

# INDUSTRIAL

# VFD CABLES

100% EMI  
Emission  
Containment

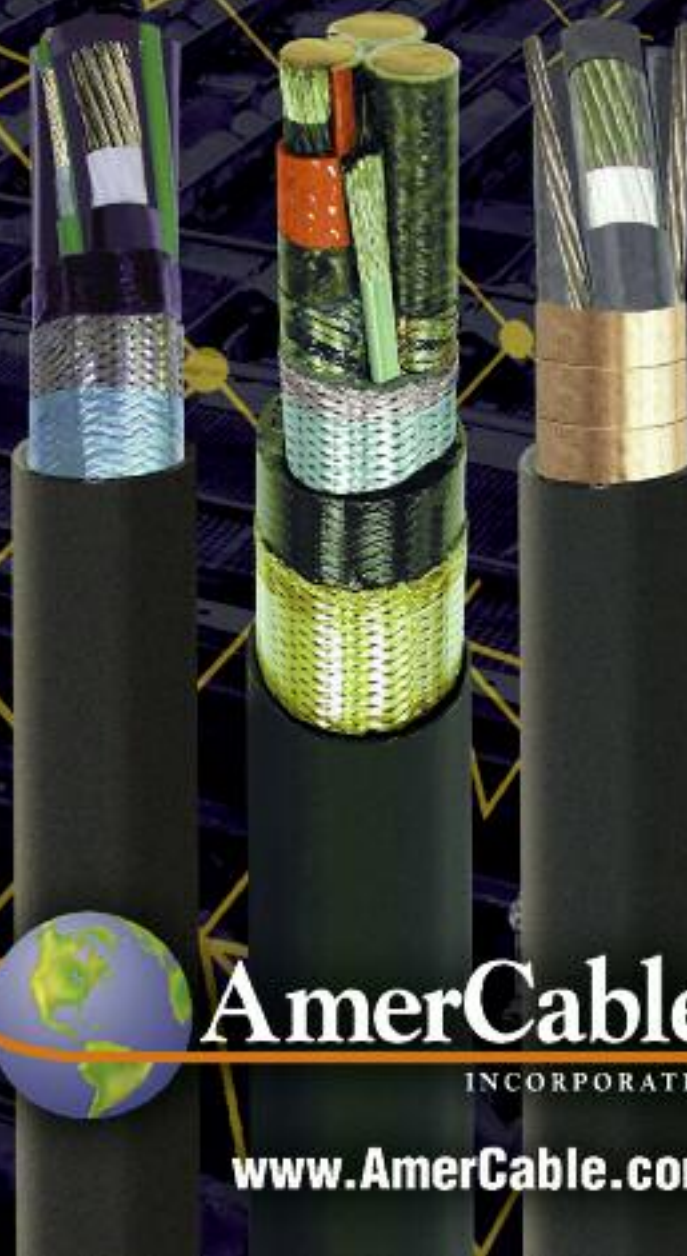
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# Industrial VFD Cables

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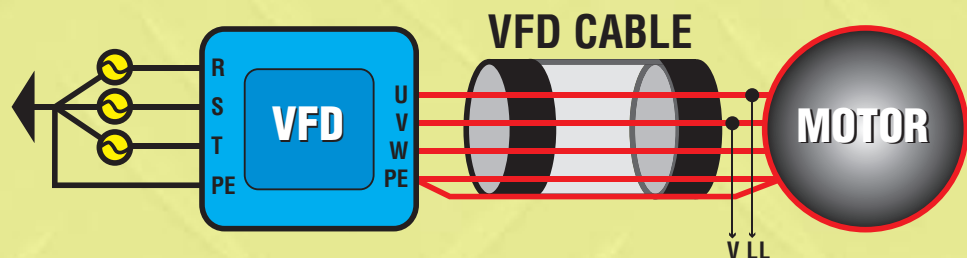
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**Low-Smoke Halogen-Free  
and  
Fire Resistant**  
constructions available.  
Contact your AmerCable rep.

**VFD Termination Kits**  
AmerCable offers pre-sized  
and pre-formed termination kit  
packages specifically for  
VFD cable constructions



AmerCable believes the information presented throughout this catalog to be reliable and current. All information is subject to change without notice. The information listed is approximate, and is presented only as a guide for product selection. We make no claims or warranties for the suitability of any product for any particular application.

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# Our Commitment to Industrial Productivity

AmerCable Industrial VFD Cables are specially engineered to provide 100% containment of EMI emissions and provide longer cable life in harsh operating conditions.

AmerCable VFD cables feature symmetrical ground conductors that reduce induced voltage imbalances and carry common mode noise back to the drive.

AmerCable's high strand count conductors and braid shield design is much more flexible, easier to install and more resistant to vibration than Type MC cable.



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# Extra Flexible VFD Power Cable

## Gexol® Insulated

Three Conductor • 2kV • Rated 110°C

### Power Conductors (x3)

Soft annealed flexible stranded tinned copper per ASTM B-33.

### Insulation (2kV)

Gexol® cross-linked flame retardant polyolefin, meeting the requirements for UL 1277.

Color: Gray with printed phase I.D.  
(Black-White-Red)

### Ground Conductors (x3)

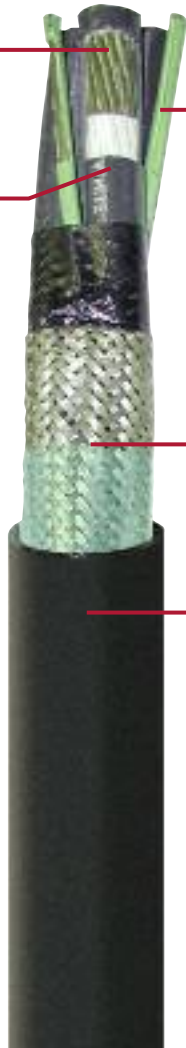
Soft annealed flexible stranded tinned copper per ASTM B-33.  
Gexol® insulation sized per UL 1277.  
Color: Green

### Shield

Overall tinned copper braid plus aluminum/polyester tape providing 100% coverage.

### Jacket

A black, arctic grade, flame retardant, oil, abrasion, chemical and sunlight resistant thermosetting compound meeting UL 1277.



## Ratings & Approvals

- 110°C Temperature Rating
- UL Listed as Marine Shipboard Cable: (E111461)
- UL Listed as Type TC-ER (E123629)
- United States Coast Guard: November 2, 1987 / 9304
- CSA listed as Marine Shipboard Cable (82346)
- Flame resistance: IEEE 1202/FT-4
- Sunlight resistant

Halogen-Free and Fire Resistant constructions available by request.

Gexol® is a registered trademark of AmerCable Incorporated

## Application

A flexible, braid and foil shielded, 2kV power cable specifically engineered for use in variable frequency AC motor drive (VFD) applications.

## Features

- Specially engineered cable design produces a longer cable life in VFD applications
- Overall braid and foil shield provides 100% coverage containing VFD EMI emissions
- Symmetrical ground conductors reduce induced voltage imbalances and carry common mode noise back to the drive
- High strand count conductors and braid shield design is much more flexible, easier to install and more resistant to vibration than Type MC cable
- Gexol's lower dielectric constant (standard XLPEs and EPRs have higher dielectric constants) reduces reflected wave peak voltage magnitudes. This allows for longer output cable distances and minimizes the effect of high frequency noise induced into the plant ground system.
- 2kV insulation thickness resists the repetitive 2-3x voltage spikes from 600V VFDs and reduces drive over-current trip problems due to cable charging current
- Severe cold durability: exceeds CSA cold bend/cold impact (-40°C/-35°C)
- Meets crush and impact requirements for Type MC cable.
- Optional tinned copper basket weave wire armor\* per IEEE 1580 and UL 1309/CSA 245
- Optional sheath\* – A black, arctic grade, flame retardant, oil, abrasion, chemical and sunlight resistant thermosetting compound meeting UL 1309/CSA 245 and IEEE 1580.

\*For armored versions the braid is placed between in inner jacket and outer sheath where it serves as both the EMI shield and armor.

## 37-102VFD • VFD Power Cable • Gexol<sup>®</sup> Insulated • Extra Flexible

Size AWG/ kcmil	Part No. 37-102	Nominal Diameter Inches	Weight Per 1000 Ft.	Green Insulated Grounding Conductor (x3) Size (AWG)	Ampacity		
					In Free Air	In Cable Tray	In Conduit
4	-312VFD	1.072	886	12	114	95	89
2	-314VFD	1.215	1421	10	152	130	119
1	-315VFD	1.340	1517	10	177	150	137
1/0	-316VFD	1.443	1803	10	205	170	163
2/0	-317VFD	1.572	2153	10	237	195	186
4/0	-319VFD	1.262	1128	8	316	260	253
262	-320VFD	2.193	4175	6	362	297	286
313	-321VFD	2.370	4727	6	404	328	324
373	-322VFD	2.501	5415	6	449	364	357
444	-323VFD	2.670	6707	6	497	402	396
535	-324VFD	2.972	7483	6	556	446	441
646	-326VFD	3.164	8916	4	617	496	489
777	-327VFD	3.388	10395	4	688	546	537

### Termination Kits

AmerCable offers pre-sized and pre-formed termination kit packages specifically for VFD cable constructions

- Cable diameters are subject to a +/- 5% manufacturing tolerance
- Ampacity In Free Air: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table B.310.3
- Ampacity In Cable Tray: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table 310.16
- Ampacity In Conduit: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table B.310.1





# CIR® (Crush & Impact Resistant) VFD Power Cable

## Gexol® Insulated

Three Conductor • 2kV • Rated 90°C • UL Listed as Type TC-ER

### Power Conductors (x3)

Soft annealed flexible stranded tinned copper per ASTM B-33.

### Insulation

Gexol® chemically cross-linked, non-chlorinated flame retardant polyolefin meeting the requirements per UL 1277. Color: Gray with printed phase I.D.

### Jacket

Crush & impact resistant, flame retardant, oil, abrasion, chemical and sunlight resistant thermoplastic compound meeting UL 1277.

### Ground Conductors (x3)

Soft annealed tinned copper per ASTM B-33 flexible stranding with 600/1000V Gexol® insulation sized per UL 1277. Color: Green

### Shield

Overall tinned copper braid plus aluminum/polyester tape providing 100% coverage.



### Safe to Handle

CIR® is a safe, flexible alternative to metal-clad cables.

## Application

A flexible, braid and foil shielded, 2kV power cable specifically engineered for use in variable frequency AC motor drive (VFD) applications.

## Features

- Specially engineered cable design produces a longer cable life in VFD applications.
- Overall braid plus foil shield is engineered with 100% coverage and a surface transfer impedance <50 milliohms at 10MHz to contain EMI.
- Symmetrical insulated ground conductors reduce induced voltage imbalances and carry common mode noise back to the drive.
- High strand count conductors and braid shield design is much more flexible, easier to install and more resistant to vibration than Type MC cable.
- Gexol's lower dielectric constant (standard XLPEs, EPRs and other Type P insulation materials have higher dielectric constants) reduces reflected wave peak voltage magnitudes. This allows for longer output cable distances and minimizes the effect of high frequency noise induced into the plant ground system.
- 2kV insulation thickness is used to resist the potential 2-3x reflected voltages experienced in 600V VFD applications.
- Passes the same stringent crush and impact testing required by UL 2225 for Type MC-HL
- Gas & vapor tight – impervious to water and air
- Smaller bend radius (up to 40% smaller) than Type MC
- Reduced tray fill (up to 35% less) compared to Type MC
- Considerably more flexible than Type MC
- Reduced installation time and cost compared to Type MC
- Glands for this product cost up to 50% LESS than those for Type MC

## CIR® Ratings & Approvals

- 90°C temperature rating
- UL listed as Type TC-ER (E123629)
- Flame Retardant – IEEE 1202/FT-4
- Suitable for use in Class I, Div 2 and Zone 2 environments
- UL listed as Marine Shipboard Cable (E111461)
- Sunlight resistant
- Direct burial

Gexol® and CIR® are registered trademarks of AmerCable Incorporated

## 37-102 CIRVFD • 2000 Volts • Crush & Impact Resistant

Size AWG/ kcmil	Part No. 37-102	Nominal Diameter Inches	Weight Per 1000 Ft.	Green Insulated Grounding Conductor (x3) Size (AWG)	Ampacity		
					In Free Air	In Cable Tray	In Conduit
14	-508CIRVFD	0.745	194	18	15	15	15
12	-516CIRVFD	0.786	224	18	20	20	20
10	-308CIRVFD	0.877	308	14	30	30	30
8	-309CIRVFD	0.926	441	14	65	55	48
6	-310CIRVFD	1.093	570	12	87	75	65
4	-312CIRVFD	1.072	886	12	114	95	89
2	-314CIRVFD	1.215	1421	10	152	130	119
1/0	-316CIRVFD	1.443	1803	10	205	170	163
2/0	-317CIRVFD	1.572	2153	10	237	195	186
4/0	-319CIRVFD	2.053	3463	8	316	260	253
262	-320CIRVFD	2.193	4175	6	362	297	286
373	-322CIRVFD	2.501	5415	6	449	364	357
535	-324CIRVFD	2.972	7483	6	556	446	441
777	-327CIRVFD	3.388	10395	4	688	546	537

### Termination Kits

AmerCable offers pre-sized and pre-formed termination kit packages specifically for VFD cable constructions

- Cable diameters are subject to a +/- 5% manufacturing tolerance
- Ampacity In Free Air: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table B.310.3
- Ampacity In Cable Tray: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table 310.16
- Ampacity In Conduit: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table B.310.1



## CIR VFD Stranding Profile

Size AWG/kcmil	Number of Strands	Closest IEEE 45 Std. Size	Equivalent Metric Size (mm <sup>2</sup> )	Uninsulated Conductor Dia. (inches)
14	19	4	2.08	0.074
12	19	6	3.29	0.093
10	37	10	5.23	0.113
8	37	16	7.57	0.136
6	61	26	12.49	0.175
4	133	41	21.11	0.258
2	133	66	33.51	0.324
1	209	83	42.79	0.361
1/0	266	106	54.45	0.407
2/0	342	133	70.01	0.461
3/0	418	168	85.57	0.510
4/0	532	212	108.91	0.575
262	646	262	132.25	0.654
313	777	313	159.06	0.720
373	925	373	189.36	0.785
444	1110	444	227.23	0.860
535	1332	535	272.68	0.941
646	1591	646	325.70	1.029
777	1924	777	393.87	1.132

# Flexible TC-ER VFD Power Cable

Three Conductor • 90°C • 600V

## Power Conductors (x3)

Soft annealed flexible stranded tinned copper per ASTM B-33

## Insulation

Cross-linked, flexible, low dielectric constant compound rated 90°C.

Sizes larger than 4/0 AWG – individual conductors colored black with conductor number surface printed in contrasting ink.

Sizes 4/0 AWG and smaller – individually colored conductors – red, white, black.

## Jacket

Flame retardant, moisture and sunlight resistant Polyvinyl Chloride (PVC). Colored black.

## Symmetrical Ground Conductors (x3)

Three symmetrically placed flexible stranded tinned copper conductors in direct contact with the shield.

## Metallic Shield

Sizes 8 AWG and Larger – Helically applied 5 mil bare copper tape.

Sizes Smaller than 8 AWG – tin-coated copper braid plus aluminum/polyester tape.

Both shielding systems provide 100% coverage.



## TC-ER Ratings & Approvals

- UL Listed as Type TC-ER 600V
- UL Listed as 1000V flexible motor supply cable (up to #2AWG)
- 90°C Temperature Rating
- FT-4 and IEEE 1202 flame ratings
- Sunlight resistant
- Direct burial (up to #2AWG)

See  
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for  
Termination  
Instructions



## Application

A flexible, shielded power cable specifically engineered for use in variable frequency AC motor drive (VFD) applications.

## Features

- Specially engineered cable design produces a longer cable life in VFD applications.
- Overall shield provides 100% coverage containing VFD EMI emissions.
- Symmetrical ground conductors reduce induced voltage imbalances and carry common mode noise back to the drive.
- High strand count design is much more flexible, easier to install and more resistant to vibration than Type MC cable.
- Meets crush and impact requirements for Type MC cable.
- AmerCable's specially formulated insulation material has a lower dielectric constant (standard XLPE and EPR insulation materials have higher dielectric constants) which withstands reflected voltages. This allows for longer output cable distances and minimizes the effect of high frequency noise induced into the plant ground system.
- Permitted for Exposed Run ("ER") use in accordance with the NEC.
- Permitted for use in Class I, Division 2 and Zone 2 industrial hazardous locations per the NEC.
- Gas and vapor tight – impervious to water and air.
- Reduced tray fill (up to 35% less) than Type MC.
- Reduced installation time and cost compared to Type MC.
- Glands for this product cost up to 50% LESS than those for Type MC.
- Bend radius 12X O.D.



## 37-108 VFD • Flexible TC-ER VFD • 600 Volts

Size AWG/kcmil	Size (mm <sup>2</sup> )	Part No. 37-108	Nominal Diameter (inches)	Weight (lbs/1000ft)	DC Resistance at 25°C (ohms/1000ft)	AC Resistance 90°C, 60Hz (ohms/1000ft)	Inductive Reactance (ohms/1000ft)	Voltage Drop 90°C, 60Hz (Volts/Amp/1000ft)	Grounding Conductor (x3) Size (AWG)	Ampacity		
										In Free Air	In Cable Tray	In Conduit
14	2.08	-508VFD	0.466	158	2.907	3.635	0.036	5.069	18	15	15	15
12	3.29	-516VFD	0.509	199	1.826	2.283	0.034	3.195	18	20	20	20
10	5.23	-308VFD	0.522	258	1.153	1.441	0.032	2.028	14	30	30	30
8	8.30	-309VFD	0.653	368	0.708	0.885	0.036	1.262	14	65	55	48
6	13.21	-310VFD	0.737	517	0.445	0.556	0.034	0.804	12	87	75	65
4	21.17	-312VFD	0.956	814	0.300	0.376	0.031	0.552	12	114	95	89
2	35	-314VFD	1.103	1178	0.184	0.230	0.030	0.349	10	152	130	119
1	42.52	-315VFD	1.221	1462	0.147	0.184	0.031	0.287	10	177	150	137
1/0	50	-316VFD	1.447	1714	0.117	0.147	0.030	0.235	10	205	170	163
2/0	66.12	-317VFD	1.538	1951	0.093	0.117	0.029	0.193	10	237	195	186
4/0	95	-319VFD	1.883	3102	0.058	0.075	0.028	0.133	8	316	260	253
262	120	-320VFD	1.981	3642	0.048	0.063	0.026	0.114	6	362	297	286
313	150	-321VFD	2.082	4185	0.040	0.053	0.026	0.100	6	404	328	324
373	185	-322VFD	2.215	4834	0.034	0.045	0.025	0.088	6	449	364	357
444	240	-323VFD	2.371	5634	0.028	0.039	0.025	0.079	6	497	402	396
535	272.68	-324VFD	2.616	7592	0.024	0.033	0.025	0.071	6	556	446	441
646	300	-326VFD	2.878	9183	0.020	0.028	0.025	0.065	4	617	496	489
777	400	-327VFD	3.089	10834	0.016	0.025	0.025	0.060	4	688	546	537

- Cable diameters are subject to a +/- 5% manufacturing tolerance
- Ampacity In Free Air: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table B.310.3
- Ampacity In Cable Tray: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table 310.16
- Ampacity In Conduit: Based on 90°C conductor temperature and 30°C ambient temperature per 2008 NEC Table B.310.1

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Instructions**

### Stranding Profile

Size AWG/kcmil	Size (mm <sup>2</sup> )	Number of Strands	Uninsulated Conductor Diameter (inch)
14	2.08	19	0.074
12	3.29	19	0.093
10	5.23	37	0.113
8	8.30	133	0.159
6	13.21	133	0.201
4	21.17	259	0.255
2	35	259	0.321
1	42.52	259	0.361
1/0	50	266	0.413
2/0	66.12	323	0.455
4/0	95	532	0.584
262	120	646	0.654
313	150	777	0.720
373	185	925	0.785
444	240	1110	0.860
535	272.68	1332	0.941
646	300	1591	1.029
777	400	1924	1.132



**Conductors (3)**

Soft annealed flexible stranded tinned copper per ASTM B-33.

**Insulation**

Extruded thermosetting 90°C Ethylene Propylene Rubber (EPR) meeting UL 1072.

**EMI Shield**

Overall tinned copper braid plus aluminum/polyester tape providing 100% coverage

**Insulation Shield**

Composite shield consisting of 0.0126" tinned copper braided with nylon providing 60% copper shielded coverage meeting UL 1072. The nylon is colored for easy phase identification (three conductor = black, blue, red) without the need to remove the shield to find an underlying colored tape.

**Conductor Shield**

A combination of semi-conducting tape and extruded thermosetting semi-conducting material meeting UL1072.

**Insulation Shield**

Semi-conducting layer meeting UL 1072.

**Symmetrical Insulated Grounding Conductors (3)**

Soft annealed flexible stranded tinned copper conductor per ASTM B-33. Gexol Insulation sized per Table 23.2 of UL1072. Color: Green

**Jacket**

A black, arctic grade, flame retardant, oil, abrasion, chemical and sunlight resistant thermosetting compound meeting UL 1072. Colored jackets for signifying different voltage levels are also available on special request (orange = 8kV and red = 15kV).

**Low smoke  
halogen-free  
jacket available.**

**Contact your AmerCable rep.**

**Applications**

A flexible, braid and foil shielded, power cable specifically engineered for use in medium voltage variable frequency AC drive (VFD) applications.

**Features**

- Flexible stranded conductors, braided shields and a braided armor (when armored). Suitable for applications involving repeated flexing and high vibration.
- Small minimum bending radius (6 x OD for unarmored cables and 8 x OD for armored cables) for easy installation.
- Insulation has a very low dielectric constant. This allows for longer output cable distances and minimizes common mode current.
- Overall braid plus foil shield is engineered with 100% coverage and a surface transfer impedance <50 milliohms at 10MHz to contain EMI.
- Symmetrical insulated ground conductors reduce induced voltage imbalances and carry common mode noise back to the drive.
- High strand count conductors and braid shield design is much more flexible, easier to install and more resistant to vibration than Type MC cable.
- Severe cold durability: exceeds CSA cold bend/cold impact (-40°C/-35°C).
- Optional braid armor of bronze, aluminum or tinned copper.

\*MV-105 rating only applies to the Unarmored Version of this product

**MMV-VFD Ratings & Approvals**

- UL Listed as Type MV-105 (E116415)\*
- Flame Resistance: IEEE 1202
- 90°C Temperature Rating
- Voltage Rating – 8kV to 15kV (25kV available on request)

**Termination Kits**

AmerCable offers pre-sized and pre-formed termination kit packages specifically for VFD cable constructions

## Three Conductor Type MMV-VFD Medium Voltage – 8kV • 133% Insulation Level

Size AWG/ kcmil	mm2	Part No. 37-105	Nominal Diameter (inches)	Weight (Lbs./ 1000 Ft.)	Ampacity		DC Resistance at 25°C (ohms/1000 Ft.)	AC Resistance at 90°C, 60Hz (ohms/1000 Ft.)	Inductive Reactance (ohms/ 1000 Ft.)	Voltage Drop (Volts per amp per 1000 Ft.)	Green Insulated Grounding Conductor (3x) Size (AWG)
					In Free Air (amps)	In Conduit in Air (amps)					
6	12.5	-332VFDMV	1.541	1349	105	92	0.445	0.556	0.048	0.820	10
4	21	-333VFDMV	1.728	1770	135	120	0.300	0.376	0.043	0.564	10
2	34	-334VFDMV	1.939	2335	185	165	0.184	0.230	0.040	0.359	10
1	43	-335VFDMV	2.031	2664	210	185	0.147	0.184	0.038	0.294	8
1/0	54	-336VFDMV	2.133	3065	240	215	0.117	0.147	0.037	0.242	8
2/0	70	-337VFDMV	2.269	3593	275	245	0.093	0.117	0.036	0.199	8
3/0	86	-338VFDMV	2.370	4064	315	280	0.074	0.094	0.035	0.166	6
4/0	109	-339VFDMV	2.511	4770	360	320	0.058	0.075	0.033	0.139	6
262	132	-340VFDMV	2.691	5544	411	360	0.048	0.063	0.032	0.121	6
313	159	-341VFDMV	2.841	6340	457	400	0.040	0.053	0.032	0.106	6
373	189	-342VFDMV	3.058	7435	507	445	0.034	0.045	0.031	0.094	4
444	227	-343VFDMV	3.218	8596	559	490	0.028	0.039	0.030	0.085	4
535	273	-344VFDMV	3.403	9900	620	540	0.024	0.033	0.030	0.076	4

- Cable diameters are subject to a +/- 5% manufacturing tolerance

## Three Conductor Type MMV-VFD Medium Voltage – 15kV • 133% Insulation Level

Size AWG/ kcmil	mm2	Part No. 37-105	Nominal Diameter (inches)	Weight (Lbs./ 1000 Ft.)	Ampacity		DC Resistance at 25°C (ohms/1000 Ft.)	AC Resistance at 90°C, 60Hz (ohms/1000 Ft.)	Inductive Reactance (ohms/ 1000 Ft.)	Voltage Drop (Volts per amp per 1000 Ft.)	Green Insulated Grounding Conductor (3x) Size (AWG)
					In Free Air (amps)	In Conduit in Air (amps)					
2	34	-357VFDMV	2.474	3375	185	165	0.184	0.230	0.044	0.364	10
1	43	-358VFDMV	2.561	3748	210	185	0.147	0.184	0.043	0.299	8
1/0	54	-359VFDMV	2.663	4184	240	215	0.117	0.147	0.041	0.246	8
2/0	70	-360VFDMV	2.795	4764	275	245	0.093	0.117	0.039	0.203	8
3/0	86	-361VFDMV	3.013	5622	315	280	0.074	0.094	0.038	0.170	6
4/0	109	-362VFDMV	3.155	6404	360	320	0.058	0.075	0.037	0.142	6
262	132	-363VFDMV	3.168	6925	411	360	0.048	0.063	0.035	0.124	6
313	159	-364VFDMV	3.276	7549	457	400	0.040	0.053	0.034	0.109	6
373	189	-365VFDMV	3.396	8529	507	445	0.034	0.045	0.034	0.097	4
444	227	-366VFDMV	3.548	9589	559	490	0.028	0.039	0.033	0.080	4

- Cable diameters are subject to a +/- 5% manufacturing tolerance
- Ampacity in Free Air: Based on 105°C conductor temperature and 40°C ambient temperature per 2008 NEC Table 310.71
- Ampacity in Conduit Air: Based on 105°C conductor temperature and 40°C ambient temperature per 2008 NEC Table 310.75





# Cable Selection Guide for VFD Applications

The circuit of a typical voltage source PWM drive is shown in Figure 1. Each part of the equipment is bonded to the safety earth system to ensure personnel safety if faults occur.

All parts have capacitance to ground shown by:

- CM for the motor windings.
- CC1 and CC2 for the power converter circuits.
- CT for the transformer's secondary winding to the transformers' screen.

The IGBT switches are in constant operation at high frequency and this produces an inverter output voltage with a PWM wave shape as shown by the voltage V1 (Figure 1).

This IGBT switches also cause a motor line to ground voltage V2 (Figure 1), normally called a common mode voltage.

The common mode voltages cause short high-frequency pulses of common mode current to flow in the safety earth circuits, shown by currents I1 and I2 (Figure 1), unless the design includes cable features to stop this from happening.

It is essential that the common mode currents return to the inverter without causing EMC - EMI problems in other equipment, and this means that the common mode currents I1 and I2 must not flow in the safety earthing system.

For the motor, this is achieved by connecting a set of wires from the motor to the inverter that run with the main power cables. These are called symmetrical grounding conductors, see Figure 2. These conductors have a very low impedance compared with the other return path via the safety earthing system.

The three symmetrical grounding conductors and overall shields are connected as shown in Figure 3. This 360° connection is essential.

The common mode currents I1 and I2 now flow in the symmetrical grounding conductors. This happens because the symmetrical grounding conductors are close to the power conductors giving a low impedance route for the currents I1 and I2 compared with the safety earthing system. As I1 and I2 flow near the power conductors this avoids creating external EMC - EMI problems.

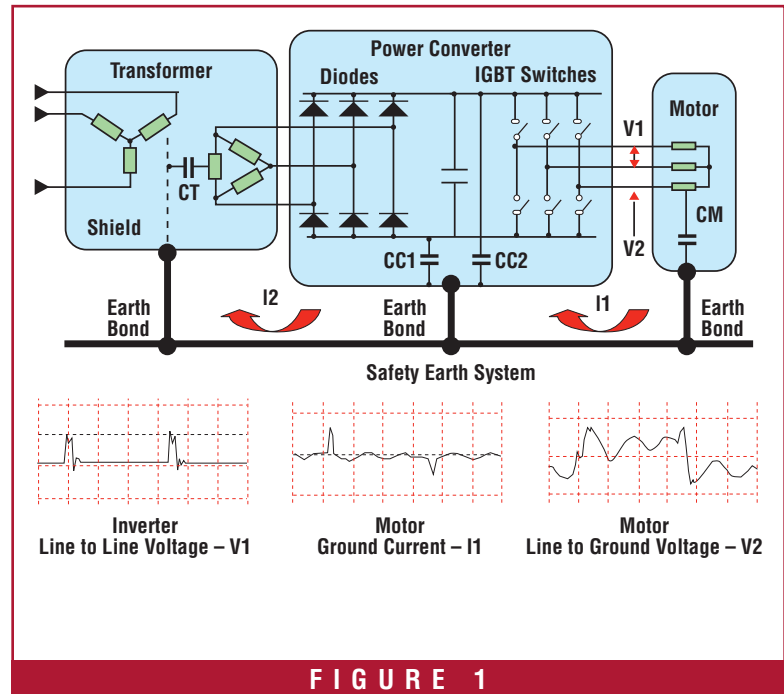


FIGURE 1

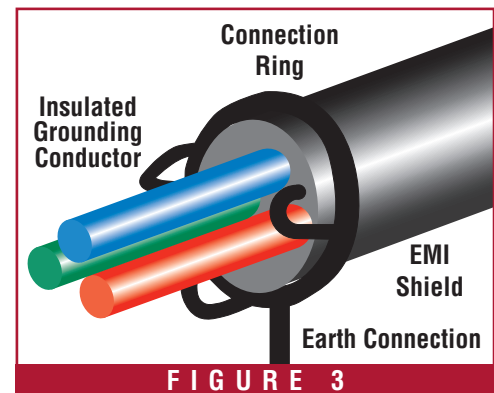


FIGURE 3

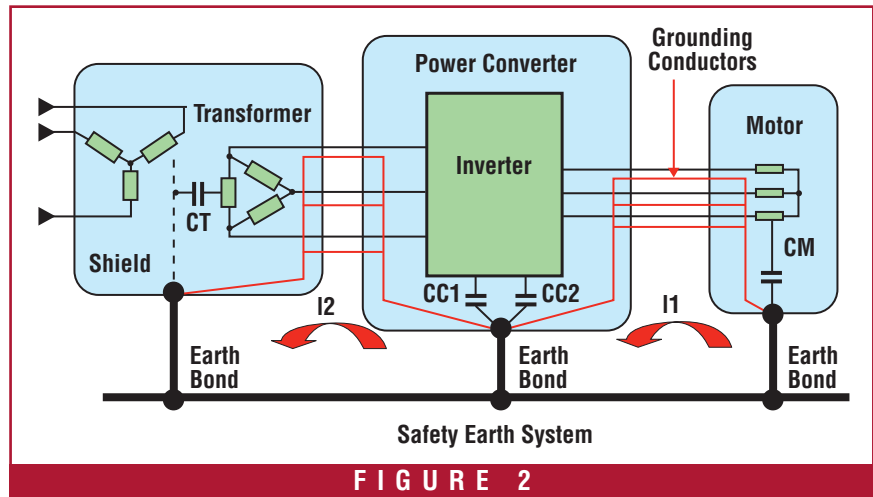
Figures 1 - 3 courtesy of Convertteam

If symmetrical grounding conductors and an overall EMI shield are not used, EMC - EMI problems are very likely to occur.

For cables used with voltage source PWM drives, a number of features are required to ensure correct operation, avoid overheating and achieve longer service life.

The essential features of a medium voltage cable for PWM drives are :

- Insulation designed to withstand the transients produced by the PWM
- Insulation with a dielectric constant no greater than 3.0 to minimize capacitance
- Voltage rating of 3x the operating voltage to prevent corona
- Three symmetrical grounding conductors. Some cables only have one grounding conductor. This is not acceptable as it produces circulating currents in the earth system
- Extremely fine strands to carry the harmonic currents without overheating (i.e. the inductance of fine stranded conductors is less than 7, 19, 37 strand conductors)
- Overall shield to stop the radiation of voltage EMI fields
- Correct termination of the components at both ends
- Semi-conducting shield around each insulation layer (MMV only)
- Metallic layer around each semi-conducting shield to earth the semi-conducting shield (MMV only)
- Correct termination hardware kits to avoid corona failures.



# Selected Maximum Horsepower for VFD Cables\*



VFD Maximum Horsepower*				
Part Number <sup>†</sup>	AWG/kcmil	230V 3Φ	460V 3Φ	575V 3Φ
-508VFD	14	3 HP	7.5 HP	10 HP
-516VFD	12	5 HP	10 HP	10 HP
-308VFD	10	7.5 HP	15 HP	20 HP
-309VFD	8	15 HP	40 HP	50 HP
-310VFD	6	25 HP	50 HP	60 HP
-312VFD	4	30 HP	60 HP	75 HP
-314VFD	2	40 HP	75 HP	100 HP
-315VFD	1	50 HP	100 HP	125 HP
-316VFD	1/0	60 HP	125 HP	150 HP
-317VFD	2/0	60HP	150 HP	200 HP
-319VFD	4/0	100 HP	200 HP	250 HP
-320VFD	262	100 HP	200 HP	300 HP
-321VFD	313	125 HP	250 HP	300 HP
-322VFD	373	125 HP	250 HP	350 HP
-323VFD	444	150 HP	300 HP	400 HP
-324VFD	535	150 HP	350 HP	450 HP
-326VFD	646	200 HP	400 HP	500 HP
-327VFD	777	-	450 HP	-

\*Recommended horsepowers are based on the Full-Load Current in Table 430.250 of the 2008 NEC and multiplied by 1.25 according to Article 430.22(A). The cable ampacities are based on 90°C conductor and cable installed in free based on Table B.310.3 in the NEC.

Actual horsepower will be subject to drive/motor manufacturer nameplate full-load current and local authority having jurisdiction.

<sup>†</sup> Complete part number can be determined by selecting the appropriate construction and adding the part number prefix (e.g. 37-102-319VFD for 4/0 Standard Gexol VFD)



# AmerCable TC-ER VFD Termination Instructions

**These instructions are intended for the use with AmerCable's TC-ER VFD 37-108VFD product line.**

The following are recommended practices and all efforts have been made to assure the information and instructions are accurate and practical. The outer jacket of the cable should be clean and free from dirt, grease and oils prior to start of termination. If necessary use denatured alcohol to clean the cable.

- Step 1** Determine how far the outer jacket needs to be cut back. This length should be long enough to allow for positioning the insulated conductors without creating a bending radius less than 5 times the insulated conductor's OD.  
Note: If using a termination kit, consult manufacturer for maximum allowable length.
- Step 2** Remove the outer jacket to the desired length and expose the EMI shield 1 inch. Take care not to cut the shield or the insulated conductors.
- Step 3** Attach ground braid to EMI shield. Lay the ground braid on the jacket with an end aligned over the EMI shield. Attach the braid to the EMI shield using a constant force spring clamp.
- Step 4** Combine grounds (optional). The grounds may be twisted together to form one ground lead to be terminated at the equipment. A flexible-strand lug sized for the equivalent circular mils of the combined ground will be required to complete the termination.
- Step 5** Terminate power conductors. Trim back insulation and install flexible-strand lug. If desired, place heat shrink tube over lug and insulation to create a seal over the termination. Colored heat shrink may be used for additional phase identification.
- Step 6** Connect power conductors, ground(s) and ground braid. Attach each of the new terminated power conductors to the appropriate phase. Connect the ground(s) and ground braid to the appropriate grounding point.





**AmerCable** manufactures high quality jacketed electrical cables for a wide variety of specialized industrial and utility applications.



**AmerCable** is an ISO 9001 certified cable manufacturer that combines leading-edge technology, proven manufacturing techniques, and high quality service to deliver the finest industrial and utility cable products available.

AmerCable serves a worldwide customer base from our manufacturing facility in El Dorado, Arkansas. Our professional field engineering and sales force work directly with customers, or in partnership with our network of independent distributors, to identify and fulfill your specific cable requirements.

AmerCable's manufacturing facility and corporate headquarters in El Dorado, Arkansas.

### What can you expect from AmerCable?

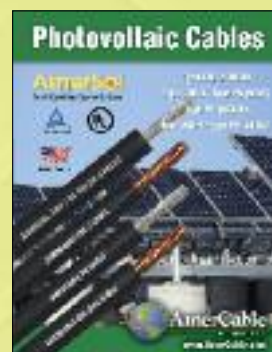
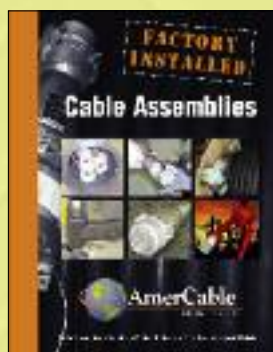
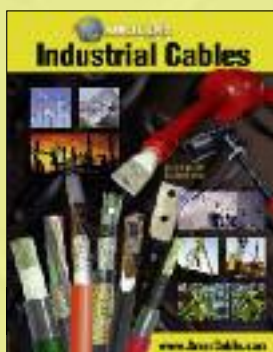
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\* Check [www.amercable.com](http://www.amercable.com) for our most current on time delivery record



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