
IRRADIANCE SENSORS INSTALLATION AND USER MANUAL



VISIONSEN



Sensor Technology



JUNE 2024

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WARRANTY CONDITIONS

Products manufactured by VSIAS under the brand VISIONSEN are warranted by VSIAS against defects in material and workmanship under normal use and service conditions for two years from the date of shipment, unless otherwise stated in the relevant product manual.



Product manuals can be viewed online at www.visionsen.com.

Products not manufactured by VSIAS but resold by VSIAS are warranted only to the limits extended by the original manufacturer.

VSIAS's liability under this warranty is limited to the repair or replacement (at VSIAS's discretion) of defective products, which will be the sole and exclusive remedy under this warranty.

The customer assumes all costs associated with removing, reinstalling, and shipping to VSIAS any products deemed to be defective. VSIAS undertakes the return costs of these products.

This warranty will not apply to products that have been subject to alteration, misuse, neglect, improper servicing, acts of god or accidents of god, or have been damaged in transit.

Warranty for installation services performed by VSIAS, such as programming according to customer specifications, electrical connections to products manufactured by VSIAS, and product-specific training, are part of VSIAS's product warranty.

“VSIAS disclaims all warranties and conditions, express, implied or statutory, regarding the products, except as expressly stated herein, to the fullest extent permitted by applicable law.”

HELP

“Products cannot be returned without prior permission. The contact information below goes directly to VSIAS Engineering Industry Inc. Co. is aimed at its customers. Please use the contact addresses for the product you are returning.”



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S AFETY

“THIS SCOPE RELATES TO THE INSTALLATION, USE, MAINTENANCE AND WORKING ON OR AROUND SENSORS, TRIPOTS, MOUNTING STANDS AND ANY EQUIPMENT AND PARTS.

FAILURE TO INSTALL AND OPERATE SENSORS, TRIPOTS, MOUNTING STANDS AND ALL KINDS OF EQUIPMENT AND PARTS PROPERLY, FAILURE TO MAINTAIN THEM AND FAILURE TO OBSERVE THE WARNINGS INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, MATERIAL DAMAGE AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. BEFORE PERFORMING ANY WORK, CONSULT YOUR ORGANIZATION'S SAFETY COORDINATORS AND OCCUPATIONAL HEALTH EXPERTS FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT..”

Use sensors, tripods, mounting stands and any equipment and parts only for the purposes for which they were designed. Do not exceed design limits. Be familiar with and follow all instructions provided in the product manuals. The guides can be accessed at www.visionsen.com or other contact addresses. You are responsible for compliance with applicable laws and regulations, including safety regulations, and for the integrity and location of any structure or system to which sensors, tripods, mounting stands and any equipment and parts are installed. Installation sites should be evaluated by a qualified engineer and handled by experienced technical personnel. If you have questions or concerns regarding the installation, use or maintenance of electrical connections of the systems, consult a licensed and qualified engineer or experienced technical personnel.

GENERAL

- Obtain necessary approvals and permits before performing field or installation work.
- Comply with occupational health guidelines.
- Use only qualified personnel for the installation, use and maintenance of all connections of mechanical parts. It is highly recommended to use licensed and qualified contractors.
- Read all applicable instructions carefully and understand the procedures thoroughly before starting work..
- If any drilling or cutting operations are to be performed during the assembly phase, wear eye protection and take other appropriate safety precautions.

- Do not allow installed products to be intervened by other than authorized personnel.
- Use only manufacturer-recommended parts, materials and tools.

ELECTRIC

- You could be killed or suffer serious bodily injury if a tripod, attachment, or tool you are installing, building, using, or maintaining comes into contact with overhead or underground power lines.
- Maintain a distance between overhead power lines and the structure to be installed that is at least one and a half times the height of the structure or the distance required by applicable code, whichever is greater.
- Before carrying out field or installation work, inform people or institutions that may be affected by the installation.
- Follow all electrical rules. Electrical equipment and related devices must be installed by licensed and experienced personnel.

WORKING AT HEIGHT AND WEATHER

- Be extremely careful when working at height.
- Use proper equipment and safety practices.
- Keep mechanical and electrical parts away from untrained or unnecessary personnel during installation and maintenance. Take precautions to prevent elevated tools and objects from falling.
- Wind, rain, snow, lightning, etc. Do not carry out any work or maintenance in harsh weather conditions such as.
- Periodically (at least once a year) check for corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. Check for wear and damage and take necessary corrective action.
- Check electrical ground connections periodically (at least once a year).

“VSIAS employees reserve the right to refuse service for products exposed to contaminants that may cause health or safety problems.”

I NFO

Irradiance sensors are a measuring device used to measure the intensity and wavelength of sunlight. The irradiance sensor uses photovoltaic (PV) cells to determine solar irradiance. Irradiance sensors measure the response of photovoltaic cells to sunlight and calculate the amount and intensity of sunlight based on this response.

The main functions of irradiance sensors are:

Solar Irradiance Measurement: Irradiance sensors measure the amount of energy of solar radiation falling on the vertical surface. This data is critical for the design and performance monitoring of solar power plants.

Wavelength Analysis: Irradiance sensors can analyze the wavelength of sunlight. This provides information on how sunlight of a particular wavelength will be absorbed and converted by photovoltaic cells.

Irradiance sensors are used to increase the efficiency of solar power plants, optimize energy production and monitor systems. They are also important for understanding and determining sunlight conditions during the design and maintenance of solar projects. Therefore, irradiance sensors are widely used to increase the efficiency of photovoltaic systems and monitor energy production.

P RODUCT INTRODUCTION

PERC Reference Irradiance Sensors, produced under the Visionsen brand, are specially designed for lower cost, higher accuracy solar radiation measurements than thermopile pyranometers for outdoor monitoring of solar power plants.

Depending on the end user's system preference, both analog outputs and digital communication via Modbus® (RS485) are available. Visionsen irradiance sensors contain a microprocessor structure that stores calibration data, eliminating the need to reprogram data loggers or SCADA systems when installing a new power plant.

Visionsen PERC Reference Irradiance Sensors have cell structure as follows; They are listed as front sheet, Eva, PERC Film, Eva and Back Sheet. After the lamination of these structures under appropriate temperature and pressure, a PV cell is formed. The short circuit current of this PV cell is measured by a sensitive shunt resistor connected to its poles. At the same time, Visionsen irradiance sensors have a back-cell temperature sensor (RTD-PT1000) to obtain temperature compensated irradiance value.

Visionsen PERC Reference Irradiance Sensors, which have two mechanical structures: angled UV ABS and aluminum, provide durability and reliability for outdoor environments with IP68 standard communication and power cables. It also provides easy installation during the installation phase with its M12 circular connector.

INSTALLATION

Irradiance sensors are installed in the same plane as the panels for in-plane of array (POA) measurements. With this installation, the sensor will be affected by the same light level as the panels.

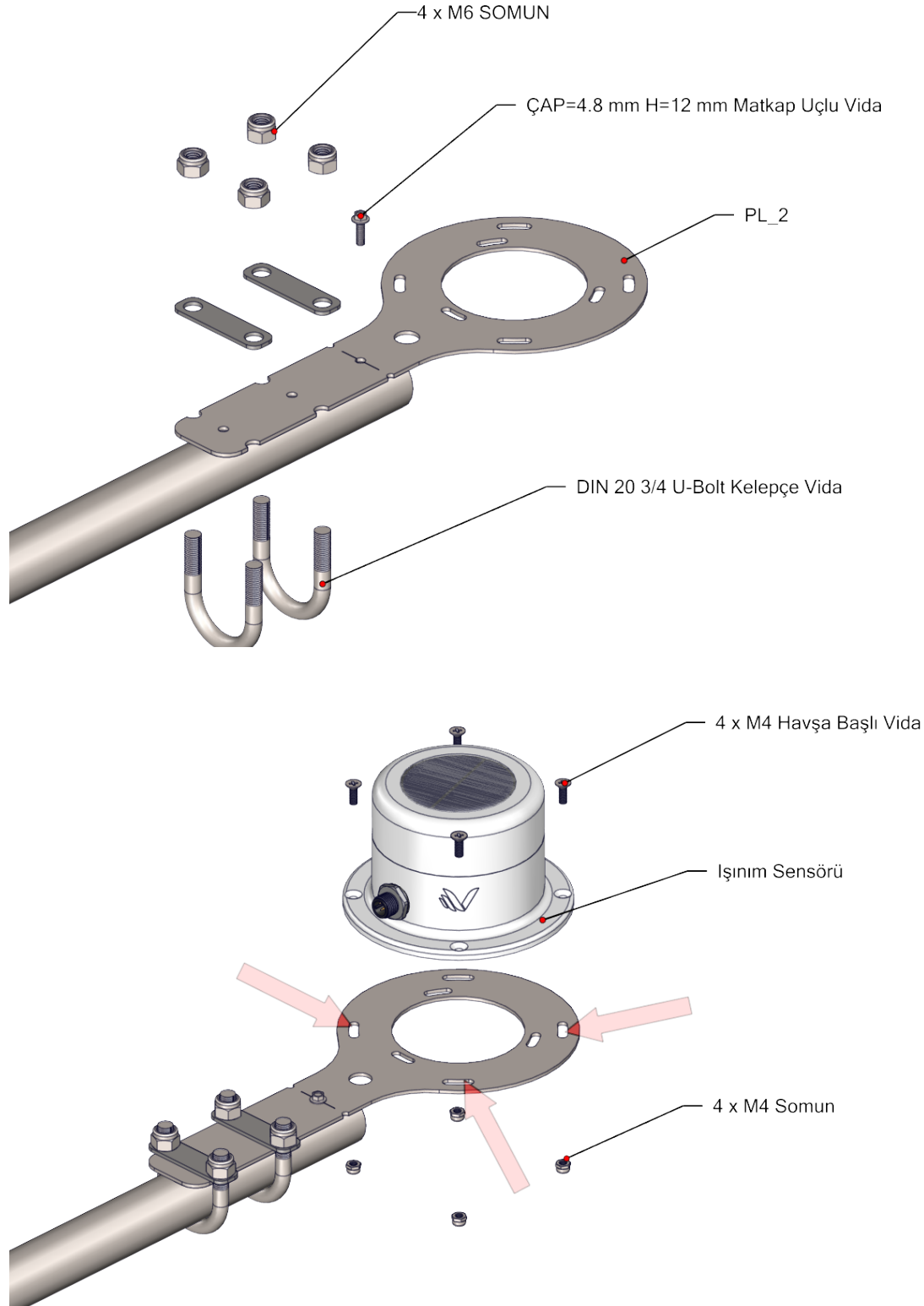
Position the irradiance sensor to provide easy access for maintenance and ideally avoid any obstructions or reflections on the plane of the sensing element.

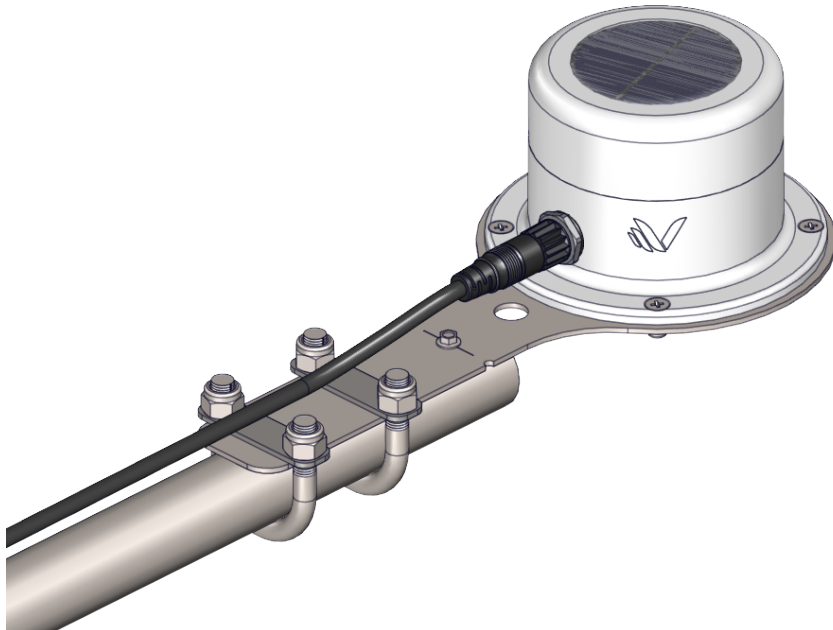
In order for the measurements to be accurate, the irradiance sensor must be mounted at exactly the **same angle as the panels**. If it is mounted at a different angle, inaccuracies in the values will be observed.

You can mount the device yourself using a tool or using a mounting tool that can be supplied by Visionsen.

M ECHANICAL INSTALLATION

When mounting the radiation sensor, mount it through the 4 screw holes at the bottom of the sensor or mount it through the appropriate holes on the mounting bracket as an accessory.





ELECTRICAL INSTALLATION

Irradiance sensors are produced with a 3 m high quality PUR FLEX cable with 3 or 4 wires, depending on the model, and a waterproof IP68 connector.

POWER CONNECTION

The minimum supply voltage for all models of MB Series single irradiance sensors is 9 V DC. 12V DC voltage is recommended to ensure reliable performance. It is recommended to protect the output of the power supply with a fast-blow fuse with a maximum rating of 250 mA.

POWER CONSUMPTION

Irradiance Sensor Voltage (V DC)	Current (mA)	Power (mW)
9	8	72
12	6	72
24	3	72

Maximum power consumption 72 mW at highest input voltage.

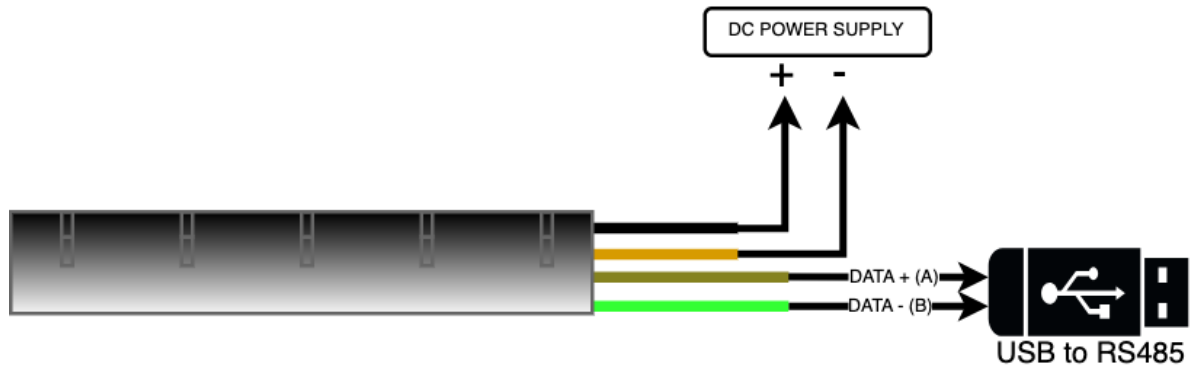
- Maximum input current 3 mA at lowest input voltage.
- Maximum inrush current 100 mA.

AN series (current output versions) include a 4 mA output delivering 0 W/m² and a 20 mA full-scale output delivering 1600 W/m² and a 0 V output delivering 0 W/m² and 1.5 V It is set so that the full-scale output of 1600 W/m² represents 1600 W/m².

COMPUTER CONNECTION



Power supply units for portable computers such as laptops can produce large voltage peaks. This may damage the digital interface of the device. Make sure there is galvanic separation between the inputs and outputs of the transducer.



Cable Color	Definition
White	9-28 V DC (+)
Brown	9-28 V DC (-)
Yellow	Data (+)
Green	Data (-)

C OMMUNICATION

Visionsen Smart Tool software allows configuring Modbus®-based irradiance sensors and monitoring real-time data.

CONNECTION SETTINGS

After connecting it to your computer with the USB-RS485 converter, you can observe the COM Port, Baud Rate, Stop Bits, Parity and Address settings of the sensor with Modbus® RTU communication protocol with the help of the Visionsen Smart Tool software you downloaded from www.visionsen.com after the connection is made. After configuring your new connection settings, you can click the "Send Settings" button.

The screenshot displays the Visionsen Smart Tool software interface. The window title is "Visionsen Smart Tool". The interface is divided into two main sections: "Seri Bağlantı Ayarları" (Serial Connection Settings) and "Yeni Bağlantı Ayarları" (New Connection Settings). The "Seri Bağlantı Ayarları" section includes fields for COM Port (COM3), Baud Rate (9600), Stop Bits (1), Parity (None), and Address (1). A "Yenile" (Refresh) button is located next to the COM Port field, and a "Bağlantıyı Kes" (Disconnect) button is at the bottom. The "Yeni Bağlantı Ayarları" section includes fields for Baud Rate (9600), Stop Bits (1), Parity (None), and Address. An "Ayar Gönder" (Send Settings) button is located at the bottom.

Visionsen Smart Tool

Bağlantı Ayarları Register Adresleri Cihaz Ayarları Kalibrasyon

Seri Bağlantı Ayarları

COM Port: COM3

Baud Rate: 9600

Stop Bits: 1 2

Parity: None Even Odd

Address: 1

Yeni Bağlantı Ayarları

Baud Rate: 9600

Stop Bits: 1 2

Parity: None Even Odd

Address:

REGISTER ADRESLERİ

If you want to change the register addresses defined in the Modbus® map, the desired address can be written in the section of the relevant sensor and a new register address can be defined after pressing the "Send Settings" button.

Visionsen Smart Tool
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Bağlantı Ayarları
Register Adresleri
Cihaz Ayarları
Kalibrasyon

Işınım 1	31
Işınım 2	32
Sıcaklık 1	15
Sıcaklık 2	19
Nem	16
Basınç	17
Rüzgar Yön	21
Rüzgar Hız	20
Oransal Işınım	0
Kirlilik Anlık	0
Kirlilik Oto	33
Sıcaklık 3	40

Adresleri Değiştir
Ayar Gönder

Işınım 1	61 W/m ²	Basınç	NA	Kirli. Oto	NA
Işınım 2	0 W/m ²	Rüz Yön	NA	Oran. Işın.	NA
Sıcaklık 1	NA	Rüz Hız	NA		
Sıcaklık 2	NA	Sıcaklık 3	NA		
Nem	NA	Kirli. Anlık	NA		

Bağlantı Başarılı
⋮

DEVICE SETTINGS

After writing the proportional values for each orientation for bidirectional radiation sensors, you need to press the send settings button to get the effective (proportional) radiation value. After connecting the device, you can also view the serial number, firmware and hardware information and current values of the device.

Visionsen Smart Tool
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Bağlantı Ayarları
Register Adresleri
Cihaz Ayarları
Kalibrasyon

Çift Işınım Oranı

Işınım 1 Yüzdesi % Işınım 2 Yüzdesi %

Otomatik Toz Temizleme Süresi

Başlangıç Saati Püskürtme Adeti

Otomatik Toz Pompa ve Ölçüm Süresi

Pompa Açık Kalma (ms) Temizleme Aralığı (dk)

Pompa Kapalı Kalma (ms) Ölçüm Bekleme (dk)

Versiyonlar

Serial No Firmware Hardware

Işınım 1	<input type="text" value="60 W/m<sup>2</sup>"/>	Basınc	<input type="text" value="NA"/>	Kirli. Oto	<input type="text" value="% 0"/>
Işınım 2	<input type="text" value="0 W/m<sup>2</sup>"/>	Rüz Yön	<input type="text" value="NA"/>	Oran. Işın.	<input type="text" value="30 W/m<sup>2</sup>"/>
Sıcaklık 1	<input type="text" value="NA"/>	Rüz Hız	<input type="text" value="NA"/>		
Sıcaklık 2	<input type="text" value="NA"/>	Sıcaklık 3	<input type="text" value="NA"/>		
Nem	<input type="text" value="NA"/>	Kirli. Anlık	<input type="text" value="NA"/>		

Bağlantı Başarılı
⋮

MODBUS® TABLE AND CONFIGURATION SETTINGS

Default communication parameters for irradiance sensors are as follows:

Modbus® Baud Rate:9600

Parity: None

Data Bits:1

Stop Bits:1

Address:1

If you are using the software on-premise, make sure the software is pre-installed on the laptop.

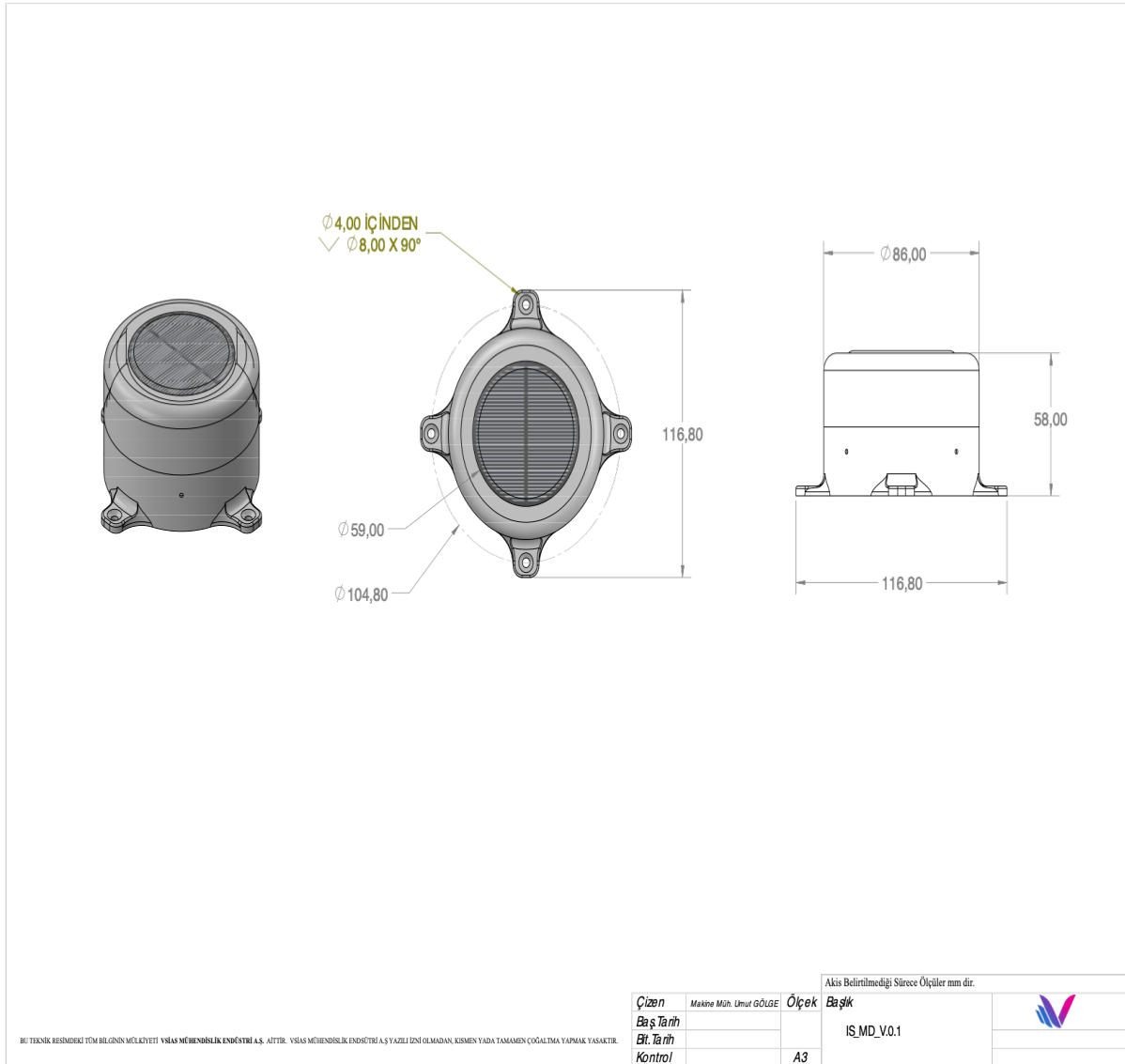
For more details about installation, monitoring and data recording, you can contact the contact addresses.

Adress		Type	Gain	Unit	Description
Hexadecimal	Decimal				
0x1F	31	uint16	10	W/m ²	Irradiance 1 (Temp. Comp.)
0x20	32	uint16	10	W/m ²	Irradiance 2 (Temp. Comp.)
0x22	34	uint16	10	W/m ²	Eff. Irradiance (Temp. Comp.)

TECHNICAL DRAWINGS

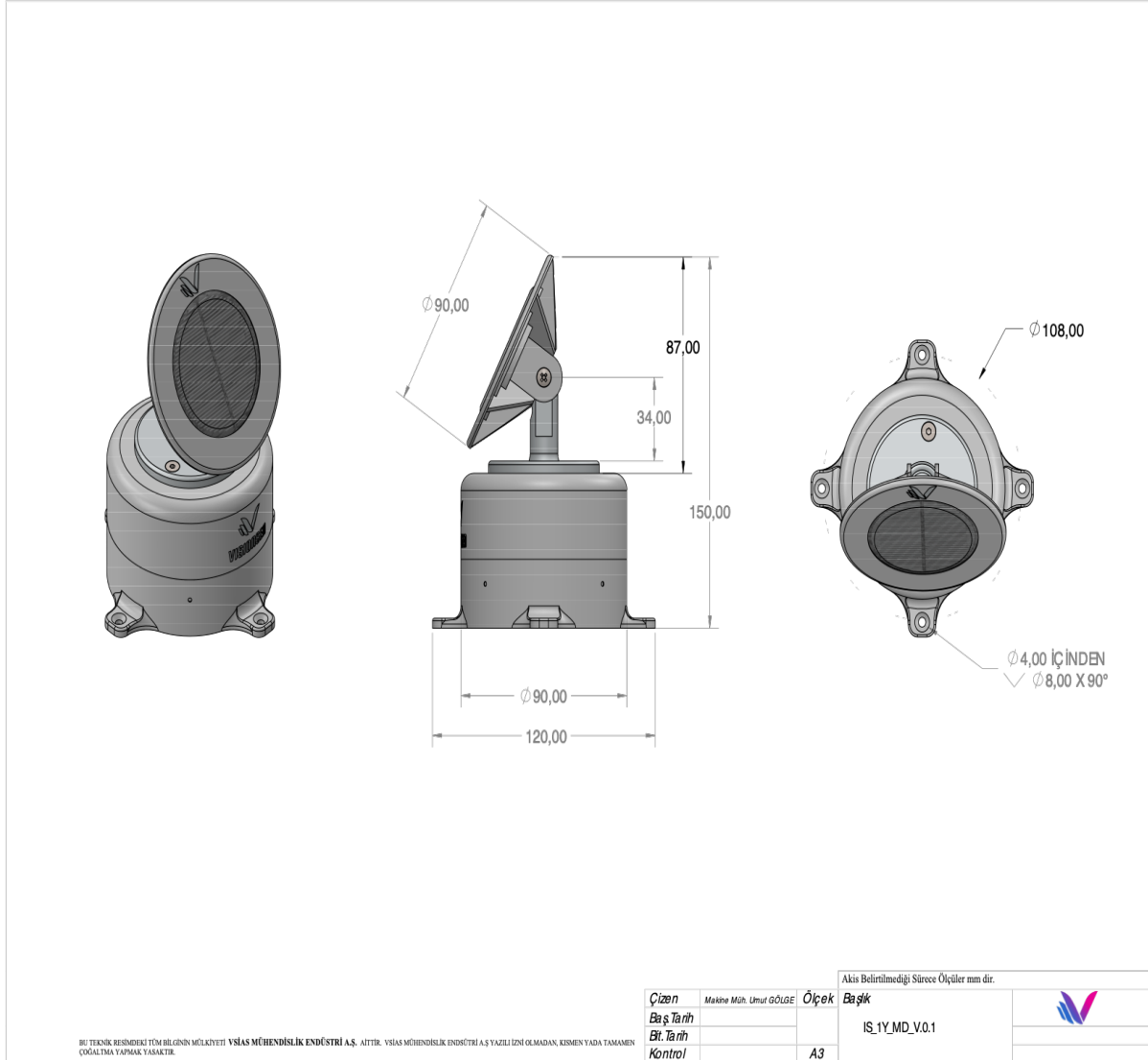
PERC IRRADIANCE SENSORS MODELS

- PIRS-mV
- PIRS-AN
- PIRS-MB



ANGLE PERC IRRADIANCE SENSOR MODELS

- **APIRS-mV**
- **APIRS-AN**
- **APIRS-MB**



DUAL ANGLE PERC IRRADIANCE SENSOR MODELS

- CAPIRS-mV
- CAPIRS-AN
- CAPIRS-MB

