

## Fault Calculations

	A-N		B-N		C-N		A-B		B-C		C-A		3P	
	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
V1	<Pre	0°	Pre	0°	Pre	0°	PPV	ABV1°	Pre	0°	PPV	CAV2°	3PV	0°
V2	Pre	-120°	<Pre	-120°	Pre	-120°	PPV	ABV2°	PPV	BCV1°	Pre	-120°	3PV	-120°
V3	Pre	120°	Pre	120°	<Pre	120°	Pre	120°	PPV	BCV2°	PPV	CAV1°	3PV	120°
IA	AI	AI°	0	0°	0	0°	PPI	ABI1°	0	0°	PPI	CAI2°	3PI	MTA°
IB	0	-120°	BI	BI°	0	-120°	PPI	ABI2°	PPI	BCI1°	0	-120°	3PI	MTA° -120°
IC	0	120°	0	120°	CI	CI°	0	120°	PPI	BCI2°	PPI	CAI1°	3PI	MTA° +120°

Where:

- Pre = Prefault Voltage
- MTA = Maximum Torque Angle or Fault Angle
- AI = A-Phase Fault Current
- AI° = 0° - MTA°
- BI = B-Phase Fault Current
- BI° = -120° - MTA°
- CI = C-Phase Fault Current
- CI° = 120° - MTA°
- V<sub>FAULT</sub> = Desired Fault Voltage
- PPV = The Phase-Neutral Voltage required to create the desired Fault Voltage =  $\frac{\sqrt{\text{Pre}^2 + \text{FaultV}^2}}{2}$
- PPI = Desired Fault Current where 50/51/67 = Pick up setting or multiple OR 21 =  $\frac{V_{\text{FAULT}}}{2 \times Z}$  OR the  
Phase-Neutral Current required to create the desired Fault Current =  $\frac{\text{Fault Current}}{2}$

- $ABV1^\circ = \text{The A-N Phase-Neutral Voltage angle } -30^\circ + a \tan\left(\frac{\text{FaultV}}{\text{Pre}}\right)$
- $ABV2^\circ = \text{The A-N Phase-Neutral Voltage angle } -30^\circ - a \tan\left(\frac{\text{FaultV}}{\text{Pre}}\right)$
- $ABI1^\circ = \text{The A-N Phase-Neutral Current angle } 30^\circ - MTA^\circ$
- $ABI2^\circ = \text{The B-N Phase-Neutral Voltage angle } 30^\circ - MTA^\circ + 180^\circ$
- $BCV1^\circ = \text{The B-N Phase-Neutral Voltage angle } 180^\circ + a \tan\left(\frac{\text{FaultV}}{\text{Pre}}\right)$
- $BCV2^\circ = \text{The C-N Phase-Neutral Voltage angle } 180^\circ - a \tan\left(\frac{\text{FaultV}}{\text{Pre}}\right)$
- $BCI1^\circ = \text{The B-N Phase-Neutral Current angle } -90^\circ - MTA^\circ$
- $BCI2^\circ = \text{The C-N Phase-Neutral Voltage angle } -90^\circ - MTA^\circ + 180^\circ$
- $CAV1^\circ = \text{The C-N Phase-Neutral Voltage angle } 60^\circ + a \tan\left(\frac{\text{FaultV}}{\text{Pre}}\right)$
- $CAV2^\circ = \text{The A-N Phase-Neutral Voltage angle } 60^\circ - a \tan\left(\frac{\text{FaultV}}{\text{Pre}}\right)$
- $CAI1^\circ = \text{The C-N Phase-Neutral Current angle } 150^\circ - MTA^\circ$
- $CAI2^\circ = \text{The A-N Phase-Neutral Voltage angle } 150^\circ - MTA^\circ - 180^\circ$
- $3PV = \text{The desired three-phase phase to neutral voltage OR} = \frac{\text{Desired Phase to Phase Voltage}}{\sqrt{3}}$
- $3PI = \text{Desired Fault Current where } 50/51/67 = \text{Pick up setting or multiple OR } 21 = \frac{V_{\text{FAULT}}}{Z} \text{ OR the}$   
 $\text{Phase-Neutral Current required to create the desired Fault Current} = \frac{3PV}{Z}$