PROAT®

Catalog

CCS

Capacitive Silicone Sensor

AC Voltage Detectors

CCS

Capacitive Silicone Sensor

✓ Voltage Detector **V_{AC}** until **27,500 V_{AC}**

✓ **Aluminum** terminals and exterior **silicone** coating

✓ Leakage line of **972mm or 1605mm** for **medium** or **very heavy contamination (MF)** according to IEC 60815-3 application area.

✓ Available Outputs:

- **CBI21** – Output 4-20 mA
- **FO** – Fiber Optic Output
- **RS485** Modbus
- **SMFR -** Semaphore

✓ Sensor's weight CCS25: **1,8** or CCS25-MF: **2,8** Kg

✓ Full equipment weight CCS25: **2,8** or CCS25-MF: **3,8** Kg

✓ **High resistance** against tampering and vandalism

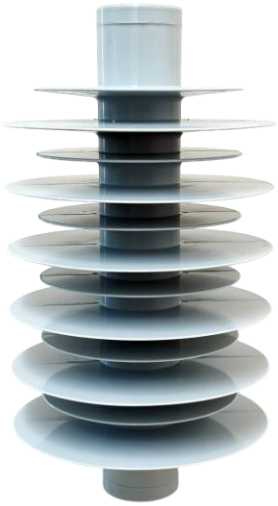
✓ Better weight, resistance and shock life compared to epoxy collectors

✓ **Stainless Steel** brackets, **waterproof** case and screws with antivibration washers **Nord-Lock**®

✓ **Vertical mounting** with M16 **hexagonal screw** adaptable to any installation, optional side bracket

✓ Optional SOP-008 for **beam anchoring for vertical mounting.** Adaptable to any installation. Approved by ADIF.

CCS25
CCS25



CCS25-MF

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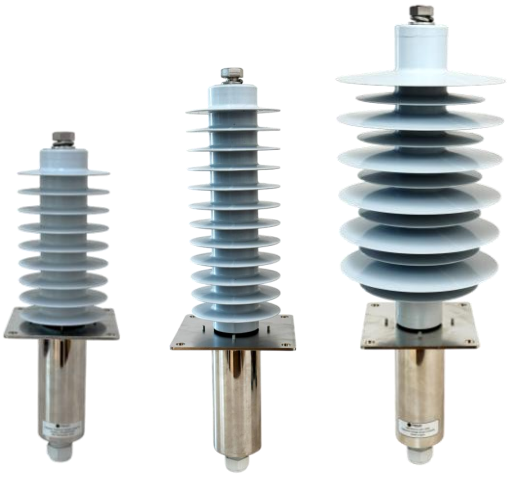
Models

Model	Voltage Service	Test 1 min 50 Hz	Leakage Line	Pollution Zone	Sensor Height	Sensor Weight
CCS10	10 kV_{AC}	50 kV_{AC}	618mm	Medium	210mm	1,2 kg
CCS10-MF	10 kV_{AC}	50 kV_{AC}	972mm	Very Strong	300mm	1,8 kg
CCS15	15 kV_{AC}	50 kV_{AC}	618mm	Medium	210mm	1,2 kg
CCS15-MF	15 kV_{AC}	50 kV_{AC}	972mm	Very Strong	300mm	1,8 kg
CCS25	27,5 kV_{AC}	95 kV_{AC}	972mm	Medium	300mm	1,8 kg
CCS25-MF	27,5 kV_{AC}	95 kV_{AC}	1605mm	Very Strong	356mm	2,8Kg

Applications

Detection and Measurement of **AC voltage** in Railway and Electrical Installations:

- High Speed Trains
- Conventional trains in AC
- Underground / Subway in AC
- Medium-Voltage Power Lines
- Industrial Installations



Voltage Detectors for Catenary

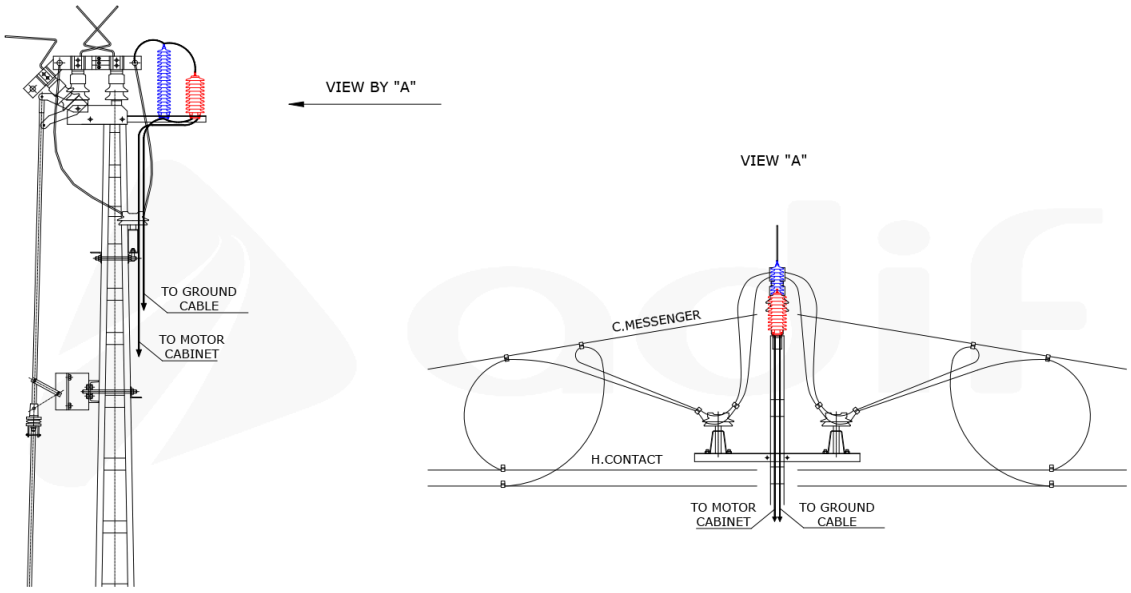
Continuous Monitoring

1 CRS/CCS
Catenary voltage detectors

2 Remote control cabinet
Data acquisition

3 Control center
Real-time monitoring

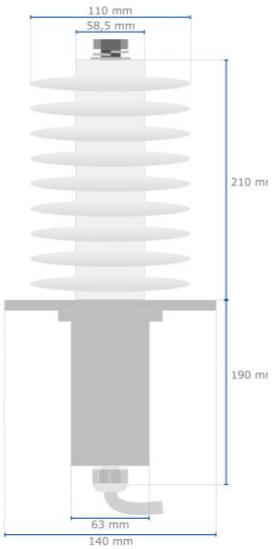
Assembly Diagram



POLE ELEVATION

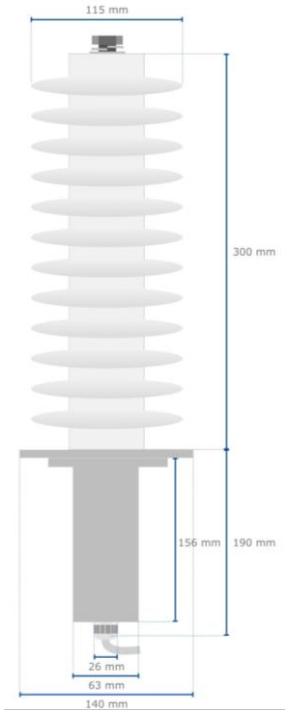
SIDE VIEW

Measurements



CCS10

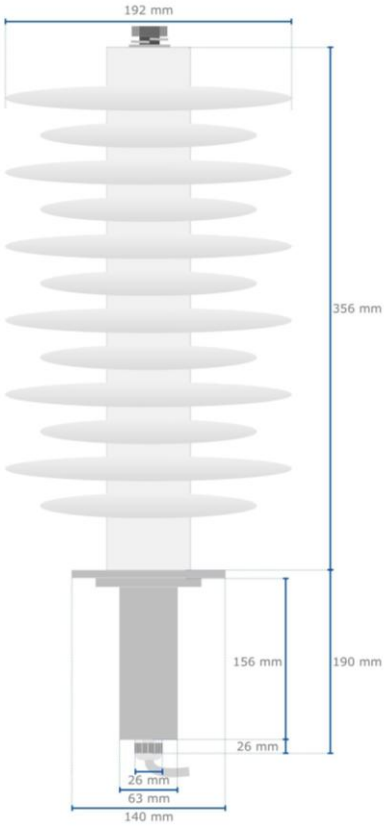
CCS15



CCS10-MF

CCS15-MF

CSS25



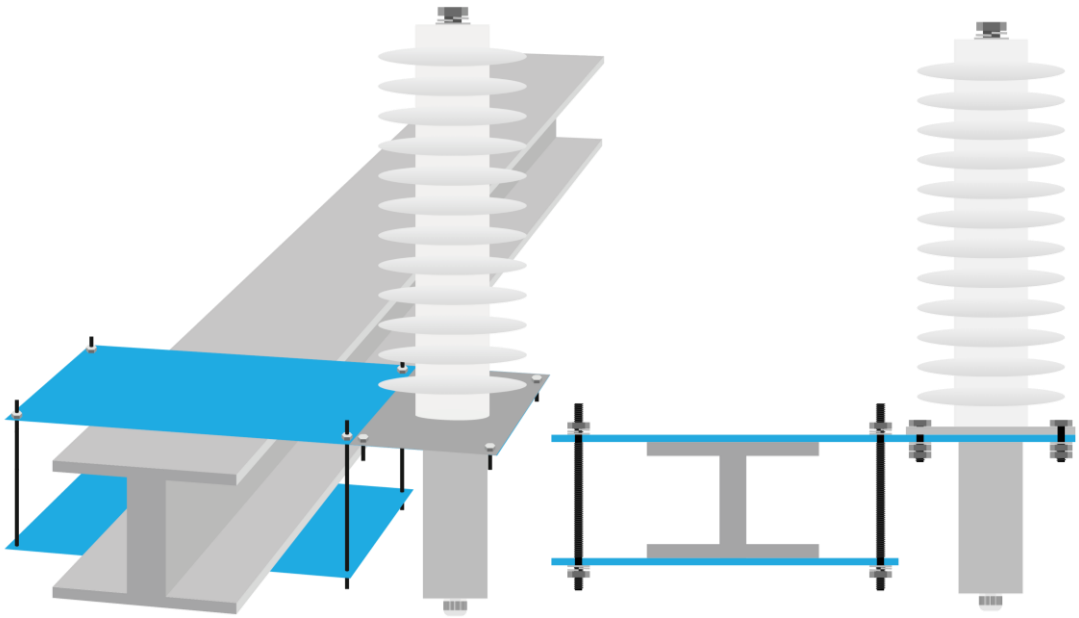
CCS25-MF

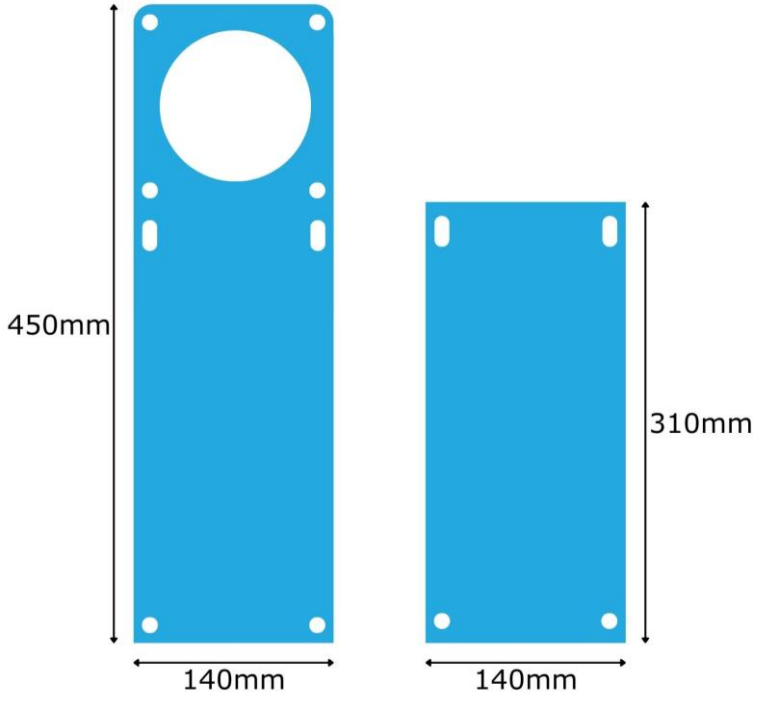
Technical data

	CCS
Silicone	**ISO 37**
Elongation Upon Impact	630 %
Resistance to traction	8,5 N/mm^2

Support – SOP-008

- Bracket for **mounting beam anchor**
- Adaptable to any installation
- **Approved by ADIF**
- Made of hot-dip galvanized steel **UNE EN ISO 1461**




450mm
310mm
140mm
140mm

CCS + CBI21

Capacitive Silicone Sensor

+

Output 4-20mA

- ✓ Capacitive Silicone Sensor **CCS**
- ✓ CBI21 **current loop converter** with isolated output **4-20mA** proportional to catenary voltage
- ✓ Measurement 16-60 Hz depending on model
- ✓ Auxiliary voltage **85-264 V_{AC} | 85-370 V_{DC} , 48 V_{DC} , 24 V_{DC}** Depending on the model
- ✓ CCS25 + CBI21 Supports lightning-like impulses **170kV**
- ✓ CCS25-MF + CBI21 Supports lightning-like impulses **250kV**
- ✓ **Epoxy Coated Circuit** installed in waterproof case

Models

Model	Nominal Frequency	Output	Output 4 – 20 mA	Auxiliary voltage
CBI21	50-60 Hz	4 wires	Yes	85-264 V_{AC} | 85-370 V_{DC}
CBI21-48	50-60 Hz	4 wires	Yes	48 V_{DC}
CBI21-24	50-60 Hz	4 wires	Yes	24 V_{DC}
CBI21-2H-24	50-60 Hz	**2 wires**	Yes	24 V_{DC}
CBI21-HZ	16-60 Hz	4 wires	Yes	85-264 V_{AC} | 85-370 V_{DC}
CBI21-HZ-24	16-60 Hz	4 wires	Yes	24 V_{DC}

Example order: CCS25 + CBI21-24

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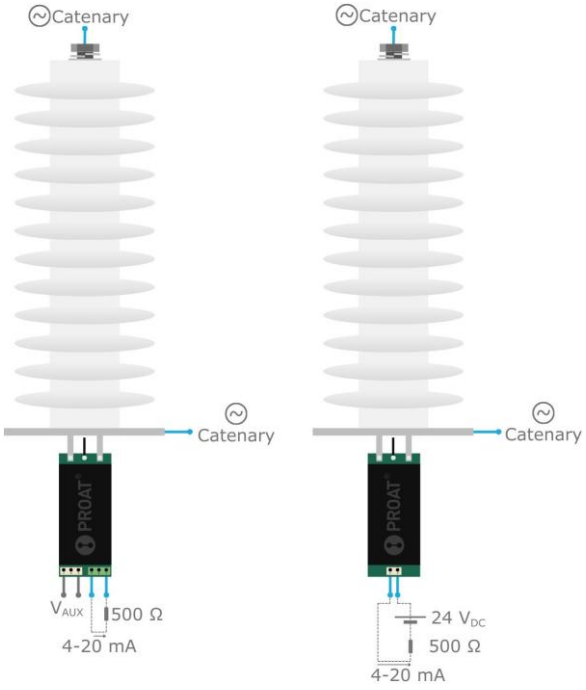
Connection



4-wire model **2-wire model**

Technical data

	CBI21
Specifications	
Output (RL = 500 Ω)	4-20 mA
Maximum load resistance	750Ω
Linearity	1%
Accuracy	±1%
Consumption	3W
Input-Output isolation	3kV
Operating temperature	-30º to +75º

Tests

Tests **Norm UNE 61243-1:**

- Applied voltage from 0 to 50 kVDC
- Operating time **tests**, according to 6.2.10: Applied voltages: 30 kVAC and then 50 kVAC for 5 minutes.
- **Dielectric test** at industrial frequency 95 kVAC 50 Hz, for 1 minute.
- **Dielectric test**, section 6.3: 15 positive pulses and 15 negative pulses, lightning type 170 KV 1.2us/50us.
- **Climatic test**: from +20ºC to -40ºC, from -40ºC to +20ºC, from +20ºC to +75ºC and from +75ºC to +20ºC with a 10-hour stay at -40ºC and +75ºC.
- **Limit test**: Tests have been carried out to determine the extreme voltage that the equipment withstands, reaching 133kV. At that point, the insulator was contoured without causing internal damage. (The equipment was still working properly after the test.)

Ensayos **Norma UNE-EN ISO 9227**:

- Corrosion test

CCS + FO

Capacitive Silicone Sensor

+

Fiber Optic Output

- ✓ Capacitive Silicone Sensor **CCS**
- ✓ Fiber Optic Transmitter-Receiver **EFOA25** and **RFOA25**
- ✓ CCS+FO Supports lightning impulse voltages up to **170kV**
- ✓ The set is approved by **ADIF**

EFOA25 – Fiber Optic Emitter

- ✓ Light **pulse output** proportional to the voltage in self-powered models
- ✓ Models for:
  - Fiber Optic with **SC connector** up to **100** meters
  - Fiber Optic with **ST connector** up to **5,000** meters
- ✓ Linearity: **±5%**
- ✓ **Self-powered** or **±12 VDC auxiliary voltage** depending on the model

  Optional power supply **FA1212-36** of ±12VDC for input voltages **85-264 VAC | 85-370VDC** with galvanic isolation input/output rated at **36kV**
- ✓ **Epoxy Coated Circuit** installed in waterproof case

RFOA25 – Fiber Optic Receiver

- ✓ With **Real-time display** of catenary voltage for Din Rail models
- ✓ **2 potential-free output contacts**:
  - Voltage Presence – Programmable levels
  - Anomalies – Fiber Optic communication failure
- ✓ **Programmable thresholds** of the presence and absence of voltage contact for Din Rail models
- ✓ **4-20mA** output proportional to the catenary voltage
- ✓ Installation on **Din Rail**
- ✓ Auxiliary voltage **85-264 VAC | 85-370VDC**

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Models – Fiber Optic Emitters

S

Model	Fiber Optic	Auxiliary voltage
EFO25	SC Connector	Catenary Self-Powered
EFOA25	SC Connector	±12V_{DC}
EFO25-LD	ST Connector	Catenary Self-Powered
EFOA25-LD	ST Connector	±12V_{DC}

Example order: CCS25 + EFOA25 with power supply FA1212-36 and compatible receiver RFOA25-D

Models – Power Supply

Model	Input	Output	Isolation Input-Output
FA1212-36	85-264 V_{AC} | 85-370V_{DC}	±12V_{DC}	36 kV_{AC}

Models – Fiber Optic Receivers

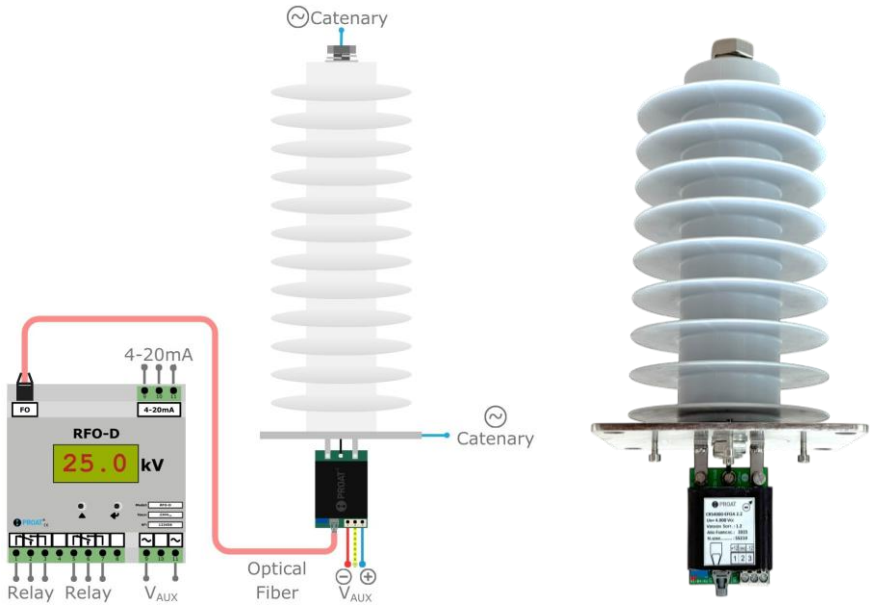
Model	Fiber Optic	Compatible Emitter	Installation	Real-Time Visualization	Output 4-20 mA	Output Contacts	Auxiliary voltage
RFO25-D	SL Connector	EFO25	Din Rail	Yes	Yes	Yes	85-264 V_{AC} | 85-370 V_{DC}
RFO25-D-24	SL Connector	EFO25	Din Rail	Yes	Yes	Yes	24 V_{DC}
RFOA25-D	SL Connector	EFOA25	Din Rail	Yes	Yes	Yes	85-264 V_{AC} | 85-370 V_{DC}
RFOA25-D-24	SL Connector	EFOA25	Din Rail	Yes	Yes	Yes	24 V_{DC}
RFO25-D-LD	ST Connector	EFO25-LD	Din Rail	Yes	Yes	Yes	85-264 V_{AC} | 85-370 V_{DC}
RFO25-D-LD-24	ST Connector	EFO25-LD	Din Rail	Yes	Yes	Yes	24 V_{DC}
RFOA25-D-LD	ST Connector	EFOA25-LD	Din Rail	Yes	Yes	Yes	85-264 V_{AC} | 85-370 V_{DC}
RFOA25-D-LD-24	ST Connector	EFOA25-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	SC Connector	Models from 5 to 100 meters
LG-xxx-LD	ST Connector	Models from 5 to 5,000 meters

Connection

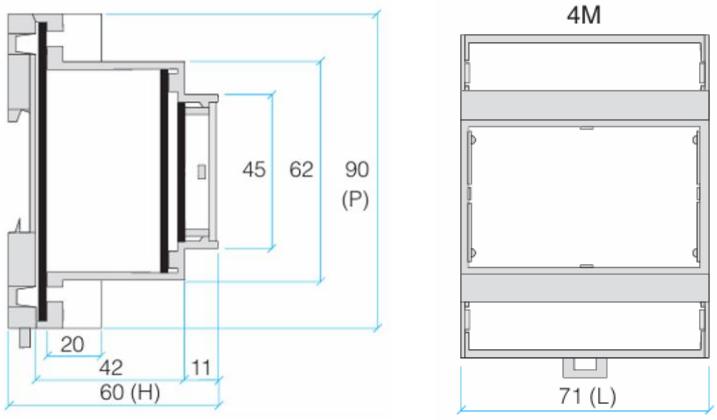


Technical Data – RFOA25

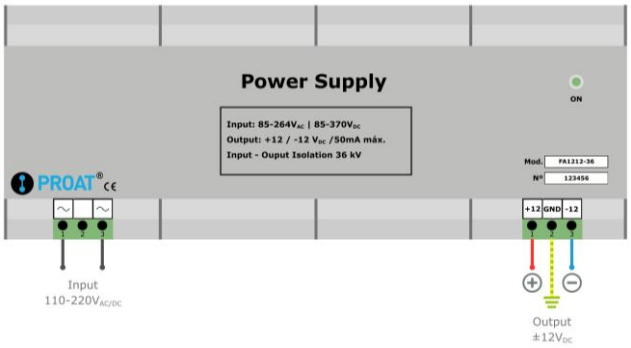
	RFO-D
Specifications	
Contact Type	SPDT
Switching Capacity:	1000 VA
Switching Voltage:	≤230 V_{AC}
Response Time	<1s
Reading Range	0 - U_N +10%
Auxiliary voltage	85-264 V_{AC} | 85-370V_{DC} 24V_{DC}
Standby Power Consumption	<5W
Operating Temperature:	-10º a +60º
Regulations	CE

Constructive Characteristics – RFO-D

- Constructive Characteristics – RFO-D
- Front Plate terminals
- Self-extinguishing plastic case class V0

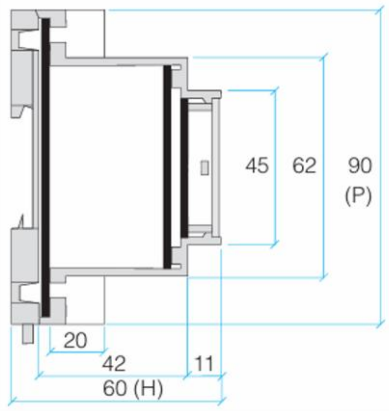


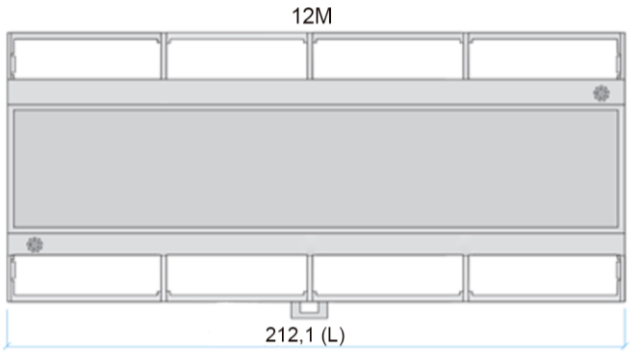
Power Supply FA1212



Constructive Characteristics – FA1212-36

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





Tests

Tests **Norm UNE 21138:**

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

Tests **Norma UNE 600068**:

- Corrosion test

Other Tests:

- Operating temperature

CCS + RS485 ModBus

Capacitive Silicone Sensor

+

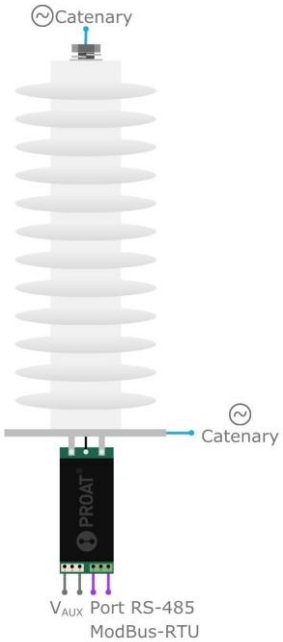
Output RS485 ModBus

- ✓ Capacitive Silicone Sensor **CCS**
- ✓ Voltage and **RS485 ModBus** communications measurement circuit
- ✓ Auxiliary voltage **85-264 V_{AC} | 85-370 V_{DC}**
- ✓ CCS + RS485 ModBus Supports lightning impulse voltages up to **170kV**
- ✓ **Epoxy Coated Circuit** installed in waterproof case

Models

Model	Auxiliary voltage
RS485-ModBus	85-264 V_{AC} | 85-370 V_{DC}

Connection



Technical Data

	RS485-ModBus
Specifications	
Interface	RS-485
Protocol	ModBus-RTU
Parameters	9600, 8, N, 1
ID ModBus	Selectable
Available Features	3,4, 6
Operation	Slave
Cable length (m)	<1200
Response Time	0,2 seg.
Linearity	2%
Precision	±1%
Consumption	2W
Input-output isolation	3kV
Operating Temperature:	-30º to +75º

Tests

Tests **Norm UNE 61243-1:**

- **Applied voltage**: 0 to 50 kV_{DC}
- **Uptime Testing**, according to 6.2.10: Applied Voltages of 30 kV_{AC} and then 50 kV_{AC} for 5 minutes.
- **Industrial Frequency Dielectric Testing** 95 kV_{AC} 50 Hz, for 1 minute.
- **Dielectric test**, section 6.3: 15 positive and 15 negative lightning impulses, 170 KV 1,2us/50us.
- **Climate test**: from +20ºC to –40ºC, from –40ºC to +20ºC, from +20ºC to +75ºC and from +75ºC to +20ºC with 10-hour dwell times at –40ºC and +75ºC.
- **Limit test**: Tests have been carried out to determine the extreme voltage that the equipment withstands, reaching 133kV. At that point, the insulator surface showed contouring, with no internal damage. (The equipment was still working properly after the test.)

Tests **Norm UNE-EN ISO 9227**:

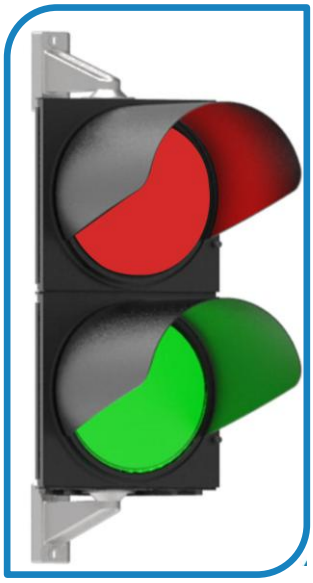
- Corrosion Test

CCS + SMFR

Capacitive Silicone Sensor

+

Green/Red Semaphore



✓ Capacitive Silicone Sensor **CCS + CBI21** for AC voltage measurement with output 4-20mA

✓ Semaphore Green/Red for catenary voltage signaling:

- Optical LED high **luminosity** in Φ 200 mm
- Enclosure color: **Dark Gray**

✓ Voltage **Presence Controller PTC-E1**:

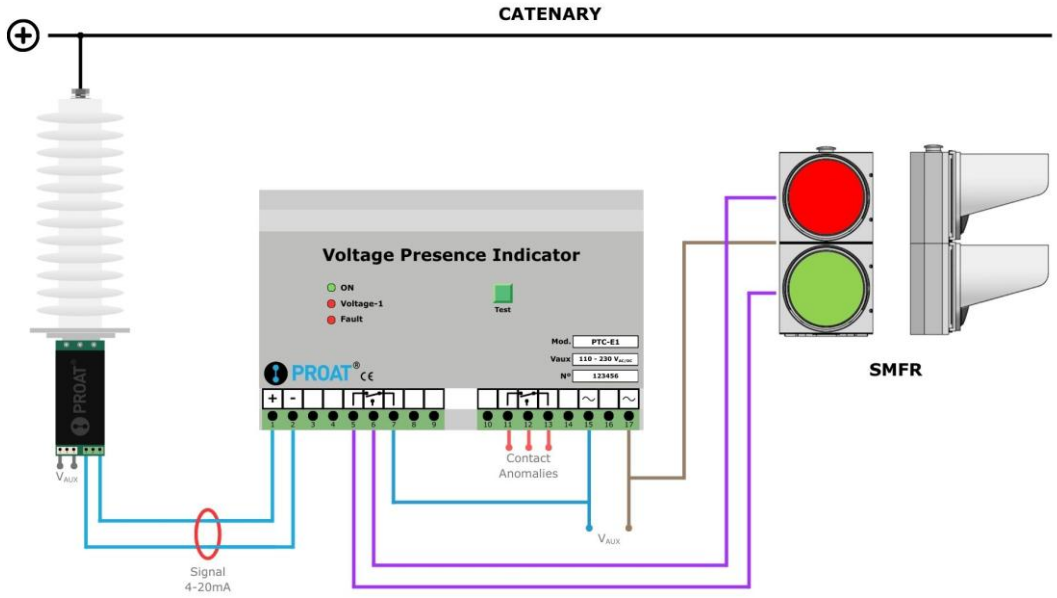
- Reading of the measures **4-20mA**
- Signage **LED** of the measure
- Signage **LED Independent** from Ignition and Anomalies
- Output with **2 Potential-Free Switched Contacts** :
  - Voltage
  - Anomaly
- Auxiliary voltage **85-264 V_{AC}** | **85-370 V_{DC}** or **24 V_{DC}**

Models

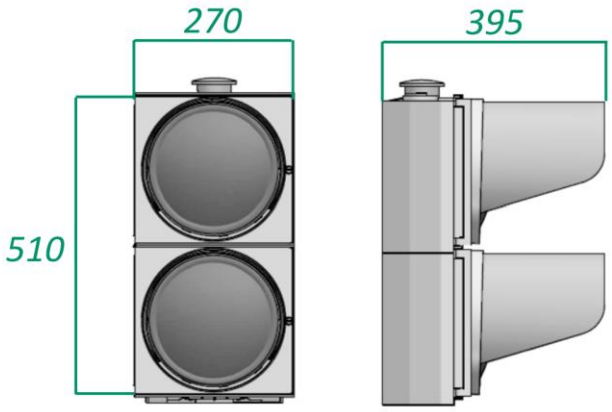
Configuration Options:

- **CCS** - Any Model
- **CBI21** - Any 4 Wire Model
- **PTC-E1** - Voltage Presence Controller PTC-E1
- **SMFR** - Green – Red semaphore
- **Semaphore Support** - Any Model

Connection

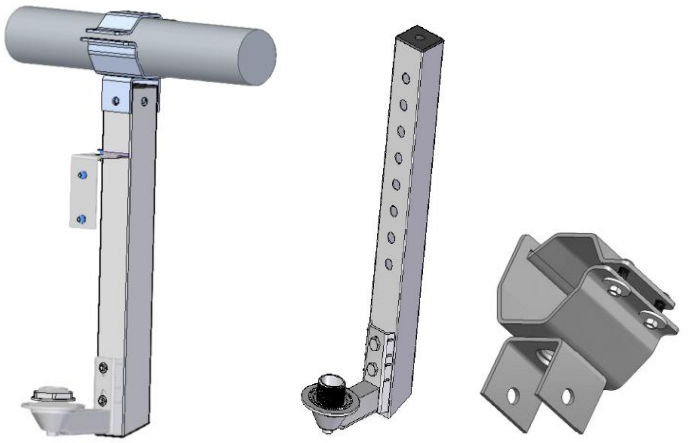


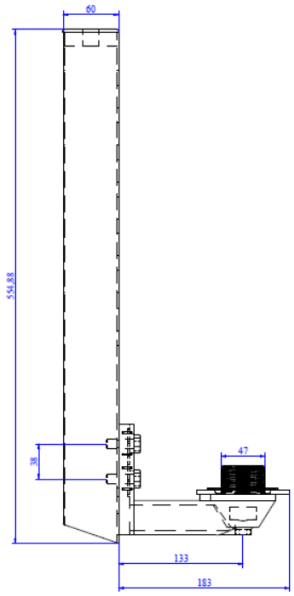
Constructive Characteristics



Support SOP-SMFR-001

- Support for anchoring on **Bracket of diameter 76mm**
- Made of **galvanized steel**



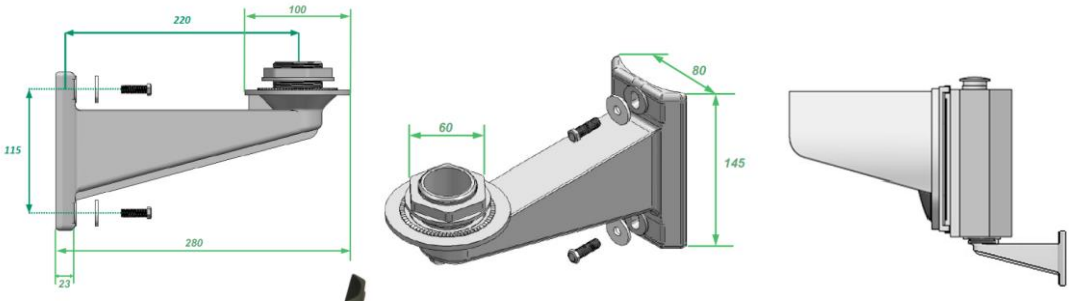


Support SOP-SMFR-002

- Support for anchoring on wall or **column Ø 100 mm**
- Made of cast **aluminum**
- **Coated in** powder **polyester** polymerized at 230ºC
- Fixing by 2 M-8 screws.
- Internal positioning and anti-rotation serration of the coupled semaphore head.
- Traffic light fixing by sleeve-nut assembly 1½" made of aluminum

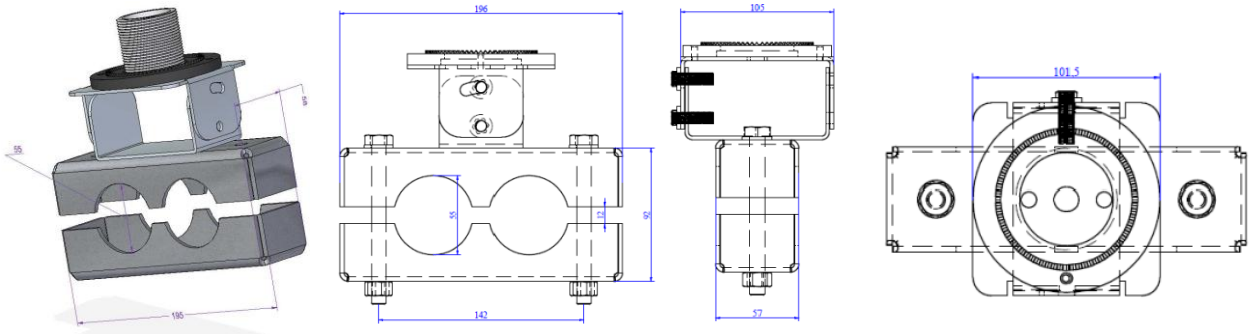
Advantages

- High mechanical strength
- High resistance to environmental conditions
- Its hollow structure allows the traffic light to be wired through it



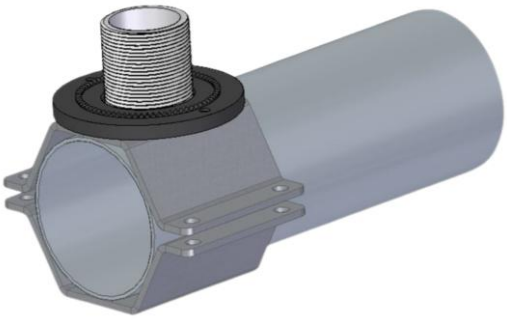
Support SOP-SMFR-003

- Support for anchoring on **Bracket of diameter 76mm**
- Made of **galvanized steel**



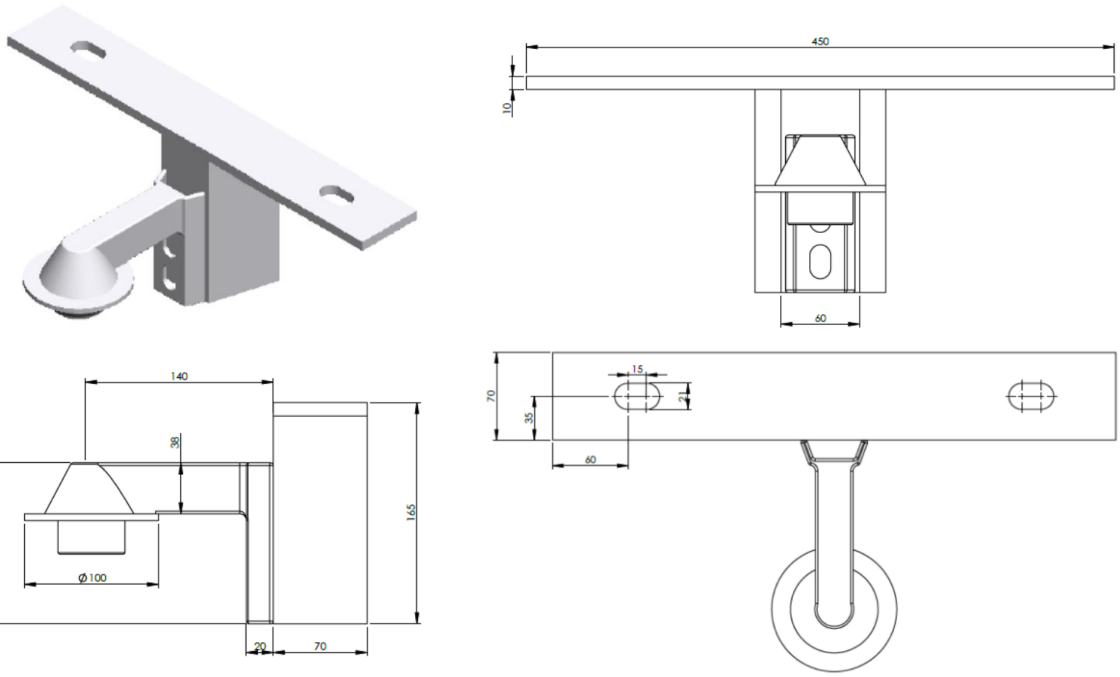
Support SOP-SMFR-004

- Support for anchoring on **Bracket of diameter 76mm**
- Made of **galvanized steel**



Support SOP-SMFR-005

- Support for **inverted ceiling anchoring**
- Made of **galvanized steel**



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Support SOP-SMFR-006

- Support for anchoring in **ceiling or vault**
- Made of **galvanized steel**

Technical Data

	SFMR
Case Specifications	
Manufacturing material	U.V. Colored stabilized polycarbonate
Environmental Protection Grade	IP55 (according to EN 60529)
Degree of impact resistance	IR3 (according to EN 60598)
Electromagnetic Compatibility	According to EN 50293
Operating Temperature	-40ºC a +60ºC
Certificate and marking	According to EN12368
Square Optics (PIL)	200 x 200 mm
Outside Size	270 x 255 mm
LED Colors	Green, Red

	PIL-200x200 PPC		
Specifications			
Nominal Voltage	125 V_{DC} or 230 V_{AC}		
Consumption	< 8W		
Number of LEDs (Red, Amber or Green)	56		
On/off reaction time	< 50 ms		
Environmental requirements (EN 12368 – 5.1)	Class A, B, C (operating temperature of -30ºC to + 70ºC)		
Electromagnetic Compatibility (EMC)	Meets standard requirements EN50278		
Luminance Distribution (EN 12368 – 6.4)	W A3/1		
Luminance Uniformity (EN 12368 – 6.5)	> 1:10		
Ghost effect (EN 12368 – 6.6) *	Class 4 (Red)	Class 4 (Amber)	Class 5 (Green)
Colors of light signals (EN 12368 – 6.7)	620-630 nm (Red)	587-592 nm (Amber)	502-508 nm (Green)
Environmental Protection Grade (EN 60598)	IP65		
Degree of impact resistance (EN 60598-1)	IR3		
Front Lens Material	Stabilized transparent polycarbonate UV		
Enclosure material	ABS black		

(*) The ghosting effect occurs in halogen or incandescent traffic lights with the parabolic reflector, due to the reflection of the sun. Drivers could get confused and have the impression that the traffic light is on when it is not.