



Catalog
CRS
Resistive
Silicone Sensor

Voltage Detectors
for DC Catenary



Resistive Silicone Sensor

- ✓ Voltage presence detector for catenary **V_{DC}**
- ✓ Models from **750 V_{DC}** to **4.000 V_{DC}**
- ✓ **Aluminum** terminals and **Silicone** outer coating
- ✓ Leakage Line: **618mm**
- ✓ Output Options:
 - **Reed Relay**
 - **CBI21** – Output 4-20 mA
 - **FO** – Fiber Optic Output
 - **Led** – Light Indicator
- ✓ Sensor weight: **1,2 Kg**
- ✓ Complete equipment weight: **2,25 Kg**
- ✓ **High resistance** to manipulation and vandalism
- ✓ Better weight, endurance, and shock resistance compared to epoxy-coated sensors
- ✓ Mounting accessories, waterproof case and **Stainless-Steel** screws with anti-vibration **Nord-Lock®** washers
- ✓ **Vertical assembly** with **M16** hexagonal screw adaptable to any installation, optional side support



Applications

Detection of DC Voltage presence in Railway Installations:

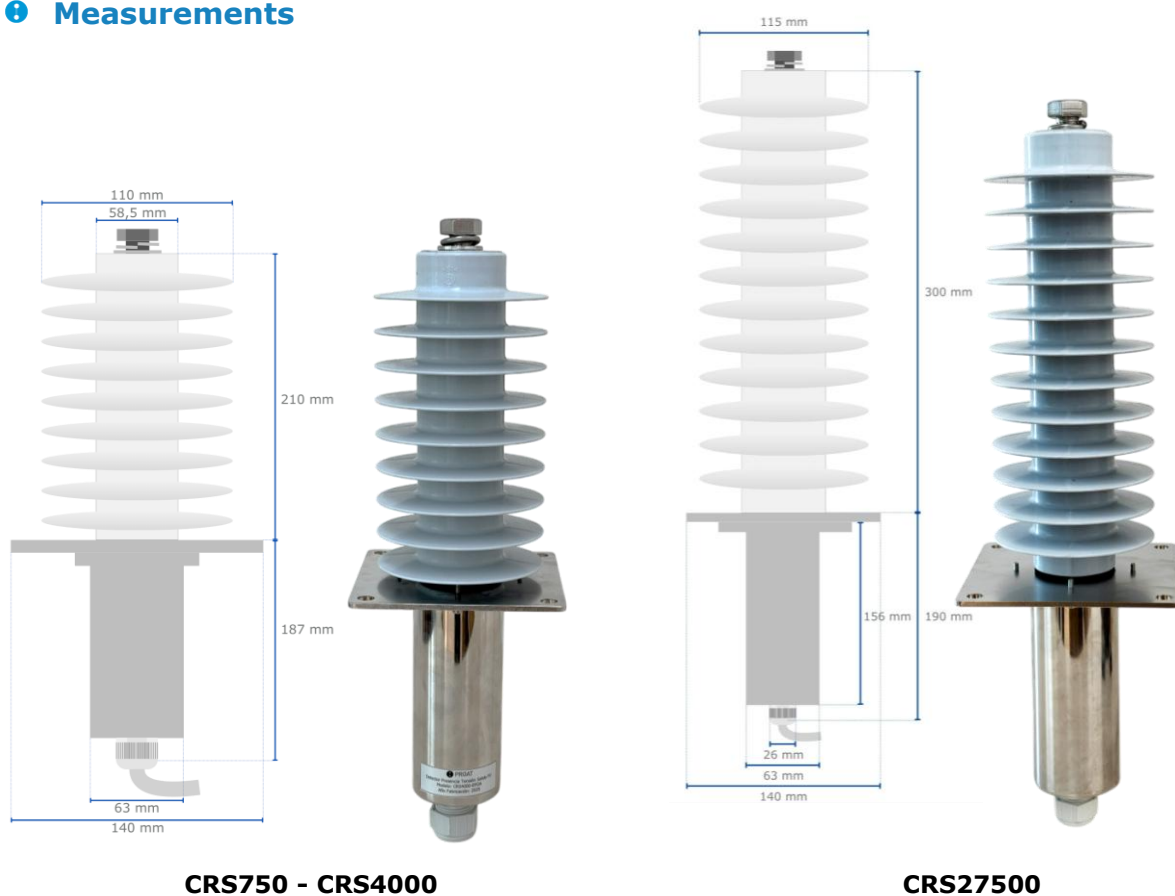
- Conventional Trains
- Metros / Underground
- Trams



Models

Model	Voltage Service	Supports 27,5 kV _{AC}	Test 1 min 50 Hz	Leakage Line	Pollution Zone	Sensor's Height	Sensor Weight
CRS750	0-750 V _{DC}	No	4 kV _{DC}	618mm	Media	210mm	1,2 kg
CRS1500	0-1500 V _{DC}	No	5 kV _{DC}	618mm	Media	210mm	1,2 kg
CRS3000	0-3000 V _{DC}	No	10 kV _{DC}	618mm	Media	210mm	1,2 kg
CRS4000	0-4000 V _{DC}	No	10 kV _{DC}	618mm	Media	210mm	1,2 kg
CRS27500	0-4000 V _{DC}	Yes	10 kV _{DC} y 50 kV _{AC}	972mm	Media	300mm	1,8 kg

Measurements



Technical Data

CRS	
Silicone	ISO 37
Elongation upon impact	630 %
Resistance to traction	8,5 N/mm ²

CRS + RL

Resistive Silicone Sensor + Reed Relay Output

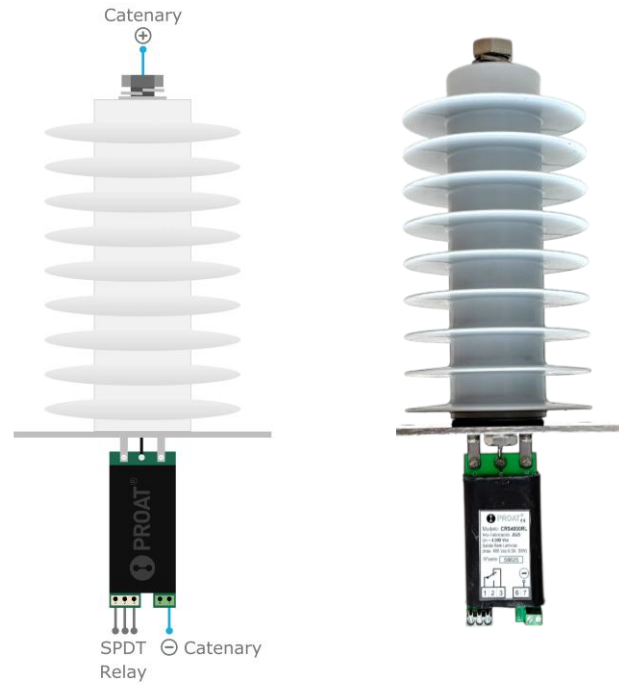
- ✓ Resistive Silicone Sensor **CRS**
- ✓ Reed Relay with **potential-free switched contact** output:
 - Activation at **>40%** of the nominal voltage
 - Deactivation at **<30%** of the nominal voltage
- ✓ **Self-powered** of the catenary voltage itself
- ✓ Very low power solution: **3mA**
- ✓ Response Time: **15ms**
- ✓ **Epoxy** coated circuit installed in waterproof case
- ✓ Approved by ADIF with Registration Number **64999051E** on 1-Sept-2016



Models

Model	Nominal Voltage	Leakage Line	Output	Auxiliary Voltage
CRS750 + RL	750 V _{DC}	618 mm	Reed Relay	Self-powered
CRS1500 + RL	1500 V _{DC}	618 mm	Reed Relay	Self-powered
CRS3000 + RL	3000 V _{DC}	618 mm	Reed Relay	Self-powered
CRS4000 + RL	4000 V _{DC}	618 mm	Reed Relay	Self-powered

Connection



Technical Data

Reed Relay

Specifications	
Contact Type	SPDT
Switching Capacity	<60 VA
Switching Voltage	<400 V _{AC} / V _{DC}
Switching Current	<1.0 A
Transport/Carrying Current	<2.0 A
Insulation Resistance	>10 ⁹ Ω
Operating Temperature	-40° a +125°

Tests

Tests **Norm UNE 21138**:

- Mechanical flexural strength tests: 20N
- Dry lightning impulse withstand voltage tests

Tests **Norm UNE 600068**:

- Corrosion test

Otros tests:

- Operating Temperature

CRS + CBI21

Resistive Silicone Sensor

+

Output 4-20mA

- ✓ Resistive Silicone Sensor **CRS**
- ✓ Current loop converter **CBI21** with isolated **4-20mA** output proportional to catenary voltage
- ✓ Auxiliary voltage **85-264 V_{AC} | 85-370 V_{DC} , 48 V_{DC} , 24 V_{DC}** depending on model
- ✓ CRS+CBI21 withstands lightning impulses up to **95kV**
- ✓ Epoxy coated circuit installed in waterproof case

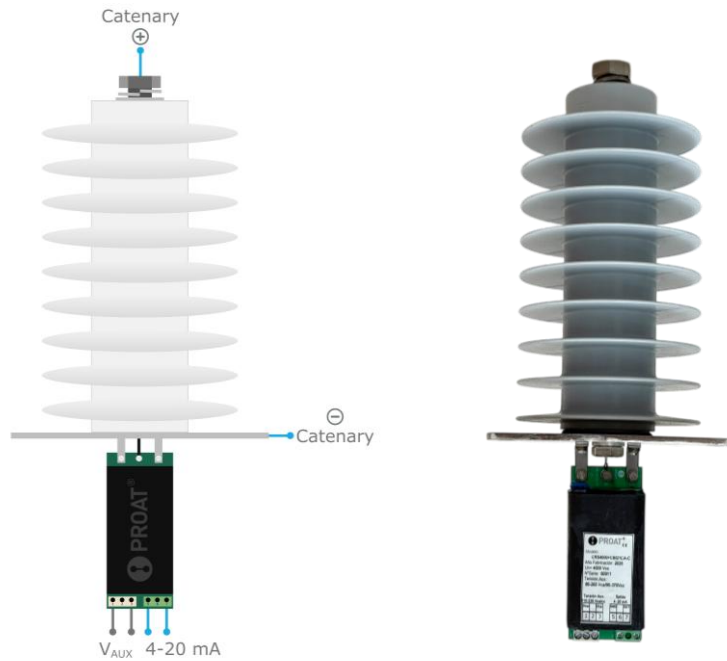


Models

Model	Compatible Sensor	Output	Auxiliary Voltage
CBI21-CA	CRS750 to CRS4000	4-20mA	85-264 V _{AC} 85-370 V _{DC}
CBI21-CA-24	CRS750 to CRS4000	4-20mA	24 V _{DC}
CBI21-CA-48	CRS750 to CRS4000	4-20mA	48 V _{DC}
CBI21-FA	CRS27500	4-20mA	85-264 V _{AC} 85-370 V _{DC}
CBI21-FA-24	CRS27500	4-20mA	24 V _{DC}
CBI21-FA-48	CRS27500	4-20mA	48 V _{DC}

Example order: CRS4000 + CBI21-CA-24

Connection



Technical Data

CBI21

Specifications	
Output (RL = 500 Ω)	4-20 mA
Maximum load resistance	750 Ω
Linearity	1%
Accuracy	$\pm 1\%$
Consumption	3W
Input-Output isolation	3kV
Operating temperature	-30° to +75°

Tests

Tests **Norm UNE 21308-1:**

- Mechanical Testing
- Dry lightning impulse voltage tests
- Voltage tests supported at dry industrial frequency
- Voltage tests supported at industrial frequency in rain

Tests **Norm UNE 600068:**

- Corrosion test

Other Tests:

- Operating temperature
- Accuracy of voltage response

CRS + FO

Resistive Silicone Sensor + Fiber Optic Output

- ✓ Resistive Silicone Sensor **CRS**
- ✓ Fiber Optic Transmitter-Receiver **EFO** and **RFO**
- ✓ CRS+FO supports lightning impulses up to **95kV**
- ✓ The CRS + FO set is **ADIF** approved (DPA-FO) with reference number **2014/00067** on 29 January 2014

EFO – Fiber Optic Emitter

- ✓ **Light pulse** output proportional to catenary voltage
- ✓ Models for:
 - Fiber Optic with **SL connector** up to **100** meters
 - Fiber Optic with **ST connector** up to **5.000** meters
- ✓ Linearity: **±5%**
- ✓ **Self-powered or Auxiliary Voltage ±12V_{DC}** depending on model
- ✓ Optional **FA1212** ±12V_{DC} power supply for voltages **85-264 V_{AC}** | **85-370V_{DC}** with galvanic isolation input-output **18,5kV**

RFO – Fiber Optic Receiver

- ✓ With **Real-time display** of catenary voltage for Din Rail models
- ✓ **2 potential-free** output contacts:
 - Presence of voltage – Programmable levels
 - Anomalies – Fiber Optic communication error
- ✓ **Programmable levels** of the presence and absence of voltage contact for Din Rail models
- ✓ **4-20mA** output proportional to the catenary voltage
- ✓ Installation on **Din Rail** o **Rack Submodule 19'** depending on model
- ✓ Auxiliary voltage **85-264 V_{AC}** | **85-370V_{DC}** or **24 V_{DC}**



Models – Fiber Optic Emitters

Model	Fiber Optic	Auxiliary Voltage
EFO	SL Connector	Catenary Self-powered
EFOA	SL Connector	±12V _{DC}
EFO-LD	ST Connector	Catenary Self-powered
EFOA-LD	ST Connector	±12V _{DC}

Example order: CCS4000 + EFOA with
Power supply FA1212-18 and compatible receiver RFOA-D

Models – Fiber Optic Receivers

Model	Fiber Optic	Compatible Emitter	Installation	Real Time Visualization	4-20 mA Output	Output Contacts	Auxiliary Voltage
RFO	SL Connector	EFO	19' Rack Submodule	No	No	Yes	85-264 V _{AC} 85-370 V _{DC}
RFO-D	SL Connector	EFO	Din Rail	Yes	Yes	Yes	85-264 V _{AC} 85-370 V _{DC}
RFO-D-24	SL Connector	EFO	Din Rail	Yes	Yes	Yes	24 V _{DC}
RFOA	SL Connector	EFOA	19' Rack Submodule	No	No	Yes	85-264 V _{AC} 85-370 V _{DC}
RFOA-D	SL Connector	EFOA	Din Rail	Yes	Yes	Yes	85-264 V _{AC} 85-370 V _{DC}
RFOA-D-24	SL Connector	EFOA	Din Rail	Yes	Yes	Yes	24 V _{DC}
RFO-LD	ST Connector	EFO-LD	19' Rack Submodule	No	No	Yes	85-264 V _{AC} 85-370 V _{DC}
RFO-D-LD	ST Connector	EFO-LD	Din Rail	Yes	Yes	Yes	85-264 V _{AC} 85-370 V _{DC}
RFO-D-LD-24	ST Connector	EFO-LD	Din Rail	Yes	Yes	Yes	24 V _{DC}
RFOA-LD	ST Connector	EFOA-LD	19' Rack Submodule	No	No	Yes	85-264 V _{AC} 85-370 V _{DC}
RFOA-D-LD	ST Connector	EFOA-LD	Din Rail	Yes	Yes	Yes	85-264 V _{AC} 85-370 V _{DC}
RFOA-D-LD-24	ST Connector	EFOA-LD	Din Rail	Yes	Yes	Yes	24 V _{DC}

*Other models can be manufactured upon request

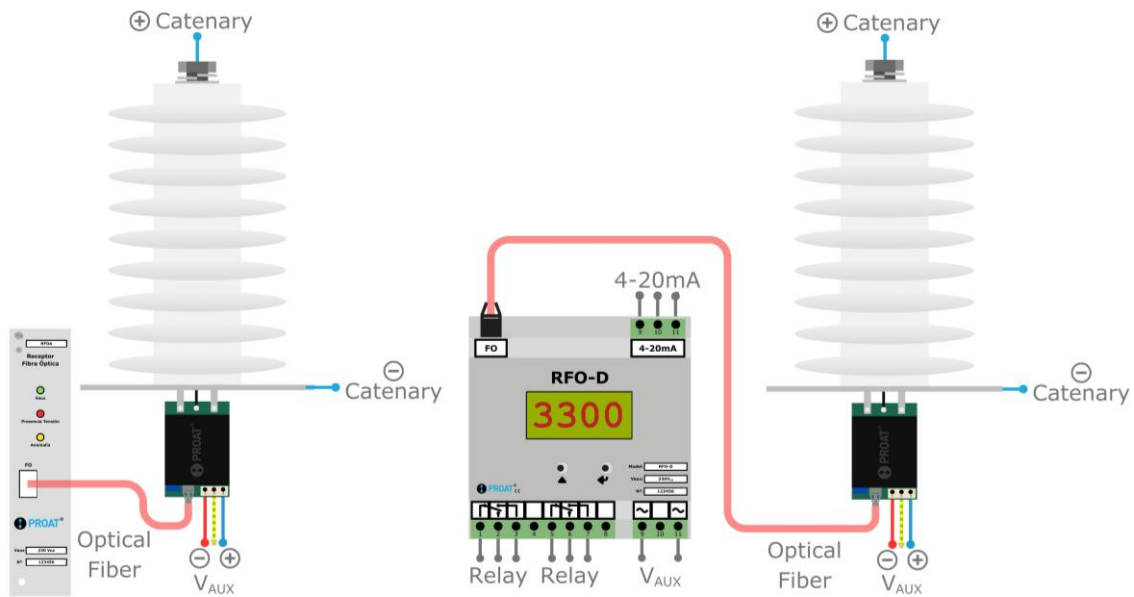
Models – Fiber Optic Patch cords

Model	Connector	Distance
LG-xxx	SL Connector	5 to 100 meters models
LG-xxx-LD	ST Connector	5 to 5,000 meters models
LG-xxx-LD-R	ST Connector	5 to 5,000 meters models - Reinforced

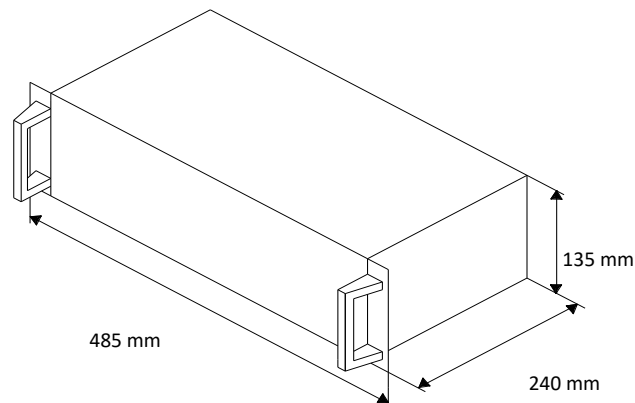
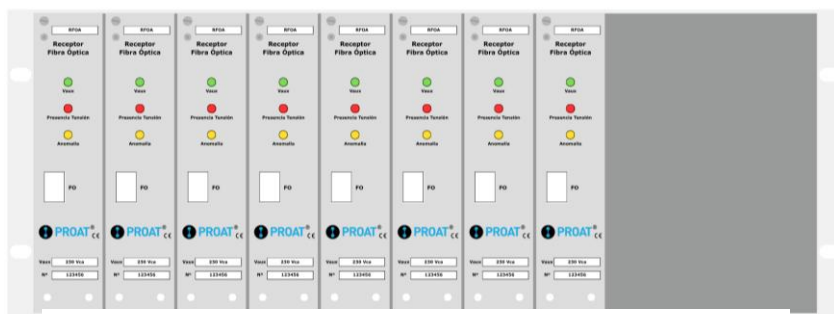
Models – Power Supply

Model	Input	Output	Isolation Input-Output
FA1212-18	85-264 V _{AC} 85-370V _{DC}	±12V _{DC}	18,5 kV _{AC}

Connection



19' Rack mounting case for 12 Modules



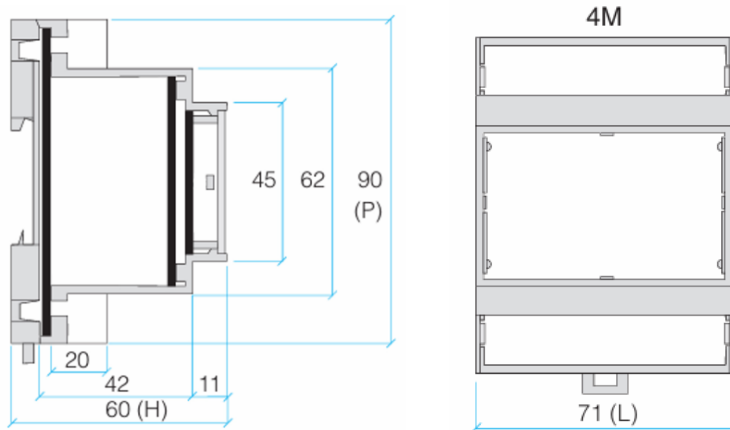
Technical Data – RFO-D

RFO-D

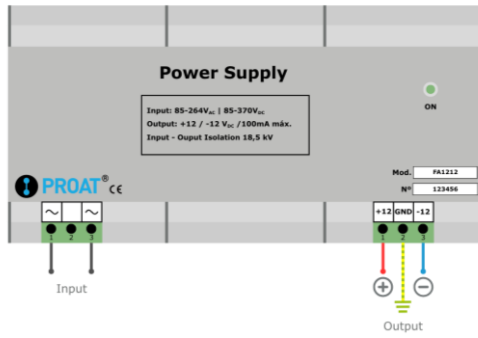
Specifications	
Contact Type	SPDT
Switching Capacity	1000 VA
Switching Voltage	$\leq 230 V_{AC}$
Response Time	$< 1s$
Reading Range	$0 - U_N + 10\%$
Auxiliary Voltage	$85-264 V_{AC} \mid 85-370 V_{DC}$ $24V_{DC}$
Standby Power Consumption	$< 5W$
Operating Temperature	$-10^{\circ} a +60^{\circ}$
Regulations	CE

Constructive Characteristics – RFO-D

- DIN Rail installation
- Front Plate terminals
- Self-extinguishing plastic case class V0

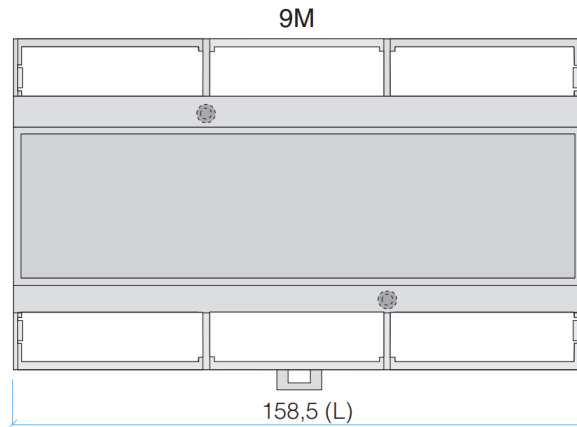
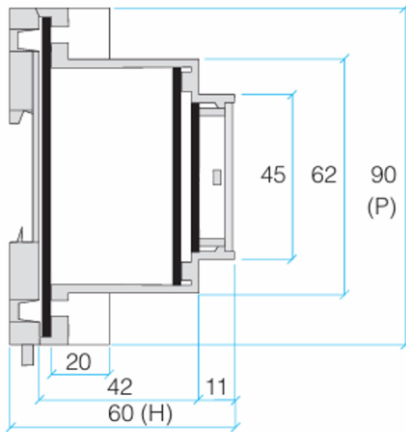


⚙️ Power Supply – FA1212



⚙️ Constructive Characteristics – FA1212

- DIN Rail installation
- Front Plate Terminals
- Self-extinguishing plastic case class VO



⚙️ Tests

Tests **Norm UNE 21138**:

- Mechanical flexion strength tests: **20N**
- Dry lightning impulse withstand voltage tests

Tests **Norm UNE 600068**:

- Corrosion test

Other Tests:

- Operating Temperature

CRS + LED

Resistive Silicone Sensor + LED Light Indicator

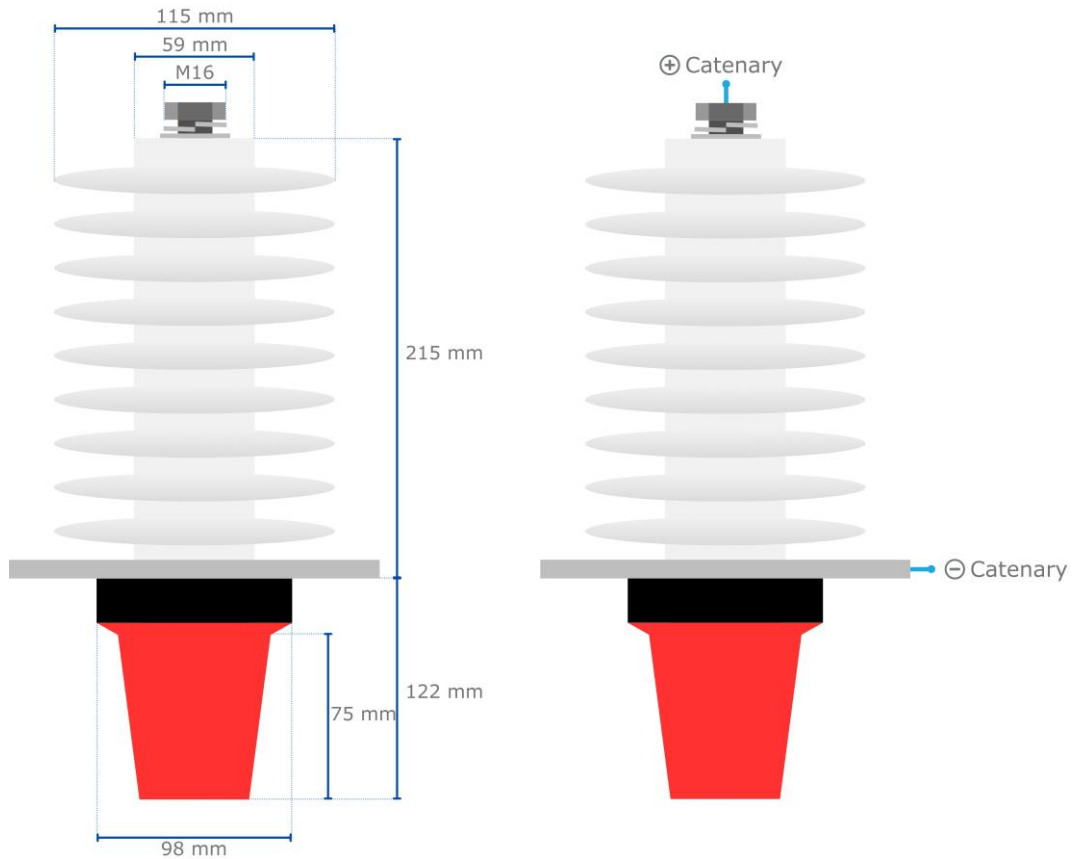
- ✓ Resistive Silicone Sensor **CRS**
- ✓ Control circuit and a **LED** flashing light lamp
- ✓ Black ABS base and Red translucent polycarbonate lampshade
- ✓ **Self-powered** from the catenary
- ✓ **Voltage signaling** in tunnels, workshops, etc. For maintenance or emergency tasks.
- ✓ Light indicator activation > **30%** of nominal voltage
- ✓ Life of light cards >**50000 hours**
- ✓ **Epoxy** coated circuit installed in waterproof case



Models

Model	Voltage Service	Auxiliary Voltage
CRS750 + LED	0-750 V _{DC}	Self-powered
CRS1500 + LED	0-1500 V _{DC}	Self-powered
CRS3000 + LED	0-3000 V _{DC}	Self-powered
CRS4000 + LED	0-4000 V _{DC}	Self-powered
CRS27500 + LED	0-25k V _{AC}	Self-powered

Measurements and Connection



Tests

Tests **Norm UNE 21138:**

- Mechanical flexion strength tests: 20N
- Dry lightning impulse withstand voltage tests

Tests **Norm UNE 60068:**

- Corrosion test

Other Tests:

- Operating Temperature

OTHER ASSEMBLIES

Models Adapted for Metropolitan Facilities

