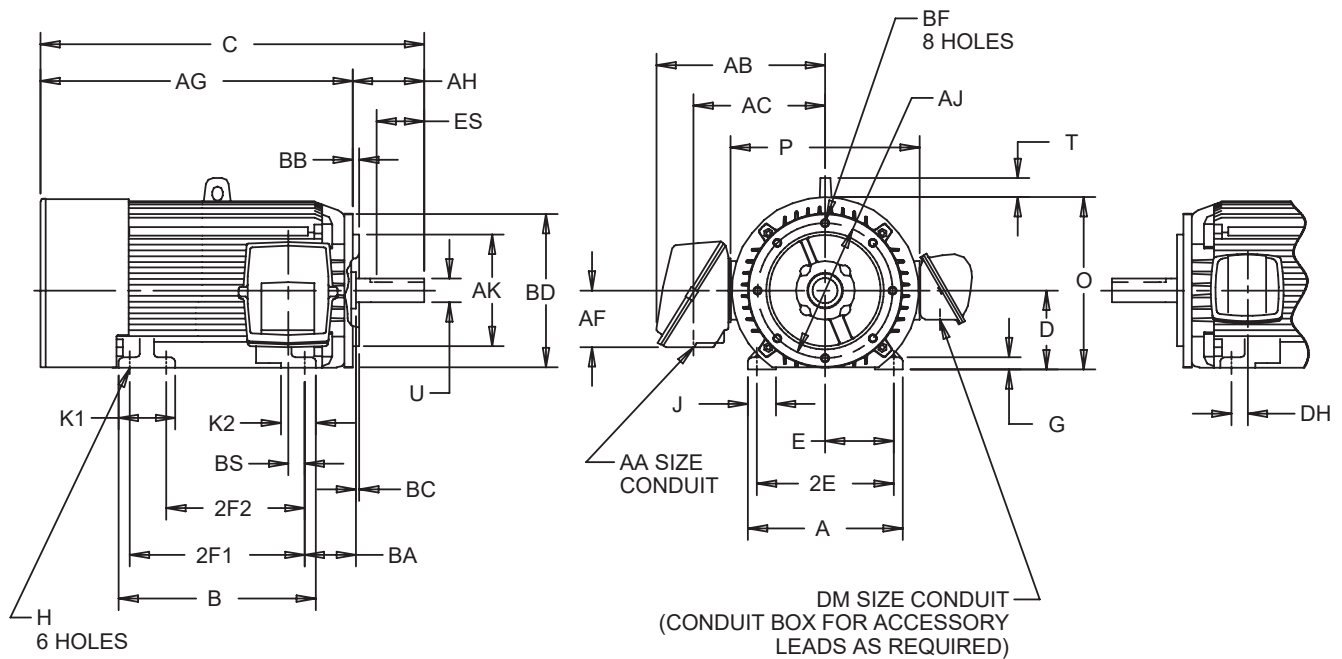
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 449TD

TYPE J

PRINT # 07-2158



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	C	D -.06	E	2E ±.03	2F1 ±.03	2F2 ±.03	G	H ±.05	J	K1
IN	22.00	28.00	55.13	11.00	9.00	18.00	25.00	20.00	1.50	.81	4.00	8.00
MM	559	711	1400	279	229	457	635	508	38	21	102	203

UNITS	K2	O	P ²	T	U -.001	AA	AG	AH	AJ	AK -.005	BA	BB MIN
IN	5.00	24.06	26.13	2.88	3.375	3 1/2 NPT	25.00	8.50	20.000	18.000	7.50	.25
MM	127	611	664	73	87.73		1184	216	508.00	457.20	191	6

UNITS	BC	BD MAX	BF	BS	DH	DM	ES MIN	SQ KEY
IN	0	22.00	.81	2.50	2.50	3/4 NPT	6.88	.875
MM	0	559	21	64	64		175	22.23

UNITS	VOLTS	AB	AC	AF
IN	460	23.44	17.94	8.06
MM		595	456	205
IN	2300	23.44	17.94	8.06
MM		595	456	205
IN	4000	24.44	18.94	10.00
MM		621	481	254

TOLERANCES	
FACE RUNOUT	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.003 T.I.R.

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2: LARGEST MOTOR WIDTH.

3: STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED.

CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.

STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

4: MOTOR MUST BE FOOT-MOUNTED AND SUPPORTED. FLANGE CANNOT SUPPORT MOTOR WEIGHT.

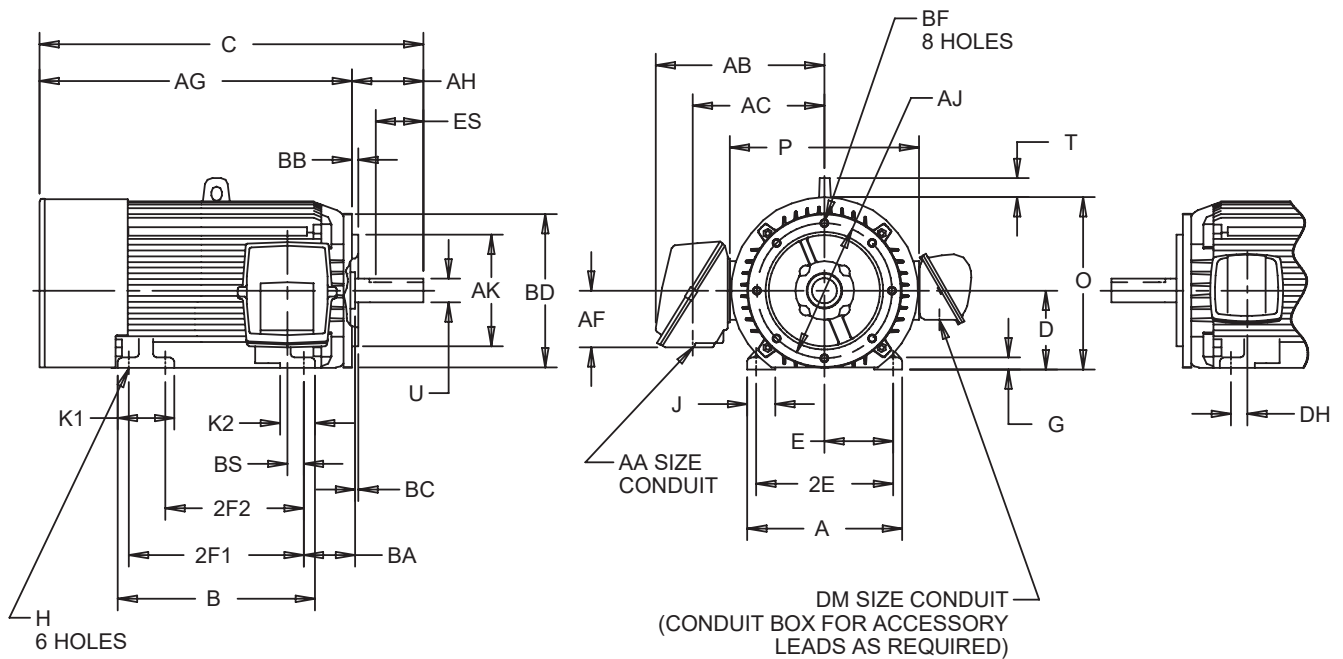
5: TOLERANCES SHOWN ARE IN INCHES ONLY.

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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 449TSD

TYPE J

PRINT # 07-2164



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	C	D -.06	E	2E ±.03	2F1 ±.03	2F2 ±.03	G	H ±.05	J	K1
IN	22.00	28.00	51.38	11.00	9.00	18.00	25.00	20.00	1.50	.81	4.00	8.00
MM	559	711	1305	279	229	457	635	508	38	21	102	203

UNITS	K2	O	P ²	T	U -.001	AA	AG	AH	AJ	AK -.005	BA	BB MIN
IN	5.00	24.06	26.50	2.88	2.375	3 1/2 NPT	46.88	4.50	20.000	18.000	7.50	.25
MM	127	611	673	73	60.33		1190	114	508.00	457.20	191	6

UNITS	BC	BD MAX	BF	BS	DH	DM	ES MIN	SQ KEY
IN	0	22.00	.81	2.50	2.50	3/4 NPT	3.13	.625
MM	0	559	21	64	64		79	15.88

UNITS	VOLTS	AB	AC	AF
IN	460	23.44	17.94	8.06
MM		595	456	205
IN	2300	23.44	17.94	8.06
MM		595	456	205
IN	4000	24.31	19.06	10.00
MM		618	484	254

TOLERANCES	
FACE RUNOUT	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.003 T.I.R.

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2: LARGEST MOTOR WIDTH.

3: STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED.

CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.

STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

4: MOTOR MUST BE FOOT-MOUNTED AND SUPPORTED. FLANGE CANNOT SUPPORT MOTOR WEIGHT.

5: TOLERANCES SHOWN ARE IN INCHES ONLY.

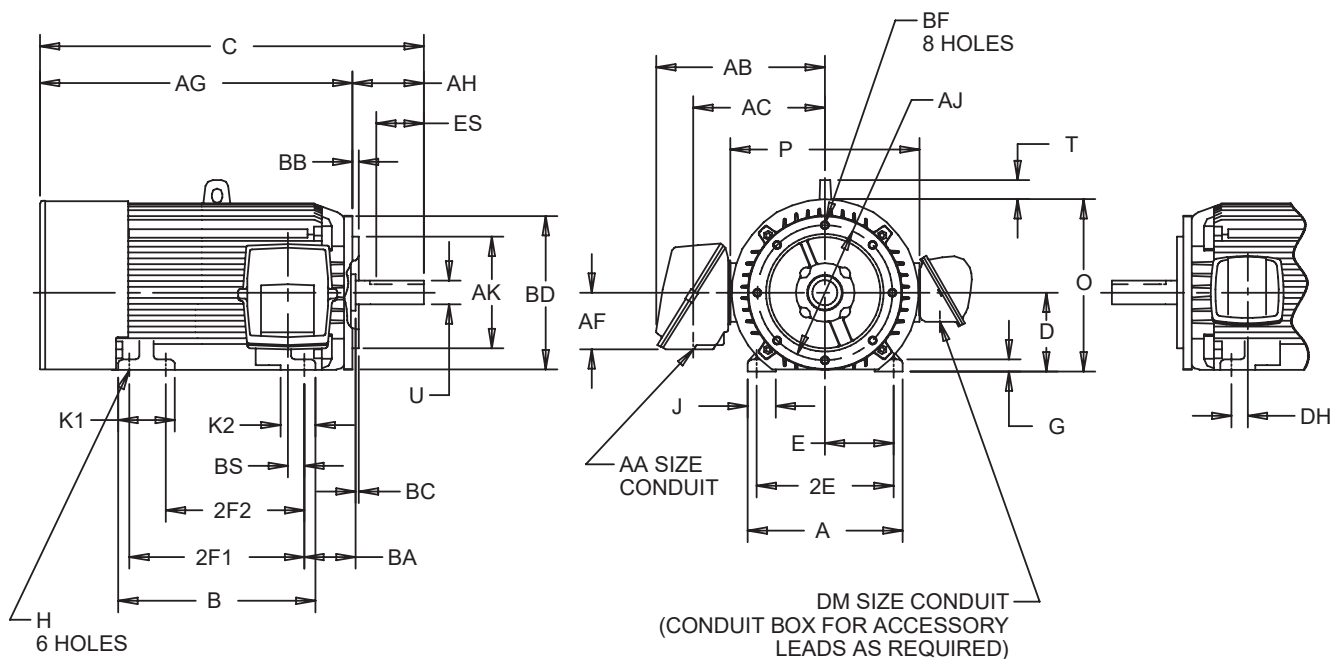
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 449TMD

TYPE J

PRINT # 07-2163



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	C	D -.06	E	2E ±.03	2F1 ±.03	2F2 ±.03	G	H ±.05	J	K1
IN	22.00	28.00	51.38	11.00	9.00	18.00	25.00	20.00	1.50	.81	4.00	8.00
MM	559	711	1305	279	229	457	635	508	38	21	102	203

UNITS	K2	O	P ²	T	U -.001	AA	AG	AH	AJ	AK -.005	BA	BB MIN
IN	5.00	24.06	26.50	2.88	2.875	3 1/2 NPT	46.88	4.50	20.000	18.000	7.50	.25
MM	127	611	673	73	73.03		1190	114	508.00	457.20	191	6

UNITS	BC	BD MAX	BF	BS	DH	DM	ES MIN	SQ KEY
IN	0	22.00	.81	2.50	2.50	3/4 NPT	3.63	.750
MM	0	559	21	64	64		92	19.05

UNITS	VOLTS	AB	AC	AF
IN	460	23.44	17.94	8.06
MM		595	456	205
IN	2300	23.44	17.94	8.06
MM		595	456	205
IN	4000	24.31	19.06	10.00
MM		618	484	254

TOLERANCES	
FACE RUNOUT	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.003 T.I.R.

- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: LARGEST MOTOR WIDTH.
- 3: STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED.
CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- 4: MOTOR MUST BE FOOT-MOUNTED AND SUPPORTED. FLANGE CANNOT SUPPORT MOTOR WEIGHT.
- 5: TOLERANCES SHOWN ARE IN INCHES ONLY.

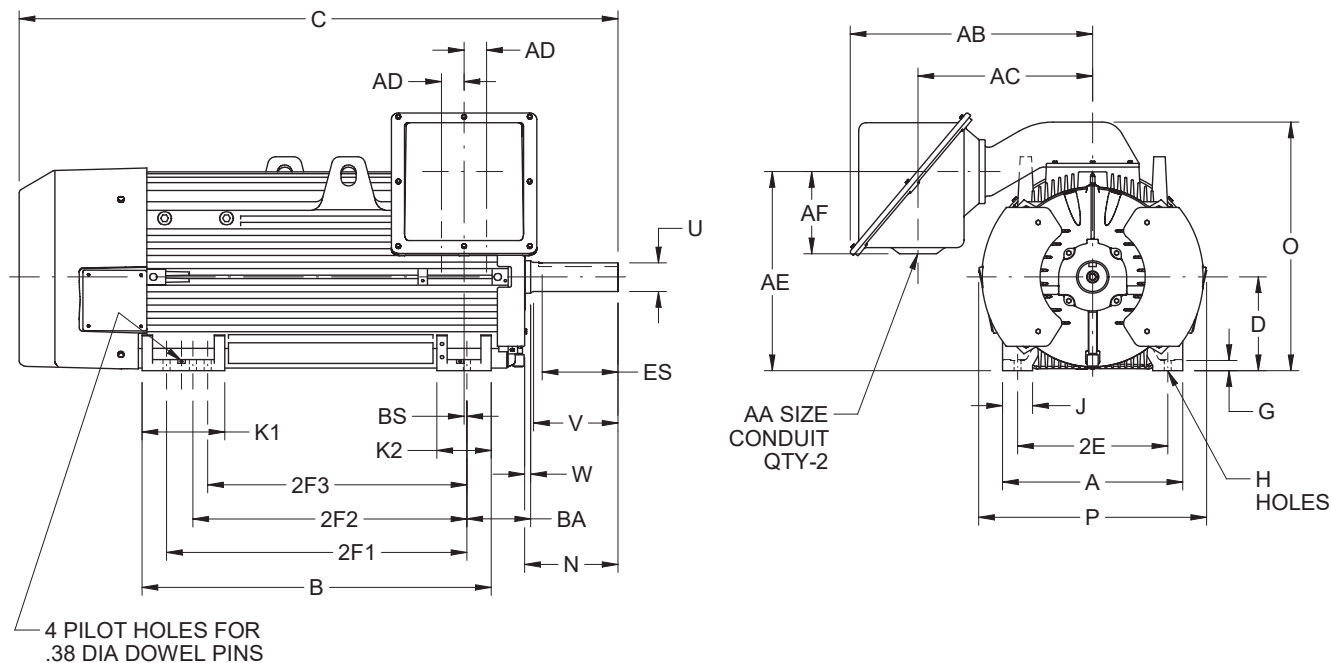
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 5000S, ML

TYPE J

PRINT # 07-2690



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H ⁴ ±.05	J	K1	K2	O
24.00	12.50	20.00	1.38	.94	4.00	11.00	7.25	33.13
P ²	W	AB	AC	AD	AE	AF	BA	BS
30.50	.69	32.25	23.25	3.00	26.50	10.94	8.50	.38
FRAME	N	U -.001	V MIN	ES MIN	SQ KEY			
5000S	6.44	2.875	5.50	4.00	.750			
5000ML	12.31	3.875	11.38	10.00	1.000			
FRAME	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03	AA		
5008S	31.50	60.63	25.00	22.00	20.00	1 1/2 NPT		
5008ML	31.50	66.50	25.00	22.00	20.00	2 NPT		
5010S	38.50	67.63	32.00	28.00	N/A	3 NPT		
5010ML	38.50	73.50	32.00	28.00	N/A	3 1/2 NPT		
5012S	46.50	75.63	40.00	36.00	N/A	4 NPT		
5012ML	46.50	81.50	40.00	36.00	N/A			

- DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- LARGEST MOTOR WIDTH.
- CONDUIT OPENING MAY BE ROTATED IN STEPS OF 90 DEGREES.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- QTY-8 HOLES ON 5008 FRAME AND QTY-6 HOLES ON ALL OTHERS.

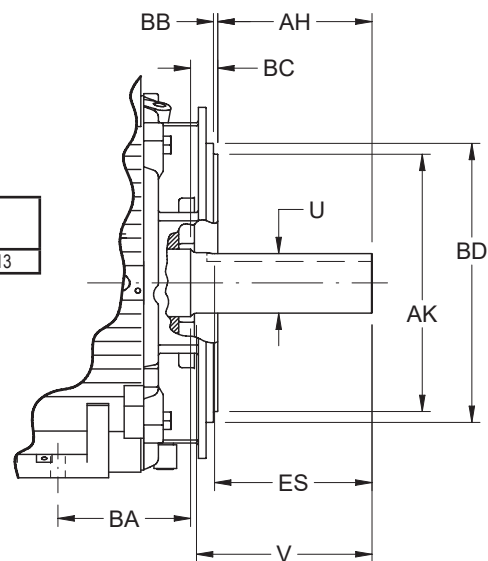
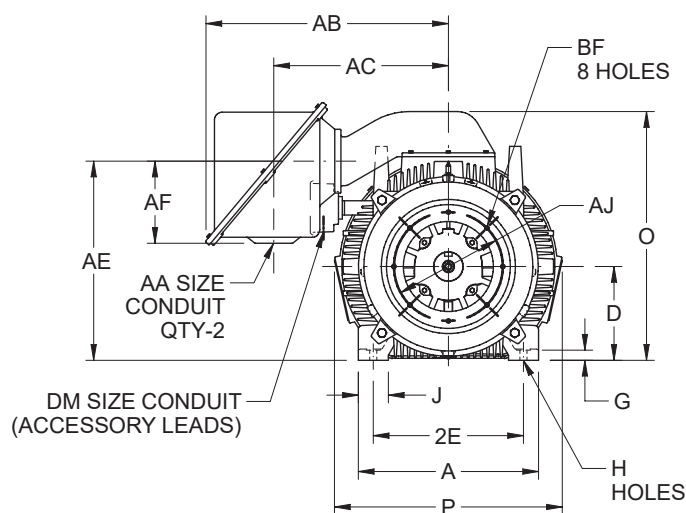
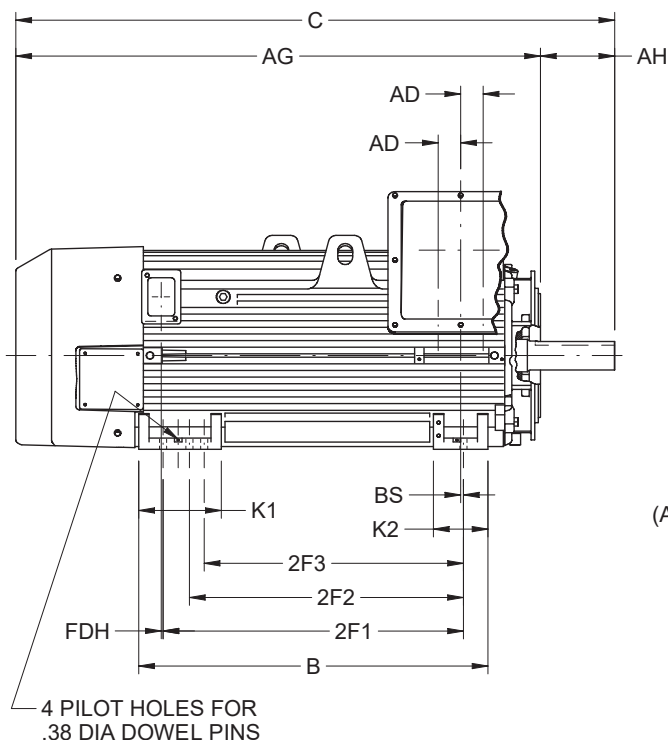
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 5000SC, MLC

TYPE J

PRINT # 07-2991



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H ⁴ +.05	J	K1	K2	O
24.00	12.50	20.00	1.38	.94	4.00	11.00	7.25	33.13

P ²	W	AB	AC	AD	AE	AF	AJ
30.50	.69	32.25	23.25	3.00	26.50	10.94	14.500

AK -.005	BA	BB MIN	BC	BD MAX	BF ⁵	BS	FDH
16.500	10.00	.25	.25	18.00	.625-11	.38	.25

FRAME	U -.001	V MIN	AH	ES MIN	SQ KEY
5000SC	2.875	5.50	5.50	4.00	.750
5000MLC	3.875	11.38	11.38	10.00	1.000

FRAME	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03	AG	AA	DM
5008SC	31.50	62.13	25.00	22.00	20.00	56.63	3 NPT	3/4 NPT
5008MLC	31.50	68.00	25.00	22.00	20.00	56.63	3 1/2 NPT	1 NPT
5010SC	38.50	69.13	32.00	28.00	N/A	63.63	4 NPT	1 1/4 NPT
5010MLC	38.50	75.00	32.00	28.00	N/A	63.63		1 1/2 NPT
5012SC	46.50	77.13	40.00	36.00	N/A	71.63		
5012MLC	46.50	83.00	40.00	36.00	N/A	71.63		

- DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- LARGEST MOTOR WIDTH.
- CONDUIT OPENING MAY BE ROTATED IN STEPS OF 90 DEGREES.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- QTY-8 HOLES ON 5008 FRAME AND QTY-6 HOLES ON ALL OTHERS.
- UNC-2B RIGHT HAND THREAD.
- MOTOR MUST BE FOOT-MOUNTED AND SUPPORTED. FLANGE CANNOT SUPPORT MOTOR WEIGHT.

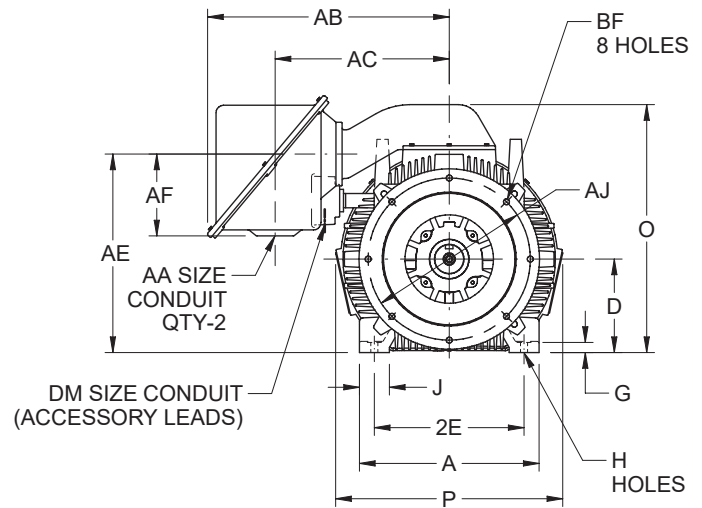
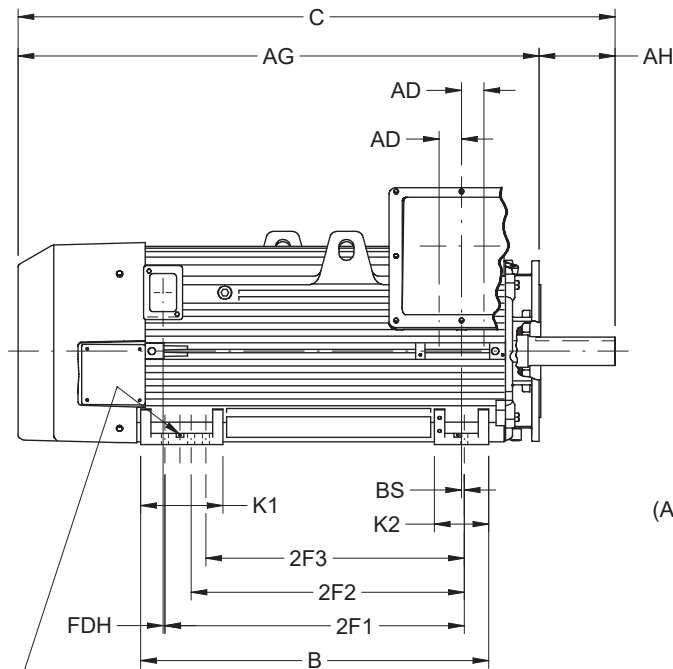
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 5000SD, MLD

TYPE J

PRINT # 07-3068



ALL DIMENSIONS ARE IN INCHES

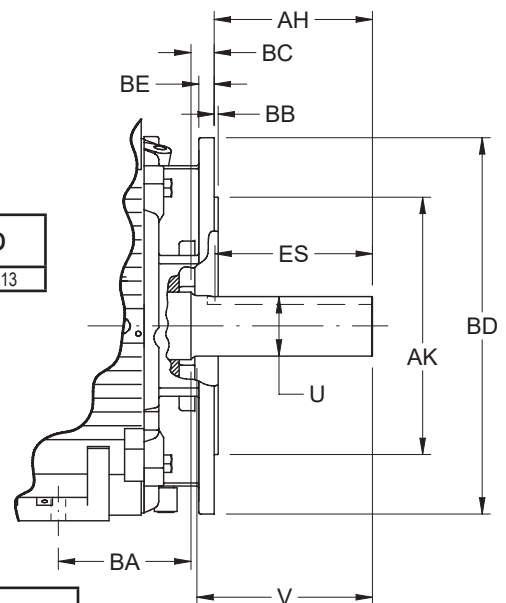
A	D -.06	2E ±.03	G	H ⁴ +.05	J	K1	K2	O
24.00	12.50	20.00	1.38	.94	4.00	11.00	7.25	33.13

P ²	W	AB	AC	AD	AE	AF	AJ
30.50	.69	32.25	23.25	3.00	26.50	10.94	22.000

AK -.005	BA	BB -.06	BC	BD MAX	BE	BF	BS	FDH
18.000	10.00	.25	0	25.00	1.00	.813	.38	.25

FRAME	U -.001	V MIN	AH	ES MIN	SQ KEY
5008SD	2.875	5.50	5.50	4.00	.750
5000MLD	3.875	11.38	11.38	10.00	1.000

FRAME	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03	AG	AA	DM
5008SD	31.50	62.13	25.00	22.00	20.00	56.63	3 NPT	3/4 NPT
5008MLD	31.50	68.00	25.00	22.00	20.00	56.63	3 1/2 NPT	1 NPT
5010SD	38.50	69.13	32.00	28.00	N/A	63.63	4 NPT	1 1/4 NPT
5010MLD	38.50	75.00	32.00	28.00	N/A	63.63		1 1/2 NPT
5012SD	46.50	77.13	40.00	36.00	N/A	71.63		
5012MLD	46.50	83.00	40.00	36.00	N/A	71.63		



1. DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. CONDUIT OPENING MAY BE ROTATED IN STEPS OF 90 DEGREES.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
4. QTY-8 HOLES ON 5008 FRAME AND QTY-6 HOLES ON ALL OTHERS.
5. MOTOR MUST BE FOOT-MOUNTED AND SUPPORTED. FLANGE CANNOT SUPPORT MOTOR WEIGHT.

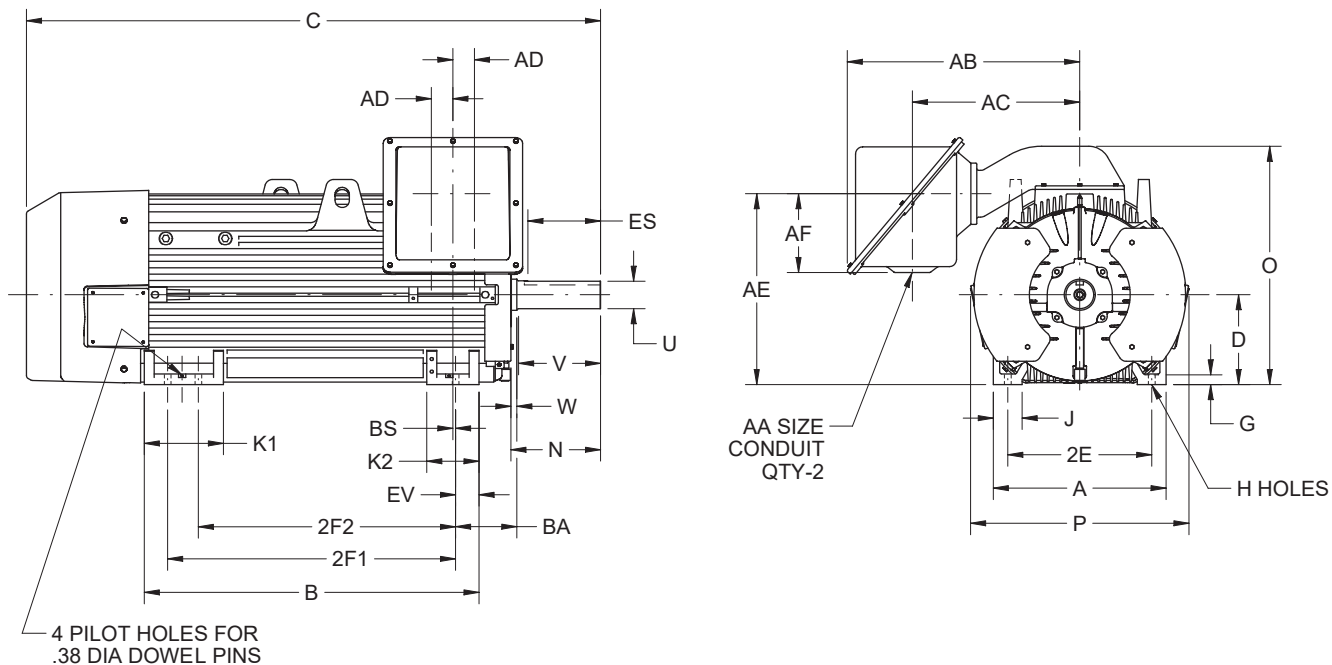
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 5800S, SS, ML

TYPE J

PRINT # 07-2922



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H ⁴ +.05	J	K1	K2	O	P ²
28.25	14.50	23.00	1.63	1.09	5.00	11.25	8.00	37.56	35.00

W	AB	AC	AD	AE	AF	BA	BS	EV
.63	35.81	26.75	3.00	30.94	10.94	10.00	.38	3.06

FRAME	N	U -.001	V MIN	ES MIN	SQ KEY
5800SS ⁴	6.38	2.875	5.50	4.00	.750
5800S	7.38	3.375	6.50	5.25	.875
5800L	15.25	4.875	14.38	12.88	1.250

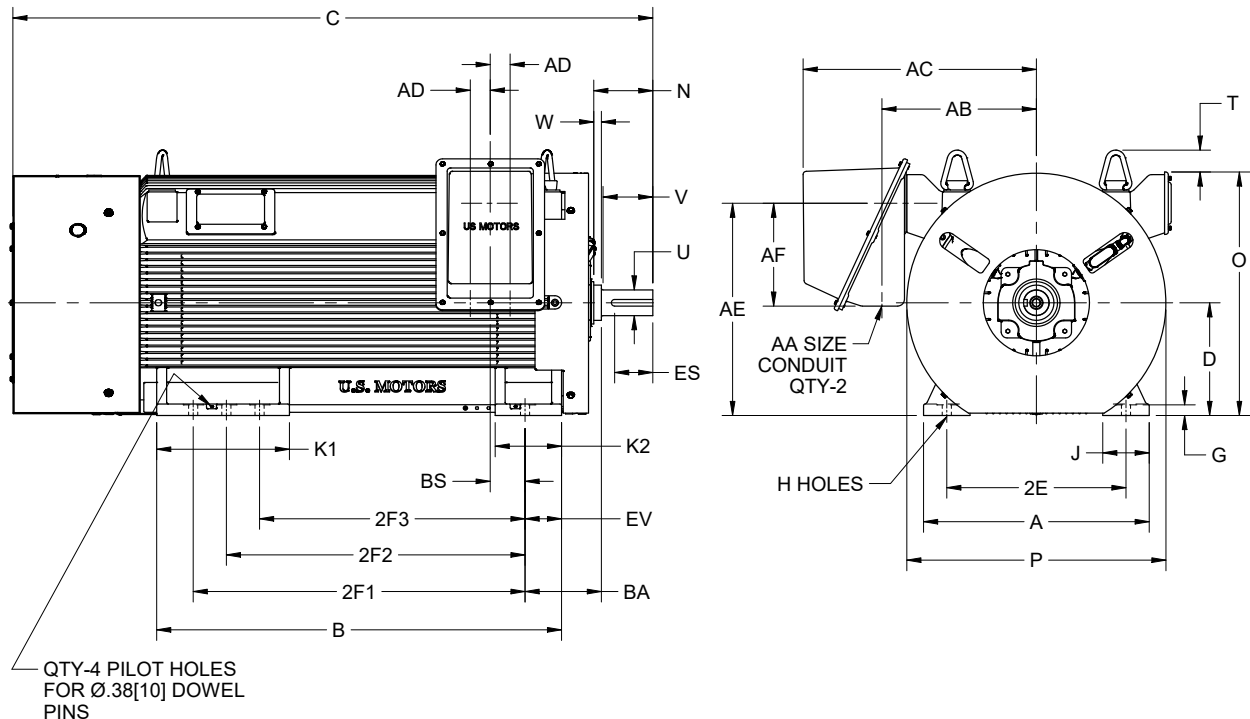
FRAME	B	C	2F1 ±.03	2F2 ±.03	AA
5810SS ⁴	41.75	76.63	36.00	32.00	3 NPT
5810S	41.75	77.63	36.00	32.00	3 1/2 NPT
5810L	41.75	85.50	36.00	32.00	4 NPT
5812SS ⁴	50.75	85.63	45.00	40.00	
5812S	50.75	86.63	45.00	40.00	
5812L	50.75	94.50	45.00	40.00	

1. DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. CONDUIT OPENING MAY BE ROTATED IN STEPS OF 90 DEGREES.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
4. SS SHAFT EXTENSION ONLY AVAILABLE ON 2 POLE.

HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
AUTOMOTIVE DUTY
ANTI-FRICTION BEARING
FRAME: 6800S

TYPE J (4-POLE & SLOWER)

PRINT # 07-3413



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	2E ±.03	G	H +.05	J	K1	K2	N	O	P ²
IN	34.00	17.00	27.00	1.63	1.38	7.00	20.00	10.00	8.88	36.69	39.03
MM	864	432	686	41	35	178	508	254	226	932	991

UNITS	T	U -.001	V MIN	W	AA	AB	AC	AD	AE	AF	BA
IN	3.28	3.875	7.50	1.16	3 1/2 NPT	35.13	23.25	3.00	32.00	15.50	11.50
MM	83	98.43	191	29		893	591	76	813	394	292

UNITS	BS	ES MIN	EV	SQ KEY
IN	5.25	5.63	5.50	1.000
MM	133	143	140	25.40

FRAME	UNITS	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03
6808S	IN	47.00	82.44	36.00	32.00	28.00
	MM	1194	2094	914	813	711
6809S	IN	51.00	86.44	40.00	36.00	32.00
	MM	1295	2196	1016	914	813
6811S	IN	61.00	96.44	50.00	45.00	40.00
	MM	1549	2450	1270	1143	1016

1. ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2. LARGEST MOTOR WIDTH.

3. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE. CONDUIT OPENING MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

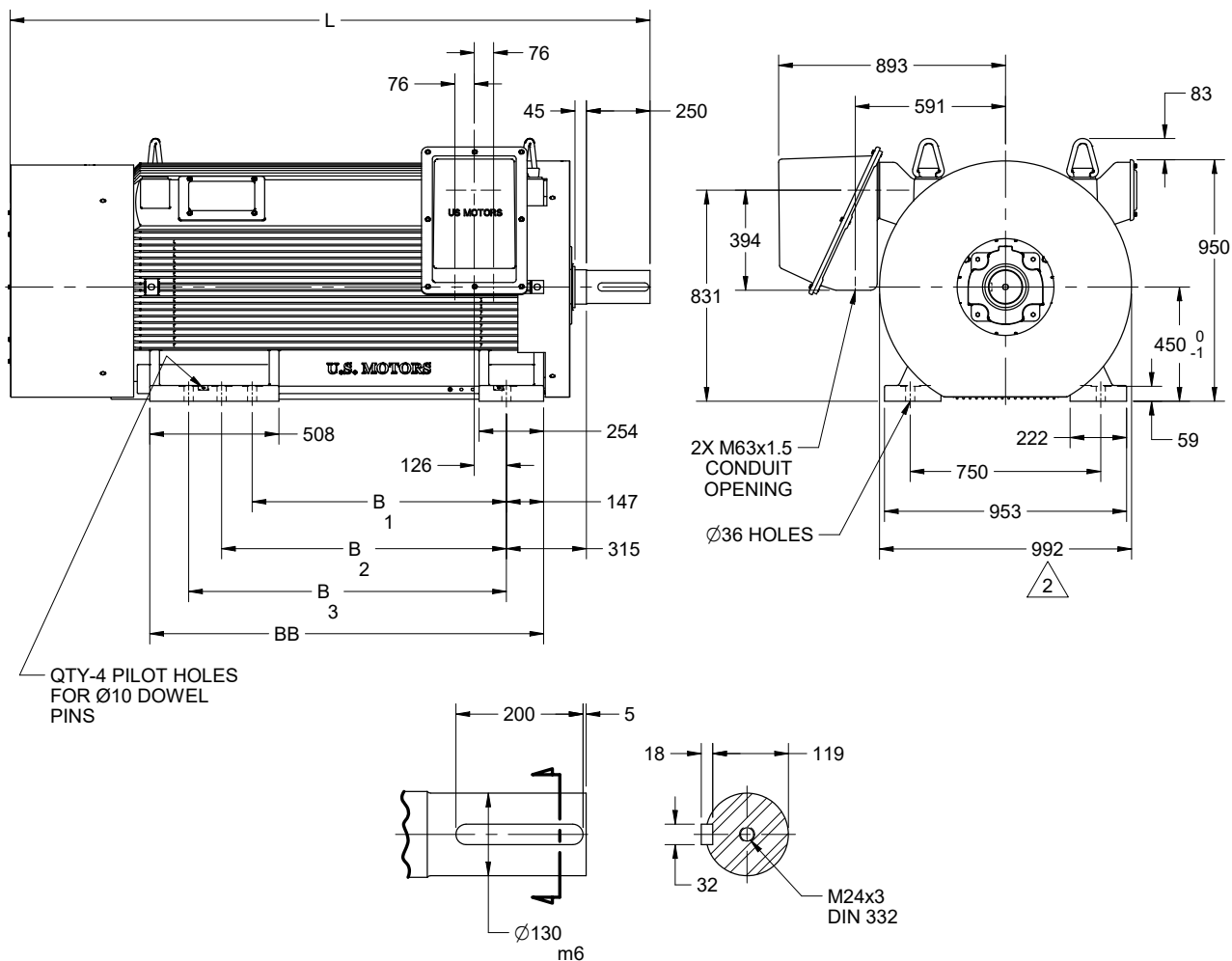
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
AUTOMOTIVE DUTY
ANTI-FRICTION BEARING
FRAME: 450 (IEC)

TYPE J (4-POLE & SLOWER)

PRINT # 07-3407



ALL DIMENSIONS ARE IN MILLIMETERS

FRAME	UNIT	L	B ₁	B ₂	B ₃
450 M/L/A	1194	2162	710	800	900
450 L/A/B	1295	2264	800	900	1000
450 B/C/D	1549	2518	1000	1120	1250

1. DIMENSIONS MAY VARY BY 6mm DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2. LARGEST MOTOR WIDTH.

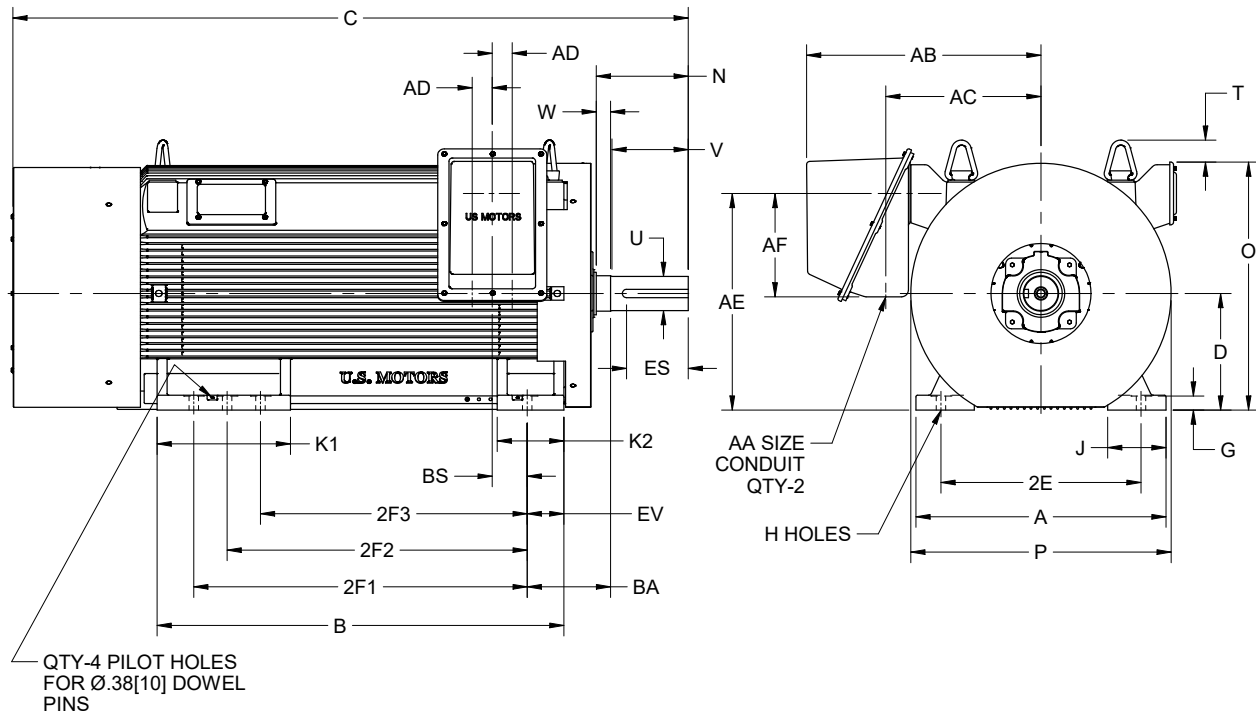
3. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE. CONDUIT OPENING MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
AUTOMOTIVE DUTY
ANTI-FRICTION BEARING
FRAME: 7000

TYPE J (4-POLE & SLOWER)

PRINT # 07-3408



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	2E ±.03	G	H +.05	J	K1	K2	N	O	P ²
IN	37.50	17.50	30.00	2.13	1.42	8.75	20.00	10.00	13.78	37.19	39.03
MM	953	445	762	54	36	222	508	254	350	945	991

UNITS	T	U -.001	V MIN	W	AA	AB	AC	AD	AE	AF	BA
IN	3.28	5.125	11.38	2.16	3 NPT	35.13	23.25	3.00	32.50	15.50	12.50
MM	83	130.18	289	55		893	591	76	826	394	318

UNITS	BS	ES MIN	EV	SQ KEY
IN	5.25	9.25	5.50	1.250
MM	133	235	140	31.75

FRAME	UNITS	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03
7007/06/05	IN	47.00	87.28	36.00	32.00	28.00
	MM	1194	2217	914	813	711
7008/07/06	IN	51.00	91.28	40.00	36.00	32.00
	MM	1295	2319	1016	914	813
7010/09/08	IN	61.00	101.28	50.00	45.00	40.00
	MM	1549	2573	1270	1143	1016

1. ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2. LARGEST MOTOR WIDTH.

3. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE. CONDUIT OPENING MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

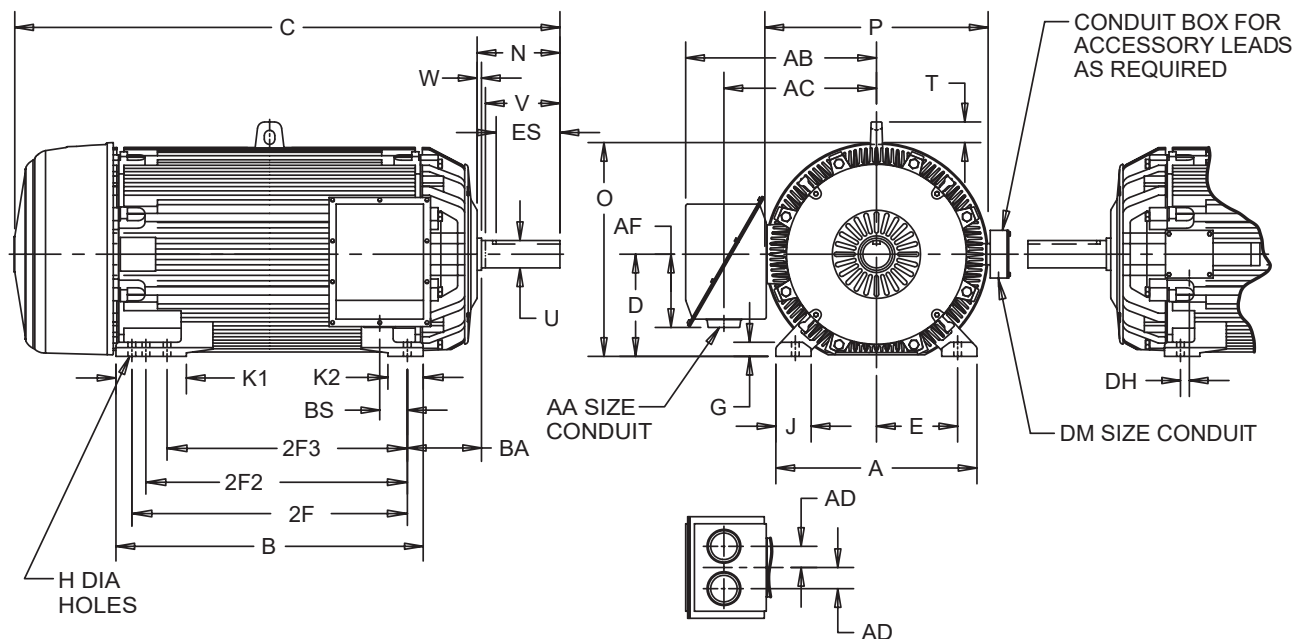
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
DIVISION 1 HAZARDOUS LOCATION
ANTI-FRICTION BEARING
FRAME: 5800S, SS, ML

TYPE E, J

PRINT # 07-2043



ALL DIMENSIONS ARE IN INCHES

FRAME	A	B	D -.06	E	2F ±.03	G	H +.05	J	K	O	P	T	W	BA	BS
5807	28.50	29.50	14.50	11.50	25.00	2.00	1.09	5.00	5.00	30.06	31.13	3.19	.13	10.00	3.91
5809	28.50	36.50	14.50	11.50	32.00	2.00	1.09	5.00	5.00	30.06	31.13	3.19	.13	10.00	3.91
5811	28.50	44.50	14.50	11.50	40.00	2.00	1.09	5.00	5.00	30.06	31.13	3.19	.13	10.00	3.91

FRAME	HP	TYPE	VOLTS	QTY OF CONDUIT	AB	AC	AD	AF	DH
5800	THRU 500	J	460	1	26.13	20.63	-	8.06	1.25
	ALL		2300		32.38	23.75	3.00	10.94	
	OVER 500		460	2	27.13	21.63	-	10.00	
	ALL	E	4000	1	26.13	19.44	-	5.63	1.25
	THRU 500		460	1	26.13	19.44	-	5.63	
	ALL		2300		32.00	21.63	3.00	8.63	
	OVER 500	E	460	2	32.00	21.63	3.00	8.63	
	ALL		4000		32.00	21.63	3.00	8.63	

FRAME	NO. OF POLES	C	N	U -.001	V MIN	ES MIN	SQ. KEY
5807SS	2	57.50	5.88	2.875	5.50	4.13	.750
5809SS		64.50	5.88	2.875	5.50	4.13	.750
5811SS		72.50	5.88	2.875	5.50	4.13	.750
5807S	4 AND MORE	58.50	6.88	3.375	6.50	5.25	.875
5809S		65.50	6.88	3.375	6.50	5.25	.875
5811S		73.50	6.88	3.375	6.50	5.25	.875
5807ML		63.38	11.75	3.875	11.25	10.00	1.000
5809ML		70.38	11.75	3.875	11.25	10.00	1.000
5811ML		78.38	11.75	3.875	11.25	10.00	1.000

AA	DM
2 1/2 NPT	3/4 NPT
3 NPT	1 NPT
3 1/2 NPT	1 1/4 NPT
4 NPT	1 1/2 NPT

1. ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. A MINIMUM CLEARANCE OF .25" BETWEEN FACE OF MOTOR AND COUPLING GUARD IS REQUIRED TO PERMIT AIR FLOW.
3. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
4. "SS" SHAFT EXTENSION IS AVAILABLE ONLY ON 2-POLE RATINGS. "S" AND "ML" SHAFT EXTENSIONS ARE NOT AVAILABLE ON 2-POLE RATINGS.

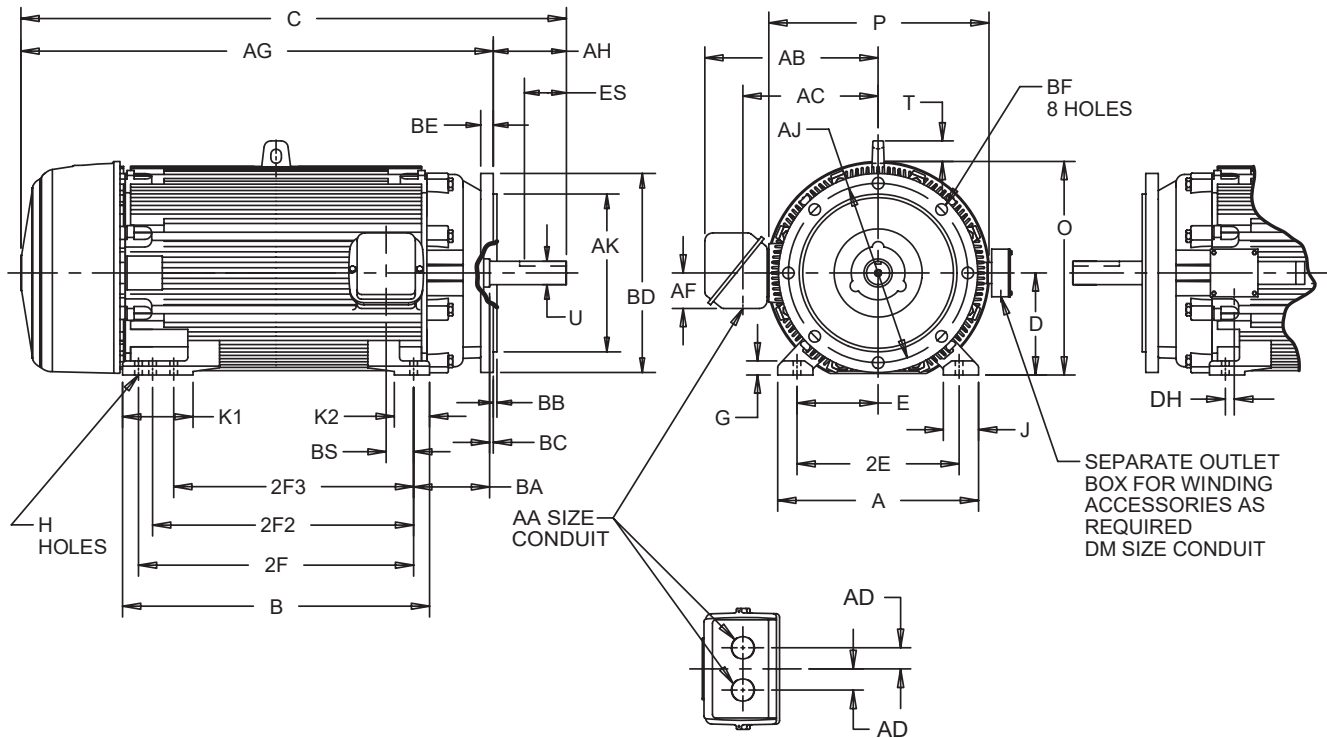
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
ANTI-FRICTION BEARING
FRAME: 5800SD

TYPE J

PRINT # 16-A-263



ALL DIMENSIONS ARE IN INCHES

A	D -.06	E	2E ±.03	G	H +.05	J	K	O	P	T	U -.001
28.50	14.50	11.50	23.00	2.00	1.09	5.00	5.00	30.06	31.13	3.19	3.375

AH	AJ	AK -.005	BA	BB MIN	BC	BD MAX	BE	BF	BS	DH	ES MIN	SQ KEY
6.75	22.000	18.000	10.00	.25	0	24.63	.88	.81	3.91	1.25	5.25	.88

HP	VOLT	AA	AB	AC	AD	AF	DM
THRU 500	460	3-1/2 NPT	26.13	20.63	-	8.06	3/4 NPT
501 & UP	460		32.50	25.38	3.00	10.94	
ALL	2300		26.13	20.63	-	8.06	
ALL	4000		27.13	21.63	-	10.00	

FRAME	B	C	2F ±.03	AG
5807	29.50	58.50	25.00	51.75
5809	36.50	65.50	32.00	58.75
5811	44.50	73.50	40.00	66.75

TOLERANCES	
FACE RUNOUT	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.003 T.I.R.

- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: MOTOR MUST BE FOOT MOUNTED OR SUPPORTED. MUST NOT BE FLANGE SUPPORTED ONLY.
- 3: CONDUIT BOX CAN BE LOCATED ON EITHER SIDE AND OPENING MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT DOWN.
- 4: TAP SIZE AND BOLT PENETRATION ALLOWANCE.
- 5: ALL TAPPED HOLES ARE UNIFIED NATIONAL COARSE, RIGHT HAND THREAD.
- 6: D-BRACKET NOT AVAILABLE ON ALL RATINGS. REQUIRES APPROVAL FROM TECHNICAL SERVICES.

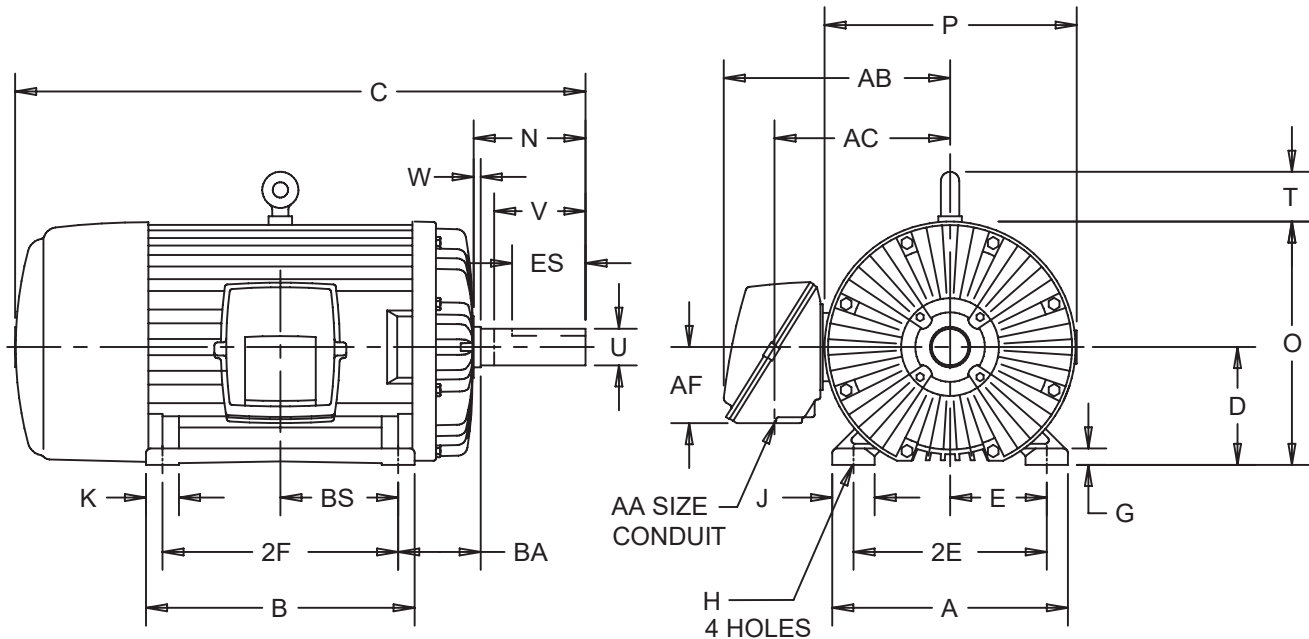
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
DIVISION 1 HAZARDOUS LOCATION
ANTI-FRICTION BEARING
FRAME: 5008S, SS

TYPE E

PRINT # 07-2366



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	D -.06	E	2E ±.03	2F ±.03	G	H ±.05
IN	25.00	28.50	12.50	10.00	20.00	25.00	1.75	.94
MM	635	724	318	254	508	635	44	24

UNITS	J	K	O	P ²	T	W	BA	BS
IN	4.50	3.50	26.38	26.63	4.13	.25	8.50	12.50
MM	114	89	670	676	105	6	216	318

UNITS	FRAME	C	N	U -.001	V MIN	ES MIN	SQ KEY
IN	5008	62.25	11.88	3.875	11.25	10.00	1.000
MM		1581	302	98.43	286	254	25.40
IN	5008S	56.38	6.00	2.875	5.50	4.13	.750
MM		1432	152	73.03	140	105	19.05
IN	5008MS	55.38	5.00	2.375	4.50	3.13	.625
MM		1407	127	60.33	114	80	15.88

VOLTS	UNITS	AA	AB	AC	AF
460	IN	3 1/2 NPT	23.88	17.31	5.63
2300	MM		606	440	143
4000	IN		29.88	19.50	8.63
	MM		759	495	219

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2: LARGEST MOTOR WIDTH.

3: CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR.

CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.

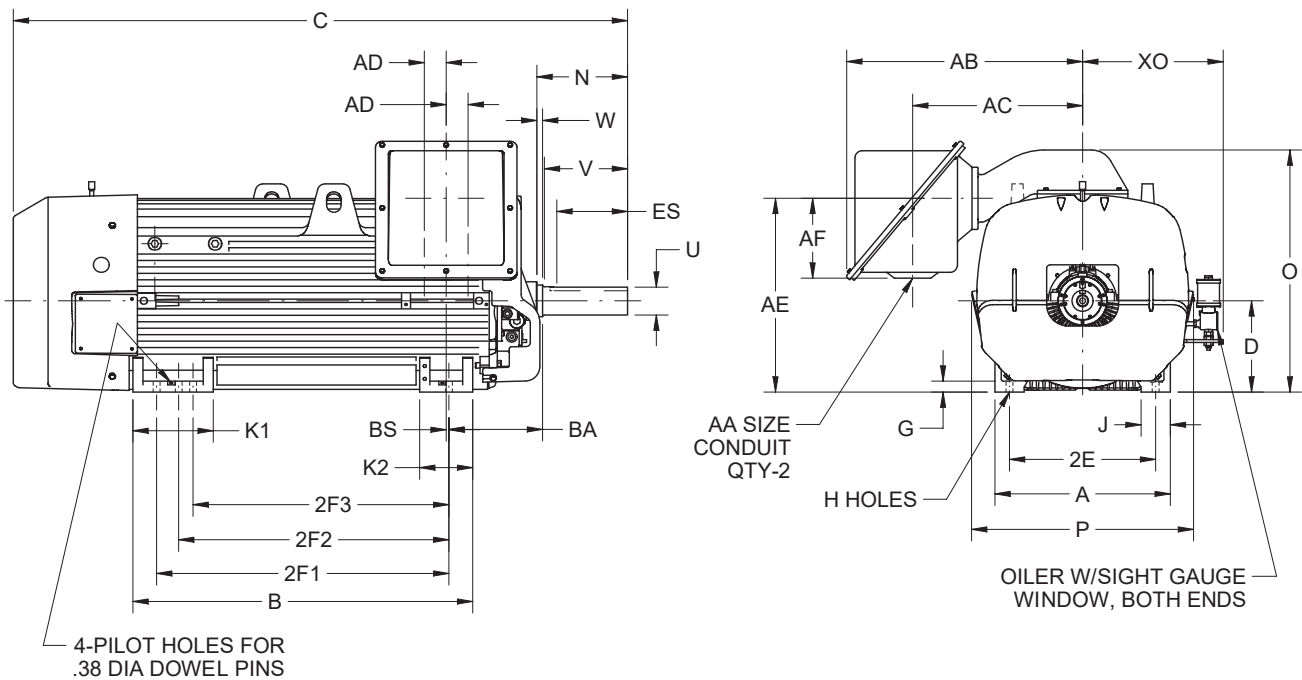
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
SLEEVE BEARING
FRAME: 5000S

TYPE JS

PRINT # 07-2689



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H [†] +.05	J	K1	K2	O	P ²
24.00	12.50	20.00	1.38	.94	4.00	11.00	7.25	33.13	30.13

W	AB	AC	AD	AE	AF	BA ±.25	BS	XO
.81	32.06	23.25	3.00	26.50	10.94	13.00	.38	19.81

FRAME	N	U -.001	V MIN	ES MIN	SQ KEY
5000S	6.56	2.875	5.50	4.00	.750

FRAME	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03	AA
5008S	31.50	63.38	25.00	22.00	20.00	3 NPT
5010S	38.50	70.38	32.00	28.00	N/A	3 1/2 NPT
5012S	46.50	78.38	40.00	36.00	N/A	4 NPT

- DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- LARGEST MOTOR WIDTH.
- CONDUIT OPENING MAY BE ROTATED IN IN STEPS OF 90 DEGREES.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- QTY-8 FOR 5008 FRAME AND QTY-6 ALL OTHERS.

COUPLING SELECTION:

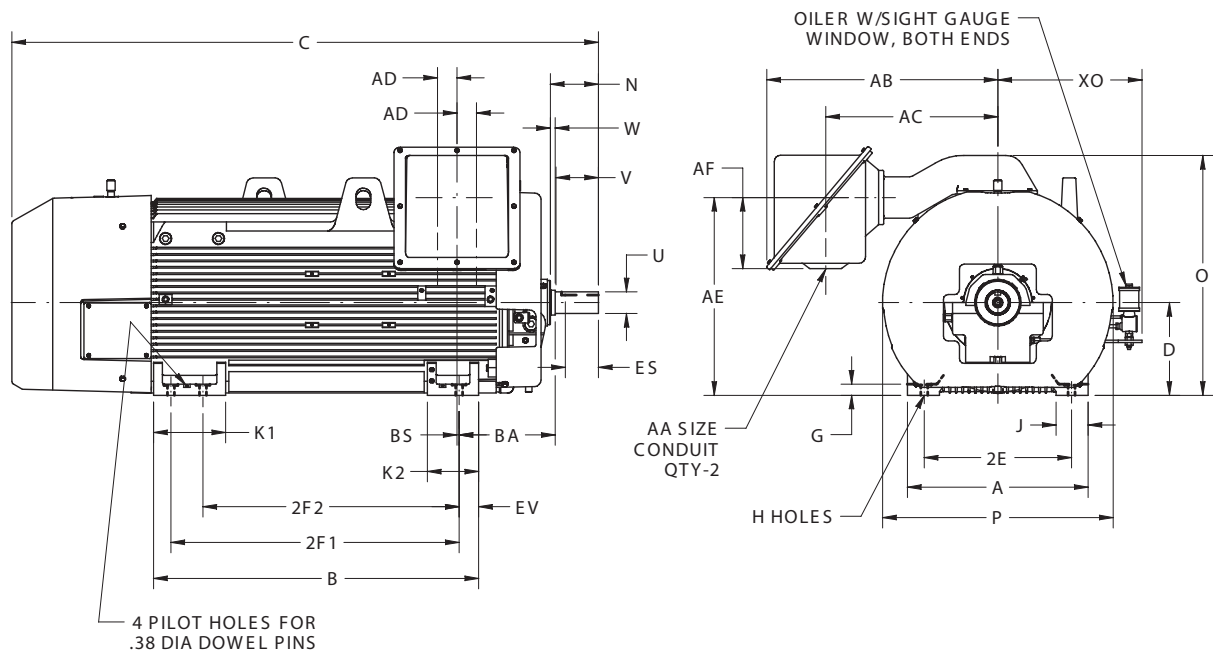
SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER SEAL FACE OR POINTER DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS .50", AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS .19".



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
SLEEVE BEARING
FRAME: 5800S, SS

TYPE JS

PRINT # 07-2921



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H +.05	J	K1	K2	O	P ²
28.25	14.50	23.00	1.63	1.09	5.00	11.25	8.00	37.56	36.00

W	AB	AC	AD	AE	AF	BA ±.25	BS	EV	XO
.82	35.81	26.75	3.00	30.94	10.94	15.00	.38	3.06	22.50

FRAME	N	U -.001	V MIN	ES MIN	SQ KEY
5800SS ⁴	6.57	2.875	5.50	4.00	.750
5800S	7.57	3.375	6.50	5.25	.875

FRAME	B	C	2F1 ±.03	2F2 ±.03	AA
5810SS ⁴	41.75	81.63	36.00	32.00	3 NPT
5010S	41.75	82.63	36.00	32.00	3 1/2 NPT
5812SS ⁴	50.75	90.63	45.00	40.00	4 NPT
5812S	50.75	91.63	45.00	40.00	

1. DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. CONDUIT OPENING MAY BE ROTATED IN IN STEPS OF 90 DEGREES.
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
4. SS SHAFT EXTENSION ONLY AVAILABLE ON 2 POLE.

COUPLING SELECTION:

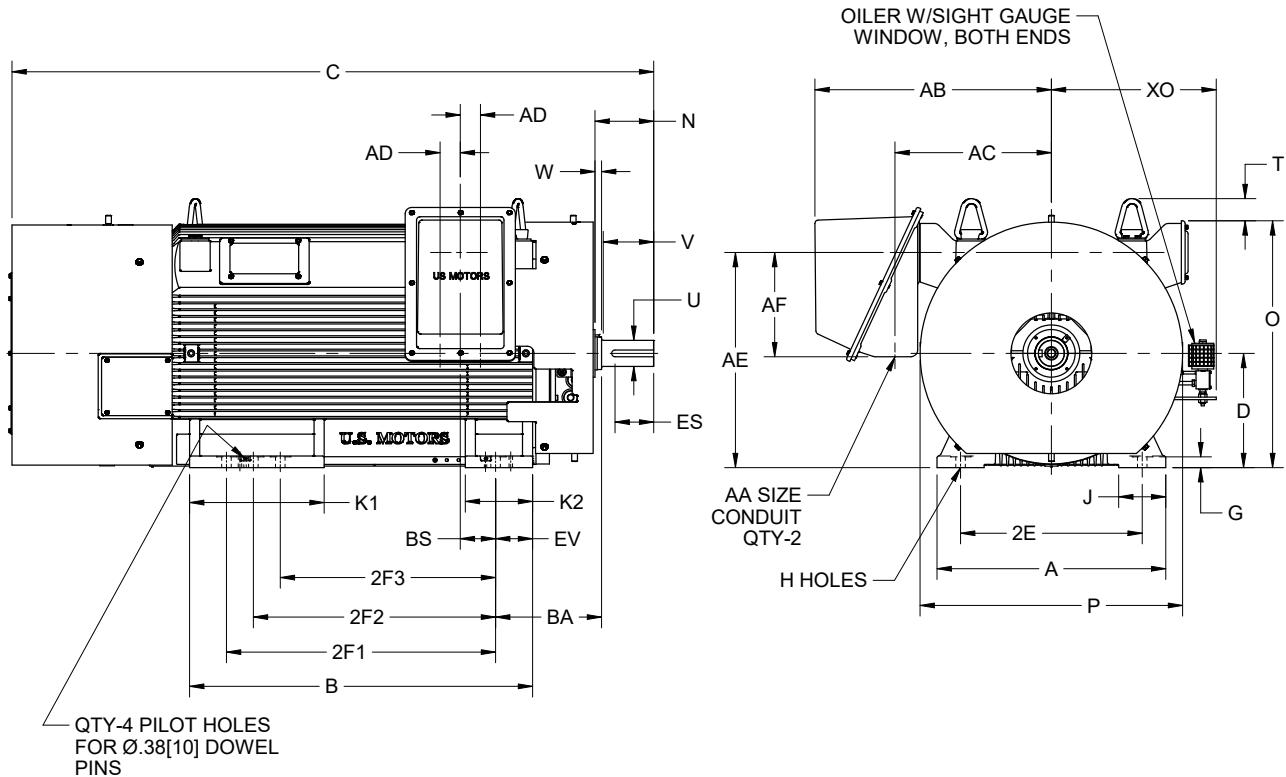
SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER SEAL FACE OR POINTER DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS .50", AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS .19".



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
AUTOMOTIVE DUTY
ANTI-FRICTION BEARING
FRAME: 6800S

TYPE J (4-POLE & SLOWER)

PRINT # 07-3413



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	2E ±.03	G	H +.05	J	K1	K2	N	O	P ²
IN	34.00	17.00	27.00	1.63	1.38	7.00	20.00	10.00	8.75	36.69	39.03
MM	864	432	686	41	35	178	508	254	222	932	991

UNITS	T	U -.001	V MIN	W	AA	AB	AC	AD	AE	AF	BA
IN	3.28	3.875	7.50	1.00	3 1/2 NPT	35.13	23.25	3.00	32.00	15.50	15.75
MM	83	98.43	191	25		893	591	76	813	394	400

UNITS	BS	ES MIN	EV	XO	SQ KEY
IN	5.25	5.63	5.50	24.50	1.000
MM	133	143	140	622	25.40

FRAME	UNITS	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03
6808S	IN	47.00	91.44	36.00	32.00	28.00
	MM	1194	2323	914	813	711
6809S	IN	51.00	95.44	40.00	36.00	32.00
	MM	1295	2424	1016	914	813
6811S	IN	61.00	105.44	50.00	45.00	40.00
	MM	1549	2678	1270	1143	1016

COUPLING SELECTION:
 SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER SEAL FACE OR POINTER DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS .50", AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS .19".

1. ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.

3. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE. CONDUIT OPENING MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

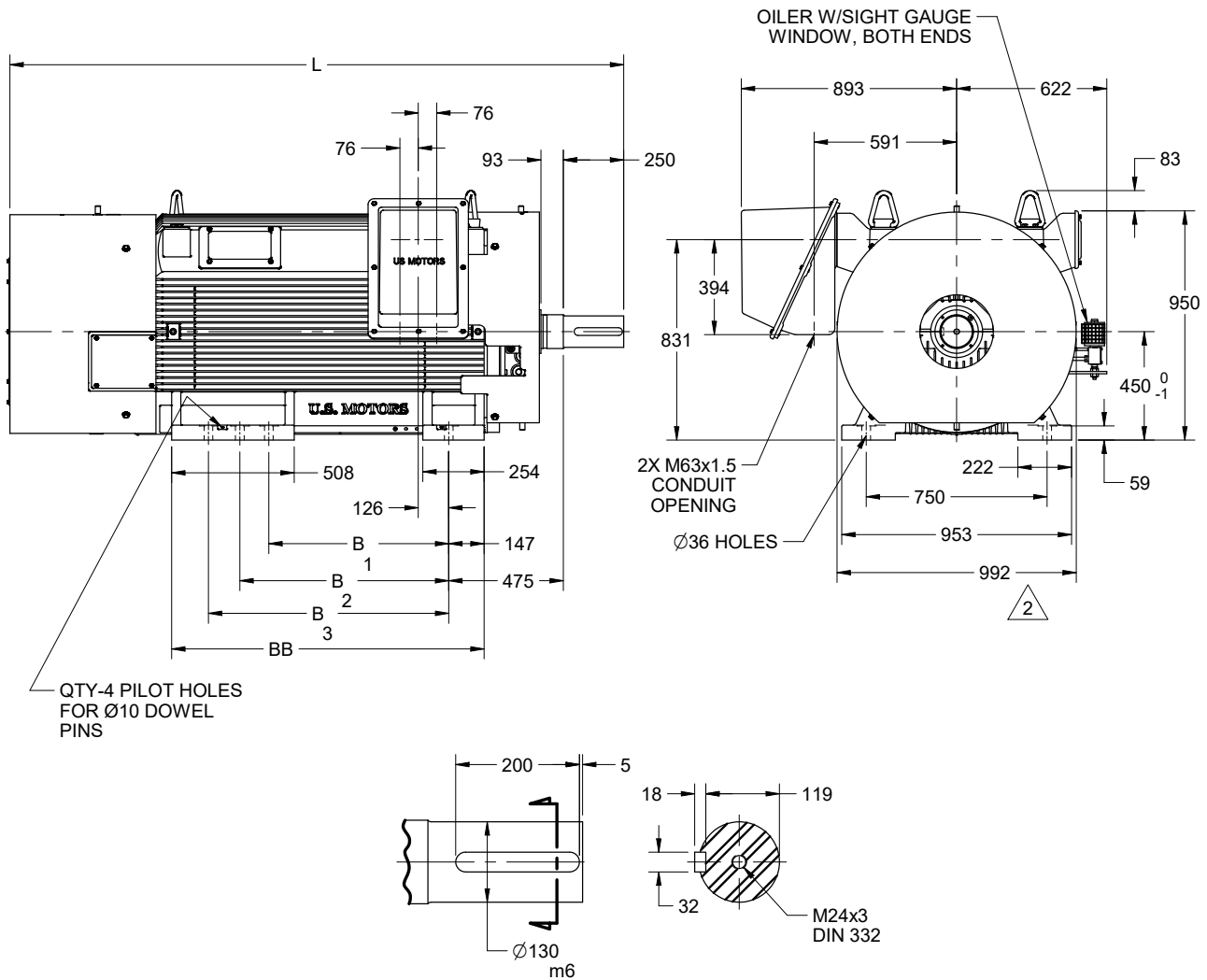
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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
AUTOMOTIVE DUTY
ANTI-FRICTION BEARING
FRAME: 450 (IEC)

TYPE JS (4-POLE & SLOWER)

PRINT # 07-3410



SHAFT DETAIL

ALL DIMENSIONS ARE IN MILLIMETERS

FRAME	BB	L	B ₁	B ₂	B ₃
450 M/L/A	1194	2444	710	800	900
450 L/A/B	1295	2546	800	900	1000
450 B/C/D	1549	2800	1000	1120	1250

COUPLING SELECTION:

SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER SEAL FACE OR POINTER DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS .50", AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS .19".

1. ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
 2. LARGEST MOTOR WIDTH.

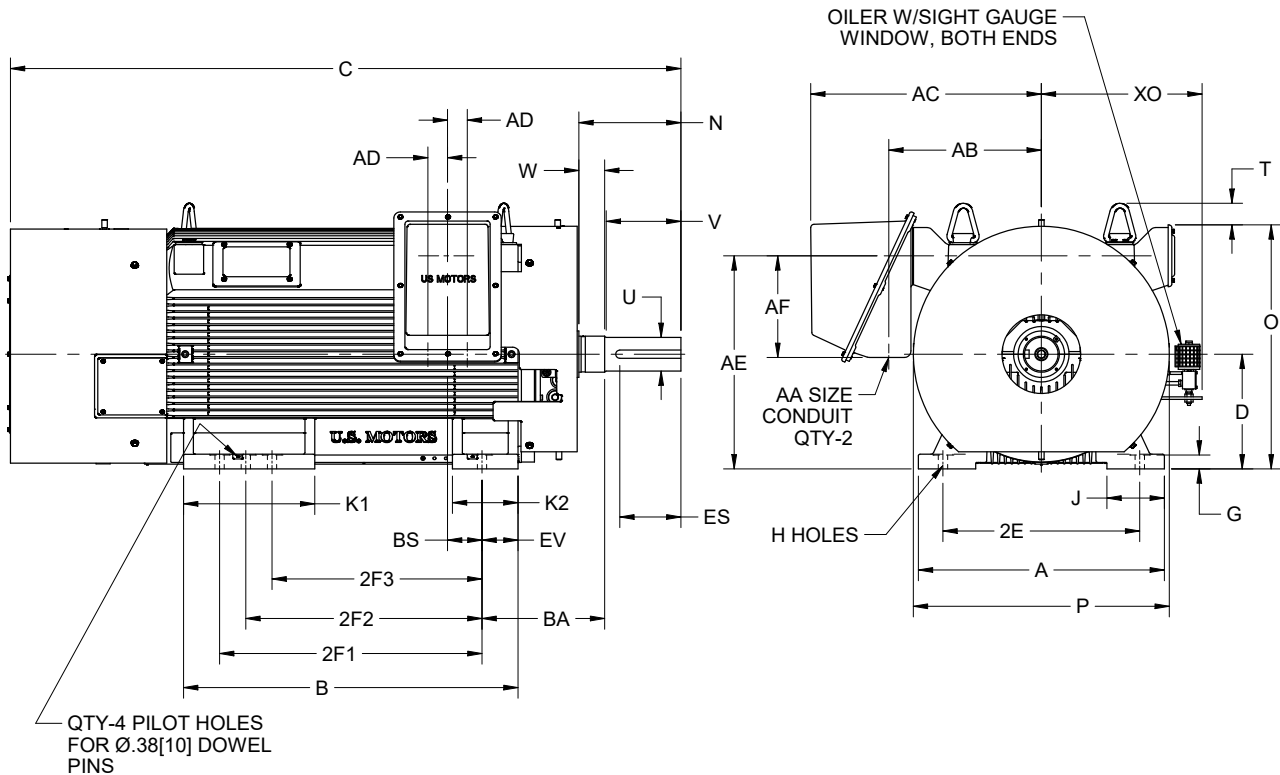
3. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE. CONDUIT OPENING MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

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HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
AUTOMOTIVE DUTY
ANTI-FRICTION BEARING
FRAME: 7000

TYPE JS (4-POLE & SLOWER)

PRINT # 07-3411



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	2E ±.03	G	H +.05	J	K1	K2	N	O	P ²
IN	37.50	17.50	30.00	2.13	1.42	8.75	20.00	10.00	15.56	37.19	39.03
MM	953	445	762	54	36	222	508	254	395	945	991

UNITS	T	U -.001	V MIN	W	AA	AB	AC	AD	AE	AF	BA
IN	3.28	5.125	11.38	3.94	3 NPT	35.13	23.25	3.00	32.50	15.50	18.70
MM	83	130.18	289	100		893	591	76	826	394	475

UNITS	BS	ES MIN	EV	XO	SQ KEY
IN	5.25	9.25	5.50	24.50	1.250
MM	133	235	140	622	31.75

FRAME	UNITS	B	C	2F1 ±.03	2F2 ±.03	2F3 ±.03
7007/06/05	IN	47.00	98.25	36.00	32.00	28.00
	MM	1194	2496	914	813	711
7008/07/06	IN	51.00	102.25	40.00	36.00	32.00
	MM	1295	2597	1016	914	813
7010/09/08	IN	61.00	112.25	50.00	45.00	40.00
	MM	1549	2851	1270	1143	1016

COUPLING SELECTION:
 SLEEVE BEARING MOTORS ARE NOT DESIGNED TO WITHSTAND AXIAL THRUST LOADS. THE MOTOR AND DRIVEN EQUIPMENT SHOULD BE ASSEMBLED AND ADJUSTED SO THAT THE SCRIBE LINE ON THE MOTOR SHAFT IS IN LINE WITH THE OUTER SEAL FACE OR POINTER DURING OPERATING CONDITIONS. THE MOTOR ROTOR MUST BE LIMITED FROM TRAVELING TO EITHER EXTREME END LIMITS. LIMITED END FLOAT TYPE COUPLINGS ARE REQUIRED. MINIMUM MOTOR ROTOR FLOAT LIMIT IS .50", AND TOTAL MAXIMUM COUPLING END FLOAT LIMIT IS .19".

- ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- LARGEST MOTOR WIDTH.

- CONDUIT BOX MAY BE LOCATED ON EITHER SIDE. CONDUIT OPENING MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

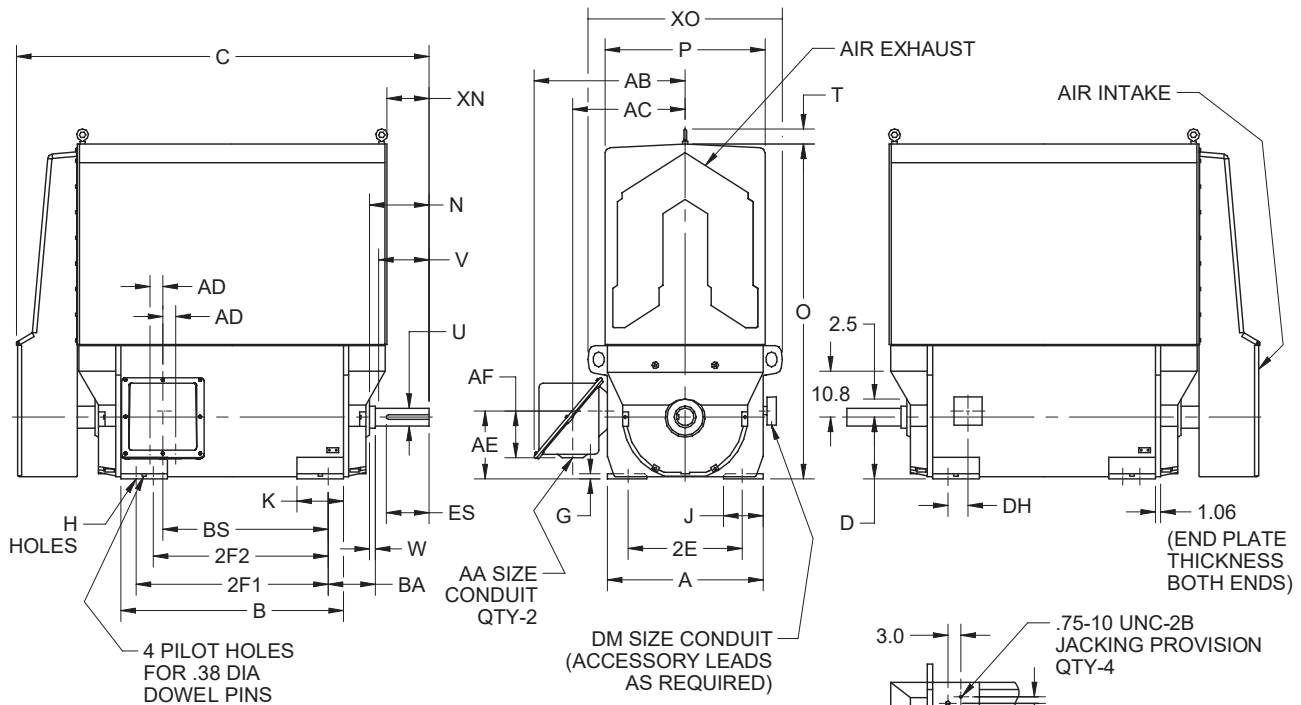
† All marks shown within this document are properties of their respective owners.



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED TUBE COOLED
ANTI-FRICTION BEARING
FRAME: 5800S, M, L

TYPE JT

PRINT # 07-2309



ALL DIMENSIONS ARE IN INCHES

A	D -.06	2E ±.03	G	H ±.05	J	K	O
36.50	14.50	23.00	1.25	1.09	9.25	10.88	78.88

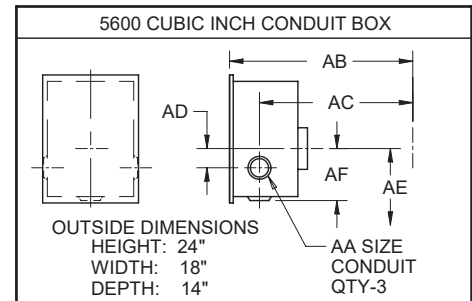
P	T	W	AE	BA	DH	XO
37.50	3.28	.38	15.94	10.00	5.69	45.50

VOLTS	HP	C/BOX VOLUME (CU.IN)	QTY AA	AB	AC	AD	AF
0-2400	ALL	6800	2	35.56	26.69	3.00	10.94
2401 - 4800	0 - 1000	5600	3	34.88	28.63	4.00	10.81
4801 - 6900	1001 & UP						

FRAME	N	U -.001	V MIN	ES MIN	XN	SQ KEY
5800S	7.13	3.375	6.50	5.00	3.00	.875
5800M	8.63	4.125	8.00	5.50	4.50	1.000
5800L	14.88	4.875	14.25	12.88	10.75	1.250

FRAME	B	C	2F1 ±.03	2F2 ±.03	BS	AA	DM
5810S	43.13	80.63	36.00	32.00	29.31	3 NPT	3/4 NPT
5810M	43.13	82.13	36.00	32.00	29.31	3 1/2 NPT	1 NPT
5810L	43.13	88.38	36.00	32.00	29.31	4 NPT	1 1/4 NPT
5811S	47.13	84.63	40.00	36.00	33.31		1 1/2 NPT
5811M	47.13	86.13	40.00	36.00	33.31		
5811L	47.13	92.38	40.00	36.00	33.31		
5812S	52.13	89.63	45.00	40.00	38.31		
5812M	52.13	91.13	45.00	40.00	38.31		
5812L	52.13	97.38	45.00	40.00	38.31		
5813S	57.13	94.63	50.00	45.00	43.31		
5813M	57.13	96.13	50.00	45.00	43.31		
5813L	57.13	102.38	50.00	45.00	43.31		

BOTTOM OF FOOT DETAIL
(TYP ALL 4 FEET)



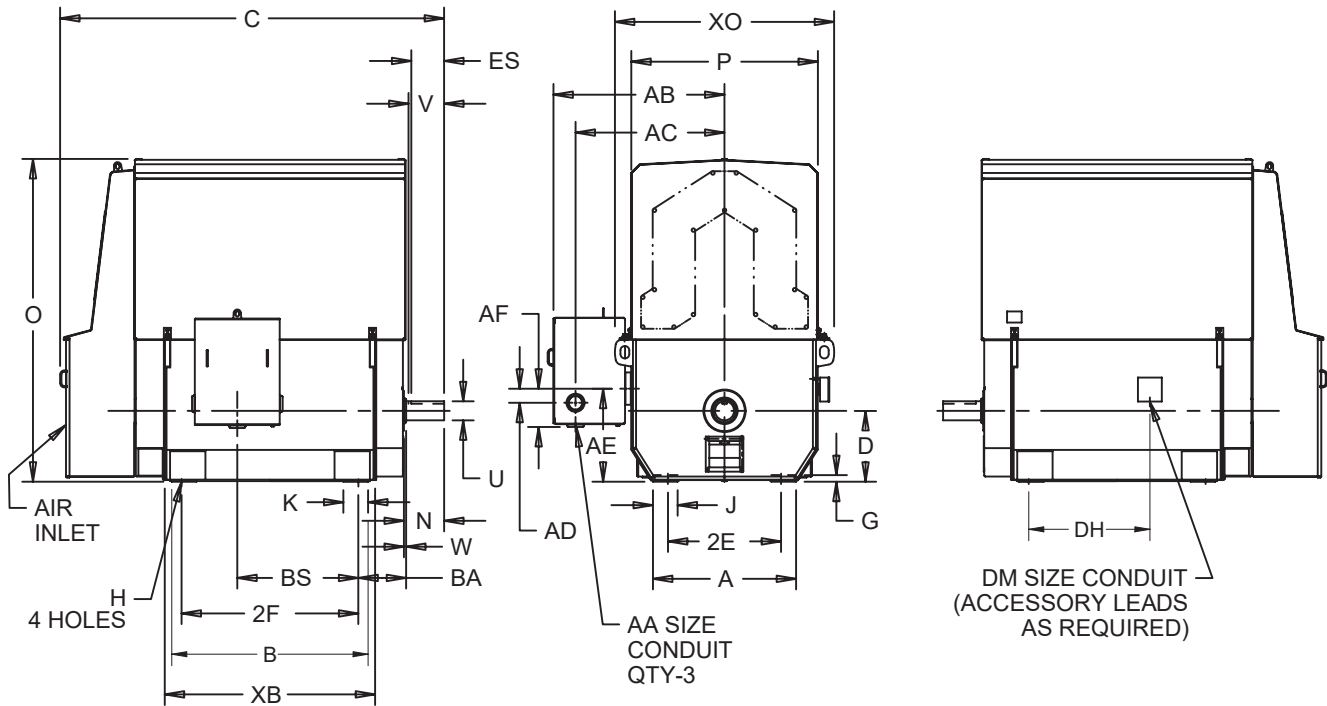
1. DIMENSIONS MAY VARY BY $\pm .25"$ DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 POSITION IS SUPPLIED WHEN SPECIFIED.
3. THE 5800S EXTENSION IS TYPICALLY FOR 2 POLE RATINGS.

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

HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED TUBE COOLED
ANTI-FRICTION BEARING
FRAME: 8000S

TYPE JT, 4 POLE & SLOWER

PRINT # 07-1881



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	2E	G	H	J	K	N	O	P ²	U -.001	V MIN
IN	41.50	20.00	32.00	1.88	1.63	8.00	7.00	11.38	91.00	54.25	5.375	10.50
MM	1054	508.0	813	48	41	203	178	289	2311	1378	136.53	267

UNITS	WW	AA	AB	AC	AD	AE	AF	BA	ES MIN	XO	SQ KEY
IN	.63	3 1/2 NPT	48.13	42.13	4.00	26.25	10.81	13.50	8.63	62.00	1.25
MM	16		1222	1070	102	667	275	343	219	1575	32

FRAME	UNITS	B	C	2F	BS, DH	XB	DM
8007S	IN	46.50	98.19	40.00	24.25	50.00	3/4 NPT
	MM	1181	2494	1016	616	1270	1 NPT
8008S	IN	51.50	103.19	45.00	29.25	55.00	1 1/2 NPT
	MM	1308	2621	1143	743	1397	
8009S	IN	56.50	108.19	50.00	34.25	60.00	
	MM	1435	2748	1270	870	1524	
8010S	IN	62.50	114.19	56.00	40.25	66.00	
	MM	1588	2900	1422	1022	1676	
8011S	IN	69.50	121.19	63.00	47.25	73.00	
	MM	1765	3078	1600	1200	1858	

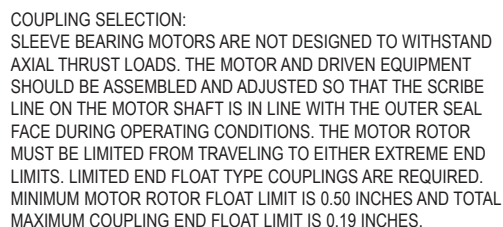
1. DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. TOLERANCES ARE IN INCHES ONLY.
4. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED.

5. MAIN CONDUIT BOX MAY NOT BE ROTATED. BOX DIMENSIONS: W=24", H=30", D=20".
6. "XB" IS THE DISTANCE BETWEEN SURFACES THAT MAY BE USED FOR HORIZONTAL JACKING.

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



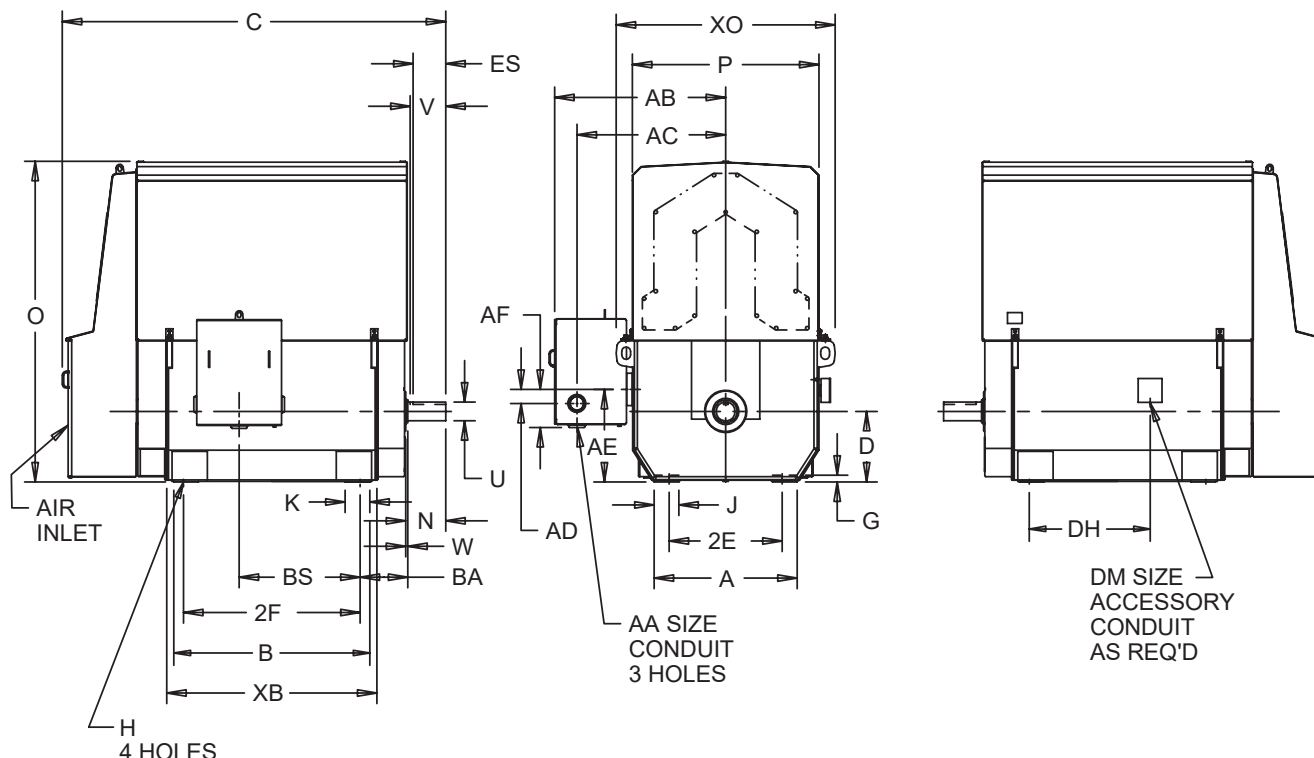
PRINT #07-2651



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED TUBE COOLED
SLEEVE BEARING
FRAME: 8000S

TYPE JTS

PRINT #07-2955



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	2E	G	H	J	K	N	O	P ²	U -.001	V MIN
IN	41.50	20.00	32.00	1.88	1.63	8.00	7.00	11.50	91.00	54.25	5.375	10.50
MM	1054	508.0	813	48	41	203	178	292	2311	1378	136.53	267

UNITS	W	AA	AB	AC	AD	AE	AF	BA	ES MIN	XO	SQ KEY
IN	.75	3 1/2 NPT	48.13	42.13	4.00	26.25	10.81	13.50	8.63	62.00	1.25
MM	19		1222	1070	102	667	275	343	219	1575	32

FRAME	UNITS	B	C	2F	BS, DH	XB	DM
8007S	IN	46.50	98.69	40.00	24.25	50.00	3/4 NPT
	MM	1181	2506	1016	616	1270	1 NPT
8008S	IN	51.50	103.69	45.00	29.25	55.00	1 1/2 NPT
	MM	1308	2633	1143	743	1397	
8009S	IN	56.50	108.69	50.00	34.25	60.00	
	MM	1435	2760	1270	870	1524	
8010S	IN	62.50	114.69	56.00	40.25	66.00	
	MM	1588	2912	1422	1022	1676	
8011S	IN	69.50	121.69	63.00	47.25	73.00	
	MM	1765	3090	1600	1200	1858	

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.

2: LARGEST MOTOR WIDTH.

3: TOLERANCE UNITS ARE IN INCHES ONLY.

4: STANDARD ASSEMBLY POSITION F-1 IS SHOWN.

F-2 IS PROVIDED WHEN SPECIFIED.

5: MAIN CONDUIT BOX MAY NOT BE ROTATED.

BOX DIMENSIONS: W=24", H=30", D=20".

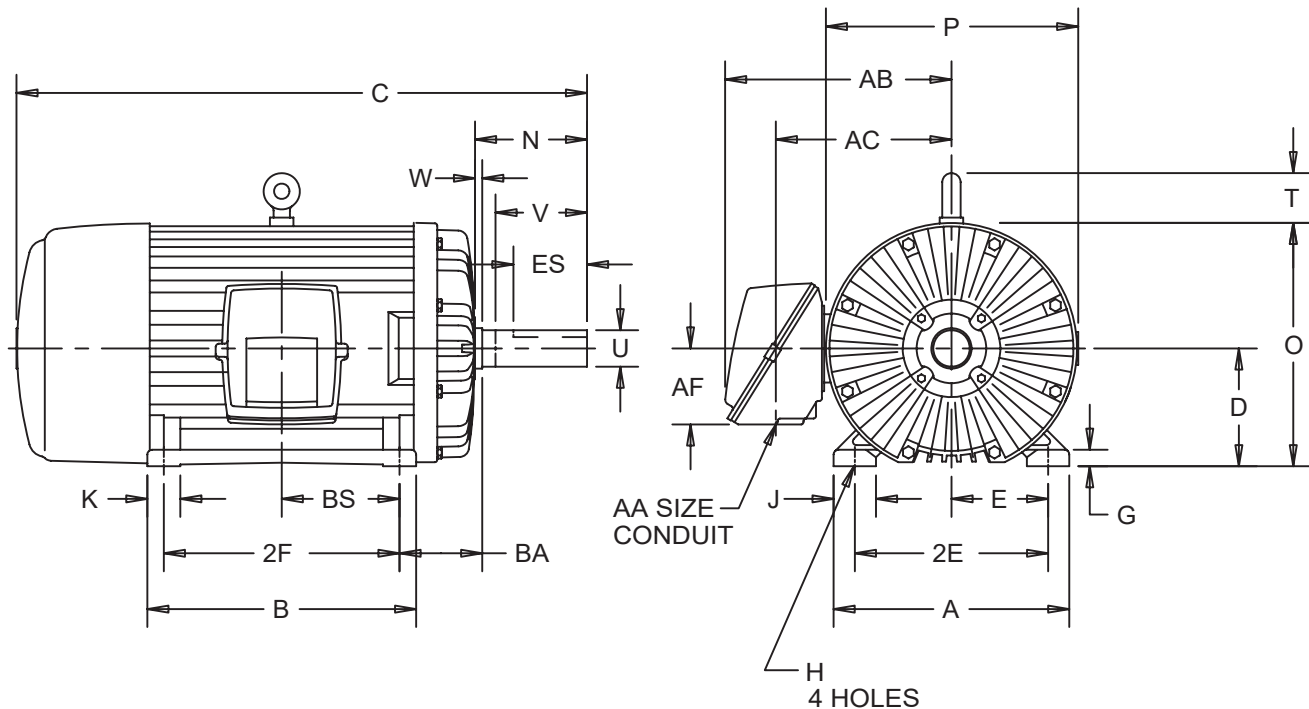
6: "XB" IS THE DISTANCE BETWEEN SURFACES THAT MAY BE USED FOR HORIZONTAL JACKING.



HORIZONTAL TITAN® MOTORS
TOTALLY ENCLOSED FAN COOLED
AUTOMOTIVE DUTY
ANTI-FRICTION BEARING
FRAME: 5000S, SS, G

TYPE JAD, JDE

PRINT # 07-2461



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	D -.06	E	2E ±.03	G	H +.05	J	K	P ²	W	BA
IN	25.00	12.50	10.00	20.00	1.75	.94	4.50	3.50	26.63	.25	8.50
MM	635	318	254	508	44	24	114	89	676	6	216

FRAME	UNITS	C	N	U -.001	V MIN	ES MIN	SQ KEY
5004	IN	53.25	11.88	3.875	11.25	10.00	1.000
	MM	1353	302	98.43	286	254	25.40
5004G	IN	52.13	10.75	3.500	10.19	9.00	.875
	MM	1324	273	88.90	259	229	22.22
5004S	IN	47.38	6.00	2.875	5.50	4.13	.750
	MM	1204	152	73.03	140	105	19.05
5004SS	IN	46.38	5.00	2.375	4.50	3.13	.625
	MM	1178	127	60.33	114	80	15.88
5008	IN	62.25	11.88	3.875	11.25	10.00	1.000
	MM	1581	302	98.43	286	254	25.40
5008G	IN	61.13	10.75	3.500	10.19	9.00	.875
	MM	1553	273	88.90	259	229	22.22
5008S	IN	56.38	6.00	2.875	5.50	4.13	.750
	MM	1432	152	73.03	140	105	19.05
5008SS	IN	55.38	5.00	2.375	4.50	3.13	.625
	MM	1407	127	60.33	114	80	15.88

BASIC FRAME	UNITS	B	2F ±.03	O	T	BS
5004	IN	19.50	16.00	25.88	3.25	8.00
	MM	495	406	657	83	203
5008	IN	28.50	25.00	26.38	4.13	12.50
	MM	724	635	670	105	318

VOLTS	UNITS	AA	AB	AC	AF
460	IN	3 1/2 NPT	23.81	18.50	8.06
	MM		605	470	205
2300	IN		23.81	18.50	8.06
	MM		605	470	205
4000	IN		24.81	19.50	10.00
	MM		630	495	254

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

4. CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF THE MOTOR. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.

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

Appendix A

Load Inertia Tables, Squirrel-Cage Induction Motors - Refer to the "High Inertia Load" Option

Load Wk² (Exclusive of Motor Wk²), Lb-Ft²

Horsepower	Synchronous Speed, RPM @ 60 Hertz						
	3600	1800	1200	900	720	600	514
150	133	640	1719	3456	5940	9230	13410
200	172	831	2238	4508	7750	12060	17530
250	210	1017	2744	5540	9530	14830	21560
300	246	1197	3239	6540	11270	17550	25530
350	281	1373	3723	7530	12980	20230	29430
400	315	1546	4199	8500	14670	22870	33280
450	349	1714	4666	9460	16320	25470	37090
500	381	1880	5130	10400	17970	28050	40850
600	443	2202	6030	12250	21190	33110	48260
700	503	2514	6900	14060	24340	38080	55500
800	560	2815	7760	15830	27440	42950	62700
900	615	3108	8590	17560	30480	47740	69700
1000	668	3393	9410	19260	33470	52500	76600
1250	790	4073	11380	23390	40740	64000	93600
1500	902	4712	13260	27350	47750	75100	110000
1750	1004	5310	15060	31170	54500	85900	126000
2000	1096	5880	16780	34860	61100	96500	141600
2250	1180	6420	18440	38430	67600	106800	156900
2500	1256	6930	20030	41900	73800	116800	171800
2750	1325	7408	21563	45259	79875	126586	186424
3000	1387	7860	23040	48520	85800	136200	200700
3250	1442	8295	24469	51696	91600	145563	214799
3500	1491	8700	25850	54800	97300	154800	228600

Horsepower	Synchronous Speed, RPM @ 50 Hertz						
	3000	1500	1000	750	600	500	429
150	208	998	2676	5378	9233	14352	20833
200	270	1298	3489	7021	12064	18764	27250
250	329	1590	4282	8626	14834	23086	33541
300	387	1874	5058	10200	17554	27333	39728
350	443	2152	5819	11748	20231	31517	45826
400	497	2425	6567	13272	22870	35644	51846
450	550	2692	7303	14774	25474	39722	57795
500	602	2955	8029	16257	28048	43753	63682
600	703	3467	9451	19170	33111	51693	75283
700	800	3964	10839	22020	38075	59486	86682
800	893	4447	12195	24814	42949	67150	97901
900	982	4918	13523	27557	47743	74696	108959
1000	1069	5377	14825	30254	52463	82134	119869
1250	1273	6478	17975	36811	63975	100311	146567
1500	1461	7520	20995	43135	75120	117959	172539
1750	1635	8509	23899	49253	85945	135143	197877
2000	1796	9451	26697	55187	96482	151911	222646
2250	1945	10349	29399	60951	106754	168299	246899
2500	2083	11206	32012	66558	116784	184338	270675
2750	2211	12025	34541	72019	126586	200051	294008
3000	2328	12808	36992	77343	136175	215458	316927
3250	2437	13556	39368	82536	145563	230577	339454
3500	2536	14272	41673	87605	154759	245423	361610

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



Appendix B

UL^{®†} Class, Group & Temperature Codes

Hazardous Location Definitions *

HAZARDOUS LOCATION	An area where the possibility of explosion and fire is created by the presence of flammable gases, vapors, dusts, fibers or flyings.
DIVISION 1	Division 1 in the normal situation; the hazard would be expected to be present in everyday production operations or during frequent repair and maintenance activity.
DIVISION 2	Division 2 in the abnormal situation; material is expected to be confined within closed containers or closed systems and will be present only through accidental rupture, breakage or unusual faulty operation.
CLASS I	Those areas in which flammable gases or vapors may be present in the air in sufficient quantities to be explosive or ignitable.
CLASS II	Those areas made hazardous by the presence of combustible dust.
CLASS III	Those areas in which there are easily ignitable fibers or flyings present, due to type of material being handled, stored or processed.

GROUPS	The gases and vapors of Class I locations are broken into four groups by the codes A, B, C and D. These materials are grouped according to the ignition temperature of the substance, its explosion pressure and other flammable characteristics.	Group A	Acetylene
		Group B	Hydrogen
		Group C	Ethyl-Ether, Ethylene, Cycle Propane
		Group D	Gasoline, Hexane, Naphtha, Benzene, Butane, Propane, Alcohol, Lacquer Solvent, Vapors, Natural Gas
	Class II - dust locations - Groups E, F & G. These groups are classified according to the ignition temperature and the conductivity of the hazardous substance.	Group E	Metal Dust
		Group F	Carbon Black, Coal, Coke Dust
		Group G	Flour, Starch, Grain Dust

	Maximum Temperature		Temperature Code	Notes
	Degrees C	Degrees F		
OPERATING TEMP. CODES	450	842	T1	1) T1, T2 & T6 not offered by USEM. 2) T1 through T2D not applicable to Class II locations. 3) T2A through T2D, Class I Group D only.
	300	572	T2	
	280	536	T2A	
	260	500	T2B	
	230	446	T2C	
	215	419	T2D	
	200	392	T3	
	180	356	T3A	
	165	329	T3B	
	160	320	T3C	
	135	275	T4	
	120	248	T4A	
	100	212	T5	
	85	185	T6	

- NOTES**
- 1) USEM offers Class I and Class II only. USEM does not offer Group A or B.
 - 2) Group C available on 5800 Frame.
 - 3) Refer to Base List Price Section for available ratings.
 - 4) Orders for UL^{®†} Listed Hazardous Location Motors must specify Division, Class, Group and Temperature Code.

* These are simplified definitions - refer to NATIONAL ELECTRICAL CODE^{®†} (NEC^{®†}), Article 500 for complete definitions.

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



Appendix C

Standard Locked Rotor & Breakdown Torque - For Pricing Purposes; Refer to the "Torque, High" Option

Horsepower	Standard Locked Rotor Torque (% Of Full Load Torque)						
	3600	1800	1200	900	720	600	514
50	120	140	135	125	120	115	110
60	120	140	135	125	120	115	110
75	105	140	135	125	120	115	110
100	105	125	125	125	120	115	110
125	100	110	125	120	115	115	110
150	100	110	120	120	115	115	60
200	100	100	120	120	115	60	60
250	70	80	100	100	60	60	60
300	70	80	100	60	60	60	60
350	70	80	100	60	60	60	60
400	70	80	60	60	60	60	60
450	70	80	60	60	60	60	60
500	70	80	60	60	60	60	60
600	60	60	60	60	60	60	60
700	60	60	60	60	60	60	60
800	60	60	60	60	60	60	60
900	60	60	60	60	60	60	60
1000	60	60	60	60	60	60	60
1250	60	60	60	60	60	60	60
1500	60	60	60	60	60	60	60
1750	60	60	60	60	60	60	60
2000	60	60	60	60	60	60	60
2250 & Up	60	60	60	60	60	60	60

Horsepower	Standard Breakdown Torque (% Of Full Load Torque)						
	3600	1800	1200	900	720	600	514
50	200	200	200	200	200	200	200
60	200	200	200	200	200	200	200
75	200	200	200	200	200	200	200
100	200	200	200	200	200	200	200
125	200	200	200	200	200	200	200
150	200	200	200	200	200	200	175
200	200	200	200	200	200	175	175
250	175	175	175	175	175	175	175
300	175	175	175	175	175	175	175
350	175	175	175	175	175	175	175
400	175	175	175	175	175	175	175
450	175	175	175	175	175	175	175
500	175	175	175	175	175	175	175
600	175	175	175	175	175	175	175
700	175	175	175	175	175	175	175
800	175	175	175	175	175	175	175
900	175	175	175	175	175	175	175
1000	175	175	175	175	175	175	175
1250	175	175	175	175	175	175	175
1500	175	175	175	175	175	175	175
1750	175	175	175	175	175	175	175
2000	175	175	175	175	175	175	175
2250 & Up	175	175	175	175	175	175	175

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



Appendix D

Space Heater Wattage, 60Hz 460/575V Nominal Efficiency Table & Shaft Extensions

Space Heater Wattage

Typical Space Heater Wattage				
Frame	ODP, WPI, WPIL	TEFC	Div. 1 Hazardous Location	TEAAC, TEWAC
449	192 Watts	288 Watts	--	--
5000	384 Watts	384 Watts	288 Watts	--
5800	384 Watts	384 Watts	384 Watts	384 Watts
6800	480 Watts	480 Watts	--	480 Watts
8000	700 Watts	--	--	700 Watts
9600	900 Watts	--	--	900 Watts

Nominal Full Load Efficiencies of Premium Efficient 60Hz 460/575V Motors

HP	OPEN MOTORS				ENCLOSED MOTORS			
	2 POLE	4 POLE	6 POLE	8 POLE	2 POLE	4 POLE	6 POLE	8 POLE
150	94.1	95.8	95.4	94.1	95.0	95.8	95.8	94.1
200	95.0	95.8	95.4	94.1	95.4	96.2	95.8	94.5
250	95.0	95.8	95.8	95.0	95.8	96.2	95.8	95.0
300	95.4	95.8	95.8	--	95.8	96.2	95.8	--
350	95.4	95.8	95.8	--	95.8	96.2	95.8	--
400	95.8	95.8	--	--	95.8	96.2	--	--
450	96.2	96.2	--	--	95.8	96.2	--	--
500	96.2	96.2	--	--	95.8	96.2	--	--

Shaft Extensions

TITAN® Horizontal Shaft Extensions					
Enclosure	Frame	2-Pole (Standard)	4-Pole & Slower (Standard)	4-Pole & Slower (Optional)	Notes
TEFC	449	TS	T	TM, TL	
	5000	S	S	ML	
	5800	SS	S	ML, L	"L" extension is only applicable to 5810 & 5812
	6800	--	S	--	
Div. 1 Hazardous Location	5000	SS	S	G	"G" is GM Automotive Extension
	5800	SS	S	ML	Applicable to 5807, 5809 & 5811
TEAAC TEWAC	5800	S	M	L	
	8000	SS	S	--	
	9600	--	S	--	
ODP WPI WPIL	449	TS	TS	TM	
	5000	SS, S	S	MS, L	Must use "S" on 2-Pole above 800 HP, Cannot use "L" with Sleeve Bearings
	5800	S	M	L	Cannot use "L" with Sleeve Bearings
	6800	SS	S	MS, No Suffix	Cannot use "No Suffix" with Sleeve Bearings
	8000	SS	S	--	
	9600	--	S	--	

Appendix E

Typical Sound Levels & Motor Weights

Typical Motor Sound Levels (Sound Pressure in dBA @ 1 Meter)							
Frame	RPM	ODP / WPI	WP11	TEFC	Div. 1 Hazardous Location	TEAAC	TEWAC
449	3600	84	--	92	--	--	--
	1800	73	--	91	--	--	--
	1200 & Slower	70	--	87	--	--	--
5000	3600	90	88	90	93	--	--
	1800	88	86	86	89	--	--
	1200 & Slower	82	80	79	82	--	--
5800	3600	91	90	90	96	90	92
	1800	90	88	85	92	90	87
	1200 & Slower	82	80	78	91	88	82
6800	3600	--	--	--	--	--	--
	1800	90	82	88	--	--	--
	1200 & Slower	86	80	82	--	--	--
8000	3600	94	90	--	--	92	--
	1800	90	88	88	--	90	87
	1200 & Slower	86	82	--	--	90	85
9600	3600	--	--	--	--	--	--
	1800	95	92	--	--	92	90
	1200 & Slower	92	87	--	--	90	87

Note: Sound abatement options available on most ratings. See Accessories and Modifications section.

Typical Motor Shipping Weights (lbs.)						
Frame	ODP/WPI	WP11	TEFC	Div. 1 Hazardous Location	TEAAC	TEWAC
449	2000	--	2400	--	--	--
5004	--	--	2700	--	--	--
5008	4115	4550	4000	3000	--	--
5010	4900	5250	4800	--	--	--
5012	5425	5775	6000	--	--	--
5807	--	--	--	4600	--	--
5809	--	--	--	5200	--	--
5810	5000	5900	7700	--	7800	7900
5811	5900	6800	--	5700	8800	8900
5812	7100	8000	9300	--	10000	10000
5813	8200	9100	--	--	11200	11200
6808	--	--	12200	--	--	--
6809	6400	6800	13300	--	8900	9000
6810	6850	7750	--	--	9400	9900
6811	7350	8000	16000	--	10600	10500
8005	9500	11600	--	--	--	--
8006	9500	11600	--	--	--	--
8007	9500	11600	--	--	12600	13800
8008	10000	12000	--	--	13750	14500
8009	10900	13000	--	--	14800	15300
8010	12000	14200	--	--	15900	16200
8011	13300	15500	--	--	17200	17600
9603	14300	16800	--	--	--	--
9604	14300	16800	--	--	18800	18800
9605	15250	18100	--	--	20200	20200
9606	16500	19400	--	--	21500	21500
9607	17700	20700	--	--	22600	22600
9608	19000	21900	--	--	24000	24000
9609	19000	23300	--	--	25400	25400
9610	19000	24600	--	--	26900	26900

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



Appendix F

Type Designations, Dual Drilled Frames & C-Face / D-Flange Availability

U.S. MOTORS® type codes for horizontal motors do have meaning - the first letter designates the enclosure:

R = TITAN® ODP, WPI, WPIL	J = TITAN® TEFC	E = TITAN® Hazardous Location UL® Listed Division 1
H = TITAN® ODP, WPI, WPIL	JT = TITAN® TEAAC	N = TITAN® Hazardous Location UL® Listed Division 2
JW = TITAN® TEWAC	JAD = Standard Efficient Auto Duty	JDE = Premium Efficient Auto Duty

The next letter(s) designate special features, such as:

E = Premium Efficient (NEMA®)	I = VFD/Inverter Duty	C = CORRO-DUTY®
S = Sleeve Bearings	N = Non-Ventilated	X = Vector Duty

Dual Mounting Holes (Standard Frame & One Frame Below)

Motor Types	Standard Frames	Enclosure	Dual Drilled Standard (Yes / No)
R	447 / 449	ODP/WPI	No
R/RS	5008 / 5010 / 5012	ODP/WPI	Yes*
R/RS	5008 / 5010 / 5012	WPIL	Yes*
R/RS	5810 / 5811 / 5812 / 5813	ODP / WPI / WPIL	Yes
H/HS	6809 / 6810 / 6811	ODP / WPI / WPIL	No
R/RS	8005 / 8006 / 8007 / 8008 / 8009 / 8010 / 8011	ODP / WPI / WPIL	No
R/RS	9603 / 9604 / 9605 / 9606 / 9607 / 9608 / 9609 / 9610	ODP / WPI / WPIL	Yes
J	449	TEFC	Yes
J/JS	5008 / 5010 / 5012	TEFC	Yes
J/JS	5810 / 5812	TEFC	Yes
J/JS	6808 / 6809 / 6811 / 450MLA / 450LAB / 450BCD / 7007 / 7008 / 7010	TEFC	Yes*
E/JAD/JDE	5004 / 5008	Div. 1 Hazardous Location / TEFC	No
E/J	5807 / 5809 / 5811	Div. 1 Hazardous Location / TEFC	Yes
JT	5810 / 5811 / 5812 / 5813	TEAAC	Yes
JT/JTS	8005 / 8006 / 8007 / 8008 / 8009 / 8010 / 8011	TEAAC	No
JT/JTS	9603 / 9604 / 9605 / 9606 / 9607 / 9608 / 9609 / 9610	TEAAC	Yes

* Tri-Drilled Frame (Standard Frame & Two Frame Below)

C-Face / D-Flange Availability

Frame	Feature	ODP & WPI		TEFC	
		"C"	"D"	"C"	"D"
449	Flange on Drive End	Yes (cast)	Yes (cast)	Yes (cast)	Yes (cast)
	Flange on both ends	No	No	No	No
	Footless ("round frame")	Yes – shaft down only	Yes – shaft down only	Yes – shaft down only	Yes – shaft down only
5000	Flange on drive end	Yes (cast)	Yes (cast)	Yes (cast)	Yes (cast)
	Flange on both ends	Yes (cast)	Yes (cast)	No	No
	Footless ("round frame")*	Yes (Fab. Steel)	No	No	No
5800	Flange on drive end	No	No	No	Yes (Fab. Steel)
	Flange on both ends	No	No	No	No
	Footless ("round frame")*	No	No	No	Yes (Fab. Steel)
6800 & Larger	Flange on drive end	No	No	No	No
	Flange on both ends	No	No	No	No
	Footless ("round frame")*	No	No	No	No

* Price footless as normal thrust vertical motor from PB500 catalog.

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Appendix G

Encoder Selection Guide

Also known as tachometer, an rotary encoder is a feedback device that translates mechanical motion into an electrical signal. There are multiple mounting styles for all types, but Titan II motors offer hollow shaft encoder mounting as a standard.

Type of Encoding:

Optical encoders are usually less expensive, but are much more vulnerable to shock, vibration, and contamination from dusty, dirty, wet, or chemical environments. For these tough environments, Nidec recommends magnetic encoders.

Encoder Wiring

Encoders may be connected with MS military style connectors (solder connections with threaded housing), built-in cable (pigtail), or EPIC industrial connectors (screw terminal). Not all models are available with all connectors; consult encoder pages for options.

Durability/Duty


Encoders are available for Titan II motors in a broad range of prices and performance specifications. Often the lowest-priced encoder is not the best for tough applications, nor is "IP rating" a good indicator of encoder durability. Instead, Nidec groups encoders by duty: light duty, mill duty, heavy mill duty and severe mill duty:

Recommended Type	Typical Applications*								
	Conveying	Converting	Films	Food ^s	Paper	Steel	Hoist	Marine ^s	Oil Drilling ^E
Light									
Standard / Mill									
Heavy									
Severe									

* Darker = better suited for application
^s Stainless Option Recommended
^E Explosion Protected Recommended

* Nidec Motor Corporation makes no warranty as to suitability of purpose; recommendations are based on industry standard applications and are subject to warranty terms and conditions of sale.

See the quick pick chart on page M-1 for more details of the encoders below:

	Type of Encoder	Mounting	Encoder (Grouped by Type)
	Optical Light Duty	Hollow Shaft	AVTRON HS35A Dynapar HS35R EPC 776
	Magnetic Mill Duty	Hollow Shaft	AVTRON HS35M
	Magnetic Heavy Duty	Hollow Shaft	AVTRON HS45 NORTHSTAR HS56
	Magnetic Severe Duty	Hollow Shaft	AVTRON AV685 NORTHSTAR HS85

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