General installation instructions for DMV VMS

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Document history							
Version	Date	Details	Prepared by	Reviewed by	Approved by	Gen. Doc	Issued for
UP1315	**29-2-2024**	**First issue**	M. Radenković M. S. Jovanović	N. Stojanović		GD03	

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1 MECHANICAL INSTALLATION

Installation warnings	
	Only qualified and authorized staff shall do installation, maintenance and service work.
	Use proper tools for connection and maintenance of the device.
	When mounting the sign on the carrier construction, ensure a stable carrier construction.

DMV devices must be installed onto a structure designed to withstand wind load, seismic events, weight load of ice in winter time or any other load the structure might bear. The structure must comply with all national and local codes. Because every sign installation is unique, mounting the signs has no single procedure.

NOTE: Carefully read this manual and follow the instructions before the installation.

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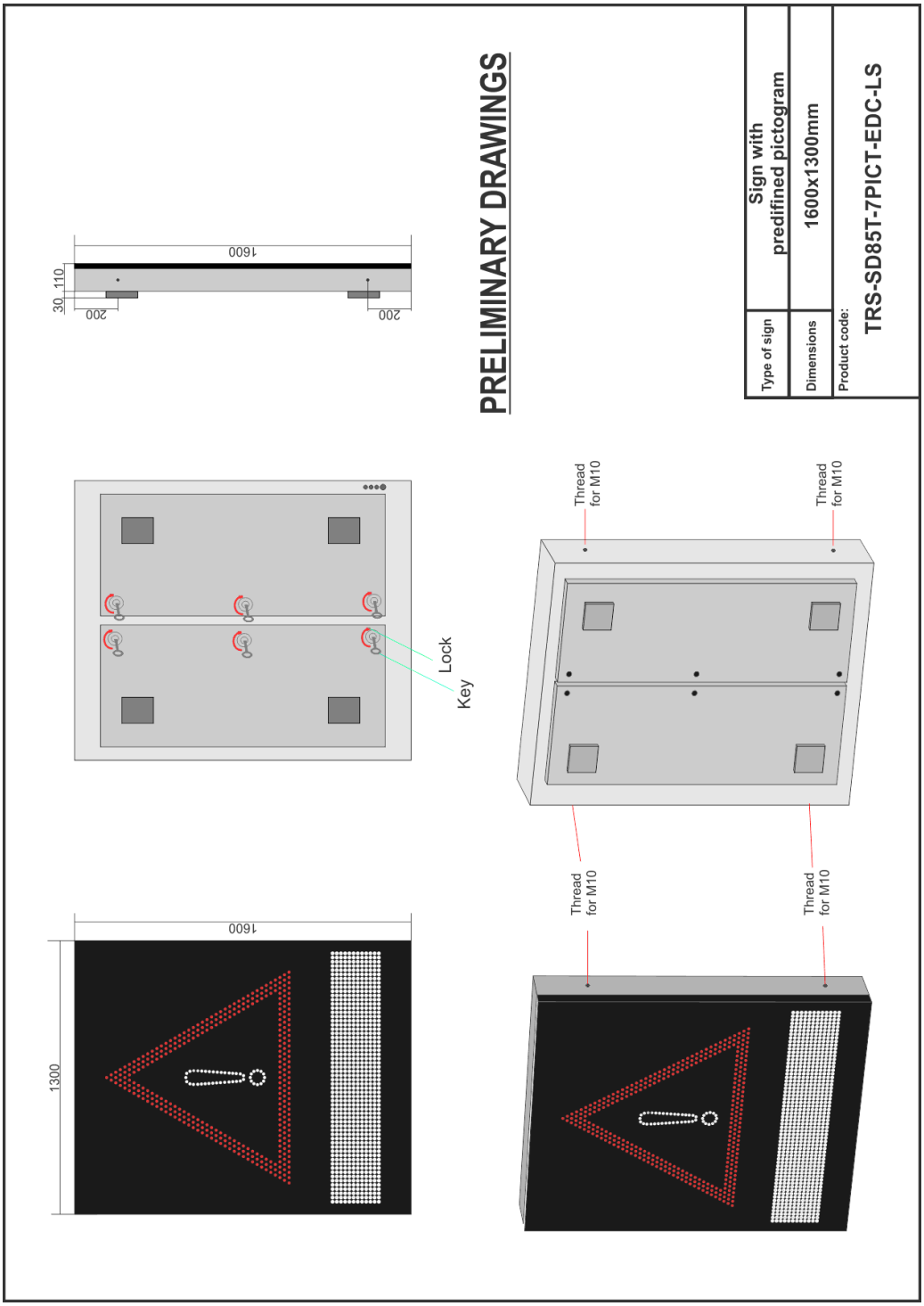
1.1 Preliminary and final drawings

Please do not make mounting constructions based on preliminary drawings. The final drawings will be sent afterwards in an agreement between the manufacturer and the customer.

Example of preliminary drawings is given below:



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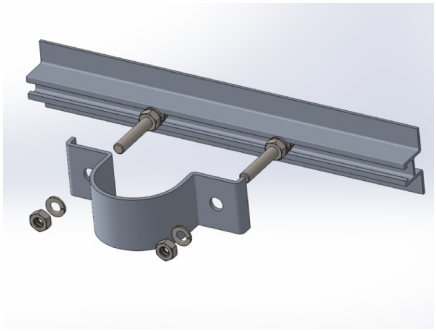
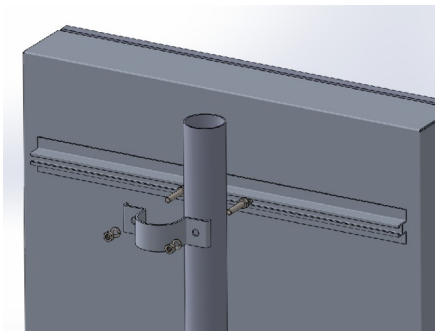
1.2 Mounting of a device

1.2.1 Mounting a device with omega holders

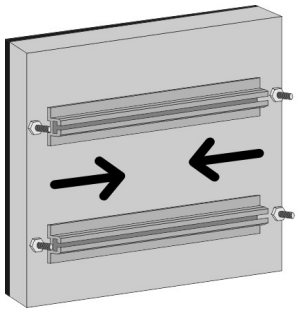
- The device is delivered with the following assembly kit:
  - Omega holders
  - Screws M8
  - Screw washers

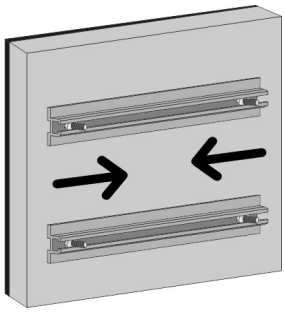
- The device can be mounted on poles fixed on the ground.
- The devices are delivered with omega pole holders for standard diameter poles 50mm, 60mm, 80mm.





- Place the screw heads inside the C-shaped channels in profiles from the device's backside.
- Place the device on the poles and put it in the right position, loosely couple the omega holders for the pole with screws placed in C-shaped carriers.
- Fix the device at the final position and screw tight fastening screws.





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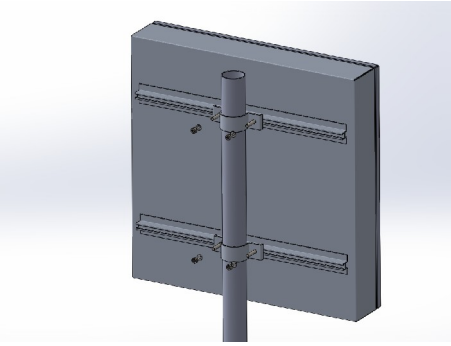
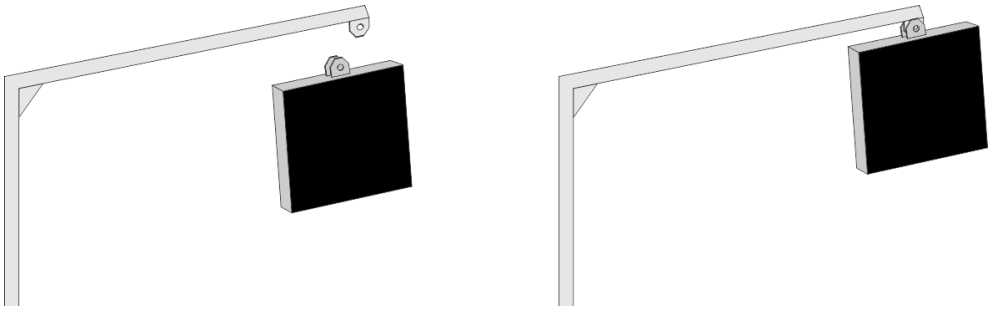


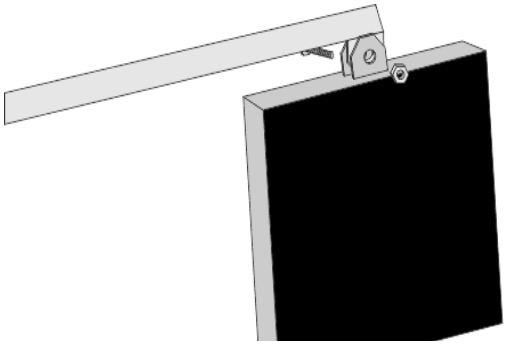
NOTE: The pole's diameter is usually 60mm. The number of poles and carrying profiles should be defined according to sign dimensions and weight. Standard screw is M8x50, screw washers M8.

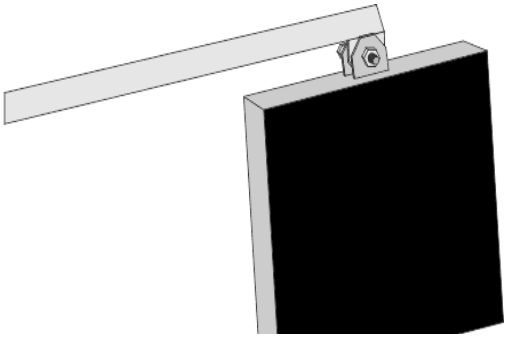
1.2.2 Suspending a sign from the gantry

- The device is delivered with the following assembly kit:
  - Screw
  - Screw washers

- The device is meant to be mounted above the middle of the road.
- On the device's top side is a holder to which the device is supported, secured with an M10 bolt.







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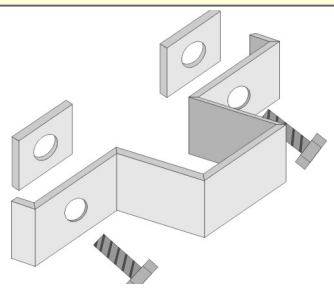
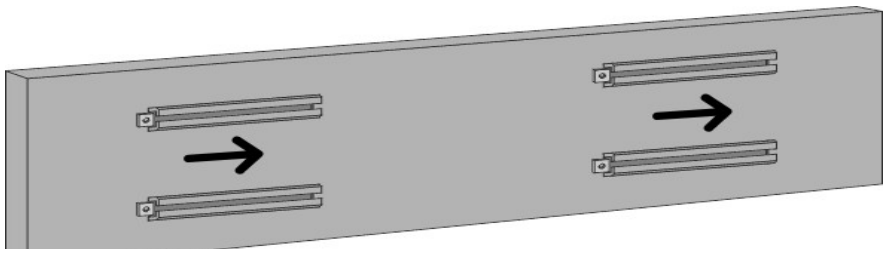
1.2.3 Mounting a device on a portal

- The device is delivered with the following assembly kit:
  - Square holders
  - Screws M8
  - Screw washers

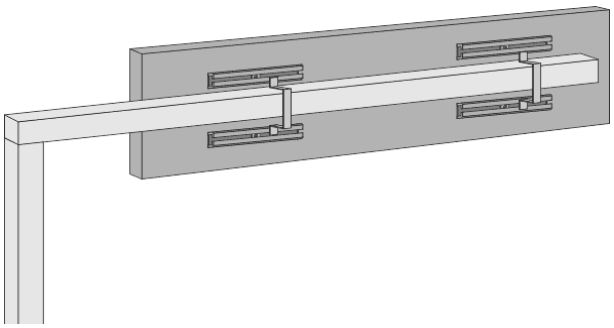
- Holders for half portals (width 100 mm) are delivered with the device.

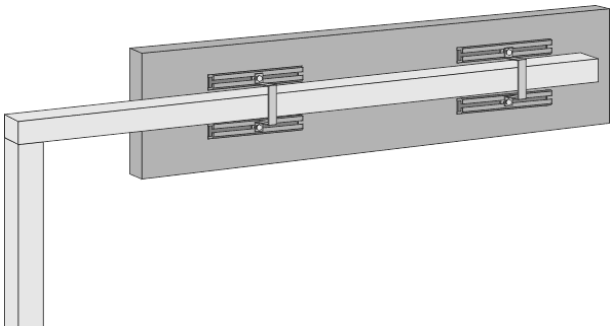


- Put the square holder in the middle of the C holders on the device's backside.



- Adjust the device on the pole and secure it with square holders by tightening the bolt on an already put square nut.





1.2.4 Mounting a device on a square pole

- The device is delivered with the following assembly kit:
  - Square holders
  - Screws M8
  - Screw washers

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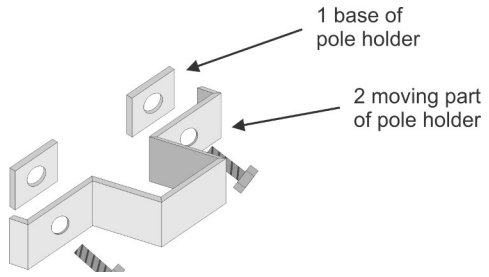
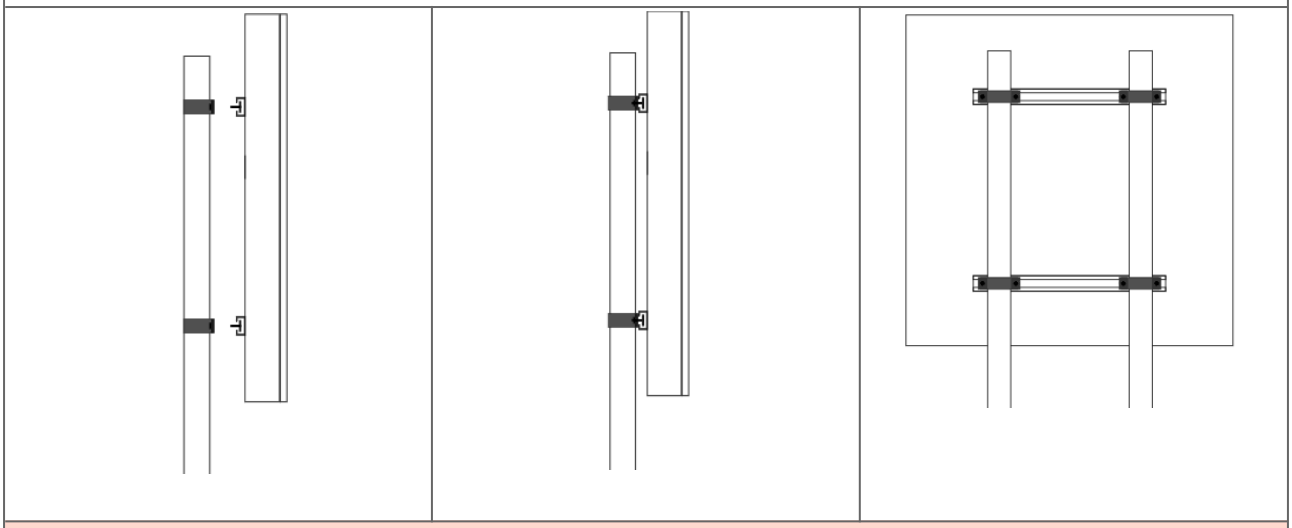
- The device can be mounted on pole fixed in the ground.
- The device is delivered with pole holders for square poles.



- Put the screw heads inside the C-shaped channels in profiles from the device's backside.
- Place the device on the pole and put it in the right position.
- Fix the device at the final position and screw tight fastening screws.



NOTE: Square poles are usually 100x100 mm. Several poles and carrying profiles should be defined according to sign dimensions and weight.

1.2.5 Mounting a device by lateral fixing

- The device is delivered with the following assembly kit:
  - Screws
  - Rubber washers
  - Iron washers and
  - Optional carriers

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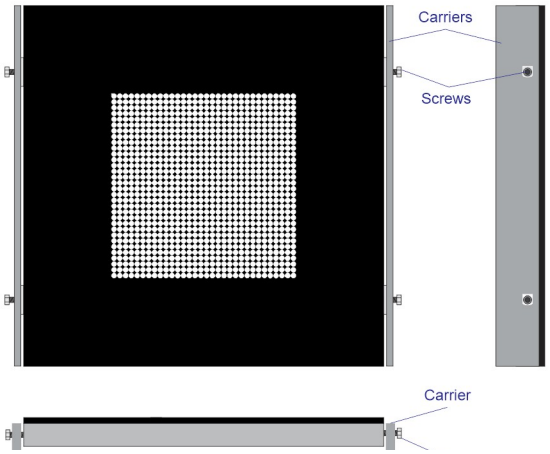
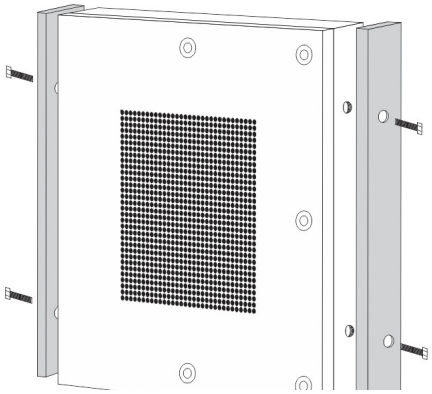
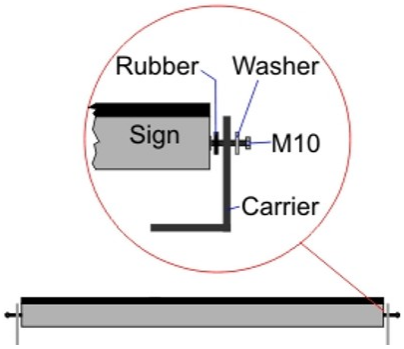
• The device is mounted on the lateral fastening device with carriers.	
• Place the device between two installed carriers. • Put the iron washer onto the screw • Place the screws through the carriers.	
• Put the rubber washer onto the screw. • Tighten the screw.	

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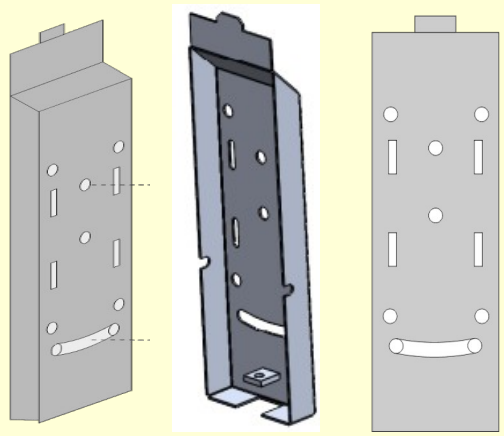
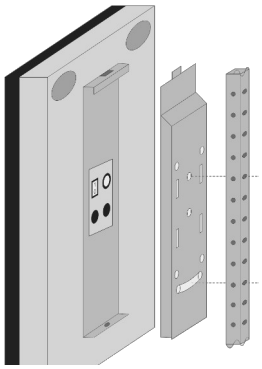
1.2.6 Mounting a device with the locking mounting bracket

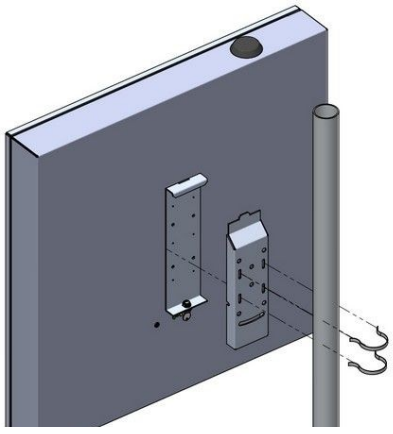
- A mounting bracket, metal tie holder and a key are supplied with the device.

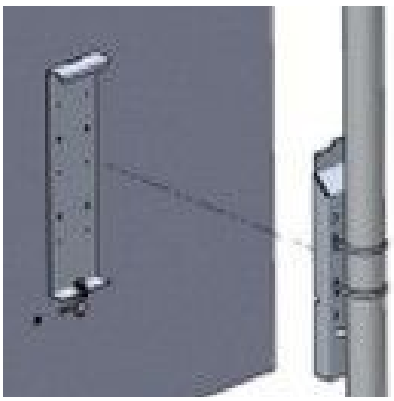


- Remove the mounting bracket from the device, unlocking it and pulling the key down.



- Attach the mounting bracket to the pole using two metal tie holders
- Tighten metal tie holders with a screwdriver.





- Attach the sign to the mounting bracket.
- Press the lock to secure.

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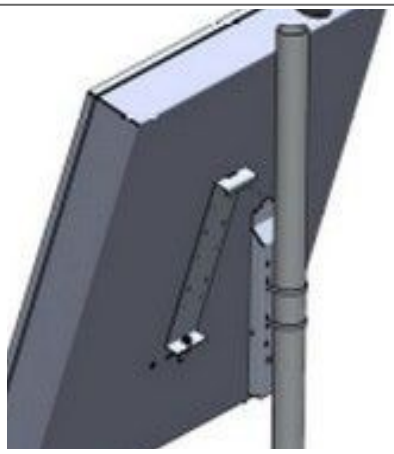
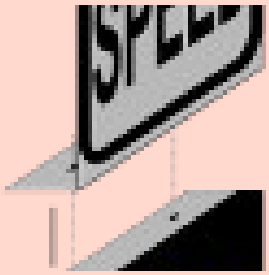


NOTE: On the top of the radar display enclosure, it is possible to install a replaceable traffic sign. It can be mounted with two screws using a screwdriver.



1.2.7 Mounting a solar panel

- Solar panel assembly kit most usually consists of:
  - Solar panel with a holder
  - T bracket (pole extension) on which the solar panel carrier is mounted, and it is mounted on the pole of the device
  - Omega holders for fixing T bracket and solar panel
  - Screws (Screws for omega holders and one long screw for fixing T extension to the pole)
  - Screw washers

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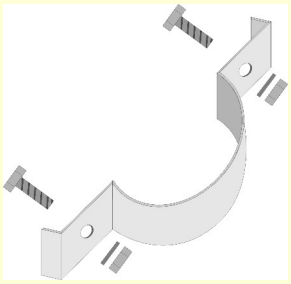
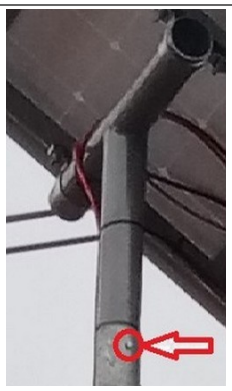
		
Solar panel	T extension	Omega holder

- Fix the T extension to the solar panel carrier using omega holders.

- Put the T extension into the pole of the device
- Drill a hole throught the pole and part of the T extension
- Put screw throuh the holes and fasten with a screw.
- NOTE: Please adjust horisontal angle of solar panel before fixing the T extension position. Solar panel should look to the equator.



NOTE1: Please adjust horisontal angle of solar panel before fixing the T extension position. Solar panel should look to the equator.

NOTE2: Please adjust vertical angle of solar panel before fixing it to the T extension position. Horizontal angle depends on geographical location of the installation.

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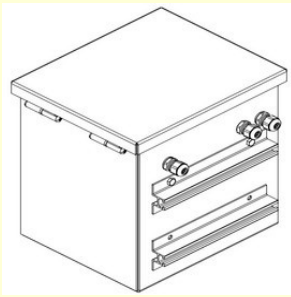
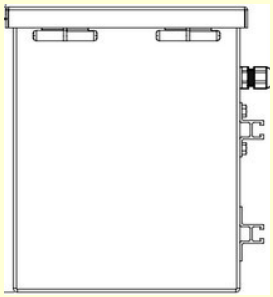
1.2.8 Mounting a battery box to the pole

A battery box assembly kit mostly consist of:

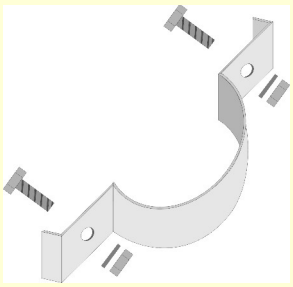
- Battery box with built-in battery and solar charger
- Omega holders for fastening the battery box on the pole
- Screws
- Screw washers



Battery box

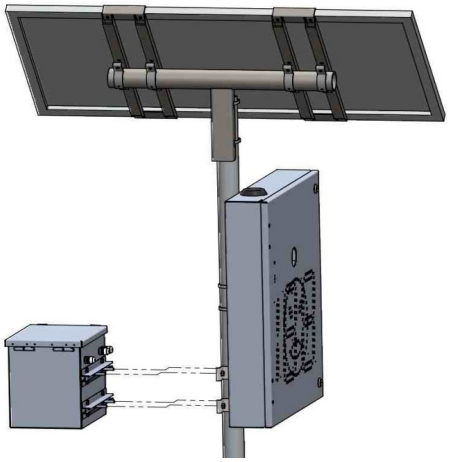


Battery box



Omega holders

- Put the screw heads through the C holders of the battery box.
- Bring the battery box to the pole, backside with C rails, close to the device and the solar panel.



- Than place omega holders, washers and nuts, over the screws in order to attach the battery box to the pole.

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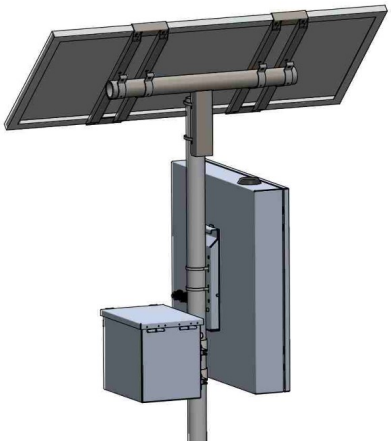
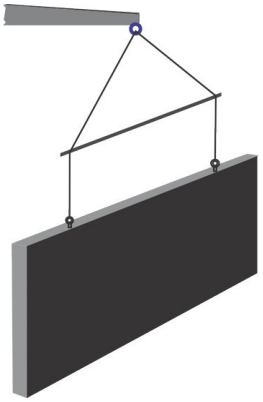
- Adjust vertical position of battery box
- Tighten the screws.



NOTE: After completing the steps above, system is mounted and can be started with cables connecting, the battery box with the sign and solar panel, see chapter 2.1.4.

1.3 Lifting recommendations

- The following recommendations apply to the devices that must be lifted during the installation.
- Lifting of the device must be done according to the following picture.



NOTE: The device holders (the eye bolts), suffer stresses due to lifting. It is recommended to take special attention after lifting to the top of the device, the eye bolts, did they get distorted during the lifting.

NOTE: If it is noticed that the eye bolts has disordered and that there is a space around it, fill the space with water-resistant silicone sealant.

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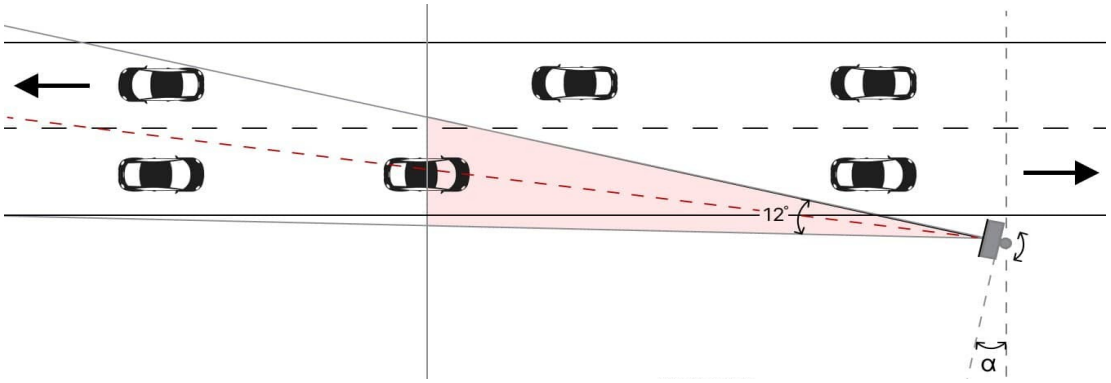
1.4 Orientation of the speed detection sign

- The sign that measures vehicles speed, and should be placed next to the incoming vehicles traffic lane, preventing incoming vehicles from being in the shadow of outgoing vehicles.

- The horizontal detection beam width of the radar is 12°.
- The radar detection range set by the manufacturer is 175m. The maximum possible detection range is 250m (Adjustable in factory only).



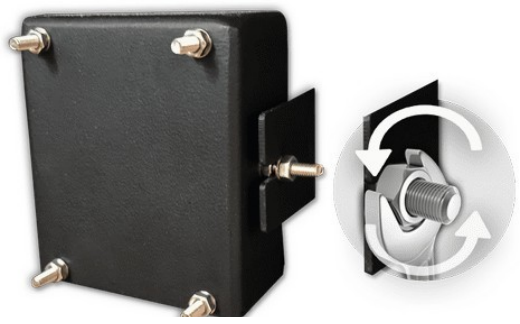
- In the table are defined recommended angles (α) with different distance ranges.

Distance range (m)	α (°)
50	3
100	1,5
150	1
175	1

NOTE: When properly set, radar can reach a range of about 250m for cars in the free field. The distance at which the radar measures a vehicle, mostly depends on the size of an object, or more precisely, on the size of the area which reflects radar waves. The distance range for trucks is due to the big truck front surfaces, 50 to 100 % higher compared to cars, for motorbikes, it will be 50 % and lower.

1.5 Adjusting vertical angle of the radar unit

- To set the radar distance, adjust the angle in relation to the road.
- Open the device, loosen up the nuts on the lateral side of the radar housing
- Adjust the radar to the preferable angle by hand and tighten the nuts again.



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2 ELECTRICAL INSTALLATION

Installation warnings
Carefully read the instructions for installation before plugging in the device.
While closing the device door, be careful not to pinch the cables and press the door for easier locking.
The device must be connected to a grounded electrical socket.

NOTE: All cables should enter the device through cable glands at the housing back. There are usually two glands, one for the main supply cable and the other for a communication cable.

2.1 Power supply connection

2.1.1 Connecting device to the main power supply (230VAC)

- Get the main power supply cable (230VDC) through the gland.

- Locate marked clamp of the terminal blocks for phase, neutral and earth (ground)

NOTE: Only trained person should attach wires to the terminals.

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2.1.2 Connecting device to the 24VDC/12VDC

- Get the main power cable (12VDC or 24VDC) through the gland.

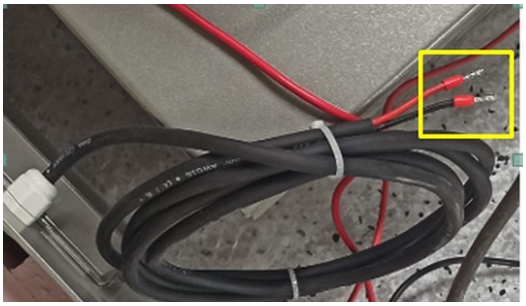
- Locate marked clamp of the terminal blocks for "**+**" and "**-**" wire.

NOTE: Only trained person should attach wires to the terminals.

2.1.3 Connecting device with battery to the 230VAC street lighting supply

- The device that is powered by a street lighting supply, a battery unit and a battery charger are placed in the device or only the battery unit is placed in the separate box.
- The clamp terminal blocks for 230VAC and the protected fuse are placed in the device.

- Open the front of the device
- Get the battery cable through the gland.



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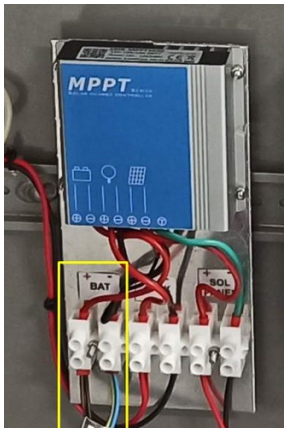
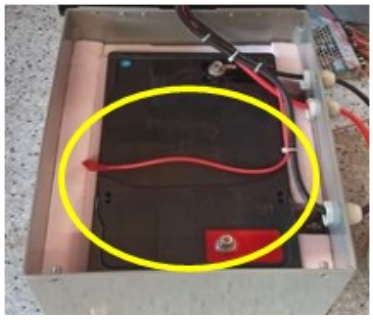
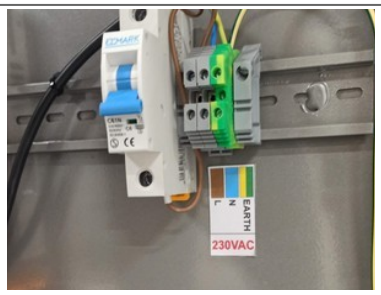
- Connect battery box cables to the battery charger clamps, marked with BAT.
- The black wire connects the **BAT "-"** terminal, and the red cable connects the **BAT "+"** terminal.



- Open the battery box and connect the red wire to the "**+**" of the battery.



- Get the 230VAC street lighting power supply cable through the gland on the device back.
- Locate marked clamp terminal blocks and connect phase, neutral and earth (ground) wire.



NOTE: LED battery status indications of the battery charger are in the table next to.

LED	Status	Function
Green LED	On	Solar panel is correctly connected, but not charged
	Fast flash(0.1/0.1s)	MPPT charging
	Flash(0.5s/0.5s)	Equal or Boost Charging
	Slow flash(0.5/2s)	Float Charging
Yellow LED	Off	Over voltage protection
	On	Battery is normal
	Slow flash(0.5/2s)	Battery voltage is low
	Fast flash(0.1/0.1s)	Low voltage protection
Red LED	Off	Work normal
	On	The output power is 0.
	Flash(0.5s/0.5s)	Over temperature
	Fast flash(0.1/0.1s)	Short circuit or Over current protection

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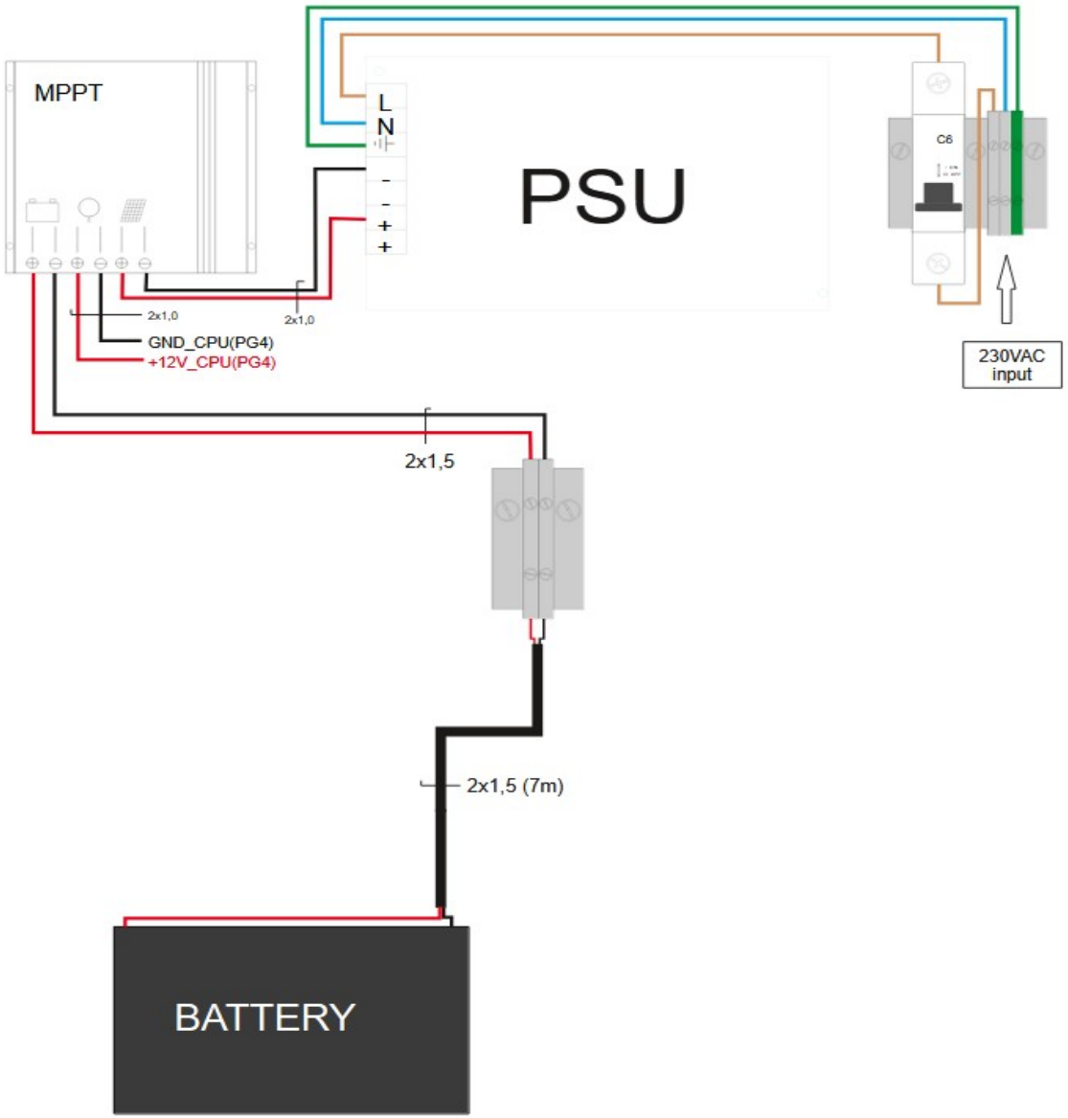
Schematic Diagram:



2.1.4 Connecting device to the solar power supply

- **Device has to be wired to battery and solar panel only after they are installed**

NOTE: The battery is supplied in a box with a disconnected "+" electrode. Before installing the battery box, open the battery box and connect the red cable to the "+" electrode

- The red and black cables of the battery box connect need to be connected directly to the solar panel cables.

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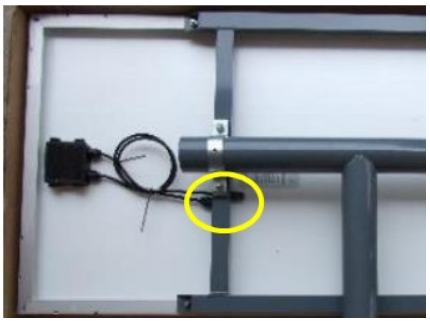
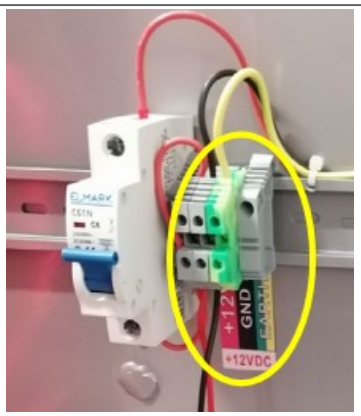
<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>• Get the battery box power cables through gland on the device's back.</td><td>  </td></tr>
<tr><td>• Connect wires to clamp terminal blocks marked +12VDC and GND.
• The black cable connect to the terminal with the black GND label, and the red cable connects to the terminal with the red +12VDC label.</td><td> 
</td></tr>
<tr><td>• Open the battery box and connect the red wire to the “+” of the battery.
• The photo next, is the photo of the battery box with the battery and battery charger inside.</td><td>  </td></tr>
</table>

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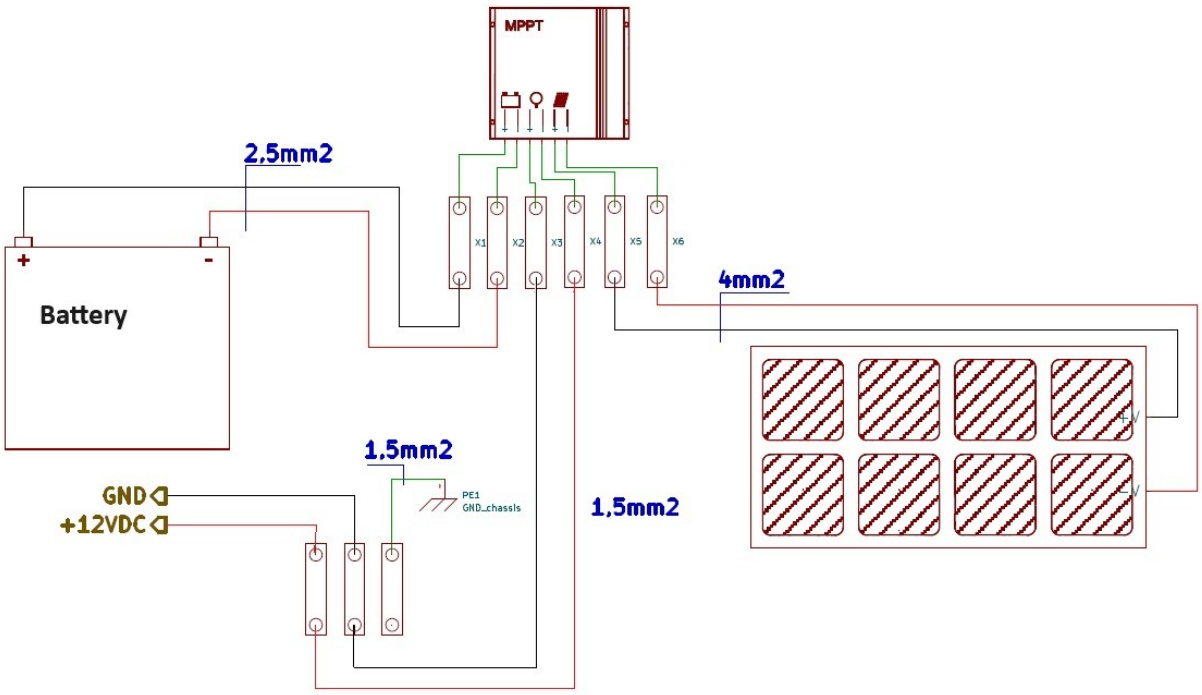
Schematic Diagram:



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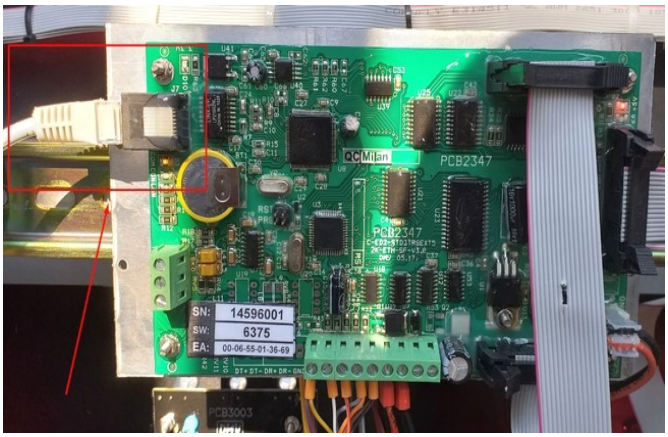
2.2 Peripheral connections

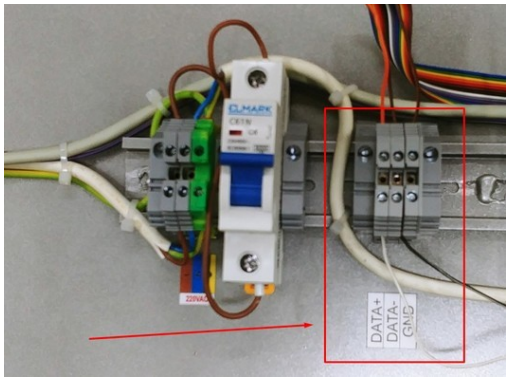
2.2.1 Ethernet connection

- Open the device.
- Get the Ethernet cable into the device through the PG gland on the device back.
- Identify the Ethernet RJ45 connector on the controller (CPU).
- Connect an Ethernet cable to the CPU board directly, see the photo below.



2.2.2 RS485 connection

- Open the device.
- Get the RS485 cable into the device through the PG gland on the device back.
- The connection of the RS485 communication can be on terminal blocks or directly to the controller (CPU board).
- Locate the clamp terminal blocks marked DATA+, DATA- and GND.
- Connect RS485 wires according to the marks on terminals.
- If the RS485 cable is connected directly to the controller, find connectors marked D+, D- and GND on the CPU board.



2.2.3 RS232 connection

- USB/RS232 adapter is required for connection between PC/laptop and device.

- Open the device.
- On CPU controller find DB9 connector. Please note that sometimes is DB9 connector separated from CPU.
- Connect USB/RS232 cable to the controller (CPU) directly.

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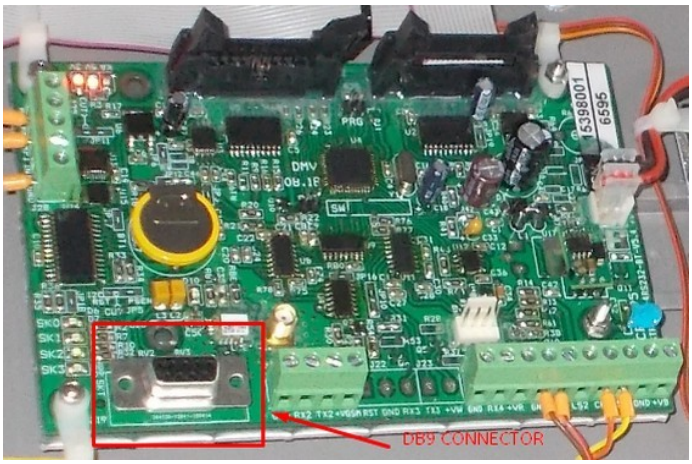
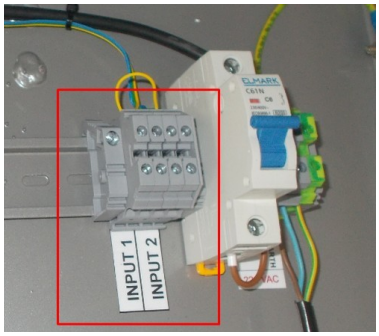


NOTE: When connecting, in the DMV user application select right serial COM port and bit rate of 19200bps or 9600bps. A message will be shown, indicating that the device has been detected.

2.2.4 Digital I/O connection

- Open the device.
- Get the cable into the device through the PG gland on the device back.
- Locate the DIO terminal blocks marked with INPUT1, INPUT2…
- Connect wires according to the marks on terminals.



2.2.5 Installing the SIM card into a GPRS modem

- To enable the connection to the Internet via mobile network, put up a SIM card in a GPRS modem.

- Turn off power of the device.
- Open the device.
- Locate the GPRS modem inside the device.
- See the SIM label, follow the insert position and put a SIM card.
- Turn on the device.

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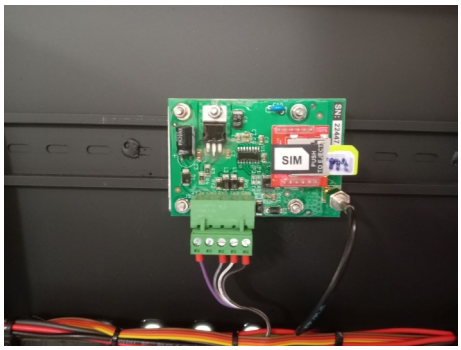
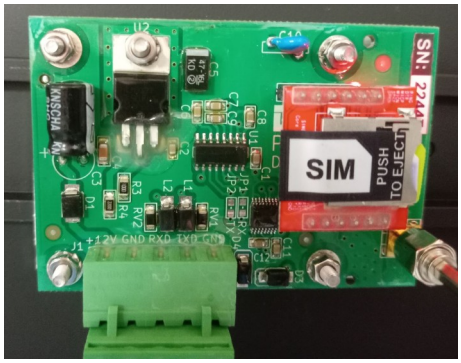
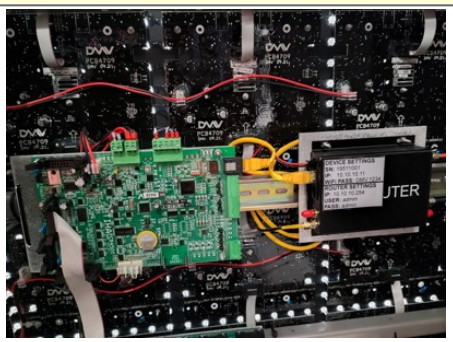




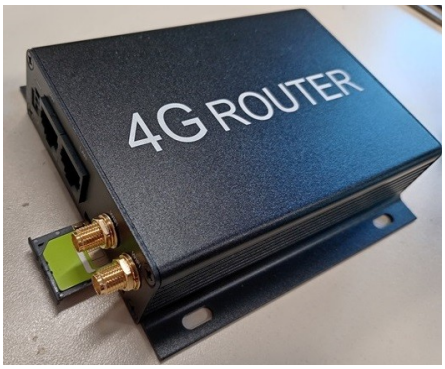
2.2.6 Installing the SIM card into a GPRS router

- To enable the connection to the Internet via mobile network, put up a SIM card in a GPRS modem.

- Turn off power of the device.
- Open the device.
- Locate the GPRS/4G inside the device.
- See the SIM label, follow the insert position and put a SIM card.
- Turn on the device.



- The LED light on the modem shows the status of the modem.
- The SIM card will register to the GSM network.
- The GPRS/4G LED indication shows the modem status, it should be ON once every 3 seconds when connecting with the server.



NOTE: Always pay attentionwhen to put sim in the right direction

2.3 Connection diagram for a device

The connection schematic diagram for the device is delivered to you on the by the email together with this installation manual.

NOTE: The connection diagrams in this installation manual are only informational please have in mind that every type device has its own connection diagram.

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