

MPS100 MOTOR PROTECTION SYSTEM

The MPS100 Motor Protection System is a microprocessor based digital relay which provides comprehensive motor protection including metering, communications, data recording and diagnostics.

ADVANTAGES

- Extensive protection package including 21 protective functions. Includes Current and Thermal based protection and 2 external fault contact inputs.
- Programmable output functions and "Time to Trip" indications enable operator intervention for abnormal conditions and controlled reset.
- Easy local interactions with front panel display and manual interface. Remote communications via RS485 serial link, with Modbus™ protocol.
- Compact, panel mount package.
- UL, C-UL component recognized.

WINDOWS® SOFTWARE

Interface for setting and communicating with Basler protection products
Request BESTCOMS™ for MPS100, specify Windows® 3.1 or Windows® 95/NT

ADDITIONAL INFORMATION

INSTRUCTION MANUAL

Request publication 9-3254-00-990

MODBUS™ INSTRUCTION MANUAL

Request publication 9-3254-00-991

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UPC-1
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APPLICATION

The MPS100 Motor Protection System relay is suitable for low voltage, 3Φ induction motors. The MPS100 includes all current based protection functions, along with thermistor. Additionally, monitoring functions and communications are included. While motors are very rugged and reliable when operating within their design limits, they are usually operated close to these limits. However, 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 MPS100 relays provide a comprehensive protection package.

PROTECTION

MPS relays include 21 distinct protective functions as listed in Table 2. The relay can be configured for any of these functions to operate any or all of the 4 output contacts (Alarm, Trip, and 2 Auxiliary). 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. 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. An RS485 serial link is also provided for remote interaction with the relay. This terminal uses Modbus™ communications protocols. The RS485 link enables multiple MPS relays to be connected to a single host computer. The data values available are listed in Table 1.

Data Type	Available Data
Measured Data	Phase and Ground currents, Thermistor resistance
Calculated Data	Motor load (% of full load), Thermal capacity (%), Time to trip, Time to start, Unbalance Current (%)
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 and Ground currents 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 style chart configuration.

THERMISTOR INPUT

MPS100 relays include 1 Thermistor input. The thermistor may be either positive temperature coefficient (PTC) or negative temperature coefficient (NTC), 0.1Ω-30KΩ.

CONTACT INPUTS

2 Contact inputs are provided for connection of external protective devices or for remote reset.

OUTPUTS

All MPS relays include 4 form C output relays. Each relay can be programmed to operate on a combination of protection functions.

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. Likewise, all measured, calculated and recorded data can be accessed. Three (3) LEDs are also included to indicate the status of the relay and the associated equipment.

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 available data.

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.

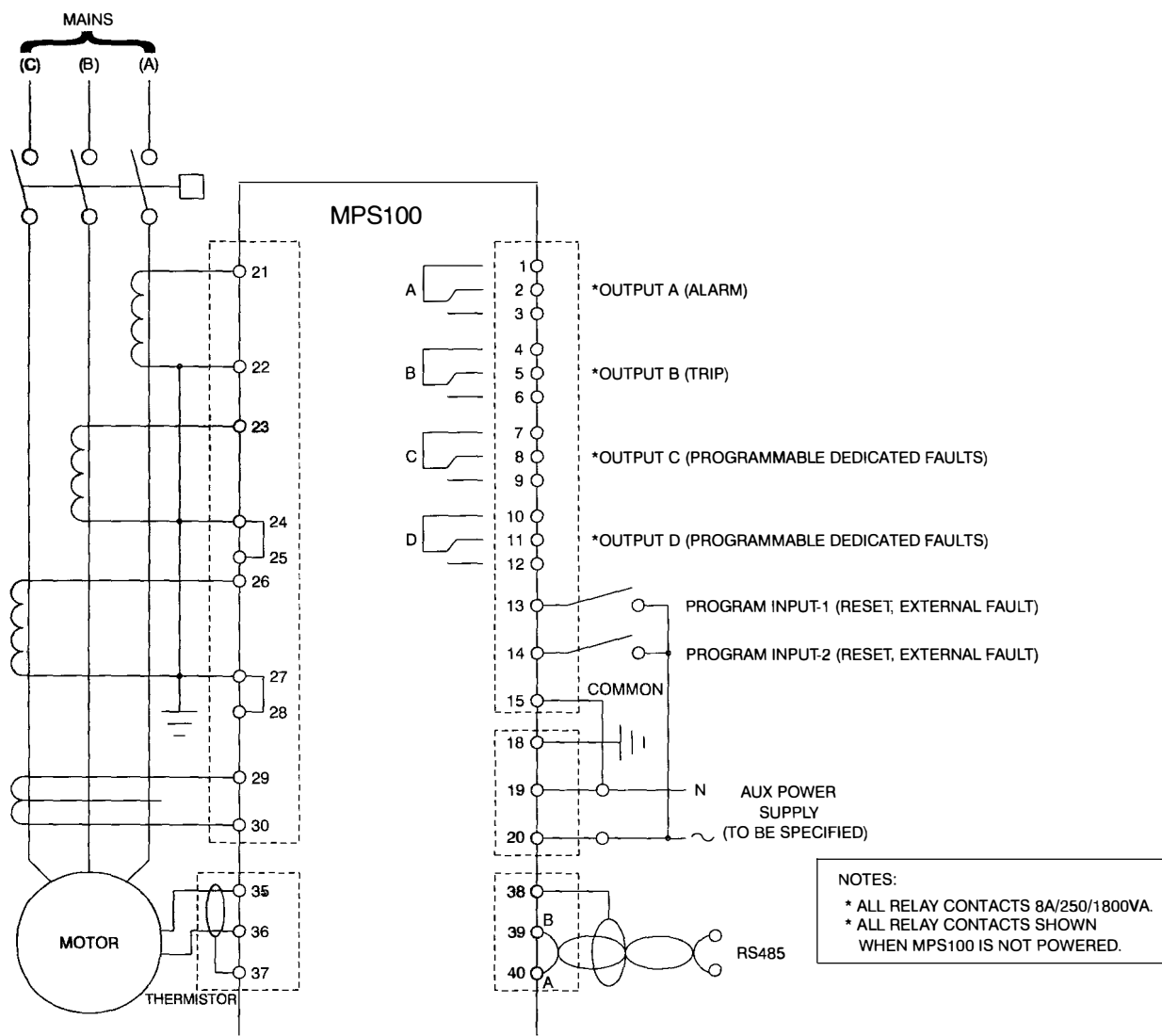
SELF TESTS

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.

Function	ANSI 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
Phase Sequence	47	Starting	n/a
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 seconds
Comm. Port Failure	3	Always	3 consecutive parity/CRC errors
Internal Relay Failure	3	Always	n/a - Relay Self Test
External Fault 1	86 or 94	Always	n/a - External Contact
External Fault 2	86 or 94	Always	n/a - External Contact
Thermistor Level 1	49R	Always	100 - 30kΩ, 2 seconds
Thermistor Level 2	49R	Always	100 - 30kΩ, 2 seconds
Unstable Current	---	Always	10% max. of full load, 1% min. of full load

Table 2 - MPS Protective Functions

FUNCTIONAL DESCRIPTION, continued



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Figure 1 - Typical Connections for MPS100

FUNCTIONAL DESCRIPTION, continued

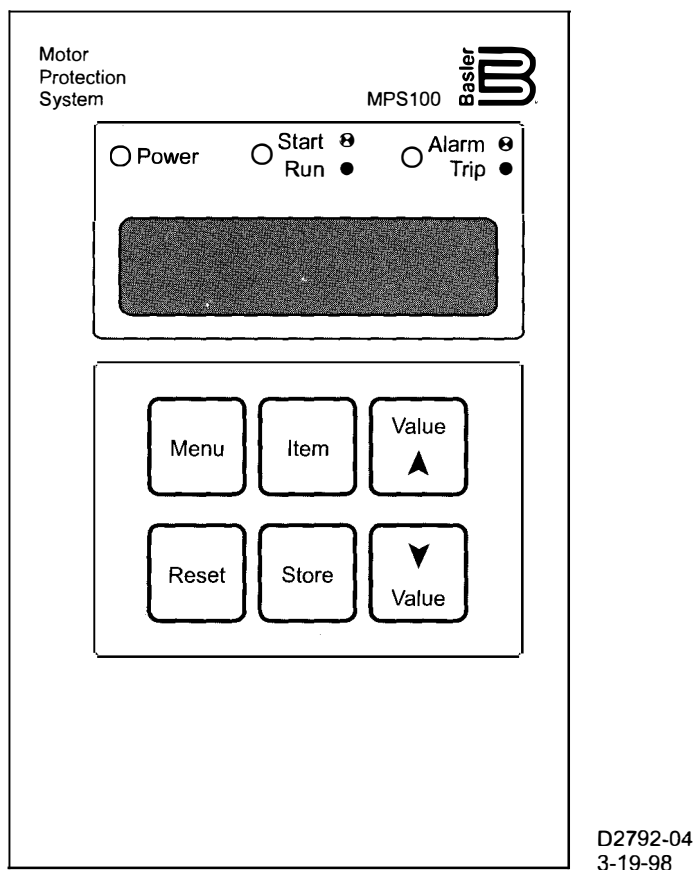


Figure 2 - Front Panel

SPECIFICATIONS

CURRENT SENSING INPUTS

Sensing Method: True RMS, 0.5 msec sample time
 Rated current: 1 or 5 ampere, depending on style chart configuration
 Maximum continuous current: 3 x rated
 1 Second rating: 30 x rated
 Input Burden: $\leq 0.5 \text{ VA @ } 5\text{A } (\% \text{ A rated}), \leq 20\text{m}\Omega$

CONTACT SENSING INPUTS

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

THERMISTOR INPUTS

Type: Positive Temperature Coefficient (PTC) or Negative Temperature Coefficient (NTC) depending on configuration and settings.
 Impedance range: 0.1Ω - $30\text{K}\Omega$

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

AC POWER SUPPLY

Input: 88-125 Vac or 165-260 Vac, depending on style selection
 Power Consumption: $\leq 10 \text{ VA}$

ACCURACIES AND RANGES

Phase Current: $\pm (3\% + 0.02 \times \text{nominal})$ below 0.9 x nominal current
 $\pm 1.5\%$ between 0.9 and 1.5 x nominal
 $\pm 5\%$ above 1.5 x nominal
 Current Range: 0.05 to 12 x nominal
 Ground Fault Current: $\pm 3\%$ of full scale
 Thermistor: $\pm 0.1\text{k}\Omega$ up to $5\text{k}\Omega$, $\pm 3\%$ above $5\text{k}\Omega$

ENVIRONMENTAL

Isolation

1500Vac for 1 minute between ground and:
 • current inputs
 • Power supply inputs
 • Output terminals

Impulse

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

Surge Withstand

In accordance with: ANSI C37.90.1 (1990), IEC 255-4 (1976) and Amend #4 (1979) Class III, IEC 255-22-2 (1988) Class III
 Oscillatory: 2.5kV peak
 Fast transient: 4kV crest voltage

Radio Frequency Interference (RFI)

In accordance with ANSI C37.90.2

Electrostatic Discharge (ESD)

6kV contact, 8kV air discharge, in accordance with Level 3 of EN61000-4-2, performance criteria A.

Ambient Temperature Range

0° to $+50^{\circ}\text{C}$

WEIGHT

2.15 lbs.

CASE SIZE

5.665"h (143.89mm) x 3.750"w (95.25mm) x 4.665"d (118.49mm)

NOTES

ORDERING

Specify a part number from the chart shown below.

