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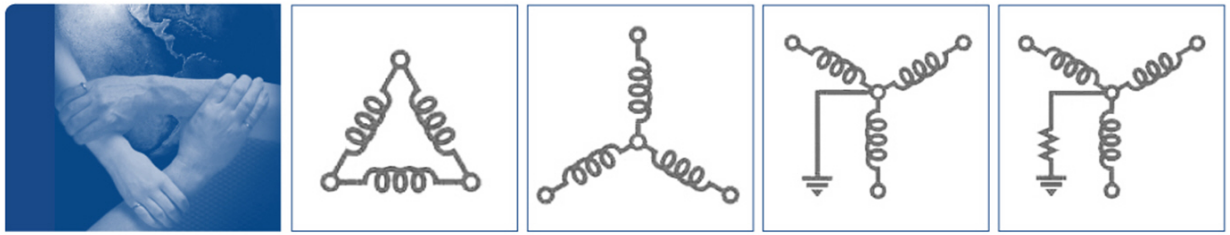
Unparalleled Protection

Protection Differences: Overcurrent relay in instantaneous mode vs. an arc flash relay

> www.i-gard.com



Time v Incident Energy

$$E_{600} = \frac{12.552}{50} T \times 10^{\left(k1 + k2 \lg G + \frac{k3 I_{arc\_600}}{k4 I_{bf}^7 + k5 I_{bf}^6 + k6 I_{bf}^5 + k7 I_{bf}^4 + k8 I_{bf}^3 + k9 I_{bf}^2 + k10 I_{bf}} + k11 \lg I_{bf} + k12 \lg D + k13 \lg I_{arc\_600} + \lg \frac{1}{CF}\right)} \quad (3)$$

$$E_{2700} = \frac{12.552}{50} T \times 10^{\left(k1 + k2 \lg G + \frac{k3 I_{arc\_2700}}{k4 I_{bf}^7 + k5 I_{bf}^6 + k6 I_{bf}^5 + k7 I_{bf}^4 + k8 I_{bf}^3 + k9 I_{bf}^2 + k10 I_{bf}} + k11 \lg I_{bf} + k12 \lg D + k13 \lg I_{arc\_2700} + \lg \frac{1}{CF}\right)} \quad (4)$$

$$E_{14300} = \frac{12.552}{50} T \times 10^{\left(k1 + k2 \lg G + \frac{k3 I_{arc\_14300}}{k4 I_{bf}^7 + k5 I_{bf}^6 + k6 I_{bf}^5 + k7 I_{bf}^4 + k8 I_{bf}^3 + k9 I_{bf}^2 + k10 I_{bf}} + k11 \lg I_{bf} + k12 \lg D + k13 \lg I_{arc\_14300} + \lg \frac{1}{CF}\right)} \quad (5)$$

$$E_{\leq 600} = \frac{12.552}{50} T \times 10^{\left(k1 + k2 \lg G + \frac{k3 I_{arc\_600}}{k4 I_{bf}^7 + k5 I_{bf}^6 + k6 I_{bf}^5 + k7 I_{bf}^4 + k8 I_{bf}^3 + k9 I_{bf}^2 + k10 I_{bf}} + k11 \lg I_{bf} + k12 \lg D + k13 \lg I_{arc} + \lg \frac{1}{CF}\right)} \quad (6)$$

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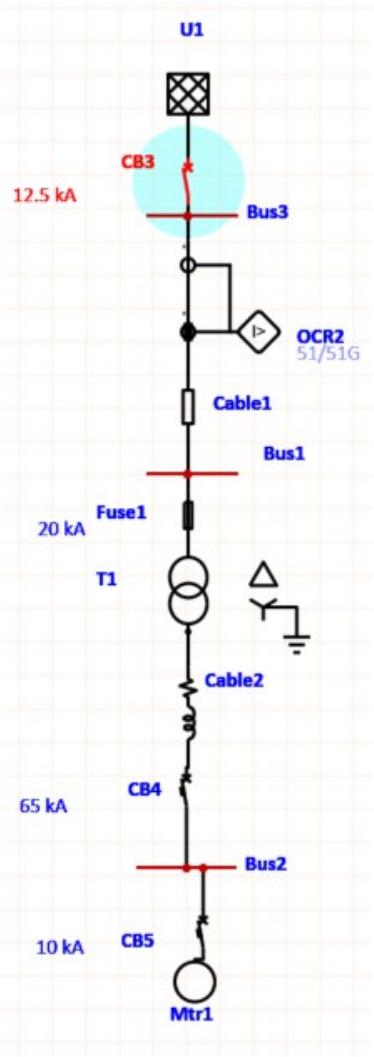
CSA Z462 Annex O.2.3

a) Zone-selective Interlocking
b) Differential relaying
c) Energy-reducing maintenance switch
d) Energy-reducing active arc flash mitigation system
e) Arc flash relay
f) HRG
g) Current-limiting fuses
h) Shunt trip

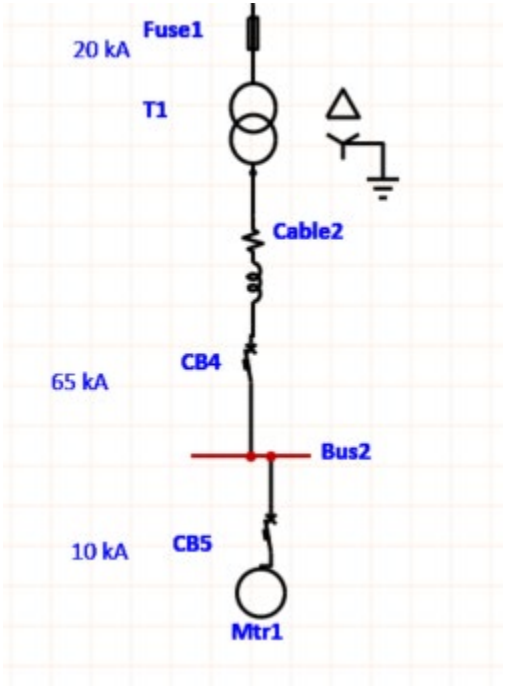
NFPA 70E Annex O.2.3

1. Zone-selective Interlocking
2. Differential relaying
3. Energy-reducing maintenance switch
4. Energy-reducing active arc flash mitigation system
5. Arc flash relay
6. HRG
7. Current-limiting devices
8. Shunt trip

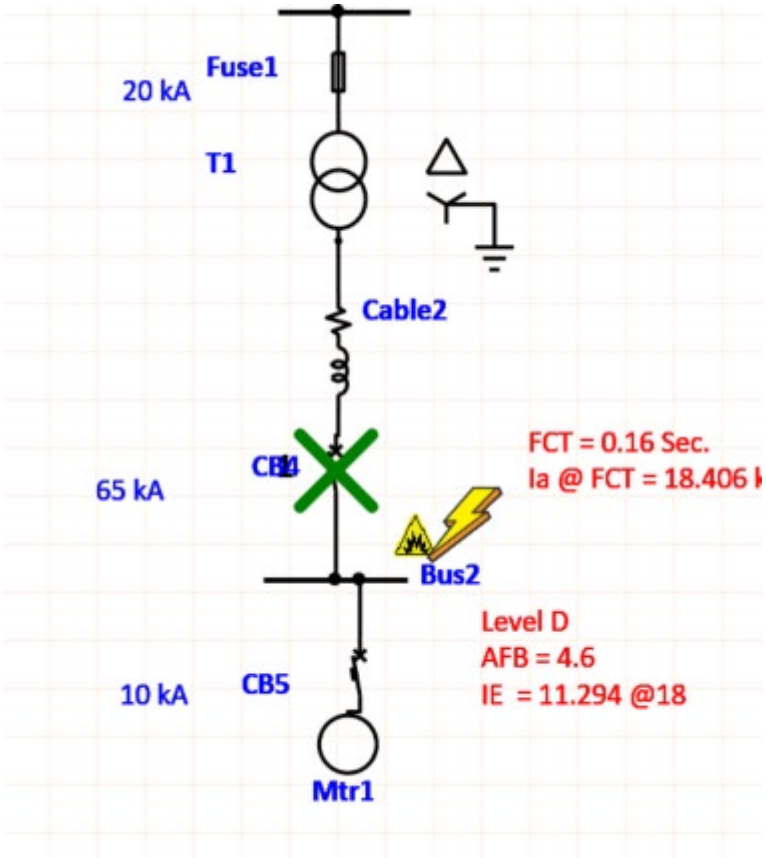
Schematic

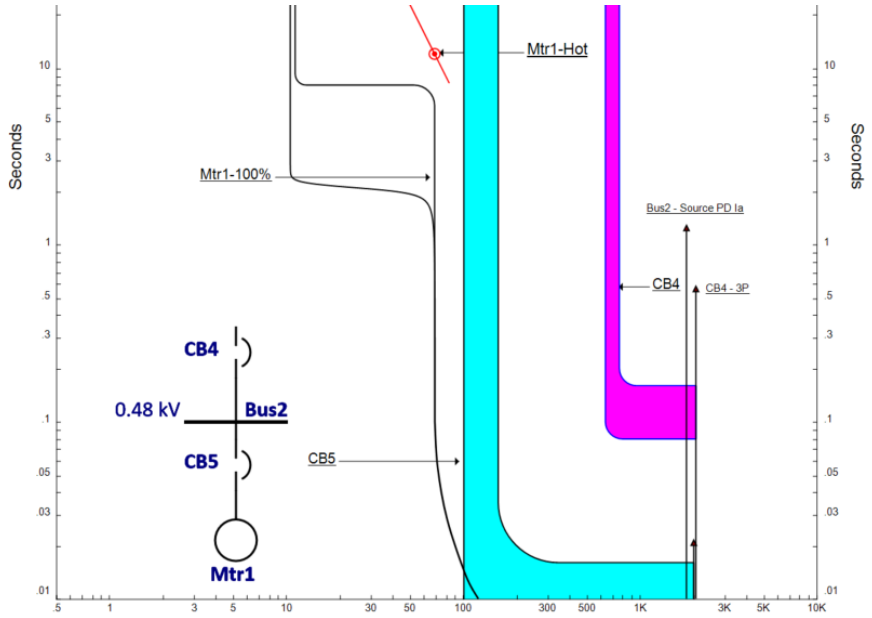

U1
CB3
12.5 kA
Bus3
OCR2
51/51G
Cable1
Bus1
Fuse1
20 kA
T1
Cable2
CB4
65 kA
Bus2
10 kA
CB5
Mtr1

Look at Secondary

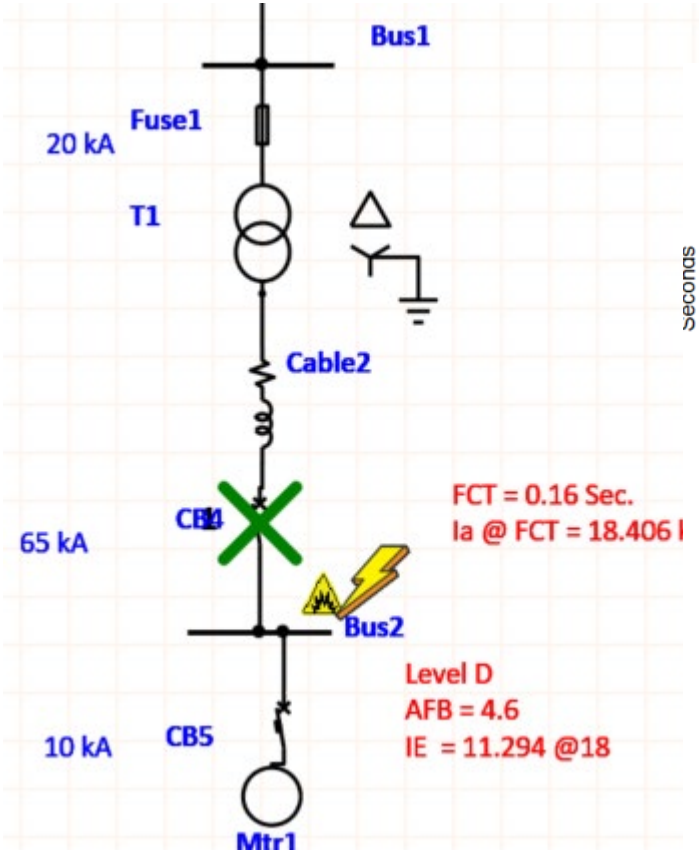


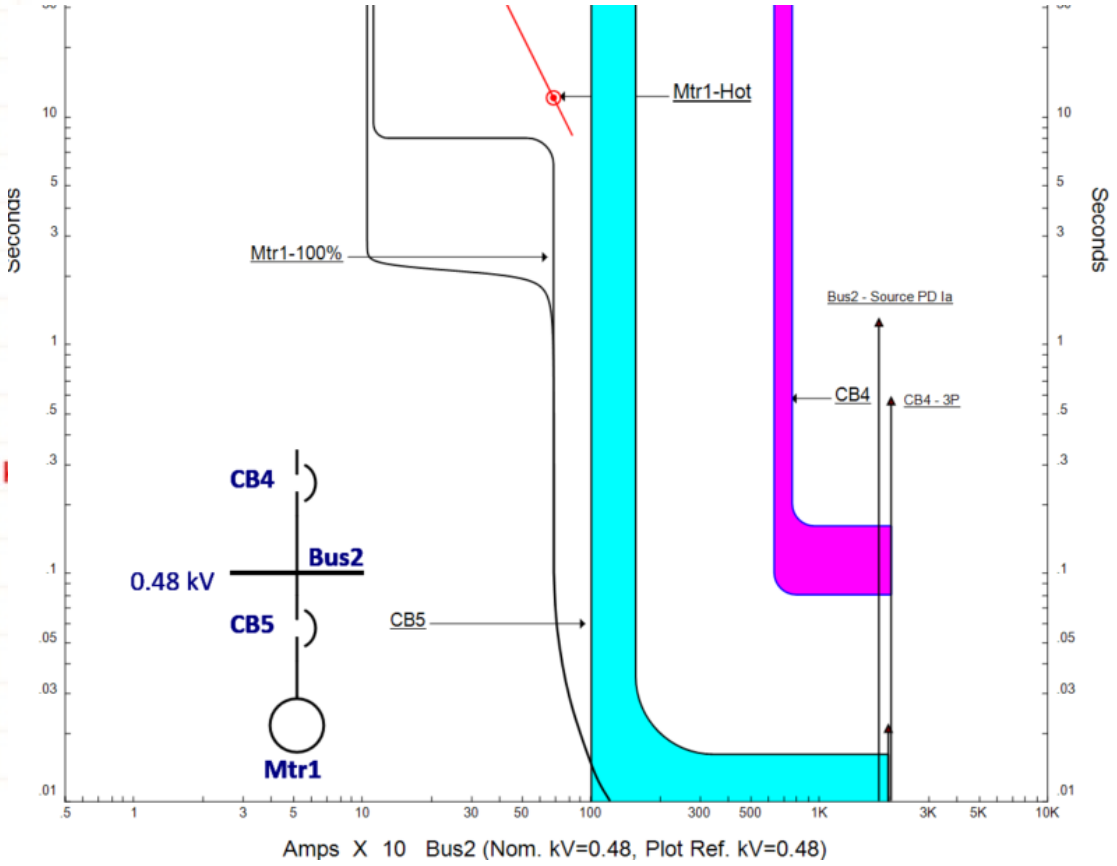
IE without Iinstantaneous





IE with Instantaneous





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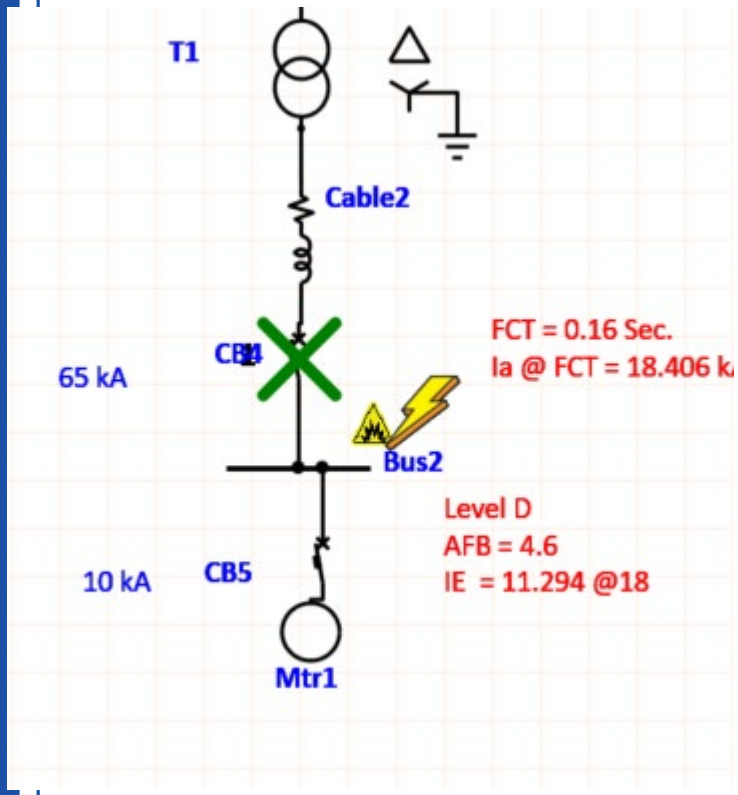
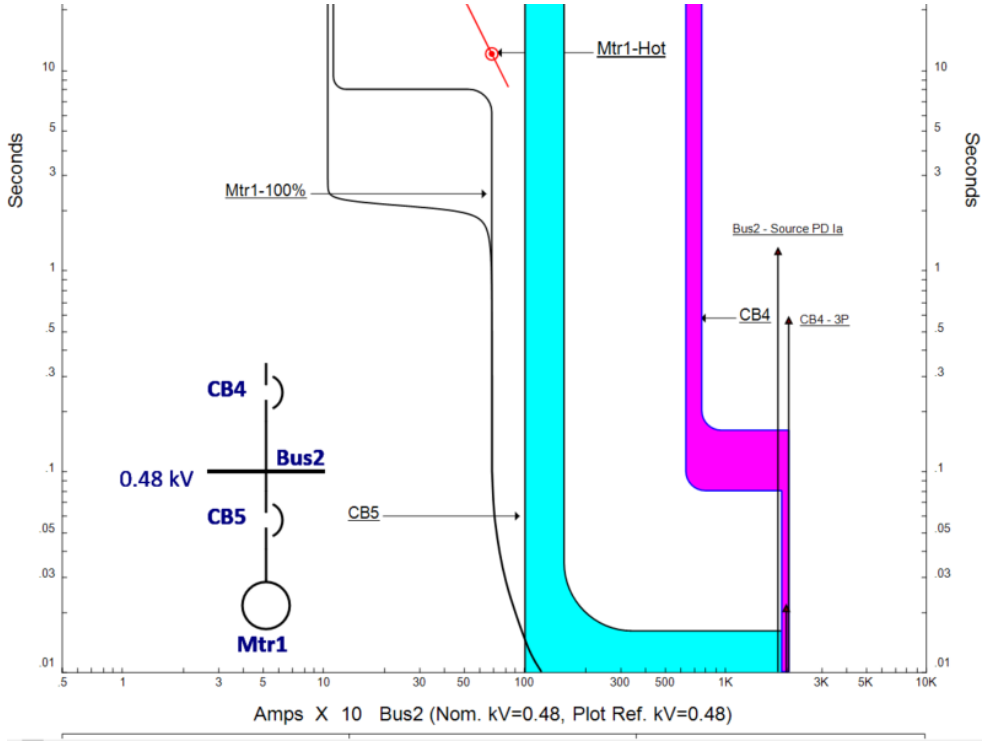
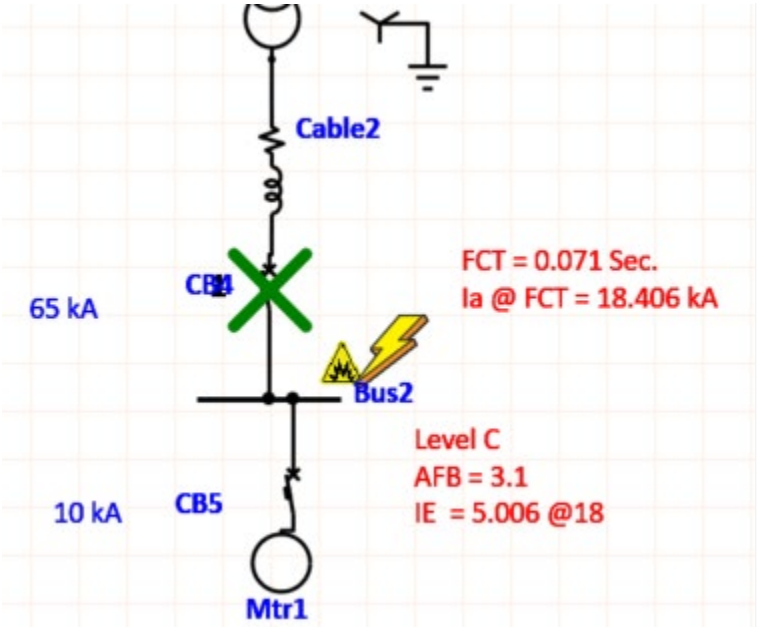
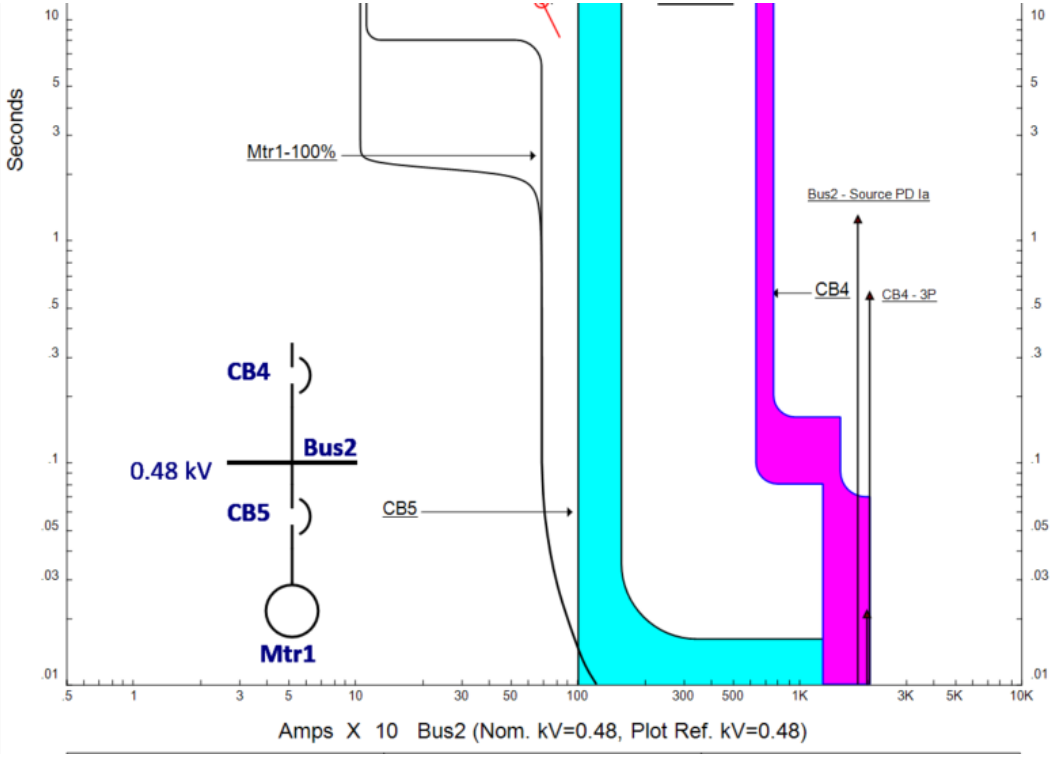

T1
Cable2
CB4
65 kA
FCT = 0.16 Sec.
Ia @ FCT = 18.406 k
Bus2
Level D
AFB = 4.6
IE = 11.294 @18
10 kA
CB5
Mtr1

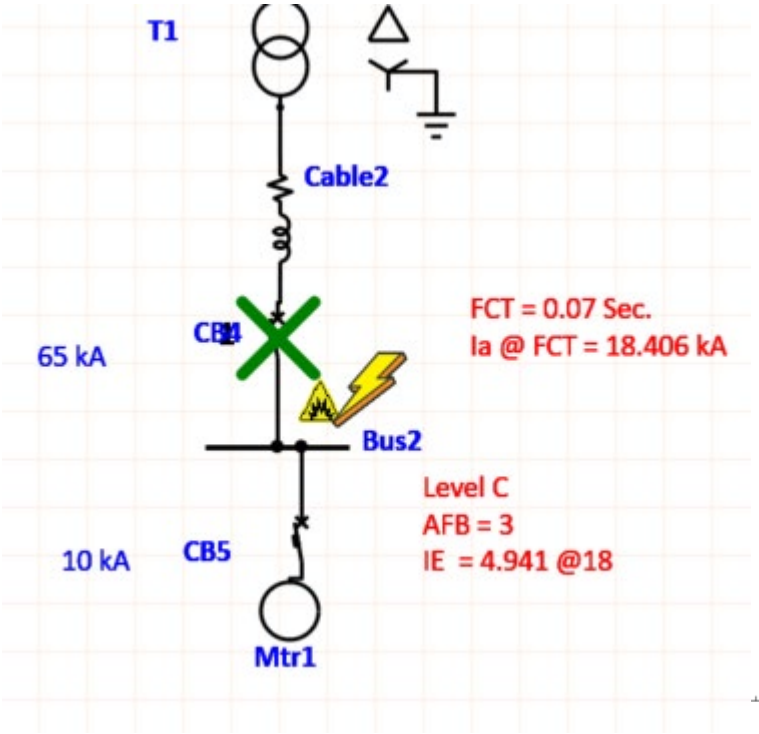

Mtr1-Hot
Mtr1-100%
Bus2 - Source PD Ia
CB4
CB4 - 3P
CB5
Seconds
Amps X 10 Bus2 (Nom. kV=0.48, Plot Ref. kV=0.48)
CB4
Bus2
0.48 kV
CB5
Mtr1

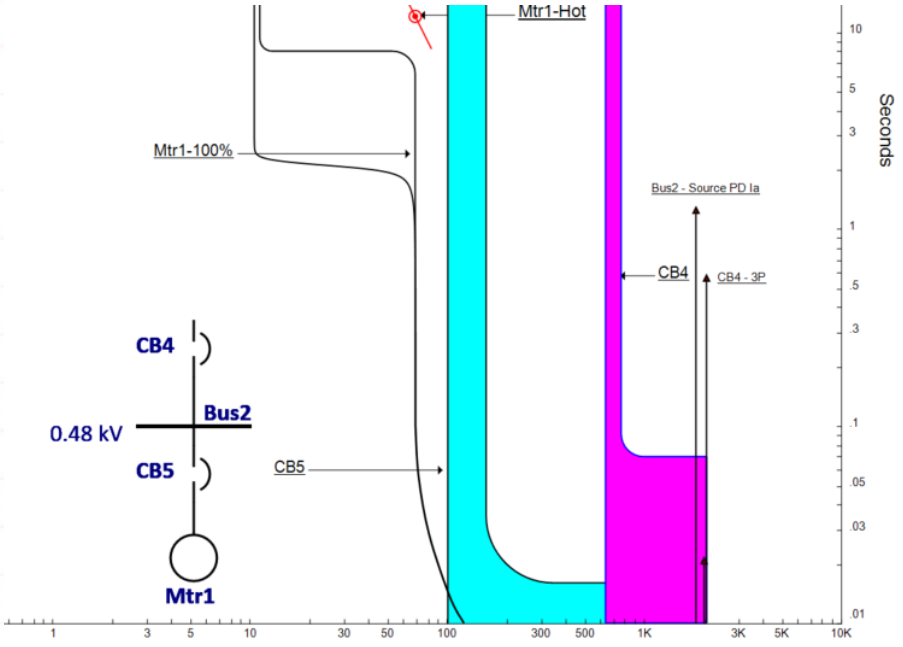
GARD


Cable2
CB4
65 kA
FCT = 0.071 Sec.
Ia @ FCT = 18.406 kA
Bus2
Level C
AFB = 3.1
IE = 5.006 @18
10 kA
CB5
Mtr1


Seconds
Mtr1-100%
Bus2 - Source PD Ia
CB4
CB4 - 3P
CB4
Bus2
0.48 kV
CB5
CB5
Mtr1
Amps X 10 Bus2 (Nom. kV=0.48, Plot Ref. kV=0.48)

GARD


T1
Cable2
CB4
65 kA
FCT = 0.07 Sec.
Ia @ FCT = 18.406 kA
Bus2
Level C
AFB = 3
IE = 4.941 @18
10 kA
CB5
Mtr1


Mtr1-Hot
Mtr1-100%
Bus2 - Source PD Ia
CB4
CB4 - 3P
CB4
Bus2
0.48 kV
CB5
CB5
Mtr1
Seconds
10
5
3
1
.5
.3
.1
.05
.03
.01
1
3
5
10
30
50
100
300
500
1K
3K
5K
10K

Arc- i-tec

Inputs

- 12 Light Inputs with built in test
- Configurable
  - Light only (0.001s)
  - Light and current
  - Light and pressure
  - 3 or 4 discrete Inputs

Outputs

- 4 discrete configurable contacts
- 1 or 2 disrete outputs

Sentri

Inputs

- 3 Light Inputs
- Fibre or point Sensors
- Configurable
  - Light only (0.001s)
  - Light and pressure
- Ground fault relay

Outputs

- 3 discrete contacts

ADM

Inputs

- 7 Light Inputs either Fibre or light sensors
- 7 Pressure Inputs
- Used exclusively with DSP HRG System

Outputs

- 1 discrete contacts

Pressure Sensor

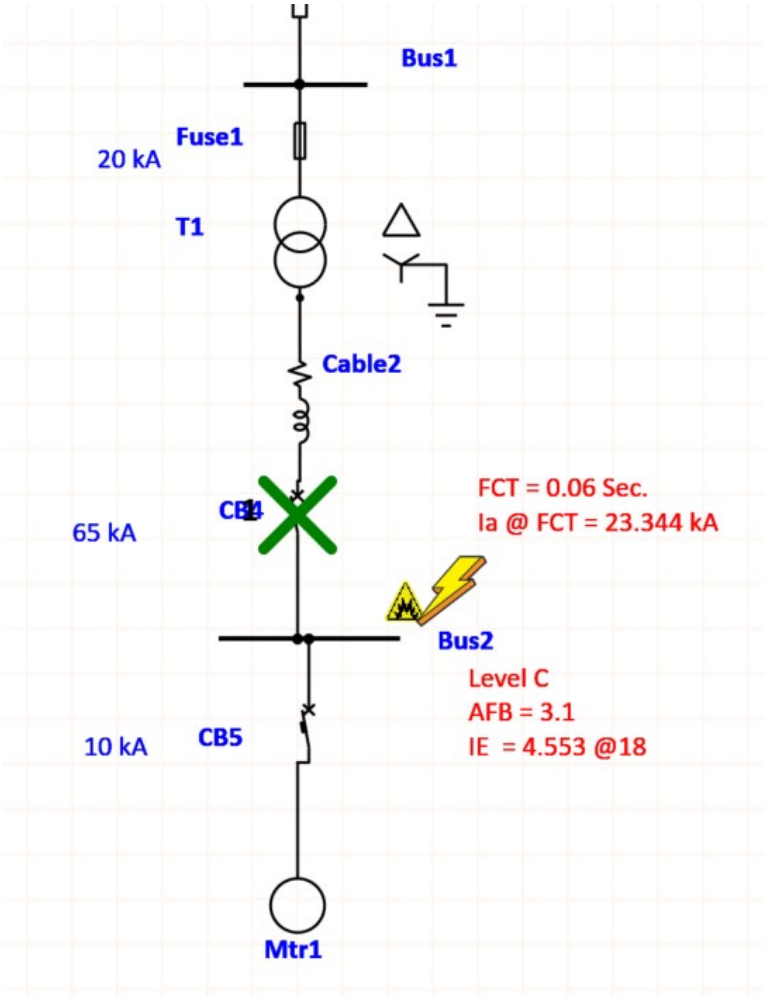
Inputs

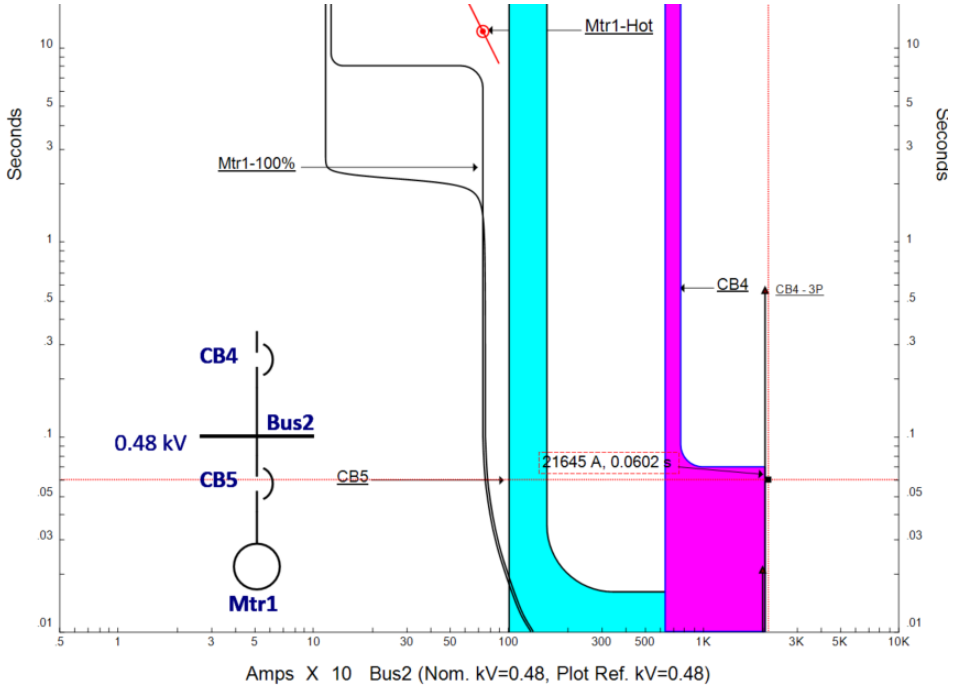
- Available Pressures
- 0.5 Bar Factory set.
- Delay 10 mS

Outputs

- 2NO 2 NC

Pressure


Bus1
Fuse1
20 kA
T1
Cable2
CB4
65 kA
FCT = 0.06 Sec.
Ia @ FCT = 23.344 kA
Bus2
Level C
AFB = 3.1
IE = 4.553 @18
10 kA
CB5
Mtr1


Mtr1-Hot
Mtr1-100%
CB4
CB4 - 3P
CB4
Bus2
0.48 kV
CB5
CB5
21645 A, 0.0602 s
Mtr1
Seconds
Seconds
Amps X 10 Bus2 (Nom. kV=0.48, Plot Ref. kV=0.48)

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Optical

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Optical

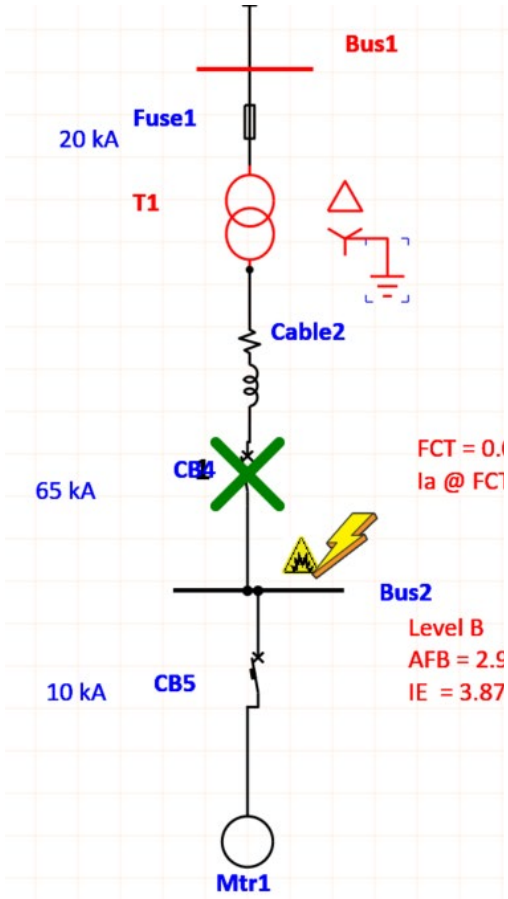
GARD

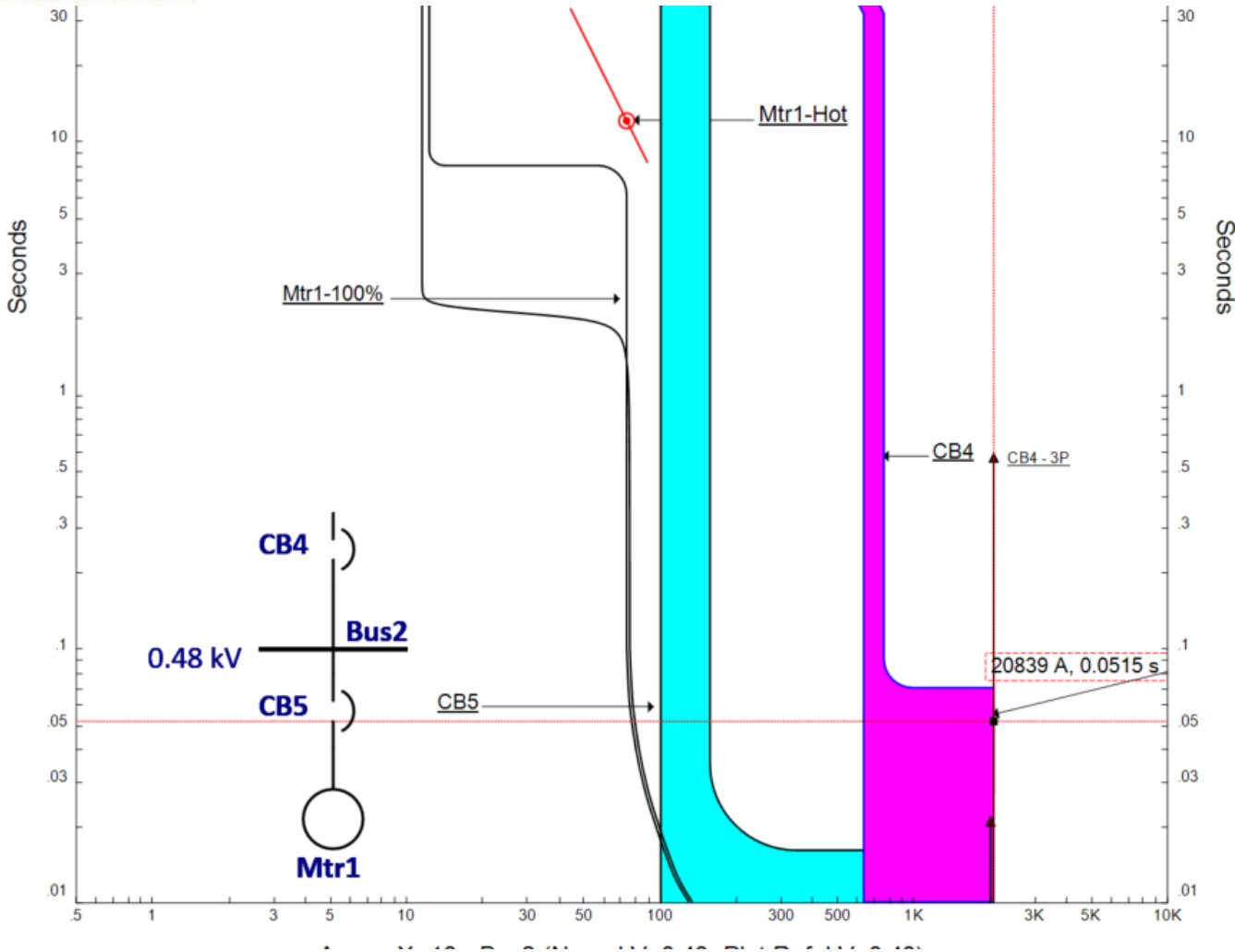
Optical

GARD

Optical

Optical


Bus1
Fuse1
20 kA
T1
Cable2
CB4
65 kA
FCT = 0.
Ia @ FC
Bus2
Level B
AFB = 2.9
IE = 3.87
10 kA
CB5
Mtr1


Seconds
Mtr1-Hot
Mtr1-100%
CB4
CB4 - 3P
20839 A, 0.0515 s
CB5
CB4
Bus2
0.48 kV
CB5
Mtr1
30
10
5
3
1
.5
.3
.1
.05
.03
.01
.5
1
3
5
10
30
50
100
300
500
1K
3K
5K
10K

Summary

State	Time (ms)	IE (Cal/cm^2) @ 18”	
No Instantaneous	160	11.294	
12 X I	160	11.294	
6 X I	160	11.294	
4 X I	71	5.006	
2 X I	70	4.941	
Pressure	60	4.553	
Light	51	3.87	

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Samples

- Go to sample.

Thank you

- www.i-gard.com
- support@i-gard.com