GE Power Management

MMII Intelligent MCC Controller

A concept that will offer reduced overall installed cost and production efficiency through information availability to operators and maintenance.

Presentation Overview

- Applications
- Protection and Control
- Inputs
- Metering and Monitoring
- User Interface
- Communications
- Typical Wiring
- Ordering

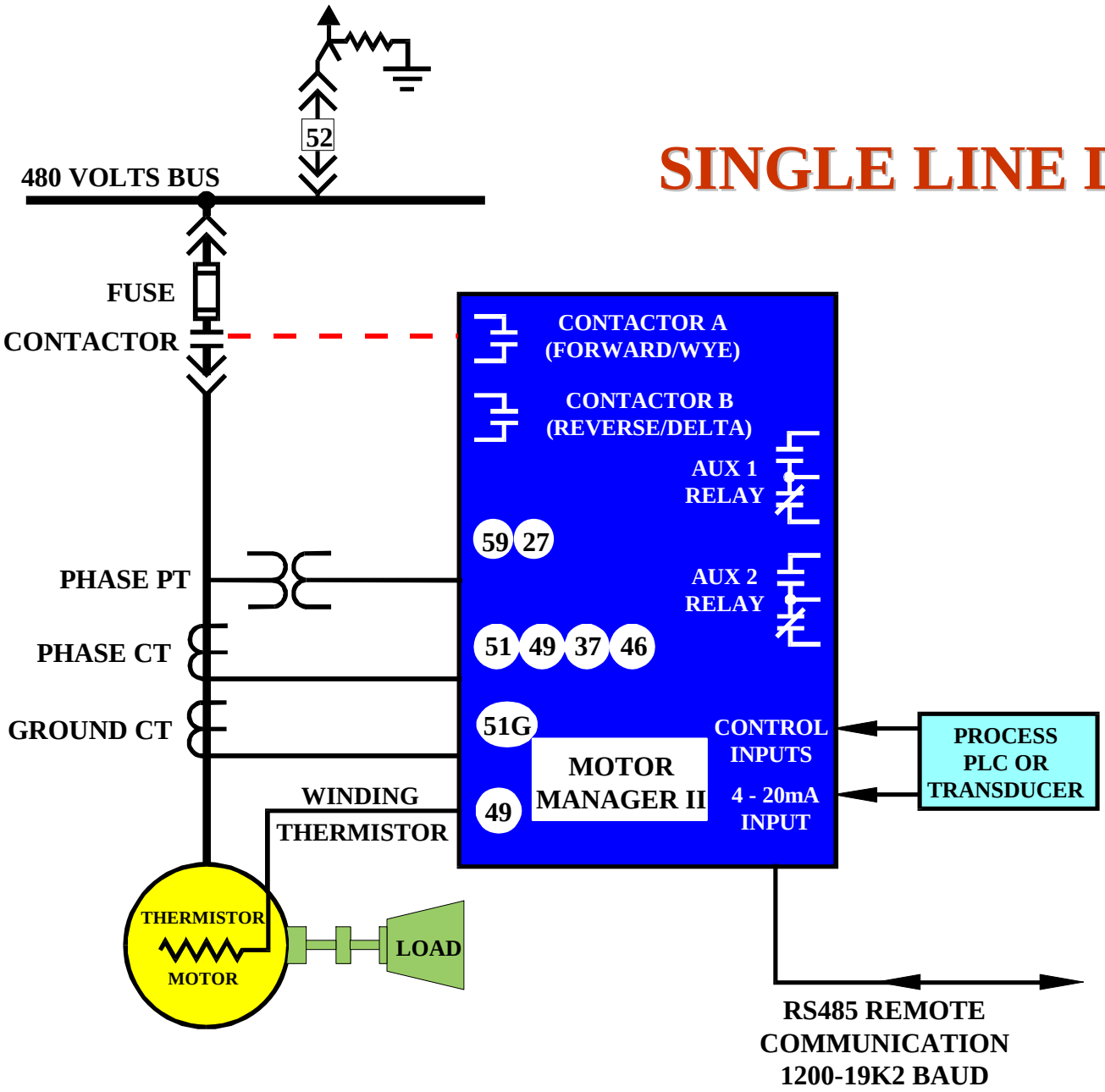
Applications

In one package the Motor Manager II (MMII) combines control functions and comprehensive motor protection, providing sophisticated control and protective relaying.

- **Low voltage motor control centers**
- **Integrated process and electrical control**

MAIN

SINGLE LINE DIAGRAM



Legend

MAIN

DEVICE	PROTECTION	
49/51	overload	STANDARD PROTECTION
46	phase unbalance (single phase)	
——	welded/open contactor	
50G/51G	ground fault	OPTION 2 ENHANCEMENT
48	locked rotor/stalled rotor	
49	hot winding (thermistor)	
37	undercurrent/under power	
27	undervoltage	
59	overvoltage	

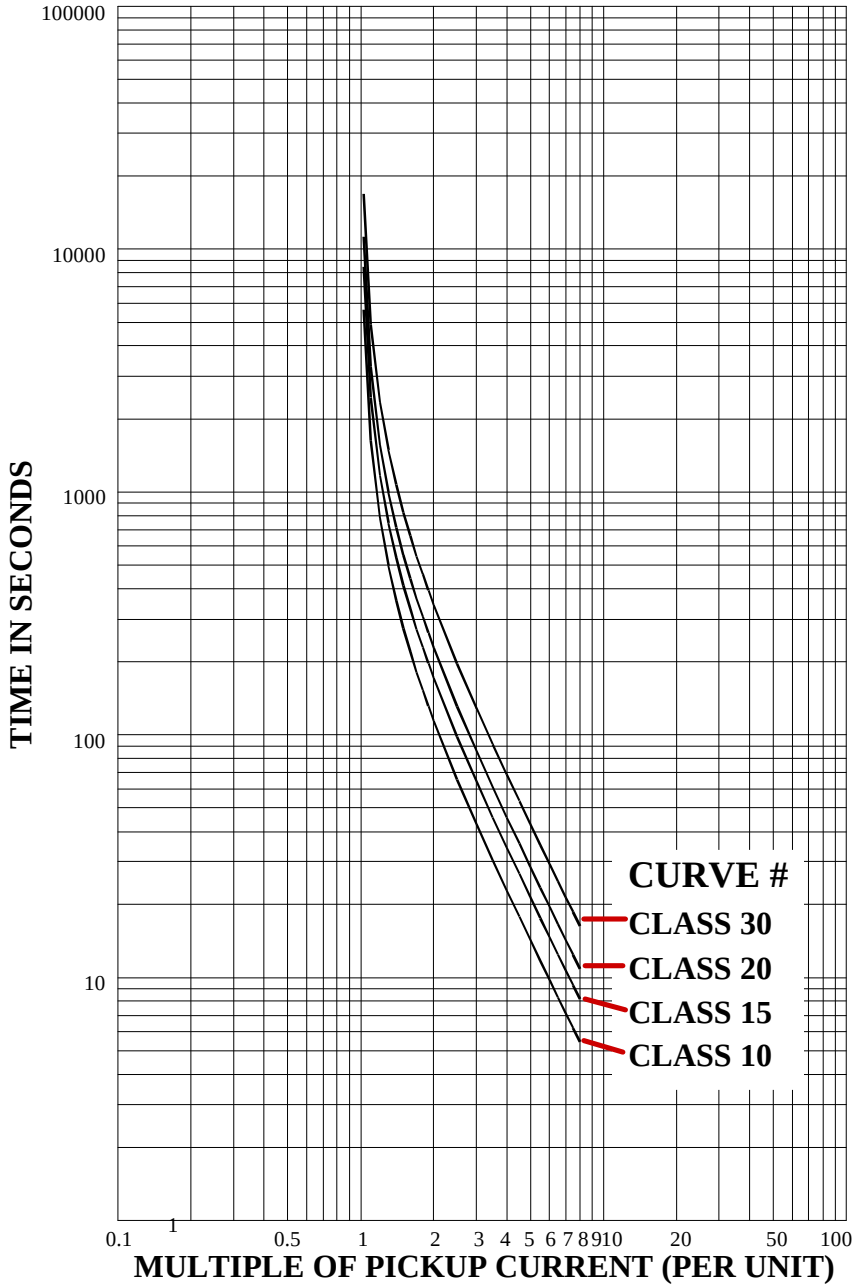
MAIN

Protection

- Overload
- Phase unbalance
- Contactor failure
- Locked/stalled rotor
- Ground fault
- Hot winding thermistor
- Undercurrent/underpower

MAIN

4 NEMA compatible time/current overload curves



MAIN

Control

- Undervoltage auto restart
- Outputs (assignable to any one of 31 functions)
  - 2 contactor (A and B)
  - 2 programmable
- Inputs: 6 fixed, 10 programmable
- 1 analog input

MAIN

Inputs

- **Switched Inputs**
  - up to 6 fixed control inputs used for start A and B, stop, local isolator, and contactor A and B status.
- **Switched Inputs**
  - scaleable to user defined values
  - high and low alarm and trip setpoints recorded with time delays

MAIN

Metering

The MMII meters and displays:

- RMS current of each phase
- ground fault leakage current
- motor load as a % of full load current
- thermal capacity used (%) according to I^2t history and chosen overload curve; hot/cold ratio is used to model heating when running below full motor current
- % unbalance
- power (kW)
- energy (kWh)
- voltage
- analog input

MAIN

Monitoring

- **Trip Record**
  - when a trip command is issued, a trip record is generated, including the cause of trip and pre-trip actual values
- **Statistics and Maintenance**
  - user enabled to set the interval at which a number of routine maintenance tasks should be performed. When these times are exceeded an alarm is generated, including:
  - motor greasing interval
  - contactor inspection
  - maximum motor stopped time

MAIN

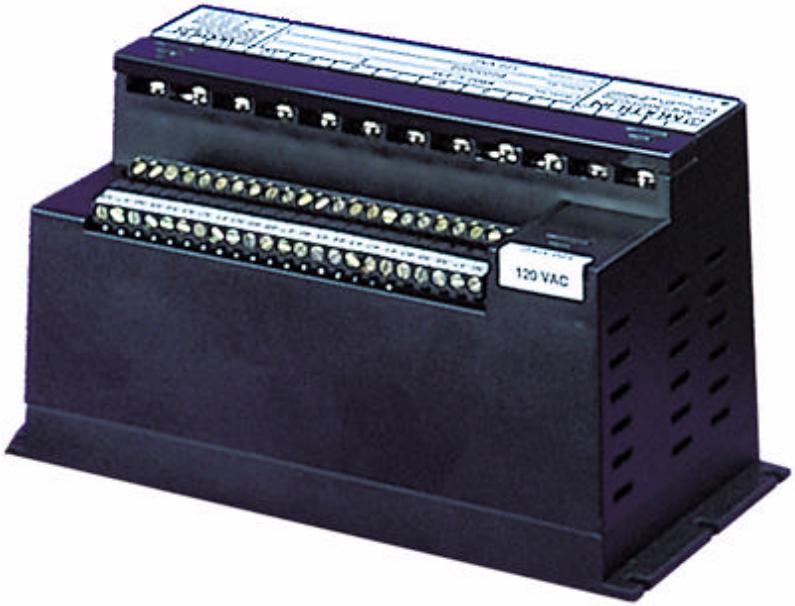
User Interface

- RS485 ModBus®, 1200 - 19,200 bps
- Display model for local interface
- Up to 11 status LEDs
- MMII PC Software

User Interface

The Chassis Mount Model

- mounted inside the motor control center (MCC)
- comes with all standard features
- setpoints are loaded through the RS485 communications port from a personal computer running the MMII program.



MAIN

MMIIPC Software

- **Windows based software**
  - Windows 95 or Windows NT
  - **Features:**
    - program or modify setpoints
    - load or save setpoints from or to a disk
    - read actual values from the MMII
    - monitor status
    - read pre-trip data and trip record
    - display dynamic trending of actual values
    - get help on any topic
    - print the instruction manual from disk

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DISPLAY:
2 line, 40 character illuminated display communicates all messages in simple English for easy interpretation by users unfamiliar with unit

RELAY INDICATORS:
RELAY A: Contactor A energized
RELAY B: Contactor B energized
AUX 1: User programmable relay 1 energized
AUX 2: User programmable relay 2 energized

PROGRAM KEYS:
ACTUAL VALUES: Press to enter actual values mode to display actual motor values such as current, ground leakage, thermal capacity.
SETPOINTS: Press to enter setpoint mode to alter or examine setpoints.
STORE: Save a newly entered setpoint.
RESET: Reset the MMII after a trip.
MESSAGE: Move to the desired setpoint or actual value message.
VALUE: Increment or decrement currently displayed setpoint value.

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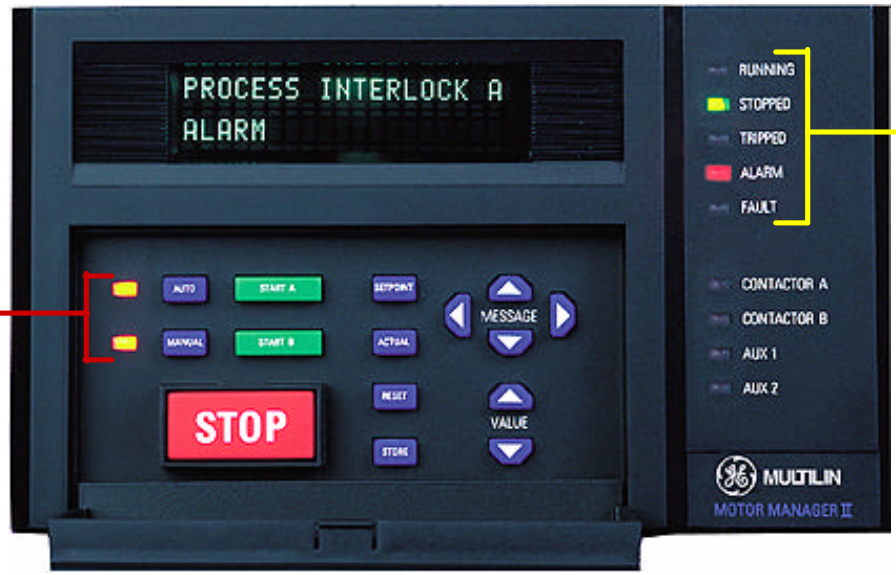
CONTROL KEYS:
AUTO: Selects operation of start via communication port.
MANUAL: Selects manual operation of motor using start key.
START A: Energize contactor A.
START B: Energize contactor B.
STOP: De-energize contactors.



STATUS INDICATORS:
RUNNING: Contactor is energized and motor is running.
STOPPED: Contactor is not energized and motor is not running.
TRIPPED: Contactor is not energized. Motor is not running. The MMII has tripped the motor due to a fault. Normally a cause of trip message will be displayed.
ALARM: One or more alarm conditions are present. Normally a cause of alarm message will be displayed.
FAULT: An internal fault or abnormal condition has been detected. The MMII may need to be replaced or serviced.

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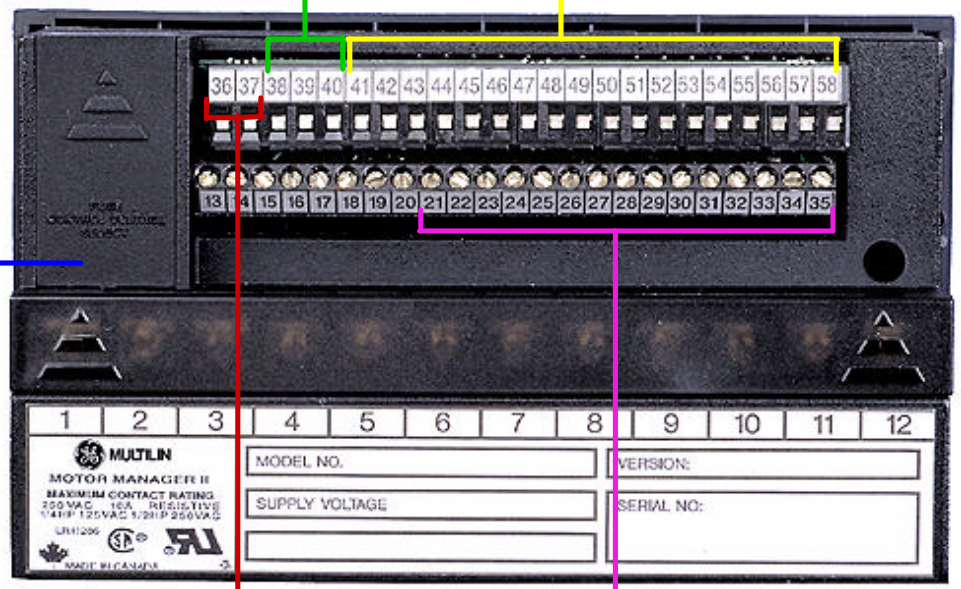
Rear View

COMMUNICATIONS
RS485 2 wire serial communication port operates at 1200 - 19,200 bps for remote commands, monitoring and setpoint store. ModBus® RTU protocol.

CONTROL POWER
120/240 VAC supply voltage selector switch and fuse access door

SUPPLY VOLTAGE
required to power the MMII



SWITCH INPUTS
Opto-isolated 120 VAC live inputs for various interlock functions. The interlock inputs are fully programmable and can be assigned to such functions as setpoint access, plant interlock, test, and various others.

4 RELAYS
- Contactor A: direct on line / forward / wye
- Contactor B: reverse / delta
- User programmable relay (AUX 1)
- User Programmable relay (AUX 2)

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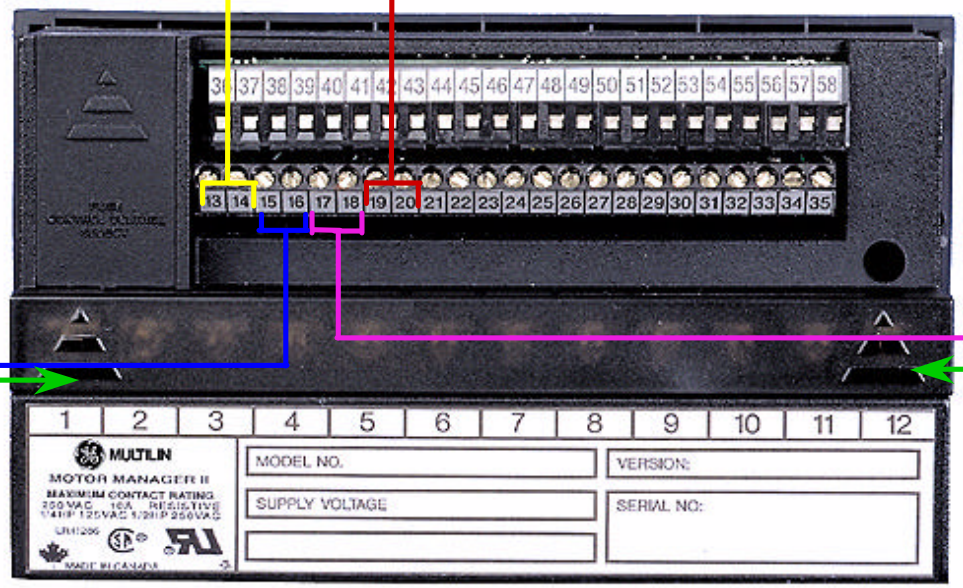
Rear View

Ground safety and surge

ANALOG INPUT
4 - 20mA input for process control monitoring / alarming / tripping.



VOLTAGE INPUT
Phase A voltage input for voltage and power monitoring.

THERMISTOR
NTC or PTC thermistor input for hot winding detection.

PHASE CT INPUTS
3 isolated phase CT inputs that accept 1 amp or 5 amp CT.

GROUND CT INPUT
5 amp or 50:0.025 ground fault input for residually connected phase CTs or separate core balance (zero sequence) CT.

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Communication

- ModBus® RTU RS485 connection
  Up to 32 MMIIs can be daisy chained together on a single communication channel.
- supports operation at 1200 to 19,200 bps

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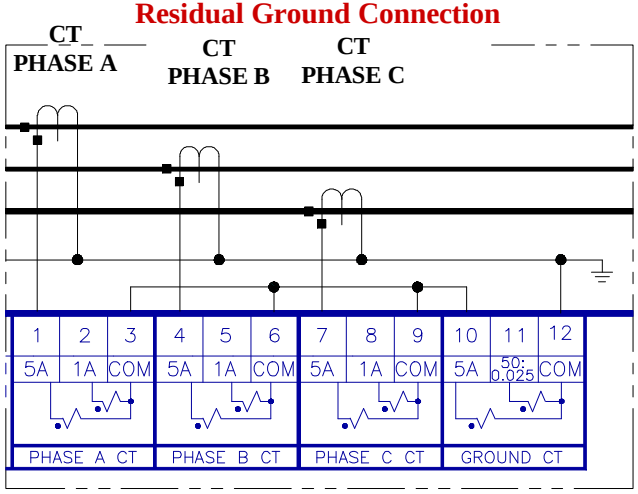
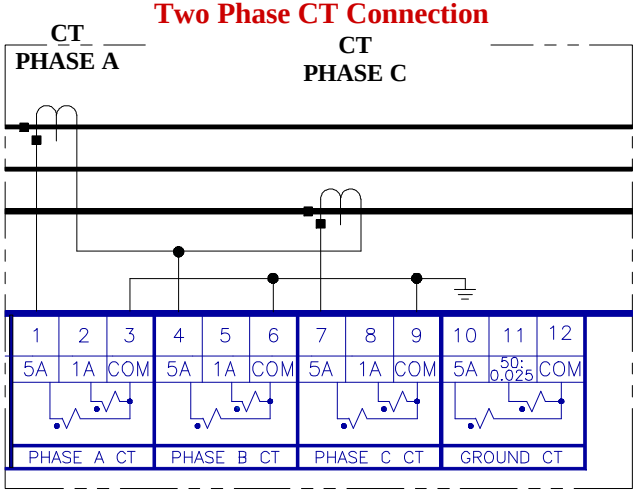
Typical Wiring

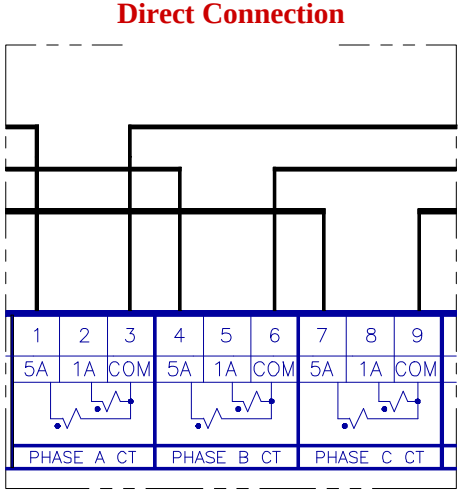
Residual Ground Connection



Two Phase CT Connection

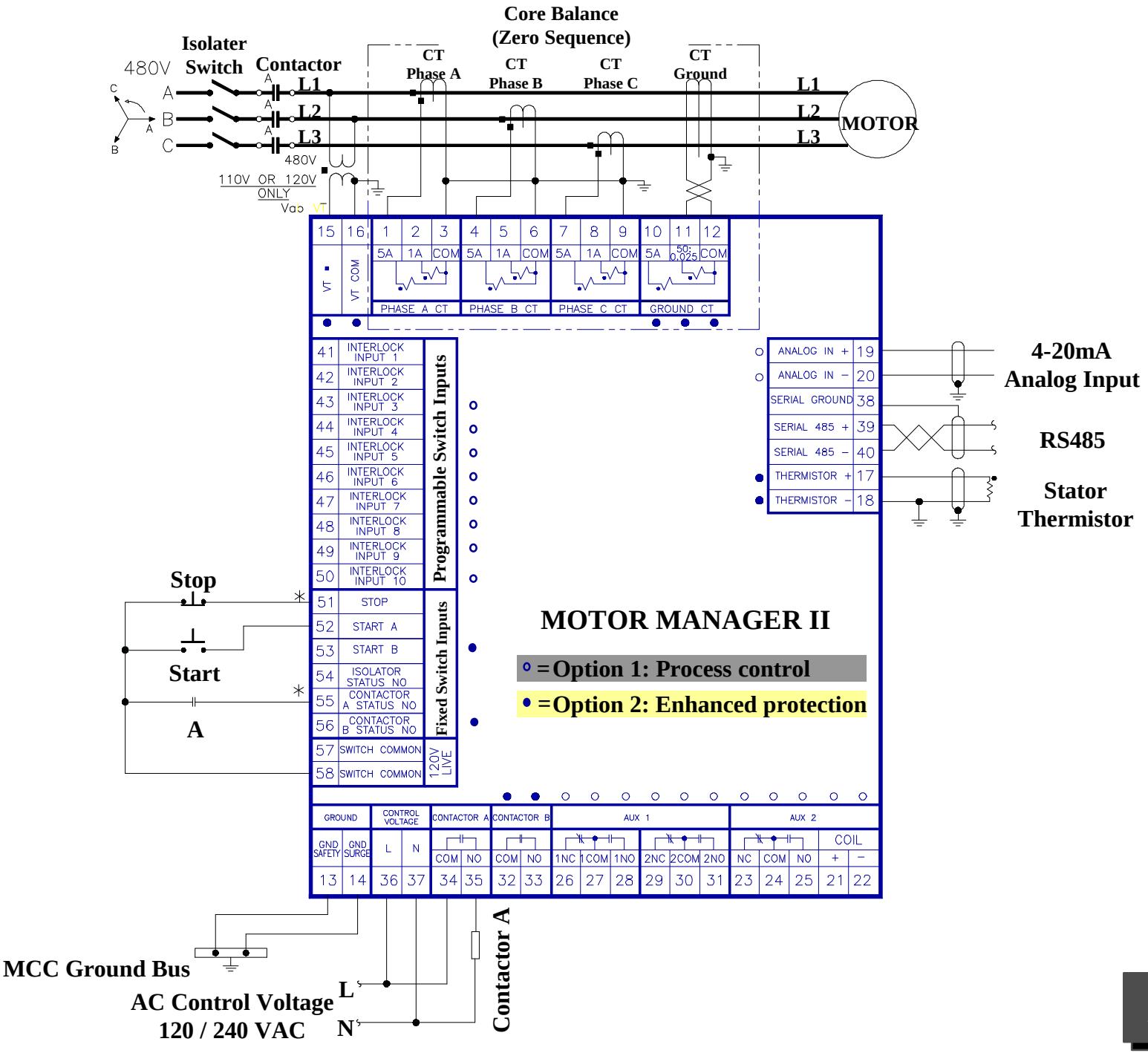


Direct Connection



PART 2 OF DIAGRAM

MAIN


Core Balance
(Zero Sequence)
Isolater
Switch
Contactor
480V
CT
Phase A
CT
Phase B
CT
Phase C
CT
Ground
L1
L2
L3
MOTOR
480V
110V OR 120V
ONLY
Vab VT
PHASE A CT
PHASE B CT
PHASE C CT
GROUND CT
4-20mA
Analog Input
RS485
Stator
Thermistor
Programmable Switch Inputs
Fixed Switch Inputs
120V LIVE
Stop
Start
A
MOTOR MANAGER II
= Option 1: Process control
= Option 2: Enhanced protection
MCC Ground Bus
AC Control Voltage
120 / 240 VAC
L
N
Contactor A

MAIN

Ordering

MMII			Basic Unit
	PD		Panel Mount With Display *
	C		Chassis Mount (Black Box)
		1	**Option 1** Process control, process input, undervoltage auto restart, diagnostics
		2	**Option 2** Enhanced protection, power (kW), thermistor, 2nd contactor control
		120	Control voltage 120 VAC
		240	Control voltage 240 VAC

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Accessories:

MMIIPC software package supplied free
RS232 TO RS485 CONVERTER box designed for harsh industrial environments
5A PHASE CT: 50, 75, 100, 150, 200, 250, 300, 350, 400, 500, 600, 750, 1000
1A PHASE CT: 50, 75, 100, 150, 200, 250, 300, 350, 400, 500, 600, 750, 1000
50:0.025 GROUND CT for sensitive ground detection on high resistance grounded systems
COLLAR for reduced depth mounting

Modifications:

MOD601: 240 VAC switch inputs - allows the use of external 240 VAC supply to power switch inputs
MOD602: 24 - 48 VDC switch inputs - allows the use of external 24 - 48 VDC supply to power switch inputs
MOD603: ESD relay - converts AUX 2 relay into an emergency shutdown relay
MOD605: Removable rear terminals - allows terminals 13 - 58 to be unplugged from the MMII
MOD610: Conformal coating
MOD613: 240 VAC VT input
MOD616: MMII with remote display

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