



Phase and ground backup protection for the primary circuit breaker.

Features and Benefits

- Built-in regulated power supply
- Fast reset current detectors
- Surge suppression on input circuits
- Drawout case (200 series)
- Optional 19" rack mount case

Applications

- Backup protection for primary circuit breaker

Protection and Control

- Phase instantaneous overcurrent
- Ground instantaneous overcurrent

Monitoring and Metering

- R
- T

User Interfaces

- Current pickup LED indicator
- Front panel settings adjustment



Introduction

The SBC is the general designation of a family of static breaker backup relays that provide phase and ground backup protection if the primary circuit breaker fails to clear a system fault. Each relay includes phase and ground current detectors, timers, power supply, necessary logic and surge suppression. These relays are packaged in either a drawout case or an enclosed metal case with hinged front cover suitable for mounting on a 19" rack or panel.

Application

The SBC static breaker backup relays are applied on a "per breaker" basis – that is, one SBC relay for each breaker in any given bus arrangement. In such an application, the current inputs to a particular SBC relay must be from the CT's that measure the current in the protected breaker. The trip outputs from the SBC relay must initiate the tripping (either directly or via transferred tripping) of all breakers which might supply fault current to the failed breaker.

Description AND Operation

SBC200 and SBC53 relays have three phase current inputs (I_A , I_B , I_C). SBC200 models with a rated CT current of 5 A have a pickup range of 1-8.5 A and a ground ($3I_0$) input with pick up adjustment of 0.5-4.25 A. The SBC53 has a phase pickup of 1-10 A and a ground ($3I_0$) input with a pick up adjustment of 0.5-5.0 A. They also contain an instantaneous trip output contact, timer(s) and a variety of breaker failure trip (BFT) output contacts.

The SBC breaker backup function begins when the primary relays associated with the protected breaker close their contacts (BFI, 62X, 62Y). Closure of one of these contacts energizes the internal power supply of the SBC. These contacts will close when the primary relays see a fault, and will remain closed until the fault is removed by successful breaker operation. With the power supply energized and any one of the four current detectors (I_A , I_B , I_C , $3I_0$) picked up, the instantaneous trip contact(s) (IT) will close. This contact(s) is normally connected to initiate a "retrip" through an alternate trip circuit of the protected breaker.

When the IT contact(s) close, timer A/O is also energized. This timer has a pickup (A) time of 10-1590 ms. If the protected breaker clears the fault, the current detectors will drop out and the A/O timer will reset. If the breaker fails to clear the fault, the A/O timer will reach its time setting and close the BFT contacts. These BFT contacts are used to trip the backup breakers.

This description generally applies to the SBC223A and SBC53A relays. Additional features are provided in the SBC223B&C and in the SBC53B&C relays as described below.

Drawout Case Construction

SBC223A

Includes one timer (A/O) and an instantaneous trip (IT) that can function as a re-trip of the original circuit breaker or as a seal-in. The timer is started by contact initiation (BFI) and is reset when either the contact initiation is removed or the current detector resets. Two N.O. BFT contacts with targets (T_1 and T_3), one BFT contact without target, and one instantaneous IT N.O. contact with target (T_2) are provided. See Figure 3.

Fig. 1. SBC221A functional block diagram

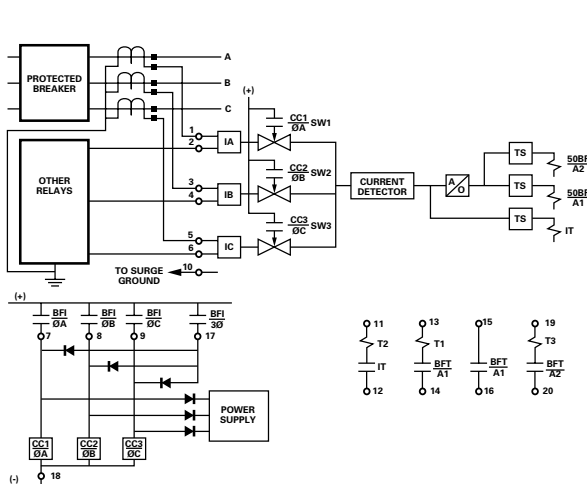
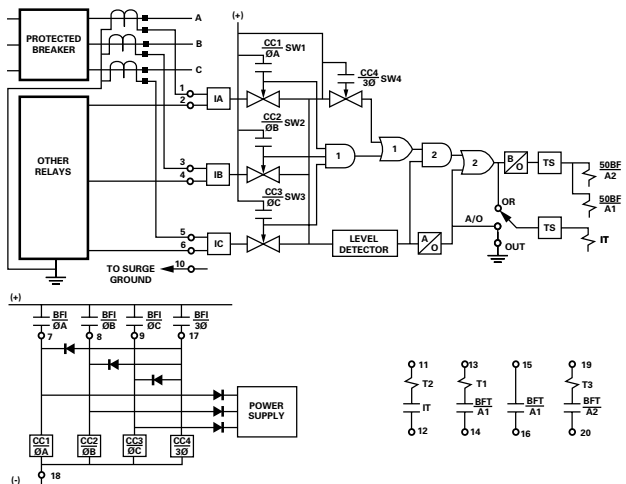


Fig. 2. SBC221B functional block diagram



SBC223B

Similar to SBC223A but with an added contact converter input. The contact converter and the current detector are used to supervise the timer in either the **AND** or **OR** mode. A movable link selects the mode. In the **OR** mode, the timer will reset only if both the current detector and the contact converter reset. In the **AND** mode, the timer will reset if either the current detector or the contact converter reset. See Figure 4.

SBC223C

Similar to the SBC223B except with two timers (A/O and B/O). The A/O timer is energized by an output from the current detector. The B/O timer is energized by an output from the contact converter or by the contact converter **AND** the current detector. The option is determined by a movable link. With two timers, two different tripping times are possible depending on the input conditions. Two "BFT" contacts with targets (T₁ and T₃), one "BFT" contact without target and one instantaneous "IT" contact with target (T₂) are provided. See Figure 5.

SBC231

Includes three non-directional instantaneous overcurrent func-

tions. The relay is intended for applications requiring an instantaneous AC overcurrent detector with fast pickup, fast reset, minimum overreach, or continued operation in the picked-up mode. The SBC231 can be used to block operation of an under-rated interrupter where fault current exceeds the interrupter's capability or to trip another breaker to reduce the fault current level prior to operation of the under-rated interrupter. The SBC231 can also be used in breaker failure schemes and as a high speed overcurrent detector in pilot and distance relaying schemes. Pickup time of the SBC231 is 1/2 cycle at 1.5 times pickup level and drop out time is 3/4 cycle with minimum fill-in time. See Figure 6.

(For 19-inch Rack Mounting) SBC53A

Includes one timer (A/O) and an instantaneous trip (IT) that can function as a re-trip of the original circuit breaker or other function. The A/O timer is started by contact initiation (BFI) and is reset when either the contact initiation is removed or the current detector resets. This relay has six N.O. electrically separate "BFI" contacts, two targets, T1 and T2 and three N.O. isolated instantaneous "IT" contacts. See Figure 7.

SBC53B

Similar to SBC53A but with an added contact converter input (AND - OR logic). The contact converter and the current detector are used to supervise the A/O timer in either the **AND** or **OR** mode.

SBC53C

Similar to SBC53B but with two timers. A/O and B/O. If the power has been activated, the A/O timer is energized by an output from the level detector and it is usually set for a relatively long time. The B/O timer is energized by an output from **AND - OR** logic and it is generally set for short times. With the link in the IN position, the **AND - OR** logic will produce an output whenever there is an output from the level detector and the contact converter. With the link in the OUT position, the **AND - OR** logic will produce an output whenever the contact converter produces an output. The purpose of two timers is to provide for two different tripping times depending on the input conditions.

The A/O and B/O timers are normally OR'd together to drive the six BFT con-tacts. If desired, a link on the A/O timer card can be moved to the "OUT" position. Then each timer (A/O and B/O) will independently drive three BFT contacts. See Figure 8.

Fig. 3 SBC223A functional block diagram

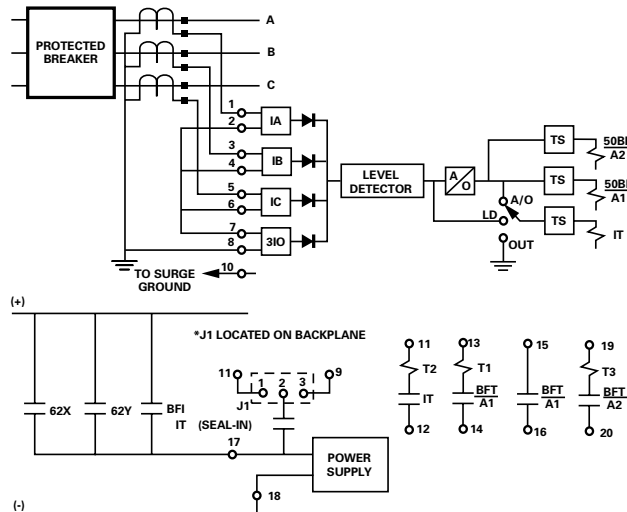
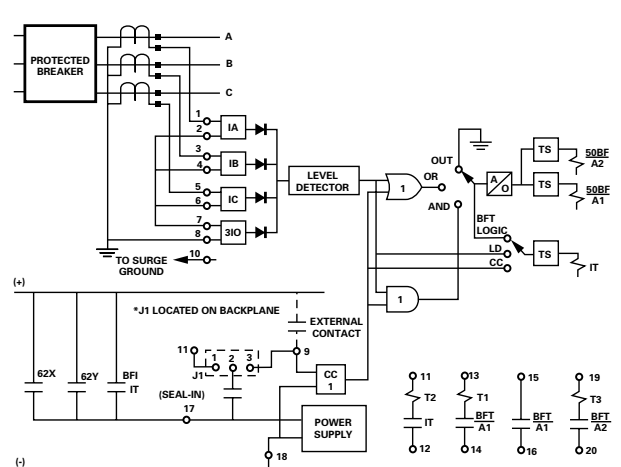


Fig. 4 SBC223B functional block diagram



technical specifications

RATINGS		BURDEN	
Current:			
Nominal:	5 A at 60 Hz with continuous capability of 10 A.	(maximum) for 10 A at 60 Hz	
1 Sec:	210 A	Phase Pickup Setting	Burden (VA)
DC Power Supply:	Single rated, 48, 125, or 250 VDC	1-2	2.3
AMBIENT TEMPERATURES		2-4	1.5
These relays have been designed for continuous operation between -20°C and +55°C per ANSI standard C37.90. In addition, these relays will operate within published characteristics, and not malfunction nor be damaged if operated in an ambient up to +65°C		4-10	1.3
BFT CONTACT RATINGS		31₀ Pickup Setting	Burden (VA)
3 A continuous, 30 A for tripping duty.		0.5-1	4.5
Specifications subject to change without notice.		1-2	2.3
		2-50	1.6
CURRENT DETECTOR FOR SBC200 / 53			
Dropout level:		95 percent of pickup.	
Dropout time:		Adjustable from less than 5 ms to 10 ms when current reduced to 90 percent of pickup.	

Fig. 5 SBC223C functional block diagram

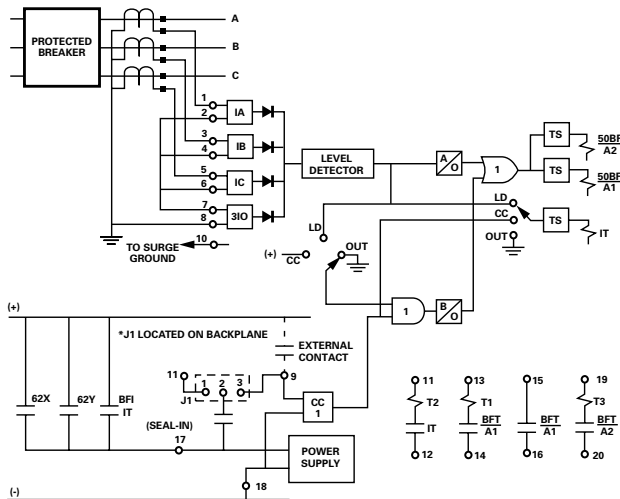


Fig. 6 SBC231A functional block diagram

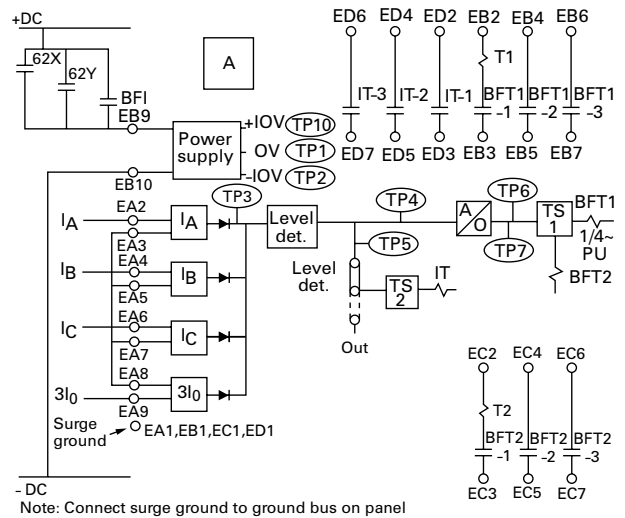


Fig. 7 Typical external conn. and logic for SBC53A

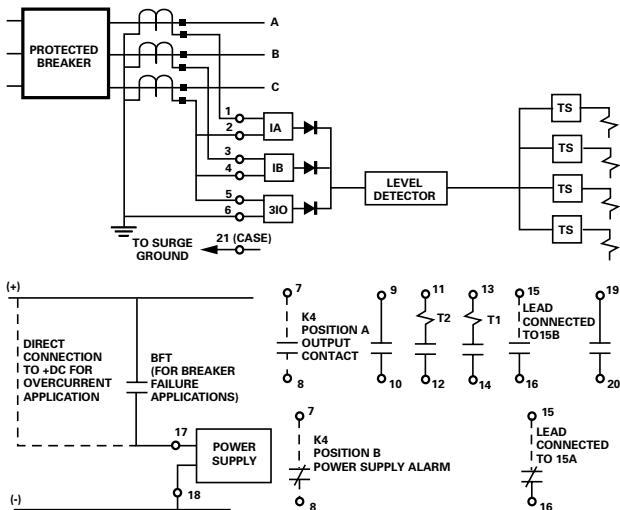
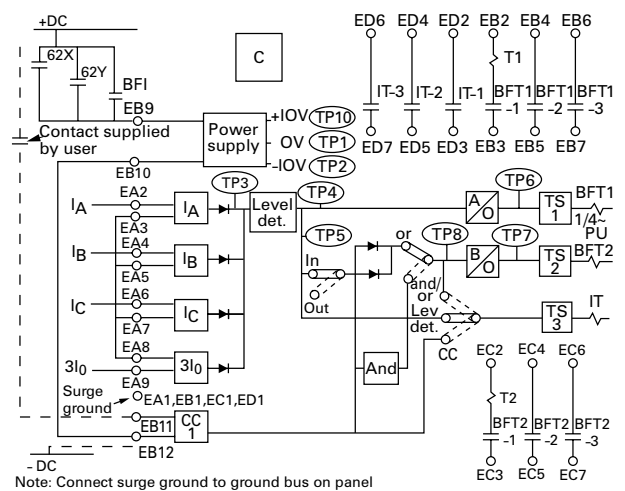


Fig. 8 Typical external conn. and logic for SBC53C



Features

- Added security is provided since the SBC relay is not connected to DC control until a fault occurs and the power supply is energized by contact initiation.
- Each relay has its own regulated power supply with a low voltage cut-off of approximately 60 percent and, thus, the relay will not operate from accidental grounding.
- The current detector has an LED to indicate pickup, for ease in calibration and testing.
- Fast reset current detectors, which may be adjusted to less than 5 ms.
- The SBC200 relays have three "BFT" contact outputs (two with targets) and one or two "IT" instantaneous trip contacts. The SBC53 relays have six electronically separate "BFT" contact outputs, two with targets, and three "IT" instantaneous trip contacts.
- Surge suppression on all AC and DC input circuits. All relays will pass the ANSI-IEEE SWC test and the GE Fast Transient and RFI test.

Selection Guide

19 Inch Rack 3 ϕ + Ground

AC Rating	Phase Range (A)	Target T1 and T2 (A)	BFT Contacts	Gr. (31 ϕ) Range (A)	Inst. Trip Contacts	Contact Conv.	A Timer 50-500 ms	B Timer 50-500 ms	DC Control (V)	Model Number	Rack Units	Approx. Wt. in lbs (kg)	
												Net	Ship
SBC53A - ONE TIMER (A/O) WITH BFT AND INST. TRIP													
60 Hz 10 A	1-10	1.0	6 N.O.	0.5-5	3 N.O.		Yes		48 125 250	SBC53A3 A1 A2	2	22 (9.9)	30 (13.6)
50 Hz 10 A	1-10	1.0	6 N.O.	0.5-5	3 N.O.		Yes		125	SBC53A4	2	22 (9.9)	30 (13.6)
SBC53B - ONE TIMER (A/O) PLUS CONTACT CONVERTER (CC) WITH BFT AND INST. TRIP													
60 Hz 10 A	1-10	1.0	6 N.O.	0.5-5	3 N.O.	1	Yes		48 125 250	SBC53B3 B1 B2	2	22 (9.9)	30 (13.6)
50 Hz 10 A	1-10	1.0	6 N.O.	0.5-5	3 N.O.	1	Yes		125	SBC53B4	2	22 (9.9)	30 (13.6)
SBC53C - TWO TIMERS (A/O, B/O) PLUS CONTACT CONVERTER (CC) WITH BFT AND INST. TRIP													
60 Hz 10 A	1-10	1.0	6 N.O.	0.5-5	3 N.O.	1	Yes	Yes	48 125 250	SBC53C3 C1 C2	2	22 (9.9)	30 (13.6)
50 Hz 10 A	1-10	1.0	6 N.O.	0.5-5	3 N.O.	1	Yes	Yes	125	SBC53C4	2	22 (9.9)	30 (13.6)

Selection Guide

Drawout Case 3 ϕ + Ground

1 Pole or 3 Pole	Freq. (Hz)	Rated CT Current (A)	Contin. Current (A)	DC Voltage	Phase Pickup (A)	Residual Current (3I ₀)(A)	BFT Contacts	Inst. Trip Contacts	No. Targets @ 0.15A Pickup	Functional Block Diagram	A/O Timer 10-1590 ms	B/O Timer 10-1590 ms	Model Number	Case Size	Approx. Wt. in lbs (kg)	
															Net	Ship

SBC221A - 1 POLE, 1 TIMER(A/O), PLUS CONTACT CONVERTERS(CC) FOR PHASE SELECTION, WITH BFT & INSTANTANEOUS TRIP(IT)

1 Pole	60	5	10	38-280	1-8.5 (0.5 A steps)		3 N.O.	1 N.O.	3	Fig. 1	Yes	No	SBC221A1A	M2	22 (10)	27 (12.3)
1 Pole	50	1	2	38-280	0.2-1.7 (0.1 A steps)		3 N.O.	1 N.O.	3	Fig. 1	Yes	No	SBC221A2A	M2	22 (10)	27 (12.3)
1 Pole	50	5	10	38-280	1-8.5 (0.5 A steps)		3 N.O.	1 N.O.	3	Fig. 1	Yes	No	SBC221A3A	M2	22 (10)	27 (12.3)

SBC221B-1POLE,2TIMERS(A/O,B/O)PLUS CONTACT CONVERTERS(CC) FORPHASE SELECTION&LOGIC,WITHBFT&INSTANTANEOUS TRIP(IT)

1 Pole	60	5	10	38-280	1-8.5 (0.5 A steps)		3 N.O.	1 N.O.	3	Fig. 2	Yes	Yes	SBC221B1A	M2	22 (10)	27 (12.3)
1 Pole	50	1	2	38-280	0.2-1.7 (0.1 A steps)		3 N.O.	1 N.O.	3	Fig. 2	Yes	Yes	SBC221B2A	M2	22 (10)	27 (12.3)
1 Pole	50	5	10	38-280	1-8.5 (0.5 A steps)		3 N.O.	1 N.O.	3	Fig. 2	Yes	Yes	SBC221B3A	M2	22 (10)	27 (12.3)

SBC223A - 3 POLE, 1 TIMER(A/O), WITH BFT AND 3 SCHEME INSTANTANEOUS TRIP(IT)

3 Pole	60	5	10	38-280	1-8.5 (0.5 A steps)	0.5-4.25 (0.25 A steps)	3 N.O.	1 N.O.	3	Fig. 3	Yes	No	SBC223A1A	M2	22 (10)	27 (12.3)
3 Pole	50	1	2	38-280	0.2-1.7 (0.1 A steps)	0.1-0.85 (0.05 A steps)	3 N.O.	1 N.O.	3	Fig. 3	Yes	No	SBC223A2A	M2	22 (10)	27 (12.3)
3 Pole	50	5	10	38-280	1-8.5 (0.5 A steps)	0.5-4.25 (0.25 A steps)	3 N.O.	1 N.O.	3	Fig. 3	Yes	No	SBC223A3A	M2	22 (10)	27 (12.3)

SBC223B - 3 POLE, 1 TIMER(A/O), PLUS CONTACT CONVERTER LOGIC WITH BFT AND 3 SCHEME INSTANTANEOUS TRIP(IT)

3 Pole	60	5	10	38-280	1-8.5 (0.5 A steps)	0.5-4.25 (0.25 A steps)	3 N.O.	1 N.O.	3	Fig. 4	Yes	No	SBC223B1A	M2	22 (10)	27 (12.3)
3 Pole	50	1	2	38-280	0.2-1.7 (0.1 A steps)	0.1-0.85 (0.05 A steps)	3 N.O.	1 N.O.	3	Fig. 4	Yes	No	SBC223B2A	M2	22 (10)	27 (12.3)
3 Pole	50	5	10	38-280	1-8.5 (0.5 A steps)	0.5-4.25 (0.25 A steps)	3 N.O.	1 N.O.	3	Fig. 4	Yes	No	SBC223B3A	M2	22 (10)	27 (12.3)

SBC231C - 3 POLE, 2 TIMERS(A/O,B/O), PLUS CONTACT CONVERTER LOGIC WITH BFT AND 3 SCHEME INSTANTANEOUS TRIP(IT)

3 Pole	60	5	10	38-280	1-8.5 (0.5 A steps)	0.5-4.25 (0.25 A steps)	3 N.O.	1 N.O.	3	Fig. 5	Yes	Yes	SBC223C1A	M2	22 (10)	27 (12.3)
3 Pole	50	1	2	38-280	0.2-1.7 (0.1 A steps)	0.1-0.85 (0.05 A steps)	3 N.O.	1 N.O.	3	Fig. 5	Yes	Yes	SBC223C2A	M2	22 (10)	27 (12.3)
3 Pole	50	5	10	38-280	1-8.5 (0.5 A steps)	0.5-4.25 (0.25 A steps)	3 N.O.	1 N.O.	3	Fig. 5	Yes	Yes	SBC223C3A	M2	22 (10)	27 (12.3)

1 Pole or 3 Pole	Freq. (Hz)	Rated CT Current (A)	Contin. Current (A)	DC Voltage	Phase Pickup (A)	Residual Current (3I ₀)(A)	Output Contacts	No. Targets @ 0.15 A Pickup	Functional Block Diagram	Model Number	Case Size	Approx. Wt. in lbs (kg)	
												Net	Ship

SBC221A - 3 INSTANTANEOUS OVERCURRENT FUNCTIONS

3 Pole	60	5	10	38-280	1-8.5 (0.5 A steps)	0.5-4.25 (0.25 A steps)	5 N.O. 1N.O.or N.C.	2	Fig. 6				SBC231A1A	M2	22 (10)	27 (12.3)
3 Pole	50	1	2	38-280	0.2-1.7 (0.1 A steps)	0.1-0.85 (0.05 A steps)	5 N.O. 1N.O.or N.C.	2	Fig. 6				SBC231A2A	M2	22 (10)	27 (12.3)
3 Pole	60	5	10	38-280	1-8.5 (0.5 A steps)	0.5-4.25 (0.25 A steps)	5 N.O. 1N.O.or N.C.	2	Fig. 6				SBC231A3A	M2	22 (10)	27 (12.3)

