



## MOTOR PROTECTION SYSTEM

Integrated protection and control for medium sized AC motors

### KEY BENEFITS

- Enhanced Thermal Model including RTD and Current Unbalance Biasing
- Complete Asset monitoring with programmable RTD inputs for Stator, Bearing and Ambient temperature protection
- Enhanced reporting - Motor Health Reports provide critical information for preventative maintenance
- Reduce troubleshooting time and maintenance costs -Event reports, waveform capture, motor start data logger
- Multiple communication protocols - Modbus RTU, Profibus, DeviceNet, Modbus TCP/IP
- Simplified programming with the EnerVista™ 369 Motor Settings Auto-Configurator
- Optional Conformal coating for exposure to chemically corrosive or humid environments (option)
- Field upgradable settings and firmware
- Suitable for hazardous locations - UL certification for Class 1 Division 2 applications (option MOD502)
- Installation flexibility - Remote display and remote RTD options
- Safe and reliable motor re-start on “Down Hole” pump applications - Unique back spin detection feature detects flow reversal on a pump motor, enabling timely and safe motor restarting
- User definable parameters and data size for DeviceNet polling
- User definable parameters and data size for Profibus DPV1 cyclic data
- Motor learned data on historical start characteristics

### APPLICATIONS

- Protection and control for medium sized AC motors
- “Down Hole” pump applications
- Suitable for applications involving Variable Frequency Drives
- Two Speed motor application

### FEATURES

#### Protection and Control

- Enhanced thermal model
- Stall / Jam protection
- Undervoltage, overvoltage
- Underfrequency
- Thermal overload
- Undercurrent/current unbalance
- Variable lockout time
- Overtemperature 12 RTDs (R option)
- Starts/hour, time between starts
- Voltage Phase Reversal (M option)
- Current based phase reversal
- Undervoltage Auto-restart

#### User Interface

- 40 Character LCD Display
- 10 System and Motor Status LED's
- Keypad for configuration and viewing metered values
- 4 programmable analog outputs
- 369 Motor Settings Auto-Configurator

#### Monitoring and Metering

- Metering - current, voltage, power, energy, frequency, RTD Temperature, Remote RTD
- Fault diagnosis, - Event Record, Oscillography, Motor Starting Data Logger
- Motor Health Report
- Statistical information & learned motor data
- Voltage/frequency/power display (M option)
- 4 analog outputs (M option)

#### Communications

- Front Panel RS232 port for programming and troubleshooting
- Optional embedded Ethernet port
- Optional Profibus DP/DPV1 or DeviceNet via dedicated port
- Multiple Protocols - Modbus RTU, Modbus TCP/IP

#### EnerVista™ Software

- State of the art software for configuration and commissioning GE Multilin products
- Document and software archiving toolset to ensure reference material and device utilities are up-to-date
- EnerVista™ Integrator providing easy integration of data in the 369 into new or existing monitoring and control systems



## Technical Specifications

### PROTECTION

#### OVERLOAD CURVES TRIP TIME

Curves: 15 curves, fixed shape/program. FlexCurve™

Overload pickup: 1.0 – 1.25 x FLA

Accuracy :Pickup: ±1% of full scale

Time: ±100 ms or ±2% of total trip time

#### SHORT CIRCUIT AND GROUND TRIP

Ground trip level: 0.25 – 25.00 A (50:0.025 CT)

10 – 100% (1 A/5 A CT)

S/C trip level: 2 – 20 x CT, OFF

Intentional delay: INST. or 10 ms to 2000 ms

(S/C) (GROUND)

Instantaneous: 45 ms

#### START PROTECTION

Thermal: Separate start and run protection

Activation: Inrush current increases 5% to >101% FLC in 1 sec

Deactivation: Current drops <Overload Pickup Level motor running if current >5% FLC

Locked rotor: 2 – 10 x FLC

Stall time: 1.0 – 600.0 sec

#### THERMAL MODELING

Thermal capacity: Separate stop/run, exponential cool down

Cool rate: Stop: cool time constant 1 – 500 min

Run: cool time constant 1 – 500 min

Hot/cold: 50 – 100%, hot after 15 min running

Lockout: 1 – 500 min programmable

±20% power on or off

#### UNBALANCE

Range: 4 – 30%

Accuracy: ±2%

Delay: 0 – 255 sec

Calculation:  $I_{av} > I_{FLC} \quad UB\% = \frac{I_m - I_{av}}{I_{av}} \times 100\%$

$I_{av} < I_{FLC} \quad UB\% = \frac{I_m - I_{av}}{I_{FLC}} \times 100\%$

where:  $I_{av}$  = average phase current

$I_m$  = phase with maximum deviation from

$I_{FLC}$  = motor full load current setting

### METERING

#### PHASE CURRENT INPUTS

Conversion: True rms, sample time 1.04 ms

CT input: 1 A and 5 A secondary

Range: 0.05 to 20 x phase CT primary amps

Full scale: 20 x phase CT primary amps

Frequency: 20 – 300 Hz

Accuracy: @ < 2 x CT 0.5% of 2 x CT

@ > 2 x CT 1.0% of 20 x CT

#### GROUND CURRENT INPUT (GF CT)

CT input (rated): 1 A / 5 A secondary and 50:0.025

CT primary: 1 – 5000 A (1 A / 5 A)

Range: 0.1 to 1.0 x CT primary (1 A / 5 A)

0.05 to 16.0 A (50:0.025)

Full scale: 1.0 x CT primary (1 A / 5 A)

Frequency: 20 – 100 Hz

Conversion: True rms 1.04 ms / sample

Accuracy: ±1% of full scale (1 A / 5 A)

±0.07 A @ 1 A (50:0.025)

±0.20 A @ 16 A (50:0.025)

#### PHASE/LINE VOLTAGE INPUT(VT)(OPTION M)

VT ratio: 1.00 – 240:1 in steps of 0.01

VT secondary: 240 VAC (full scale)

Range: 0.05 – 1.00 x full scale

Frequency: 20 – 100 Hz

Conversion: True rms 1.04 ms/sample

Accuracy: ±1.0% of full scale

Burden: >200 kΩ

Max continuous: 280 VAC

ACCURACY			
PARAMETER	(FULL SCALE)	RESOLUTION	RANGE
kW	±2%	1 kW	±32,000
kvar	±2%	1 kvar	±32,000
kVA	±2%	1 kVA	0 – 50,000
mWh	±2%	1 MWh	0 – 65,535
±kvarh	±2%	1 kvarh	0 – 65,535
Power Factor	±1%	0.01	±0.00 – 1.00
Frequency	±0.02 Hz	0.01 Hz	20.00 – 100.00
kW Demand	±2%	1 kW	0 – 50,000
kvar Demand	±2%	1 kvar	0 – 50,000
kVA Demand	±2%	1 kVA	0 – 50,000
Amp Demand	±2%	1 A	0 – 65,535

### MONITORING

#### WAVEFORM CAPTURE

Length: 3 buffers containing 16 cycles of all current and voltage channels

Trigger position: 1 – 100% pre-trip to post-trip

Trigger: manually via communications or digital input

### INPUTS

#### RTDS INPUTS (OPTION R):

Wire type: 3-wire

Sensor type: 100 Ω platinum (DIN 43760)

100 Ω nickel, 120 Ω nickel

10 Ω Copper

RTD sensing current: 3 mA

Range: -40 to 200° C or -40 to 424° F

Lead resistance: 25 Ω max for Pt and Ni type

3 Ω max for Cu type

Isolation: 36 Vpk

### DIGITAL / SWITCH INPUTS

Inputs: 6 optically isolated

Input type: Dry contact (<800 Ω)

Function: Programmable

### CT INPUTS

#### PHASE CT BURDEN

PHASE CT	INPUT		BURDEN	
	(A)	VA	(W)	(Ω)
1A	1	0.03	0.03	
	5	0.64	0.03	
	20	11.7	0.03	
5A	5	0.07	0.003	
	25	1.71	0.003	
	100	31	0.003	

#### GROUND CT BURDEN

GROUND CT	INPUT		BURDEN	
	(A)	VA	(Ω)	(W)
1 A	1	0.04	0.036	
	5	0.78	0.031	
	20	6.79	0.017	
5 A	5	0.07	0.003	
	25	1.72	0.003	
	100	25	0.003	
50:0.025	0.025	0.24	384	
	0.1	2.61	261	
	0.5	37.5	150	

#### GROUND/PHASE CT CURRENT WITHSTAND

CT	WITHSTAND TIME		
	1 s	2 s	continuous
1 A	100 x CT	40 x CT	3 x CT
5 A	100 x CT	40 x CT	3 x CT
50:0.025	10 A	5 A	150 mA

### COMMUNICATIONS

RS232: Front port (up to 19,200 bps, Modbus® RTU)

RS485: 3 rear ports (up to 19,200 bps, 36 V isolation, Modbus® RTU)

Ethernet: Modbus TCP/IP 10base

### POWER SUPPLY

#### CONTROL POWER

Input:

HI: 50 – 300 VDC

40 – 265 VAC: 50 / 60 Hz

Power: Nominal: 20 VA

Maximum: 65 VA

Holdup: Non-failsafe trip: 200 ms

Failsafe trip: 100 ms

### OUTPUTS

#### ANALOG OUTPUT (OPTION M)

OUTPUT	PROGRAMMABLE	
	0 – 1 mA	0 – 20 mA / 4 – 20 mA
MAX LOAD	2400 W	600 W / 600 W
MAX OUTPUT	1.01 mA	20.2 mA / 20.2 mA

Accuracy: ±1% of full scale

Isolation: 50 V isolated active source

### OUTPUT RELAYS

Rated Load	RESISTIVE LOAD (PF = 1)	INDUCTIVE LOAD (PF = 0.4)(L/R – 7ms)
		8 A @ 250 VAC
Carry Current	8 A	
Max Switching Capacity	2000 VA	875 VA
	240 W	170 W
Max Switching V	380 VAC / 125 VDC	
Max Switching I	8 A	
Operate Time	< 10ms (5ms typical)	
Contact Material	Silver alloy	

### TYPE TESTS

Dielectric: 2.0 kV for 1 min to relays, CTs,

Insulation: IEC255-5 500 VDC

Transients: ANSI C37.90.1 oscillatory

2.5 kV/1 MHz

ANSI C37.90.1 fast rise 5 kV/10 ns

Ontario Hydro A-28M-82

IEC/EN 61000-4.4 Level 4,

Frequency disturbance Class III Level

IEC60255-5

Impulse test: 50 MHz/15 W transmitter

RFI: C37.90.2 electromagnetic interference

EMI: @ 150 MHz and 450 MHz, 10 V/m

Static: IEC60255-22-2 Level 2

Environment: IEC60068-2-38 Part 2, IEC60255-6

Dust/moisture: IP50

### ENVIRONMENTAL

Operating Temperatures: Cold: IEC60068-2-1, 16hrs at -40°C

Dry Heat: IEC60068-2-2, 16hrs at +85°C

Humidity (non-condensing):

IEC60068-2-30, 95%, variant 1, 6 days

Note: LCD contrast impaired below -20° C

### PACKAGING

Shipping Box: 12" x 12" x 8" (L x H x D)

305 mm x 305 mm x 203 mm

(L x H x D)

Ship Weight: 10 lbs / 4.5 kg

### APPROVALS:

ISO: Manufactured under an ISO9001 registered system

UL: Recognized under E234799

UL Class 1 Div 2 (Option Mod502)

CSA: C22.2 no.142, C22.2 no.213

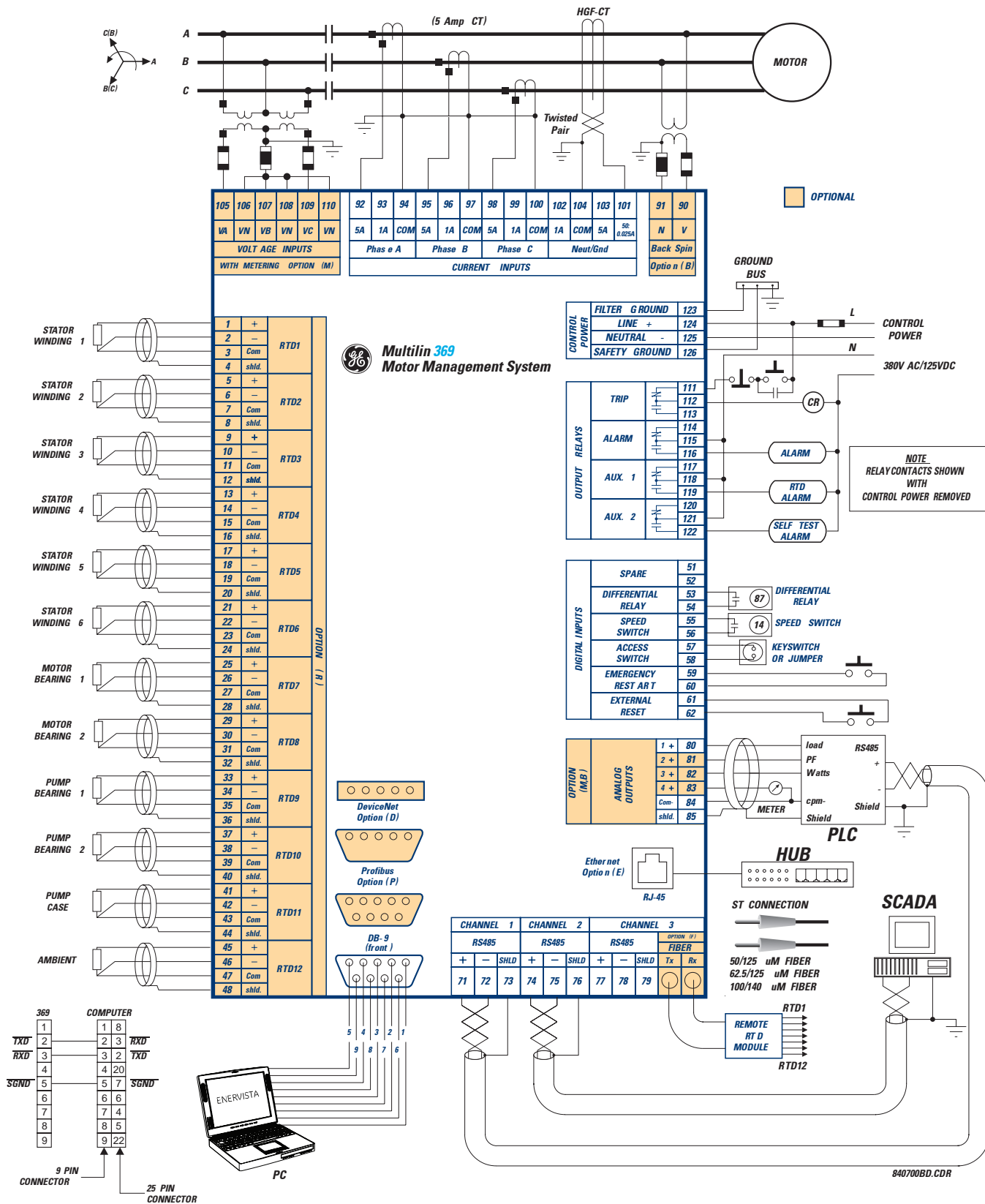
CE: EN 55011/CISPR11, EN50082-2,

IEC947-1, IEC1010-1

\*Specifications subject to change without notice.



# Typical Wiring



Motor Protection

## PN-129039 Description

### 369 - HI - R - M - 0 - E - 0 - E

369							Basic unit (no RTD)
	HI						50 – 300 VDC / 40 – 265 VAC Control Power
	LO						20 – 60 VDC / 20 – 48 VAC Control Power
		R					Optional 12 RTD inputs (built-in)
		0					No optional RTD inputs
			M				Optional metering package
			B				Optional backspin detection (includes metering)
			0				No optional metering package or backspin detection
				F			Optional fiber optic port
				0			No optional fiber optic port
					P		Optional Profibus DP0 Interface
					P1		Optional Profibus DPV1 Interface
					E		Optional Modbus® TCP over Ethernet interface
					D		Optional DeviceNet protocol
					0		No optional protocol interfaces
						H	Harsh Chemical Environment Option
						E	Enhanced diagnostics (includes enhanced motor diagnostics, enhanced event recorder, security audit trail) and enhanced faceplate
						0	No enhanced diagnostics and basic faceplate

#### Accessories for the 369:

- 369 Motor Protection Learning CD TRCD-369-C-S-1
- Multilink Ethernet Switch ML2400-F-HI-HI-A2-A2-A6-G1
- Remote RTD Module RRTD
- Viewpoint Maintenance VPM-1
- Viewpoint Monitoring VP-1

#### Visit [www.GEMultilin.com/369](http://www.GEMultilin.com/369) to:



- View Guideform Specifications
- Download the instruction manual
- Review applications notes and support documents
- Buy a 369 online