



WELCOME

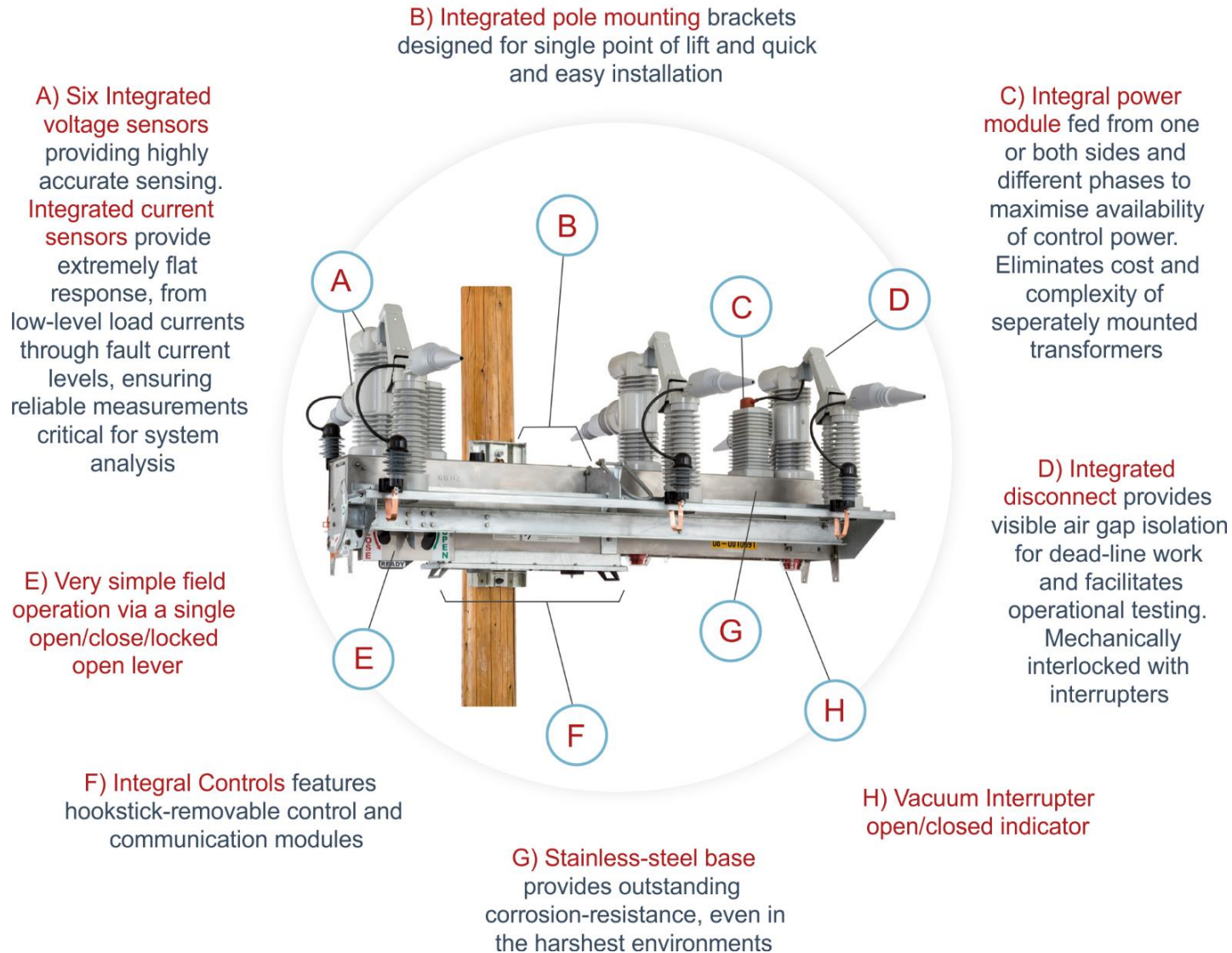
A light gray world map is centered in the background of the slide.

Improving the reliability performance of medium voltage networks the business case

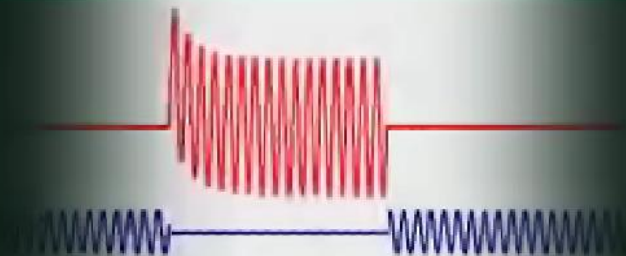
Presenter: Roger Martin (EBM)



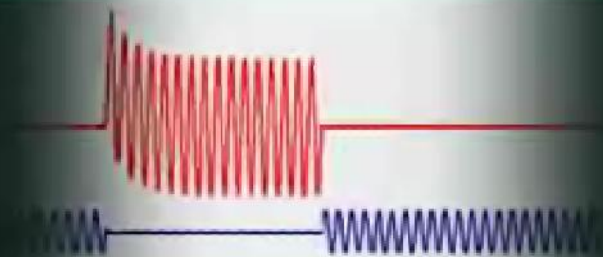
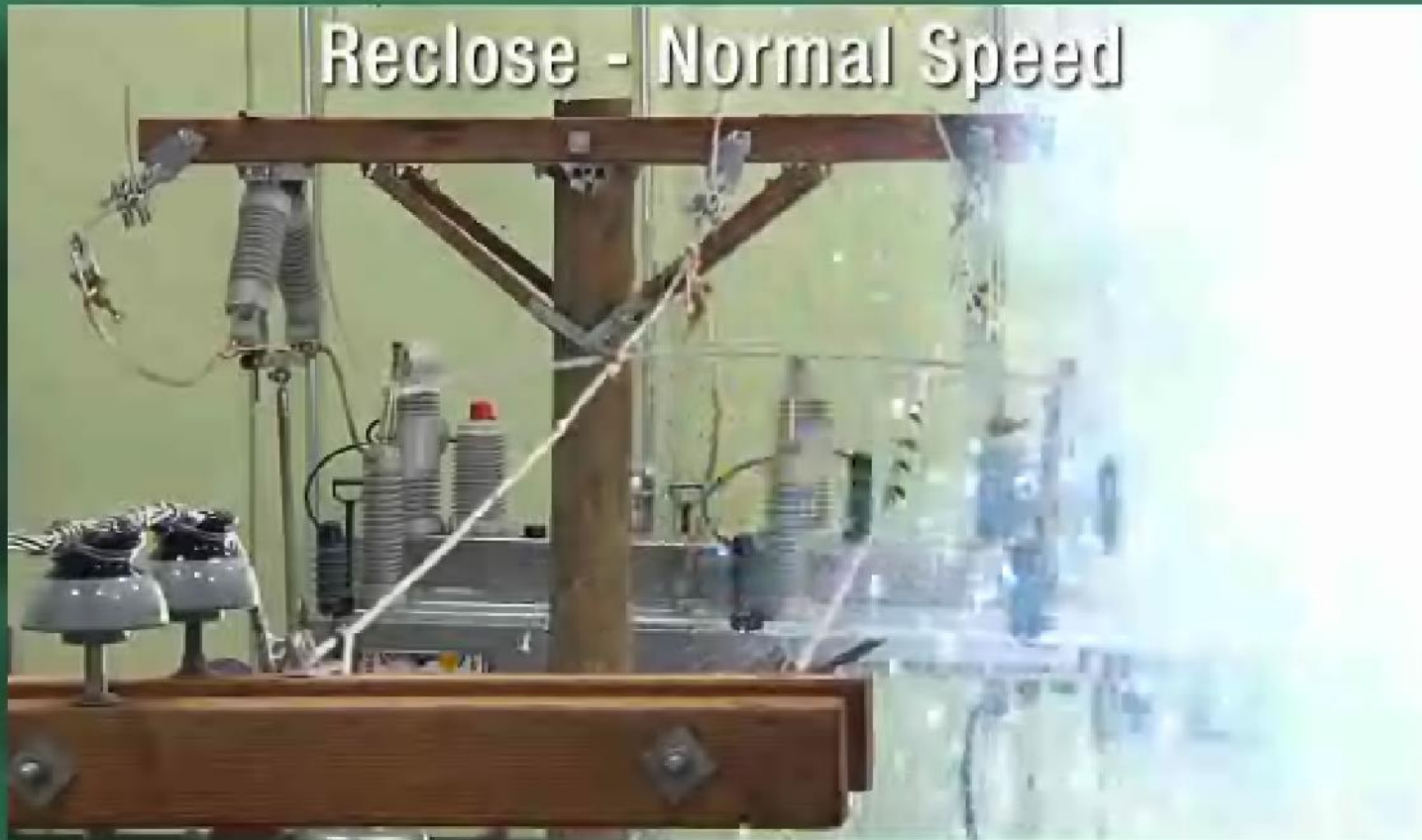
IntelliRupter Pulse Closer



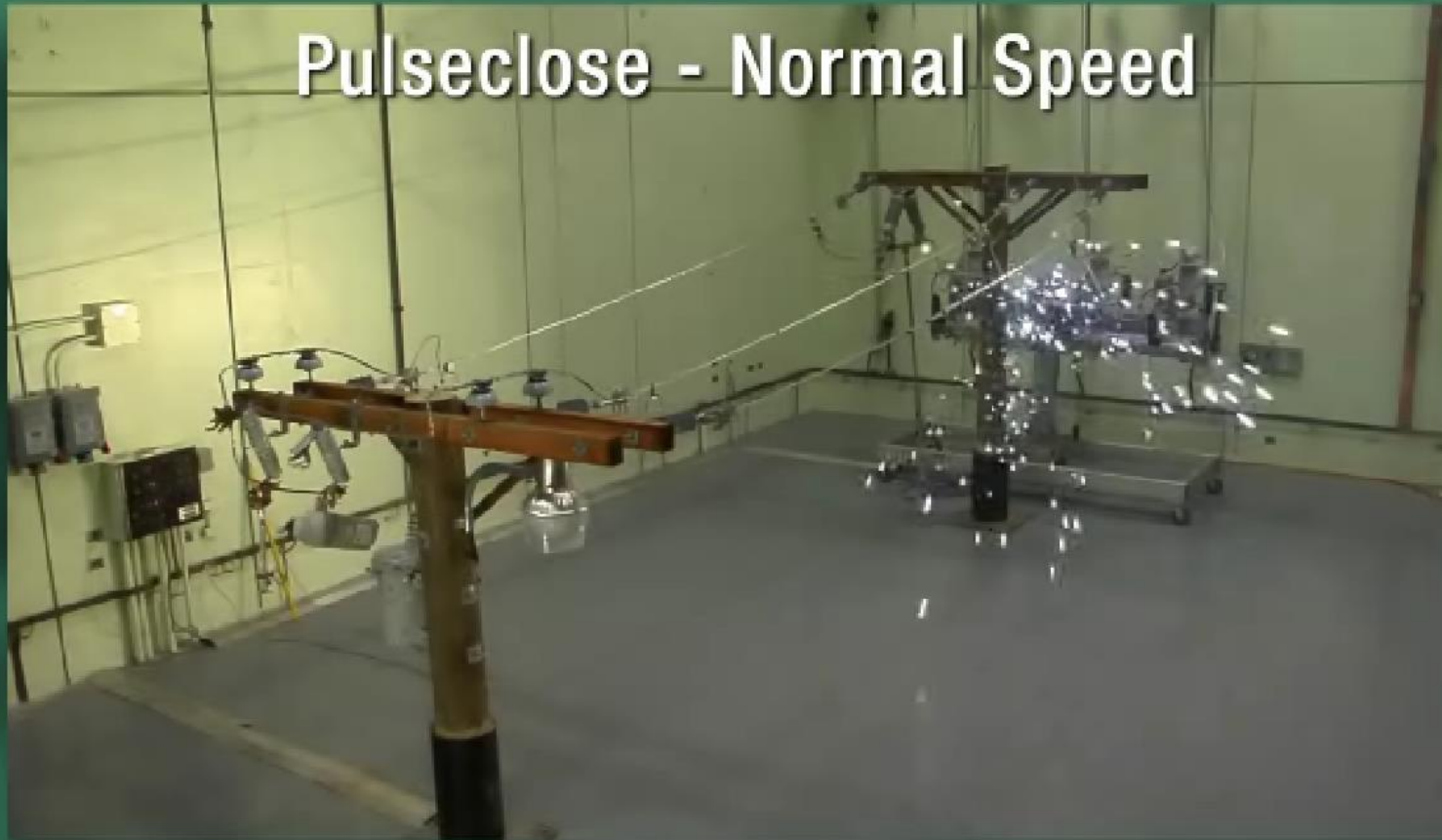
Reclose - Normal Speed



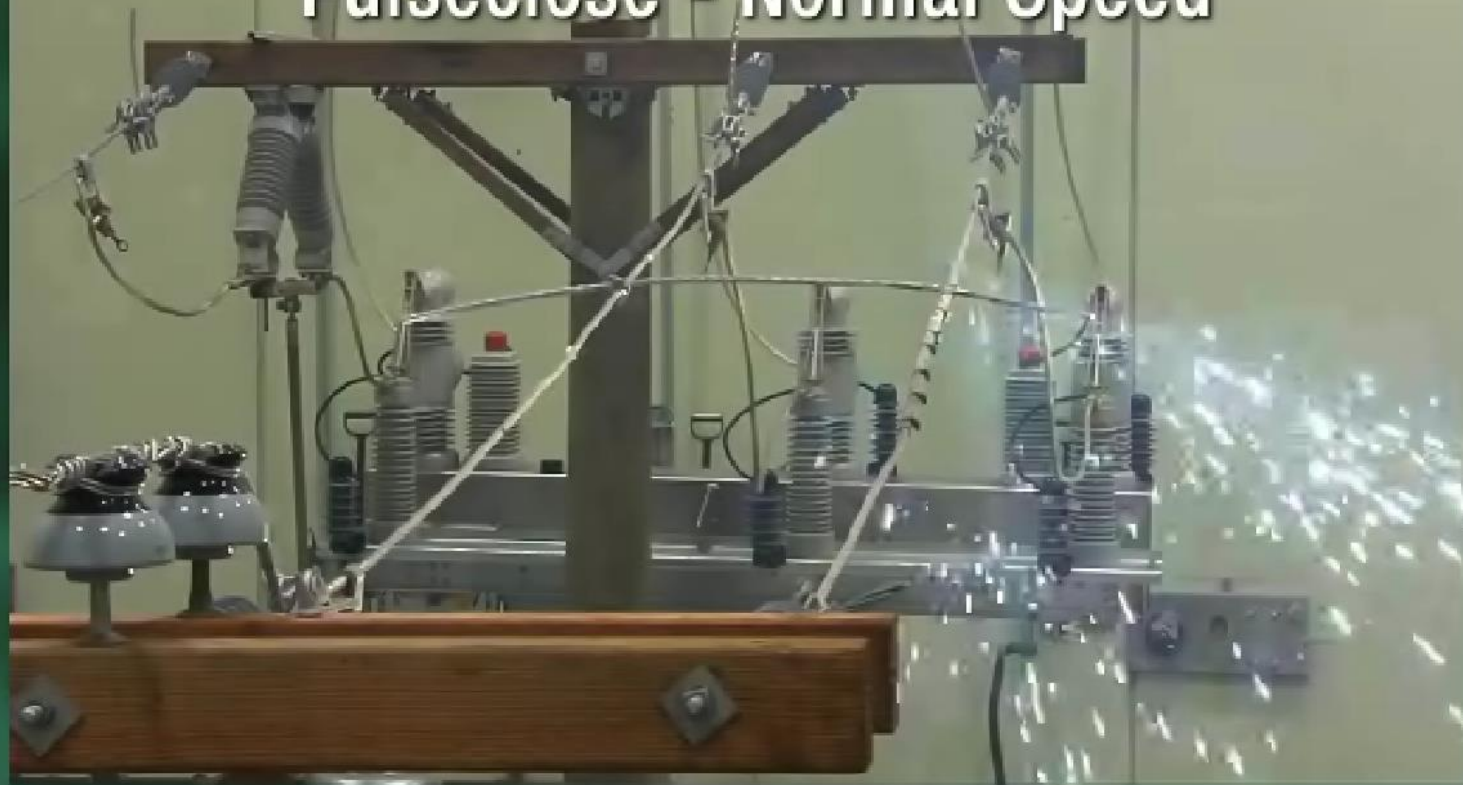
Reclose - Normal Speed



Pulseclose - Normal Speed

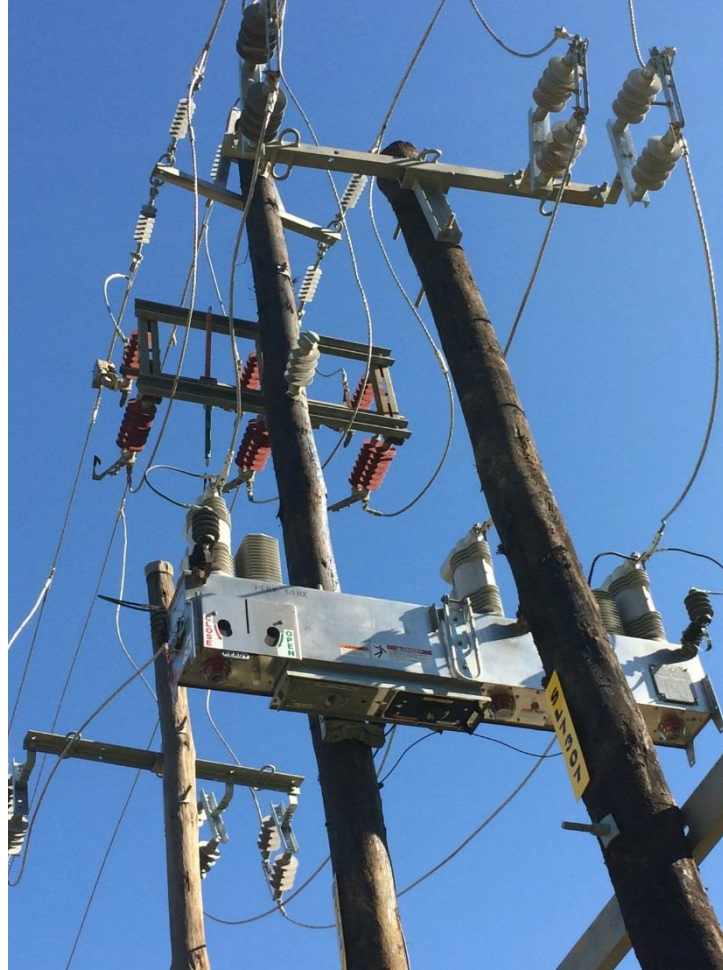


Pulseclose - Normal Speed

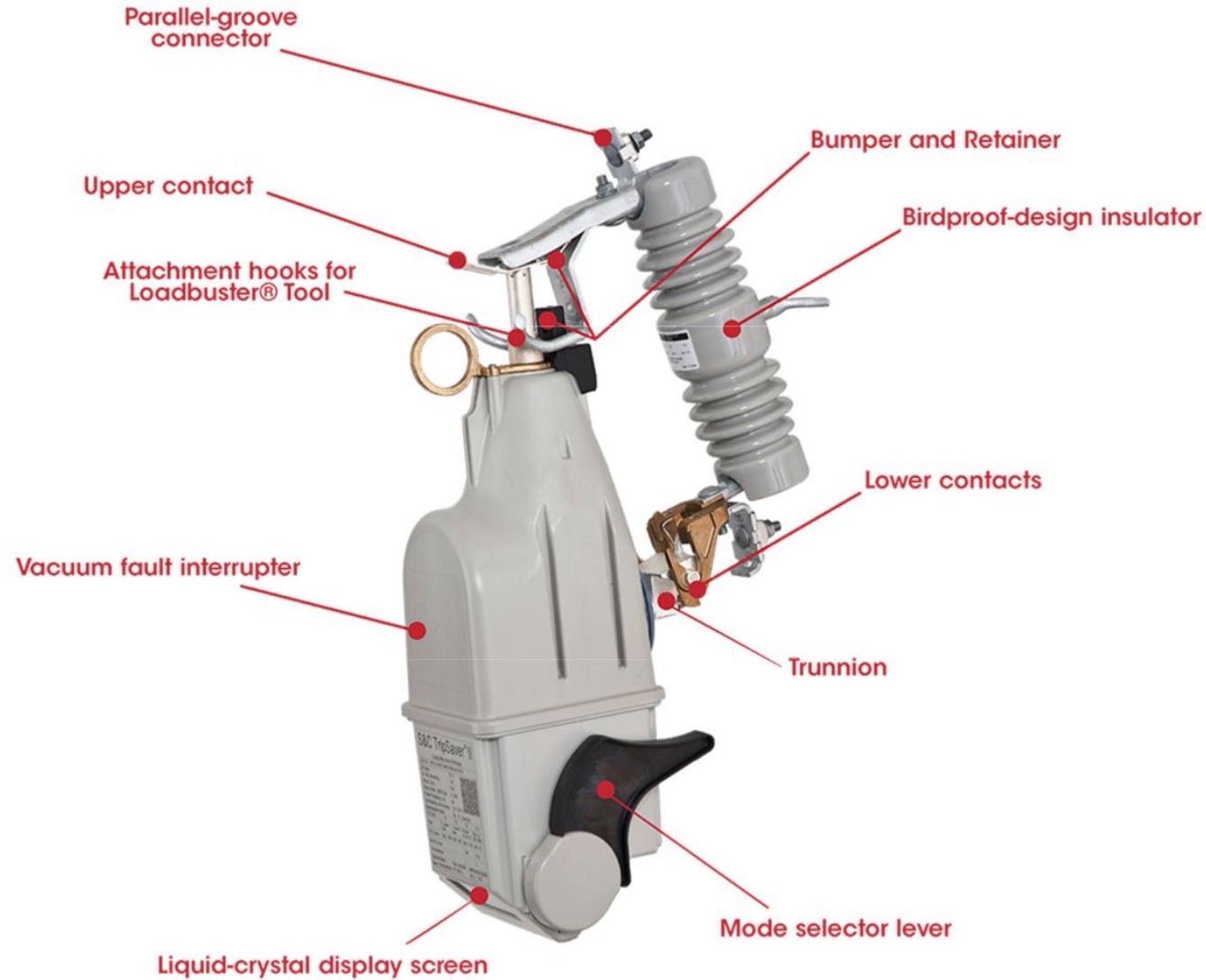




IntelliRupter Installation



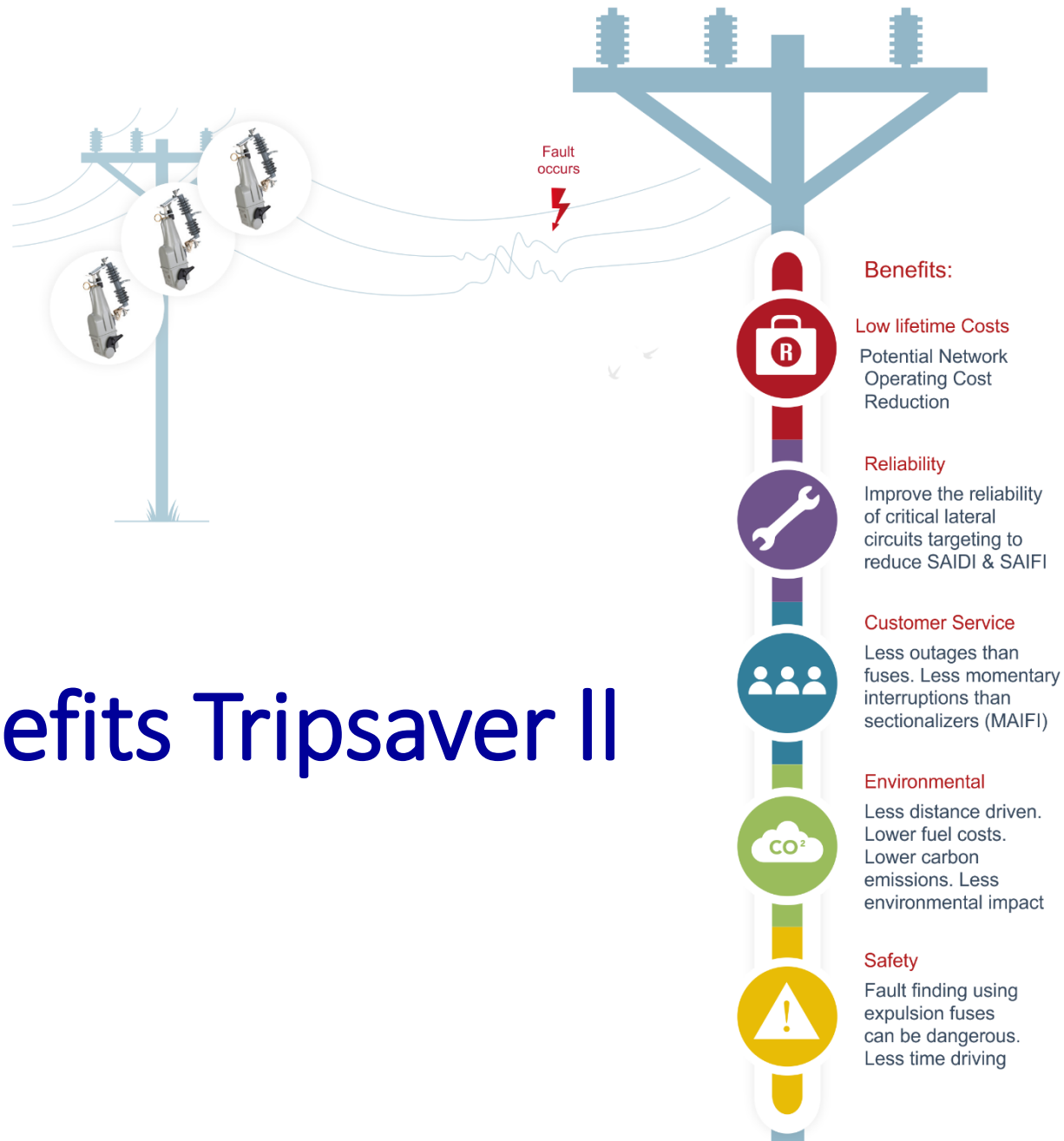
S&C TripSaver II



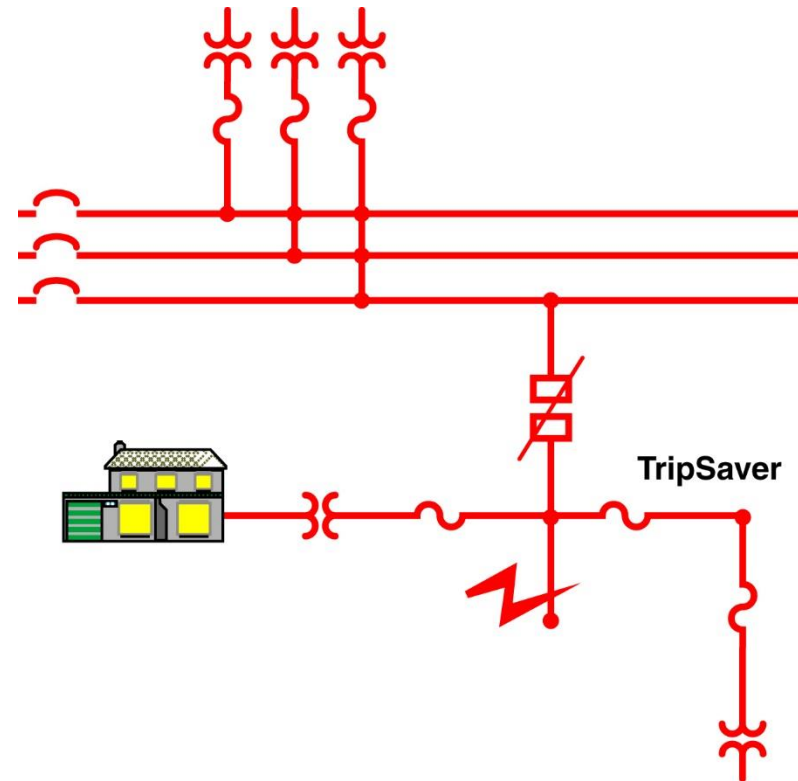
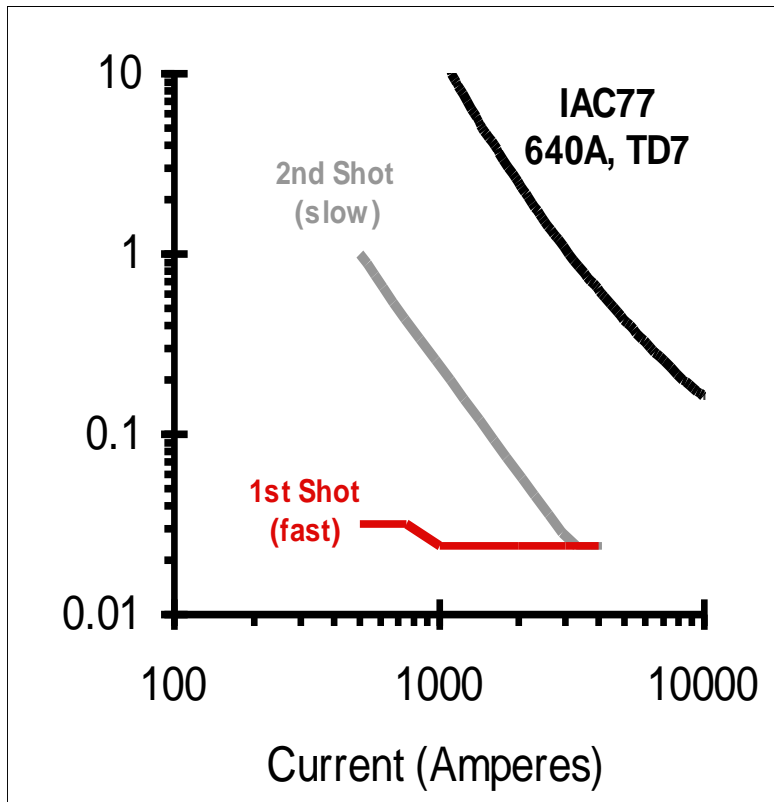
TripSaver II Installation



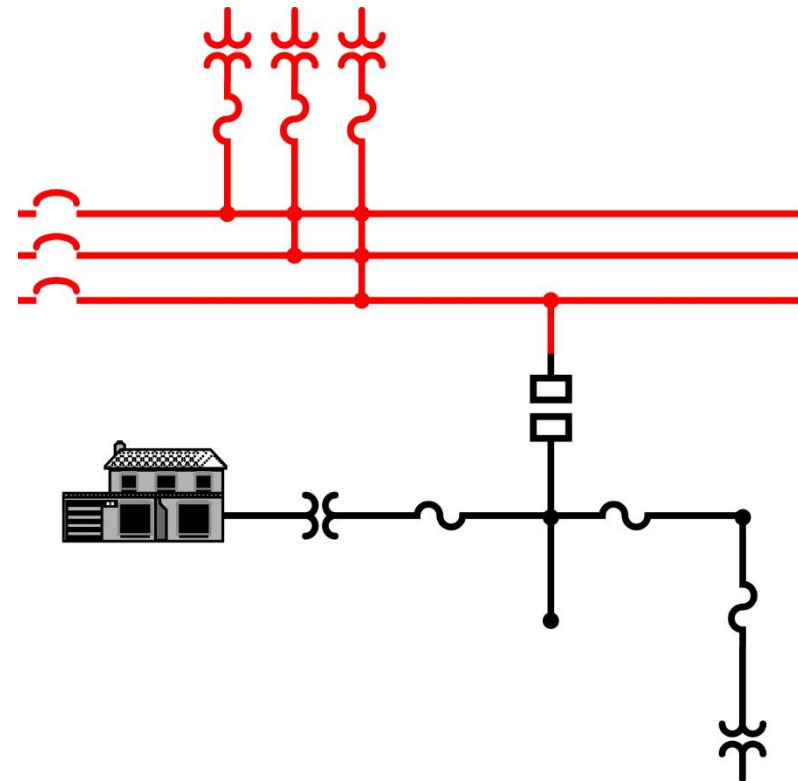
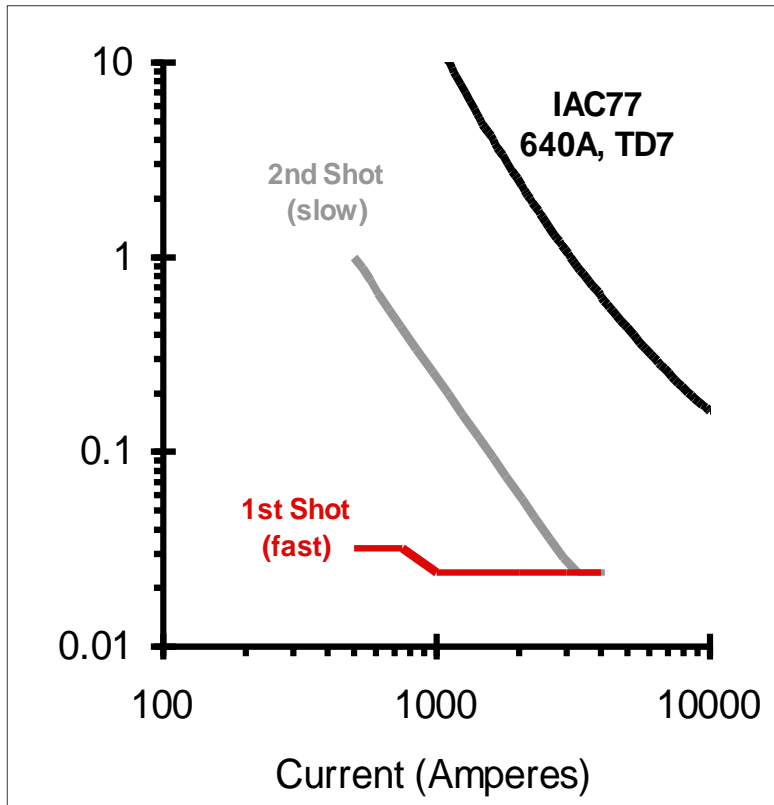
Benefits Tripsaver II



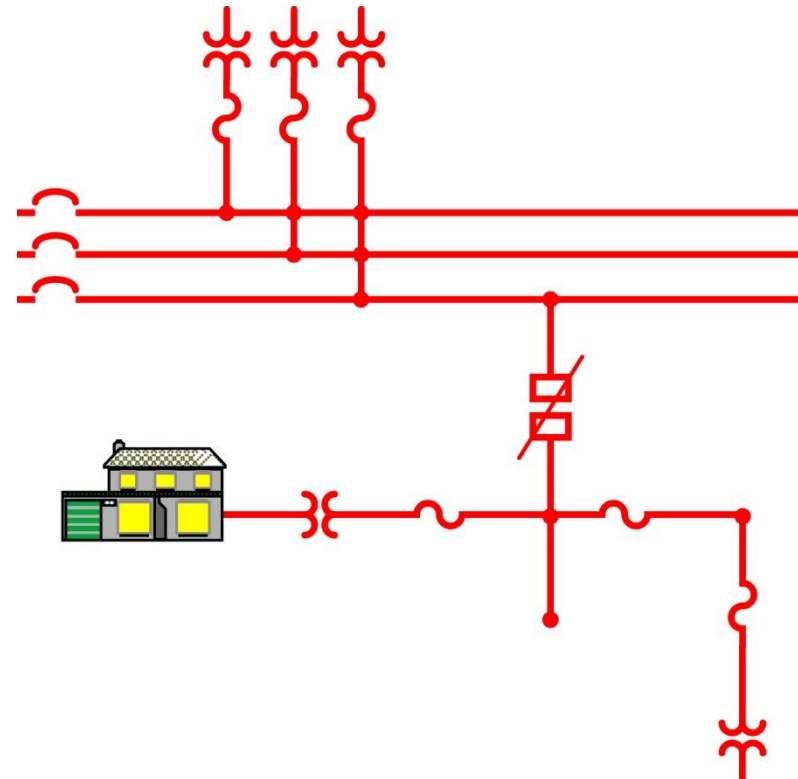
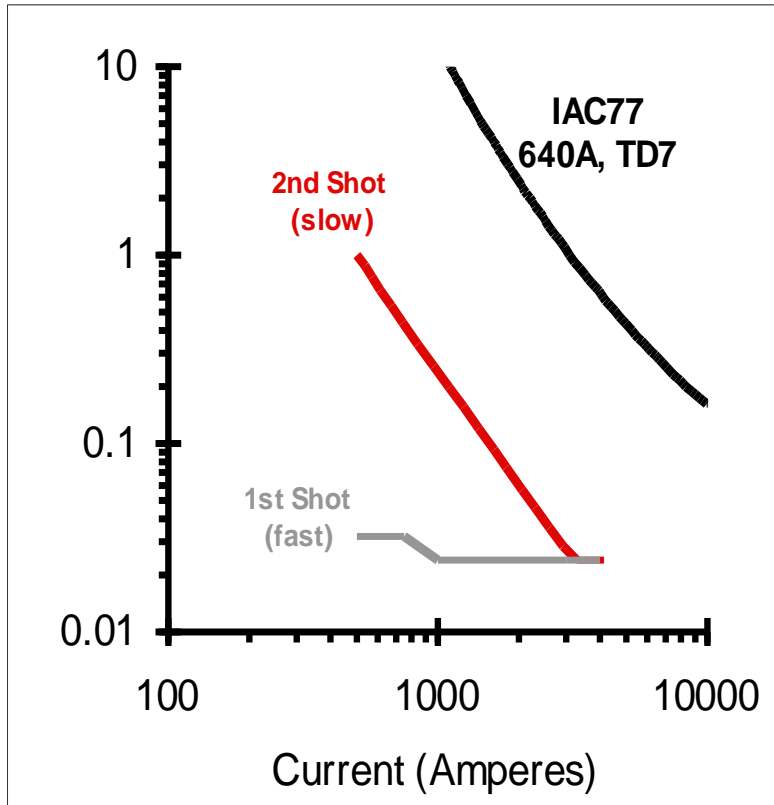
S&C TripSaver II – Temporary Fault



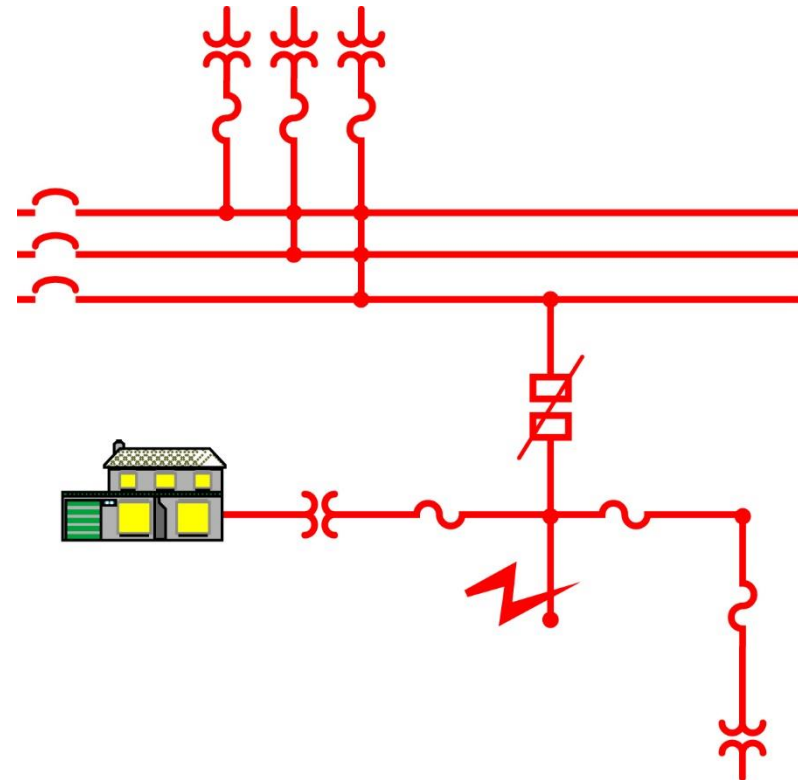
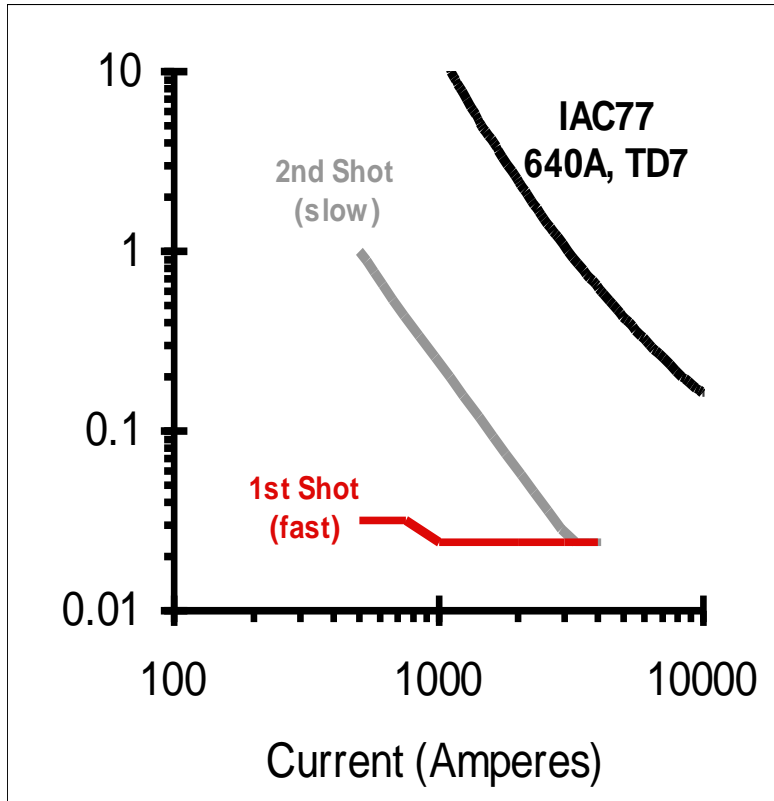
S&C TripSaver II – Temporary Fault



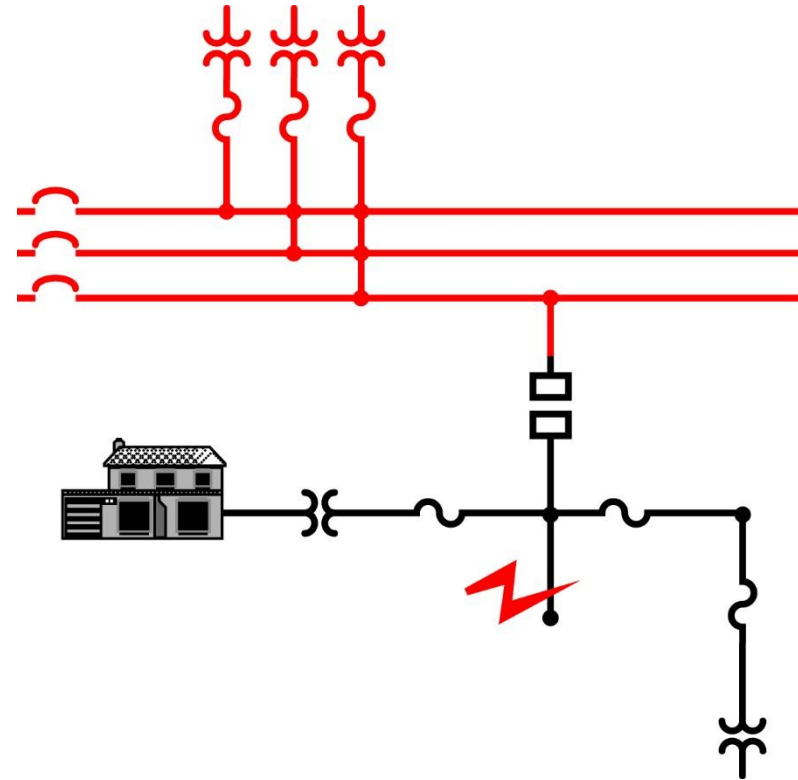
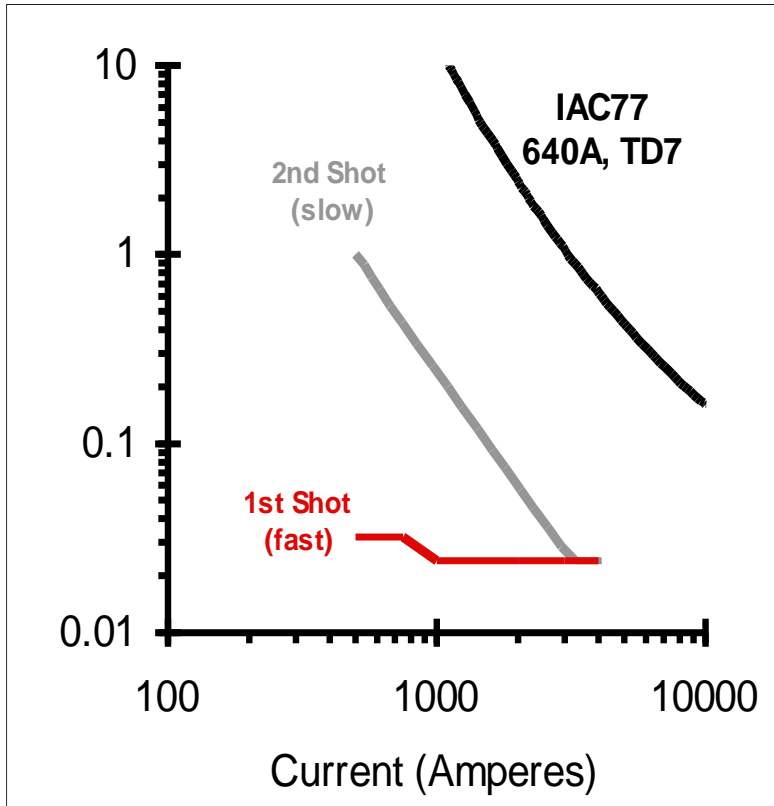
S&C TripSaver II – Temporary Fault



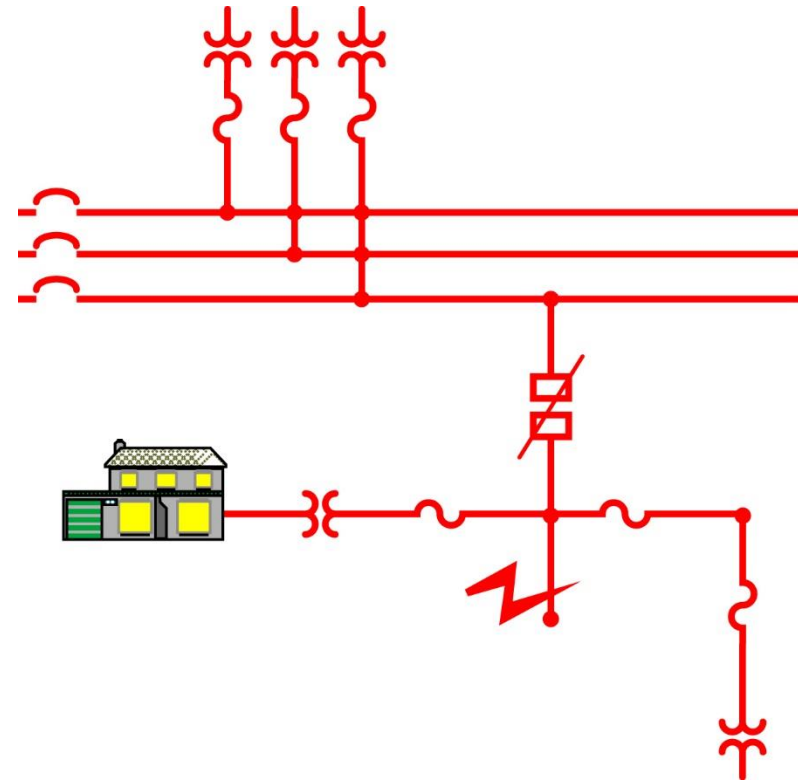
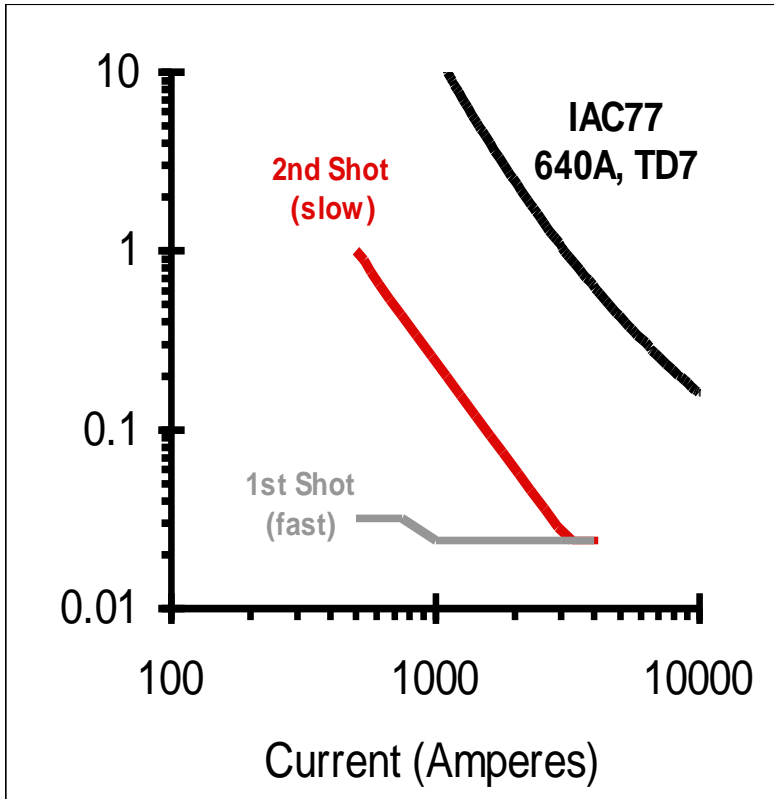
S&C TripSaver II – Permanent Fault



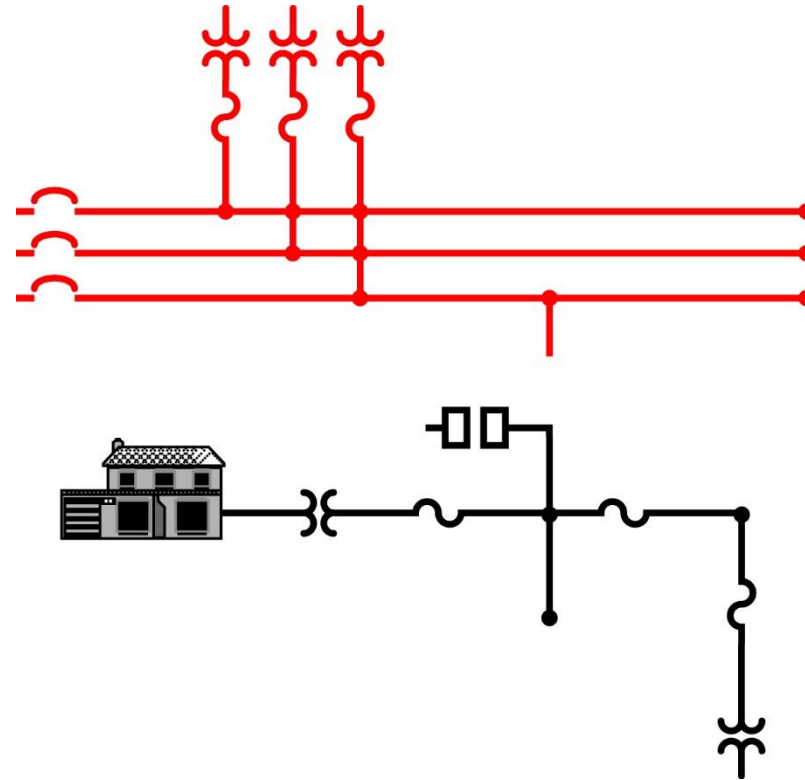
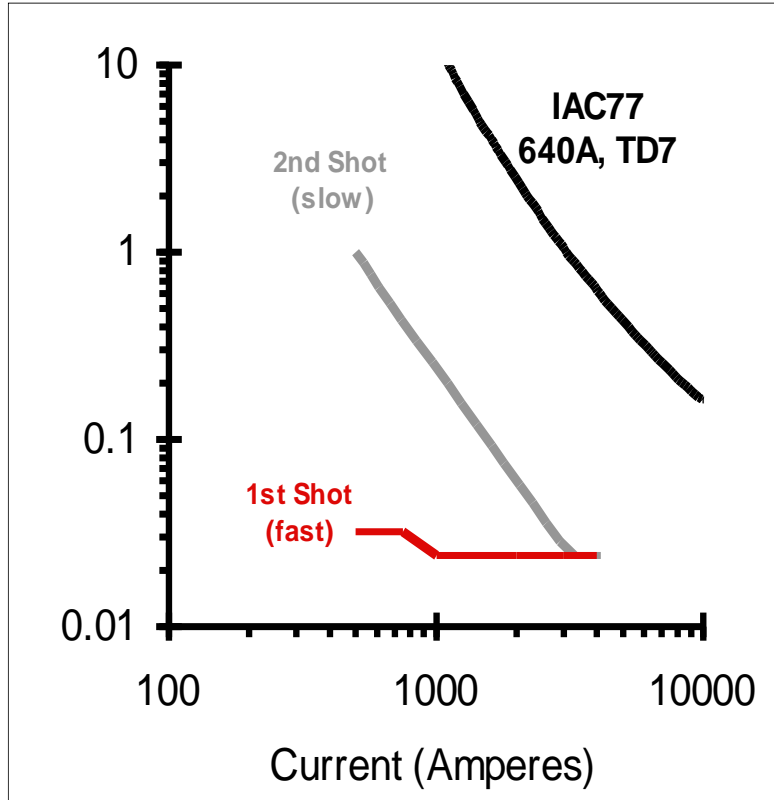
S&C TripSaver II – Permanent Fault



S&C TripSaver II – Permanent Fault

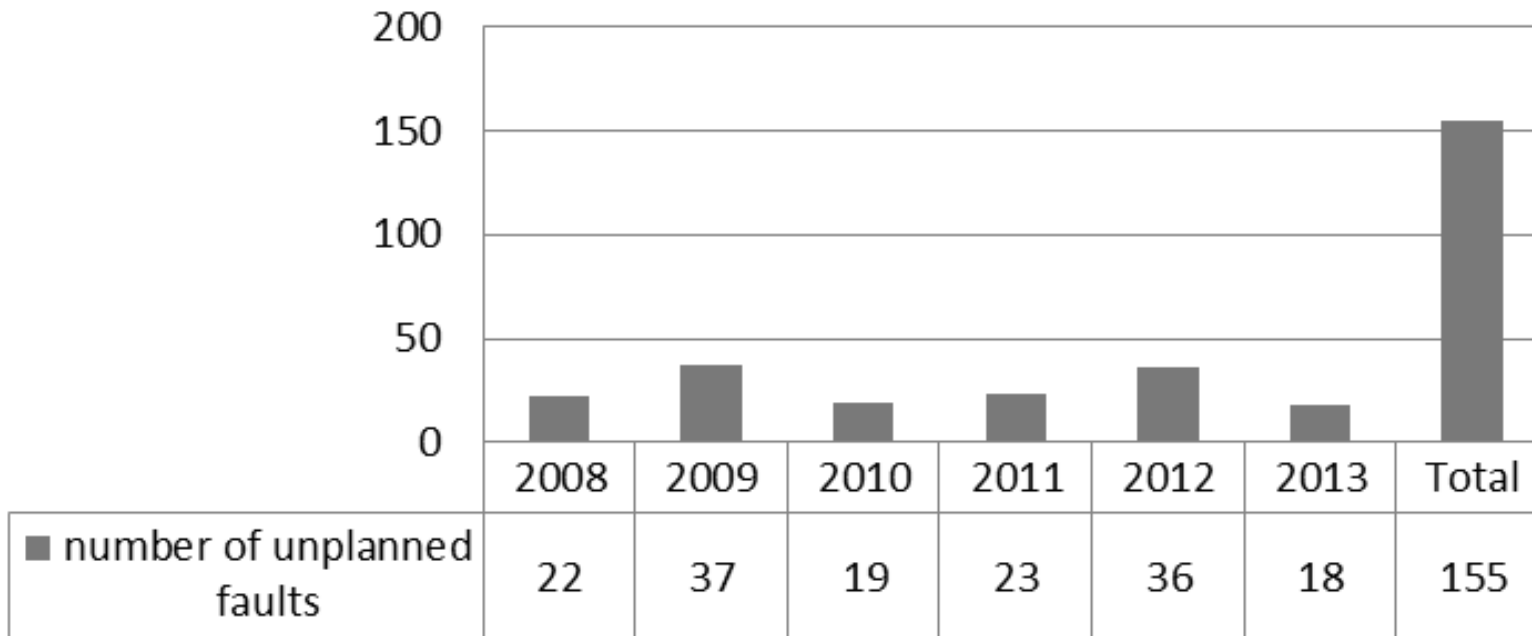


S&C TripSaver II – Permanent Fault



WaterKloof Feeder Statistics

PILOT FEEDER FAULT FREQUENCY STATISTICS - WATERKLOOF F1 11kV FEEDER - number of unplanned faults (2008-2013)



Costs Evaluation for the Different Solutions

Configuration 1	Standard Eskom MV Network with fuses, disconnects and reclosers
Configuration 2	Configuration 1 + Fusesavers added at SF451
Configuration 3	Configuration 2 + Tripsavers and FPI's added at SF617
Configuration 4	Configuration 3 + Intellirupter Pulsecloser added at LBS 4204

	Configuration 1	Configuration 2	Configuration 3	Configuration 4
Power Factor (Cos θ)	0.92	0.92	0.92	0.92
Load Factor	0.58	0.58	0.58	0.58
Customer type	Industrial / commercial	Industrial / commercial	Industrial / commercial	Industrial / commercial
Customer charges	80c /kWh	80c /kWh	80c /kWh	80c /kWh
Cost of unserved energy	R21.48/kWh	R21.48/kWh	R21.48/kWh	R21.48/kWh
SAIDI value using DigSILENT	15.24	12.99	12.4	7.13
Utility cost	R 559 071.80	R 705 204.86	R 943 814.18	R 1 342 960.29
Customer Interruption cost	R 2 967 336.00	R 2 702 229.90	R 2 639 026.32	R 1 659 123.89
Total cost	R 3 526 407.80	R 3 407 434.76	R 3 582 840.50	R 3 002 084.18

TripSaver II – Summary of Operations – Phase A

Below it can be seen the screen showing the Trip events for the unit under the serial number TCMR-0001413.

- Total number of open operations due to overcurrent: **5 (five)**
- Number of drop-open due to overcurrent (lock-out due to permanent fault): **1 (one)**

S&C TripSaver® II Cutout-Mounted Recloser

Event Logs

Historical Counts

Number of Forced Interrupter Closes	0
Number of Interrupter Open Operations due to Overcurrent	5
Total Number Of Interrupter Open Operations	15
Number of Drop-Opens due to Overcurrent	1
Number of Drop-Opens due to Overload	0
Number of Drop-Opens due to Sectionalizing	0
Total Number of Drop-Opens	3

Trip Events

Event	Tripped On	Relative Time, DD-HH:MM:SS.000	Duration, ms	Current, A
5	TCC0	423-23:31:22.592	29	2071
4	TCC3	334-08:29:02.288	35	2187
3	TCC2	334-08:29:00.237	34	2171
2	TCC1	334-08:28:58.186	35	2190
1	TCC0	334-08:28:55.134	29	2201

Clear All Events

Snapshot From: TCMR-0001413 | Transceiver ID:

TripSaver II – Summary of Operations – Phase B

Below it can be seen the screen showing the Trip events for the unit under the serial number TCMR-0001414.

- Total number of open operations due to overcurrent: **8 (eight)**
- Number of drop-open due to overcurrent (lock-out due to permanent fault): **1 (one)**

S&C TripSaver® II Cutout-Mounted Recloser

Event Logs

Historical Counts

Number of Forced Interrupter Closes	0
Number of Interrupter Open Operations due to Overcurrent	8
Total Number Of Interrupter Open Operations	28
Number of Drop-Opens due to Overcurrent	1
Number of Drop-Opens due to Overload	0
Number of Drop-Opens due to Sectionalizing	0
Total Number of Drop-Opens	6

Trip Events

Event	Tripped On	Relative Time, DD-HH:MM:SS.000	Duration, ms	Current, A
8	TCC0	551-01:43:42.033	29	2173
7	TCC0	504-05:45:30.544	29	2096
6	TCC3	399-12:46:24.721	35	2215
5	TCC2	399-12:46:22.670	35	2204
4	TCC1	399-12:46:20.619	35	2223
3	TCC0	399-12:46:17.568	29	2212
2	TCC0	218-03:34:36.935	29	2245
1	TCC0	189-16:39:35.340	29	2155

Clear All Events

Snapshot From: TCMR-0001414 | Transceiver ID:

TripSaver II – Summary of Operations – Phase C

Below it can be seen the screen showing the Trip events for the unit under the serial number TCMR-0001415.

- Total number of open operations due to overcurrent: **3 (three)**
- Number of drop-open due to overcurrent (lock-out due to permanent fault): **0 (zero)**

S&C TripSaver® II Cutout-Mounted Recloser

Event Logs

Historical Counts

Number of Forced Interrupter Closes	0
Number of Interrupter Open Operations due to Overcurrent	3
Total Number Of Interrupter Open Operations	36
Number of Drop-Opens due to Overcurrent	0
Number of Drop-Opens due to Overload	0
Number of Drop-Opens due to Sectionalizing	0
Total Number of Drop-Opens	7

Trip Events

Event	Tripped On	Relative Time, DD-HH:MM:SS.000	Duration, ms	Current, A
3	TCC0	601-11:25:47.546	29	2133
2	TCC0	223-17:25:47.885	29	2171
1	TCC0	189-03:47:21.608	29	2189

Clear All Events

Snapshot From: TCMR-0001415 | Transceiver ID:

Business Case for use of Tripsaver II

Business Case based on ESKOM Pilot Results

Sept 2014 - May 2017

Assumptions

Duration of pilot (months): 33

Cost of truck roll: R 5,000

Number of customers: 6

Average load (kW): 345

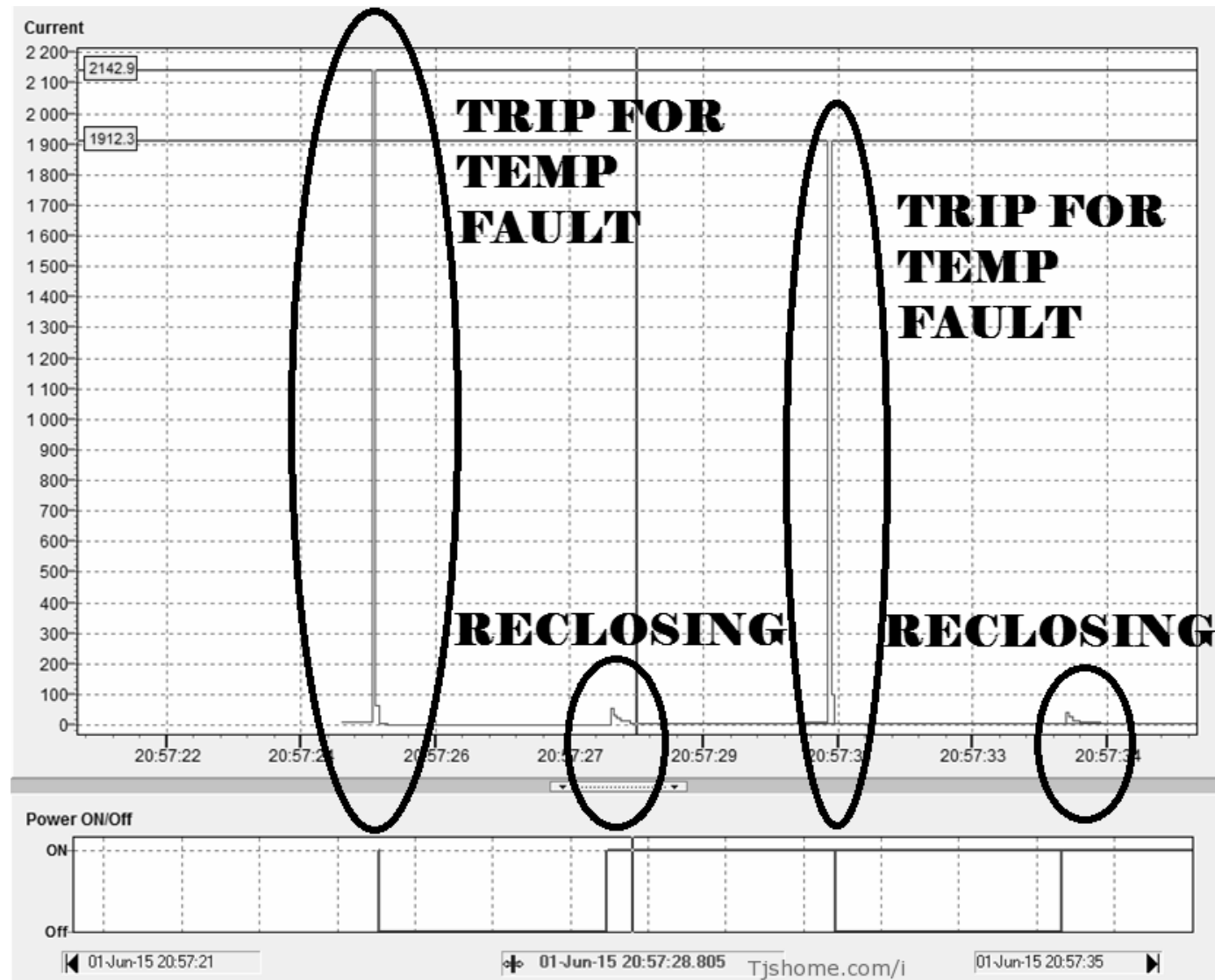
Distribution tariff (R/kWh): R 15.37

Average time to restore (hrs): 3

Cost of TSII: R 32,750

A	Cost of TS II installation	=	R 103,250
B	Avoidance of temporary faults causing extended outages	=	8
C	Truck roll cost	=	R 5,000
D (B x C)	O&M cost saving	=	R 40,000
E	Avoided energy not supplied (kWh)	=	49,680
F	Distribution tariff	=	R 15.37
G (E x F)	Value of avoided energy not supplied	=	R 763,582
H (D + G)	Total savings across pilot period	=	R 803,582
I (H/2.75)	Savings per year	=	R 292,211
J (A/I)	Payback period (years)	=	0.35

TripSaver – Example of Operation



Conclusions

- Innovative solutions have a higher upfront cost but lower lifetime costs.
- A complete business case considering the costs of the interruption has to be made in order to drive the best investment decisions.



THANK YOU