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

September 1995
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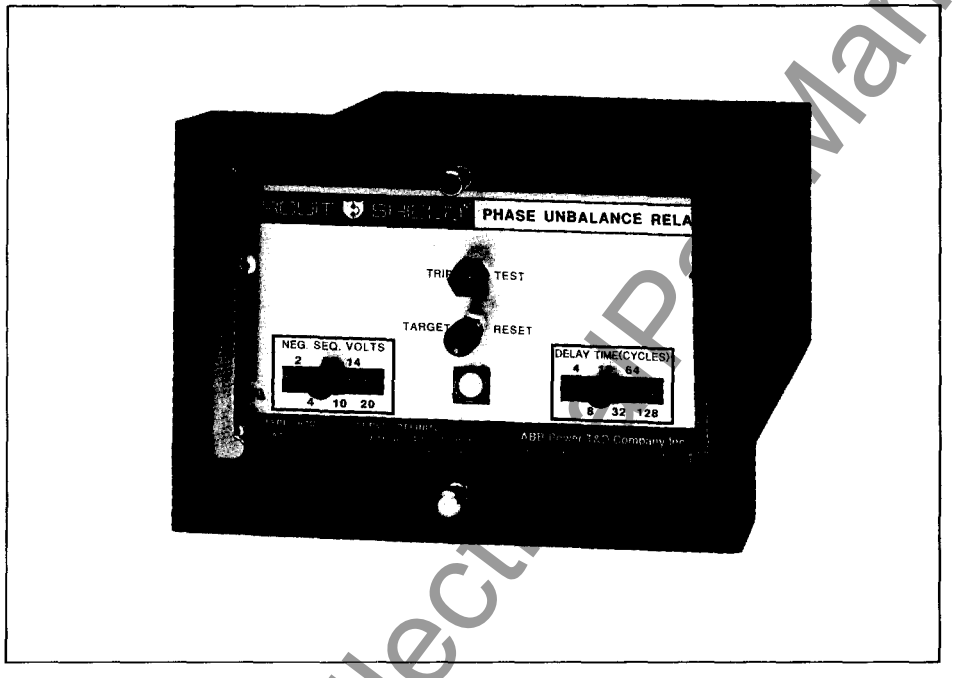
Mailed to: E, D, C/41-200B

Device Number: 60

CIRCUIT SHIELD ®

Type 60Q Phase Unbalance Relay



Features

- High sensitivity
- Built-in time delay
- Built-in harmonic filter
- Low burden
- UL recognized
- Seismic capability to 6g ZPA
- Transient immunity
- 2 year warranty

Application

The Type 60Q is a negative sequence over-voltage relay used for detecting unbalance in three phase supply voltages.

If one fuse blows in the three phase supply to a motor, the voltage does not collapse, due to the back emf.

If the motor had been running at full load before the fuse opened, the negative sequence component of the voltages (E_2) is equal to the ratio of the running to the starting current. This yields an E_2 of 16% for a motor with a starting current of 6 per unit. If the fuse blows when the motor is running lightly loaded, the resultant E_2 will be less; at no load, typical values are 3 to 4%.

The Type 60Q has negative sequence voltage pickup adjustable from 1 to 10 volts E_2; that is, from 1.45 to 14.5%. This range provides sufficient sensitivity to detect a blown fuse condition, even for a motor running at no load. Another model is available with a pickup range of 2 to 20 volts.

The Type 60Q contains: a built-in timer, adjustable from 4-128 cycles (60 Hz base), or 0.3-10 seconds; and a built-in harmonic filter which allows the relay to operate properly even if the supply voltage waveform is poor.

The relay is equipped with both a normally open contact, suitable for tripping circuit breakers, and a normally closed contact, suitable for opening holding coils of motor starters.

Specifications

Input Circuit Rating:	160V, 60 Hz maximum continuous 120V, nominal
Burden:	At 120V: less than 1 VA, 1.0 pf, per phase
Pickup Taps:	1, 2, 3, 5, 7, 10 Volts or 2, 4, 6, 10, 14, 20 Volts (Negative Sequence Component)
Time Delay Taps:	4, 8, 16, 32, 64, 128 cycles (60 Hz base) 0.32, 0.63, 1.25, 2.5, 5, 10 seconds
Control Power:	48/125 Vdc @ 0.05A max. 48/110 Vdc @ 0.05A max. 24/ 32 Vdc @ 0.08A max. 220 Vdc @ 0.05A max. 250 Vdc @ 0.05A max. 175 Vdc @ 0.05A max. (for use with Type 96 converter 200B1203) See IB for 120 Vac applications
Output Circuit Rating:	Each contact @ 125 Vdc: @ 250 Vdc: 30 amperes 30 amperes tripping duty. 5 amperes 5 amperes continuous. 0.3 ampere 0.1 ampere break.
Temperature:	Minus 20°C to plus 70°C
Transient Immunity:	More than 2500V, 1 MHz bursts at 400 Hz repetition rate, continuous (ANSI C37.90.1 SWC); Fast Transient Test; EMI test.
Dielectric:	2000 Vac RMS, 60 seconds all circuits to ground.
Seismic Capability:	More than 6g ZPA biaxial multifrequency vibration without damage or malfunction (ANSI/IEEE C37.98).
Weight:	Unboxed – 3.6 lbs. (1.6 kg) Boxed – 4.3 lbs. (1.9 kg) – 0.26 cubic feet
Volume:	Boxed – 0.26 cubic feet

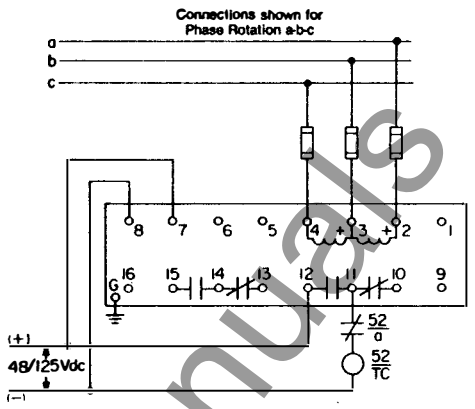
How To Specify

Relay shall be Asea Brown Boveri Type 60Q or equal. Relay shall have adjustable negative sequence voltage pickup and adjustable time delay. Relay shall be capable of withstanding up to 6g ZPA seismic stress without malfunction. An operation indicator shall be provided. Built-in means shall be provided to allow operational tests without additional equipment.

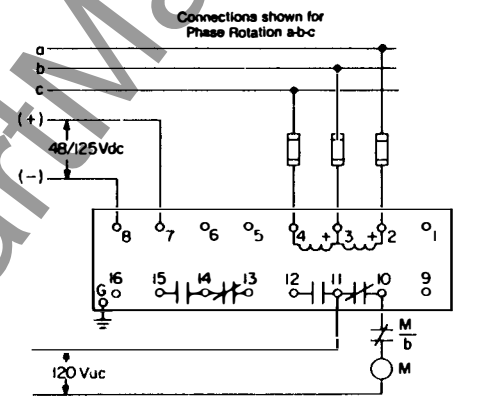
How to Order

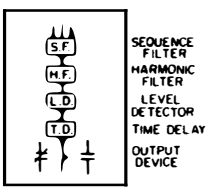
For a complete listing of available voltage relays including the Type 60Q see TD 41-025. To place an order, or for additional information, contact the nearest ABB Representative.

Connections For Use With A Circuit Breaker

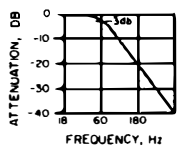


Connections For Use With A Motor Starter





Relay Block Diagram



Harmonic Filter Response

Further Information

List Prices: PL 41-020
Technical Data: TD 41-025
Instruction Book: IB 7.4.1.7-3
Motor Protection Paper: TP 18.0-3
Other Protective Relays:
Application Selector Guide, TD 41-016

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Type 60Q Phase Unbalance Relay

Type	Max. Voltage Rating	Tap Range Pickup	Pickup Curve	Pickup Time	Dropout Curve	Dropout Time	Output Contacts	Internal Connections	① Control Voltage	Catalog Number
60Q	160 V 60 Hz	1-10 V E_2	Defin.	4-128 Cycles	—	—	2-C	16D211F	48/125 Vdc	412J4275
									24/32 Vdc	412J4295
									175 Vdc	412J4215
									250 Vdc	412J4255
				0.32-10 Sec.					48/125 Vdc	412J5275
									24/32 Vdc	412J5295
									175 Vdc	412J5215
									250 Vdc	412J5255
		2-20 V E_2		4-128 Cycles					48/125 Vdc	412J4375
									24/32 Vdc	412J4395
									175 Vdc	412J4315
									250 Vdc	412J4355
				0.32-10 Sec.					48/125 Vdc	412J5375
									24/32 Vdc	412J5395
									175 Vdc	412J5315
									250 Vdc	412J5355
	160 V 50 Hz	1-10 V E_2		4-128 Cycles					48/125 Vdc	412S4275
									48/110 Vdc	412S4205
									24/32 Vdc	412S4295
									175 Vdc	412S4215
									250 Vdc	412S4255
				0.32-10 Sec.					48/125 Vdc	412S5275
									48/110 Vdc	412S5205
									24/32 Vdc	412S5295
									175 Vdc	412S5215
									250 Vdc	412S5255
		2-20 V E_2		4-128 Cycles					48/125 Vdc	412S4375
									48/110 Vdc	412S4305
									24/32 Vdc	412S4395
									175 Vdc	412S4315
									250 Vdc	412S4355
				0.32-10 Sec.					48/125 Vdc	412S5375
									48/110 Vdc	412S5305
									24/32 Vdc	412S5395
									175 Vdc	412S5315
									250 Vdc	412S5355

① For other control voltages contact the nearest ABB Representative.

To place an order, or for further information, contact the nearest ABB Representative.

Internal Connection Diagram

Note: Refer to Instruction Book IB 7.4.1.7-3 for contact logic data.

16D211F Type 60Q
Three-Phase Voltage Relays
Drawout Test Case