

Standard Output Voltages for PCs Power Supplies

PCs use several different voltages to power their various components. The core voltages have mostly remained unchanged over the 20-year history of the PC, though a couple of the less-used voltages have essentially been dropped, and an important new one has been added. The power supply provides each of these voltages, in varying amounts depending on the model, directly from its circuitry.

Most of the power provided by the power supply is in the form of **POSITIVE VOLTAGES**, but some is in the form of **NEGATIVE VOLTAGES**. Negative voltage is a slightly strange concept when used in reference to a DC current. In a nutshell, it just means that the voltage potential is measured from ground to the signal, instead of the signal to ground. It's essentially like turning a battery upside-down: same voltage, the current just goes backwards.

The amount of current provided at each voltage level is important because of its impact on determining the supply's ability to provide sufficient power for your system. Here are the details on the various voltages provided by today's power supplies:

-12 V: This voltage is used on some types of serial port circuits, whose amplifier circuits require both -12V and +12V. It is not needed on some newer systems, and even on older ones not very much is used, because the serial ports require little power. Most power supplies provide it for compatibility with older hardware, but usually with a current limit of less than 1 A.

-5 V: A now archaic voltage, -5 V was used on some of the earliest PCs for floppy controllers and other circuits used by ISA bus cards. It is usually provided, in small quantity (generally less than 1A), for compatibility with older hardware. Some form factor power supplies such as the SFX no longer bother to supply it (systems using the SFX power supply are intended not to have ISA bus slots).

0 V: Zero volts is the ground of the PC's electrical system, also sometimes called common or (especially in the UK) earth. The ground signals provided by the power supply are used to complete circuits with the other voltages. They provide a plane of reference against which other voltages are measured.

+3.3 V: The newest voltage level provided by modern power supplies, it was introduced with the ATX form factor and is now found on the ATX/NLX, SFX and WTX form factors. It is not found in Baby AT or older form factors. Originally, the lowest regular voltage provided by the power supply was +5 V, which was used to provide power to the CPU, memory, and everything else on the motherboard. Starting with the second generation Pentium chips, Intel went to a reduced 3.3 V voltage, in order to reduce power consumption as the chips got faster. This required motherboard manufacturers to put voltage regulators on their boards to change the +5 V to +3.3 V. The regulators produced a great deal of waste heat and having to do this reduction on the motherboard was very inefficient, so now the power supply provides +3.3 V directly. It is used to run most newer CPUs, as well as some types of system memory, AGP video cards, and other circuits.

+5 V: On older form factor systems (Baby AT and earlier), this is the voltage used to run the motherboard, the CPU (directly or indirectly) and the vast majority of other components in the system. On newer systems, many of the components, especially the CPU, have migrated to the lower +3.3 V described above, but the motherboard and many of its components still use +5 V.

+12 V: This voltage is used primarily to power disk drive motors. It is also used by fans and other types of cooling devices. It is in most cases not used by the motherboard in a modern PC but is passed on to the system bus slots for any cards that might need it. Of course, drives are connected directly to the power supply through their own connectors