

**PUBLIC POWER CORPORATION S.A.
T/NPRD/SUBSTATION & SWITCHING STATION
SPECIFICATIONS AND EQUIPMENT SECTION**

September 2004

TECHNICAL DESCRIPTION TD-46

**VOLTAGE RELAYS
SUPPLIED FROM SINGLE-PHASE VT LOCATED IN THE NEUTRAL OF
A 30KV, 50MVAR SHUNT REACTOR FOR THE DETECTION OF
OVERVOLTAGE CONDITIONS**

I. SCOPE

This hereby technical description covers PPC's requirements regarding functional features, technical characteristics and testing of voltage relays.

II. KEYWORDS

Voltage relays, overvoltage relays.

III. STANDARDS

The relays shall conform to IEC standards.

IV. USE

The voltage relays are used for the detection of overvoltage conditions in the neutral of a 30KV, 50MVAR shunt reactors and thus protecting the shunt reactors against earth faults.

The single phase voltage transformer which feeds the voltage relay is of 30KV/ $\sqrt{3}$ /100/ $\sqrt{3}$ V ratio, and of rated burden of 200VA.

V. OPERATING CONDITIONS

- | | |
|---|----------------------------------|
| 1. Installation | : Indoors, inside a relay kiosk. |
| 2. Limits of ambient temperature during service | : - 10 °C to +45 °C |
| 3. Altitude | : Up to 1000 m above sea level |

VI. ELECTRICAL CHARACTERISTICS OF PPC's 30 KV SYSTEM

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|--|---|--------------------|
| 1. Nominal Voltage (phase to phase) | : | 30 KV |
| 2. Maximum Operating Voltage
(phase to phase) | : | 36 KV |
| 3. Number of phases | : | 3 |
| 4. Nominal Frequency | : | 50 Hz |
| 5. Short Circuit level | : | 20 KA |
| 6. Basic Insulation level | : | 250 KV |
| 7. Available auxiliary D.C. supply voltage | : | 220 V DC \pm 10% |

VII. REQUIRED PROTECTION FUNCTIONS SETTING CHARACTERISTICS OF THE RELAY

The relay shall be equipped with overvoltage protection function and with the following characteristics:

- | | | |
|---|---|---------------------------------|
| a. Setting range | : | From 50 to 130 V in steps of 1V |
| b. Delay time | : | 0 to 10 sec in steps of 0.1 sec |
| c. Inherent time delay to operate
(pick up time) | : | ≤ 50 ms |
| d. Reset time | : | ≤ 50 ms |
| e. Reset ratio | : | $\geq 95\%$ |

VIII. RELAY SETTINGS

1. The overvoltage element of the relay shall be set at a value little below of the value of $100 / \sqrt{3}$ V with the time delay being set at a value of about 0,3 – 1sec.

IX. REQUIRED TECHNICAL CHARACTERISTICS OF THE RELAY

- | | | |
|--------------------|---|---|
| 1. Type | : | Numerical or digital with input suitable for being supplier a single phase VT |
| 2. Rated frequency | : | 50 Hz |

3. Setting range : 50 – 130 V in steps of 1 V
4. Rated auxiliary supply voltage : 220V DC
5. Inputs (From VT) : The relay shall be supplied via one (1) single phase VT with nominal ratio of $30000/\sqrt{3}/100\sqrt{3}$ V.
Under normal operating conditions, the voltage which the voltage relay sees is $100/\sqrt{3}$ V. Under earth fault conditions, the voltage which relay sees will vary from 1.3 to $1.6 \times 100/\sqrt{3}$ V depending on the fault location.
6. Outputs contacts : At least 2 NO
7. Continuous current rating of the output contacts : 5 A
8. Current rating of the output contacts for 200ms : 30 A
9. Switching making capacity of the output contacts at 220 V DC : 4 A
10. Switching breaking capacity of the output contacts at 220 V DC : 0.2A

X. ADDITIONAL REQUIRED FEATURES OF THE RELAY

1. The relay shall be suitable for flush panel mounting.
2. The relay terminals shall be preferably of the screw type and they must be suitable to be wired with 2.5 mm size conductors.
3. The relay shall be capable of interfacing via IEC-61850
4. The relay shall be equipped with fault recording capability.

XI. TESTS

A. Routine Tests

1. Power frequency voltage withstand test :
2 KV rms, 50 Hz, 1 minute as per IEC 60255 – 5.

B. Type Tests

1. Impulse voltage withstand test :
5KV peak, 1.2/50 μ s, 0.5 J, 3 positive and 3 negative impulses at intervals of 5 sec as per IEC 60255 – 5.
2. High Frequency test :
2.5 KV peak, 1 MHz, τ = 15 ms,
400 pulses /seconds, duration = 2 sec
as per IEC 60255 – 22 – 1, class III.
3. Fast Transient interference test :
2 KV, 5/50 ns, 5 KHz, burst length = 15 ms,
repetition rate = 300 ms, both polarities,
duration = 1 min as per IEC 60255 – 22 – 4 and IEC 61000-4-4 class III.

XII. DATA TO BE SUBMITTED BY BIDDERS

1. Bidders must provide all information required in “ATTACHMENT A” of this hereby technical description.
Failure on the bidder’s part to comply with this request will be taken as sufficient reason for rejection of the offer.
2. Technical pamphlets and brochures which will help the evaluation process.
3. Outline and wiring drawings of the offered relay including mounting instructions.
4. If the offered type of voltage relay is equipped with more than one (1) inputs from VTs, then a drawing must be submitted in which the relay wiring must be indicated for the supply of the relay from one single-phase VT.
5. Any type test certificates for the type tests specified in this hereby technical description. Acceptance or not lies on PPC’s judgment.

XIII. PACKING

The relays shall be packed inside robust paper boxes proper for this type of equipment.

“ATTACHMENT A”

VOLTAGE RELAYS
SUPPLIED FROM SINGLE PHASE VT LOCATED IN THE NEUTRAL OF
A 30KV, 50MVAR SHUNT REACTOR
FOR DETECTION OF OVERVOLTAGE CONDITIONS

1. Type and manufacturer of the relay :
2. Temperature operating limits of the relay :
3. Is overvoltage protection function provided ? :
4. With regard the overvoltage function
 - a. Setting range :
 - b. Delay time :
 - c. Inherent time delay (or pick up time) :
 - d. Reset time :
 - e. Reset ratio :
5. Rated frequency :
6. Rated auxiliary supply voltage :
7. Is the relay suitable to be supplied from open for the detection of the residual of the voltage? :
8. Number of output contacts :
9. Continuous current rating of the output contacts. :
10. Current rating of the output contacts for 200ms. :
11. Switching making capacity of the output contacts at 220 V DC. :
12. Switching breaking capacity of the output contacts at 220V DC :
13. Is the relay suitable for flush panel mounting? :

14. Are the relay terminals of the screw type
and suitable to be wired with 2.5 mm²
size conductors ? :
15. Power consumption of the voltage relay
in VA at 220 V DC. :
16. Is the relay equipped with fault recording
capability? :
17. Can the relay communicate via IEC-61850
Protocol? :
18. Is relay of the numerical or the digital type :
19. Weight of the relay :