

Power Systems

- [Plugs and Receptacles](#)

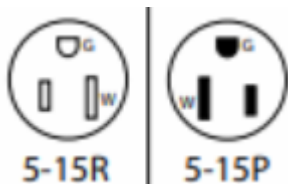
Plugs and Receptacles

Sources: [1](#)

Quick reference

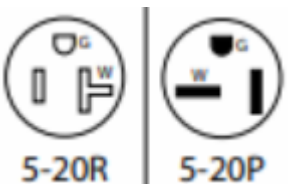
120V 15 amp circuits

Normal 15 amp grounded circuits use 5-15P plugs and 5-15R receptacles



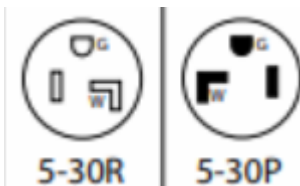
120V 20 amp circuits

5-20P plugs and 5-20R receptacles



120V 30 amp

These are typically going to require twist-lock style plugs and receptacles
















































































The chart below shows various plug and receptacle types.














The chart below shows all plug and receptacle types for various voltage and current scenarios.

NEMA Configurations Chart

North American Non-Locking Plugs and Receptacles

| VOLTAGE | NEMA | 15 AMPERE | | 20 AMPERE | | 30 AMPERE | | 50 AMPERE | | 60 AMPERE | |
|-----------------|------|---|---|---|---|---|--|---|---|---|---|
| | | RECEPTACLE | PLUG | RECEPTACLE | PLUG | RECEPTACLE | PLUG | RECEPTACLE | PLUG | RECEPTACLE | PLUG |
| 125V | 1 |  |  | |  | |  | | | | |
| | | 1-15R | 1-15P | | 1-20P | | 1-30P | | | | |
| 250V | 2 | |  |  |  |  |  | | | | |
| | | | 2-15P | 2-20R | 2-20P | 2-30R | 2-30P | | | | |
| 125V | 5 |  |  |  |  |  |  |  |  | | |
| | | 5-15R | 5-15P | 5-20R | 5-20P | 5-30R | 5-30P | 5-50R | 5-50P | | |
| 250V | 6 |  |  |  |  |  |  |  |  | | |
| | | 6-15R | 6-15P | 6-20R | 6-20P | 6-30R | 6-30P | 6-50R | 6-50P | | |
| 277V | 7 |  |  |  |  |  |  |  |  | | |
| | | 7-15R | 7-15P | 7-20R | 7-20P | 7-30R | 7-30P | 7-50R | 7-50P | | |
| 125/ 250V | 10 | | |  |  |  |  |  |  | | |
| | | | | 10-20R | 10-20P | 10-30R | 10-30P | 10-50R | 10-50P | | |
| 3Ø250V | 11 |  |  |  |  |  |  |  |  | | |
| | | 11-15R | 11-15P | 11-20R | 11-20P | 11-30R | 11-30P | 11-50R | 11-50P | | |
| 125/ 250V | 14 |  |  |  |  |  |  |  |  |  |  |
| | | 14-15R | 14-15P | 14-20R | 14-20P | 14-30R | 14-30P | 14-50R | 14-50P | 14-60R | 14-60P |
| 3Ø250V | 15 |  |  |  |  |  |  |  |  |  |  |
| | | 15-15R | 15-15P | 15-20R | 15-20P | 15-30R | 15-30P | 15-50R | 15-50P | 15-60R | 15-60P |
| 3ØY 120/208V | 18 |  |  |  |  |  |  |  |  |  |  |
| | | 18-15R | 18-15P | 18-20R | 18-20P | 18-30R | 18-30P | 18-50R | 18-50P | 18-60R | 18-60P |

International Standards IEC 60320

| Connector (female) | Appliance inlet (male) | Configuration Female/Male | Earth contact | International | | North America | | Max. pin temp. (°C) |
|-----------------------|---------------------------|---|------------------|---------------------|----------------|---------------------|----------------|------------------------|
| | | | | Max. current (A) | Voltage (V) | Max. current (A) | Voltage (V) | |
| C1 | C2 |  | No | 0.2 | 250 | 10 | 125 | 70 |
| C5 | C6 |  | Yes | 2.5 | 250 | 10 | 125 | 70 |
| C7 | C8 |  | No | 2.5 | 250 | 10 | 125 | 70 |
| C9 | C10 |  | No | 6 | 250 | / | 125 | 70 |
| C13 | C14 |  | Yes | 10 | 250 | 15 | 125/250 | 70 |
| C15 | C16 |  | Yes | 10 | 250 | 15 | 125/250 | 120 |
| C15A | C16A |  | Yes | 10 | 250 | 15 | 125/250 | 155 |
| C17 | C18 |  | No | 10 | 250 | 15 | 125/250 | 70 |
| C19 | C20 |  | Yes | 16 | 250 | 20 | 125/250 | 70 |
| C21 | C22 |  | Yes | 16 | 250 | 20 | 125/250 | 155 |
| C23 | C24 |  | No | 16 | 250 | 20 | 125/250 | 70 |

Among the connector types, C13, C15 and C19 are the most commonly used ones in data centers. Details are listed in the table below:

| Connector Type | Configuration | Max. Current/Voltage | Max. pin temp. (°C) | Common Application |
|----------------|---|----------------------|---------------------|---|
| C13 |  | 10A/250V | 70 | C13 connectors commonly work with inlets on computers and devices that can be attached to computers. |
| C15 |  | 10A/250V | 120 | C15 receptacles are for use in high temperature settings, such as electric kettles, computer networking closets, and PoE switches with high wattage power supplies. |
| C19 |  | 16A/250V | 70 | C19 connectors are common for devices that require higher current than which can be provided by C13 and C15 connectors. Typical applications are on enterprise-class servers, data center rack-mounted power distribution units (PDUs) and chassis switches |

IEC 60320 power cords uses even number for plug and odd number for the mating receptacle, and usually male appliance inlet is 1 higher than the sheet for the corresponding female cable connector. Therefore the most common used power cord types is C14 to C13 and C20 to C19. Other common power cord types also include C14 to C15 and C20 to C15.



C14 to C13



C20 to C15



C20 to C19

North American: NEMA 5-15P (Type B)

The NEMA standards are commonly adopted in most North American countries and some countries that follow NEMA standard. Among the NEMA 5-15P plug are the most widely used in sockets. They are three-wire circuits (hot, neutral and ground), and are rated at 15 A at 250 V, although they usually carry 110 V.

Nema 5-15 standard known

NEMA 5-15P to NEMA 5-15R power cord is the most common type. The NEMA 5-15P stands for the plug, and the NEMA 5-15R stands for the receptacle. Other frequently used power cord types that use NEMA 5-15 plug include [NEMA 5-15P to C13](#) and NEMA 5-15P to C15.

common nema 5-15p power cords

Europe: CEE 7/7 (Type E, Type F)

CEE 7/7 is now the de facto plug standard in many European countries, and in some countries that follow CENELEC standard. European countries that do not use CEE 7/7 are Denmark (AFSNIT 107-2-D1), Ireland, Italy (CEI 23-50), Malta (BS 1363), Cyprus (BS 1363), Gibraltar (BS 1363) and Switzerland (SEV 1011). The most popular power cords that adopt CEE 7/7 plug include CEE 7/7 to C13, CEE 7/7 to C15, and CEE 7/7 to C19.

common cee 7-7 power cords

Other Standards: JIS C 8303, AS/NZS 3112 etc.

Some other countries also have their own plug standard. For example, Australian standard AS/NZS 3112 (Type I), Brazilian standard NBR 14136 and Japanese standard JIS C 8303 (Type A, B), etc. But one common thing is that they might all adopt the IEC 60320 connector standard.

plug standards in different countries