

ERP-UB. Protection and Relay Test Unit
(common for the relays modules type "ERP")



Available Relays Modules

(for use with the Protection and Relay Test Unit (ERP-UB))



ERP-SFT. Overcurrent and Earth Fault Relay Module



ERP-SDND. Directional/Non Directional Overcurrent Relay Module



ERP-PDF. Differential Protection Relay Module



ERP-MA. Feeder Management Relay Module



ERP-PD. Distance Protection Relay Module



ISO:9001-2000 Certificate of Approval. Reg. No. E204034



European Union Certificate



Certificates ISO 14001: 2004 and ECO-Management and Audit Scheme (environmental management)



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ERP-UB. Protection and Relay Test Unit

DESCRIPTION

This is a teaching unit which gives students theoretical and practical experience with several industrial relays.

It includes experiments investigating earth fault, overcurrent, differential, circulating current and distance numerical protection. The unit uses real industrial protection equipment and techniques, not simulation, and a variety of industrial relays specially adapted for educational use (see available relays).

This unit also covers relay setting and tripping characteristics, as well as grading and discrimination under fault conditions, and it allows students to compare individual relays characteristics and simultaneous comparison of any two relays to introduce the topic of discrimination.

Instrumentation, power supplies, transformers and load resistors are incorporated in the unit and has an user-friendly desk space for users to work on.

The relays are housed in modern, portable enclosures.

The test unit will support up to two relays at once. These can be different relays or both the same.

The relays are programmed either directly or using software, because this unit includes relays support software which enables users to program the relays modules on a suitable computer (computer not included) using software.

Students connect the relays to the console by plugging leads into terminals on the front panels, thus perform experiments and practices using the unit to set test conditions and control and monitor relay behaviour.

The unit and relay front panels have schematic diagrams which help users carry out and understand the experiments.



SPECIFICATIONS

Unit designed for comprehensive investigations into the theory and practice of electrical power system protection.

This unit is common for the relays modules type "ERP" and can use one or more relays.

Anodized aluminium structure. Panels and main metallic elements in stainless steel.

Floor-standing unit enabling wide range of protection relay investigations.

It uses genuine industrial relays, not simulations, with full range of safety features incorporated throughout.

Diagrams on the unit enable students to set up and perform practices and experiments with minimal supervision.

Comprehensive controls, transformers, supplies and instrumentation.

Modern, ergonomic and practical design which includes desk space for users or students to work on, and mounting area for relays.

It is supplied with relay support software.

Selection of up-to-date numerical protection relays, specially adapted for educational use. (See available relays).

Unit controls and instrumentations specifications:

- 0 to 10 A variable current supply.

- 0 to 220 V variable voltage supply.

- 2 fault limiting resistors.

- Timed fault application circuit breaker.

- Configurable tapped transformer with delta or star secondary.

- Variable three-phase load star connected.

- Variable three-phase load delta connected.

- 2 sets of three-phase voltage transformers.

- 4 sets of three-phase current transformers.

- Mains isolator.

Test circuits:

- Configurable transformer test circuit.

- Relay test area.

- Transmission line model (5 x 50 km).

Cables and accessories for normal operation.

Manuals:

This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance, Practices, including unit description and procedure.

EXERCISES AND PRACTICAL POSSIBILITIES

-A wide range of practices and investigations into the performance and characteristics of a variety of different industrial relays.

REQUIRED SERVICES

- Electrical supply: 380/415 V three-phase and neutral electrical supply fused at 16 A per phase.

DIMENSIONS AND WEIGHT

- Dimensions: 2500x1000x1800mm approx.

- Weight: 600 Kg. approx.

ERP-SFT. Overcurrent and Earth Fault Relay Module

DESCRIPTION

For use with the Protection and Relay Test Unit (ERP-UB), this relay enables investigations into protection and monitoring of transformers, transmission lines and distribution schemes.

The module mounts on the desk area of the Protection and Relay Test Unit and by using a multi-core cable and safety leads connects to the test unit.

The relay is housed in a modern and robust enclosure (steel box) with carrying handles.

The relay module is based on the Micom P122 industrial relay, enabling the students to set up different fault circuits on the Protection and Relay Test Unit. Students will use the keypad and display on the relay module to programme it to the setting needed for the tests. They can also use the relay support software and computer (available separately, not included in the supply) to programme the relay module. The relay module is then connected to the fault circuits so test can be performed.

Facility to test two relay modules at the same time because there are enough connections on the Protection and Relay Test Unit.



SPECIFICATIONS

For use with the Protection and Relay Test Unit (ERP-UB), to enable investigations into protection and monitoring of transformers, transmission lines and distribution schemes.

It enables a wide range of test and investigations and it demonstrates the latest relay technology.

Modern and robust enclosure (steel box) with carrying handles.

Modern industrial overcurrent and earth fault relay presented in an educational and teaching format.

The connections are via safety sockets.

The main functions:

- Three-phase earth and overcurrent: three independent stages, the first stage selectable from any of 12 IDMT curves, the remaining stages having a direct time characteristic (ANSI 50/51 and ANSI 50N/51N)

- Thermal overload protection (ANSI 49).

- High impedance restricted earth fault (ANSI 64N)

- Undercurrent (ANSI 37).

- Broken conductor detection (ANSI 46BC).

- Negative phase sequence overcurrent - two independent stages (ANSI 46)

- Selectable blocking.

- Circuit monitoring.

- Trend, fault and disturbance records.

The connection to the experimental circuit is via current transformers with ratio to suit the inputs of the relay.

It allows an effective demonstration of the effect of current and voltage transformer ratio, connection and rating on protective relays.

Accuracy: $\pm 5\%$

Current: 1 A (A.C.)

Frequency: 50 or 60 Hz.

Operating time: typically 10 ms to 25 ms.

Cables and accessories for normal operation.

Manuals:

This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance, Practices and connection information.

EXERCISES AND PRACTICAL POSSIBILITIES

-A wide range of practices and investigations into the characteristics and performance of an industrial overcurrent and earth fault relay.

REQUIRED SERVICES

- Protection and Relay Test Unit (ERP-UB).

DIMENSIONS AND WEIGHT

- Dimensions: 490x400x310 mm. approx.

- Weight: 10 Kg. approx.

ERP-SDND. Directional/Non Directional Overcurrent Relay Module

DESCRIPTION

A directional/non-directional overcurrent relay presented in an educational and teaching format.

For use with the Protection and Relay Test Unit (ERP-UB), this relay enables investigations into protection and monitoring of generator and transformer schemes, overhead lines, underground cables and backup on high-voltage systems.

The module mounts on the desk area of the Protection and Relay Test Unit and by using a multi/core cable and safety leads connects to the test unit.

The relay is housed in a modern and robust enclosure (steel box) with carrying handles.

The relay module is based on the Micom P127 industrial relay, enabling the students to set up different fault circuits on the Protection and Relay Test Unit. Students will use the keypad and display on the relay module to programme it to the setting needed for the tests. They can also use the Micom S1 software (supplied with the Protection and Relay Test Unit) and computer (available separately, not included in the supply) to programme the relay module. The relay module is then connected to the fault circuits so test can be performed.

Tests are performed using single relay, but there is the facility to test two relay modules at the same time because there are enough connections on the Protection and Relay Test Unit.



SPECIFICATIONS

For use with the Protection and Relay Test Unit (ERP-UB), to enable investigations into protection and monitoring of generator and transformer schemes, overhead lines, underground cables and backup on high-voltage systems.

It enables a wide range of test and investigations and it demonstrates the latest relay technology.

Modern and robust enclosure (steel box) with carrying handles.

Modern industrial directional/non directional overcurrent relay presented in an educational and teaching format.

The connections are via safety sockets.

The main functions:

Three independent stages of directional/non-directional phase overcurrent (ANSI 50, ANSI 51, ANSI 67). The first stage may be set to any of 12 IDMT curves, the remaining two having a direct time characteristic.

Undercurrent (ANSI 37).

Thermal overload protection (ANSI 49).

Negative phase sequence overcurrent (ANSI 46)

Overvoltage (ANSI 59).

Undervoltage (ANSI 27).

Directional/non-directional earth fault (ANSI 67N, ANSI 50N, ANSI 51N).

Creating fault and disturbance records.

Selectable blocking.

The connection to the experimental circuit is via current transformers with ratio to suit the inputs of the relay.

It allows an effective demonstration of the effect of current and voltage transformer ratio, connection and rating on protective relays.

Accuracy: $\pm 10\%$.

Current: 1 A (A. C.).

Frequency: 50 or 60 Hz.

Operating time: typically 10 ms to 25 ms.

Cables and accessories for normal operation.

Manuals:

This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance, Practices and connection information.

EXERCISES AND PRACTICAL POSSIBILITIES

-A wide range of practices and investigations into the performance and characteristics of an industrial directional/non directional overcurrent relay.

REQUIRED SERVICES

- Protection and Relay Test Unit (ERP-UB).

DIMENSIONS AND WEIGHT

- Dimensions: 490x400x310 mm. approx.

- Weight: 15 Kg. approx.

ERP-PDF. Differential Protection Relay Module

DESCRIPTION

This relay has to be used with the Protection and Relay Test Unit (ERP-UB), enables investigations into protection of transformers, autotransformers, generators and other apparatus with two windings.

A digital differential protection relay presented in an educational and teaching format.

The relay clearly demonstrates the characteristics of three-phase differential protection, and includes high stability during 'out-of-zone' faults, high-speed operation, zero-sequence current filtering for each winding, magnetising inrush restraint, amplitude and vector matching.

The module mounts on the desk area of the Protection and Relay Test Unit and by using a multi-core cable and safety leads connects to the test unit.

The relay is housed in a modern and robust enclosure (steel box) with carrying handles.

The relay module is based on the Micom P631 industrial relay, enabling the students to set up different fault circuits on the Protection and Relay Test Unit. Students will use the keypad and display on the relay module to programme it to the setting needed for the tests. They can also use the Micom S1 software and computer (available separately, not included in the supply) to programme the relay module. The relay module is then connected to the fault circuits so test can be performed.

Most tests are performed using single relays. However, there are enough connections on the Protection and Relay Test Unit to test two relay modules at the same time.



SPECIFICATIONS

For use with Protection and Relay Test Unit (ERP-UB) , to enable investigations into protection of transformers, autotransformers, generators and other apparatus with two windings.

It enables a wide range of test and investigations and it demonstrates the latest relay technology.

It demonstrates the characteristics of three-phase differential protection.

Modern and robust enclosure (steel box) with carrying handles.

Modern industrial differential protection relay presented in an educational and teaching format.

The connections are via safety sockets.

The main functions:

- Differential protection (ANSI 87).

- Thermal overload protection (ANSI 49).

- Definite time overcurrent protection (ANSI 50P, ANSI 50Q and ANSI 50N/G).

- Inverse time overcurrent protection (ANSI 51P, ANSI 51Q and ANSI 51N/G).

Connection to the primary and secondary windings of the experimental circuit is via current transformers with ratio to suit the inputs of the relay. This provides an effective demonstration of the effect of current and voltage transformer ratio, connection and rating on protective relays.

Accuracy: $\pm 5\%$.

Current: 1 A (A. C.)

Frequency: 50 or 60 Hz.

Operating time: typically 10 ms to 25 ms.

Cables and accessories for normal operation.

Manuals:

This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance, Practices and connection information.

EXERCISES AND PRACTICAL POSSIBILITIES

-A wide range of practices and investigations into the performance and characteristics of an industrial differential protection relay.

REQUIRED SERVICES

- Protection and Relay Test Unit (ERP-UB).

DIMENSIONS AND WEIGHT

- Dimensions: 490x400x310 mm. approx.

- Weight: 15 Kg. approx.

ERP-MA. Feeder Management Relay Module

DESCRIPTION

Feeder Management Relay Module for use with Protection and Relay Test Unit (ERP-UB), which enables investigations into protection and monitoring of overhead lines and underground cables.

The module mounts on the desk area of the Protection and Relay Test Unit and by using a multi-core cable and safety leads connects to the test unit.

The relay is housed in a modern and robust enclosure (steel box) with carrying handles.

The relay module is based on the Micom P142 industrial relay, enabling the students to set up different fault circuits on the Protection and Relay Test Unit. Students will use the keypad and display on the relay module to programme it to the setting needed for the tests. They can also use the Micom S1 software (supplied with the Protection and Relay Test Unit) and computer (available separately, not included in the supply) to programme the relay module. The relay module is then connected to the fault circuits so test can be performed.

Tests are performed using single relay, but there is the facility to test two relay modules at the same time because there are enough connections on the Protection and Relay Test Unit.



SPECIFICATIONS

For use with the Protection and Relay Test Unit (ERP-UB), to enable investigations into protection and monitoring of overhead lines and underground cables.

It enables a wide range of test and investigations and it demonstrates the latest relay technology.

Modern and robust enclosure (steel box) with carrying handles.

Modern industrial feeder management relay presented in an educational and teaching format.

The connections are via safety sockets.

The main functions:

4 independent stages of directional/non-directional overcurrent (ANSI 50, ANSI 51, ANSI 67). The first two stage, may be independently set to any of ten IDMT curves, the remaining two stage having a direct time characteristic.

Directional/non-directional earth fault (ANSI 50N, ANSI 51N, ANSI 67N).

Sensitive directional/non-directional earth fault.

Sensitive directional earth fault.

Wattmetric earth fault (ANSI 32N).

Restricted earth fault (ANSI 64N).

Directional/non-directional negative sequence overcurrent (ANSI 46, ANSI 67).

Under and overvoltage (ANSI 27, ANSI 59).

Thermal overload protection (ANSI 49).

Residual overvoltage (ANSI 59N).

Under and over frequency.

Negative sequence overvoltage (ANSI 47).

Selectable blocking.

Broken conductor.

Creating fault and disturbance records.

The connection to the experimental circuit is via current transformers with ratio to suit the inputs of the relay.

It allows an effective demonstration of the effect of current and voltage transformer ratio, connection and rating on protective relays.

Accuracy: $\pm 10\%$.

Current: 1 A (A. C.)

Frequency: 50 or 60 Hz

Operating time: typically 10 ms to 25 ms.

Cables and accessories for normal operation.

Manuals:

This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance, Practices and connection information.

EXERCISES AND PRACTICAL POSSIBILITIES

-A wide range of practices and investigations into the performance and characteristics of an industrial feeder management relay.

REQUIRED SERVICES

- Protection and Relay Test Unit (ERP-UB).

DIMENSIONS AND WEIGHT

- Dimensions: 490x400x310 mm. approx.

- Weight: 15 Kg. approx.

ERP-PD. Distance Protection Relay Module

DESCRIPTION

Distance Protection Relay Module for use with the Protection and Relay Test Unit (ERP-UB), enabling investigations into protection and monitoring of overhead transmission lines.

The module mounts on the desk area of the Protection and Relay Test Unit and by using a multi-core cable and safety leads connects to the test unit.

The relay is housed in a modern and robust enclosure (steel box) with carrying handles.

The relay module is based on the Micom P441 industrial relay, enabling the students to set up different fault circuits on the Protection and Relay Test Unit. Students will use the keypad and display on the relay module to programme it to the setting needed for the tests. They can also use the Micom S1 software (supplied with the Protection and Relay Test Unit) and computer (available separately, not included in the supply) to programme the relay module. The relay module is then connected to the fault circuits so test can be performed.

Tests are performed using single relay, but there is the facility to test two relay modules at the same time because there are enough connections on the Protection and Relay Test Unit.



SPECIFICATIONS

For use with the Protection and Relay Test Unit (ERP-UB), to enable investigations into protection and monitoring of overhead transmission lines.

It enables a wide range of test and investigations and it demonstrates the latest relay technology.

Modern and robust enclosure (steel box) with carrying handles.

Modern industrial distance protection relay presented in an educational and teaching format.

The connections are via safety sockets.

The main functions:

- Full scheme phase and ground distance protection. Up to five zones (ANSI 21 G and ANSI 21 P).

- Directional/non-directional earth fault (ANSI 50N, ANSI 51N, ANSI 67N).

- Directional/non-directional phase overcurrent (ANSI 50, ANSI 51, ANSI 67).

- Directional/non-directional negative sequence overcurrent (ANSI 46, ANSI 67).

- Broken conductor.

- Thermal overload protection (ANSI 49).

- Creating fault and disturbance records.

- Blocking of any one protection element.

The connection to the experimental circuit is via current transformers with ratio to suit the inputs of the relay.

It allows an effective demonstration of the effect of current and voltage transformer ratio, connection and rating on protective relays.

Accuracy: $\pm 10\%$.

Current: 1 A (A. C.).

Frequency: 50 or 60 Hz.

Operating time: typically 10 ms to 25 ms.

Cables and accessories for normal operation.

Manuals:

This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance, Practices and connection information.

EXERCISES AND PRACTICAL POSSIBILITIES

-A wide range of practices and investigations into the performance and characteristics of an industrial distance protection relay.

REQUIRED SERVICES

- Protection and Relay Test Unit (ERP-UB).

DIMENSIONS AND WEIGHT

- Dimensions: 490x400x310 mm. approx.

- Weight: 15 Kg. approx.

* Specifications subject to change without previous notice, due to the convenience of improvements of the product.



C/ Del Agua, 14. Polígono San José de Valderas. 28918 LEGANES. (Madrid). SPAIN.

Phone: 34-91-6199363 FAX: 34-91-6198647

E-mail: edibon@edibon.com WEB site: www.edibon.com

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