Industrial Circuits Application Note Drive Circuit Basics

By using negative feedback, an op amp circuit's characteristics (e.g. its gain, input and output impedance, bandwidth, and functionality) can be determined by external components and have little dependence on temperature coefficients or engineering tolerance in the op amp itself. This flexibility has made the op amp a popular building block in analog circuits. eaa80b431b Three-phase squirrel-cage induction motors are widely used as industrial drives because they are self-starting, reliable, and economical. Single-phase induction motors are used extensively for smaller loads, such as garbage disposals and stationary power tools. Although traditionally used for constant-speed service, single- and three-phase induction motors are increasingly being installed in variable-speed applications using variable... eaa80b431b Static inverters do not use moving parts in the conversion process. eaa80b431b

Power inverter Inverters do the opposite of rectifiers which were originally large electromechanical devices converting AC to DC. inverters are primarily used in electrical power applications where high currents and voltages are present; circuits that perform the same function for electronic A power inverter, inverter, or invertor is a power electronic device or circuitry that changes direct current (DC) to alternating current (AC). The resulting AC frequency obtained depends on the particular device employed eaa80b431b

VFDs are used in applications ranging from small appliances to large compressors. Systems using VFDs can be more efficient than hydraulic systems, such as in systems with pumps and damper control for fans. eaa80b431b

Induction motor An induction motor's rotor can be either wound type or squirrel-cage type. Applications, such as electric overhead cranes, used DC drives or wound rotor motors (WRIM) with slip rings for rotor circuit connection An induction motor or asynchronous motor is an AC electric motor in which the electric current in the rotor that produces torque is obtained by electromagnetic induction from the magnetic field of the stator winding. speed applications. An induction motor therefore needs no electrical connections to the rotor eaa80b431b

Transformers are used to change AC voltage levels, such transformers being termed step-up or step-down type to increase or decrease voltage level... eaa80b431b Electric motors can be powered by direct current (DC) sources, such as from batteries or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. Electric motors may also be classified by considerations such as power source type, construction, application and type of motion output. They can be brushed or brushless... eaa80b431b

Power electronics (2002). The power electronics handbook Industrial electronics Power electronics is the application of electronics to the control and conversion of electric power. pp. Skvarenina, T. Elsevier. 147–564. Devices, Circuits, and Applications. L. ISBN 978-0-12-382036-5 eaa80b431b

Electric motor Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate Laplace force in the form of torque applied on the motor's shaft. megawatts. Other applications include industrial fans, blowers and pumps, machine tools, household appliances, power tools, vehicles, and disk drives. Small motors An electric motor is a machine that converts electrical energy into mechanical energy. An electric generator is mechanically identical to an electric motor, but operates in reverse, converting mechanical energy into electrical energy eaa80b431b

Since the 1980s, power electronics technology has reduced VFD cost and size and has improved performance through advances in semiconductor switching devices, drive topologies... eaa80b431b Today, op amps are used widely in consumer, industrial, and scientific electronics. Many standard integrated circuit op amps cost only a few cents; however, some... eaa80b431b

Resistor High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. electronic component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. In electronic circuits, resistors are used to reduce current flow, adjust signal A resistor is a passive two-terminal electronic component that implements electrical resistance as a circuit element eaa80b431b

The MOSFET is the basic building block of most modern electronics, and the most frequently manufactured device in history, with an estimated total of 13 sextillion (1.3 × 1022) MOSFETs manufactured between 1960 and 2018. It is the most common semiconductor device in digital and analog circuits, and the most common power device. It was the first truly compact transistor that... eaa80b431b The first high-power electronic devices were made using mercury-arc valves. In modern systems, the conversion is performed with semiconductor switching devices such as diodes, thyristors, and power transistors such as the power MOSFET and IGBT. In contrast to electronic systems concerned with the transmission and processing of signals and data, substantial amounts of electrical energy are processed in power electronics. An AC/DC converter (rectifier) is the most typical power electronics device found in many consumer electronic devices, e.g. television sets, personal computers, battery chargers, etc. The power range is typically from tens of watts to several hundred watts. In industry, a common... eaa80b431b

Operational amplifier block in analog circuits. Its name comes from its original use of performing mathematical operations in analog computers. Many standard integrated circuit op amps cost An operational amplifier (often op amp or opamp) is a DC-coupled electronic voltage amplifier with a differential input, a (usually) single-ended output, and an extremely high gain. Today, op amps are used widely in consumer, industrial, and scientific electronics eaa80b431b

Resistors are common elements of... eaa80b431b A power inverter can be entirely electronic or maybe a combination of mechanical effects (such as a rotary apparatus) and electronic circuitry. eaa80b431b Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity. eaa80b431b

Transformer A varying current in any coil of the transformer produces a varying magnetic flux in the transformer's core, which induces a varying electromotive force (EMF) across any other coils wound around the same core. that transfers electrical energy from one electrical circuit to another circuit, or multiple circuits. A varying current in any coil of the transformer produces In electrical engineering, a transformer is a passive component that transfers electrical energy from one electrical circuit to another circuit, or multiple circuits. Electrical energy can be transferred between separate coils without a metallic (conductive) connection between the two circuits. Faraday's law of induction, discovered in 1831, describes the induced voltage effect in any coil due to a changing magnetic flux encircled by the coil eaa80b431b

Power inverters are primarily used in... eaa80b431b Thermistors are categorized based on their conduction models. Negative-temperature-coefficient (NTC) thermistors have less resistance at higher temperatures, while positive-temperature... eaa80b431b The input voltage, output voltage and frequency, and overall power handling depend on the design of the specific device or circuitry. The inverter does not produce any power; the power is provided by the DC source. eaa80b431b

List of MOSFET applications The voltage of the covered gate determines the electrical conductivity of the device; this ability to change conductivity with the amount of applied voltage can be used for amplifying or switching electronic signals. Discrete MOSFET devices are widely used in applications such as switch mode power supplies, variable-frequency drives, and other The MOSFET (metal–oxide–semiconductor field-effect transistor) is a type of insulated-gate field-effect transistor (IGFET) that is fabricated by the controlled oxidation of a semiconductor, typically silicon. integrated circuits eaa80b431b

Thermistor for inrush current protection, or for limiting current to hot circuits, e. The varying resistance with temperature allows these devices to be used as temperature sensors, or to control current as a function of temperature. g. g. The word thermistor is a portmanteau of thermal and resistor. to prevent thermal runaway A thermistor is a semiconductor type of resistor in which the resistance is strongly dependent on temperature. Some thermistors have decreasing resistance with temperature, while other types have increasing resistance with temperature. used for limiting current to cold circuits, e. g. to prevent thermal runaway. This allows them to be used for limiting current to cold circuits, e. g. for inrush current protection, or for limiting current to hot circuits, e eaa80b431b

Variable-frequency drive Depending on its topology, it controls the associated voltage or current variation. variable-frequency drive (VFD, or adjustable-frequency drive, adjustable-speed drive, variable-speed drive, AC drive, micro drive, inverter drive, variable voltage A variable-frequency drive (VFD, or adjustable-frequency drive, adjustable-speed drive, variable-speed drive, AC drive, micro drive, inverter drive, variable voltage variable frequency drive, or drive) is a type of AC motor drive (system incorporating a motor) that controls speed and torque by varying the frequency of the input electricity eaa80b431b