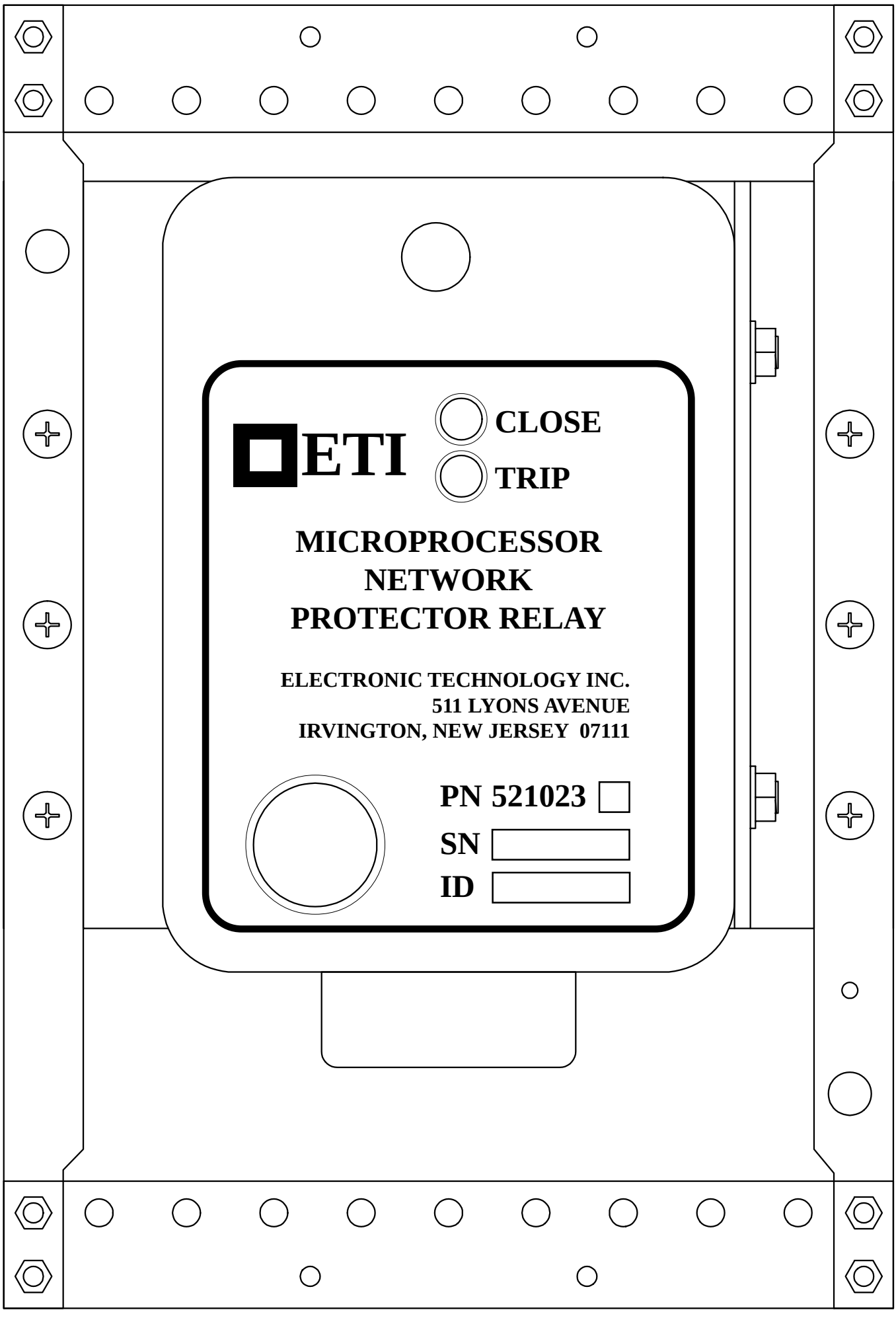

ETI
CLOSE
TRIP
MICROPROCESSOR
NETWORK
PROTECTOR RELAY
ELECTRONIC TECHNOLOGY INC.
511 LYONS AVENUE
IRVINGTON, NEW JERSEY 07111
PN 521023
SN
ID

MICROPROCESSOR NETWORK PROTECTOR RELAY

DESCRIPTION

The MNPR® is a three-phase device that responds to power flowing to or from the secondary network. When a fault occurs in the primary feeder or in a connected transformer, or if the primary feeder is de-energized by opening the station breaker, the MNPR®, in the sensitive trip mode, will energize the network protector's trip coil and open the protector. When the feeder is clear of all faults and the transformer voltage is greater than that of the network and the transformer voltage leads the network voltage in phase angle, the MNPR® will energize the reclose output and close the protector. The function of the electro-mechanical master and phasing relays are incorporated in the MNPR®. Phase detection in the MNPR® prevents the protector from closing when the transformer voltage lags the network voltage.

The MNPR® with the appropriate mounting frame and setup can be used with either the ETI, Richards Manufacturing, General Electric, Westinghouse, Cutler-Hammer or SPD network protectors as a replacement for the two older mechanical induction-cup devices (Master and Phasing Relays), the Solid State Network Protector Relay (SSNPR), the Digital Network Protector Relay (DNPR), the MCPR or the MCPV network protector relay.

The microprocessor adds extensive flexibility and control not available in the existing units. A communication port allows access to operating parameters and status reporting.

The characteristics of the MNPR® are programmable with setup parameters that define the system conditions that will cause the protector to automatically trip or reclose.

MICROPROCESSOR NETWORK PROTECTOR RELAY

1. Direct Replacement for

Electro-mechanical relays
Solid State (SSNPR) relays
Digital Network Protector Relays (DNPR)
MCPR and MPCV relays

2. Protectors

Richards Manufacturing Company
Electronic Technology Incorporated
General Electric
Westinghouse
Cutler-Hammer
SPD

3. Adjustable setup parameters

Reclose Volts
Reclose Angle
Reclose Time Delay
Sensitive Trip Current
Sensitive Trip Delay
Time Delay
Instantaneous Trip Current
Insensitive Trip Current
Extended Delay
Watt-Var Current
Watt-Var or Inverse Watt-Var Angle
Phase Compensation
CT Ratio

4. Status indicators

Alphanumeric display of:
- Mode
- Volts
- Amps
- Temperature
- Status
- Cycles

Green Trip indicator
Red Close indicator

5. Programming Unit

Rugged, portable for Field use
Easy to use menu system
Programs all relay modes
Direct reading of all variables
Remote Trip, Block and Unblock

6. PC Software

All features of programming unit
Real time monitoring
Save and recall of relay configurations
Capture and Display 3 phase waveforms

7. Palm O/S Software

All features of programming unit
All features of PC software

8. Communications Options

Standard optical programming port
Power Line Modems
RS232
RS422
RS485
Fiber Optic
Direct Dial up Telephone Line
Customer Defined

9. Communications Protocols

ETI proprietary
DNP 3.0
Cooper 2179 DCA (GE/Harris)
ETI DCA (GE/Harris)
Modbus
ASCII
Customer defined

10. Auxiliary Inputs and Outputs (Optional)

Four (4) bipolar analog inputs
Two (2) 125 volt discrete inputs
Two (2) 350 volt 0.2 amp discrete outputs

MICROPROCESSOR NETWORK PROTECTOR RELAY

RECLOSE PARAMETERS

Definition: RECLOSE VOLTAGE (standard)

Description: Vector sum of phase voltages times Network Voltage. $V_N * V_{TN} * \cos\theta$ divided by 3 must exceed this set point.

Range: 0.0 to 15.0
Steps: 0.1
Units: volts

Definition: RECLOSE VOLTAGE (circular)

Description: V_{TN} must exceed this set point.

Range: 0.0 to 15.0
Steps: 0.1
Units: volts

Definition: RECLOSE ANGLE

Description: The phase angle between Transformer Voltage and Network Voltage must be greater or equal to this setting.

Range: -60 to +30
Steps: 1
Units: degrees

Definition: RECLOSE TIME DELAY

Description: Reclose condition must remain for this period before reclose is issued.

Range: 1 to 255
Steps: 1
Units: cycles

TRIP PARAMETERS

Sensitive Trip Mode

The Sensitive Trip module is active for all trip modes. It may be combined with other trip modes, in which both modes must be satisfied for trip to occur.

Definition: SENSITIVE TRIP

Description: Signed vector sum of phase voltages times currents $V_N * I_N * \cos\theta$ divided by $3 * V_N$ must exceed this set point any trip mode is allowed.

Range: -1.0 to -1000.0
Steps: 0.1
Units: milliamps

Definition: SENSITIVE TRIP DELAY

Description: Sensitive Trip condition must remain for this period before trip is issued.

Range: 1 to 255
Steps: 1
Units: cycles

MICROPROCESSOR NETWORK PROTECTOR RELAY

Time Delay Mode

Time delay mode requires that the sensitive trip mode be satisfied for the time delay setting or that the sensitive trip mode be satisfied and the instantaneous current has been exceeded for a trip command to be issued.

Definition: TIME DELAY

Description: The sensitive trip will be delayed by this value.

Range: 0 to 65535
Steps: 1
Units: seconds

Definition: INSTANTANEOUS TRIP CURRENT

Description: If Sensitive Trip conditions are met and the absolute magnitude current in any phase exceeds this value the protector will trip instantly.

Range: 0.0 to 15.0
Steps: 0.1
Units: amps

Definition: EXTENDED DELAY

Description: The Instantaneous Trip of the Time Delay mode will be delayed by this value.

Range: 1 to 255
Steps: 1
Units: seconds

Insensitive Trip Mode

The Insensitive module may be used if the Time Delay Sensitive module is not used. The use of this module is intended to hold off trip indefinitely until both the Sensitive Trip conditions are met and the absolute value of current in any phase exceeds the Insensitive Trip value.

Definition: INSENSITIVE TRIP CURRENT

Description: When Sensitive Trip conditions are met but the absolute magnitude current in any phase does not exceed this value no trip occurs. When Sensitive Trip conditions are met and the absolute current in any phase exceeds this value the unit trips instantly.

Range: 0.0 to 15.0
Steps: 0.1
Units: amps

Definition: EXTENDED DELAY

Description: The trip of the Insensitive mode will be delayed by this value.

Range: 1 to 255
Steps: 1
Units: seconds

MICROPROCESSOR NETWORK PROTECTOR RELAY

Watt-Var Module

The Watt-Var module is available to provide trip under conditions where the normal trip conditions would not apply.

Definition: WATT-VAR CURRENT

Description: When this value of current on any phase is measured, the measured phase currents are shifted by the Watt-Var angle value.

Range: 0.0 to 15.0
Steps: 0.1
Units: amps

Definition: WATT-VAR ANGLE

Description: This is the value of phase shift to use for Watt-Var current. Inverse Watt-Var is indicated by positive values.

Range: -90 to +90
Steps: 1
Units: degrees

COMPENSATION PARAMETERS

Definition: PHASE COMPENSATION (GE type only)

Description: Phase currents are each shifted by this value to compensate for current transformer phase shift.

Range: -90 to +90
Steps: 1
Units: degrees

Definition: CT RATIO

Description: CT ratio provides readout in network amperes

Range: 50 to 12750 : 5
Steps: 50
Units: ratio

OUTPUTS

RECLOSE: Maintained until verified

TRIP: 1 sec on / 1 sec off pulse for programmed cycles (default 3)

MICROPROCESSOR NETWORK PROTECTOR RELAY

TECHNICAL SPECIFICATIONS

Operations: 200,000 operations rated load.

Wiring: All wire 200 degree C 1000V Teflon. All external wiring and internal CT wiring 16 gauge.

Loads: Loads presented by the MNPR

Operating Power:	.25 A max.
CT (all phases):	Short circuit
Other Inputs:	>200,000 ohm

Operating Voltage Range: 13 to 187 VAC Line to neutral
One, two or three phases live
125/216 VAC 60 Hz WYE system

Output Contact Rating: 20 amps (inductive 480 V 60 Hz)

Tolerances: +25 deg C
Current: +/- 2% of setting or +/- .5mA
Voltage: +/- .5V of setting
Phase: +/- 5 degree of setting
Time: +/- 2% of setting

-25 to +110 deg C
Current: +/- 5% of setting or +/- .5mA
Voltage: +/- .5 V of setting
Phase: +/- 5 degree of setting
Time: +/- 5% of setting

Cross Phase Detection: Network and transformer must be phased properly or reclose will not occur.

Dead Network: The unit will provide a reclose output if all three phases are dead.

Dead Network Relay	
Pickup Voltage:	60 VAC
Dropout Voltage:	13 VAC

Reclose Operate Voltage: 80 to 160 VAC line to neutral.

MICROPROCESSOR NETWORK PROTECTOR RELAY

TECHNICAL SPECIFICATIONS

Surge: The relay will not be damaged or exhibit spurious output when tested per ANSI C37.90A.

Transient: The relay will not be damaged or exhibit spurious output when subjected the IEEE Transient Test 5000V peak, 2 uS rise time, 10 uS decay to half value, source impedance 400 ohm/500 picofarads

Radio Frequency: The relay will not exhibit spurious output when subjected to a 7V/meter field strength at the face of the relay, over a 25 to 1000 MHz frequency band, continuously scanned.

Harmonic Content: The relay will not exhibit spurious output when subjected to the following voltage harmonic contents:

1. Difference Voltage (V_{TN})

   a. 41% Fundamental
      6% Third Harmonic
      50% Fifth Harmonic
      2% Seventh Harmonic
      1% Ninth Harmonic
   b. V_{TN} Magnitude 6V (Fundamental)

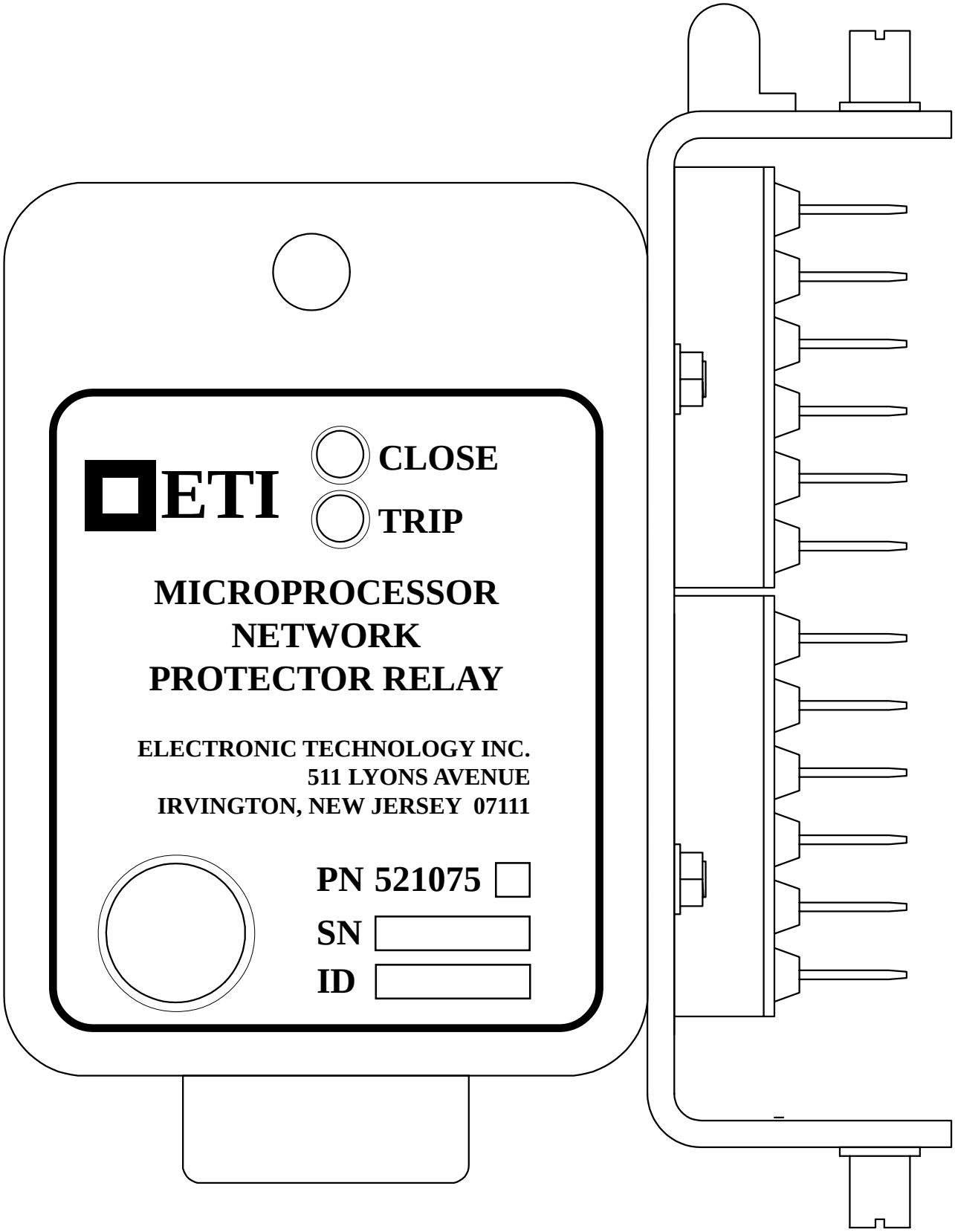
2. Network Voltage

   a. 100% Fundamental
   b. V_N Magnitude 125 V_{LN}

MICROPROCESSOR NETWORK PROTECTOR RELAY

TECHNICAL SPECIFICATIONS

Operating Temperature Range:	Designed for -40 to 110 deg C continuous, with excursions to 125 deg C.
Shock:	Designed to meet Mil-Std-810B Method 516.1 Procedure 1 (15 g, 11 mS half sine) Procedure 2.
Vibration:	Designed to meet Mil-Std-810D Method 514.1 Procedure 9 & 10, curve AX.
Fungus:	Designed to meet Mil-Std-810, Method 508.
Salt Spray:	Designed to meet requirements of Mil-Std-810, Method 509.
Humidity:	Designed to meet Mil-Std-202, Method 103 Test Condition B.
Submergibility:	Designed to be waterproof to a 15 foot depth.
Mean Time Between Failure	The MTBF is calculated per Mil-Std 217 using the data derived from Mil-Std-883 where ever applicable and other approved industry standards. Based on the combined MTBF of all the components, the net MTBF of is no greater than one failure per 100 years for an average operating temperature of 50°C.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