



GE VERNOVA

MVAP

22

Technical Manual
Voltage Selection or Fuse Failure Relay

Publication Reference: R8052G

HANDLING OF ELECTRONIC EQUIPMENT

A person's normal movements can easily generate electrostatic potentials of several thousand volts. Discharge of these voltages into semiconductor devices when handling circuits can cause serious damage, which often may not be immediately apparent, but the reliability of the circuit will have been reduced.

The electronic circuits of GE Vernova products are immune to the relevant levels of electrostatic discharge when housed in their cases. Do not expose them to the risk of damage by withdrawing modules unnecessarily.

Each module incorporates the highest practicable protection for its semiconductor devices. However, if it becomes necessary to withdraw a module, the following precautions should be taken to preserve the high reliability and long life for which the equipment has been designed and manufactured.

1. Before removing a module, ensure that you are at the same electrostatic potential as the equipment by touching the case.
2. Handle the module by its front-plate, frame, or edges of the printed circuit board. Avoid touching the electronic components, printed circuit track or connectors.
3. Do not pass the module to any person without first ensuring that you are both at the same electrostatic potential. Shaking hands achieves equipotential.
4. Place the module on an antistatic surface, or on a conducting surface which is at the same potential as yourself.
5. Store or transport the module in a conductive bag.

More information on safe working procedures for all electronic equipment can be found in BS5783 and IEC 60147-0F.

If you are making measurements on the internal electronic circuitry of an equipment in service, it is preferable that you are earthed to the case with a conductive wrist strap.

Wrist straps should have a resistance to ground between 500k - 10M ohms. If a wrist strap is not available, you should maintain regular contact with the case to prevent the build-up of static. Instrumentation which may be used for making measurements should be earthed to the case whenever possible.

GE Vernova strongly recommends that detailed investigations on the electronic circuitry, or modification work, should be carried out in a Special Handling Area such as described in BS5783 or IEC 60147-0F.

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1. SAFETY SECTION

This Safety Section should be read before commencing any work on the equipment.

1.1 Health and safety

The information in the Safety Section of the product documentation is intended to ensure that products are properly installed and handled in order to maintain them in a safe condition. It is assumed that everyone who will be associated with the equipment will be familiar with the contents of the Safety Section.

1.2 Explanation of symbols and labels

The meaning of symbols and labels which may be used on the equipment or in the product documentation, is given below:

The meaning of symbols and labels which may be used on the equipment or in the product documentation, is given below:



Caution: refer to product documentation



Caution: risk of electric shock

Protective/safety *earth terminal Functional *earth terminal



Note: This symbol may also be used for a protective/safety earth terminal if that terminal is part of a terminal block or sub-assembly e.g. power supply.

***NOTE:** THE TERM EARTH USED THROUGHOUT THE PRODUCT DOCUMENTATION IS THE DIRECT EQUIVALENT OF THE NORTH AMERICAN TERM GROUND.

2. INSTALLING, COMMISSIONING AND SERVICING

Equipment connections



Personnel undertaking installation, commissioning or servicing work on this equipment should be aware of the correct working procedures to ensure safety. The product documentation should be consulted before installing, commissioning or servicing the equipment.

Terminals exposed during installation, commissioning and maintenance may present a hazardous voltage unless the equipment is electrically isolated.

If there is unlocked access to the rear of the equipment, care should be taken by all personnel to avoid electrical shock or energy hazards.

Voltage and current connections should be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety. To ensure that wires are correctly terminated, the correct crimp terminal and tool for the wire size should be used.

Before energising the equipment it must be earthed using the protective earth terminal, or the appropriate termination of the supply plug in the case of plug connected equipment. Omitting or disconnecting the equipment earth may cause a safety hazard.

The recommended minimum earth wire size is 2.5mm², unless otherwise stated in the technical data section of the product documentation. Before energising the equipment, the following should be checked: - Voltage rating and polarity; - CT circuit rating and integrity of connections;

- Protective fuse rating; - Integrity of earth connection (where applicable) - Remove front plate plastic film protection - Remove insulating strip from battery compartment

3. EQUIPMENT OPERATING CONDITIONS

The equipment should be operated within the specified electrical and environmental limits.

3.1. Current transformer circuits



Do not open the secondary circuit of a live CT since the high-level voltage may be lethal to personnel and could damage insulation.

3.2. External resistors



Where external resistors are fitted to relays, these may present a risk of shock or burns, if touched.

3.3. Battery replacement



Where internal batteries are fitted, they should be replaced with the recommended type and be installed with the correct polarity, to avoid possible damage to the equipment.

3.4. Insulation and dielectric strength testing



Insulation testing may leave capacitors charged up to a hazardous voltage. At end of each part of the test, the voltage should be gradually reduced to zero, discharge capacitors, before the test leads are disconnected.

3.5. Insertion of modules and pcb cards



These must not be inserted into or withdrawn from equipment whilst it is since this may result in damage.

3.6. Fibre optic communication



Where fibre optic communication devices are fitted, these should not be viewed directly. Optical power meters should be used to determine the operation or signal level of the device.

4. OLDER PRODUCTS

4.1 Electrical adjustments



Equipments which require direct physical adjustments to their operating mechanism to change current or voltage settings, should have the electrical removed before making the change, to avoid any risk of electrical shock.

4.2 Mechanical adjustments



The electrical power to the relay contacts should be removed before checking mechanical settings, to avoid any risk of electric shock.

4.3 Draw out case relays



Removal of the cover on equipment incorporating electromechanical operating elements, may expose hazardous live parts such as relay contacts.

4.4 Insertion and withdrawal of extender cards



When using an extender card, this should not be inserted or withdrawn from equipment whilst it is energized. This is to avoid possible shock or damage hazards. Hazardous live voltages may be accessible on the extender card.

4.5 Insertion and withdrawal of heavy current test plugs



When using a heavy current test plug, CT shorting links must be in place insertion or removal, to avoid potentially lethal voltages.

5. DECOMMISSIONING AND DISPOSAL



Decommissioning: The auxiliary supply circuit in the relay may include capacitors across the supply or to earth. To avoid electric shock or energy hazards, after completely isolating the supplies to the relay (both poles of any dc supply), the capacitors should be safely discharged via the external terminals prior to decommissioning.

Disposal: It is recommended that incineration and disposal to water courses is avoided. The product should be disposed of in a safe manner. Any products containing batteries should have them removed before disposal, taking precautions to avoid short circuits. Particular regulations within the country of operation, may apply to the disposal of lithium batteries.

6. TECHNICAL SPECIFICATIONS

Protective fuse rating

The recommended maximum rating of the external protective fuse for this equipment is 16A, Red Spot type or equivalent, unless otherwise stated in the technical data section of the product documentation.

Insulation class: IEC 601010-1: 1990/A2: 2001 Class
I EN 61010-1: 2001 Class I

Insulation: IEC 601010-1: 1990/A2: 1995

Category: Category III

(Overvoltage): EN 61010-1: 2001 Category III

Environment: IEC 601010-1: 1990/A2: 1995
Pollution degree 2

EN 61010-1: 2001
Pollution degree 2

Product Safety: 72/23/EEC



EN 61010-1: 2001 EN 60950-1: 2002

This equipment requires a protective (safety) earth connection to ensure user safety.

Distribution level, fixed insulation. Equipment in this category is qualification tested at 5kV peak, 1.2/50µs, 500Ω, 0.5J, between all supply circuits and earth, and also between independent circuits.

Compliance is demonstrated by reference to generic safety standards.

Compliance with the European Commission Low Voltage Directive.

Compliance is demonstrated by reference to generic safety standards.

MVAP 22

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1. APPLICATION

The MVAP 22 is essentially a fuse failure relay with changeover output contacts enabling its use for either voltage selection or fuse failure protection. A typical application as a voltage selection relay is the automatic connection of metering equipment to an alternative supply if the normal or preferred supply fails. As a fuse failure relay it will monitor the output of a voltage transformer and give an alarm or disconnect protection circuits for VT fuse failure.

The relay monitors the three-phase voltage supply and operates if the supply is interrupted or becomes unbalanced due to failure of the voltage transformers primary or secondary fuses.

2. INSPECTION

2.1 Inspection

Carefully examine the relay and case to see that no damage has occurred during transit. Check that the relay serial number on the relay, case and cover are identical and that the model number and rating information are correct.

With the relay withdrawn, remove all packing pieces and elastic bands that were used in transit.

Check that the flag is free to move. Carefully actuate the armature with a small screwdriver/probe. note that immediately after the point where normally open contacts just make there is still a small further movement of the armature. This ensures that contact follow through and wiping action is present.

2.2 Wiring

Check that the external wiring is correct to the relevant diagram or scheme diagram. The relay diagram number appears on the rating label inside the relay case.

2.3 Earthing

Ensure that the case earthing terminal at the rear of the case, is used to connect the relay to a local earth bar.

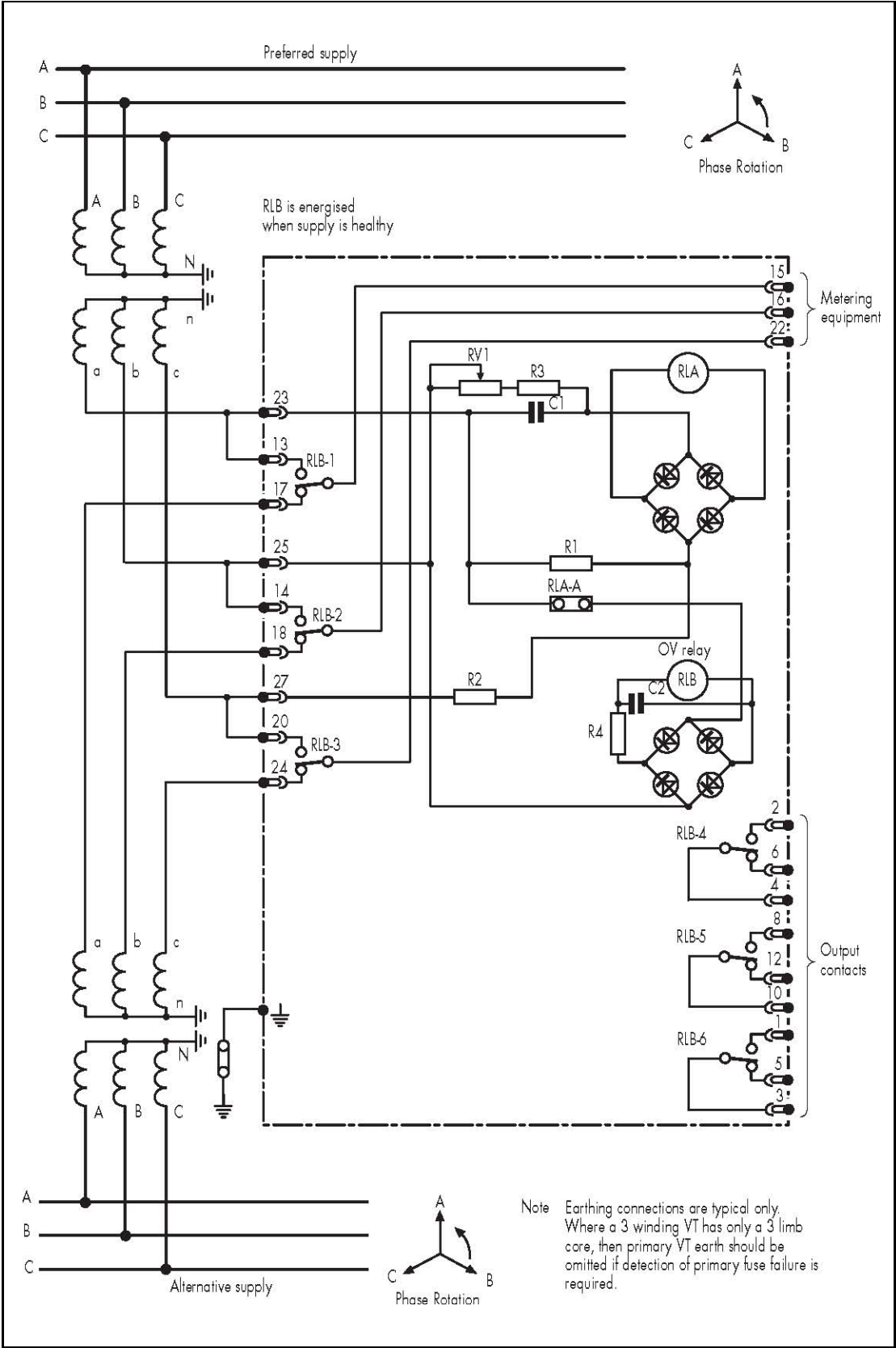
2.4 Insulation

The relay and its associated wiring, may be insulation tested between:-

all electrically isolated circuits

all circuits and earth

An electronic or brushless insulation tester should be used, having a dc voltage not exceeding 1000V. Accessible terminals of the same circuit should first be strapped together. Deliberate circuit earthing links, removed for the tests, must subsequently be replaced.



3. COMMISSIONING TESTS

3.1 Test equipment required

3 phase ganged variable voltage transformer

2 multimeters

3.2 Secondary injection tests

Refer to a typical diagram FIMVAP 22.001

- (a) Isolate the outputs of both the 'preferred' and 'alternative' voltage transformers from the relay (e.g. remove the output fuses).
 - (b) Connect the output of a 3 phase ganged variable voltage transformer to the 'preferred' supply input terminals of the relay, with A, B, C phase rotation as follows:-
A phase - terminals 23 and 13 B phase - terminals 25 and 14 C phase - terminals 27 and 20
 - (c) Apply 80% of the lower rating of the relay, (e.g. 110/125V - 80% of 110V) 3 phase balanced voltage. Check that this voltage appears on the 'metering output terminals' 15, 16 and 22.
 - (d) Check for correct phasing of the metering supply as follows: Measure the voltage between terminals 23 and 15. This should be zero. Measure the voltage between terminals 25 and 16. This should be zero. Measure the voltage between terminals 27 and 22. This should be zero.
 - (e) With the supply voltage set to 80%, remove the A phase. Check that 'RLA' relay picks up and relay 'RLB' drops off, this can be checked by measuring B and C phase outputs to the metering equipment, this should be at zero volts (B and C terminals 16 and 22).
 - (f) Increase the supply voltage to 125% of the lower rating of the relay and then restore the 'A' phase supply. Check that the 125% of V_n is now obtained across terminals 15, 16 and 22.
- 3.2.1 Repeat tests (e) and (f) by removing B and C phase in turn and monitoring terminals 16 and 22, and, 15 and 16 respectively.
- 3.2.2
- (a) Remove the 3-phase ganged variac supply from the 'preferred' input.
 - (b) Connect the 3 phase ganged variac to the 'alternative' input as follows:-
A phase - terminal 17 B phase - terminal 18 C phase - terminal 24.
 - (c) Apply rated voltage. Check that the rated voltage appears across terminals 15, 16 and 22.
 - (d) Check for correct phasing at the metering terminals as follows:-
Measure the voltage between terminals 17 and 15. This should be zero.
Measure the voltage between terminals 18 and 16. This should be zero.
Measure the voltage between terminals 24 and 22. This should be zero.
- 3.2.2 Check the operation of all output contacts. Check the flag operate/reset.
- 3.2.3 Remove all test supplies and replace the VT fuses.
- 3.2.4 Remove each VT fuse in turn, with the system healthy, and check that each time the alternative supply is selected.

4. SPARES

When ordering spares, quote the full relay model number and any component references numbers, or briefly describe the parts required.

Repairs

Should the need arise for the equipment to be returned to GE Vernova for repair, then the form at the back of this manual should be completed and sent with the equipment together with a copy of any commissioning test results.

5. COMMISSIONING TEST RECORD

VOLTAGE SELECTION OR FUSE FAILURE RELAY TYPE MVAP 22

Site _____ Circuit _____

Model No _____ Serial No _____

Preferred Supply _____ Alternative Supply _____

Diagram _____

Tests

Preferred supply

3.2 (b) Check phase rotation _____

(c) 80% of V_n , check volts on terminals 15, 16, 22 _____

(d) Check phasing terminals 23, 15 _____

25, 16 _____

27, 22 _____

(e) With 'A' phase removed, volts at 80% of V_n check across terminals 16, 22 _____(f) With 'A' phase restored, volts at 125% of V_n check voltage on terminals 15, 16, 22 _____

3.2.1 Test (e) with 'B' phase removed _____

Test (f) with 'B' phase restored _____

Test (e) with 'C' phase removed _____

Test (f) with 'C' phase restored _____

Alternative supply3.2.2 (c) Check rated voltage (V_n) on terminals 15, 16, 22

(d) Check phasing terminals 17, 15 _____

18, 16 _____

24, 22 _____

3.2.3 Check contact operation

Check flag operate/reset

3.2.5 Check fuse failure operation A _____ B _____ C _____

Commissioning Engineer

Customer Witness

Date

Date

REPAIR FORM

Please complete this form and return it to GE Vernova with the equipment to be repaired. This form may also be used in the case of application queries.

GE Vernova - SAS St. Leonards Building, Redhill Business Park, Stafford, ST16 1WT, United Kingdom

For: After Sales Service Department

Customer Ref: _____ Model No: _____

Ge Vernova: _____ Serial No: _____

Contract Ref: _____ Date: _____

1. What parameters were in use at the time the fault occurred?

AC Volts _____ Main VT/Test set DC Volts _____

Battery/Power supply AC current _____ Main CT/Test set Frequency _____

2. Which type of test was being used? _____

3. Were all the external components fitted where required? Yes/No (Delete as appropriate)

4. List the relay settings being used

5. What did you expect to happen?

6. What did happen?

7. When did the fault occur?

Instant Yes/No Intermittent Yes/No

Time Yes/No (Delete as appropriate) delayed by how _____ long?

1. What indications if any did the relay show?

2. Was there any visual damage?

3. Any other remarks which may be useful:

Signature

Title

Name (in capitals)

Company Name



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