

TEST BLOCK MiCOM P991, P992 & P993

Test block, multi-finger test plug and single-finger test plug



P991 TEST BLOCK

P992 MULTI-FINGER TEST PLUG

P993 SINGLE-FINGER TEST PLUG

The P991 test block, designed within all the protection ranges, offers safe and preconfigured facilities for monitoring and secondary injection testing in any power system protection scheme when used with the P992 multi-finger test plug.

A single-finger test plug is also available, type P993, that provides a safe and isolated means solely for the verification of CT circuits.

The P991 test block features visible automatic line CT shorting prior to the relay CT circuit being broken on insertion of a P992 multi-finger test plug.

Up to three stages of sequential contact operation are provided by the P991 test plug. To avoid accidental tripping an extraction stop facility is included.

The P991 test block carries 14 circuits. Each circuit is brought out to separate pairs of 4mm screw terminations at the rear of the test block

MODELS AVAILABLE

> **P991:** Standardized preconfigured test block

> **P992:** Multi-finger test plug

> **P993:** Single-finger test plug for CT current verification



CUSTOMER BENEFITS

- Standardised test block
- Test block can be mounted adjacent to any relay or system
- Automatic CT shorting
- Test block removes need to disturb protective system wiring for testing
- Single finger test plug provides a safe, isolated, means for CT current monitoring
- CE marked
- UL listed

APPLICATION

The P990 series allows easy wiring verification and aids commissioning of relays and instruments. It can be used as a test facility either for individual relays or a protection scheme. The P991 test block offers facilities for monitoring and secondary injection testing of power system protection schemes and measurement schemes when used with the P992 multi-finger test plug.

Access to current transformers (CT), voltage transformers, auxiliary supply, plant status and trip circuits is possible without the need to disturb the relay or instrument wiring.

On insertion of the P992 multi-finger test plug, the shorting of adjacent line CT connections always takes place before breaking the connection to the relay or instrument, in order to prevent open circuit CTs.

A P993 single-finger test plug is also available for onload verification of the current flow in individual CT circuits routed through the P991 test block, 5kV rms isolation is provided.

DESCRIPTION

MiCOM P991 test block

The P991 test block houses fourteen cassettes.

The cassettes contain contact pairs that allow circuits to be completed via the screw terminals at the rear.

There are specific types of cassette to suit any circuit; these are preconfigured

MiCOM P992 multi-finger test plug

Access to the circuits connected to the P991 test block is provided by the P992 multi-finger test plug. The P992 is compatible with any configuration of the P991.

The P992 enables convenient wiring of the test equipment prior to insertion into the test block.

Use of the P992 ensures that the circuits operate in a predetermined sequence, according to the application, before breaking the connection between the circuit and line connection.

Each socket is numbered at the front and relates to the corresponding terminal on the rear of the test block

Current transformer shorting

Operation of the P991 test block with the P992 multi-finger test plug ensures automatic shorting of all the current transformer circuits connected to the P991 before allowing access to the relays.

This prevents open circuiting of current transformers and the consequential unwanted generation of dangerously high voltages.

MiCOM P993 Single-finger test plug

The P993 single-finger test plug is provided for the verification of CT circuits. It has been designed solely for use with the CT cassette of the P991 test block.

For maximum safety, the P993 converts the monitored current into a voltage which can be measured using a high impedance voltmeter.

The isolation between contact-fingers and 4mm output sockets is 5kV rms.

Two switch selectable current ranges are available:

- 0 to 2A (I) - scale 1V = 1A
- 2A to 20A (II) - scale 1V = 10A.

The insertion of the P993 will not cause the CT circuit to be open circuited.

SELECTION

The required configuration for the P991 test block must be specified at the time of the order.

The sequence of operation of the cassettes is defined by circuit type as described below.

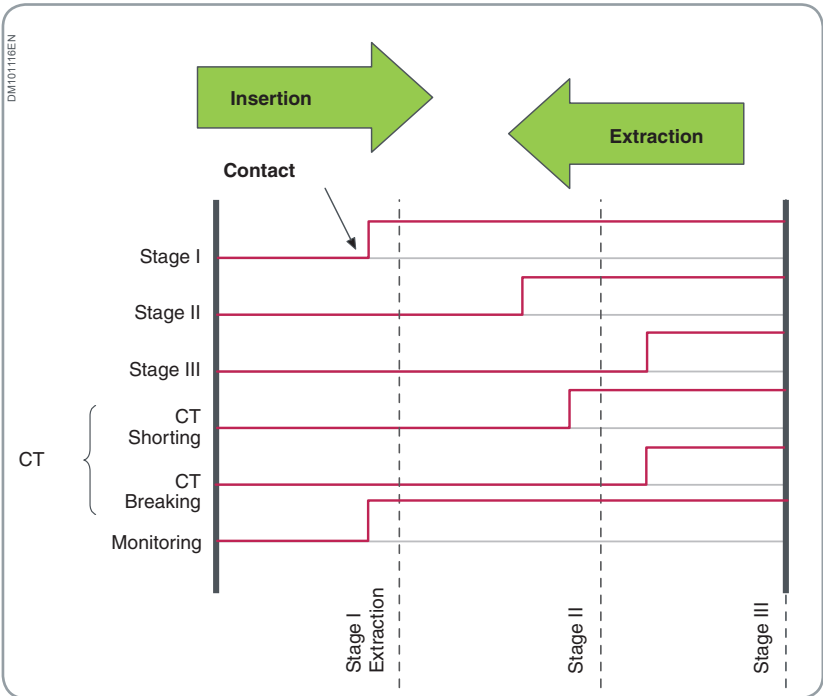
OPERATING SEQUENCE

With the various circuits connected through a test facility, it is sometimes necessary to provide a sequence of operation during test plug insertion and extraction. This is achieved by use of different cassette types.

There are three stages of operation of cassette contacts in the P991 test block. Stage I contacts are the first to be opened followed by Stage II then Stage III.

Refer to figure 1 - Sequence diagram.

- 1st Stage opening normally closed contacts of Stage I cassettes.
- 2nd Stage opening normally closed contacts of Stage II cassettes. Shorting adjacent CT cassettes in a group.
- 3rd Stage break CT circuit connection to relay. Open normally closed contacts of Stage III cassettes. Make connection with normally open cassette contacts.



Sequence diagram during insertion and extraction of P992

CIRCUIT TYPES

Stage I cassette

This has normally closed contacts and is the first to be opened when inserting the P992 multi-finger test plug. This type of circuit can be used to provide trip circuit isolation or to remotely indicate that the protection is out of service. It may also be used for preventing intertripping, and breaking both watchdog and I/O circuits.

Stage II cassette

This has normally closed contacts and is the second to be opened when inserting the P992 multi-finger test plug. This type of circuit can be used for removing the auxiliary supply and for VT and I/O circuits.

Stage III cassette

This has normally closed contacts and is the third to be opened when inserting the P992 multi-finger test plug. It is suitable for VT and I/O circuits.

CT cassette

This has normally closed contacts and protects the line CT secondary from being open circuited, preventing the consequential generation of dangerously high voltages. The CT cassette contacts are automatically shorted to adjacent CT cassette contacts, in the same group, when inserting the P992 multi-finger test plug. For sequence of operation see Figure 1.

This cassette should only be used for CTs. CTs should not be connected to other cassette types as these do not provide automatic CT shorting.

Note: Insertion of a P993 single finger test plug does not cause CTs connected to adjacent cassettes to be shorted together. CT current can be safely monitored using a P993 inserted into a CT cassette

Monitoring cassette

The two terminals of this cassette are permanently isolated from each other. This provides the facility to monitor two independent parameters eg. + and - auxiliary supply terminals. When connected to the positive and negative terminals of the auxiliary power supply this provides access for monitoring and the supply of power to test equipment.



Caution should be exercised when using this cassette type, since between stage I and stage III, one side of the plug contact will be momentarily connected with inverse polarity.

The monitoring cassette should only be used for monitoring purposes. Damage could be caused if it is used to power any products using EMC input filtering or ancillary equipment with an earthed supply input terminal.

Cassette identification and labelling

Cassette types may be identified at the front of the test block:

| Cassette | Symbol | Background colour |
|------------|--------|-------------------|
| CT | | Orange |
| Monitoring | // | White |

A space is provided for a customer defined labels on the cover to identify circuits

INSTALLATION AND USE

The generic safety guide R4129 should be read before installing or using the P990 series test block or test plugs.

Test block

No cassettes other than CT cassettes shall be used for connection to CT circuits.

Only the odd numbered terminals should be used for P991 test block line side connections, (e.g. line CT connections), to maintain automatic CT shorting. Even numbered terminals are generally designated as the relay/instrument side of the block.



This product must not be disassembled.

PRODUCT USE

Test block

Foreign objects must not be inserted into the P991 test block as this may compromise the safety features designed into the product. Only the P992 multi-finger test plug or P993 single-finger test plug should be used to access the test block connections at the front of the panel.



Warning

At any stage in handling of the test plugs care must be taken not to make contact with test plug-fingers as they may be connected to live equipment either via the test block or test equipment.

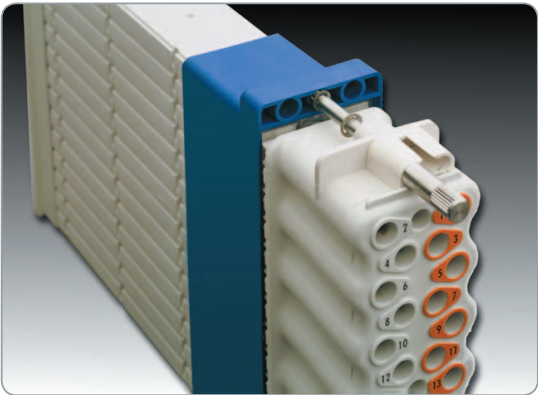


Multi-finger test plug

Do not use P992 to break normally closed live circuits without a shorting link in place.
Do not short-circuit the terminals of normally open monitor cassettes.

Care must be taken when removing the P992 from the P991 test block to avoid contact bounce, which may be experienced during rapid withdrawal.

When the P992 is not in use, it should be stored in its protective case to maintain the test plug in a serviceable condition.



Before use, the insulation of test leads should be visually checked for damage.

Figure 1

The retaining nuts should be hand tightened after insertion of the P992, to ensure that the P992 cannot be accidentally withdrawn.

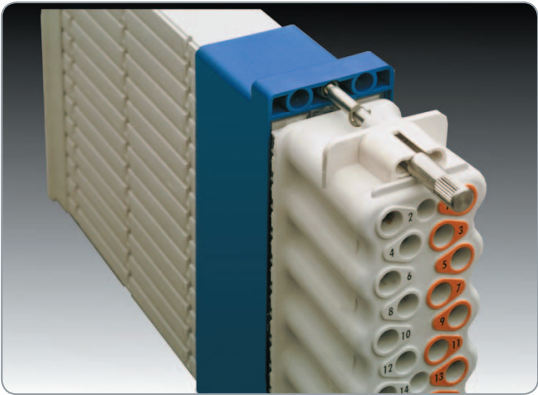


Figure 2

To use the extraction stop feature, first centralise the extraction stops about the nuts.

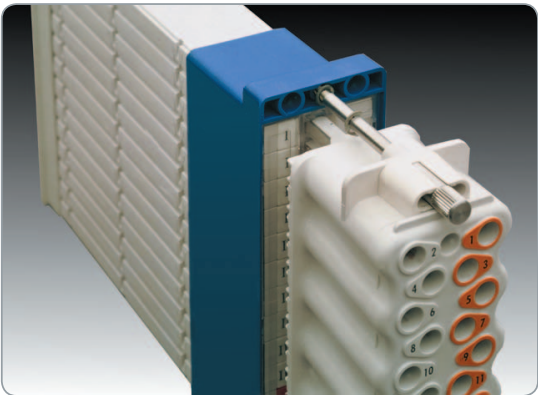


Figure 3

Then pull out the P992 until it stops in the stage 1 position.

Single-finger test plug

It is safe to insert the single-finger test plug into a test block with or without a voltmeter connected to it.

The single-finger test plug should be used in conjunction with a high impedance voltmeter (>1MOhms).

Only one single-finger test plug should be used within any one group of CTs at any one time.

There are two ranges of current measurement on the single-finger test plug. Each range has a scaling factor as detailed below.

| P993 | Range (A) | Scaling factor for 2V range |
|------|-----------|-----------------------------|
| 1 | 0-2 | 1V=1A |
| 2 | 2-20 | 1V=10A |

Note: When performing current measurements using the single-finger test plug the output should not exceed 2V as the accuracy will be adversely affected. If necessary, change to the higher test plug setting.

Care must be taken when removing the P993 from the P991 test block to avoid contact bounce, which may be experienced during rapid withdrawal.

When the P993 is not in use, it should be stored in its protective case to maintain the test plug in a serviceable condition.



The single-finger test plug must only be inserted in CT cassettes to avoid both maloperations and personal safety hazards.

TECHNICAL DATA SUMMARY

Test block and multi-finger test plug

- > Test block circuit withstands
 - 20A continuous (UL 5A nominal)
150A for 10s
500A for 1s
- > Multi-finger test plug circuit withstands
 - 20A continuous (UL 5A nominal)
50A for 10s
100A for 3s
150A for 1s
- > Maximum working voltages
 - 300V ac rms or dc relative to earth/neutral (UL 250V ac rms or dc)
 - 600V ac rms or dc between any adjacent cassettes

Single-finger test plug

- > Accuracy
 - Setting range 0A to 2A : 1mA rms to 2A rms, ±5% of reading.
 - Setting range 2A to 20A : 2A rms to 20A rms, ±5% of reading
- > Burden
 - Less than 10mΩ on both setting ranges
- > Current withstands
 - 20A continuous (UL 5A nominal)
150A for 10s
500A for 1s

Test block and test plugs

> EMC compliance



This product has been classified as electromagnetically benign and is therefore excluded from the European Community EMC Directive 89/336/EEC.

> Product safety



Compliance with the European Community Low Voltage Directive 73/23/EEC, is demonstrated by reference to general safety standards: EN 60255-5: 2001

Relevant clauses of
EN 61010-1: 2001
EN 60950-1: 2001

These products are Listed under UL file number E155724

REAR TERMINAL RECOMMENDATIONS

Screws

| | |
|-------------------|-----------------------------|
| Size | M4 coarse thread x 7mm long |
| Material | Steel or brass |
| Plating | Nockel or passivated zinc |
| Tightening torque | 1.5 Nm nominal/2 Nm maximum |

Connectors

| | | |
|------------------------------------|------------------------------|-------------|
| Type M4 ring | 90° | Straight |
| Supplier | JST | JST/AMP |
| Terminal Connector Combinations | 2 1 0 | 0 1 1 |
| Pre-insulated connector (red) | Wire range 0.25mm² - 1.65mm² | |
| Pre-insulated connectors (blue) | Wire range 1.04mm² - 2.63mm² | |
| Pre-insulated (sleeved) connectors | Wire range 2.64mm² - 6.64mm² | |

UL recognized wire and crimps must be used to maintain any UL approval.

Case mounting screws

| | |
|-------------------|---|
| Size/Material | M4 sems steel thread forming 12mm long (could use steel or brass M4 screws into pre-tapped holes) |
| Plating | Nickel or passivated zinc |
| Tightening torque | 1.5 Nm nominal/2 Nm maximum |

DISPOSAL AND RECYCLING

Disposal

It is recommended that incineration and disposal to watercourses is avoided.
The product should be disposed of in a safe manner according to the regulations in the country of operation.

Recycling

For recycling purposes, the plastic parts should be seperated according to the plastic identity information on each moulding.

MiCOM P991 TEST BLOCK COVER

To achieve IP52 dust/water protection the cover must be fitted.

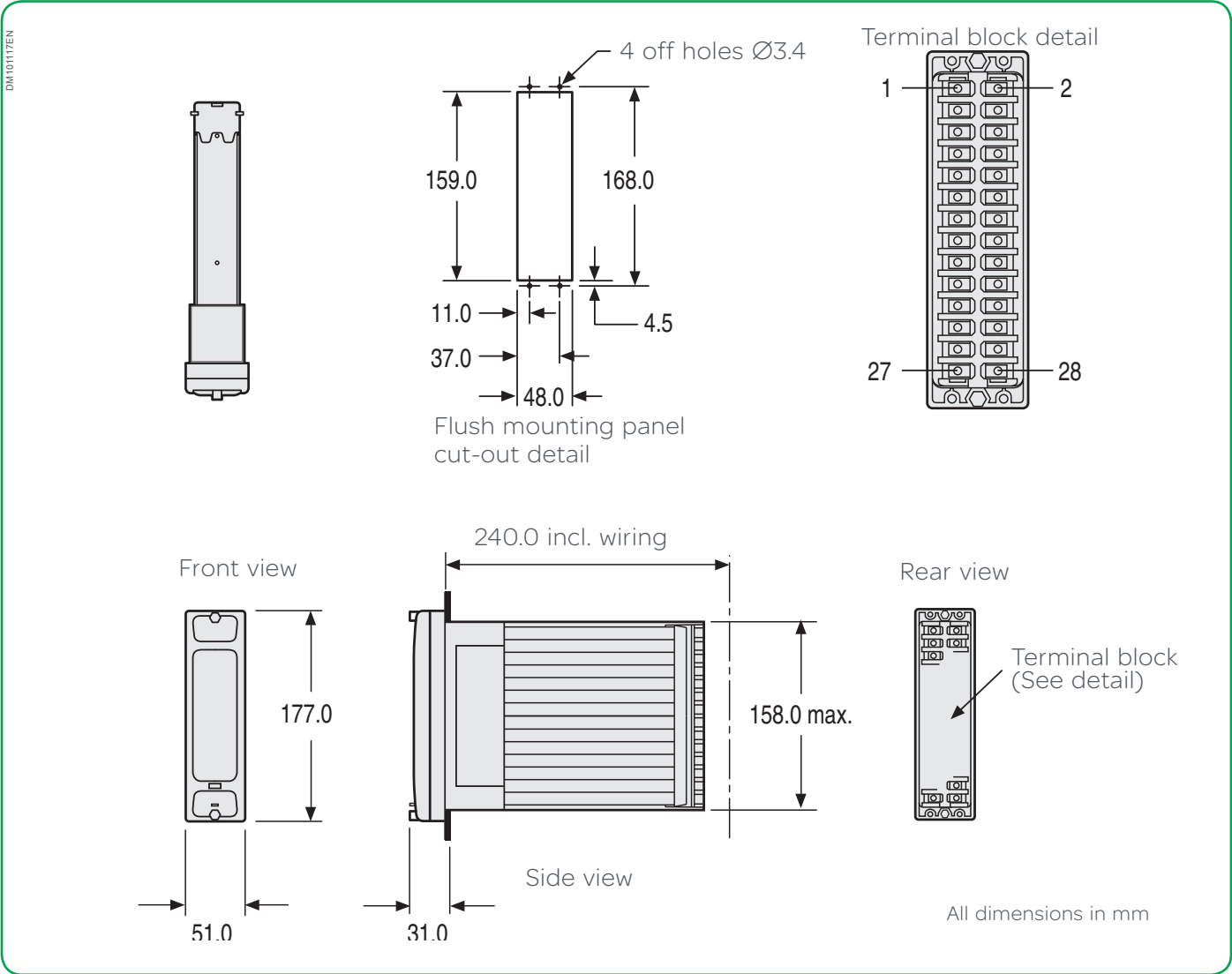
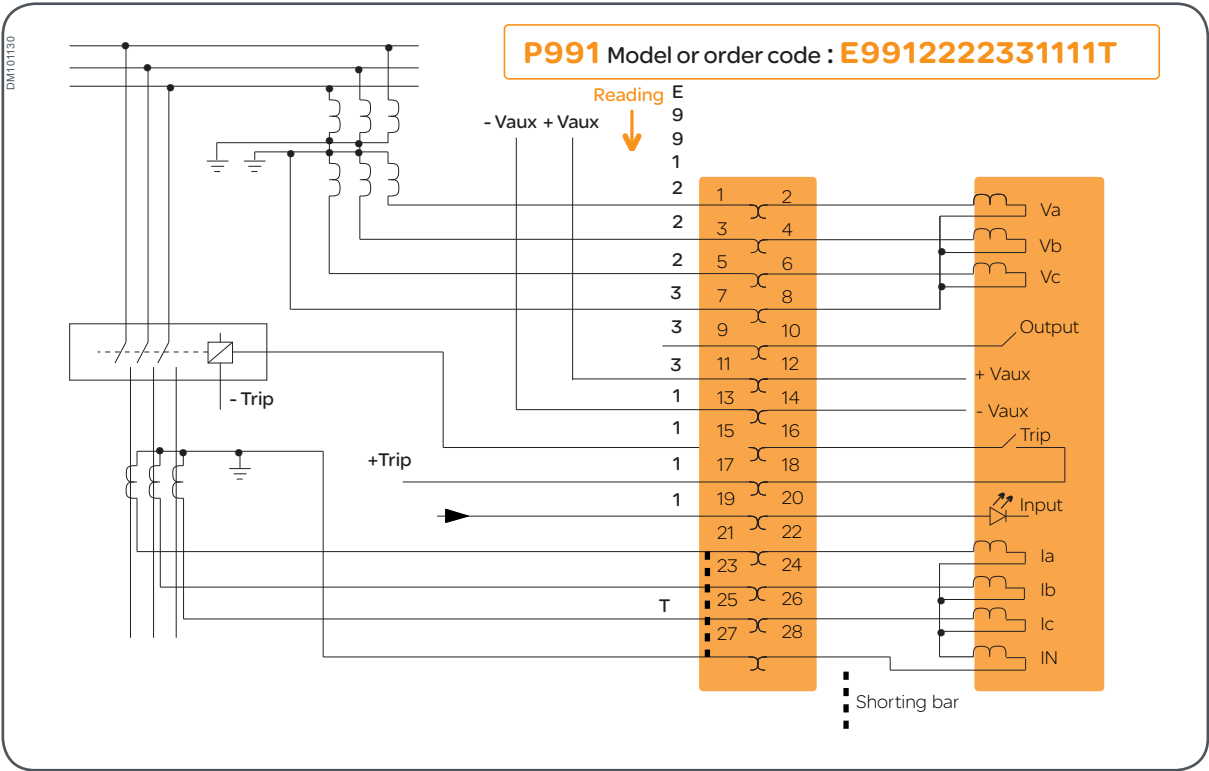


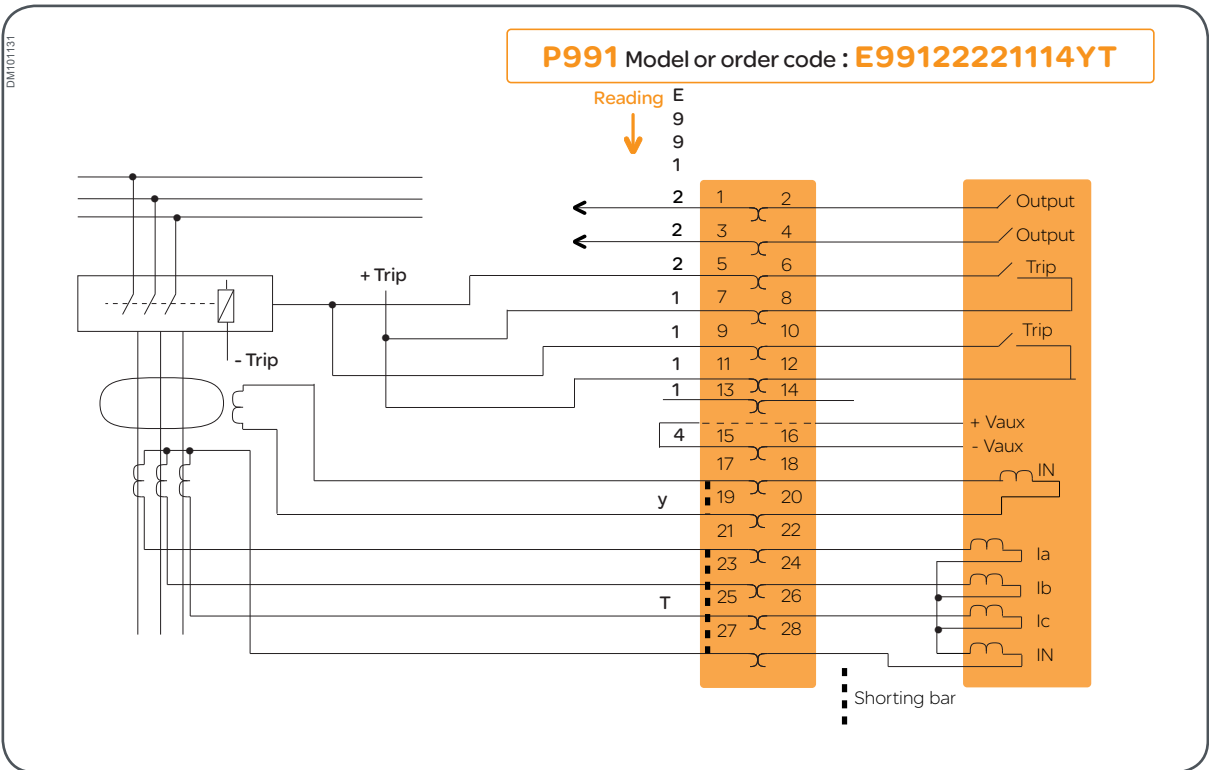
Figure 4
Mounting details



TYPICAL APPLICATION USING CURRENT, VOLTAGE, TRIP CIRCUIT, AUXILIARY SUPPLY, LOGICAL INPUT, OUTPUT CONTACT.



TYPICAL APPLICATION WITH THREE-PHASE AND SENSITIVE EARTH FAULT RELAY.



MiCOM P990 SERIES HOW TO ORDER ?

| PRODUCT REFERENCES | ORDERING CODES | 1 | 2 | 3 | 4 | Y | T | X |
|---------------------|-----------------|----|----|---|---|---|---|---|
| P9911111111111111C | E991ALL1 | 14 | | | | | | |
| P991111112222222C | E9916182 | 6 | 8 | | | | | |
| P9911111122228889C | E991111112222T | 6 | 4 | | | | 1 | |
| P9911111222228889C | E991111122222T | 4 | 6 | | | | 1 | |
| P9911118944898922C | E9911111Y44YY22 | 4 | 2 | | 2 | 3 | | |
| P9911133332888989C | E99111333322TY | 2 | 2 | 4 | | 1 | 1 | |
| P9912222111898889C | E9912222111YT | 4 | 4 | | | 1 | 1 | |
| P9912222114118889C | E991222211411T | 5 | 4 | | 1 | | 1 | |
| P9912222114898889C | E9912222114YT | 3 | 4 | | 1 | 1 | 1 | |
| P9912222131118889C | E991222213111T | 5 | 4 | 1 | | | 1 | |
| P9912222111898889C | E9912222111YT | 3 | 5 | | | 1 | 1 | |
| P991222222222222C | E991ALL2 | | 14 | | | | | |
| P9912222222228889C | E991222222222T | | 10 | | | | 1 | |
| P9912222228888889C | E9912222222X | | 7 | | | | | 1 |
| P9912222233118889C | E991222223311T | 2 | 6 | 2 | | | 1 | |
| P9912222289898889C | E99122222YYT | | 6 | | | 2 | 1 | |
| P991222241118889C | E991222241111T | 4 | 5 | | 1 | | 1 | |
| P9912222331118889C | E9912222331111T | 4 | 4 | 2 | | | 1 | |
| P9912222331128889C | E9912222331122T | 2 | 6 | 2 | | | 1 | |
| P9912222892228889C | E9912222Y2222T | | 8 | | | 1 | 1 | |
| P9912233331118889C | E9912233331111T | 4 | 2 | 4 | | | 1 | |
| P9912233331128889C | E9912233331122T | 2 | 4 | 4 | | | 1 | |
| P9912288891118889C | E99122T1111T | 4 | 2 | | | | 2 | |
| P991888911118889C | E991T111111T | 6 | | | | | 2 | |
| P9918889222222211C | E991T222222211 | 2 | 8 | | | | 1 | |
| P9918889331118889C | E991T331111T | 4 | | 2 | | | 2 | |
| P9918889333311111C | E991T333311111 | 6 | | 4 | | | 1 | |
| P9918889888922222C | E991TT22222 | | 6 | | | | 2 | |
| P99188898889228889C | E991TT22T | | 2 | | | | 3 | |
| P99188898889888911C | E991TTT11 | 2 | | | | | 3 | |
| P9918889892228889C | E991TY2222T | | 4 | | | 1 | 2 | |
| P99188898989228889C | E991TYY22T | | 2 | | | 2 | 2 | |
| P9918989892222222C | E991YYY222222 | | 8 | | | 3 | | |
| P9918989898922222C | E991YYYY22222 | | 6 | | | 4 | | |
| P99189898989892222C | E991YYYYY2222 | | 4 | | | 5 | | |
| P992C | E992 | | | | | | | |
| P993C | E993 | | | | | | | |

Built your P991 with a Cassette selection from number 1 to Cassette number 14 using the list on the left to create a P991 adapted to your application.

Code 1: Stage I cassette (Trip)

Code 2: Stage II cassette (VT)

Code 3: Stage III cassette (I/O or Power supply)

Code 4: Monitoring cassette (monitoring)

Code T: Set of 3 CTs with shorting bar
(replaces 8889, 4 cassettes)

Code Y: Single CT with shorting bar
(replaces 89, 2 cassettes)

Code X: Set of CTs
(replace 8888889, 7 cassettes)

Code ALL2: (replace 222222222)

Code ALL1: (replace 111111111)

Code 6: 6 time the next number
ex: 61 (replace 111111)

Code 8: 8 time the next number
ex: 82 (replace 2222222)

P991



P992

Multi-finger
test plug



P993

Single-finger
test plug



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