



# BE1-11g Generator Protection System

 **Basler Electric**

[www.basler.com](http://www.basler.com)

# Comm. Hardware

- Front panel USB port—  
no more 9-pin cables and settings
- Rear panel RS-485 port
- Rear panel IRIG-B time port
- Optional Ethernet port
  - › Copper
  - › Optical fiber

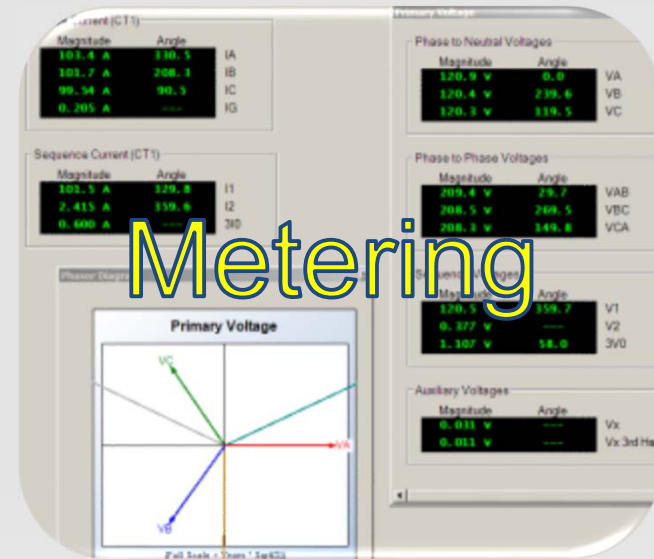
# Software

- BESTCOMS*Plus*®
  - › Settings and graphical logic
  - › Drivers load automatically
  - › Requires activation
- BESTwave™ COMTRADE viewer
- BEST61850—for IEC 61850 protocol

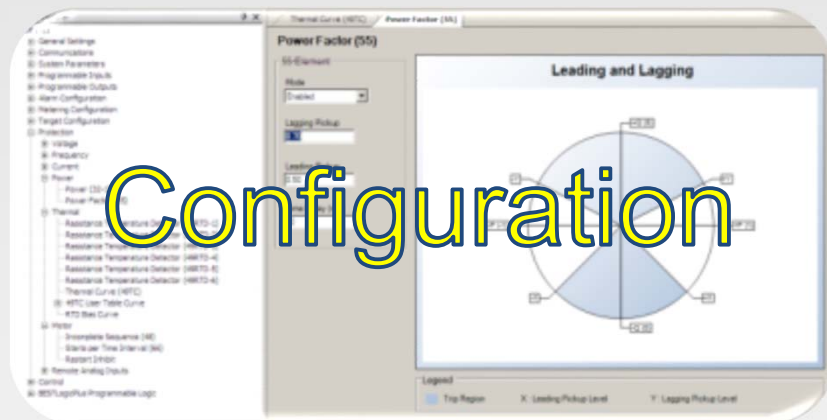
# BESTCOMSPlus®

## System Interface Software

- Flexible, comprehensive, intuitive, and user friendly
- Common to modern relays
- No cost



Metering



Configuration

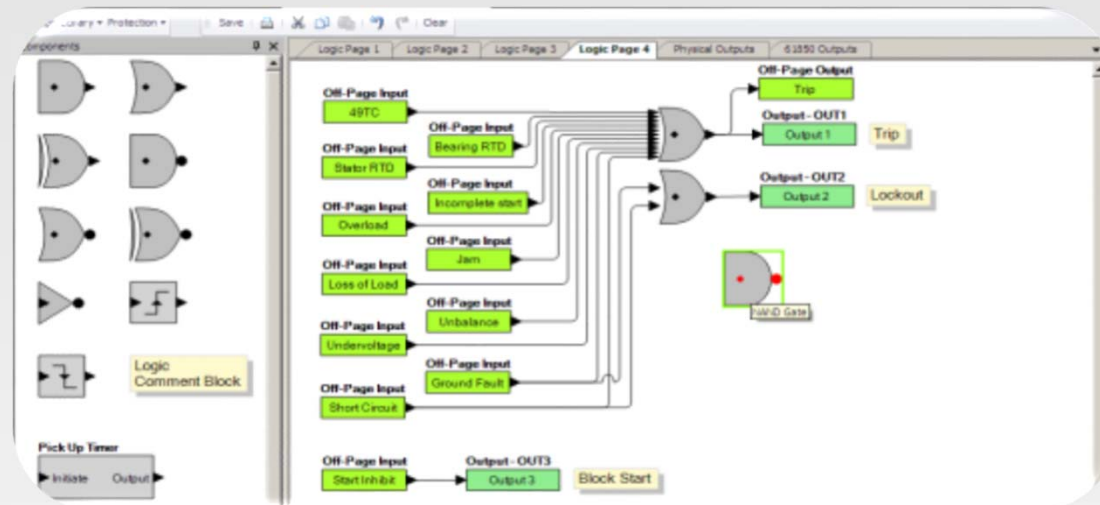


Reporting

# BESTlogic™ Plus





## Programmable Logic

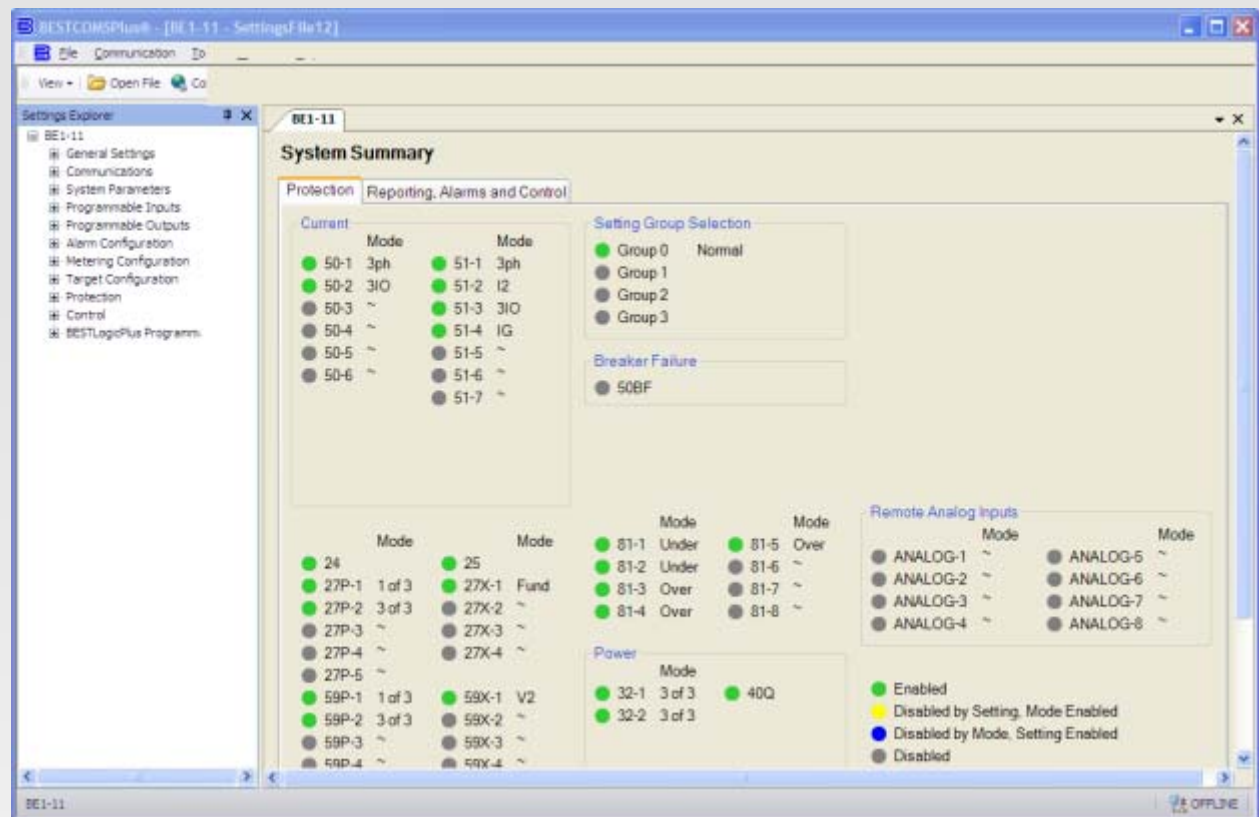
- Drag-and-drop interface with virtual switches, breaker control, timers, 7 available logic gates, and more.
- Available preprogrammed logic schemes for common applications.



# BESTCOMSPlus® Settings

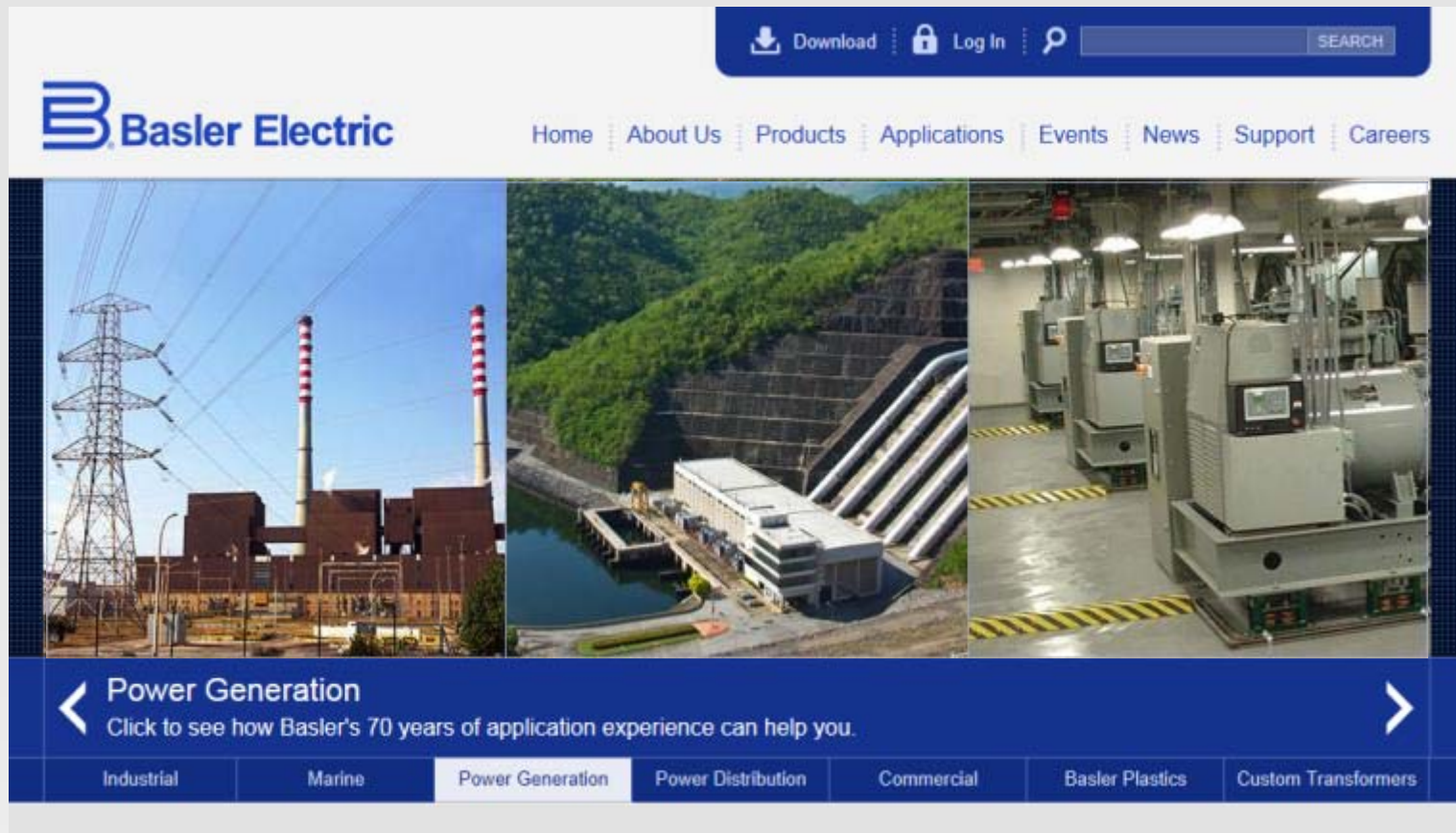
## System Summary

- Prevents errors
- Easy confirmation of relay setting
- Enabled and pickup set 
- No pickup set 
- Pickup set but mode disabled 
- Disabled 



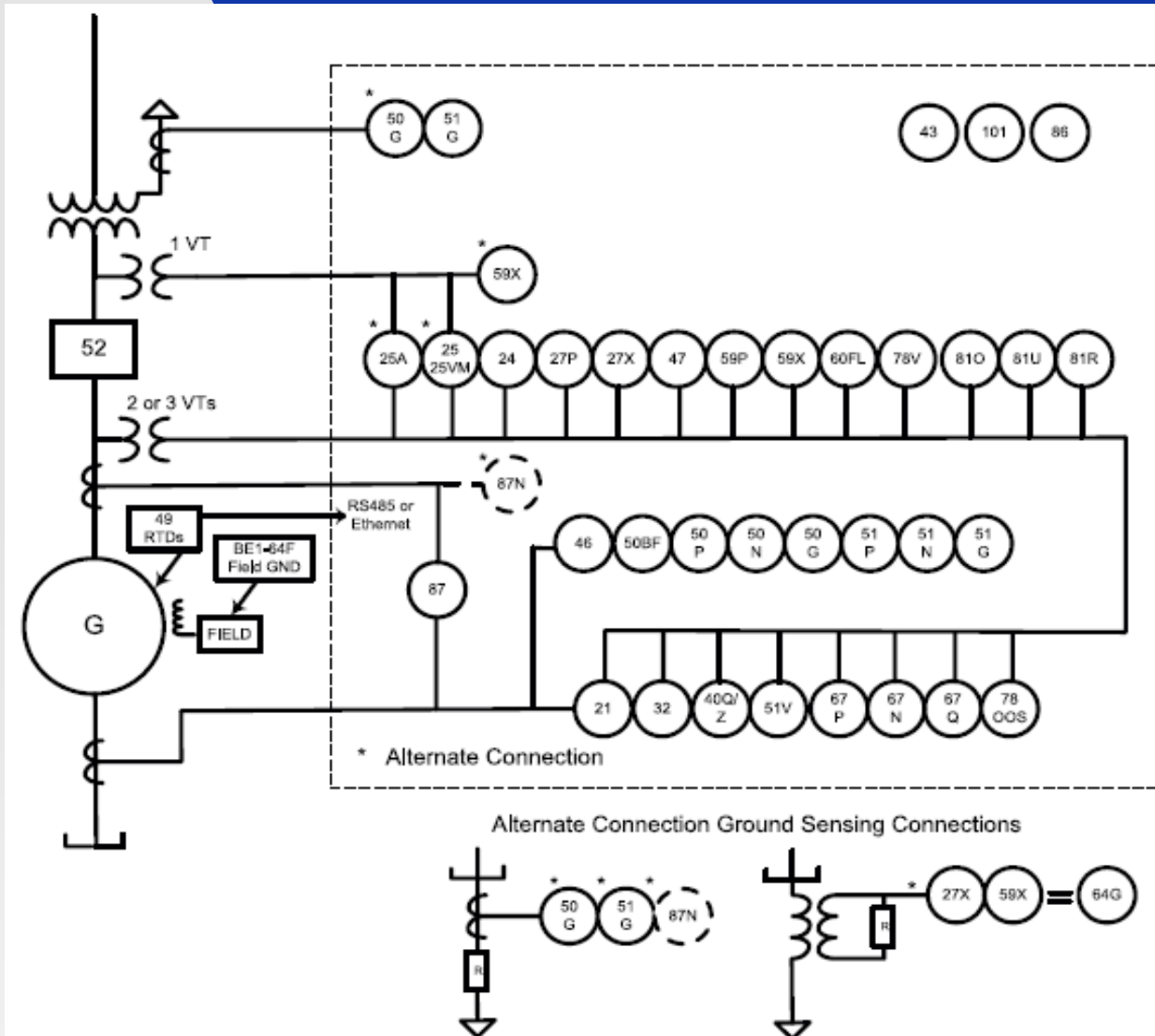


# BESTspace™ Templates



<http://www.basler.com/html/pcs-logic.htm>

# Application Diagram





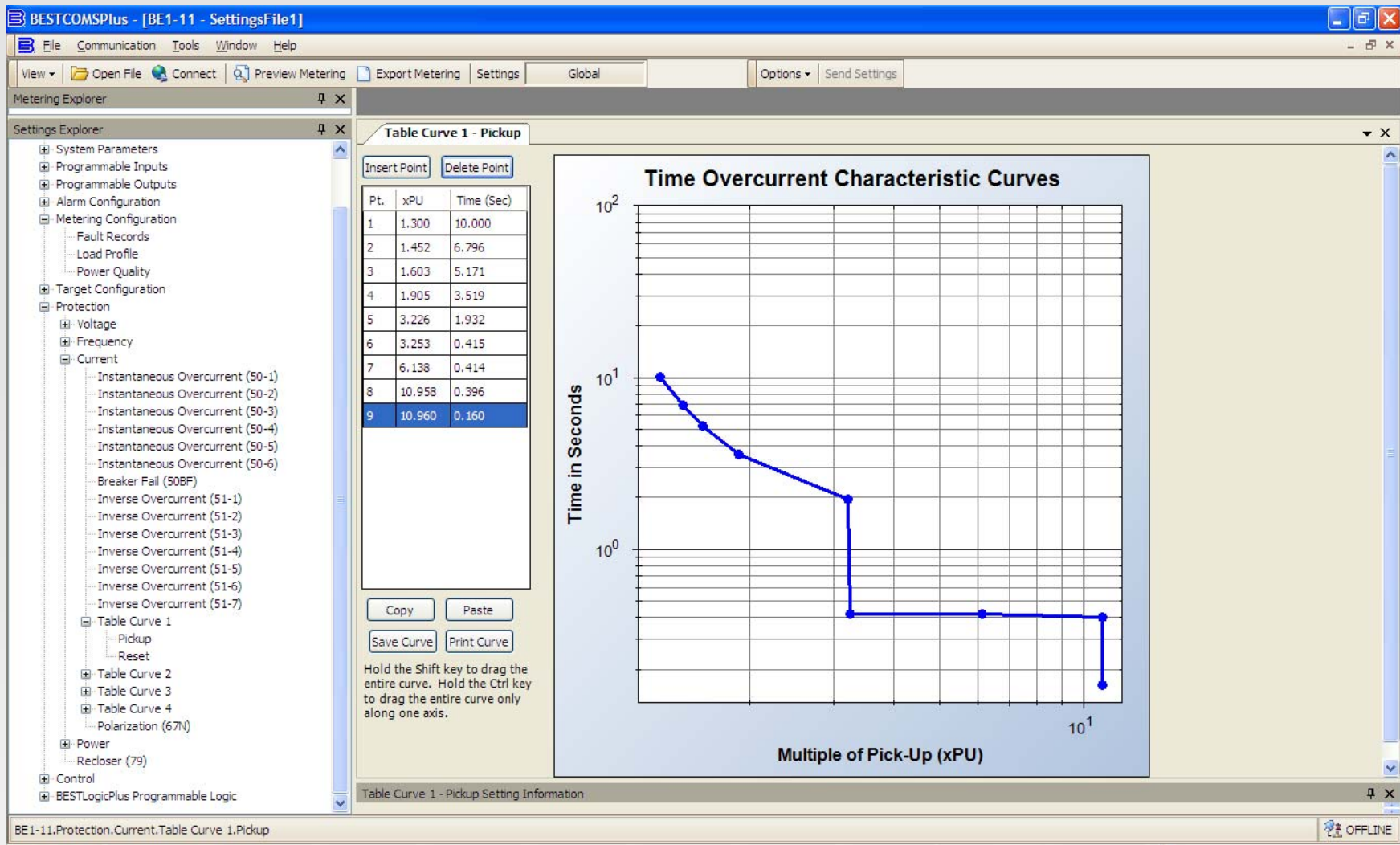
# Time O/C Features

## Time-overcurrent (51) element

- Seven TOC independent elements
- Total of 24 defined standard curves
- T (table): 4 curves user-defined
- P: programmed equation curve shape (1)
- Nine operation modes
- Reset time: instantaneous or integrated

Element	# Included
51	7

# Program T Curves



# Voltage Features

## 3-Phase and Single-Phase Inputs

- Undervoltage (27, 27X)
- Overvoltage (59, 59X)
- Choice of inverse-time or definite-time

Element	# Included
27	5
27X	4
59	4
59X	4

# Vx Voltage Elements

Single-phase over- (59X) and under- (27X) voltage elements have five measurement choices:

- Fundamental
- Positive-Sequence component  $V_1$
- Negative-Sequence component  $V_2$
- Zero Sequence component  $V_0$
- Third Harmonic—180 Hz

# Testing Aids

## Relay helps you test!

- Targets
- Fault Summaries
- Fault Records
  - › Analyze events
  - › Use COMTRADE playback
- Relay self-test
- Status reporting
- Event reporting

# Reporting Aids

- Fault summaries: 255
- Oscillographic event reports: 6–32
  - › 1 or 2 reports per fault
  - › 240 cycles, to 32 samples/cycle
  - › COMTRADE
- 1028-event sequence-of-events recorder
- Nonvolatile event memory for all



# Familiarization Tests

- Power up
- Communications
- BESTCOMS*Plus*® style number
- IRIG time (if used)
- Contact sensing inputs
- Control outputs
- Current circuit
- Voltage circuits
- Power
- Aux V inputs
- Line/Bus Angle, Freq, Slip

# Testing Procedure

- Reset targets
- Clear previous test logic (if needed)
- Make / modify logic and settings
  - › “Save” to compile new logic
  - › File > Save new settings
- “Upload settings and logic” to relay
- Perform test
- Enter results on provided report form

# Loss of Excitation – Reverse Var (40Q)

Pages 497-499

## Loss of Excitation - Reverse Var Based

40Q Element

Mode

Enabled

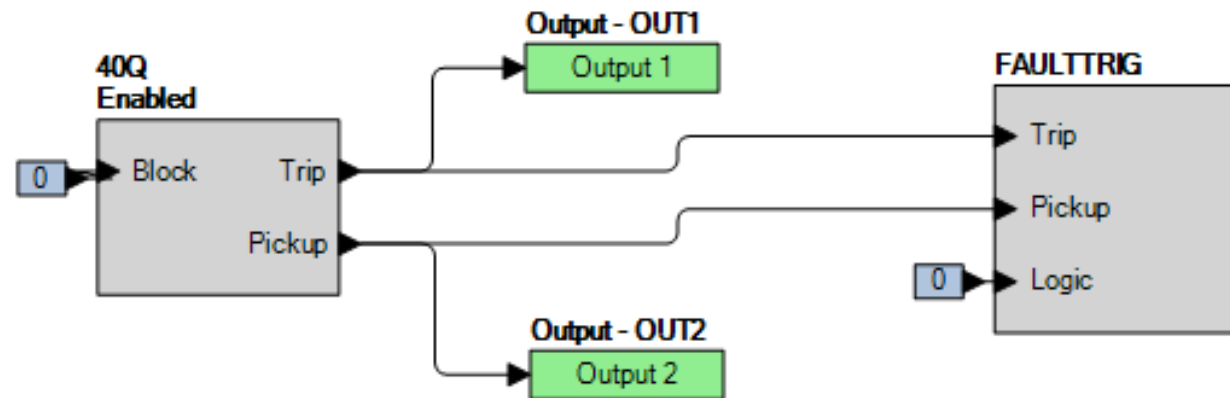
Pickup

500.0 Secondary var

500.0 Primary var

Time Delay (ms)

50



# Vector Jump (78V)

Pages 423-425

## Vector Jump

### 78V Element

Mode

Enabled

Source

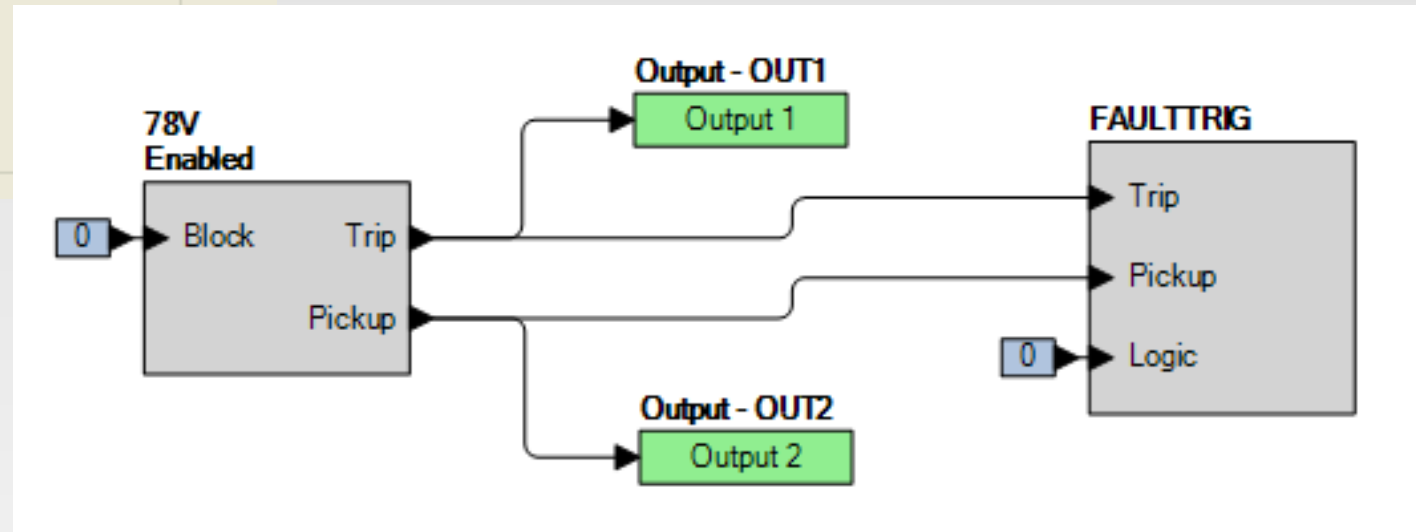
Phase VT

Pickup (°)

20

Trip Hold Time (ms)

150



# Neg. Seq. Overcurrent (46)

- 46 Curve
- Time dial = K factor

**Inverse Overcurrent**

51-1 Element (51Q)

Mode  
2

Source  
CT Circuit 1

Pickup  
0.500 Secondary A  
0.500 Primary A

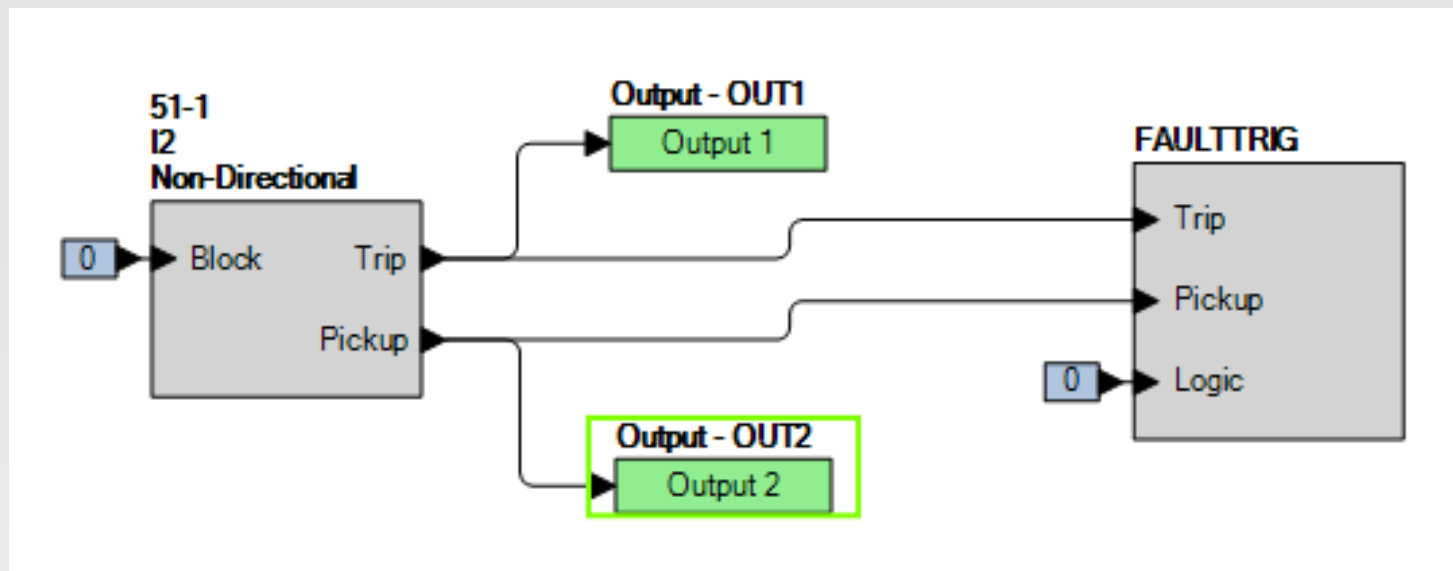
Time Dial  
10

Curve  
46 - K Factor

Direction  
Non-Directional

Reset Timing  
Instantaneous

# Neg. Seq. Overcurrent (46)





**Questions?**