# VFD CABLE SOLUTIONS

TPC WIRE & CABLE CORP.
*EXPECT HIGH PERFORMANCE®*

# Cable Solutions for Variable Frequency Drives

TPC Wire & Cable is a leading supplier of high-performance wire, cable, and connector assemblies designed to withstand impact, abrasion, continuous flexing, caustic chemicals, and extreme temperatures. Our products persist in the most difficult applications, which reduces your unplanned downtime and associated costs. VFD applications are well known for their harsh, electrically noisy environments that cause faults and failures. Our VFD cables are engineered to overcome the challenges, allowing customers to receive the full benefit of their system.

## Unique Concerns with VFD Motors

Because VFDs operate at high-frequency switching speeds, there is always potential for reflected waves, EMI noise, and common-mode voltage that wreak havoc on equipment. Choosing the right cable reduces these concerns.

**Problem:** Reflected waves and voltage spikes (up to 1500+ volts!) that create corona effects, which degrade insulation and lead to cable failure

**Solution:** Cable insulation system designed for higher voltage potential and materials chosen to reduce electrical stress

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**Problem:** Electro-magnetic (EMI) noise radiates and interferes with equipment

**Solution:** Cable shielding that reduces the effects of radiated electrical noise and foil/braid combination for most effective shielding

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**Problem:** Common-mode or stray voltage that causes pitting of the bearings and motor damage

**Solution:** Cable shield system that provides a low impedence path to ground, which prevents stray voltage from finding a path through the motor

## 3 Reasons to Choose TPC Over Commodity Cable

| ATTRIBUTES | TPC | COMMODITY |
|---|---|---|
| Braid Shields | Tinned copper braid shields that greatly improve flexibility and ease-of-use | Copper tape shield that's stiff and difficult to bend in tight spaces |
| Voltage Ratings | Withstands corona voltages up tp 2,000 V | Lower ratings that may be insufficient even with a 480 V system |
| Jacket Life | Specially compounded jacket designed to hold up in harsh industrial environments for extended periods of time | Simple PVC jacket prone to failure |

## CASE STUDY: VFD Cable Reduces Motor Failure

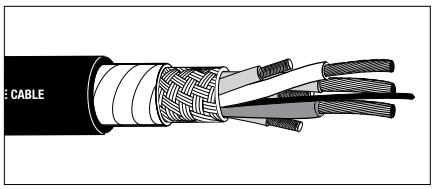
**PROBLEM:**
A global manufacturer of structural metal components serving automotive OEMs was experiencing problems with the cable powering its motor. **The cable was failing every four months due to environmental abuse from flexing, abrasion, and exposure to chemicals.** For each instance of failure, the cost to replace the cable was $580 in product and labor plus 1 hour of downtime, which added up significantly over time.

**SOLUTION:**
The TPC representative recommended Trex-Onics® VFD Shielded Power Cable with a male-to-female six pole rectangular connector assembly. **TPC's cable assemblies are built to handle the harshest environments.** The custom length Trex-Onics® cable designed for industrial applications where flexing, abrasion, impact, and oil are present, coupled with the requested rectangular connector, created a rugged end-to-end solution.

**RESULT:**
TPC's Trex-Onics® VFD Shielded Power Cable Assembly was installed in the unit. **After 21 months, the cable assembly was still holding up well in the environment.** The total cost in products and labor for TPC's solution was just $787 compared to $3,060 the customer would've spent repairing/replacing the commodity product. Plus, the customer was able to minimize downtime and actually gained 5 hours of production time.

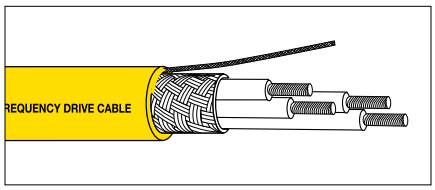
*Source: TPC Cost Value Analysis Report #3356*

# Featured Products




## Super-Trex® VFD Shielded Power Cable

- Features a heavy-duty jacket that provides protection against abrasion, impact, oil, chemicals, heat and flame.
- Constructed with both a foil and braid shield and will withstand corona voltages up to 2,000 volts.
- Symmetrical ground wires are used to reduce the effect of common-mode-voltage noise.
- Ideal for harsh environment VFD applications where a longer lasting cable is desired.




## Trex-Onics® Low Capacitance VFD Shielded Power Cable

- A heavy-duty tinned copper braid protects equipment and motor from damage and provides a shield against EM and RF noise and interference, and a low impedance path to ground.
- Finely stranded copper conductors extend conductor life in dynamic applications and are alpha-numerically marked for ease of identification.
- The oil resistant insulation system offers high dielectric, tensile and mechanical properties.

## Trex-Onics® Hybrid Motor Cable

- A heavy-duty tinned copper braid protects equipment and motor from damage and provides a shield against EM and RF noise and interference, and a low impedance path to ground.
- Finely stranded copper conductors extend conductor life in dynamic applications and are alpha-numerically marked for ease of identification.
- The oil resistant insulation system offers high dielectric, tensile and mechanical properties.

# Connector Assemblies

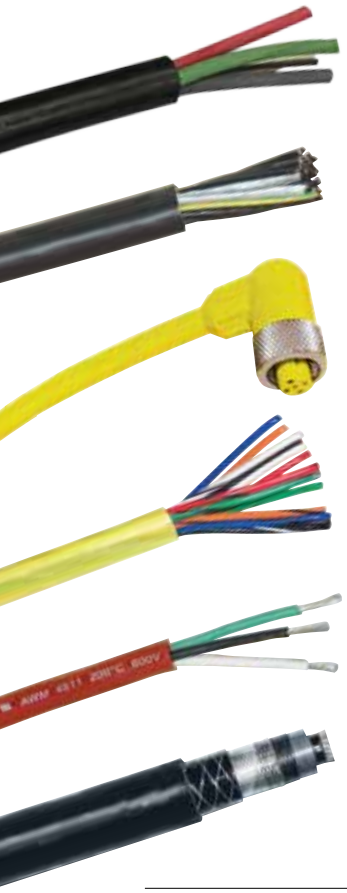
## Molded & Mechanical Connector Assemblies

- Designed with a fully molded backend (mechanical options also available), these connector assemblies withstand abuse caused by continuous flexing and pulling
- The M23 insert offering is versatile in design, accommodating both signal and power applications ranging from 28-14 AWG.
- The M23 interface is used as the preferred connection in many motor and drive applications and offers both the threaded and quick bayonet locking systems.
- TPC's engineering group offers custom pinouts and wiring capabilities with numerous cable products at any length.

## The Importance of Cable Selection

Choosing and installing cable specifically designed for variable frequency drives mitigates the challenges. By managing amp load, minimizing voltage drop, reducing the effects of electrical noise, providing a shield to diminish radiated noise, and providing a ground for reducing shock hazards, you are protecting your investment in motor equipment and cables.

# TPC Products are Designed for Abuse



- **Super-Trex®:** A very rugged line of cables which includes both single and multi-conductor configurations ranging from 600 volts to 2000 volts. These products are designed primarily for power and control applications where cables may be exposed to tension, reeling, flexing, cutting, abrasion, and impact.
- **Trex-Onics®:** Designed for constant flexing applications such as cable carriers and robotics, this product line is designed to provide a high level of resistance to abrasion and cutting. Trex-Onics products include power cables and shielded multi-conductor cables for instrumentation, control and communications.
- **Quick-Connects™:** Line of cord sets and cable assemblies designed for applications that require tough, sealed connectors that are able to operate in industrial environments. Available as minis, micros, nanos, and more. Accessories include adapters, shorting plugs, three-way receptacles, and custom items.
- **Chem-Gard®:** Designed for a broad range of applications where heat, cold or extreme chemical exposure can affect cable performance. Chem-Gard uses a fluoropolymer insulation and jacket that gives the cable a temperature performance range from -60°C to +200°C. The fluoropolymer jacket also allows the cable to survive in very acidic, alkali or solvent based environments.
- **Thermo-Trex®:** High temperature cables and accessories designed for temperatures ranging from 400°F to 1000°F. This line includes power and control cables as well as a line of thermocouple extension wires and igniter wires.
- **Power-Trex®:** Temporary and emergency power family of products featuring high performance cabling systems, assemblies, custom enclosures, accessories, and storage and deployment solutions.

## Cable Selection Guide By Horsepower

| 440–480 VOLT 3-PHASE | COND. SIZE | AMPACITY @ 30°C | PRODUCT FAMILY |
|---|---|---|---|
| 10 HP | 16 | 18 | Trex-Onics® |
| 10 HP | 14 | 25 | Trex-Onics® |
| 15 HP | 12 | 30 | Trex-Onics® |
| 20 HP | 10 | 40 | Trex-Onics® |
| 30 HP | 8 | 55 | Trex-Onics® |
| 40 HP | 6 | 75 | Trex-Onics® |
| 50 HP | 4 | 85 | Trex-Onics® |
| 60 HP | 4 | 114 | Super-Trex® |

| 440–480 VOLT 3-PHASE | COND. SIZE | AMPACITY @ 30°C | PRODUCT FAMILY |
|---|---|---|---|
| 75 HP | 2 | 152 | Super-Trex® |
| 125 HP | 1/0 | 205 | Super-Trex® |
| 150 HP | 2/0 | 237 | Super-Trex® |
| 200 HP | 4/0 | 316 | Super-Trex® |
| 200 HP | 262 | 362 | Super-Trex® |
| 250 HP | 373 | 449 | Super-Trex® |
| 300 HP | 444 | 497 | Super-Trex® |
| 350 HP | 535 | 555 | Super-Trex® |

**Recommended horsepower is based on full-load current in Table 430.250 for the 2011 NEC Handbook and multiplied by 1.25 according to Article 430.22A and 430.122. Cable ampacities are based on 90°C conductor temperature and 30°C ambient temperature per the specified NEC Table.*

*Actual horsepower is subject to the drive/motor manufacturers nameplate full-load current, and the local Authority Having Jurisdiction (AHJ).*

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