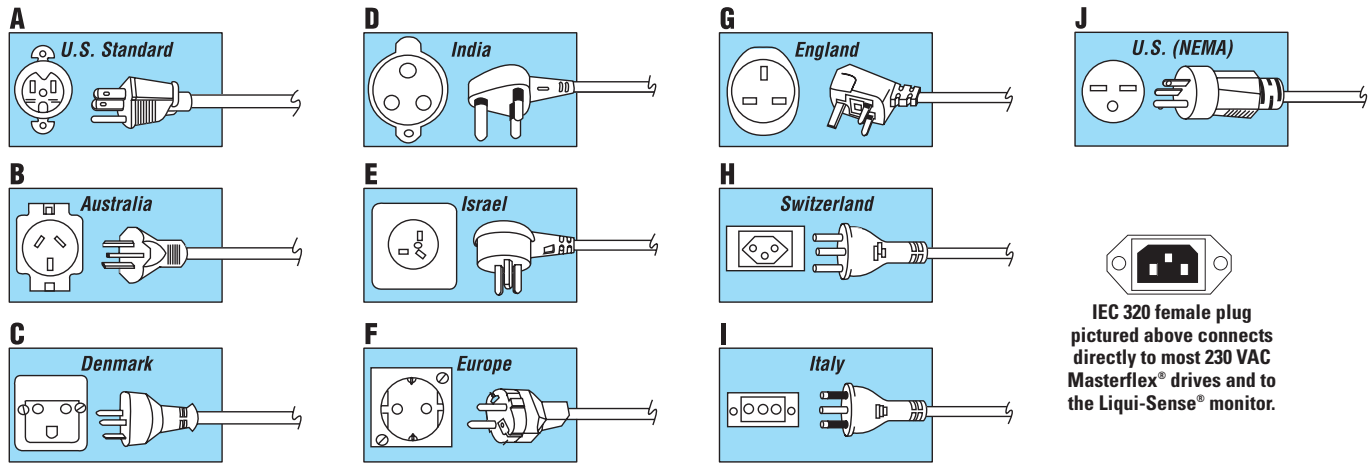


Power Cord/Plug Sets for Masterflex® Drives



Replacement Cord/Plug Sets Ordering Information

Key	Catalog number	Description	Key	Catalog number	Description
A	50001-68	U.S. Standard	F	50001-70	Europe
B	50001-60	Australia	G	50001-72	England
C	50001-62	Denmark	H	50001-74	Switzerland
D	50001-64	India	I	50001-76	Italy
E	50001-67	Israel	J	50001-78	U.S. (NEMA)

A cord/plug set will automatically be included with most 230 VAC drives and will be selected based on the country of destination. At left is a reference table of the available cord/plug sets. Cord/plug sets feature a country-specific male plug on one end and an IEC 320 female plug on the other end. Order a cord/plug set to replace a lost or damaged set or to use your 230 VAC drive in another country. Most 230 VAC drives use the country-specific cord/plug sets; see the specific Masterflex® drive page in this catalog to determine if your drive uses these cord/plug sets.

Glossary of Terms

Absolute pressure (psia): The total force per unit area exerted by a fluid. It is the sum of atmospheric and gauge pressures.

Accuracy: The degree of precision. Usually expressed, in terms of error, as a percentage of the specified value, or as a percentage of a range.

A/D: Analog-to-digital conversion. The process changes an analog signal into a digital value representative of the magnitude of the signal at the moment of conversion.

Alternating current (AC): Current that reverses polarity at a uniform frequency.

Atmospheric pressure: The force exerted per unit area by the weight of the atmosphere.

Baud rate: A unit of measure for data transmission speed. Equal to the number of signal elements (typically bits) transmitted per second. Typical baud rates are 300, 1200, 2400, 4800, 9600, 14400, and 28800.

Byte: Eight related bits of information processed as a unit. Eight bits equal one byte.

Contacts: Elements used to mechanically make or break an electric circuit.

Continuous duty: A device able to operate continuously with no off or rest periods.

Direct current (DC): A current with a constant polarity.

Explosion-proof (XPRF) motor: A totally enclosed motor that will withstand an explosion of a specific vapor or gas within its housing, or will prevent sparks or flashes generated within its housing from igniting surrounding vapor or gas.

Intrinsically safe motor: A motor designed to prevent sparks generated within its housing from igniting surrounding vapor or gas, but is not rated "explosion-proof."

Normally closed (NC): A switch in which the contacts are closed (contacting) without any external force acting upon it.

Normally open (NO): A switch in which the contacts are open (separated) without any external forces acting upon it.

Open drip-proof (ODP) motor: An open motor with ventilator openings that prevent liquids and solids, dropped from an angle of 0° to 15° from vertical, from interfering with its operation.

Parallel transmission: The transmission of data bits over different lines, usually simultaneously; as opposed to serial transmission.

RS-232: A standard computer interface used primarily to connect PCs and microprocessors with instruments, such as pH meters.

Serial transmission: Sending one bit at a time on a single transmission line.

Series (universal) motor: A non-induction type motor utilized for small equipment. Speed will decrease as load increases.

Shaded-pole motor: A low-starting torque motor that depends on induced current to create the magnetic field necessary to start the motor.

Single-phase motor: Any motor energized by a single alternation voltage.

Stop bit: A signal following a character or block that prepares the receiving device to receive the next character or block.

Three-phase motor: A relatively inexpensive, self-starting motor (no starting winding or capacitor); can start heavy loads. The motor requires a three-phase AC power supply.

Tolerance: The maximum allowable deviation from a specified standard, as the range of variation permitted, expressed in actual values or more often as a percentage of the nominal value.

Totally enclosed (TE) motor: Motors that prevent the free flow of air from the inside of the motor enclosure to the outside.

Totally enclosed, fan-cooled (TEFC) motor: A motor in a totally enclosed housing that is equipped with a separate external blower.

Totally enclosed, nonventilated (TENV) motor: A motor in a totally enclosed housing that is not equipped with an external cooling device.

Viscosity: The resistance of a fluid to flow when subjected to shear stress.

Ingress Protection (IP) Ratings

The IP rating system classifies the degrees of protection from solid objects and liquids afforded by electrical equipment and enclosures. The system is recognized in most countries and is set out in a number of British and European standards. These include: Classification of Degrees of Protection Provided by Enclosures, BS (British Standards) 5490:1977; IEC (International Electrotechnical Commission) 529:1976.



Specifications for Degrees of Protection of Enclosures of Switchgear and Control Gear for voltages up to and including 1000 VAC and 1200 VDC, BS 5420:1977; and IEC 144:1963.

First Digit

Protection against solid objects

- 0 no protection
- 1 protected against solid objects over 50 mm (e.g. accidental touch by hands)
- 2 protected against solid objects over 12 mm (e.g. fingers)
- 3 protected against solid objects over 2.5 mm (tools)
- 4 protected against solid objects over 1 mm (fine tools/wires)
- 5 protected against dust—limited ingress (no harmful deposits)
- 6 totally protected against dust

Second Digit

Protection against liquids

- 0 no protection
- 1 protected against vertically falling drops of water (e.g. condensation)
- 2 protected against direct sprays of water up to 15° from the vertical
- 3 protected against spraying water up to 60° from the vertical
- 4 protected against water sprayed from all directions—limited ingress permitted
- 5 protected against low-pressure jets of water from all directions—limited ingress permitted
- 6 protected against strong jets of water from all directions—limited ingress permitted (e.g. for use on ship decks)
- 7 protected against the effects of immersion between 15 cm and 1 m

NEMA/IEC Enclosure Ratings

Conversion of NEMA type classifications to IEC classification designation (IP ratings).

Note: NEMA standards meet or exceed IEC standards; therefore, the conversion does not work in the opposite direction.

NEMA enclosure type no.	NEMA definition	IEC enclosure class
1	General-purpose. Protects against dust, light, and indirect splashing but is not dust-tight; primarily prevents contact with live parts; used indoors and under normal atmospheric conditions.	IP10
2	Drip-tight. Similar to Type 1 but with addition of drip shields; used where condensation may be severe (as in cooling rooms and laundries).	IP11
3 and 3S	Weather-resistant. Protects against weather hazards such as rain and sleet; used outdoors on ship docks, in construction work, and in tunnels and subways.	IP54
3R	Intended for outdoor use. Provides a degree of protection against falling rain and ice formation. Meets rod entry, rain, external icing, and rust-resistance design tests.	IP14
4 and 4X	Watertight (weatherproof). Must exclude at least 65 GPM of water from 1-in. nozzle delivered from a distance not less than 10 ft for 5 min. Used outdoors on ship docks, in dairies, and in breweries.	IP56
5	Dust-tight. Provided with gaskets or equivalent to exclude dust; used in steel mills and cement plants.	IP52
6 and 6P	Submersible. Design depends on specified conditions of pressure and time; submersible in water; used in quarries, mines, and manholes.	IP67
7	Hazardous. For indoor use in Class I, Groups A, B, C, and D environments as defined in the NEC.	—
8	Hazardous. For indoor and outdoor use in locations classified as Class I, Groups A, B, C, and D as defined in the NEC.	—
9	Hazardous. For indoor and outdoor use in locations classified as Class II, Groups E, F, or G as defined in the NEC.	—
10	MSHA. Meets the requirements of the Mine Safety and Health Administration, 30 CFR Part 18 (1978).	—
11	General-purpose. Protects against the corrosive effects of liquids and gases. Meets drip and corrosion resistance tests.	—
12 and 12K	General-purpose. Intended for indoor use, provides some protection against dust, falling dirt, and dripping noncorrosive liquids. Meets drip, dust, and rust resistance tests.	IP54
13	General-purpose. Primarily used to provide protection against dust, spraying of water, oil, and noncorrosive coolants. Meets oil exclusion and rust resistance design tests.	IP54

National Electrical Code (NEC) Hazardous Area Classifications

CLASS I: Areas where flammable gases or vapors may be present in the air in sufficient quantities to be explosive

Group A: Atmospheres containing acetylene

Group B: Atmospheres such as butadiene, ethylene oxide, propylene oxide, acrolein, or hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas)

Group C: Atmospheres such as cyclopropane, ethyl ether, or ethylene (or gas or vapors of equivalent hazard)

Group D: Atmospheres such as acetone, alcohol, ammonia, benzene, benzol, butane, gasoline, hexane, lacquer solvent vapors, naphtha, natural gas, propane, or gas or vapors of equivalent hazard

CLASS II: Areas made hazardous by the presence of combustible dust

Group E: Atmospheres containing combustible

- 1) metal dusts, regardless of resistivity
- 2) dust of similarly hazardous characteristics having a resistivity less than 100 kΩ-cm
- 3) electrically conductive dusts

Group F: Atmospheres containing combustible

- 1) carbon black, charcoal, or coke dusts having more than 8% total volatile material
- 2) dusts so sensitized that they present an explosion hazard, and dusts having a resistivity greater than 100 Ω-cm but less than or equal to 1×10^8 Ω-cm

Group G: Atmospheres containing combustible

- 1) dust having resistivity equal to or greater than 100 kΩ-cm
- 2) electrically nonconductive dusts

CLASS III: Areas made hazardous by the presence of easily ignitable fibers or dust, but which are not likely to be suspended in the air in sufficient quantities to ignite

Division 1: Atmospheres where hazardous concentrations exist continuously, intermittently, or periodically under normal operating conditions

Division 2: Atmospheres where hazardous concentrations exist only in case of accidental rupture or breakdown of equipment

Explosion-proof: Enclosures or housings are designed to withstand internal explosions and prevent the spread of fire to the outside.

Intrinsically safe: Systems in which electrical energy in the circuits is not present at levels that would ignite a flammable mixture of a gas and air.

Regulatory Agencies and Approvals

ASCII: American Standard Code for Information Interchange is a method of encoding characters into 7 or 8 binary bits (typically 7 bits plus an 8th bit for parity).

ANSI: The American National Standards Institute is a private organization that coordinates the creation of voluntary standards in a number of fields including engineering, electronics, and construction.

ASTM: The American Society for Testing and Materials is a scientific and technical organization that develops material standards and testing methods.

DIN: The Deutsche Industrie Normen is a German organization that develops and promotes standards from physical quantities engineering to material engineering.

FDA: Food & Drug Administration is responsible for approving food and drugs for widespread use. Definitions for proper use are found in a series of regulations published annually under Government Regulations CFR 21.

ISO 9000 series: The ISO 9000 series is divided into five international standards (ISO 9000, 9001, 9002, 9003, and 9004) addressing issues concerning product quality. The standards guide manufacturers on the development, production, installation, inspection, and management of products to ensure total and consistent quality.

NEMA: The National Electrical Manufacturers Association is a trade association of electrical equipment manufacturers that develops and publishes many manufacturing standards.

NIST: The National Institute of Standards and Technology is a U.S. government agency that provides standard reference materials and calibration services. NIST-certified instruments are calibrated at NIST. NIST-traceable instruments are factory calibrated against NIST-certified standards.

OEM: Products used by Original Equipment Manufacturers in the design of equipment.

OSHA: The Occupational Safety and Health Administration oversees and regulates workplace health and safety.

UL: Underwriters Laboratories, Inc. is concerned with safety of personnel and property. UL listing indicates compliance with UL safety standards for electrical, mechanical, and fire hazards.

USP Class VI: Safety evaluation standards of the U.S. Pharmacopoeia/National Formulary for biocompatibility with plastics.

The icons below represent agencies that give various product approvals. Look for them next to products in this catalog.

Products with this symbol meet ISO quality standards for design, development, and servicing capabilities.



Products with this mark meet certain requirements as reported by Factory Mutual Research.



Products with this symbol are listed by Underwriters Laboratories, Inc. Samples of these products have been evaluated by UL and meet the applicable UL standards for safety.



Products with this symbol have been certified to Cenelec (European Electrotechnical Standardization) and/or IEC (International Electrotechnical Commission) for use in hazardous areas.



Products with this symbol bear the UL Listing Mark for Canada.



Products with this symbol have been tested and certified by NSF International. NSF is a nongovernmental agency that focuses on health-related standards for products and services.



Products with this symbol bear the UL Listing Mark for Canada and the U.S.



Products with this symbol are recognized under the Recognized Component Program of Underwriters Laboratories, Inc.



Products with this symbol have been approved for use with dairy products. It is recognized and used by industries that require sanitary products.



This symbol assures you that the product meets certain safety standards and/or performance criteria as set by the Canadian Standards Association.



Products with this symbol are listed by ETL Testing Laboratories, Inc. and meet applicable safety standards.



Products with this symbol conform to certain standards and are eligible to be placed on the market in the European Community.



Products with this symbol measure temperatures based on the ITS-90 temperature scale.

