MULTILIN™ MM200

Low Voltage Motor Protection and Control

The Multilin MM200 is a digital motor protection and control system, designed for low voltage motor applications that integrates protection, control and multiple communication protocols in a rugged compact device. Easily integrated into new and existing control system architectures, the Multilin MM200 provides comprehensive low voltage motor protection and communications for all types of motor protection applications.

Key Benefits

- Flexible protection, control, and communication options to suit low voltage motor applications
- Small footprint designed specifically for IEC and NEMA MCC applications
- Integrated pushbuttons and LED indicators reduce external components and wiring
- Flexible DIN rail mounting
- Multiple communication protocols allows simple integration into monitoring and control systems
- Optional control panel provides local control
- Universal device for all motor power ratings
- No CTs required for less than 5A motor ratings
- Thermistor input to monitor the ambient or motor temperature
- Support for Hand Held Display (HHD) that provides a graphical color local interface allowing local operators to view and change setting files and quickly access relay diagnostic information

Applications

- Low Voltage Three-Phase Motors
- MCC and standalone Panel Mount Applications
- IEC and NEMA Motor Control Center (MCCs)
- Process control applications
- System architecture requiring multiple simultaneous communications
- FVNR, FVR, two speed

Protection and Control

- Motor Thermal Model
- Undercurrent & Current Unbalance
- Acceleration Time
- Sensitive Ground Fault
- Built-in Starter Logic
- FVNR, FVR, Two-Speed
- Auto / Manual Control
- Configurable Inputs
- Power Fail Restart

Metering & Monitoring

- Current, Motor Loads, Thermal Capacity
- Motor Running Time, Cause of Trip, Total Number of Trips
- 1A / 5A combined CT inputs

Communications

- Networking through RS485
- Multiple protocols - Modbus RTU ODVA Compliant DeviceNet Internally powered Profibus
- Simultaneous Communications

EnerVista™ Software

- Simplify setup and configuration
- Strong document archive and management system
- Simplify full featured monitoring and data recording
- Strong maintenance and troubleshooting tool
- Seamless integration toolkit

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Protection and Control

The MM200 is a digital motor protection and control system, designed for Low Voltage motor applications. Compact and powerful, the MM200's protection can be scaled to the specific requirements of your system.

Motor Thermal Model

To provide optimal protection and maximize run time, the MM200 employs an advanced thermal model, consisting of four key elements:

- Overload Curves
- Hot/Cold Safe Stall Ratio
- Motor Cooling Time Constants
- Thermal protection reset

Overload Curves

The MM200 thermal model can be programmed with one of 15 standard overload curves.

When properly selected to match the motor manufactures thermal damage curves, the MM200 overload curve and Overload Pickup Level will determine the thermal capacity accumulated within the motor.

Hot / Cold Safe Stall Ratio

This ratio defines the steady state level of thermal capacity used (TCU) by the motor. This level corresponds to normal operating temperature of a fully loaded motor and will be adjusted proportionally if the motor load is lower then rated.
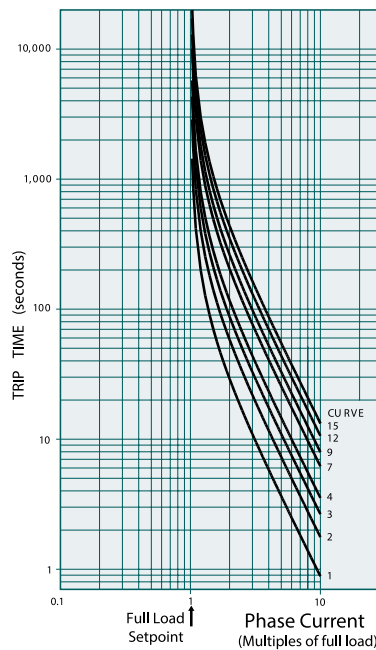
15 Standard Curves available in the MM200

Motor Cool Time Constants

When the MM200 detects that the motor is running at a load lower then the overload pickup setpoint or the motor is stopped, it will start reducing the TCU value exponentially, based on the programmed cool time constants. As cooling occurs at different rates for stopped and running motors, two separate constants are used.

Mechanical Jam and Acceleration Time

These two elements are used to prevent motor damage during abnormal operating conditions such as driven load jams and excessively long acceleration times

Ground Fault

This function is designed to protect motors against phase to ground faults. The MM200 comes with one ground CT input intended for Core balance (Zero sequence) protection.

Current Unbalance

In addition to the Thermal model, current unbalance is available in the MM200 relay as an independent element with a built-in single phasing detection algorithm.

Undercurrent Protection

Undercurrent protection is standard in the MM200. providing additional protection while the motor is in the running state and any of the phase currents drop below the defined pick-up level for the durartion specified.

Functional Block Diagram

ANSI® Device Numbers & Functions

DEVICE NUMBER	FUNCTION
37	Undercurrent
46	Current Unbalance
49	Thermal Overload
50G	Ground Instantaneous Overcurrent
51R	Locked/Stalled Rotot, Mechanical Jam
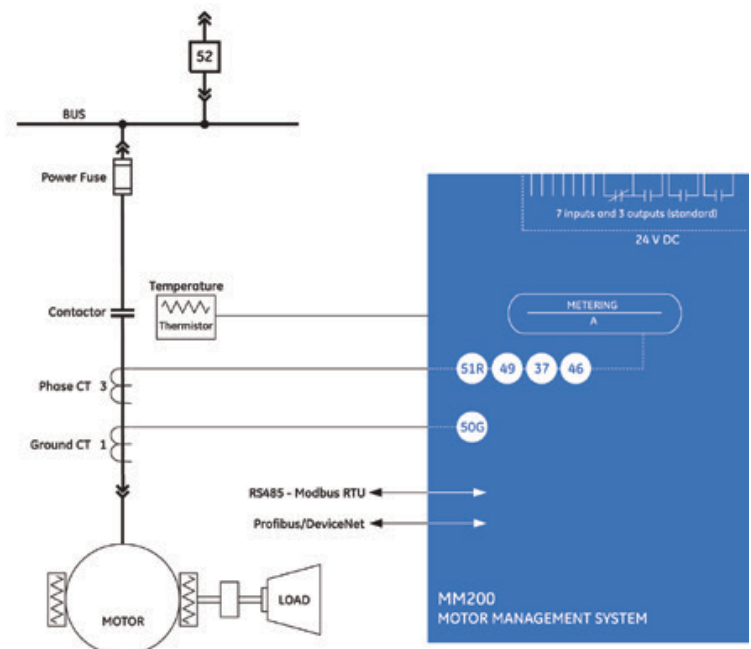
Power Fail Restart

The MM200 supports a Power Fail Restart element (PFR), which provides an undervoltage motor restart after a momentary power loss (dip). The undervoltage condition is detected by a digital input associated with an externally mounted voltage relay.

The PFR in combination with a voltage relay provides an undervoltage motor restart solution in applications such as; oil and gas, where process uptime is critical to the overall operation of the facility.

Thermistor

A single input from a motor winding thermistor is provided with the MM200. The MM200 can accept both positive temperature coefficient (PTC) and negative temperature coefficient (NTC) sensors. A thermistor level can be selected for both alarm and trip.

Monitoring and Metering

The MM200 includes high accuracy metering of current signals. Current parameters are available as total RMS magnitude.

Digital Counters

The MM200 provides ten digital counters to aid in system analysis. The digital counters can be used for scheduling inspections on equipment, performing qualitative analysis of system problems and spotting trends.

Learned Data

Monitoring the motor's operating characteristics assists in determining the motor start parameters and is a critical tool for determining the operating characteristics of the system, motor and connected load.

Advanced Device Health Diagnostics

The MM200 performs comprehensive device health diagnostic tests during startup and continuously at runtime to test its own major functions and critical hardware. These diagnostic tests monitor for conditions that could impact the MM200's performance, evaluate the criticality of this impact and present device status via SCADA communications. Providing continuous monitoring and early detection of possible issues helps improve system availability by employing predictive maintenance

Communications

The MM200 utilizes the most advanced communications technologies available today making it an easier and more flexible motor protection relay to use and integrate into new and existing infrastructures. Multiple communication ports and protocols allow control and easy access to information from the MM200. All communication ports are capable of communication simultaneously.

The MM200 supports the most popular industry standard protocols enabling easy, direct integration into HMI and electrical SCADA systems. Modbus RTU is provided standard with a RS485 networking port. The following optional protocols and communication ports are available:

- Fieldbus Protocol with dedicated port
  - ODVA compliant DeviceNet
  - Internally powered Profibus

Profibus DP

Providing a high degree of communication flexibility, the MM200 supports both Profibus DP-V0 and DP-V1. Profibus DP-V0 provides highspeed cyclic data exchange between distributed field devices and the Profibus master. In addition to the high-speed cyclic data communication with DP-V0, DP-V1 provides communication of acyclic data information between the slaves and the engineering workstation, which allows for independent diagnosing and fine-tuning of each slave on the network.

Rapid Device Replacement

The MM200 supports Rapid Device Replacement, which is compatible with DeviceNet scanners that use Automatic Device Replacement (ADR) functionality. When Rapid Device Replacement is used in DeviceNet networks, this allows rapid change of MM200 devices with minimum process interruption.

When using Rapid Device Replacement, the MM200 can be replaced without the need to manually configure settings. The DeviceNet scanner will automatically recognize a new device and download the key protection, control and communication settings from the original MM200, reducing process downtime and manual setting file configuration.

EnerVista™ Software

The EnerVista™ Suite is an industry-leading set of software programs that simplifies every aspect of using the MM200 relay. The EnerVista™ suite provides all the tools to monitor the status of the protected asset, maintain the relay, and integrate information measured by the MM200 into DCS or SCADA monitoring systems.

EnerVista™ Launchpad

EnerVista™ Launchpad is a powerful software package that provides users with all of the setup and support tools needed for configuring and maintaining Multilin products. The setup software within Launchpad allows configuring devices in real-time by communicating using serial, Ethernet, or modem connections, or offline by creating setting files to be sent to devices at a later time.

Included in Launchpad is a document archiving and management system that ensures critical documentation is up-to-date and available when needed. Documents made available include:

- Manuals
- Application Notes
- Guideform Specifications
- Brochures
- Wiring Diagrams
- FAQs
- Service Bulletins
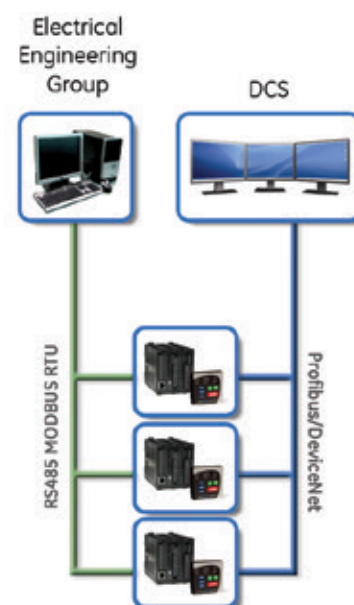
MM200 Dual Architecture Communication

Viewpoint Monitoring

Viewpoint Monitoring is a simple-to-use and full-featured monitoring and data recording software package for small systems. Viewpoint Monitoring provides a complete HMI package with the following functionality:

- Plug & Play Device Monitoring
- System Single-Line Monitoring & Control
- Annunciator Alarm Screens
- Trending Reports
- Automatic Event Retrieval
- Automatic Waveform Retrieval

Viewpoint Maintenance

Viewpoint Maintenance provides tools that will create reports on the operating status of the relay, simplify the steps to download fault and event data, and reduce the work required for cyber-security compliance audits.

EnerVista™ Integrator

EnerVista™ Integrator is a toolkit that allows seamless integration of Multilin devices into new or existing automation systems. Included in EnerVista™ Integrator is:

- OPC/DDE Server
- Multilin Drivers
- Automatic Event Retrieval
- Automatic Waveform Retrieval

EnerVista MM200 Set-up
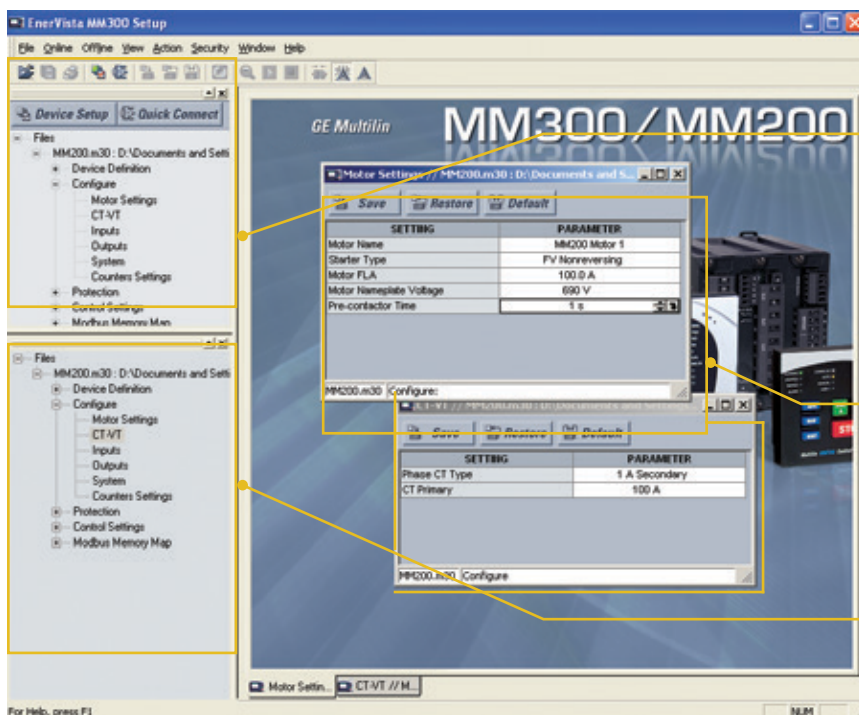
Online Device Window:
- *Online communication to device*
- *Relay designation*
- *Online configuration of all relay setpoints*
- *Communication to multiple devices*
- *Copy online settings to files offline*

Active Settings Window:
- *Simple drop down menu options for setting parameters*
- *Detailed view parameter set points*

Offline File Window:
- *Create setting file templates*
- *Copy and paste settings from one relay to another*
- *Copy offline settings to online devices*

EnerVista setup software simplifies every aspect of using the MM200 relay. The EnerVista suite provides all the tools required to configure monitor & maintain the relay. Advanced communications support ensures easy integration into new or existing DCS scada systems.

User Interface

Front Panel Controls
- Integrated Device Controls

12 LED Indicators:
- Motor Status
- Alarm Indication & trip
- Communication Status
- Additional user LEDs
- Auto/Manual
- % Motor Load

Power Supply and Digital Inputs:
- 24 VDC Power Supply
- 7 × 24 VDC Inputs (wet)
- 60-300VAC Power Supply
- 6x AC Inputs

Optional Fieldbus Protocols
(ProfiBus or DeviceNet)
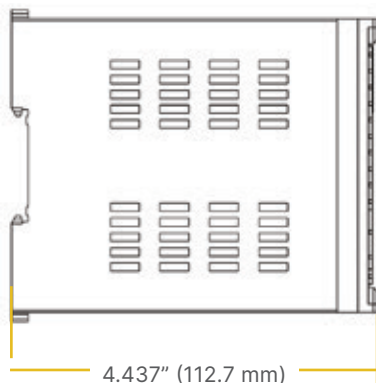
3 Phase CT Inputs

RS485 Communications and Thermistor Input

Optional Control Panel Interface

- Sensitive Ground Fault
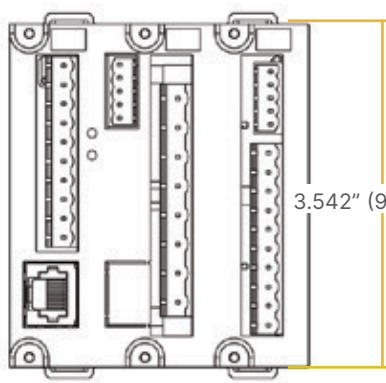- 2 Form A Outputs (5 Amps)
- 1 Form C Outputs (5 Amps)

Dimensions
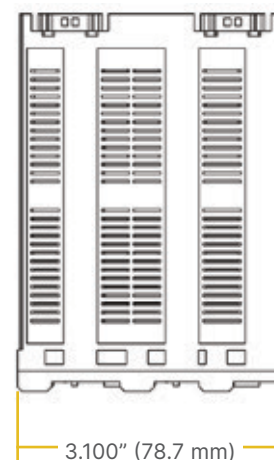
Side View

4.437" (112.7 mm)

Front View

3.542" (90 mm)

Top View

3.100" (78.7 mm)
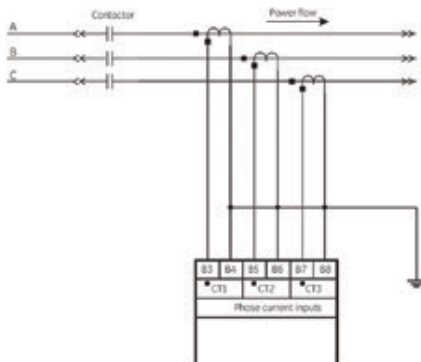
HandHeld Display (HHD

The Hand Held Display (HHD) provides a rugged local interface for MM200 Motor Protection Systems where a local display is not used in the MCC.

The HHD provides a graphical color local interface to the MM200 Motor Protection Systems allowing local operators to view and change setting files and quickly access relay diagnostic information.

The HHD provides a clear and detailed view of all motor settings, diagnostic information and metering data available in the MM200 allowing local operators to make informed decisions on the motors operation.
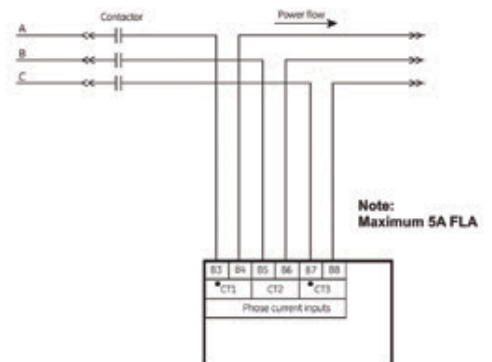
Wiring Diagrams
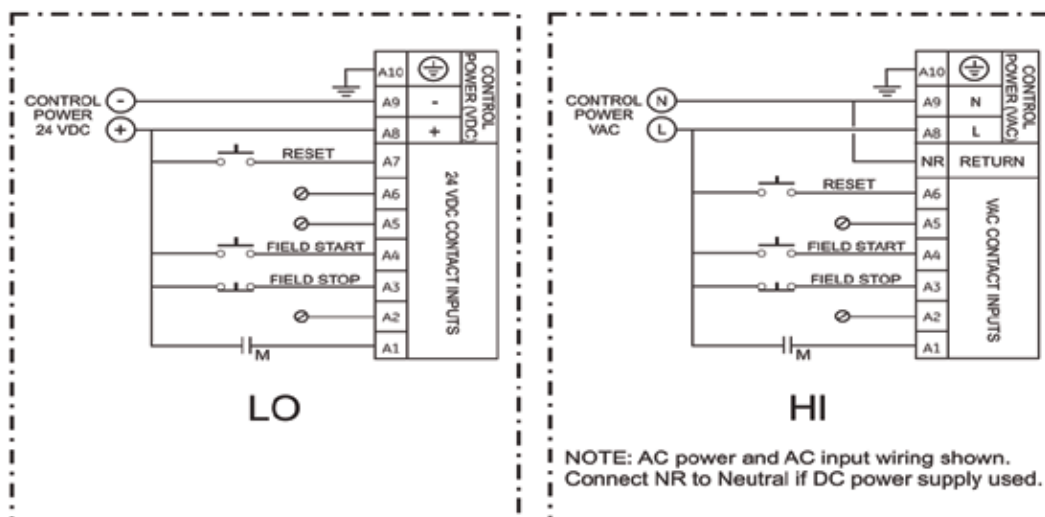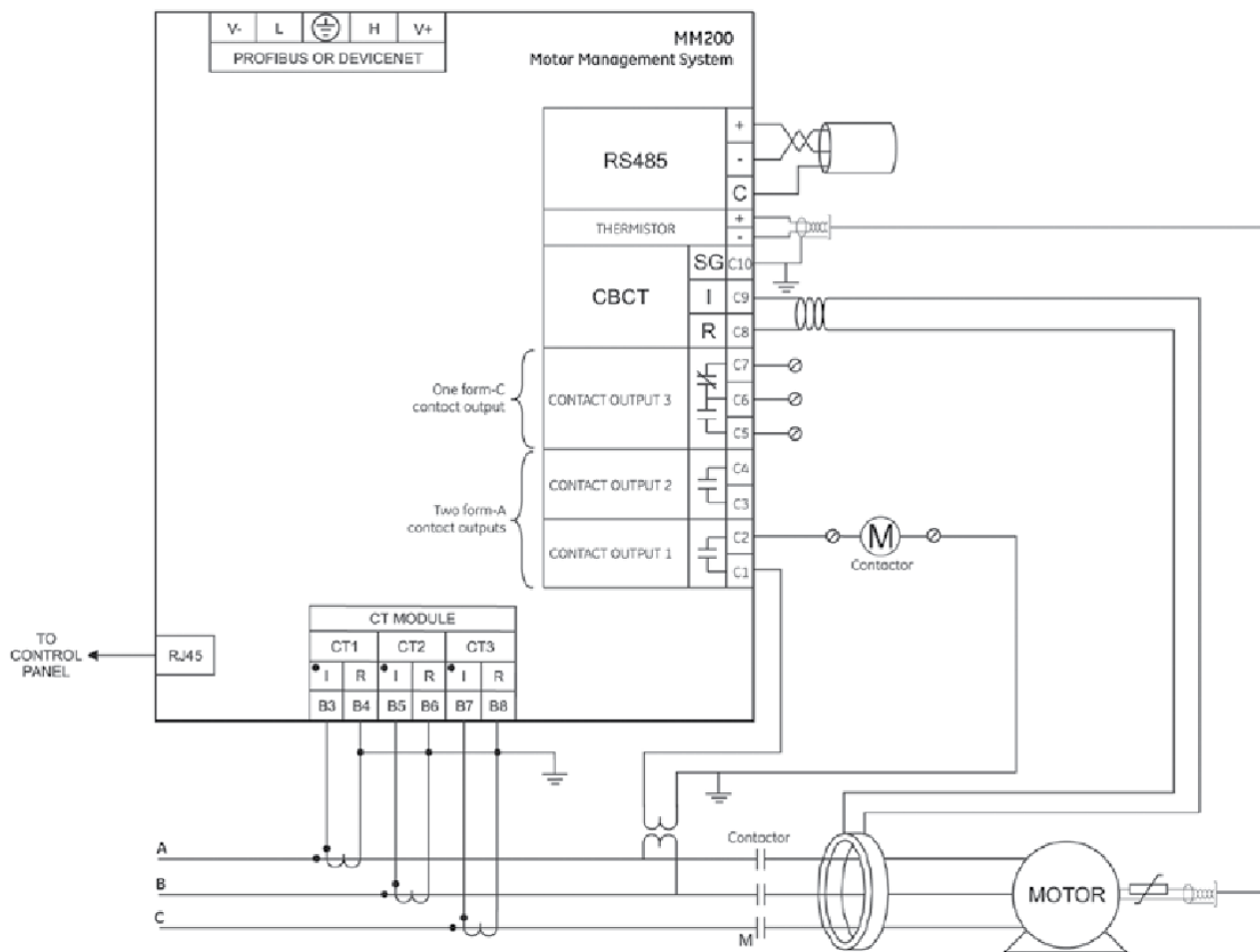

Three Phase CT Connection

Two Phase CT Connection

Direct Connection

Note:
Maximum 5A FLA

Wiring Diagrams (Cont)

NOTE: AC power and AC input wiring shown.
Connect NR to Neutral if DC power supply used.
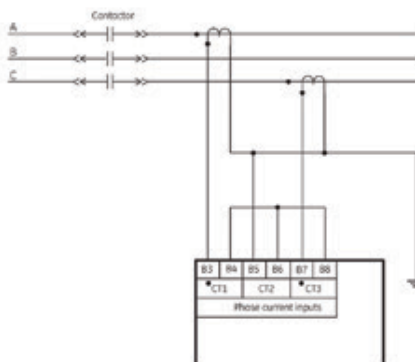
Technical Specifications

INPUTS

PHASE CURRENT INPUTS

CT Primary:	0.5A to 1000A
CT Secondary:	1A or 5A (Both supported as standard)
Burden:	0.2VA
Conversion Range:	0.2 to 40 A (8x CT)
Nominal Frequency:	50/60 Hz
Frequency Range:	40-70 Hz
Accuracy: (Ext CT)	2% of injected or 1% of 8xCTP
Accuracy: (Direct)	2% of injected or 0.1A
CT Withstand:	0.2 seconds at 100 x rated current 1.0 second at 50 x rated current 2.0 seconds at 40 x rated current continuous at 3 x rated current (40DegC)

SENSITIVE GROUND CURRENT INPUT

CT Primary:	0.5A to 15A
Conversion Range:	0.5A to 15A, 2000:1 CBCT
Accuracy:	0.1A (0.5A to 3.99A) 0.2A (4.0A to 15A)

DIGITAL INPUTS X7

Fixed Threshhold:	24VDC
Recognition Time:	2 cycle recognition
Continuous Current Draw:	4mA
Type:	Opto-isolated inputs
External Switch:	Wet Contact
Max. Inputs Voltage:	30VDC

DIGITAL INPUTS (HI)

Nominal voltage	120 V AC to 240 V AC
Recognition time	2 cycles
Continuous current draw	4 mA @120 V AC; 8 mA @ 240 V AC
Type	opto-isolated inputs
External switch	wet contact
Voltage range	65 V AC to 300 V AC

OUTPUTS

Configuration:	Electromechanical 2 x Form-A and 1 x Form-C
Contact Material:	Silver aloy
Operate Time:	10ms
Minimum Contact Load:	10mA at 5Vdc
Maximum Switching Rate:	300 ops / min (no load), 30 ops per min (load)
Mechanical Life:	10,000,000 ops
Continuous Current	5 A at 60°C
Make and Carry for 0.2s:	30A per ANSI C37.90

OUTPUTS

OUTPUT RELAY BREAK CAPACITY (FORM_A)

AC resistive, 120Vac:	5A
AC resistive, 240Vac:	5A
AC inductive, PF = 0.4 pilot duty:	240VA
DC resistive, 30Vdc	5A

OUTPUT RELAY BREAK CAPACITY (FORM_C)

AC resistive, 120Vac:	5A (NO) 5A (NC)
AC resistive, 240Vac:	5A (NO) 8A (NC)
AC inductive, PF = 0.4 pilot duty:	2 40VA
DC resistive, 30Vdc	5A

POWER SUPPLY SPECIFICATIONS

POWER SUPPLY (LO RANGE)

Nominal	24 V DC
Range	18 to 36 V DC
Power Consumption	10 W typical

POWER SUPPLY (HI RANGE)

Nominal Range	120 to 240 V AC; 125 to 250 V DC 60 to 300 V AC (50 and 60 Hz); 84 to 250 V DC
Power Consumption	10 W typical
Voltage withstand	2 × highest nominal voltage for 10 ms

PROTECTION

THERMAL MODEL

Standard Curve Time Multiplier:	1 to 15 in steps of 1
Thermal Overload Pickup:	1.01 to 1.25 in steps of 0.01 x FLA
Motor Full Load Current (FLA):	0.5A to 1000A step 0.1A
Motor Rated Voltage:	100Vac - 690Vac
Curve Biasing:	Hot/Cold Curve Ratio Stopped / Running Cool Rate
Stopped/ Running Time Cool Constants Decay:	Exponential
Hot/Cold Safe Stall Ratio:	1% to 100% steps 1%
Timing Accuracy:	±500 ms
Elements:	Trip and Alarm

PROTECTION

CURRENT UNBALANCE

Unbalance:	(Imax - Iav) / Iav, if Iav >= Ifla (Imax - Iav) / Iflc, if Iav < Ifla
Range/Pickup Level:	4% to 40% steps of 1%
Time Delay:	1 to 60s in steps of 1
Pickup Accuracy:	±2%
Timing Accuracy:	±500ms
Elements:	Trip and Alarm

UNDERCURRENT

Pickup Level:	1 to 100% of FLC
Time Delay:	1 to 60 s in steps of 1
Timing Accuracy:	±500 ms
Elements:	Trip and Alarm

MECHANICAL JAM

Pickup Level:	1.01 to 4.50 of FLA in steps of 0.01
Time Delay:	0.1 to 30.0s in steps of 0.1
Timing Accuracy:	±500 ms
Elements:	Trip

GROUND FAULT

Pickup Level:	0.5 to 15.0A in steps 0.1 (CBCT)
Time Delay:	0 to 10s in steps 0.1s (start) 0 to 5s in steps 0.1s (run) Alarm time delay on start/run: 0 to 60s in steps of 1s
Timing Accuracy:	+100ms or ±0.5% of total time
Elements:	Trip and Alarm

ACCELERATION TIMER

Pickup:	Iav > Icuttoff
Dropout:	Iav < Ipu or Timer expired
Time Delay (force to running if expired):	0.5 to 250.0 s in steps of 0.1 0 to 5s in steps 0.1s (run)
Timing Accuracy:	±500ms or ±1.5% of total time
Elements:	Trip and Alarm

CERTIFICATION

ISO:	Manufactured under an ISO9001 registered system
CE	conforms to EN60255-5, EN60255-27, EN60255-26, EN50263
cULus	UL508 / UL1053 / C22.2.No 14

Please refer to MM200 Motor Manager Instruction Manual for complete technical specifications.

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Technical Specifications

TYPE TESTS	
Dielectric voltage withstand:	EN60255-5
Impulse voltage withstand:	EN60255-5
Damped Oscillatory:	IEC 61000-4-18/ IEC 60255-22-1
Electrostatic Discharge:	EN61000-4-2 / IEC 60255-22-2
RF immunity:	EN61000-4-3 / IEC 60255-22-3
Fast Transient Disturbance:	EN61000-4-4 / IEC 60255-22-4
Surge Immunity:	EN61000-4-5 / IEC 60255-22-5
Conducted RF Immunity:	EN61000-4-6 / IEC 60255-22-6
Power Frequency Immunity:	EN61000-4-7 / IEC 60255-22-7
Voltage interruption and Ripple DC:	IEC 60255-11
Radiated & Conducted Emissions:	CISPR11 / CISPR22 / IEC 60255-25
Sinusoidal Vibration:	IEC 60255-21-1
Shock & Bump:	IEC 60255-21-2
Siesmic:	IEC 60255-21-3
Power magnetic Immunity:	IEC 61000-4-8
Pulse Magnetic Immunity:	IEC 61000-4-9
Damped Magnetic Immunity:	IEC 61000-4-10
Voltage Dip & interruption:	IEC 61000-4-11
Damped Oscillatory:	IEC 61000-4-12
Voltage Ripple:	IEC 61000-4-17
Ingress Protection:	IEC 60529
Environmental (Cold):	IEC 60068-2-1
Environmental (Dry heat):	IEC 60068-2-2
Relative Humidity Cyclic:	IEC 60068-2-30
Safety:	UL508 / UL C22.2-14 / UL1053

ENVIRONMENTAL	
Temperature Range *:	
Ambient Operating:	-20°C to +60°C
Ambient Storage:	-40°C to +90°C
Humidity:	Up to 90% non-condensing @ 55C
Pollution degree:	II
IP Rating	Base Unit IP20, Control panel IP54

Temperature range based on 1" around base unit

COMMUNICATIONS	
SERIAL RS485	
Baud Rates:	Up to 115kbps
Parity:	None
Protocol:	Modbus® RTU/half duplex
Typical Distance:	1200m
Isolation:	2kV
DEVICENET (COPPER)	
Modes:	Slave at 125, 250, 500 kbaud
Connector:	5 pin terminal
PROFIBUS (COPPER)	
Modes:	DP V0 Slave, up to 1.5MB
Connector:	5 pin terminal

DeviceNet CONFORMANCE TESTED™

Please refer to MM200 Motor Manager Instruction Manual for complete technical specifications.

Ordering

MM200	*	X	*	*	*	Description
Control Panel	X					None
	B					Basic Control Panel, no USB
Power Supply			L			24 VDC
			H			60 - 300 VAC
Communication				1		RS485 Modbus RTU + DeviceNet Slave
				2		RS485 Modbus RTU + Profibus DP Slave
Protection					S	Standard Protection & Control

For more information, visit
gevernova.com/grid-solutions