NODER IUPS-R

PARKING SPACE OCCUPANCY DETECTION SYSTEM

Technical documentation

Ver.1.2_022022

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1. Protection

Before installing this device, read these instructions. Failure to follow the instructions may result in malfunction or even damage to the equipment. The manufacturer is not liable for damages caused by negligence. Entering any modifications to the device that are not authorized by the manufacturer or performing independent repairs results in the loss of rights resulting from the warranty.

2. Warning

Electric device under voltage. Before performing any activities related to the power supply (connecting wires, installing the device, etc.), make sure that this device is not connected to the power supply. The assembly should be made by person with appropriate electrical qualifications.

3. Devices description

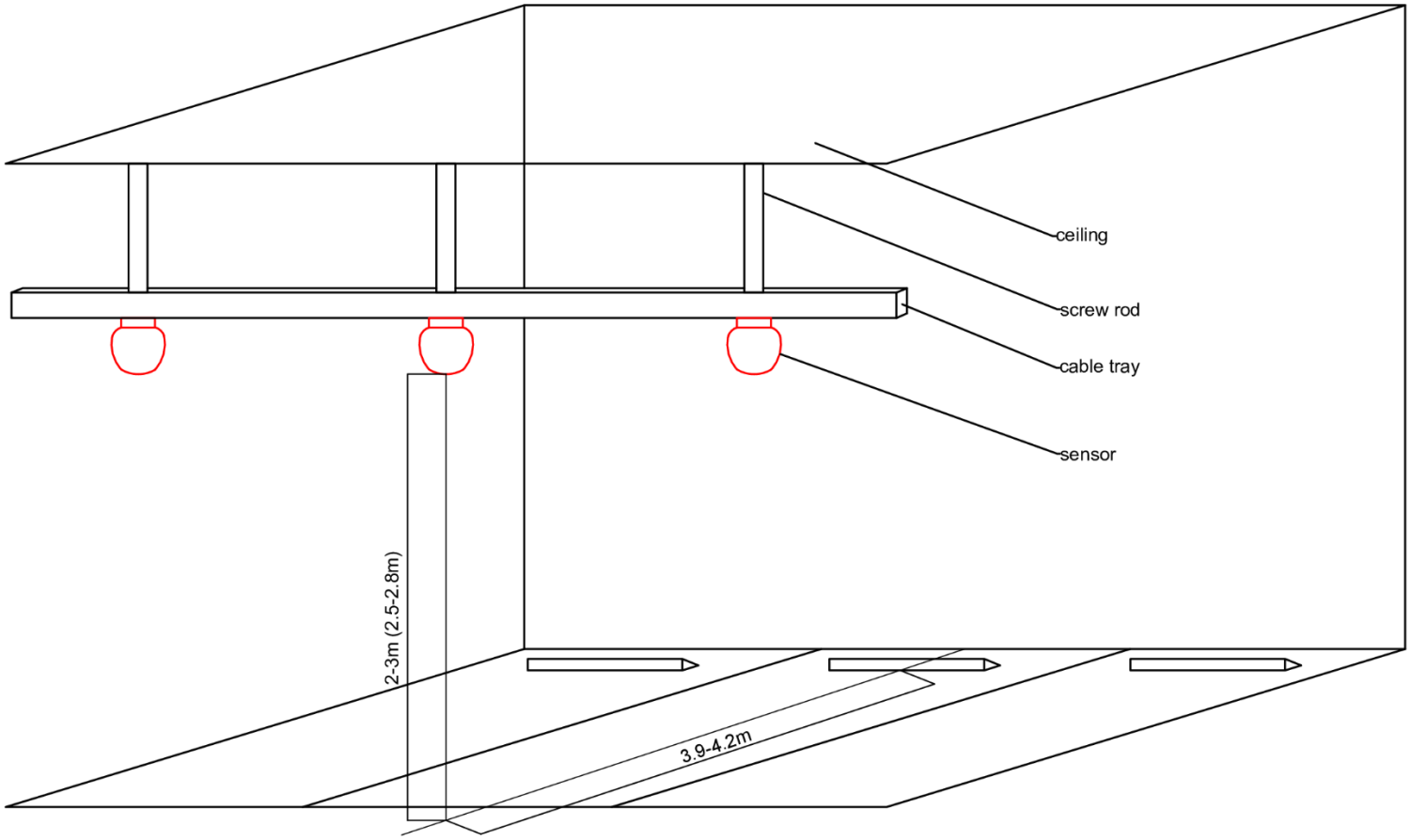
The NODER parking space occupancy detection system is based on integrated ultrasonic sensors with visual signaling and IP concentrators. Sensors installed above each parking space detect the vehicle and inform about the status of the parking space (free or occupied). The sensor uses ultrasonic technology to detect the status of the parking space, and then controls the LEDs accordingly to display the correct color and give the driver an idea of where the available space is.

Sensors are connected to each other in groups using devices called concentrators. Each concentrator supports the sensors using four independent RS-485 buses.
The concentrator enables data exchange with sensors directly from the Axxon Intellect master system via TCP/IP protocol. Parking space occupancy detection system uses ultrasonic detection technology to real-timely monitor status of parking spaces. All space's status information are collected and analyzed by a server, then be releases to LED signage.

4. Location of the Noder IUPS-R sensor

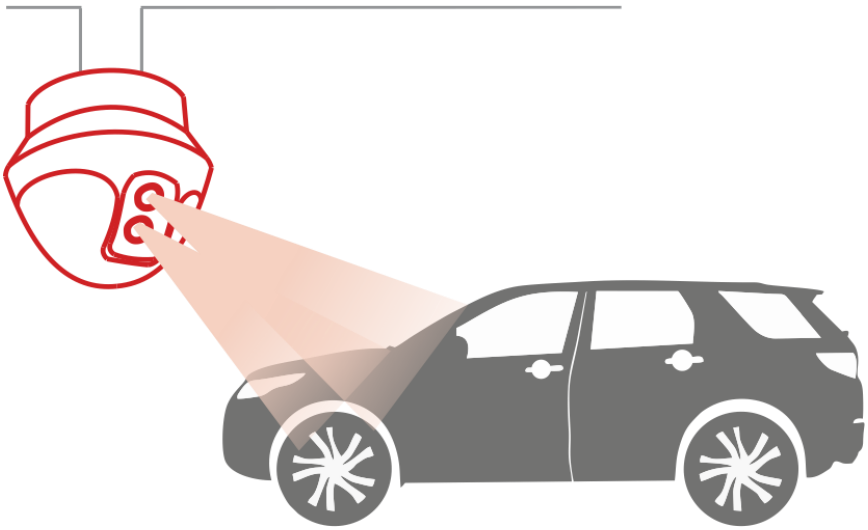
Sensors should be mounted in the center of each parking space at a distance of 3.9-4.2m from its end, as shown in the figures included in this chapter. The height range for the correct reading of the occupancy of a parking space is 2-3m. **However, the recommended height is 2.5-2.8m**. For the proper installation, a cable tray with a minimum width of 10cm is required. **Cable tray must be rigidly mounted to the ceiling, without the possibility of swaying**. Subsequent sensors should be connected using original ended patchcords with a length of about 3 meters.

Location of the sensor in relation to the parking space:



Connection of subsequent sensors in one line with approximately 3m patchcords above the parking spaces:

To reduce the occurrence of incorrect states, sensor should be positioned centrally to the parking space:

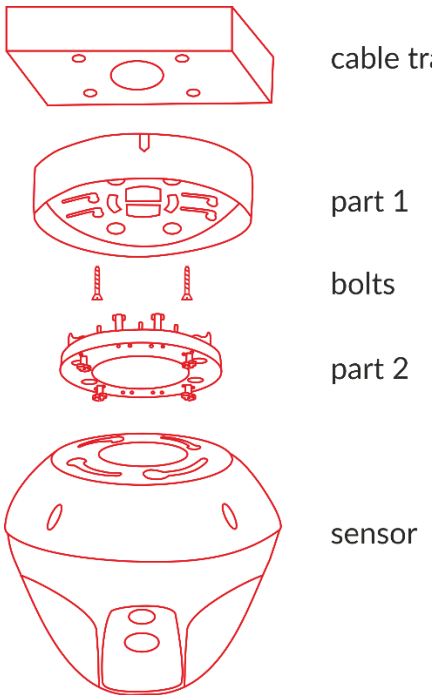


5. Installation and connection of the Noder IUPS-R sensor

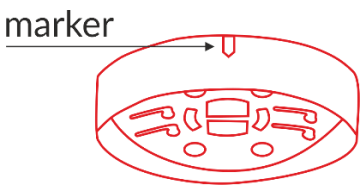
To proper start the NODER parking space occupancy detection system, the right installation with proper assembly and connection of devices is required.

5.1 Mounting of the Noder IUPS-R sensor

Below are the steps necessary for the proper installation of the sensor:



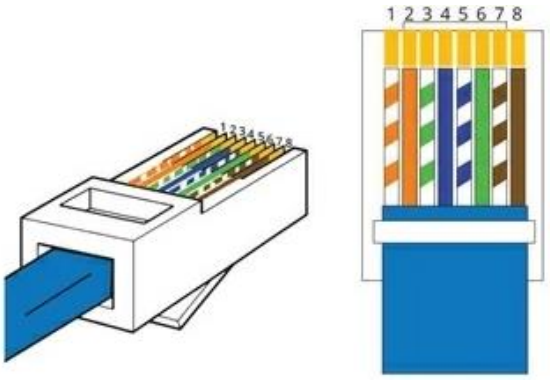
1. Cut a hole with a diameter of 40mm in the cable tray.
2. Insert part number 1 into the cut hole. The marker on the part must be towards the parking space.



3. Fasten part 1 on the cable tray with 2-4 self-tapping screws with dimension of ϕ4*10.
4. Connect part number 2 to part number 1 with the hooks on part number 2.
5. Connect part number 2 to the detector using the tabs on part number 2.

5.2 Connection of the Noder IUPS-R sensor

The sensor has two RJ-45 inputs. To connect them with other devices, it is recommended to use good quality cables and patchcords UTP cat. 5e. First sensor, which is located the closest to the concentrator should be connected to its RS - 485 bus ([RX +] - brown, [RX-] - white-brown).
To power the sensors, should be used a power supply with an output voltage of 24V DC. The way of connecting the individual wires is described in the table below:



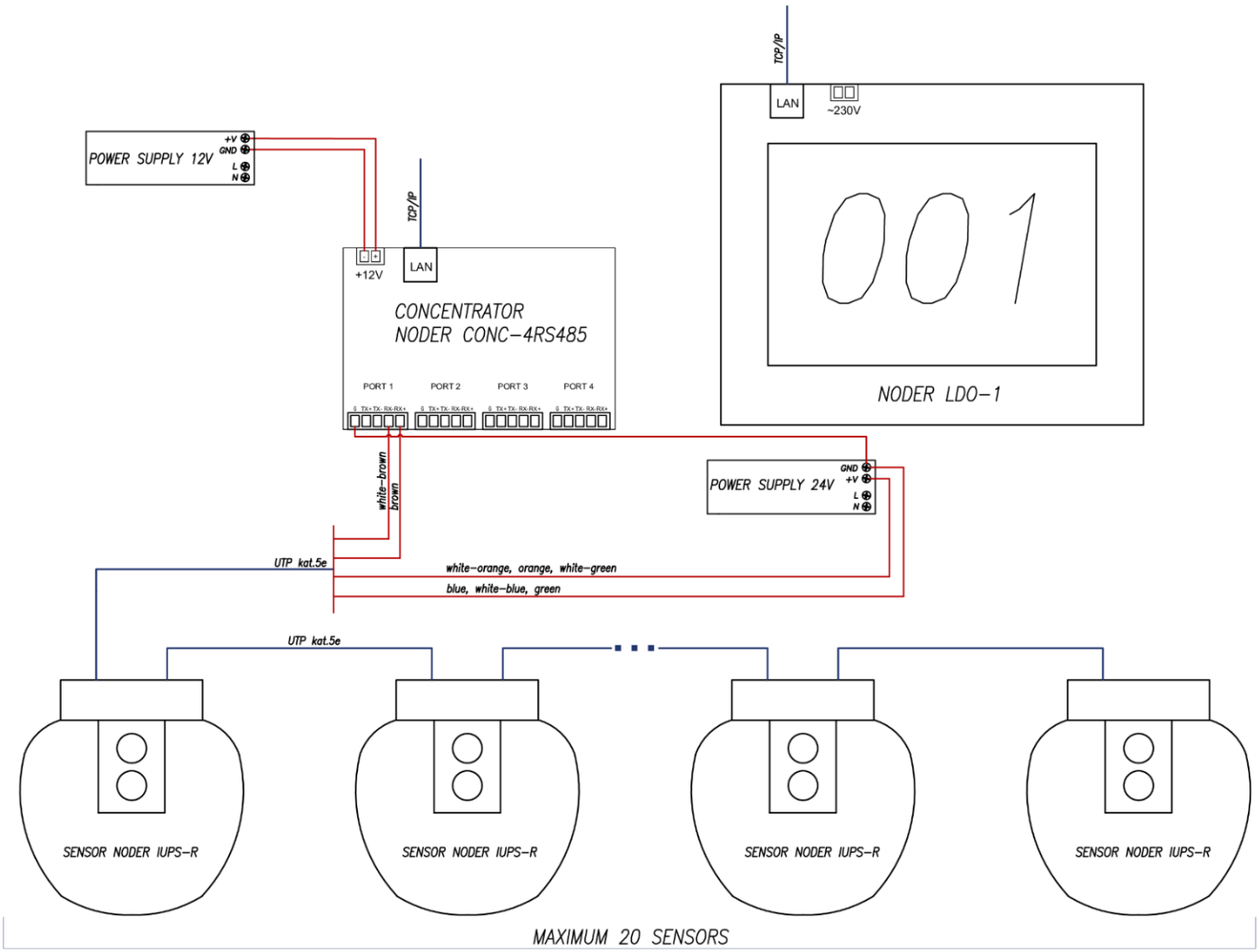
Wire	Colour	Connection
1	White-orange	+24V
2	Orange	
3	White-green	
4	Blue	GND
5	White-blue	
6	Green	
7	White-brown	RS-485- (RX-)
8	brown	RS-485+ (RX+)

RJ-45 interface configured in this way should be connected to the first sensor. The use of the that kind of bus structure as shown in the figure ("*Fig. 4. Diagram showing the connection of sensors in one line*") is recommended when connecting up to 20 sensors . An alternative method is to combine the structure into the letter "T", which means to create two parallel lines ("*Fig. 5. Diagram showing connection of the sensors in two lines")*. Thanks to this method, voltage drops are reduced and it is possible to connect 32 sensors to one RS-485 bus.
To connect sensors, should be used factory-terminated UTP cat.5e patchcords. Devices should be connected in series (take a look -> *Connection diagrams*). The maximum number of devices connected to a single bus port of a concentrator is 32. One concentrator with four RS-485 buses can handle a total of 128 detectors. To power the concentrator, use a power supply with an output voltage of 12V DC.

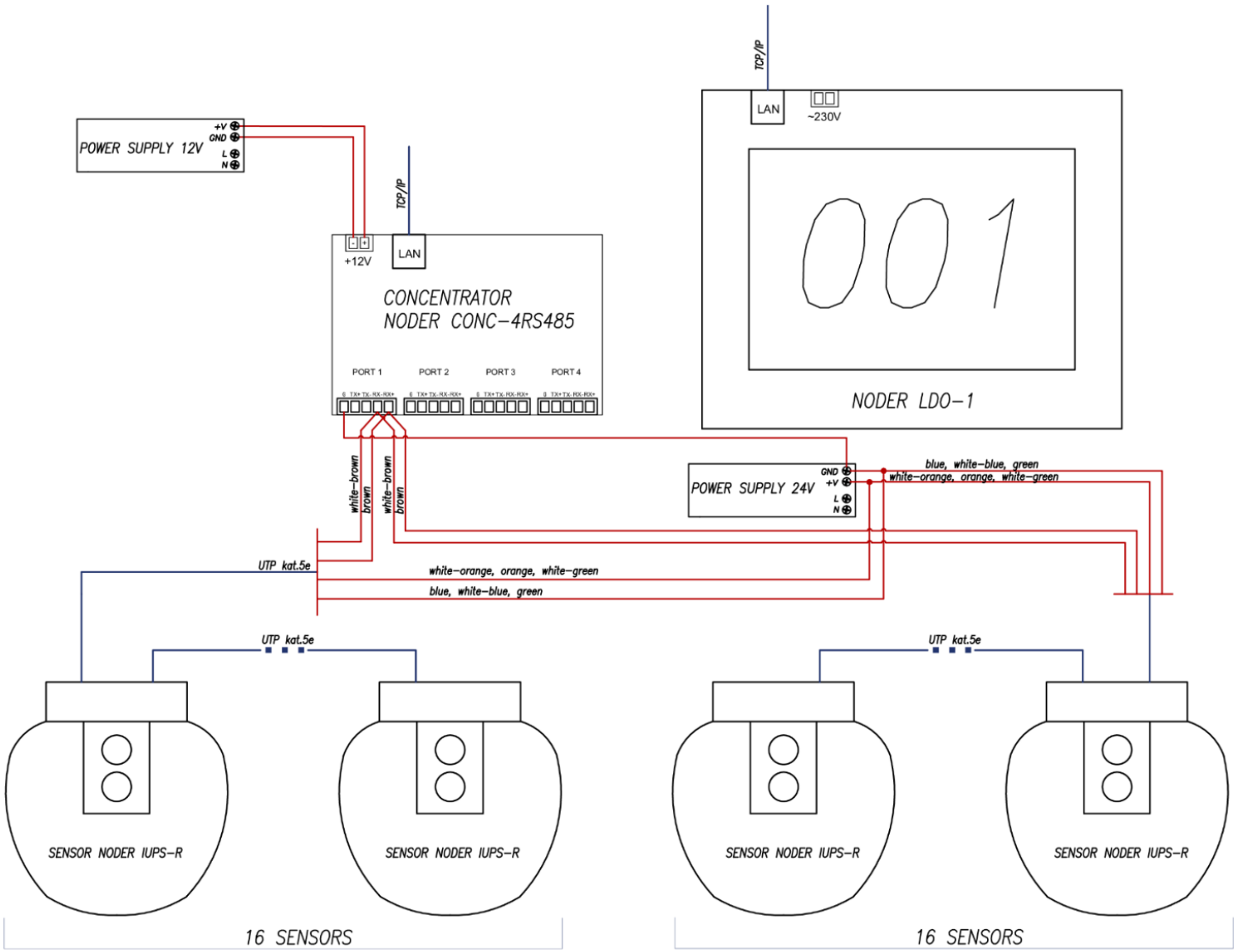
6. Connection diagrams

Sample connection diagrams are shown below. The diagrams show, as the example, the first port of the concentrator for communication with the sensors and the LED displayer connected to the system via the TCP / IP network, which will inform about the number of free parking spaces.

On the figure number 4 is shown the maximum of sensors in one line (20) connected to one RS-485. In this case, the first of sensors is connected to the power supply device (power supply) and the concentrator port (RS-485 communication), and the next ones are connected in series by patchcords (from sensor to sensor). Using more sensors on one line is not recommended due to voltage drops on the cables and connectors, which result in insufficient voltage level for proper work of devices furthest away from the power supply.

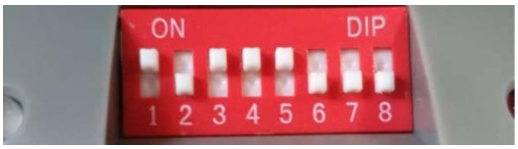


The figure number 5 shows an alternative method of connecting devices, which allows 32 detectors to be connected per bus. In this case, there are two lines connected in parallel to the bus port. The first of sensors are connected to the power supply device (power supply) and the concentrator ports (RS-485 communication), while the next ones are connected in series by patchcords (from device to device). Using of the second line, enables the connection of up to 32 detectors (e.g. line 1 - 20 sensors, line 2 - 12 sensors or, as shown in the figure number 5: line 1 - 16 detectors, line 2 - 16 detectors).

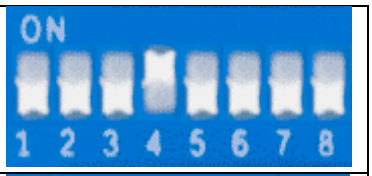
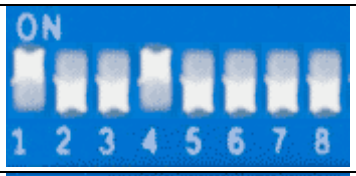


7. Addressing of the Noder IUPS-R

In order for the sensors to communicate correctly with the concentrator, it is necessary to properly address it. Each sensor connected to the one port of concentrator must have a unique address for proper communication. The DIP switch on the side of the sensor housing is used for this purpose. Addresses from 0 to 31 are set in the binary system (the least significant bit from the left).



The table below shows the switch settings for addresses 0-31:

0		8	
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	

7		15	

16		24	
17		25	
18		26	
19		27	
20		28	
21		29	
22		30	
23		31