



Guardian PL'c' (Performance Level 'c') Safety Notes

The Machinery Directive standard EN ISO 13849-1 is a European safety regulation. This is a generic standard defining the requirements for the safety-related parts of control systems. The primary goal of Directive is to ensure that equipment will function in a safe manner. There are many specific standards that can be used to show compliance to the Machinery Directive. To that end, machines and their components are expected to function safely. A pressure sensor—while not the only component—is a machinery component that is expected to comply under the Directive, when they are used in a safety function on a machine.

Determining functional safety is complicated and minimally involves an assessment of the probability, an assessment of impact resulting from failure, and a path to address a failure should it occur. While the supplier evaluates and classifies the safety assessment of his equipment, the user decides, selects, installs, and tests the type of equipment that is needed.

One such Machinery Directive assessment is Performance Level (PL). As the name implies, there are several levels of performance that can be directed to the safety requirements of a system. Performance Level is determined by assessing various factors that contribute to the safe operation of equipment. In evaluating the safety system, $MTTF_d$ (Mean Time To dangerous Failure); DC (Diagnostic Coverage); Architecture Categories; etc., are evaluated. The particular Performance Level rating can be achieved in several ways by balancing the factors that comprise the level rating. Performance Levels are rated from 'a' to 'e', in increasing safety assurance. For example, the safety rigors of PL'a' are not as stringent as they are for PL'e'. A sensor safety plan that includes an integral safety relay switch, PL'c' compliance with the newest laws, and evaluated by a third party, provides the best protection and peace of mind that safer systems provide.

Dynisco offers its popular pressure sensors with an internal relay switch that serves as a safety shutdown as well as being compliant to the Directive through an extension of the line called Guardian Series. Guardian PL'c' has been reviewed by the respected third-party agency **exida**™ and the hardware was found to meet Performance Level 'c' (PL'c') as a single sensor when installed per Category 1. When installed as two sensors per Category 3, Guardian meets Performance Level 'd' as defined by the Machinery Directive EN ISO 13849-1. All Guardian Series sensors have undergone extensive FMEDA analysis (Failure Mode Effects and Diagnostic Analysis). FMEDA reports are available on request.

Guardian PL'c' sensors include an integral safety relay that is Normally Closed. The relay contacts will open under the following fault conditions:

- When an open bridge is detected
- When there is a loss of power to the sensor
- When the pressure exceeds a % of full scale of pressure range threshold of, as selected at the time of order, even with turndown applied.

Not all fault conditions are detected, such as a damaged diaphragm.



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