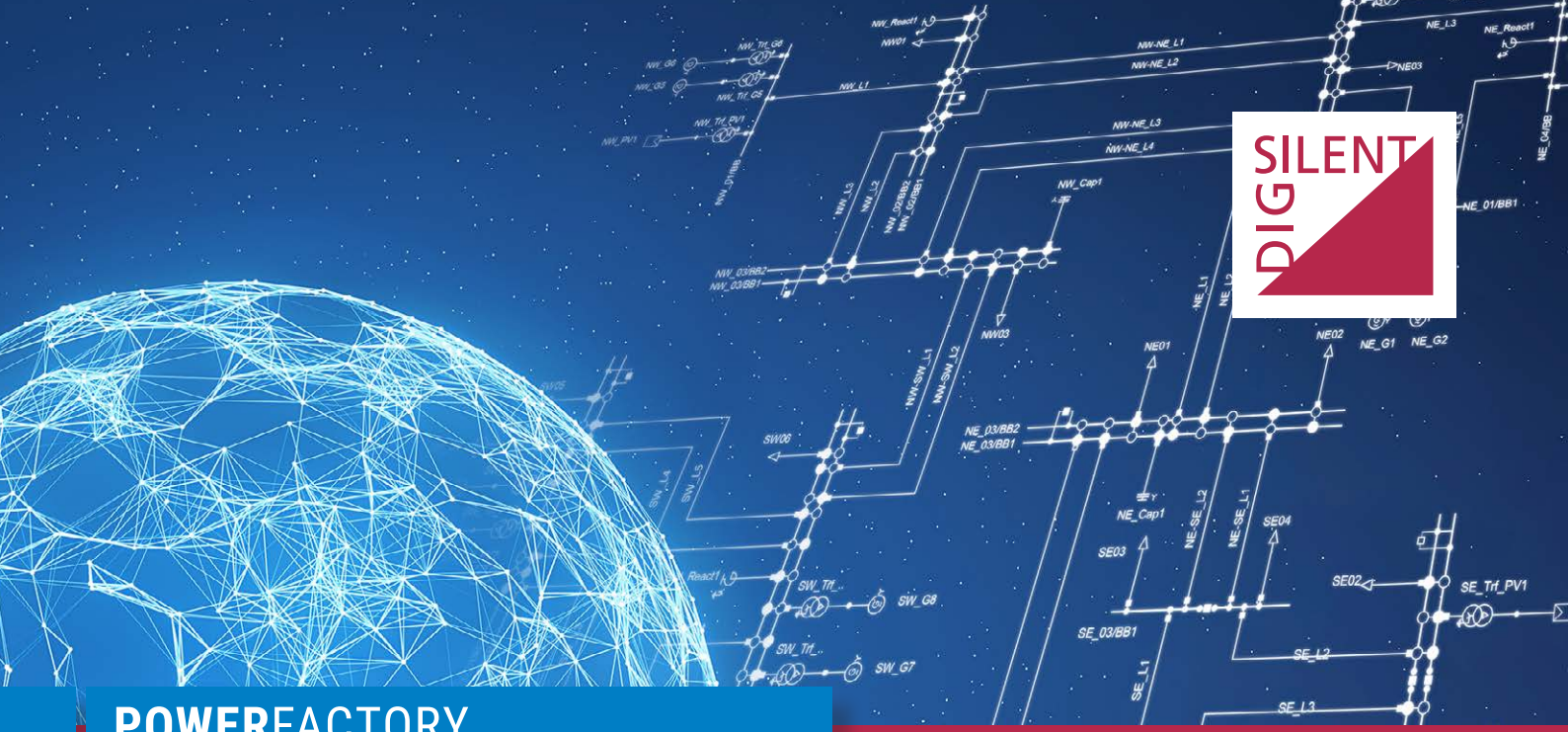

POWERFACTORY

PowerFactory 2021

Technical Reference

DIgSILENT Voltage restraint overcurrent Generic Relay

PF2021

POWER SYSTEM SOLUTIONS

MADE IN GERMANY

Publisher:
DIgSILENT GmbH
Heinrich-Hertz-Straße 9
72810 Gomaringen / Germany
Tel.: +49 (0) 7072-9168-0
Fax: +49 (0) 7072-9168-88
info@digsilent.de

Please visit our homepage at:
https://www.digsilent.de

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Contents

1 F50V_F51V Voltage restraint overcurrent

1.1 Intent

To model a 3 phase inverse time/definite time overcurrent element with trip threshold depending up on the phase voltage.

1.2 Functionality

The trip threshold of the *F50V/51V Voltage restraint overcurrent* generic relay can be controlled by one of the following logics:

- *Voltage restrained*.
- *Voltage controlled*.
- *Undervoltage Seal-In* (only for the definite time overcurrent element).

Voltage restrained The value of the trip threshold of the overcurrent element is decreased proportional to the voltage decrease. Two voltage values (V_1, and V_2 with $V_2 > V_1$) and one angular coefficient in the $I = f(U)$ plan are set by the user (*KIM* variable in the "Logic" tab page of the "V restraint" block).
The following rule applies to the trip threshold ($Trip$) calculation using the measured voltage (V):

- $V > V_2$ $\quad Trip = I_2$
- $V_1 < V < V_2$ $\quad Trip = I_1 + (V - V_1)(I_2 - I_1)/(V_2 - V_1)$
- $V < V_1$ $\quad Trip = I_1$

The *Voltage restrained* logic is enabled setting equal to 1 the *VrestraintedON* variable in the "Logic" tab page of the "V restraint" block. Please don't forget to set equal to 0 the *VcontrolledON* variable.

Voltage controlled If the measured voltage value falls below a settable voltage threshold (V_2), the trip threshold of the overcurrent element is multiplied by the KIm value . The *Voltage controlled* logic is enabled setting equal to 1 the *VcontrolledON* variable in the "Logic" tab page of the "V restraint" block. Please don't forget to set equal to 0 the *VrestraintedON* variable.

Undervoltage Seal-In If the measured voltage value falls below a settable voltage threshold ($V < SEAL - IN$), the definite time overcurrent element pickup is maintained for a selectable seal-in time (T-SEAL IN (I>)). In this way, the expire of the overcurrent element trip time delay can be also ensured in case of voltage collapse and reduced fault current.

Two relay input signals can be used to block the protective elements. Each protective element can be set to ignore the blocking input or to ignore the blocking input after that a user's definable time has expired after the element trip ("Blocking" tab page).

1.3 Inputs

- One 3 phase CT (”Phase Ct” block, *StaCt* class).
- One 3 phase VT (”Phase Vt” block, *StaVt* class).
- Two blocking signals (*iblock_1* blocking the ”Iv>” restrained/controlled overcurrent element, and *iblock_2* blocking the ”I> (50-51)”undervoltage Seal-In overcurrent element).

1.4 Available Units

Measurement

- One 3phase measurement element (”Measurement” block, *RMS Calculation* enabled, *Filter* disabled [RelMeasure class]).
- One 3phase sequence measurement element (”Measurement Seq” block, *RMS Calculation* enabled, *Filter* disabled [RelMeasure class]).

Protective elements

- One inverse/definite time 3 phase voltage restrained/controlled overcurrent element (”Iv>” block, [*RelToc* class]).
- One voltage restrained/controlled logic element (”V restraint” block, [*RelLogdip* class]).
- One definite time 3 phase overcurrent element (”I> (50-51)” block, [*RelToc* class]).
- One under voltage seal in instantaneous element (”U< (I>)” block , [*RelUlim* class]).
- Two seal in timers (”T-SEAL IN (I>)” and ”tI>” block , [*RelTimer* class]).
- Two undervoltage Seal-In logic elements (”BlocknegLogic” and ”I> Seal Logic” block [*RelLogdip* class]).

Output logic

- One relay trip element (”Output logic” block, *RelLogdip* class).

1.4.1 Outputs

- *yout* associated by default to any protective element trip.
- *y_s* associate to any protective element start signal.

The output logic can be configured in the ”Logic” tab page of the ”Output Logic” block.