

	Standard	Technology
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Title: **STANDARD FOR TEST BLOCK CONNECTIONS FOR METERING AND MEASUREMENT CIRCUITS**

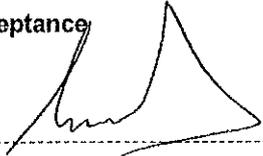
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COE Acceptance



Richard McCurrach
PTM&C Senior Manager

Date: 18/8/2018

DBOUS Acceptance



Amelia Mtshali
Senior Manager: Power Delivery
Engineering (DBOUS)

Date: 28/08/2018

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1	A specific plant, project or solution	
2	A mature and stable technical area/technology	X
3	Established and accepted practices.	X

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SCOT Study Committee Number/Name: Metering and Measurements



Eskom

Standard

Technology

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Compiled by

Henri Groenewald

Standards Amalgamation work group

Date: 2014-02-20

Approved by

Reginald Brooks

Metering and Measurements Study Committee Chairperson

Date: 2014-03-12

Authorized by

Willie Majola

Senior General Manager Engineering

Date: 14/03/2014

Supported by SCOT/SC

Richard McCurrach

PTM&C Technical Committee Chairperson

Date: 14/03/2014

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1. Introduction

This standard was created to assist metering sections in the field with the requirements for meter test instruments and tools which will enable metering technicians to perform their work effectively.

2. Supporting clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to set out Eskom’s requirements for test block connections for metering and measurement circuits.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] ISO 9001 Quality Management Systems.
- [2] 240-70975231 (old DSP 34-1975), *Specification for current and voltage transformer test blocks*

2.2.2 Informative

- [3] N/A.

2.3 Definitions

2.3.1 General

Definition	Description
Current circuit	Internal connections of the meter and part of the measuring element through which flows the current of the circuit to which the meter is connected [SANS 62052-11]
Current instrument transformer (CT)	Instrument transformer in which the secondary current, in normal conditions of use, is substantially proportional to the primary current, and differs in phase by an angle which is approximately zero for an appropriate direction of the connections [IEC Dictionary]
Meter	Device for measuring and totalling the variable consumption of a product. In general a meter consists of a sensor and an integrating device that displays the total consumption in metrological units [SANS 62051]
Manual switch element test block	A test block which requires a manual operation (opening and closing of links) to perform maintenance work on the metering circuitry
Test block	Device that permits access to voltage and current circuits for testing purposes while the metering installation is in normal service

Definition	Description
Voltage instrument transformer (VT)	Instrument transformer in which the secondary voltage, in normal conditions of use, is substantially proportional to the primary voltage, and differs in phase from it by an angle which is approximately zero for an appropriate direction of connections [IEC Dictionary]
Withdraw able test block	A two part test block which allows for the automatic isolation of metering and measurement circuits during maintenance tasks through the incorporation of "make before break contacts". No manual switching of individual elements is required.

2.3.2 Disclosure classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

AC	Alternating current
CT	Current instrument transformer
MCB	Miniature circuit breaker
VT	Voltage instrument transformer

2.5 Roles and responsibilities

The relevant metering sections within Eskom Distribution, Transmission and Generation are responsible to commission and maintain metering installations and shall ensure that test block connections adhere to the standard configurations as listed in this document.

2.6 Process for monitoring

Adherence to this document shall be monitored through routine inspections.

2.7 Related/supporting documents

This document replaces DST 32-328.

3. Requirements

3.1 General

- a) The test block connections shall permit access to voltage and current circuits for testing purposes while the metering installation may still be in normal service.
- b) Withdrawable PK-2 4-way test blocks are preferred. For Generation metering, the PK-2 6-way test blocks are preferred for CT circuits.
- c) Test block connections shown in the attached figures shall be adhered to.
- d) When 13-way test blocks are used on new installations then the wiring diagram shall be in accordance with figure 4 or 5 in Annex A.
- e) Voltage transformer circuits shall be suitably protected via miniature circuit breakers or fuses.
- f) Test blocks shall be suitably labelled to indicate voltage or current circuits.
- g) Current transformer circuits shall be earthed in the meter panel.

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- h) Test blocks shall provide for a sealing mechanism and they shall be sealed after work has been done on the circuits. For Generation, sealing of test blocks is not required.

3.2 Technical specifications

The mechanical and electrical requirements shall be as specified in 240-70975231 (old DSP 34-1975), Specification for current and voltage transformer test blocks.

3.3 Standard test block connections

The following diagrams provides for standardised configurations for the various applications.

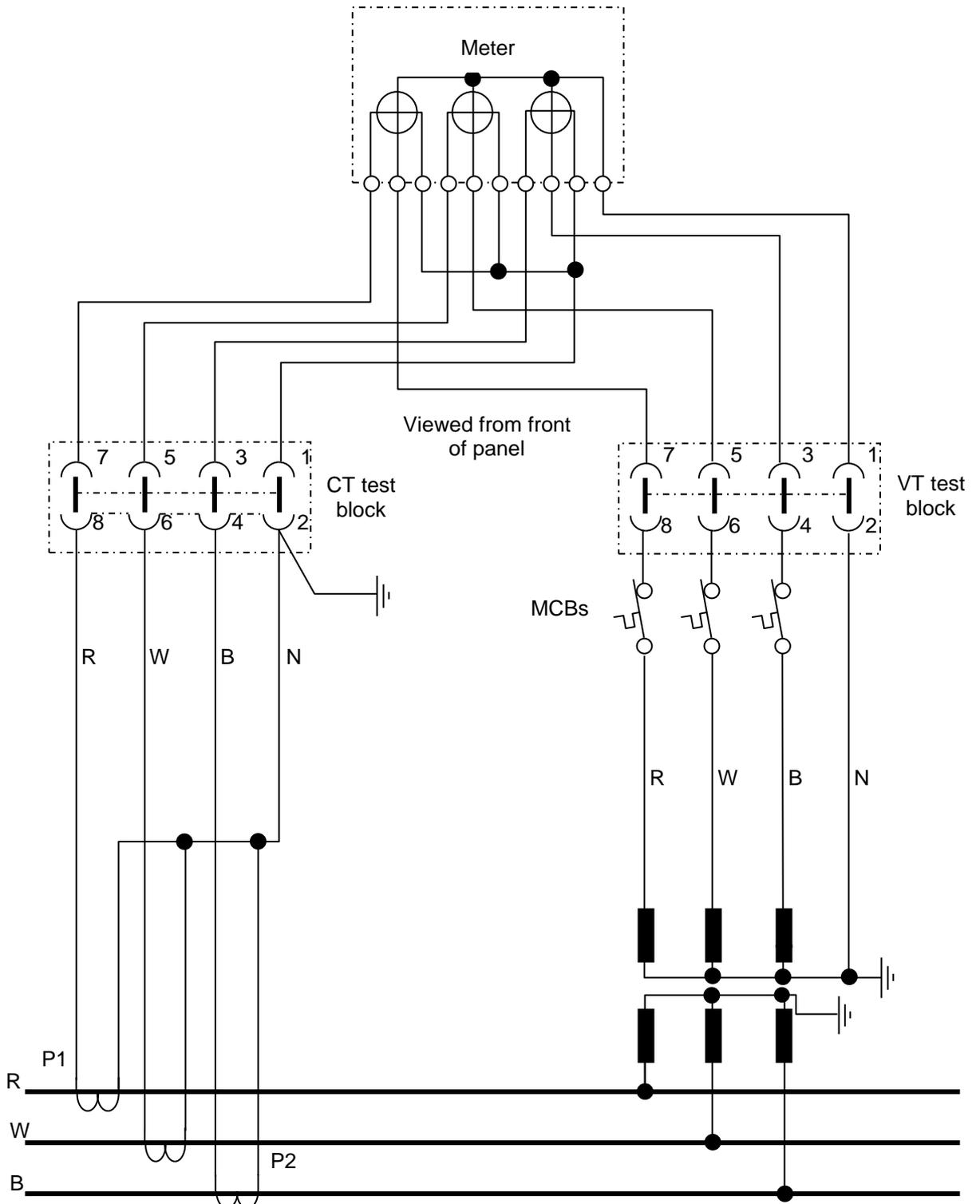


Figure 1: Withdrawable test blocks: 3 phase 4 wire standard metering circuit connections for PK-2, 4 way test blocks

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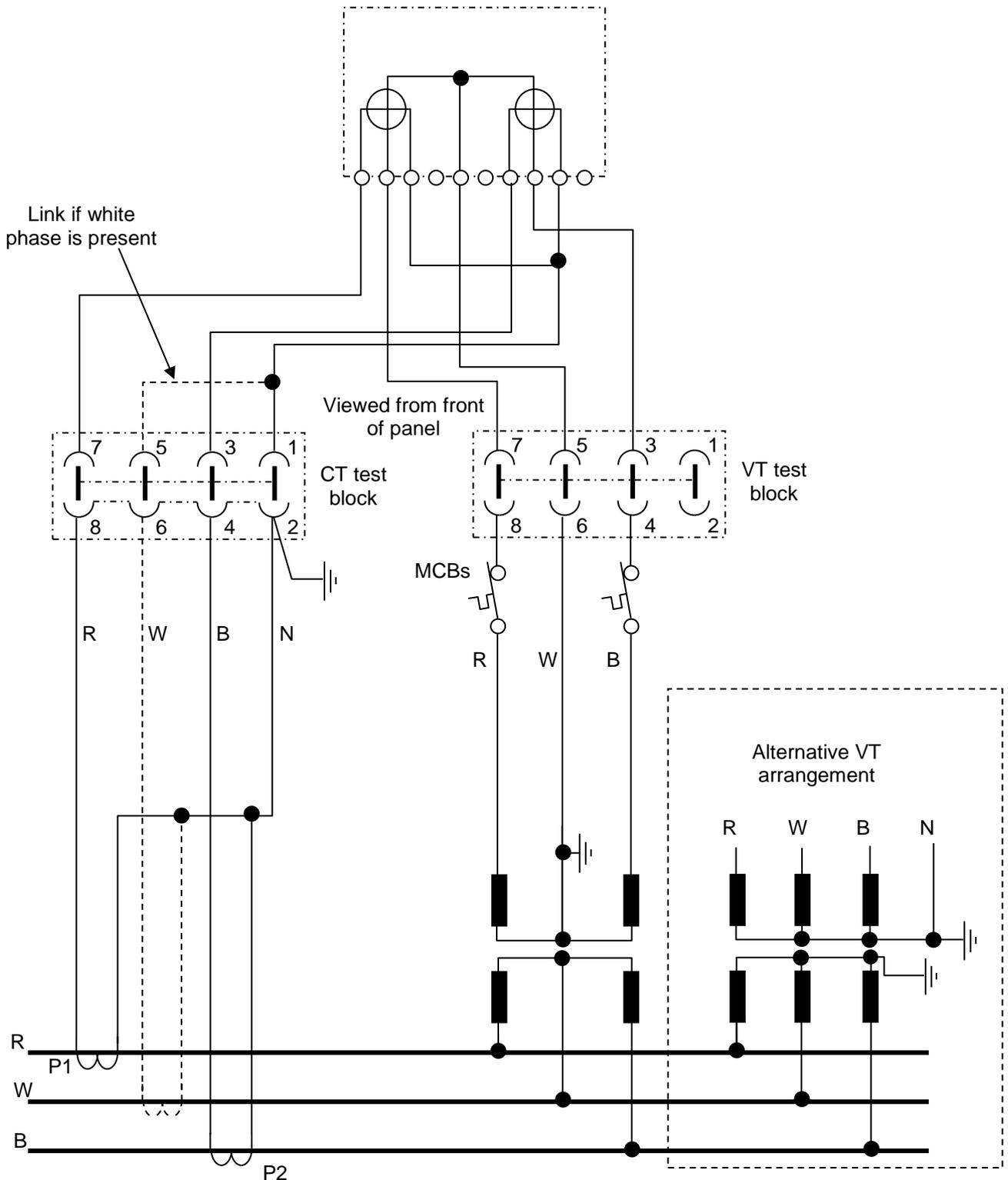
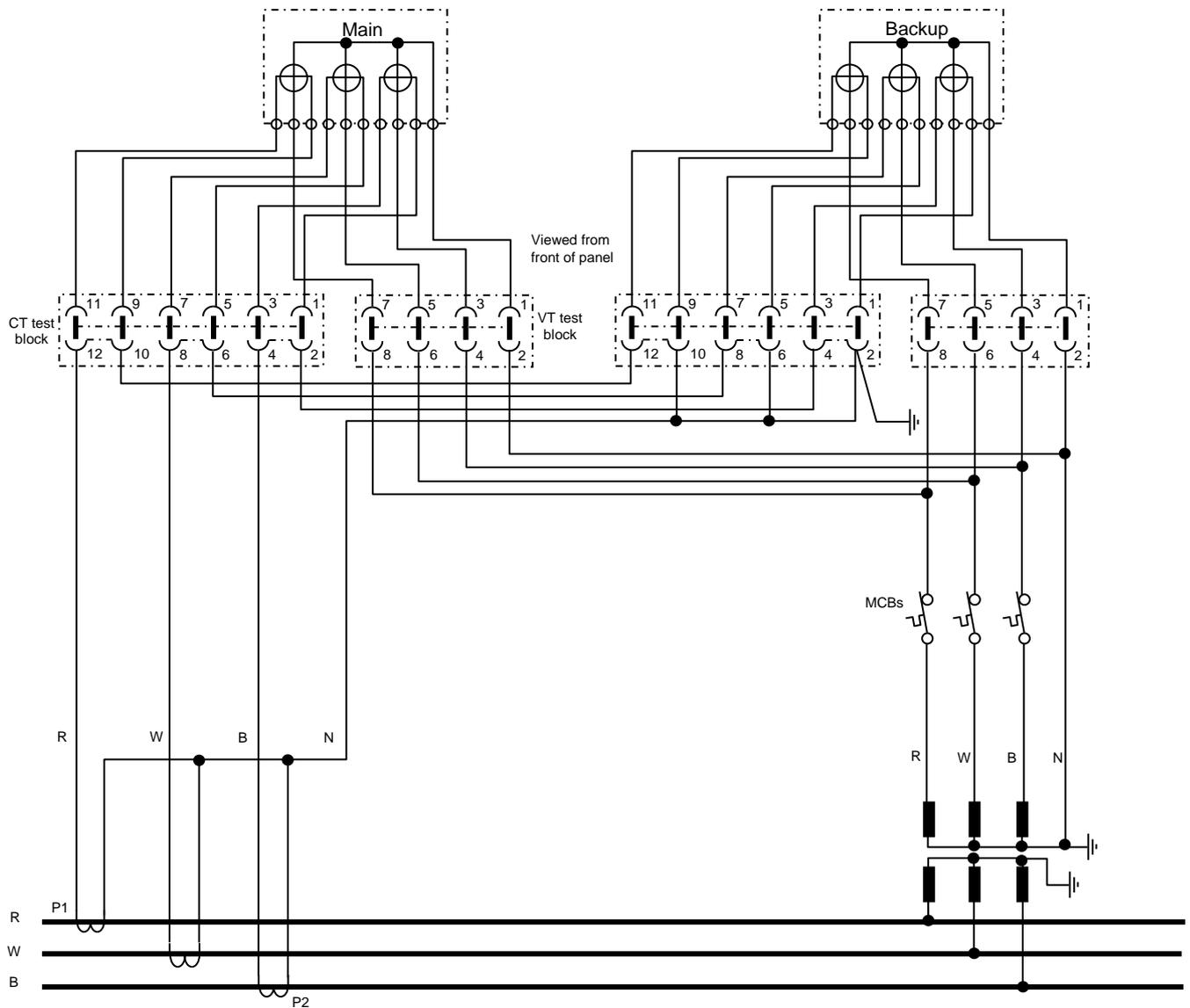


Figure 2: Withdrawable test blocks: 3 phase 3 wire standard metering circuit connections for PK-2, 4 way test blocks

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Notes: The CT circuits utilise 6 way PK2 test blocks to allow the testing of the main circuit while leaving the backup circuit undisturbed (or if protection circuit exists in place of backup metering).

Figure 3: Withdrawable test blocks: Showing the possible use of split CT shorting bars with the use of a 6-way test block on a 3 phase 4 wire main/backup metering scheme

Condition	Link "a"	Link "b"
Normal operation	Closed	Open
On test	Open	Closed

Note: Table shows the use of links which avoid circuit wiring changes

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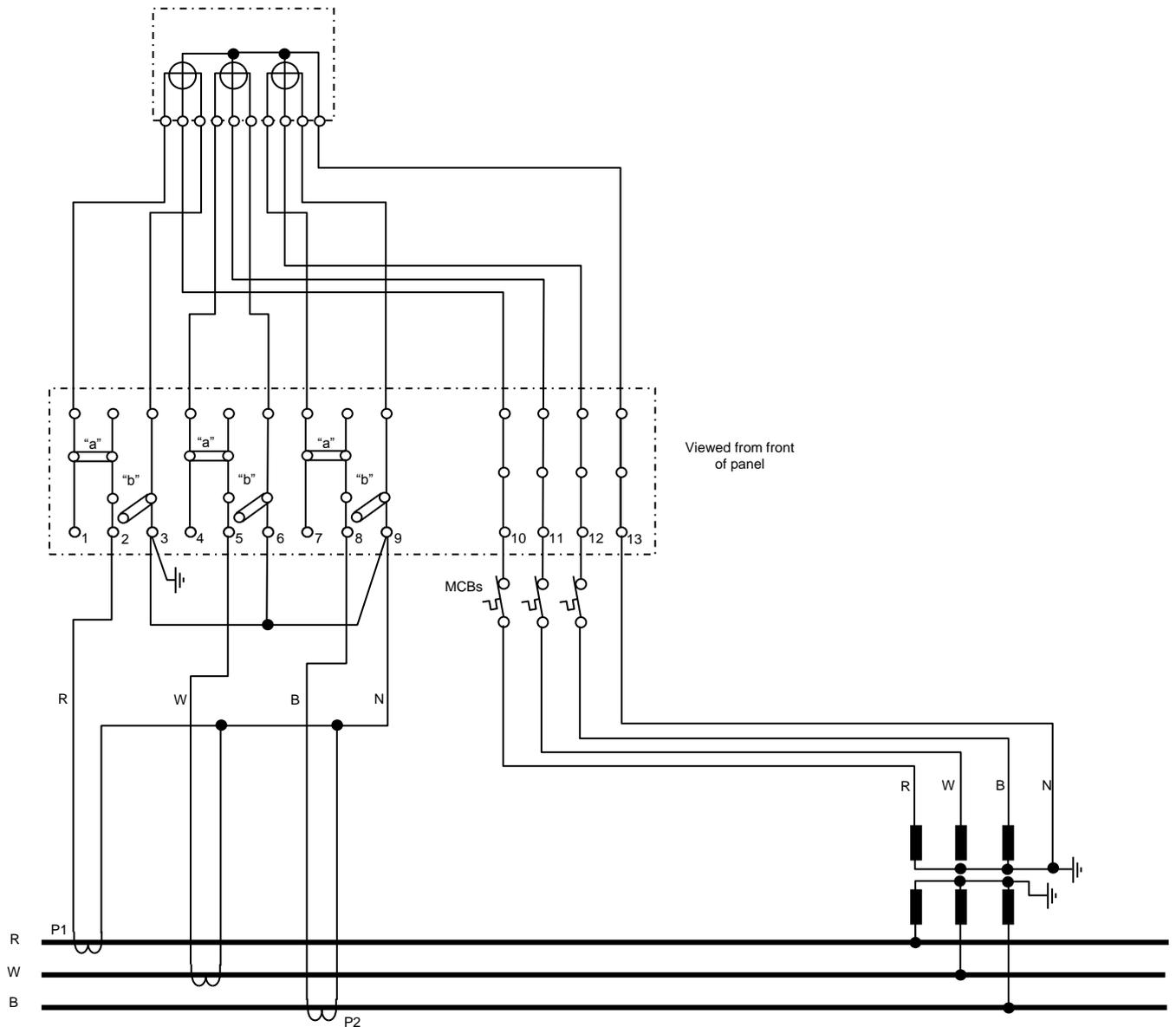


Figure 4: Manual switch element test block: 3 phase 4 wire standard metering circuit connections for a 13-way test block (Standard to be used with 13-way test block for new applications)

Condition	Link "a"	Link "b"
Normal operation	Closed	Open
On test	Open	Closed

Note: Table shows the use of links which avoid circuit wiring changes

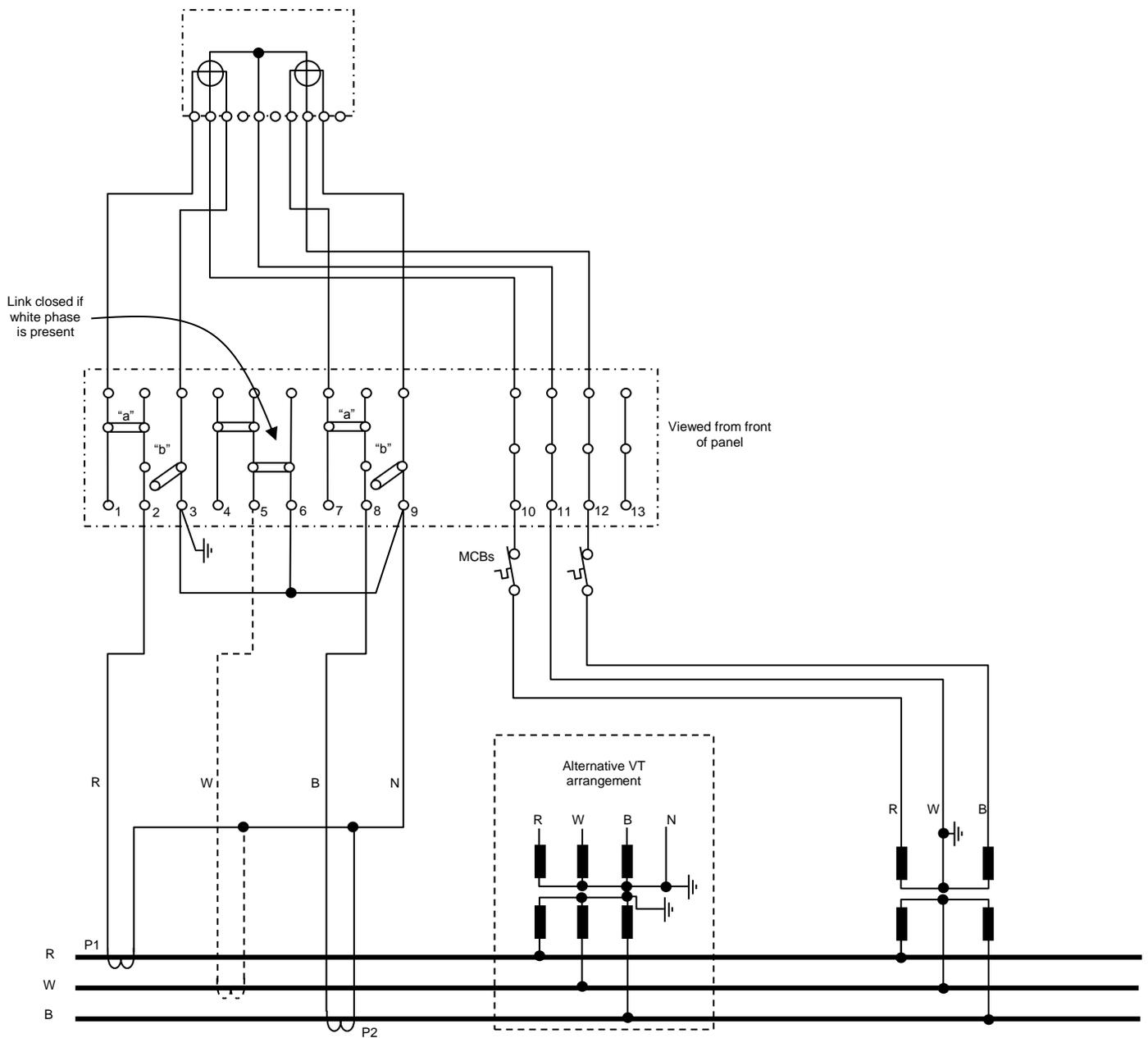


Figure 5: Manual switch element test block: 3 phase 3 wire standard metering circuit connections for a 13-way test block (Standard to be used with 13-way test block for new applications)

4. Authorization

This document has been seen and accepted by:

Name	Designation
W Majola	Senior General Manager: Engineering
P Moyo	General Manager: Power Delivery Engineering

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Name	Designation
P Moyo	General Manager: Power Delivery Engineering
D Odendaal	General Manager: Plant Engineering
P Madiba	Senior Manager: Electrical & C&I
A Mtshali	Metering, DC & Security Systems Manager (Acting) – PTM&C
A Pillay	Senior Manager: PTM
M Viljoen	Senior Manager: PEIC, Electrical & C&I

5. Revisions

Date	Rev.	Compiled By:	Clause	Remarks
March 2014	1	H Groenewald	-	New number allocated to document: 240-70732868 Development team expanded.
Feb 2009	1	H Groenewald	-	Keywords added Formatted into new template Added definitions and abbreviations Added Par 4.2 “Technical specifications” Removed “obsolete” test block connection diagrams to Annex B

6. Development team

The following people were involved in the development of this document:

Henri Groenewald	PTM&C
Mohammed Omar	PTM&C
André le Roux	Southern Region
Hylton Hiralal	Central Region
Michael McDonald	Energy Trading
Reginald Brooks	Western Region
Wernher Schmidt	Eastern Region
Richard Brayshaw	Group Technology Engineering (Electrical)
Johan Le Roux	Group Technology PTM
Christiaan Olivier	Group Technology PTM
Elekanyani Ndlovu	CoE Plant Manager, Electrical
Johan Botma	Group Technology PEIC Secondary Plant

7. Acknowledgements

N/A.

Annex A – Obsolete test block connections

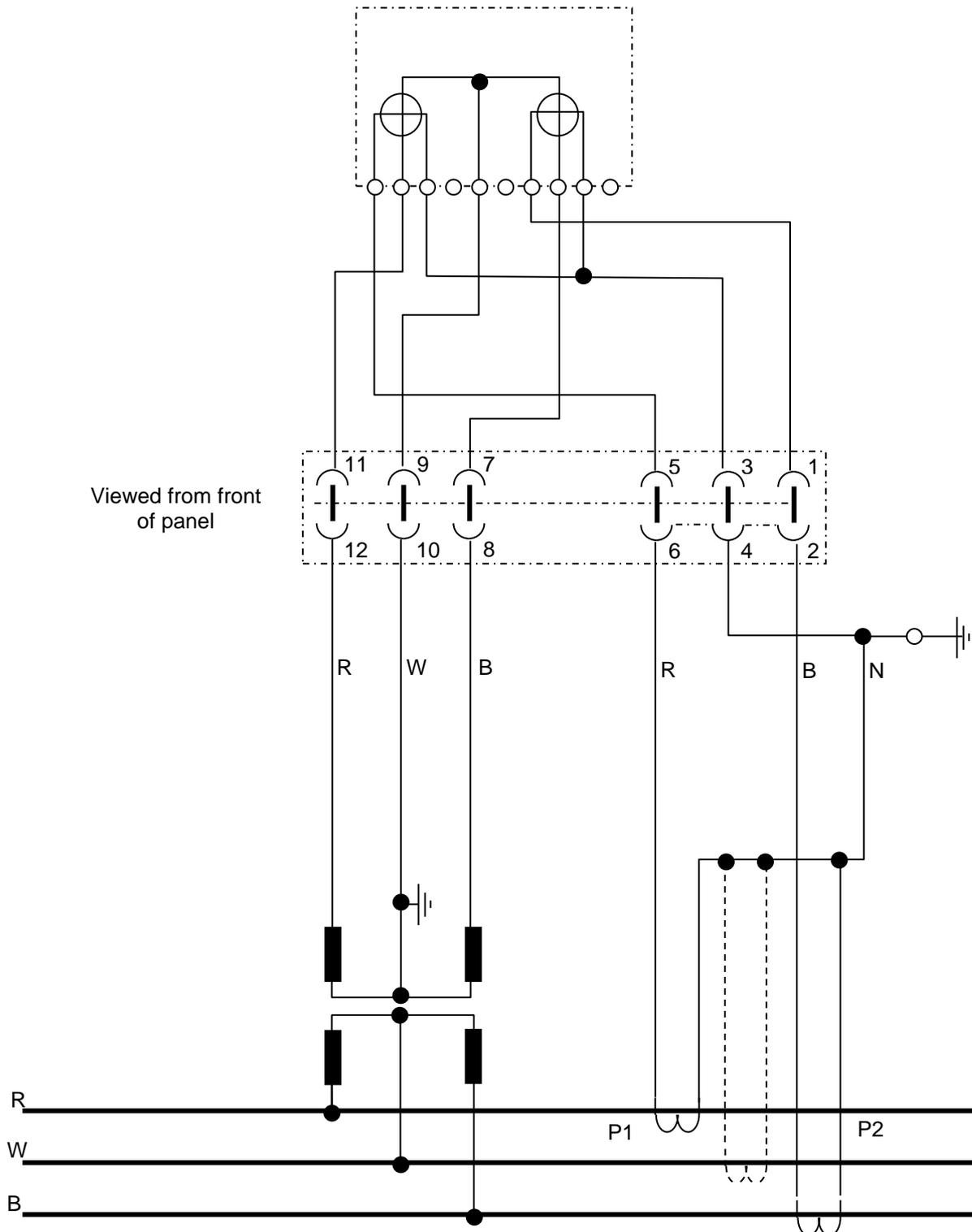


Figure A1: 3 phase 3 wire standard metering circuit connections for PK-2, 6 way test block.

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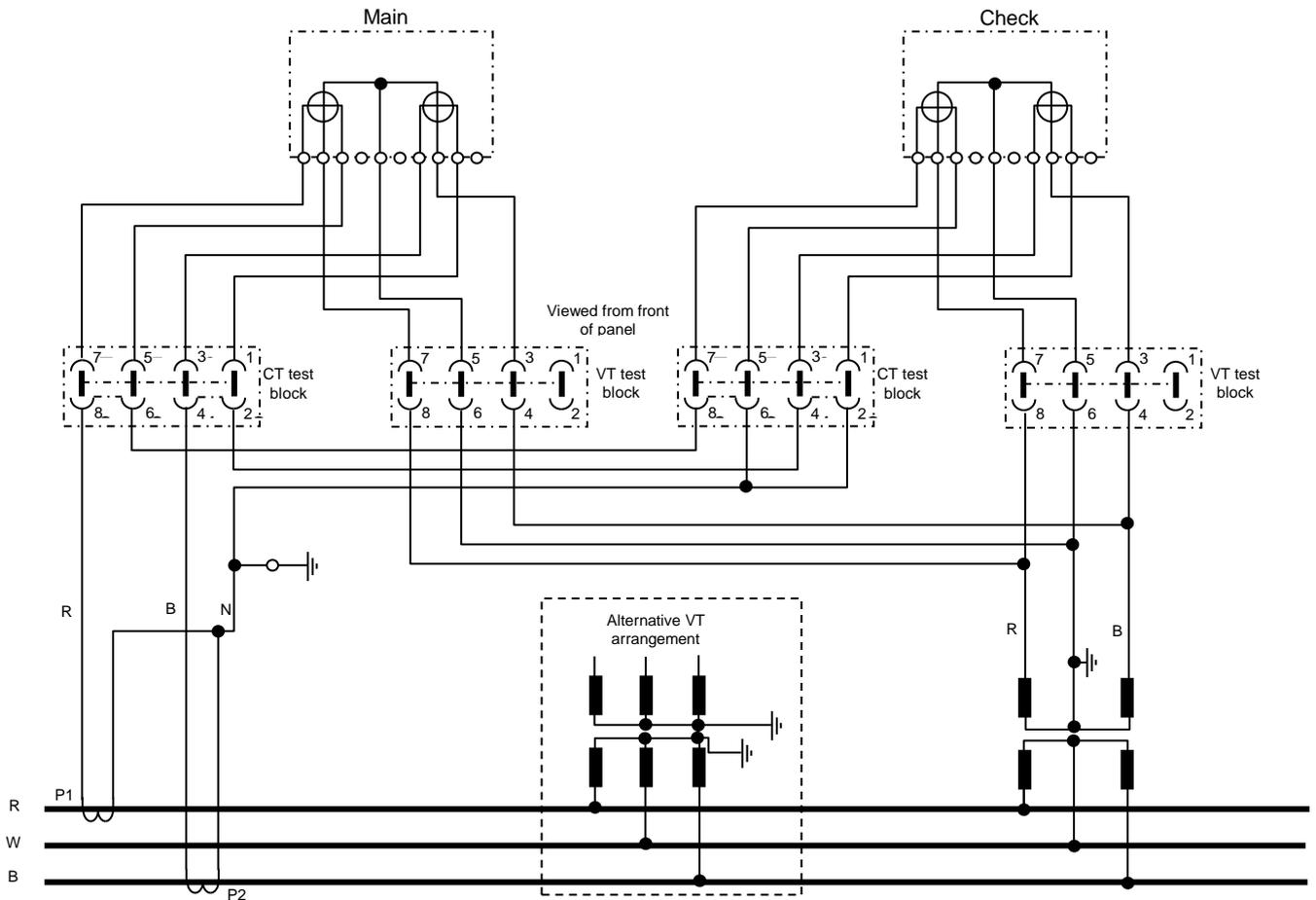


Figure A2: Showing the possible use of split CT shorting bars on a 3 phase 3 wire main/check metering scheme, connections allow testing of main circuit leaving check metering undisturbed

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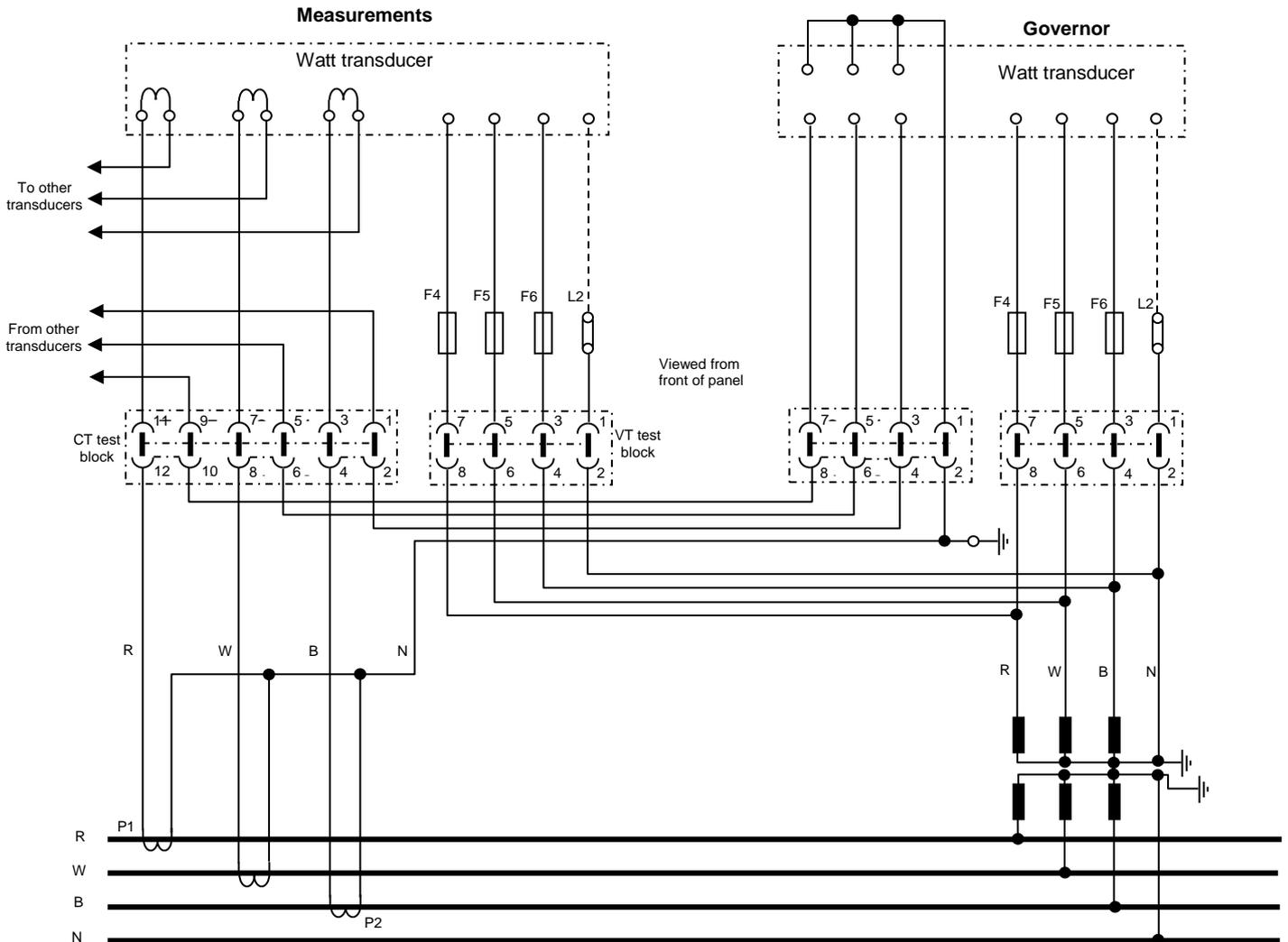


Figure A3: Showing the incorporation of the watt transducer used in the governor of a generator e.g. PK-2 6-way and 4-way.

Condition	Link "a"	Link "b"
Normal operation	Open	Closed
On test	Open	Open

Note: Table shows the use of links which avoid circuit wiring changes

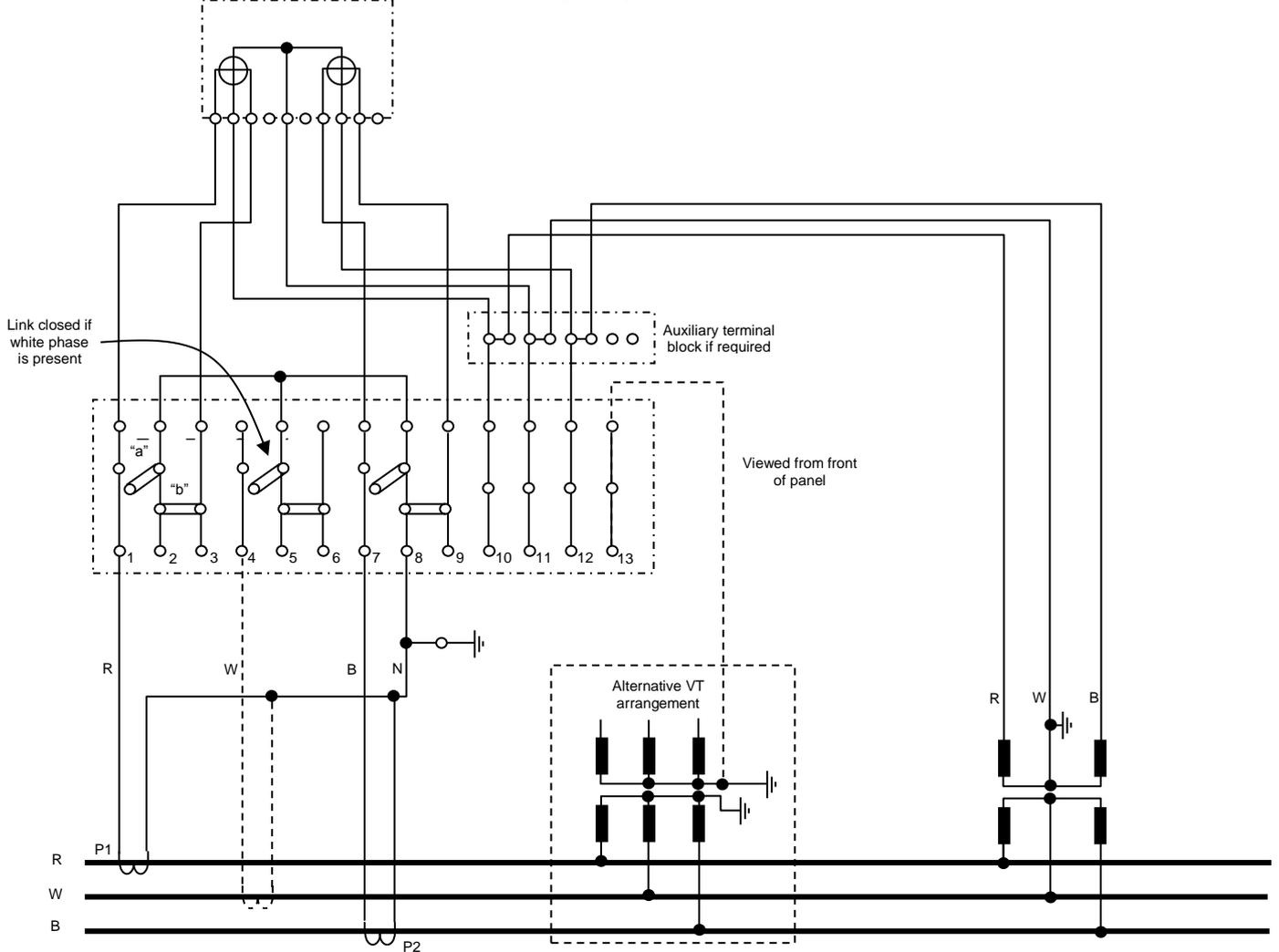


Figure A4: 3 phase 3 wire standard metering circuit connections for a 13-way test block (Optional diagram as previously used in Cape area).

Condition	Link "a"	Link "b"
Normal operation	Closed	Open
On test	Open	Open

Note: Table shows the use of links which avoid circuit wiring changes

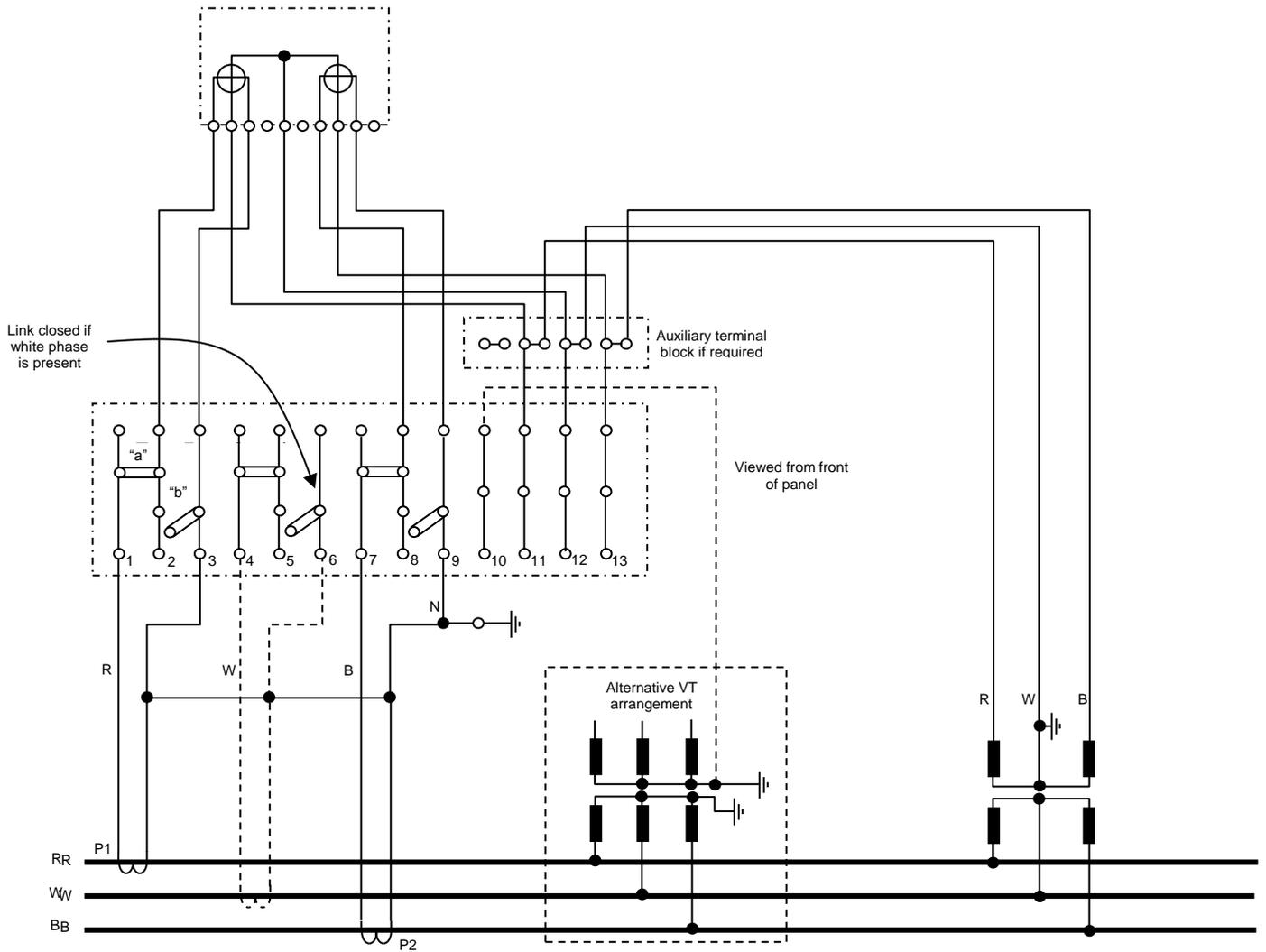


Figure A5:3 phase 3 wire standard metering circuit connections for a 13-way test block (Optional diagram as previously used in Johannesburg area)

Condition	Link "a"	Link "b"
Normal operation	Open	Closed
On test	Open	Open

Note: Table shows the use of links which avoid circuit wiring changes

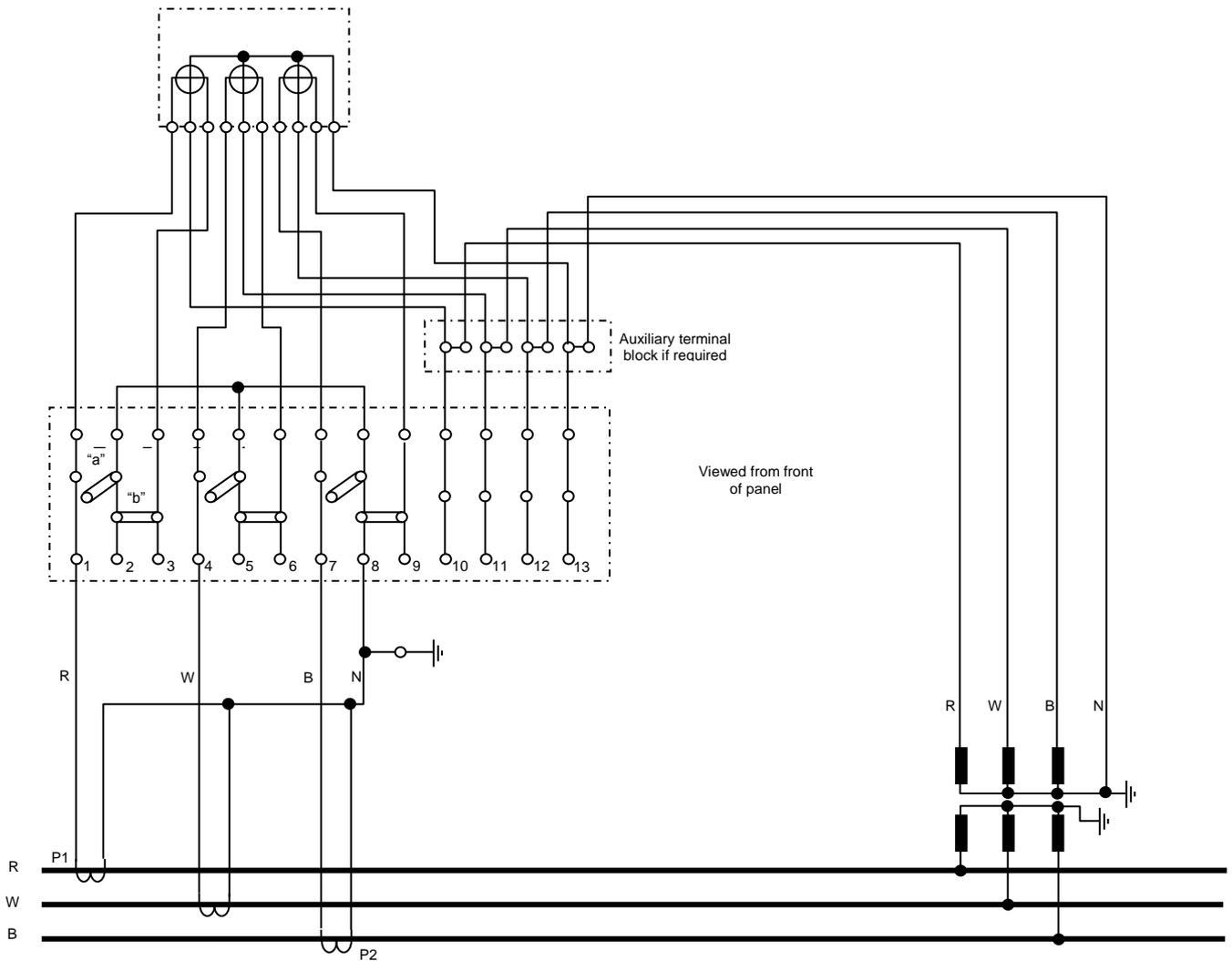


Figure A6: 3 phase 4 wire standard metering circuit connections for a 13-way test block (Optional diagram as previously used in the Cape area)

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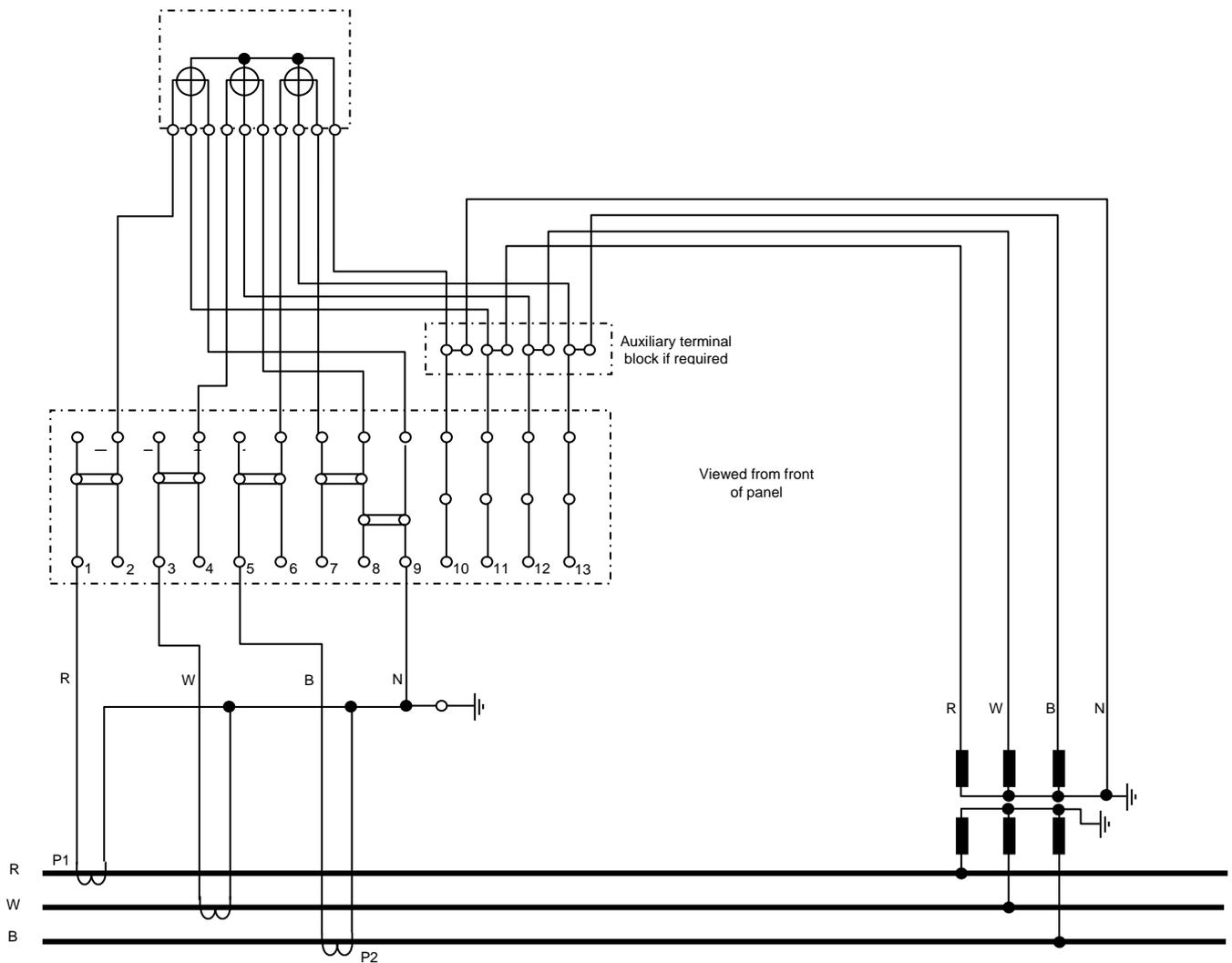


Figure A7: 3 phase 4 wire standard metering circuit connections for a 13 way test block (Optional diagram as previously used in the Johannesburg area)

Condition	Link "a"	Link "b"
Normal operation	Closed	Open
On test	Open	Open

Note: Table shows the use of links which avoid circuit wiring changes

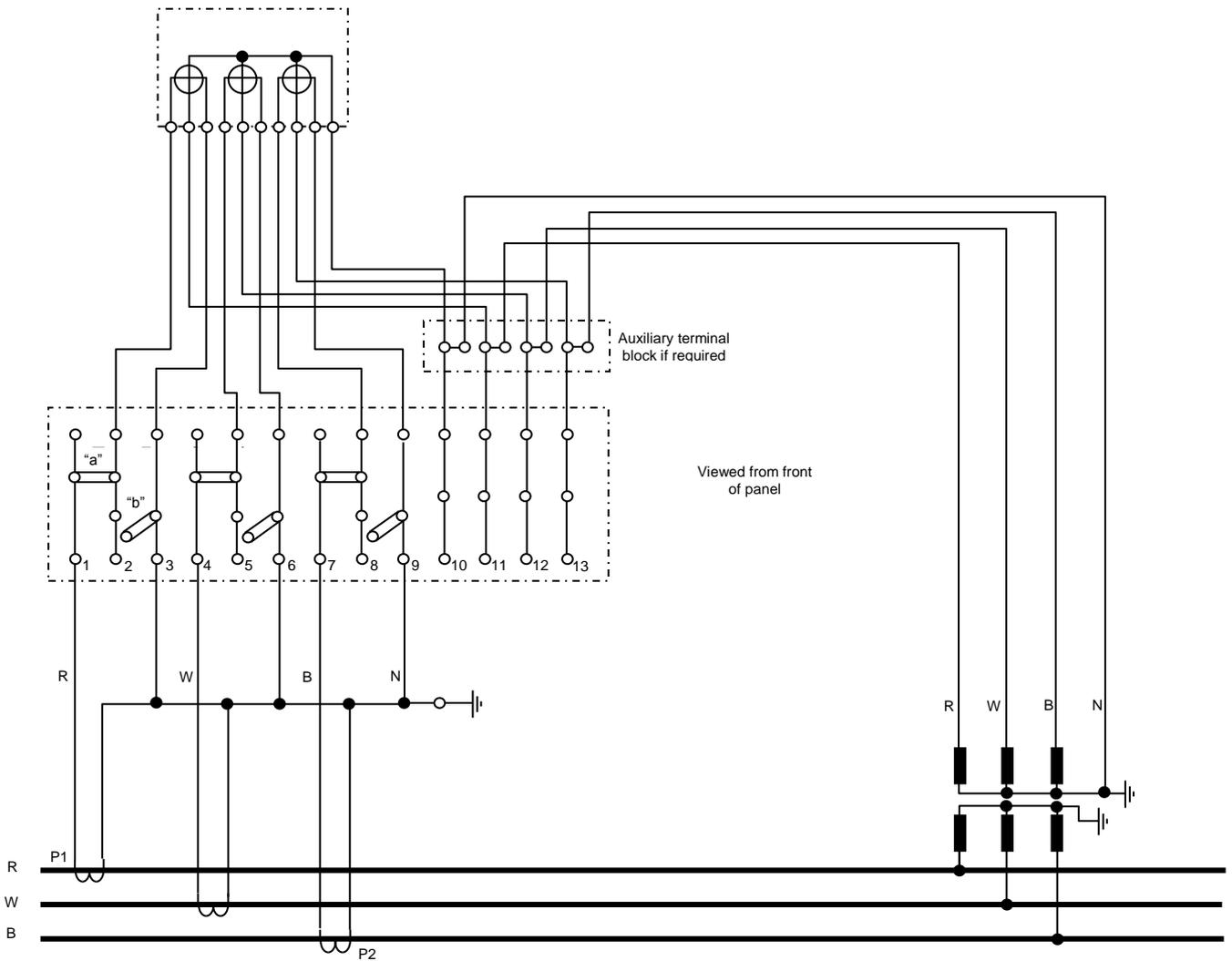


Figure A8: 3 phase 4 wire standard metering circuit connections for a 13-way test block (Optional diagram as previously used in the Johannesburg area)