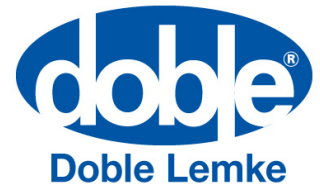


MachineGuard



Acceptance Checklist

TOGETHER WE POWER THE WORLD®

The MachineGuard system from Doble Lemke offers industry standard, safe and comprehensive PD monitoring of rotating machines - Just check out the SPEC!

☑ IEC 60270 Compliant: YES

IEC 60270 compliance is a key consideration! Central to PD analysis is an understanding of the PD charge (Q), its frequency content, and repetition rate. IEC has long asserted that one of the most sensitive regions for true PD characterization is 100...500 kHz. To compare results, you must know what the charge level is within the machine under test. This value is commonly called Apparent Charge (Qa). Doble's MachineGuard system records the following information and is used for alarming, PD analysis, which trends:

- Qa (Apparent Charge)
- Qiec (a weighted IEC standard method of reviewing charge)
- PRPD (Phase Resolved Plot of PD in regards to a specified frequency range)
- Phi-Q
- Phi-Q-N
- FFT
- Q vs Time

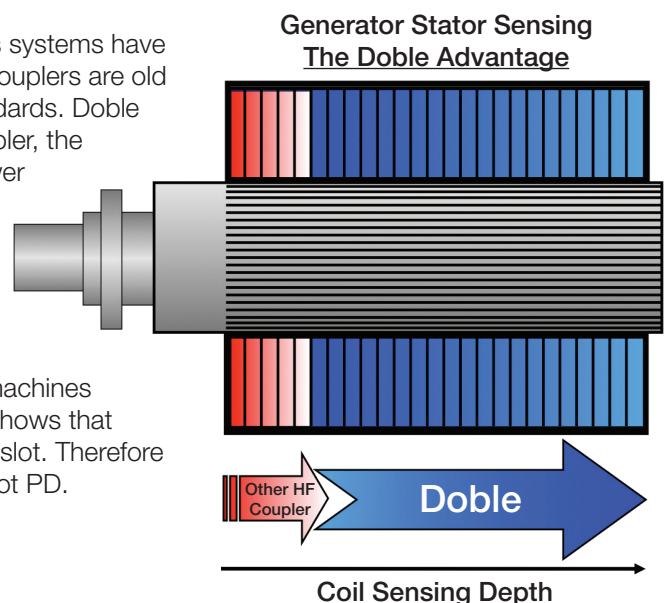


If it's not weighted and calibrated to Charge and Frequency, it's just a GUESS. Make sure your system conforms to IEC and IEEE.

☑ Complete Machine Sensing: YES

Doble uses 2 nF couplers, whereas other companies systems have been using 80 pF couplers since the 1980s. 80 pF couplers are old technology and do not conform to international standards. Doble has LF (low frequency) Couplers - the larger the coupler, the lower the frequency that can be sensed. And the lower the frequency the less attenuation occurs to a PD signal.

A PD signal that is measured through an 80 pF coupler can only be measured about 1 to 3 turns into a rotating machine winding. The notion that the first couple of coils is the only place where rotating machines fail is completely false. Case study after case study shows that failures can occur throughout the winding and in the slot. Therefore it is extremely unlikely for 80 pF couplers to detect slot PD.



☑ Modbus Protocol: YES

In the standard configuration, MachineGuard's PD-Guard is connected to the network by an Ethernet or fiber optic Ethernet cable. As an option, the system can be configured for ModBus connectivity.

✔ Built In System Protection: **YES**

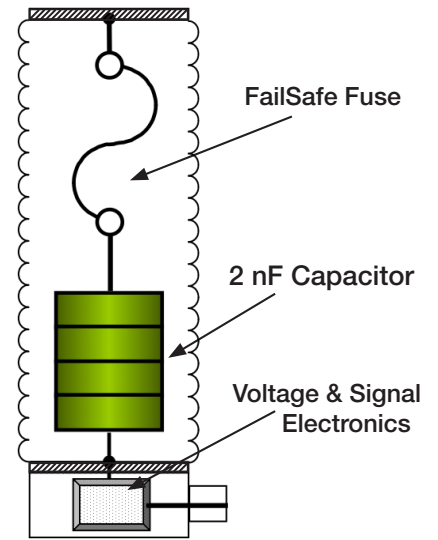
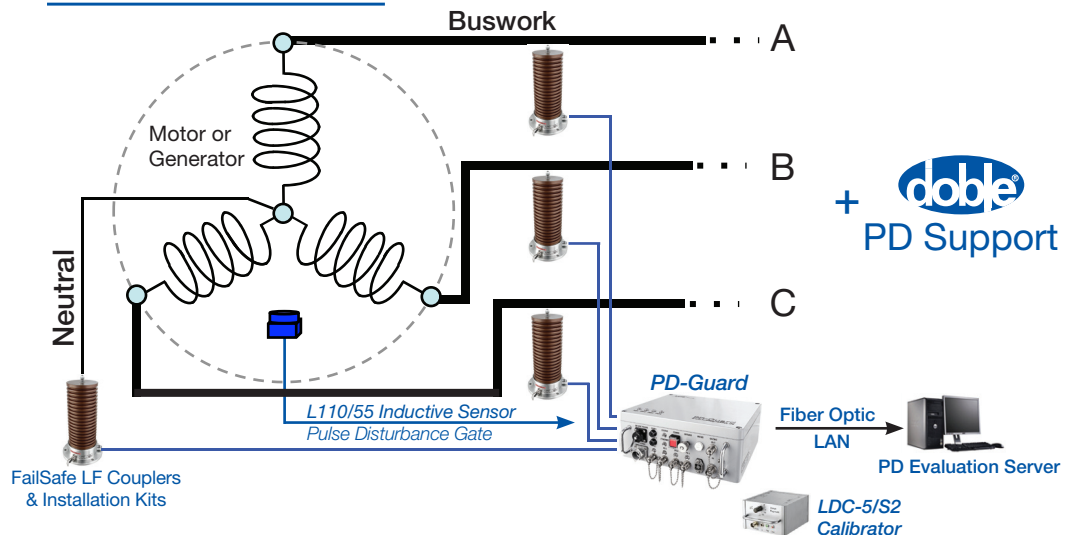
Don't let the couplers compromise the system! By themselves Doble's LF Couplers offer safe and reliable use in accordance with industry standards. Failure of the coupler could lead to a phase to ground fault that could damage the machine. This is especially a concern when dealing with higher voltage machines in excess of 13.8kV. The Doble PDDC-24 FailSafe LF Coupler includes an HV fuse that safely removes the coupler from the buswork in the event of failure.

✔ Advanced Noise Rejection: **YES**

MachineGuard has several methods of noise rejection to deal with power electronic and extraneous noise. First, the PD-Guard includes a gating input that connects to an inductive sensor (no physical connection required) that effectively removes power electronic noise created by the exciter.

Since the MachineGuard system conforms to IEC/IEEE standards, and can critically analyze the frequency content of the PD, it doesn't need to rely on methods such as Time of Flight (TOF) to remove any and all PD sources outside the machine. TOF is necessary if the system is only measuring PD from a very localized area (due to high attenuation) and there is no way to fully analyze the PD charge level and frequency content over time. First, noise from outside the generator is much lower than the generator itself, and we can choose a much broader frequency range that highlights the machines' PD, not the environment. Besides, TOF is not necessary when you are not frequency constrained, can trend real PD activity, and are calibrated to charge. Extra couplers just add additional installation challenges and potential problems. In addition, MachineGuard uses a fourth coupler attached to the neutral when possible. This allows for critical correlation analysis of PD from BOTH ends of the coil. With this information, more intelligent analysis of the PD activity is possible.

MachineGuard



✔ Doble MachineGuard Acceptance Report: **ACCEPTED & RECOMMENDED**

Doble MachineGuard system offers the best and newest technologies developed in the 21st century. The system meets or exceeds all industry and diagnostic requirements to ensure safe and reliable machine operation.



For more information, contact

PDinfo@doble.com

or visit

www.doble.com

Specifications are subject to change without notice.

Doble is certified ISO 9001:2000
Doble is an ESCO Technologies Company

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