PROAT®

Catalog

Railway Equipment and Facilities

WHAT DO WE DO?

At PROAT, we design, manufacture, and market electrical and electronic equipment for the **measurement, protection, and operation of electrical installations**.

In addition, we have a **high-voltage laboratory**, which allows us to guarantee the quality and reliability of our products.

INDEX

Voltage Detectors for Catenary

Summary of Models




	CRS	CRS-27500	CCS	CCS-MF
Voltage	DC	DC + AC	AC	AC
Range	0-4000 V_{DC}	0-4000 V_{DC} 0-27500 V_{AC}	0-27500 V_{AC}	0-27500 V_{AC}
Pollution Degree	Medium	Medium	Medium	Very High
SALIDAS				
Reed Relay	✓			
CBI-21 4-20mA	✓	✓	✓	✓
RS485 ModBus			✓	✓
Fiber Optic	✓	✓	✓	✓
PTC-M1	✓	✓		
LED 	✓	✓		
SMFR 	✓	✓	✓	✓

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CRS

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
  - **PTC-M1** – Current Voltage Presence Detector
  - **Led** – Light Indicator
  - **SMFR** – Semaphore
- ✓ 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
- ✓ Optional SOP-008 for **beam anchoring for vertical mounting.** Adaptable to any installation. Approved by ADIF.

Applications

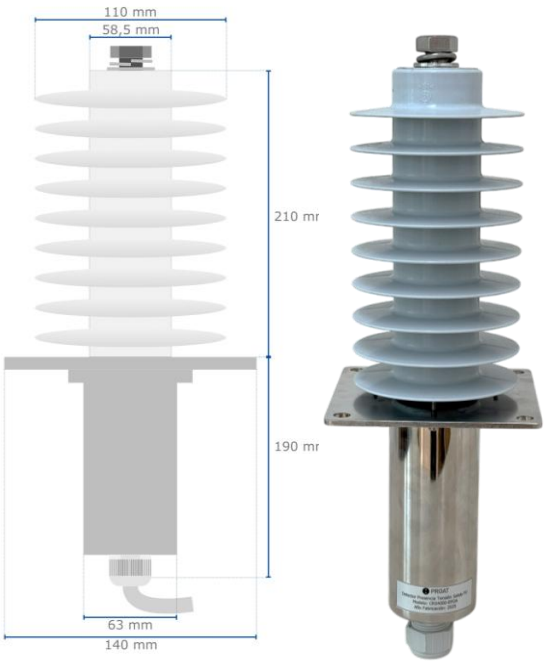
Detection of DC Voltage presence in Railway Installations:

- Conventional Trains
- Metros
- Trams

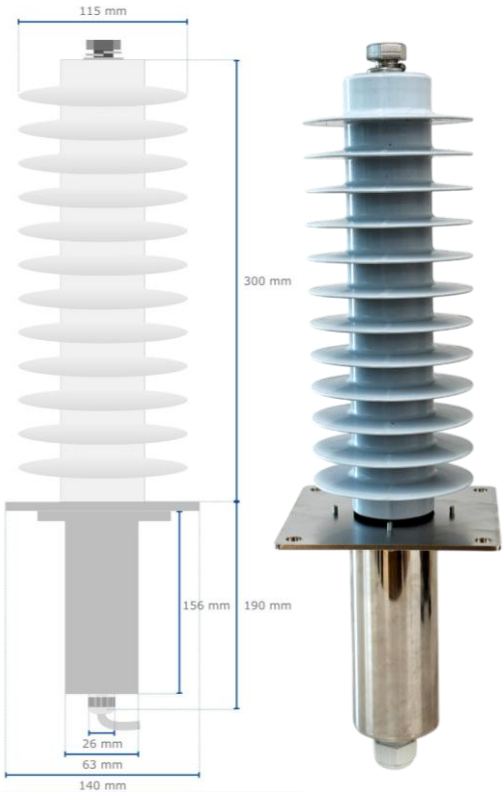
Models

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	Average	210mm	1,2 kg
CRS1500	0-1500 V_{DC}	No	5 kV_{DC}	618mm	Average	210mm	1,2 kg
CRS3000	0-3000 V_{DC}	No	10 kV_{DC}	618mm	Average	210mm	1,2 kg
CRS4000	0-4000 V_{DC}	No	10 kV_{DC}	618mm	Average	210mm	1,2 kg
CRS27500	0-4000 V_{DC}	Yes	10 kV_{DC} y 50 kV_{AC}	972mm	Average	300mm	1,8 kg

Measurements



CRS750 - CRS4000



CRS27500

Technical Data

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

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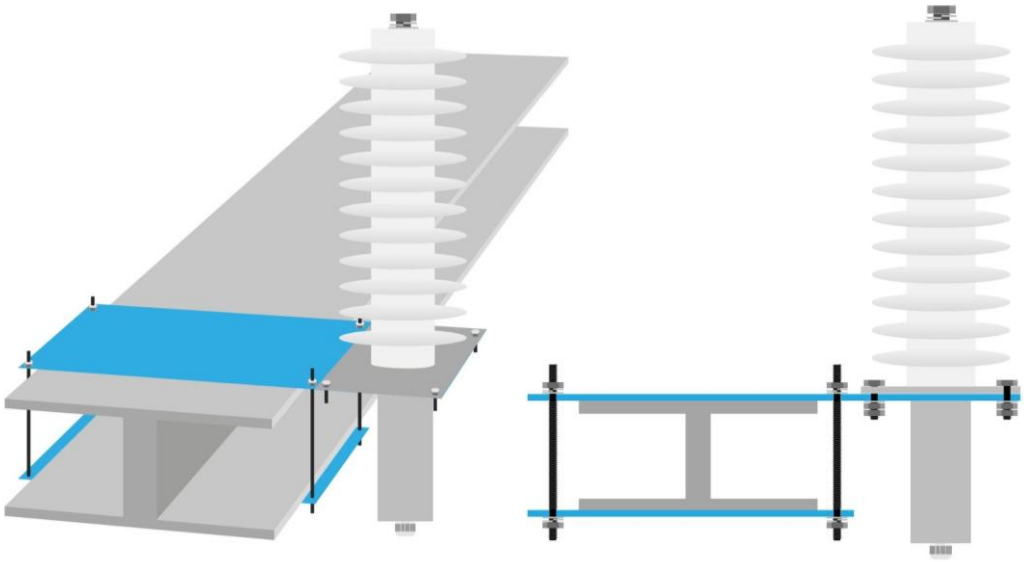
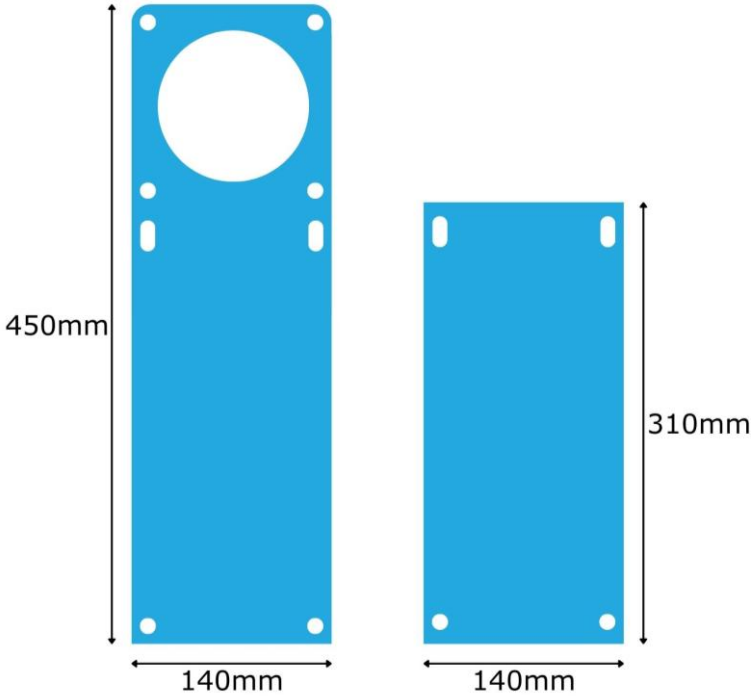
Support – SOP-008

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





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

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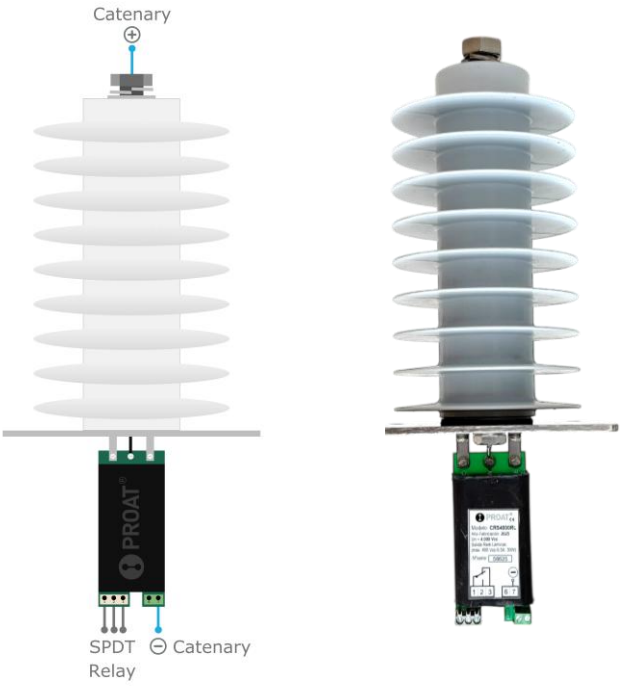
Connection



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	-40º a +125º

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

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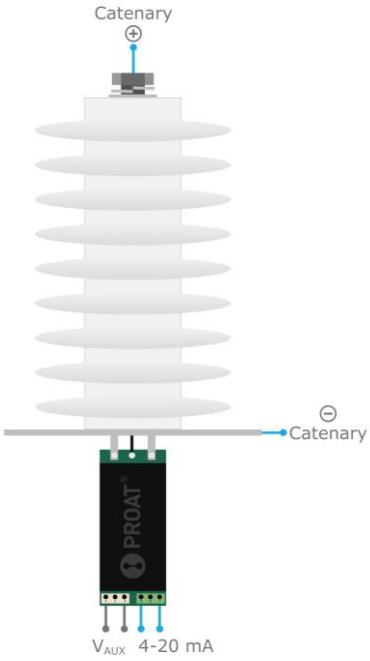
Connection



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 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 – Emisor Fibra Óptica

- ✓ **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**
- ✓ **Epoxy coated** circuit installed in waterproof cover

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$_{DC}$**

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v1.11 3/10/2025

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: CRS4000 + 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

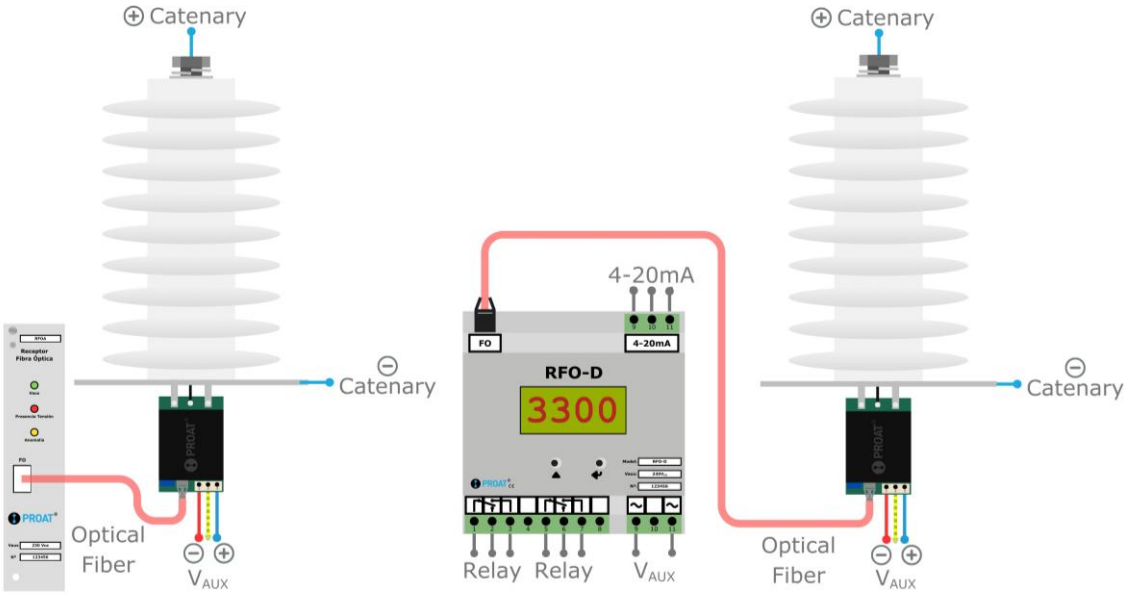
Models – Fiber Optic Patch cords

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

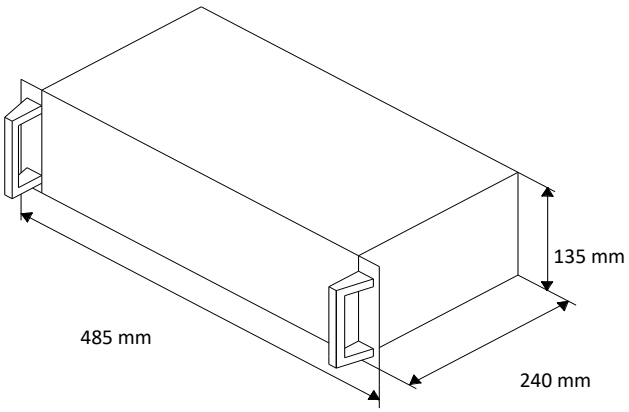
Models – Power Supply

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

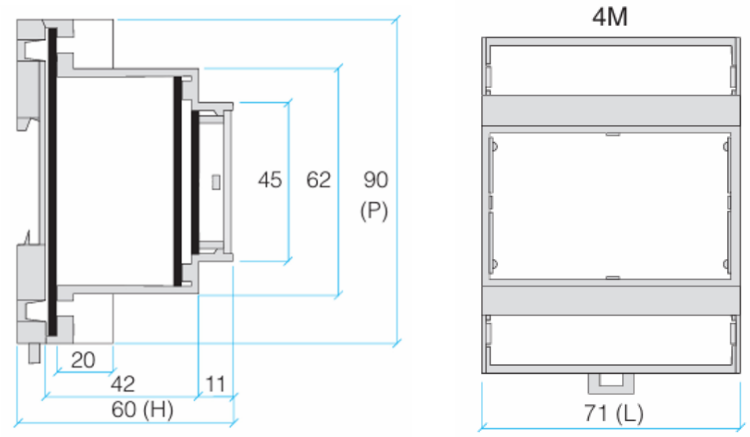


Technical Data – RFO-D

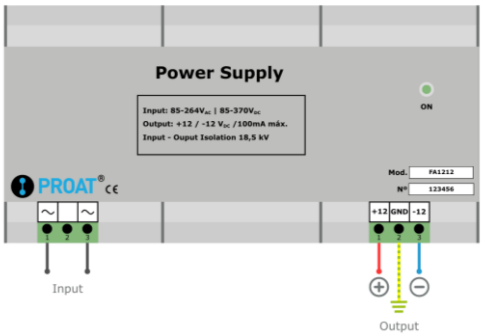
	RFO-D
Specifications	
Contact Type	SPDT
Switching Capacity	1000 VA
Switching Voltage	≤230 V_{AC}
Response Time	<1s
Reading Range	0 - U_N +10%
Auxiliary Voltage	85-264 V_{AC} | 85-370V_{DC} 24V_{DC}
Standby Power Consumption	<5W
Operating Temperature	-10º a +60º
Regulations	CE

Constructive Characteristics – RFO-D

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

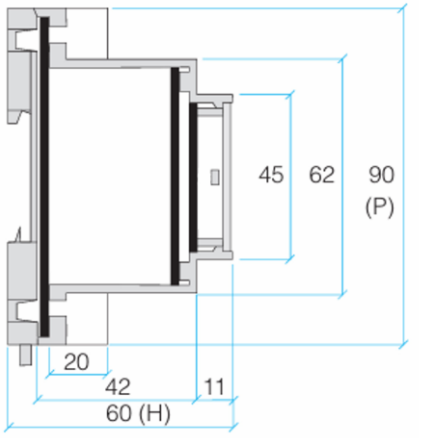


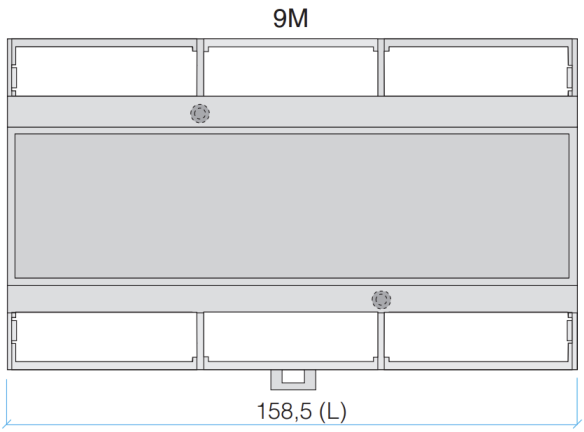
Power Supply – FA1212



Constructive Characteristics – FA1212

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





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 + PTC-M1

Resistive Silicone Sensor

+

Current Voltage Presence Detector

- ✓ Silicone Resistive Sensor **CRS**
- ✓ Remote signalling in electrical panel, for disconnectors or circuit breakers.
- ✓ **PTC-M1** amplifies the signal coming from a Resistive Sensor. Input **150 V_{DC}**, activation with **>30%**
- ✓ Potential-Free Switched Contact **Output**
- ✓ Voltage indication by Red Led diode
- ✓ Auxiliary voltage **120-230 V_{DC} | 120-230 V_{AC}** or **48 V_{DC}** Depending on the model
- ✓ Socket contacts **11 Pins**, **DIN rail mounting**

Applications

Detection of the presence of **DC voltage** in Railway Installations:

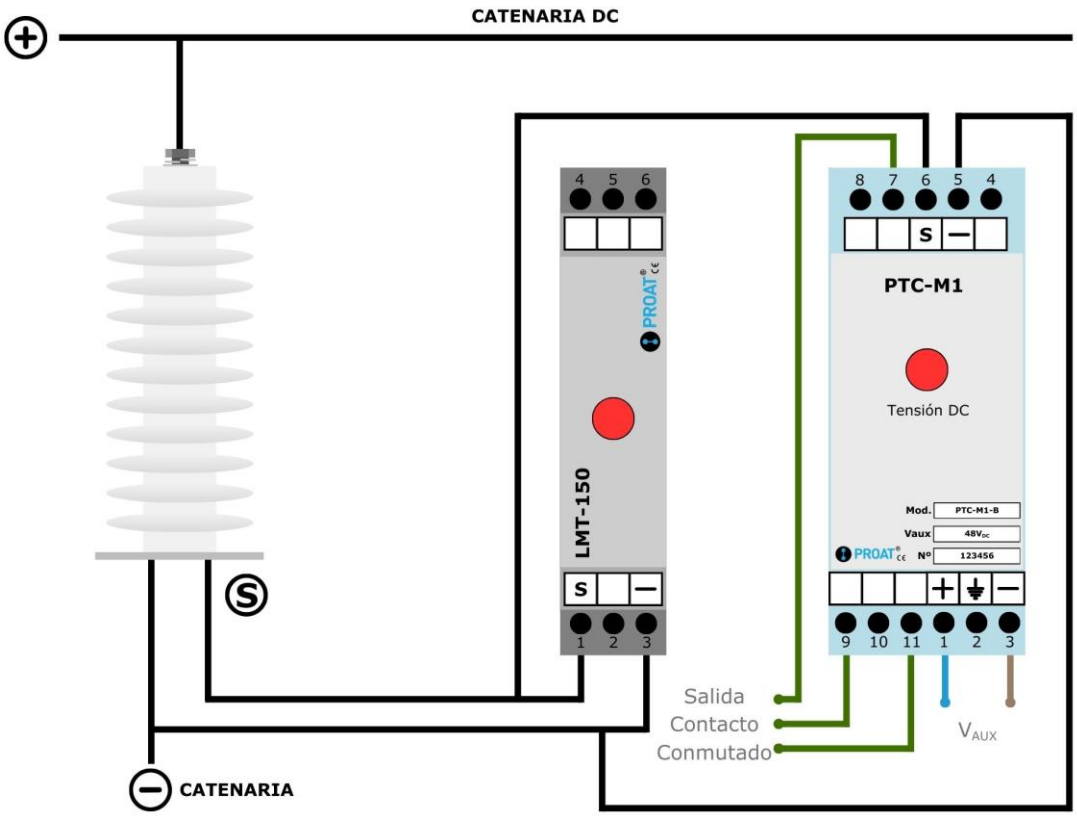
- Conventional Trains
- Metros
- Trams

Models

Model	Auxiliary Voltage
PTC-M1	120-230 V_{DC} | 120-230 V_{AC}
PTC-M1-48	48 V_{DC}

Example of order : CRS1500 + PTC-M1

Connection



LMT-150 Limiter

The function of the LMT-150 limiter is to prevent the output voltage from remaining at non-hazardous levels (<150 V) when the PTC-M1 is disconnected from the base.

A red LED indicates the presence of voltage in the catenary.

Model	LED
LMT-150	No
LMT-150-L	Yes

Constructive Characteristics– PTC-M1

- DIN rail installation
- UNDECAL base terminals
- Self-extinguishing plastic enclosure, class V0

Technical data – PTC-M1

MODEL	PTC-M1
Technical data	
Input Voltage	0-150 V_{DC}
Presence detection level	30%
Quiescent consumption	1 W
Fault consumption	<2 W
Standards complied with	
Insulation Test Voltage	
High-frequency disturbances	
Fast Transients	
Voltage Impulse	
Relay Contact Characteristics	
Continuous Current	5 A
Switching Voltage	<230 V_{AC}
Switching Power	<2000 VA

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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

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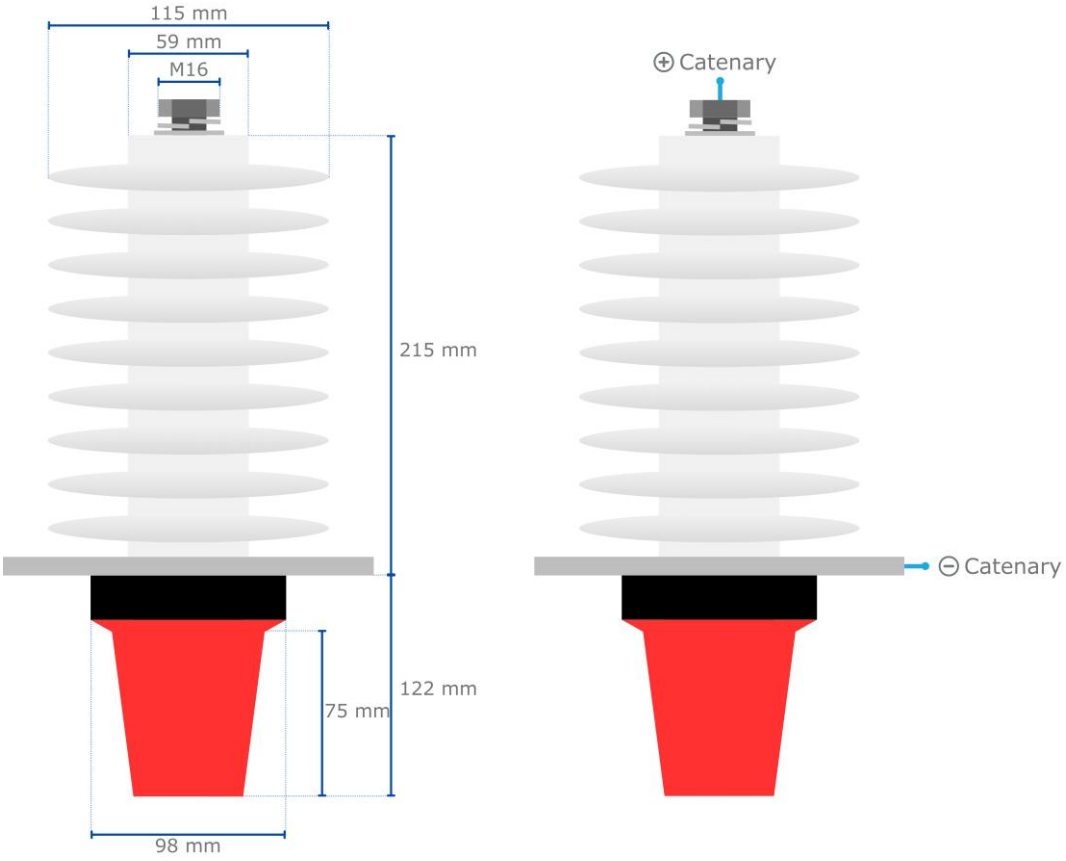
Measurements and Connection



Tests

Tests **Norm UNE 21138**:

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

Tests **Norm UNE 600068**:

- Corrosion test

Other Tests:

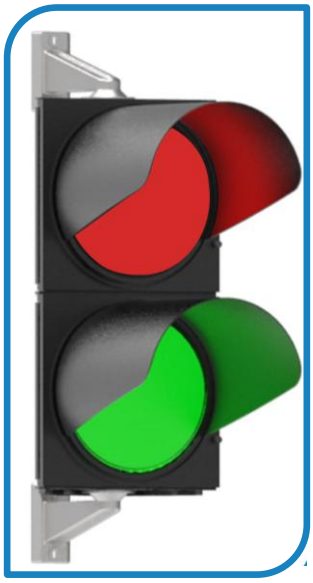
- Operating Temperature

CRS + SMFR

Resistive Silicone Sensor

+

Green/Red Semaphore



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

✓ Semaphore Green/Red for catenary voltage signalling:

- 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:

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

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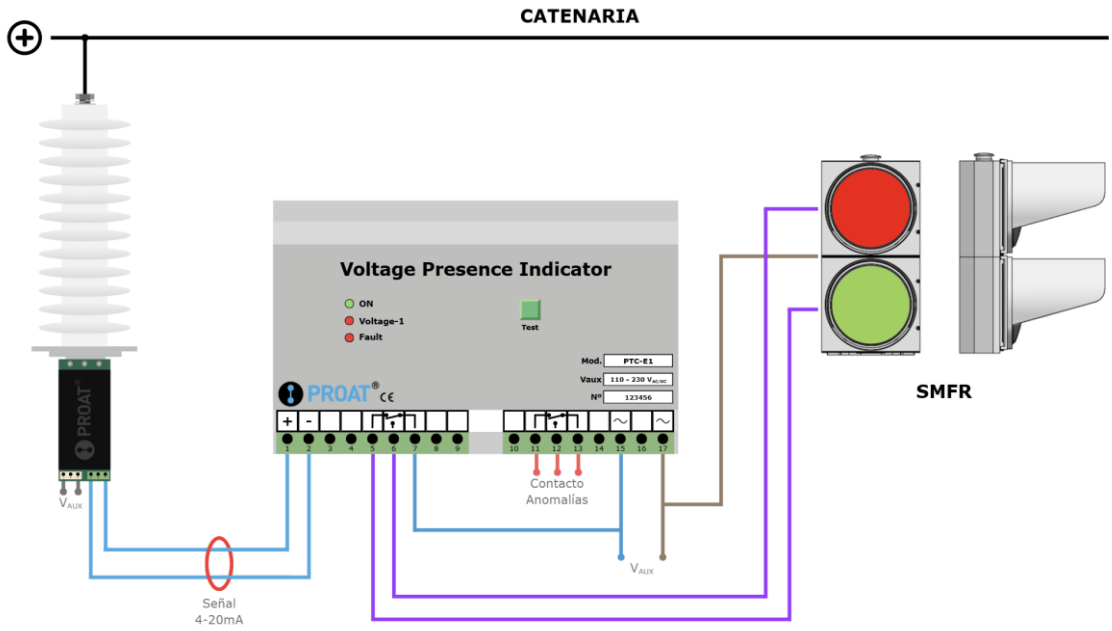
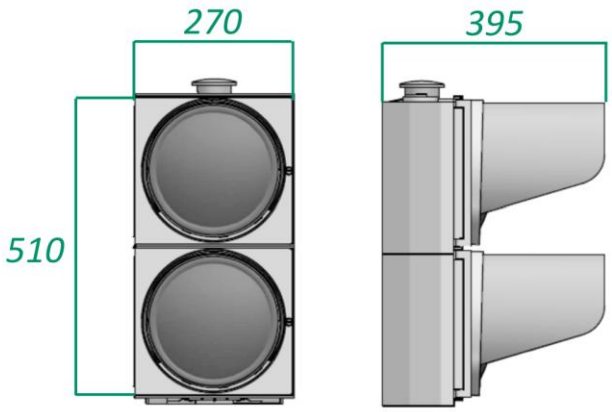
Connection

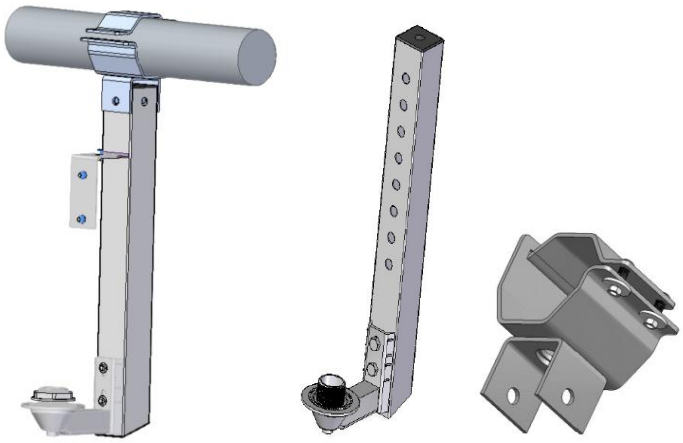


Constructive Characteristics



Support SOP-SMFR-001

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

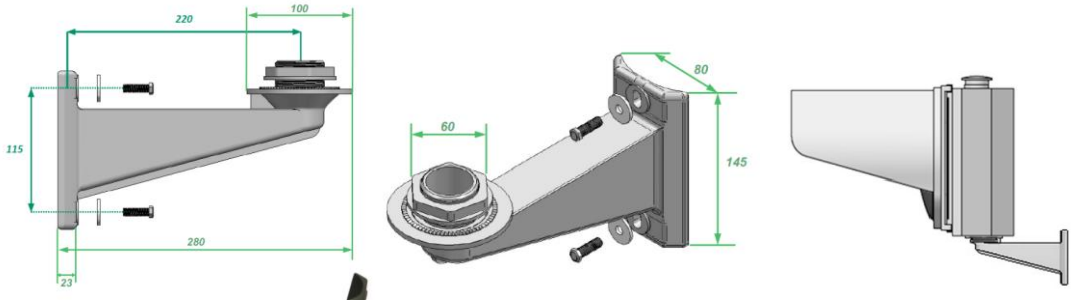


Support SOP-SMFR-002

- 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

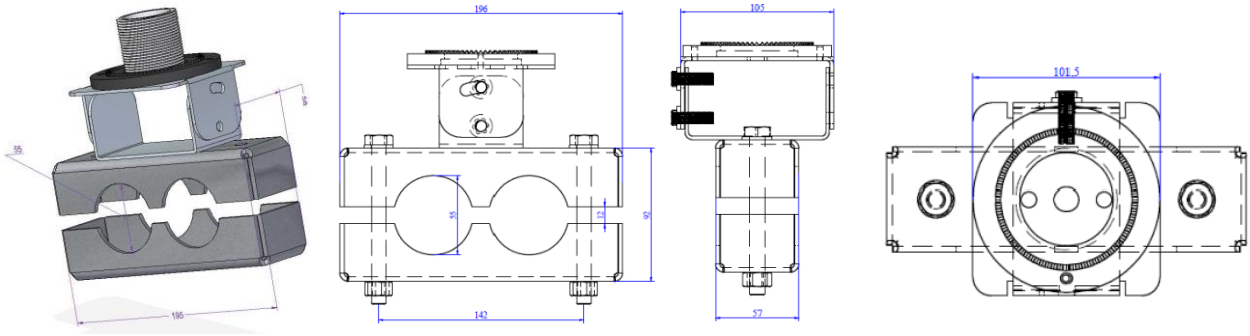
Advantages

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



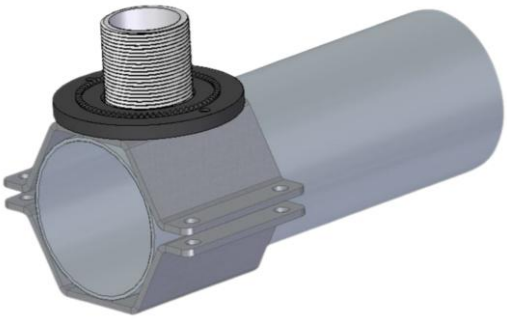
Support SOP-SMFR-003

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



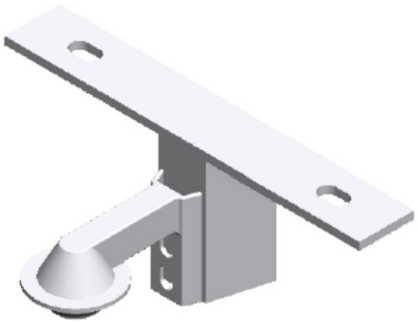
Support SOP-SMFR-004

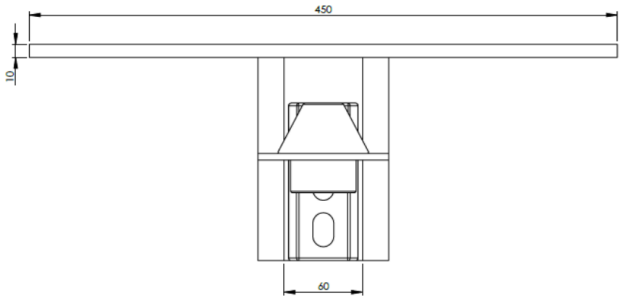
- Support for anchoring on **Bracket of diameter 76mm**
- Made of **galvanized steel**

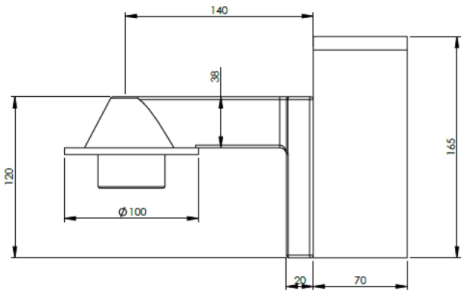


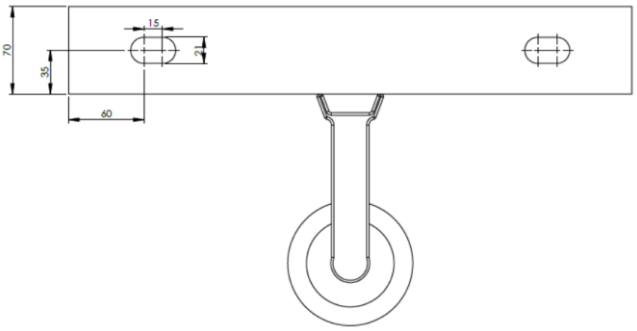
Support SOP-SMFR-005

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









Support SOP-SMFR-006

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

Technical Data

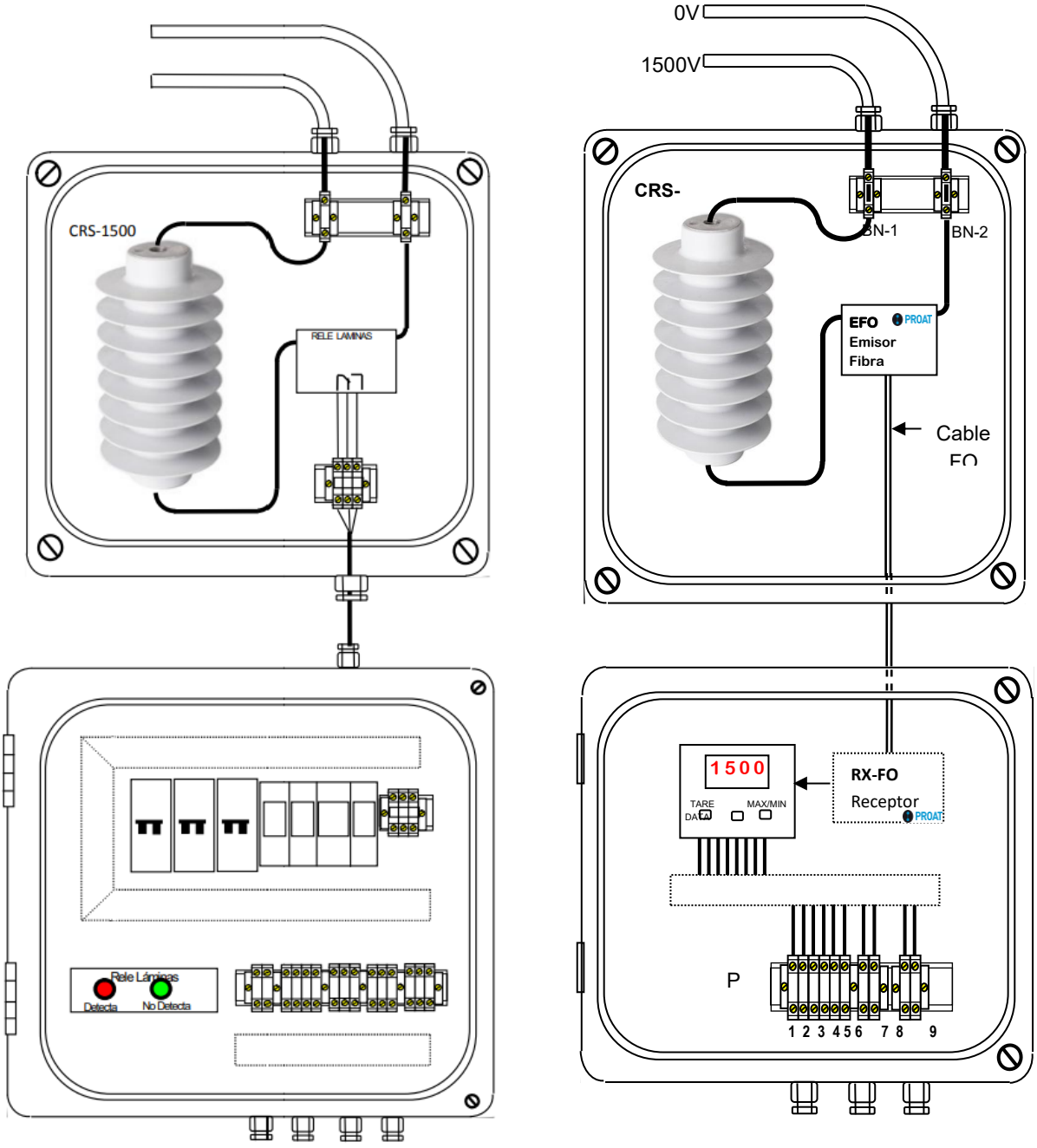
	SFMR
Case Specifications	
Manufacturing material	U.V. Colored stabilized polycarbonate
Environmental Protection Grade	IP55 (according to EN 60529)
Degree of impact resistance	IR3 (according to EN 60598)
Electromagnetic Compatibility	According to EN 50293
Operating Temperature	-40ºC a +60ºC
Certificate 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.

OTHER ASSEMBLIES

Models Adapted for Metropolitan Facilities



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CRE + RL

Epoxy Resistive Voltage Sensor

+

Reed Relay Output

- ✓ Catenary Voltage Detector **V_{DC}**
- ✓ Models from **750 V_{DC}** to **4.000 V_{DC}**
- ✓ **Brass** terminals and **Epoxy** construction
- ✓ Outdoor models made with **Cycloaliphatic Epoxy** resin
- ✓ Leakage Line of **305mm**
- ✓ **Self-powered** from the catenary voltage itself
- ✓ **Vertical mounting** adaptable to any installation

Reed Relay

✓ **Reed Relay** housed inside a cylindrical die-cast aluminum box with epoxy resin with potential-free switching contact output:

- Activation at **>40%** of nominal voltage
- Deactivation at **<30%** of the nominal voltage
- Response time: **15 ms**
- Consumption: **3mA** a 4000 V_{DC}

Applications

Detection of **DC voltage** presence in railway installations:

- Conventional trains
- Subways
- Trams

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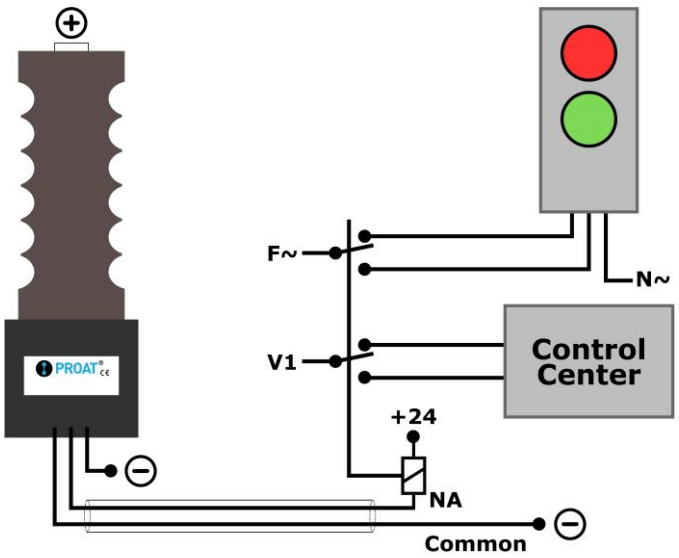
Models

Model	Material	Nominal Voltage V_N	Mechanical Charge	Leakage Line	Test Voltage 10s	Weight
CRE-750 + RL	Epoxy	750 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-750-EXT + RL	Cycloaliphatic Epoxy	750 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-1500 + RL	Epoxy	1500 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-1500-EXT + RL	Cycloaliphatic Epoxy	1500 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-4000 + RL	Epoxy	4000 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-4000-EXT + RL	Cycloaliphatic Epoxy	4000 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg

Connection

Four output terminals for external connection:

- Negative from catenary
- Three reed relay switching contacts



Example of connection with semaphore

Technical data - RL

	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:	-40º a +125º

CRE + PTC-M1

Epoxy Resistive Sensor

+

Direct Current Voltage Presence Detector

- ✓ Catenary Voltage Presence Detector **V_{DC}**
- ✓ Models from **750 V_{DC}** to **4.000 V_{DC}**
- ✓ **Brass** terminals and **Epoxy** construction
- ✓ Outdoor models made with cycloaliphatic Epoxy resin
- ✓ Leakage line of **305mm**
- ✓ **Vertical mounting** adaptable to any installation

PTC-M1 – Direct Current Voltage Preene Detector

- ✓ **PTC-M1** amplifies the signal from a Resistive Sensor. Input **150 V_{DC}**, activation at **>30%**
- ✓ Output: **potential-free switching contact**
- ✓ Voltage indication with **Red LED** diode
- ✓ Auxiliary voltage **120-230 V_{DC} | 120-230 V_{AC}** or **48 V_{DC}** depending on model
- ✓ Contacts on **11-pin** socket, **DIN rail** mounting

Applications

Detection of **DC voltage presence** in railway installations:

- Conventional trains
- Subways
- Trams

Allows remote signaling in an electrical panel, for disconnectors or circuit breakers.

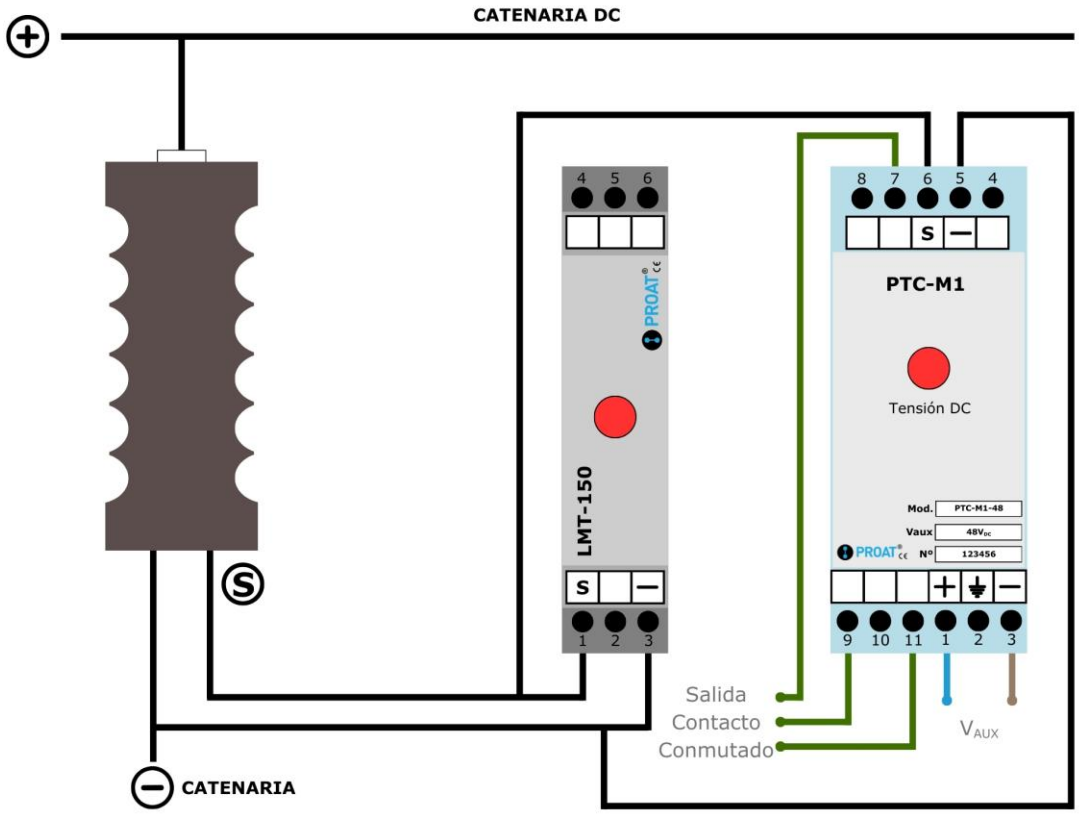
Models

Model	Material	Nominal Voltage V_N	Mechanical Charge	Leakage Line	Test Voltage 10s	Weight
CRE-750	Epoxy	750 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-750-EXT	Cycloaliphatic Epoxy	750 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-1500	Epoxy	1500 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-1500-EXT	Cycloaliphatic Epoxy	1500 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-4000	Epoxy	4000 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg
CRE-4000-EXT	Cycloaliphatic Epoxy	4000 V_{DC}	4000 N	305 mm	2 * V_N	1,5 kg

Model	Auxiliary Voltage
PTC-M1	120-230 V_{DC} | 120-230 V_{AC}
PTC-M1-48	48 V_{DC}

Example of order: CRE-750 + PTC-M1

Connection



LMT-150 Limiter

The function of the LMT-150 limiter is to prevent the output voltage from remaining at non-hazardous levels (<150 V) when the PTC-M1 is disconnected from the base.

A red LED indicates the presence of voltage in the catenary.

Model	LED
LMT-150	No
LMT-150-L	Yes

Constructive Characteristics– PTC-M1

- DIN rail installation
- UNDECAL base terminals
- Self-extinguishing plastic enclosure, class V0

Technical data – PTC-M1

MODEL	PTC-M1
Technical data	
Input Voltage	0-150 V_{DC}
Presence detection level	30%
Quiescent consumption	1 W
Fault consumption	<2 W
Standards complied with	
Insulation Test Voltage	
High-frequency disturbances	
Fast Transients	
Voltage Impulse	
Relay Contact Characteristics	
Continuous Current	5 A
Switching Voltage	<230 V_{AC}
Switching Power	<2000 VA

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SMFR

Voltage Detector Semaphore for Catenary DC

- ✓ Catenary Voltage Detector **V_{DC}**
- ✓ Models of **750 V_{DC}** or **1500 V_{DC}**
- ✓ **Self-powered or Auxiliary Voltage** depending on the model
- ✓ High-brightness **LED optics** in Φ 200 mm
- ✓ Pictogram '**750'**, '**1500'** or **Light**
- ✓ **Available LED colors** : amber, blue, red, green and white
- ✓ Enclosure color: **Dark Gray**

Applications

DC Catenary voltage signaling for drivers:

- Trams
- Metropolitan Networks

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Functional Features

Self-Powered Model

- Powered by catenary voltage, connected to positive and negative

	SFMR-750	SFMR-1500
Operating ranges		
On	≥ 440 V_{DC}	≥ 880 V_{DC}
Off	< 440 V_{DC}	< 880 V_{DC}
Nominal Voltage	750 V_{DC}	1500 V_{DC}
Max. permanent voltage	800 V_{DC}	1600 V_{DC}
Max. peak voltage	1200 V_{DC} (5ms)	2000 V_{DC} (5ms)

Models with Auxilia Voltage

	SFMR-750	SFMR-1500
Operating ranges		
On	> 500 V_{DC}	> 1500 V_{DC}
Intermittent	≤ 500 V_{DC}	≥ 880 V_{DC}
Off	No auxiliary voltage	No auxiliary voltage
Nominal Voltage	750 V_{DC}	1500 V_{DC}
Max. permanent voltage	800 V_{DC}	1600 V_{DC}
Max. peak voltage	1200 V_{DC} (5ms)	2000 V_{DC} (5ms)

Optics

Optics Pictogram 750

Optics Pictogram 1500

Round LED Optics PIL-200x200 PPC

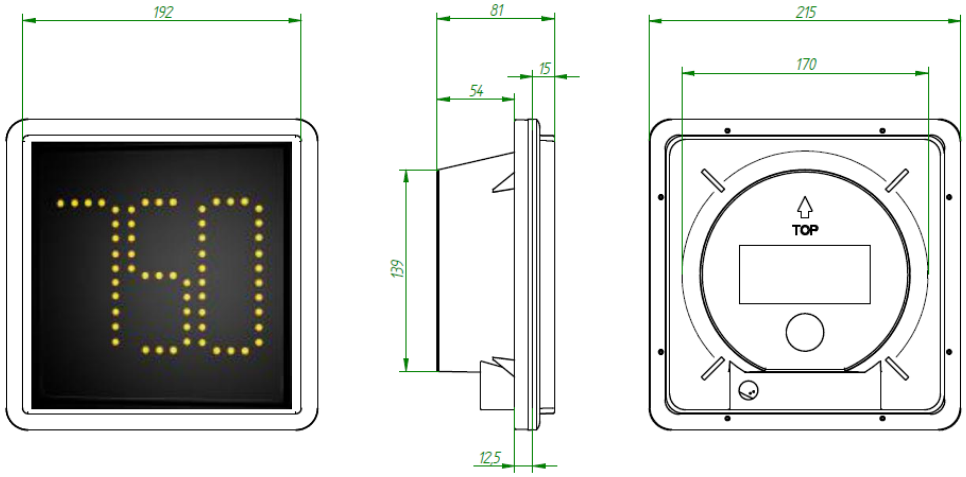
Models of 750 V_{DC}

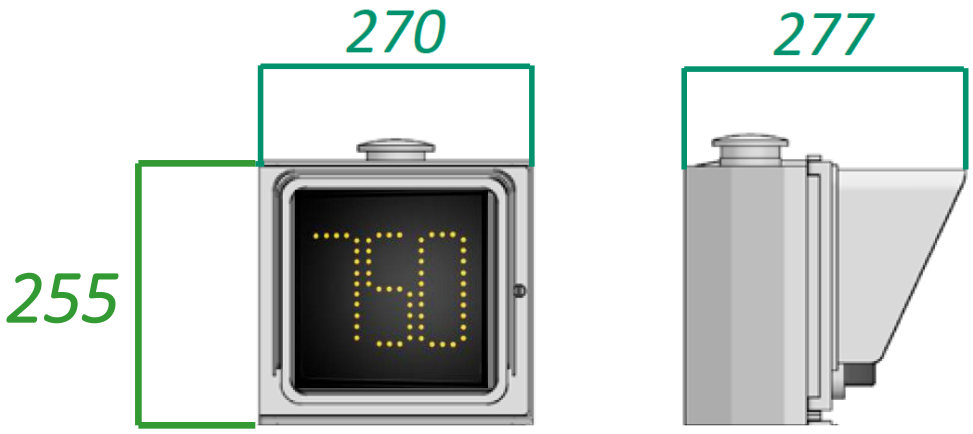
Model	Nominal Voltage	Pictogram	LED Color	Auxiliary Voltage
SMFR-750-PA	750 V_{DC}	'750'	Amber	Self-Powered
SMFR-750-PZ	750 V_{DC}	'750'	Blue	Self-Powered
SMFR-750-PR	750 V_{DC}	'750'	Red	Self-Powered
SMFR-750-PV	750 V_{DC}	'750'	Green	Self-Powered
SMFR-750-PB	750 V_{DC}	'750'	White	Self-Powered
SMFR-750-PA-230	750 V_{DC}	'750'	Amber	230 V_{AC}
SMFR-750-PZ-230	750 V_{DC}	'750'	Blue	230 V_{AC}
SMFR-750-PR-230	750 V_{DC}	'750'	Red	230 V_{AC}
SMFR-750-PV-230	750 V_{DC}	'750'	Green	230 V_{AC}
SMFR-750-PB-230	750 V_{DC}	'750'	White	230 V_{AC}
SMFR-750-PA-125	750 V_{DC}	'750'	Amber	125 V_{DC}
SMFR-750-PZ-125	750 V_{DC}	'750'	Blue	125 V_{DC}
SMFR-750-PR-125	750 V_{DC}	'750'	Red	125 V_{DC}
SMFR-750-PV-125	750 V_{DC}	'750'	Green	125 V_{DC}
SMFR-750-PB-125	750 V_{DC}	'750'	White	125 V_{DC}
SMFR-750-A-230	750 V_{DC}	Led Optics	Amber	230 V_{AC}
SMFR-750-A-230	750 V_{DC}	Led Optics	Blue	230 V_{AC}
SMFR-750-R-230	750 V_{DC}	Led Optics	Red	230 V_{AC}
SMFR-750-V-230	750 V_{DC}	Led Optics	Green	230 V_{AC}
SMFR-750-B-230	750 V_{DC}	Led Optics	White	230 V_{AC}
SMFR-750-A-125	750 V_{DC}	Led Optics	Amber	125 V_{DC}
SMFR-750-Z-125	750 V_{DC}	Led Optics	Blue	125 V_{DC}
SMFR-750-R-125	750 V_{DC}	Led Optics	Red	125 V_{DC}
SMFR-750-V-125	750 V_{DC}	Led Optics	Green	125 V_{DC}
SMFR-750-B-125	750 V_{DC}	Led Optics	White	125 V_{DC}

Models of 1500 V_{DC}

Model	Nominal Voltage	Pictogram	LED Color	Auxiliary Voltage
SMFR-1500-PA	1500 V_{DC}	'1500'	Amber	Self-Powered
SMFR-1500-PZ	1500 V_{DC}	'1500'	Blue	Self-Powered
SMFR-1500-PR	1500 V_{DC}	'1500'	Red	Self-Powered
SMFR-1500-PV	1500 V_{DC}	'1500'	Green	Self-Powered
SMFR-1500-PB	1500 V_{DC}	'1500'	White	Self-Powered
SMFR-1500-PA-230	1500 V_{DC}	'1500'	Amber	230 V_{AC}
SMFR-1500-PZ-230	1500 V_{DC}	'1500'	Blue	230 V_{AC}
SMFR-1500-PR-230	1500 V_{DC}	'1500'	Red	230 V_{AC}
SMFR-1500-PV-230	1500 V_{DC}	'1500'	Green	230 V_{AC}
SMFR-1500-PB-230	1500 V_{DC}	'1500'	White	230 V_{AC}
SMFR-1500-PA-125	1500 V_{DC}	'1500'	Amber	125 V_{DC}
SMFR-1500-PZ-125	1500 V_{DC}	'1500'	Blue	125 V_{DC}
SMFR-1500-PR-125	1500 V_{DC}	'1500'	Red	125 V_{DC}
SMFR-1500-PV-125	1500 V_{DC}	'1500'	Green	125 V_{DC}
SMFR-1500-PB-125	1500 V_{DC}	'1500'	White	125 V_{DC}
SMFR-1500-A-230	1500 V_{DC}	Led Optics	Amber	230 V_{AC}
SMFR-1500-A-230	1500 V_{DC}	Led Optics	Blue	230 V_{AC}
SMFR-1500-R-230	1500 V_{DC}	Led Optics	Red	230 V_{AC}
SMFR-1500-V-230	1500 V_{DC}	Led Optics	Green	230 V_{AC}
SMFR-1500-B-230	1500 V_{DC}	Led Optics	White	230 V_{AC}
SMFR-1500-A-125	1500 V_{DC}	Led Optics	Amber	125 V_{DC}
SMFR-1500-Z-125	1500 V_{DC}	Led Optics	Blue	125 V_{DC}
SMFR-1500-R-125	1500 V_{DC}	Led Optics	Red	125 V_{DC}
SMFR-1500-V-125	1500 V_{DC}	Led Optics	Green	125 V_{DC}
SMFR-1500-B-125	1500 V_{DC}	Led Optics	White	125 V_{DC}

Constructive Characteristics



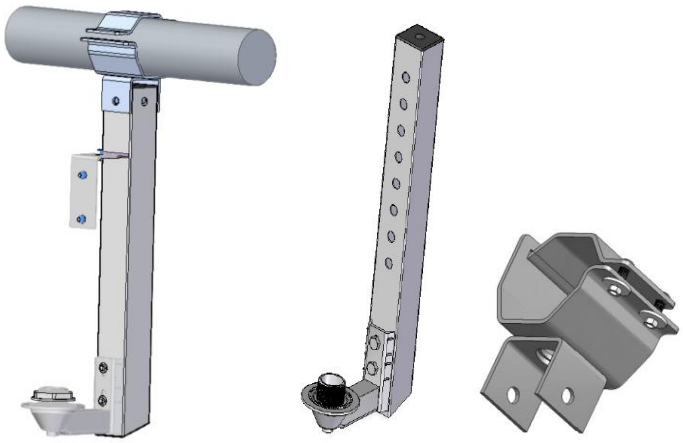


Power Cord

- **SMFR-750**: It is recommended to use cable of the type SEGURFOC-331 SZ1-K (AS+) 1x1.5 insulated 1000V silicone or similar
- **SMFR-1500**: It is recommended to use cable of the type Exzhellent® Solar ZZ-F (AS) 1,8 kV CC - 0,6-1 kV CA TÜV 2 Pfg 116

Support SOP-SMFR-001

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

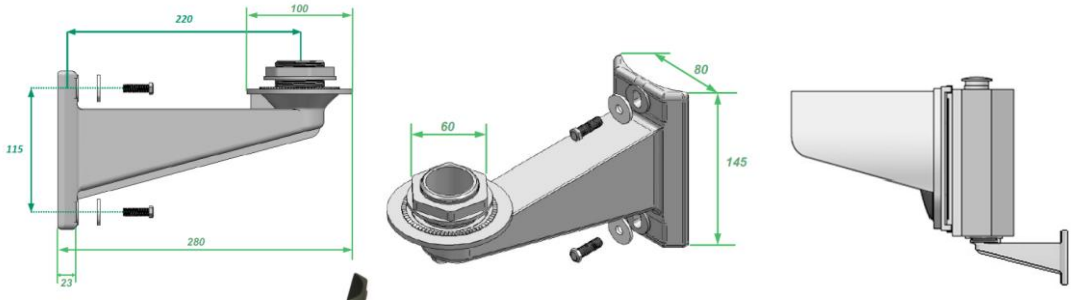


Support SOP-SMFR-002

- 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

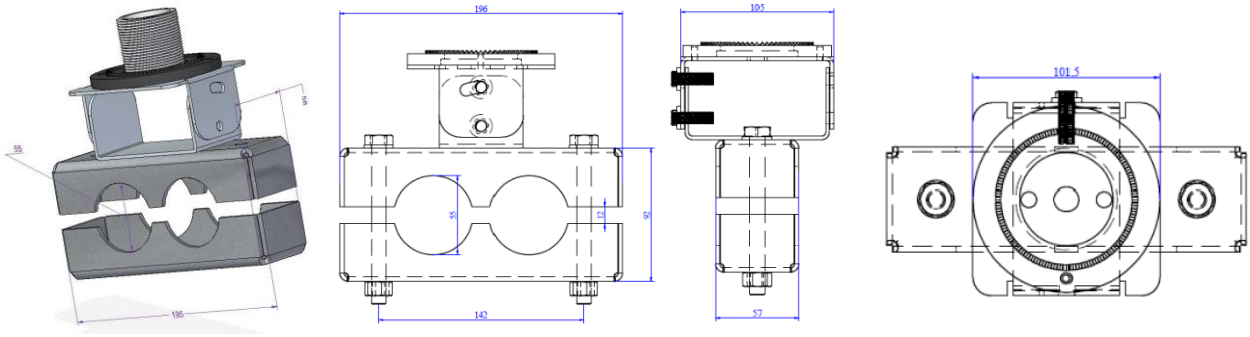
Advantages

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



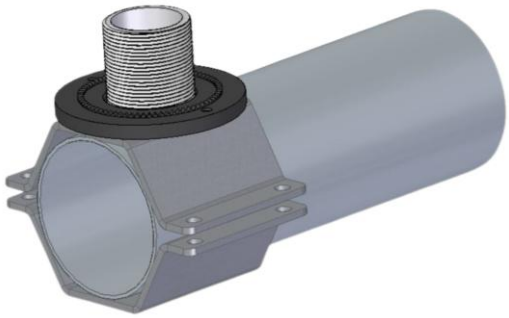
Support SOP-SMFR-003

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



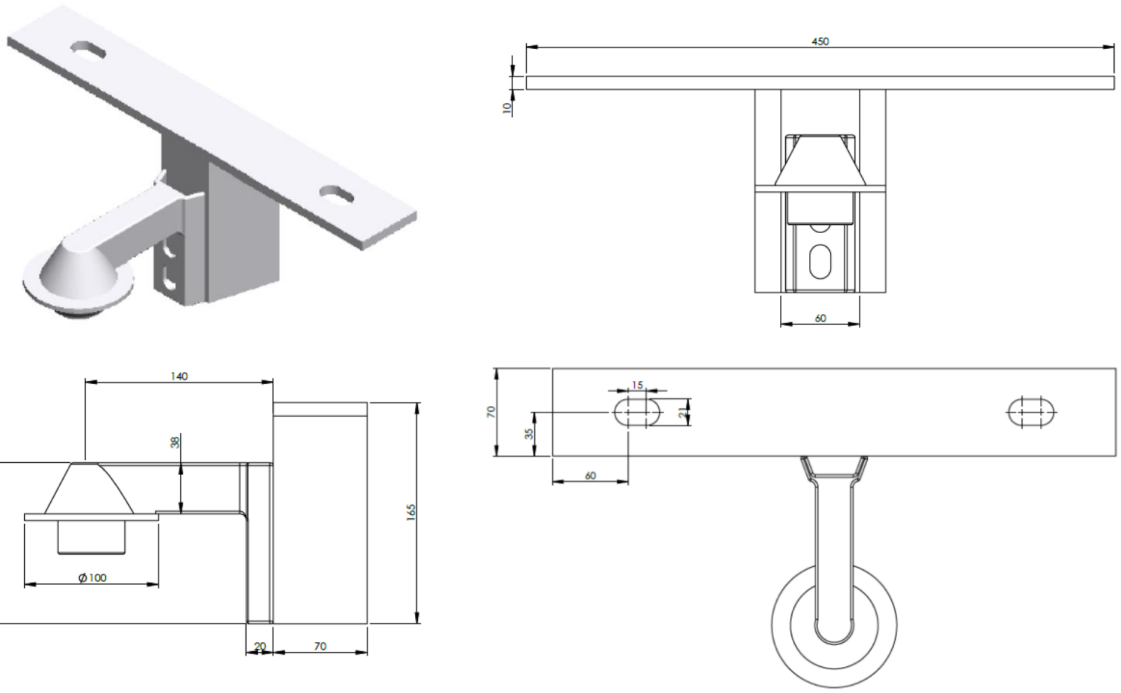
Support SOP-SMFR-004

- 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**



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
Enclosure color	gray, black, yellow, or green
Pictogram	'750' in color '1500' in color
LED Colors	Amber, green, red, white, blue

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.

CJ3000+PTC-EM3

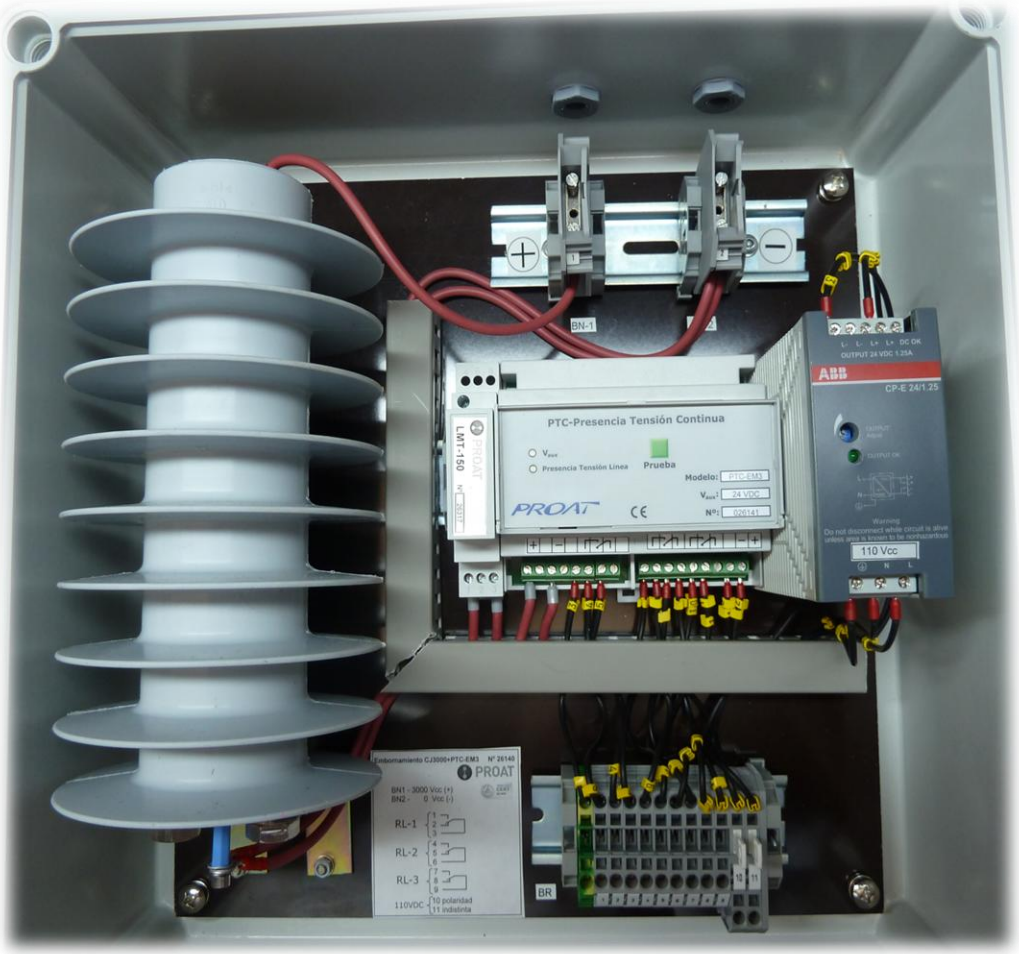
DC Locomotive Voltage Absence Detector

Description

Measures the voltage of the installation and activates three potential-free switching contacts when the voltage is below 50 volts, protecting maintenance personnel.

Applications

Safe access to the engine room when voltage absence is detected.



Model

Model	Catenary Voltage	Auxiliary Voltage
CJ3000+PTC-EM3	3,3 kV_{DC}	24 V_{DC}

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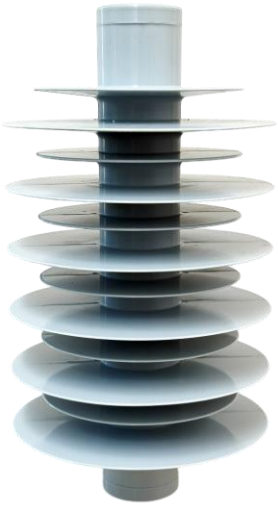
CCS

Capacitive Silicone Sensor

- ✓ Catenary Voltage Detector **V_{AC}**
- ✓ Models 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

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	Media	210mm	1,2 kg
CCS10-MF	10 kV_{AC}	50 kV_{AC}	972mm	Muy Fuerte	300mm	1,8 kg
CCS25	27,5 kV_{AC}	95 kV_{AC}	972mm	Media	300mm	1,8 kg
CCS25-MF	27,5 kV_{AC}	95 kV_{AC}	1605mm	Muy Fuerte	356mm	2,8Kg

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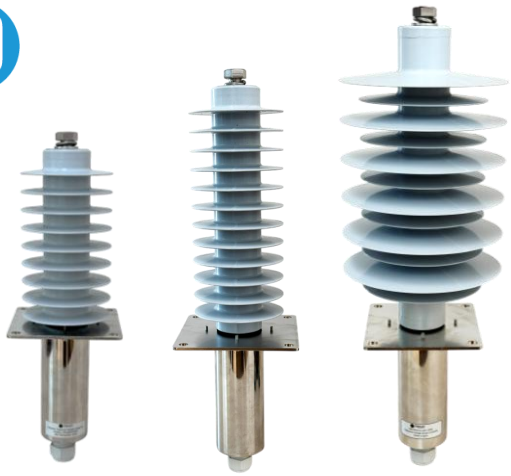
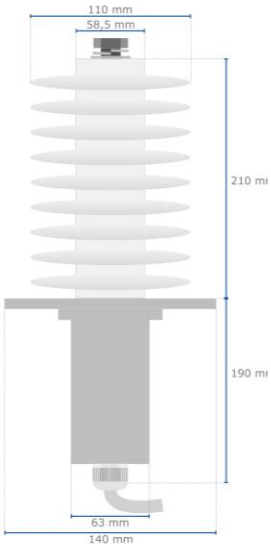
Applications

Detection of the presence of **AC voltage** in Railway Installations:

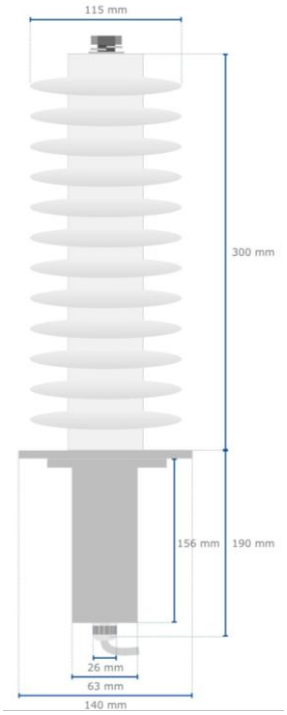
- High Speed Trains
- Conventional trains in AC
- Underground / Subway in AC



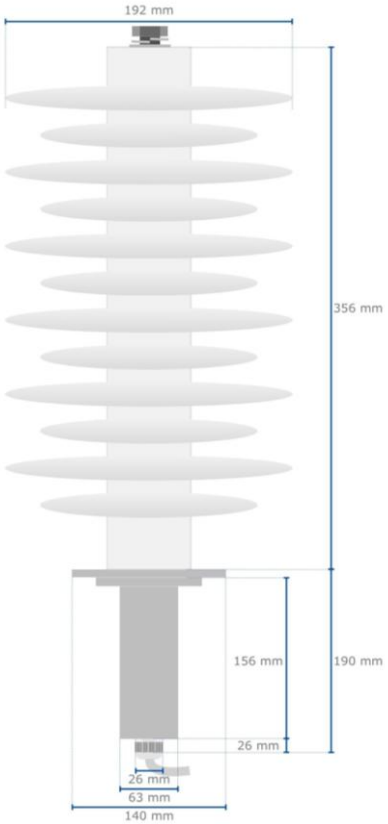
Measurements



CCS10



CCS10-MF



CCS25-MF

CCS25

Technical data

	CCS
Silicone	**ISO 37**

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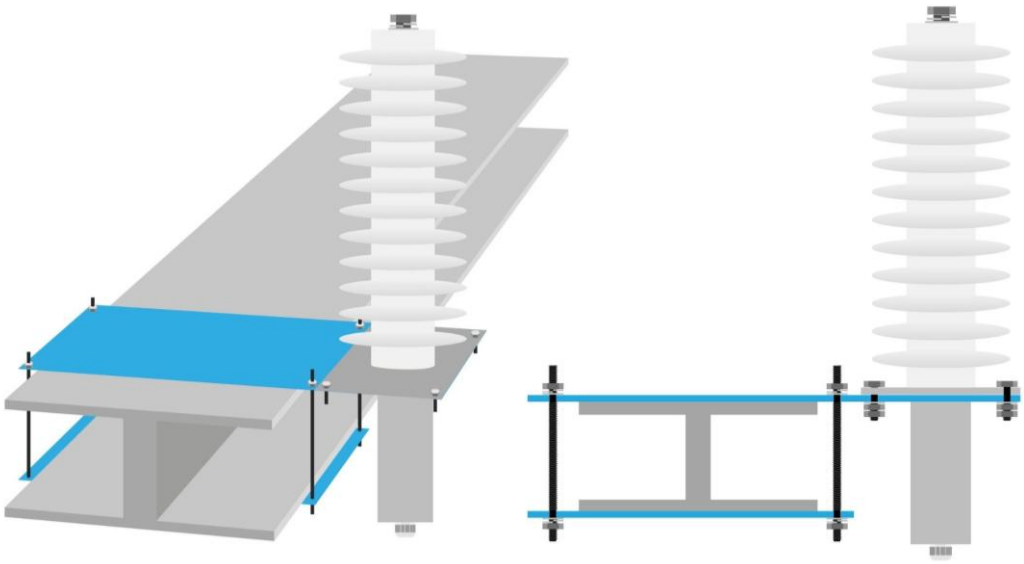
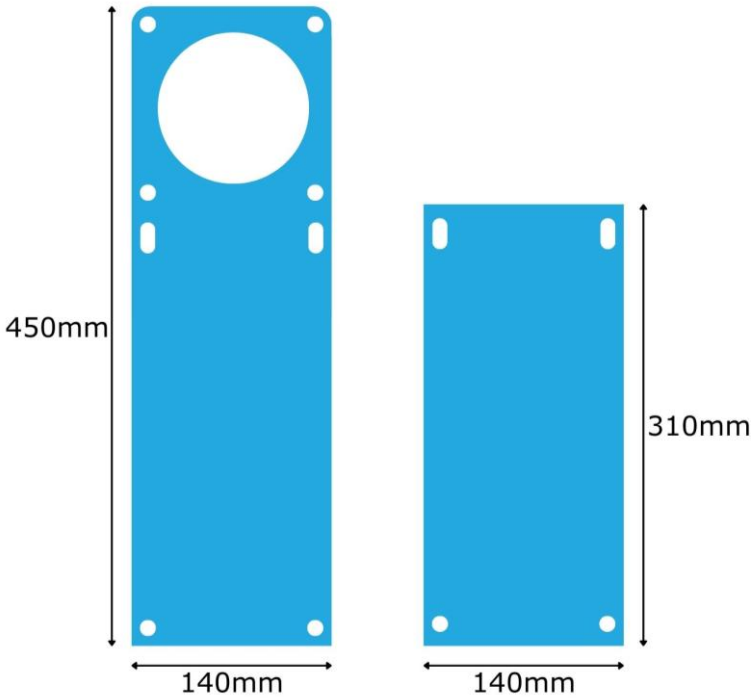
Elongation Upon Impact	630 %
Resistance to traction	8,5 N/mm^2

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**





CCS + CBI21

Capacitive Silicone Sensor

+

Output 4-20mA

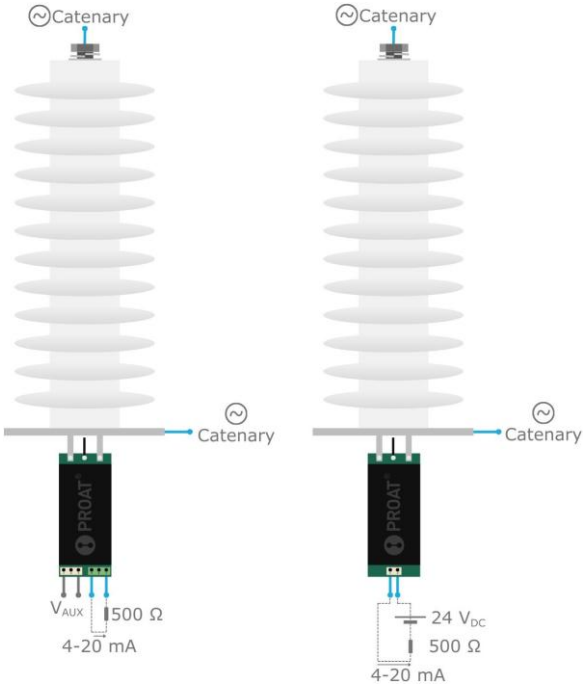
- ✓ Capacitive Silicone Sensor **CCS**
- ✓ CBI21 **current loop converter** with isolated output **4-20mA** proportional to catenary voltage
- ✓ Measurement 16-60 Hz depending on model
- ✓ Auxiliary voltage **85-264 VAC | 85-370 VDC , 48 VDC , 24 VDC** Depending on the model
- ✓ CCS25 + CBI21 Supports 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

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 **EFO** and **RFO**
- ✓ CCS+FO Supports lightning impulse voltages up to **95kV**
- ✓ The set is approved by **ADIF**

EFO – Fiber Optic Emitter

- ✓ **Outputs light pulses** proportional to catenary voltage
- ✓ 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 **Auxiliary voltage ±12VDC** depending on 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

RFO – 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

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

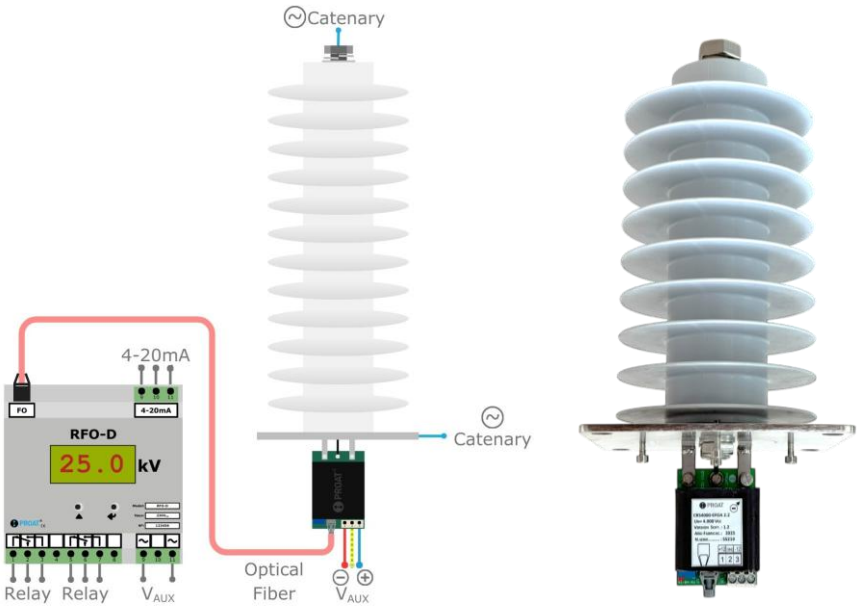
Model	Fiber Optic	Compatible Emitter	Installation	Real-Time Visualization	Output 4-20 mA	Output Contacts	Auxiliary voltage
RFO25-D	SL Connector	EFO25	Din Rail	Yes	Yes	Yes	85-264 V_{AC} | 85-370 V_{DC}
RFO25-D-24	SL Connector	EFO25	Din Rail	Yes	Yes	Yes	24 V_{DC}
RFOA25-D	SL Connector	EFOA25	Din Rail	Yes	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 reques

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

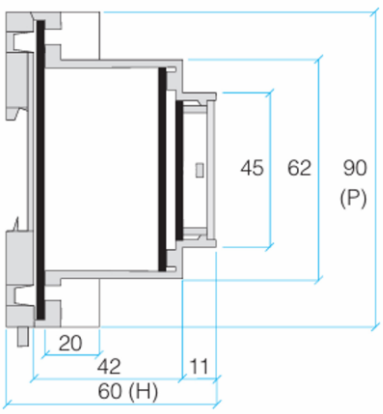


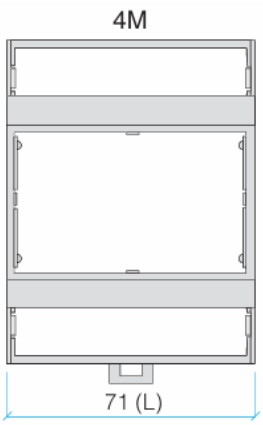
Technical Data – RFO-D

	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

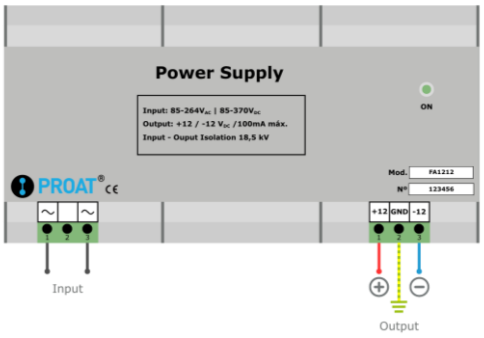
Constructive Characteristics – RFO-D

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



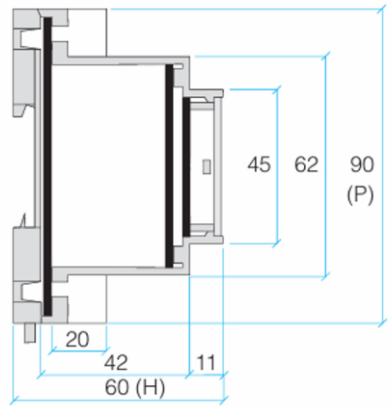


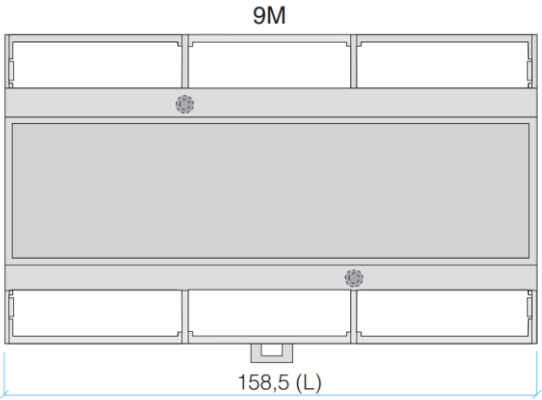
Power Supply FA1212



Constructive Characteristics

- 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 withstand voltage tests

Tests **Norma UNE 600068**:

- Corrosion test

Other Tests:

- Operating temperature

CCS + RS485 ModBus

Capacitive Silicone Sensor

+

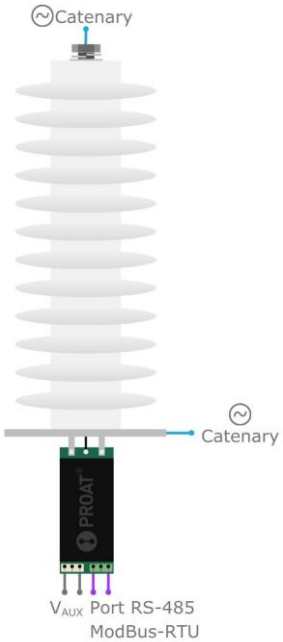
Output RS485 ModBus

- ✓ 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 kVDC
- **Uptime Testing**, according to 6.2.10: Applied Voltages of 30 kVAC and then 50 kVAC for 5 minutes.
- **Industrial Frequency Dielectric Testing** 95 kVAC 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**:

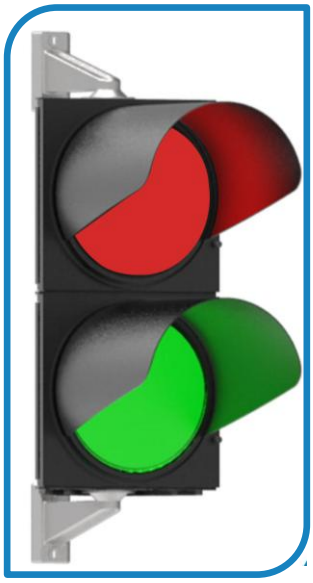
- Corrosion Test

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 signalling:

- 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

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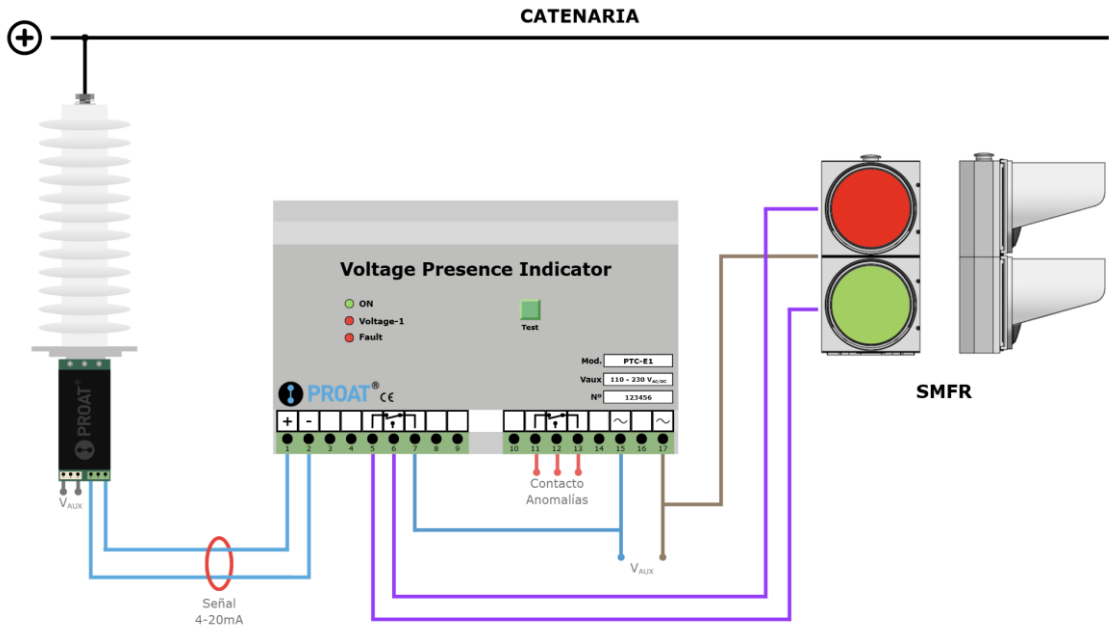
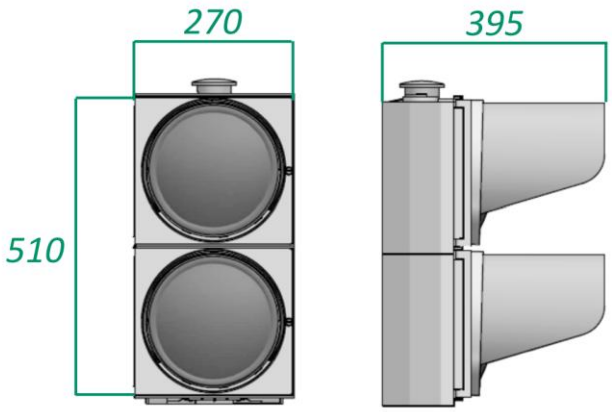
Connection

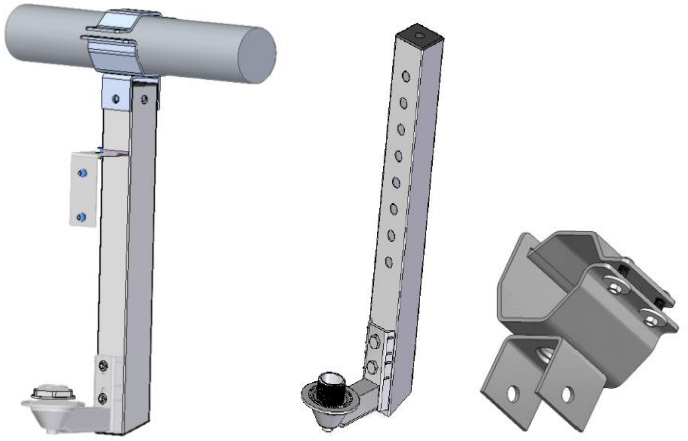


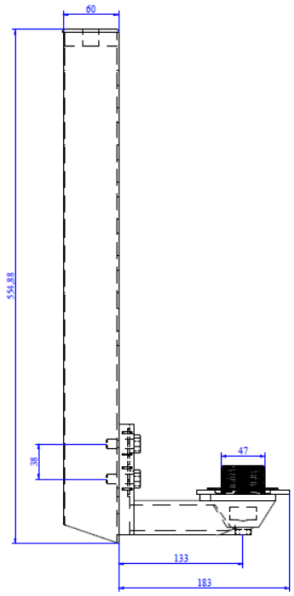
Constructive Characteristics



Support SOP-SMFR-001

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



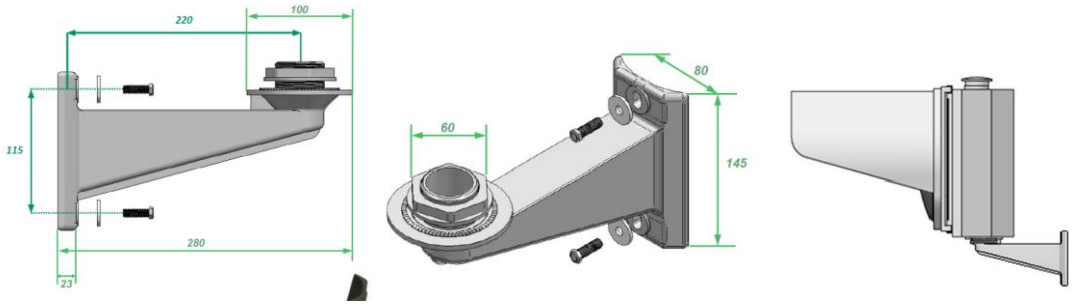


Support SOP-SMFR-002

- 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

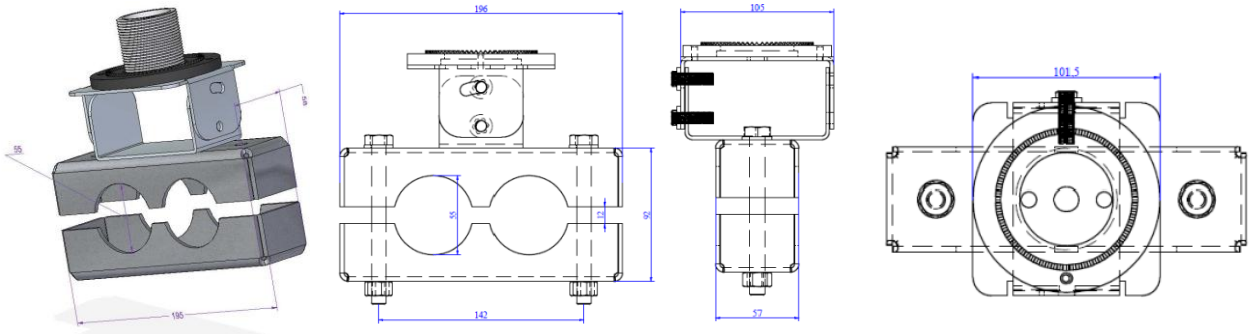
Advantages

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



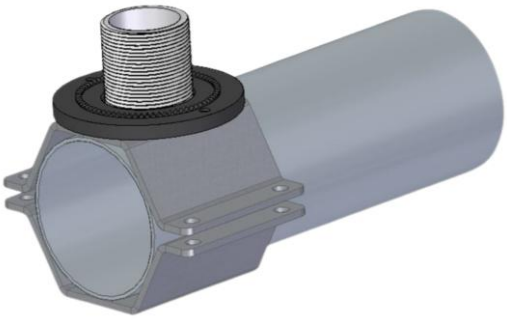
Support SOP-SMFR-003

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



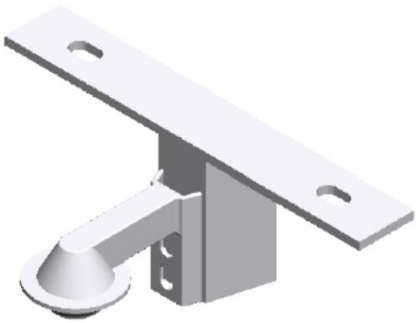
Support SOP-SMFR-004

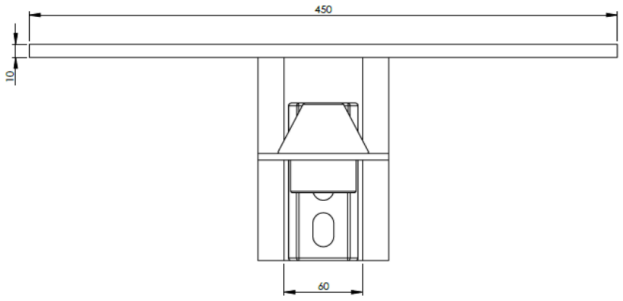
- Support for anchoring on **Bracket of diameter 76mm**
- Made of **galvanized steel**

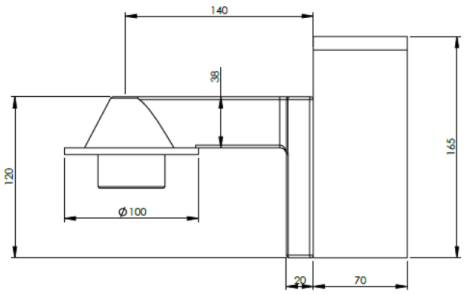


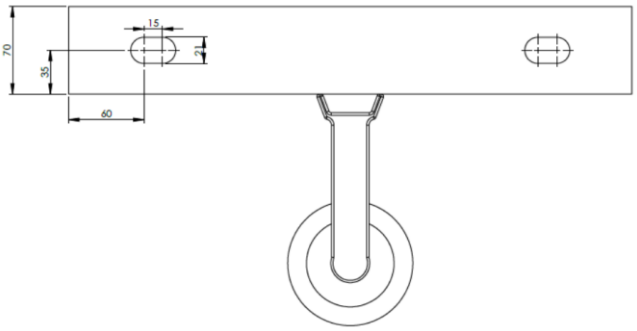
Support SOP-SMFR-005

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









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

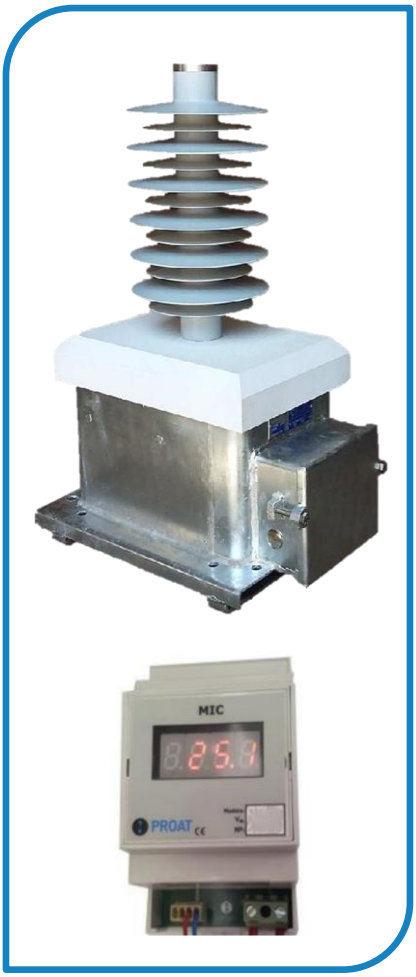
	PIL-200x200 PPC		
Specifications			
Nominal Voltage	125 V_{DC} or 230 V_{AC}		
Consumption	< 8W		
Number of LEDs (Red, Amber or Green)	56		
On/off reaction time	< 50 ms		
Environmental requirements (EN 12368 – 5.1)	Class A, B, C (operating temperature of -30ºC to + 70ºC)		
Electromagnetic Compatibility (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.

VFR + MIC

AC Catenary Voltage Detectors

- ✓ Silicone-Epoxy Transformer **25kV$_{AC}$** – **100 V$_{AC}$**
- ✓ Proportional output from **0-100 V$_{AC}$** relative to catenary voltage
- ✓ **0,12 mm** copper primary winding
- ✓ **1,3 mm** copper secondary winding
- ✓ Primary winding made with **epoxy resin** insulation class E (CEI 60085 Standard)
- ✓ **Encapsulated in galvanized Steel** to prevent fragment projection
- ✓ **Non-polluting:** free of oils and fluorinated gases as insulating materials
- ✓ Weight : **40 kg**
- ✓ **Leakage line** of **1950 mm**
- ✓ Lifetime **>30 years**, maintenance free
- ✓ Exclusively **vertical** mounting



MIC-25 – AC Catenary Voltage Detector

- ✓ **MIC-25** device displays catenary voltage
- ✓ Installed in DIN rail enclosure
- ✓ Auxiliary power supply **24 V$_{DC}$** or **230 V$_{AC\ 50Hz}$** depending on model

Applications

AC voltage presence detection in railway installations:

- High-speed trains
- Conventionals AC trains
- AC metro systems

Transformer Model

Model	Primary Voltage	Secondary Voltage
VFR-25Kv-100	25 kV_{AC}	100 V_{AC}

Display Model

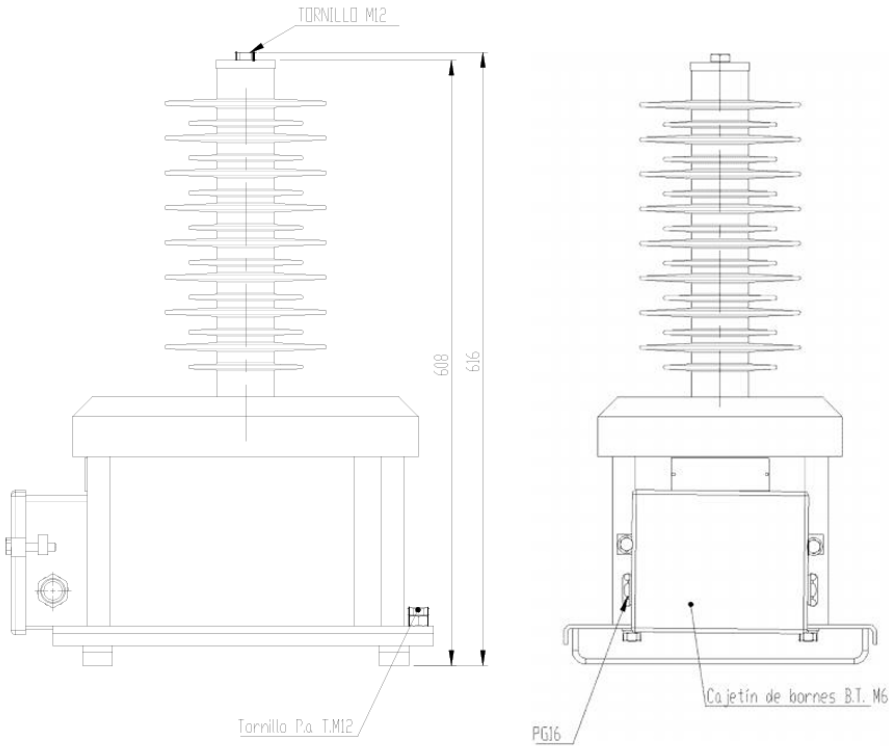
Model	Display range	Auxiliary Voltage
MIC-25kv	0-30 kV_{AC}	230 V_{AC}
MIC-25kv-24	0-30 kV_{AC}	24 V_{DC}

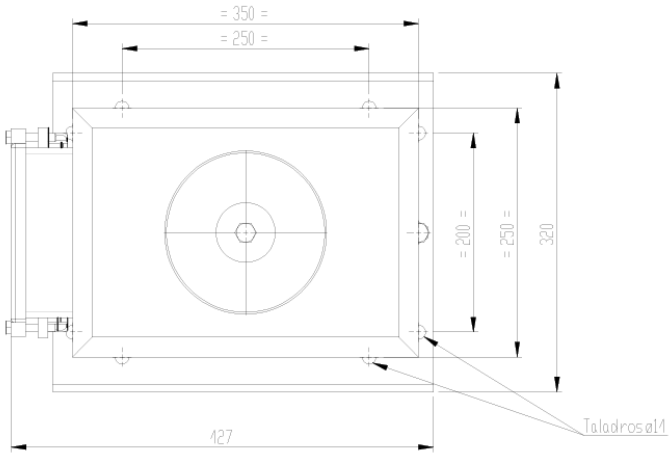
Technical data

MODEL	VFR-25Kv-100
Electrical Characteristics	
Rated Primary Votage - U_{pn}	27.5 kV
Rated Secondary Voltage - U_{sn}	100 V
Maximum Service Voltage - U_m	36 kV
Rated voltage withstand at industrial frequency:	
Between primary and secondary to ground	70 kV
Between secondary and ground	3 kV
Maximum impulse voltage (peak value)	170 kV
Accuracy power	100 VA
Accuracy class	1
Rated frequency (f)	50/60 Hz
Permissible continuous overvoltage (Un) (kV)	1,2 Upn
Mechanical Characteristics	
Tightening torque for M6 screws	4 Nm
Tightening torque for M12 screws	35 Nm
Primary terminal material	Aluminum
Ground terminal material	Stainless.steel
Sealed secondary terminal cover, sealable with cable gland connection	
Galvanized Steel tank to prevent corrosion	
Weight	40 kg
Leakage line	1950 mm
Other Characteristiques	
Lifetime	>30 years
Enclosure material	Silicone
Internal material	Epoxy
Maintenance-free	

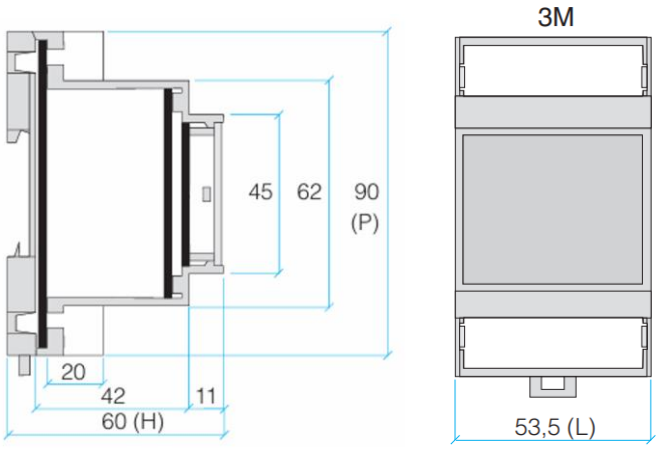
Pol. Ind. Can Tapioles c/Narcís Monturiol, 4 nave 10, 08110 Montcada-Reixac (Barcelona) SPAIN
Tel. +34 935790610 · comercial@proat.es · www.proat.es

VFR - Measurements





MIC - Measurements



GDB

Bitension Discriminator Group for Catenary DC/AC

✓ **GBD** detects the presence of **DC** and **AC** voltage in railway systems

✓ For **workshops** or railway installations with **two different voltages**, the Bitension Discriminator Group (GDB) is installed to signal the voltage present in the catenary

✓ CCS25 + CBI21 **Capacitive Detector** for AC Voltage Measurement:

- Nominal Voltage: **27,5 kV_{AC}**
- **Output 4-20 mA**
- Sensor **with DC voltage filter**. 4 mA output up to voltages of 50 kV_{DC}
- Auxiliary voltage **85-264 V_{AC}** | **85-370 V_{DC}** or **24 V_{DC}**

✓ Resistive Detector **CRS27500 + CBI21FA** for DC measurement:

- Nominal Voltage: **3,3 kV_{DC}**
- **Output 4-20 mA**
- Sensor with **AC voltage filter**. 4 mA output up to voltages of 36K V_{AC}
- Auxiliary voltage **85-264 V_{AC}** | **85-370 V_{DC}** or **24 V_{DC}**

✓ Voltage **Presence Controller PTC-E2**:

- Reading of two measures **4-20mA**
- AC and DC **independent LED** signage
- Independent LED **Signaling of Power On and Anomalies**
- Output with **3 Potential-Free Switched Contacts** :
  - Voltage **DC**
  - Voltage **AC**
  - **Anomaly**
- Auxiliary Voltage **85-264 V_{AC}** | **85-370 V_{DC}** or **24 V_{DC}**

Applications

Detection of the presence of **AC and DC BI-tension** in Railway Installations.

Functional Features

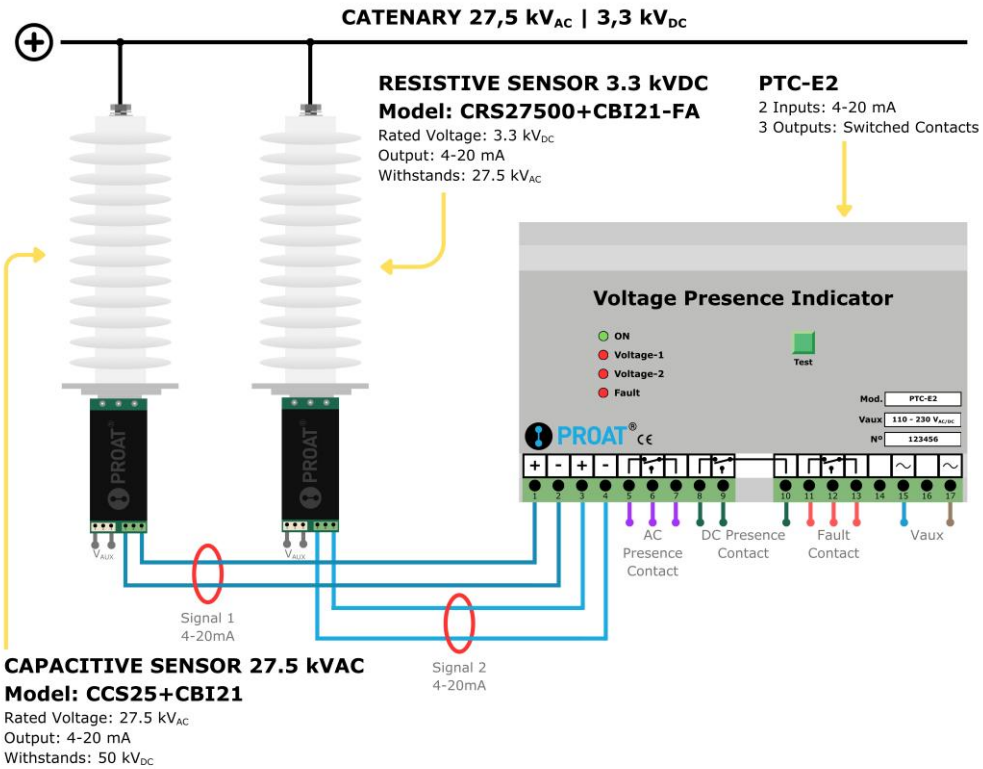
- **3 Output relays with potential-free switched contact** to signal the presence of DC voltage, AC voltage and Anomalies.
- **TEST button** to simulate system activation and deactivation
- **Green LED** to signal the ignition
- **Red LED** to signal Voltage 1
- **Red LED** to signal Voltage 2
- **Red LED** to signal installation failure

Models

Model	DC Nominal Voltage	AC Nominal Voltage	Nominal Frequency	Auxiliary Voltage
GDB	3,3 kV_{DC}	27,5 kV_{AC}	50-60 Hz	85-264 V_{AC} | 85-370 V_{DC}
GDB-24	3,3 kV_{DC}	27,5 kV_{AC}	50-60 Hz	24 V_{DC}
GDB-HZ	3,3 kV_{DC}	27,5 kV_{AC}	16-60 Hz	85-264 V_{AC} | 85-370 V_{DC}
GDB-HZ-24	3,3 kV_{DC}	27,5 kV_{AC}	16-60 Hz	24 V_{DC}

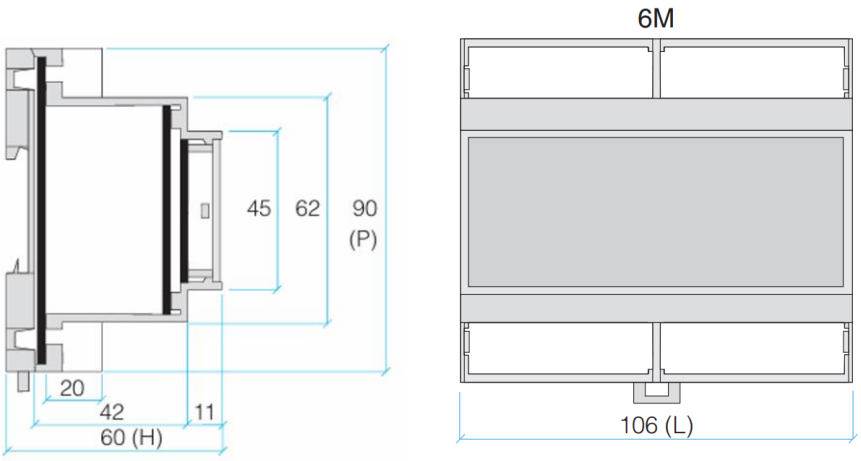
*Other models can be manufactured on request

Connection - GDB



Constructive Characteristics – PTC-E2

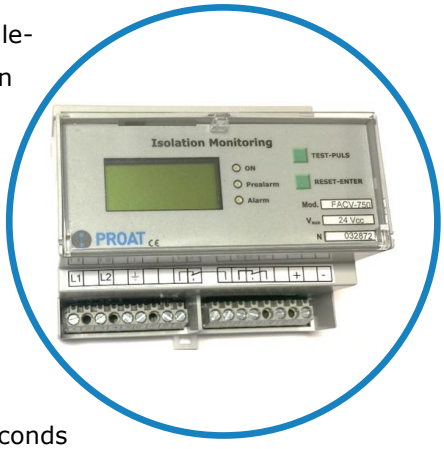
- DIN rail installation
- Terminals on front plate
- Self-extinguishing plastic box class V0



FACV

AC Insolation Monitor

with Automatic Reset and Real-Time Display



✓ Detects **symmetrical and asymmetrical** insolation faults in single-phase and three-phase AC systems in any of the phases, or between the neutral point and ground.

✓ **2 independent potential-free output** commuted contacts, with programmable actuation levels and time delays: pre-alarm and alarm.

✓ **Pre-alarm:** actuation level of 50 - 100 kΩ and actuation delay of 10-30 seconds.

✓ **Alarm:** actuation level of 1 - 45 kΩ and actuation delay of 1-10 seconds

✓ Alarm with **automatic reset** configurable between 1-60 minutes

✓ **Real-time display** of the installation's isolation level. Measurement range: 1 kΩ - 1000 kΩ

✓ For IT systems from **115VAC - 7200VAC** depending on model and coupler

✓ **Modbus** Communications

Applications

Monitoring of possible isolation failures in AC systems isolated from IT ground:

- Railway Facilities
- Power Plants
- Mobile Power Generators
- Lighting Installations
- Elevators

Function Features

- 2 output relays with independent potential-free commuted contacts, with programmable actuation levels and timings: Pre-alarm and Alarm.
- Programming adjustment values using the **SET-MENU** buttons on the front of the device:
  - Pre-alarm action level
  - Alarm action level
  - Pre-alarm time delay
  - Alarm time delay
  - Automatic reset time
  - Alarm memory – Yes/No
  - Modbus ID
  - Language: Spanish/English
- Real-time display of ground resistance measurements
- 2x8-character front display
- **TEST** button to simulate ground faults (+) and (-)
- **RESET** button to reset the device and clear the fault
- LEDs to signal pre-alarm and alarm faults
- Electrically isolated RS-485 interface with Modbus-RTU protocol, depending on the model:
  - Instantaneous isolation measurement
  - Relay status
  - View ModBus map

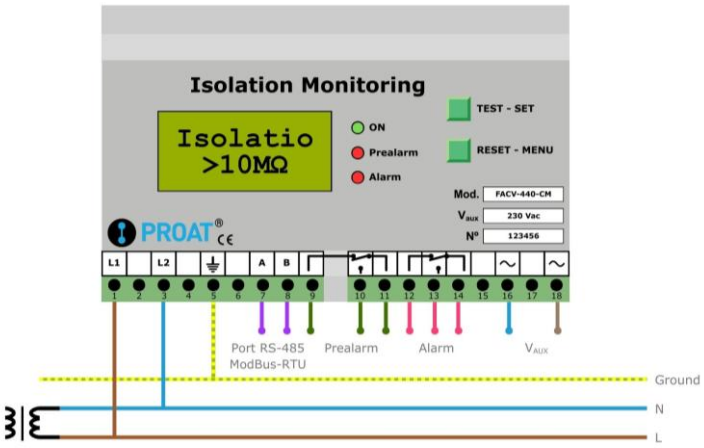
Models

Model	Nominal Voltage U_N	Operating Range	Alarm Level	Power Voltage	DIN Size	Communications
FACV-115-M	115 V_{AC}	0-115 V_{AC}	50-150kΩ y 5-45kΩ	60-264V_{AC} | 80-300V_{DC}	9M - 160mm	ModBus-RTU
FACV-115-M-24	115 V_{AC}	0-115 V_{AC}	50-150kΩ y 5-45kΩ	24 V_{DC}	9M - 160mm	ModBus-RTU
FACV-230-M	230 V_{AC}	0-230 V_{AC}	50-150kΩ y 5-45kΩ	60-264V_{AC} | 80-300V_{DC}	9M - 160mm	ModBus-RTU
FACV-230-M-24	230 V_{AC}	0-230 V_{AC}	50-150kΩ y 5-45kΩ	24 V_{DC}	9M - 160mm	ModBus-RTU
FACV-440-M	440 V_{AC}	0-440 V_{AC}	50-150kΩ y 5-45kΩ	60-264V_{AC} | 80-300V_{DC}	9M - 160mm	ModBus-RTU
FACV-440-M-24	440 V_{AC}	0-440 V_{AC}	50-150kΩ y 5-45kΩ	24 V_{DC}	9M - 160mm	ModBus-RTU
FACV-750-M	750 V_{AC}	0-750 V_{AC}	50-150kΩ y 5-45kΩ	60-264V_{AC} | 80-300V_{DC}	9M - 160mm	ModBus-RTU
FACV-750-M-24	750 V_{AC}	0-750 V_{AC}	50-150kΩ y 5-45kΩ	24 V_{DC}	9M - 160mm	ModBus-RTU
FACV-440E-M + AC-1000	1000 V_{AC}	0-1000 V_{AC}	50-150kΩ y 5-45kΩ	60-264V_{AC} | 80-300V_{DC}	9M - 160mm + Coupler	ModBus-RTU
FACV-440E-M-24 + AC-1000	1000 V_{AC}	0-1000 V_{AC}	50-150kΩ y 5-45kΩ	24 V_{DC}	9M - 160mm + Coupler	ModBus-RTU
FACV-440S-M + ADP-4200	7200 V_{AC}	0-7200 V_{AC}	50-150kΩ y 5-45kΩ	60-264V_{AC} | 80-300V_{DC}	9M - 160mm + Coupler	ModBus-RTU
FACV-440S-M-24 + ADP-4200	7200 V_{AC}	0-7200 V_{AC}	50-150kΩ y 5-45kΩ	24 V_{DC}	9M - 160mm + Coupler	ModBus-RTU
FACV-440S-M + ADP-7200	1000 V_{AC}	0-1000 V_{AC}	50-150kΩ y 5-45kΩ	60-264V_{AC} | 80-300V_{DC}	9M - 160mm + Coupler	ModBus-RTU
FACV-440S-M-24 + ADP-7200	1000 V_{AC}	0-1000 V_{AC}	50-150kΩ y 5-45kΩ	24 V_{DC}	9M - 160mm + Coupler	ModBus-RTU

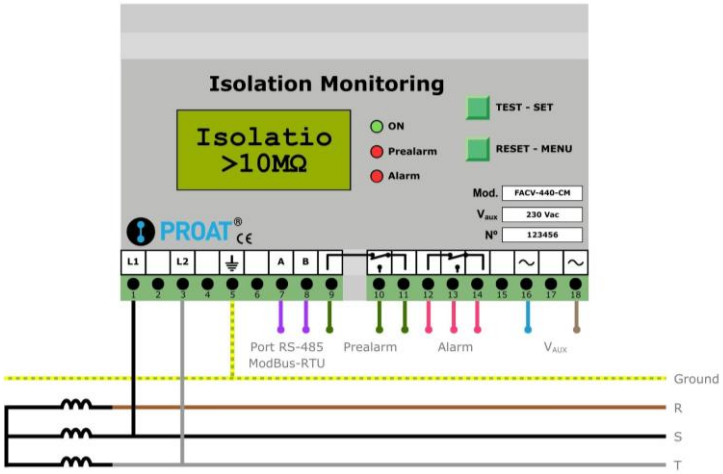
* Other models can be manufactured upon request

Wiring FACV

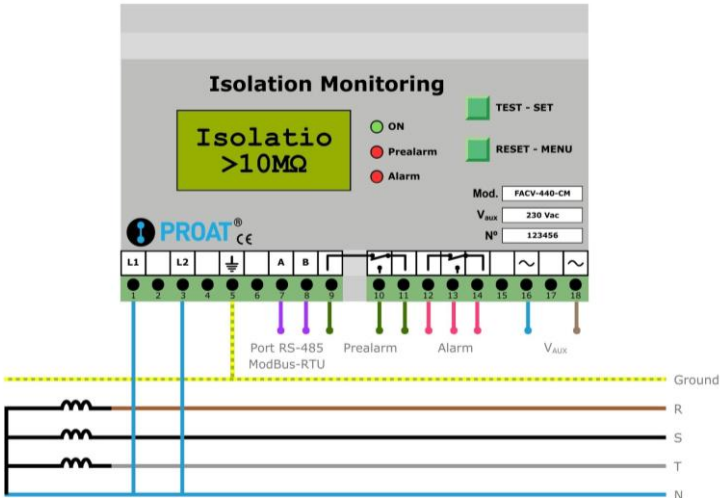
- Single-phase



- Three-phase without neutral

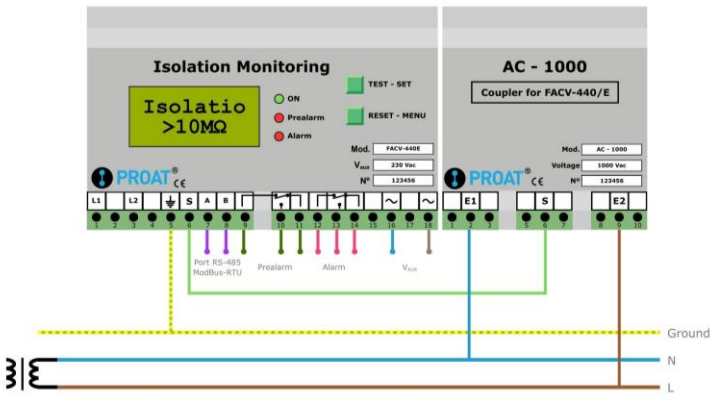


- Three-phase with neutral

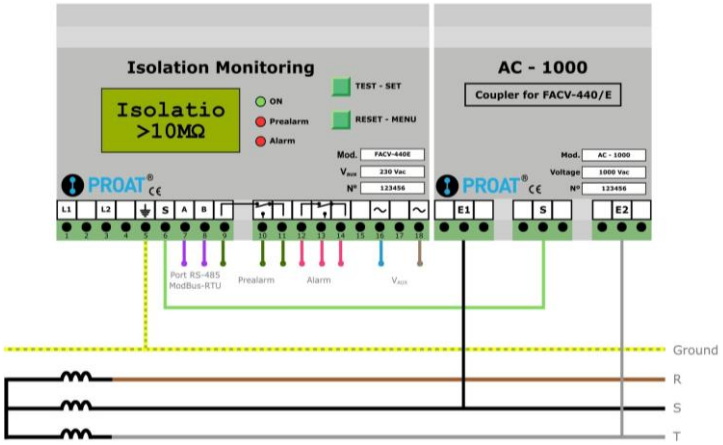


Wiring FACV + AC-1000

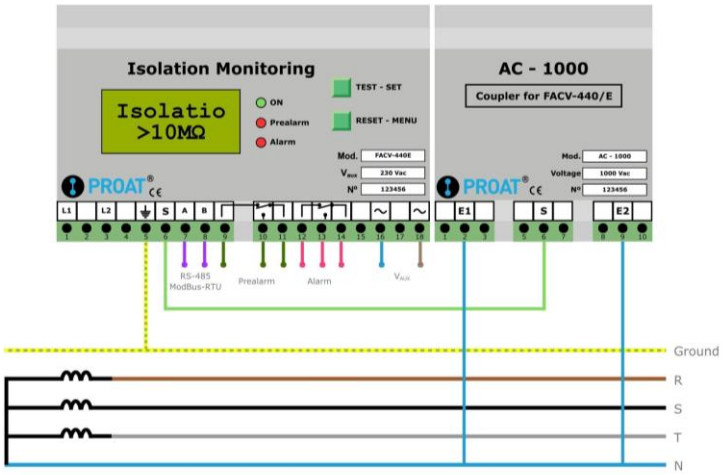
- Single-phase



- Three-phase without neutral

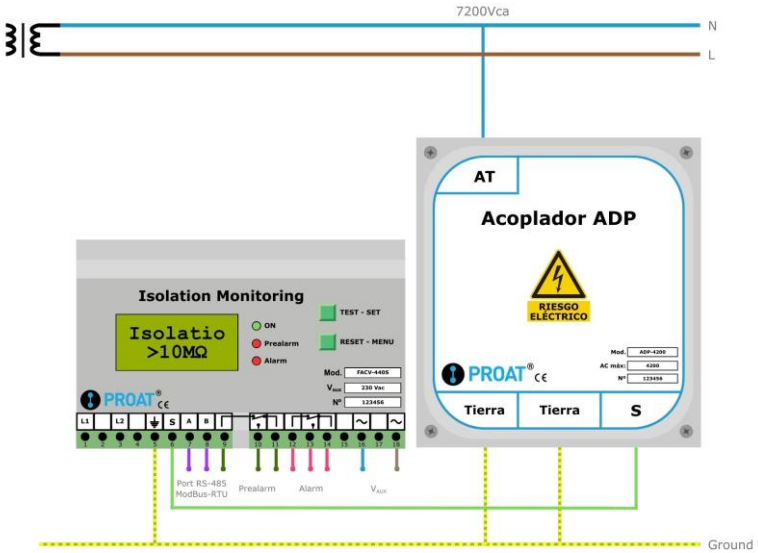


- Three-phase with neutral



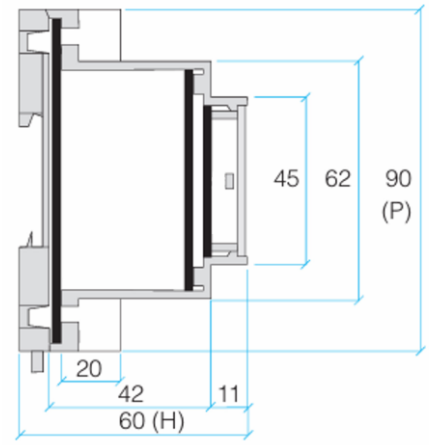
Wiring FACV + AC-4200/7200

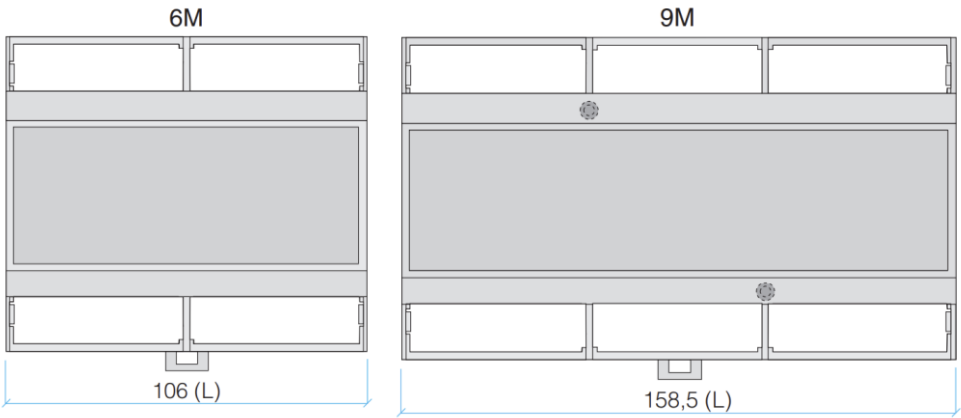
- Single-phase



Constructive Features

- DIN rail mounting
- Front plate terminals
- Class VO self-extinguishing plastic enclosure





Technical Data

MODEL	FACV
Voltage Range	
Voltage range U_N	**0 - U_N** V_{AC}
Nominal frequency F_N	40-300Hz
Auxiliary voltage V_{AUX}	60 – 264 V_{AC} 80 – 300 V_{DC} 24 V_{DC}
Consumption at rest	≤6W
Maximum consumption	≤12W
Response Values	
Pre-alarm level	**50 kΩ - 150 kΩ**
Alarm level	**1 kΩ - 45 kΩ**
Measurement range	1 kΩ - 1000 kΩ
Measurement error 1-10 kΩ/10-200 kΩ	±1 kΩ / ±10%
Hysteresis	25%
Response time with R_F=0,5*R_{AL}	≤5 s
Pre-alarm time delay	10-30 s
Alarm time delay	1-10 s
Reset time	1-60 min
Factory settings	
Pre-alarm level	100 kΩ
Alarm level	10 kΩ
Pre-alarm time delay	10 seg.
Alarm time delay	5 seg.
Reset time	1 min
Modbus ID	1
Alarm memory	No
Language	ESP
Measuring Circuit	
Measurement voltage	+12 V_{DC}
Internal resistance	>132 kΩ
Impedance at 50Hz	>132 kΩ
Measurement current with R_F=0	≤300µA
Parasitic capacity	<5uF
Type of faults detected	Symmetrical and Asymmetrical
Vista Frontal	
ON	Green Led
Fault (+)	Red Led
Fault (-)	Red Led
Test button	Yes
Reset button	Yes
Screen	LCD 2x8 charac.
Dielectric Test	
V_{DC} Input – V_{AUX}	3k V_{RMS} – 1min
V_{DC} Input - Output Contacts	3k V_{RMS} – 1min
V_{AUX} – Output Contacts	3k V_{RMS} – 1min

Switching Elements	
Number of switching elements	2
Type of outputs	Switched relay
Voltage outputs	Voltage free
Max AC load	250V_{AC} 2A
Max DC load	300V_{DC} 0,1A
Switching time RL	< 10 ms
Number of cycles	20,000,000
General Data	
Operation mode	Continually
Mounting	DIN rail
Connection	Screw M2,5
Screw torque	≤0,4 Nm
Protection grade	IP20
Flammability class	UL94V-0
Weight	350 gr
Operating temperature	-5ºC...+60ºC
Storage temperature	-20ºC...+80ºC
Relative humidity (without condensation)	<95%
Setting values method	Front opening
Standards	
Electrical safety requirements	UNE-EN 61010-1
Electrical safety requirements	UNE-EN 61010-2-0081
Electromagnetic compatibility (EMC)	UNE-EN 61000-6-1
Electromagnetic compatibility (EMC)	UNE-EN 61000-6-3/A1
European directive	2006/95/CE
European directive	2004/108/CE
Standard	IEC-61557-8
Communications	
Interface	RS-485
Protocol	ModBus-RTU
Port parameters	9600,8,0,1
ID ModBus	1-248
Available features	3,4
Operation	Slave
Cable length (m)	<1200
Connection	Terminals A/B

IPT3.VPIS

AC Voltage Presence Indicator

✓ **IPT3.VPIS** indicates the **presence of alternating voltage in three-phase systems**

✓ For three-phase voltages up to **440 V_{AC}**

✓ For voltages **up to 36kV** with APRC type Epoxy Capacitive Sensor

✓ **Flashing red LED signalling,** independent in each phase

✓ **Self-powered** from the installation itself

✓ Signals voltage when the **nominal voltage > 40%** according to standard UNE-EN 62271

Applications

Monitoring the presence or absence of voltage in three-phase AC systems:

- Railway Facilities
- Photovoltaic Installations
- Industrial Equipment
- Naval Electrical Systems
- Electric Car Charging Systems

Functional Features

- **Three independent RED LED indicators** per phase to signal the presence of independent voltage
- **TEST pushbutton** to check the operation of the device.

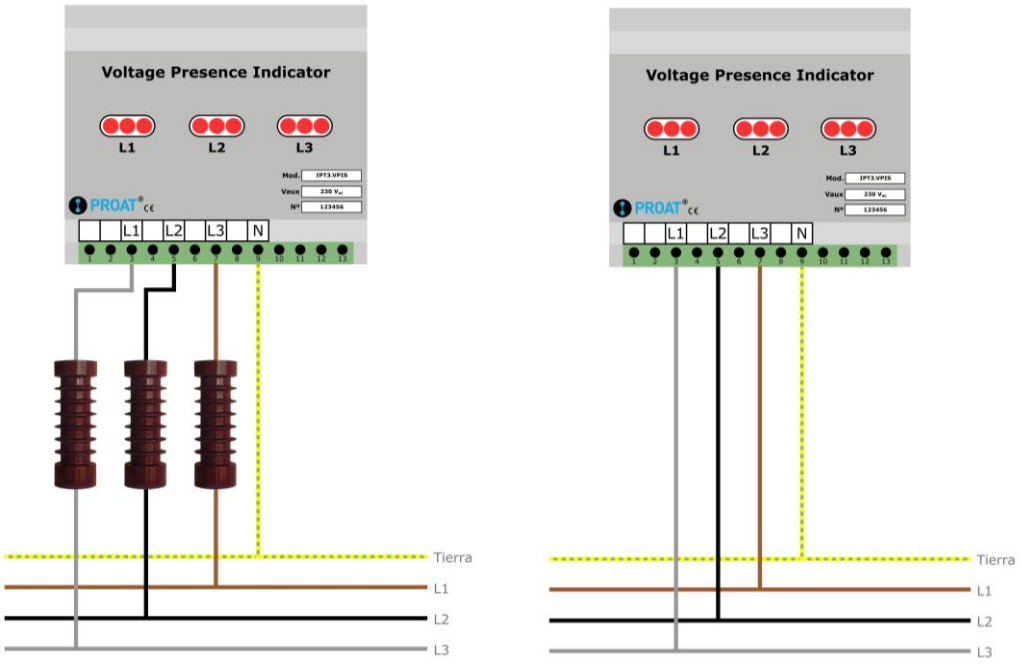
Models IPT3

Models IPT3	Auxiliary Voltage	Nominal Voltage
IPT3.vpis	Self-powered	≤ 440 V_{AC}

Capacitive sensors of different nominal voltages

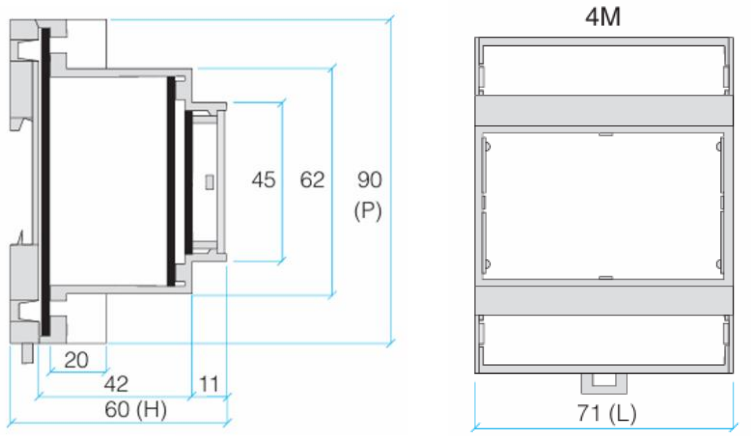
Model	Nominal Voltage	Leakage Line	Capacity pF	High Voltage Impulses
APRC-36	36 kV	457 mm	75	170
APRC-24	24 kV	305 mm	150	125
APRC-17,5	17,5 kV	256 mm	150	95
APRC-12	12 kV	171 mm	220	75

Connection



Constructive Characteristics

- DIN rail installation
- Terminals on front plate
- Self-extinguishing plastic box class V0



Technical Data

- Operating temperature: **-25ºC** until **+55ºC**
- Protection class: **IP40**
- External dimensions **90x70x70 mm**
- Red LED **Indicators**
- Consumption: **<0,5W** (at 230 V_{AC})
- Minimum current required **120µA** according to UNE-EN 62271

PTA3

AC Voltage Detector

✓ **PTA3** Detects the **presence of alternating voltage in three-phase systems**

✓ For voltages up to **440 V_{AC}**

✓ For voltages **up to 36kV** with APRC type Epoxy Capacitive Sensor

✓ **Independent LED front signaling** in each phase

✓ Output with **4 Potential-Free Switched Contacts**:

- Phase R
- Phase S
- Phase T
- 3 Phases

✓ Auxiliary voltage **85-264 V_{AC}** | **85-370 V_{DC}** or **24 V_{DC}** Depending on the model

Applications

Monitoring the presence or absence of voltage in three-phase AC systems:

- Railway Facilities
- Photovoltaic Installations
- Industrial Equipment
- Naval Electrical Systems
- Electric Car Charging Systems

Functional Features

- **Four contacts free of output potential** , one per phase, which connects, in the absence of the voltage of the corresponding phase: R, S or T, and the fourth if all three phases fail
- **Red LED indicators** that indicate the presence of voltage in the line of each phase
- Timing 500 msec
- **Front Green LED indicator** indicating the presence of auxiliary power supply voltage
- **Pulsador TEST** para comprobar el funcionamiento del equipo

Models PTA3

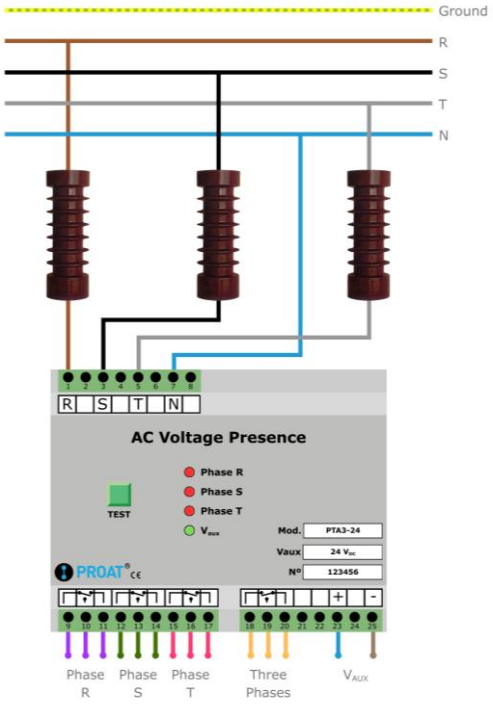
Model	Nomina Three-phase voltage U_N	Auxiliary Voltage
PTA3	Depending on Sensor	86-264 V_{AC} | 90-370 V_{DC}
PTA3-24	Depending on Sensor	24 V_{DC}
PTA3-S440	440 V_{AC}	86-264 V_{AC} | 90-370 V_{DC}
PTA3-S440-24	440 V_{AC}	24 V_{DC}

*Other models can be manufactured on request

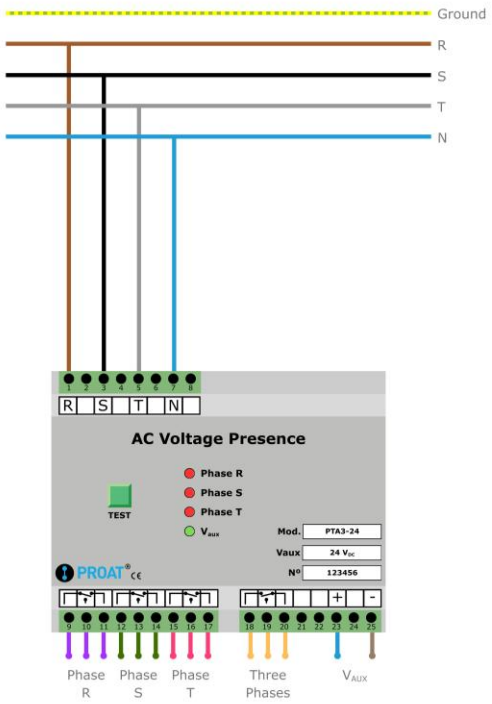
Capacitive sensors of different nominal voltages:

Model	Nominal Voltage	Leakage Line	Capacity pF	High Voltage Impulses
APRC-36	36 kV	457 mm	75	170
APRC-24	24 kV	305 mm	150	125
APRC-17,5	17,5 kV	256 mm	150	95
APRC-12	12 kV	171 mm	220	75

Connection



PTA3



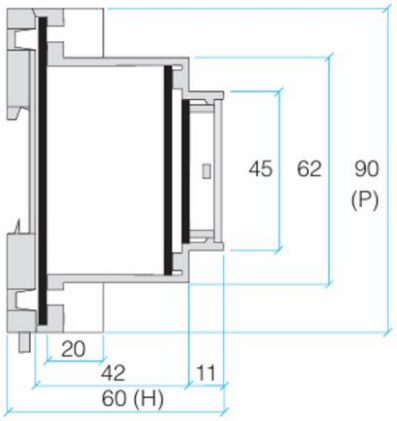
PTA3-S440

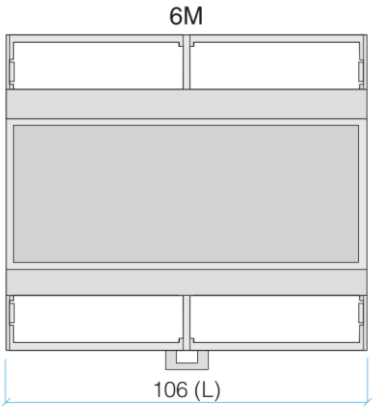
PTA-3 associated with three Capacitive Sensors

to detect absence of line voltage.

Constructive Characteristics

- DIN rail installation
- Terminals on front plate
- Self-extinguishing plastic box class V0





Technical Data

MODEL	PTA3
Electrical Features	
Auxiliary voltage	86-264 V_{AC} | 90-370 V_{DC} 24V_{DC}
Consumption during rest	1.5 W
Consumption with defect	<2 W
Operating Temperature	-5ºC/+55ºC
Type of sensors to use	
Capacitive type APRC	de 3,6 a 36 kV
Standards	
Dielectric Strength	
Fast transients	EN61000-4-4
Voltage Impulse	EN61000-4-5
Relay Contact Properties	
Permanent current	6A
Max. switching voltage	230 V_{AC}
Max. switching power	2000 VA

Pol. Ind. Can Tapioles c/Narcís Monturiol, 4 nave 10, 08110 Montcada-Reixac (Barcelona) SPAIN
Tel. +34 935790610 · comercial@proat.es · www.proat.es

DCT

Ground Continuity Detector

✓ **Detects faults** in the **grounding** of the installation

✓ Triggers an **alarm signal** when the ground connection has been cut or damaged

✓ **Switched contact** with potential-free output, with programmable actuation levels between 1 and 99 Ω, from which the alarm is activated

✓ **Real-time display** of the resistance level of the system

✓ **Modbus-RTU** communications according to model

✓ **Tropicalized** device to protect it from harsh environments.

Applications

Monitoring for potential grounding failures:

- Railway Facilities
- Photovoltaic Installations
- Electrical Installations
- Industrial Equipment
- Mining Facilities
- Electric Car Charging Systems

Functional Features

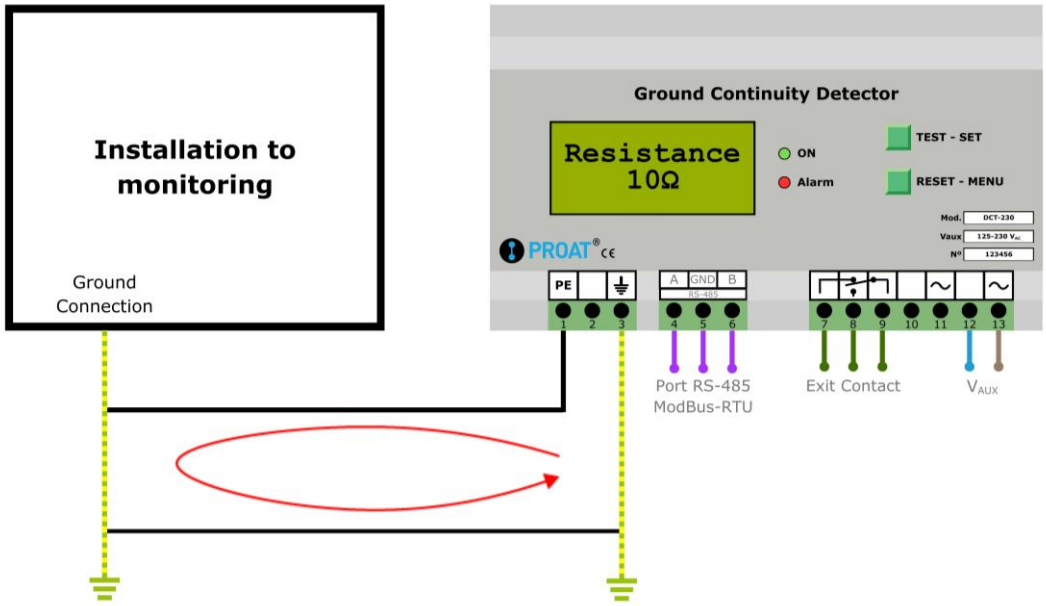
- **Real-time visualization** of continuity to ground
- **Green LED** indicating that the equipment is active
- **Red LED** Alarm
- Potential-free switched contact **alarm**
- Port RS-485, with **ModBus-RTU**

Models

Model	Auxiliary Voltage	Communications
DCT-230	120-230 $V_{AC/DC}$	-
DCT-24	20-30 V_{DC}	-
DCT-230-M	120-230 $V_{AC/DC}$	ModBus-RTU
DCT-24-M	20-30 V_{DC}	ModBus-RTU

*Other models can be manufactured on request

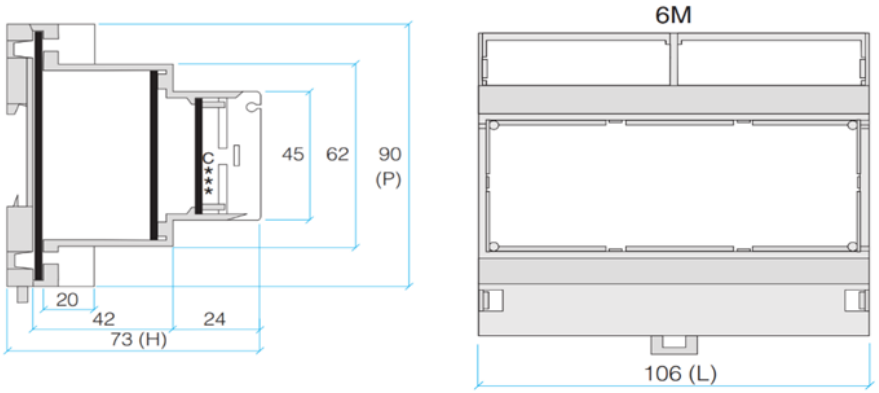
Connection



DCT continuously monitors red loop resistance

Constructive Characteristics

- DIN rail installation
- Terminals on front plate
- Self-extinguishing plastic box class V0



Technical Data

Voltage Ranges	
Auxiliary Voltage V_{AUX} (DCT-230)	120-230 $V_{AC/DC}$
Auxiliary Voltage V_{AUX} (DCT-24)	24 V_{DC}
Power Consumption	≤12VA

Programmable and responsive values	
Adjustment Level	1-99Ω
Measurement error 0-10 Ω	±1Ω
Measurement error 10-50Ω	±10%
Measurement error 50-1000 Ω	±5%
Response Time	<1 sec
Timing Failure	5 sec
RL Switching Time (Type C)	<100 msec
Hysteresis	±1Ω

Factory Settings	
Adjustment Level	20 Ω
Timing before triggering alarm	5 sec
Language	Spanish
ID ModBus	1

Measuring circuit	
Internal Resistance R+	122 Ω
Internal Resistance R-	122 Ω
Applied Measurement Voltage	+18 V_{DC}

Front view	
ON	Green LED
Alarm	Red LED
Identification labels	SI
Test Push Button	SI
Reset Push Button	SI
Screen	LCD 2x8 carac.
Information Displayed	**continually**

Dielectric Test	
PE-Ground input versus auxiliary voltage	2k V_{DC}
PE-Ground Input vs. Switching Elements	2k V_{DC}
Auxiliary voltage vs. switching elements	2k V_{DC}

Switching Elements	
Number of switching elements	1
Type of departures	Switched relay
Voltage Outputs	Voltage-free
Maximum AC load	250V_{AC} 2A
Maximum DC load	300V_{DC} 0,1A
RL switching time	< 10 ms
Service life, number of cycles	20,000,000

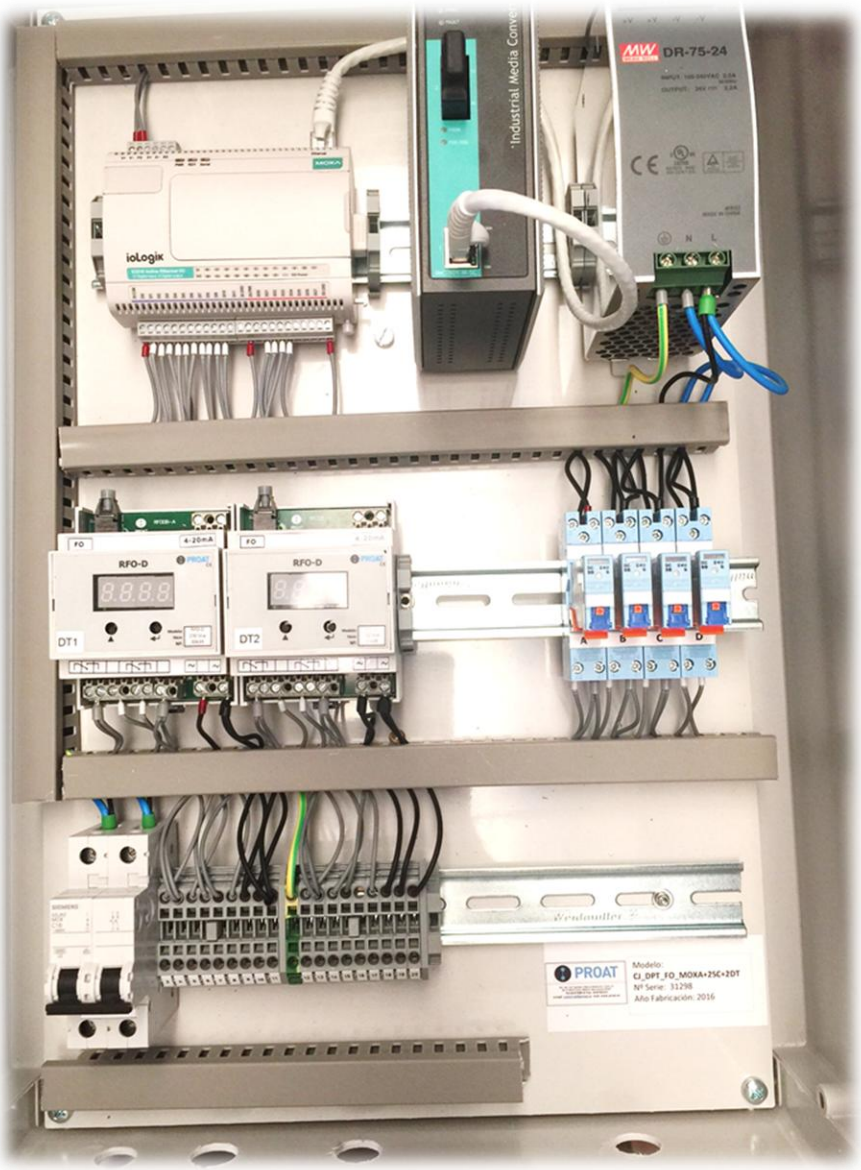
General Data	
Operating mode	Continuous
Assembly	DIN rail
Connection	screw M2,5
Maximum bolting torque	0,4 Nm
Degree of Protection	IP20
Flammability	UL94V-0
Weight	310g. approx.
Operating temperatures	-15ºC...+70ºC
Storage Temperature	-20ºC...+80ºC
Relative Humidity (non-condensing)	<95%
Value Change Method	Front Selection

Standards	
Emissions EMC	EN50081
Interference Immunity EMC	EN50082-1
Electromagnetic Compatibility	UNE EN 50121-5

Communications	
Interface	RS-485
Protocol	ModBus-RTU
Parameters	9600,8,N,1
ID ModBus	1-240
Available Features	3,4 y 6
Operation	Slave
Cable length (m)	<1200
Connection	Terminals A/B

REMOTE CONTROL PANELS

- Receives the status of detectors and disconnectors via fiber optics
- Allows the control center to give the orders to open and close disconnectors



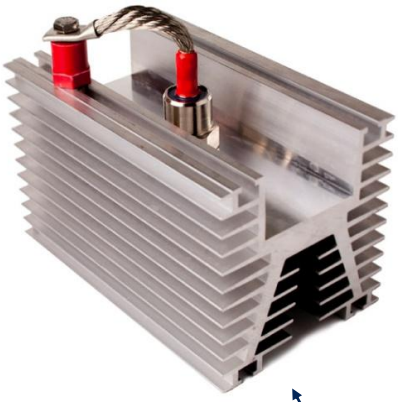
Model	Disconnectors	Detectors
CJ-DPT-FO-MOXA + 1SC + 1DT	1	1
CJ-DPT-FO-MOXA + 2SC + 2DT	2	2
CJ-DPT-FO-MOXA + 3SC + 1DT	3	1
CJ-DPT-FO-MOXA + 3SC + 2DT	4	2

SPECIFIC PANELS FOR METROPOLITAN LINES

Pol. Ind. Can Tapioles c/Narcís Monturiol, 4 nave 10, 08110 Montcada-Reixac (Barcelona) SPAIN
Tel. +34 935790610 · comercial@proat.es · www.proat.es

ASSEMBLIES DIODE-HEATSINK

(Listed by the Ministry of Defense)



Polycarbonate CASE

Bakelite Mounting Plate

Transparent lid