ABB Power T&D Company Inc.
Relay Division
Coral Springs, FL
Allentown, PA

September, 1990
Supersedes Descriptive Bulletin 41-240, pages 1-2, dated October, 1989
Mailed to: E, D, C/41-200A

For Detection of Ground Faults on Lines, Transformers, and Multi-Winding Machines
Device Number: 32N

Types CWC, CWP, and CWP-1 Directional Ground Relays

Application

The CWC, CWP, and CWP-1 relays are applied for directional ground fault protection on grounded neutral power systems.

Type CWC

The CWC relay is current polarized. The relay develops torque proportional to the product of the polarizing and residual currents and the cosine of the phase angle between them.

The CWC relay is recommended at stations where the power transformer bank neutral is grounded. In such cases the residual voltage will generally be small.

Type CWP

The CWP relay is voltage-polarized by residual voltage obtained across the open corner of the delta winding of a grounded wye-delta voltage transformer. The relay develops a torque proportional to the product of the polarizing voltage and the residual current and the cosine $(\Theta - 60)$ where the Θ is the angle by which the relay current lags the relay voltage.

The CWP relay is recommended for use where the power transformer bank neutral is not available.

Type CWP-1

The CWP-1 relay is similar to the type CWP relay except it has a higher sensitivity.

The relay is applicable for selective alarm or tripping for systems where the ground fault current is limited to a range of about 0.2% to 8% of rated full load current. The system must be high-resistance grounded because of the maximum torque angle characteristic of the CWP-1 (maximum torque when current leads voltage by 45°).

Construction

① Tap Block

Volt-amperes indicated on tap plate represent the minimum pickup product of residual current and polarizing voltage at maximum torque angle. Tap changing is accomplished by a tap screw. When tap position is changed, the spare tap screw is inserted into the desired new position prior to removal of the original, to avoid open-circuiting of the current transformer.

② Time Dial

Indexed setting from ½ to 11 are clearly visible. With a fixed multiple of tap value, setting #11 gives the maximum operating time in seconds.

③ Stationary Contact

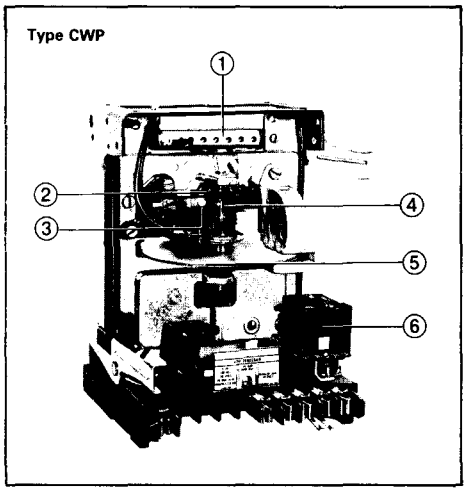
Made of pure silver. Will close 30 amperes at 250 volts dc. Has sufficient wipe to assure positive contact. In fast breaker reclosing schemes which require quick-opening relay contacts, the metal plate is reversed, holding the stationary contact fixed against the backstop. On double-trip relays, adjustment of ⅛" contact follow (or wipe) is obtained by use of a vernier adjusting screw on the stationary contact plate.

④ Moving Contact

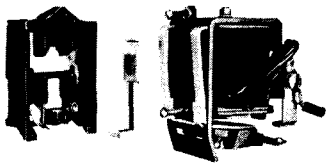
Also made of pure silver. Electrical connection is through a spiral spring from the contact to the spring adjuster frame, and then to the relay terminals.

⑤ Induction Disc Unit

The moving disc assembly which carries the moving contact is rotated by an electromagnet located at the rear of the relay and, to obtain the desired time-product operating curve, is damped by a permanent magnet. The disc shaft is supported at the lower end by a steel ball bearing which rides between concave sapphire jewel surfaces, and at the upper end by a stainless steel pin.



⑥ Indicating Contactor Switch (ICS)



Indicates relay operation by means of a target which drops into visual position upon completion of a trip circuit.

When energized at or above pickup value, moving contacts bridge two stationary contacts and complete the trip circuit. The ICS contacts are connected in parallel with the main relay contacts and relieve them of carrying heavy circuits.

The main relay contacts will close 30 amperes at 250 volts dc, and the ICS contacts will safely carry this current long enough to trip a circuit breaker. Front-located taps provide connection for 0.2 or 2.0 ampere dc minimum pickup setting.

The operation indicator target is reset external to the relay case by means of a push rod located in the bottom of the relay cover.

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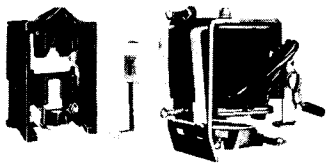

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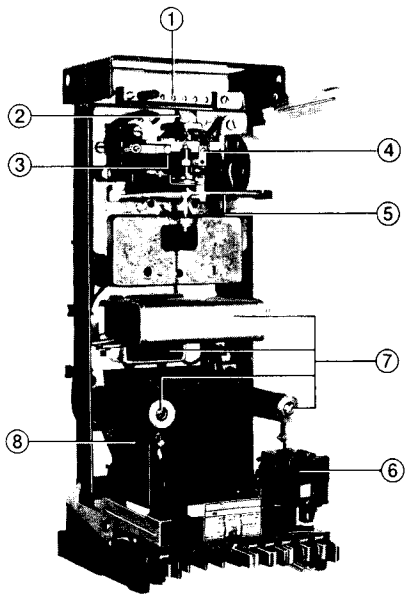
⑦ Phase Shifting Transformer

Consists of a capacitor and resistor connected in series with the lower pole circuit.

⑧ Current Transformer

Relay settings are provided by a tapped auxiliary step up transformer which supplies current to the upper poles of the relay electromagnet. Transformer has a maximum ratio of 20/1.

Type CWP-1



Shipping Weights and Carton Dimensions

Relay Type	Flexitest Case Type	Weight, Lbs., Approx. (KG)		Domestic Shipping Carton Dimensions: Inches (Cm)
		Net	Shipping	
CWC	FT-21	12 (5.5)	16 (7.3)	9 x 12 x 13 (23 x 30 x 33)
CWP	FT-21	12 (5.5)	16 (7.3)	9 x 12 x 13 (23 x 30 x 33)
CWP-1	FT-31	16 (7.3)	20 (9.1)	13 x 13 x 21 (33 x 33 x 53)

Further Information

List Prices: PL 41-020
Technical Data: TD 41-025
Instructions:
CWC and CWP Relays, IL 41-242.4
CWP-1 Relay, IL 41-242.5
Renewal Parts: RPD 41-927
Flexitest Case Dimensions: 41-076
Contactor Switches: DB 41-081
Other Protective Relays:
Application Selector Guide, TD 41-016

Printed in U.S.A.

December, 1990
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Mailed to: E, D, C/41-200A

For Detection of Ground Faults on Lines, Transformers, and Multi-Winding Machines

Types CWC, CWP, and CWP-1 Directional Ground Relays

Product, Single Phase, Ground Protection (Device Number: 32N)

Type	Polarization	Contacts	I^2 Product Range	Indicating Contactor Switch③	Instantaneous Trip: IIT⑤	Relay Data: Internal Schematic	Relay Data: Style Number	Case Size
CWC①	Current	Spst-cc	.25-4.0	0.2/2.0 amps dc	None	57D7919	291B935A09	**FT-21**
		Dpst-cc				57D7920	670B989A09	
		Spst-cc			4-16	57D7921	291B935A21	
					10-40		291B935A22	
			2.25-36		None	57D7919	291B935A10	
					10-40	57D7921	291B935A23	
					20-80		291B935A24	

Product Single Phase, Ground Protection Continued (Device Number: 32N)

Type	Polarization	Contacts	V_I Product Range	Indicating Contactor Switch③	Instantaneous Trip: IIT⑤	Relay Data: Internal Schematic	Relay Data: Style Number	Case Size
CWP①②	Voltage	Spst-cc	20-150	0.2/2.0 amps dc	None	183A711	291B928A09	**FT-21**
					2-8	183A713	291B928A11	
					4-16		291B928A12	
					10-40		291B928A13	
			75-600		None	183A711	291B928A10	
					2-8	183A113	291B928A14	
					4-16		291B928A15	
					10-40		291B928A16	
		Dpst-cc	20-150		None	183A712	291B928A23	**FT-21**
					2-8	183A714	291B928A17	
					4-16		291B928A18	
					10-40		291B928A19	
			75-600		None	183A712	291B928A24	
					2-8	183A714	291B928A20	
					4-16		291B928A21	
					10-40		291B928A22	
CWP-1②	Voltage	Spst-cc	Sensitivity 0.3 amp at 250V	0.2/2.0 amps dc	None	188A417	292B865A09	**FT-31**
		Dpst-cc			None	188A425	292B865A10	

Potential Polarizing Transformers, Single Phase (Product Bulletin 42-871 for dimensions)④

Volt-amps	Frequency, Hertz	Primary Volts: Line to Line	Primary Volts: Line to Neutral	Secondary Volts	Compensated at: Volt-amps	Compensated at: Power Factor	Connections Primary/Secondary	Style Number
50	50/60	115	66.5	115	25	100%	Connect wye/broken delta	9626A06G01
		200	115	66.5				9626A06G02
		200	115	115				9626A06G03

① 50-Hertz relays and auxiliaries can be supplied at same price. Order "Similar to Style Number ....., except 50 Hertz".

② See potential polarizing transformers, this page.

③ **ICS:** Indicating Contactor Switch (dc current operated) having seal-in contacts and indicating target which are actuated when the ICS coil is energized at or above pickup current setting. Suitable for dc control voltages up to and including 250 volts dc. Two current ranges are available:
(1) 0.2/2.0 amps dc, with tapped coil.
(2) 1.0 amp dc, without taps.
Rating of ICS unit used in specific types of relays is shown in price tables. All other ratings must be negotiated.

When ac current is necessary in a control trip circuit, the ICS unit can be replaced by an **ACS** unit.

The ACS unit may be supplied in place of an ICS unit at no additional cost. Specify system voltage rating on order.

④ Refer to LVIT Sales, Low Voltage Instrument Transformer Division, Pinetops, NC, for price and shipment.

⑤ **IIT:** Indicating Instantaneous Trip rated per ranges shown in price tables. Unit is nondirectional, adjustable, and has target actuated when coil is energized at or above pickup setting. Unit has a dropout ratio of 65% at minimum setting and 90% at maximum setting.