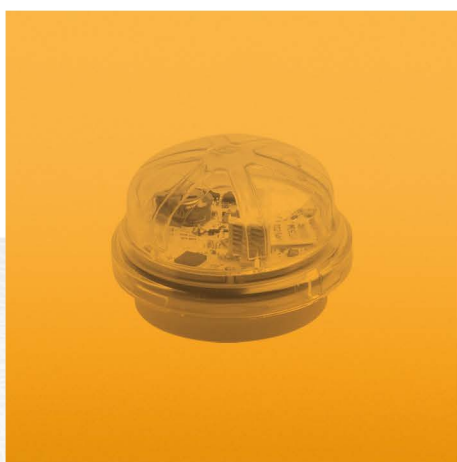


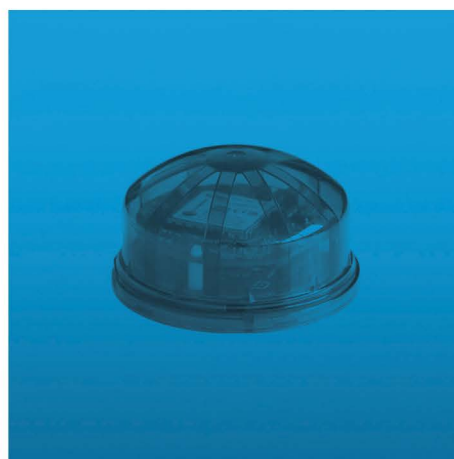
# CATALOGUE

## 2025

### NODES



### GATEWAY LITE



### GATEWAY



### PROBES

# GENERAL INDEX

2025 - Algorab S.r.l.®

CTE2502

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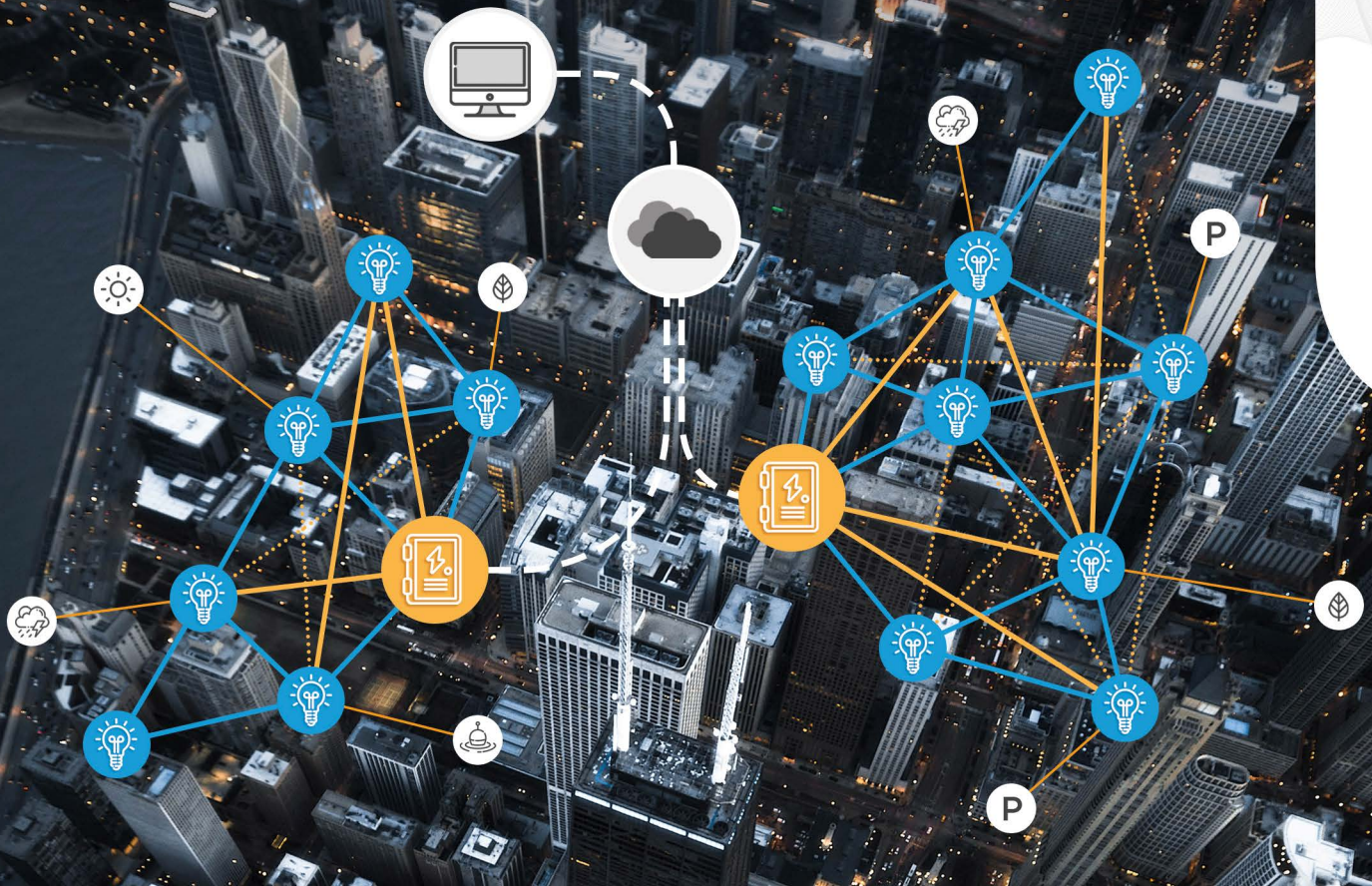
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# MESH Architecture



## SW Platform

Central management system platform, processes and stores transmitted and received data. Allows the end user to have full control of the system remotely.



## Server Cloud

Software can be hosted on our cloud servers or on-premise at the customer's infrastructure.



## Gateway

Gateways are generally installed in electrical panels present in the area to control also the power line. They act as a connection between the system and the SW platform.



## Nodes

Nodes are installed on street lamps, internally or externally depending on the characteristics of the lighting fixtures and the project needs and act both as the lighting control device.



## Sensors

Sensors are located throughout the territory and have the task of providing the system manager with all the information necessary for monitoring the area of interest.

The power of

# DUAL BAND

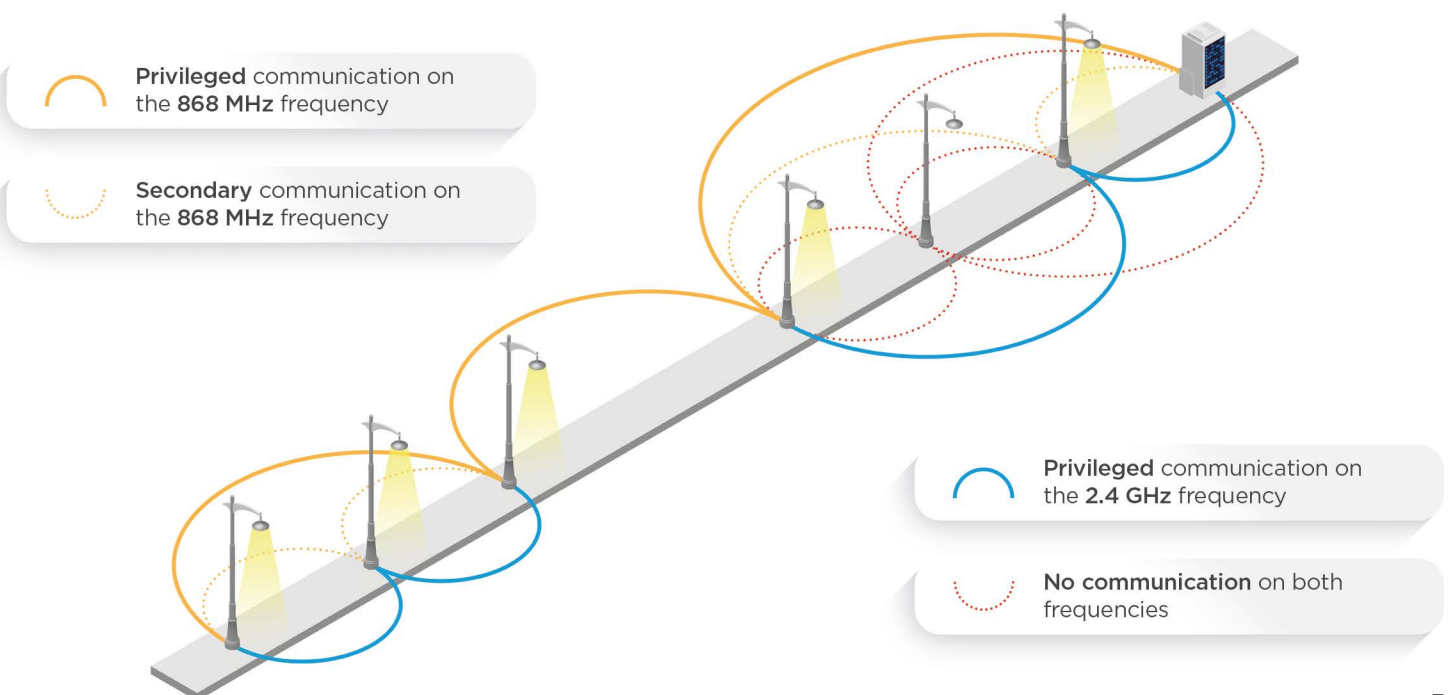
*"2.4 GHz and 868 MHz are one thing, thanks to simultaneous Dual Band"*

Algorab is the first manufacturer to offer, on the market, a highly innovative product that allows you to effectively exploit all the advantages of both frequencies used simultaneously. Reliability, flexibility and compatibility are the main characteristics of our products that distinguish us and guarantee longevity and safety to the system.

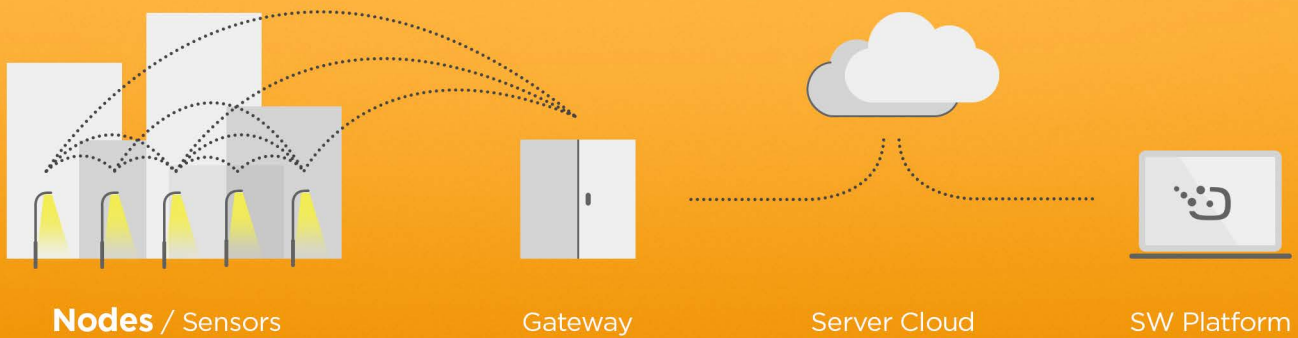


## Dual Band infrastructure diagram:








**Sending informations simultaneously on both frequencies (2.4 GHz and 868 MHz), Algorab system is able to guarantee extremely fast and reliable communication. Even in the event of obstacles or large distances between the elements of the system, the double band allows a constant exchange of information (sending and receiving) on the frequency which, in that situation, is the most efficient.**



# NODES



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Zhaga Remote Control Node



## Description

P5-ZS2 is a Zhaga D4i certified wireless point-to-point lighting remote control device capable of supporting DALI, DALI-2 and D4i standards. This level of integration and symbiosis with the lighting body makes the P5-ZS2 an extremely reliable and globally applicable device for the management of the modern smart cities.

Thanks to the effectiveness of the simultaneous communication in Dual Band (2.4 GHz and 868 MHz) between the various nodes and the gateway, Algorab is able to structure a complete WSN (Wireless Sensor Network) in mesh topology: the best for having safe management and total remote control even in the case of very large systems and particularly hostile conditions.



### Dimensions

Diameter: 40 mm  
Height: 29 mm



IP66 - IK09

# Remote control of the light point - ZHAGA



Reliability and broad communication capacity thanks to Dual Band



Stand-Alone: it can work even if isolated from the gateway



Level of integration: DALI, DALI-2 Zhaga D4i

4

Can handle up to 4 DALI drivers

- Easy to install thanks to the Zhaga socket

- Master Clock:** just a few nodes equipped with the **+TIME** function are enough to **synchronize** the **system** with the right timing

- Reading of standard DALI values and custom values

- CAM specifications are supported** (*Minimum Environmental Criteria*)



Detection of Non-perpendicularity of the pole



DALI commands can be managed through P5 App



Optimal distance of communication nodes: up to 200 m (*Dual Band*)



Adaptive Lighting: Compatibility with the TAIS2/FAIS2 systems

Code	Device Name	Description
101304	P5-ZS2-DB +SEN	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point + 3D Accelerometer and luxmeter
101303	P5-ZS2-DB	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point
101300	P5-ZS2-SB +SEN	WSN Single Band device (2.4 GHz) for control of a light point + 3D Accelerometer and luxmeter
101299	P5-ZS2-SB	WSN Single Band device (2.4 GHz) for control of a light point
102448	P5-ZS2-DB +SEN +TIME	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point + 3D Accelerometer and luxmeter + TIME
102424	P5-ZS2-DB +SEN xPIR	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point + 3D Accelerometer and luxmeter + Firmware configuration for external PIR

# P5 ZPIR



Motion sensor and  
Zhaga Remote Control Node



## Description

P5-ZPIR is a Zhaga D4i certified wireless device for point-to-point lighting remote control that supports the DALI, DALI-2 and D4i standards. This level of integration and symbiosis with the lighting fixture makes the P5-ZPIR an extremely reliable and globally applicable device for the management of the most modern smart cities.

Thanks to the installation of a double PIR (Passive InfraRed) sensor and the Fresnel lens, the P5-ZPIR node is able to capture radiation in the infrared spectrum radiated by moving bodies and apply the dimming profiles set by the control center (or the P5 App).

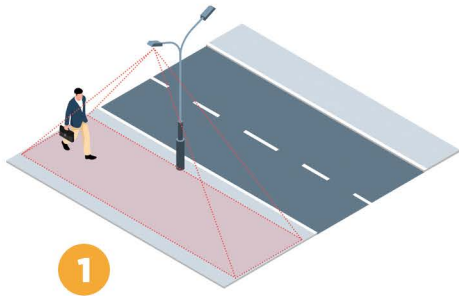


### Dimensions

Diameter: 80 mm  
Height: 42 mm

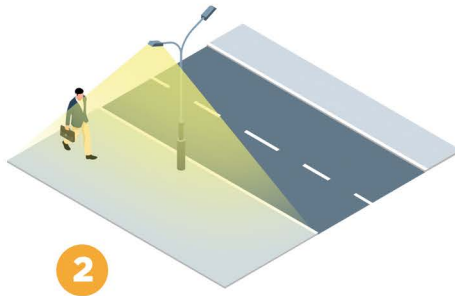


IP66 - IK09



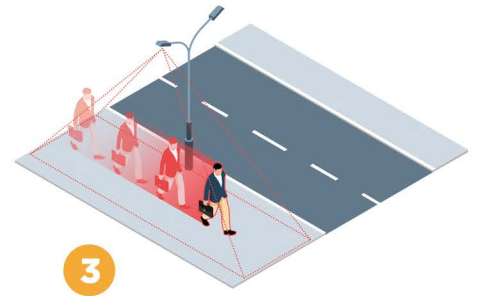
1

Presence detection area thanks to infrared sensors



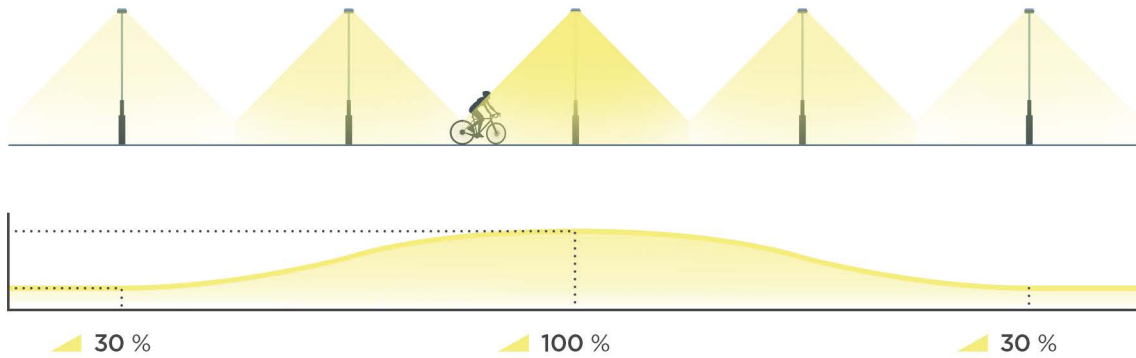
2

Switching on the lamp with previously set dimming



3

Identifying the direction of the subject by changing the thermal trace



**Wave effect:** Thanks to the interaction between the P5-ZPIR and the other Algorab nodes, it is possible to follow the movement of the subject along the illumination line while keeping the rest of the system to a minimum.



Reliability and broad communication capacity thanks to Dual Band



Easy to install using the special Zhaga socket at a height of 5-12 meters



Level of integration: DALI, DALI-2 Zhaga D4i



Pedestrian, bicycle and electric micromobility motion detection

○ **Motion detection area:** 30x6 meters at 5 m height, up to an area of 36x12 meters at 12 m height

○ It can manage up to **4 DALI drivers** with **reading** of standard **DALI values** and custom values

○ In combination with the **P5 App**, it is possible to **manage small systems** independently without the need for a gateway

○ Optimal **distance of communication nodes:** up to **200 m (Dual Band)**

Code	Device Name	Description
102331	P5-ZPIR-DB +SEN	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point equipped with PIR sensors + 3D Accelerometer and luxmeter
102330	P5-ZPIR-SB +SEN	WSN Single Band device (2.4 GHz) for control of a light point equipped with PIR sensors + 3D Accelerometer and luxmeter



Nema Remote Control Node



## Description

P5-NS2 is a wireless point-to-point lighting remote control device installed on a NEMA-7 socket capable of supporting DALI and 0-10 V standards. Thanks to its powerful firmware (remotely upgradeable) this node has high computing power allowing it to enable multiple control and command functions of the single light point.

Also for the P5-NS2, simultaneous communication in Dual Band (2.4 GHz and 868 MHz) is essential to structure a complete WSN (Wireless Sensor Network) in mesh topology: the best for secure management and total remote control even in the case of very large systems.



**Dimensions**  
Diameter: 88.6 mm  
Height: 98 mm



NEMA Socket

IP66 - IK09

# Remote control of the light point - NEMA



Reliability and broad communication capacity thanks to Dual Band



Stand-Alone: it can work even if isolated from the gateway



Level of integration: DALI

8

Can handle up to 8 DALI drivers

- Easy to install thanks to the Nema socket

- Master Clock:** just a few nodes equipped with the +GPS are enough to **synchronize** the **system** with the right positioning

- Reading of standard DALI values and custom values

- CAM specifications are supported** (*Minimum Environmental Criteria*)



Detection of Non-perpendicularity of the pole



DALI commands can be managed through P5 App



Optimal distance of communication nodes: up to 200 m (*Dual Band*)



Adaptive Lighting: Compatibility with the TAIS2/FAIS2 systems

Code	Device Name	Description
102038	P5-NS2-DB +SEN +PM	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point + 3D Accelerometer and luxmeter + Power Meter
102039	P5-NS2-DB +SEN +PM +GPS	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point + 3D Accelerometer and luxmeter + Power Meter + GPS
102298	P5-NS2-DB +SEN +PM +GPS +UPS	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point + 3D Accelerometer and luxmeter + Power Meter + GPS + UPS
102007	P5-NS2-SB +SEN +PM	WSN Single Band device (2.4 GHz) for control of a light point + 3D Accelerometer and luxmeter + Power Meter
102037	P5-NS2-SB +SEN +PM +GPS	WSN Single Band device (2.4 GHz) for control of a light point + 3D Accelerometer and luxmeter + Power Meter + GPS



Internal Remote Control Node



## ✘ Description

P5-IS2 is a wireless device for the remote control of point-to-point lighting typically installed inside the lighting body or externally allocated in a dedicated box. It guarantees real-time management and diagnostics of the light point and supports DALI and 0-10 V standards; it also offers the possibility of managing the switching on/off of electrical loads over 1.5 kW.

It is often used for the retrofitting of lighting fixtures of which you want to maintain the original structure, such as historic lamps. In these cases, or for other project/application needs, the P5-IS2 is equipped with specific antennas, thus making it an extremely versatile node.



**Dimensions**  
110x59x29 mm



IP20 - IK08

# Remote control of the light point - INTERNAL



Reliability and broad communication capacity thanks to Dual Band



Stand-Alone: it can work even if isolated from the gateway



Level of integration: DALI

8

Can handle up to 8 DALI drivers

- Node **wired** directly **inside the lighting body** or **positioned** in a special **P5-BOX**

- Measurement of electrical parameters** in AC upstream of the appliance thanks to **integration of an internal Power Meter**

- Reading** of standard **DALI values** and custom values

- CAM specifications are supported** (*Minimum Environmental Criteria*)



Detection of **Non-perpendicularity** of the pole



DALI commands can be **managed** through **P5 App**



Optimal **distance of communication nodes:** up to **200 m** (*Dual Band*)



**Adaptive Lighting:** **Compatibility** with the **TAIS2/FAIS2** systems

Code	Device Name	Description
102114	P5-IS2-DB +SEN	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point + 3D Accelerometer and relay
102119	P5-IS2-DB +SEN +PM +I10	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point + 3D Accelerometer and relay + Power Meter ( <i>optional 1-10 V interface</i> )
102132	P5-IS2-SB +SEN	WSN Single Band device (2.4 GHz) for control of a light point + 3D Accelerometer and relay
102528	P5-IS2-DB	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point +Relay
102117	P5-IS2-SB +SEN +PM +I10	WSN Single Band device (2.4 GHz) for control of a light point + 3D Accelerometer and relay + Power Meter ( <i>optional 1-10 V interface</i> )
102550	P5-IS2-DB-DMX +SEN +PM	WSN Dual Band device (2.4 GHz and 868 MHz) for control a light point with RS485 interface + 3D Accelerometer and relay + Power Meter
102551	P5-IS2-SB-DMX +SEN +PM	WSN Single Band device (2.4 GHz) for control a light point with RS485 interface + 3D Accelerometer and relay + Power Meter

# P5 IS2-BOX

Assembled kit:  
P5-IS2 + BOX



## Description

In this configuration the P5-IS2 node is already integrated in the appropriate plastic box (ASA/ABS) with the associated Dual Band or Single Band antenna depending on the project/application needs.

It is often used for the retrofitting of lighting fixtures of which you want to maintain the original structure, such as historic lamps. To facilitate installation on poles or other surfaces, the box is also supplied with a fixing kit.

The P5-IS2 node inside guarantees real-time management and diagnostics of the light point and supports DALI and 0-10 V standards.



**Dimensions**  
130x175x33 mm



IP67

# Remote control of the light point - External BOX



Reliability and broad communication capacity thanks to Dual Band



Stand-Alone: it can work even if isolated from the gateway



Level of integration: DALI

8

Can handle up to 8 DALI drivers



Detection of Non-perpendicularity of the pole



Wired node directly inside of the P5-BOX



Optimal distance of communication nodes: up to 200 m (Dual Band)



Adaptive Lighting: Compatibility with the TAIS2/FAIS2 systems



## Composition

# P5-IS2 + BOX

- 1 Box in ASA/ABS plastic material
- 2 Slot for external antenna installation
- 3 P5-IS2
- 4 Antenna
- 5 PG13.5 waterproof cable glands

Code	Device Name	Description
102449	ASS-B-P5-IS2-DB +SEN	WSN Dual Band device (2.4 GHz and 868 MHz) + 3D Accelerometer and relay, positioned in the white BOX made of ASA plastic material
102450	ASS-B-P5-IS2-SB +SEN	WSN Single Band device (2.4 GHz) + 3D Accelerometer and relay, positioned in the white BOX made of ASA plastic material
102451	ASS-G-P5-IS2-DB +SEN	WSN Dual Band device (2.4 GHz and 868 MHz) + 3D Accelerometer and relay, positioned in the gray BOX made of ABS plastic material
102452	ASS-G-P5-IS2-SB +SEN	WSN Single Band device (2.4 GHz) + 3D Accelerometer and relay, positioned in the gray BOX made of ABS plastic material

# P5-T.BOX

Remote control node  
for Re-smarting



## Description

Extremely versatile device designed with a view to the "Digital Transformation" of road and railway infrastructures. The P5-T.BOX represents an excellent solution for all systems that require a remote control system but do not have the possibility of integrating current standards (such as the Zhaga connection).

Thanks to the P5-IS2 Dual Band device (2.4 GHz and 868 MHz), the high-performance antenna and the box made of UL94V-0 "Flame-resistant" ABS material are also perfectly suited to tunnel systems.



**Dimensions**  
130x175x45 mm



# Re-smarting Tunnel



Remote Power on/Shutdown of lights



Stand-Alone: it can work even if isolated from the gateway



"Flame-Resistant" Box degree: UL94V-0



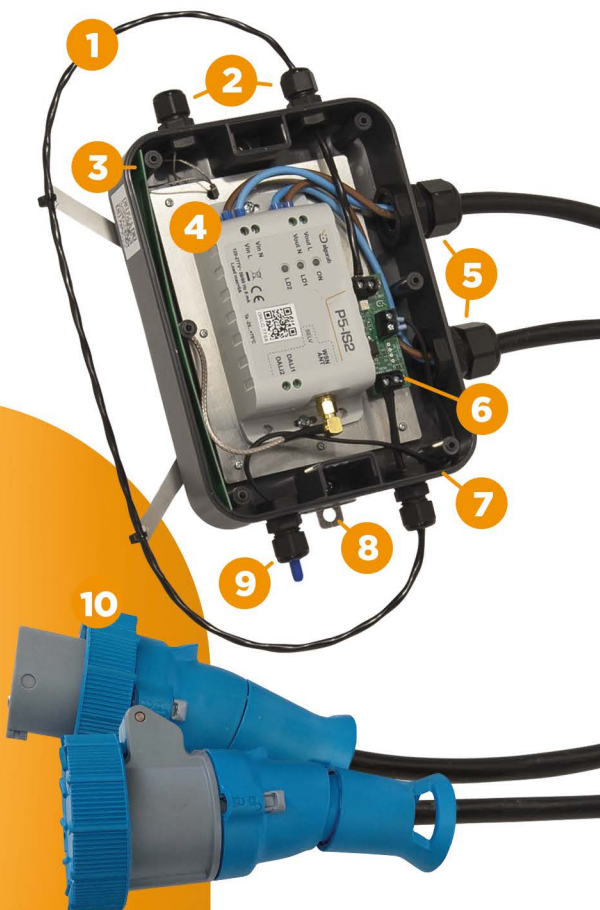
Fire detection via special thermosensitive cable T68

Attachment to the channel via stainless steel bracket equipped with a special hook fastening

Fall arrest system via anchoring of the bracket to the duct with the safety cable

## Composition

### P5-T.BOX



- 1 T68 thermosensitive cable
- 2 PG7 waterproof cable glands
- 3 Dual Band 2.4 GHz and 868 MHz antenna
- 4 P5-IS2-DB +SEN +PM
- 5 PG13.5 waterproof cable glands
- 6 T. FIRE expansion board
- 7 "Flame-resistant" UL94V-0 box in ABS
- 8 Safety cable attachment
- 9 External temperature sensor
- 10 Mobile Input/Output at 16 A - IEC309

Code	Device name	Description
102307	P5-T.BOX +FIRE	IoT device for remote control of tunnels + External temperature sensor and T68 thermosensitive cable
102306	P5-T.BOX	IoT device with lamp remote control/diagnostic functions and repeater for WSN network, specific for tunnels


# ANTENNAS for P5-IS2

## Low Profile Antenna - Outdoor

ANT-P5-PIAT-DB


</> Code: 102394



 Dual Band 2.4 GHz/868 MHz

 Gain 4.15 dBi (2.4 GHz)  
Gain 1.15 dBi (868 MHz)

 1 Male SMA connector

 Ø 88 mm x 30 mm

 Screw Mount fixing 10

 Cable length: 50cm

*Note: Antenna can be positioned directly on the lighting body, to be installed horizontally.*

## PCB Adhesive Antenna - Internal

ANT-P5-ADE-SB

</> Code: 101053



 Single Band 2.4 GHz

 Gain 3.0 dBi

 1 Male SMA connector

 67 x 17 x 1 mm

 Double-sided fixing

 Cable length: 40 cm

*Note: Antenna can be positioned inside the luminaires or inside the special box supplied with the assembled kit ASS-P5-IS2 (Page 15). Antenna recommended for tunnels only. Double-sided tape included in the purchase price.*

# ANTENNAS for P5-BOX ASSEMBLIES

Stilo Antenna- Outdoor

ANT-CRDBOX-STIL-SB


</> Code: 102263



 Single Band 2.4 GHz

 Gain 2.1 dBi

 1 Male N connector

 Ø 19 mm x 150 mm

 Fixing via connector

 Linear Polarization

**Note:** Antenna can be positioned directly on the N Female connectors located in the upper part of the ASS-P5-IS2 assemblies (Page 15).

Stilo Antenna- Outdoor

ANT-CRDBOX-STIL-868


</> Code: 102262



 Single Band 868 MHz

 Gain 2.1 dBi

 1 Male N connector

 Ø 19 mm x 285 mm

 Fixing via connector

 Linear Polarization

**Note:** Antenna can be positioned directly on the N Female connectors located in the upper part of the ASS-P5-IS2 assemblies (Page 15).

PCB Antenna - Internal

ANT-P5-PCB-DB

</> Code: 102232





 Dual Band 2.4 GHz/868 MHz

 Gain 2.1 dBi (2,4 GHz)  
Gain -1 dBi (868 MHz)

 1 Male SMA connector

 160 x 30 x 1 mm

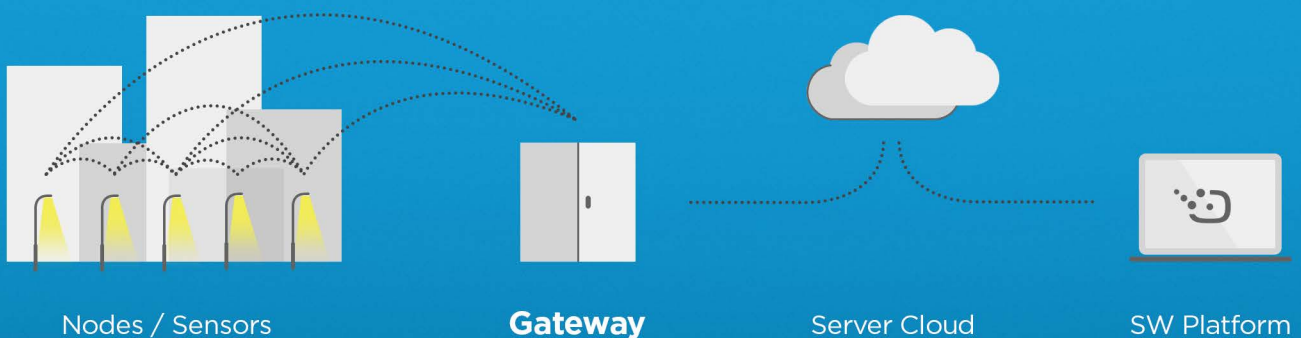
 Double-sided fixing/  
Interlocking

 Cable length: 13 cm



**Note:** Antenna can be positioned inside the luminaires or inside the special box supplied with the assembled kit ASS-P5-IS2 (Page 15).  
**Double-sided tape not included in the purchase price.**

# GATEWAY

LITE



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## Master Gateway Remote Control Node

×

×

### ×

## Description

G5-Z-DB is a wireless device for remote control of point-to-point lighting compliant with the Zhaga standard ref. Book 18, multistandard and multiprotocol capable of implementing both mesh and "star center" network architectures.

The peculiarity of this device is its ability to simultaneously act as both a node and a gateway, managing up to 50 nodes of the WSN network. The G5-Z-DB communicates with the control center using the integrated LTE modem; thanks to all these characteristics, this product allows you to structure a small remote control system without installing panel modules, thus avoiding additional wiring and costs.



**Dimensions**  
Diameter: 80 mm  
Height: 47 mm



IP66 - IK09

# LITE Gateway and Remote control of the light point



Reliability and broad communication capacity thanks to Dual Band



Manages the system's communication with the control center via LTE



Management of small systems or isolated area of plant

50

Up to 50 light points manageable by a single G5-Z-DB

- Easy to install thanks to the Zhaga socket

- Reading of standard DALI values and custom values

- Can handle up to 4 DALI drivers

- CAM specifications are supported (*Minimum Environmental Criteria*)



Remote control of light point like node



Possibility to set of hourly offsets based on the Astronomical clock



DALI commands can be managed through P5 App

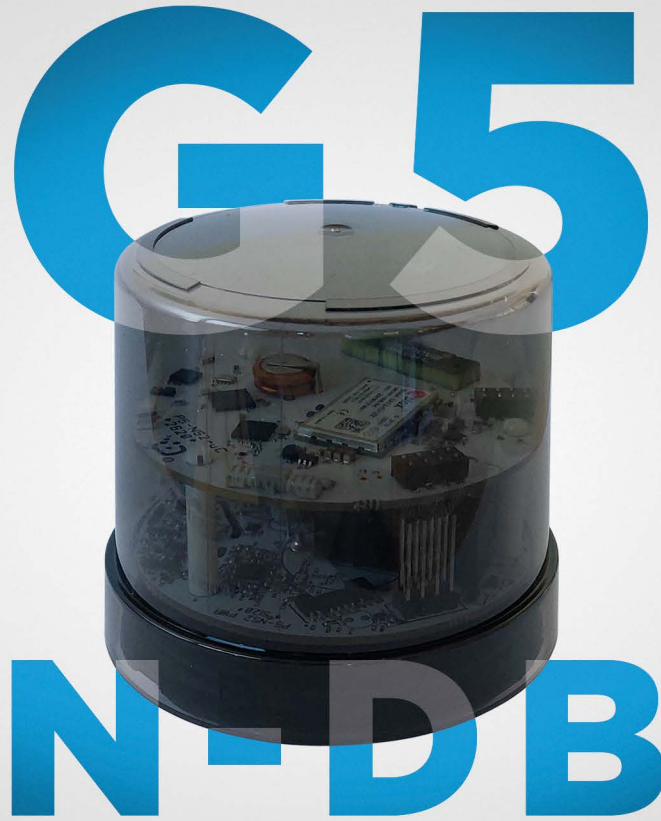


Detection of Non-perpendicularity of the pole

G5-Z-DB device is a latest generation product that implements a profound symbiosis with the lamp it controls, from which it receives low voltage power, communicates with and controls the LED driver present via bidirectional DALI connection.

The high computing power allows it to enable all the control and command functions of the single light point, implementing for example: the astronomical clock, virtual midnight, "stand-alone" operation, internal regulation profiles, as well as to the functions required for adaptive lighting which relates to the needs of the context (traffic, presence, luminance, weather, etc.) in order to optimally regulate the delivery of the luminous flux of the single light point or groups of lamps.

Code	Device Name	Description
102417	G5-Z-DB	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point equipped with an M2M LTE Modem



## Master Gateway Remote Control Node



### **Description**

G5-N-DB is a wireless device for point-to-point lighting remote control, installed on a NEMA-7 socket, supports DALI and 0-10 V standards and is able to implement both mesh and “star center” network architectures.

The peculiarity of this device is its ability to simultaneously act as both a node and a gateway, managing up to 50 nodes of the WSN network. The G5-N-DB communicates with the control center using the integrated LTE modem; thanks to all these characteristics, this product allows you to structure a small remote control system without installing panel modules, thus avoiding additional wiring and costs.



**Dimensions**  
Diameter: 88.6 mm  
Height: 98 mm



NEMA Socket

IP66 - IK09

# LITE Gateway and Remote control of the light point



Reliability and broad communication capacity thanks to Dual Band



Manages the system's communication with the control center via LTE



Management of small systems or isolated area of plant

50

Up to 50 light points manageable by a single G5-N-DB

- Easy to install thanks to the Nema socket

- Reading of standard DALI values and custom values

- Can handle up to 8 DALI drivers

- CAM specifications are supported (*Minimum Environmental Criteria*)



Remote control of light point like node



Possibility to set of hourly offsets based on the Astronomical clock



DALI commands can be managed through P5 App



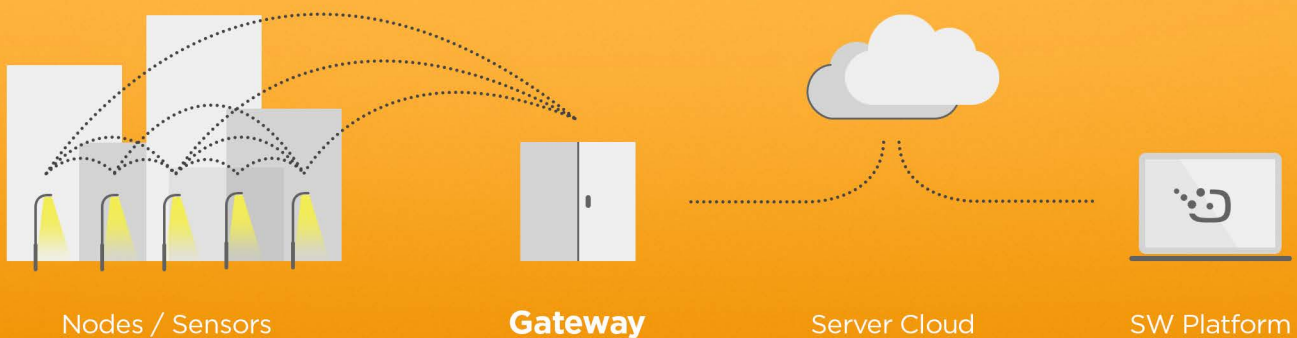
Detection of Non-perpendicularity of the pole

G5-N-DB device is a latest generation product that implements a profound symbiosis with the lamp it controls, from which it receives low voltage power, communicates with and controls the LED driver present via bidirectional DALI connection.











The high computing power allows it to enable all the control and command functions of the single light point, implementing for example: the astronomical clock, virtual midnight, "stand-alone" operation, internal regulation profiles, as well as to the functions required for adaptive lighting which relates to the needs of the context (traffic, presence, luminance, weather, etc.) in order to optimally regulate the delivery of the luminous flux of the single light point or groups of lamps.

Code	Device Name	Description
102420	G5-N-DB	WSN Dual Band device (2.4 GHz and 868 MHz) for control of a light point equipped with an M2M LTE Modem

# GATEWAY



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# RIO ETH

## Master Gateway Panel Control



## ✘ Description

A key element for remote control, the RIO-ETH module is the actual IoT Gateway for the infrastructure of a smart city, dedicated to the management and communication between the devices in the field and the supervision platform.

Small and powerful Linux-based industrial embedded computer, it is designed to manage local automations and also strongly oriented towards remote data transfer via Ethernet interfaces or modems with on-board SIM card slot. The firmware installed on board an industrial flash memory, allows for immediate replacement by bypassing the card without the need for configuration.



**Dimensions**  
18.9x113.3x77 mm



Manages the system's communication with the control center via LTE and/or Ethernet



Acquisition of information via RS485 interface



Management of plant of any size or complexity

**400**

Up to 400 light points manageable by a single RIO-ETH

Protected positioning, inside the electrical panel

Ease of integration/replacement of elements (SIM, hardware maintenance, etc.)



Expandability of functions and elements



Possibility to set hourly offsets based on the Astronomical clock

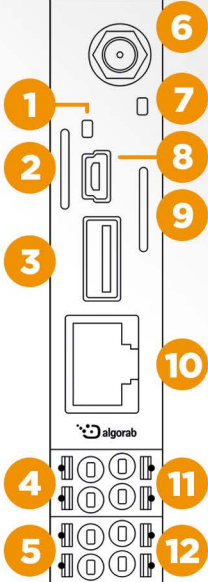


Electrical cabinet control Module



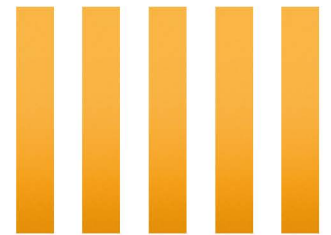
Remote diagnostics and problem resolution

RIO-ETH



Gateway and Panel Control

# MODULAR



RIO-ETH | RIO-CRD | RIO-IOA | RIO-8IN | RIO-5OUT

- 1 LED Status
- 2 MSD (Mini SD)
- 3 USB Type A
- 4 RS485 #1

- 5 Power supply
- 6 RF Antenna
- 7 LED Modem
- 8 USB Mini B

- 9 SIM (Micro SIM)
- 10 Ethernet RJ45
- 11 RS485 #2
- 12 Auxiliary Power Supply

Code	Device Name	Description
102304	RIO-ETH +LTE	Master Embedded PC CPU Module with Linux Operating System for remote control and automation of the electrical panel + LTE Modem (Cat1)
101192	RIO-ETH	Master Embedded PC CPU Module with Linux Operating System for remote control and automation of the electrical panel



# RIO CRD

Point-to-point coordinator



## ✘ Description

RIO-CRD module is the device dedicated to the point-to-point management of the Algorab remote control system. Suitably connected to the RIO-ETH Gateway module, it provides for the communication, sending and receiving of all messages in the WSN network on both the 2.4 GHz and 868 MHz frequencies.

Designed to manage a large data flow, it guarantees the encryption of radio packets, performs the conversion of the communication protocol and manages the "Over The Air" update of all devices in the field through the mesh network.



**Dimensions**  
18.9x113.3x77 mm



Reliability and broad communication capacity thanks to Dual Band



Acquisition of information via 4-20 mA interface



Keeping of the time synchronization for the system



GPS coordinates detected via antenna



Expandability of functions and elements



Transmission of information via RS485 interface

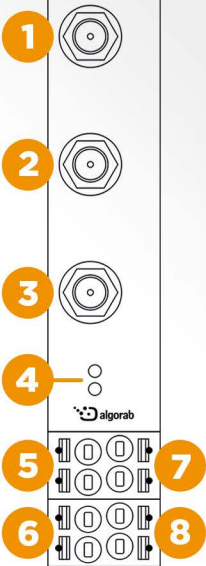


Node firmware update via WSN network



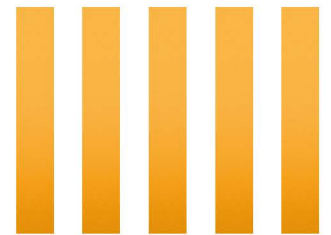
Encryption of information according to the AES256B standard

RIO-CRDS2



Gateway and Panel Control

# MODULAR



RIO-ETH | **RIO-CRD** | RIO-IOA | RIO-8IN | RIO-5OUT

- 1 868 MHz antenna
- 2 2.4 GHz antenna
- 3 GPS antenna
- 4 LED Status
- 5 RS485
- 6 Power supply
- 7 In 4-20 mA
- 8 Auxiliary Power Supply

Code	Device Name	Description
102036	RIO-CRD-DB	Dual Band coordinator module (2.4 GHz and 868 MHz) for WSN networks, can also be positioned separate from the panel using a specific CRD-BOX
102131	RIO-CRD-DB +GPS	Dual Band coordinator module (2.4 GHz and 868 MHz) for WSN networks, can also be positioned separate from the panel via a special CRD-BOX + GPS
102091	RIO-CRD-SB	Single Band coordinator module (2.4 GHz) for WSN networks, can also be positioned separate from the panel using a specific CRD-BOX
102093	RIO-CRD-SB +GPS	Single Band coordinator module (2.4 GHz) for WSN networks, can also be positioned separate from the panel via a special CRD-BOX + GPS

On request also available in the Dual Band 915 MHz version



Assembled kit:  
RIO-CRD + BOX



## Description

In this configuration RIO-CRD module is already integrated in the appropriate plastic box (ASA/ABS) with the associated Dual Band or Single Band antenna depending on the project/application needs.

This assembly was born from the need to optimize the antenna signal, which for installation reasons can also be positioned far from the electrical panel. In this case the best solution is to remote the RIO-CRD module via the CRD-BOX so as to minimize the distance between the antenna and the coordinator.



**Dimensions**  
200x200x45 mm

# MAIN functions



Reliability and broad communication capacity thanks to Dual Band



Versatility of antennas mounting based on design needs



Keeping of the time synchronization for the system



GPS coordinates detected via antenna



Positioning up to 80 meters away from the electrical panel



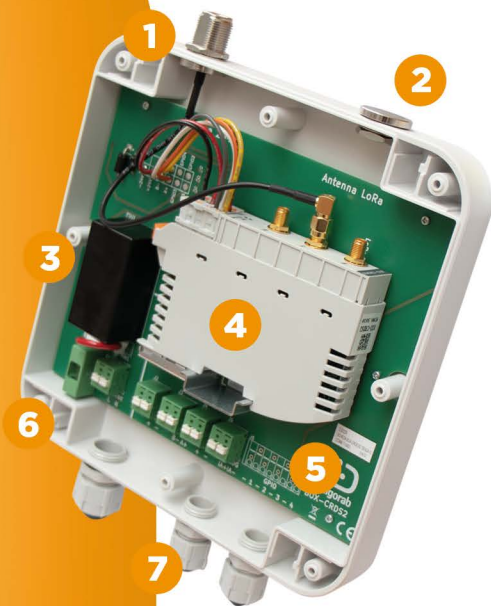
Transmission of information via RS485 interface



Node firmware update via WSN network



Encryption of information according to the AES256B standard



- 1 Slot for 2.4 GHz antenna
- 2 Slot for 868 MHz antenna
- 3 24 Vdc or 220 Vac power supply block
- 4 RIO-CRD fixed on DIN rail
- 5 Carrier Board with clamps
- 6 Box in ASA/ABS plastic material
- 7 PG9 waterproof cable glands

Code	Device Name	Description
102453	ASS-B-RIO-CRD-DB	Dual Band coordinator module (2.4 GHz and 868 MHz) for WSN networks, positioned in the white BOX made of ASA plastic material
102454	ASS-B-RIO-CRD-SB	Single Band coordinator module (2.4 GHz) for WSN networks, positioned in the white BOX made of ASA plastic material
102455	ASS-G-RIO-CRD-DB	Dual Band coordinator module (2.4 GHz and 868 MHz) for WSN networks, positioned in the gray BOX made of ABS plastic material
102456	ASS-G-RIO-CRD-SB	Single Band coordinator module (2.4 GHz) for WSN networks, positioned in the gray BOX made of ABS plastic material



# RIO IOA

Remote Input Output



## ✘ Description

The best product for panel management and control, RIO-IOA module includes various slots to interface different types of devices, including those within pre-existing panels.

Alongside RIO-ETH Gateway, it reports all the states of the circuit breakers, contactors and power meters on the supervision platform, sending alarms in the event of anomalies. Thanks to the output relays, it is able to activate line contactors with the Astro function managed by the Gateway, as well as simply control the utilities from the platform.



**Dimensions**  
18.9x113.3x77 mm

# 1

Variable input:

Analogue 4-20 mA

- Analogue zero-sequence

- Analogue frequency



**RIO-IOA readings:**  
(Variable Analog Input)



**Toroidal Transformer**  
reading (Page 48)



**Twilight Sensor** reading  
(Page 51)



**Brightness Sensor** reading  
(Page 64)



**Air Quality Probe** reading  
(Page 62)



**Weather Station** reading  
(Page 63)



**Liquid Level Sensor** reading  
(Page 64)

# 5

Digital Inputs  
(24 Vdc)

Inputs expandable by adding:  
**RIO-8IN** (Page 36)



**Magnetothermic switches**  
Status Reading



**Line contactors** Status  
Reading



**Selectors** Status Reading  
(position)

# 3

Relay  
Contacts  
Clean

Contacts expandable by adding:  
**RIO-5OUT** (Page 37)



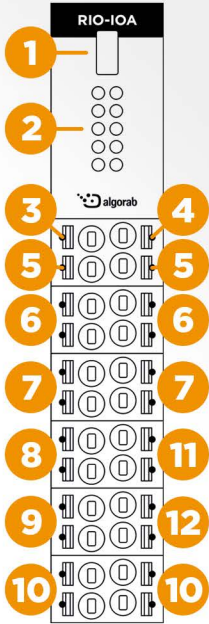
Command Management:  
**Contactor power supply**



Commands **Control reset**  
switches

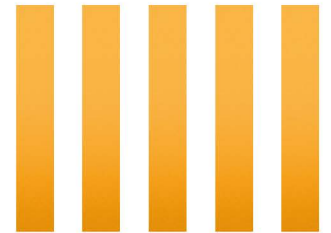


**Control inductive loads** up to  
1.5 A @ 30 Vdc/250 Vac



Gateway and Panel Control

# MODULAR



RIO-ETH | RIO-CRD | **RIO-IOA** | RIO-8IN | RIO-5OUT

- 1 DIP-Switch
- 2 LED Status
- 3 Ground
- 4 Analogue Input

- 5 Digital Inputs
- 6 Digital Inputs
- 7 Digital Inputs
- 8 Relay contacts

- 9 Relay contacts
- 10 Auxiliary Power supply for Relay
- 11 Contact (NO/NC) Open/Close
- 12 Open Contacts (NO)

Code	Device Name	Description
101071	RIO-IOA	Mixed interface module with 5 digital inputs (24 Vdc), 3 relay outputs, 1 analog input 4-20 mA; 24 Vdc power supply
102305	RIO-IOA +F	Mixed interface module with 5 digital inputs (24 Vdc), 3 relay outputs, 1 analog frequency input 0-3 KHz @ 24 V; 24 Vdc power supply
102378	RIO-IOA +TOR	Mixed interface module with 5 digital inputs (24 Vdc), 3 relay outputs, 1 zero-sequence input, leakage currents from 0-300 mA; 24 Vdc power supply
101272	RIO-IOA-12V	Mixed interface module with 5 digital inputs (12 Vdc), 3 relay outputs, 1 analog input 4-20 mA; 12 Vdc power supply

Expansion module

# RIO-8IN



Expansion module for the RIO remote control and automation system equipped with 8 opto-isolated digital inputs (24 Vdc) to be able to detect the status of various types of elements such as: thermal-magnetic switches, closing/opening contacts, proximity sensors, etc.

RIO series modules can be added, removed (replaced) very easily thanks to their particular DIN rail attachment system. The terminals, where the electrical signals are connected, are easily removable; consequently replacing a module does not involve re-wiring the connection cables.



Magnetothermic switches status reading



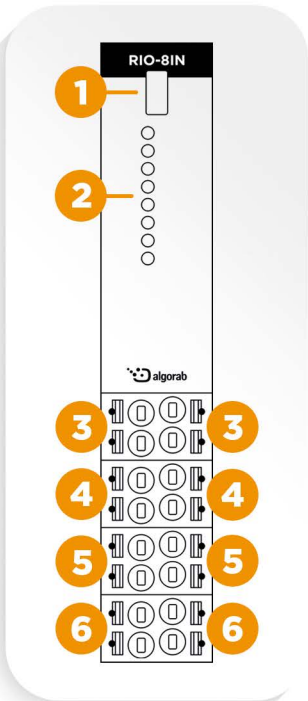
Line contactors status reading



Selectors status reading (*position*)



Electrical cabinet door status reading (*open/close*)



Gateway and Panel Control

## MODULAR



RIO-ETH | RIO-CRD | RIO-IOA | **RIO-8IN** | RIO-5OUT

- 1 DIP-Switch
- 2 Input LED
- 3 IN 1/2
- 4 IN 3/4

- 5 IN 5/6
- 6 IN 7/8

Code	Device Name	Description
100907	RIO-8IN	Expansion module with 8 digital inputs (24 Vdc), always connected to the CPU Master module

Expansion module

# RIO-5OUT



Expansion module for the RIO remote control and automation system equipped with 5 relay outputs (inductive load: 1.5 A @ 30 Vdc/250 Vac) with clean contacts to be able to control as many ON/OFF users. The outputs are completely manageable through the RIO-ETH master module with customizable logic that can be set from the supervision platform.

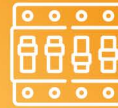
RIO series modules can be added, removed (replaced) very easily thanks to their particular DIN rail attachment system. The terminals, where the electrical signals are connected, are easily removable; consequently replacing a module does not involve re-wiring the connection cables.



Command management for power supply of line contactors



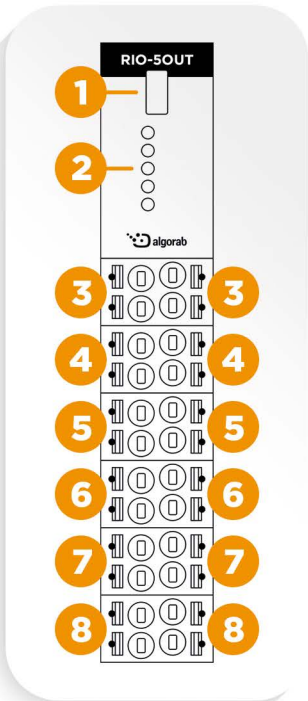
Command management for power supply of remote line



Command management of switch control panel reset

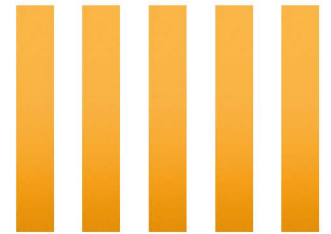


Management of auxiliary control commands



Gateway and Panel Control

## MODULAR



RIO-ETH | RIO-CRD | RIO-IOA | RIO-8IN | **RIO-5OUT**

- |                        |                                     |
|------------------------|-------------------------------------|
| <b>1</b> DIP-Switch    | <b>5</b> Relay contact              |
| <b>2</b> LED Relay     | <b>6</b> Relay contact              |
| <b>3</b> Relay contact | <b>7</b> Relay contact              |
| <b>4</b> Relay contact | <b>8</b> Power supply Relay support |

Code	Device Name	Description
100908	RIO-5OUT	Expansion module with 5 relay outputs (inductive load: 1.5 A @ 30 Vdc/250 Vac), always connected to the CPU Master module



# RIO CVT

Signal converter



## Description

RIO-CVT module is the device dedicated to the conversion of 4-20 mA analog data into Modbus RTU or as information for the WSN network. Extremely versatile element capable of acquiring information via RS485 interface and 4-20 mA and then transmitting it via Dual Band network (2.4 GHz and 868 MHz) on the WSN.

Designed to adapt to different types of infrastructure, among its main features we find the ability to convert data from other panel control elements and sensors/probes of the smart city (level probes, weather stations, etc.).



**Dimensions**  
18.9x113.3x77 mm



Transmission of information via Dual Band network



Acquisition of information via RS485 interface



Acquisition of information via 4-20 mA interface



Positionable module in a special box, outside the cabinet



Converts the signal 4-20 mA coming from some veil luminance



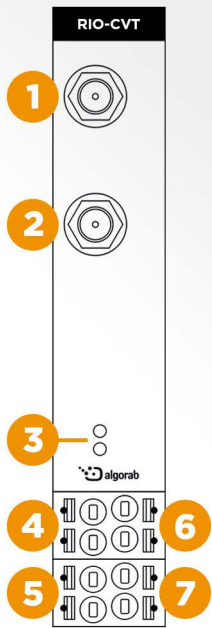
Converts data coming from a Power Meter



Converts data coming from a Weather Station

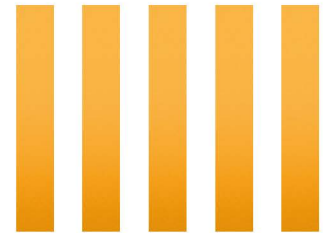


Converts data coming from a Liquid Level Probe



Gateway and Panel Control

# MODULAR



**RIO-CVT** | Signal converter

- 1 868 MHz antenna
- 2 2.4 GHz antenna
- 3 LED Status
- 4 RS485
- 5 Power Supply
- 6 In 4-20 mA
- 7 Auxiliary Power Supply

Code	Device Name	Description
102446	RIO-CVT-DB	Dual Band (2.4 GHz and 868 MHz) signal converter module, can also be positioned separate from the panel using a special BOX
102445	RIO-CVT-SB	Single Band (2.4 GHz) signal converter module, can also be positioned separate from the panel using a special BOX

A white, rectangular, outdoor-rated plastic enclosure for a radio module. The top surface is visible, showing the 'algorab' logo in the upper right corner. The device has a threaded metal connector on the top edge and several ports on the bottom edge. The text 'RIO CVT-BOX' is overlaid in large, bold, orange and white letters.

# RIO CVT-BOX

Assembled kit:  
RIO-CVT + BOX



## Description

In this configuration RIO-CVT module is already integrated in the appropriate plastic box (ASA) with the associated Dual Band or Single Band antenna depending on the project/application needs.

This assembly was born from the need to optimize the antenna signal, which for installation reasons can also be positioned far from the electrical panel. In this case the best solution is to remote the RIO-CVT module via a box so as to minimize the distance between the antenna and the converter.



**Dimensions**  
200x200x45 mm

# MAIN functions



Transmission of information via Dual Band network



Acquisition of information via RS485 interface



Acquisition of information via 4-20 mA interface



Positioning up to 80 meters away from the electrical panel



Converts the signal 4-20 mA coming from some veil luminance



Converts data coming from a Power Meter



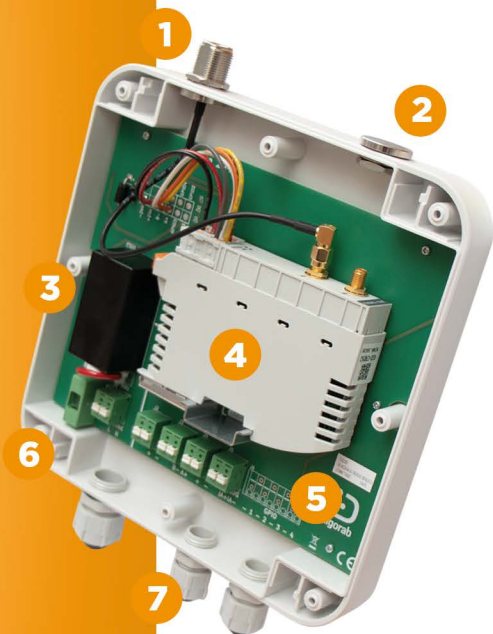
Converts data coming from a Weather Station



Converts data coming from a Liquid Level Probe

## Composition

# RIO-CVT + BOX



- 1 Slot for 2.4 GHz antenna
- 2 Slot for 868 MHz antenna
- 3 24 Vdc or 220 Vac power supply block
- 4 RIO-CVT fixed on DIN rail
- 5 Carrier Board with clamps
- 6 Box in ASA plastic material
- 7 PG9 waterproof cable glands

Code	Device Name	Description
102457	ASS-B-RIO-CVT-DB	Dual Band (2.4 GHz and 868 MHz) signal converter module, positioned in the appropriate white BOX made of ASA plastic material
102458	ASS-B-RIO-CVT-SB	Single Band (2.4 GHz) signal converter module, positioned in the appropriate white BOX made of ASA plastic material

# ANTENNAS for RIO-ETH (electrical panel)


Low Profile Antenna - Outdoor

ANT-RIO-PIAT-SB-LTE

</> Code: 102062



 LTE / 2.4 GHz

 Gain 4.5 dBi (2.4 GHz)  
Gain 3.0 dBi (LTE)

 2 SMA Male Connectors

 80 x 74 x 14.7 mm

 Screw Mount fixing 10

 Cable length: 50 cm

**Note:** Panel antenna connected to both RIO-ETH module (using the LTE network) and RIO-CRD module (using the 2.4 GHz network), can be positioned in the upper part outside the panel or internally with the support bracket (Bracket code: 102173). **Antenna recommended for Single Band point-to-point systems.**

Low Profile Antenna - Outdoor

ANT-RIO-PIAT-LTE

</> Code: 102511



 LTE

 Gain 3.0 dBi

 1 Male SMA connector

 80 x 74 x 14.7 mm

 Screw Mount fixing 10

 Cable length: 50 cm

**Note:** Panel antenna connected to RIO-ETH module, which can be positioned in the upper part outside the panel or internally with support bracket (Bracket code: 102173). **Antenna recommended for panel control, or Dual Band point-to-point systems in association with antenna 102057.**

Stilo Antenna - Internal

ANT-RIO-STIL-LTE +SNODO

</> Code: 102282




 LTE

 Gain 4.0 dBi

 1 Male SMA connector

 Ø 20 x 136.3 mm

 Fixing via connector

 Linear Polarization

**Notes:** Panel antenna connected directly to RIO-ETH module.


# ANTENNAS for RIO-CRD (electrical panel)

## Low Profile Antenna - Outdoor

ANT-RIO-PIAT-DB

</> Code: 102057




 Dual Band 2.4 GHz/868 MHz

 Gain 4.0 dBi (2.4 GHz)  
Gain 1.8 dBi (868 MHz)

 2 SMA Male Connectors

 80 x 74 x 14.7 mm

 Screw Mount fixing 10

 Cable length: 50 cm

**Notes:** Panel antenna connected to RIO-CRD module, which can be positioned in the upper part outside the panel or internally with support bracket (Bracket code: 102173).

**Antenna recommended for Dual Band point-to-point systems in association with antenna 102511.**

## Stilo Antenna - Internal

ANT-RIO-STIL-868 +SNODO

</> Code: 101207



 Single Band 868 MHz

 Gain 3.0 dBi

 1 Male SMA connector

 Ø 13 mm x 207 mm

 Fixing via connector

 Linear Polarization

**Notes:** Panel antenna connected directly to RIO-CRD module.

## GPS Antenna - Internal

ANT-RIO-ADE-GPS

</> Code: 102274



 GNSS/GPS

 Gain 2.1 dBi

 1 Male SMA connector

 56.4 x 20 x 0.1 mm

 Fixing via connector

 Cable length: 30 cm

**Notes:** Can be positioned inside the panel connected directly to RIO-CRD module. (Not suitable for metal electrical panels)

# ANTENNAS for RIO-CRD-BOX ASSEMBLIES

Stilo Antenna - Outdoor

ANT-CRDBOX-STIL-SB


</> Code: 102263



 Single Band 2.4 GHz

 Gain 2.1 dBi

 1 Male N connector

 Ø 19 mm x 150 mm

 Fixing via connector

 Linear Polarization

**Note:** Antenna can be positioned directly on the N Female connectors located at the top of the ASS-RIO-CRD assemblies (Page 33).

Stilo Antenna - Outdoor

ANT-CRDBOX-STIL-868

</> Code: 102262



 Single Band 868 MHz

 Gain 2.1 dBi

 1 Male N connector

 Ø 19 mm x 285 mm

 Fixing via connector

 Linear Polarization

**Note:** Antenna can be positioned directly on the N Female connectors located at the top of the ASS-RIO-CRD assemblies (Page 33).

Stilo Antenna - Outdoor

ANT-RIO-STILO-SB


</> Code: 102083



 Single Band 868 MHz

 Gain 5.8 dBi

 1 Female N connector

 Ø 30 mm x 840 mm

 Pole fixing

 Vertical Polarization

**Note:** 868 MHz pole-mounted antenna used in combination with ASS-RIO-CRD assemblies (Page 33).

# Accessories



Bracket for Antennas

STAF-ANT-PIAT

</> Code: 102173



Stainless steel bracket for internal fixing of low profile antennas.



RF Cable - Extension

CAV-SMA-MF-1M

</> Code: 102261



Connector A: SMA Female



Connector B: SMA Male



Maximum operating frequency: DC 3 GHz



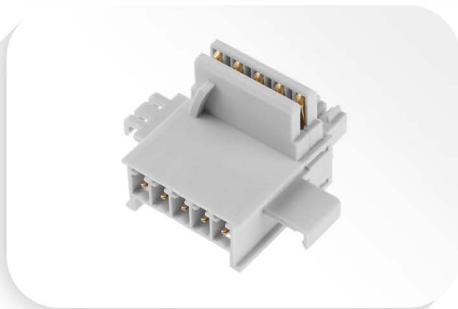
Cable length: 1 meter



BUS connector

RIO-BUS-1

</> Code: 100743



Installation: DIN rail



Number of poles: 5

**Note:** BUS connectors are used to connect all RIO products positioned on a DIN rail.  
Replacement product, already included in new RIO modules.

# POWER METER - DIRECT insertion



Three-phase/Single-phase Power Meter

RIO-PM-DIR-3F

</> Code: 101092



**Type of current:** Three-phase and single-phase loads, direct insertion



**Current range:** 0.25-65A



**Frequency range:** 45-65 Hz



**Communication interface:** RS485 ModBUS RTU



**Accuracy:** 113-265 VLN (196-460 VLL AC) **Ib:** 5 A

**Current:** 0.04-0.2 Ib:  $\pm$  (0.5% RDG +1 DGT)  
0.2-max Ib:  $\pm$  (0.5% RDG)

**Active power:** 0.05-max Ib, within range Un, PF=1:  $\pm$  (1% RDG)  
0.1-max Ib, within range Un, PF=0.5 L or 0.8 C:  $\pm$  (1% RDG)

**Power factor:**  $\pm$  [0.001+1% (1.000 - "PF RDG")]

**Reactive power:** 0.05-max Ib, within range Un, sinphi=1:  $\pm$  (2% RDG)  
0.1-max Ib, within range Un, sinphi=0.5 L or 0.8 C:  $\pm$  (2% RDG)

**Certified according to the MID Directive**

**Note:** Product suitable when the power cables pass inside the electrical panel and can be wired directly to the Power Meter. Possibility to remote by connecting the Power Meter via RS485 interface.



Single-phase Power Meter

RIO-PM-DIR-1F

</> Code: 101311



**Type of current:** Single-phase loads, direct insertion up to 32 A  
**Rated voltage:** 230 VLN -30% +20%



**Communication interface:** RS485 ModBUS RTU



**Rated current range:** 0-45 A, Ib 5 A, I<sub>max</sub> 45 A, I<sub>min</sub> 0.25 A **Ib:** 5 A

**Accuracy:**  $\pm$  0.5% RDG

**Note:** This model can be used up to 45 A if a 6 mm<sup>2</sup> cable complies with local regulations and/or installation requirements.



**Active energy:** Class 1 according to EN62053-21

**Reactive energy:** Class 2 according to EN62053-23

**Note:** Product suitable when the power cables pass inside the electrical panel and can be wired directly to the Power Meter. Possibility to remote by connecting the Power Meter via RS485 interface.

# POWER METER - INDIRECT insertion



Three-phase Power Meter - CT Connection RIO-PM-TA-3F

</> Code: 101258



\*Purchase Options



**Type of current:** Three-phase loads, CT connection



**Current range:** 0.25-6A  
(CT: 50-300 A)



**Frequency range:** 45-65 Hz



**Communication interface:** RS485 ModBUS RTU



**Accuracy:** 230-277 VLN (400-480 VLL AC) Ib: 5 A  
**Current:** 0.04-0.2 Ib:  $\pm$  (0.5% RDG +1 DGT)  
0.2-max Ib:  $\pm$  (0.5% RDG)  
**Active power:** 0.05-max Ib, within range Un, PF=1:  $\pm$  (1% RDG)  
0.1-max Ib, within range Un, PF=0.5 L or 0.8 C:  $\pm$  (1% RDG)  
**Power factor:**  $\pm$  [0.001+1% (1.000 - "PF RDG")]  
**Reactive power:** 0.05-max Ib, within range Un, sinphi=1:  $\pm$  (2% RDG)  
0.1-max Ib, within range Un, sinphi=0.5 L or 0.8 C:  $\pm$  (2% RDG)  
**Certified according to the MID Directive**

**Note:** Product recommended when the power cables are external to the electrical panel and cannot be wired directly into the Power Meter, this solution requires the purchase of the current transformer kit (Code: 101259).



Available with the following accessories:



CT Transformer KIT

</> Code: 101259

**Frequency range:** 48-62 Hz

**Primary current:** 50 A  
**Secondary current:** 5 A

**Class:** 0.5

**Max cable diameter:** 23 mm

**Device Name:** KIT-TA-50-5

**Note:** The current transformer KIT is made up of 3 units as it must meet the needs of combination with the Three-Phase Power Meter (Three-Phase Power Meter Code: 101258).

# WATCHDOG and POWER SUPPLIES



Modular Watchdog

RIO-TIMER-1

</> Code: 101426



Rated Current: 16/30 A



Contact structure: 1 exchange



Nominal supply voltage (Un): 24...240 Vac @ 50/60 Hz



Nominal voltage/Maximum switchable voltage: 250/400 Vac



Timing: 8 intervals (from 0.05 seconds up to 10 days)



Operating temperature: -20 ~ +60°C

**Note:** Control element with the function of rebooting RIO-ETH module in case of malfunction. The RIO-ETH module is programmed to interrupt the watchdog countdown before it reaches its end by resetting the count; if this does not happen and the countdown reaches zero, the watchdog intervenes by rebooting the RIO-ETH.



Toroidal Transformer

RIO-TOR-1

</> Code: 102437



Current transformer ratio: 1000/1



Operating frequency: 50-60 Hz



Operating temperature: -5 ~ +50°C

**Note:** Panel dispersion meter. To be used in combination with RIO-IOA +TOR (Code: 102378).



## Power Supplies 60 W

RIO-ALIM-24V

</> Code: 101256



### INPUT

**Voltage range:**  
85 ~ 264 Vac  
120 ~ 370 Vdc



### OUTPUT

**DC Voltage:** 24 V  
**Rated Current:** 2.5 A  
**Nominal Power:** 60 W



**Operating temperature:** -30 ~ +70°C



## Power Supplies 60 W + UPS

RIO-ALIM-24V +UPS

</> Code: 101244



### INPUT

**Voltage range:**  
90 ~ 264 Vac  
127 ~ 370 Vdc



### OUTPUT

**DC Voltage:** 27.6 V  
**Rated Current:** 1.4 A  
**Nominal Power:** 59.34 W



**Operating temperature:** -30 ~ +70°C



### UPS Function:

Contact Output (Voltage Presence), ON : AC ; OFF : AC Fail  
Contact Output (Battery Status), OFF : Battery OK ; ON : Battery low  
Max. rating: 30V/1A  
Low Voltage Battery: <22V



\*Purchase Options



Available with the following accessories:



### Pair of Batteries

</> Code: 102055

#### Device Name: KIT-RIO-BAT-2

Pair of 12 V (2.3 Ah) batteries, each which allows the power supply (101244) to exploit the UPS function.

The batteries are fixed to the panel using a special bracket.



### Battery fixing bracket

</> Code: 102436

#### Device Name: STAF-RIO-BAT-2

Steel bracket for fixing a pair of batteries (Code: 102055).


# SELECTORS and SWITCHES

 2-way selector switch + OFF


RIO-SEL-2OFF

 Code: 102309



 Rotary cam selector

 Number of positions: 2 + OFF

 Mounting: Modular element for 35 mm DIN rail

 Operating temperature: -25 ~ +55°C

 3-way selector switch + OFF


RIO-SEL-3OFF

 Code: 102435



 Rotary cam selector

 Number of positions: 3 + OFF

 Mounting: Modular element for 35 mm DIN rail

 Operating temperature: -25 ~ +55°C

## SELECTOR POSSIBLE APPLICATION



**Maintenance position**  
with controlled dimming  
or total shutdown



**Astro/Manual position**  
action based on manual commands  
or via Astronomical clock



Partial  
**On/Off position**

**Note:** Both selectors are identical in performance, the difference is defined only by the number of positions as the selector 102435 has 3 positions + OFF compared to item 102309 which only has 2 + OFF.

## Twilight Switch

RIO-CREP

 Code: 102294



 **Nominal operating voltage:** 230 Vac + 10-15% @ 50/60 Hz



**Minimum current switching:**  
10 mA - 230 Vac  
100 mA - 24 Vac/Vdc



**Maximum current switching:**  
10 A - 250 Vac PF=0.6  
16 A - 250 Vac PF=1



**Light intensity adjustment:** 2 - 2000 lux



**Operating temperature:** -30 ~ +55°C

*Note: It does not require prior configuration but correct positioning during installation is essential.*

## Time/Astronomical Switch

RIO-ASTR

 Code: 102325



 **Rated Current:** 16/30 A

 **Contact structure:** 1 exchange

 **Supply voltage (Un):** 110...230 Vac @ 50/60 Hz



**Nominal voltage/Maximum switchable voltage:** 250/400 Vac



**Operating temperature:** -20 ~ +50°C

*Note: Requires preliminary configuration to return accurate data.*

### TIME/ASTRONOMICAL SWITCH POSSIBLE APPLICATION



#### **Astro Program:**

Calculate sunrise/sunset times in date and time function geographic coordinates



#### **Automatic Clock:**

Automatic identification via latitude and longitude



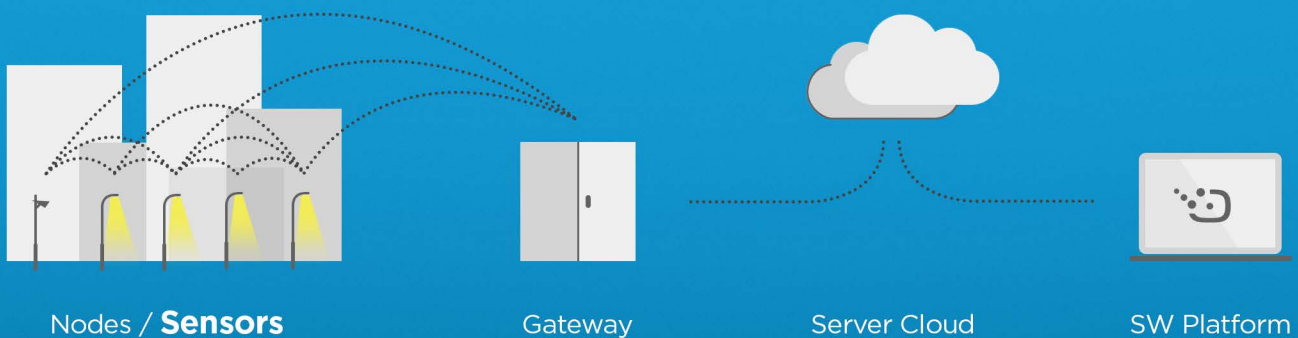
#### **Safe Mode:**

In case of malfunction of the system the switch maintains a switching-on an hourly basis





# PROBES

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# SENSORS



## Section **INDEX:**

 <b>VELOS2</b> _____	<b>55</b>
 <b>TAIS2</b> _____	<b>59</b>
 <b>FAIS2</b> _____	<b>61</b>
 <b>Various SENSORS</b> _____	<b>62</b>

Luminance Probe

# VELOS2



## Description

VELOS2 device is a debilitating luminance probe capable of self-centering the tunnel mouth and making accurate real-time measurements of veil luminance.

Thanks to the high-resolution 5 Megapixel optical sensor and a complex artificial vision algorithm, VELOS2 probe is able to keep the frame locked, making the information collected extremely reliable.

This device in Machine-to-Machine mode can also perform the function of a local "Gateway" and directly control the lighting regulation, in case of stand-alone installation.



**Dimensions**  
26x9.5x11 cm

# In short: VELOS2



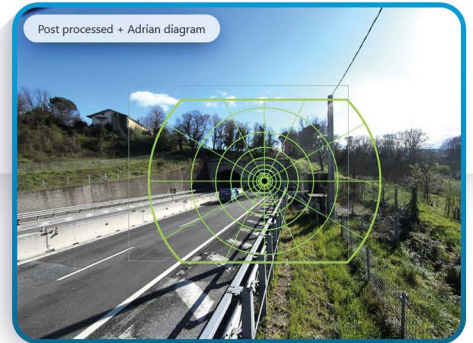
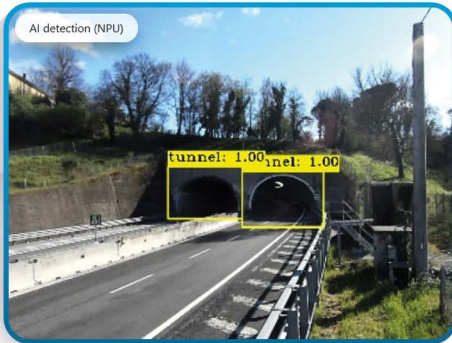
Recognition via Artificial Intelligence



Tracing of the tunnel entrance



Projection of the Adrian's diagram, instant calculation of veil luminance



Plug-and-Play installation



Detection of Non-perpendicularity of the pole



Can serve as a gateway for stand alone plant management



Measurement of the debilitating luminance of veil without physical limits of Cd-m<sup>2</sup>

Wide cone of vision thanks to the wide-angle lens and 5 Megapixel high-resolution sensor

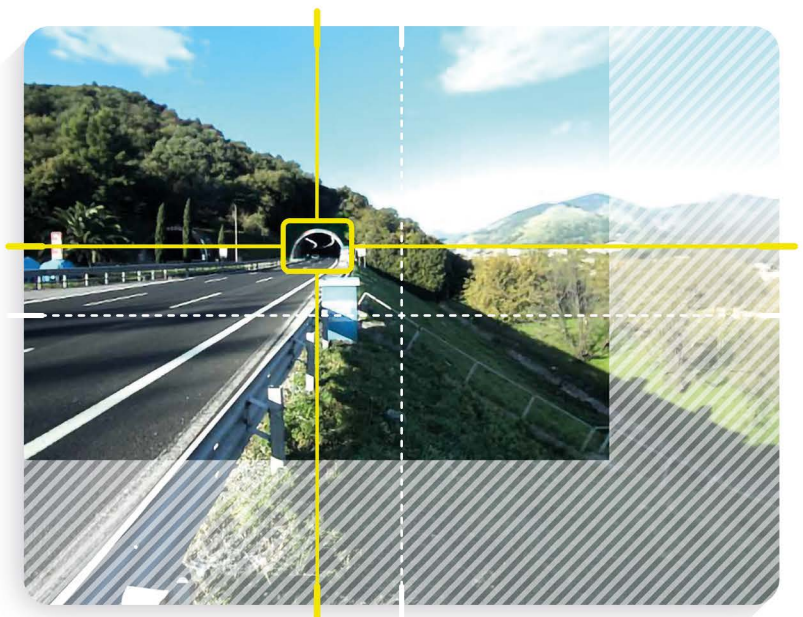
Over-the-air (OTA) firmware update through the M2M modem

## CONTINUOUS SELF-CENTERING *tunnel entrance*

Artificial Intelligence identifies the tunnel entrance and maintains anchorage on it even in the event of partial inclination of the pole.

Even if the probe's visual cone shifts, self-centering allows the tunnel entrance to remain locked.

Self-centering allows for simplified installation by limiting manual/visual intervention to alignment via the sight only.



# CALCULATION OF THE DEBILITATING LUMINANCE OF VELO

## 1. IMAGE EXPOSURE Analysis

Image with reduced exposure time

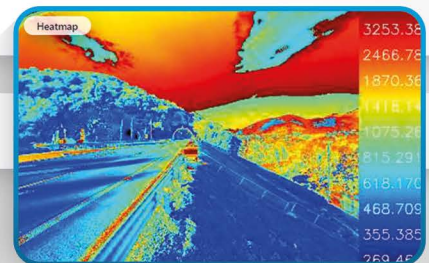
Image with automatic exposure time

Image with long exposure time

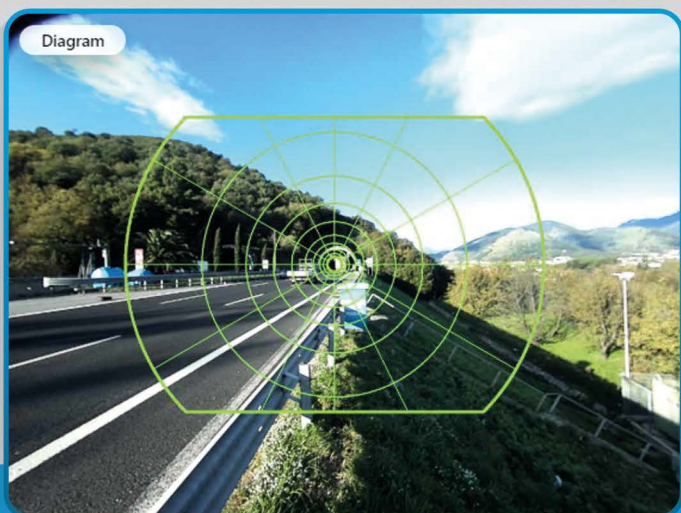


- Analysis based on the **fusion of three images** with **different exposure times**.
- This **procedure** is fundamental for measuring the debilitating luminance of the veil as it **examines all the points of greatest and least luminous intensity**.

Brightness Heatmap



## 2. ADRIAN'S DIAGRAM Application



- After identifying the tunnel entrance and merging the images at different exposures, the integrated **Artificial Intelligence** positions the **Adrian's diagram** for calculation of the debilitating veil luminance.
- This **diagram** simulates the **driver's visual space** at the stopping distance from the tunnel entrance.

The screenshot displays the Velos 2 web interface. At the top, there's a navigation bar with 'Home', 'Frame', 'Tools', 'Images', 'Stats', 'EN', and 'Login'. Below this, a status bar shows 'No GPS' and 'Alarm'. The main content area is divided into several sections:

- L20 Section:** Shows a reading of 114,42 cd/m2. Below it, an 'Output' section indicates 'No analogic output!'. An 'Automation' section shows two time-based triggers: one at 07:55 (06:55 UTC) and another at 16:55 (15:55 UTC). A 'Camera tilt' section shows 'PITCH 0.10° (Max: 0.40°)' and 'ROLL 0.00° (Max: -0.30°)'. A 'System' section includes buttons for 'Tamper', 'Heater', and 'Tracking'. Below these are 'Comm. protocols' (P5 comm., Modbus, Frequency, 4-20 mA, Automation) and an 'Alarm' section showing 'Device has been tampered'. A 'Version' section shows 'Velos2 2.0.0.0'. A 'QR' section shows 'KNKQ10L7'. A 'CPU (Board)' section shows '52 °C (35 °C)'. A 'CPU (RAM)' section shows '30 % (177 MB)'. An 'Exposure' section shows '45889 μs'.

Easy viewing  
for centering during  
installation

Real-time probe  
status display

View history of  
measurements  
taken

\*Web interface viewable  
on site or remotely  
(if a DeNAT SIM  
is chosen)

Code	Device Name	Description
102468	VELO-220-ETH +DB	Dual Band Digital Debilitating Luminance Probe (2.4 GHz and 868 MHz) with Ethernet port, 220 Vac power supply
102469	VELO-220-ETH	Digital Debilitating Luminance Probe with Ethernet port and 220 Vac power supply
102470	VELO-220-LTE +DB	Dual Band Digital Debilitating Luminance Probe (2.4 GHz and 868 MHz) 220 Vac power supply + M2M LTE Modem (SIM excluded)
102471	VELO-220-LTE	Digital Debilitating Luminance Probe 220 Vac power supply + M2M LTE Modem (SIM excluded)
102472	VELO-220-485 +420 +DB	Dual Band Digital Debilitating Luminance Probe (2.4 GHz and 868 MHz) with RS485 signal output and 4-20 mA, 220 Vac power supply
102473	VELO-220-485 +420	Digital Debilitating Luminance Probe with RS485 signal output and 4-20 mA, 220 Vac power supply
102474	VELO-220-485 +F +DB	Dual Band Digital Debilitating Luminance Probe (2.4 GHz and 868 MHz) with RS485 and analogue frequency signal output, 220 Vac power supply
102475	VELO-220-485 +F	Digital Debilitating Luminance Probe with RS485 and analogue frequency signal output, 220 Vac power supply

Traffic Adaptive Installation

# TAIS2



Full Adaptive Installation



## Description

TAIS2 device is a digital sensor that uses sophisticated artificial vision algorithms to count traffic, managing to discriminate only the elements of interest. It integrates perfectly with the P5 series nodes and can also work in stand-alone mode as a controller for system management, without the need to install additional gateways or coordinators.

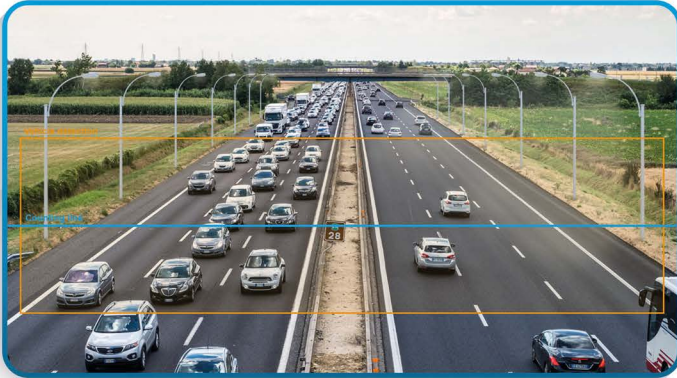
TAIS2 device allows you to implement a real-time lighting regulation system based on traffic level measurements. By comparing the measurements carried out with the reference legislation, TAIS2 device allows the lighting of a street to be lowered by up to two lighting categories, thus saving energy.



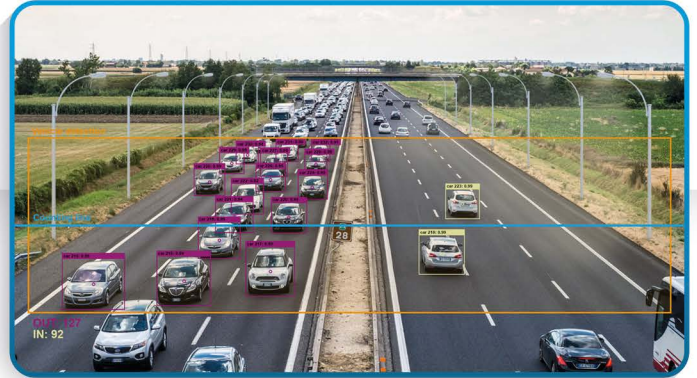
**Dimensions**  
26x9.5x11 cm



Preliminary tracing of the area to be analyzed and the vehicle counting line



Progressive counting of vehicles in transit in the reference area and discrimination of objects identified as not vehicles



Real-time calculation of the dimming to be applied to the system based on the measured data and the project parameters previously inserted in the device



Recommended action distance: 60-90 meters



Management of up to 6 lanes\* with opposite directions



Can serve as a gateway for stand alone plant management



Real-time image display

- Wide cone of vision thanks to the wide-angle lens and 5 Megapixel high-resolution sensor

- Detection of non-perpendicularity of the pole via the 3-axis accelerometer, tampering and impact detection system

- Over-the-air (OTA) firmware update through the M2M modem

- Real-time calculation of dimming based on the progressive counting of vehicles in transit

Code	Device Name	Description
102322	TAI-220-LTE +DB	TAI Dual Band device (2.4 GHz and 868 MHz) for direct control of the light points, 220 Vac power supply + M2M LTE Modem (SIM excluded)
102321	TAI-220 +DB	TAI Dual Band device (2.4 GHz and 868 MHz) for direct control of light points, 220 Vac power supply
102486	TAI-24-LTE +DB	TAI Dual Band device (2.4 GHz and 868 MHz) for direct control of the light points, 24 Vdc power supply + M2M LTE Modem (SIM excluded)
102487	TAI-24 +DB	TAI Dual Band device (2.4 GHz and 868 MHz) for direct control of light points, 24 Vdc power supply
102488	TAI-220/24-LTE +DB	TAI Dual Band device (2.4 GHz and 868 MHz) for direct control of the light points, 220 Vac/24 Vdc power supply + M2M LTE Modem (SIM excluded)

*\*Management of up to 6 lanes (3 in each direction) only in case of optimal central positioning of the TAI2 device*

Traffic Adaptive Installation

# TAIS2



## FAIS2

Full Adaptive Installation



### Description

FAIS2 device is a camera-based sensor for adaptive lighting systems, it uses sophisticated Artificial Intelligence algorithms to count traffic, measure ground luminance (according to EN 13201-3) and estimate weather conditions. By comparing the measurements carried out with the reference legislation, FAIS2 device allows the lighting of a street to be lowered by up to three lighting categories, thus saving energy.

It integrates perfectly with the P5 series nodes and can also work in stand-alone mode as a controller for the system management, without the need to install additional gateways or coordinators.



**Dimensions**  
26x9.5x11 cm



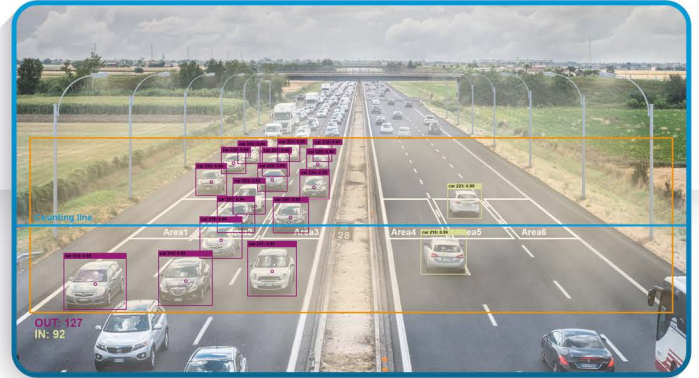
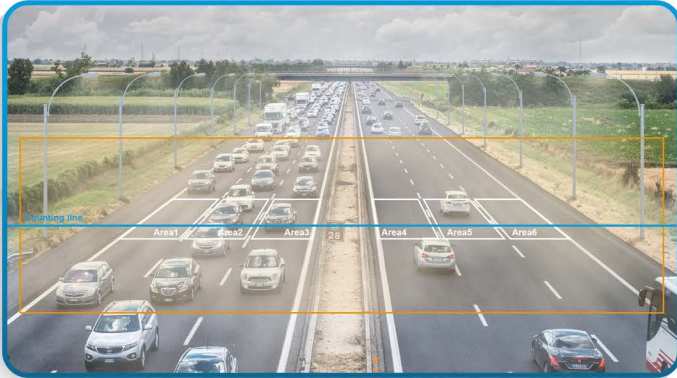
IP66



Preliminary tracing of the area to be analyzed and definition of the individual areas of positioning of the marks for the luminance calculation



Progressive counting of vehicles in transit in the reference area and discrimination of objects identified as not vehicles



Application of reference marks on each area examined and evaluation of the relevant weather conditions for real-time calculation of the dimming to be applied to the system.



Recommended action distance: 60-90 meters



Management of up to 6 lanes\* with opposite directions



Can serve as a gateway for stand alone plant management



Real-time image display

Wide cone of vision thanks to the wide-angle lens and 5 Megapixel high-resolution sensor

Detection of non-perpendicularity of the pole via the 3-axis accelerometer, tampering and impact detection system

Over-the-air (OTA) firmware update through the M2M modem

Real-time calculation of dimming based on the progressive counting of vehicles in transit and the weather conditions

Code	Device Name	Description
102324	FAI-220-LTE +DB	FAI Dual Band device (2.4 GHz and 868 MHz) for direct control of the light points, 220 Vac power supply + M2M LTE Modem (SIM excluded)
102323	FAI-220 +DB	FAI Dual Band device (2.4 GHz and 868 MHz) for direct control of light points, 220 Vac power supply
102490	FAI-24-LTE +DB	FAI Dual Band device (2.4 GHz and 868 MHz) for direct control of the light points, 24 Vdc power supply + M2M LTE Modem (SIM excluded)
102491	FAI-24 +DB	FAI Dual Band device (2.4 GHz and 868 MHz) for direct control of light points, 24 Vdc power supply
102492	FAI-220/24-LTE +DB	FAI Dual Band device (2.4 GHz and 868 MHz) for direct control of the light points, 220 Vac/24 Vdc power supply + M2M LTE Modem (SIM excluded)

\*Management of up to 6 lanes (3 in each direction) only in case of optimal central positioning of the FAIS2 device

# PROBES and WEATHER STATIONS



Air quality measurement probe

S5-ARIA-1

</> Code: 102299



Air: Temperature - Humidity - Pressure



Airborne particulate matter: PM<sub>1</sub> - PM<sub>2.5</sub> - PM<sub>10</sub>

## GAS CONCENTRATION DETECTIONS

NO<sub>2</sub>

Nitrogen dioxide

SO<sub>2</sub>

Sulfur dioxide

CO

Carbon monoxide

H<sub>2</sub>S

Hydrogen sulfide

O<sub>3</sub>

Ozone

NO

Nitrogen Monoxide

**Note:** Probe recommended for air monitoring in urban contexts.

To be able to send data over the WSN network it must be coupled to a RIO-CVT module (Page 38).



Temperature probe

S5-TEMP-1

</> Code: 102545



Power supply: 5 ... 24 Vdc



Output: RS485 MODBUS-RTU



Humidity measurement range:  
0 ~ 100% RH



Dimensions: Ø 17 x 71,5 mm



Maximum analog connection length: 200 m



Operating temperature: -30 ~ +80 °C

**Note:** To be able to send data over the WSN network it must be coupled to a RIO-CVT module (Page 38).



Weather Station

S5-METEO-5

</> Code: 101264



Power supply: 5-30 Vdc



Communication: RS485



Operating temperature: -35 ~ +70 °C

### WEATHER STATION APPLICATIONS



Wind speed



Wind direction



Temperature



Atmospheric pressure



Humidity



Dew point

**Note:** Weather station offering a wide range of measurements.

To be able to send data over the WSN network it must be coupled to a RIO-CVT module (Page 38).



Weather Station

S5-METEO-6

</> Code: 102292



Power supply: 5-30 Vdc



Communication: RS485



Operating temperature: -35 ~ +70 °C

### WEATHER STATION APPLICATIONS



Wind speed



Wind direction



Temperature



Atmospheric pressure



Humidity



Dew point



Precipitation \*(Information can only be acquired from this model)

**Note:** Weather station offering a wide range of measurements including those related to precipitation.

To be able to send data over the WSN network it must be coupled to a RIO-CVT module (Page 38).

# Various SENSORS



Liquid Level Sensor

S5-ALL-1

</> Code: 102157



<...> **Measurement range:** up to 12 m with a measurement accuracy of  $\pm 5$  mm



**Working pressure:** -1 to 3 bar



**Operating temperature:** -40 ~ +60°C

**Note:** Sensor for flooding detection with radar measurement.  
In order to send data over the WSN network it must be coupled to a RIO-CVT module (Page 38).



Brightness Sensor

S5-LUX-1

</> Code: 101220



**Power supply:** 24 Vac/Vdc



**Consumption:** < 1 W a 24 Vdc



**Multi-range switching:** 0...500 Lux / 1 / 2 / 5 / 20 / 60 kLux



**Normalized output:** 4-20 mA



**Operating temperature:** -10 ~ +50 °C

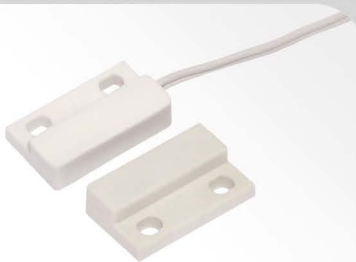
**Note:** Sensor for brightness detection generally placed near an electrical panel.  
In order to send data over the WSN network it must be coupled to a RIO-CVT module (Page 38).



Door Status Sensor

S5-PORT-1

</> Code: 102519



**Operating amperage:** 1.25 A



**Operating voltage:** 180 Vdc



**Maximum contact load:** 10 W



**Operating temperature:** -30 ~ +70 °C

## PIR Motion Sensor

S5-PIR-Z

</> Code: 102301



+ \*Purchase Options

Zhaga book 18 interface (4 connection points)

D4i communication protocol for controlling the light point

Can be installed on lighting fixtures positioned at a height of 5-12 metres

Motion detection area: 30x6 m at 5 meters high, up to an area of 36x12 m at 12 meters high

Note: Infrared Motion Sensor mounted in combination with a remote control node.

## + Available with the following accessories:



PIR Mask

</> Code: 102438

**Device Name:** MASC-PIR-1  
Mask to be placed over the motion sensor to limit the field of vision and "selecting" only the area of interest.  
(Defines the area with an angle of 90°)



Zhaga BOX - Outdoor

</> Code: 101439

**Device Name:** BOX-ZHAGA-2  
IP67 outdoor box to support up to two devices with Zhaga standards up to 80 mm in diameter (one facing upwards and one facing downwards). Complete with 220 Vac/24 Vdc power supply, two PG13.5 watertight cable glands and pole or wall fixing bracket. Recommended use when the elements cannot be integrated directly onto the lighting body.

### Zhaga BOX single socket:



Zhaga BOX - Outdoor

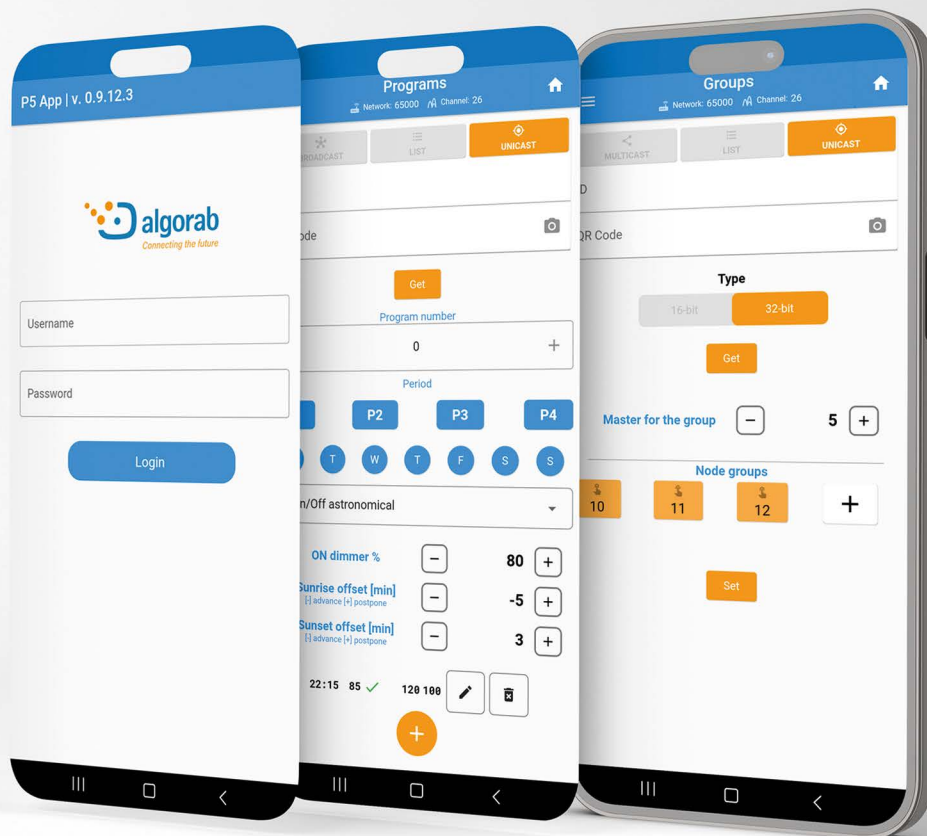
</> Code: 102542

**Device Name:** BOX-ZHAGA-1  
IP67 outdoor box to support up to two devices with Zhaga standards up to 80 mm in diameter (one facing upwards and one facing downwards). Complete with 220 Vac/24 Vdc power supply, two PG13.5 watertight cable glands and pole or wall fixing bracket. Product used in combination with P5-ZPIR (Code: 102331).

# System management

# STAND-ALONE

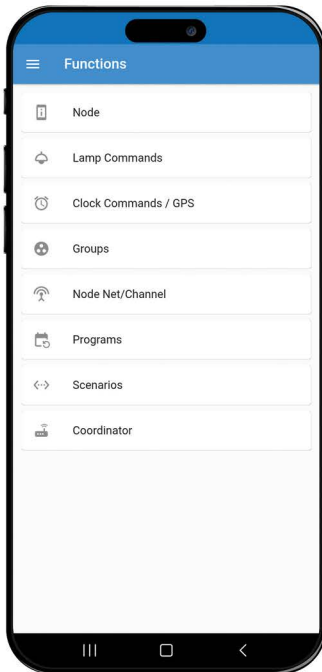
P5-App / P5-Bridge



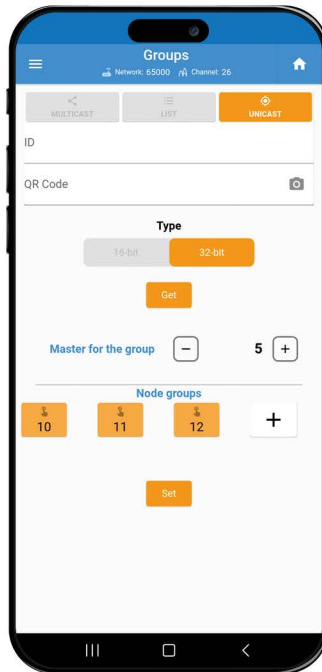
## P5-App Features for Android

- Check the operation of a stand-alone wireless sensor network
- Read the status of the P5 node and perform diagnostic measurements
- Set on/off the sunset/sunrise times with offset
- Create and manage groups of lamps with specific rules and time programming of 0-100% brightness regulation
- Define specific rules for each day of the week, for four periods of the year (as required by the CAM)
- Configure, via a dedicated portal, multi-user access according to a hierarchy of users with different usage privileges

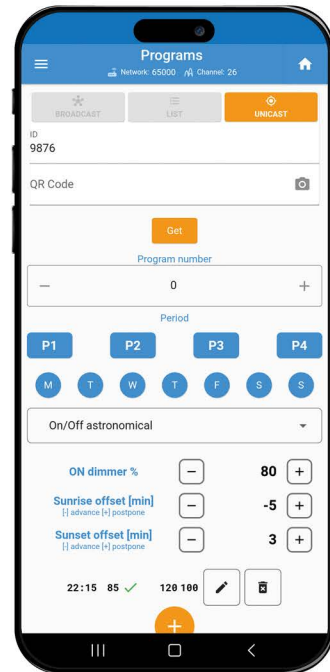
## P5-App Screenshots



Screenshot:  
Main Functions



Screenshot:  
Group Creation



Screenshot:  
Program Creation

## P5-App / P5-Bridge / Node Connection Diagram

The P5-Bridge only has the function of converting the Bluetooth signal coming from the Smartphone to the 2.4 GHz or 868 MHz protocol



Code	Device Name	Description
202527	P5-APP	Android app for managing the main settings of a remote control system: lamp control, node status, CAM, group creation, dimming profile, etc.
102110	P5-BRIDGE	Bluetooth (Android) to IEEE 802.15.4 converter at 2.4 GHz and/or LoRa at 868 MHz to communicate with remote control nodes

**Note:** The P5-App, to communicate with the nodes, requires the P5-Bridge as a signal converter.



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