

Emergency Power Systems: NZMs Protect Generators



Emergency power supply systems can save lives in hospitals, protect production processes or ensure continuous operation in IT centres and administrative buildings. In the event of a mains failure, the emergency power systems feed the consumers for which continuous operation is vital. This is where Moeller's NZM circuit-breakers are used to implement key functions: They protect, switch and synchronize the generators reliably and safely.

As part of the NZM range, Moeller offers circuit-breakers with an electronic release that can be adjusted exactly for generator protection. The circuit-breakers are suitable for rated currents from 50 to 1600 A and can reliably disconnect short-circuit currents up to 150 000 A.

Generator specifications require them to be able to withstand a multiple of their rated current for several seconds without damage. The setting values of the release can be adjusted, for example, to double the rated current linked with a one second delay, so as to ensure optimum protection of the generator from overload on the one hand, and optimum use of generator capacity on the other. This firstly ensures that temporary

overcurrents above the rated current are ignored by the circuit-breaker electronics. Downstream protective devices then have the chance of disconnecting faulty system sections, whilst remaining sections are still supplied. Secondly, they reliably and quickly disconnect larger overcurrents over one second so that the generator is not damaged.

Moeller NZM circuit-breakers can also be equipped with motor operators so that they can be actuated remotely. These ensure circuit-breaker make times of less than 60 ms so that they are ideally suited to synchronizing generators with the mains supply. Manual on switching with an equally fast make time of below 60 ms is also possible in the event of

failures in the auxiliary supply. Protective seals and locking facilities are also available for protecting settings and operating buttons from unauthorised access, in which a distinction can be made simply between local and remote operation.

Thanks to accessories such as shunt releases, emergency shutdowns can be completed in 20 ms. Undervoltage releases monitor the voltage and carry out an immediate disconnection of the circuit-breaker if the voltage present clearly goes below the required level.

Moeller circuit-breakers offer an outstandingly long service life. Circuit-breaker, remote

operator and accessories can withstand up to 20 000 switch operations without any damage. With up to 50 switch operations per month, this corresponds to a lifespan of over thirty years.

NZM in six operating modes

PSL Prozessortechnik GmbH is a company based in Nettetal-Kaldenkirchen and includes the production of switchboards and electronic devices to its operations, tailor made for power generation with combustion motors. This ranges from standard standby generator sets up to fully automated power supply systems. For example, PSL Prozessortechnik planned, constructed and installed an emergency power supply system with three 630 KVA / 910 A units for the IT centre of a bank in Düsseldorf. NZM circuit-breakers were used in the project.

Georg Lüdecke, managing director of PSL Prozessortechnik GmbH explains: "You can even rely on NZM circuit-breakers when, in the event of a short-circuit, generators have difficulty only producing twice to six times the continuous current. They reliably disconnect even the smallest short-circuit currents within a few milliseconds, and can also be set for special requirements so that small short-circuit currents are ignored for up to a second."

Another reason for Georg Lüdecke choosing the NZM is its extensive range of functions: NZMs basically allow six operating modes that can be used as required by the customer. The use of all six operating modes is well illustrated in the IT centre application.

Emergency power operation: Three units are available on standby in the power supply of the IT centre. In the event of a mains failure all three units start up. This means that all three generator circuit-breakers are connected to the generator busbar and the generators excited virtually simultaneously using a special startup synchronization. As soon as all three units are connected to the busbar and supply the generator voltage, the mains coupling switch is disconnected and the generator coupling switch connected. All units can supply the consumers within 15 seconds, with every unit taking the same share of the load. The units themselves are regulated at a rated frequency of 50 Hz.

Return synchronization: After the mains supply is restored and the supply recovery time has expired, the units are synchronized back to the mains supply, powered down to the minimum output and the generator switches disconnected. The units continue running for around three more minutes to cool down and are then stopped and returned to standby mode.

Peak load operation: When the "Peak load" keyswitch is actuated, the preselected base load unit is started, connected to the generator busbar and the coupling switch synchronized. The unit then runs in parallel operation and is regulated to the reference value set. When the load test operation is deselected, the unit is run to the minimum output, the generator and coupling switches are disconnected and the unit is stopped after the cooling time has elapsed.

Mains supply failure during mains parallel operation: When a mains fault is detected during parallel operation, the mains and coupling switch is disconnected within 100 milliseconds. The base load unit is discharged, the two other units are started and connected in a rapid synchronization procedure. Once all units are in operation, the generator coupling switch closes. The units then continue running in emergency power mode with effective load balancing and set frequency regulation to supply the consumers. After the mains supply is restored and the supply recovery time has expired, the same return synchronization steps are executed as previously described.

Manual operation: In manual operation, the operator is responsible for the entire system.

Manual synchronization: In this operating mode, the speed (frequency) is set to the comparison frequency with the speed adjuster. If the synchroscope shows that the generators are in phase, the circuit-breaker is switched on via the "Manual synchronization switch On" button. It is then only necessary to adjust the effective power component with the speed adjuster.



CONCLUSION

Georg Lüdecke, managing director of PSL Prozessortechnik GmbH explains: "The design of emergency power systems requires a special level of care that must be applied to all the components used. Moeller's NZM circuit-breakers are verifiably stable and reliable. They are easy to operate and offer a good price/performance ratio."



MS1215