

# Surge & Lightning Monitoring Device

For Metal Oxide Surge Arresters from 6 to 800 kV AC



## Monitoring of surge arrester, EGLA, MOA, MOR, SPD, TLA.

- LoRa, Sigfox and NFC wireless solution. Wired via RS485, Digital output.
- Solar supply & external supply versions.
- Unique condition monitoring : resistive leakage current & total discharged energy monitoring system, lightning, surge events and discharges records.
- Durable device: stainless steel, polycarbonate UV resistant, aluminum. Outdoor device : IP65.
- Up to 3 phases / surge arresters on the same device.
- Monitoring software
- GPS localisation and timestamp

## A unique and innovative device to master surges activities

Paralec has dedicated its research activities to lightning and surges qualification. This new range of products aims at helping our customer to understand the origin of surges, their parameters and impact on equipment.

It involves diagnostic of metal oxide based surge arresters (MOR, TLA, MOA) in service, record peak currents, historical data, number of events, cumulative charges discharged by equipment.

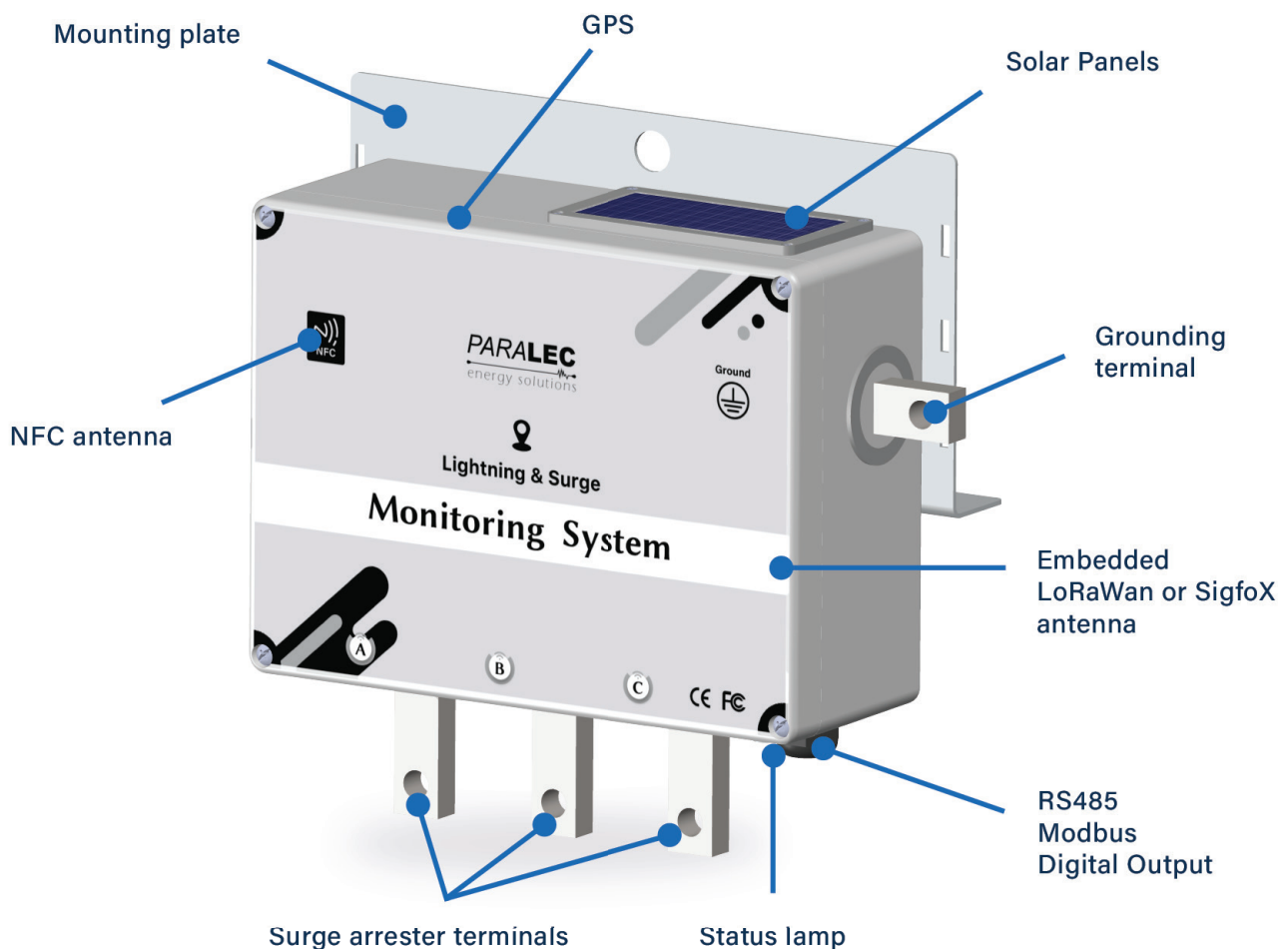
It allows ageing and problems qualification to reach higher accuracy in order to optimize reliability and expenditure.

With a communication range of 5 km on Sigfox or LoRaWan standards allows the user have a safe and remote connection.

SM Series Surge Monitoring can be installed easily on ground conductors.

Thanks to its IP65, housing, rugged materials and self power, the SM Series suitable for outdoors.

Power supply is ensured through supercap cell and solar panels. Optional DC power supply can also be arranged.



REFERENCE	SM
<b>EARTHING CONNECTION</b>	
CONDUCTOR DIAMETER RANGE	5 to 25   35 to 300 mm <sup>2</sup>
INSTALLATION ON THE CONDUCTOR	Terminals, 9 mm hole in series
<b>LIGHTNING EVENT COUNTER</b>	
MINIMUM DISCHARGE PEAK CURRENT DETECTED - 8/20 us waveform - IEC 62561-6	200 A*
MAXIMUM DISCHARGE PEAK CURRENT DETECTED - 10/350 us waveform - IEC 62561-6	100 kA
RESPONSE TIME - ms	1.3 μs
MINIMUM TIME BETWEEN 2 STROKE FOR REGISTRATION, RESPONSE TIME	10 μs
LONG DURATION CURRENT WITHSTAND CAPABILITY	2500 A for 4 ms
HIGH CURRENT WITHSTAND CAPABILITY	100 kA
IMPULSE CURRENT PEAK MEASUREMENT	YES
IMPULSE DURATION	YES
LIGHTNING POLARITY	YES
<b>MEASUREMENT</b>	
MINIMUM DISCHARGE PEAK CURRENT MEASURED - 8/20 us waveform - IEC 62561-6	100 A
MAXIMUM DISCHARGE PEAK CURRENT MEASURED - 10/350 us waveform - IEC 62561-6	40 kA*
FREQUENCY	50/60 Hz
FOLLOW CURRENT / GROUND FAULT RANGE	70 to 10 000 A*
TOTAL LET THROUGH I <sup>2</sup> .t	YES
ELECTRIC CHARGE, COULOMB	0 to 4C
WAVEFORM RECORD	YES, initial 100 μs
<b>LEAKAGE MEASUREMENTS</b>	
TOTAL LEAKAGE CURRENT	50 μA to 50 mA
ACCURACY (at Tamb ≤ 40 °C)	± 5%
SURFACE POLLUTION & HUMIDITY INGRESS DETECTION (UNDER EVALUATION)	YES
THIRD HARMONIC LEAKAGE CURRENT	50 - 5000 μA
ACCURACY (at Tamb ≤ 40 °C)	± 10%
RESISTIVE LEAKAGE CURRENT	50 - 5000 μA
ACCURACY (at Tamb ≤ 40 °C)	± 10%

\*other ranges on request

## ENVIRONMENTAL CONSTRAINTS

TEMPERATURE - °C	Class C2: -40 to +70
PROTECTION CLASS	IP65, NEMA 4X
TEMPERATURE CHANGE RATE - °C/min	Class C2: 1,0
RELATIVE HUMIDITY - %	Class C2: 10 to 100
MAX ABSOLUTE HUMIDITY - g/m3	Class C2: 35
MAX ALTITUDE - m	2000
ATMOSPHERIC PRESSURE - kPa	70 to 106
STANDARDS/TEST	IEC 62561-6:2018
TYPE OF SURGE COUNTER as per IEC 62561-6	Type 1 and Type 2; outdoor

## RECORD

NUMBER OF EVENTS	100 Events. For each Events up to 4 components. See below example.
NUMBER OF 1 <sup>st</sup> STROKE WAVEFORM	5 last waveforms for 100 µs at 1MSPS
TOTAL COUNTERS	Counter I <sup>2</sup> t lightning Counter I <sup>2</sup> t switching Counter I <sup>2</sup> t 50 Hz Counter I <sup>2</sup> t leakage Counter I <sup>2</sup> t total Number of lightning events Number of switching events
MAX RECORDS	Max total leakage Max resistive leakage Max power frequency current Max lightning current Max switching current
PROTECTION DEVICE REMAINING LIFESPAN	% of life remaining Protection device end of life
COMMUNICATION	Last 50 communications

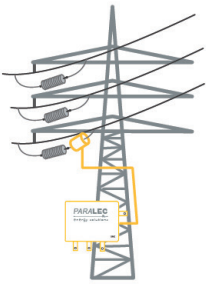
## EVENT COMPONENTS RECORD EXAMPLE

### EVENT COMPONENTS RECORDS LEAKAGE

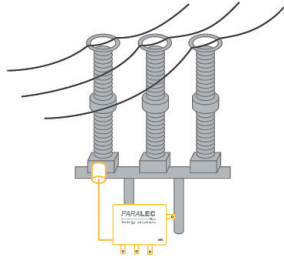
	Unit	Example of value
Date	Date	2021-05-06
Time	Time	14:30:05Z
Tot max mA	mA	0.5
Res max mA	mA	0.1
Cap max mA	mA	0.4
Temp °C	°C	37
I <sup>2</sup> t (A <sup>2</sup> s)	A <sup>2</sup> s	0.0002
Capacitance	pF	120
Tot min mA	mA	0.5
Res min mA	mA	0.1
Cap min mA	mA	0.4

### EVENT COMPONENTS RECORDS LIGHTNING

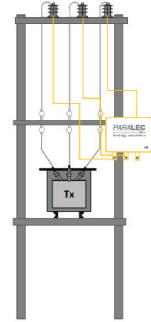
	Unit	Example of value
Date	Date	2021-05-06
Time	Time	14:30:05Z
Peak Current	kA	-1
Changes Coulomb	C	0.6
Duration	µs	30
I <sup>2</sup> t (A <sup>2</sup> s)	A <sup>2</sup> s	34



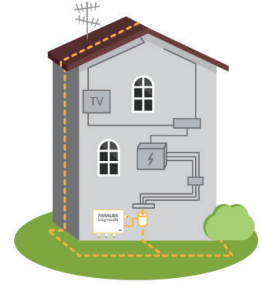
On overhead lines with TLA or EGLA



On substation MOA

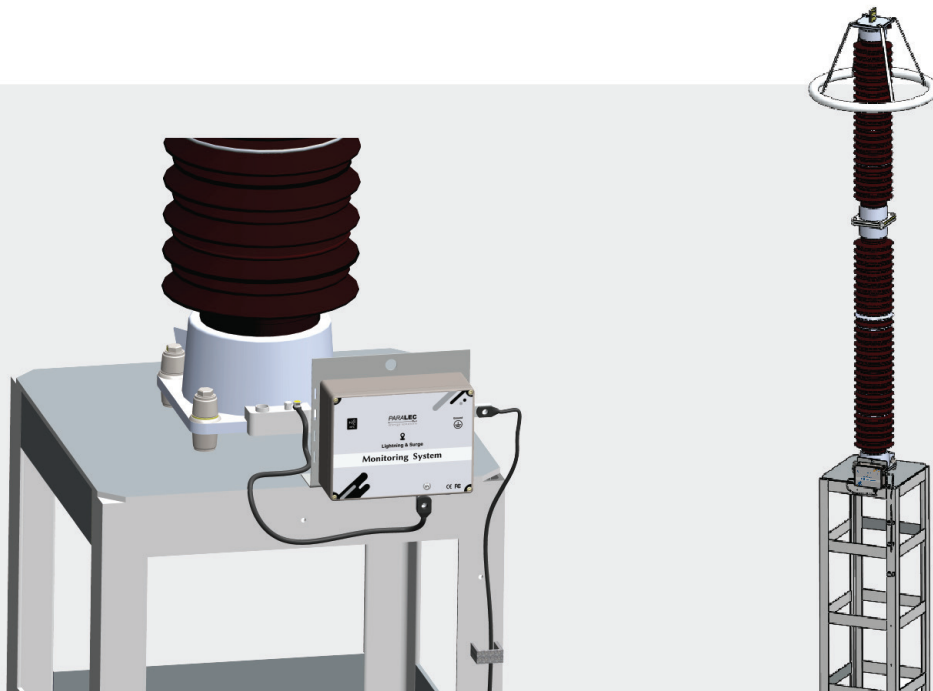


PMT MOA

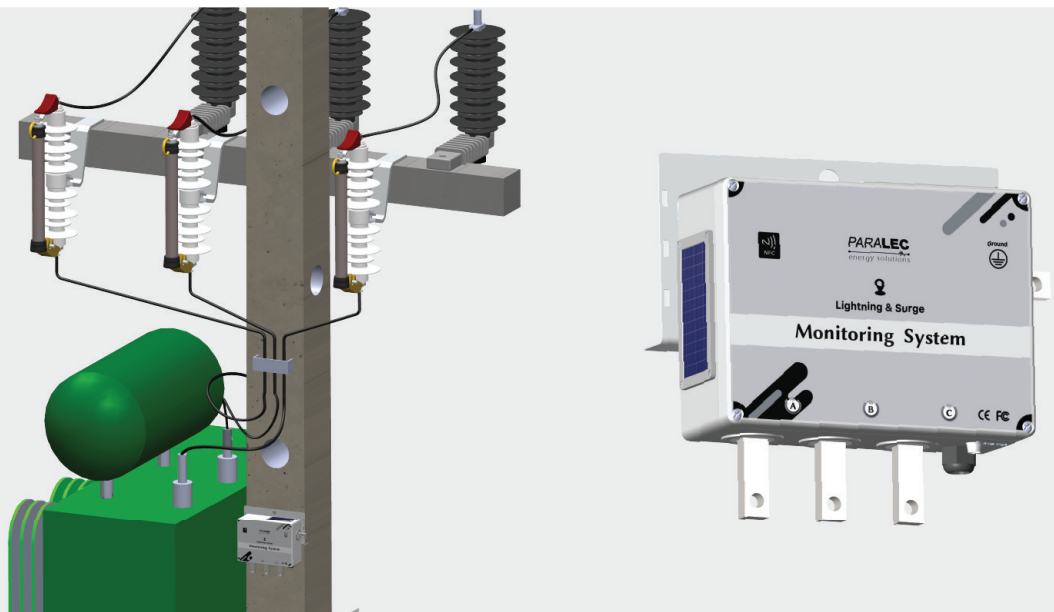


On building SPD

On MOA in Substation

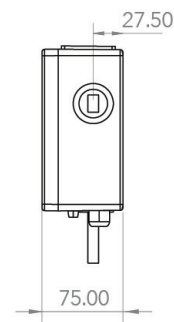
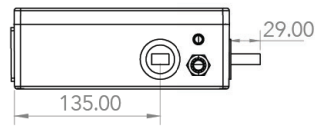
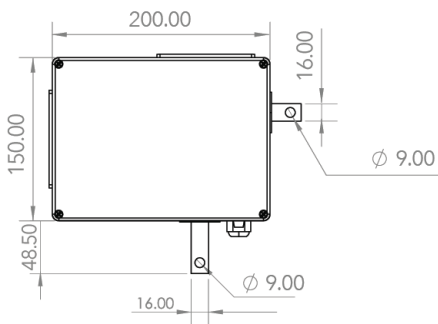
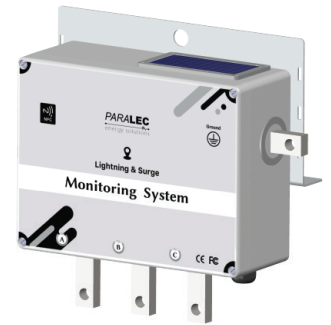
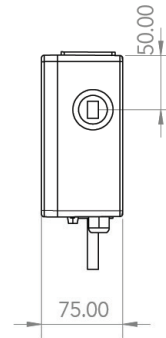
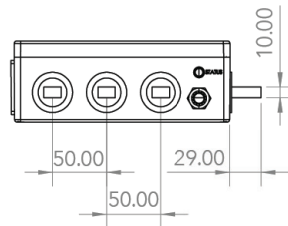
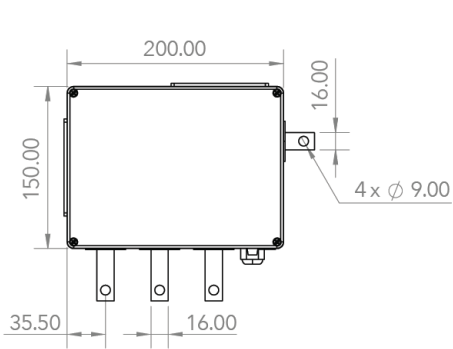


On MOA on PMT

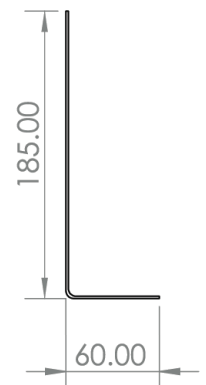
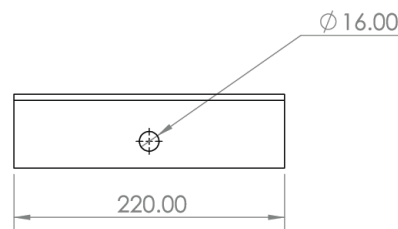
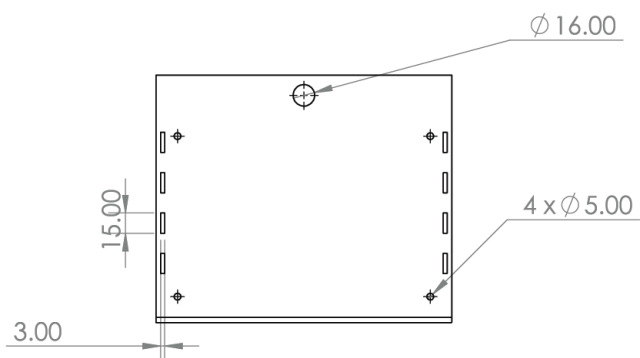


# DIMENSIONS

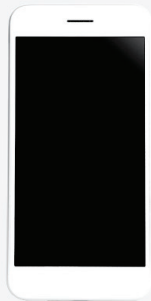
SM



Mounting plate (included)



## Short Range



**Wireless  
NFC**  
Contact



**Wireless  
Bluetooth**  
10 to 20 m



**Wired  
Modbus**

Modbus RTU via 2 wires,  
RS485 to master

## Long Range



**Wireless  
Sigfox**

**Wireless  
LoRaWan**  
Up to 5 km  
line of sight



**LoRaWAN®**  
Gateway



**Concentrator  
Equipped with HMI,  
DataBase**

LAN or broadband  
cellular network (4/5G)  
IEC61850, DNP3,  
MODBUS, REST API



**SCADA / BMS**



## Concentrator Full

### *Equipped with HMI, DataBase*

LAN or broadband  
cellular network (4/5G)  
IEC61850, DNP3, MODBUS, REST API  
HMI touch panel 12"  
LoRA gateway  
Database Memory : 256Gb



## Concentrator Light

### *Mini DataBase*

LAN or broadband  
cellular network (4/5G)  
IEC61850, DNP3, MODBUS, REST API  
LoRA gateway  
Database Memory : 64Gb



## Bluetooth / LoraWan Converter





## List of devices

Serial	Name	Type	Protection	Location	Position	Phase	KV	Channel	Status
SN650001-4427*	SLMD-000	SMC	SA-000	Tank-000	Tower-000	C	110	COM10   1   ...	1
SN650001-10a0*	SLMD-001	SMB	SA-001	Tank-001	Tower-001	A	35	COM11   2   ...	0
SN650001-8960**	SLMD-002	SMC	SA-002	Tank-002	Tower-002	B	110	COM10   3   ...	3
SN650001-256d*	SLMD-003	SMB	SA-003	Tank-003	Tower-003	C	35	COM11   4   ...	1
SN650001-b169*	SLMD-004	SMC	SA-004	Tank-004	Tower-004	B	110	COM10   5   ...	2
SN650001-63c5*	SLMD-005	SMB	SA-005	Tank-005	Tower-005	A	35	COM11   6   ...	0
	SLMD-006	SMC	SA-006	Tank-006	Tower-006	C	110	Disabled	0
	SLMD-007	SMB	SA-007	Tank-007	Tower-007	A	35	Disabled	0
	SLMD-008	SMC	SA-008	Tank-008	Tower-008	B	110	Disabled	0
	SLMD-009	SMB	SA-009	Tank-009	Tower-009	C	35	Disabled	0

Rows per page: 10 1-10 of 10

## List of events

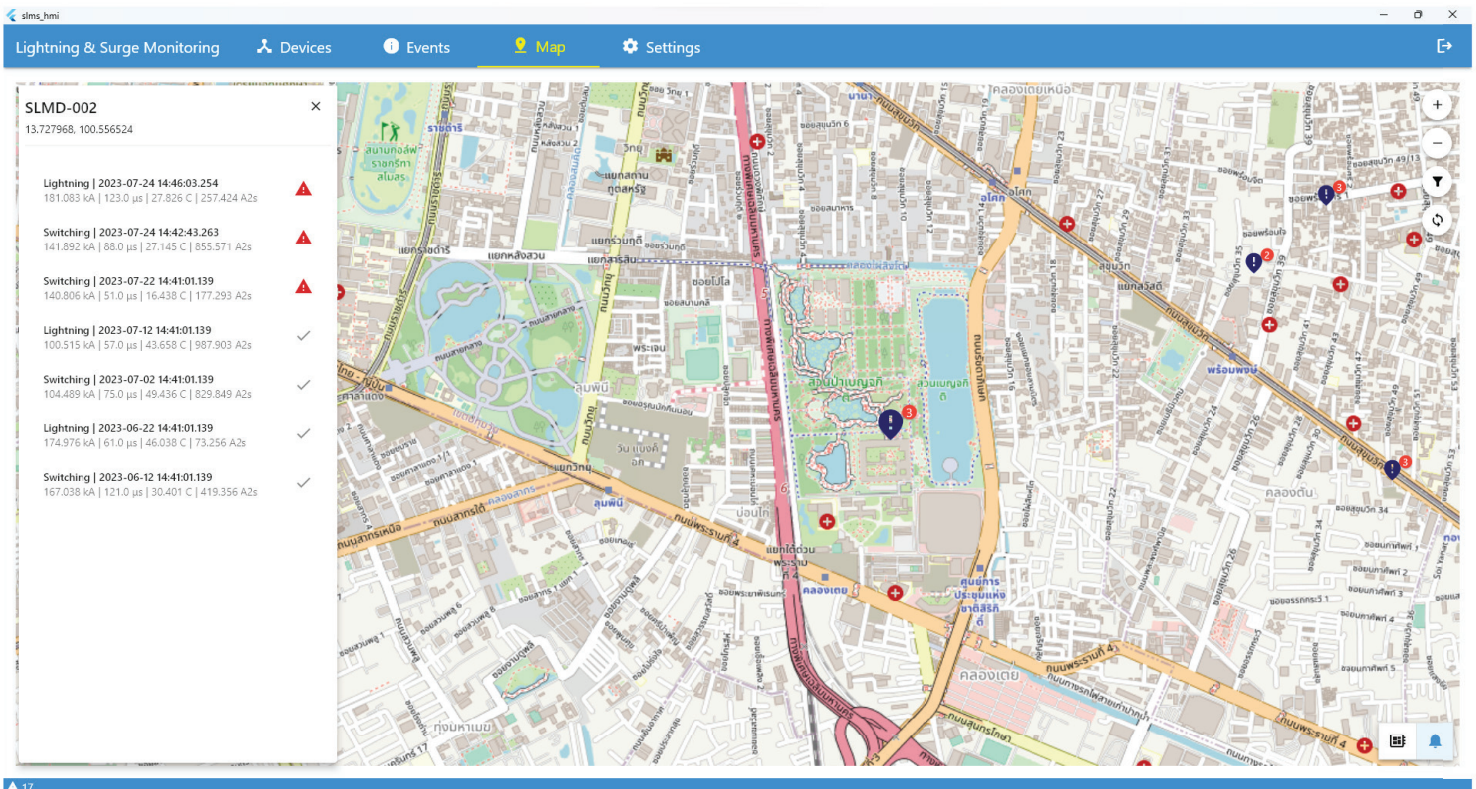
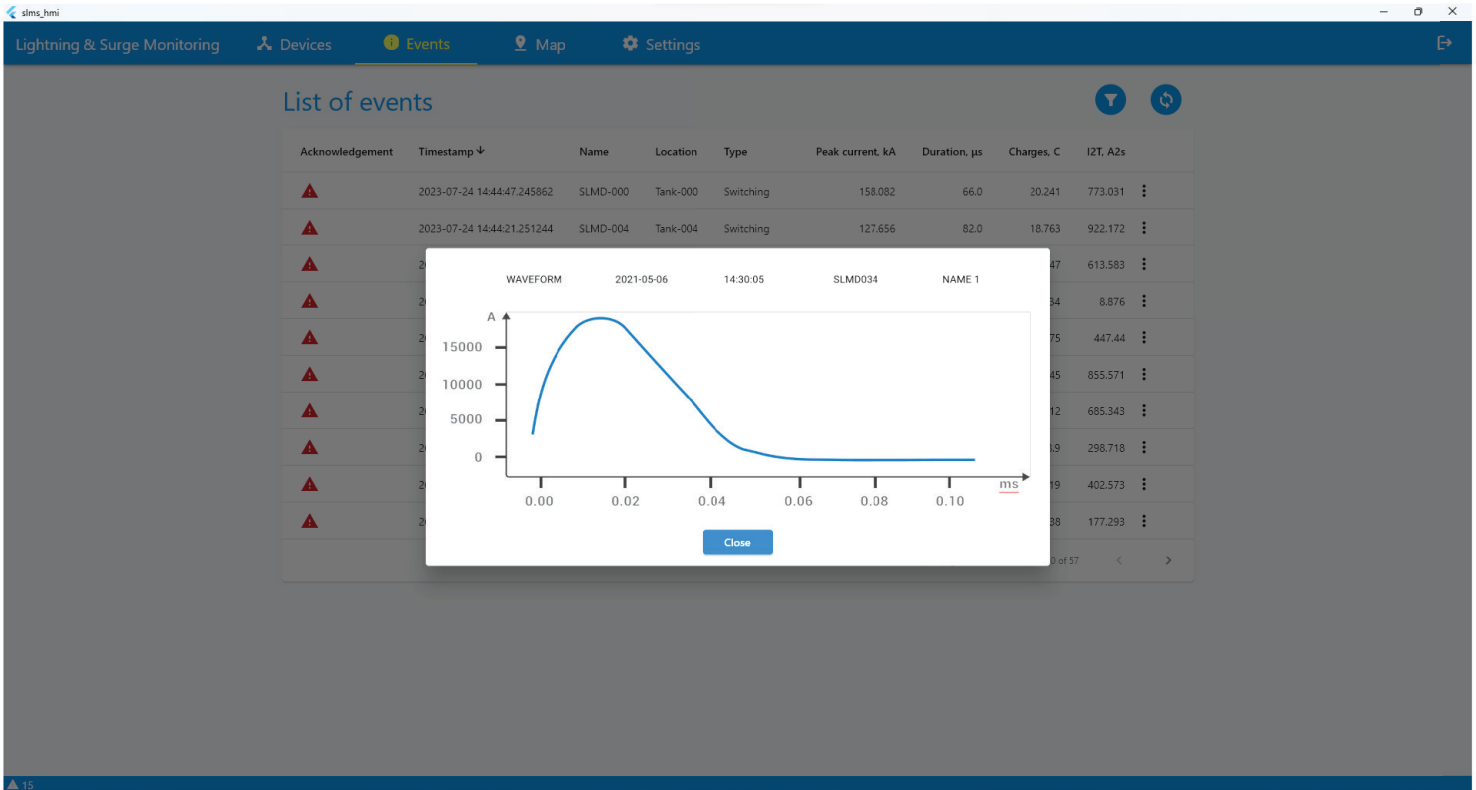
Acknowledgement	Timestamp ↓	Name	Location	Type	Peak current, kA	Duration, μs	Charges, C	I <sub>2T</sub> , A <sup>2</sup> s
▲	2023-07-24 14:44:47.245862	SLMD-000	Tank-000	Switching	158.082	66.0	20.241	773.031
▲	2023-07-24 14:44:21.251244	SLMD-004	Tank-004	Switching	127.656	82.0	18.763	922.172
▲	2023-07-24 14:44:17.252680	SLMD-005	Tank-005	Switching	119.792	98.0	32.047	613.583
▲	2023-07-24 14:43:55.256857	SLMD-003	Tank-003	Lightning	139.982	110.0	7.634	8.876
▲	2023-07-24 14:42:49.262927	SLMD-001	Tank-001	Switching	114.348	50.0	35.975	447.44
▲	2023-07-24 14:42:43.263834	SLMD-002	Tank-002	Switching	141.892	88.0	27.145	855.571
▲	2023-07-24 14:41:27.257211	SLMD-000	Tank-000	Lightning	139.317	91.0	13.312	685.343
▲	2023-07-24 14:41:01.138973	SLMD-000	Tank-000	Switching	188.65	116.0	8.9	298.718
▲	2023-07-23 14:41:01.139848	SLMD-001	Tank-001	Switching	185.288	129.0	29.19	402.573
▲	2023-07-22 14:41:01.139850	SLMD-002	Tank-002	Switching	140.806	51.0	16.438	177.293

Rows per page: 10 1-10 of 57

# SOFTWARE CONCENTRATOR



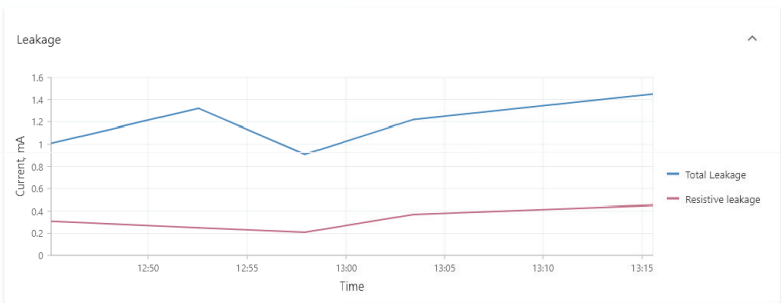
PARALEC  
energy solutions



SMC SN650001-8960\*\*\* SLMD-002

<b>Counter I2t total</b> <b>479,751</b> 20% remaining	<b>Max Resistive Leakage</b> <b>456,449</b> +10% vs J-30 +15% vs phase A, B 20% of max	<b>Max Leakage</b> <b>900,315</b> 20% remaining	<b>Power Supply</b> <b>OK</b>	<b>Last Communication</b> <b>2 s</b>
---	--	---	----------------------------------	---

<b>Number of Events</b> <b>9</b> 20% remaining	<b>Max lightning</b> <b>20kA, 30µs</b>	<b>Max Switching</b> <b>1.2kA, 5ms</b>
--	---	---



### List of events

Acknowledgement	Timestamp ↓	Type	Peak current, kA	Duration, µs	Charges, C	I2T, A2s
⚠	2023-07-24 14:52:43.248366	Lightning	116.42	88.0	7.734	951.842
⚠	2023-07-24 14:49:23.249866	Switching	122.244	53.0	20.884	89.121
⚠	2023-07-24 14:46:03.254159	Lightning	181.083	123.0	27.826	257.424
⚠	2023-07-24 14:42:43.263834	Switching	141.892	88.0	27.145	855.571
⚠	2023-07-22 14:41:01.139850	Switching	140.806	51.0	16.438	177.293
✓	2023-07-12 14:41:01.139868	Lightning	100.515	57.0	43.658	987.903
✓	2023-07-02 14:41:01.139872	Switching	104.489	75.0	49.436	829.849
✓	2023-06-22 14:41:01.139879	Lightning	174.976	61.0	46.038	73.256
✓	2023-06-12 14:41:01.139883	Switching	167.038	121.0	30.401	419.356

Rows per page: 10 | 1-10 of 9

### Counters

Counter I2t lightning: 100	Max Total Leakage: 100
Counter I2t switching: 100	Max Resistive Leakage: 100
Counter I2t 50Hz: 100	Max Capacity Leakage: 100
Counter I2t total: 100	Max Power Frequency Current: 100
	Max Lightning: 100
	Max Switching: 100

# PRODUCT RANGE



1,2,3	4	5	6	7	8
<b>103</b>	....	....	....	....	....
<b>SMB</b>	<b>Phases</b>	<b>Power Supply</b>	<b>Communication</b>	<b>Current Range</b>	<b>Frequency</b>
1,2,3	4	5	6	7	8
<b>104</b>	....	....	....	....	....
<b>SMC</b>	<b>Phases</b>	<b>Power Supply</b>	<b>Communication</b>	<b>Current Range</b>	<b>Frequency</b>

4		5		8	
1	1 phase	1	12 VDC	1	EU863-870
2	3 phases	2	Solar Panel A	2	US902-928
6		7		3	CN470-510
1	RS485	1	200A - 40kA	4	AU915-928
2	LoRa	2	100A - 20kA	5	AS920-923
3	SigFox	3	300A - 60kA	6	AS923-925
4	Digital Output	4	500A - 100kA	7	KR920-923
		5	750A - 150kA	8	IN865-867
		6	1000A - 200kA		



## PARALEC ENERGY CO., LTD.

**Europe**  
 Le Mathis, 204 avenue de Colmar, 67100 Strasbourg  
 FRANCE  
 TEL : +33 7 85 71 90 63

[www.paralec.com](http://www.paralec.com)  
[www.surge-lightning-arrester-monitoring.com](http://www.surge-lightning-arrester-monitoring.com)

**Asia**  
 1000/5-6 Liberty Plaza, 20<sup>th</sup> Floor, Soi.Thonglor,  
 Sukhumvit 55 Rd., Kongtun Nua, Wattana, Bangkok  
 THAILAND  
 TEL : +66 (0)2 381 5886

Email : [info@paralec.com](mailto:info@paralec.com)  
 LINE : @paralec