



TECHNICAL DESCRIPTION TD-40/4

CURRENT UNBALANCE RELAYS TO BE USED IN

CONJUNCTION WITH 20KV SHUNT CAPACITOR BANKS

I. SCOPE

This hereby technical description covers IPTO's requirements regarding functional features, technical characteristics and testing of current unbalance relays.

II. KEY WORDS

Current unbalance relays, overcurrent relays.

III. STANDARDS

The relays shall conform to IEC 60255 standards. Relays as per ANSI/IEEE can be offered, subject, however to IPTO approval.

IV. USE

The relay will be used to detect capacitor unit failure or failures anywhere in the two stars (wyes) of 20KV, 4MVAR externally fused shunt capacitor banks and to provide either alarm or tripping depending on the number of failed units (alarm for one unit failure, tripping for two unit failures).

V. OPERATING CONDITIONS

1. Installation : Indoors, inside the control building of the substation.

2. Limits of ambient temperature during service : -10°C to +55°C
3. Limits of relative humidity : 5% to 95%
4. Altitude : Up to 1000 m above sea level

VI. ELECTRICAL CHARACTERISTICS OF 20KV SYSTEM

1. Nominal Voltage (phase-to-phase) : 20KV
2. Maximum Operating Voltage (phase to phase) : 24KV
3. Number of phases : 3
4. Nominal frequency : 50Hz
5. Short Circuit level : 10kA
6. Basic Insulation level : 150KV
7. Available auxiliary D.C. supply voltage : 110V D.C.
8. The 20KV system is grounded (earthed) via a 12Ω resistor.

VII. REQUIRED PROTECTION FUNCTION OF THE RELAYS

Unbalance Protection

The relay is going to be used in conjunction with a CT of ratio 40/5A which is connected midpoint between the two stars (wyes) of 20KV, 4MVAR externally fused capacitor banks.

The loss of one capacitor unit causes a current of about 16A(15,75A) to flow between the neutrals of the two stars (wyes). The loss of two capacitor units causes a current of about 35A (34,65A) to flow between the neutrals of the two stars (wyes)

VIII. REQUIRED FEATURES OF THE RELAYS

1. Single-phase: overcurrent of definite time
2. The relay must be of reduced sensitivity for frequencies other than the fundamental so as to prevent undesired operations.
3. The relay shall be equipped with at least two(2) trip output contacts one associated with the low stage (IE>) and one with the high stage (IE>>) and

two output alarm contacts one for the low stage ($I_E >$) and one associated with the high stage ($I_E >>$)

4. The relay shall be suitable for flush panel mounting.
5. The relay terminals shall be suitable to be wired with 2,5mm² size conductors and preferably be of the screw type.
6. The relay shall be equipped with fault recording capability.
7. The relay shall be capable of communicating via any open international remote communication protocol.

IX. REQUIRED TECHNICAL CHARACTERISTICS OF THE RELAYS

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| 1. Required type | : overcurrent relay with two stages (low and high) for detection of unbalanced currents, single phase, definite time |
| 2. Rated frequency | : 50Hz |
| 3. Setting range for low stage($I_E >$) | : (0,1-3) x I_n in steps of 0,1 |
| 4. Setting range for high stage ($I_E >>$) | : (0,1 – 3) x I_n in steps of 0,1 |
| 5. Delay time | : 0 to 20sec for both $I_E >$ and $I_E >>$ |
| 6. Rated input (I_n) | : 5A |
| 7. Rated auxiliary supply voltage | : 110V D.C. |
| 8. Number of output contacts for tripping | : One (1) NO. |
| 9. Continuous current rating of the output tripping contacts | : 5A |
| 10. Short-time current rating of the output tripping contacts | : 30A for 200ms |
| 11. Making capacity of the output tripping contacts at 110V D.C. | : 1000W at L/R=40ms |
| 12. Number of output contacts for alarm | : 2 NO, one for the low stage and one for the high stage. |

13. Continuous current rating of the output contacts for alarm : 1A
14. Making capacity of the output contacts for alarm at 110V DC : 550W at L/R=40ms

X. TESTS

A. Routine Tests

1. Power frequency voltage withstand test: 2KV rms, 50Hz, 1 minute, as per IEC 60255-27
2. Protective bonding continuity test, as per IEC 60255-27
3. Functional test

B. Type Tests

1. Impulse voltage withstand test:
5KV, 1,2/50µs, as per IEC 60255-27
2. Power frequency voltage withstand test: 2KV rms, 50Hz, 1 minute, as per IEC 60255-27
3. Electromagnetic immunity tests, as per IEC 60255-26 and relevant IEC 61000 standards
4. Electromagnetic emission tests, as per IEC 60255-26 and relevant IEC 61000 standards

XI. DATA TO BE SUBMITTED BY ALL BIDDERS

1. Bidders must provide all information requested 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 that will help the evaluation process.
3. Outline and wiring drawings of the offered relay including mounting instructions.

4. Any type test certificates for the type test specified in this hereby technical description.

XII. PACKING

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

One relay per box.

“ATTACHMENT A”
CURRENT UNBALANCE RELAYS TO BE USED IN CONJUNCTION WITH 20KV
SHUNT CAPACITOR BANKS

1. Type and manufacturer of the relay :
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2. Is the relay single phase and of definite time? :
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3. Temperature operating limits of the relay :
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4. Setting range for the low stage ($I_E >$) :
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 - a. In steps of :
.....
 - b. Delay time :
.....
5. Setting range for the high stage ($I_E >>$) :
.....
 - a. In steps of :
.....
 - b. Delay time :
.....
6. Rated Input (I_n) :
.....
7. Rated auxiliary supply voltage :
.....
8. Number of output contacts for tripping :
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9. Continuous current rating of the output tripping contacts :
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10. Short-time current rating of the output tripping contacts :
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11. Making capacity of the output tripping contacts at 110V D.C. :
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12. Number of output contacts for alarm :
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13. Continuous current rating of the output contacts for alarm :
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14. Making capacity of the output contacts for alarm at 110V D.C. :
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15. Rated frequency :
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16. Power consumption of the relay in VA :
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17. Is the offered relay of reduced sensitivity for frequencies other than the fundamental so as to prevent undesired operations? :
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18. Is the relay suitable for flush panel mounting? :
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19. Are the relay terminals of the screw type and suitable to be wired with 2,5mm² size conductors? :
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20. Are the relay terminals of the screw type? :
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21. Is the relay equipped with fault recording capability? :
22. Remote communication protocol :
23. Dimensions of the relay (Width x Height x Depth) :
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24. Weight of the relay :
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25. Does one output trip contact and one output alarm contact correspond to the low stage of the relay; :
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26. Does one output trip contact and one output alarm contact correspond to the high stage of the relay; :
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