

# Inverter Duty and Inverter Duty - Vector Performance AC Motor Product Line

## Inverter Duty

- 1/3 - 2 HP, 56 - 140 frame sizes, Explosion Proof, Class I, Groups C & D, Class 2, Groups F & G, XT - Extra Tough
- 1/3 - 1 HP, 56 frame size, low voltage 115/230

## V\*S Master

- Continuous constant torque to zero speed
- 1000:1 Constant Torque
- 2 - 500 HP, 180 - L449, TENV/TEFC
- Standard NEMA frame assignments
- Meets latest 2005 NEC code for thermal protection on AF power
- Surpasses the requirements of NEMA MG-1 Part 31
- Guaranteed corona free operation
- Thermal protection; 3 N/C thermostats
- 40° C Ambient, Continuous Duty, Class F insulation
- Encoder provisions



## RPM AC

- Continuous constant torque to zero speed
- 1000:1 Constant Torque
- 1/3 - 1000 HP; TENV, TEFC, TEBC, DPG-FV, TEDC-A/A, TEDC-A/W
- Power dense, low weight, low inertia designs
- Meets latest 2005 NEC code for thermal protection on AF power
- Surpasses the requirements of NEMA MG-1 Part 31
- Guaranteed corona free operation
- Thermal protection; 3 N/C thermostats
- 40° C Ambient, Continuous Duty, Class F or H insulation
- Encoder provisions



## DEFINITIONS

### Inverter Duty

- Motors with insulation systems that meet NEMA part 31 for adjustable frequency power operation

### Inverter Duty - Vector Performance

- Motors with insulation systems that meet NEMA part 31 for adjustable frequency power operation
- Motors designed exclusively for adjustable frequency power and have extended constant torque speed capability
- Thermal protection provided that meets NEC code requirements on adjustable frequency power



# Inverter Duty Explosion Proof - Extra Tough Totally Enclosed - IP54

## Electrical Characteristics

Phase: 3  
 Frequency: 60 Hz  
 Ambient: 40° C  
 Service Factor: 1  
 Duty Cycle: Continuous  
 Insulation: Class F  
 Temp. Rise: Class B  
 Max RPM: 5400

## Key Information

Warranty (From Date Of Manufacture / From Date Of Installation):  
 (24/12)  
 Nameplate Agency Approvals:  
 CSA, UL

## Application Information

For general purpose industrial applications containing hazardous gas, vapors, dust and fibers. These Motors are rated at 6 - 60 HZ continuous constant torque and 60 - 90 HZ continuous constant horsepower ( UL File E6881 ).

## CONSTRUCTION FEATURES

### 56 - 140T Frames

UL Listing: Division 1 Class 1 Groups C & D, Class 2 Groups F & G, T3C  
 Materials: Plate steel frame and fan cover, cast iron conduit box and end shields  
 Conduit Box: F1 mounted  
 Bearing Type: Double sealed ball bearings - permanently lubricated  
 Bearing Protection: External shaft slinger  
 Shaft Material: Carbon steel  
 Nameplate Material: Stainless steel  
 Drain Type & Location: None  
 Additional Features: These motors have three N.C. automatic reset thermostats.



### C-Face Foot Mounted 1/3 - 2 HP

HP	Synch RPM	Voltage	Frame	Enclosure	Product	Model Number	List Price	Price Symbol	"C" Dim.	Notes	Approx. Wt. (lb)
1/3	3600	230/460	56C	TEFC-XP	XT	◆ P56X4070	693	REM03	13.37		53
	1800	230/460	56C	TEFC-XP	XT	◆ P56X4071	738	REM03	12.55		43
	1200	230/460	56C	TEFC-XP	XT	◆ P56X4072	818	REM03	13.37		45
1/2	3600	230/460	56C	TEFC-XP	XT	◆ P56X4073	722	REM03	13.37		44
	1800	230/460	56C	TEFC-XP	XT	◆ P56X4074	770	REM03	12.55		45
	1200	230/460	56C	TEFC-XP	XT	◆ P56X4075	847	REM03	13.86		47
3/4	3600	230/460	56C	TEFC-XP	XT	◆ P56X4076	747	REM03	13.37		46
	1800	230/460	56C	TEFC-XP	XT	◆ P56X4077	797	REM03	13.86		46
	1200	230/460	143TC	TEFC-XP	XT	◆ P14X9123	858	RXM03	14.42		48
1	3600	230/460	143TC	TEFC-XP	XT	◆ P14X9124	851	RXM03	13.42		47
	1800	230/460	143TC	TEFC-XP	XT	◆ P14X9127	882	RXM03	13.42		47
	1200	230/460	145TC	TEFC-XP	XT	◆ P14X9125	969	RXM03	15.48		50
1.5	3600	230/460	143TC	TEFC-XP	XT	◆ P14X9126	936	RXM03	13.92		51
	1800	230/460	145TC	TEFC-XP	XT	◆ P14X9128	914	RXM03	14.42		52
2	3600	230/460	145TC	TEFC-XP	XT	◆ P14X9132	1050	RXM03	14.42		53
	1800	230/460	145TC	TEFC-XP	XT	◆ P14X9129	999	RXM03	14.4255		55

◆ - Inverter capable. See Page M-273

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).

# Inverter Duty LV (Low Voltage) Totally Enclosed - IP44

## Electrical Characteristics

Phase: 3  
 Frequency: 60 Hz  
 Ambient: 40° C  
 Service Factor: 1.15  
 Duty Cycle: Continuous  
 Insulation: Class F+  
 Temp. Rise: Class B  
 Max RPM: 5400

## Key Information

**Definitions:**  
 TEFC = E-Master motors that meet EPEAC efficiencies  
**Warranty** (From Date Of Manufacture / From Date Of Installation):  
 (24/12)  
**Nameplate Agency Approvals:** CE, CSA, UL

## Application Information

Designed for optimized performance from a 115/230 volt single phase input - three phase output variable frequency controller.

## CONSTRUCTION FEATURES

### 56 Frames

Materials: Rolled steel frame, conduit box and fan cover, Aluminum end shields  
 Conduit Box: Oversized, top mounted with F1 & F2 lead outlets  
 Bearing Type: Double shielded ball bearings  
 Shaft Material: High strength carbon steel  
 Nameplate Material: Mylar  
 Drain Type & Location: Weep hole in both end shields



## C-Face Foot Mounted 1/3 - 1 HP

HP	Synch RPM	Voltage	Frame	Enclosure		Model Number	List Price	Price Symbol	Norm. Stock	"C" Dim.	Notes	Approx. Wt. (lb)
1/3	1800	115/230	56C	TEFC	◆	P56X1426	\$262	REM01	Yes	11.48		24
1/2	1800	115/230	56C	TEFC	◆	P56X1424	296	REM01	Yes	11.48		28
3/4	1800	115/230	56C	TEFC	◆	P56X1427	326	REM01	Yes	12.48		30
1	1800	115/230	56C	TEFC	◆	P56X1425	333	REM01	Yes	12.48		32

◆ - Inverter capable. See Page M-273

## Inverter Duty



### GENERAL PRODUCT DESCRIPTION

The V\*S Master motor, like the RPM AC motor, was designed from the beginning to be a Variable Speed Inverter Duty motor. It is not a fixed speed motor design that has been re-rated to be an Inverter Duty motor. All V\*S Master motors are designed to operate from zero speed to base speed with full load current and torque below the class F temperature rise. Each V\*S Master has three thermostats, one per phase, to provide Inverter Duty thermal protection. The V\*S Master 1800 rpm, 1200 rpm and 900 rpm motors truly provide the performance of a blower-cooled motor in a TEFC enclosure. This means that the customer does not need to purchase and mount a blower motor starter or install three-phase power leads to the blower motor.

### V\*S Master Features

- 1000:1 Constant Torque or “Continuous constant torque to zero speed” - This means that the V\*S Master is designed to operate from zero to base speed continuously with full load current and torque. The V\*S Master TEFC and TENV motors are designed to draw nameplate current continuously at zero speed without exceeding the class F temperature rise. The industry standard is to call this capability 1000:1 Constant Torque, some manufacturers identify this capability 1000:1 Constant Torque, some manufactures identify this capability as 2000:1, 3000:1, infinity:1, etc. All of these terms describe the same capability of the AC Motor, one is not better than another.
- Standard NEMA T Frames - V\*S Master motors, 2 HP to 500 HP are all in standard NEMA frames (Larger motors are in above NEMA frames 447T through L449T).
- Cast Iron Frames - All V\*S Master motors are in cast iron frames with cast iron end shields. Adding XT features also provides a cast iron fan cover and conduit box along with other XT features.
- 200% Overload Torque - Each V\*S Master has an electrical design that will provide 200% overload torque for one minute from zero to base speed.
- Constant Horsepower - The standard V\*S Master is designed to provide constant horsepower to 1.5 times base speed.
- Thermostats - Each V\*S Master motor has three normally closed thermostats connected in series, one in each phase of the motor. One set of P1 and P2 leads is brought to the conduit box. If any of the thermostats opens, the P1 and P2 circuit opens.
- Encoder Provisions - Each V\*S Master has encoder provisions as a standard feature, even if an encoder is not ordered with the motor.
- Insulated Bearing - Every 440 frame (444T through L449T) has an opposite drive end insulated bearing as standard to reduce the chances of the bearings being damaged by shaft currents. In large motors (440 frames) it is quite common to have shaft currents caused by magnetic flux dissymmetry, one insulated bearing will usually protect against this source of shaft currents. Other modifications, such as “Current Shield” can be added to protect against other sources of shaft currents.
- Corona Free Insulation - Every V\*S Master motor has Reliance Electric’s “Corona Free” insulation system that exceeds the insulation requirements described in NEMA MG1-2003, part 31, for Definite Purpose, Inverter-Fed Polyphase motors.
- Class F Insulation - V\*S Master motors have class F insulation and operate below class F temperature rise. Nearly all TEFC V\*S Master motors operate with a class B rise over a 4:1 speed range. That means that most TEFC 1800-rpm motors will operate with a class B rise over a 450 rpm to 1800 rpm (covers most actual operating conditions) speed range.
- 40° C ambient - Standard on nameplate, many V\*S Master motors are suitable for higher ambient temperatures with only a nameplate change.
- Continuous Duty - Contact Reliance Electric for different duty cycles
- 1.0 Service Factor - Because V\*S Master motors are designed for Inverter Duty applications, not across-the-line designs, all designs have a 1.0 SF as standard on inverter power.
- Re-greaseable bearings - For longest life in severe duty applications, all V\*S Master motors have re-greaseable bearings.
- Stainless Steel Nameplates - Every V\*S Master motor has an Inverter Duty stainless steel nameplate with the electrical design number, magnetizing current, constant torque speed range, number of poles, rotor inertia, bearing numbers and other NEMA data.



Large AC

Inverter Duty AC Motors

RPM AC Inverter Duty Motors

RPM XL Small DC Motors

RPM III Medium DC Motors

General Information

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).

## Inverter Duty



### V\*S Master Features (cont)

- F1 Mounting - Conduit box location is F1 as standard on NEMA frame motors (IEC motors have conduit box on opposite side as standard). F2 or top mounted conduit boxes are available as a modification.
- Visit web site [www.reliance.com](http://www.reliance.com) for additional Inverter Duty Motor information. Download the V\*S Master Data Sheet, RAPS-540-2.



- V\*S Master motors are CSA, Canadian Standards Association, certified and carry the monogram on the nameplate. All accessories attached the motor must also carry their own CSA mark. Reliance Electric's file number for V\*S Master motors is, LR7861.



- The European Committee for Electrotechnical Standardization defines compliance standards for the CE mark required on motors shipping to Europe. It is available upon request on all V\*S Master motors. The V\*S Master IEC motors carry the CE mark as standard. All accessories attached to the motor must also carry their own CE mark.



- V\*S Master motors carry the Underwriters' Laboratories, Inc., Recognized Component mark for electric motors used in ordinary locations (not explosion-proof). Reliance Electric's file number for V\*S Master motors is, E54825.

### Optimum Pole

Reliance Electric's Inverter Duty Motors are based on the use of "optimum pole" design. Unlike fixed speed motors, Inverter-Fed motors can have different base speeds based on different base frequencies. For example, a four-pole motor designed with a base frequency of 40 hertz and a base voltage of 460 vac will have a base synchronous speed of 1200 rpm.

Reliance Electric selects the number of poles to be used on an Inverter Duty motor so that the torque density, speed range, efficiency, power factor, overload capability and acoustic noise can be optimized. Like the Inverter Duty RPM AC motor, most of the Inverter Duty V\*S Master motors in frames 180T through 400T are four-pole designs, regardless of the base speed. The Inverter is set to match the motor nameplate, for example, 50 hp, 1200 rpm, 460 vac, 40 hertz, and 4 poles. On larger frames of Inverter Duty AC motors, many of the designs are six-pole, regardless of the base speed.

This approach has also been used in Reliance Electric's DC Motor designs for years. Most of the DC motor ratings 500 hp and less are four-pole designs, regardless of the base speed.

For more information on optimum pole design, go to Reliance Electric's web site, [www.reliance.com](http://www.reliance.com), and print the white paper, "Optimum Pole Configuration of A-C Induction Motors used on Adjustable Frequency Power Supplies," B-7100-1.



# Inverter Duty AC Motor

## Continuous Constant Torque to Zero Speed

### 1000:1 Constant Torque

### TEFC & TENV

#### Features

- Cast Iron frame and end brackets
- Three normally closed thermostats, one per phase
- Shaft drilled and tapped for installation of stub shaft
- 200% overload torque for one minute below base speed
- Class F insulation
- TEFC, Class B Rise for 4:1 Constant Torque
- Continuous Duty
- 40° C Ambient
- Inverter Duty - not for “across the line” operation
- See previous Product Pages for additional features



#### 2 - 500 HP

HP	Synch RPM	Voltage	Frame	Enclosure	Model Number	List Price	Price Symbol	Norm. Stock	460V AMPS	Dimensions Sheet	Approx. Wt. (lb.)
2	1200	230/460	184TC	TENV	<b>P18G1187</b>	\$1,214	RVM22	Yes	2.6	613050-145	86
	1200	230/460	184TC	TEFC	<b>P18G1192</b>	1,179	RVM22	Yes	2.6	613051-127	110
3	1800	230/460	182TC	TENV	<b>P18G1188</b>	975	RVM22	Yes	3.8	613050-145	86
	1800	230/460	182TC	TEFC	<b>P18G1193</b>	946	RVM22	Yes	3.8	613051-127	110
	1800	575	182TC	TEFC	<b>P18G1226</b>	946	RVM22	N	3.0	613051-127	110
	1200	230/460	213TC	TEFC	<b>P21G1165</b>	1,484	RVM22	N	3.8	613051-127	170
	1200	230/460	215T	TENV	<b>P21G3205</b>	1,484	RVM22	N	3.9	613050-152	135
5	1800	230/460	L184TC	TENV	<b>P18G1189</b>	1,139	RVM22	Yes	6.4	613050-145	121
	1800	230/460	L184TC	TEFC	<b>P18G1194</b>	1,106	RVM22	Yes	6.4	613051-127	115
	1800	575	L184TC	TEFC	<b>P18G1227</b>	1,106	RVM22	N	5.1	613051-127	115
	1200	230/460	L215TC	TEFC	<b>P21G1166</b>	1,720	RVM22	N	6.4	613051-127	190
	1200	230/460	L215T	TENV	<b>P21G3206</b>	1,720	RVM22	N	6.3	613050-152	175
7.5	1800	230/460	L215TC	TENV	<b>P21G1162</b>	1,424	RVM22	Yes	6.3	613050-145	175
	1800	230/460	213TC	TEFC	<b>P21G1167</b>	1,383	RVM22	Yes	10.8	613051-127	170
	1800	575	213TC	TEFC	<b>P21G1178</b>	1,383	RVM22	N	8.6	613051-127	170
	1200	230/460	254T	TEFC	<b>P25G3205</b>	2,170	RVM22	N	10	611740-1	305
10	1800	230/460	254TC	TENV	<b>P25G1152</b>	1,765	RVM22	Yes	12.7	611741-267	185
	1800	230/460	L215TC	TEFC	<b>P21G1164</b>	1,605	RVM22	Yes	12.5	613051-4	190
	1800	575	L215TC	TEFC	<b>P21G1179</b>	1,605	RVM22	N	9.9	613051-4	190
	1200	230/460	256T	TEFC	<b>P25G3206</b>	2,458	RVM22	N	12.6	611740-1	315
15	1800	230/460	256TC	TENV	<b>P25G1150</b>	2,195	RVM22	Yes	18.7	611741-267	265
	1800	230/460	254TC	TEFC	<b>P25G1153</b>	1,925	RVM22	Yes	18.4	613051-127	280
	1800	575	254TC	TEFC	<b>P25G1164</b>	1,925	RVM22	N	16.6	613051-127	280
	1200	460	284T	TEFC	<b>P28G3205</b>	2,903	RVM22	N	19.2	611740-1	435
20	1800	460	284T	TENV	<b>P28G3208</b>	2,402	RVM22	N	24.3	611741-118	340
	1800	460	256TC	TEFC	<b>P25G1151</b>	2,110	RVM22	Yes	25.5	611740-3	325
	1800	575	256TC	TEFC	<b>P25G1165</b>	2,110	RVM22	N	20.4	611740-3	325
	1200	460	286T	TEFC	<b>P28G3206</b>	3,301	RVM22	N	25.2	611740-1	450
25	1800	460	324T	TENV	<b>P32G3210</b>	3,198	RVM22	N	30.6	611741-118	370
	1800	460	284TC	TEFC	<b>P28G1083</b>	2,668	RVM22	Yes	31	611740-3	445
	1800	575	284TC	TEFC	<b>P28G1087</b>	2,668	RVM22	N	24.8	611740-3	445
	1200	460	324T	TEFC	<b>P32G3205</b>	4,333	RVM22	N	31.6	611740-1	540
30	1800	460	326T	TENV	<b>P32G3209</b>	4,963	RVM22	N	36.4	611741-118	465
	1800	460	286T	TEFC	<b>P28G3207</b>	2,813	RVM22	Yes	38.1	611740-1	450
	1800	575	286T	TEFC	<b>P28G3211</b>	2,813	RVM22	N	30.5	611740-1	450
	1200	460	326T	TEFC	<b>P32G3206</b>	5,303	RVM22	N	37.5	611740-1	580

NOTE: For the current version of Inverter Duty Motor dimension sheets, connection diagrams, design curves, etc., visit [www.reliance.com](http://www.reliance.com)

(1) - F Rise 1000:1 CT, F Rise 4:1 CT

(2) - Rated only for 4:1 constant torque speed range, F Rise

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).

# Inverter Duty AC Motor

## Continuous Constant Torque to Zero Speed

### 1000:1 Constant Torque

### TEFC & TENV



#### 2 - 500 HP Con't

HP	Synch RPM	Voltage	Frame	Enclosure	Model Number	List Price	Price Symbol	Norm. Stock	460V AMPS	Dimensions Sheet	Approx. Wt. (lb.)
40	1800	460	364T	TENV	<b>P36G3209</b>	6,063	RVM22		30	611741-1	505
	1800	460	324T	TEFC	<b>P32G3207</b>	3,949	RVM22	Yes	49.8	611740-1	540
	1800	575	324T	TEFC	<b>P32G3214</b>	3,949	RVM22	N	39.8	611740-1	540
	1200	460	364T	TEFC	<b>P36G3205</b>	6,388	RVM22	N	50	611740-1	800
50	1800	460	404T	TENV	<b>P40G3208</b>	7,526	RVM22	N	57.9	611741-116	755
	1800	460	326T	TEFC	<b>P32G3208</b>	4,826	RVM22	Yes	62.6	611740-1	580
	1800	575	326T	TEFC	<b>P32G3215</b>	4,826	RVM22	N	50.1	611740-1	580
	1200	460	365T	TEFC	<b>P36G3206</b>	7,913	RVM22	N	60.7	611740-1	840
60	1800	460	364T	TEFC	<b>P36G3207</b>	5,979	RVM22	Yes	71.4	611740-1	800
	1800	575	364T	TEFC	<b>P36G3212</b>	5,979	RVM22	N	57.1	611740-1	800
	1200	460	404T	TEFC	<b>P40G3205</b>	9,443	RVM22	N	71.1	611740-1	1120
75	1800	460	365T	TEFC	<b>P36G3208</b>	7,489	RVM22	Yes	89.4	611740-1	840
	1800	575	365T	TEFC	<b>P36G3213</b>	7,489	RVM22	N	71.5	611740-1	840
	1200	460	405T	TEFC	<b>P40G3206</b>	10,340	RVM22	N	85.1	611740-1	1160
100	1800	460	405T	TEFC	<b>P40G3207</b>	9,680	RVM22	Yes	115.4	611740-1	1160
	1800	575	405T	TEFC	<b>P40G3211</b>	9,680	RVM22	N	92.3	611740-1	1160
	1200	460	444T	TEFC	<b>P44G3205</b>	13,356	RVM22	N	119	611740-1	1540
125	1800	460	444T	TEFC	<b>P44G3207</b>	12,015	RVM22	Yes	151	611740-1	1540
	1800	575	444T	TEFC	<b>P44G3229</b>	12,015	RVM22	N	121	611740-1	1540
	1200	460	445T	TEFC	<b>P44G3206</b>	14,998	RVM22	N	151	611740-1	1730
150	1800	460	445T	TEFC	<b>P44G3208</b>	14,339	RVM22	Yes	177	611740-1	1730
	1800	575	445T	TEFC	<b>P44G3230</b>	14,339	RVM22	N	142	611740-1	1730
	1200	460	447T	TEFC	<b>P44G3209</b>	18,502	RVM22	N	177	616524-1	2275
	1800	460	447T	TEFC	<b>P44G3213</b>	16,990	RVM22	Yes	226	616524-1	2275
200	1800	575	447T	TEFC	<b>P44G3231</b>	16,990	RVM22	N	181	616524-1	2275
	1200	460	449T	TEFC	<b>P44G3210</b>	22,996	RVM22	N	230	616524-1	2650
	1800	460	449T	TEFC	<b>P44G3214</b>	21,003	RVM22	Yes	279	616524-1	2650
250	1800	575	449T	TEFC	<b>P44G3232</b>	21,003	RVM22	N	223	616524-1	2650
	1200	460	449T (1)	TEFC	<b>P44G3220</b>	26,800	RVM22	N	290	616524-1	2650
	1200	460	L449T	TEFC	<b>P44G3211</b>	28,800	RVM22	N	290	611747-1	4000
	1800	460	449T	TEFC	<b>P44G3215</b>	24,014	RVM22	Yes	338	616524-1	2650
300	1800	575	449T	TEFC	<b>P44G3233</b>	24,014	RVM22	N	270	616524-1	2650
	1200	460	L449T	TEFC	<b>P44G3212</b>	36,011	RVM22	N	354	611747-1	4000
	1800	460	L449T	TEFC	<b>P44G3216</b>	28,811	RVM22	N	397	611747-1	4000
350	1800	575	L449T	TEFC	<b>P44G3234</b>	28,811	RVM22	N	318	611747-1	4000
	1800	460	L449T	TEFC	<b>P44G3217</b>	38,500	RVM22	N	445	611747-1	4000
400	1800	575	L449T	TEFC	<b>P44G3235</b>	38,500	RVM22	N	356	611747-1	4000
	1800	460	L449T	TEFC	<b>P44G3218</b>	46,315	RVM22	N	501	611747-1	4000
450	1800	575	L449T	TEFC	<b>P44G3236</b>	46,315	RVM22	N	401	611747-1	4000
	1800	460	L449T (2)	TEFC	<b>P44G3221</b>	47,680	RVM22	N	551	611747-1	4000
500	1800	575	L449T (2)	TEFC	<b>P44G3237</b>	47,680	RVM22	N	441	611747-1	4000

NOTE: For the current version of Inverter Duty Motor dimension sheets, connection diagrams, design curves, etc., visit [www.reliance.com](http://www.reliance.com)

(1) - F Rise 1000:1 CT, F Rise 4:1 CT

(2) - Rated only for 4:1 constant torque speed range, F Rise

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).

## V\*S Master Encoder Kits



60HP, TEFC, 364T  
with HS35 ENCODER

### Encoder With Mounting Kit - Requires Both Model Numbers

Frame	Enclosure	Type	Supply Voltage	Output/PPR	Encoder Model	List Price	Mounting Kit Model	List Price	Price Symbol
180T-250T	TENV	RA HS35-MS	5 to 24 vdc	Single/1024	<b>K99G40</b>	\$1,100	<b>K18G22</b>	\$100	RVM22
180-210T	TEFC	RA HS35-MS	5 to 24 vdc	Single/1024	<b>K99G40</b>	1,100	<b>K21G23</b>	100	RVM22
180T-250T	TENV	BEI HS35	5 to 15 vdc	Single/1024	<b>K99G32</b>	1,000	<b>K18G22</b>	100	RVM22
180T-440T	TEFC	BEI HS35	5 to 15 vdc	Single/1024	<b>K99G32</b>	1,000	<b>K21G23</b>	100	RVM22
180T-250T	TENV	BEI HS35	5 to 24 vdc	Single/2048	<b>K99G36</b>	1,000	<b>K18G22</b>	100	RVM22
180T-440T	TEFC	BEI HS35	5 to 24 vdc	Single/2048	<b>K99G36</b>	1,000	<b>K21G23</b>	100	RVM22
180T-250T	TENV	BEI HS35	5 to 24 vdc	Single/1024	<b>K99G34</b>	1,000	<b>K18G22</b>	100	RVM22
180T-440T	TEFC	BEI HS35	5 to 24 vdc	Single/1024	<b>K99G34</b>	1,000	<b>K21G23</b>	100	RVM22
180T-250T	TENV	HSD35	5 to 26 vdc	Single/1024	<b>K99G41</b>	1,250	<b>K21G25</b>	100	RVM22
180T-440T	TEFC	HSD35	5 to 26 vdc	Single/1024	<b>K99G41</b>	1,250	<b>K21G23</b>	100	RVM22

**RA HS35-MS** - The Rockwell Automation RA HS35-MS encoder is a hollow shaft encoder with a single output, 1024 ppr, that has two channel quadrature outputs (A and B) with complementary outputs and a marker pulse (Z). The mating screw-on MS (Military-Style) connector is included with the encoder. The encoder requires 5-24 vdc input and is rated for 85 degrees C ambient, 6,000 rpm maximum and has a IP65 enclosure rating. The magnetic rotor is mechanically more robust than glass or metal optical disks. This Rockwell Automation encoder has a shaft design that provides extended life compared to other HS35 model encoders.

**BEI HS35** - This is an optical hollow shaft encoder with a single output, 1024 ppr, that has two channel quadrature outputs (A and B) with complementary outputs and a market pulse (Z). The mating screw-on MS (Military-Style) connector is included with the encoder. Two versions of the encoder are stocked, 5 to 15 vdc input and a 5 to 26 vdc input, both are rated for 70 degrees C ambient, 6000 rpm maximum. This encoder comes with a protective cover as shown in the above picture. See BEI's web site for additional information, [www.beiied.com](http://www.beiied.com).

**LakeShore HSD35** - The HSD35 is a hollow shaft encoder with a single output, 1024 ppr, that has two channel quadrature outputs (A and B) with complementary outputs and a marker pulse (Z). Encoder includes EPIC latching industrial connector. The encoder requires 5-26 vdc input and is rated for 70 degrees C ambient, 3600 rpm maximum. The HSD35 optical encoder replaces the HS35M. For more information on LakeShore or DynaPar encoders, see web site [www.dancon.com](http://www.dancon.com).

**NOTES:** For mounting of the above encoders and kits by Reliance Electric, see the Modification Center price pages of this section

See the Variable Speed Catalog or the Configurator for a complete list of encoders available on production Inverter Duty AC Motor orders.

# V\*S Master Dimension Sheet Index



## TEFC (Totally Enclosed Fan Cooled)

DESCRIPTION	ACCESSORIES	FRAMES	D/S NUMBER
Foot	Encoder Provisions (M12 hole)	180T - 210T	616545-596
Foot	DynaPar HS35	180T - 210T	616545-602
Foot	Avtron M285 Encoder	180T - 210T	616545-595
Foot	Provisions Only for Avtron M285	210T	617269-013
C-face with feet	DynaPar HS35	182TC - L215TC	616545-605
C-face with feet	BEI HS35 Encoder	180TC - 210TC	613051-317
C-face with feet	Provisions Only Avtron M285	210TC	617269-011
C-face with feet	LakeShore HS56 Encoder	180TC - 210TC	616545-597
C-face with feet	Stearns Brake & BEI HS35 Encoder	180TC - 210TC	613051-342
C-face with feet	Stearns Brake & DynaPar H20	180TC - 210TC	613051-253
C-face with feet	Stearns Brake & LakeShore HS56	180TC - 210TC	617269-25
C-face footless	Stearns Brake & DynaPar HS35	180TC - 210TC	617269-20
C-face footless	140TC (AK = 4.5 inches)	182TY - L184T	616545-594
C-face footless	BEI HS35 Encoder	180TC - 250TC	616545-592
C-face footless	DynaPar HS35	180TC - 210TC	613051-356
180TC C-face footless	BEI HS35 Encoder	210TCZ	613051-341
D-flange with feet	Stearns Brake, XT & BEI HS35 Encoder	180TD - 210TD	616545-514
Foot	Provisions Only Avtron M285	210T	617269-013
Foot	Complete Prov Only for 56 C-face encoder	250T - 440T	611740-632
Foot	BEI HS35 Encoder	250T - 440T	611740-200
Foot	BEI HS35 Encoder / Top Conduit Box	250T - 440T	616555-524
Foot	Avtron M285 Encoder	250T - 440TS	611760-541
Foot	Avtron M3 / M4 Aux C/B	250T - 440T	611760-644
Foot	Avtron M3 / M4 / Top Conduit Box	250T - 440TS	616555-552
Foot	DynaPar HS35	250T - 440TS	611760-63
Foot	LakeShore HS56	250T - 440T	616555-594
Foot	LakeShore HS56 / Oversize CB	250T - 440T	616555-573
Foot	LakeShore HS56 / Top Conduit Box	250T - 440T	616555-600
Foot	Prov Only M285 / 841XL Features	250T - 360TS	611760-573
Foot	Stearns Brake & BEI HS35 Encoder	250T - 445TS	616555-553
Foot	Stearns Brake & Avtron M3 / M4	250T - 440T	616555-545
Foot	Stearns Brake & LakeShore HS35M	250T - 440T	616555-584
Foot	Stearns Brake & LakeShore HS56	250T - 440T	616555-595
C-face with feet	Provisions Only Avtron M285	210TC	617269-011
C-face with feet	Provisions Only LakeShore SL56	210TC	617269-009
C-face with feet	BEI HS35 Encoder	250TC - 440TC	611740-199
C-face with feet	DynaPar HS35	250TC - 440TC	611760-60
C-face with feet	Lakeshore HS35M	250TC - 440TC	616555-523
C-face with feet	Avtron M3 / M4 Encoder	250TC - 440TC	611760-014
C-face with feet	BEI HS35 Encoder - Top C/B	250TC - 440TC	611760-698
C-face with feet	Stearns Brake / BEI HS35 / Top C/B	250TC - 440TC	611760-58
C-face with feet	Stearns Brake & BEI HS35 Encoder	250TC - 440TC	611760-61
C-face with feet	Stearns Brake & Lakeshore HS56	250TC - 440TC	616555-596
D-flange with feet	Avtron M3 / M4	250TD - 440TD	616555-551
C-face footless	BEI HS35 Encoder	250TC - 440TC	616555-741
C-face footless	Avtron M3 / M4 Encoder	250TC - 360TC	611760-842
Foot	BEI HS35 Encoder	447T - 449TS	616524-93
Foot	Lakeshore HS56	447T - 449TS	616524-181
Foot	Avtron M3 / M4 - 841XL Features	447T - 449TS	616524-98
Foot	Avtron M3 / M4	447T - 449TS	616524-126

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).

# V\*S Master Dimension Sheet Index



Large AC

Inverter Duty AC Motors

PPM AC Inverter Duty Motors

PPM XL Small DC Motors

PPM III Medium DC Motors

General Information

## TEFC (Totally Enclosed Fan Cooled) con'tt

DESCRIPTION	ACCESSORIES	FRAMES	D/S NUMBER
Foot	841XL Mech Features Avtron M3 / M4	447T - 449TS	616524-98
Foot	Avtron Coupled M4 Encoder	447T - 449TS	616524-92
C-face with feet	Lakeshore HS56	447TC - 449TSC	616524-94
C-face with feet	BEI HS35 Encoder	447TC - 449TSC	616524-159
Foot	BEI HS35 Encoder	L449T - L449TY	611747-105
Foot	Avtron M3 / M4 - Shaft Ground Brush	L449T - L449TY	611747-103

## TENV (Totally Enclosed Non Vent)

Foot	XT with Prov for Encoder	180T - 210T	613050-670
Foot	XT with BEI HS35	180T - 210T	613050-673
Foot	XT with DynaPar HS35	180T - 210T	613050-709
Foot	XT with Prov for Encoder, Top C/B	180T - 210T	613050-678
Foot	XT with DynaPar H56	180T - 210T	613050-719
Foot	XT with Avtron M285	180T - 210T	613050-720
Foot	XT with DynaPar H20	180T - 210T	613050-667
Foot	Stearns Brake & BEI HS35 Encoder	180T - 210T	613050-708
Foot	XT Stearns Brake & SL85 Sandwich	210T	613050-614
C-face with feet	Provisions for Encoder	180TC - 210TC	613050-145
C-face with feet	XT Provisions for Encoder	180TC - 210TC	613050-705
C-face with feet	Provisions Only for SL56	210TC	617269-009
C-face with feet	Lakeshore SL56	180TC - 210TC	613050-608
C-face with feet	LakeShore SL85	180TC - 210TC	613050-706
C-face with feet	BEI HS35 Encoder	180TC - 210TC	613050-665
C-face with feet	Avtron M3 / M4 Encoder	180TC - 210TC	613050-666
C-face with feet	XT with LakeShore HS56	180TC - 210TC	613050-679
C-face with feet	DynaPar HS35	180TC - 210TC	613050-718
C-face with feet	XT Avtron M485	180TC - 210TC	613050-721
C-face with feet	XT Avtron M485, Top Conduit Box	180TC - 210TC	613050-724
C-face with feet	LakeShore SL85 / Top Conduit Box	180TC - 210TC	613050-722
C-face with feet	XT, Lakeshore HS35M	180TC - 210TC	613050-729
C-face footless	LakeShore SL85	180TC - 210TC	613050-723
C-face footless	XT with Avtron M3 / M4 encoder	180TC - 210TC	613050-668
C-face with feet	Stearns Brake & BEI HS35 Encoder	180TC - 210TC	613050-707
C-face with feet	Stearns Brake & DynaPar HS35 Encoder	180TC - 210TC	617558-001
C-face with feet	Stearns Brake & SL85 Sandwich	180TC - 210TC	613050-617
C-face with feet	Stearns Brake & HS56 Encoder	180TC - 210TC	617558-005
C-face footless	Stearns Brake / Vert / DynaPar HS35	180TC	613050-611
C-face footless	Stearns Brake / DynaPar HS35	180TC - 210TC	617558-002
C-face footless	Stearns Brake & SL85 Sandwich	180TC - 210TC	613050-716
C-face footless	Stearns Brake & BEI HS35 Encoder	180TC - 210TC	617558-002
D-flange with feet	Cone Drive Shaft	180TDZ	613050-677
Foot	Prov for Encoder	250T - 440T	611741-118
Foot	XT with Prov for Encoder	250T - 440T	611741-649
Foot	XT with Prov for Encoder / Top C/B	250T - 440T	611741-658
Foot	BEI HS35 Encoder	254T - 326TS	611741-123
Foot	LakeShore SL85	250T - 360T	611741-633
Foot	Povisions Only Avtron M285	250 T	611741-642
Foot	Avtron M285 / Encoder Ground Brush	250T - 440T	611741-644
Foot	XT Avtron M485, Top C/B	250T - 326TS	611741-666
Foot	Avtron M3 / M4 10 Pin connector	254T - 326TS	611741-641

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).

# V\*S Master Dimension Sheet Index



## TENV (Totally Enclosed Non Vent) con't

DESCRIPTION	ACCESSORIES	FRAMES	D/S NUMBER
Foot	Stearns Brake & Avtron HS M3	250T - 320T	611741-632
Foot	Stearns Brake & BEI HS35 Encoder	250T	611741-124
Foot	Stearns Brake & Lakeshore SL85 Encoder	250T - 360T	611741-576
Foot	Stearns Brake & Avtron M285	324T - 365T	611741-651
C-face with feet	Prov for Encoder	250TC - 440TC	611741-267
C-face with feet	BEI HS35 Encoder	250TC - 326TC	611741-630
C-face with feet	BEI HS35 Encoder	250TC - 286TSC	611741-102
C-face with feet	BEI HS35 Encoder - Top C/B	250TC - 326TSC	611741-647
C-face with feet	Avtron M3 / M4 Encoder	250TC - 326TSC	611741-648
C-face with feet	Avtron M485	250TC - 440TC	611741-665
C-face with feet	BEI H25 Encoder	250TZ - 256TZ	611741-645
C-face with feet	RIM 8500 Encoder	250TC - 286TSC	611741-125
C-face with feet	DynaPar HS35 / Cone Drive / 841XL Feat	250TC - 440TC	611741-637
C-face with feet	Stearns Brake & BEI HS35 Encoder	250TC	611741-107
D-flange with feet	Avtron M3 / M4 Encoder	250TD	611741-628
C-face footless	Prov for Encoder	250TC - 440TC	611741-772
C-face footless	Stearns Brake & SL85 Encoder	250TC - 360TC	611741-770
Foot	Double Shaft Extension	445TY - 449TS	616546-001
Foot	Double Shaft Extension	445T - 449TS	616546-002

## IEC Motors - IC411 (previously IC41) - TEFC (Totally Enclosed Fan Cooled)

Foot	Cast Iron NEMA F1 Mtg	112 - 132	616556-502
Foot	SL85 Encoder; Top Conduit Box	112S - L132M	613071-534
Foot	BEI HS35; IEC Std Conduit Box Location	112S - L132M	613071-543
FF Flange with Feet	F1 Mounting	112S - 132M	616545-593
FF Flange Footless	General Dimension Sheet	112S/M - L132S/M	616556-503
FF Flange Footless	DynaPar H20	112 - 132	617269-019
B5 Flange Footless	Stearns Brake & DynaPar H20	112S - 132M	617269-18
Foot	Standard IEC Frame	160 - 280M	611770-501
Foot	BEI HS35 NEMA F1 Mtg	160 - 280	611770-011
Foot	BEI HS35 NEMA F2 Mtg	160 - 280	611770-010
Foot	SL85 Oversized Conduit Box	160 - 280	611770-516
Foot	SL85 Top Conduit Box	160 - 280	611770-546
Foot	LakeShore RIM 8500; Top C/B	160-280	611770-515
Foot	LakeShore SL56	160-280	611770-516
Foot	SL85 NEMA F1 Mtg	160 - 280	616557-516
Footless FF Flange	SL85 / OSCB	250S - 250M	611770-726
Foot	Aux Conduit Box	280K - 280H	611770-512
Foot	BEI HS35; Top Conduit Box	280H	616524-132
Foot	DynaPar RD-62; Aux C/B	280H	611770-514
Foot	BEI HS35; Top Conduit Box	L280G	611747-106
Foot	BEI HS35	280K, 280H, L280H	611770-012
Foot	BEI HS35 NEMA F1 Mtg	280K, 280H, L280H	611770-009
FF Flange with Feet	Cast Iron	280K - 280H	611770-513

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).

## Inverter Duty Modification Center

### ORDERING INSTRUCTIONS

- Modifications are not available on standard non-stock model number motors.
- Instructions also apply to “Mounted Kit Pricing” found in the Small & Medium AC Accessories and Kits section of this catalog.

### Before Entering an Order

1. Determine the proper stock model number motor and parts required and check availability.
2. Be sure the modifications required are available.

### How to Price an Order

1. Record the list price of the required motor model number plus add all list modification adders and multiply it by the appropriate discount symbol.
2. Record total motor net.

### How and Where to Enter an Order

**Reliance Distributors:** Can phone their orders to Rockwell Automation Reliance Electric Inside Sales Representative or send a fax to: 864-281-2363. For those not assigned an Inside Sales Representative, you may call the main switchboard at 864-297-4800.

**District Sales Engineers:** May place orders to the Modification Centers via OMS.

### Cancellation or Changes to an Order

Maximum cancellation charge is \$100

To cancel an order for a motor after it is modified, but before it ships - a cancellation charge of double the modification charge will be invoiced to the customer. Any MOD order cancelled before modification is completed is subject to 25% cancellation charge.

Once shipped, modified motors cannot be returned.

### Delivery Cycle

The delivery cycle will be subject to the availability of stock motors and parts. If the motor and/or the parts are not currently in stock, then the total delivery cycle for the order must include the time to replenish the longest lead time item PLUS the time to complete the modification.

The Modification Center is designed to process and ship units as quickly as possible; therefore, “Hold for Approval” and other similar conditions are not available on Modification Center orders. For best delivery results, check stock availability and reserve the motor prior to order entry. Typically, modifications will require 2 to 7 business days, once the order is entered. Orders for more than 5 units may require additional delivery time.

### Hours

The Modification Centers are operated from 7 am to 3 pm Monday through Friday.

# Inverter Duty Vector Performance Modification Center

Large AC

Inverter Duty AC Motors

RPM AC Inverter Duty Motors

RPM XL Small DC Motors

RPM III Medium DC Motors

General Information

Modification Description	Frame	Product	List Price Adder	Notes
<b>1. ALTITUDE (3300 ft to 9900 ft) OR AMBIENT (40° to 65° C)</b> Use next larger rating add this nameplate charge.	180-449	ALL NON XP	140	
<b>2. BEARINGS: (per set / per motor)</b> Shielded bearings (specify double or single bearing. Mfg. is Reliance Option)	180-280	ALL NON XP	280	
Sealed bearings - convert to permanently lubricated sealed bearings	48, 56, 140 180-280	ALL NON XP ALL NON XP	280 280	
<b>3. BRAKES:</b> Mount double C-face DODGE DBSS and DBES brake kit to c-face motor - Does not include brake price - See accessories section for brake price:  - Standard Enclosures only, 3 ft.lb. to 25 ft.lb.	56C. 140TC	ALL NON XP	250	
<b>4. BRAKE FAST RESPONSE KIT</b> Mount fast response kit in conduit box. D-Series only		See: "Mounted Kit Pricing" Starting on page	M-155	
<b>5. CONDUIT BOX: Mounting of stock box kits.</b> - Oversize or Cast Iron		See: "Mounted Kit Pricing" Starting on page	M-155	
- Auxiliary Conduit Box: Mounted on Main C/Box		See: "Mounted Kit Pricing" Starting on page	M-155	
- Conduit Box Drain Hole	56-449	ALL NON XP	210	
<b>6. CONNECTIONS:</b> Final connect dual to single voltage.	48-140 180-320 360-449	ALL NON XP ALL NON XP ALL NON XP	150 210 280	
<b>7. DRIP COVERS:</b> Mounting of stock canopy kits This modification does not provide vertical lifting Not available with encoder		See: "Mounted Kit Pricing" Starting on page	M-155	
<b>8. ENDSHIELDS:</b> Mount C-Face and D-Flange end brackets		See: "Mounted Kit Pricing" Starting on page	M-155	
<b>9. FAN COVER: (Mill &amp; Chem Duty Kit)</b> Mount Cast Iron Fan Shroud and Conduit Box		See: "Mounted Kit Pricing" Starting on page	M-155	
<b>10. FEEDBACK DEVICES:</b> Mounted on V*S Master Inverter Duty AC Motors. All encoders are hollow shaft, single quadrature output. Price includes encoder, kit and mounting. · RA HS35-MS · BEI hollow shaft HS35 · LakeShore hollow shaft HSD35	180-449 180-449 180-449	TEFC & TENV TEFC & TENV TEFC & TENV	1,200 1,100 1,350	
<b>11. FRAME:</b> Remove feet from cast iron frame motors. (Note: add in conjunction with flange modification) Not returnable	140 180-210 250	ALL NON XP ALL NON XP ALL NON XP	\$210 420 550	
<b>12. GREASE:</b> Changing to special grease - based on compatability / suitability: Mobil 28 or Aeroshell 7 low temperature or DC-44 (synthetic) high temperature grease.	180-280 320-360 400-445	ALL NON XP ALL NON XP ALL NON XP	620 830 1,110	
<b>13. GREASE FITTINGS:</b> Alemite 1610 or button head zerk fitting	250-449	ALL	210	
<b>14. INSULATION:</b> (Addition of tropical, anti-fungus treatment to windings)  BJ or FJ	48,56,140	ALL NON XP	280	
BJ or FJ (base model must be F insulation)	180-286 324-445	ALL NON XP ALL NON XP	420 550	

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).

# Inverter Duty Vector Performance Modification Center

Modification Description	Frame	Product	List Price Adder	Notes
<b>15. LEAD TERMINALS:</b>				
Addition of eyelet-type lead terminals	48,56,140	ALL	280	
Compression type (Burndy, etc.) lead lugs	48-449	ALL	350	
<b>16. MOUNTING:</b> (not available on L180-L210 frames)				
F-1 to F-2/W6/W8/W5/W7	180-280	ALL NON XP	280	107
	320-449	ALL NON XP	420	107
<b>17. NAMEPLATES:</b> Allows adding definite purpose nameplates or the addition of information. Characters of additional information will be available in 3/32" only. Over 25 characters will require an additional blank nameplate with the auxiliary nameplate charge added. Charges are per nameplate. Nameplates are stainless steel.				
Separate nameplate for customer data	48-449	ALL NON XP	140	
Additional data on motor nameplate	48-449	ALL NON XP	140	
Separately shipped re-rated nameplate for stock motor in the field (no CSA logo) Requires return of old nameplate.	48-449	ALL NON XP	140	
<b>18. SEALS:</b>				
V-ring rubber slinger on drive end	140T-445T	ALL	280	
<b>19. SERVICE FACTOR (1.15 SF):</b>				
Use Next larger rating add this nameplate charge.	48-449	ALL NON XP	\$140	
<b>20. SPACE HEATERS:</b> (120, 240, 480 volt) Auxiliary box not included. See conduit boxes for auxiliary box price.				
Mounting of standard strip heaters	48,56,140	ALL NON XP	420	107
	180-280	ALL NON XP	490	
	320-400	ALL NON XP	550	
	440-449	ALL NON XP	690	
<b>21. TERMINAL BLOCK:</b>				
Mount dual voltage Terminal Strip in Main Conduit Box		See: "Mounted Kit Pricing" Starting on page	M-155	
Mount IEC style terminal block in main conduit box		See: "Mounted Kit Pricing" Starting on page	M-155	

**Note:** Where multiple modifications require a nameplate change, the charge should only be applied once.

For pricing information or to place orders, go to [www.PTplace.com](http://www.PTplace.com).