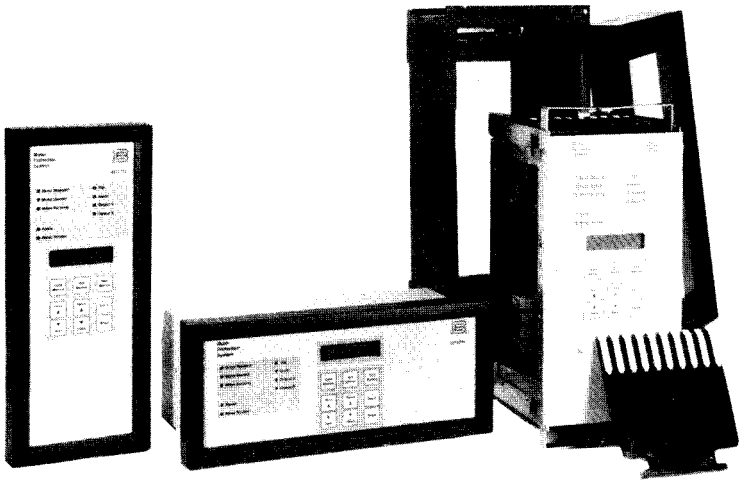

MPS200 Series MOTOR PROTECTION SYSTEMS

The MPS Motor Protection Systems are microprocessor based digital relays which provide complete motor protection (MPS200), or protection and control (MPS210), including metering, communications, data recording and diagnostics.

ADVANTAGES

- Complete protection package including 48 protective functions.
- Accuracy and stability provided with true RMS sensing, at 0.5 millisecond sampling rate.
- Programmable output functions and "Time to Trip" indications enable operator intervention for abnormal conditions and controlled reset.
- Easy local interaction with front panel display and manual interface, or with Windows® PC-based Graphical User Interface (GUI).
- Remote communications via RS485 serial link, with Modbus™ protocol.
- Flexible configurations, including horizontal, vertical or drawout cases.
- UL, C-UL component recognized.

WINDOWS® SOFTWARE

Interface for setting and communicating with Basler protection products

Request BESTCOMS™ for MPS200, specify Windows® 3.1 or Windows® 95/NT

ADDITIONAL INFORMATION

INSTRUCTION MANUAL

Request publication 9-3083-00-990

MODBUS™ INSTRUCTION MANUAL

Request publication 9-3083-00-991

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APPLICATION

The MPS Motor Protection System relays are suitable for low and medium voltage, 3Φ induction motors. The MPS200 relay includes all protection functions, along with the monitoring functions and communications. The MPS210 relay adds the motor control functions. While motors are very rugged and reliable when operating within their design limits, most motors have minimal margins for operating under abnormal conditions. A motor protection system is necessary to allow the motor to operate close to its limits and to protect the motor from abnormal operating conditions. The MPS200 and MPS210 relays provide a comprehensive protection package.

PROTECTION

MPS relays include 48 distinct protective functions, as listed in Table 3. The relay can be configured for any of these functions to provide an Alarm or Trip signal, both, or none. Function reset can also be configured, with Automatic, Front Panel, and Programmable Logic Controller (PLC) reset options. The relay will display a "Time to Trip" value which can enable corrective actions to prevent tripping.

MPS relays include a Thermal Modeling algorithm which computes the protected motor's thermal capacity based on various parameters including load current, overload pickup, hot / cold ratio, heating / cooling factor, stall time factor, and speed switch input. The algorithm dynamically responds to system conditions and includes both tripping and reset characteristics.

MONITORING AND COMMUNICATIONS

MPS relays include a backlit Liquid Crystal Display (LCD), along with a keypad to enable local interaction. Users can apply settings, read parameters and retrieve detailed trip and alarm data. Unauthorized setting changes can be blocked by removing a rear panel hardware jumper. An RS485 serial link is also provided for remote interaction with the relay, using Modbus™ communications protocol. The RS485 link enables multiple MPS relays to be connected to a single host computer. The data values are listed in Table 1.

CONTROL (MPS210 Only)

The MPS210 can control various motor starting methods such as Direct-On-Line, Star / Delta, Forward / Reverse, Soft Starters and Two Speeds. Control signals can be received from Local Switches, a PLC, or through the serial port communications. The relay can be configured for automatic reset, or can require a reset signal before accepting start signals after any trip. The MPS210 will block motor starting if the bus voltage is below an inhibit setpoint or if the logic inputs indicate a blocking condition.

Data Type	Available Data
Measured Data	Phase and line voltages, Phase currents, Ground fault current, Power, Reactive power, Power factor, RTD temperature
Calculated Data	Motor load (% of full load), Thermal capacity, Time to trip, Time to start, Unbalance Current
Logic Input Status	Individual status, per input
Statistical Data	Total running hours, number of starts, number of trips, last start time, last starting peak current
Fault Data	Last trip, Last alarm, Phase currents at time of trip, Ground fault current at time of trip, Phase voltages at time of trip

Table 1 - Real Time and Recorded Data

FUNCTIONAL DESCRIPTION

CURRENT INPUTS

The relay monitors three phase and ground currents individually. The ground current can be obtained from a ground sensor (doughnut) or residually connected current transformer. Nominal current input can be 1 or 5 amperes, based on CT connection.

VOLTAGE INPUTS

Three phase voltage is monitored, using either three- or four-wire connections. Voltage based protection can be disabled if input signals are not available.

RTD INPUTS

MPS relays include 10 RTD inputs. The RTDs may be either Copper (10Ω), Platinum (100Ω), or Nickel (120Ω), depending on the relay configuration.

CONTACT INPUTS

20 Contact inputs to control system operation. Input functions are shown in Table 2.

Number of Inputs	Description	MPS Version
1	Authorized Key (security)	MPS200 & MPS210
1	Speed Switch	MPS210
3	External Fault (N/C)	MPS210
3	Local Control (Start Contactor A, Start Contactor B, Stop)	MPS210
1	External Lockout	MPS210
2	PLC Mode Selection	MPS210
3	PLC Contacts (Contactor A, Contactor B, Reset)	MPS210
6	Position Status (Contactor A, Contactor B, Isolator) (NO & NC)	MPS210

Table 2 - Input Functions

OUTPUTS

All MPS relays include 4 form C output relays. Relay outputs A and B are automatically configured to control contactors A and B. These outputs function based on the programmed motor starting method.

HUMAN MACHINE INTERFACE (HMI)

The human machine interface (HMI) includes a backlit 2-line LCD display and a keypad to allow local interaction with the relay. All setting and setup information can be displayed or adjusted from the front panel. Likewise, all measured, calculated and recorded data can be accessed. Nine (9) LEDs are also included to indicate the status of the relay and the associated equipment. See Figure 2.

GRAPHICAL USER INTERFACE (GUI)

A personal computer based program is available for interaction with MPS relays. This provides logical, screen-based, program for relay setup.

REMOTE COMMUNICATIONS

The relay includes an RS485 communications port which can be used for communications with a remote computer. The communications link enables monitoring of the settings and data, as well as changes to the settings and control of the motor (MPS210 only).

SELF TESTS

MPS relays include extensive self test capabilities. This includes power-up tests, manual tests and continuous (background) tests. Any self test failure is reported as an Internal Failure which can be configured as an alarm or trip condition.

FUNCTIONAL DESCRIPTION, continued

Function	ANSII Code	When Active	Range
Max. Start Time	48	Starting	1 - 250 Seconds
Too Many Starts	66	Starting	1 - 10 Starts Within 1-60 Minute Period
Undercurrent Level 1	37	Running	10-90% Full Load, 1-60 Seconds
Undercurrent Level 2	37	Running	10-90% Full Load, 1-60 Seconds
Load Increase	51L	Running	60-150% Full Load, 5 Seconds
Overcurrent Level 1 - Stall	51R	Running	100-500% Full Load, 0.5-10 Seconds
Overcurrent Level 2 - Short	50	Always	400-1200% Full Load, 0.0-0.4 Second
Thermal Level 1	49/51	Always	50-99% of Thermal Capacity
Thermal Level 2	49/51	Always	100% of Thermal Capacity
Unbalance Level 1	46	Always	50% of Unbalance Level 1, 1 Second
Unbalance Level 2	46	Always	10-40% Full Load, 20-120 Seconds
Undervoltage	27	Starting & Running	50-95% of Nominal, 0.2-10 seconds.
Overvoltage Level 1	59	Starting & Running	100-120% of Nominal, 1 second delay
Overvoltage Level 2	59	Starting & Running	100-120% of Nominal, 1-100 seconds
Phase Loss	47	Always	20% Unbalance, 2 Seconds
Phase Sequence	47	Always	Reversed Sequence, 2 Seconds
Ground Fault Level 1	50G	Always	1-100% of Full Load, 1-60 seconds
Ground Fault Level 2	50N	Always	1-100% of Full Load, 0.0-2.0 second
Comm. Port Failure	3	Always	3 Consecutive parity/CRC errors
Internal Relay Failure	3	Always	n/a - Relay Self Test
Control Circuit Open	74	Beginning of Start	n/a - circuit aux. does not change state
Welded Contactor	74	Beginning of Stop	n/a - Contactor Aux. Does Not Change State
External Fault 1	86 or 94	Always	n/a - External Contact
External Fault 2	86 or 94	Always	n/a - External Contact
External Fault 3	86 or 94	Always	n/a - External Contact
RTD 1 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 1 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 2 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 2 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 3 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 3 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 4 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 4 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 5 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 5 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 6 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 6 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 7 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 7 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 8 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 8 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 8 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 9 Level 2	49R	Always	0-200°C, 2 Seconds
RTD 10 Level 1	49R	Always	0-200°C, 2 Seconds
RTD 10 Level 2	49R	Always	0-200°C, 2 Seconds
Under Power Level 1	32L	Running	5-99% Rated, 1-120 Seconds
Under Power Level 2	32L	Running	5-99% Rated, 1-120 Seconds
Low Power Factor	55	Running	0.20-0.98, 1-120 Seconds

Table 3 - MPS Protective Functions

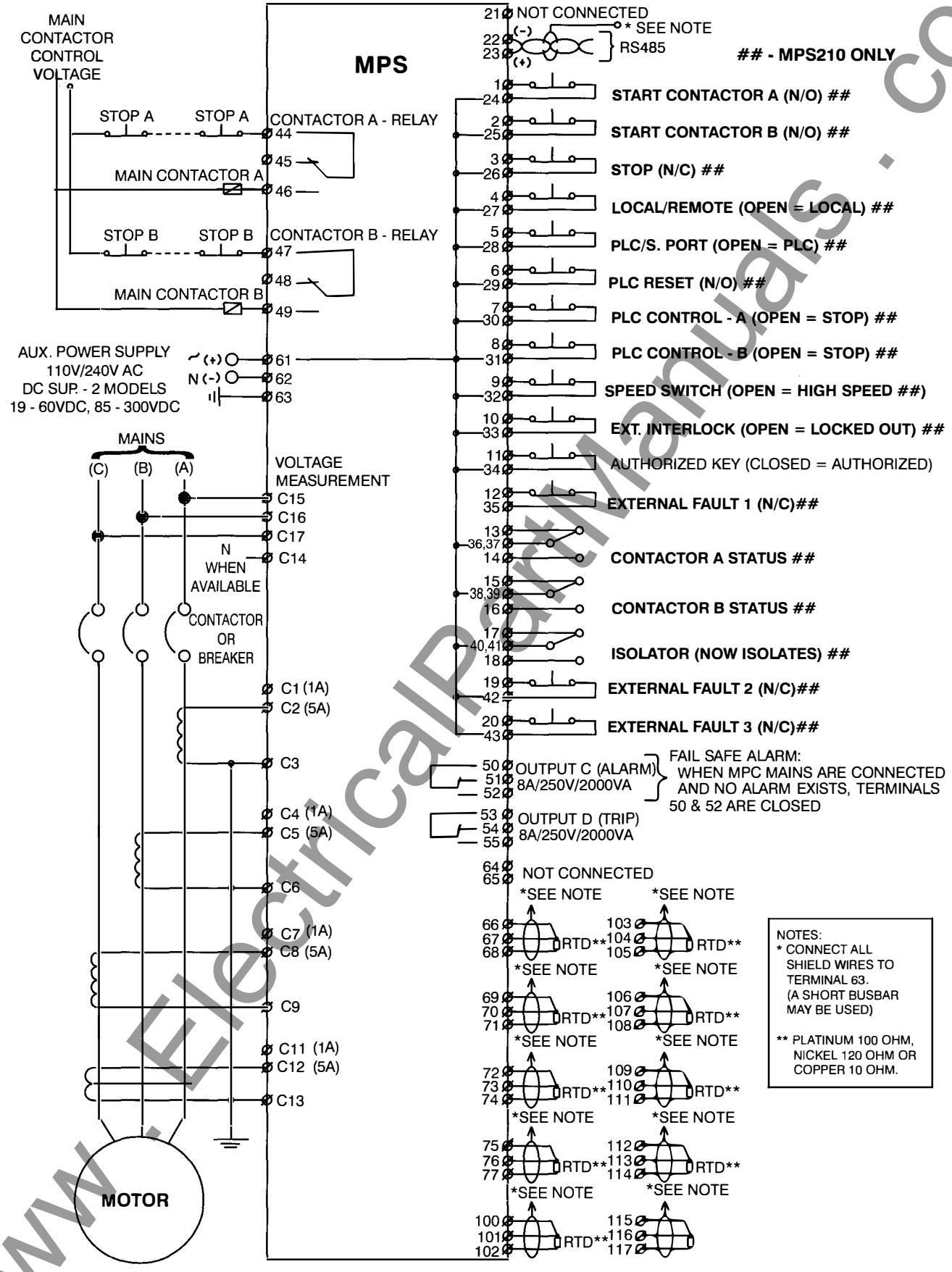


Figure 1 - Typical Connections for MPS210

SPECIFICATIONS

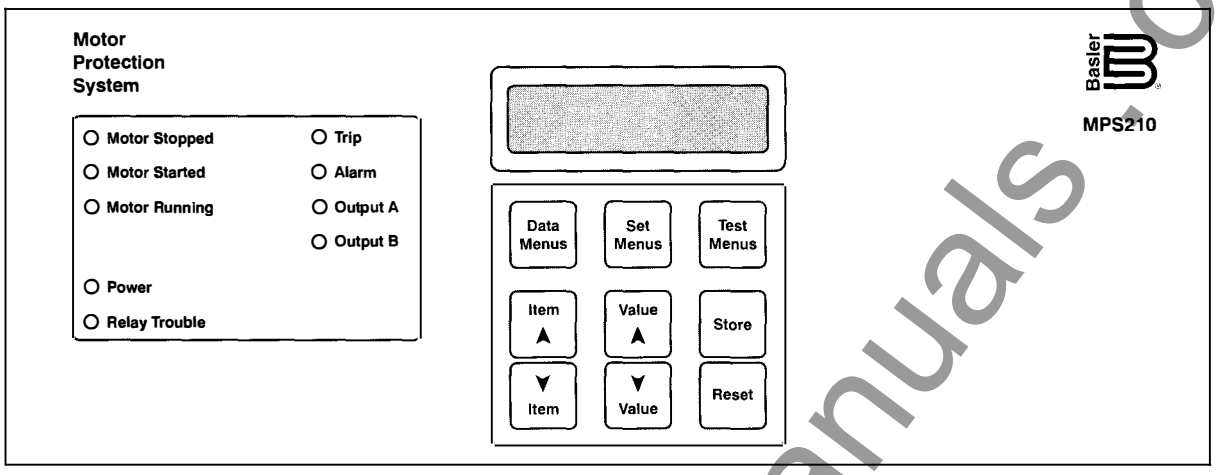


Figure 2 - Front Panel (Horizontal Case)

CURRENT SENSING INPUTS

Sensing Method: True RMS, 0.5 msec sample time
Rated current: 1 or 5 ampere, depending on connections
Maximum continuous current: 3 x rated
1 Second rating: 30 x rated
Input Burden: ≤0.6 VA @ 5A (5A Nominal), ≤20mW

VOLTAGE SENSING INPUTS

Sensing method: True RMS, 0.5 msec sample time
Rated Voltage: 50-690 Vac phase-to-phase (380 VAC phase-to-neutral)
Input burden ≤0.1VA

CONTACT SENSING INPUTS

Voltage level: Internally connected to control power - no external voltage required

RTD INPUTS

Type: Copper (10Ω), Platinum (100Ω) or Nickel (120Ω) depending on configuration and settings.
Maximum wire resistance 25% of RTD at 0°C.

OUTPUT CONTACTS

Make and carry: 30A for tripping duty (5 cycles) @ 250 Vdc, 5A continuous
Break: 0.4A @ 125 Vdc Resistive, (1A @ 48 Vdc)
0.3A @ 125 Vdc Inductive, (0.7A @ 48 Vdc), L/R=0.04

POWER SUPPLY

DC Power Supply:
Input: 19-60 Vdc or 85-300 Vdc, depending on configuration
Burden: ≤30 VA

AC Power Supply
Input: 80-135 Vac or 160-270 Vac, depending on switch selection
Burden: ≤30 VA

ACCURACIES AND RANGES

Current: ± (3% + 0.02 x nominal) below 0.9 x nominal current
±1.5% between 0.9 and 1.5 x nominal
±5% above 1.5 x nominal
Current Range: 0.05 to 12 x nominal
Ground Fault Current: ±3% of full scale, 0.05 to 1 x nominal
Voltage: ±1% of full scale, 50-750 volts
Power: ±3%, 0-65 MW, total of three phases
Reactive Power: ±3%, 0-65 MVAR, total of three phases
Power Factor: ±3%, 0-1, total of three phases
RTDs: ±3% of resistance, 0-200°C

IMPULSE

Meets IEC 255-4 (1976) & Amend #1 (1979)
Meets IEC 255-5 (1977)
5 kV common-mode test
5 kV transverse-mode test

CASE SIZE

Vertical or horizontal fixed case: 12.13" (308mm) x 5.27" (134mm) x 6.34" (161mm)

Drawout: 15.13" (384.2mm) x 6.63" (168.3mm) x 8.38" (212.8mm)

SPECIFICATIONS, Continued

DIELECTRIC STRENGTH

1500 Vac/2121 Vdc for 1 min. common mode, between ground and:
- current inputs
- voltage inputs
- auxiliary power supply inputs
- control terminals

1500 Vac for 1 min. transverse mode, between each of the above circuits

1000 Vac across open contacts

SURGE WITHSTAND

Oscillatory: 2.5 kV peak

Fast transient: 4 kV crest voltage

In accordance with: ANSI C37.90.1 (1990), IEC 255-4 (1976) and Amend #1 (1979) Class III, IEC 255-22-2 (1988) Class III

RADIO FREQUENCY INTERFERENCE (RFI)

Type tested using 5 watt hand-held transceiver in the ranges of 144 and 440 MHz with the antenna placed within six inches of the relay.

AMBIENT TEMPERATURE RANGE

Operating: -20° to +65°C

Display: -10° to +60°C

ELECTROSTATIC DISCHARGE (ESD)

15 kV Air Discharge per IEEE (37.90x -199x-D4)

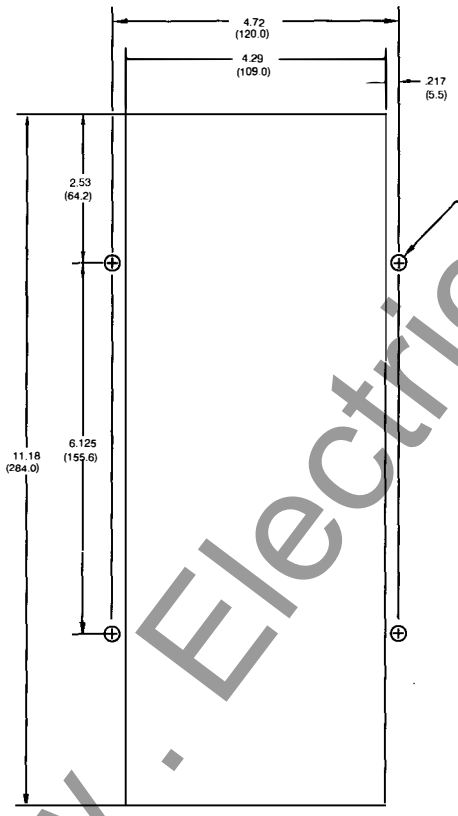


Figure 3 - Fixed Case Panel Cutout Dimensions

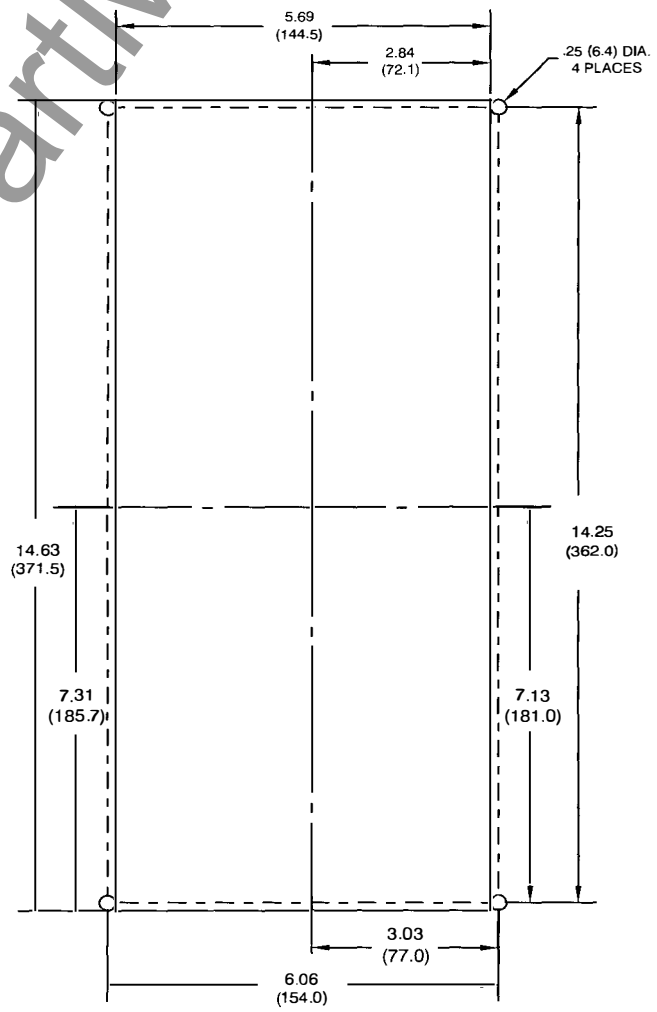
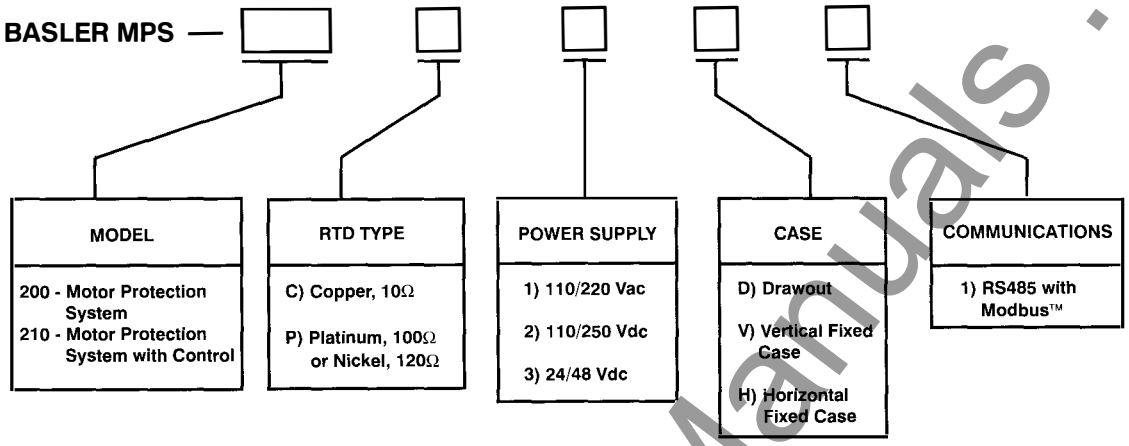


Figure 4 - Drawout Case Cutout Dimensions

ORDERING

Specify a part number from the chart shown below.



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