MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

CUTLER-HAMMER

2D78559G01

UNIVERSAL RTD INTERFACE MODULE

Used with the applicable Universal RTD / MP-3000 configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Eaton MP-3000 Instruction Manual IM02602002E, URTD accessory identity, sensor data and connection diagrams.

Powering Business Worldwide

MP-3000 Motor Protection Relay

Instruction Leaflet for Installing, Operating, and Maintaining the Eaton Cutler-Hammer MP-3000 Motor Protection Relay



Table 1.3 MP-3000 Motor Protection Relay Accessories.		
Catalog Number	Description	Style Number
URTD Module	Universal RTD Module	2D78559G01
IQDCPS	IQ DC dc to ac power supply converter, 100 - 150 Vdc	2D78542G01
MPFO-1	1 Meter precut optical fiber link for URTD with connectors	66D2037G01
MPFO-5	5 Meter precut optical fiber link for URTD with connectors	66D2037G02
MPFO-10	10 Meter precut optical fiber link for URTD with connectors	66D2037G03
MPFO-25	25 Meter precut optical fiber link for URTD with connectors	66D2037G04
MPFO-50	50 Meter precut optical fiber link for URTD with connectors	66D2037G07
MPFO-75	75 Meter precut optical fiber link for URTD with connectors	66D2037G10
MPFO-76	76 Meter precut optical fiber link for URTD with connectors	66D2037G11
MPFO-100	100 Meter precut optical fiber link for URTD with connectors	66D2037G13
MPFO-120	120 Meter precut optical fiber link for URTD with connectors	66D2037G14
MP3BRACKET	PONI Mounting Bracket	66D2053G01
MPML	Relay mounting plate adapter with 1/2” Stud - fits GE Multilin® 269 cutout	66D2044G01
MPML-L	Relay mounting plate adapter with 1” Stud - fits GE Multilin® 269 cutout	66D2044G02
EPONI	Ethernet communications module	66D2028G01
EPONIF	Ethernet optical fiber communications module	66D2028G02
IPONI	INCOM communications module	8793C36G03
DPONI	Data communications module	6D2132G01
RS-485 PONI	Modbus RTU communications module	66D2042G01
MD3000	Motor/Generator Differential Relay Fixed Case	66D2126G01
MD3001	Motor/Generator Differential Relay Drawout Case	66D2127G01

Table 1.4 MP-3000 Renewal Parts.		
Catalog Number	Description	Style Number
MP3011-IC	MP-3011 Inner Chassis, 5A CT, No Communications	66D2208G11
MP3012-IC	MP-3012 Inner Chassis, 5A CT, with INCOM Communications	66D2208G12
MP3013-IC	MP-3013 Inner Chassis, 5A CT, with Modbus Communications	66D2208G13
MP3014-IC	MP-3014 Inner Chassis, 5A CT, with DeviceNet Communications	66D2208G14
MP3111-IC	MP-3111 Inner Chassis, 1A CT, No Communications	66D2208G15
MP3112-IC	MP-3112 Inner Chassis, 1A CT, with INCOM Communications	66D2208G16
MP3113-IC	MP-3113 Inner Chassis, 1A CT, with Modbus Communications	66D2208G17
MP3114-IC	MP-3114 Inner Chassis, 1A CT, with DeviceNet Communications	66D2208G18
MP3X11-OC	MP-3XXX Outer Chassis, for Use with No Communications or INCOM Comminications Inner Chassis	66D2035G01
MP3X13-OC	MP-3XXX Outer Chassis, for Use with Modbus Communications Inner Chassis	66D2035G02
MP3X14-OC	MP-3XXX Outer Chassis, for Use with DeviseNet Communications Inner Chassis	66D2035G03

*** Note: Check with distributor for availability.**

SECTION 3 - MP-3000 TECHNICAL SPECIFICATIONS

Control Power

Nominal Voltage:	120 Vac or 240 Vac (+10%, -25%)
Operating Range:	120 Vac: 90-132 Vac 240 Vac: 180-264 Vac
Interruption Ride-through Time:	Complete drop of power for minimum of 13 cycles at nominal 60 Hz control power voltage, and 11 cycles at nominal 50 Hz control power voltage
Frequency:	60 Hz nominal, 57-63 Hz 50 Hz nominal, 47-53 Hz
Power Consumption:	24 VA max URTD: 6 VA max IPONI: 1 VA max

Current Inputs

Nominal (I_n):	1 A or 5 A
CT Rating:	2 x I_n continuous 50 x I_n for 1 second
CT Burdens:	< 0.25 VA @ 5 A (nominal) < 0.05 VA @ 1 A (nominal)

Metering Accuracy

Phase Current Accuracy:	± 1% of I_n (from 0 to I_nA) ± 1% of reading (from I_n to I0I_nA)
Ground Current Accuracy:	± 1.5% of I_n (0 to 55% of I_nA) ± 2% of I_n (55% I_n to I_nA) ± 2% of reading (from I_n to 4 I_nA)

Discrete Inputs

Number of inputs:	2 programmable
Rating:	1.2 VA @ 120 Vac Maximum off = 36 Vac Minimum on = 86 Vac

Output Contacts

Number of Outputs:	4 form C, programmable
Momentary:	Make 30 A ac/dc for 0.25 sec. Break 0.25 A @ 250 Vdc (resistive) Break 5 A @ 120/240 Vac
Continuous:	5 A @ 120/240 Vac 5 A @ 30 Vdc

Analog Output

Rating:	± 4 to 20 mA, programmable
Maximum Load:	1 kilohm
Accuracy:	1%

Motor Overload Protection (I^2t)

Full Load Amps:	10 to 3,000 A
Locked Rotor Current:	300 to 1,200% FLA
Locked Rotor Time:	1 to 120 sec.
Ultimate Trip Current:	85 to 150% FLA
Phase CT ratio:	10 to 4,000: I_n
Ground CT ratio:	10 to 4,000: I_n
Timing Accuracy:	The greater of ± 2.5% or ± 100 ms for current > 1.1 X UTC

Trip Setting Ranges

Ground Fault (GF):	Off, 2% to 55% of CT ratio primary
GF Start Delay:	2 to 60 cycles
GF Run Delay:	0 to 60 cycles
Timer Accuracy:	± 2.5 cycles, -1/2 cycle
Instantaneous Overcurrent:	Off, 300 to 1,600% FLA
IOC Start Time Delay:	2 to 60 cycles
Timer Accuracy:	± 2.5 cycles, -1/2 cycle
Jam Trip:	Off, 100 to 1,200% FLA
Underload Trip:	Off, 6 to 90% FLA
Phase Unbalance Trip (I):	Off, I_2/I_1 = 4 to 40%
Start Delay Timers:	0 to 120 sec. - underload and phase unbalance 0 to 1,200 sec. - jam
Run Delay Timers:	0 to 240 sec.
Timer Accuracy:	± .5% + 250 ms For phase unbalance, add 200 ms for zero setting For underload, add 480 ms for zero setting

Alarm Setting Range

Ground Fault:	Off, 2% to 55% CT Ratio
Overload I^2t:	Off, 60 to 99% I^2t
Jam:	Off, 100 to 1,200 %FLA
Underload:	Off, 6 to 90% FLA
Phase Unbalance:	Off, 4 to 40% I_2/I_1
Run Delay Timers:	Off, 0 to 240 sec.

Start Control Functions

Starts per Time:	1 to 10 starts
Time for Starts per Time:	Off, 1 to 240 minutes
Time Between Starts:	Off, 1 to 240 minutes
Number of Cold Starts:	1 to 5 starts
Motor Transition Current:	10 to 300% FLA
Time for Transition:	0 to 1,200 sec.
Incomplete Sequence Timer:	Off, 1 to 240 sec.
Long Acceleration Timer:	Off, 1 to 1,200 sec.
Antibackspin Timer:	Off, 1 to 3,600 sec.

RTD Inputs (Requires URTD module)

Sensor Types:	10 ohm copper 100 ohm nickel 120 ohm nickel 100 ohm platinum

URTD Module Communications

Interface:	Plastic optical fiber (preferred) Electrical (3-wire)
Fiber Optic Cable:	Type HFBR-ELS (length) - precut low-loss with connectors Type HBFR-EUS (length) - bulk low-loss without connectors Type HBFR-RLS (length) - standard-loss, acceptable for <10 m

SECTION 6 - INSTALLATION AND WIRING

6.0 Mounting the MP-3000 Motor Protection Relay

The following subsections describe the mounting of the MP-3000 motor protection relay, and its optional URTD and PONI communications modules.

6.0.2 Mounting Locations

Mount the unit vertically on a flat panel. The location should be as free as possible of water, chemicals, dust, and excessive heat and vibration. The panel should protect the User from accidental contact with live terminals on the back of the MP-3000. A 0.125-in. (3.18-mm) steel panel or door, solidly grounded, is recommended.

Before actually cutting the panel, check the required three-dimensional clearances for the MP-3000 case, particularly behind the panel. Figures 6.2 and 6.3 show these clearances. If mounting the unit on a swinging door, check the swinging clearance of rear projections and wired connections.

Figure 6.1 shows dimensions for the panel cutout and mounting holes. Cutout tolerances and mounting screw hole placement are critical. In particular, the tolerance of the horizontal dimension between the center of the mounting holes and the vertical edge of the cutout must be between 0 and +0.050 in. (+1.273 mm).

NOTE: The cutout is the same as for the previous-generation IQ 1000 II and MP-3000 motor relays, and other Eaton IQ products of this case size. The six mounting holes that secure these older products are still correctly located for the MP-3000, but the four additional new holes should be added.

Secure the MP-3000 to the panel with the special self-tapping plastic screws using moderate torque - 8 in.-lbs (0.9 N-m). Use the 0.375-in. (9.5-mm) long screws supplied with the MP-3000 to mount the unit on a 0.125-in. (3.18-mm) panel. Do not attempt to tap the screw holes, and do not use machine screws.

6.0.1 Mounting the URTD Module

The optional URTD module provides temperature data to the MP-3000 from up to 11 RTDs embedded in the motor and driven equipment. Refer to URTD I.L. 17367 for further information.

The URTD module may be mounted either on the back of the MP-3000 by using the URTD mounting bracket and machine screws (supplied with the URTD module), or mounted remotely from the MP-3000. If mounting the URTD module on the back of the MP-3000, see Figure 6.3 for overall depth dimensions. Figure 6.4 shows the URTD standalone mounting dimensions.

Consider the benefit of mounting the URTD module away from the MP-3000, as close as possible to the motor. The RTD wiring, consisting of a large bundle of wires, is thus much shorter. The URTD conveys multiplexed temperature data back to the MP-3000 via a single optical fiber (recommended), or by a 3-wire communications conductor. The URTD may be placed up to 400 ft (121.9 m) from the MP-3000 with the optical fiber connection (recommended), or up to 499 ft (152 m) away with a wired communications connection. Note that the URTD requires 120 Vac power (6 VA) at its remote location. It may be mounted in any orientation.

6.0.3 Mounting the PONI Communications Module

Refer to Section 10 for a description of the various types of optional PONI communications modules that can be used with the MP-3000. Check the I.L. for the selected PONI to confirm dimensions and communications network connection requirements.

Figure 6.3 shows clearance dimensions to the rear of an I-PONI, M-PONI, or D-PONI. An E-PONI is 0.5 in. (12.7 mm) deeper.

The PONI, if used, is always mounted on the back of the MP-3000. If no URTD is mounted there, use the mounting bracket supplied with the MP-3000, as shown in Figure 6.3. The bracket gives a convenient space to run CT wires underneath the PONI to the adjacent CT terminal block.

If a URTD is mounted on the back of the MP-3000, the PONI piggybacks directly to the URTD module as shown. Use the machine screws supplied with the PONI in the molded plastic mounting holes of the URTD.

6.1 Wiring—General Information

When routing wires between the starter and the associated machine or process equipment, follow these guidelines:

- Do not route the control or RTD wiring through the high-voltage compartment of the motor starter. However, the starter manufacturer may be able to recommend or provide specific measures for doing this if it is really necessary.
- Separate the lower voltage (120 Vac) from the higher voltage (440 Vac or higher) conductors as much as possible. In general, maintain a minimum distance of 1.5 ft (45 cm) between the two types.
- Any low-voltage control wiring routed out of the motor starter cabinet should be at least #14 AWG (2.6 mm^2) stranded copper wire.
- Communications circuits may use thinner conductors, as recommended in installation literature for those circuits.

⚠ WARNING

BEFORE WORKING WITH THE WIRING, MAKE SURE POWER IS DISCONNECTED FROM THE MOTOR STARTER, MP-3000, AND ALL REMOTE CONNECTIONS, INCLUDING CONTACT OUTPUT CONTROL CIRCUITS AND REMOTE INPUT CONTACTS. OTHERWISE, HAZARDOUS VOLTAGES COULD CAUSE INJURY OR DEATH. ALSO, UNEXPECTED MOTOR CONTROL ACTION COULD INJURE PERSONNEL OR DESTROY EQUIPMENT.

Figure 6.5 shows rear terminal connections of the MP-3000.

Connect terminal 5 to the closest solid electrical-safety grounding point with a heavy wire or braid (#14 AWG [2.6mm^2] or larger). Do not use a current-carrying or neutral conductor for this grounding. Also, do not tie terminal 5 to neutral terminal 7 at the relay. Note that terminal 5 is internally connected to the outer case and to the conductive faceplate of the relay.

6.1.1 CT Wiring

Carefully read the advice in Section 5.1.5 on the choice of CT ratios for a particular motor application. An inappropriate CT ratio results in poor measurement accuracy and limited protection. More serious errors in ratio choice make it impossible to set the relay properly.

Connect the phase and optional ground CTs as shown in Figure 6.6. Pay attention to the phase identification and sequence, and check for consistent polarity among the three phases. The MP-3000 may not allow the motor to run, and cannot protect the motor properly, if two phases are swapped or if the polarity of any CT is reversed with respect to the other two.

Pass the motor phase conductors through the window of the flux-canceling ground CT. The ground CT need not have any particular polarity relationship to the phase CTs.

6.1.6 URTD Wiring

Connect a source of 120 Vac only to the power terminals of connector J3 on the URTD module. Connect either terminal 16 or terminal 32 (but not both) to a non-current-carrying safety ground.

Table 6.1 Eaton Cutler-Hammer Agilent Technologies Cabling.

Length (Meters)	Catalog Number	Number
1	MPFO-1	HBFR-ELS001 or HBFR-RLS001
5	MPFO-5	HBFR-ELS005 or HBFR-RLS005
10	MPFO-10	HBFR-ELS010 or HBFR-RLS010
25	MPFO-25	HBFR-ELS025
50	MPFO-50	HBFR-ELS050
75	MPFO-75	HBFR-ELS075
76	MPFO-76	HBFR-ELS076
100	MPFO-100	HBFR-ELS100
120	MPFO-120	HBFR-ELS120
Uncut Fiber	Not Applicable	HBFR-EUS (length)

Figure 6.7 shows connections between the URTD and the MP-3000. Use either the optical fiber or the electrical 3-wire connection. It is not necessary to connect both. If both are connected, the MP-3000 uses data from the optical fiber. It defaults to the wired connection, only if the fiber is removed or fails.

NOTE: The optical fiber is the much-preferred method of transmitting temperature data from the URTD to the MP-3000. It is also easier to install.

Preassembled plastic optical fibers with connectors can be ordered from Eaton Inc., or from any distributor of Agilent Technologies® optical fiber products.

In addition, these same distributors offer long rolls of cable with connectors that can be installed in the field. Some distributors will make custom lengths to order.

The fiber length should not exceed 400 ft (121.9 m). For long runs over 33 ft (10 m), be sure to use H-P extra low loss plastic fiber HBFR-ELS or -EUS. Do not splice fiber. Maximum short-term pulling force is 11.3 lbf (50 N).

Surplus length of a precut fiber causes no problems. Simply coil and tie the excess fiber at a convenient point. Avoid high tie pressure. The bending radius of the fiber should be greater than 2 in. (50.8 mm).

The fiber terminations simply snap into or out of the connectors of the URTD and MP-3000.

When using 3-wire shielded cable, wire according to the connection guidelines in Table III of the Universal RTD Module IL 17367. The 3-wire shielded cable should be #16 AWG (1.31 mm^2) or #18 AWG (0.832 mm^2). Connect the cable shield *only* at the MP-3000 end, at terminal 23. Insulate the shield, and do not connect at the URTD end.

⚠ CAUTION

IF THE MP-3000 IS SUPPLIED FROM 240 VAC, THE URTD COMMUNICATIONS COMMON TERMINAL 22 IS AT 120 VAC WITH RESPECT TO THE SUPPLY NEUTRAL.

The maximum cable length is 500 ft (152 m).

6.1.7 Wiring RTDs to the URTD Module

Consult URTD Module Instruction Leaflet I.L.17367.

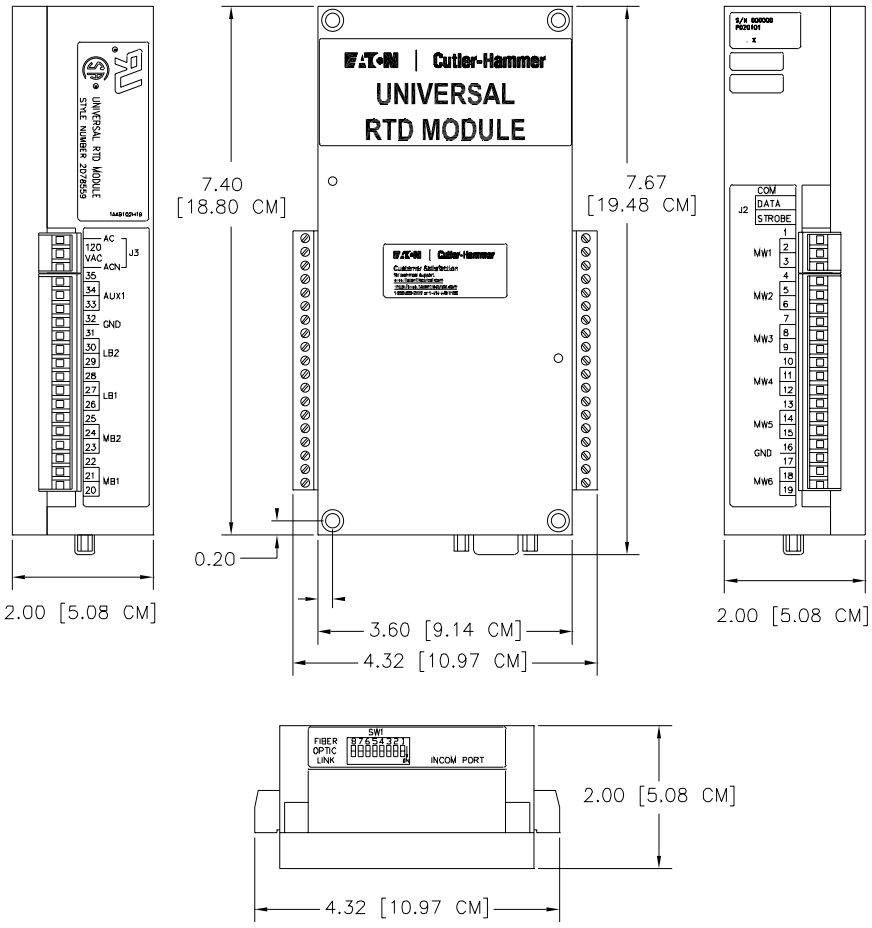
Three URTD terminals are provided for each RTD input. Terminals 1-15 and 17-19 are inputs for up to 6-winding RTDs. Terminals 20-25 accept up to two motor bearing RTDs. Terminals 26-31 accept up to two load bearing RTDs. Terminals 33-35 accept an auxiliary RTD.

The three terminals for any unused RTD input channel should be wired together. For example, if MW5 and MW6 are unused, MW5 terminals 13-15 should be wired together; and MW6 terminals 17-19 should be separately wired together.

Figure 6.9 shows the wiring of RTDs to the URTD inputs. Use #18 AWG, three-conductor shielded cable. Note the connection rules in the figure. When making connections to a two-lead RTD, connect two of the cable conductors to one of the RTD leads as shown. Make this connection as close to the motor as possible. Connect the third cable conductor to the remaining RTD lead.

Connect the shield and drain wire, along with the one cable conductor, to the middle of the three RTD input channel terminals, as shown in Figure 6.9. The RTD cable shield should be connected only at the URTD end, and insulated at the RTD end. The RTDs themselves must not be grounded at the motor.

Remember to set the URTD module DIP switches according to the types of RTDs in each of the winding, motor bearing, load bearing, and auxiliary groups. Refer to URTD Module Instruction Leaflet I.L. 17367.



DIMENSIONS IN INCHES [CM]

Figure 6.4 Universal RTD Module Mounting Dimensions.

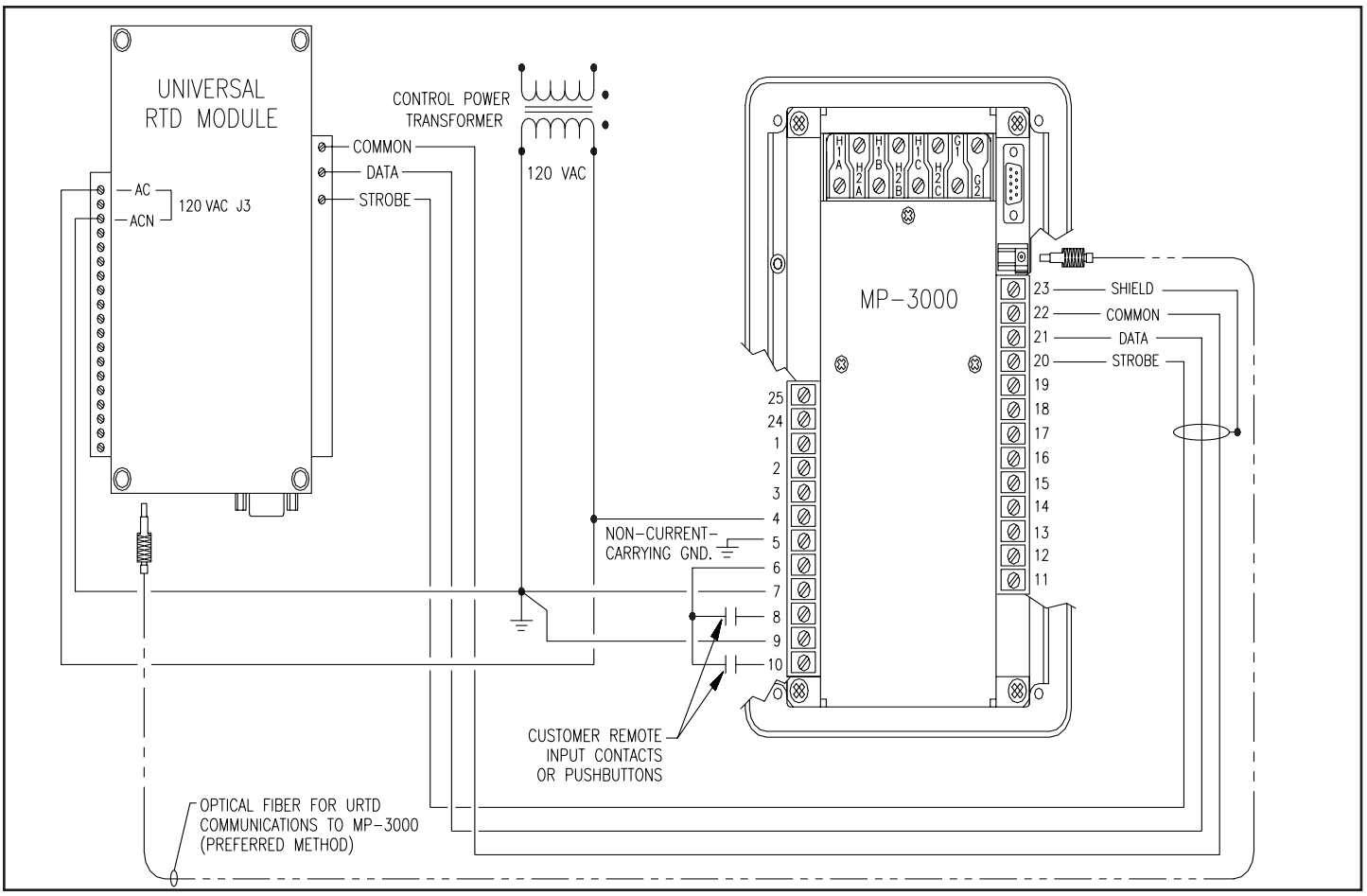


Figure 6.7 Typical AC Supply and URTD Wiring.

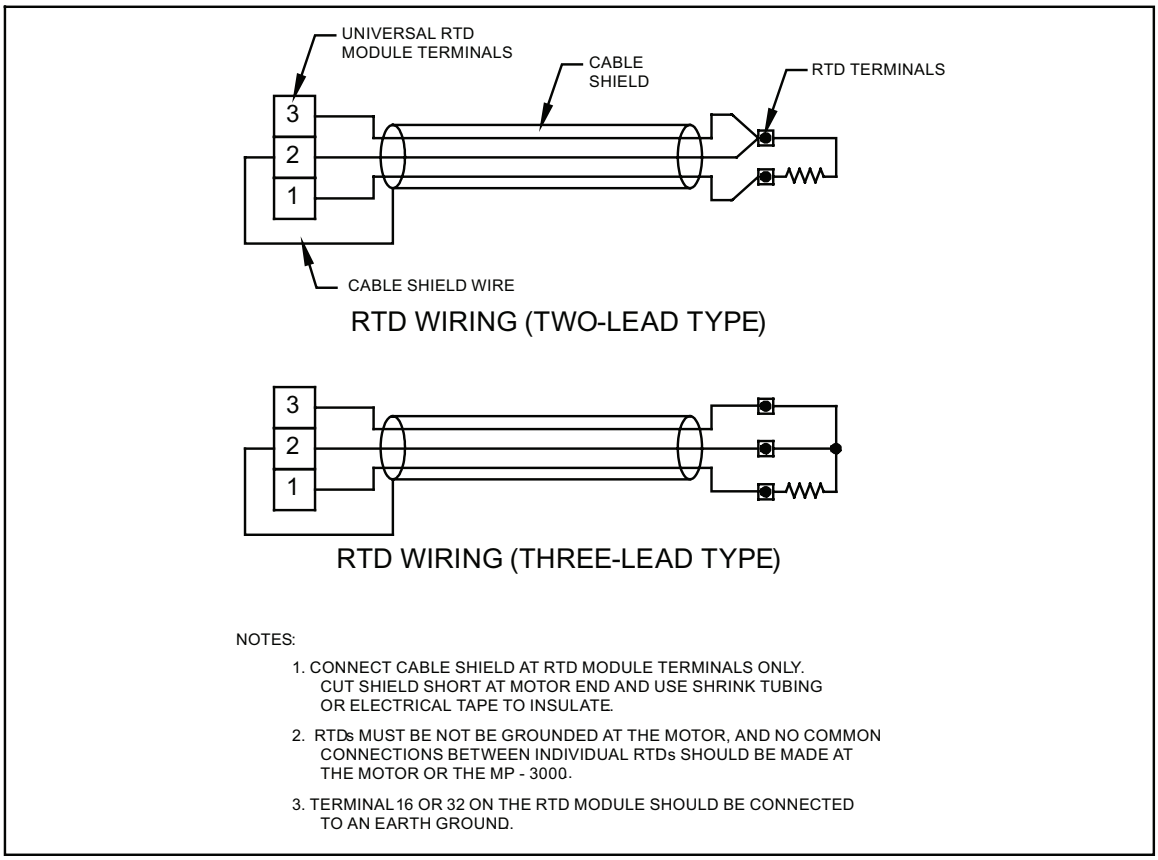


Figure 6.9 Wiring to URTD Module.