

DC-EXX Advanced MG Set Control



DC-EXX MG Set Control

The DC-EXX is TMEIC's new motor generator control for mining excavators. This control is a high-performance, innovative hardware-software system built on proven technology and over 50 years of experience. The system is designed for multiple DC generators and motors used in large machines. Common-bus DC rectifiers feed individual IGBT (Insulated Gate Bipolar Transistors) field exciter-regulators, while a single high-speed PLC provides precise control and enables high excavator productivity.



Overall MG Set System

Main Components

- Medium voltage AC power from the mine trail cable feeds MG set sync motors and auxiliary transformer
- Each sync motor MG set powers multiple DC generators on a common shaft
- Diode AC-DC converters on auxiliary power create two 600 volt common DC busses for generator and motor fields
- Exciters use IGBT switches in a DC chopper configuration to feed filtered, controlled current to DC fields
- A high-speed drive controller sends operator commands to the microprocessor-controlled exciters to create DC generator voltage
- Motor torque and speed are controlled for optimum digging and machine protection
- Dragline AC incoming Power Factor is maintained by sync motor exciters fed from the DC motor common bus
- Machine supervisory PLC controls and protects excavator and communicates through operator and maintenance displays
- Profibus link to drives used for commands and monitoring
- Static switches in the generator and motor fields provide field protection and controlled emergency stopping

Ruggedized DC-EXX Modules

DC Converter

- DC Converter
- 440 V ac 3-phase input
- 600 V dc output
- 340 Amp output capacity
- "Soft-on" circuit for bus charging
- Built-in absorption shopper

Exciter



- 300 or 600 V dc in, 150, 300 and 600 Amp output, output voltage to match field requirement
- Microprocessor controlled IGBT switches regulate armature voltage and current
- Film type internal capacitors for wide temperature tolerance
- Receives operating commands through Profibus input from drive controller





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DC-EXX Features	Benefits
Common Bus – allows field power sharing	 Smaller feed transformers and lower cost
Complete control during LE [Excitation] stop	• Faster motion stop while protecting motors and generators
Low harmonics of diode versus thyristor converters	 Less heating and possible interference, smaller auxiliary transformer
IGBT power switches versus Thyristors	Faster response, no cell state sensors, fewer devices
Drive controller communicates, sets limits, and operating modes	 Simplified supervisory PLC system and real-time monitoring
Smooth integration with supervisory controls	 Improved operating, maintenance, and troubleshooting
• Replace field circuit DC contactors with Thyristor crowbar	 Less maintenance, yet same field circuit protection and braking
Common electronics card set between all drives	Fewer, common spares
• PLC master has motion protection and drive settings	• Visible functionality for easier monitoring and maintenance
Current but proven technology	Long product life
Fewer excitation transformers with lower total kVA	• Less space, simpler, lower cost MCC and AC feeds
Simpler drive internal controls	Easier troubleshooting and setup
Smaller footprint of base drive on amp/amp basis	Better and smaller panel layout and maintenance
Lower total system cost	Better value