Table 2.E
Lug Selection

Drive Catalog Number	AC Input R, S, T/Output U, V, W and PE		DC+/DC– [2]		TE	
	Cable (per Phase) *Qty. mm² (AWG)*	**T&B Part No.**[3] *Qty. Number*	**Cable** (per Phase) *Qty. mm² (AWG)*	**T&B Part No.**[3] *Qty. Number*	**Cable** (per Phase) *Qty. mm² (AWG)*	**T&B Part No.**[3] *Qty. Number*
1336F-A040	(1) 53.5 (1/0)	(8) 54153[1]	(1) 13.3 (6)	(2) 54135[1]	(1) 13.3 (6)	(1) 54135[1]
1336F-A050	(1) 85.0 (3/0)	(8) 54163[1]	(1) 13.3 (6)	(2) 54135[1]	(1) 13.3 (6)	(1) 54135[1]
1336F-A060	(1) 107.2 (4/0)	(8) 54168[1]	(1) 13.3 (6)	(2) 54135[1]	(1) 21.2 (4)	(1) 54139[1]
1336F-A075	(2) 53.5 (1/0)	(8) 54109T (8) 54109B	(1) 33.6 (2)	(2) 54109	(1) 21.2 (4)	(1) 54139[1]
1336F-A100	(2) 85.0 (3/0)	(8) 54111T (8) 54111B	(1) 42.4 (1)	(2) 54148	(1) 33.6 (2)	(1) 54142[1]
1336F-A125	(2) 107.2 (4/0)	(8) 54112T (8) 54112B	(1) 67.4 (2/0)	(2) 54110	(1) 33.6 (2)	(1) 54142[1]
1336F-B060	(1) 42.4 (1)	(8) 54147[1]	(1) 8.4 (8)	(2) 54131[1]	(1) 13.3 (6)	(1) 54135[1]
1336F-B075	(1) 53.5 (1/0)	(8) 54153[1]	(1) 13.3 (6)	(2) 54135[1]	(1) 13.3 (6)	(1) 54135[1]
1336F-B100	(1) 85.0 (3/0)	(8) 54163[1]	(1) 13.3 (6)	(2) 54135[1]	(1) 13.3 (6)	(1) 54135[1]
1336F-B125	(1) 107.2 (4/0)	(8) 54168[1]	(1) 26.7 (3)	(2) 54147[1]	(1) 21.2 (4)	(1) 54139[1]
1336F-BX150	(1) 107.2 (4/0)	(8) 54168[1]	(1) 26.7 (3)	(2) 54147[1]	(1) 21.2 (4)	(1) 54139[1]
1336F-B150	(2) 53.5 (1/0)	(8) 54109T (8) 54109B	(1) 33.6 (2)	(2) 54110	(1) 21.2 (4)	(1) 54139[1]
1336F-B200	(2) 85.0 (3/0)	(8) 54111T (8) 54111B	(1) 42.4 (1)	(2) 54148	(1) 26.7 (3)	(1) 54142[1]
1336F-B250	(2) 107.2 (4/0)	(8) 54112T (8) 54112B	(1) 67.4 (2/0)	(2) 54110	(1) 33.6 (2)	(1) 54142[1]
1336F-BX250	(3) 53.5 (1/0)	(24) 54109	(1) 67.4 (2/0)	(2) 54110	NA	NA
1336F-BP/BPR250	(3) 53.5 (1/0)	(24) 54109	(1) 67.4 (2/0)	(2) 54110	NA	NA
1336F-B300	(3) 67.4 (2/0)	(24) 54110	(1) 42.4 (1)	(2) 54148	NA	NA
1336F-BP/BPR300	(3) 67.4 (2/0)	(24) 54110	(1) 42.4 (1)	(2) 54148	NA	NA
1336F-B350	(3) 85.0 (3/0)	(24) 54111	(1) 42.4 (1)	(2) 54148	NA	NA
1336F-BP/BPR350	(3) 85.0 (3/0)	(24) 54111	(1) 42.4 (1)	(2) 54148	NA	NA
1336F-B400	(3) 107.2 (4/0)	(24) 54112	(1) 42.4 (1)	(2) 54148	NA	NA
1336F-BP/BPR400	(3) 107.2 (4/0)	(24) 54112	(1) 42.4 (1)	(2) 54148	NA	NA
1336F-B450	(3) 127.0 (250 MCM)	(24) 54174	(1) 42.4 (1)	(2) 54148	NA	NA
1336F-BP/BPR450	(3) 127.0 (250 MCM)	(24) 54174	(1) 42.4 (1)	(2) 54148	NA	NA
1336F-B500	(3) 152.0 (300 MCM)	(24) 54179	(1) 53.5 (1/0)	(2) 54109	NA	NA
1336F-B600	(3) 152.0 (300 MCM)	(24) 54179	(1) 53.5 (1/0)	(2) 54109	NA	NA
1336F-C075	(1) 33.6 (2)	(8) 54142[1]	(1) 13.3 (6)	(2) 54135[1]	(1) 8.4 (8)	(1) 54131[1]
1336F-C100	(1) 53.5 (1/0)	(8) 54153[1]	(1) 13.3 (6)	(2) 54135[1]	(1) 13.3 (6)	(1) 54135[1]
1336F-C125	(1) 67.4 (2/0)	(8) 54158[1]	(1) 26.7 (3)	(2) 54147[1]	(1) 13.3 (6)	(1) 54135[1]
1336F-C150	(1) 107.2 (4/0)	(8) 54111	(1) 42.4 (1)	(2) 54148	(1) 13.3 (6)	(1) 54135[1]
1336F-C200	(2) 67.4 (2/0)	(8) 54110T (8) 54110B	(1) 42.4 (1)	(2) 54148	(1) 26.7 (3)	(1) 54142[1]
1336F-C250	(2) 85.0 (3/0)	(8) 54111T (8) 54111B	(1) 67.4 (2/0)	(2) 54110	(1) 26.7 (3)	(1) 54142[1]
1336F-CX300	(3) 85.0 (3/0)	(16) 54111	Consult Factory		NA	NA
1336F-C300	(3) 85.0 (3/0)	(16) 54111			NA	NA
1336F-C350	(3) 53.5 (1/0)	(24) 54109			NA	NA
1336F-C400	(3) 67.4 (2/0)	(24) 54110			NA	NA
1336F-C450	(3) 85.0 (3/0)	(24) 54111			NA	NA
1336F-C500	(3) 107.2 (4/0)	(24) 54112			NA	NA
1336F-C600	(3) 127.0 (250 MCM)	(24) 54174			NA	NA

1 5/16" Stud. All other studs are 3/8".

2 Lugs shown for DC+/– are based on dynamic brake sizing of 50% of (motor rating X 1.25). Select proper lugs based on required braking torque. Refer to 1336-5.64 or 1336-5.65 for additional information.

3 T & B COLOR-KEYED® Connectors require T & B WT117 or TBM-6 Crimper tool or equivalent. Lugs should be crimped according to manufacturer's tool instructions. If required, Rockwell Automation can supply lug kits for lugs shown above. Kits do not include crimping tools. Consult factory for kit information.

Motor Cables

A variety of cable types are acceptable for drive installations. For many installations, unshielded cable is adequate, provided it can be separated from sensitive circuits. As an approximate guide, allow a spacing of 0.3 meters (1 ft.) for every 10 meters (32.8 ft.) of length. In all cases, long parallel runs must be avoided. Do not use cable with an insulation thickness less than or equal to 15 mils (0.4 mm/0.015 in.).

The cable should be 4-conductor with the ground lead being connected directly to the drive ground terminal (PE) and the motor frame ground terminal. See table below.

Unshielded

THHN, THWN or similar wire is acceptable for drive installation in dry environments provided adequate free air space and/or conduit fill rates limits are provided. **Do not use THHN or similarly coated wire in wet areas**. Any wire chosen must have a minimum insulation thickness of 15 mils and should not have large variations in insulation concentricity.

Shielded/Armored Cable

Shielded cable is recommended if sensitive circuits or devices are connected or mounted to the machinery driven by the motor (see table).

Recommended Shielded Wire

Location	Rating/Type	Description
Standard (Option 1)	600V, 90° C (194° F) XHHW2/RHW-2 Anixter B209500-B209507, Belden 29501-29507, or equivalent	• Four tinned copper conductors with XLP insulation. • Copper braid/aluminum foil combination shield and tinned copper drain wire. • PVC jacket.
Standard (Option 2)	Tray rated 600V, 90° C (194° F) RHH/RHW-2 Anixter OLF-7xxxxx or equivalent	• Three tinned copper conductors with XLPE insulation. • 5 mil single helical copper tape (25% overlap min.) with three bare copper grounds in contact with shield. • PVC jacket.
Class I & II; Division I & II	Tray rated 600V, 90° C (194° F) RHH/RHW-2 Anixter 7V-7xxxx-3G or equivalent	• Three bare copper conductors with XLPE insulation and impervious corrugated continuously welded aluminum armor. • Black sunlight resistant PVC jacket overall. • Three copper grounds on #10 AWG and smaller.

Conduit

If metal conduit is preferred for cable distribution, the following guidelines must be followed.

- Drives are normally mounted in cabinets and ground connections are made at a common ground point in the cabinet. Normal installation of conduit provides grounded connections to both the motor frame ground (junction box) and drive cabinet ground. These ground connections help minimize interference. This is a noise reduction recommendation only, and does not affect the requirements for safety grounding (refer to pages 2–11 and 2–12).

- No more than three sets of motor leads can be routed through a single conduit. This will minimize “cross talk” that could reduce the effectiveness of the noise reduction methods described. If more than three drive/motor connections per conduit are required, shielded cable as described above must be used. If practical, each conduit should contain only one set of motor leads.

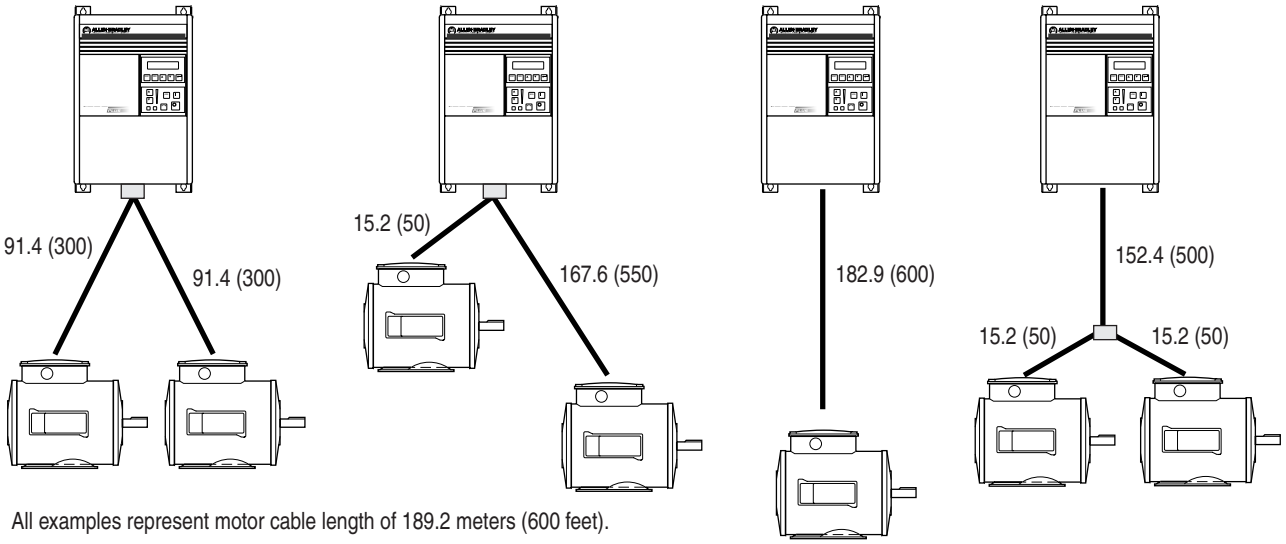
ATTENTION: To avoid a possible shock hazard caused by induced voltages, unused wires in the conduit must be grounded at both ends. For the same reason, if a drive sharing a conduit is being serviced or installed, all drives using this conduit should be disabled. This will eliminate the possible shock hazard from “cross coupled” drive motor leads.

Motor Lead Lengths

Installations with long cables to the motor may require the addition of output reactors or cable terminators to limit voltage reflections at the motor. Excessive cable charging current can also reduce the amount of current available to produce rated motor torque. Refer to Tables 2.F and 2.G for the maximum cable length allowed for various installation techniques. Shaded distances are restricted by cable capacitance charging current. The figure below demonstrates how total cable length is calculated. Failure to follow these guidelines can result in poor motor performance and nuisance drive overcurrent or overload tripping. For installations that exceed the recommended maximum lengths listed, contact the factory.

Please note that the cable lengths shown are guidelines. Your application may be restricted to a shorter cable length due to wire type, wire placement, line reactor and type of motor.

How to Measure Motor Cable Lengths Limited by Capacitance



All examples represent motor cable length of 189.2 meters (600 feet).

Table 2.F
Maximum Motor Cable Length Restrictions in meters (feet) - 380V-480V Drives[1]

Drive Frame	Drive kW (HP)	Motor kW (HP)	No External Devices				w/1204-TFB2 Term.			w/1204-TFA1 Terminator					Reactor at Drive[2]	
			Motor				Motor			Motor					Motor	
			A	B	1329	1600V or 1329R/L (1850V)	A or B		1329	A		B		1329	A	B or 1329
			Any Cable	Any Cable	Any Cable	Any Cable[6]	Cable Type		Any Cable	Cable Type		Cable Type		Any Cable	Any Cable	Any Cable
							Shld.[3]	Unshld.		Shld.[3]	Unshld.	Shld.[3]	Unshld.			
A1	0.37 (0.5)	0.37 (0.5)	12.2 (40)	33.5 (110)	91.4 (300)	91.4 (300)	**Use 1204-TFA1**			30.5 (100)	61.0 (200)	30.5 (100)	61.0 (200)	91.4 (300)	22.9 (75)	182.9 (600)
	0.75 (1)	0.75 (1)	12.2 (40)	33.5 (110)	91.4 (300)	91.4 (300)				30.5 (100)	30.5 (100)	30.5 (100)	30.5 (100)	91.4 (300)	22.9 (75)	182.9 (600)
		0.37 (0.5)	12.2 (40)	33.5 (110)	91.4 (300)	91.4 (300)				30.5 (100)	61.0 (200)	30.5 (100)	61.0 (200)	91.4 (300)	22.9 (75)	182.9 (600)
	1.2 (1.5)	1.2 (1.5)	12.2 (40)	33.5 (110)	91.4 (300)	91.4 (300)				30.5 (100)	30.5 (100)	61.0 (200)	61.0 (200)	91.4 (300)	22.9 (75)	182.9 (600)
		0.75 (1)	12.2 (40)	33.5 (110)	91.4 (300)	91.4 (300)				30.5 (100)	30.5 (100)	61.0 (200)	61.0 (200)	91.4 (300)	22.9 (75)	182.9 (600)
		0.37 (0.5)	12.2 (40)	33.5 (110)	114.3 (375)	121.9 (400)				30.5 (100)	30.5 (100)	61.0 (200)	61.0 (200)	121.9 (400)	22.9 (75)	182.9 (600)
A2	1.5 (2)	1.5 (2)	7.6 (25)	12.2 (40)	91.4 (300)	91.4 (300)	91.4 (300)	91.4 (300)	91.4 (300)	30.5 (100)	30.5 (100)	91.4 (300)	61.0 (200)	91.4 (300)	22.9 (75)	182.9 (600)
		1.2 (1.5)	7.6 (25)	12.2 (40)	114.3 (375)	182.9 (600)	91.4 (300)	182.9 (600)	182.9 (600)	30.5 (100)	30.5 (100)	91.4 (300)	61.0 (200)	182.9 (600)	22.9 (75)	182.9 (600)
		0.75 (1)	7.6 (25)	12.2 (40)	114.3 (375)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)	30.5 (100)	30.5 (100)	91.4 (300)	61.0 (200)	182.9 (600)	22.9 (75)	182.9 (600)
		0.37 (0.5)	7.6 (25)	12.2 (40)	114.3 (375)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)	30.5 (100)	30.5 (100)	91.4 (300)	61.0 (200)	182.9 (600)	22.9 (75)	182.9 (600)
	2.2 (3)	2.2 (3)	7.6 (25)	12.2 (40)	91.4 (300)	91.4 (300)	182.9 (600)	182.9 (600)	182.9 (600)	**Use 1204-TFB2**					22.9 (75)	182.9 (600)
		1.5 (2)	7.6 (25)	12.2 (40)	114.3 (375)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)						22.9 (75)	182.9 (600)
		0.75 (1)	7.6 (25)	12.2 (40)	114.3 (375)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)						22.9 (75)	182.9 (600)
		0.37 (0.5)	7.6 (25)	12.2 (40)	114.3 (375)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)						22.9 (75)	182.9 (600)
A3	3.7 (5)	3.7 (5)	7.6 (25)	12.2 (40)	114.3 (375)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)						22.9 (75)	182.9 (600)
		2.2 (3)	7.6 (25)	12.2 (40)	114.3 (375)	Contact factory for advice on cable lengths over 182.9 (600).	182.9 (600)	182.9 (600)	182.9 (600)						22.9 (75)	182.9 (600)
		1.5 (2)	7.6 (25)	12.2 (40)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						22.9 (75)	182.9 (600)
		0.75 (1)	7.6 (25)	12.2 (40)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						22.9 (75)	182.9 (600)
		0.37 (0.5)	7.6 (25)	12.2 (40)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						22.9 (75)	182.9 (600)
A4	5.5-15 (7.5-20)	5.5-15 (7.5-20)	7.6 (25)	12.2 (40)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						24.4 (80)	182.9 (600)
B	11-22 (15-30)	11-22 (15-30)	7.6 (25)	12.2 (40)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						24.4 (80)	182.9 (600)
C	30-45 (X40-X60)	30-45 (40-60)	7.6 (25)	12.2 (40)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						76.2 (250)	182.9 (600)
D	45-112 (60-X150)	45-112 (60-150)	12.2 (40)	30.5 (100)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						61.0 (200)	182.9 (600)
E	112-187 (150-250)	112-187 (150-250)	12.2 (40)	53.3 (175)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						182.9 (600)	182.9 (600)
F	187-336 (250-450)	187-336 (250-450)	18.3 (60)	53.3 (175)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						182.9 (600)	182.9 (600)
G	187-448 (X250-600)	187-448 (250-600)	18.3 (60)	53.3 (175)	114.3 (375)		182.9 (600)	182.9 (600)	182.9 (600)						182.9 (600)	182.9 (600)

Type A Motor Characteristics: No phase paper or misplaced phase paper, lower quality insulation systems, corona inception voltages between 850 and 1000 volts.
Type B Motor Characteristics: Properly placed phase paper, medium quality insulation systems, corona inception voltages between 1000 and 1200 volts.
1329R/L Motors: These AC variable speed motors are "Control-Matched" for use with Allen-Bradley Drives. Each motor is designed to meet or exceed the requirements of the Federal Energy Act of 1992. All 1329R/L motors are optimized for variable speed operation and include premium inverter grade insulation systems which meet or exceed NEMA MG1. Part 31.40.4.2.

Table 2.G
Maximum Motor Cable Length Restrictions in meters (feet) - 500V-600V Drives[4]

			No External Devices			w/1204-TFB2 Terminator			w/1204-TFA1 Terminator			Reactor at Drive[2]		
			Motor			Motor			Motor			Motor		
			A	B	1329R/L Motors[5]	A	B	1600V or 1329R/L (1850V)[5]	A	B	1600V or 1329R/L (1850V)[5]	A	B	1600V or 1329R/L (1850V)[5]
Drive Frame	Drive kW (HP)	Motor kW (HP)	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*	*Any Cable*
A4	0.75 (1)	0.75 (1)	NR	NR	NA	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)	Not Recommended		
		0.37 (0.5)	NR	NR	NA	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
	1.5 (2)	1.5 (2)	NR	NR	NA	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		1.2 (1.5)	NR	NR	NA	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		0.75 (1)	NR	NR	182.9 (600)	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		0.37 (0.5)	NR	NR	182.9 (600)	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
	2.2 (3)	2.2 (3)	NR	NR	NA	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		1.5 (2)	NR	NR	NA	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		0.75 (1)	NR	NR	182.9 (600)	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		0.37 (0.5)	NR	NR	182.9 (600)	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
	3.7 (5)	3.7 (5)	NR	NR	NA	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		2.2 (3)	NR	NR	NA	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		1.5 (2)	NR	NR	182.9 (600)	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		0.75 (1)	NR	NR	182.9 (600)	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
		0.37 (0.5)	NR	NR	182.9 (600)	NR	182.9 (600)	335.3 (1100)	NR	61.0 (200)	182.9 (600)			
	5.5-15 (7.5-20)	5.5-15 (7.5-20)	NR	9.1 (30)	182.9 (600)	91.4 (300)	182.9 (600)	182.9 (600)	NR	61.0 (200)	182.9 (600)	30.5 (100)	91.4 (300)	182.9 (600)
C	18.5-45 (25-60)	18.5-45 (25-60)	NR	9.1 (30)	182.9 (600)	91.4 (300)	182.9 (600)	182.9 (600)	NR	61.0 (200)	182.9 (600)	30.5 (100)	91.4 (300)	182.9 (600)
D	56-93 (75-125)	56-93 (75-125)	NR	9.1 (30)	182.9 (600)	91.4 (300)	182.9 (600)	182.9 (600)	NR	61.0 (200)	182.9 (600)	61.0 (200)	91.4 (300)	182.9 (600)
E	112-224 (150-X300)	112-224 (150-X300)	NR	9.1 (30)	182.9 (600)	91.4 (300)	182.9 (600)	182.9 (600)	NR	61.0 (200)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)
F	261-298 (350-400)	261-298 (350-400)	NR	9.1 (30)	182.9 (600)	91.4 (300)	182.9 (600)	182.9 (600)	NR	61.0 (200)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)
G	224-448 (300-600)	224-448 (300-600)	NR	9.1 (30)	182.9 (600)	91.4 (300)	182.9 (600)	182.9 (600)	NR	61.0 (200)	182.9 (600)	182.9 (600)	182.9 (600)	182.9 (600)

NR = Not Recommended
NA = Not Available at time of printing

1 Values shown are for 480V nominal input voltage, drive carrier frequency of 2 kHz and ambient temperature at the motor of 40 degrees C. Consult factory regarding operation at carrier frequencies above 2 kHz. Multiply values by 0.85 for high line conditions. For input voltages of 380, 400 or 415V AC, multiply the table values by 1.25, 1.20 or 1.15, respectively.

2 A 3% reactor reduces motor and cable stress but may cause a degradation of motor waveform quality. Reactors must have a turn-turn insulation rating of 2100 volts or higher.

3 Includes wire in conduit.

4 Values shown are for nominal input voltage and drive carrier frequency of 2 kHz. Consult factory regarding operation at carrier frequencies above 2 kHz. Multiply values by 0.85 for high line conditions.

5 When used on 600V systems, 1329R/L motors have a corona inception voltage rating of approximately 1850V.

6 These distance restrictions are due to charging of cable capacitance and may vary from application to application.