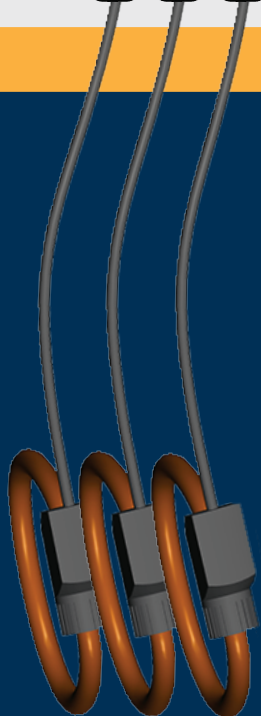
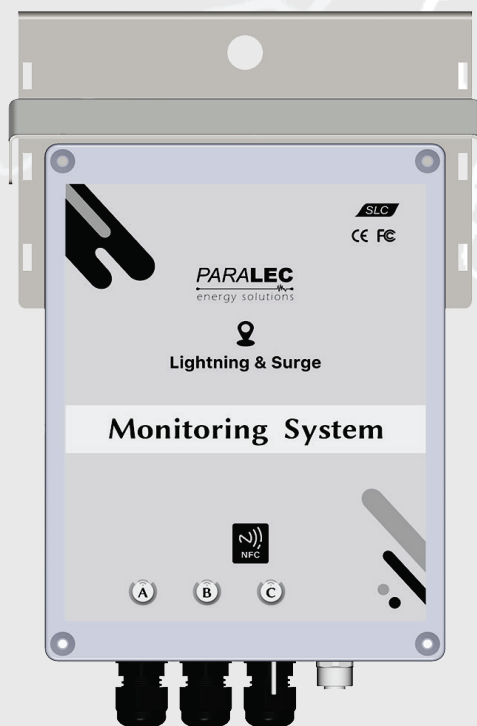


Surge & Lightning Monitoring Device

For Gapped Arresters from 6 to 800 kVAC



- **Monitoring of LLPD, EGLA, TLA, CLAH, lightning rods transmission lines, building**
- Wired or wireless communication : RS485 modbus, LoRA, NFC
- Outdoor device : IP65
- Solar supply & external supply versions
- Unique condition monitoring :
total discharged energy monitoring system , lightning , surge events and discharges record, lightning waveform
- Durable device:
stainless steel, polycarbonate UV resistant, aluminum.
- Up to 3 phases gapped arresters on the same device.
- Monitoring software
- GPS localisation and timestamp



See lightning & surges, clearly

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

It involves diagnostic of gapped arresters (EGLA, CLAH, LLPD) in service : peak current, polarity, waveform record, cumulative charges, let-through, follow current, number of events, with outstanding accuracy 10%. All records come with exact time stamp thanks to embedded GPS.

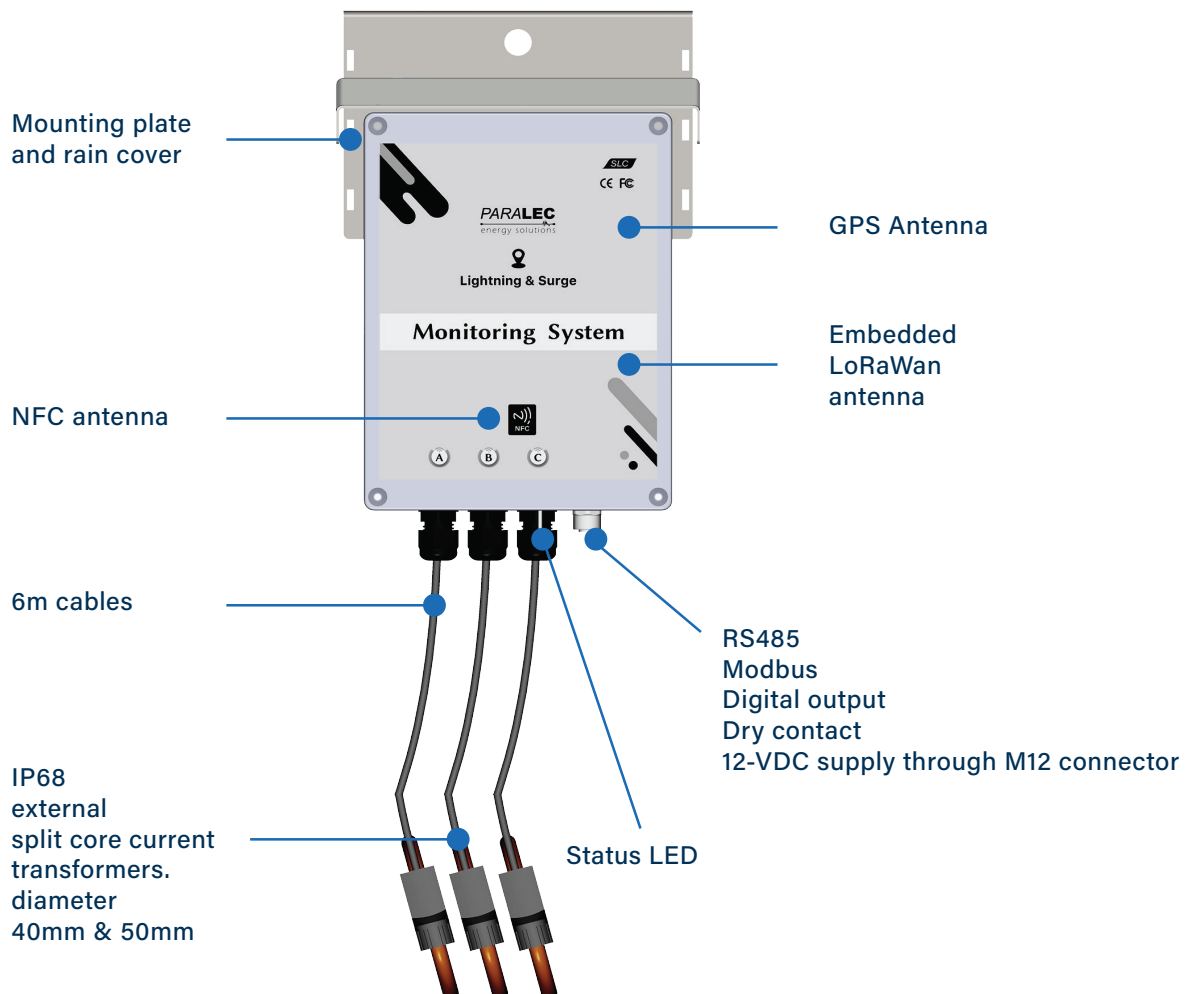
A count down method based on let through allows the user to have an overview on the % of lifespan remaining for the device. Warnings are also registered whenever thresholds are crossed on : follow current duration, follow current peak, discharge capabilities, energy handling capabilities.

With a communication range of 2.5 km on LoRaWan standards allows the user to have a safe and remote connection.

SL Surge Monitoring can be installed easily on ground conductors. Thanks to up to 10m cable and split core transformers, diameter 50mm.

Thanks to its IP65, housing, rugged materials and self power, the SL serie is suitable for outdoor installation.

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



TECHNICAL CHARACTERISTICS



PARALEC
energy solutions

REFERENCE	SLC
EARTHING CONNECTION	
CONDUCTOR DIAMETER RANGE	5 to 50 35 to 400 mm ²
INSTALLATION ON THE CONDUCTOR	Clamped on conductor
LIGHTNING EVENT COUNTER	
MINIMUM DISCHARGE PEAK CURRENT DETECTED - 8/20 μs waveform - IEC 62561-6	200 A*
MAXIMUM DISCHARGE PEAK CURRENT DETECTED - 10/350 μs waveform - IEC 62561-6	100 kA
MAXIMUM DISCHARGE PEAK CURRENT MEASURED - 10/350 μs waveform - IEC 62561-6	40 kA*
RESPONSE TIME	1.3 μs
MINIMUM TIME BETWEEN 2 STROKE FOR REGISTRATION, RESPONSE TIME	10 μs
LONG DURATION CURRENT WITHSTAND CAPABILITY	2 500 A for 4 ms
HIGH CURRENT WITHSTAND CAPABILITY	100 kA
IMPULSE CURRENT PEAK MEASUREMENT	YES
MEASUREMENT	
MINIMUM DISCHARGE PEAK CURRENT MEASURED - 8/20 μs waveform - IEC 62561-6	200 A*
MAXIMUM DISCHARGE PEAK CURRENT MEASURED - 10/350 μs waveform - IEC 62561-6	40 kA*
PEAK LIGHTNING CURRENT ACCURACY 8/20us	10%
FOLLOW CURRENT / GROUND FAULT RANGE	70 to 10 000 A*
FOLLOW CURRENT / GROUND FAULT (50/60Hz) ACCURACY	10%
TOTAL LET THROUGH I ² t	YES
CHARGE RANGE	0 to 65C
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/m ³	Class C2: 35
MAX ALTITUDE - m	2 000
ATMOSPHERIC PRESSURE - kPa	70 to 106
STANDARDS/TEST	IEC 62561-6
TYPE OF SURGE COUNTER as per IEC 62561-6	Type 1 and Type 2; outdoor

* other range on request

RECORDS

NUMBER OF EVENTS	100 Events, with up to 300 components of 3 phases. Example see below.
LOGS (WARNING, COMMUNICATION...)	400 records
1 st IMPULSE	100 μ s at 1 MSPS 600 records for 3 phases
GPS	Time stamp and location
COUNTERS	I ² t lightning, lightning charges (C) I ² t power frequency currents, power frequency charges (C) I ² t switching, switching charges (C) I ² t total, total charges (C)
MAXIMUM	Max power frequency current Max switching Max lightning

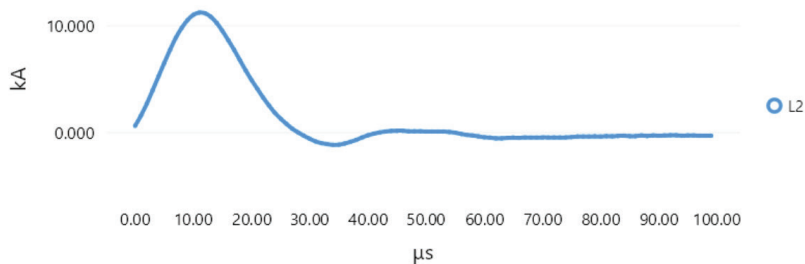
LIFE SPAN WARNING / ALARM

% OF LIFE REMAINING	%, ratio total I ² t / maximum I ² t
PROSPECTIVE END OF LIFE	Days
ALARMS TRIGGER	Overcurrent 50/60Hz > 1 cycle 10 components registered < 10 days Maximum total I ² t reached

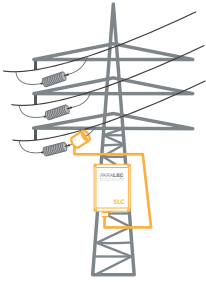
EVENT COMPONENTS RECORD EXAMPLE

EVENT COMPONENTS RECORDS LIGHTNING	Unit	Example of Value
Date	Date	2021-05-06
Time	Time	14:30:05Z
Peak Current ⁽¹⁾	kA	-1
Changes Coulomb ⁽¹⁾	C	0.6
Duration ⁽¹⁾	μ s	30
I ² t(A ² s) ⁽¹⁾	A ² s	34

EVENT WAVEFORM RECORD 100 μ s 1MSPS ⁽¹⁾



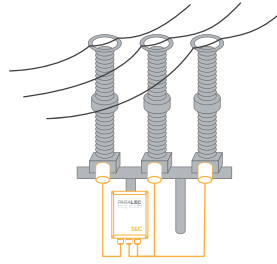
⁽¹⁾ available for 3 phases



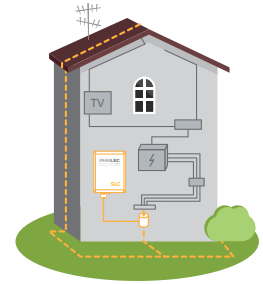
On overhead lines with
LLPD, TLA or EGLA



On buildings
ground lead

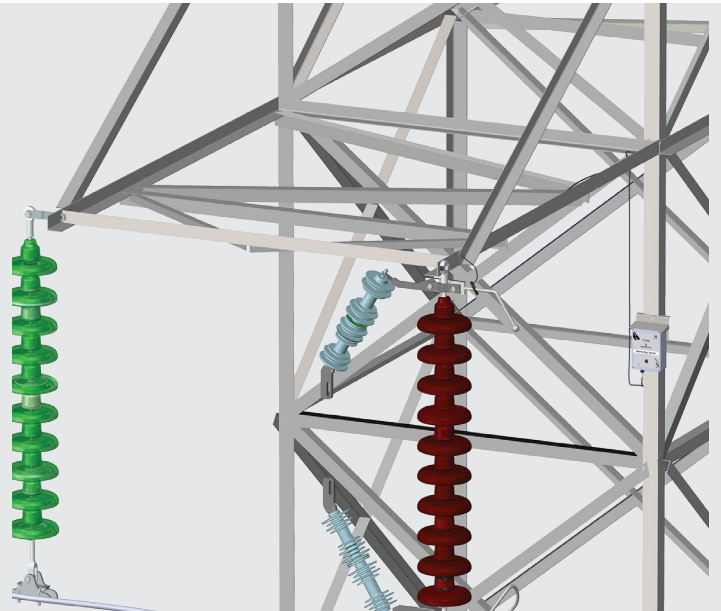
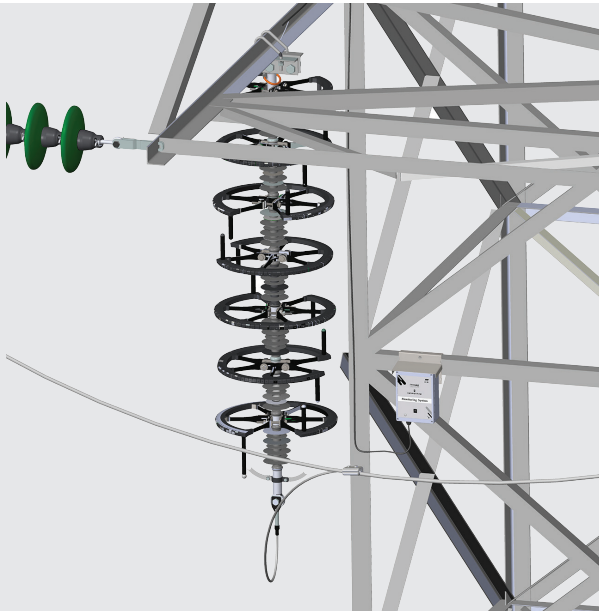


On substation MOA

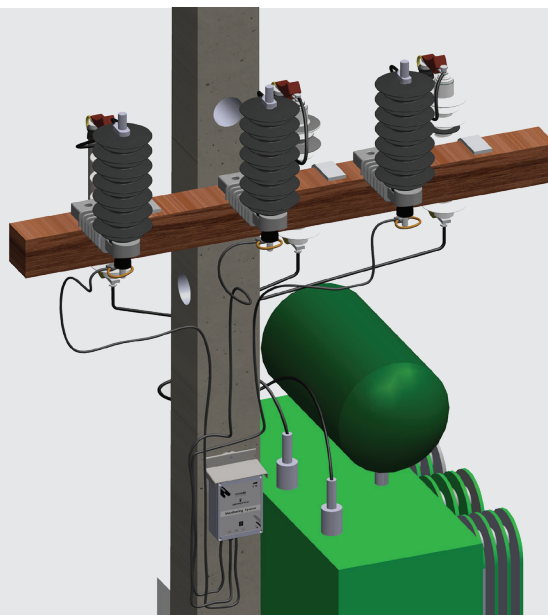


On building SPD

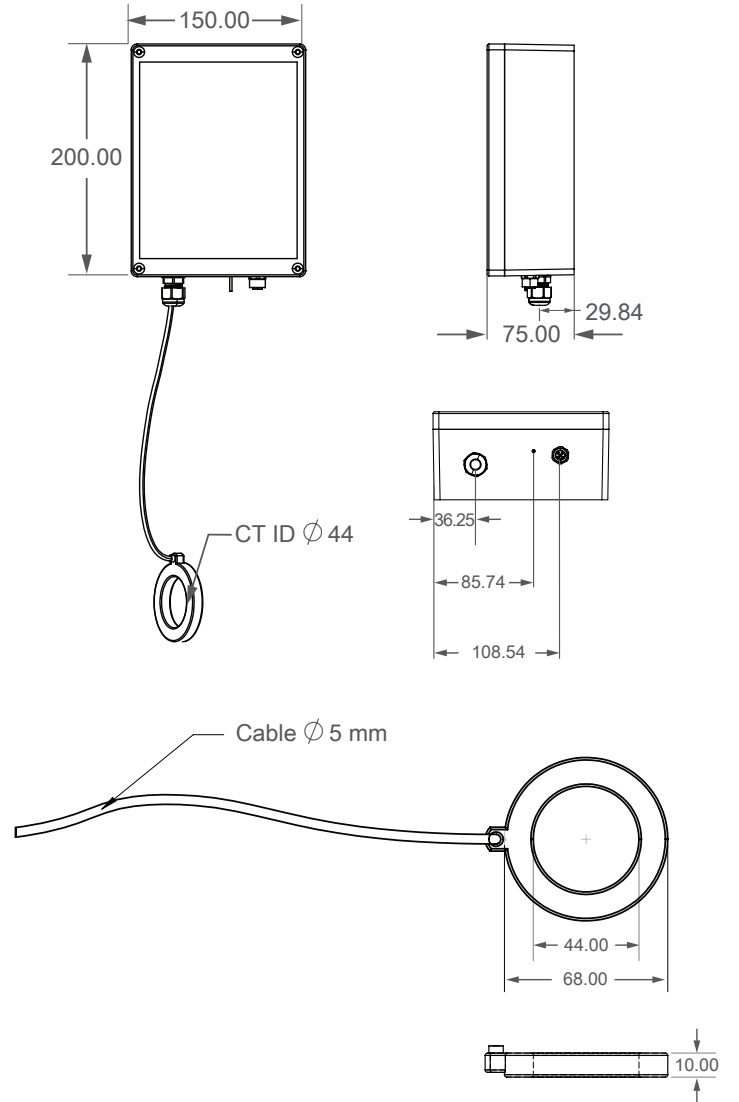
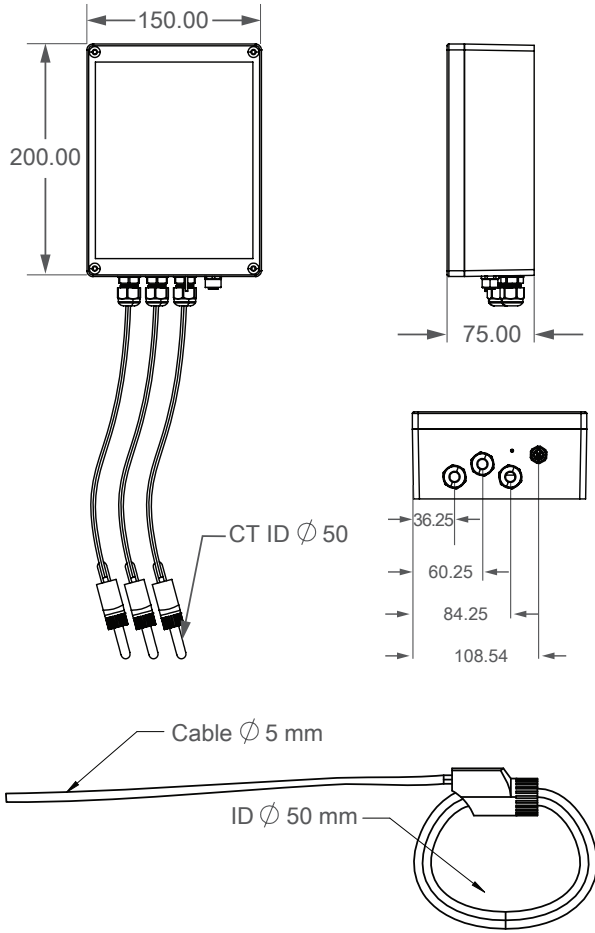
On EGLA or LLPD



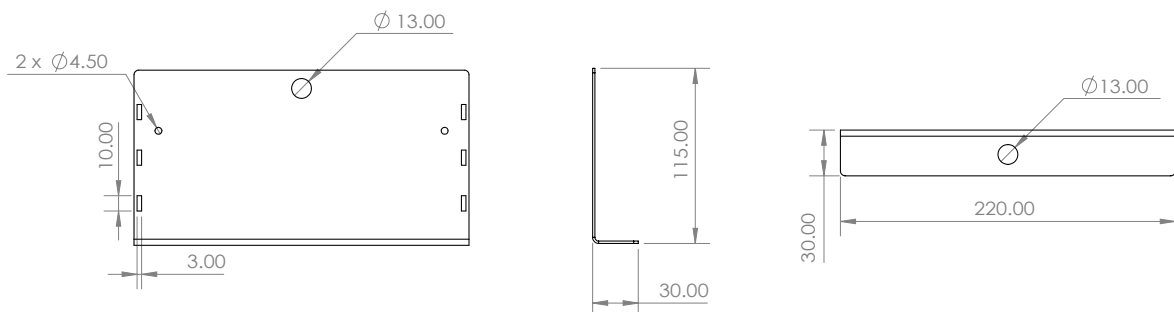
On MOA and PMT



SL



Mounting plate (included)



Short Range



**Wireless
NFC**
Contact



**Wireless
cellular(4/5G),
Wi-Fi**

**Wired
Modbus**

Modbus RTU via 2 wires,
RS485 to master

Long Range



**Wireless
LoRaWan**
Up to 3 km line of sight



SCADA / BMS



Concentrator
Equipped with HMI, DataBase

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



Concentrator Full

Equipped with HMI, DataBase

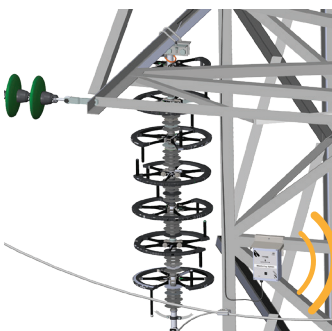
LAN or broadband
cellular network (4/5G)
IEC61850, DNP3, MODBUS, REST API
HMI touch panel 12"
LoRA gateway
Database Memory : 256Gb



Concentrator Wifi Light I CL2W

Mini DataBase

Data visualisation
PostGRE Database
Planar Antenna



slms_hmi | Lightning & Surge Monitoring | **Devices** | Events | Map | Settings

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

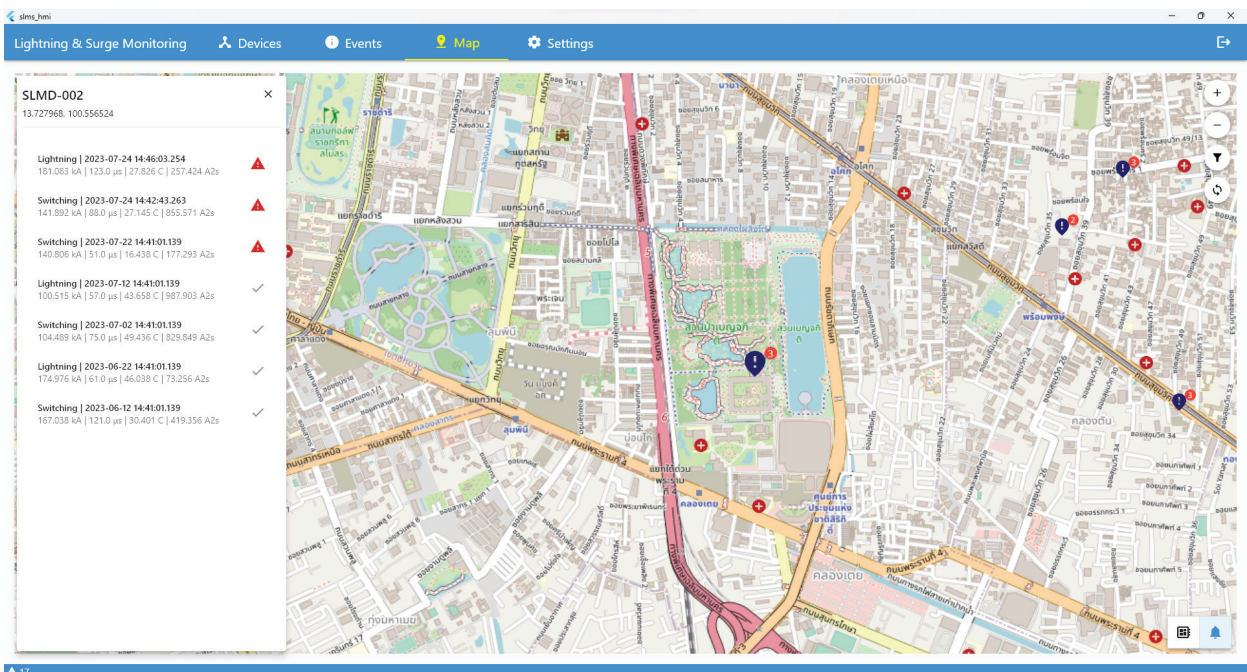
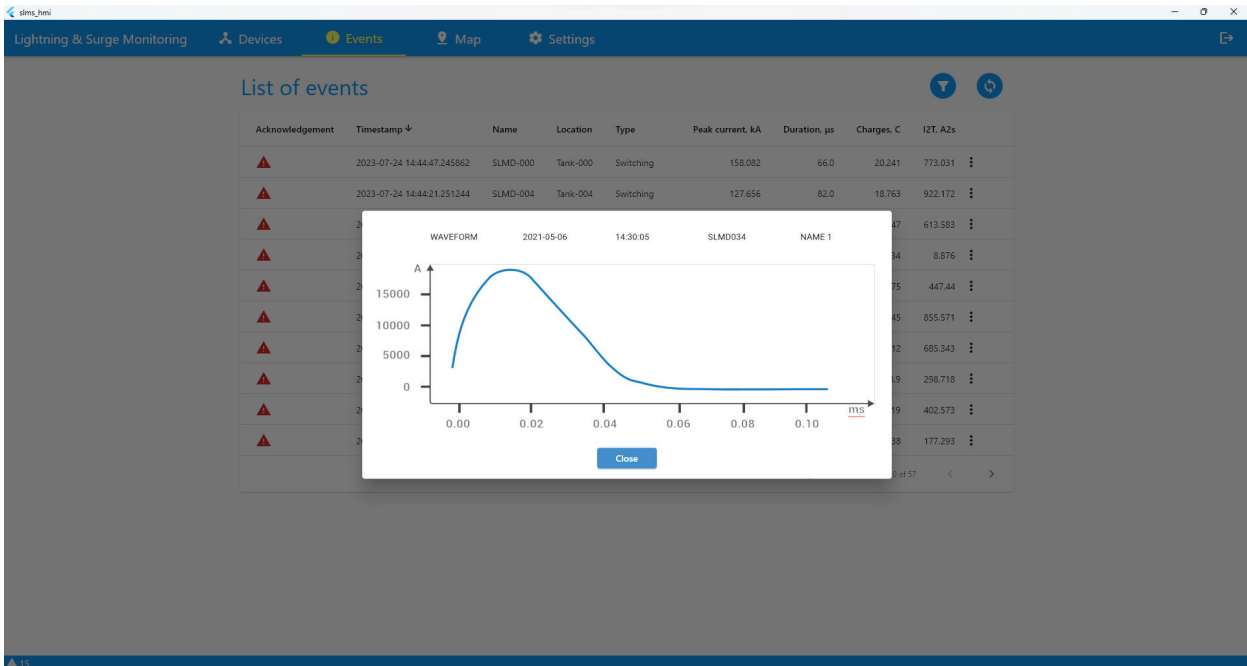
Rows per page: 10 | 1-10 of 10

slms_hmi | Lightning & Surge Monitoring | Devices | **Events** | Map | Settings

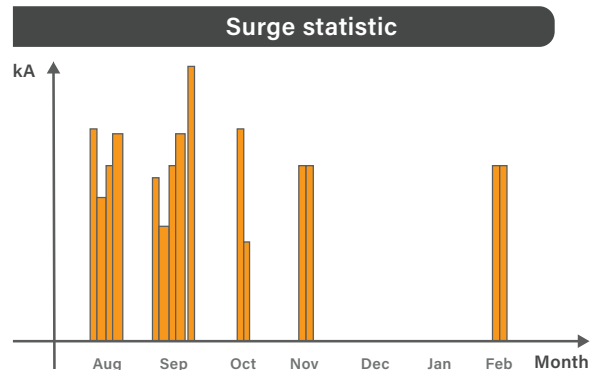
List of events

Acknowledgement	Timestamp ↓	Name	Location	Type	Peak current, kA	Duration, μs	Charges, C	I2T, A2s
⚠	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 14:42:49.262827	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



Impulse current -A	Count
1-5 kA	0
5-10 kA	1
10-40 kA	1
> 40 kA	0
Total	2





SLC SN650001-8960*** SLMD-002

Counter I2t total 479.751 <small>20% remaining</small>	Power Supply OK	Last Communication 2 s
---	---	--

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

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

Counter I2t switching:
100

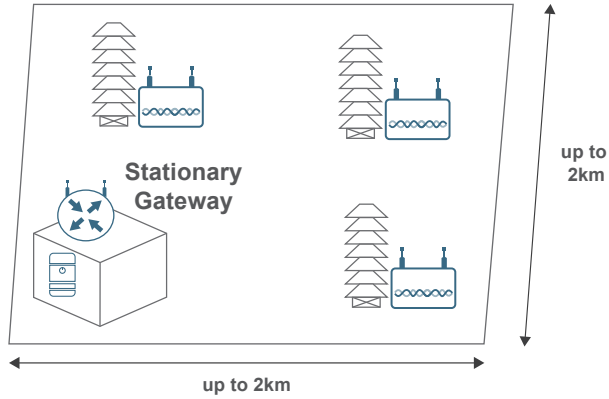
Counter I2t 50Hz:
100

Counter I2t total:
100

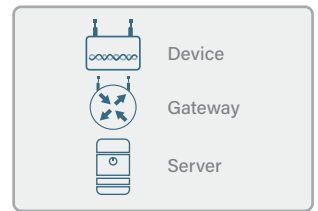
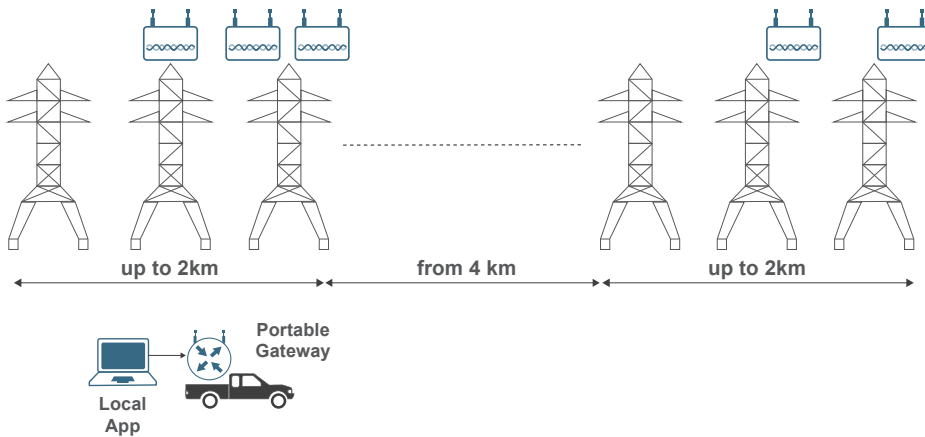
Max Power Frequency Current:
100

Max Lightning:

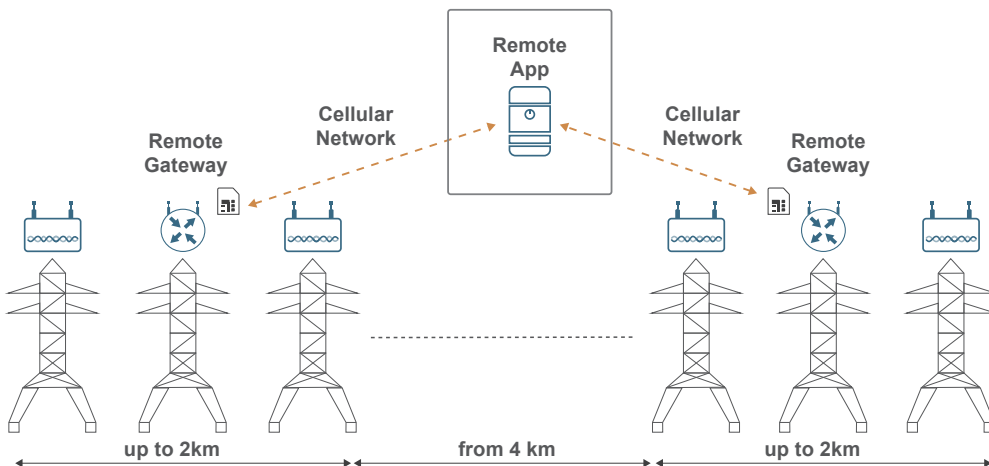
Substation - LoRaWan local private network



Transmission Line - LoRaWan temporary communication



Transmission Line - LoRaWan private network



PRODUCT RANGE



PARALEC
energy solutions

1,2,3	4	5	6	7	8	9	10
106	1	1
SLC	Phases	Cable length	Communication	Current range	Frequency	Brand	Version

4	5	7	8
1	1	1	1
2	2	2	2
3	3	3	3
4		4	4
		5	5
		6	6

6	7	8
1	1	1
2	2	2
3	3	3
	4	4
	5	5
	6	6
	7	7
	8	8
	9	9

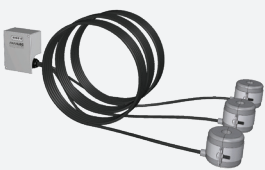
4	5	7	8
1 phase - split core	3 meters	200A - 40kA	EU863-870
3 phase - split core	6 meters	100A - 20kA	US902-928
1 phase - closed core	10 meters	300A - 60kA	CN470-510
3 phase - closed core		500A - 100kA	AU915-928
		750A - 150kA	AS920-923
		1000A - 200kA	AS923-925
			KR920-923
			IN865-867
			None

6
1 RS485
2 LoRa
3 Digital Output

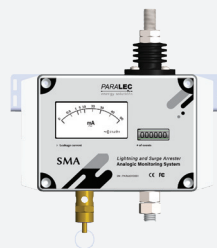
Communication Devices

10742111	LORA gateway
10762111	Concentrator light LORA
10712121	Concentrator full LORA

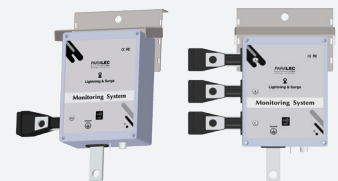
Also Available



SC250
Surge Counter



SMA
Surge Counter and
leakage current



SMC
Surge arrester monitoring device -
resistive leakage current



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