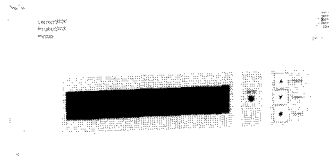


Behind-the-Panel  
Mounting



Semi-flush  
Mounting

## BE3-GPR GENERATOR PROTECTIVE RELAY

Basler Electric's BE3-GPR generator protective relay offers multiple protective features in a single package. Its microprocessor-based design provides high accuracy, reliability and repeatability. It is extremely easy to set up with an IBM compatible PC or from a menu-driven settings screen or from the front panel. The digital readout makes calibration quick, easy, and accurate without the need to bench test the relay to verify settings.

### FEATURES

- Microprocessor-based design
- Up to 10 protective functions
- Displays relay set points
- Two versions, stand-alone and paralleled
- Front panel programmability
- PC programmable
- True RMS sensing
- Isolated current inputs
- Adjustable trip set points
- Adjustable reset set points
- Adjustable time delays for each function
- Accepts single phase, three phase 3 or 4 wire voltage inputs
- 12 or 24 Vdc power inputs
- IEEE C37.90.1-1989 for Surge Withstand
- IEEE C37.90.1-1989 for Fast Transient
- UL Standard 508 recognized
- CSA Standard 14 certified
- Accepts 1 or 5 Amp CT secondaries

### WINDOWS® SOFTWARE

Interface for setting and communicating with Basler products (standard)  
Request BESTCOMS-BE3GPR-32 (Windows® 95, NT, 98, Me)

### ADDITIONAL INFORMATION

#### INSTRUCTION MANUAL

Request Publication 9278200993

#### TIMING CURVES

Request Publication 9252000999

**DESCRIPTION and  
FUNCTIONS**  
Pages 2 and 3

**FEATURES**  
Page 4

**SPECIFICATIONS**  
Page 5

**INTERCONNECT,  
DISPLAY and  
DIMENSIONS**  
Pages 6 and 7

**ORDERING  
INFORMATION**  
Page 8

**B Basler Electric**

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## DESCRIPTION

BE3-GPR (Generator protective relay) utilizes microprocessor-based technology to provide total generator protection in a single package. This microprocessor design allows for exact set point adjustment and precise generator system protection. BE3-GPR provides multiple functions in a single case, and that adds up to significant installation and setup savings. BE3-GPR allows for direct setup via a PC for easy, fast setup. Low sensing burdens mean that BE3-GPR does not require dedicated PTs and CTs. Optional protection features allow for customizing the BE3-GPR to meet your system's requirements.

## PROTECTIVE FUNCTIONS

### BASIC STAND-ALONE GENERATOR VERSION

- 27/59 Under/Overvoltage  
Trip points are settable from 70 to 600 Vac in 1 volt steps.  
Reset set points are settable from 70 to 600 Vac in 1 volt steps.  
Trip timing is adjustable from 0-20 seconds in 1 second steps.
- 81O/U Under/Overfrequency  
Trip points are settable from 35 to 75 Hz in 0.1 Hz steps.  
Reset set points are settable from 35 to 75 Hz in 0.1 Hz steps.  
Trip timing is adjustable from 0-20 seconds in 1 second steps.
- 81U Underfrequency  
Trip point is settable from 35 to 75 Hz in 0.1 Hz steps.  
Reset set points are settable from 35 to 75 Hz in 0.1 Hz steps.  
Trip timing is adjustable from 0-20 seconds in 1 second steps.

### BASIC PARALLELED GENERATOR VERSION

- 27/59 Under/Overvoltage  
Trip points are settable from 70 to 600 Vac in 1 volt steps.  
Reset set points are settable from 70 to 600 Vac in 1 volt steps.  
Trip timing is adjustable from 0-20 seconds in 1 second steps.
- 81O/U Under/Overfrequency  
Trip points are settable from 35 to 75 Hz in 0.1 Hz steps.  
Reset set points are settable from 35 to 75 Hz in 0.1 Hz steps.  
Trip timing is adjustable from 0-20 seconds in 1 second steps.
- 81U Underfrequency  
Trip point is settable from 35 to 75 Hz in 0.1 Hz steps.  
Reset set points are settable from 35 to 75 Hz in 0.1 Hz steps.  
Trip timing is adjustable from 0-20 seconds in 1 second steps.
- 32R Reverse Power  
Trip point is settable from 50 to 999 Watts in 1 Watt steps.  
Reset set points settable from 50 to 999 Watts in 1 Watt steps.  
Trip timing is adjustable from 0-20 seconds in 1 second steps.  
Style Option "P" provides single element reverse power protection. Style Option "W" provides three phase three element reverse power protection.

### OPTIONAL PROTECTIVE FUNCTIONS

- 25 Sync Check with Dead Bus  
(Paralleled version only)  
Phase Angle is settable from 2 to 20° in 1° steps.  
Voltage difference is settable from 1 to 100 Vac in 1 volt steps.  
Time delay is adjustable from .2-2 seconds in 0.1 second steps.  
Slip frequency is adjustable from .1 to 1.0 Hz in .1 Hz steps.  
Dead bus is adjustable from 10 to 50 volts in 1 volt steps.  
Breaker closure is selectable for Gen Hz > Bus Hz only or with Gen Hz > or < Bus Hz.

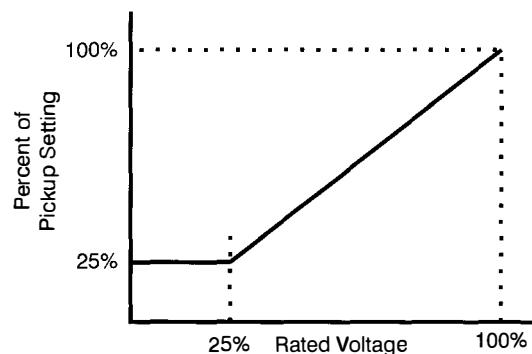
## PROTECTIVE FUNCTIONS, Continued

### OPTIONAL PROTECTIVE FUNCTIONS (Continued)

- 47      Phase Balance      Trip point is settable from 5 to 100 Volts in 1 Volt steps.  
Reset set points are settable from 5 to 100 Volts in 1 Volt steps.  
Trip timing is adjustable from 0-20 seconds in 1 second steps.
- 40      Loss of Excitation  
(Paralleled version only)      Measures Reactive Current into the paralleled generator.  
Trip point is settable from 0.15 to 2.5 in 0.01 Amp steps (5 Amp).  
Trip point is settable from 0.03 to 0.5 in 0.01 Amp steps (1 Amp).  
Reset point is settable from 0.15 to 2.5 in 0.01 Amp steps (5 Amp).  
Reset point is settable from 0.03 to 0.5 in 0.01 Amp steps (1 Amp).  
Trip timing is adjustable from 0-20 seconds in 1 second steps.
- 51N\*      Neutral Ground Fault      Trip point is settable from 0.2 to 3 in 0.01 Amp steps (5 Amp).  
Trip point is settable from 0.04 to 0.6 in 0.01 Amp steps (1 Amp).  
Reset point is settable from 0.2 to 3 in 0.01 Amp steps (5 Amp).  
Reset point is settable from 0.04 to 0.6 in 0.01 Amp steps (1 Amp).  
Trip timing is adjustable from 0-20 seconds in 1 second steps.
- 51/27R\*      Three Phase Time Overcurrent  
with Voltage Restraint      Trip point is settable from 0.1 to 9.99A in 0.1 Amp steps (5 Amp).  
Trip point is settable from 0.1 to 2.00A in 0.01 Amp steps (1 Amp).  
Reset point is settable from 0.1 to 9.99A in 0.1 Amp steps (5 Amp).  
Reset point is settable from 0.1 to 2.00A in 0.01 Amp steps (1 Amp).  
Time dial settings 0.0 to 9.9 in 0.1 increments (100 settings).  
Time curves: 16 inverse and 1 fixed time curve, including:
 

S1 - CO Short Inverse	V1 - CO Very Inverse
S2 - IAC Short Inverse	V2 - IAC Very Inverse
L1 - CO Long Inverse	E1 - CO Extremely Inverse
L2 - IAC Long Inverse	E2 - IAC Extremely Inverse
D - CO Definite	A - BS, IEC Standard Inverse
M - CO Moderately Inverse	B - BS, IEC Very Inverse
I1 - CO Inverse	C - BS, IEC Extremely Inverse
I2 - IAC Inverse	G - BS, IEC Long Time Inverse
	F - Fixed Time

Voltage Restraint characteristics: Under fault conditions, system voltage may collapse to a low value compared to the relatively small voltage drop associated with overloads. The time overcurrent relay with voltage restraint decreases the current pickup proportionally to this voltage reduction to increase overcurrent sensitivity of the relay during fault conditions.



\* The 51N and 51/27R functions are mutually exclusive.

## FEATURES

### Front Panel Programmability:

The front panel of the BE3-GPR has a LCD display and pushbuttons for programming. These buttons allow for the selection of items like energized or de-energized contact tripping, threshold adjustments, reset adjustments, time delays and enable/disable of specific protection features and much more. This front panel programming takes the guesswork out of relay setup. The front panel pushbuttons can be locked out for added security.

### Watchdog Timer:

The watchdog timer monitors the microprocessor for specific indications of proper operation. If something occurs to inhibit proper operation, the watchdog timer energizes an output relay with a Form C contact arrangement for customer use.

### Packaging:

The BE3-GPR is provided either in a semi-flush mounting package or a behind-the-panel mounting configuration. Compression type terminal strips are located so that wiring is simple. These terminals accept 1-#10 Ga. wire or 2-#14 Ga. wires.

### Programmable Contact Status:

The output contacts can be programmed to either energize or de-energize to trip. In other words, the contact status can be selected so that the relay, for a particular function, either picks up or drops out when the setting is exceeded.

### Reset Input:

An input is available to allow the relay to automatically reset when the fault goes away, or the relay can maintain an output until this input is momentarily received.

### Disable Input:

A contact input disables the relay to avoid nuisance tripping during generator build-up.

### RS232 Communications:

BESTCOMS is a Windows®-based PC software program that is included with each BE3-GPR relay. This program provides a user-friendly means to set up all parameters of the BE3-GPR. Also, communications can be made using a terminal emulation program such as TELIX to send (type) or receive (display) ASCII characters in serial data format.

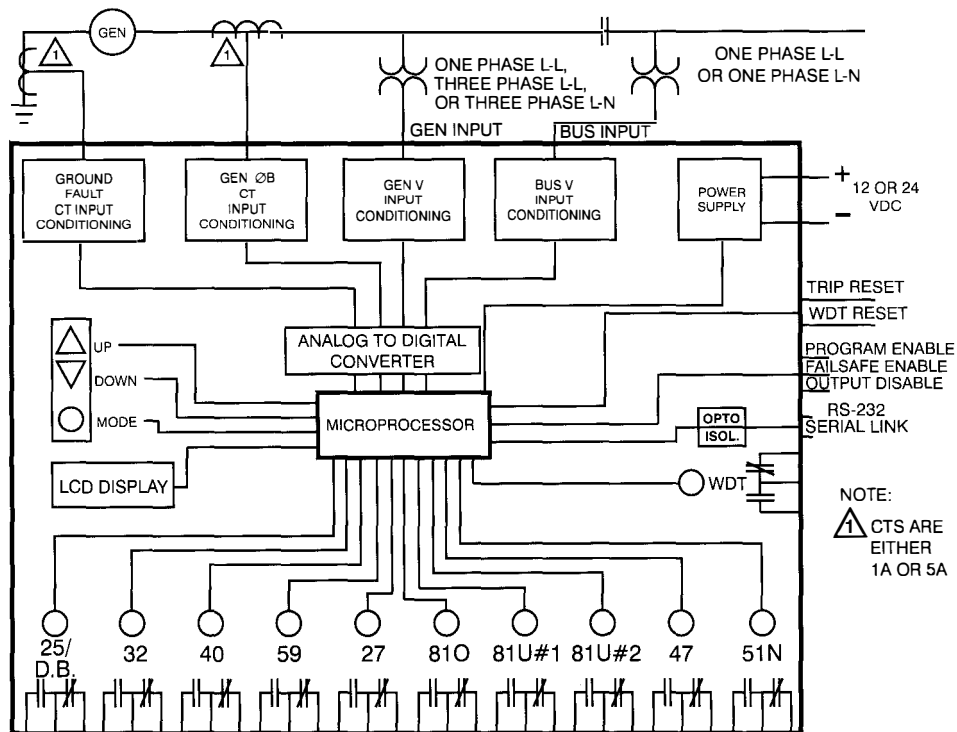


Figure 1 - Functional Block Diagram

Note: The integrated design of BE3-GPR greatly simplifies wiring over discrete relays.

## SPECIFICATIONS

### OUTPUTS:

Each protective function has a Form C output contact arrangement.

### Contact ratings:

#### Resistive

120/240Vac - Make 30A for 0.2 seconds, carry 7A continuously, break 7A.  
250Vdc - Make 30A for 0.2 seconds, carry 7A continuously, break 0.3A. (L/R=0.04)  
10A @ 30Vdc resistive

#### Inductive

120/240Vac, 125 Vdc - Break 0.3A (L/R=0.04)  
5A @ 30Vdc Inductive  
0.3A @ 240Vac Inductive (L/R=0.04)

#### Surge withstand Capability

Qualified to IEEE C37.90.1-1989 standard  
Surge Withstand Capability (SWC) tests for protective relays and relay systems

#### Fast Transient

Qualified to IEEE C37.90.1-1989

#### Radio Frequency Interference (RFI)

Field tested using five watt transceiver operating at random frequencies centered around 144 MHz and 440 MHz

### INPUTS:

#### DC Power Input (Battery):

12Vdc nominal systems (8-16Vdc)

### INPUTS (continued)

24Vdc nominal systems (16-32Vdc)  
(both negative ground systems)  
Power input burden is 6.5 Watts.

#### Generator/Bus Voltage Input:

100 to 480Vac nominals, 50/60Hz  
@ < 1VA/phase  
1.2 times nominal continuously  
1.5 times nominal for 10 seconds  
May be single phase, three phase three wire or three phase four wire.

#### Generator Line Current:

1 or 5 Amp input @ 1VA/phase  
2 times nominal continuously  
10 times nominal for 1 second

### ENVIRONMENTAL:

Vibration: 10 to 500 Hz @ 2 Gs in three mutually perpendicular planes

Shock: 15 Gs in each of three mutually perpendicular axes

#### Ambient Operating Temperature range:

-25°C (-13°F) to +60°C (+149°F).  
(Display readout is limited to -25°C to +60°C operation.)

### AGENCY RATINGS:

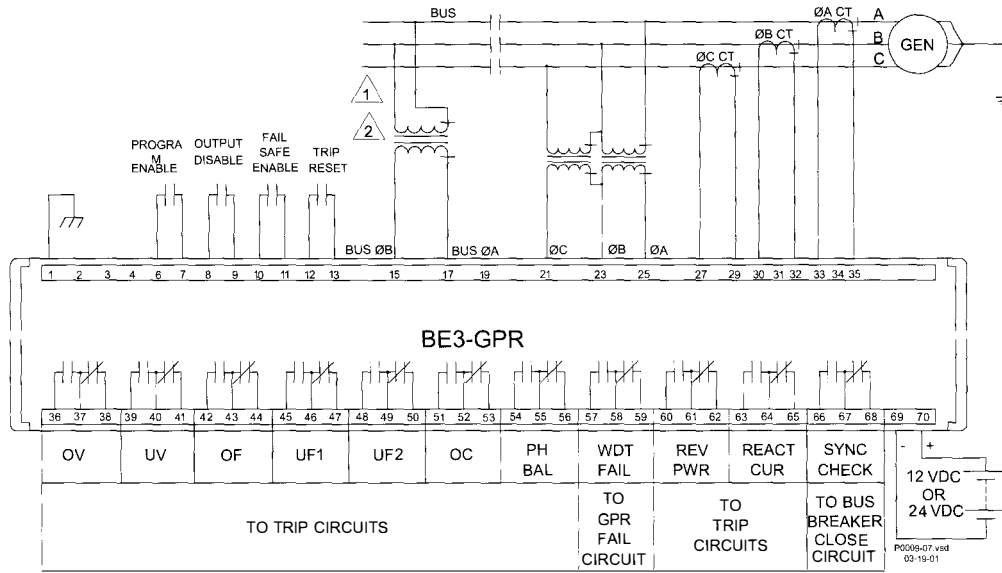
UL Standard 508  
CSA Certified  
Patent #5309312

### ACCURACIES OFFERED:

Function	Accuracy	Repeatability	Steps	Temp
27/59	±2%	±1.0%	1V	-25°C to +60°C
81O/U	±0.02 Hz	±0.004Hz	0.1Hz	-25°C to +60°C
32R	±2% or ±10W@PF>0.5I ±5% or ±10W@PF>0.5I	±1.0% ±1.0%	1W 1W	-25°C to +60°C -25°C to +25°C
25 (Phase Angle)	±0.5° max	±0.1°	1°	-25°C to +60°C
(Delta V)	±3% or ±2V	±1.5%	1V	-25°C to +60°C
(Slip Frequency)	±0.02Hz	±0.01Hz	0.1Hz	-25°C to +60°C
47	±3% or ±2V	±1%	1V	-25°C to +60°C
40	±3.5% or ±0.05A	±1%	0.01A	-25°C to +60°C
51N	±2%	±1%	0.01A	-25°C to +60°C
51/27R	±2.5%	±1%	0.1/0.01A	-25°C to +60°C

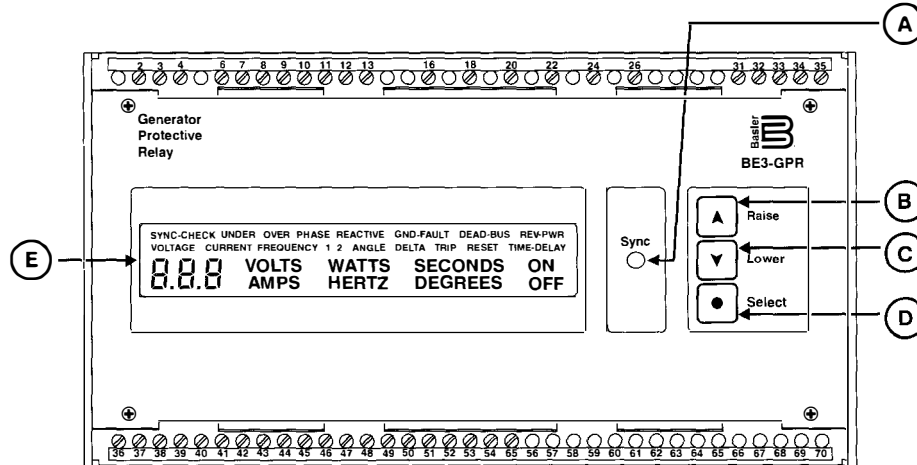
Accuracy of all timing functions is ±1% or less than ±50 msec, whichever is greater.

## CONNECTIONS and DISPLAY



- NOTES:
- 1 IT IS IMPERATIVE THAT THIS INPUT BE PROPERLY CONNECTED IN RELATIONSHIP WITH TERMINALS 21, 23, AND 25.
  - 2 INPUT IS NOT REQUIRED IF SYNC-CHECK IS NOT PRESENT.

**Figure 2 - Typical Interconnection Diagram  
BE3-GPR-P1 or BE3-GPR-W1 with 3 Phase L-L Sensing and 5A CTs**



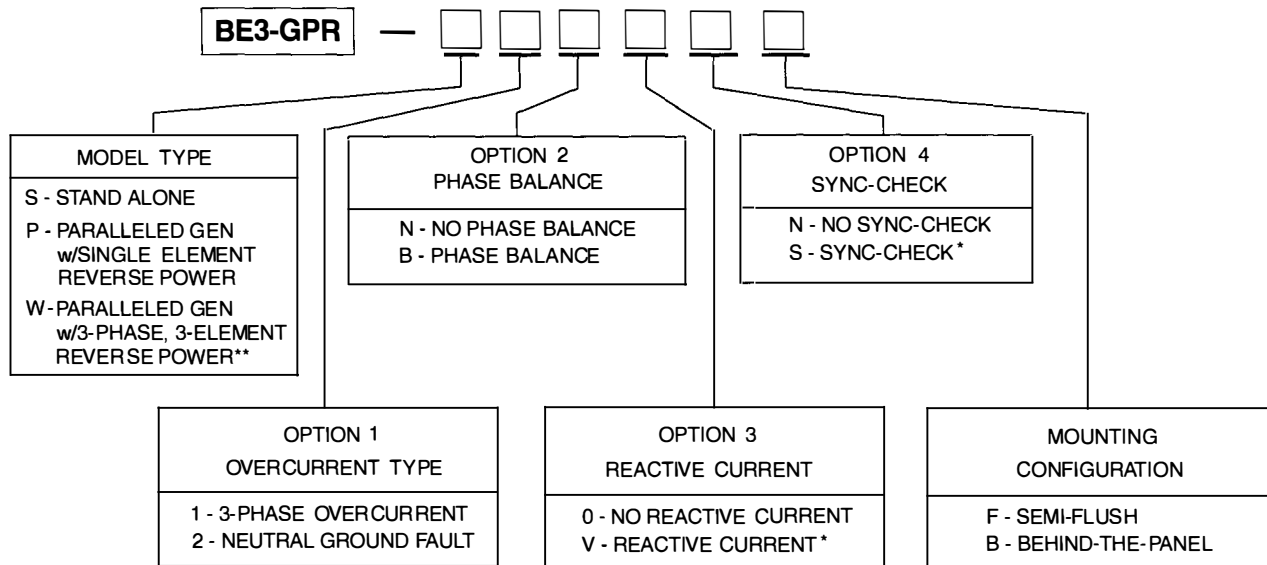
- (A) Red LED illuminates for a sync-check condition.
- (B) Pushbutton used to toggle the menu selections, scroll for set point adjustments, fast scroll by pressing for one second, and, when simultaneously pressed with the SELECT button, makes the menu selection sequence move in the forward direction.
- (C) Pushbutton used to scroll and fast scroll by holding for one second for set point adjustments, and, when simultaneously pressed with the SELECT button, to reverse the menu selection sequence from the forward direction.
- (D) Pushbutton used to simultaneously save settings in the nonvolatile memory and move on to the next selection sequence. Also, when pressed in conjunction with either the RAISE or LOWER button, the direction of the user option sequence can be forced forward or reverse, respectively.
- (E) LCD provides the primary visual interface to the user. Used when performing Relay settings and monitoring Relay functions.

**Figure 3 - Front Panel Display**



## ORDERING

### STYLE NUMBER SELECTION CHART



NOTES : \* Paralleled models only.  
 \*\* Requires 3 phase overcurrent option 1-1.

Example of style number: BE3-GPR-P2BVVSF

## OPTIONAL EQUIPMENT

15W Power Supply:

P/N	Power Input	Power Output
9 313700100	120ac/125dc	24Vdc
9 313700101	230ac/250dc	24Vdc

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