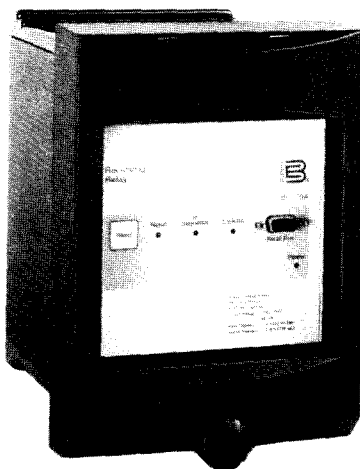


S2 Cradle for
Retrofit



S1 Case for
New Installations

BE1-79A RETROFIT RECLOSING RELAY

The BE1-79A Multiple Shot Reclosing Relay is an economical, microprocessor based relay that automatically recloses circuit breakers that have been tripped by protective relays or other devices in power transmission and distribution systems. The BE1-79A offers true "plug and play" convenience; it can be installed in an existing GE type S2 case with no wiring changes required. Most General Electric type ACR11 style reclosing relays can be directly replaced by the BE1-79A. The BE1-79A is also available in a Basler S1 case for new installations.

ADVANTAGES

- Directly replaces ACR relays in existing case with no wiring changes required.
- A single BE1-79A configuration replaces multiple ACR types.
- Front panel indicators for relay power and recloser status.
- Easy setup with front panel communications interface.
- Economical, microprocessor based design.
- Available in S1 case for new installations.
- Two-year warranty.

ADDITIONAL INFORMATION

STANDARDS, DIMENSIONS AND ACCESSORIES

Request Bulletin SDA

INSTRUCTION MANUAL

Request publication 9310200990

**FEATURES and
APPLICATION**
Page 2

**FUNCTIONAL
DESCRIPTION**
Pages 3 - 5

SPECIFICATIONS
Pages 6 and 7

**ORDERING
INFORMATION**
Page 8

B Basler Electric

P. O. BOX 269 HIGHLAND, ILLINOIS, U.S.A. 62249 PHONE 618-654-2341 FAX 618-654-2351

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FEATURES

BE1-79A Multiple Shot Reclosing Relays have the following standard features:

- Rugged construction in a drawout steel case
- A maximum of four automatic reclosures
- A maximum of four automatic resets
- Lockout function
- Selectable instantaneous or delayed first reclosure
- Selectable internal or external instantaneous jumper
- Selectable normally closed or normally open RS output contact
- Selectable Relay Fail or Lockout *and* Relay Fail output contact
- Selectable contact sensing voltage range

Controls and Indicators

The front panel has indicators to verify relay power and recloser status. A Reset switch is provided to restore the unit to the reset mode by clearing a reclosing sequence or a lockout condition. Onboard switches facilitate configuring the relay for either ACR11A, ACR11B, ACR11C, ACR11E, and ACR11F operation. Additional onboard switches permit selection of either an internal or external jumper for an instantaneous first reclose; and a N/O or N/C RS output contact.

Communications

The BE1-79A uses ASCII protocol. All relay settings are read or changed through the Serial Port located on the front panel.

Power Holdup Circuit

The BE1-79A is available with an internal power holdup circuit. This circuitry enables the output contacts to be maintained for a minimum of 40 cycles after nominal operating power is removed from relay.

APPLICATION

The BE1-79A is a multishot reclosing relay, specifically intended to replace GE ACR relay applications. BE1-79A relays can be installed in existing ACR cases (S2 size), with no wiring changes required. The BE1-79A can be configured to match specific ACR relay functionality via cradle-mounted switches. ACR functionality is duplicated, with settings achieved via a front panel RS-232 communications, using an ASCII based command set.

More than 90% of faults occurring on overhead lines may be cleared by momentarily de-energizing the line. The BE1-79A Multiple Shot Reclosing Relay automatically recloses circuit breakers that have been tripped by protective relays or other devices in power transmission and distribution systems.

Once the circuit breaker has been opened to de-energize the line, the BE1-79A provides a reliable automatic reclosure. The advantages are:

- Improved Service Continuity – returns the line to service quickly, preserving line integrity and minimizing outage effects on critical loads.
- System Stability – prevents disjointing of the system grid.

FUNCTIONAL DESCRIPTION

Circuit operation is divided into Inputs, Microprocessor, and Outputs. Relay circuit functions are illustrated in Figure 1 and described in the following paragraphs.

Inputs

There are four types of inputs to the BE1-79 relay. They are:

- Operating AC/DC Power
- Contact Sensing Inputs
- Reset Switch
- Serial Communication Port

Operating AC/DC Power

Operating power for the internal circuitry is applied to the isolated internal switching power supply. The power supply operates over a range of 120 to 240 Vac or 125 to 250 Vdc with no changes in connections or jumpers required. The operating power input is not polarity sensitive and is not disrupted by variations in the supply voltage or frequency over the power supply operating range. Part number 9310200101 relays are equipped with hold-up circuitry that maintains relay function for a minimum of 40 cycles after nominal operating power is removed.

FUNCTIONAL DESCRIPTION, continued

Contact Sensing Inputs

The contact sensing inputs use an opto-isolator to provide isolation from external power sources. Inputs V1 through V4 can operate at any one of three jumper-selectable voltage ranges. This feature prevents the possibility of control feedback caused by control system inductive coupling. Each input has a dedicated jumper that is located on the digital circuit board. Input V5 is dedicated to monitoring the relay power supply input and is not jumper-selectable. The function of each input depends on the operating configuration of the relay.

Reset Switch

This momentary switch clears the In Sequence or Lockout LEDs located on the front panel and restores the relay to a reset condition. The reset switch performs the same function as the manual clutch release on the General Electric ACR11 relays. Operating power must be applied to terminals 5 and 6 for a reset to occur.

Serial Communication Port

The serial communication port is a standard RS-232 (DB-9) female connector located on the front panel. This serial port provides the means to configure and read relay settings.

Microprocessor

All reclosing and communication functions are coordinated by the microprocessor. The BE1-79A uses an eight bit microprocessor with integral ROM (read only memory) and RAM (random access memory). The microprocessor is monitored by a watchdog circuit

that will reset the microprocessor if a problem is detected.

Outputs

The BE1-79A has 10 outputs. The function of each output depends on the operating configuration of the relay.

Reclosing Sequences

A reclosing sequence is initiated by the closure of a 52B contact. A reclosing sequence is indicated by the In Sequence LED located on the front panel. The BE1-79A provides up to four automatic reclosures. Each reclose setting is adjustable and has a setting range of 0 to 300 seconds. The number of reclosing attempts may be limited by adjusting any one of the reclose time delay settings to zero. When a breaker trip occurs at this point in the reclosing sequence, lockout will result. An instantaneous first reclose is enabled on relays configured for ACR11B operation by a jumper across case terminals 13 and 17 or a switch mounted on the right side of the relay.

Each of the four reclose settings has a corresponding reset timer. A final reset controls the time between lockout and reset. Each reset setting is adjustable and has a setting range of 0 to 300 seconds. Pressing the momentary front panel reset switch will clear a reclosing sequence and return the relay to the reset mode. Each reclose and reset timer setting is based on the breaker opening that initiates the first reclose timer.

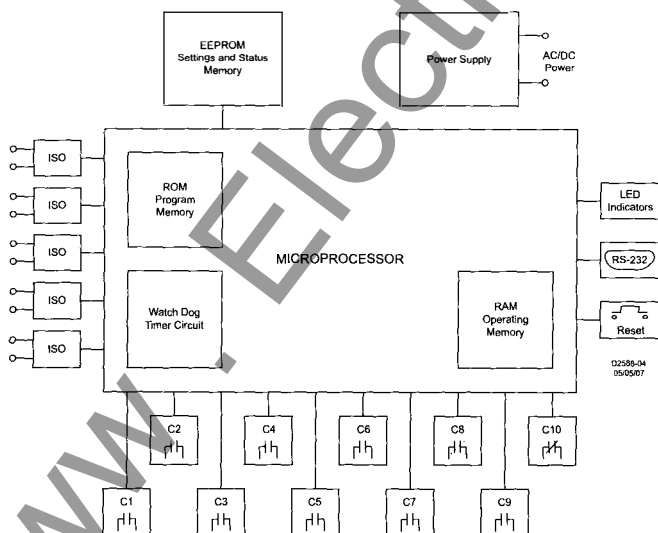


Figure 1 - Relay circuit functions

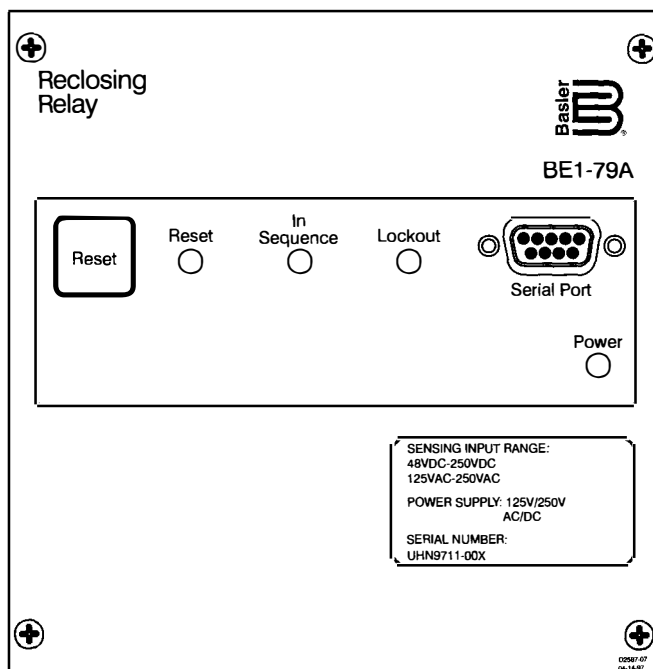


Figure 2 - Front panel

FUNCTIONAL DESCRIPTION, Continued

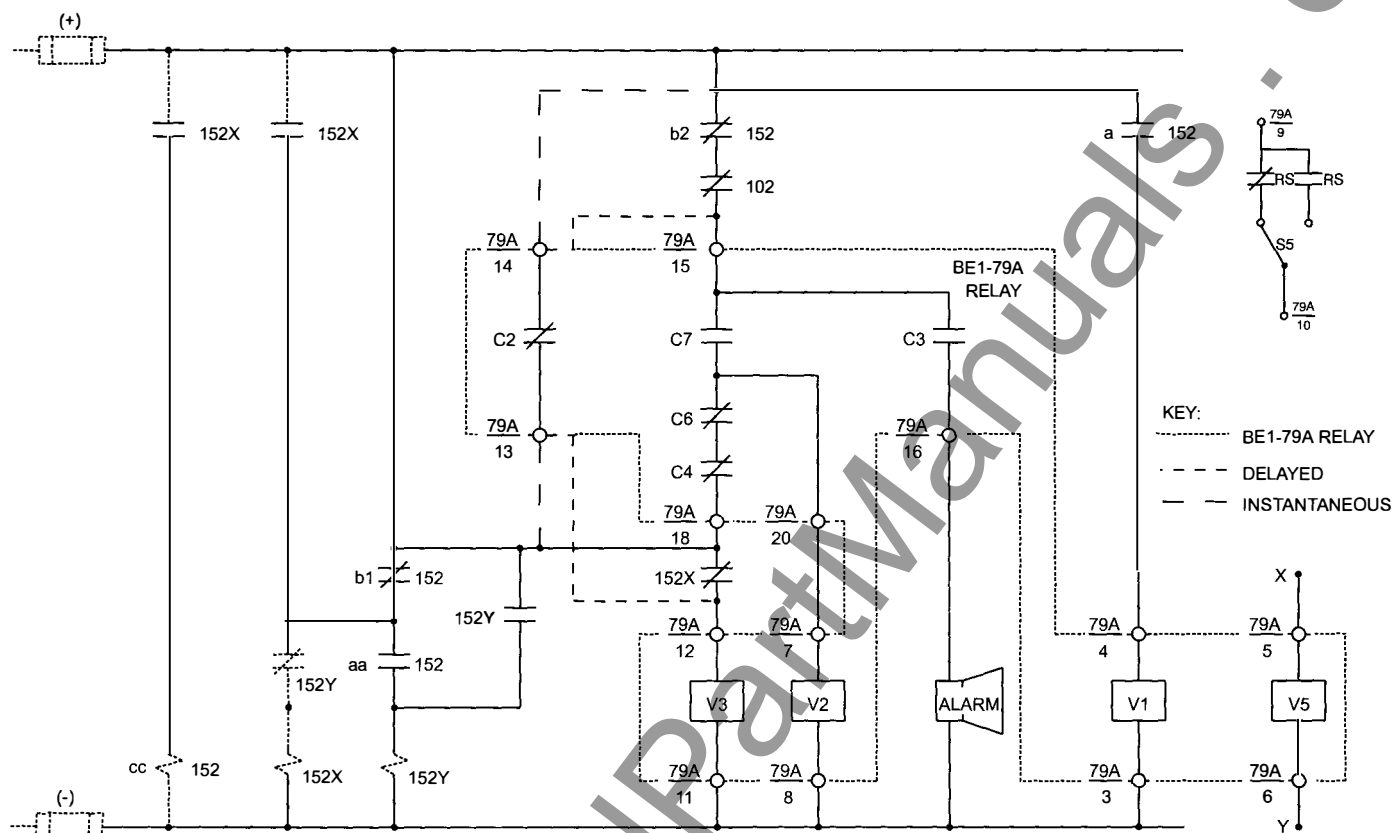


Figure 3 - Typical Connections for BE1-79A, ACR11A Application

FUNCTIONAL DESCRIPTION, Continued

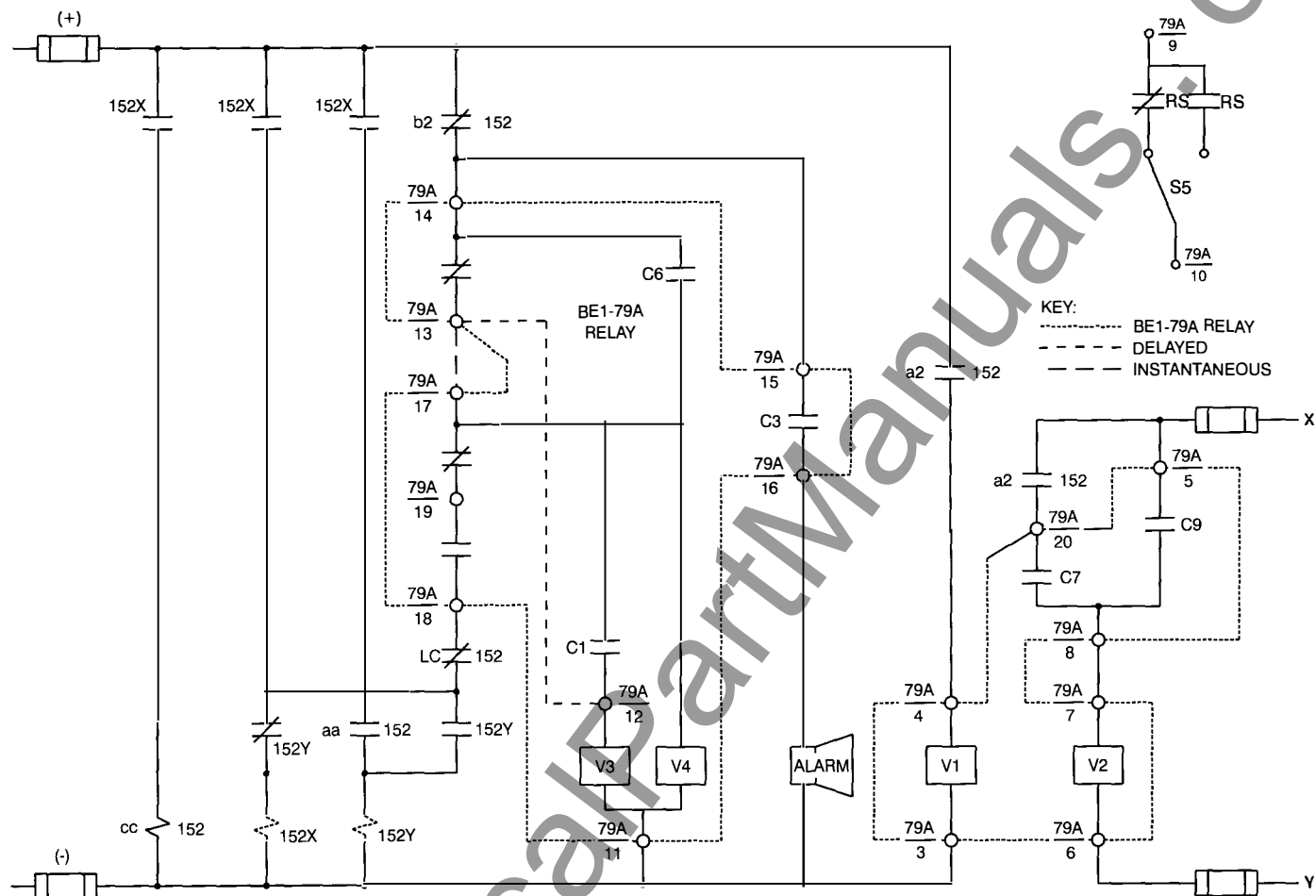


Figure 4 - Typical Connections for BE1-79A, ACR11B Application

PERFORMANCE SPECIFICATIONS

RECLOSE TIMERS

Reclose 1, Reclose 2, Reclose 3, and Reclose 4

Range: 0 to 300 seconds
 Increments: 0.1 seconds
 Accuracy: ± 20 milliseconds $\pm 1\%$, typical
 ± 50 milliseconds $\pm 1\%$, max.

RESET TIMERS

Reset 1, Reset 2, Reset 3, and Reset 4, and Final Reset

Range: 0 to 300 seconds
 Increments: 0.1 seconds
 Accuracy: ± 20 milliseconds $\pm 1\%$, typical
 ± 50 milliseconds $\pm 1\%$, max.

LOCKOUT TIMER

Range: 0 to 300 seconds
 Increments: 0.1 seconds
 Accuracy: ± 20 milliseconds $\pm 1\%$, typical
 ± 50 milliseconds $\pm 1\%$, max.

RS TIMERS

RS Set and RS Reset

Range: 0 to 300 seconds
 Increments: 0.1 seconds
 Accuracy: ± 20 milliseconds $\pm 1\%$, typical
 ± 50 milliseconds $\pm 1\%$, max.

COMMUNICATION PORT

Parameters: 9600 baud, 8N1 half duplex
 Protocol: ASCII

POWER SUPPLY

AC or DC operation:

Range: 120 to 240Vac
 Range: 125 to 250Vdc

POWER HOLDUP TIME

9310200101 40 cycles (670 milliseconds)
 Relays only: minimum, after loss of nominal operating voltage

CONTACT SENSING INPUTS

Operating range

48Vdc: 38.4 to 275Vdc
 120Vdc/120Vac: 100 to 275Vdc or 96 to 264Vac
 250Vdc/240Vac: 200 to 275Vdc or 192 to 264Vac

Energizing level: $\leq 80\%$ of nominal

Current draw: 1.5 mA maximum per input

Recognition Time: 15 milliseconds for DC,
 (AC 45-65Hz), typical
 25 milliseconds for DC,
 (AC 45-65Hz), maximum

Drop-out time: 15 milliseconds for DC,
 (AC 45-65Hz), typical
 25 milliseconds for DC,
 (AC 45-65Hz), maximum

OUTPUT CONTACTS

Make and carry for tripping duty:

30 amperes for 0.2 seconds per IEEE C37.90
 7 amperes for 2 minutes

Break Resistive or Inductive:

0.3 amperes at 125 or 250 Vdc
 (L/R = 0.04 maximum)

GENERAL SPECIFICATIONS

ENVIRONMENTAL

Operating Temperature Range: -40°C to +70°C
(-40°F to 158°F)

Storage Temperature Range: -40°C to +85°C
(-40°F to 185°F)

Humidity: Qualified to IEC 68-2-38, 1st Edition
1974, *Basic Environmental Test Procedures,
Part 2: Test Z/AD: Composite Temperature
Humidity Cyclic Test*

Electrostatic Discharge (ESD): 8kV contact
discharges and 15kV air discharges applied in
accordance with IEC 801-2 ESD.

Isolation: 1500 Vac at 50/60 Hz in accordance with
IEEE C37.90. The RS-232 Serial Communication
Port is intended only for periodic use and is not
subject to the requirements of IEEE C37.90.

Surge Withstand Capability (Oscillatory and Fast
Transient): Qualified to IEEE C37.90.1-1989
*Standard Surge Withstand Capability (SWC)
Tests for Protective Relays and Relay Systems.*
The RS-232 Serial Communication Port is
intended only for periodic use and is not subject
to the requirements of IEEE C37.90.1.

Radio Frequency Interference (RFI): Type tested
using a five watt, hand-held transceiver in the
ranges of 144 and 440 MHz, within the antenna
placed within six inches of the relay.

Shock: Withstands 15g in each of three mutually
perpendicular planes without structural damage
or degradation of performance.

Vibration: Withstands 2g in each of three mutually
perpendicular planes, swept over the range of
10 to 500Hz for a total of six sweeps, 15
minutes each sweep, without structural damage
or degradation of performance.

WEIGHT

S1: Maximum 13 pounds (including case)

S2: Maximum 5 pounds (excluding case)

ORDERING

HOW TO ORDER:

Designate one of the following part numbers.

9310200100	Retrofit for installation in existing ACR case	(S2 cradle)
9310200101	Retrofit for use in existing ACR case with Power Supply Holdup	(S2 cradle)
9310200200	Complete (case included) relay for new installations	(S1 case)

STANDARD ACCESSORY:

Adapter bracket to mount an S1 case relay in a GE S2 or Westinghouse FT-21 cutout. Order P/N 9108551021.

B Basler Electric

ROUTE 143, BOX 269, HIGHLAND, ILLINOIS U.S.A. 62249
PHONE 618-654-2341 FAX 618-654-2351

P.A.E. Les Pins, 67319 Wasselonne Cedex FRANCE
PHONE (33-3-88) 87-1010 FAX (33-3-88) 87-0808

<http://www.basler.com>, info@basler.com

