Reyrolle
Protection
Devices

7PG23 5B3

Restricted Earth Fault

Answers for energy

SIEMENS

Contents

Technical Manual Chapters

7PG23 5B3

Restricted Earth Fault

Document Release History

This document is issue 02/2010. The list of revisions up to and including this issue is:

Pre release

02/2010	Document formatted due to rebrand

Software Revision History

Contents

1. Introduction

Experience gained in the manufacture and application of the 2B3, 3B3, & 4B3 relays has resulted in the development of the 5B3 relay. The 5B3 relay is ideal for restricted earth fault protection of transformer windings or phase and earth fault protection of reactors and the stator windings of large machines. This relay may also be used for high impedance busbar protection.

High impedance schemes have the advantages over low impedance schemes that a more sensitive setting can be obtained without any loss of stability and the primary fault setting calculation is simpler. Low impedance current operated schemes are more susceptible to maloperations from through faults unless greater care is taken with the selection of current transformers.

For some restricted earth fault applications the primary fault setting needs to be greater at harmonic frequencies than the setting at the fundamental frequency. The 5B3 relay uses a low pass filter circuit to achieve this.

2. Functions

The relay operating element is a type B61 d.c. attracted armature element energised via a low pass filter circuit and a full wave rectifier. This element is of robust construction and fitted with three heavy duty contacts and a hand reset flag indicator. The contacts are suitable for the direct operation of the circuit breaker trip coil.

The low pass filter ensures that when the relay is used in the above applications the primary fault setting of the protective scheme at harmonic frequencies will always be greater than the setting at the fundamental frequency. Thus no adverse reduction in fault setting can occur with the high frequency current produced in certain installations during switching.

The relay has a preset setting of 15V and other resistors are introduced into the circuit to provide a voltage setting range up to 270V in increments of 5V using heavy duty DIL switches. Non-linear resistors are included to limit the peak voltage output from the current transformers (eg. for high fault current in-zone) and so protect the insulation on the current transformer secondary winding and the wiring to the relay as well as the relay components.

7PG23 5B3

Restricted Earth Fault

Document Release History

This document is issue 02/2010. The list of revisions up to and including this issue is:

Pre release

02/2010	Document formatted due to rebrand

Software Revision History

Contents

1. General

Performance Data to IEC 60255

2. Characteristic Energizing Quantity

AC Voltage Vs	15V to 270V
AC Current In	20mA fixed
Frequency	50Hz/60Hz

3. Characteristics

3.1 Protection Settings

Voltage Vs	15V to 270V in 5V steps

3.2 Operating Times

Operating Time	45mS max. at 3 x Vs

4. Accuracy

Operating Voltage Vs	± 5%

5. Accuracy Influencing Factors

5.1 Temperature

Ambient Range	-5°C to +40°C
Setting Variation	±10%

5.2 Frequency

Range	47Hz to 61Hz
Setting Variation	±5%

6. Thermal Withstand

Continuous and Limited Period Overload

1.25 x Vs	Continuous
2 x Vs	for 10 minutes

7. Burden

AC Burden	Vs x 20mA

8. Output Contacts

8.1 Indication

Hand Reset Flag

8.2 Contacts

3 normally open self reset

Make and Carry

for 200 msec 6.6kVA with 30A maximum

Break

The contacts are intended for use in circuits where an external contact breaks the trip current, e.g. a circuit breaker auxiliary switch or trip relay cut-throat.

9. Environmental Withstand

Temperature - IEC 68-2-1/2

Operating range	-10°C to +55°C
Storage range	-25°C to +70°C

Humidity - IEC 68-2-3

Operational test	56 days at 40°C and 95% RH

Transient Overvoltage - IEC 255-5

Between all terminals and earth or between any two terminals without damage or flashover	5kV 1.2/50ms 0.5J

Insulation - IEC 255-5

Between any terminal and earth	2.0kV rms for 1 min
Between independent circuits	2.0kV rms for 1 min
Across normally open contacts	1.0kV rms for 1 min

Vibration

Relay complies with BS142, Section 2.2, category S2 (0.5g) over the frequency range of 10Hz to 800Hz.

Impact

Relay will withstand panel impact shocks of 20g.

Mechanical Classification

Durability In excess of 10^5 operations

7PG23 5B3

Restricted Earth Fault

Document Release History

This document is issue 02/2010. The list of revisions up to and including this issue is:

Pre release

02/2010	Document reformat due to rebrand

Software Revision History

Contents

Table of Figures

1. Theory of High Impedance Current Balance Protective Schemes and their Application

1.1. Determination of Stability

The stability of a current balance scheme using a high impedance relay circuit is based on the fact that for a given through fault condition, the maximum voltage that can occur across the relay circuit is determined by means of a simple calculation. If the setting voltage of the relay is made equal to or greater than this voltage, then the protection will be stable.

In calculating the required setting voltage of the relay it is assumed that one current transformer is fully saturated and that the remaining CTs maintain their ratio. In this condition, the excitation impedance of the CT is negligible and the resistance of the secondary winding, together with leads connecting the CT to the relay terminals, constitute the only burden in parallel with the relay as shown in fig. 1.

Thus the voltage across the relay is given by:
V = I x (X1 + Y1) for CT1 saturated
V = I x (X2 + Y2) for CT2 saturated
where,
X1 and X2 = the secondary winding resistances of the CTs.
Y1 and Y2 = the value of the pilot loop resistance between the relative CT and the relay circuit terminals.
I = the CT secondary current corresponding to the maximum steady state through fault current of the protected equipment.
V = the maximum voltage that can occur across the relay circuit under through fault conditions.

For stability, the voltage setting of the relay must be made equal to or exceed, the highest value of V calculated above. Experience and extensive laboratory tests have proved that if this method of estimating the relay setting voltage is adopted, the stability of the protection will be very much greater than the value of I used in the calculation. This is because a CT is normally not continuously saturated and consequently any voltage generated by this CT will reduce the voltage appearing across the relay circuit.

1.2. Current Transformer Requirements

Experience has shown that most protective CTs are suitable for use with high impedance relays and that where the CTs are specifically designed for this protection their overall size may be smaller than that required for an alternative current balance protection.

The basic requirements are:

a) All CTs should, if possible have identical turns ratios.
b) The knee point voltage of each CT, should be at least 2 x Vs.

The knee point voltage is expressed as the voltage applied to the secondary circuit with the primary open circuit which when increased by 10% causes the magnetising current to increase by 50%.

c) CTs should be of the low leakage reactance type.

Most modern CTs are of this type and there is no difficulty in meeting this requirement. A low leakage reactance CT has a joint less ring type core, the secondary winding evenly distributed along the whole length of the magnetic circuit and the primary conductor passes through the approximate centre of the core.

1.3. Fault Setting

The fault setting of a current balance protection using a high impedance relay circuit can be calculated in the following manner.

Primary fault setting = N (I + I1 + I2 + I3)
where,
I = the relay operating current.
I1, I2, I3 = the excitation currents of the CTs at the relay setting voltage.

N = the CT ratio.

The fault setting of the protective scheme depends upon the protected equipment and the type of system earthing. For a solidly earthed power transformer a fault setting of 10 to 60% of the rated current of the protected winding is recommended.

If the power transformer is earthed through a resistor rated to pass an earth fault current of 100% or more of the rated current of the protected winding, a fault setting of 10 to 25% of the rated current of the earthed resistor is recommended.
In the case of earth fault protection for feeders terminating in a power transformer, as shown in Figure 5, it may be necessary to increase the basic fault setting to ensure that the capacitance currents of the feeder do not impair the stability of the protection. For stability during an external fault on the system to which the feeder is connected, the fault setting should preferably be greater than three times the residual capacitance current of the feeder. The maximum residual capacitance current is equal to the capacitance current to earth per phase at normal voltage in the case of a feeder in a solidly earthed system, and three times this value for a feeder in a resistance earthed system. Higher fault settings can be obtained as described in the following section

1.4. To give required current setting

The primary fault current setting obtained may be too low and be required to be increased, for example, a feeder terminating in a power transformer. If the relative increase is relatively small, an increase in the relay circuit voltage setting and hence an increase in the values of I1, I2, and I3 may give the required result. Alternatively, when the required increase in fault setting is large, the correct result can be obtained by connecting a resistor in parallel with relay circuit, thereby effectively increasing the value of primary current setting.

2. Typical Applications

2.1. Generators and Synchronous Motors

a) The circuit for phase to phase and phase to earth fault protection is shown in fig. 2. It requires two CTs and a single pole relay per phase. If the generator is earthed through a relatively high value earthing resistor, it may be necessary to supplement the high impedance protection by a sensitive earth fault protection.

b) The circuit for phase to earth protection is shown in fig. 3. It requires three line CTs and a single pole relay. A neutral CT is necessary if the neutral of the protected winding is connected to earth.

2.2. Series Reactor

Same as 2.1 (a).

2.3. Shunt Reactor

Same as 2.1 (b).

2.4. Auto Transformers

A scheme for phase to phase and phase to earth fault protection is shown in fig. 4. It requires three CTs and a single pole relay per phase. This scheme does not detect winding short circuits which do not involve earth or another phase. Where a protection responsive to this type of fault condition is required, Duobias protection can be used.

2.5. Restricted Earth Fault Protection for Windings of Power Transformers

A scheme for restricted earth fault protection is shown in fig. 5.

2.6. Earth Fault Protection for Feeders Terminating in a Power Transformer

The arrangement will be the same as on the delta side of the transformer shown in fig. 5 but in this case it may be necessary to increase the basic fault setting to ensure that the capacitance currents of the feeder do not impair the stability of the protection. For stability the fault setting should preferably be greater than three times the residual capacitance current of the feeder for an external earth fault on the system to which the feeder is connected. The residual capacitance current is equal to the capacitance current to earth per phase at normal voltage, in the case of a feeder in a solidly earthed system, and three times this value for a feeder in a resistance earthed system.

2.7. Busbar Protection and Protection of HV Connections

The circuit for phase to phase and phase to earth protection is shown in fig. 6a, and fig. 6b shows the circuit for phase to earth fault protection only. Where the protection is for a busbar installation controlling a number of circuit breakers, it is normally arranged so that two independent protections must operate before tripping of the circuit breakers can occur. The second protection would either be a duplicate of the high impedance scheme shown or, depending on the type of switchgear, a different protection, such as "leakage to frame" protection.

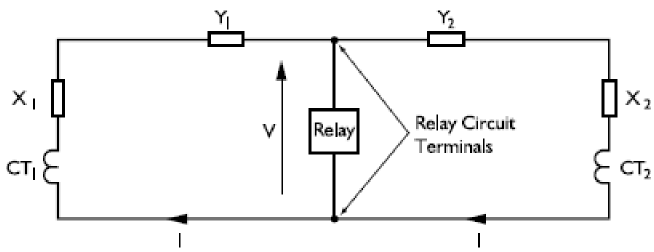


Figure 1 Basic Circuit of High-Impedance Current-balance scheme

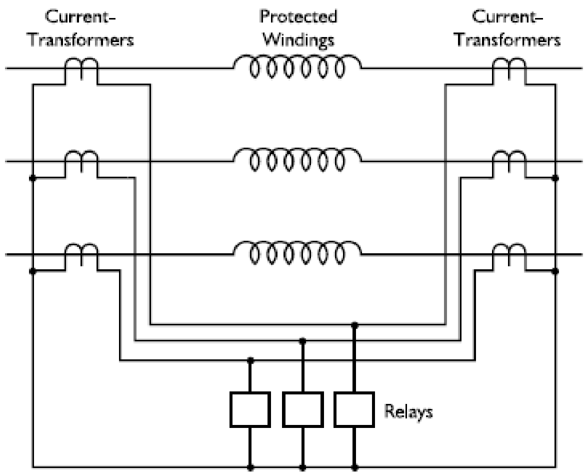


Figure 2 Phase/Phase & Phase/Earth Fault Protection for Generator AC Windings, Synchronous-motor AC Windings, and Series Reactors

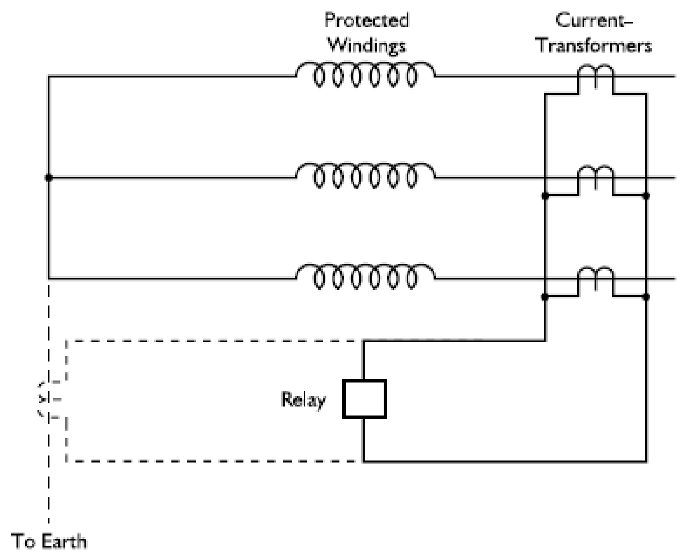


Figure 3 Phase to Earth Fault Protection for generator AC Windings, Synchronous-motor AC Windings, and Shunt Reactors.

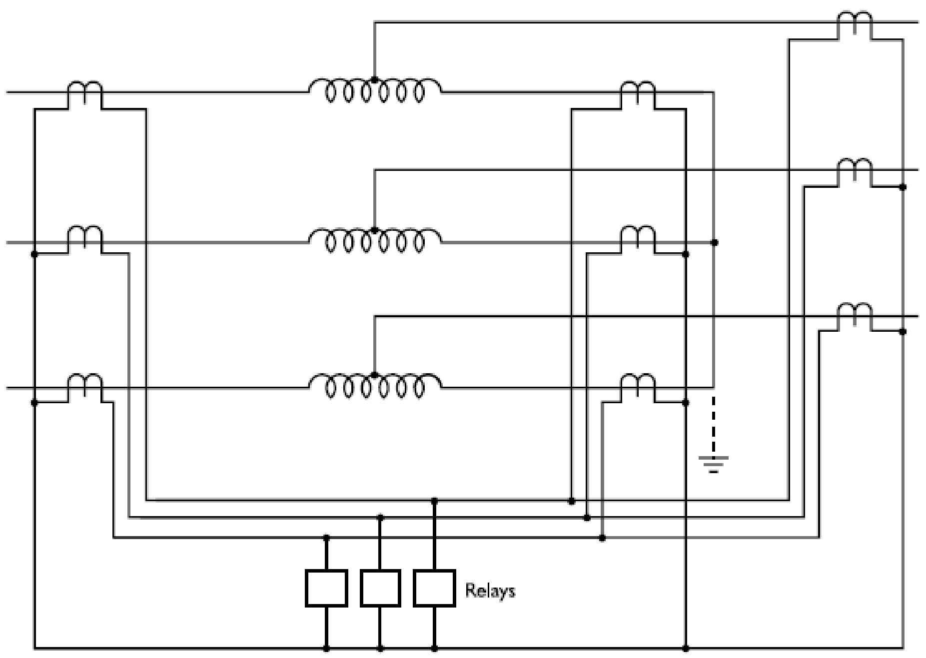


Figure 4 Phase/Phase & Phase/Earth Fault Protection for Auto-transformers

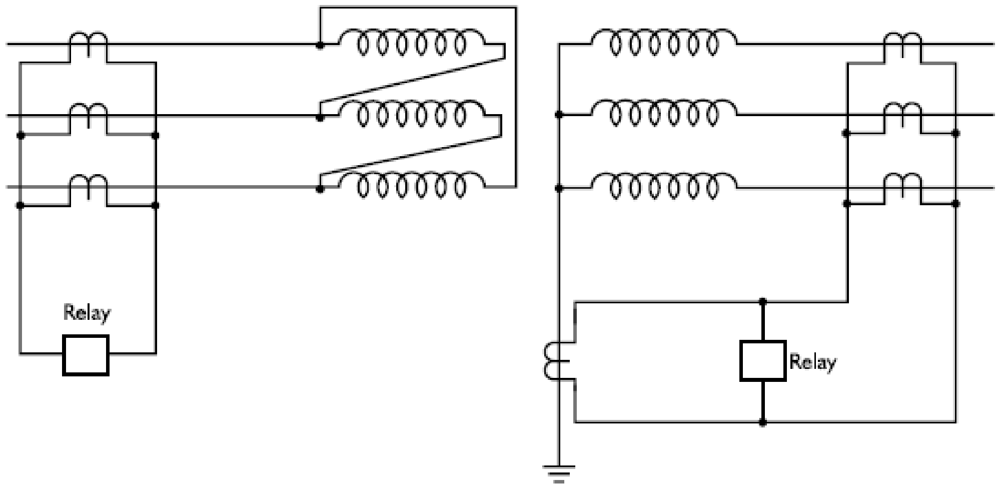


Figure 5 restricted Earth-Fault Protection for Transformers Windings

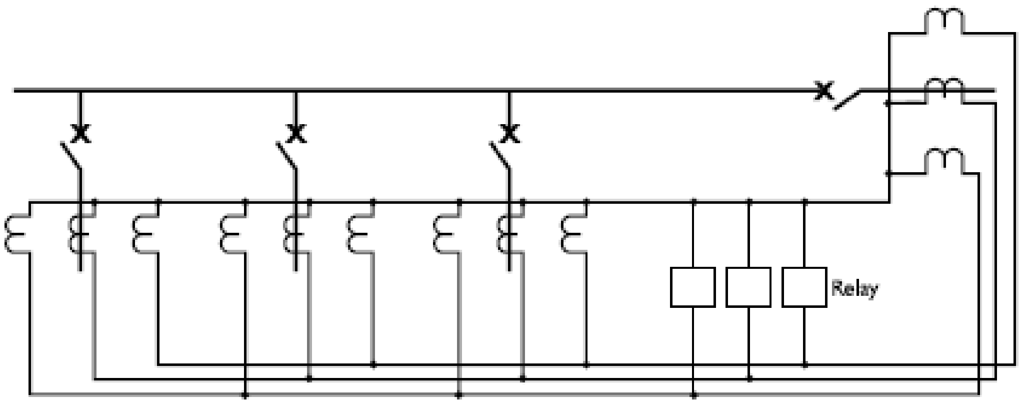


Figure 6 (a) Phase/Phase and Phase/Earth Fault Protection

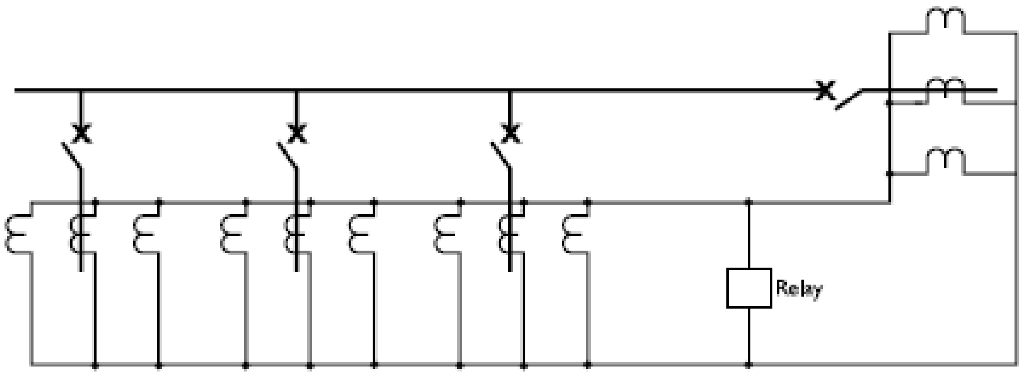


Figure 6 (b) Phase/Earth Fault Protection

7PG23 5B3

Restricted Earth Fault

Document Release History

This document is issue 02/2010. The list of revisions up to and including this issue is:

Pre release

02/2010	Document reformat due to rebrand

Software Revision History

Contents

1. Unpacking, Storage and Handling

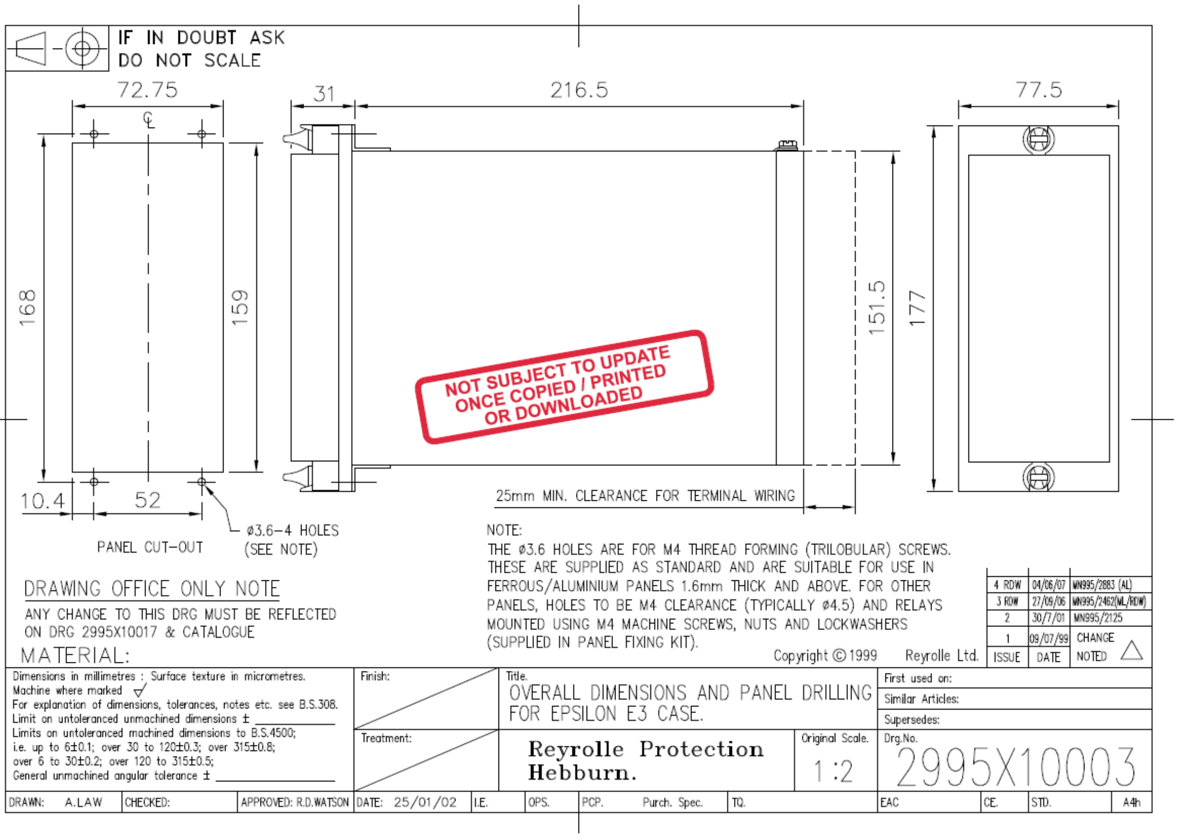
On receipt, remove the relay from the container in which it was received and inspect it for obvious damage. To prevent the possible ingress of dirt the sealed polythene bag should not be opened until the relay is to be used. If damage has been sustained a claim should immediately be made against the carrier, also inform Siemens Protection Devices Ltd and the nearest Siemens agent, using the Defect Report Form in the Maintenance section of this manual. When not required for immediate use, the relay should be returned to its original carton and stored in a clean, dry place.

2. Recommended Mounting Position

The relay should be mounted on the circuit breaker or panel to allow the operator the best access to the relay functions.

3. Relay Dimensions

The relay is supplied in single element, E3 case.



7PG23 5B3

Restricted Earth Fault

Document Release History

This document is issue 02/2010. The list of revisions up to and including this issue is:

Pre release

02/2010	Document reformat due to rebrand

Software Revision History

Contents

1. Required Test Equipment

- A 1000V insulation resistance test set.
- A heavy current primary injection test transformer capable of providing 500A and an output of at least 5kVA.
- A variable ratio transformer suitable for controlling the input to the primary injection test transformer.
- Plug connections for voltage transformer and busbar orifices.
- An ammeter and a metering transformer to measure the output of the primary injection test transformer.
- Two multi-purpose instruments, e.g. Avometers.
- An ohmmeter.
- One or two variable ratio transformers for secondary injection tests.
- Resistors of suitable value to control the output of the variable ratio transformers.
- A suitable a.c. supply.

2. Precautions

Before testing commences the equipment should be isolated from the current transformers and the CT's short circuited in line with local site procedures. During secondary injection tests, take care that the test circuit is earthed at one point only.

3. Programme of Tests

- General checks of connections.
- Insulation resistance tests.
- Pilot resistance tests.
- Current transformer ratio and polarity tests.
- Fault setting tests by primary injection.
- Tests using load current.
- Fault setting tests by secondary injection.
- Tripping and intertripping tests on circuit breakers, and operation tests on indicating devices.

4. Testing of Current Transformers Mounted in Power Transformer Bushings

If the CTs associated with the earth fault protection are located in the power transformer bushings, it may not be possible to apply test connections between the CTs and the power transformer windings. If this is so, apply the test connections on another winding in order to short circuit the power transformer when making the primary injection tests. The injected primary current will be limited by the impedance of the power transformer; when making the CT polarity tests, check the spill current with the pilot connections normal and with them reversed. The connection which produces negligible spill current is correct.

As the injected primary current will normally be low in comparison with rated current of CTs make further tests using load current, as detailed in "Tests using load current" in order to verify as far as possible the conclusions reached during the primary injection tests.

5. General Check of Connections

Isolate the auxiliary supplies. Check that the wiring is complete and that the connections are tight.

6. Insulation Resistance Tests

Isolate the auxiliary supplies. Remove the earth connections. Measure the insulation resistance at those points which will ensure that all the wiring, including the trip circuits and relays, is tested. Insulation resistance values which may be considered satisfactory depend on the amount of wiring involved. Where a considerable amount of multicore wiring is involved a reading of 2 or 3 megohms is reasonable, but for short lengths of wiring on a panel higher readings should be obtained. Normally a 1 megohm reading should not be considered satisfactory.

7. Pilot Resistance Tests

Isolate the auxiliary supplies. Using the test circuit shown in fig. 1 measure the resistance of the pilots between the relay tapping point and the CTs. These values should not exceed those values employed in the setting calculations. If the value obtained exceeds that given in the setting calculations, check the permissible pilot loop resistance using the equation:
$R = V/I - R_{ct}$

8. Current Transformer Ratio and Polarity Tests

If the protection does not include a neutral CT, ratio and polarity tests may be made with load current as described under "Tests Using Load Current". If the protection includes more than one set of line CTs or more than one neutral CT, ensure that the polarities of all CTs are checked relative to each other. Isolate the auxiliary supplies.

8.1. Ratio Test

Using the test circuit shown in fig. 2 inject a value of primary current equal to the rating of the CT primary. If this is more than can be obtained from the primary injection test transformer, inject the highest possible value.
Note that: Secondary current = Primary current / CT ratio

8.2. Polarity Test

Using the test circuit shown in fig. 3 inject a value of primary current equal to rating the CT primary. If this is more than can be obtained from the primary injection test transformer, inject the highest possible value. The current in the relay circuit should be negligible. Make the test on all phases.

9. Fault Setting Tests by Primary Injection

Isolate the auxiliary supplies. Adjust the relay and the relay setting resistors to the recommended values given in the setting calculations. Using the test circuit shown in fig. 4 pass a current through one CT primary and increasing the current gradually, note the value at which the relay operates. This should approximate to the value given in the calculations.

10. Tests Using Load Current

If it is not practical to perform the ratio and polarity tests by primary current injection as described previously, the ratio and polarity tests of the line CTs and a check of relay operation can be made using load current. The test is applicable to earth fault protection which does not include neutral CTs. Isolate the auxiliary supplies.

10.1. Ratio Test

Connect an ammeter across the relay circuit and disconnect the relay. Short circuit and disconnect two CTs. Note that: Secondary current = Primary current / CT ratio

10.2. Polarity Test

Restore the CT connections and note the ammeter reading, this should be negligible.

10.3. Check of Relay Operation

Reconnect the relay and disconnect the ammeter. Short circuit and disconnect one CT. If the load exceeds the fault setting of the protection, check that the relay operates.

11. Fault Setting Tests by Secondary Injection

Isolate the auxiliary supplies. Using the test circuit shown in fig. 5 inject a current and, increasing it gradually, note the value at which operation occurs. This should be equal to:
Primary fault setting / CT ratio

12. Tripping Tests and Intertripping Tests on Circuit Breakers and Operation Tests on Indicating Devices

Check that the auxiliary supplies are connected. Operate the earth fault relay and check that the circuit breakers operate only when the appropriate resistors are selected and that the indicators operate correctly.

13. Check of Attracted Armature Element

To enable the attracted armature element to be checked and tested the following is required:

- 0.15mm (0.006") Shim, 0.4mm (0.016") Shim, 1.0mm (0.039") Shim or Rod; 1.65mm (0.065") Shim or Rod, 2.4mm (0.095") Shim or Rod
- 0 to 15g Pressure Gauge
- Contact Pliers or Stroking Tool
- Set of BA Spanners
- Small Screw-driver
- Variable A.C. Supply

The shims can be obtained on precision metric feeler gauges, typically M & W Set No. 390M.

13.1. Mechanical Checks

The location of the components is shown in fig. 6.

13.1.1. Armature

Ensure that there is not excessive end play on the armature by a gentle movement in the horizontal directions. Ensure that the residual screw in the armature has full travel onto the core face in the operated position and that the armature fully engages on the back stop in the reset position.

13.1.2. Armature Gap

Ensure that the armature gap is free from dust or swarf and clean, if necessary, with a soft brush or a wooden spatula.

13.1.3. Contact Stack

Check that the contact stack clamp nut is tight.

13.1.4. Contacts

If contacts require cleaning they should be washed with a suitable substance using a soft brush, then polished with chamois leather mounted on a spatula. If pitting has occurred, then they should be burnished smooth and cleaned again to ensure the removal of any grit. It is not advisable to use abrasive paper. Care must be taken to avoid bending the contact fingers. All make contacts should make and all break contacts should break simultaneously and have a good wiping action and follow through.

13.1.5. Commissioning

The following check is to be made before the element is put into service. To check minimum armature travel after contact touch (i.e. contact follow through) insert a 0.25mm shim between the residual screw on the armature and the face of the core, see fig. 7. Close the armature onto the shim and ensure that the contacts are closed. If the armature travel after contact touch (i.e. contact follow through) is less than the minimum 0.25mm see resetting recommendations.

13.1.6. During Service

To check minimum armature travel after contact (i.e. contact follow through) insert a 0.15mm shim between the residual screw on the armature and the face of the core, see fig. 8. Close the armature onto the shim and ensure that the contacts are closed. If the armature travel after contact touch (i.e. contact follow through) is less than the minimum 0.15mm see resetting recommendations.

13.1.7. Flag Indicator

Check that the flag falls just prior to the make contact touching, or, if break contacts only are fitted, just after the break contact opens.

13.2. Recommendations for Re-setting

If the relay does not comply with above then the following points should be checked and the relay adjusted as necessary.

13.2.1. Armature

The end plate on the armature is controlled by the armature keep. Adjustment is made by slacking the keep fixing screw and slightly moving the keep horizontally forward or backward. Retighten the keep screw after any adjustment.

13.2.2. Armature Gap

The armature gap is measured using a 2.4mm (0.095") shim or rod approximately 1.6mm (1/16") in from the bottom edge of the core face, see fig. 8. Adjustment is made by the back stop screw which is sealed after adjustment during manufacture. If it is re-adjusted on site we recommend that it’s re-sealed with a suitable lacquer.

13.2.3. Residual Gap

Measure the residual gap by inserting a 0.15mm (0.006") shim between the top of the core face and the adjustment with the armature closed, see fig. 9. The gap is adjusted by the residual screw. The shim should be slotted or have a hole in it to clear the residual screw and should be a sliding fit up to, but not beyond, the top edge of the core face.

13.2.4. Contacts

The contacts should be approximately horizontal with yoke. The position of the contacts is adjusted by the tappet arm screw which is screwed into position and retained by a lock nut. This adjustment should not normally be altered on site. The contact gap should be 2.4mm (0.095") and is adjusted by moving the fixed contact relative to the moving contact. To ensure that the contacts make simultaneously we recommend that the bottom right hand contact is set to the correct dimension, then set all similar contacts so that they make simultaneously with this contact. Ensure that the armature has the required minimum travel after contact touch by inserting a 0.4mm (0.016") shim between the residual screw on the armature and the core, with the armature closed see fig. 7. All make contacts should be closed.

13.3. Contact Control Force

Ensure that there is sufficient control force to return the armature positively on to the back stop screw and that the operation occurs at the minimum specified voltage or setting. The control force is applied by the moving spring steel strip of the make contacts and adjusted by stroking the spring steel strip with contact pliers or a contact stroking tool. Do not kink these strips. The pressure should be evenly distributed to ensure that all contacts in the same layer are horizontally in line as shown in fig. 10.

13.3.1. Flag Indicator

Check that the flag falls just prior to the make contacts touching. Adjustment to the hand reset flag is made by the 10BA adjusting screw, see fig. 11. Ensure that the flag mechanism does not prevent the armature from fully returning to the back stop.

13.3.2. Electrical Checks

Check that the relay operates at its setting as stated below and fully resets when the supply is switched off. The test supply should consist of a 240V a.c. supply from a Variac with a 6kW, 10W, fixed resistor and ammeter in series.

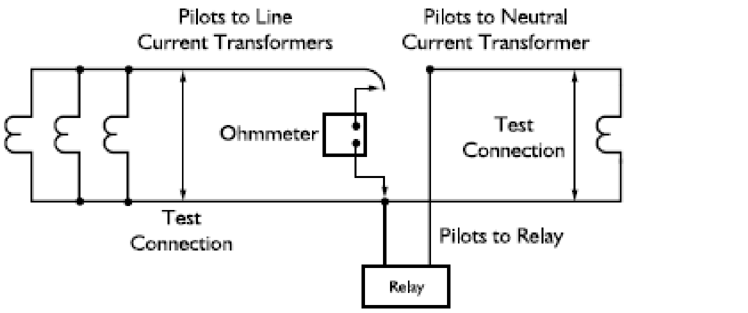


Figure 1 Pilot-Resistance Test-Circuit

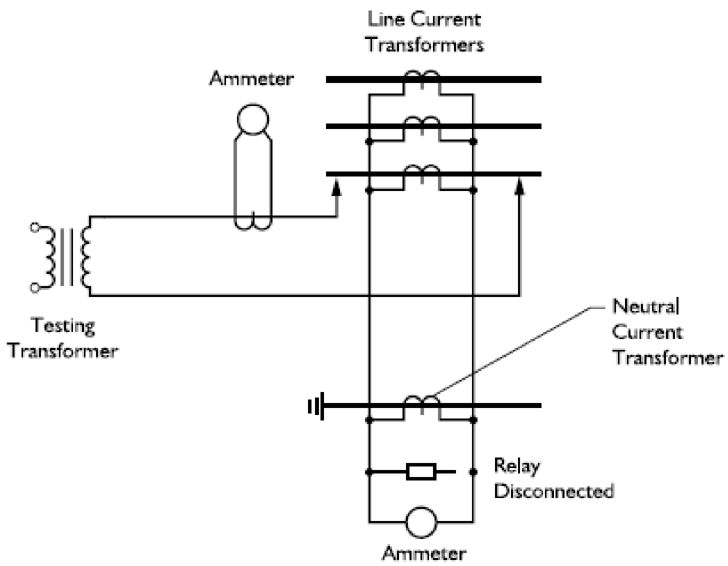


Figure 2 Current-Transformer Ratio Test-Circuit

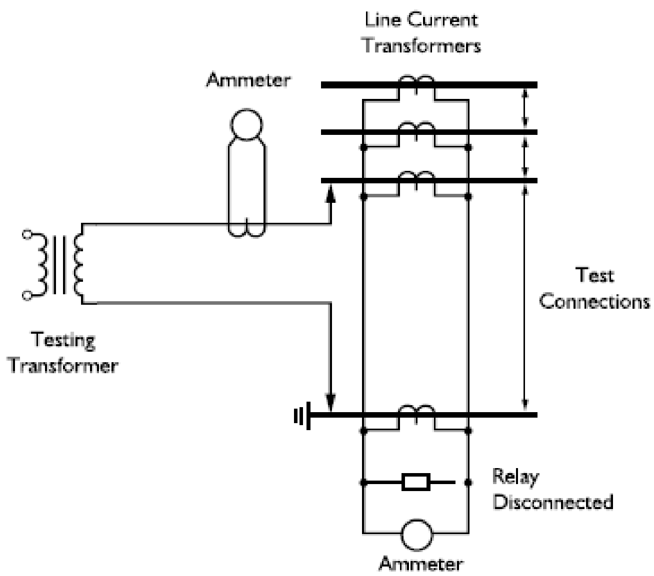


Figure 3 Current-Transformer Polarity Test-Circuit

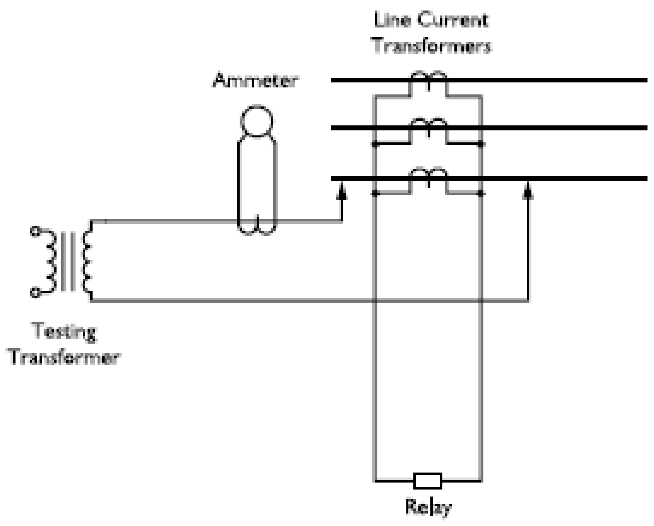


Figure 4 Circuit for Fault-Setting Test by Primary Injection

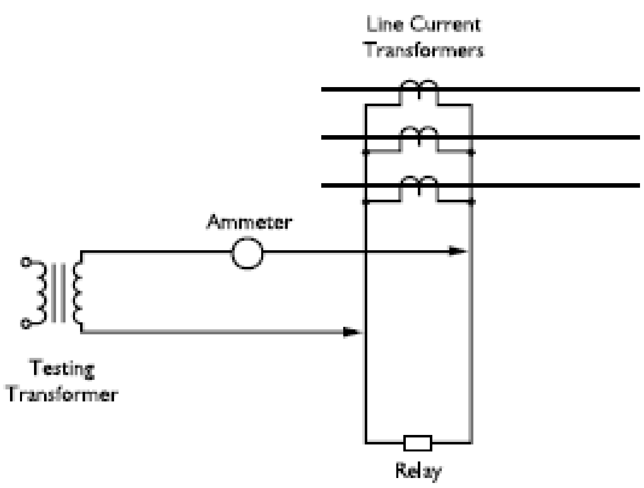


Figure 5 Circuit for Fault-Setting Tests by Secondary Injection

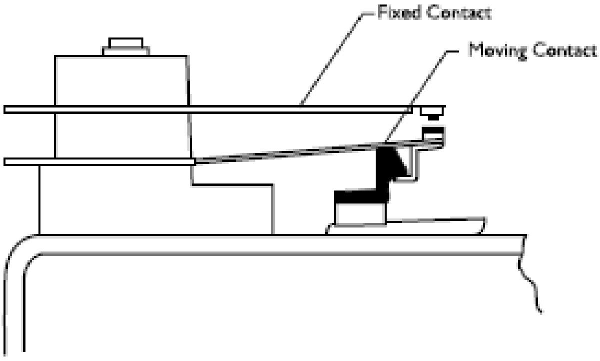


Figure 6 Type B61 Contact Stack as used on 5B3 Relay

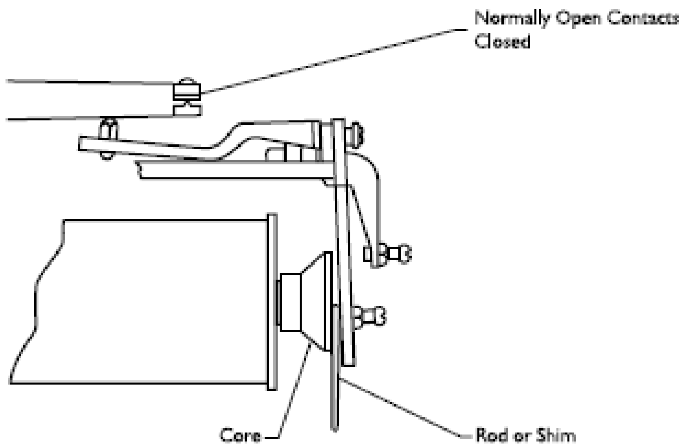


Figure 7 Checking Remaining Armature Travel at Contact Touch

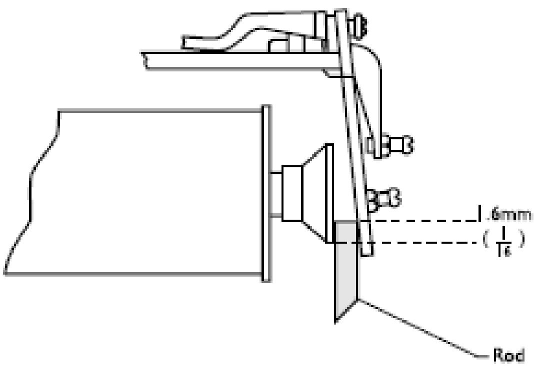


Figure 8 Armature Gap Setting

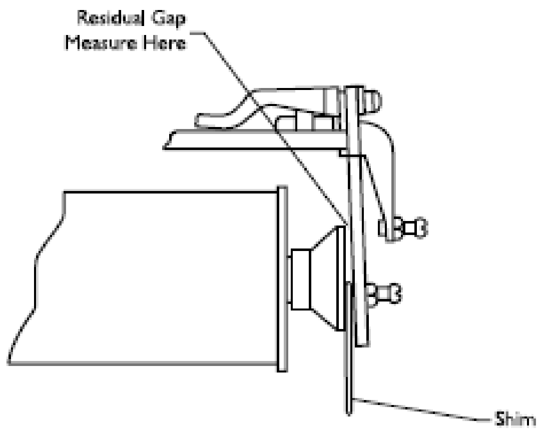


Figure 9 Residual Gap Setting

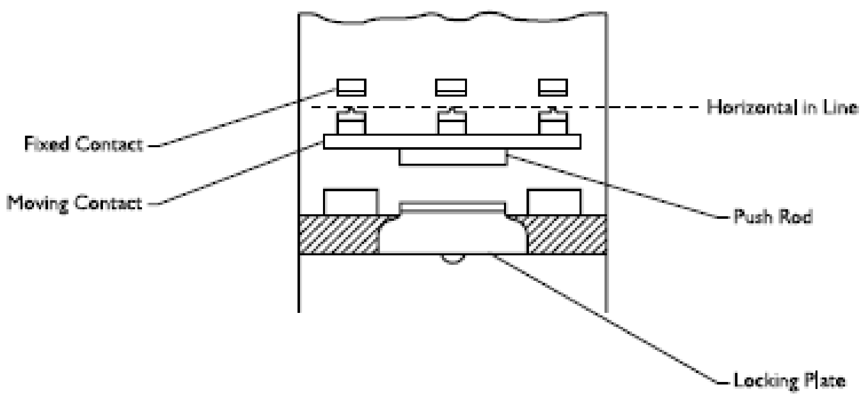


Figure 10 Setting of Contact Control Force

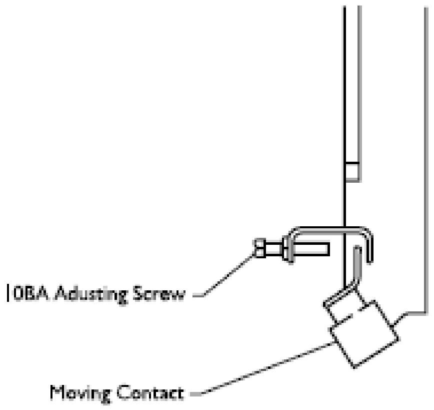


Figure 11 Flag Mechanism

7PG23 5B3

Restricted Earth Fault

Document Release History

This document is issue 02/2010. The list of revisions up to and including this issue is:

Pre release

02/2010	Document reformat due to rebrand

Software Revision History

Contents

1. Mechanical Inspection

Inspect the relay for dust and dirty or tarnished contacts. Use a blower to remove dust, and if necessary clean the contacts using a stiff brush dipped in a suitable substance.

2. Test Intervals

The maintenance tests required will largely depend upon experience and site conditions, but as a general rule it is recommended that the following inspection and tests are performed every twelve months.

- Mechanical Inspection
- Check of Connections
- Insulation Resistance Test
- Fault Setting Tests by Secondary Injection
- Tests using Load Current
- Check the continuity of the neutral CT loop with a bell test set or an ohmmeter

3. Defect Report Form

Form sheet for repairs and returned goods (fields marked with * are mandatory fields)

Sender:

*** Name, first name:**	Complete phone number (incl. country code):	Complete fax number (incl. country code):
Email address:	*** Org-ID and GBK reference:**	*** AWV:**

*** Order-/ reference-no (choosing at least 1 option):**

Order-no for repair:	order-/ delivery note-no for return of commission failure:	Beginning order-no for credit note demand:

Information concerning the product and its use:

*** Order Code (MLFB):**	Firmware version: V	*** Serial number:**	
* Customer:	Product was in use approximately since:	Station/project:	Hotline Input no.:
Customer original purchase order number:	Delivery note number with position number:	Manufacturer:	

*** Type of order (choosing at least 1 option):**

- ☐ Repair
- ☐ Upgrade / Modification to …
- ☐ Return of commission failure
- ☐ Warranty repair
- ☐ For collection
- ☐ Credit Note
- ☐ Quotation (not repair V4 and current products! See prices in PMD)

Type of failure:

- ☐ Device or module does not start up
- ☐ Sporadic failure
- ☐ Permanent failure
- ☐ Repeated breakdown
- ☐ Mechanical problem
- ☐ Knock sensitive
- ☐ Temperature caused failure
- ☐ Failure after firmware update
- ☐ Overload
- ☐ Transport damage
- ☐ Failure after ca ☐ hrs in use

Error description:

- ☐ Display message:
  (use separated sheet for more info)
- ☐ Active LED messages:
- ☐ Faulty Interface(s), which?
- ☐ Wrong measured value(s), which?
- ☐ Faulty input(s)/output(s), which?

***Detailed error description** (please refer to other error reports or documentation if possible):

*** Shall a firmware update be made during repair or mechanical upgrade of protective relays? (choosing at least 1 option)**

- ☐ Yes, to most recent version
- ☐ No
- ☐ Yes, actual parameters must be reusable

repair report:

- ☐ Yes, standard report (free of charge)
- ☐ Yes, detailed report (charge: 400EUR)

Shipping address of the repaired/upgraded product:

Company, department

Name, first name

Street, number

Postcode, city, country

Date, Signature

Please contact the Siemens representative office in your country to obtain return instructions.

E D EA MF TCC 6 release from 11/2009

Siemens Protection Devices Limited
P.O. Box 8
North Farm Road
Hebburn
Tyne & Wear
NE31 1TZ
United Kingdom
Phone: +44 (0)191 401 7901
Fax: +44 (0)191 401 5575
Email: marketing.spdl.gb@siemens.com

For enquires please contact our Customer Support Center
Phone: +49 180/524 70 00
Fax: +49 180/524 24 71(Charges depending on provider)
E-mail: support.energy@siemens.com

EMDG-T10094-00-76GB

January 2011

www. siemens.com/energy