

	Standard	Technology
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Title: **STANDARD FOR PHASE FAILURE RELAYS**

Unique Identifier: **240-76628623**

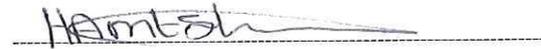
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Area of Applicability: **Engineering**

Next Review Date: **STABILISED**

COE Acceptance

DBOUS Acceptance

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Date: 2019-11-07

Date: 7/11/2019

This document is **STABILISED**. The technical content in this document is not expected to change because the document covers: *(Tick applicable motivation)*

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

PCM Reference: <xxxxxxx>

SCOT Study Committee Number/Name: <Number or name>

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Title: STANDARD FOR PHASE FAILURE RELAYS

Unique Identifier: 240-76628623

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Area of Applicability: Engineering

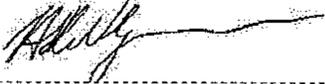
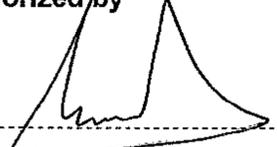
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1. Introduction

Phase failure or phase sequence relays are used in metering panels within voltage selection modules to trigger the selection of voltages to meters.

This standard describes the minimum requirements for these relays.

2. Supporting clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to set a standard on voltage phase fail relays.

2.1.2 Applicability

This standard is applicable to all metering installations in Eskom Holdings Distribution and Transmission Divisions where phase failure relays are utilised.

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] IEC 60255-5, Electrical relays. Part 5: Insulation tests for electrical relays.

2.2.2 Informative

None

2.3 Definitions

2.3.1 General

None

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
AC	Alternating current
°C	Celcius.
Hz	Hertz.
LED	Light emitting diode.

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Abbreviation	Description
mcd	Milli-candela (unit for luminous intensity).
ms	Milli-second.
mA	Milli-ampere.
NPS	Negative phase sequence.
N/C	Normally closed.
N/O	Normally open.
VA	Volt-ampere.

2.5 Roles and responsibilities

Implementing of this document is the responsibility of metering staff.

2.6 Process for monitoring

Task observations of metering field staff.

2.7 Related/supporting documents

This document replaces DPC 34-390.

3. Description of operation

The relay will be used to monitor the negative phase sequence (NPS) voltage component of a three-phase supply. This will provide reliable detection of phase imbalance, phase failure or reversed phase sequence. Failure of any supply parameter will be monitored by internally mounted relay contacts and indicated visually by means of a green, high intensity LED.

3.1 Operational characteristics

3.1.1 The supply to the relay shall be tapped from the voltage sensing inputs.

3.1.2 The relay shall energize ± 2 seconds after power is supplied or restored and the LED shall indicate the relay condition ON.

3.1.3 The relay shall de-energize when any of the following occurs:

- a) Reversal of phase sequence;
- b) Excessive imbalance between phases (>10 %); (No external adjustment - pre-set at 10%)
- c) Excessive phase angle error (>10 degrees).
- d) A single phase failure irrespective of whether neutral is connected.

3.1.4 The unit shall not react to a balanced under-voltage or over-voltage condition on all three-phases.

3.2 Technical specifications

3.2.1 Supply specifications

Voltage	1) 110 V AC ± 15 % of nominal
Frequency	50 Hz
Power consumption	± 3 VA
Rating	continuous operation
Operating temperature	-20 °C to + 50 °C
Supply interruptions	not to react on less than 20 ms

3.2.2 The relay shall not operate under the following supply voltage variations:

Symmetrical	± 15 % (minimum)
Single Ø	- 10 % (remaining two phases normal)

3.2.3 Phase error sensitivity: 10 ° ± 1 °

3.2.4 Time delay: 2 s (relay shall remain energized for this time after failure occurs)

3.2.5 The relay shall be self-resetting when supply returns to normal (± 2 s after power is restored).

3.2.6 The indicating LED shall be high intensity (at least 50 mcd at 20 mA) and GREEN;
The view angle shall be 50 °.

3.2.7 The LED shall only be ON when the relay is energized.

3.2.8 Relay output contact specifications

Relay contacts	2 × single-pole change-over contacts
Contact rating	250 V AC - 5 A
Contact isolation	2500 V

3.3 Wiring and connections

3.3.1 The relay unit shall be the standard round 11 pin plug-in type

3.3.2 The three phases, Red, White and Blue shall be connected to pin 5, pin 6 and pin 7 respectively (standard phase sequence) and neutral to pin 10 - (no external connection in 3W installations)

3.3.3 Relay contacts shall be:

- a) pins 1 + 3 N/O
pins 1 + 4 N/C
- b) pins 11 + 9 N/O
pins 11 + 8 N/C

3.3.4 Pin 2 shall not be used.

3.4 Casing

Dimensions shall not exceed 38mm wide by 88mm high by 100mm deep.

3.5 Base

The base shall be rated for 400V and 10A.

3.6 Markings

The following non-removable marking shall be clearly displayed on the relay casing:

- a) Voltage rating
- b) Contact rating
- c) Wiring diagram (Voltage and contact connections)
- d) Make and model
- e) Function

4. Authorization

This document has been seen and accepted by:

Name	Designation
R McCurrach	Senior Manager: PTM&C
A Mtshali	Metering, DC & Security Systems Manager (Acting) – PTM&C
R Brooks	Metering & Measurements SC Chairperson

5. Revisions

Date	Rev.	Compiled By:	Clause	Remarks
May 2015	1	HPD Groenewald	- 3.3.1 Fig 2	New number allocated to document 240-76628623 Removed the 400V rating (only used in 100V applications). Removed the reference to the buzzer.
Sept 2006	1	PJ Uys	-	Buzzer removed Added detail requirements for contact rating and a wiring Model number references removed

6. Development team

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

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7. Acknowledgements

Not applicable

Annex A – Connection and operational diagrams

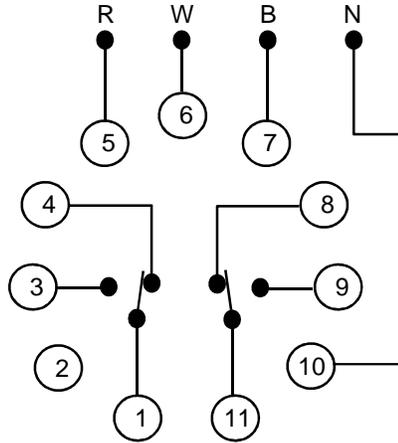


Figure 1: Connection diagram

Three phase power supply	R	[Pulse]	R	[Pulse]	[Pulse]	[Pulse]	[Pulse]	[Pulse]
	B	[Pulse]	W	[Pulse]	[Pulse]	[Pulse]	[Pulse]	[Pulse]
	W	[Pulse]	B	[Pulse]	[Pulse]	[Pulse]	[Pulse]	[Pulse]
	Reversed Phase sequence		N	[Pulse]	[Pulse]	[Pulse]	[Pulse]	[Pulse]
Relay on			[Pulse]			[Pulse]		
LED on			[Pulse]			[Pulse]		
			3 phase 4 wire system				3 phase 3 wire system	

Figure 2: Operational diagram

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