The **offline monitoring function** of the insulation monitoring device **ISOMETER® isoNAV685-D-B** makes it possible to monitor the state of the insulation in drive systems, even in earthed systems

Avoiding failure of drive systems

Drive systems are important and widespread industrial applications. One of the most critical elements and, at the same time, the main source of failures of drive systems is the electrical insulation. There are various studies on the insulation system for stator windings that report drive failures due to insulation faults in the order of 26 % [1] or even 36 % [2].

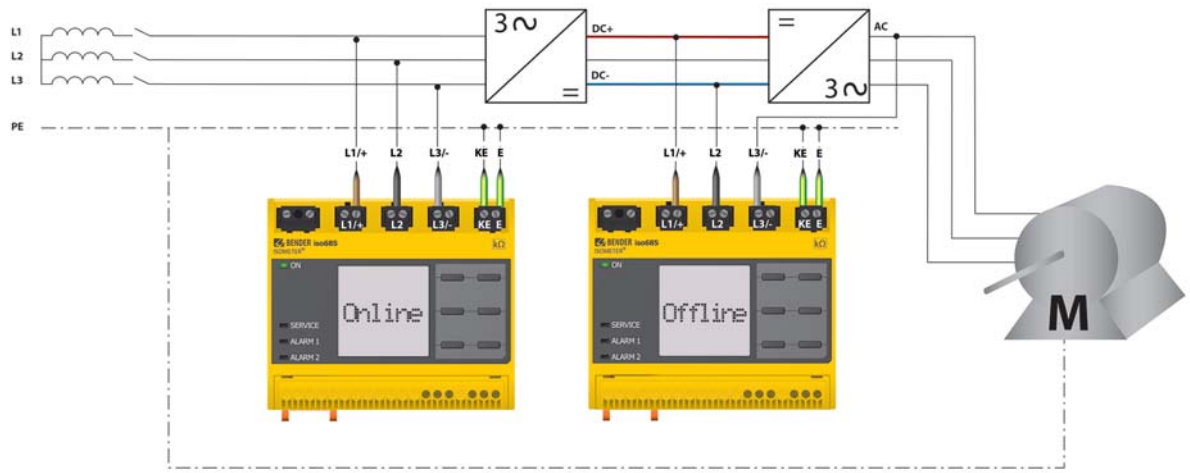
Insulation faults can be caused by, e.g., mechanical damage, dust, moisture, thermal ageing of the insulation or rodent damage. Independent of the cause, insulation faults represent a life-threatening hazard for personnel, the risk of damage to assets and a hazard for the availability of electrical power.

[1] MOTOR RELIABILITY WORKING GROUP, "Report of large motor reliability survey of industrial and commercial installations, Part I," IEEE Trans. Ind. Appl., vol. IA-21, no. 4, pp. 853–864, Jul. 1985"

[2] O. V. Thorsen and M. Dalva, "A survey of faults on induction motors in offshore oil industry, petrochemical industry, gas terminals, and oil refineries," IEEE Trans. Ind. Appl., vol. 31, no. 5, pp. 1186–1196, Sep./Oct. 1995."

Fig. 1

Regulated drive with insulation monitoring in operation and offline mode with isoNAV685



Unplanned failures due to faults in the electrical insulation cause to some extent very considerable costs in industrial processes. For this reason it is desirable that a weak spot in the insulation system is detected at an early stage so that planned maintenance or drive replacement can be undertaken in good time.

In the majority of cases the economic losses caused by an unexpected failure of the drive exceed the maintenance costs several times over. For example, the losses due to a stoppage on an offshore oil platform caused by drive failures are up to $ 25,000/h.[3]

It is known that drive systems operated in IT systems can be monitored using commonly available insulation monitoring devices while they are in operation. Drive systems that are operated in earthed systems (TN and TT system) can be monitored using commonly available residual current monitors . Proactive maintenance helps to avoid possible costs due to the unplanned failure of drive systems.

On the other hand, it is often not known that offline insulation monitoring devices can be used for unearthed and earthed drives outside the active operating state to detect a degradation in the level of insulation at an early stage.

"A degradation in the level of insulation is detected before parts of the installation or loads enter a critical state ..."

Parts of installations or loads that are de-energised, or that are only switched on briefly or in case of an emergency are continuously monitored by offline monitoring during the shutdown period. A degradation in the level of insulation is therefore

[3] A Survey on Testing and Monitoring Methods for Stator Insulation Systems of Low-Voltage Induction Machines Focusing on Turn Insulation Problems, "IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, VOL. 55, NO. 12, DECEMBER 2008"

detected before parts of the installation or loads enter a critical state and important functions essential for operation fail.

This time saving can be used to plan a maintenance measure. Unplanned stoppages due to shutdown are reliably prevented and downtime reduced. In the past, solutions for offline monitoring were available above all for motors and heaters. On pure AC systems, e.g. the ISOMETER® IR420-D6 could be used together with a coupling device up to 7200 V, without having to use external medium voltage isolating relays.

"Unplanned stoppages due to shutdown are reliably prevented and downtime reduced."

The latest offline insulation monitoring device from Bender, the ISOMETER® isoNAV685-D-B, is available especially for large frequency converter drives up to AC 690 V and DC 1000 V (or higher voltages with an external coupling switch), on which both the intermediate circuit and the motor circuit must be monitored offline. ■

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THE ADVANTAGES

of continuous monitoring
by means of offline monitoring:

- Increase in the productivity of installations due to the prevention of expensive, unplanned installation stoppages, interruptions to operation or emergency situations
- Minimisation of the fire risk and risk of a hazard due to two-stage warning
- Reduction of damage due to faulty power modules and motors, as well as consequently longer service life of the parts of the installation
- Lower inventory costs for keeping spare parts for assemblies
- Optimized maintenance due to early warning that contributes to the reduction of the costs for operation and maintenance.