
T&R Test Equipment Ltd



OPERATING AND MAINTENANCE MANUAL

Product: ***3 Phase Secondary Current Injection Test Set***
Type: ***200A-3PH/E***

DESIGNED AND MANUFACTURED BY:

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GENERAL SAFETY STATEMENT

The following safety precautions should be reviewed to avoid injury to the user and damage to the product (and other products connected to it). To avoid potential hazards only use this product as specified.

Only suitably qualified personnel should use this equipment. Servicing of this product should only be carried out by suitably qualified service personnel.

Hazardous voltages and currents are present on the outputs of this unit.

To Avoid Fire Hazards and Personal Injury

Use the correct power supply lead. Only use a suitably rated and approved power supply lead for the country of use.

Ensure that systems that the unit is to be connected to are dead.

Do not connect and disconnect leads whilst outputs are switched on.

Ensure that the product is grounded. To avoid electric shock it is essential that the grounding conductor is connected to the earth ground. If an additional earth terminal is provided on the equipment that may be connected to a local earth. Ensure that the product is properly grounded before making any connections to inputs or outputs.

Terminal ratings must be observed to prevent fire hazards and risk of injury to the operator. Consult the product manual for ratings information before making connections to any terminal.

It is **ESSENTIAL** to consult the product manual for rating information before making any connection to a terminal or terminal group marked with a warning triangle.

Only use fuses of a type and rating specified for this product.

Do not operate the unit out of its case or with any covers or panels removed.

Do not touch exposed connections and components when power is present.

Do not operate the product if any damage is suspected. Refer the unit to qualified service personnel to be checked.

Do not operate the unit in wet or damp conditions

Do not operate the unit in an explosive atmosphere

If any further queries occur regarding the usage and maintenance of the equipment detailed in this manual, please refer these to the supplier of the equipment in the first case or to:

T & R Test Equipment Limited

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1. Description of Equipment
2. Operation of Equipment
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1. DESCRIPTION OF EQUIPMENT

1.1 Electrical Specification

1.2 Variable 3 Phase Supply

1.3 Timer Control

1.4 Output Control

1.5 Construction

1.1 Electrical Specification

- 1.1.1 The supply voltage for the equipment is 415V (380v if requested) , 3 phase, 50/60Hz.
The unit will tolerate an input voltage variation of $\pm 6\%$.

IMPORTANT:

The Unit Must be Connected to a 4 Wire Supply.

- 1.1.2 The maximum power supply requirements will be 1100VA per phase.

- 1.1.3 The maximum current output from each phase is:
200A at 0 - 5V

- 1.1.4 Output current duty cycles:
Current 1 (50A) continuously rated
Current 2 (100A) 5 minutes ON load followed by 15 minutes OFF load
Current 3 (200A) 1 minute ON load followed by 15 minutes OFF load

- 1.1.5 Output current metering:
The analogue ammeters are scaled 0-50 & 0-100
There are 3 selectable ammeter ranges:- 0-50A, 0-100A & 0-200A
The metering accuracy is better than 1.5% of FSD.

IMPORTANT:

If the output current exceeds the maximum of each or any range by 15%, the output from the unit will be automatically switched off.

- 1.1.6 The fully isolated auxiliary fixed output supply is:
240V at 0.05A

- 1.1.7 The maximum voltage appearing on the relay contact test sockets is 24V DC. The maximum current flowing in the test circuit when the relay contacts are connected will be 0.3A DC. The contact test circuits are fully isolated.

1.2 Variable Three Phase Output

- 1.2.1 There are three independently controllable outputs available from the equipment. These outputs are 120° apart electrically.
- 1.2.2 The equipment's output terminals are located on the top edge of the front panel. Each terminal is clearly marked showing the output phase and polarity.
- 1.2.3 Each output phase is controlled by moving the appropriate regulator control knob in a clockwise direction. The output currents will be indicated on the ammeters.

1.3 Timer Control

1.3.1 The timer system will have the following parameters:

Range: 0-999.999 seconds (Quartz locked)
Resolution: 0.001 seconds
Accuracy: Contact mode ± 2 ms
Current mode ± 3 ms for test currents 20-40% on each range
Current mode +3ms or -1ms for test currents 40-100% on each range

NOTE: Timing results obtained with test currents below 20% of the selected ammeter range, and on measured times of 19ms and below, are of doubtful accuracy and should be ignored.

1.3.2 The timer system has three modes of operation which are as follows:

- a. Timing relays with normally closed contacts. (N/C)
- b. Timing relays with normally open contacts. (N/O)
- c. Timing circuit breakers both electromagnetic and thermal types where no auxiliary contacts are available. (I)

1.3.3 The external contacts may be voltage free or may have a DC voltage applied (220V DC maximum).

NOTE: See **Section 2** for connection procedure for live contacts.

1.3.4 In the I position an additional control selector switch is provided to enable the timer system to operate either from A, B or C phase injected current.

1.4 Output Control

- 1.4.1 The output from the unit is controlled by the illuminated output ON and OFF push-buttons. These push-buttons are located on the front panel of the unit.
- 1.4.2 The output is automatically switched off by the following actions:
 - a. Depressing the OFF push-button.
 - b. By the operation of external contacts changing state, i.e. N/C to open, when in contact mode of timer operation.
 - c. By the collapse of the injected current once the device under test has operated, when in current operated mode of timer operation.

1.5 Construction

- 1.5.1 The unit is housed in a steel case complete with a detachable lid and carrying handles located at each end of the case.

2. OPERATION

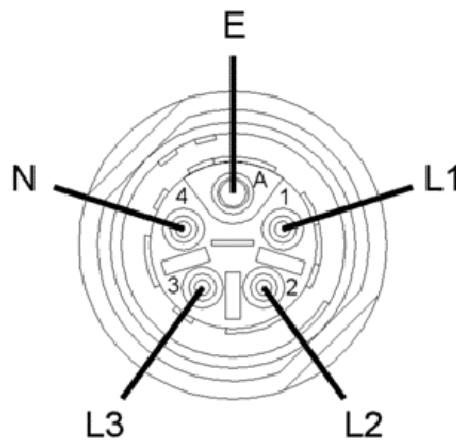
- 2.1 Supply Voltage Connections
- 2.2 Front Panel Control Functions
- 2.3 Connections and Timing Functions
- 2.4 Method of Operation

2.1 Supply Voltage Connections

2.1.1 The 200A-3PH/E is provided with a 5 core supply cable. These cores are marked to ensure the correct phase rotation. The mains input lead is marked as follows:

L1	Brown
L2	Black
L3	Black
Neutral	Blue
Earth	Green and Yellow

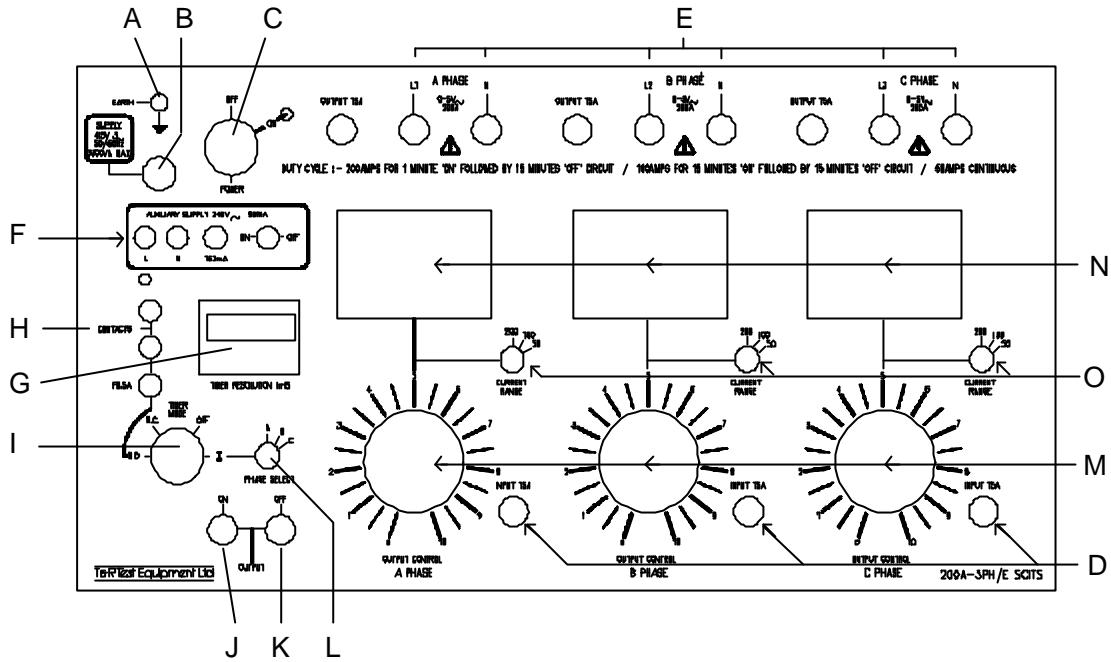
Connections for Mains Input Socket



2.2 Front Panel Control Functions (Figure 1)

2.2.1	ITEM	FUNCTION
	Supply ON/OFF switch	To isolate all supply leads from the mains supply .
	Supply ON lamp (RED)	To indicate supply is connected, the ON/OFF switch is closed and that the supply fuse is healthy.
	Output OFF illuminated push-button (GREEN)	Indicates output is OFF Switches OFF output when pressed
	Output ON illuminated push-button (RED)	Indicates output is ON Switches ON output when pressed
	Timer mode switch	This 4 position switch selects the method of timer/output control
	I Position phase selector	Will select a phase for timer under current control.

Figure 1 Front Panel Layout - 200A-3PH/E scits



- A Earth terminal
- B Input socket
- C Supply ON/OFF switch
- D Output fuses
- E Output terminals
- F Auxiliary supply sockets, fuse and ON/OFF switch
- G Timer
- H Contact sockets
- I Timer mode switch
- J Output ON push-button
- K Output OFF push-button
- L Current operated phase selector switch
- M Controlling Regulators
- N Output ammeters
- O Ammeter range selectors

2.3 Connections and Timing Functions

2.3.1 The following figures give the connections and associated timing functions for various relay types.

2.3.2 **Figure 3a** Over current relays

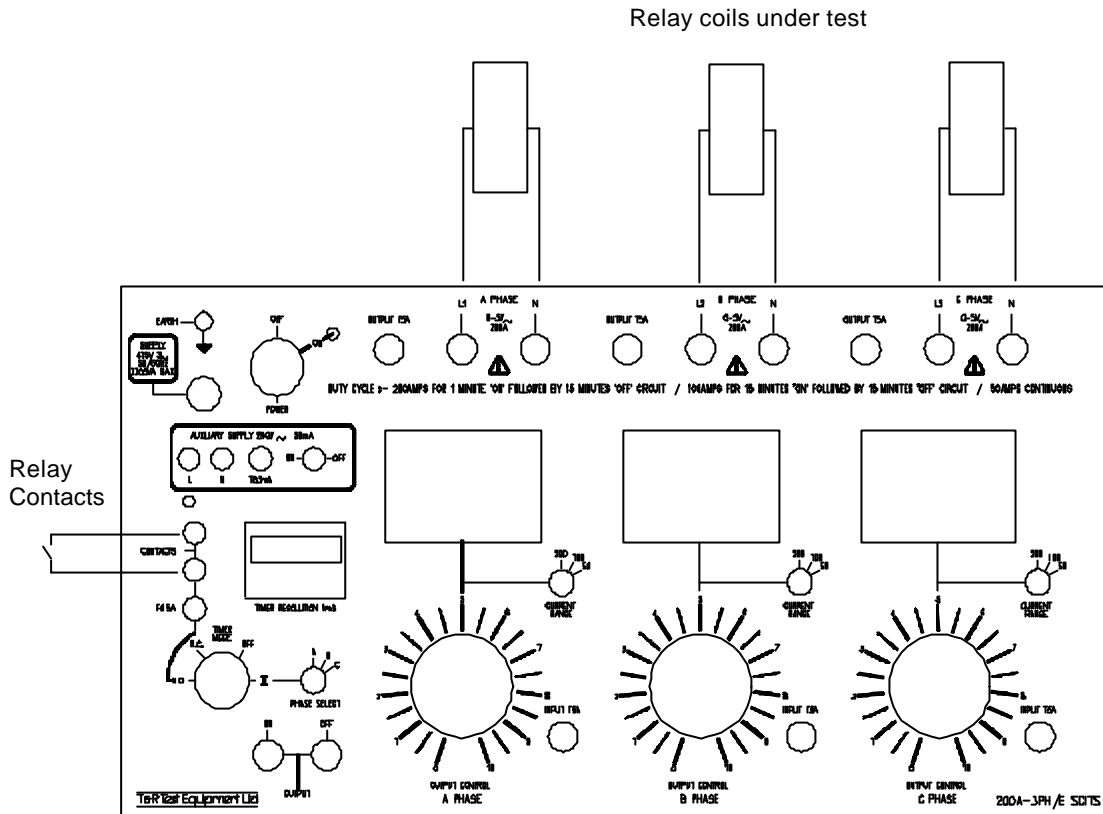
2.3.3 **Figure 3b** Devices with no auxiliary contacts

2.3.4 **Figure 3c** Phase relationships

IMPORTANT NOTES

When connecting live contacts to the contact terminals ensure that care is taken when making the connection. Also ensure that the POSITIVE input is connected to the RED socket and the NEGATIVE input is connected to the BLUE socket. If the connections are reversed the 0.25A fuse will rupture for load currents greater than 0.25A and the system will not function correctly for load currents below 0.25A

Figure 3a Over Current Relays



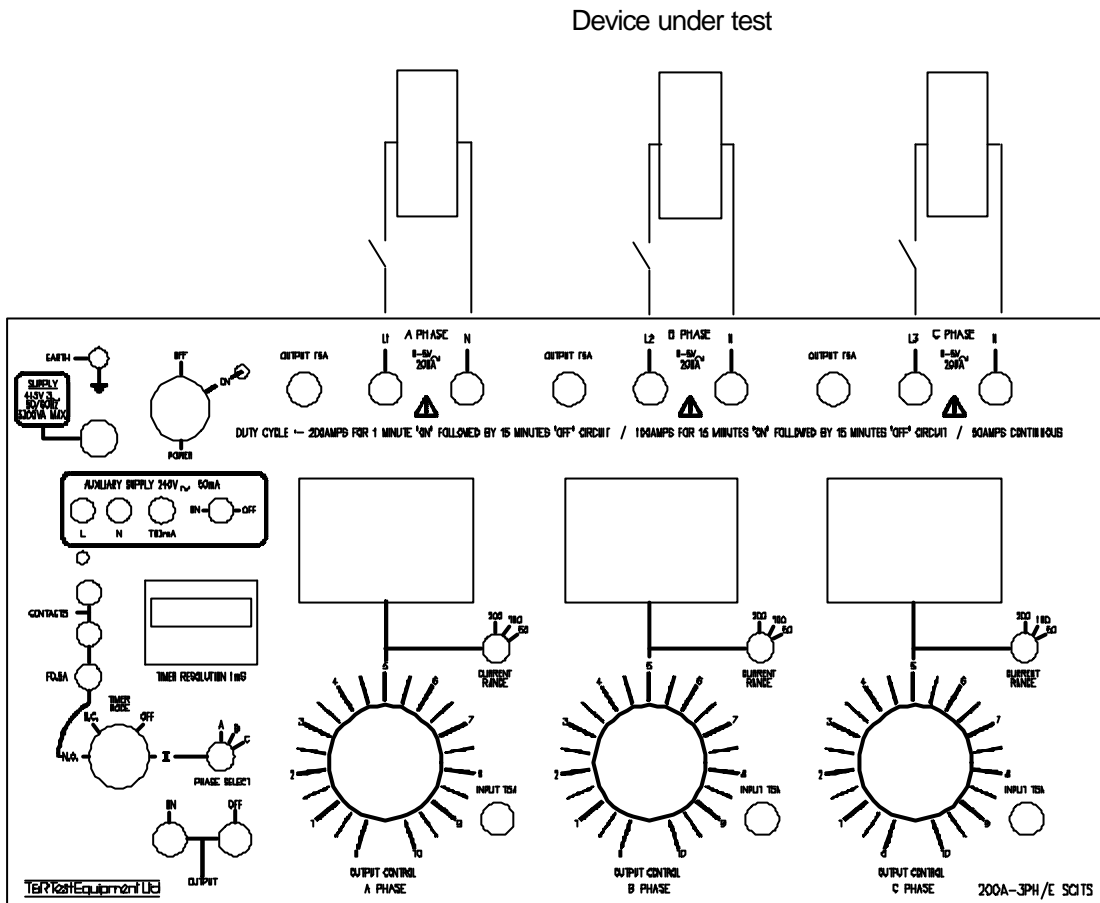
CONNECTIONS

1. Timer mode switch setting to N/C or N/O
2. Relay contacts to red and blue contact terminals
3. Relay coils to the desired outputs

TEST PROCEDURES

1. Switch on the main supply switch
2. Select timer mode switch to the **OFF** position
3. Ensure that the output regulators are in the zero position
4. Select the desired output range
5. Check that connections are made as above
6. Press output ON push-button and adjust output regulators until the desired output levels are indicated
7. Press output OFF push-button
8. Select **N/O** or **N/C** position on the timer mode switch and ensure timer is reading zero
9. Press output ON push-button
10. Relay will trip after a set time, which will be displayed on the timer, and the outputs will be switched off automatically

Figure 3b Timing Devices with No Auxiliary Contacts



CONNECTIONS

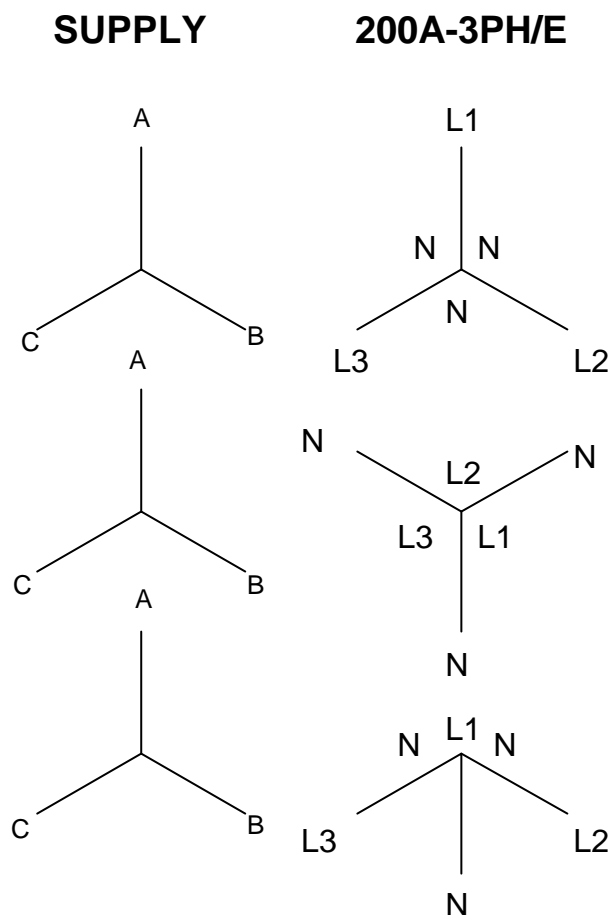
1. Timer mode switch setting to I
2. Connect the device to the desired outputs

TEST PROCEDURES

1. Switch on the main supply switch
2. Select timer mode to the **OFF** position
3. Ensure that the output regulators are in the zero position
4. Select the desired output range also select desired current operated time phase
5. Check that the connections are made as above and that the device is closed
6. Press output ON push-button and adjust to the desired output level
7. Press output OFF push-button
8. Select **I** position on the timer mode switch and ensure the timer is reading zero
9. Press the output ON push-button
10. Current will now flow through the device.
11. Once the device has tripped the timer will stop and the output will be switched off

NOTE: Timing results obtained with test currents below 20% on each ammeter range, and on measured times of 19ms and below, are of doubtful accuracy and should be ignored.

Figure 3c Phase Relationships



NOTE

1. Other phases can be shifted by 180° by connection reversal
2. DELTA output connections are not valid
3. Diagrams above show equal output currents. Unequal currents are valid

2.4 Method of Operation

- 2.4.1 Connect the equipment via the mains cable provided, to a 3-phase 4-wire supply.
- 2.4.2 Connect the output leads to the desired output terminals which are located on the top panel. The methods of connection are described in **Section 2.3**. Select the desired output.
- 2.4.3 It is advisable to make a preliminary test on the test object, starting at zero voltage, in order to test the load impedance, before performing the test with regulator set at higher values. Therefore, ensure the regulator knob is fully anti-clockwise before switching on.
- 2.4.4 Connect the supply lead to the mains and move the supply switch to the ON position, The supply ON lamp should now be illuminated.
- 2.4.5 Ensure the timer mode switch is in the OFF position. Select the desired ammeter range.
- 2.4.6 Depress the ON push-button.
- 2.4.7 Increase the current by rotating the regulator knob in a clockwise direction until the desired currents are indicated on the ammeters. Depress the output OFF push-button.
- 2.4.8 Connect the test object contacts to the relay contact terminals on the test set, select timer mode switch: N/O or N/C contacts, reset timer if necessary.
- 2.4.9 Depress the ON push-button and the following occurs:-
 - a. Timer will start, current will flow through the test object
 - b. Once the test object's contacts have changed state the timer will stop and the test current will be automatically switched off
 - c. 2-3 seconds must now elapse before the timer function is active and ready for a repeat test.
- 2.4.10 On completion of the test, return regulator to zero and switch off the supply. Before disconnecting the test object ensure the mains supply switch is in the OFF position.
- 2.4.11 It is usual to repeat the above test method several times checking that the times are consistent. However, it is advisable to allow the relay to cool between tests, particularly, if large overcurrents are being passed through the relay.
- 2.4.12 When testing thermal devices or circuit breakers with no auxiliary contacts, the test method is the same except that the timer control switch is in the " I " position.

3. MAINTENANCE

- 3.1 The switches and contactors should be occasionally examined for signs of wear and contact erosion. Badly eroded contacts should be replaced immediately.
- 3.2 The voltage regulator should be regularly examined, particularly in respect of the brushes, in order that the latter can be replaced before excessive wear has taken place.
- 3.3 The intervals between inspection and renewal of the brushes will depend upon the amount of usage. However, it should be remembered that extensive damage to the regulator can result if the brushes are allowed to wear away to such an extent that a loss of brush pressure occurs, thus causing arcing.
- 3.4 The occasional wiping of the regulator track with an alcohol moistened rag is recommended. If, however, the track is badly corroded, it should be cleaned with very fine sand paper, ensuring a flat surface is restored. Remove particles with a fine brush, and finally cleanse with an alcohol moistened brush.
- 3.5 To remove the instrument from its case, the following procedure should be adopted:
 - a. Remove the lid from the equipment.
 - b. Place the instrument in the normal operating position and remove the four M6 posidrive, top panel fixing screws.
 - c. Turn the unit over on to the front panel, ensuring the surface is protected, remove the four M5 set screws, lift the equipment's case off.

4. STANDARD ACCESSORIES

4.1 Spare fuses supplied

- a. 3 off **T5A** 1¼ inch
- b. 2 off **T63mA** 20mm
- c. 1 off **F500mA** 20mm

4.2 The following items are provided with the equipment:

- a. Mains input lead.
- c. Operating & Maintenance Manual.

5. OVERALL PERFORMANCE SPECIFICATION

5.1 Insulation Resistance at 1000V DC

The insulation resistance will not be less than 10 megohms between mains input to frame and all isolated outputs, and all combinations of isolated output to isolated output.

5.2 Applied Voltage Test

Mains input to frame and all isolated outputs 2kV RMS for 1 minute.

All combinations of isolated output to isolated output.

Isolated output to frame.

1.5kV RMS for 1 minute.

5.3 Accuracy of Instruments

The ammeter plus appropriate current transducer better than + 1.5% of full scale

5.4 Polarity

Zero phase shift.

Mains input - auxiliary voltage output.

Mains input - current output (Common = Neutral).

6. CALIBRATION RESULTS

6.1 Equipment Serial Number

6.2 Ammeter Circuits

Standard Ammeter	Equipment's Ammeter		
	A phase	B phase	C phase
200A			
160A			
120A			
80A			
40A			
20A			

Standard Ammeter	Equipment's Ammeter		
	A phase	B phase	C phase
100A			
80A			
60A			
40A			
20A			
10A			

Standard Ammeter	Equipment's Ammeter		
	A phase	B phase	C phase
50A			
40A			
30A			
20A			
10A			
5A			

7. TEST CERTIFICATE

PRODUCT TYPE: **200A-3PH/E scits**

PRODUCT SERIAL NUMBER:

TEST PROCEDURE: As routine test sheet:- 200A3PHE rts.doc

TESTED BY:

PASSED BY:

DATE:

8. REVISION

Product / Type: 3 Phase Secondary Current Injection Test Set / 200A-3PH/E
File: 200A-3PHE manual v8.doc
Author: D. Buckle

Issue / Date: 8 / 19.04.2001
Modified By: D. Buckle

Checked By: I.D.W. Lake	Date: 19.04.2001
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Drawings Required

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