
WARRINGTON, UK, JANUARY 26, 2015

Motor-drive package delivers precise process control and ATEX compliance

The challenge of matching low voltage AC motors and AC drives for use in hazardous environments within the chemical, oil and gas industries has been overcome by ABB's ATEX-approved motor-drive package.

Because very few manufacturers make both motors and variable-speed drives, it is a major concern to the industry when searching for combinations that are ATEX approved. For instance, end-users that choose to match their own drive and motor combinations may be forced to select a larger motor than optimum because of the limited selections available from their chosen manufacturers. If loadability curves are not available, then the ATEX137 work place directive will have to be implemented through a "self-assessment" route, which can be costly and time consuming.

Furthermore, when controlling motors in potentially explosive atmospheres, it is important to be aware of the effects an AC drive has on the operating conditions of a motor, compared to direct-on-line (DOL) operation. These include higher voltage stresses through steep voltage pulses, common mode voltages and currents, and higher motor surface temperature rises due to a non-sinusoidal supply.

For these reasons ATEX directives call for extra attention to be given when an Ex motor is used with an AC drive. Usually only the motor and driven load are installed in the potentially explosive atmosphere, with the drive being installed in a safe area. By choosing an ABB ATEX package, end-users can be confident that the motor and drive combination is optimised for their application and that surface temperature limits have been tested and verified at an ABB laboratory rather than on site with a customer's own test equipment.

Among the many sources of risk affecting AC drives and motors in hazardous environments is an increase in motor surface temperature. Reduced cooling capacity can be caused by driving the motor outside its specified speed range. Increased surface temperature can occur if the motor is incorrectly dimensioned for use with an AC drive.

When using an ABB industrial drive, its motor control platform – direct torque control (DTC) - can help reduce the temperature. Using DTC control, along with ABB's dimensioning and selection tool DriveSize, prevents over temperature. The dimensioning is based on type tested load capacity curves. This also ensures the application is optimised for the load.

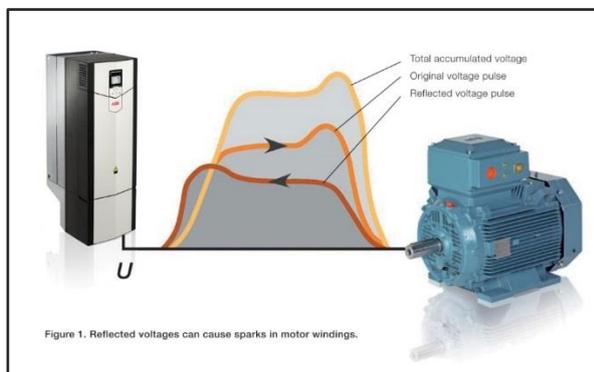
As well as ensuring surface temperatures are tested and controlled, ABB can also offer a certified safety function which is able to disconnect the drive from the source of energy if surface temperatures are exceeded when the load is stalled or damaged. ABB can offer ATEX certified safe torque-off (STO) circuits and thermistor protection systems in wall mounted drives or cabinet drives.

ABB has identified several routes to EC Declaration of Conformity for low voltage AC drives and motors. Each route depends on the motor voltage, frame size and winding insulation along with the AC drive type, control platform and filter arrangement. A flowchart, available in ABB's brochure, "*ATEX compliance in chemical oil and gas*", guides users through the motor-drive package selection process for use in hazardous areas. It outlines the appropriate drive to choose based on motor size and hazardous area requirements.

Among the many motor types that can be matched with ABB's variable-speed drives are flameproof from 80 to 400 with power ratings from 0.55 to 710 kW, increased safety in 80 to 560 frame sizes at rated power from 0.25 to 1000 kW, non-sparking in 71 to 560 frames from 0.25 to 2000 kW and dust ignition proof (known more specifically as Ex tD/DIP) motors in frames 70 to 400 from 0.12 to 710 kW.

The ABB drives suited to the control of ATEX certified AC motors include the ABB industrial drive, ACS880 rated from 0.55 to 5600 kW, the ABB standard drive, ACS550, rated from 0.37 to 355 kW and the ABB general machinery drive, ACS355 with a power range from 0.37 to 22 kW.

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Caption: ABB's ATEX compliant motor-drive package.

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