Enable Sustainable Manufacturing with Variable Speed Drive Solutions

Up to 70% of electricity used in industry is consumed by motors. Historically, the vast majority of motors were connected directly to the AC grid and operated at a fixed rotational speed. It has been estimated that if all fixed speed motors were equipped with drives, global energy usage could be reduced by as much as 10%. Analog Devices provides complete signal chain solutions incorporating high performance current and voltage sensing, robust isolation, high density power management and seamless connectivity. These deliver advanced motion solutions that increase productivity, extend equipment lifetime and accelerate lower carbon manufacturing.

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Precision Current & Voltage Feedback

Current feedback is vital to enhance drive performance and determines the overall control bandwidth and response time of motors. Ensuring the motor is operating at peak efficiency, low latency, synchronized measurements offered by ADI's AD8410A and MAX49925 current sense amplifiers enable faster system response for low voltage motor drives (<100 V). For higher voltage systems, the ADuM7701 / ADuM7702 / ADuM7703 / ADuM7704 isolated sigma delta ADC products offer very low offset drift for reduced torque ripple, and enable the use of low-value shunt resistors for improved system efficiency, accuracy, and reliability. In applications with isolated current sensing using hall sensors, the AD7380 (4 MSPS) and MAX11192 (2 MSPS) simultaneous sampling SAR ADCs enhance noise and dynamic range performance.

Digital Isolation & Isolated Gate Drivers

ADI's innovative portfolio of data isolators delivers digital isolation technology for protocols ranging from SPI, I2C, USB, and CAN to gigabit LVDS, protecting people and assets from high voltage and disruptive electric interference, while maintaining data integrity. The ADuM341E quad channel digital isolator offers galvanic isolation up to 1173 Vpeak along with low propagation delay enabling low latency and low jitter for precision timing. Meanwhile robust isolated gate drivers protect power devices from faults and electromagnetic transients. The ADuM4221 isolated half-bridge gate driver provides ultra low propagation delay for improved system efficiency, offers common mode transient immunity (CMTI) up to 150 kV/µs to support fast switching speeds and is compatible with the latest SiC and GaN technology. The ADuM4122 offers two different slew rate levels to optimise power loss and EMI control.

Power Management

As motor drives become decentralized and are placed closer to the motor, efficient power management in smaller enclosures becomes key. The MAX17690 / MAX17691 / MAX17692 flyback converters enable isolated and high-density power solutions while multi-output buck regulators like the ADP5054 regulate the output voltages for powering digital loads (e.g. FPGA / processor). MAX14721 / MAX14722 / MAX14723 power limiters enable voltage and current protection for enhanced drive reliability.

Robust Secure Connectivity

Analog Devices Ethernet PHYs, RS-485/RS-422 and LVDS/M-LVDS transceivers are designed with added noise immunity and robustness for reliable operation in harsh industrial environments. The ADIN1200 industrial Ethernet PHY paired with the Fido5200, 2-port real-time Ethernet multiprotocol (REM) switch, enables up to 100 Mbps data transfer for secure connectivity. For RS-485, the MAX22507E / MAX22508E transceivers are optimized for high speed communication up to 50 Mbps, offer full duplex operation and include integrated surge protection.

With increased connectivity comes the need for added security at the device level. Protecting production assets from malware attack, and untrusted commands through secure authenticator technology is critical. The DS28S60 and MAX1065 protect motor drives by enabling secure boot and trusted execution, ensuring a secure chain of trust across the network.