

Reyrolle
Protection
Devices

7PG26 – DAD

High Impedance Current Relay

Answers for energy

7PG26 – DAD

High Impedance Circulating Current Relay

Description

The type DAD relay provides high-speed, high impedance, current differential protection with individual open-circuit monitoring of the CT secondary circuits. An advanced design input filter with a harmonic rejection circuit improves overall protection stability by rejecting the harmonics generated by the onset of CT saturation. The relay is provided with four output relays each with two contacts. Three of the relays, those normally associated with the alarm function, can be selected for latched/non-latched contact operation

Functional Overview

High speed of operation.

Input filter characteristic rejects d.c. offset transients and provides excellent harmonic rejection

Integrated open circuit current transformer supervision alarm

Low a.c. and d.c. burdens

Application

High impedance busbar zone protection and circulating current protection of auto transformers, motors and generators. Transient stability under through fault conditions is a problem with many forms of differential protection due to variations in CT magnetizing characteristics. As saturation is approached, the CT output current waveforms become increasingly distorted with a high percentage of 3rd and other higher odd harmonics. These problems can be overcome by either using biased differential protection, or more elegantly by the use of high impedance schemes. In the latter case the relay settings are calculated assuming one CT is completely saturated. Using this worst case condition the voltage and current settings for type DAD high impedance protection can be precisely calculated with known stability margins. Intermediate conditions, where a CT is only partially saturated, increases the stability margin. This approach enables schemes to be engineered using CTs with relatively low knee-point voltages.

The DAD relay also incorporates supervision of the CT secondary circuits. This supervision is traditionally provided by a sensitive alarm relay, but this integration of protection, CT supervision and associated timers in the DAD considerably simplifies system design and secondary wiring. Zone switch out relays are recommended to switch out an affected zone.

High impedance busbar protection is recommended for all switchgear applications where faults must be cleared in the shortest possible time. High impedance schemes can provide lower fault settings and a better through-fault stability than possible with most other schemes. The stability of a current balance scheme using a high impedance relay circuit depends upon the relay voltage

setting being greater than the maximum voltage which can appear across the relay under a given through fault condition. Stabilizing resistors and metrosils complete the scheme.

Current transformers

Experience has shown that only Class .X. CTs to BS3938 meet all the basic requirements for this type of protection. For most applications it will be found that the overall size of the CT will be smaller than that required for alternative current balance protections.

Technical information

Ratings, In 1A and 5A 50/60Hz

Auxiliary supply

Nominal voltage Vd.c	Voltage range Vd.c
24V to 58V	18V to 60V
110V to 220V*	88V to 280V

* will also operate from 110/120Va.c (range 88V to 132Vac)

Auxiliary Supply to IEC 255-11:

Allowable superimposed a.c. component, maximum of 12% of rated d.c. voltage. Allowable breaks or dips (including collapse to zero from minimum voltage) in supply, up to 20ms.

Settings

Protection: 0.5% to 96% of I_n in steps of 0.5%
i.e. $I_n = 1A - 5mA$ to $960mA$ in steps of $5mA$

or $I_n = 5A - 25mA$ to $4.8A$ in steps of $25mA$.

Alarm: 50Hz -10% to 40% in steps of 10% of I_s
60Hz - 9.5% to 38% in steps of 9.5% of I_s
Where I_s is the relay current setting.

Time delay: 0.25s to 63.75s in steps of 0.25s.

A.C. burden: Burdens expressed in Volts.

1A rating, voltage at setting = $0.120 + 0.78 \times I_s$ volts

5A rating, voltage at setting = $0.025 + 0.08 \times I_s$ volts.

D.C. burden:

Range	18V to 60V	88V to 280V
Quiescent short term	0.25W 5W max.	0.65W 8W max.

Output contacts

Output relay	RL1	RL2	RL3	RL4
Function	Trip	Alarm	Alarm	Alarm
Contacts	2 NO	2 NO	2 NO	2 NO
Operation	Inst	DTL	DTL	DTL
Latched	No	Select	Select	Select

Contact ratings

Make and carry within limits of $L/R = 50ms$, and

300V max: for 0.5s 20Aa.c. or d.c.

for 0.2s 30Aa.c. or d.c.

Carry continuously: 5Aa.c. rms or d.c.

Break within limits of 5A and 300V maximum:

a.c. resistive 1250VA, a.c. inductive

250VA PF 0.4 min,

d.c. resistive 50W

d.c. inductive 30W $L/R = 40ms$, 50W

$L/R = 10ms$.

Minimum recommended load 500mW (Lower limits of 10mA and 5V)

Minimum number of operations 1000 at maximum load

Normally open contacts are wired via case trip-isolation contacts and normally closed contacts are wired via case shorting-contacts.

Indication

Two red LED's per phase are provided, (TRIP and ALARM).

The alarm LED is illuminated when the alarm setting is exceeded, and it will reset if the input falls below the alarm setting. If the input remains above setting it is latched on completion of the set time delay. Indications are retained in memory during breaks in the auxiliary supply and re-established when the supply is restored. Latched output contacts and indications are reset from the case reset push button which also tests all the LED's.

Harmonic rejection

The relay will not operate on third or higher harmonics.

2nd harmonic rejection 2:1 min.

3rd harmonic rejection 50Hz 40:1min.

60Hz 20:1 min.

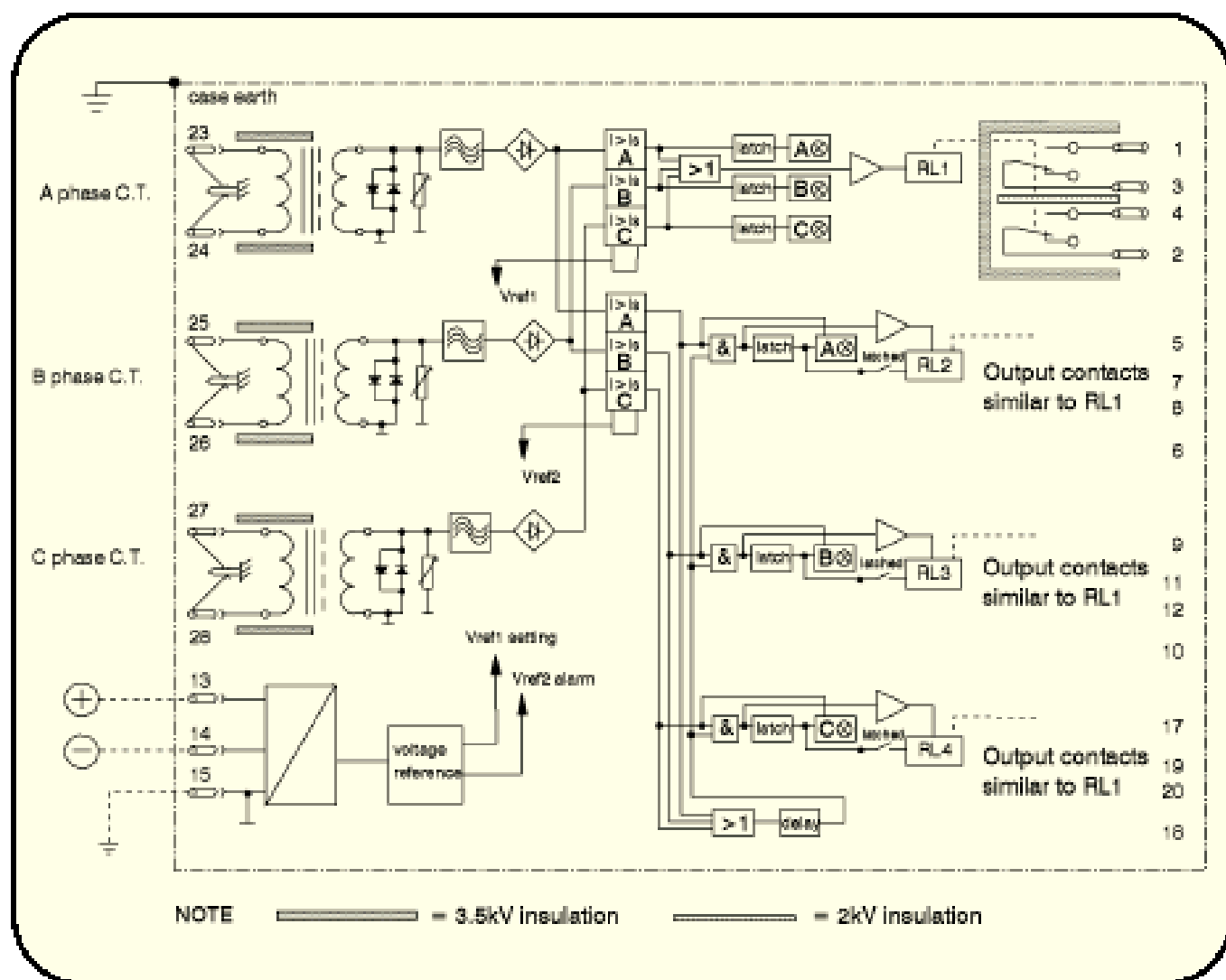


Fig 1. Diagram of DAD relay.

Ordering Information 7PG26 DAD

Product description	Variants	Order No.
<p>DAD</p> <p>High impedance circulating current protection.</p>	<p><u>Relay type</u> DAD - 3 phase unit with integral current transformer supervision and time delay</p> <p><u>Voltage range</u> 18V to 60V DC 88V to 280V DC</p> <p><u>Nominal current</u> 1A 5A</p> <p><u>Frequency</u> 50Hz 60Hz</p> <p><u>Housing size</u> Case size E6 (4U high)</p>	<p>7 P G 2 6 □ □ - □ A A □ 0 - 0 □ A 0</p>

1) Schemes require external stabilising resistors and metrosils, see 7XG series ancillary equipment list

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