PUMATRONIX

ITSCAMPRO

# ITSCAMPRO NM1

SOLUTION FOR DETECTING AND SCREENING NON-METROLOGICAL INFRACTIONS

# Installation

**Pumatronix Equipamentos Eletrônicos Ltda.**

Rua Bartolomeu Lourenço de Gusmão, 1970. Curitiba, Brasil



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# Changes History

| Date | Revision | Updated content |
|---|---|---|
| 08/13/2024 | 1.0 | Initial Issue |
| 11/08/2024 | 1.1 | Inclusion of the compact NM1 frame;<br>General updating of components; |

# Summary

# 1. ITSCAMPRO NM1 Installation Steps

Once the *Installation Pre-Requirements* and the *Necessary Conditions for Installation* have been met, as indicated in the ITSCAMPRO NM1 Product Manual, the initial installation steps must be carried out and are presented in the ideal sequence of execution:

1) Data Network Setting;
2) Definition of the position of the modules on the road, as indicated in the *Surveillance Positioning Requirements* detailed in the ITSCAMPRO NM1 Product Manual;
3) Installation of the equipment on the chosen infrastructure (see Required Installation Infrastructure, presented in the ITSCAMPRO NM1 Product Manual);
4) Electrical and data installations;
5) System Settings;

# 2. Data Network Setting

6) Set up communication between the *Secondary Modules* and the *Main Module* and the *Tertiary Module*, setting the network type that shall be used for data transmission. The factory default network is DHCP with IP 10.0.0.2 and netmask 255.255.255.0. If you need to change to the *Static IP* type, you need to access the ULP of the *Tertiary Module* by connecting a monitor, keyboard and mouse to the device. This stage shall take place in an appropriate location, which allows the devices to be supported on a bench, facilitating access:

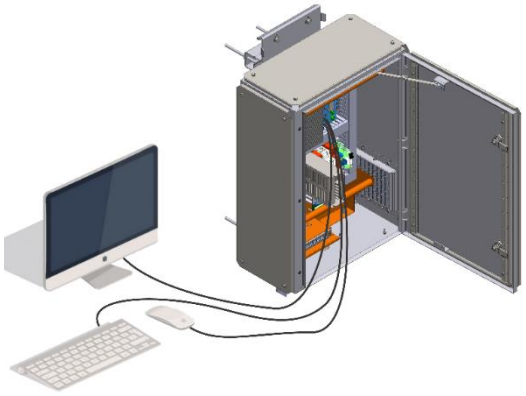


*Figure 1 - Access to the ULP to set up the network type*

7) Access the *System > Network* menu on the ITSCAMPRO NM1 interface and select the factory default network *eth0*;

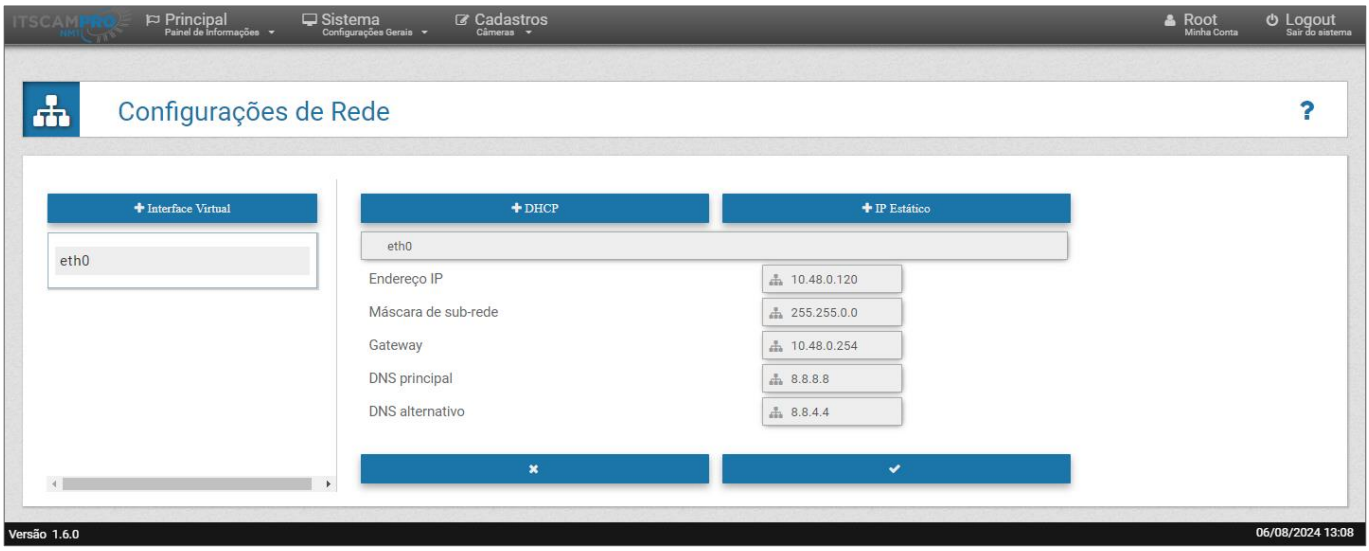



*Figure 2 - Setting options for the selected eth0 network*

8) To set up a *Static IP*, mainly enter the *IP Address*, *Subnet Mask* and *Gateway*;
9) To set up the DHCP, click on *DHCP* and enter the details of the *primary DNS* and the *alternative DNS*;
10) When saving the settings, the system restarts and the page reloads after 40 seconds;
11) Carry out the Network Interface Parameterization.

## 2.1. Network Interface Parameterization

12) Check the settings of the network on which the device will be installed and carry out the necessary parameterization before physically installing the equipment on site, especially in situations where the network settings of the capture device are different from the standard. The changed network settings are effectively applied after the equipment is restarted. When the change is made via the web interface, the restart is automatic once the change has been confirmed;

**Network settings for capture devices: The ITSCAM 400 and ITSCAM VIGIA+ capture devices have the same factory network settings. Installing more than one device requires individual access to the image capture equipment and changing the default network settings.**

13) Connect the ITSCAM device to a portable auxiliary device, after it has been properly fixed to the selected structure and disconnected from the local network where the equipment will be installed, using an Ethernet cable;
14) Access the image capture device's web interface via a browser, which offers the settings available for operation, using the factory default data indicated in the ITSCAM VIGIA+ device's Installation Guide;
15) Set a new IP address for the equipment separately, considering the local network data;
16) Use the recovery IP address (*192.168.254.254*) only in cases where the user changes the IP address by mistake and loses the connection to the device. The use of this IP address to recover access is only available in a point-to-point connection with the equipment, when connected to the ETH1 port;

**The maintenance IP address of ITSCAM devices (192.168.254.254) is disabled when the primary IP address conflicts with it. Therefore, when manually configuring the equipment's network interface (Ethernet), values other than the maintenance IP must be applied, as there will be no way to recover the connection in extraordinary situations when the primary IP is lost.**

a) Consider the most common situations in which the primary IP address conflicts with the maintenance address:

i) Primary IP of the ITSCAM device in the range 192.168.254.x and netmask 255.255.255.0
ii) Primary IP of the ITSCAM device in the range 192.168.x.x and netmask 255.255.0.0
iii) Primary IP of the ITSCAM device in the range 192.x.x.x and netmask 255.0.0.0
iv) Netmask set to 0.0.0.0.

# 3. Mounting the Devices

17) Check the *Positioning Requirements* for the type of violation to be monitored, detailed in the ITSCAMPRO NM1 Product Manual;
18) Select the type of structure to mount the components on, considering the flexibility of the ITSCAMPRO NM1 installation, which allows the use of existing structures on a road, for example: *Posts, Road Signs and Structures* or *Gantries*;

**Alignment with the roadsides: During installation, it is important to observe the alignment on the roadsides, so that a safe space is maintained for large vehicles to travel normally. Likewise, the chosen location must allow operators to maintain the system safely.**

19) Consider the illustrated diagram of the device installation:

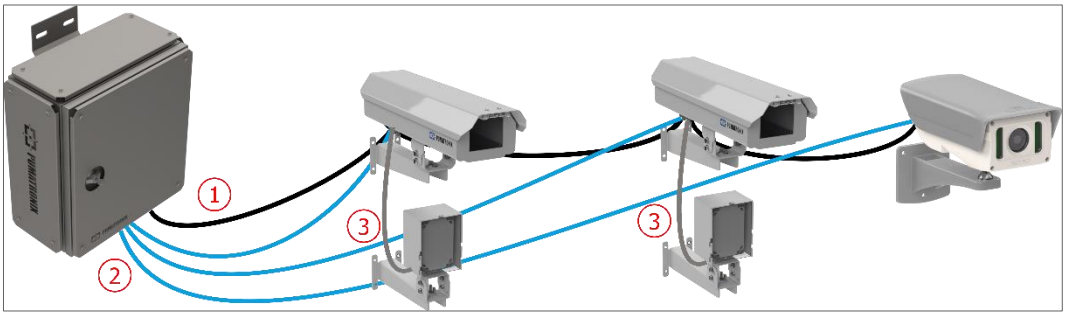



*Figure 3 – General wiring diagram for cables and devices: 1) 8-way sleeve cable; 2) Ethernet cables; 3) ITSLUX cable*

20) Proceed with mounting the equipment on the selected structure using the relevant bracket, with the aid of the Installation Guide for the product;

## 3.1. Mounting the Devices on the Pole

21) Assemble the equipment to the respective bracket using the specific parts;
22) Attach the cage bracket of each device to the pole using the clamps, a total of 2 (two) clamps for each device;


*Figure 4– Mounting the Devices on the Pole*

| Item | Description |
|---|---|
| 1 | ITSCAM VIGIA+ |
| 2 | ITSCAM 411 with Protection Box, model PTX12 |
| 3 | NM1 Frame or NM1 Compact Frame |
| 4 | ITSLUX Illuminator |

## 3.2. Mounting the ITSLUX Illuminator

23) Assemble the *ITSLUX NEVADA Bracket* by inserting the ITSLUX illuminator and closing it with the *Protective Acrylic* indicated, using the parts shown in the image:

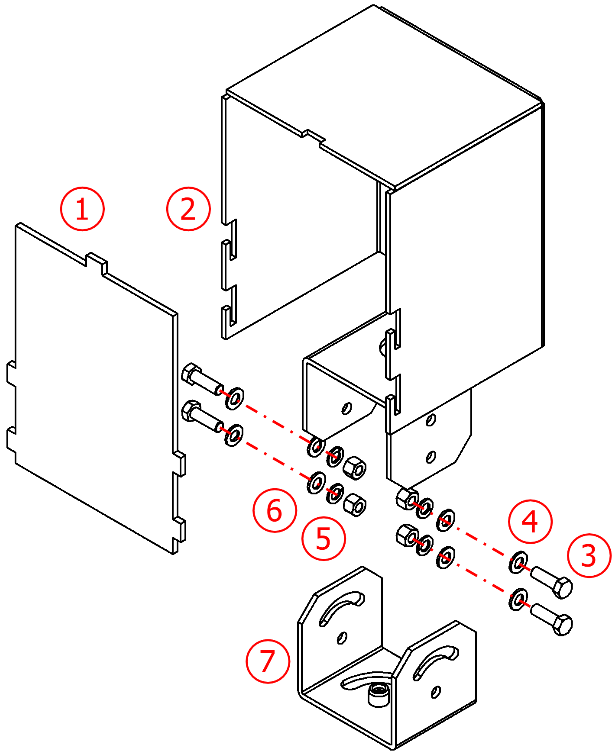



*Figure 5 - ITSLUX Bracket Parts*

| Item | Description | Quantity |
|---|---|---|
| 1 | Protective Acrylic | 1 |
| 2 | ITSLUX NEVADA Bracket | 1 |
| 3 | M5 x 16 stainless steel hex. bolt | 4 |
| 4 | M5 stainless steel flat washer | 8 |
| 5 | M5 stainless steel hex. nut | 4 |
| 6 | M5 stainless steel spring washer | 4 |
| 7 | Bracket base | 1 |

24) Assemble the *CPV12 Aluminum Bracket* using the parts shown in the image:

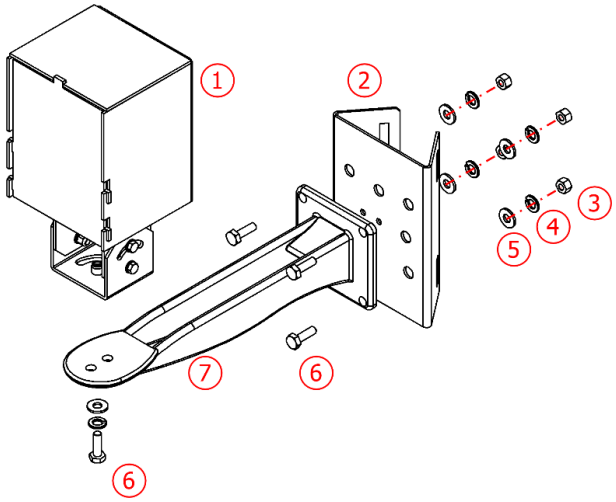



*Figure 6 - ITSLUX Illuminator Cage Bracket Parts*

| Item | Description | Quantity |
|---|---|---|
| 1 | ITSLUX Bracket with Illuminator | 1 |
| 2 | 40mm Cage Bracket | 1 |
| 3 | M6 stainless steel hex. nut | 4 |
| 4 | M6 stainless steel spring washer | 5 |
| 5 | M6 stainless steel flat washer | 5 |
| 6 | Hex. screw M6 x 20 stainless steel | 5 |
| 7 | CPV12 Aluminum Bracket | 1 |

25) Mount the *ITSLUX NEVADA Bracket* (1) with illuminator to the CPV12 Aluminum Bracket (7) using the M6 x 20 stainless steel hex. bolt (6) indicated.
26) Mount the assembled set to the *40mm Cage Bracket*, using 4 M6 x 20 stainless steel hex. bolts (6).

# 4. Electrical and Data Installations

27) Use the existing power grid to energize the set installed at a road monitoring point. Connecting the *Tertiary Module* distributes the power to the other modules, as shown in the General Connection

Diagram, which specifies the functions of the connections made between the modules and the local connections of the *Tertiary Module*:

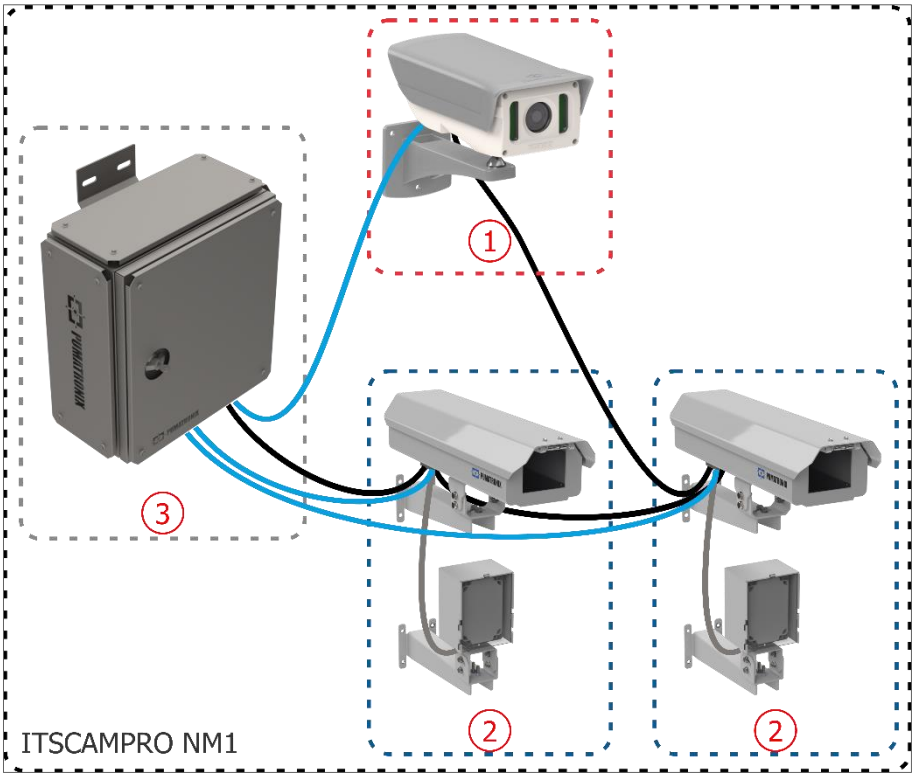



*Figure 7 - ITSCAMPRO NM1 General Connection Diagram: 1) Main Module; 2) Secondary Module; 3) Tertiary Module Control Switchboard*

28) Connect the traffic light signal to the *Surveillance Board* on the *Tertiary Module* switchboard. Consider the ITSCAMPRO NM1 installation diagram as a general guideline for connecting the traffic light signal:

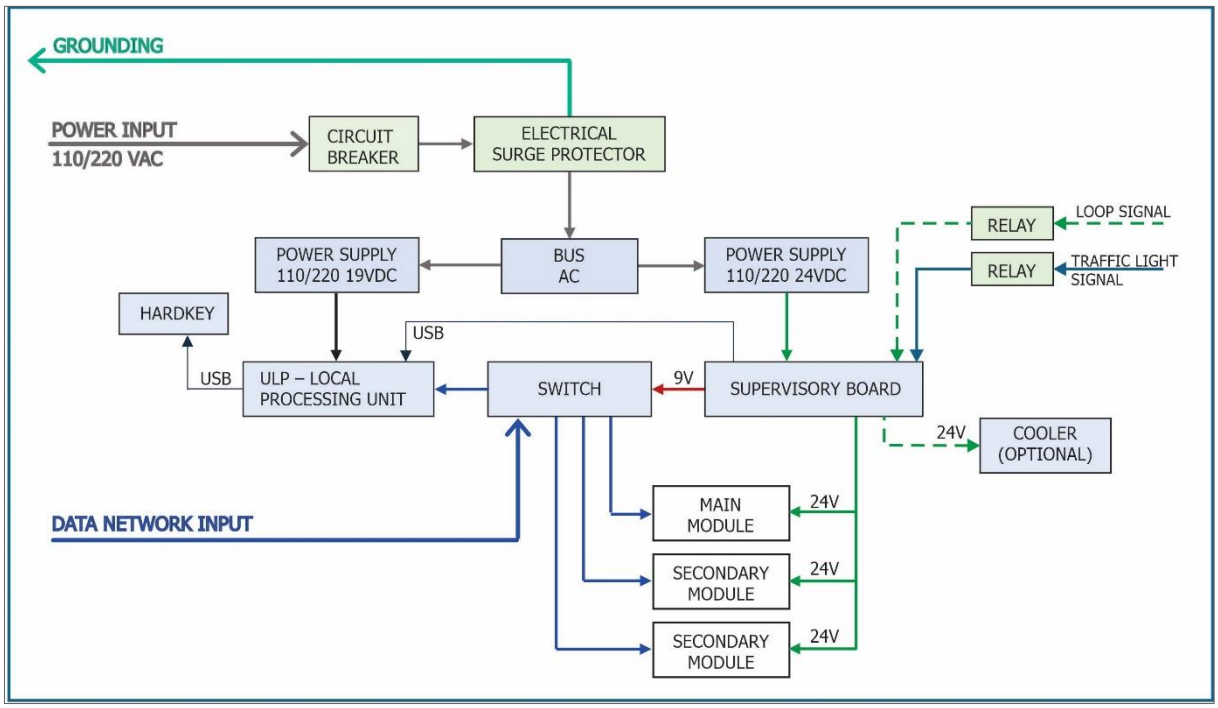



*Figure 8 - NM1 Switchboard Installation Diagram*

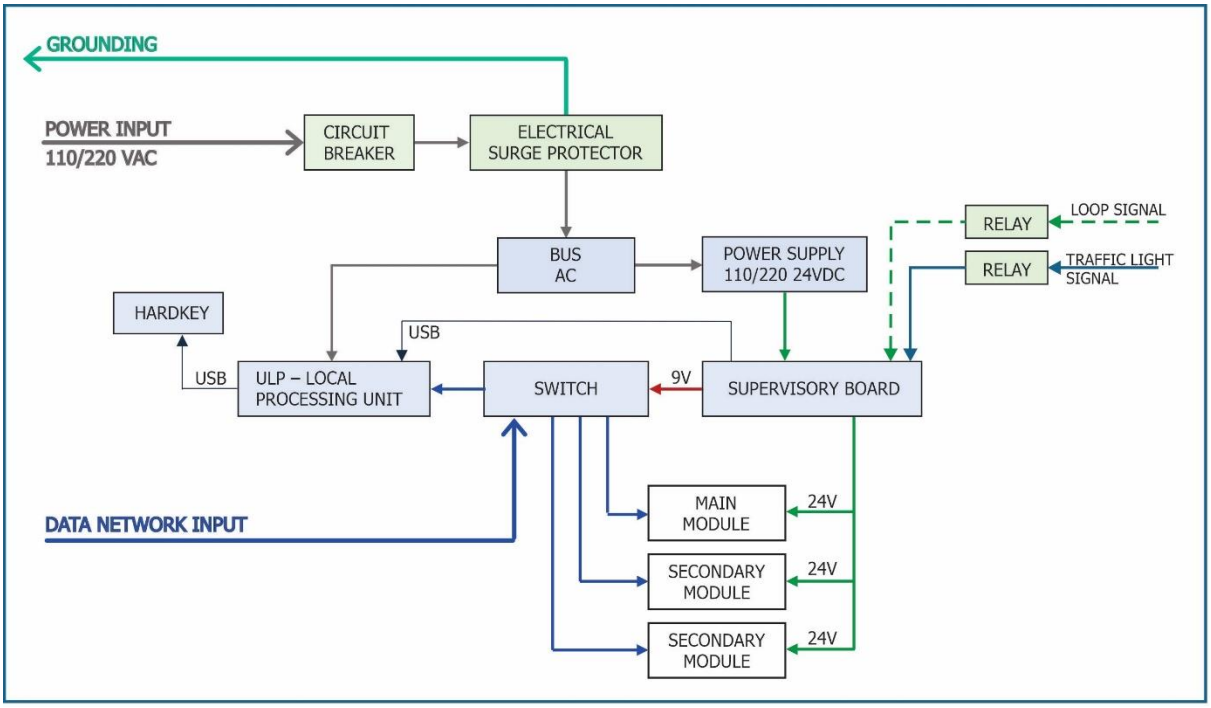
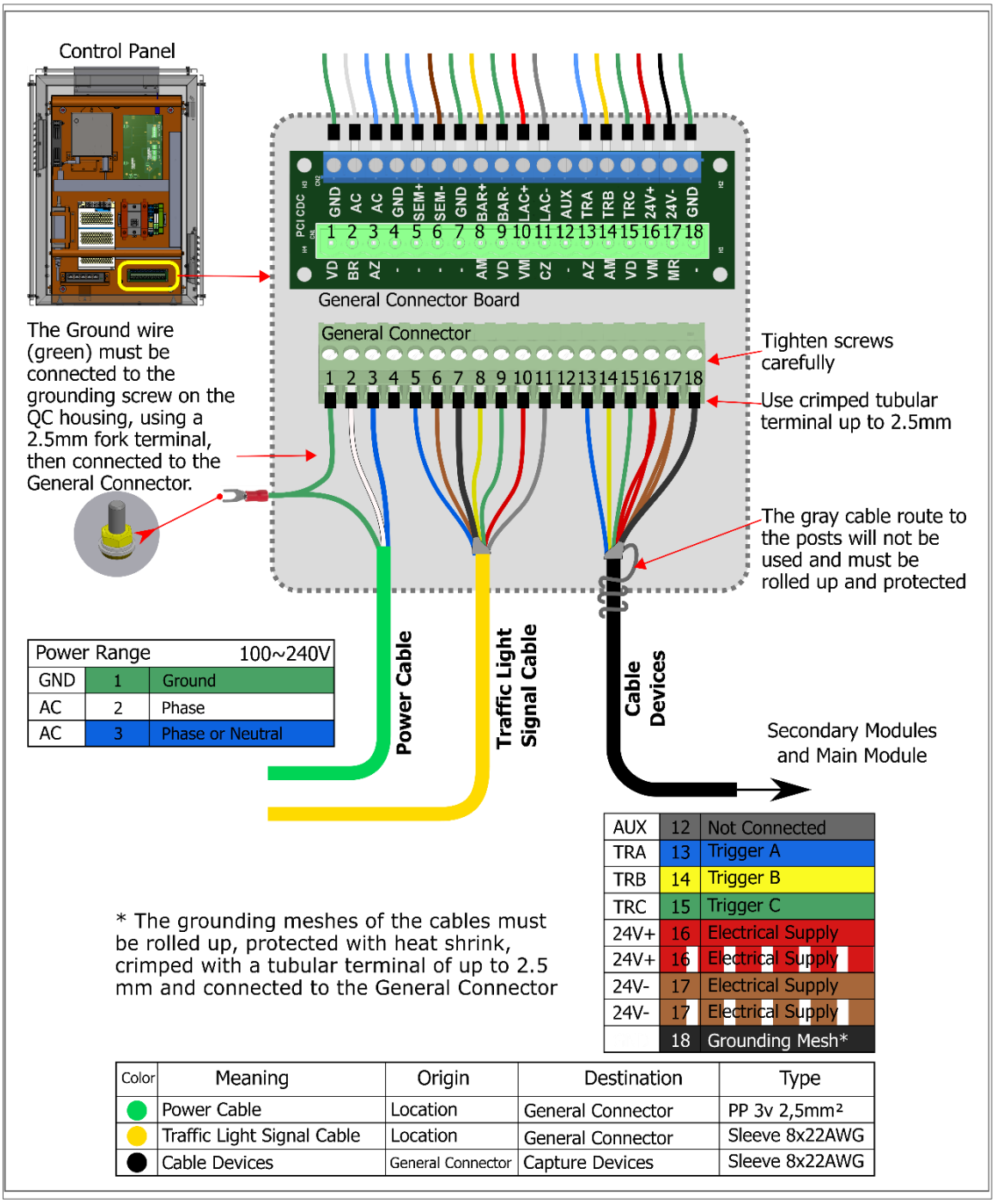



*Figure 9 - Compact NM1 Switchboard Installation Diagram*

29) Install the 8x22AWG sleeve cable with sufficient length for the distances applied in the installation, connecting it to the Protection Box of each *Secondary Module*, with the wires specified in Module Connections;
30) Power the ITSCAMPRO NM1 system by connecting it via the *Surveillance Board*, as indicated in Surveillance Board Installation;
31) To carry out the electrical installation of the ITSCAMPRO NM1 system, you will need electrical conduits and cables of varying lengths, following the steps for connecting the installed assembly to a monitoring point:
    a) Divert electricity from the road's transmission lines to the *Tertiary Module*;
    b) Pass the PP 3v 2.5mm² cable through the 3/4" conduit of the *Tertiary Module* switchboard;
    c) Prepare grounding;
    d) Connect grounding to the frame housing;
    e) Connect the power cable to the switchboard's *General Connector*, considering the wires and terminals indicated in the General Connector Diagram:




| Power Range | | 100~240V |
|---|---|---|
| GND | 1 | Ground |
| AC | 2 | Phase |
| AC | 3 | Phase or Neutral |

| | | |
|---|---|---|
| AUX | 12 | Not Connected |
| TRA | 13 | Trigger A |
| TRB | 14 | Trigger B |
| TRC | 15 | Trigger C |
| 24V+ | 16 | Electrical Supply |
| 24V+ | 16 | Electrical Supply |
| 24V- | 17 | Electrical Supply |
| 24V- | 17 | Electrical Supply |
| | 18 | Grounding Mesh* |

| Color | Meaning | Origin | Destination | Type |
|---|---|---|---|---|
| ● | Power Cable | Location | General Connector | PP 3v 2,5mm² |
| ● | Traffic Light Signal Cable | Location | General Connector | Sleeve 8x22AWG |
| ● | Cable Devices | General Connector | Capture Devices | Sleeve 8x22AWG |

*Figure 10 – Tertiary Module General Connector Diagram*

## 4.1. Connections to the Surveillance Board (NM1 Switchboard)

32) Fasten the *NM1 Switchboard* to the road structure (Poles, Road Signs and Sign Structures or Gantries);
33) Carry out the electrical connections by connecting the cables numbered 1 to 5 on the *Surveillance Board Connection Diagram* to the *General Connection Board* of the NM1 Switchboard, with the following specifications:
   a) Power connection (cable 1): 1 0.75 3-way Pp cable:
      i) Connect the cable numbered 1 to the GND (green), AC (white), AC (blue) terminals on the *General Connection Board*;
      ii) Connect the grounding point of the cable numbered 1 closer to the switchboard;

b) Power supply connection (cable 2): 1 2-way cable:
   i) Connect the cable numbered 2 to the 24V terminal on the *Surveillance Board* with the power supply;
c) Connection to road sensor (cable 3): 1 2-way cable (for each sensor):
   i) Connect the sensor signals to the Surveillance Board using the cables numbered 3;
d) Connection to ITSCAM devices (cable 4): 1 shielded 8x22AWG sleeve cable:
   i) Prepare the power connection for the devices via the cable numbered 4 to the +24Vdc (red) and GND (brown) terminals on the *General Connection Board*;
   ii) Connect the wires that trigger the ITSCAM devices by connecting the cable numbered 4 to terminals TRIGGER A (blue), TRIGGER B (yellow), TRIGGER C (green);
e) Data connection (cable 5): 3 Furukawa External PoE CAT-5E Ethernet cables (one for each image capture device):
   i) Connect the network cable of each ITSCAM device to the *Switch* connected to the *Local Processing Unit (LPU)*, which ensures data communication between the devices;

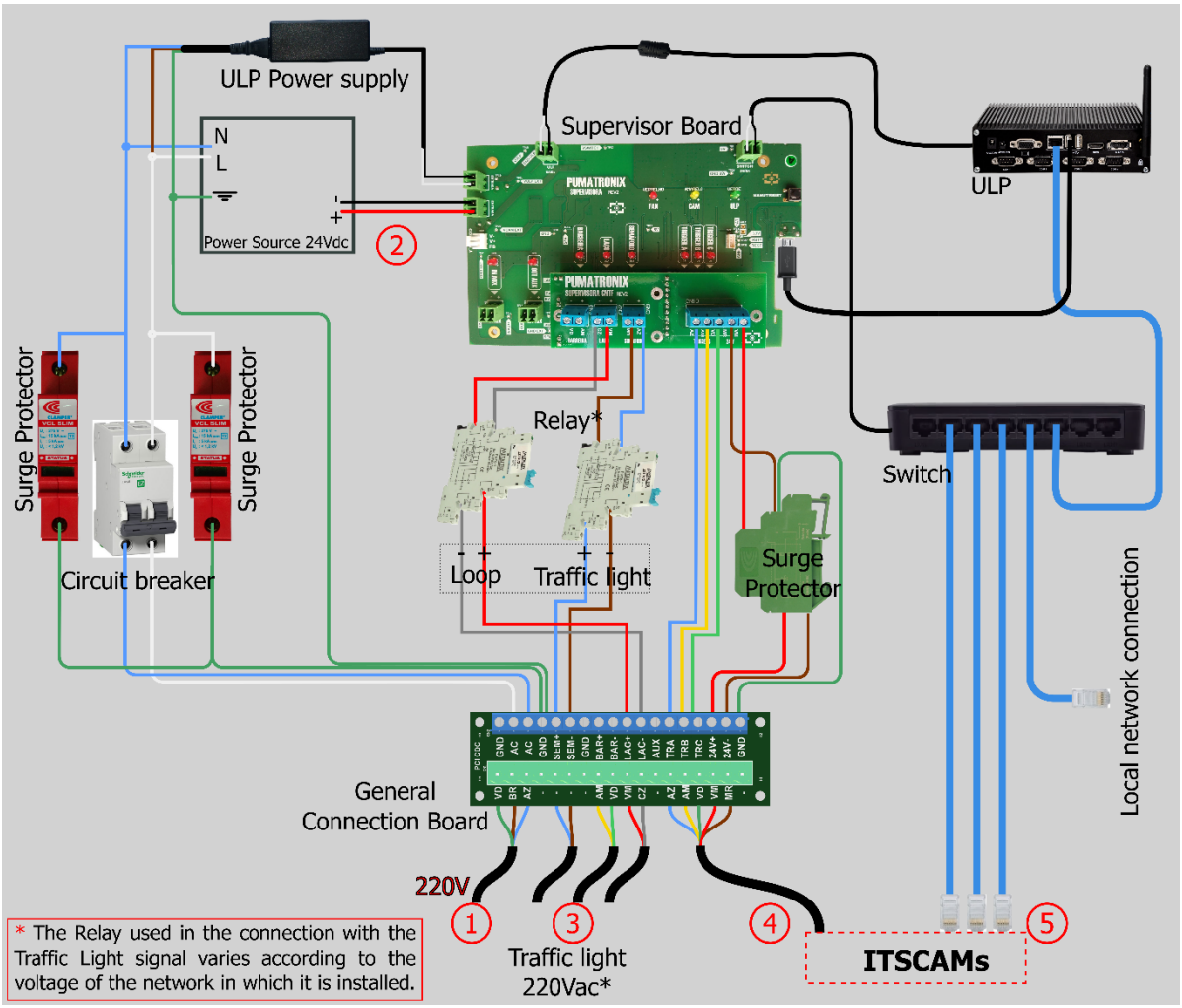



*Figure 11 - Connection diagram with the Surveillance Board (when 220 Vac Traffic Light)*

34) Connect the power supply to the ITSCAMPRO NM1 system by connecting the cable numbered 1 (0.75 Pp 3-way cable) to the existing power grid.

## 4.2. Connections to the Surveillance Board (Compact NM1 Switchboard)

35) Fasten the *Compact NM1 Switchboard* to the road structure (*Poles, Road Signs and Sign Structures* or *Gantries*);
36) Carry out the electrical connections by connecting the cables numbered 1 to 5 on the *Surveillance Board Connection Diagram* to the *General Connection Board* of the Compact NM1 Switchboard, with the specifications indicated:
   a) Power connection (cable 1): 1 0.75 3-way Pp cable:
      i) Connect the cable numbered 1 to the GND (green), AC (white), AC (blue) terminals on the *General Connection Board*;
      ii) Connect the grounding point of the cable numbered 1 closer to the switchboard;
   b) Power supply connection (cable 2): 1 2-way cable:
      i) Connect the cable numbered 2 to the 24V terminal on the Surveillance Board with the power supply;
   c) Connection to road sensor (cable 3): 1 2-way cable (for each sensor):
      i) Connect the sensor signals to the Surveillance Board using the cables numbered 3;
   d) Connection to ITSCAM devices (cable 4): 1 shielded 8x22AWG sleeve cable:
      i) Prepare the power connection for the devices via the cable numbered 4 to the +24Vdc (red) and GND (brown) terminals on the *General Connection Board*;
      ii) Connect the wires that trigger the ITSCAM devices by connecting the cable numbered 4 to terminals TRIGGER A (blue), TRIGGER B (yellow), TRIGGER C (green);
   e) Data connection (cable 5): 3 Furukawa External PoE CAT-5E Ethernet cables (one for each image capture device):
      i) Connect the network cable of each ITSCAM device to the *Switch* connected to the *Local Processing Unit (ULP)*, which ensures data communication between the devices;

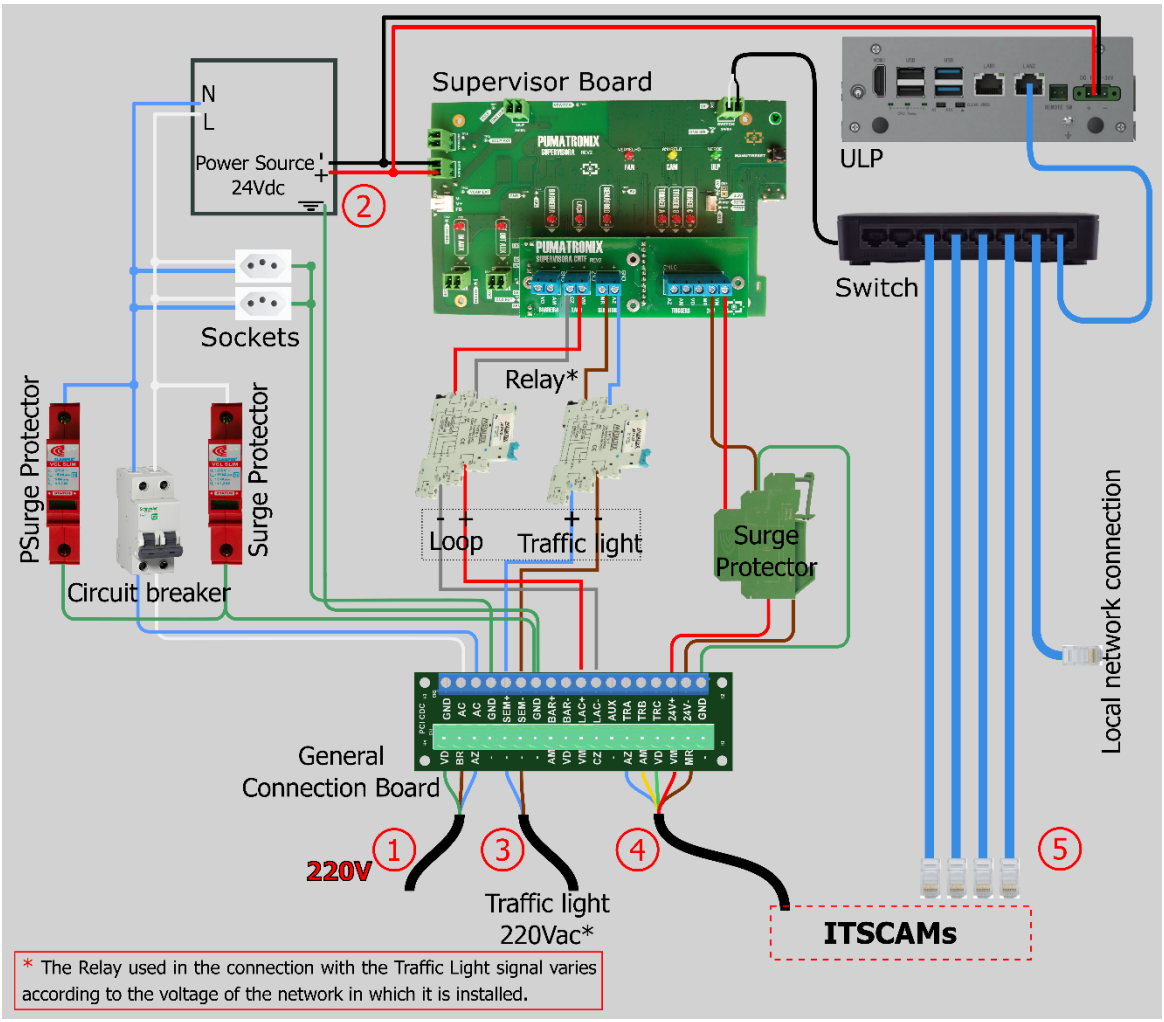



*Figure 12 - Connection diagram with the Surveillance Board on the Compact NM1 Switchboard (when 220 Vac Traffic Light)*

37) Connect the power supply to the ITSCAMPRO NM1 system by connecting the cable numbered 1 (0.75 Pp 3-way cable) to the existing power grid.

## 4.3. Module Connections

38) Connect the 8x22AWG sleeve cable between the devices, using a Sindal connector for the wire connections inside the Protective Box, following the diagram:

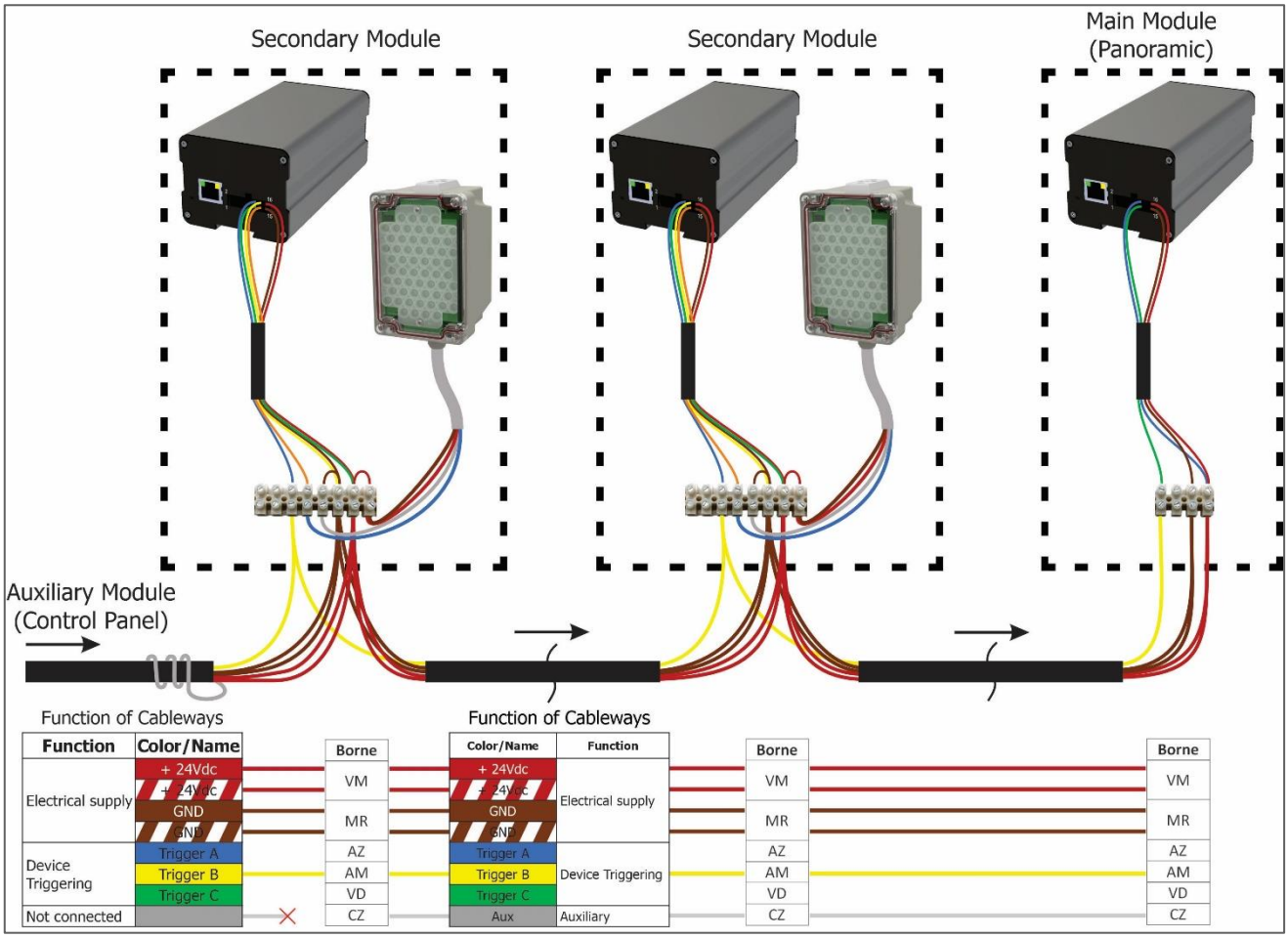



*Figure 13 – Module Connections Diagram*

39) Carry out the electrical connections of the *Secondary Modules* and *Main Module* with the *Surveillance Board* in the *Tertiary Module* Control Switchboard;
40) Carry out the data connections from the *Secondary Modules* and *Main Module* to the Switch on the *Tertiary Module* Control Switchboard;

## 4.3.1. Connections to the Main Module Device

41) Carry out the data connection between the *Main Module* (Panoramic image capture device) and the *Tertiary Module* Control Switchboard, using an External PoE CAT-5E Ethernet Cable for the connection, following the steps:
   a) Release the cable gland on the ITSCAM device to pass the PoE Ethernet cable through;
   b) Crimp an RJ-45 onto the end of the cable, using the EIA/TIA 568A standard;
   c) Connect the cable to the Ethernet connector at the back of the ITSCAM:

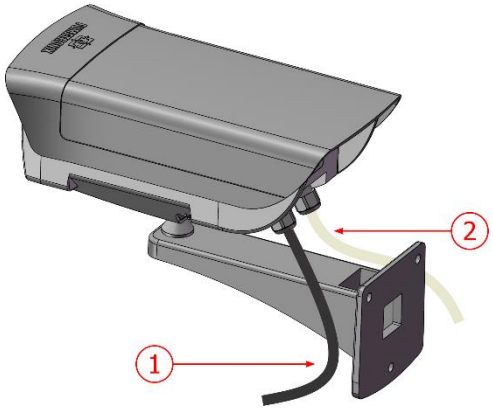



*Figure 14- Connections to the Main Module Device: 1) Ethernet cable; 2) 8-way sleeve cable*

| ITSCAM terminal | Signal | Main Module Connection |
|---|---|---|
| 1 (red) | V+ | Power Supply: Positive Voltage: 12 or 24VDC |
| 2 (brown) | GND | Power Supply: Ground |
| 3 (green) | IN1+ | Positive terminal for external signal input |
| 4 (blue) | IN1- | Negative terminal for external signal input |

**Oxidation Risk: The electrical and signal connections made to the ITSCAM bundle and the data network cable must remain protected in the Main Module Protection Box to prevent oxidation of the connections and unwanted infiltration of liquids into the bundle.**

## 4.3.2. Connections to the Secondary Module Device

42) Carry out the data connection between a *Secondary Module* (image capture device with OCR) and the *Tertiary Module*'s Control Switchboard, using an External PoE CAT-5E Ethernet Cable for the connection, following the steps:
   a) Release the cable gland to pass the PoE Ethernet cable through;
   b) Pass the cable into the Protective Box;
   c) Crimp an RJ-45 onto the end of the cable, using the EIA/TIA 568A standard;
   d) Connect the cable to the Ethernet connector at the back of the ITSCAM:

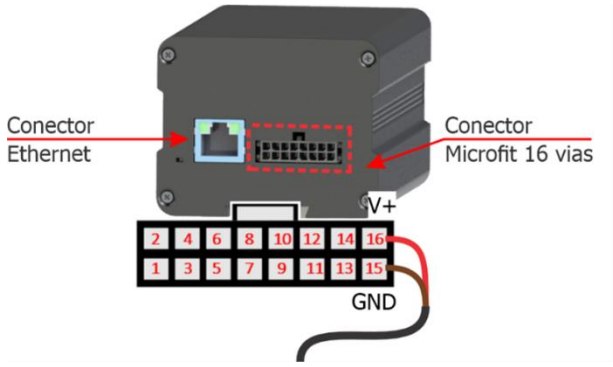



*Figure 15- Connections to the Secondary Module Device: 1) Ethernet cable; 2) 8-way sleeve cable*

| ITSCAM terminal | Signal | Secondary Module Connection |
|---|---|---|
| 1 (red) | V+ | Power Supply: Positive Voltage: 12 or 24VDC |
| 2 (brown) | GND | Power Supply: Ground |
| 11 (orange) | OUT1+ | Positive terminal for illuminator shot |
| 12 (yellow) | OUT1- | Negative terminal for illuminator shot |

**Oxidation Risk: The electrical and signal connections made to the ITSCAM bundle and the data network cable must remain protected in the Secondary Module Protection Box to prevent oxidation of the connections and unwanted infiltration of liquids into the bundle.**

43) Connect the ITSLUX illuminator to the ITSCAM device inside the Protective Box using the connections diagram:

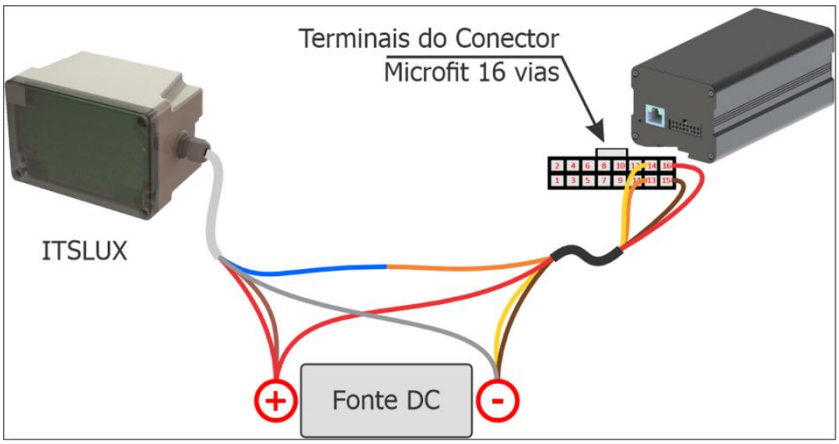



*Figure 16 - Diagram illustrating the connections between the ITSCAM device and the ITSLUX Illuminator*

| ITSLUX terminal | Signal | Secondary Module/Illuminator Connection |
|---|---|---|
| 1 (red) | V+ | Power Supply: Positive Voltage: 9 to 24VDC (via ITSLUX gray) |
| 2 (gray) | GND | Power Supply: Ground |
| 3 (blue) | IN1- | Negative terminal for illuminator shot |
| 4 (brown) | IN1+ | Positive terminal for illuminator shot |

# 5. System Settings

Carry out the necessary procedures to test the connections and set up the system after physically installing the modules and all the cabling used in the electrical and data installation of the equipment that makes up the ITSCAMPRO NM1:

44) Check that all equipment is energized;
45) Access ITSCAMPRO NM1 installed;
46) Register the devices of the *Main* and *Secondary* modules in ITSCAMPRO NM1;
47) Set the violations that will be inspected at the monitoring point;
48) Adjust image framing of the vehicle in each *Secondary Module* and the panoramic image in the *Main Module*.

**For advanced information on the setting options, please refer to the Integration Manual for the respective device.**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