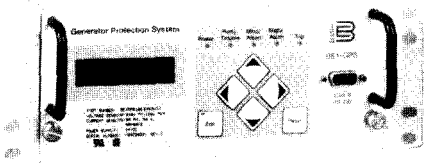
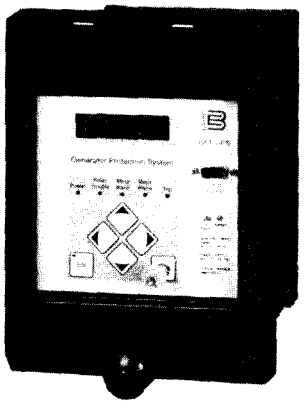




BE1-GPS100 GENERATOR PROTECTION SYSTEM

The BE1-GPS100 is a multifunction, programmable numerical protection, meter, and control relay. Functions provided include three phase voltage controlled, voltage restrained, or standard overcurrent, phase residual and independent ground overcurrent, negative sequence overcurrent, breaker failure, over/underfrequency, phase over/undervoltage, zero sequence over/undervoltage, and negative sequence overvoltage, forward or reverse power, loss of excitation, volts per hertz, sync check, sensitive third harmonic ground fault monitoring, breaker monitoring and control and metering functions, all in an integrated system.

ADVANTAGES

- BESTlogic provides the user with very high flexibility in configuring a protection and control system.
- Substantial functionality in a small package, useful where space is very limited but high functionality is needed.
- Programmable LCD display allows the relay to replace local indication and control functions, such as panel metering, alarm annunciation, and control switches.
- Three independent communication ports with protocol support allows integration with distributed control systems.
- Provides optional separate ground current input for those applications where this is required.
- Includes frequency tracking and voltage restrained overcurrent for backup and cogeneration applications.
- Includes Real Time Clock with 8 hour capacitor ride through and optional battery backup.
- Available in fully drawout half rack case. Two Basler Electric half rack IEDs (Intelligent Electronic Devices) can be dovetailed together to mount in a standard 19-inch equipment rack with no special mounting hardware.
- Available in fully drawout S1 case with test paddle. The S1 case, with available adapter plates, fits cutout, drilling and behind panel projection dimensions for common Basler Electric, GE and Westinghouse unit case relays.

WINDOWS® SOFTWARE

Interface for setting and communicating with Basler protection products.
Request BESTCOMS™ for BE1-GPS100.

ADDITIONAL INFORMATION

INSTRUCTION MANUAL
Request publication 9318700990

TIMING CURVES
Request publication 9252000999

MODBUS INSTRUCTION MANUAL
Request publication 9318700991

DNP 3.0 INSTRUCTION MANUAL
Request publication 9318700992

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

FEATURES

PROTECTION

- Phase and Neutral Instantaneous Overcurrent elements with settable time delay: 50TP, 50TN
- Phase, Neutral, and Negative Sequence Time Overcurrent elements: 46, 51P, 51N, 151N
- Phase overcurrent element (51P) includes capability of voltage restraint or voltage control.
- Internally calculated phase residual, 3I0, available on all relays. Optional independent ground input available. Neutral overcurrent elements (50TN, 51N, 151N) monitor either ground or calculated residual.
- Negative sequence overcurrent element (46) includes algorithm for timing based on generator K factors or may use standard TOC curves.
- All U.S. and IEC timing curves plus user programmable curve.
- Phase Undervoltage and Overvoltage elements: 27P, 127P, 59P, 159P. Elements use a 1 of 3, 2 of 3, or 3 of 3 logic, and monitor either line-line or line-ground voltages.
- Auxiliary Undervoltage and Overvoltage elements: 27X, 127X, 59X, 159X. Elements monitor either fundamental or third harmonic on the optional auxiliary 4th VT input, or fundamental phase residual, 3V0, of the phase inputs.
- Negative Sequence Overvoltage element: 47
- Overexcitation, Volts per Hertz element: 24
- Four Under/Overfrequency elements: 81, 181, 281, 381
- Forward/Reverse Power: 32, 132
- Loss of Excitation (offset sloped VAR flow algorithm): 40Q, 140Q
- Breaker Failure protection function: BF
- 4 general purpose logic timers: 62, 162, 262, 362
- Inadvertent energization protection using 50 elements supervised by 81 and/or 27 elements
- 100% stator ground fault protection using auxiliary voltage elements for ground overvoltage and 3rd harmonic ground undervoltage
- Sync check and/or dead bus close supervision 25, 27X (Requires optional 4th VT sensing circuit)
- Programmable Logic using BESTlogic
- Two protection settings group controllable via relay logic, 43 Aux switches, and hardwired inputs. Setting group selection may control tripping logic.
- Fuse loss detection (60FL) protects against false trip due to loss of voltage sensing.

CONTROL

- Virtual breaker control switch—controllable from both HMI and com. ports: 101
- Four virtual selector switches—controllable from both HMI and com. ports: 43, 143, 243, 343
- Communication port control of 101 and #43 switches allows for SCADA control of relay and breaker.

INSTRUMENTATION

- Real time A, B, C phase current, voltage; frequency; and derived neutral and negative sequence current and voltage.
- Real Time 3 phase Watts, VARs, and Power Factor.

REPORTS

- Current demands for phase, ground, and negative sequence currents, and forward and reverse Watts and VARs—magnitudes and time stamps are recorded for today's peak, yesterday's peak, and peak since reset.
- kWh and kVARh, forward and reverse
- Breaker operations counter and contact interruption duty. Breaker operate time also available.

FAULT RECORDING

- 255 event sequence of events report with I/O and alarm sub-reports
- Fault Reporting; 1 or 2 oscillography records per fault report
- 16 fault summary reports; two most recent Fault Summary Records saved to non-volative memory
- Total number of fault and oscillography records settable from 6 to 16
- Total of 240 cycles oscillography memory @ 12 samples/cycle
- COMTRADE format

COMMUNICATION PORTS

- Three independent general purpose communication ports
  - Front RS-232 ASCII communications
  - Rear RS-232 ASCII communications
  - Rear RS-485 ASCII, Modbus®, DNP®3.0, and TNP protocols
- IRIG-B time sync (unmodulated)

SELF TEST AND ALARM FUNCTIONS

- Relay fail, major alarm, and minor alarm LEDs, and fail-safe alarm output contact.
- Extensive internal diagnostics monitor all internal functions of the relay.
- More than 20 additional alarm points—programmable for major or minor priority including:
  - User defined logic state alarms that may be associated with any user specified relay logic state or relay protective element status.
  - Phase current, and forward and reverse Watt and VAR demand alarm.
  - Neutral and negative sequence unbalance demand alarms.

FEATURES, continued

- Three breaker alarm points programmable for slow trip, interruption duty threshold, or operations counter.
- Trip circuit voltage and continuity monitor.

PROGRAMMABLE I/O

- Four programmable inputs.
- Five programmable outputs and one dedicated programmable alarm output.

HARDWARE FEATURES

- Two case configurations
  - S1: Basler/GE style (with test plug)
  - H1: Half Rack
- Active CT technology for low burden and increased dynamic range.
- Flash Memory for upgrading embedded programming without changing chips.
- Real Time Clock with 8 hour capacitor ride through and optional battery backup.
- Integral HMI with 2x16 character display and keypad for editing settings and resetting targets and alarms.
- Wide range ac/dc power supply options provide long hold up time to ride through dips on power source. (100 ms with 4 output relays energized, upon complete loss of source. Starting voltage 125Vac for Option 1 (48/125Vac/dc) and 250Vac for Option 2 (125/250Vac/dc))
- Automatically adjusts sampling rate for sensed line frequency over the range of 10-75 Hz to provide high accuracy of protective elements over a wide operating range.

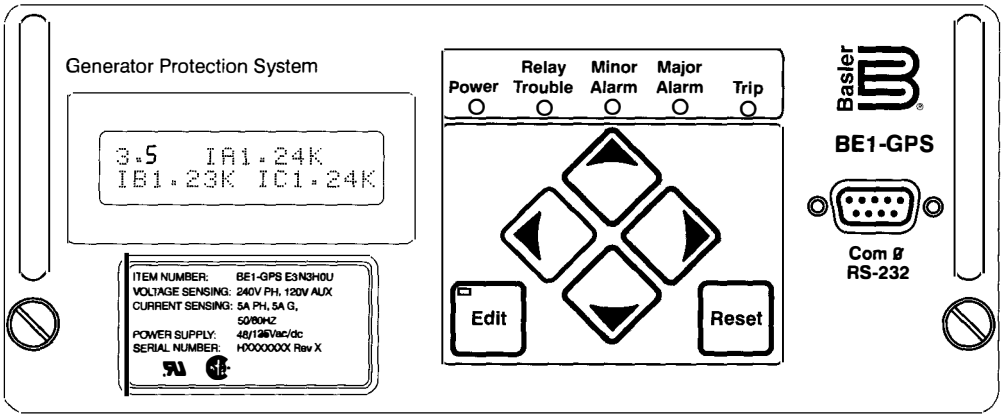


Figure 1 - Advanced HMI (Human Machine Interface)

APPLICATIONS

The BE1-GPS100 Generator Protection System provides three phase, ground, and negative sequence overcurrent, voltage, frequency, reverse power, loss of excitation, volts per hertz, and sync check protection and is intended for use in any generator protection application. Its unique capabilities make it ideally suited for applications with the following requirements:

- Applications that require the flexibility provided by wide setting ranges, multiple setting groups, multiple coordination curves, and an extremely versatile programmable logic, in one unit.
- Applications that require the economy and space savings provided by a multifunction unit. This one unit can provide all of the protection, control, metering, and local and remote indication functions required in many typical units.
- Retrofit applications requiring the features and functions of the GPS-100 in an S1 case.
- Applications where the small size and limited behind-panel projection facilitates modernizing protection, metering, and control systems in existing substations.
- Applications that wish to have the protection redundancy provided by having differential relaying in an independent protective relaying package.
- Applications that require communications and protocol support.
- Applications where drawout construction is desirable.
- Applications that require high accuracy across a wide frequency range.
- Applications where the capabilities of intelligent electronic devices (IEDs) are used to decrease relay and equipment maintenance costs.

FUNCTIONAL DESCRIPTION

The BE1-GPS100 is a multifunction, numerical relay that provides a comprehensive mix of protective functions to detect generator faults and abnormal operating conditions along with control and metering functions in an integrated system. This system is suitable for any generator application and many utility/ cogeneration facility intertie applications. Twelve sample per cycle digital signal processing, with frequency compensation, extracts the fundamental component for high accuracy with distorted waveforms and at off-nominal frequency operation.

The unit has one set of three phase current and voltage sensing inputs to provide all common protective functions except generator differential, 87G (which, provided as a separate relay, prevents the "all your eggs in one basket" pitfall). The voltage sensing circuits automatically configure themselves internally for 1 phase, 3 phase 3 wire, or 3 phase 4 wire VT circuits. An optional 4th auxiliary voltage input is available for either generator ground sensing or bus voltage sensing.

The BE1-GPS100 can also be ordered with an optional independent ground current input, typically used for application with a separate ground CT such as a flux balancing window CT or to provide ground backup protection for the generator step up transformer.

The S1 and half rack cases are fully drawout with current circuit shorting provisions. Two Basler Electric half rack IEDs (Intelligent Electronic Devices) such as primary and backup BE1-GPS100s or the BE1-851 or -951 Overcurrent Protection Systems can be dovetailed together to mount in a standard 19" equipment rack with no special mounting hardware. Replacing an obsolete GE or Westinghouse single function relay with a GPS-100 in an S1 case upgrades existing protection and monitoring without having to cut the panel.

Three independent communications ports, along with built-in support for Modbus® and other common protocols, provide easy access to integrating the protection, control, metering, and status monitoring functions into a substation automation system. The standard IRIG-B port provides time synchronization from a master clock.

Real time metering provides Watt, Watt-hour, VAR, VAR-hour, voltage, amp, and unbalance loading telemetry for the protected circuit. Contact sensing inputs and alarm monitoring functions provide real time status information. Remote control is provided by virtual control and selector switches with select-before-operate control of programmable outputs.

BESTlogic

BESTlogic programmable logic provides the user with high flexibility in configuring a protection and control system.

Each of the protection and control functions in the BE1-GPS100 is implemented as an independent function block that is equivalent to its single function, discrete device counterpart. Each independent function block has all of the inputs and outputs that the discrete component counterpart might have. Figures 5A and 5B show each of the independent function blocks available for use in the BE1-GPS100 and their associated logic I/O. Programming BESTlogic is equivalent to choosing the devices required by your protection and control scheme and drawing schematic diagrams to connect the logic inputs and outputs to obtain the desired operational logic.

The BE1-GPS100 relay can store, as user settings, one user programmable, custom logic scheme. To save you time and provide guidance, preprogrammed logic schemes have also been provided. Any of the preprogrammed schemes can be copied into the logic settings, then modified to the application's needs. User-programmable variable and virtual switch names make relay event reports user-friendly.

BESTlogic provides the protection engineer with the flexibility to set up this powerful multifunction system with the same freedom that was once enjoyed with single function, discrete devices. It is no longer necessary to compromise your standard protection and operating practices to work within the limitations in programmability of previous multifunction devices.

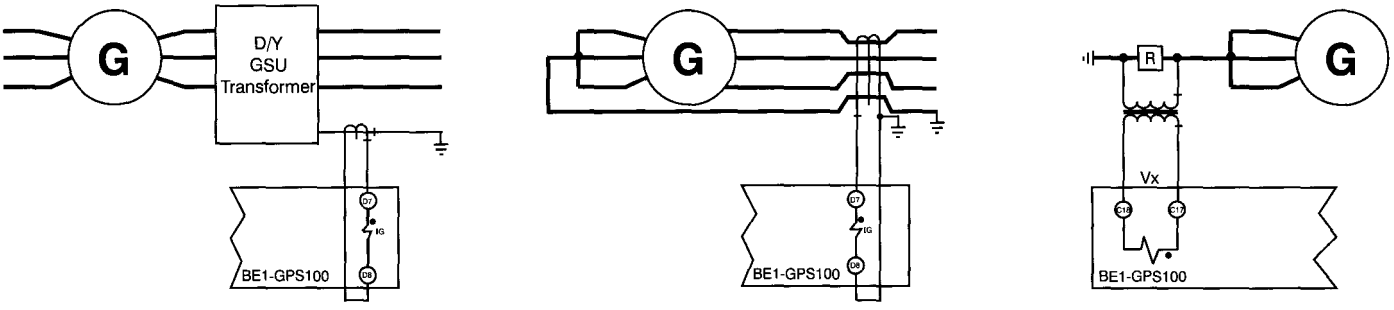
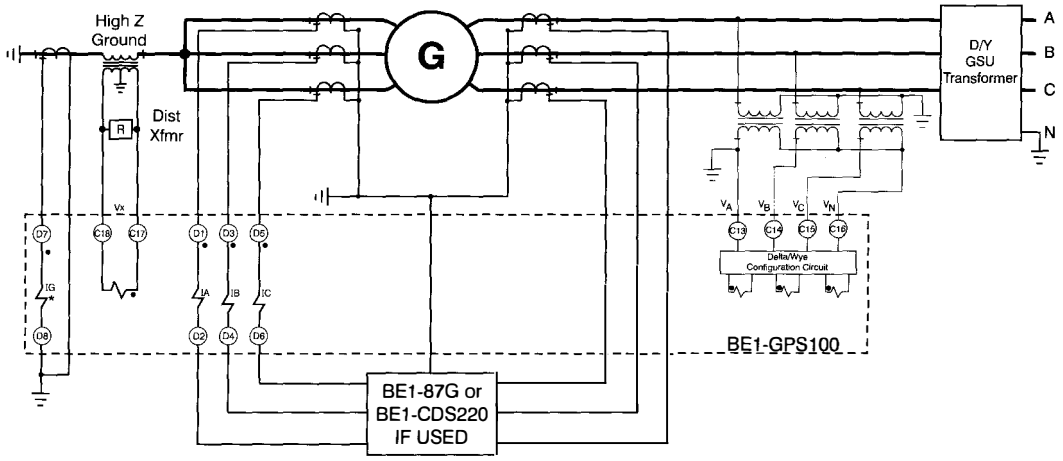


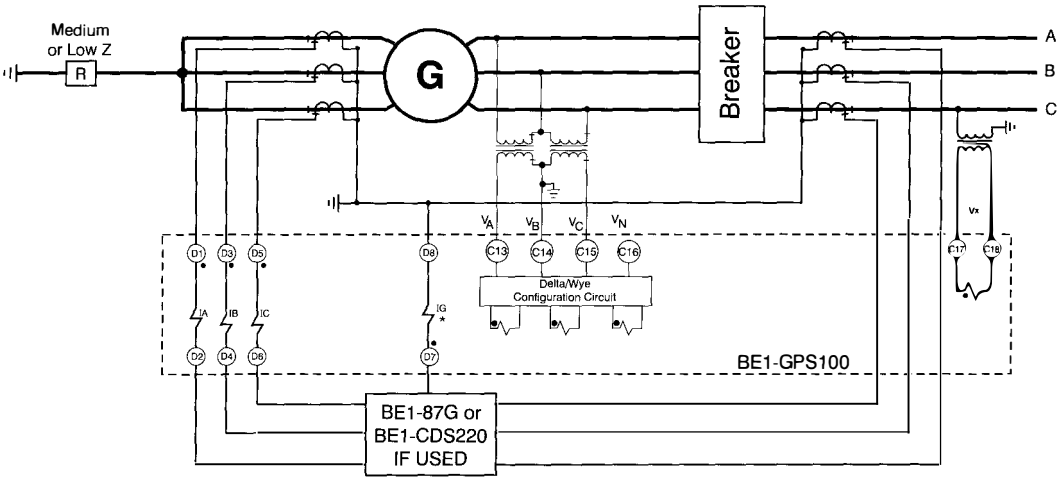
Figure 2A - Typical Alternate Connections for Vx and IG

FUNCTIONAL DESCRIPTION, continued



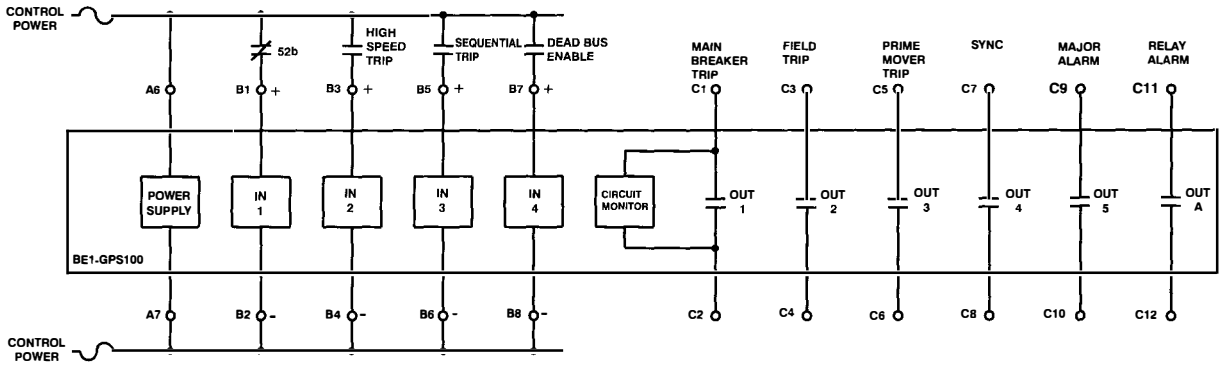
* Independent Ground input is optional.

Figure 2B - Typical External Sensing Connections, with Vx and IG Used for Stator Ground Fault



* Independent Ground input is optional.

Figure 2C - Typical External Sensing Connections, with Vx Used for Sync Check and IG Used for Ground Differential Overcurrent



NOTES:

1.) CONNECTIONS SHOWN ARE FOR USE WITH PRE-PROGRAMMED LOGIC SCHEME LZ-W-25. LZ-W-25 PROVIDES LOW IMPEDANCE GROUNDED GENERATOR PROTECTION WITH SEQUENTIAL TRIP AND SYNC CHECK LOGIC. ALL INPUTS AND OUTPUTS ARE FULLY PROGRAMMABLE USING BESTlogic.

Figure 3 - Typical External Connections

FUNCTIONAL DESCRIPTION, continued

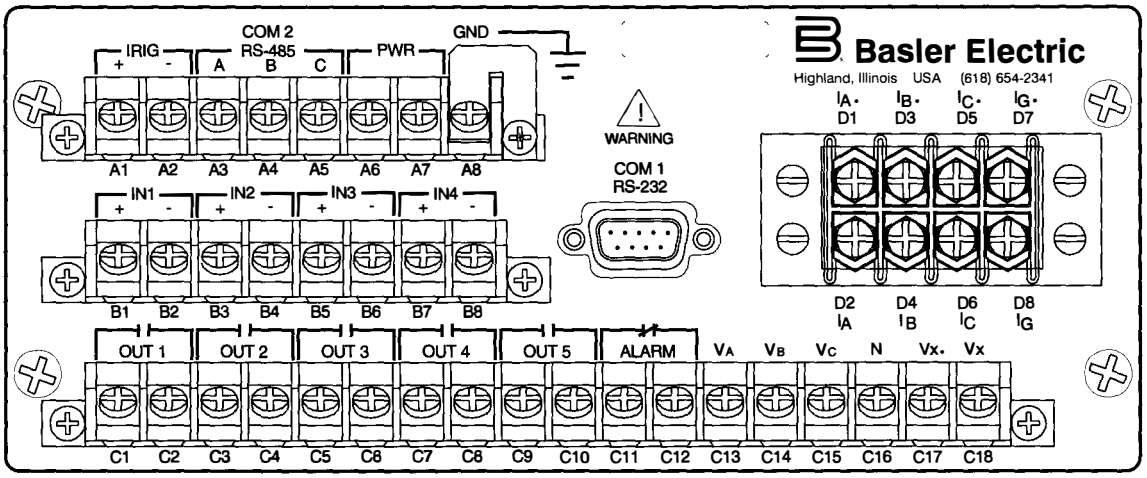


Figure 4A - BE1-GPS100 Rear Panel Connections

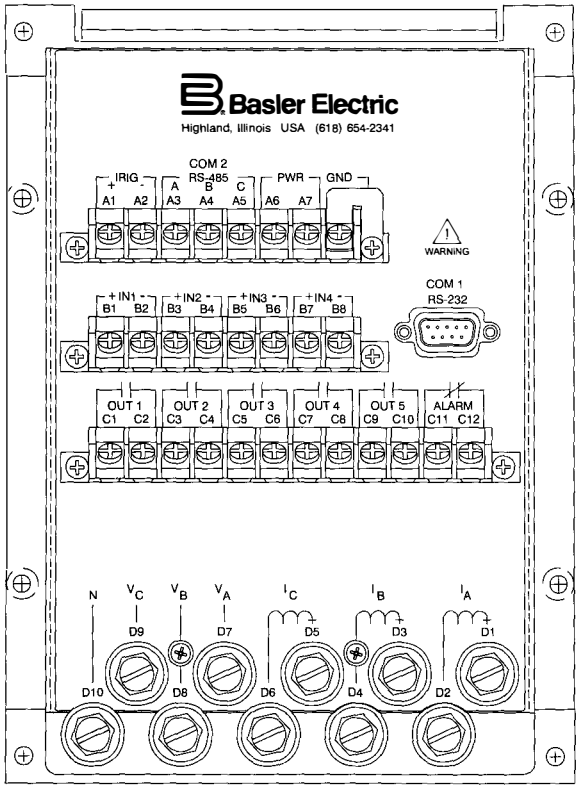


Figure 4B - S1 Rear Panel Connections

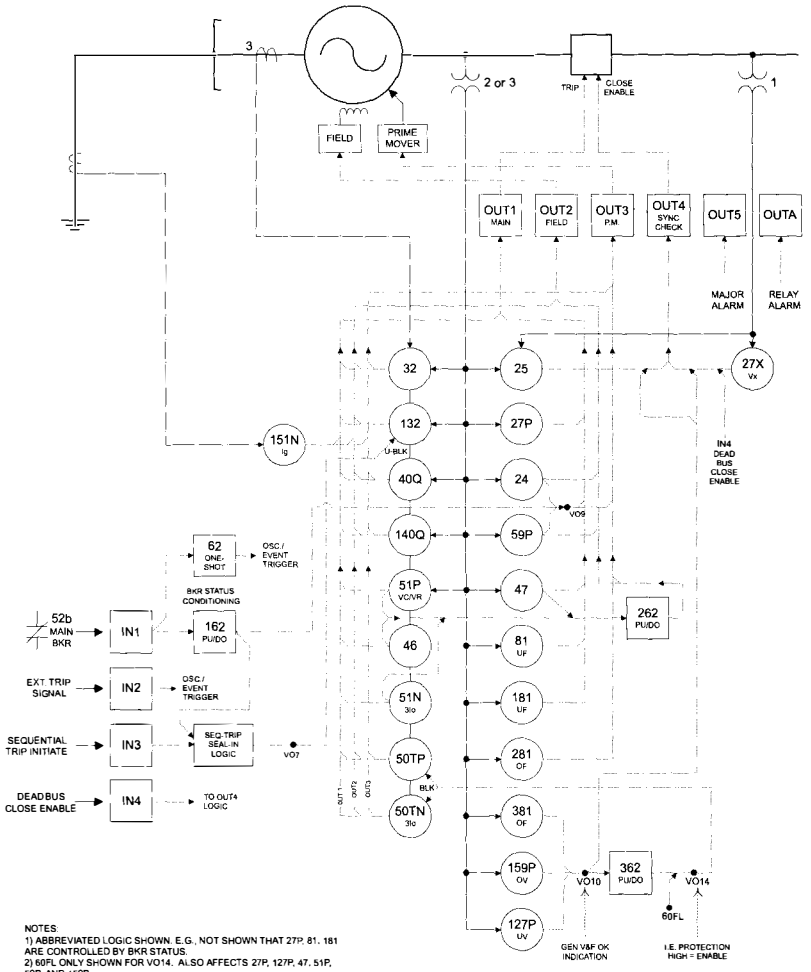


Figure 5 - Typical Application, Single Line

GENERAL SPECIFICATIONS

5 Amp CURRENT INPUTS

Continuous rating:	20A
One Sec. Rating:	400A
Saturation limit:	150A
Burden:	<10milliohms

1 Amp CURRENT INPUTS

Continuous rating:	4A
One Sec. rating:	80A
Saturation limit:	30A
Burden:	<22milliohms

PHASE AC VOLTAGE INPUTS

Continuous:	300V, Line to Line
One Sec. rating:	600V, Line to Neutral
Burden:	Less than 1VA @ 300Vac

AUXILIARY AC VOLTAGE INPUT

Continuous:	150V
One Sec. rating:	600V
Burden:	Less than 1VA @ 150Vac

A/D CONVERTER

Sampling Rate:	12/cycle, adjusted to input frequency 10-75Hz

POWER SUPPLY

Option 1:	DC range 35 - 150V AC range 55 - 135V
Option 2:	DC range 90 - 300V AC range 90 - 270V
Option 3:	DC range 17 - 32V (down to 8V for momentary dips)
Burden:	6 watts continuous, 8 watts maximum with all outputs energized

TRIP CONTACTS

Make and carry:	30A (0.2sec)
Continuous:	7A
Break:	0.3A DC (L/R=0.04)

CONTROL INPUTS

Wetting voltage range: Same as control power supply option.

	Low Range		High Range	
Power Supply Option	Turn-on Voltage Range	Burden	Turn-on Voltage Range	Burden
1) 48/125Vac/Vdc	26-38V	13k ohms	69-100V	24k ohms
2) 125/250Vac/Vdc	69-100V	25k ohms	138-200V	54k ohms
3) 24Vdc	5-8Vdc	7k ohms	N/A	N/A

Control inputs recognize both DC and AC voltages.

COMMUNICATION PORTS

Response time:	<100mSec for metering and control functions
Baud rate:	300 - 19200

ELECTRICAL ENVIRONMENT

- IEEE C37.90-1989 Standard for Relays and Relay Systems Associated with Electric Power Apparatus
- IEC 255-5 Insulation Test for Electrical Relays Impulse and Dielectric Strength (2000Vac at 50/60Hz)
- IEEE C37.90.1-1989 Standard Surge Withstand Capability Tests for Relays and Relay Systems Associated with Electric Power Apparatus
- IEC 255-22-1 1MHz Burst Disturbance Tests for Electrical Disturbance Tests for Measuring Relays and Protection Equipment
- EN 61000-4-4 Electrical Fast Transient/Burst Immunity Test
- EN 61000-4-3 Radiated, Radio-frequency, Electromagnetic Field Immunity Test
- Type tested using a 5-watt, hand-held transceiver in the ranges of 144 and 440MHz with the antenna placed within 6 inches of the relay.
- IEEE C37.90.3 (Jan. 01) Draft Standard Electrostatic Discharge Tests for Protective Relays
- EN 61000-4-2 Electrostatic Discharge Immunity Test

MECHANICAL ENVIRONMENT

- Operating temperature range: -40°C to 70°C* (-40°F to 158°F)
  *LCD Display is inoperative below -20°C.
- Storage temperature range: -40°C to 70°C (-40°F to 158°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
- Qualified to IEC 255-21-1 (Class 1) Vibration Tests for Electrical Relays
- Qualified to IEC 255-21-2 (Class 1) Shock and Bump Tests for Electrical Relays

CERTIFICATIONS

UL Recognized, File E97033
CSA Certified, File LR23131
DNP 3.0 IED Certified, Subset Level 2, 6/20/00, by SUBNET Solutions, Inc.

CASE SIZE

H1: 10.50"W x 3.47"H x 9.10"D with mounting flanges (8.5"W without mounting flanges)
S1: 6.65"W x 9.32"H x 9.405"D

SHIPPING WEIGHT

H1: Approx. 10 pounds
S1: Approx. 16 pounds

WARRANTY

7 years

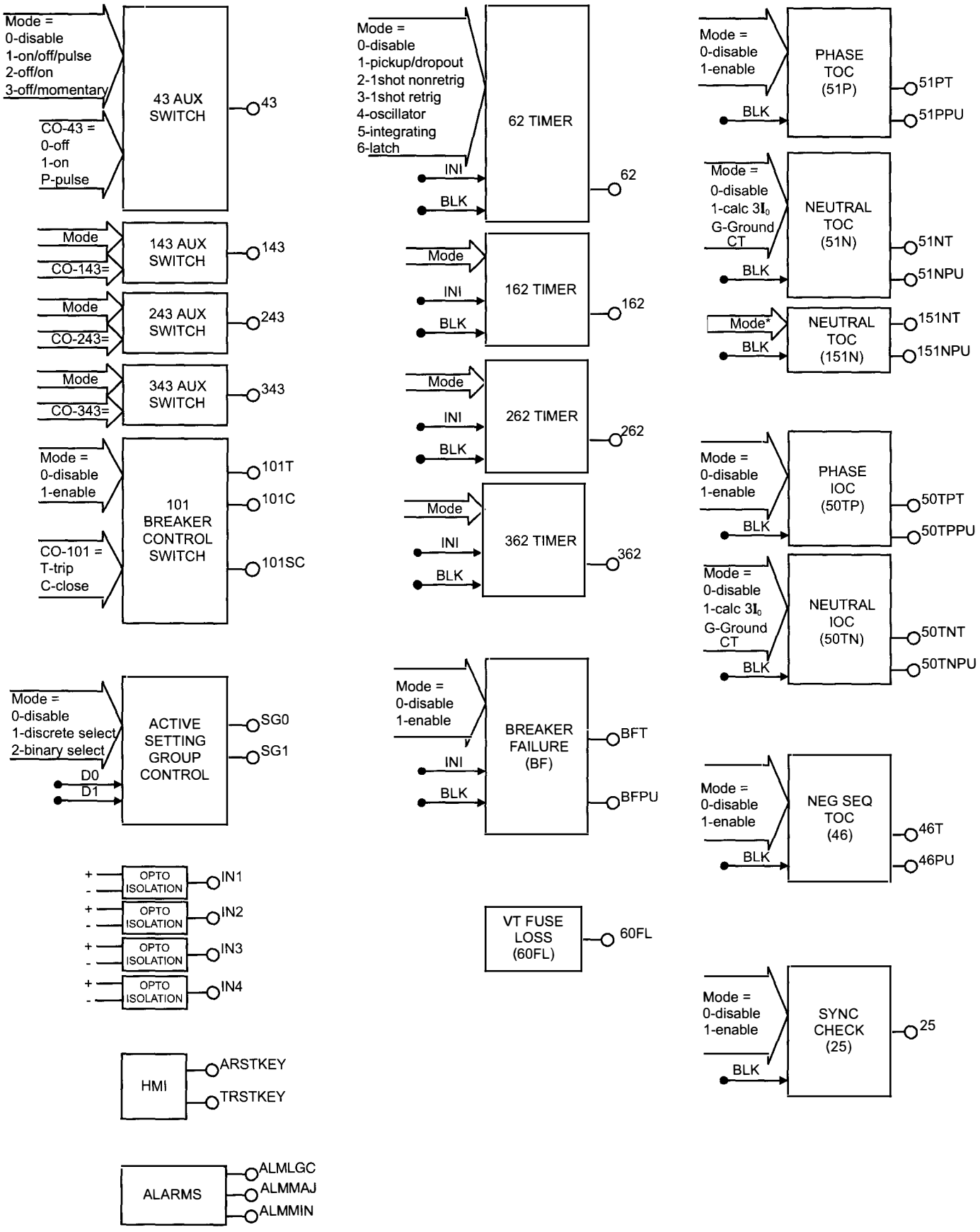


Figure 6A - BESTlogic Function Blocks

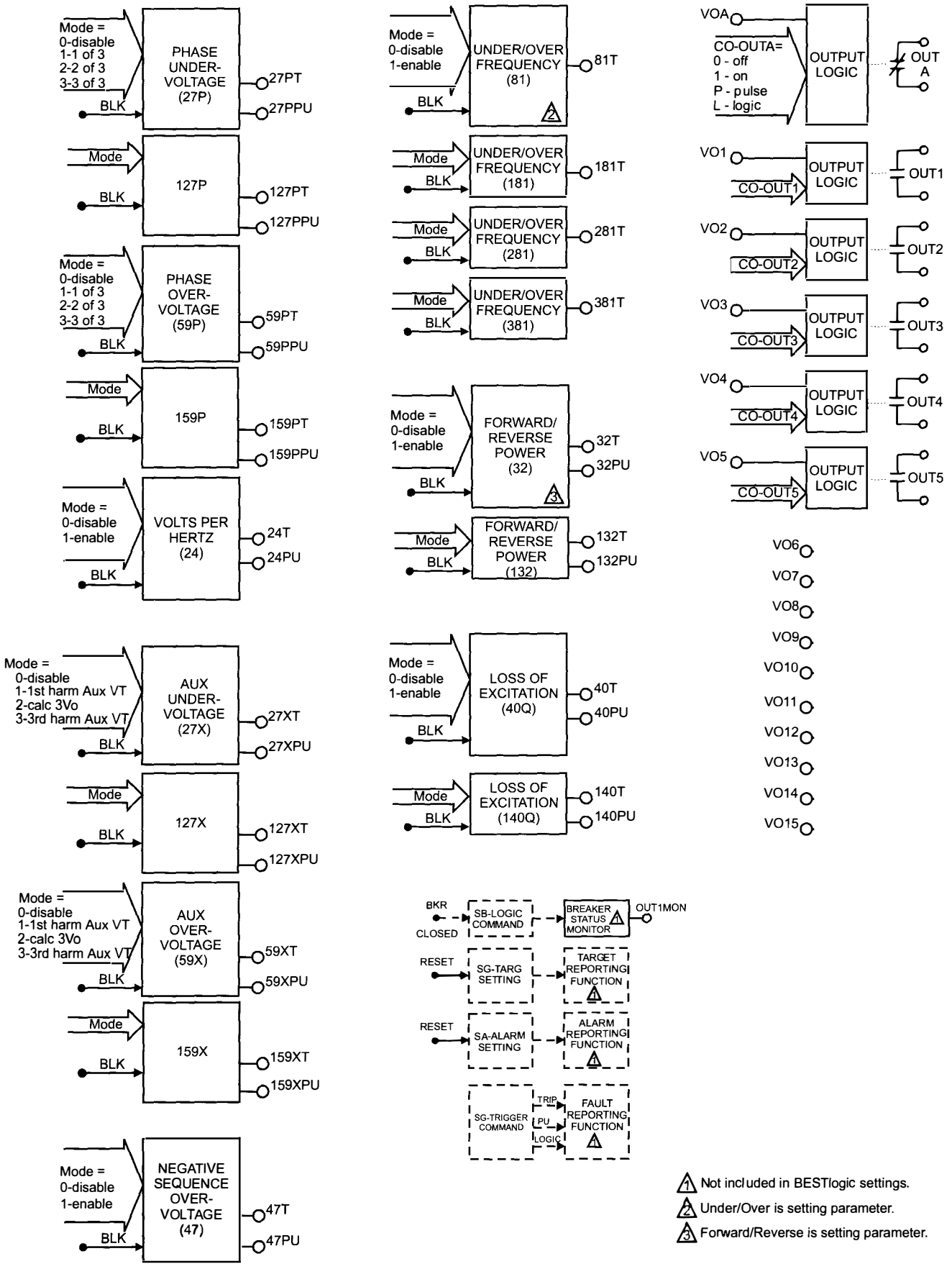


Figure 6B - BESTlogic Function Blocks

PERFORMANCE SPECIFICATIONS

INSTANTANEOUS OVERCURRENT WITH SETTABLE DELAY (50TP, 50TN)

Pickup: 5A CT 0.5 - 150.0A
1A CT 0.1 - 30.0A
PU time with TD=0.000 Sec
2 cyc for P&G @ 5 x PU
3 cyc for N&Q @ 5 x PU
Delay time: 0.000 - 60 sec
Time Accuracy: ±0.5% or ±½ cyc for P & N
±0.5% or ±1 cyc for Q

TIME OVERCURRENT (51P, 51N, 151N)

Pickup: 5A CT 0.5 - 16.0A
1A CT 0.1 - 3.20A
Time dial: TD=K=0 - 99 for 46 curve
TD=0.0 - 9.9 for all other curves
Time-Current Characteristics:
The following expression describes the inverse time current characteristic for each curve:

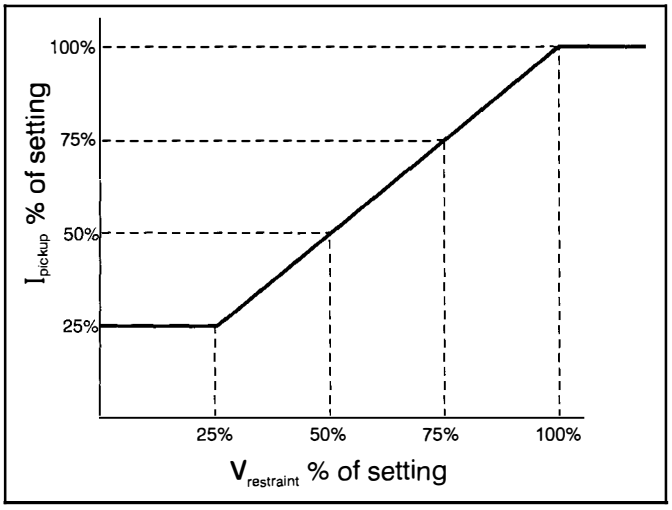
$$T_T = \frac{AD}{M^N - C} + BD + K = \text{Time to trip}$$

$$T_R = \frac{RD}{M^2 - 1} = \text{Time for decaying reset}$$

where D = Time dial, M = Multiple of PU and A, B, C, N, K and R are constants that govern the shape of each curve. The protection engineer can set the constants for the P (programmable) curve to achieve virtually any characteristic.

51P VOLTAGE CONTROL (27R)

Control Modes: Uncontrolled, voltage controlled, voltage restrained.
Control/Restraint Range: 30 - 250V
Restrained Mode Characteristic: (see below)



Curve Type	Constants					
	A	B	C	N	K	R
S1	0.2663	0.03393	1.000	1.2969	0.028	0.5000
S2	0.0286	0.02080	1.000	0.9844	0.028	0.0940
L1	5.6143	2.18592	1.000	1.000	0.028	15.750
L2	2.3955	0.00000	1.000	0.3125	0.028	7.8001
D	0.4797	0.21359	1.000	1.5625	0.028	0.8750
M	0.3022	0.12840	1.000	0.5000	0.028	1.7500
I1	8.9341	0.17966	1.000	2.0938	0.028	9.0000
I2	0.2747	0.1042	1.000	0.4375	0.028	0.8868
V1	5.4678	0.10814	1.000	2.0469	0.028	5.5000
V2	4.4309	0.0991	1.000	1.9531	0.028	5.8231
E1	7.7624	0.02758	1.000	2.0938	0.028	7.7500
E2	4.9883	0.0129	1.000	2.0469	0.028	4.7742
A	0.01414	0.00000	1.000	0.0200	0.028	2.0000
B	1.4636	0.00000	1.000	1.0469	0.028	3.2500
C	8.2506	0.00000	1.000	2.0469	0.028	8.0000
G	12.1212	0.00000	1.000	1.000	0.028	29.000
F	0.0000	1.00000	0.000	0.0000	0.028	1.0000
46	*	0	0	2	0.028	100
P	0 to 600	0 to 25	0 to 1	.5 to 2.5	0.028	0 to 30

S1, S2 = CO Short Inv, IAC Short Inv
L1, L2 = CO Long Inv, IAC Long Inv
D = CO Definite Time
M = CO Moderately Inverse
I1, I2 = CO Inverse, IAC Inverse
V1, V2 = CO Very Inv, IAC Very Inv
E1, E2 = CO Ext Inverse, IAC Ext. Inverse
A = IEC Standard Inverse
B = IEC Very Inverse
C = IEC Extremely Inverse
G = IEC Long Time Inverse
F = Fixed Time
46 = Negative Sequence Overcurrent
P = Programmable

* Constant A is variable for the 46 curve and is determined as necessary based on generator full load current, minimum pickup, and K factor settings.

NEGATIVE SEQUENCE OVERCURRENT (46)

Pickup: 5A CT 0.1-16.0A
1A CT 0.02 - 3.20A
Time dial: TD=K=0 - 99 for 46 curve
TD=0.0 - 9.9 for all other curves
Time-Current Characteristics: Same curves as 51 elements

BREAKER FAILURE (BF)

Time: 50 - 999mSec
Dropout: 5A CT 0.5A
1A CT 0.1A
Time Accuracy: ±0.5% or +1¼ cyc / -½ cyc

VOLTS/HZ (24)

Pickup: 0.5 - 6V/Hz
Delay Time: Inverse Squared Curve

$$T_T = \frac{D_T}{(M-1)^2} \qquad T_R = D_R \times \frac{ET}{FST} \times 100$$

T_T = Time to Trip
T_R = Time to Reset
D_T = Time Dial, Trip
D_R = Time Dial, Reset
$M = \frac{\text{Actual V/Hz}}{\text{Pickup V/Hz}}$
ET = Elapsed Time
FST = Full Scale Trip Time (T_T)

PERFORMANCE SPECIFICATIONS, continued

SYNC CHECK (25)

Delta Phase Angle:	1 - 25 degrees
Delta Voltage Magnitude:	1 - 20V
Delta Frequency:	0.01 - 0.50Hz

PHASE OVER/UNDERVOLTAGE (27P, 127P, 59P, 159P)

Mode:	1 of 3; 2 of 3; 3 of 3
Pickup:	10.0-300V_{L-L} or 10.0-300V_{L-N}
Delay Time:	0.050 - 600sec.

NEGATIVE SEQUENCE OVERVOLTAGE (47)

Pickup:	1.0 - 300V_{L-N}
Delay Time:	0.050 - 600sec.

AUXILIARY / 3V0 OVER/UNDERVOLTAGE (27X, 127X, 59X, 159X)

Mode:	Fundamental V_X, Phase 3V0, 3rd Harmonic V_X
Pickup:	1.0 - 150V
Delay Time:	0.050 - 600 Sec.

FREQUENCY (81, 181, 281, 381)

Mode:	Over, Under
Pickup:	40.00 - 70.00 Hz
Delay Time:	0.000 - 600 Sec.
Time Accuracy:	±0.5% or +1 cyc / -0 cyc (Min. trip time affected by minimum 3 cyc security count)

POWER (32, 132)

Mode:	Forward, Reverse
Pickup:	5A: 1.0 - 6000 Watts, 3 ph
	1A: 1.0 - 1200 Watts, 3 ph
Pickup Accuracy:	±3%
Delay Time:	0.050 - 600 Sec.

UNDEREXCITATION (40Q, 140Q)

Pickup:	5A: 1.0 - 6000 VARs, 3 ph
	1A: 1.0 - 1200 VARs, 3 ph
Pickup Accuracy:	±3%
Delay Time:	0.050 - 600 Sec.

GENERAL PURPOSE LOGIC TIMERS (62, 162, 262, 362)

Mode:	PU.DO
	1 Shot, Non-Retrig.
	1 Shot, Retrig.
	Integrating
	Latch
T1 and T2 Delay TIme:	0.000 - 9999 Sec.
Time Accuracy:	±0.5% or ±¾ cyc

CURRENT PICKUP ACCURACY (All 46, 50 and 51)

Phase and Ground:	5A	2% or 50mA
	1A	2% or 10mA
Neutral and Negative Sequence:	5A	3% or 75mA
	1A	3% or 75mA

VOLTAGE PICKUP ACCURACY (All 27, 47 and 59)

±2% or ±0.5V

DEFINITE TIME ACCURACY UNLESS OTHERWISE STATED (All 27, 32, 40Q, 47 and 59)

Definite Time Accuracy: ±0.5% or ±1 cyc

SETTING GROUPS

Setting Groups:	2
Control Modes:	External: Discrete input logic; Binary: Input logic

METERING

Current Range:	5A	0.5 to 15.0
	1A	0.1 to 3.0
Current Accuracy:	±1%	
Phase Voltage Range:	3W	0 - 300 V_{L-L}
	4W	0 - 300 V_{L-L}
		0 - 173 V_{L-N}
Phase Voltage Accuracy:	±0.5% for 50V<V_{L-L}<300V	
Auxiliary Voltage Range:	0 - 150V	
Auxiliary Voltage Accuracy:	±0.5% for 50V<V<150V	
Watt/VAR:	5A	0 to ±7500
	1A	0 to ±1500
Watt Accuracy:	1% @ Unity PF	
VAR Accuracy:	1% @ Zero PF	
Energy:	0 to ±1.0E12 (F/R registers)	
Frequency:	10 - 75Hz	
Frequency Accuracy:	0.01Hz	

DEMANDS (IA, IB, IC, IN, IQ, Fwd Watts, Rvs Watts, Fwd VARs, Rvs VARs)

Demand Interval:	1 - 60 min.
Demand Mode:	Thermal

BREAKER MONITORING

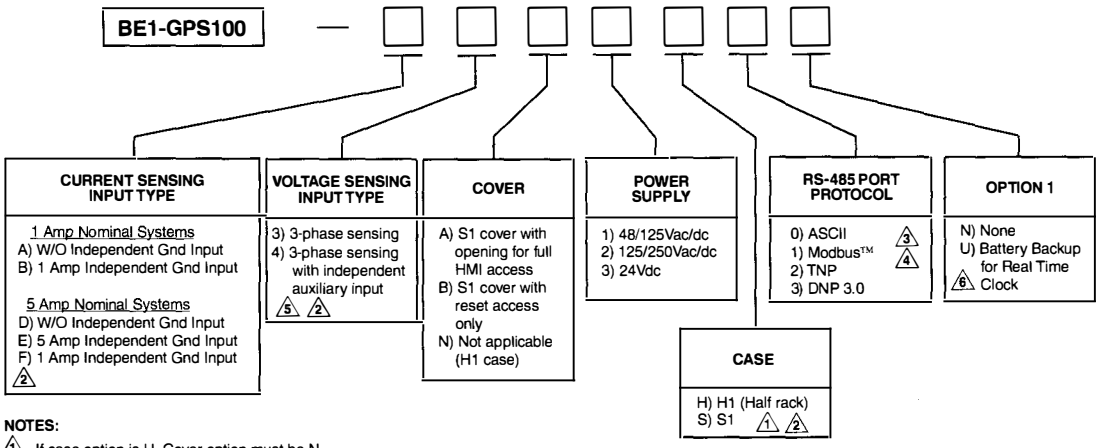
Duty Mode:	I or I^2
Duty Alarm Range:	0 - to 100%
Op Counter Alarm Range:	0 - 99999
Trip Time Alarm Range:	20 - 1000mSec

ORDERING

SAMPLE STYLE NUMBER

The style number identification chart defines the electrical characteristics and operation features included in BE1-GPS100 relay. If the style number were **BE1-GPS100 E3N1H0U**, the device would have the following:

- **(E)** - 5 Amp nominal system with 5 Amp Independent Ground Input
- **(3)** - Three phase voltage sensing
- **(N)** - Not applicable
- **(1)** - 48/125Vac/Vdc power supply
- **(H)** - Half Rack drawout case
- **(0)** - ASCII Communications
- **(U)** - Battery backup for real time clock



NOTES:

1. If case option is H, Cover option must be N.
2. Case option must be H for Current Sensing Input Type B, E, or F or voltage sensing option to be 4.
3. ASCII communication is standard on Com0 (front RS-232) and Com1 (rear RS-232) ports.
4. Check with factory for availability.
5. Aux VT input adds 25 Sync-Check option.
6. Option available in H1 case only.

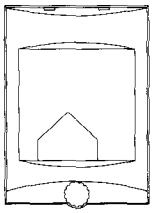


Figure 7A
Cover option A.

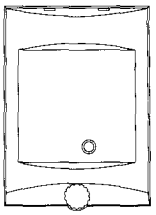
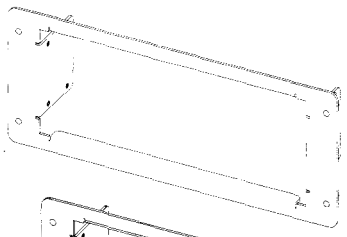


Figure 7B
Cover option B.

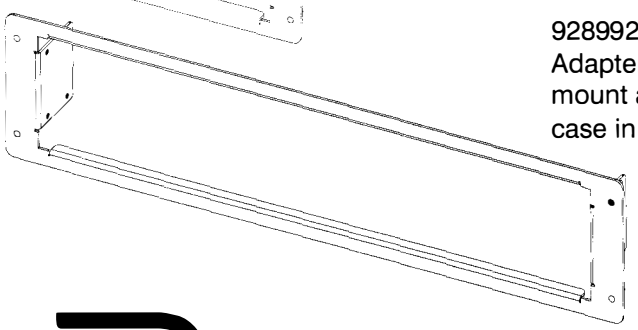
STANDARD ACCESSORIES

9180400108 H1 Test Case with 1 CT Terminal Block and 18-position Bottom Terminal Block
9239922100 Test box to facilitate bench testing.
9108551021 Adapter plate to mount an S1 case in a GE S2 or Westinghouse FT-21 cutout.
9108550122 Adapter plate to mount an S1 case in a Westinghouse FT-32 cutout.

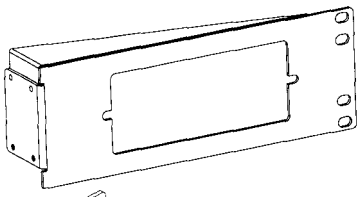
9289900017
Escutcheon plate to panel mount one H1 relay.



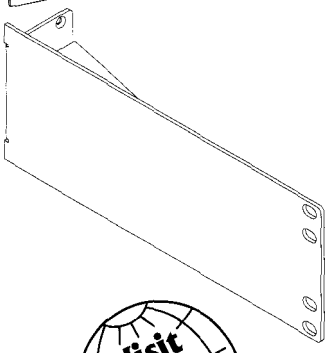
9289900016
Escutcheon plate to panel mount two dovetailed H1 relays.



9289929100
Adapter bracket with cutout for ABB FT test switch, to mount a single H1 case in a 19" rack.



9289924100
Adapter bracket to mount a single H1 case in a 19" rack.



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